

BIODIVERSITY MANAGEMENT PLAN

FOR

VILANCULOS COASTAL WILDLIFE SANCTUARY

(SOFALA PROVINCE, REPUBLIC OF MOZAMBIQUE)

VOLUME 2

THE BIODIVERSITY MANAGEMENT PLAN

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For:

VILANCULOS COASTAL WILDLIFE SANCTUARY (PTY) LTD

and

**GLOBAL ENVIRONMENT FACILITY
(PDF B)**

BIODIVERSITY MANAGEMENT PLAN

VOLUME 1: CONDENSED PLAN

Available as hard copy and on CD

VOLUME 2: THE BIODIVERSITY MANAGEMENT PLAN

Available on CD (Attached)

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- PART B: GENERAL DESCRIPTION**
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PREAMBLE

If you were to design a place with maximum diversity, choose a location on the tropical east coast of Africa, add a peninsula, a large bay, tidal sand flats, an estuarine lagoon, sea grass beds, freshwater lakes, extensive mangrove swamps and reed swamps, throw in coral and rocky reefs, idyllic sandy beaches, forested dunes and a wide tidal range, and then sprinkle it with over 400 species of fishes, including the elusive sea horses and mudskippers, thousands of rare and unusual invertebrates, nesting turtles, millions of jellyfish, the enigmatic dugong, giant manta rays and whales offshore. Improve the mix by adding items of cultural diversity, including traditional fisherfolk and life styles, Arabian dhows, expert boat builders, an historic lighthouse, ancient middens, a dark past but a bright future, thatched camps under satin skies, and the night-time drum beat of Africa. What do you have? The Vilanculos Coastal Wildlife Sanctuary in Inhambane province, Mozambique.

(M.N. Bruton, 2002)

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PART M: RESEARCH, MONITORING AND EVALUATION

CHAPTER M1: THE RESEARCH, MONITORING AND EVALUATION PROCESS

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SECTIONS ON BUDGET AND ECONOMICS STILL TO BE ADDED

EXECUTIVE SUMMARY

EXPLANATION

The length of this volume of the BMP (the main plan; about 650 pages) necessitated a departure from the norm with regards to the executive summary. It was opted to prepare a condensed version of the BMP (Volume 1), with only a very brief Executive Summary that follows below. To alleviate this shortcoming somewhat, brief summaries dealing with specific topics are included in the text for certain parts of the Plan. (Refer to the discussion below on the format and structure of the BMP). No attempt has been made to achieve the impossible by trying to summarise the Plan in its full context; an extremely brief and therefore unfortunately somewhat subjective assessment of the “what” and “why” with regards to Vilanculos Coastal Wildlife Sanctuary (VCWS) is all that can be presented in the limited space that is available. No executive summary can do justice to the magnitude of the project, nor can it even begin to highlight all the environmental and social impacts, both positive and negative, thereof.

THE EXECUTIVE SUMMARY

The establishment, planning, development, management and utilisation of the VCWS in Mozambique’s Imhambane province has been entrusted to a private company, Vilanculos Coastal Wildlife Sanctuary (Pty) Ltd, by the Council of Ministers in October 2000. The Sanctuary is about 42 000 ha in extent, with another 20 000 ha that may be added during a planned phase II expansion. The total land surface of the two phases is about 40 000 ha. The VCWS lies immediately to the south of the Bazaruto Archipelago on the San Sebastian (or Quewene) Peninsula. Quewene is blessed with a mosaic of different marine and terrestrial habitats and richness in biodiversity that ranks it amongst the very top of Africa’s protected areas.

The first development started in early 2001 and took place at a brisk pace. The concession provides for 50 residential stands and lodges with a total of 100 beds to be developed. To date (February 2003) one 20-bed lodge has been partially completed and is operational, whilst negotiations for the other two lodges (one 60-bed) are far advanced. Basic service infrastructure has been provided including a water reticulation network, a sewerage and waste disposal system, staff housing and a provisional road network.

The International Finance Corporation (IFC, of the World Bank Group) was so impressed by the VCWS triple-bottom-line approach of conservation, sustainable use and benefit sharing that they became involved with the development of the Sanctuary in mid-2001. This involvement led to a Global Environment Facility PDF B (Project Development Fund, category B) grant being made available in early 2002 to assist the company with the planning of the VCWS and to prepare a Biodiversity Management Plan (BMP). The BMP is directly based on a brief baseline survey undertaken by a

multi-disciplinary team of specialists between June and September 2002, and deals not only with biodiversity aspects but also with social and economic factors. The Plan is thus an embodiment of the triple-bottom-line approach. The PDF grant may be followed by a longer-term GEF involvement in the further development of the Sanctuary in the form of financial support for biodiversity-based activities.

Time and financial constraints as well as the almost total lack of baseline data for Quewene, severely hampered the planning process. The BMP is thus regarded as a provisional document and will be revised during year 2 of the proposed GEF project. A series of Operational Plans covering a wide range of topics will also be compiled to augment the BMP and to enable the VCWS management to effectively implement the Plan.

The mission and objectives of VCWS as embodied in the BMP reflect the triple-bottom-line approach of the sponsors of the project, and is fully in line with international and national laws and policies, including social requirements.

Although the Company accepted an environmentally friendly development ethic and has to comply with the provisos of an overarching Environmental Impact Assessment (EIA) that was approved in late 2001, it spoiled its track record somewhat by not adhering to the guidelines in all respects. During the planning exercise that led to the compilation of this BMP, aspects such as an airstrip constructed on a fragile salt marsh system contrary to the provisos of the EIA came to the fore and invited wide-ranging criticism. However, adherence to the EIA, to the extensive environmentally friendly development guidelines contained in various in-house documents and to the multitude of development and management aspects contained in this BMP, should eventually lead to a development that can serve as a model for other private protected area initiatives.

A previous oversight that is rectified in the BMP was the absence of a proper zoning plan to regulate and guide the development of VCWS. The zoning plan that is presented in the BMP is thus unfortunately a *post facto* effort that to a certain extent has to accept the mistakes of the past as a given. The zoning plan should nevertheless be invaluable in guiding and structuring future developments. The implementation of the zoning plan will be closely linked to the practice of integrated coastal area management (ICAM). Adherence to the ICAM procedures outlined in the BMP will ensure that the conservation of the biodiversity of VCWS takes place on a level commensurate with the ecological importance and fragility of the region.

The substrate of VCWS is primarily deep Aeolian sand of relatively recent origin. The dynamic (unstable and mobile) dune barrier system along the Indian Ocean in the east is probably less than 1000 years old and is subject to “blow-outs” and, in geomorphological terms, a possible rapid movement of the northern extremity of the sand-spit towards the north-northwest (the similar system at Bazaruto Island moves at an estimated 600 m per 1000 years). This dune barrier over time led to the formation of a classical estuary on the lee side of the dunes.

The sandy soils are uniformly deficient in plant nutrients, which in turn means that the quality of the grazing for herbivores is poor and the agricultural potential is low. The reintroduction of suitable herbivores has nevertheless been proposed in the EIA and the original project submission, and has been approved by the government as a project deliverable. The reintroduction programme would hinge on the relocation of species

that used to occur in the region in historical times. A variety of indigenous ungulate species are intended for reintroduction including the buffalo, as well as elephant and hippopotamus. The motivation for the planned reintroduction programme is based on the demise, due to unsustainable harvesting, of the ungulates and other game that used to occur in the region and the desire to rehabilitate as far as is possible the VCWS environment in its broadest context.

Concern has been voiced, however, that it is unlikely that all the erstwhile free-ranging game species remained in the area on a year-round basis. They had the freedom to move to better grazing, for example the wetlands to the immediate west of the current sanctuary, at will. The game-proof fence that was erected on a portion of the western boundary, will mean that the relocated species would be permanently confined to an area that has already been described as marginal for most of the bigger game.

The fence that was erected during 2002 means that a temporary game enclosure of about 8 500 ha has been fenced. The first animals to be released will probably be released into this enclosure, while the rest of the current Sanctuary and possibly also the Phase 2 expansion are being fenced. The existing portion of the temporary fence will then be removed to open up the larger area. It has been decided that all the wildlife, including the reintroduced species, will “belong” to the local communities. Although the VCWS will play a leading role in managing the wildlife according to the strategic wildlife utilisation plan, it will be done on behalf of and in close cooperation with the communities. The net financial returns of any consumptive use will accrue to them.

A strategic marine resources utilisation plan has also been drawn up as part of the BMP process. The marine survey has indicated that the utilisation of marine resources has already reached unsustainable levels. The strategic plan will endeavour to closely involve the communities, especially the fishers, in a process that will hopefully lead to a turnaround in this situation. A similar plan, based on the same principles of active community involvement according to the process of co-management, has been prepared for the production of agricultural products. The current and long-established but environmentally destructive practise of slash-and-burn (shifting) agriculture will be phased out, to be replaced by the environmentally friendly technique of organic farming. The local people will again be an active partner in the venture and will co-manage the project.

In addition to the abovementioned strategic plans, the BMP also provides a sustainable tourism development programme. This programme includes a strategic tourism development plan as well as a module on institutional tourism development, a low-key interpretation programme and codes of practise/conduct to regulate the tourism initiative and the tourism-based utilisation of natural resources.

Other biodiversity-related actions dealt with in the BMP include comprehensive guidelines on the conservation, management and (where appropriate) utilisation of marine resources in general, fresh water aquatic systems, flora, avifauna, terrestrial fauna specifically ungulates and elephant, herpetofauna, a section on invertebrates and an ecosystem restoration plan.

Although the terrestrial wildlife of VCWS would be an isolated fenced-in population, the marine resources represent a shared commodity. The principle of establishing a

regional conservation network encompassing all the actual and potential role players feature high on the agenda. A concerted regional conservation action will be the only way that the highly endangered Dugong can possibly be saved from extinction in what may be the marine mammal's last stronghold along the east coast of Africa. Population estimates indicate that as few as 30 individuals of this flagship-species still occur in the region.

During the fieldwork phase of the BMP the social impacts of the project were, within the constraints posed by a shortage of funds and a lack of time, the subject of a detailed assessment. Although interesting statistics on human population attitudes, dynamics, demographics and socio-economic realities came to the fore, certain important shortcomings that would warrant urgent attention were also highlighted.

The following two aspects can specifically be mentioned: Firstly, the huge discrepancy between the original VCWS estimates of the human population of the Sanctuary (1 089 persons) and the actual figure, unofficially estimated to be in the region of 9 000 people. The results of a proper full population census are still pending. This discrepancy had a ripple effect with regards to the planning of the resettlement programme because many more households than originally anticipated will have to be resettled, and also with regards to the alignment of the permanent game-proof fence. More land than planned would be needed to accommodate people and less of the already marginal habitat would be left for the wildlife.

Secondly, notwithstanding the inclusion and acceptance of a public consultation and disclosure programme (PCDP) in a provisional biodiversity business plan for VCWS that was compiled in 2001, it turned out that the local communities were largely in the dark with regards to the project in general and to those project activities that would or could impact on their daily lives in particular. A real sense of mistrust against their own leaders and also the project sponsor came to the fore. To address this situation and to prevent it from further escalating, a comprehensive PCDP is included in the BMP.

An equally comprehensive resettlement action plan (RAP) is also presented in the BMP. This plan properly addresses the shortcomings of the small-scale initial resettlement action that took place in 2002 and provides an operational policy and extensive guidelines for the execution of the resettlement actions that are still pending. The resettlement programme is necessitated by the need to move people out of the fenced-in Reserve area, due to the presence of potentially dangerous big game after the wildlife reintroduction programme took place.

In order to enable the local people to regulate and govern their own lives, an innovative community development plan (CDP) is included in the BMP. The CDP will empower the people to take full ownership of the socio-economic aspects of the VCWS project, under the guidance of the VCWS management and enabled by the GEF involvement. A number of conservation-initiated opportunities (CIO's) have been identified in the BMP and will assist the project sponsor in determining project priorities and community-based actions. Independent community structures, with VCWS management only playing a facilitating role, would be established to enable the communities to take their rightful place and play a meaningful role in the management and utilisation of the resources of the Sanctuary.

Due to the absence of proper baseline data on which to build and base the future deployment of the VCWS project, an extensive research, monitoring and evaluation (RM&E) programme would need to be implemented. The RM&E strategy provides for the design of the strategy, for management-orientated research (albeit on a limited scale due to financial constraints), and for extensive monitoring and evaluation of the social and biodiversity impacts and implications of the project. Planning, in the form of structured revisions of the BMP and the compilation of a variety of operational plans, will receive the attention that it deserves.

A PARAGRAPH ON ECONOMICS WILL BE ADDED.

A PARAGRAPH ON THE BUDGET WILL BE ADDED

In order to further develop the VCWS and to properly manage the biodiversity resources and social aspects of the venture, as well as to provide an operational structure to implement the BMP, a project-based staff establishment is recommended. The staff establishment provides for executive management and support functions and is divided along lines that would allow the effective execution of the policies, objectives and plans of the BMP. Within the limitations imposed by a shortage of funds, full use will be made of contracted specialists during the implementation phase of the BMP. The principle of preferential employment in favour of local Mozambicans will be diligently adhered to, with expatriates only being contracted if no suitable local candidates are available. After completion of the GEF project as embodied in the BMP, the staff establishment will of necessity be scaled down.

GLOSSARY OF TECHNICAL TERMS AND ACRONYMS

TECHNICAL TERMS

Accipiter:	Collective name for sparrowhawks and goshawks
Aff. (affinis):	Similar to but not the same; related to.
Angiosperm:	Flowering plant
Anthropogenic:	Man made or man induced
Apadale horizon:	Structureless and non-calcareous subsoil horizon
Benthic:	Bottom-dwelling; living on or near the sea floor
Bivalve:	A shellfish in the Phylum Mollusca with two shells joined by a hinge
Byssus:	Anchoring threads produced by a gland in the foot of many bivalves
Bushclump:	A small thicket usually smaller than 1 ha in extent.
Carapace:	Bony or chitinous shield covering part or all of the back of certain animals, especially Crustacea
Cations:	Positively (+) charged ions; in agriculture it includes plant nutrients such as Ca (2+), Mg (2+) and K(+) etc.
Commensal:	An organism that lives together with another species without harming it
Cf (confertus):	Similar to and may be the same
Colloids:	Very small organic and inorganic soil particles less than 1µm in size
Crepuscular:	Appearing or active at twilight
Depauperate:	Reduced diversity
Detritus:	Particles of decaying plant and animal material and associated micro-organisms
Diatoms:	Unicellular algae with walls impregnated with silica
Ecotone:	The boundary between two habitats such as woodland and grassland; the area is transitional between the two having characteristics of both.
Edaphic:	Soil related
Endemic:	Refers to a species' range; endemic to a region/country means the entire range of the species is contained within the specific area
Endorheic:	Pans that have no outlet
Eurytopic:	Occurring in a wide range of habitats
Eutrophic:	A term used to describe the quality of water
Gerontocratic:	A leadership form based on age (elderhood) and sex (male)
Halophyte:	Plants which usually grow under very saline conditions.
Hydrophyte:	Plants which grow in water
Hydroid:	A form of zooid occurring in the Hydrozoa
Hypocotyls:	A term used for the live bearing fruits of mangroves
Manubrium:	Peduncle suspended from the bell of a jellyfish and ending in the mouth
Migrant:	Birds that visit the area seasonally
Monotypic:	A single species dominates in an area
Moribund:	Dead material
Nudibranch:	Mollusc with naked gills and no shell

Ochric topsoil:	A surface horizon, often pale in colour, that does not qualify as organic, humic, vertic or melanic topsoil horizons
Palaearctic:	Migrant birds that visit the area from the Palaearctic region (Eurasia)
Patrilineal:	Inheritance through the male line
Patrilocal:	Sons and their wives settle in the family homesteads (not with the wife's family)
Pelagic:	Swimming in the water column of the open sea
Plankton:	Animals (zooplankton) or plants (phytoplankton) which float or drift in the water
Polyp:	Cylindrical animal, attached at one end, bearing a mouth and tentacles at the other
Resident:	Birds that remain year-round in the area
Rhizomatous:	Underground runners produced by plants are called rhizomes.
Scandent:	Usually refers to a plant which has no specific structures for climbing but simply leans against plants and grows over them.
Sessile:	Attached or stationary
Siphonozoid:	A type of zoid that is in the shape of a siphon, and which draws water into and out of the colonial animal
Scolopacids:	Migratory wading birds belonging to the Family Scolopacidae
Symbiosis:	Intimate relationship between two organisms which is of mutual benefit
Syncretic:	The socially/culturally institutionalised result of a mixture of influences
Zoanthid:	Sea anemones and the other "flowerlike" animals, usually with simple tentacles and parts arranged in sixes
Zoid:	Individual forming part of a colonial organism
Zooxanthellae:	Microscopic unicellular algae that is symbiotic in the bodies of some animals, such as corals

LIST OF ACRONYMS

ARSC:	Agricultural Resources Steering Committee
ARPIT:	Agricultural Resources Project Implementation team
BD & C:	Biodiversity and Conservation
BBP:	Bio-Business Plan
BMP:	Biodiversity Management Plan
BNP:	Bazaruto National Park
CIDP:	Consultation and Information Disclosure Programme
DGM:	Deputy General Manager
EAW:	East African Wildlife (Pty) Ltd
EIA:	Environmental Impact Assessment
ESU:	Economically Sustainable Use
GEF:	Global Environment Facility
GM:	General Manager
GSC:	General Staff Code
HOA:	Home Owner's Association
HTNS:	Hotel and Tourism Association Northern Sector
IFC:	International Finance Corporation
IUCN:	The World Conservation Union
KCA:	Kawene Community Association

LAC:	limits of Acceptable Change
MICOA:	Ministry for the Coordination of Environmental Affairs
MRSC:	Marine Resources Steering Committee
MRPIT:	Marine Resources Project Implementation Team
MRSUP:	Marine Resources Strategic Utilisation Plan
NDP:	Node Development Plan
SDP:	Site Development Plan
NGO:	Non-governmental Organisation
OP:	Operational Plan/Policy
PCDP:	Public Consultation and Disclosure Plan
RAP:	Resettlement Action Plan
RESERVE:	Refers to the fenced-in natural area/game area of the Vilanculos Coastal Wildlife Sanctuary
ROS:	Recreation Opportunity Spectrum
SAFA:	Sanctuary Farmer's Association
SAP:	Sustainable Agricultural Programme
SBSR:	Social Benefit Sharing and Responsibility
SFA:	Sanctuary Fishers Association
SIA:	Social impact assessment
STDP:	Strategic Tourism Development Plan
STF:	Sanctuary Tourism Forum
STTF:	Sanctuary tourism task Force
SMC:	Sanctuary Management Committee
SSO:	Sanctuary Standing Orders
TDS:	Temporary Duty Specialist
TRPIT:	Terrestrial Resources Project Implementation Team
TRSC:	Terrestrial Resources Steering Committee
TRSP:	Terrestrial Resources Strategic Plan
TWSUP:	Terrestrial Wildlife Strategic Utilisation Plan
UNESCO:	United Nations Education, Scientific and Cultural Organisation.
VCWS:	Vilanculos Coastal Wildlife Sanctuary
VAMP:	Visitor Activity Management Process
VERP:	Visitor Experience and Resource Protection
VIM:	Visitor Impact Management
WCPA:	World Commission on Protected Areas

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- Francois Odendaal. PhD. Sustainable use of marine resources.
- Steve Telford. PhD. Mozambican environmental law and policies (associate to Francois Odendaal)

In addition to these TDS's, the IFC directly contracted a number of specialists who dealt with topics such as the community participation strategy (Gaye Thompson, PhD) and sustainable tourism planning (Sarah French, MSc). Ed (BA) and Alison (MSc) Wilson contributed to the Chapter on Research, Monitoring and Evaluation. The work of these IFC specialists was freely incorporated into the BMP. . The World Conservation Union (IUCN) also participated in certain activities.

The project brief, incorporating this BMP, will be compiled by the IFC. This brief will, should the IFC wish to endorse the project, be submitted to the Global Environment Facility (GEF) with regards to funding.

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During the compilation of a report such as this the views, attitudes, expectations and perceptions of the author/editor are to a certain extent reflected in the composition and content of the end product. Any errors, misinterpretations and omissions therefore remain my responsibility.

Lampies Lambrechts
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INTRODUCTION

Notwithstanding the fact that the country is relatively sparsely populated by humans with a population density of only 22,5 persons/km², and bearing in mind that vast tracts of land in the remote rural districts are almost uninhabited by humans, Mozambique's system of formal protected areas fall far short of the recommended international norm. The country's national parks (Banhine, Zinave, Gorongosa and Bazaruto and the newly proclaimed Limpopo and Quirimbas) and formally designated reserves (Marromeu, Gili, Maputo-Elephant and Niassa, as well as Inhaca and Portuguese Islands) together constitute less than 2% of the total land surface area.

Since the signing of the peace accord that ended the devastating civil war of the 1980's, the government has embarked on a far-sighted and far-reaching program to improve the conservation status of the country's biodiversity resources. This progressive policy relies heavily on private sector involvement, even in the management and utilisation of formally designated protected areas such as national parks (Unpublished data, Ministry of Tourism).

Mozambique is furthermore a signatory to the 1992 Convention on Biological Diversity (the so-called Rio Accord), when some 153 states from all the continents pledged their support for the global environmental action program for the next century. Individual states undertook to implement programs that would give effect to the prominent convention themes of conservation of the biodiversity and the promotion of sustainable land uses. Another recommended action arising from the Rio Accord was the establishment of a system of protected areas. The establishment of the VCWS, a wholly private sector initiative, and the new Limpopo and Quirimbas National Parks are the first meaningful protected areas in Mozambique that came into being as a result of the implementation of these local and international policies.

Notwithstanding the relatively small size of the VCWS (about 42 000 ha for Phase 1, including 22 707 ha terrestrial area and 19 260 ha sea), its establishment at the end of 2000 was a significant step forward in the struggle to conserve and rehabilitate Mozambique's severely depleted biodiversity resources. The almost 3 000 km coastline of Mozambique is especially poorly protected, with only six formal protected areas situated on the coast, viz. the Maputo Elephant Reserve, the Bazaruto National Park, the Marromeu Reserve, the recently proclaimed Quirimbas National Park in Cabo Delgado province, the small Inhaca and Portuguese Islands and now also the VCWS. Only 0,26% of the country's territorial waters (excluding VCWS) are protected (Motta *et al* 2001).

The San Sebastian/Quewene Peninsula-Bazaruto Archipelago complex includes the main islands of Bazaruto, Benguerua and Magaruque, as well as a number of smaller islands and obviously also the Quewene peninsula. The VCWS forms the southernmost portion of this complex and includes terrestrial habitats, parts of the Bay of Vilanculos, the Indian Ocean to a depth of 20m off the eastern seaboard (this original stipulation has since been changed for practical reasons; the boundary now runs in a straight line down the coast), and the Islands of Lenene (200 ha) and Chilonzuine (100 ha) (see Map). The VCWS is the first protected area in Mozambique, and possibly in Africa and even the world, where the formal

conservation of a sensitive marine environment and resources has been entrusted and delegated to a private company (Vilanculos Coastal Wildlife Sanctuary (Pty) Ltd).

Benguerua, Magaruque and Bangué, together with a contiguous sea area extending five kilometres to the west and to the 100m line of bathymetry to the east, were declared as the Bazaruto National Park (BNP) in 1971. Bazaruto island itself and the small Santa Carolina were proclaimed as Surveillance Zones. Current official plans for the Archipelago involve the gazetting of all five islands within a greater Bazaruto National Park (BNP), and the adoption of legislation promoting both conservation and sustainable use of the natural resources of the Archipelago. Government has recently approved the proposed extension of the boundaries of the National Park increasing its area from 600 km² to about 1,500 km². To date, Bazaruto and the new Quirimbas are Mozambique's only full-blown marine National Parks.

The VCWS is contiguous with the Bazaruto archipelago and the two form part of the same ecological system. However, for some inexplicable reason the most spectacular and ecologically diverse portion of the complex, the Quewene Peninsula, has not been proclaimed as part of the Bazaruto National Park, even though it was proposed for inclusion when the master plan for the Park was compiled in 1992 (Dutton and Zolho, 1992). The peninsula possibly boasts the richest biodiversity in all of Mozambique, and ranks amongst the very top of the biodiversity hot spots on the African continent.

The diversity of habitats in VCWS include a mosaic of wetlands, freshwater lakes, tidal mudflats, salt marshes, mangrove communities and salinas, estuaries, a sand peninsula barrier along the seaward boundary of the Inhamambane Estuary, islands, coral reefs, sea grass meadows, tree and scrub forest on the coastal dunes, patches of tree savannah and miombo woodland with dambos.

The VCWS holding company, East African Wildlife Prop (Ltd) (EAW) submitted a "Feasibility Study and Development Proposal" dated 6 March 2000 to the Mozambican government for approval of the planned VCWS. This document broadly outlined the company's vision and objectives for VCWS, including ecotourism development. Authorisation for the project and consequently also the establishment of VCWS was granted by the Council of Ministers on 17 October 2000 (Resolution 4/2000). The project was considered as such a high priority by the Council, that it was granted Category A status, which it shares with a handful of major industrial initiatives. The project authorisation grants rights of land use and benefit to the company for a period of 50 years, renewable for a further 50 years. The authorisation empowers EAW with sweeping rights, including the rights of sole management of VCWS and the protection of the area against poaching, pollution and unauthorised access.

At the time when the VCWS was formally approved, the Quewene Peninsula could almost be described as an island, as the area could not be accessed by road. The development company, GeoAfrica, immediately started to establish a presence on the ground by providing basic infrastructure, appointing staff and liaising with the local communities. In order to go ahead in an orderly fashion, GeoAfrica compiled various development plans, as well as a Bio-Business Plan (BBP) in April 2001 (Lambrechts, 2001a). This initial plan was revised in July 2001 (Lambrechts 2001b) and divided into four parts. Although the BBP laid down community development parameters and conservation and utilisation guidelines, the natural resources section of the plan (Part 1) was not based on any real field observations and was thus rather superficial.

The BBP was followed by an environmental impact assessment (EIA) report in September 2001 (Lambrechts, 2001c) which was approved by government in November 2001. This EIA report differed from normal EIA's in the sense that it considered an area of 42 000 ha in general terms, and did not for example involve an in-depth evaluation of a specific site such as the development of a new tourist hotel. As such the EIA to a certain extent filled the role of an additional development plan, with the accent on maintaining or rehabilitating the natural environment and the biodiversity.

The IFC, through the Environmental Projects Unit, became aware of the VCWS during the second quarter of 2001. After a visit to the site in mid-2001, they were convinced firstly about the richness of the biodiversity of the area and its global significance, secondly the huge conservation potential and low conservation status of VCWS, thirdly the potential for and need of sustainable use of the natural resources, and finally the benefits that the local communities and the developer would derive from the project. It was also obvious that EAW would need financial assistance and technical support if the full spectrum of conservation priorities were to be properly addressed.

The IFC, as the executing agency, subsequently submitted a Project Development Fund Block B (PDF B) grant application to the Global Environment Facility (GEF) of the World Bank. The objective of the approved PDF B grant was to enable EAW, assisted by the IFC and the World Conservation Union (IUCN), to undertake a comprehensive range of baseline surveys that would enable the IFC to submit a full project brief to the GEF. This BMP will form the basis of the project brief document, that will be submitted by the IFC to the GEF early in 2003.

FORMAT AND STRUCTURE OF THE BIODIVERSITY MANAGEMENT PLAN AND THE PLANNING PROCESS

This Biodiversity Management Plan document follows no specific format. It is nevertheless loosely based on the planning document guidelines of the KwaZulu-Natal nature conservation agency in South Africa (Ezemvelo KwaZulu-Natal Wildlife). The author/editor of the BMP has been involved with the planning of a number of protected areas in the Kingdom of Lesotho, where the Kwa-Zulu Natal process and format was successfully applied. The plan layout that was used for the compilation of two of the Lesotho conservation, development and management plans (Bainbridge, 1998a & b), was adapted to meet with Vilanculos Coastal Wildlife Sanctuary (VCWS) conditions and requirements.

The planning of protected areas such as the VCWS is a dynamic process that merely reflects the state of the environment and the planning objectives at the specific time. It must be able to accommodate the principle of adaptive management that will be applied to the management of the biodiversity of VCWS, and will provide a list of *what* managements are to be undertaken, as well as the reasons *why* they must be done. According to the IUCN (Hockings, Stolton and Dudley, 2000), planning should take place within the context (“*where are we now?*”) and the vision (“*where do we want to be?*”) for the protected area, and should provide answers to the basic question of “*how are we going to get there?*”.

Any plan aimed at assisting in adaptive management should therefore constantly adapt to changes in the biophysical, the socio-economic and the cultural environments within which it was originally drafted. This document is thus not cast in stone, and will be formally reevaluated, and revised if necessary, on a regular basis (probably years one, three and five of the GEF project). The Global Environmental Facility (GEF) Project Manager (Implementation) (see Part L), assisted by contracted specialists if necessary, will be tasked to deal with these formal revisions, with extensive inputs from the VCWS management staff. The comprehensive guidelines laid down by the IUCN to evaluate management effectiveness (Hockings *et al*, *op cit*), also apply *situ situ* to the planning process and have been applied wherever possible and necessary.

Unfortunately, the almost universal problem facing protected area planners namely the need to avoid the tendency of over-enthusiastic planning leading to cumbersome and complex plans that are difficult to implement, could in the case of VCWS not be fully avoided. The complexity of both the physical environment and the biodiversity resources of the sanctuary, linked to the fact that no baseline research or planning has ever been undertaken in the area, the comprehensive requirements that must be met to qualify for GEF funding and the far-reaching social impacts of the project, necessitated a more comprehensive BMP with more follow-up work than would have been the case under ideal conditions. The author/editor of this report is notwithstanding this shortcoming, still of the opinion that the resources that would be provided would be able to cope with the effective implementation of the plan.

The sheer volume of work and diversity of topics that had to be included in the BMP meant that the document would, even if was subdivided and conventionally bound in

separate volumes, have been too cumbersome for easy reference and use. It would also have been difficult if not impossible to update the document and incorporate changes after formal revisions of the plan took place, which is scheduled for every two years starting in year one. The full text, consisting of the Plan itself (Volume 2), the species lists (Volume 3) and the specialist reports (Volume 4), would thus only be available on compact disk. The comprehensive Condensed Plan (Volume 1) would be the only document to be available as a hard copy, but would also be available on the disk.

A multidisciplinary approach was followed during the PDF B (GEF/IFC) planning process. Experienced TDS's were contracted to undertake the necessary base-line surveys and to submit reports relevant to their respective terms of references. The fieldwork phase of the planning process started in late June 2002 when a planning workshop was held at VCWS. Most of the fieldwork was completed by August, but some surveys continued until mid-September 2002, with some reports only becoming available during February 2003. This rather hasty process was due to a GEF/IFC deadline for the submission of the project brief that had to be met (and that could not be kept!).

Unfortunately financial and time constraints severely handicapped the ability of the TDS's/planners to undertake proper surveys, and in all instances the need for more time were pointed out as a serious shortcoming. This problem was exacerbated by the fact that the VCWS itself presented the specialists/planners with almost uncharted territory, and that no aerial photographs were available for the peninsula. The need for follow-up surveys were universally pointed out, and these studies will be undertaken during the implementation phase of the project once the expected GEF involvement materialises. The following days were allocated to the various activities that led to the compilation of the BMP:

Avifauna survey (Tarboton)	12
Reptiles, amphibians, plants and mammals (Jacobsen)	50
Wildlife capacity, ecosystem restoration, burning program and VCWS enlargement (Peel)	20
Wildlife reintroduction program (Grobler)	7
Marine systems (Bruton)	40
Fresh water systems and hydrology (Rall and Coleman)	35
Regional conservation plan and literature review (Dutton)	7
Aquatic systems coordinator and sub-editor (Mulder)	8
Research, monitoring and evaluation (Mulder and Peel)	20
Conservation incentive system (Du Plessis)	10
Economic analysis (Du Plessis)	20
Sustainable local economy/agriculture (Theunissen)	30
Project management, co-ordination and supervision (Lambrechts)	65

Furthermore, the short period of time that was available to gather base-line data, covered only part of the winter season. This had an obvious effect on for example the avifauna survey, since a number of migratory species could not be observed. It also complicated the identification of many plant species, including annuals and plants that were not flowering or in seed. The gaps in our knowledge that arose from this unavoidable situation, will be addressed during the abovementioned follow-up surveys. The appropriate topics for follow-up are identified and discussed in the text.

The reader will also notice from the list of TDS's and their respective fields that was listed above, that certain obvious topics such as for example geology and archaeology were not included in the base-line studies. This shortcoming was caused by a tight planning budget that necessitated the prioritising of the topics that could be funded with the available financial resources. Only those aspects dealt with in the PDF B project brief were included in the surveys. This situation will be addressed and rectified during the implementation phase (funds permitting).

The planning process itself adhered to universally accepted norms and procedures. Terms of references were drawn up for each base-line study, and each of the contracted planning specialists had full scientific license and freedom of expression with regards to his/her activity. All the planning reports were submitted in draft format and were, wherever possible and time permitting, subject to peer review. The individual specialist reports are published as a separate volume to the BMP (Volume 3: Specialist Reports), but will only be available on compact disk and not in hard copy format.

In addition to the first tier BMP, a series of second level Operational Plans/Policies (OPs) will be prepared for certain of the principal management operations or tasks, that will be undertaken on VCWS during the initial five years covered by the BMP. The OPs will contain detailed but concise prescriptions on *how* these management actions will be dealt with, and will list the actions to be undertaken annually. Costs will, where applicable, be included in each OP.

OPs will be concise documents, containing only essential data relevant to the specific topic. Examples of OPs that would need to be prepared are for the prescribed burning and fire control program, fence patrols, wildlife distribution surveys and censuses, reclamation of abandoned slash-and-burn fields, various sustainable utilisation and implementation plans, some social action plans and many others. These plans/operational documents will be identified at the appropriate sections in the text of the BMP. The compilation of the OPs will primarily be a management staff responsibility, with extensive technical support by the GEF Project Manager (Implementation) and, where necessary, contracted specialists.

The BMP and the subsidiary OPs will be working documents that will endeavour to provide some insight on the following, without the questions actually being phrased as such in the text:

What is to be done?	What is to be achieved?
Where will it be done?	Why will it be done
Who will be affected?	How will it be done?
Who will do it?	With what will it be done?
When will it be done?	How will the results be maintained?

The BMP has been structured into four volumes to include the following:

VOLUME 1: CONDENSED PLAN (Available as hard copy and on CD)

VOLUME 2: (Only available on CD)

Part A:	Policy and Legal Context
Part B:	General Description of the Area

Part C:	Aims, Classification, Vision and Objectives and Threats
Part D:	Conservation and Management of Biodiversity Resources
Part E:	Expansion and Ecosystem Restoration
Part F:	Zoning Plan and Integrated Coastal Area Management
Part G:	Social Impact Assessment
Part H:	Social Action Plans
Part I:	Tourism
Part J:	Conservation Initiated Opportunities
Part K:	Economics
Part L:	Administration
Part M:	Research, Monitoring and Evaluation

VOLUME 3: SPECIES LISTS (Only available on CD)

VOLUME 4: SPECIALIST REPORTS (Only available on CD)

The BMP obviously concentrates on biodiversity matters. Other topics such as all the activities and plans relating to social impacts, social actions, tourism and the economical analysis have nevertheless been included in the BMP, albeit in a somewhat condensed format, in order for the global picture to emerge. These “peripheral” topics, whilst not strictly speaking related to biodiversity, would all have a direct influence on the conservation, management and utilisation of the biodiversity resources of VCWS and could not be dealt with in separate documents. As such, the plan takes cognisance of and includes the three bottom-line prerequisites of the 1992 Convention on Biodiversity (CBD): *conservation* of natural resources leading to sustainable *utilisation* and *benefit sharing*. The full reports with text of these non-biodiversity topics are also available in Volume 4 (Specialist Reports) of the BMP.

It should be noted that the BMP in its current format would only become effective if and when the envisaged main GEF grant is approved and becomes available. No private development company, including GeoAfrica acting for EAW, could be expected to shoulder the burden of what would essentially be a relatively expensive conservation action undertaken on behalf of the people of Mozambique. The financial ramifications of the multitude of biodiversity-related actions and social action plans that would be undertaken as a consequence of the BMP, would rule out any chance of the VCWS project being developed on a profitable basis, and would seriously jeopardise the very existence of the venture in the event of the developer having to foot the bill.

Whether the envisaged GEF grant would indeed materialise, can obviously not be guaranteed. Should it be approved, it could be predicted that the money would not become available before early 2004. In the meantime, GeoAfrica would continue with the development of VCWS based on the ecological, environmental and social guidelines and principles contained in this BMP and the EIA, without being able to fully implement for example all the prescribed research and monitoring activities.

PART A: LEGAL STATUS AND POLICIES

CHAPTER A1: LEGAL STATUS

1.1 OFFICIAL PROCLAMATION

Item one of the project-designated objectives as set out in the Terms and Authorization of the Vilanculos Coastal Wildlife Sanctuary Project, as approved by the Council of Ministers on 17 October 2002, Resolution 4/2000, stipulates as follows:

“The establishment and management of a private nature reserve for the preservation and conservation of all indigenous species, marinas, fauna and flora”

Following on the Council of Minister’s resolution that sanctioned the establishment of the VCWS, the objectives, social responsibilities, structures and operating procedures of the development company was published in the official publication of the Republic of Mozambique dated 18 April 2001.

Other than the reference to a “private nature reserve” that was authorised in Resolution 4/2000, it does not seem as if VCWS was officially proclaimed as a protected area. The legal status of the sanctuary is thus unclear, and it would seem as if an official proclamation as some category of protected area would be needed. This apparent oversight will be followed up.

1.2 NATIONAL LEGISLATION AND POLICIES

Prior and subsequent to the preparation of this BMP, the establishment, development, management and utilisation of VCWS has (although not in all respects, as would be evident from the BMP) and will be in accordance with national legislation and policies. This is especially important in the light of the fact that the VCWS development is in its entirety driven by private enterprise, and would thus tend to be much more open to public scrutiny than any similar public sector development. Compliance with all relevant legislation and policies are thus a non-negotiable necessity, not only to meet with legal requirements but as an added safeguard to the conservation of the VCWS biodiversity resources.

The responsible government ministry, the Ministry for the Coordination of Environmental Affairs (MICOA) developed a legal framework for environmental management in Mozambique, embodying the following elements:

- The National Environmental Management Programme (NEMP) (1996)
- The Framework Environmental Law (1997)
- EIA Regulations (1998)
- EIA Guidelines (in preparation, but the draft guidelines have been used for the compilation of the General VCWS EIA)

1.2.1 The National Environmental Management Programme (NEMP)

The NEMP was approved by the Council of Ministers in 1996 and contains an Environmental Policy, a proposal for Framework Environmental Legislation and an Environmental Strategy. Other relevant laws include the Land Law (1998) and the Forestry and Wildlife Law (1999).

To give effect to the NEMP, MICOA is working towards the following:

- The development of inter-sectoral policies for sustainable development.
- The development and promotion of integrated resource-use planning.
- The promotion of sector legislation and of establishment of norms and criteria for environmental protection and sustainable use of the country's natural resources.
- The creation of favourable conditions for effective law enforcement and environmental monitoring.

1.2.2 The Framework Environmental Law

This Law (passed in 1997) acknowledges the responsibility of the Government of Mozambique in the promotion and implementation of the National Environmental Management Programme. The aims of the Law are to provide a legal framework for the use and correct management of the environment and its components and to assure the sustainable development of Mozambique.

The Environmental Law is applicable to all public or private activities, which may influence the environment either directly or indirectly, for example by controlling pollution and/or the degradation of the environment and to make EIAs mandatory in any instance where a development may impact on the environment (see below).

The Law also forbids all activities that may threaten biological resources, especially those in danger of extinction. Environmental protection zones, such as VCWS, can be created to protect environmental components that have a recognised ecological and/or socio-economic value. These protected zones may be national, regional or local and may cover land areas, lakes, rivers, marine waters and other distinctive natural zones.

EIA Regulations

The complexity of the VCWS project necessitates comprehensive EIAs to be compiled for most of the developmental aspects, according to the Framework Environmental Law. The law establishes the regime of environmental licensing based on an environmental impact assessment and defines comprehensive EIA Regulations for Mozambique. Some of the key Articles of the Regulations that have to be complied with are summarised below:

- Article 2 specifies that the Decree is applicable to all public or private activities that may have a direct or indirect impact on the environment.
- Under Article 3, MICOA's responsibilities include the power to:
 - Issue and publicise general directives on environmental impact assessment procedures;
 - Approve EIA Terms of Reference for environmental impact studies;
 - Undertake reviews of environmental impact studies, in collaboration with interested public entities, civil society and affected communities; and
 - Issue environmental licenses based on the EIA.

- Article 4 lists the documentation that must be provided prior to the compilation of the EIA:
 - A description, location and characterisation of the activity;
 - An executive summary of the project; and
 - Information on the environment where the activity is located.
- Article 6 stipulates that an environmental impact study must contain at least the following information:
 - Geographical location of the area of influence of the activity, as well as a description of the baseline environmental situation;
 - A description of the activity and its alternatives in the planning, construction and operational phases;
 - A comparison of the alternatives and a prediction of the environmental impacts of each alternative;
 - Identification and assessment of mitigation measures;
 - An environmental management program, including the monitoring of impacts, and accident prevention and contingency plans; and
 - Identification of the team that carried out the study.
- The public consultation process, including mechanisms for receiving petitions, is outlined in Article 7 and must be publicised by the proponent so that it reaches all affected stakeholders. MICOA may call for public hearings if required or when any affected party requests this.
- Article 9 deals with the review procedures of the environmental impact study report. On receipt of the report, MICOA oversees a technical review provided that the EIA process was carried out in compliance with the EIA regulations as well as the Terms of Reference approved by MICOA. Based on the review the MICOA decides on the environmental viability of the proposed activity. If approved, the proponent will be issued with an environmental licence in order to proceed with the project. (This has been done for VCWS, with the proviso that the General EIA that was approved did not rule out the need for further detailed EIAs dealing with specific developments.)

Appendix 1 of the Regulations provides a list of activities that require EIA. In addition, plans, programmes and projects not covered in the list but that may affect, directly or indirectly, the following examples of sensitive areas, all of whom apply to VCWS, may require an EIA:

- Coral reefs
- Mangroves
- Natural forests
- Small islands
- Zones of potential erosion, including dunes along the coastline
- Wetlands
- Zones where the habitats and ecosystems are in danger of extinction
- Zones of outstanding landscape beauty

1.2.3 The Land Law

The new Land Law, promulgated in 1997, recognises the need to protect ecologically sensitive areas through the creation of protected areas. The Law, therefore, provides an additional legal basis for demarcating areas for protection and conservation (Article

5) and the creation of total and partially protected zones (Article 6). The latter provision now permits the conservation and management of riparian and coastal habitat together with their associated species. Importantly, the Land law also recognises the rights of local communities over land and natural resources thereby offering, for the first time, the possibility of involving rural communities fully in the management and conservation of natural resources (Article 31).

1.2.4 The Forestry and Wildlife Law

In 1997, the government adopted a new Forestry and Wildlife Policy and Strategy, the overall objective being “to conserve, utilise and develop forest and wildlife resources for the social, ecological and economic benefit of the present and future generations of the Mozambican people”.

In accordance with the objectives of the Forestry and Wildlife Policy and Strategy, a new Wildlife and Forestry Law was passed in 1999. The new Law replaces the outdated laws promulgated in 1965 (the Forestry Laws) and 1978 (the Wildlife Laws)

The Law confirms the rights of the state over natural forest and wildlife resources in the country. An essential principle of the new Forestry and Wildlife Law is that local communities must be more fully involved in the conservation and sustainable use of forestry and wildlife resources.

Article 10 of this law recognises three types of protected zones for the conservation of fauna and flora, namely National Parks, National Reserves and Historical – Cultural Use Zones

VCWS finally need to adhere to the policies of the Ministry of Tourism, the national body responsible for the planning, administration and control of tourist operations. With a view to the development of the tourist industry, the government approved a National Tourism Policy for the Development of Tourism in Mozambique. One of the basic principles of the policy, with which VCWS needs to comply, is to "promote initiatives where they assure the maintenance of ecological integrity, the preservation of the landscape value and the sustainable use of natural resources, and improvement of the quality of life of the local population".

1.2.5 Compliance with national legislation and policies

The development, management and utilisation of VCWS and the biodiversity resources should comply with the relevant clauses and articles of the abovementioned laws and the regulations and policies pertaining thereto.

1.3 COMMUNITY-BASED NATURAL RESOURCES MANAGEMENT

A significant theme running through many of the foregoing policies and laws concerns the pivotal role local communities should play in managing natural resources. Currently, Mozambique is actively promoting the management of natural resources by the primary resource users including wildlife, a rich hardwood forestry estate, and extensive inland and coastal fisheries. A further potential resource for community-based natural resources management (CBNRM) programmes is the rapidly expanding tourism sector.

The National Directorate for Forestry and Wildlife (DNFFB) is the state agency responsible for forestry and wildlife (and the lead institution involved in evolving CBNRM in the country), but it is restricted in fulfilling its mandate by a range of problems caused by two decades of war and under-investment.

Currently certain special pilot CBNRM projects have established protocols allowing limited resource rights and return of concession fees to established community institutions on a trial basis. The outputs of this type of process are likely to impact on the evolving policy and legal framework for CBNRM in Mozambique. The VCWS model of empowering the local communities (as dealt with in various sections of the BMP) could play an important role in assisting DNFFB to formulate effective policies in this regard.

CHAPTER A2: INTERNAL VCWS POLICIES

Full executive authority to develop, manage and utilise VCWS is vested in the Board of Directors of EAW. The right to determine policies to give effect to the mission and objectives for VCWS, is also explicit in this executive authority.

In order to safeguard the interests of the implementing or sponsoring agency during the GEF implementation phase of the project, however, certain provisos would be attached to the right of EAW (the client) to formulate new biodiversity-related policies and/or to adapt or change existing policies. These provisos are dealt with in Part L, but relate mainly to certain entrenched provisions with regards to plans, research, monitoring and evaluation.

PART B: GENERAL DESCRIPTION OF THE PHYSICAL ENVIRONMENT AND BIOTA OF VILANCULOS COASTAL WILDLIFE SANCTUARY

CHAPTER B1: PHYSICAL ENVIRONMENT AND FRESH WATER AQUATIC SYSTEMS

1.1 CLIMATE

No climatic data exist for the Quewene Peninsula. Basic data, specifically rainfall, has been measured since 2001, but at least two but probably three automatic weather monitoring stations would be installed and the data logged. These stations would probably be installed on the coastal side of the peninsula, another one on the bay side and the third in the Lake Manhale region in the south. The stations run on solar power and they log a range of weather variables (temp rain, wind, humidity, etc) at set intervals. The data would be downloaded directly onto a computer at monthly intervals and provides a permanent record that can also be fed into the national weather monitoring program for Mozambique.

The climate falls into Koppen's type (Aw) or equatorial dry season type. (Tinley 1985).

The following climatic data is for the nearby (20 km) coastal town of Vilanculos, situated across the bay of Vilanculos on the mainland, for the period 1987 – 2001.

1.1.1 Rainfall

The rainfall of the region is dominated by two climatic systems:

- The Indian Ocean Subtropical Anticyclone System of the SE Trade Wind Zone form the Zambezi River southwards, with rain occurring during the passage of depressions, and
- The southern end of the East African Monsoon System

Although precipitation can occur throughout the year, most of the rain falls during the summer months (October – March) with nearly 80% of the rain measured during November – March. The following table shows the mean rainfall figures for Vilanculos for the years 1987 – 2001.

Mean monthly rainfall (mm) for Vilanculos (15 years)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall	195	234	119	46	34	24	19	26	5	26	65	108	901

1.1.2 Temperatures

The mean maximum and minimum temperatures for Vilanculos can be seen in the following table. Due to the sub-tropical climate the summer months have high temperatures, and it is noteworthy that the winter temperatures are also relatively high with a mean maximum of 26.2°C. Summer and winter mean maximum temperatures

vary between 31°C and 25°C. and mean minimums between 26°C and 15°C. The area does not experience any frosts.

**Mean maximum and minimum temperatures (°C) for Vilanculos
(15 years)**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	31	31	31	29	28	26	25	25	27	28	30	30
Minimum	24	24	23	20	18	15	15	16	19	21	23	23

1.1.3 Relative humidity

Relative humidity varies depending on the season, and averages 80,25%. The maximum relative humidity occurs in the winter months (May – September, 82.8%), with minimum relative humidity measured during the summer months (October – December) at 77%, as can be seen in the following table.

Relative humidity (%) for Vilanculos (15 years)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Humidity	78	80	80	80	82	85	85	83	79	77	77	77

1.1.4 Evaporation

Annual evaporation at Vilanculos averages 1083mm. With a total annual mean precipitation of 901mm, there is an obvious water deficit. The maximum evaporation obviously takes place during the hot summer months, as can be seen from the table.

Average evaporation (mm) for Vilanculos (15 years)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Evaporation	100	82	94	92	80	73	71	94	89	103	102	103

1.1.5 Wind

According to Tinley (1985) the wind direction for the region is primarily south-east to east. The average wind speed at 15h00, at Beira which is 250 km due north of Vilankulo, is 16 km/h, which is the threshold for effective transport of dry sand. Gale force winds i.e. 50 km/h or more occur in the area of Maputo-Inhambane at an average frequency of eight times per annum. This is likely to be similar along the Quewene peninsula. (For hurricanes, see section 1.1.6 below)

1.1.6 Climatic extremes

The Vilanculos area and the Quewene peninsula fall in a region which is known for the climatic extremes; these include:

- Hurricanes occur on average 3.1 times per annum in the Mozambique channel. A total of 12 high intensity and 38 medium intensity hurricanes have been documented for the region during the last 50 years (Dutton 2002)

- Tropical cyclones, originating in the Indian Ocean and affecting the area whenever they occur. They normally are responsible for higher rainfall patterns.
- Drought is not a common feature but when it occurs has a number of negative effects:
 - Crop production in the area is adversely affected
 - The levels of the fresh water lakes will drop, and some will dry up altogether
 - The quality (salinity) of the water in the lakes will also be adversely affected

1.2 GEOLOGY, GEOMORPHOLOGY AND PHYSICAL PROCESSES

As far as could be determined, no site-specific studies on the geology, geomorphology or physical processes of the San Sebastian/Quewene Peninsula have been undertaken to date. However, a number of areas along the southeast coast of Africa have been studied in detail and the sequence of events that shaped these particular landscapes into their present form have been described. (Botha & de Wit 1996, Botha 1997, Cooper & McCarthy 1998, Dingle *et al* 1983, Forster 1975, Frankel 1972, King 1972, Watkeys *et al* 1993). These geological processes would also apply to the southern and central Mozambican coastal regions, and provide a general indication of the geological events that shaped the current-day Quewene peninsula.

Two studies undertaken in the Bazaruto Archipelago to the immediate north of the VCWS are probably indicative of some of the geological processes that were involved in the region, and the data could be extrapolated to also include the sanctuary (Wright 1996, Ramsey 1989).

In geological terms the San Sebastian Peninsula and the islands of the Bazaruto Archipelago are of very recent origin, their first emergence as a land-form probably dating back to mid-Quaternary (i.e. within the last million years). These land surfaces are a consequence of a suite of geomorphological processes that persist to the present time, and which are continuing to reshape the features we witness in this area today.

The islands and the peninsula consist largely of unconsolidated sediments, i.e. mainly coarse and fine sands with a very low clay content. This material originates from the sediment loads carried out to sea by the major up-current rivers (Save, Pungue and Zambezi) and which have been borne southwards by the Mozambique Current, deposited on the continental shelf and then reworked and redistributed, both by current action below the sea (during periods of high sea-level), and by wind and sheet erosion above the sea (during periods of low sea-level). The eastern coastline of southern Africa has been subject to successive regressions (raised sea-levels) and introgressions (lowered sea-levels) during the Quaternary. These changes were generated in part by tectonic movement (eastward tilting of the continental edge) and in part by climate changes - cold periods resulting in sea-levels dropping (more water then being tied into ice at polar caps) and warm periods which raised sea-levels. The scale of these sea-level changes vary: there was a period in the mid- to late-Pleistocene (ca. 120 000 years ago) when the sea-level on the Zululand coast of KwaZulu-Natal province of South Africa was 90 m higher than the present level, and a subsequent period when it dropped to 30 m below the present level; in the last 7000 years the sea-level has fluctuated around 2-4 m above or below the present level.

Ramsey (1989) estimated that 125 000 years ago the sea-level was 6 – 8 m higher than at present at Bazaruto Island, while during the ice age (glacial phase) 18 000 years ago the sea-level dropped as low as 120 m below the present level. This would have placed the VCWS shoreline about 5 km to the east of the present Inhamambane estuary.

In the case of VCWS, there is good evidence - in the form of the successive ridges and troughs that run north-south across the peninsula - that this landscape constitutes a sequence of dunes ('aeolinites') formed by wind-blown sand. The prevailing on-shore direction of the wind accounts for their north-south orientation and the source material was probably from seaward beaches exposed during low sea-level periods. Most if not all of the Quewene peninsula, as well as the areas to the south of the current VCWS that are earmarked for possible inclusion (see discussion elsewhere), are comprised of this redistributed aeolian sand.

The youngest of the dunes (which is not yet vegetated and is probably <1000 years old) runs up the coastline parallel to the shore and continues northwards into the sea as a long finger of sand that encloses the trough which forms the Inhamambane Estuary. This dune cordon is similar to the dune system on the eastern coast of Bazaruto Island (Wright, 1996). To the west of this dune cordon lie older and larger dunes that have been stabilized by vegetation. These, and the troughs between them, have been reworked by sheet erosion and wind action to the extent that ridges and troughs often merge on the peninsula and their north-south orientation is blurred in places. Ramsey (1989) calculated that the northern sand-spit of Bazaruto Island have migrated towards the mainland (north-westwards) at a rate of 600 m per 1 000 years. This would probably also hold true for the similar sand-spit (or dune barrier cordon) of the Inhamambane Estuary on VCWS.

The origin of the exotic *Casuarina* pines along the eastern dunes are unknown, but they were probably, as was the case with Bazaruto Island in the 1960's (Wright 1996), planted in an effort to stabilise the open parabolic dunes in the vicinity of the lighthouse. Although the *Casuarina* stands are not extensive, they may possibly cause a slowing down or even stopping of the lateral and vertical accretion of the barrier dunes, leading to increased coastal erosion, increased movement of sand up the east coast and increased sedimentation further north.

Under marine conditions (i.e. during high sea-level periods) shell debris is likely to have accumulated in places within the sandy sediments and these concentrations of calcium carbonate would have led, over time, to localized consolidation ('lithification') of the sediments here by dissolution, leaching and reprecipitation of the soluble carbonates to form lime-rich sheets of 'rock' or "beachrock" (Ramsey 1989, Wright 1996). There are exposures of this nature along the western rim of Lake Manhale. Impervious lime-rich sheets may also underlie some of the pans on the peninsula and where they do, they are likely to result in these water-bodies being brackish. Most of the water-bodies that dot the peninsula probably lie in the dune troughs but at least some (those that are small and circular in shape) may have been formed (or at least shaped) by wind action.

1.3 SOILS, SUBSTRATES AND CORAL REEFS

To date, no detailed soil survey has been undertaken on VCWS. An analysis of some soil samples were, however, undertaken and produced the following results (see Part B for a more detailed description, and refer also to Volume 4 of the BMP: Specialist Reports):

- Two soil types were identified: Fernwood and Griffon. Both are deep sandy soils with poor water retention rates but excellent water infiltration tempos. The soils would tend to dry out quickly, and crops will have to be watered frequently.
- The topsoil analysis indicates a neutral pH (between 6.1 and 7.01), and a low availability of calcium, magnesium, phosphor and potassium. The soil is thus low in basic plant nutrients.
- The soils at deeper depths (30 – 90 cm) are more acid (pH 5.21 – 5.78), caused by water level fluctuations in the sub soil horizons. Acidity is the result of the replacement of the basic plant nutrients such as calcium, magnesium and potassium with hydrogen and aluminium. This replacement is a natural phenomenon and is caused by the relatively high rainfall of about 1 000 mm/annum and subsequent leaching. The deeper soils are therefore also low in calcium, magnesium, phosphor and potassium.

Given their low clay content and nutrient deficiency, the peninsula's sandy soils have a low fertility and for the most part, they probably also have a low organic content, with organic-rich soils only likely to be developed in the more permanent wetlands and in the mangrove swamps. The variability in the colour of the sandy soils (red, yellow, greyish, etc) is a consequence of local differences in sub-surface drainage and the effect this has on the oxidation state of the small quantities of iron oxide in the soil: red soils develop in the best-drained sites, yellow in sites with intermediate drainage and grey soils in poorly drained sites.

The aeolian sand lacks cohesiveness due to the deficiency of clay, making them highly susceptible to wind and water erosion. On Bazaruto Island, Wright (1996) measured the movements of the dune slipface of the eastern dune cordon to be as much as 24 cm in 48 hours. Similar occurrences may take place on the coastal dune cordon at VCWS.

The unconsolidated sandy soils are easily disturbed by vehicular activity. Once the protective vegetation cover has been removed, the loose sand does not provide a suitable road base. The planning and construction of roads/tracks will have to take cognisance of this complicating factor.

The coral reefs of the VCWS have not been studied in any detail. However, the coral reefs of the Bazaruto Archipelago, (and thus probably also the reefs off the VCWS eastern seaboard) occur on the south-western margin of the vast Indo-Pacific faunal province, and are represented by fringing assemblages developed on submerged, carbonate-cemented beachrock (Ramsey, 1989). The reefs owe their existence to the clear subtropical water of the warm Agulhas current, the absence of silt-laden rivers in the coastal hinterland and suitable coral substrate formed by the submerged sandstone beachrock.

Motta, Pereira and Schleyer (2002) pointed out that critical ecosystems such as coral reefs received specific attention in Mozambique's National Coastal Zone Management

Programme, and that a management plan for the country's coral reefs is being formulated. They found that the reefs in protected and inaccessible areas (such as off Bazaruto and the VCWS dune barrier cordon) were in the best condition with little evidence of algal cover. The northern reefs of southern Mozambique (i.e. off Bazaruto and VCWS) were the least affected by the severe floods of 2002, that led to a dramatic decrease in both hard and soft coral cover further south in the XaiXai lagoon (Motta *et al* 2002).

The VCWS reefs are fairly deep (10 – 40 m). Their depth, together with the difficulty to access them from land and their distance away from human habitation, add to their protection. During three dives undertaken by a member of the marine resources utilisation team, man-induced damage to the reefs was found to be negligible. Motta *et al* (2002)

1.4 FRESH WATER AQUATIC SYSTEMS, BIOTA AND HYDROLOGY

1.4.1 Introduction

The freshwater aquatic system and hydrological (FASH) survey was undertaken during late-August to mid-September 2002. The field survey was, as was the case for most of the surveys that took place as part of the PDF B process, hampered by a lack of time, the time of the year and the absence of aerial photographs (see below).

The survey involved the following tasks:

- Classification of the freshwater aquatic system:
 - A broad scale physical classification of the freshwater systems associated with the VCWS based on surface waters: general hydrological regime, size and general water chemistry i.e. pH, electrical conductivity (EC), and dissolved oxygen (DO).
 - A broad scale biological characterization (fish and macro-invertebrates) of the described freshwater systems associated with the VCWS.
- Determining the conservation importance of the freshwater aquatic system associated with the area:
 - Naturalness: A qualitative assessment of the deviation from a perceived natural state in terms of abstraction, exotics, erosion, flow regulation, pollution and land use.
 - Diversity: General qualitative macro-habitat descriptions and rapid sampling of fish and macro-invertebrates (identification of macro-invertebrates only to family level)
 - Rarity: Presence of habitats or species within VWCS.
 - Extent: Presence of habitats or species within VWCS.
 - Sensitivity: Perceived vulnerability and viability of habitats or species
- Identification of threats:
 - Threats to the freshwater aquatic systems and hydrology (FASH)
 - Information gaps & research needs

- Threats & limitations that may affect management actions
- Development of a FASH management plan
 - General description of the FASH
 - General description of the ecological attributes of the FASH
 - Identification and description of real or possible threats
 - Define the management/ conservation objectives for FASH
 - Define the management goals (milestones to measure performance and set endpoints to ensure achievement of the objective) for FASH

1.4.2 Survey objective

The objectives for the FASH component of the work was to conduct:

“an assessment of the aquatic freshwater systems of the VCWS, to identify conservation needs and priorities and to propose a management framework.”

1.4.3 Assumptions and limitations

Although it was realised from the onset that only a preliminary assessment of the freshwater aquatic system of VCWS would be possible, the focus of the FASH survey was to identify and analyse aquatic ecological attributes, rather than to present a detailed classification of the aquatic biota and habitat types associated with the VCWS. Issues such as the possible incidence of waterborne diseases were therefore not discussed, but are nevertheless regarded as a very important component of any management plan and should receive attention during a future follow-up survey.

The information is presented as principles for the way forward and is intended to highlight red flag issues and to focus efforts on relevant work and research needs.

Two major project limitations were identified:

- The survey was conducted at the end of the dry period and must therefore be regarded as limited in scope. The results should thus be treated with circumspection and should be viewed as part of an adaptive management strategy that could change as more data become available.
- Another major limitation was the lack of aerial photographs for the study area. It was therefore not possible to delineate the extent of the different freshwater types associated with the VCWS and the approach was limited to known and accessible freshwater bodies.

1.4.4 Methodology, data collection and interpretation

(1) Approach

The survey was undertaken as a hierarchical sequence of dependant tasks intended to highlight important FASH attributes that should be considered as part of the design of the BMP. The study was initiated with a literature survey intended to gather available information regarding freshwater ecosystems for the study area. A field survey was conducted to gather baseline data to assist with the development of a classification

framework for the freshwater aquatic system, as well as the identification of relevant ecological attributes that would enable the design of a conservation and biodiversity management plan for the freshwater ecosystem.

(2) Data collection

The aquatic habitats of VCWS include wetlands, pans, freshwater lakes, tidal mudflats, salt marshes, mangroves and estuaries. Exact demarcation of these habitats was not possible since aerial photographs were not available, and it was therefore not possible to implement a methodical survey that would ensure inclusion of all different freshwater types of the study area. The following sites in the current or Phase 1 of the sanctuary were therefore selected to represent as many of the known types of freshwater bodies present in the study area as possible:

Sites visited during the field visit.

Site	Co-ordinates
Xilowane Swamp	S: 22°15'20.3" E: 35°30'31.9"
Nhahotsane Pan	S: 22°11'53.3" E: 35°28'18.1"
Njone Lake	S: 22°11'09.9" E: 35°28'11.2"
Tirweni Pan	S: 22°07'45.5" E: 35°27'15.4"
Switsangweni Pan	S: 22°07'51.6" E: 35°27'20.6"
Jacana Swamp	S: 22°07'40.6" E: 35°26'55.0"
Mukwe pan	S: 22°07'55.3" E: 35°27'14.9"
Manhale Lake	E: 35°26'48.9" S: 22°16'55.7"
Madaca'munhu Marsh	E: 35°29'34.7" S: 22°08'47.9"
Jane Marsh	E: 35°29'51.0" S: 22°21'11.0"
Msasa Marsh	E: 35°26'43.4" S: 22°08'10.5"
Mazolo Marsh	E: 35°27'12.2" S: 22°08'57.2"
Marapi Marsh	E: 35°26'23.7" S: 22°09'30.4"

(3) Interpretation

Classification of freshwater bodies

The freshwater bodies were classified based on major readily identifiable differences. Although certain of these classification characteristics were artificial, they are replicable and are intended to facilitate decision-making regarding the implementation of future research and/or management actions. The classification system was based on characteristics such as type, size, hydraulics and the presence of biotopes.

Hydrology

- *Rainfall*: Rainfall data for Vilanculos appears in section 1.1.1 above.
- *Water quality*: *In situ* water quality data was collected from most of the abovementioned sites during the field visit. A water sample was also collected for Laboratory analysis from Mukwe Pan (reticulation pan). Temperature (°C), conductivity/TDS (ppm) and turbidity (cm secchi) were measured in the field with lightweight, compact field equipment. A water sample was also collected from the reticulation pond for analysis.

Aquatic invertebrates

Only a superficial study of the aquatic invertebrates of VCWS was possible in the limited time available. In order to implement an approach that would still allow an evaluation of the aquatic macro-invertebrate fauna, associated with the diverse habitat types, the same sampling exercise as used for the South African Scoring System (SASS) was used. SASS is a rapid method developed as a tool to assess the condition of flowing water in South African Rivers. Since the study area do not present many areas with flowing waters, only the sampling protocol of SASS was used to standardize collection effort. The number of invertebrate taxa collected from the different biotopes associated with the freshwater bodies was used to indicate the general diversity of these waters. The sampling protocol was standardised to four biotopes that included fringing or emergent vegetation, aquatic vegetation, open waters and bottom sediments. Sampling was conducted with a 1mm mesh size net mounted on a 30cm² frame.

The number of taxa collected at each site was converted to a percentage of the total number of taxa collected during the survey. This percentage diversity score was used as an indication of the invertebrate diversity at each site. Sites with a high diversity were generally regarded as of a higher conservation importance than sites with low diversities. Sites supporting rare and sensitive taxa (in terms of total diversity for the survey) were also warranted a high conservation importance, even if the site's overall biodiversity was low.

Fish

Fish were collected using standard sampling strategies, which included electro fishing; both small and large seine nets as well as gill nets. Different sampling strategies were used at the different sampling sites depending on the nature of the habitats present as well as the suitability of the sampling equipment for that habitat type. Each of the different methods is known to display some bias either amongst size classes or different species. The approach was therefore to use as many of the different strategies at each site as possible to minimize the likelihood of bias.

- *Electro fishing*: Is an efficient method, being quick and requiring little manpower. When used properly, fish experience minimal negative effects and it can be used in a wide variety of habitats including both shallow and deep waters as well as flowing and standing waters. The efficacy of this method depends on the conductivity of the water, temperature, species and fish size. Two electro fishing units were used: a portable battery operated unit (DC, 1A 350V pulsating) as well as a fixed generator driven unit (DC 600V 5A pulsating)
- *Seine & gill netting*: Netting, on the other hand, is not affected by conductivity or temperature and can be applied for different species as well as size classes. The method can also be implemented in much deeper water bodies where shocking would be impractical. This method does require experience and knowledge of fish habitats and behaviour. Two seine nets were used (15m x 9mm stretched mesh & 50m x 9mm stretched mesh) as well as a fleet of 10 x 10m multifilament gill nets, ranging from 22mm to 150mm stretched mesh sizes.

- *Fish poisons*: Fish poisons such as Rotenone are used extensively, specifically during baseline studies and abundance assessments. Due to the lack of available information regarding the presence of likely rare or sensitive species it was however decided not to use fish poisons during the survey due to its destructive nature.

Sampling effort for the different sampling methods was standardised for each depth and cover type. These standardised methods are presented in the following table.

Standardized sampling methods for different depth and cover classes.

	Slow shallow	Slow deep
Overhanging vegetation	Shock Seine, small	Seine, small Gill net
Undercut banks	Shock	Gill net
Aquatic macrophytes	Shock Seine, small	Seine, small Gill net
Open water	Seine, large	Seine, Large Gill net

Captured fish were identified and measured before being released. Reference samples were retained for identification purposes and will be lodged at the South African Institute of Aquatic Biodiversity.

Habitat integrity assessment (HIA)

The ecological integrity of an aquatic system is defined as its ability to support and maintain a balanced, integrated composition of physico-chemical and habitat characteristics, as well as biotic components on a temporal and spatial scale that are comparable to the natural characteristics of ecosystems in the region. The HIA measures specific criteria in order to provide an indication of the impact category of a site. Impacts were identified during the field visit to ensure that the integrity assessment was relevant to impacts actually affecting the habitat template for the different freshwater bodies present in the sanctuary.

The following real or potential threats were identified during the field survey:

Threats to the freshwater aquatic system associated with the VCWS

CRITERION	DESCRIPTION
Aquatic Zone Criterion	
Water abstraction	Abstraction for consumptive purposes
Infilling	Sediment infilling as a result of erosion
Resource exploitation	Exploitation of biotic resources
Water quality modification	Washing and/or salt loading
Inundation	Inundation from flooding
Exotic macrophytes	Presence of exotic macrophytes
Exotic aquatic fauna	Presence of exotic fauna
Riparian Zone Criterion	
Indigenous vegetation removal	Removal of vegetation associated with the riparian zone

Exotic vegetation encroachment	Encroachment of exotics in the riparian zone
Erosion	Erosion affecting run-off and sediment load into the water body
Villages	Presence of villages in the catchment area
Roads/Paths	Presence of roads or paths in the catchment area
Burning	Affects of burning in the catchment area
Cropping	Extent of cropping affecting the catchment area
Excavation	Excavation activities within the catchment area
Trampling	Trampling as a result of anthropogenic activities
Mining	Salt mining

Impacts were weighted using a weight matrix and cross comparison. Impact levels were evaluated as a deviation from a perceived natural condition to enable a qualitative assessment of the integrity of a site. Sites were classed from no discernable impairment (zero), to critical impairment (25). A Score summary is provided below.

Summary of scoring for impact criteria

Criteria score		
Description	Score	Impact category
No discernable impact, or the factor is located in such a way that it has no discernable impact on habitat quality diversity, size and variability	0	None
The modification is limited to few localities and the impact on habitat quality, diversity, variability and size is very small	1-5	Small
The modification is present at a small number of localities and the impact on habitat quality, diversity, variability and size is also limited	6-10	Moderate
The modification is generally present with a clearly detrimental impact on habitat quality, diversity; large areas are however not influenced	11-15	Large
The modification is frequently present and the habitat quality, diversity, variability of almost the whole section is affected. Only small areas are not affected	16-20	Serious
The modification is present overall with a high intensity; the habitat quality, diversity and variability in almost the whole of the defined section are detrimentally influenced	21-25	Critical

For the purposes of this survey, the HIA approach was used to present an indication of habitat quality rather than impact level, in order to facilitate decision-making regarding the conservation importance of the different water bodies. Once the scores were weighted, the weighted score for each criterion at each site was calculated by the following equation:

$$WS = (SR) \times (25)/CW$$

Where:

WS = Weighted Score

SR = Severity Rating = Impact Score given in the field

25 is the maximum possible severity rating in this case

CW = Criteria Weight Percentage

The weighted scores for all the criteria at a particular site were then summed to produce a score indicating what percentage of that site is impacted. This score was subtracted from 100 to give an indication of what percentage of the site was not impacted.

This percentage was then categorised into the following impact classes:

Classification of site impact class.

Site Score		
Score (%) of Total	Class	Description
90-100	A	Unmodified, natural
80-90	B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the basic ecosystem functions are essentially unchanged.
60-79	C	Moderately modified. A loss and change of natural habitat and biota has occurred, but the basic ecosystem functions are still predominantly unchanged.
40-59	D	Largely unmodified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
20-39	E	The loss of natural habitat, biota and basic ecosystem functions is extensive.
0-19	F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances, basic ecosystem functions have been destroyed and the changes are irreversible.

1.4.5 Results and discussion

1.4.5.1 Classification of aquatic systems

The classification of the freshwater aquatic systems was based on a single survey at the end of the dry season. This presents a major limitation since it was not possible to assess the level of wet season connectivity between the different (currently isolated) water bodies.

The current delineation between pans and lakes should be regarded as an artificial one since it is based only on size. This delineation is however regarded as important and is related to the perceived sensitivity of the water body to impairment. Smaller water bodies generally have a lower resistance to change than larger systems. This difference in the resistance (ability to withstand change) and resilience (ability to recover from change) between small and large systems necessitates a division between small and large systems for management purposes.

Pans

Pans are regarded as water bodies without in or outflow (endorheic) that are fed through rainwater run-off or recharged by groundwater. Pans on VCWS are generally smaller than approximately 20ha, deeper than 1m and could dry up on a seasonal basis. Pans on the sanctuary are divided into vegetated pans e.g. Nhahotsane Pan, Switsangweni Pan, Jacana Pan and non vegetated pans i.e. Tirweni Pan.

Lakes

Lakes are not necessarily closed water bodies and are much larger (typically larger than 30 ha) and deeper (deeper than 3m) than pans. Lakes are generally permanent and are maintained through run-off, groundwater recharge or surface water inflows.

Freshwater marshes

The freshwater marshes (Jane Marsh & Xilowane Marsh) on the sanctuary (Phase 1; Phase 2 was not surveyed) are open systems and drains into the ocean or estuary. These marshes are densely vegetated and supports only small areas of non-vegetated open water. The marshes are maintained through rainwater and/or groundwater recharge.

Ecotone marshes

Ecotone marshes are the transitional areas between the freshwater and marine environments. These are highly fragile ecosystems since the maintenance of these systems depends on a delicate balance between the influx of both fresh and salt water and any alteration to this balance can have far reaching implications on the functioning of the marsh. Such impacts are still evident from the destruction that resulted from the 2000 floods.

The Ecotone marshes are divided into marshes that are maintained by inflow of surface freshwater e.g. Xilowane Ecotone Marsh, and marshes that are maintained by freshwater seepage into the ecotone such as Msasa Ecotone Marsh, Mazolo Ecotone marsh, Madaca Munhu Ecotone marsh, Airstrip Ecotone Marsh and Marapi Ecotone Marsh.

1.4.5.2 Hydrology

Rainfall

The Mean Annual Precipitation (MAP) for the nearby mainland town of Vilanculos for the period 1997 – 2001 was measured at 901 mm, with a mean annual evaporation of 1083 mm. Occasional cyclone activity, such as happened in 2000, could cause extreme rainfall conditions and flooding to occur.

General hydrological description

The VCWS is situated in sand dune systems along the coast to the north of Maputo. The system consists of a series of lakes swamps and pans set in the coastal dunes. There are no major river systems passing through or feeding the current extent of the VCWS area. The water generated in the VCWS is by direct rainfall or the tidal influx from the sea in certain areas.

The system of lakes and pans is essentially driven by the groundwater system under the dunes. The dune sands have relatively high hydraulic conductivities and therefore infiltration rates. The rainfall intensities associated with typical storms in the area would infiltrate into the dunes down to the water table causing the water table level to fluctuate. During high intensity storms or storms of long duration, the water table will rise to the surface and the sands will become saturated. The rainfall would then flow over the surface to the water bodies. In general however the water would flow subsurface to maintain the surface water bodies.

The nature of the subsurface flow would depend on the topography, geology of the dunes and hydraulic conductivities of the particular basin. The subsurface flow could reach the water bodies in the following ways: -

- Subsurface flow all the way to the body;
- The subsurface flow could daylight in the form of a spring or seepage area which would then flow over the surface to the water body;
- Within a particular catchment, the local conditions could vary such that the water bodies could be fed by both mechanisms.

The groundwater catchments could be quite different from the surface water catchments. The groundwater surface in the dunes would define the water bodies that are linked. The individual basins or catchment areas could therefore be linked through the groundwater. One water body could flow into another. A series of boreholes, topographical survey (contour plan of the area) and hydrographic survey of the lakes/pans would enable the groundwater catchments and flow directions to be defined.

Wright (1996) postulated that the eastern dune cordon that dominates the morphology of Bazaruto Island forms a rain barrier that causes a rain shadow on the western side of the island. It also slows down the prevailing winds, and thus catches a lot of the island's precipitation. Combined with the high permeability of the dune sands, this acts as Bazaruto's main reservoir of groundwater. In the case of VCWS, the coastal dune cordon to the east of the Inhamambane estuary may fulfil the same role, thus contributing to the extensive wetland system, including the Jane Marsh and the Muangane Marsh further south in the Phase 2 area, on the lee side of the dunes. These wetlands drain northwards into the Inhamambane Estuary.

Water quality

In situ water quality measurements were made on site and are presented below. Water quality has a direct effect on aquatic biota and is also important in defining the specific characteristics of a site.

***In situ* water quality.**

Site	Date	Time	Temp(°C)	TDS(ppm)	Turbidity(mm)
Xilowane Marsh	29/08/02	10:31	27	310	
Nhahotsane Pan	30/08/02	13:10	28.5	240	2170
Njone Lake	31/08/02	15:35	28.5	990	690
Tirweni Pan	1/9/2002	9:04	26	260	210
Switsangweni Pan	1/9/2002	10:32	28	190	750
Jacana Pan	1/9/2002	15:14	29	420	570
Mukwe Lake	2/9/2002	12:38	29	230	1350
Manhale Lake	5/9/2002	13:33		670	570
Madaca'munhu Ecotone	4/9/2002	15:06		ADL	
Jane Marsh	10/9/2002	11:08	26.3	200	750
Msasa Ecotone	3/9/2002	10:12		1990	
Mazola Ecotone	4/9/2002	11:00		ADL	
Marapi Ecotone	3/9/2002	14:15		ADL	

Although water quality parameters were generally of high standards, and no major pollution sources were identifiable, TDS and Turbidity ranges are worth mentioning. The total dissolved salt load ranged between 190 mg/l to 990mg/l for the inland freshwater systems and were much higher for the Ecotone marshes ranging from 1990mg/l up to 33000mg/l. Turbidity also varied from as high as 2170mm to only 210mm. The cause for the difference in salt loading in Njone Lake is at this stage not clear.

1.4.5.3 Aquatic invertebrates

Due to time constraints aquatic macro invertebrates were only collected from the pans and lakes visited during the study and not from the Ecotone marshes. A total of 37 aquatic macro invertebrate taxa were sampled at nine sites during the survey and are presented in Volume 3: Species lists, of the BMP.

Some invertebrate taxa that could be regarded as sensitive to water quality impairment were collected (seed shrimp, pale burrower etc) from all sites. Of specific importance are the seed shrimps collected from Mukwe Lake. Seed shrimps usually occur under conditions with elevated salt concentrations, but the site at which they occurred had a fairly low TDS of 230. Freshwater sponges, another taxa sensitive to water quality impairment, were also collected from Xilowane and Lake Mukwe.

Diversity of taxa

The number of taxa and % diversity for each site are represented below. The diversity of the macro invertebrate fauna associated with the freshwater system is generally low. The reason for this is ascribed to the lack of any flowing/ rocky biotopes known to support high diversities. The diversity assessment focussed on the truly freshwater systems and no macro invertebrate collections were made from the Ecotone Marshes.

The number of taxa collected, the % of taxa collected and the diversity score for each site.

Site	No# of taxa	% Total taxa	Diversity score
Nhahotsane pan	15	40.54	Medium
Xilowane marsh	33	89.19	High
Njone lake	16	43.24	Medium
Tirweni pan	9	24.32	Low
Manhale lake	13	35.14	Medium
Jane marsh	17	45.95	Medium
Switsangweni pan	10	27.03	Low
Jacana swamp	12	32.43	Low
Mukwe lake	18	48.65	Medium
TOTAL	37	100.00	

0 – 33% = Low diversity
 34 – 66% = Medium diversity
 67 – 100% = High diversity

The variation in the diversities of Invertebrate Taxa amongst different freshwater bodies can probably be related to intrinsic biotope diversities.

Taxa of conservation importance

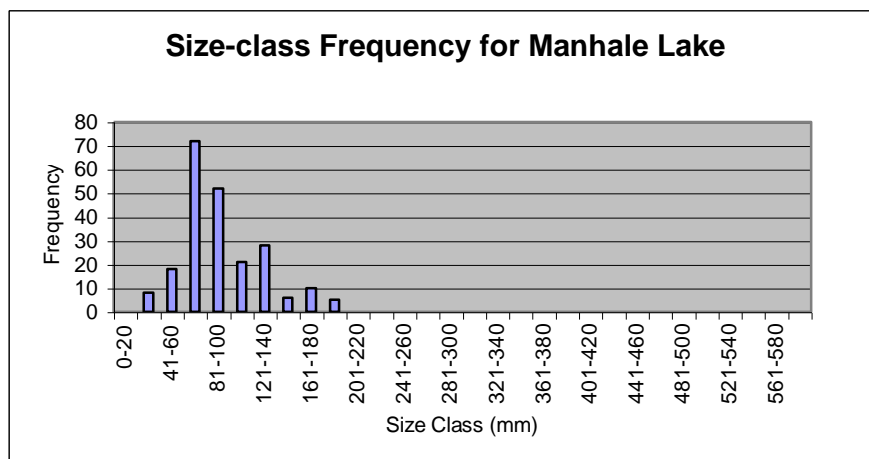
A freshwater sponge was collected from Mukwe Lake. Freshwater sponges are known to be highly sensitive to water quality alterations and are therefore regarded as good indicator organisms. An Ostracod was also collected from Mukwe and awaits identification.

1.4.5.4 Fish

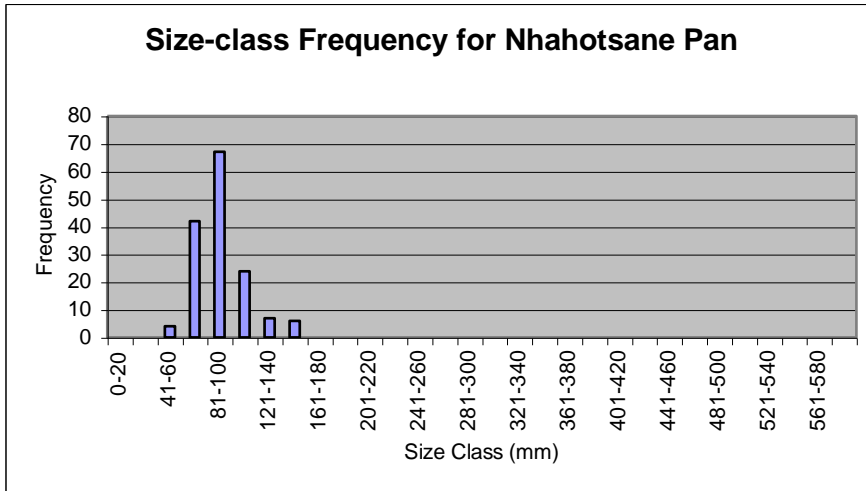
Very low fish diversities were collected from the different sites. The collected species represented mostly generalist and widespread species. This low diversity is ascribed to the absence of any river system that feeds the area. The dominant species sampled was *Oreochromis mossambicus*. This species was collected from all the different freshwater types visited during the field survey and was, except for the marshes and Njone Lake the only species collected from the endorheic pans. Other species collected during the survey included *Barbus paludinosus*, *Clarias gariepinus*, *Awous cf ??* (not identified yet) and a Gobeiid species (possibly a new species?) from Njone Lake that is awaiting identification. Mud skippers (*Periophthalmus koelreuteri*) were sampled from most of the Ecotone marshes.

Resource utilisation

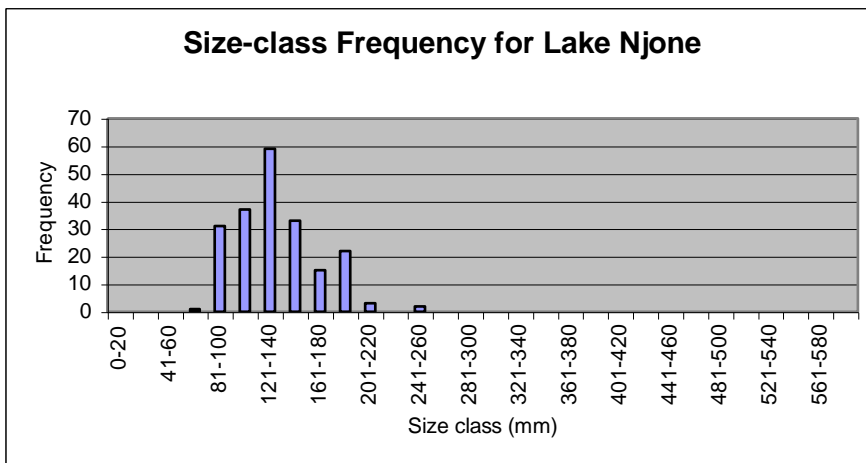
Length frequency graphs were drawn up for four of the sites where local people are known to harvest the freshwater fish resource. At all these sites sufficient numbers of *Oreochromis mossambicus* were caught to allow a brief evaluation of resource utilization.



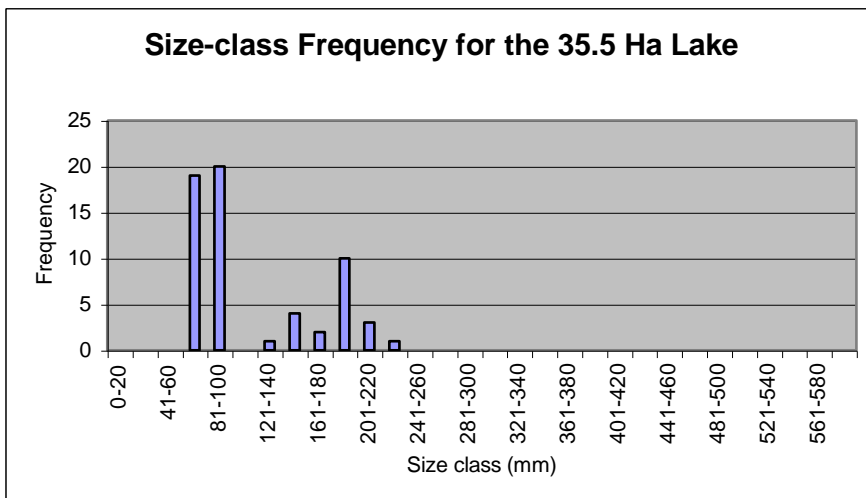
SIZE-CLASS FREQUENCY OF *Oreochromis mossambicus* SAMPLED IN MANHALE LAKE



SIZE-CLASS FREQUENCY OF *OREOCHROMIS MOSSAMBICUS* SAMPLED IN NHAHOTSANE PAN



SIZE-CLASS FREQUENCY OF *OREOCHROMIS MOSSAMBICUS* SAMPLED IN LAKE NJONE



SIZE-CLASS FREQUENCY OF *OREOCHROMIS MOSSAMBICUS* SAMPLED IN LAKE MUKWE

From the length frequency distributions it is evident that the populations associated with the different lakes cannot be regarded as over exploited since different size classes are mostly present in the collected samples. The length frequency distribution

for Mukwe Lake is however of concern since some pressure must be the cause for the non-typical length frequency distribution recorded from the Lake. This is however more likely related to intrinsic pressure in the lake rather than fishing pressure.

Issues of conservation importance

Three issues are of specific conservation importance:

- The likely presence of *Cloiria* within the Ecotone marshes, typically Msasa marsh as well as Marapi marsh.
- The unidentified gobeiid from Njone Lake.
- The variation in colour patterns of *Oreochromis mossambicus* from Mukwe Lake indicating isolation from other populations on the sanctuary as well as from mainland populations.

1.4.5.5 Habitat integrity assessment (HIA) scores

Aquatic systems are very sensitive to physical and chemical changes (Maitland & Morgan, 1997). In order to assess the integrity of the sites an evaluation exercise was implemented to ensure a fair evaluation of impairment levels associated with the site.

The site integrity scores are summarised as follows along with the associated impact classes

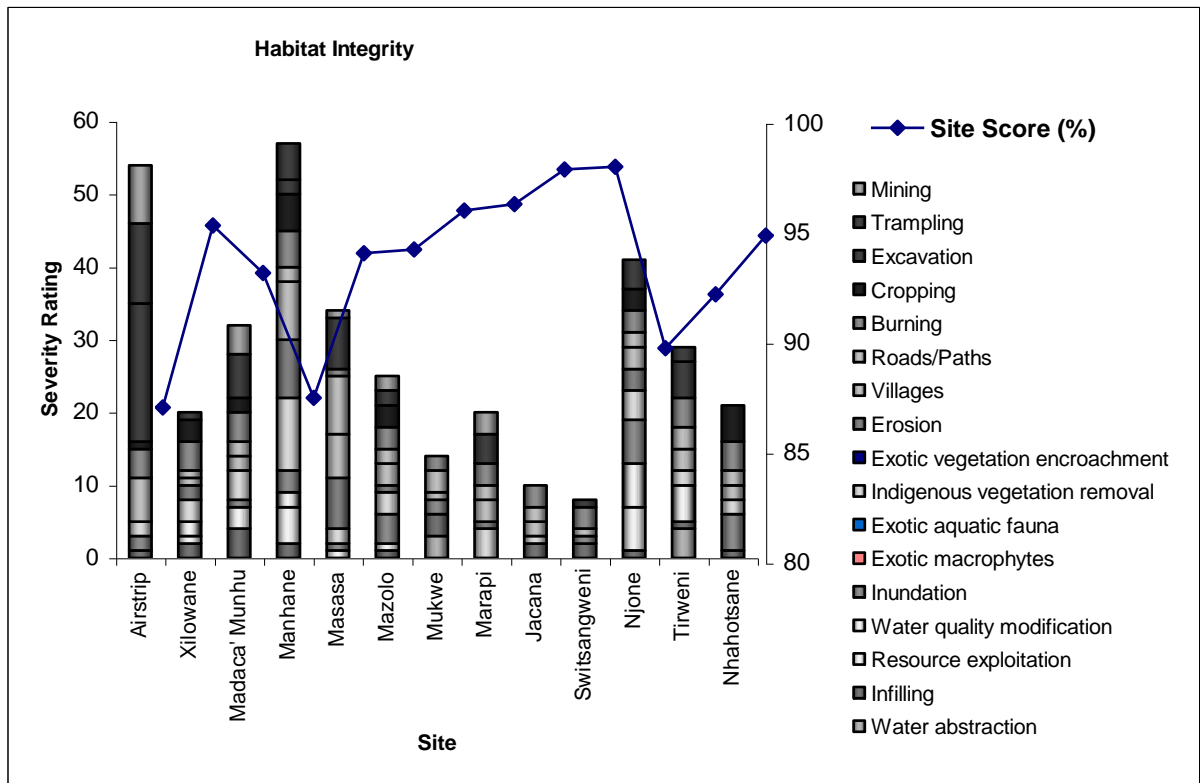
Site Integrity Score Summary

Site	Score	Class
Airstrip	87.08	B
Xilowane	95.36	A
Madaca' Munhu	93.21	A
Manhale	87.52	B
Msasa	94.10	A
Mazolo	94.28	A
Mukwe	96.04	A
Marapi	96.35	A
Jacana	97.90	A
Switsangweni	98.04	A
Njone	89.77	B
Tirweni	92.23	A
Nhahotsane	94.90	A

From this assessment it is evident that the habitat integrity of the different freshwater systems associated with the VCWS are generally of an exceptionally high status. The impairment levels at all these freshwater systems are still regarded as of a limited nature and can be restored since it is not affecting the overall functioning of these water bodies. The only exception to this is the impacts on the Airstrip Ecotone that could result from the excavation associated with the newly constructed landing strip. Although the excavation of the drainage line into the salt marsh has not yet resulted in the onset of erosion it represents a nick point in the drainage line that could threaten the functioning of the whole marsh by erosion.

Both Manhale and Njone Lakes also indicate generally increased impairment levels. This is attributed to the importance of the use of these lakes as fishing areas.

An overlay of these site percentage scores for each site are presented in the figure below, with a bar graph giving the summed habitat integrity scores before they were weighted.



Overlay of Integrity score over Summed severity ratings for each site.

CHAPTER B2: BIOLOGICAL ENVIRONMENT

2.1 VEGETATION

2.1.1 Introduction

The VCWS was first visited (by the vegetation specialist, Dr Niels Jacobsen) from 13 June to 2 July 2002, although the actual survey period was shorter. This visit concentrated on the flora and a follow-up visit was conducted from 26 August – 13 September, during which time the emphasis was more on the fauna. However each was not exclusive. As the surveys took place during the winter months many plants could not be identified. Despite this drawback, the species list of some 505 plants includes many new distribution records. A relatively comprehensive survey cannot be achieved over such a short period of time, particularly at this time of the year, and follow up surveys will be undertaken to include spring and summer.

2.1.2 Survey methods

The area of Phase 1 was accessed by vehicle and on foot and notes made of the vegetation occurring at the site (s) traversed. Plants were recorded on a pocket tape recorder for later transcription. Where possible specimens in fruit or flower were collected for later confirmation of field identifications and for those not identified. As far as possible as many different habitats within the VCWS were sampled for plant taxa. The survey was seriously hampered by the lack of aerial or orthophotos of the sanctuary. These would have made the selection of survey sites to cover the terrain as fully as possible in the time available, much more efficient as well as being able to provide a low-resolution vegetation map of the area.

2.1.3. Results

2.1.3.1 Classification

The VCWS lies within the Flora Zambesiaca area and according to Wild & Grandvaux Barbosa (1967) the vegetation in the sanctuary is comprised of three main types namely 14a. Mangroves, 14b. Coastal Thicket (Forest) and 20. *Brachystegia spiciformis* woodland/savanna on Sul do Save sands. White (1983) incorporated the vegetation of the peninsula firstly into coastal Mangroves and secondly the inland Zanzibar – Inhambane regional mosaic, comprised mostly of forest, thicket and secondary grassland according to physiognomy and rainfall.

As a consequence of the large relatively uniform area of aeolian sand deposition and the resultant dune topography, it is poor in habitat diversity. In addition the area has also been subjected to human habitation and its attendant destructive processes dating back at least to the nineteenth century (Richter pers comm.).

2.1.3.2 Species richness, rare and threatened species

A total of 505 species of plants were recorded from Phase 1 of the VCWS (see the annotated species list, Volume 3 of the BMP). Many other hitherto unidentified specimens were collected for identification and verification, which are likely to substantially increase the number of species recorded from the VCWS.

Several species of rare or endangered species were found including the following Red Data Book species (Golding in press):

Species	RDB Category
<i>Azelia quanzensis</i>	LR-nt
<i>Allophyllus mossambicensis</i>	VU
<i>Aloe suffulta</i>	DD
<i>Encephalartos ferox</i>	LR-nt
<i>Eulophia petersii</i>	DD
<i>Maerua brunnescens</i>	DD
<i>Pavetta revoluta</i>	DD
<i>P. sp. cf catophylla</i>	DD
<i>Tritonia moggii</i>	DD
<i>Zanthoxylum schlechteri</i>	VU

VU – vulnerable; DD – data deficient; LR – locally restricted, nt – near threatened.

Several species are Mozambique endemics or near endemics such as:

Brackenridgea zanguebarica
Commiphora schlechteri
Euphorbia halipedicola
Euphorbia sp. aff. ambroseae
Mimusops obtusifolia
Tritonia moggii
Allophyllus mossambicus
Zanthoxylum schlechteri

Many new distribution records for species were recorded (vide Palgrave 1984). These included such species as *Mundulea sericea*, *Millettia grandis*, *Craibia zimmermannii*, *Dracaena mannii*, *Trema orientalis*, *Maclura africana*, *Ficus thonningii*, *Ximenia caffra*, *Artabotrys monteiroae*, *Capparis sepiaria*, *Albizia adianthifolia*, *Acacia burkei*, *A. kraussiana*, *Afzelia quanzensis*, *Pterocarpus rotundifolius*, *Erythroxylum delagoense*, *Teclea gerrardii*, *Commiphora neglecta*, *Acridocarpus natalitius*, *Drypetes arguta*, *Sapium ellipticum*, *S. integerrimum*, *Euphorbia triangularis*, *Lannea antiscorbutica*, *Allophyllus africanus*, *Grewia flavescens*, *Hibiscus diversifolius*, *Adansonia digitata*, *Rawsonia lucida*, *Dovyalis longispina*, *Combretum pisoniiflorum*, *Syzygium guineense*, *Manilkara mochisa*, *Inhambanella henriquesii*, *Euclea racemosa*, *Cordia sp. cf goetzei*, *Ehretia rigida*, *Tricalysia lanceolata*, *Canthium huillense* and *C. inerme*.

The vegetation of the VCWS is therefore of considerable interest, especially those species which as yet have not been recorded or identified. With more time available a detailed survey of the sanctuary will be undertaken, including the compilation of a vegetation map to assist in assessing the utilization by, and the requirements of, the re-introduced fauna.

2.1.3.3 Communities

Although Wild & Grandvaux Barbosa (1967) have incorporated the vegetation of the area into three basic types (Mangroves, Dune thicket and Miombo woodland), these can be further subdivided into broad communities. It must be borne in mind however that no quantitative analysis of the vegetation has been undertaken, and that detailed vegetation mapping will need to be undertaken at a later stage.

Sea Grass Community

The “sea grasses” are not really grasses but are related angiosperms growing totally submerged in shallow sea waters (<3-5 m deep). Only four species were recorded during the survey but more are expected to be identified during follow-up surveys. These grasses are rooted in the sand, forming extensive swards of monotypic species or of communities of mixed species. The most common species appeared to be *Thalassodendron ciliata*, a broadleaved, stalked species that occurred extensively throughout the bay, and *Cymodocea serrulata* that is common along the estuary. The other less common species were *Halodule uninervis* and *Syringodium isoetifolia*.

Salt marsh community.

Salt marshes are poorly represented in the VCWS, being largely restricted to those areas that are flooded during high tide and drain again at low tide. Much of these sites are bare sand with vegetation limited to mangroves and where some freshwater reduces the salinity a more typical salt marsh community may be found. This is dominated mostly by a sedge-like plant *Juncus kraussi*, a species reaching 70-80 cm in height and very tolerant of high salinity. In the marsh along the estuary a sedge *Schoenoplectus litoralis* also occurs together with the former species. Much of the terrain in the salt marsh below Msasa camp at Porto Seguro, is covered by another sedge *Cyperus* sp., a taxon also present at other sites. Only a few other salt marsh species were recorded, including *Salicornia perrieri*, *Sarcocornia* sp. cf *perennis*, *Sesuvium portulacastrum*, *Salsola* sp. and *Chenolea diffusa*. The large Mangrove fern *Acrostichum aureum* grows predominantly under these conditions particularly in salt marshes along the eastern side adjacent to the estuary. Under drier conditions the salt tolerant grass *Sporobolus virginicus* forms extensive monotypic swards.

Mangrove Community

The mangrove communities are contiguous with the salt marsh communities but tend to be dominated by woody plants. Although some zonation of species as described by Mogg (1969) from Inhaca Island near Maputo in southern Mozambique, it is evident that this varies from place to place and frequently plants occur mixed. Mangrove is a loose term for halophytes that have adapted to living with their roots submerged for lengthy periods of time in sea water. Most have developed roots that remain above water for longer periods enabling the plants to breathe. There are various modifications by different species, allowing these species to inhabit waters of different depths, hence some resultant stratification of the plants.

In deepest waters large species such as *Sonnerattia alba* are found, behind which there was often a mixture of *Ceriops tagal*, *Rhizophora mucronata* and *Bruguiera gymnorhiza*. The latter was usually more prevalent on the landward side. Closest to the shore and extending onto the lower sandy beach zone were White mangroves *Avicennia marina*. This species was also usually present around salt marshes as the waters tended mostly to be shallow or was absent, allowing the pneumatophores or air roots to breathe. Particularly fine stands of this species were found at the upper end of the estuary.

In many of the mangrove communities there were plants without such modifications but still highly tolerant of saline conditions. Such halophytes included *Brexia madagascariensis*, *Lumnitzera racemosa* and *Suriana marina*. These plants may form monotypic stands under suitable conditions, usually on the landward side of the mangroves. The Mangrove fern *Acrostichum aureum* was also observed in mangrove communities along the peninsula.

Dune Community

The dune plant community differs substantially from that of the mangroves and few plants are shared. This is essentially because life under extremes of climate as experienced on the sea shore and dunes is more demanding, resulting in different adaptive strategies. As there is mostly a difference in the plant species which inhabit the fore dunes and those along the top and lee of the dunes, this community has been arbitrarily split into two subcommunities.

Fore dune/ Strand subcommunity

Along the lower and middle littoral zone few plants occur and the sand is mostly bare. Some grass such as *Sporobolus virginicus* may occur forming substantial swards. It appears to be absent from east facing slopes having only been recorded from those facing west and north. A prostrate rhizomatous herb *Sesuvium portulacastrum* also grows along the lower slopes, frequently where the White mangroves end. These species increase in density further up the slope, especially the grass, with which the *Sesuvium* is unable to compete. *Sporobolus virginicus* is therefore a dominant species over much of the middle to upper littoral zone, with several other species such as *Cyperus crassipes*, *Ipomoea pes-caprae*, *Canavalia rosea* and *Scaevola plumieri* being present. These plants bind the loose sand and enrich the soil, increasing water-holding capacity and providing humus. They are therefore very important in maintaining dune stability.

Dune Thicket and Scrub subcommunity

In the east, the plateau regions of the peninsula is somewhat isolated from the strong south-easterly winds which appear to be the prevailing winds along the outer Spit (or dune barrier cordon), which therefore appears to act as a windbreak reducing the influence of salt spray over much of the actual shoreline of the peninsula. This may be the reason why many of the woody species grow here without exhibiting signs of wind shear.

The vegetation along the outer Spit, by contrast, bears the brunt of the prevailing winds. The dunes on the eastern side of the Spit rise sharply and steeply, and are largely bare of vegetation along the windward side, with only scattered tall specimens of the exotic *Casuarina equisetifolia* growing along the upper slopes. Erosion at the foot of the dunes as a result of wave undercutting, is in progress. It is only at, or near the crest that plants such as *Ipomoea pes-caprae* form extensive mats together with the less abundant *Launaea sarmentosa* and *Carpobrotus junodii*.

In the lee of the dunes the vegetation cover increases and includes stands of *Sporobolus virginicus*, *Cyperus crassipes* and woody species, in particular *Diospyros rotundifolius*. In hollows where rain water gathers other species occur, particularly Wild date palms *Phoenix reclinata* and grasses such as *Imperata cylindrica*. Beyond the first dunes the vegetation cover varies considerably from areas of bare sand to clumps of *Diospyros rotundifolius* and other shrubs and thickets of *Phoenix* and *Hyphaene coriacea* in hollows, often together with stands of reeds *Phragmites australis*.

Exotic Casuarinas are widespread here but decrease in frequency westwards. Shrubs become more plentiful and species richness increases from east to west. Species such as *D. rotundifolia*, *Pavetta* sp. cf. *catophylla*, *Eugenia capensis*, *Mimusops caffra*, *Maclura africana* and *Clerodendrum glabrum*, *Euclea natalensis* and *Sophora inhambanensis* occur. Areas inundated during high tide have dense stands of *Suriana marina* growing along the lower slopes. Scattered grass tussocks occur along the littoral zone in the west, typical species being *Sporobolus virginicus*, *Cyperus crassipes*, *Ipomoea pes-caprae* and *Canavalia rosea*.

On the margins of the peninsula the dunes rise steeply in the east to an undulating plain, a former beach terrace < 5 m above sea level, whereas at the northern end the dunes fall steeply into the sea, with the narrow beach terrace 200 – 300 m in width along the northwest only 1-2 m above sea level. In the west there is a similar narrow beach terrace but this tails off rapidly southwards just beyond Dugong Lodge. The vegetation varied considerably according to aspect, with that in the east and north forming dune thicket and scrub, with miombo woodland and thicket in the west reaching the upper littoral zone.

The vegetation of these lowland areas in the north and east were especially species rich, with more than 100 taxa recorded in the narrow north-western terrace. Although some species such as *Cyperus crassipes*, *Canavalia rosea* and *Sporobolus virginicus* also grow along the upper littoral zone, crest and even behind the crest, woody species predominate forming a more stable habitat for forbs and other plants to grow in.

The woody species included an *Acacia* sp. cf *grandicornuta*, *Elaeodendron matabelicum*, *Mimusops obtusifolia*, *M. caffra*, *Sideroxylon inerme*, *Sclerocarya birrea*, with *Maclura africana* very common along the sea front. Other trees included *Trichilia emetica*, *Teclea gerrardii*, *Euphorbia triangularis*, *Dialium schlechteri* and *Vepris lanceolata*. Shrubs consisted mostly of *Brackenridgea zanguebarica*, *Suregada zanzibariensis*, *Rawsonia lucida* and *Maerua nervosa* but varied considerably including amongst others, *Capparis sepiaria*, *Dicrostachys cinerea* and in parts *Commiphora neglecta* and *Zanthoxylum schlechteri*. Stunted Msimbeet *Milletia grandis* were also recorded from dune thicket opposite the disused lighthouse on the Spit. The field layer contained many species, most common of which were *Barleria crossandriiformis*, *B. repens* and *B. sp. cf gueinzii*. Climbers included *Adenia gummifera*, *Combretum pisoniiformis*, *Acacia kraussiana*, *Secamone filiformis* and others typical of a thicket or forest community.

The remnant dune thicket was patchy, sometimes impenetrable but normally represented by scrub and open areas. Along the estuary several immature Baobabs *Adansonia digitata* were present, probably the result of the translocation of fruit to the area by the local fishing community followed by subsequent germination and growth. The dunes south of the estuary are characterised by peaks and troughs and the vegetation is very variable, alternating between tall thicket or forest in hollows where soil moisture is perhaps higher and dense scrub along the crests and slope. Here other species may be dominant such as *Eugenia capensis*. The vegetation of this area is very complex and a follow-up survey will be undertaken to allow a proper assessment.

In the north behind the dune scrub the beach terrace dipped inland forming depressions before rising to the central upland dune field of the peninsula. These depressions have become marshy, some permanent and others seasonal, mostly grassland and sedges but fringed along the margins with thickets of *Phoenix reclinata*. A tongue of mangroves and salt marsh extend along the foot of the dunes at the tip of the peninsula, almost separating the former beach

terrace from the hinterland. In the south the extensive Jane marsh lies along the inland side of the dunes, emptying into the estuary.

Wetlands

The sanctuary has two basic freshwater wetland types namely pans and marshes:

Pans

The area has many pans, some seasonal and others perennial ranging in size, ranging from small depressions which hold rain water for short periods to a lake of about 1000 ha and several metres deep. According to van der Walt (pers. comm.) all of the main depressions lie at sea level. Most of these pans can be split into those with emergent vegetation and those without. Among the former are pans in the process of filling in, that is, retaining such shallow water that vegetation encroachment from the side is possible, and those with deeper water but with rooted aquatic vegetation, with floating leaves as well as submerged species. A few pans were found which did not have emergent hydrophytes.

Apart from these relatively minor differences the vegetation of these pans is similar throughout the peninsula. Pans in the process of filling in, have patches of reeds *Phragmites australis*, bulrushes *Typha capensis* and dense growths of Nile grass *Acroceras macrum*. In patches of open water, rooted aquatics such as *Nymphaea nouchalii* var. *caerulea* occur, with their leaves floating on the water.

Vegetated pans mostly have large numbers of waterlilies of both *N. nouchalii* var. *caerulea* and *N. nouchalii* var. *zanzibariensis*. Submerged in the pans are many plants of the bladderwort *Utricularia stellaris*, a yellow flowered herb with whorled air bladders and another *Utricularia* sp. also with yellow flowers in the south around Jane marsh.

Most of the littoral zones of the pans are bare because of the receding water levels. Some plants grow in these moist soils as the water levels retreat, including bladderworts, sundews and sedges such as *Fuirena* spp. However most of the soils were bare. At the margin of more perennial pans vegetation in the form of *Cyperus sphaerospermus* commonly occurs, sometimes forming monotypic stands. Along the upper littoral zone a sedge *Cyperus* sp. cf *sphacelatus* formed extensive stands which thinned out upslope towards the ecotone with terrestrial vegetation. A zone of the grass *Ischaemum fasciculatum* is usually found around the upper littoral of the pan often with the previously mentioned sedge growing amongst it. Other grasses such as *Imperata cylindrica* were present around some pans and everywhere the prostrate blue-flowered *Veronica anagallis-aquatica* was found.

Most pans also exhibited a ring of *Hyphaene coriacea* along the ecotone with the miombo woodland. This may be densest in the west and north of the pan. Although some variations were seen most of the pans exhibited a similar zonation.

Marshes

The freshwater marshes were mostly restricted to the eastern side of the peninsula and comprised extensive stands of vegetation separated by areas of open water, usually covered by the leaves of waterlilies. In most instances the ecotone between the marshes and the surrounding woodland was relatively narrow. The marshes showed a similar vegetation community to that of the pans, comprised largely of rooted waterlilies and emergent stands of reeds *P. australis*, bulrushes *T. capensis* and large tussocks of the sedge *Cladium mariscus*. Another large broad-leaved sedge *Scleria poiformis* formed dominant stands in parts of the Jane marsh. Grasses such as Nile grass *Acroceras macrum* and Rice grass *Leersia hexandra* also grew in patches in shallow water. The swamp fig *Ficus trichopoda* formed stands under suitable conditions and ferns such as *Thelypteris interrupta* grew in moist conditions together with sedges such as *Cyperus* sp. cf *sphacelatus*, which formed stands along the margins of the marsh thinning out on the landward side. The grass *Ischaemum fasciculatum* also formed extensive stands along the littoral zone often together with the previous species. The climbing swamp fern *Stenochlaena tenuifolia* was found to occur along the ecotone between woodland and marshes at many sites along the peninsula.

Miombo woodland

Most of the sanctuary is covered by open to closed *Brachystegia spiciformis* and *Julbernardia globiflora* woodland (Miombo). These species dominate the woodland and are therefore most common. According to Wild & Grandvaux Barboza (1968) these species vary in dominance according to soil conditions and aridity, with *Julbernardia globiflora* dominating on the poorer soils. Canopy height varied from 3-10 m. Many other trees and shrubs grow in miombo woodland, either solitary or in clumps. Such species included *Balanites maughamii*, *Brachystegia* sp. cf *torrei*, *Ozoroa obovata*, *Maprounea africana*, *Olax dissitiflora*, *Garcinia livingstonei*, *Strychnos madagascariensis*, *S. spinosa* and *Dicrostachys cinerea* among others. Shrubs such as *Pavetta* sp., *Ochna natalitia*, *Synaptolepis kirkii* and especially *Crotalaria monteiroi* were present, the latter very widespread and common.

Typical miombo woodland may have an open to closed canopy interspersed by a field layer of grasses in more open areas. In the sanctuary this grass layer is dominated by two species namely *Digitaria eriantha* and *Andropogon schirensis*. Other species such as *Heteropogon contortus*, *Hyperthelia dissoluta*, *Schizachyrium sanguineum* and *Triraphis schlechteri* were also sporadically present. The sedge *Bulbostylis hispidula* was also very abundant throughout. Forbs were common but did not contribute much to the ground cover. *Chamaechrista plumosa* was particularly common. Other species included *Oxygonum dregeanum*, *Commelina diffusa*, *C. erecta*, *Indigofera* spp., *Kyphocarpa angustifolia*, *Aneilemma hockii*, *Crotalaria* spp., *Tephrosia longipes*, *Vernonia centauroides* and many others. *Sarcostemma viminalis* was common under these conditions, frequently growing around the base of trees, particularly in areas of poor soil.

Large areas remain bare because of a probable lack of nutrients. The orchid *Cyrtorchis arcuata* was the most abundantly recorded epiphyte commonly growing on *Brachystegia spiciformis*. Within this woodland there are various seral or developmental stages, according to the frequency that the woodland has been subjected to a system of slash and burn (shifting) agriculture, which affects the height,

dominance and density of these trees. The system has also been subjected to frequent man-made fires that have contributed to the current distribution pattern of these trees.

Miombo woodland usually grows on impoverished sandy soils that are characteristic of the peninsula. Being poor in nutrients, and with a slow turnover of such nutrients because of the seasonal climate, the soils receive some of these nutrients back following the advent of such fires. It is therefore largely a fire driven system, and many plant species, particularly the dominant ones, exhibit considerable resistance to such fires.

Bushclumps

Although the bushclumps form part of the miombo woodland, their affinities lie intermediate between this and dune forest/ scrub. They typically have *Balanites maughamii* as an emergent species sometimes together with *Brachystegia spiciformis* and *B. sp. cf. torrei*. Other trees and shrubs included in particular, *Diospyros rotundifolia*, *Olax dissitiflora*, *Ozoroa obovata*, *Strychnos spinosa*, *Tarenna littoralis*, *Psydrax obovata*, *P. locuples*, *Lannea sp. cf. antiscorbutica*, *Commiphora schlechteri*, *Suregada zanzibariensis* and *Brackenridgea zanguebarica*. The field layer is largely bare, particularly in the shade, but the stoloniferous fern *Microsorium scolopendria* forms extensive stands inside the bushclumps. Grasses were sparse but included *Brachiaria humulicola*, *Panicum deustum* and *Megastachya mucronata*.

Forbs such as *Dietes iridioides*, *Zamioculcas zamiifolia* and *Gonatopus sp. cf. rhizomatosus* also occurred in shade but other species such as *Aneilemma dregei* were found mostly around the outer perimeter. The succulent and scandent shrub *Senecio viminalis* was common and almost exclusive to these bushclumps. Climbers were common especially *Landolphia kirkii* and *Ancylobotrys petersiana*, the orchid *Vanilla roscheri* and others.

Cultivated and Fallow land community

During cultivation most of the existing vegetation is removed with only stumps and rootstocks of the original woody species left. Even these may be removed in subsequent years. After most of the dead wood and vegetation had been cleared some fruit trees such as Cashews *Anacardium occidentale*, papayas *Carica papaya*, mangoes *Mangifera indica* and jamba *Syzygium cumini* are planted as well as crops such as cassava *Manihot esculenta*, ground nuts *Voandzeia subteranea*, maize *Zea mays*, sorghum *Sorghum sp.* and millet *Pennisetum sp.*

Under cultivation many otherwise rare or uncommon species in the surrounding miombo and dune scrub communities are benefited and become common. Some species have not been recorded outside of cultivated areas. Such pioneer plants or ruderals were mostly annual species which took advantage of the lack of competition to flourish. These species included forbs such as *Limeum fenestratum*, *Commelina benghalensis*, *Triumfetta rhomboidea*, *Tribulus terrestris*, *Citrullus lanatus* and grasses such as *Cenchrus brownii*, *Tragus berteronianus*, *Enneapogon sp.*, *Eragrostis sp.*, *Panicum sp. cf. schinzii* commonly occur under these conditions.

2.1.4 Discussion

2.1.4.1 Introduction

From what has been found so far the VCWS appears to occupy a unique position in the distribution of plants and animals that can only be clarified by a more detailed survey. Many new distribution records and unexpected occurrences have been recorded. The distribution of the herpetofauna for instance, indicate a link with that of the Bazaruto Archipelago, a not unforeseen conclusion, but it does not explain the differences in species with that of the Vilanculos mainland. Broadley (1990) suggested that habitat destruction in the past on the peninsula resulted in the relict and insular species recorded on the Bazaruto Archipelago. However these species are now known to still occur along the peninsula. It is possible that the island and peninsula were split off from the mainland in the distant past and then reconnected at a later stage (see section 1.2 above), allowing typical “mainland” species to re-immigrate. It could of course also be argued that species from the islands could have drifted or been translocated from there to the peninsula.

The area has been subjected to considerable anthropogenic disturbances in the past, most of which are still present. The impacts have been similar on both the flora and the fauna. Current tourism developments are unfortunately adding to the destructive processes because communities that in the past were minimally affected by the local communities such as the ecologically sensitive Mangrove-Salt marshes, have been partly degraded by the construction of lodges and airfields. Roads and drainage canals have been made through and across these highly sensitive habitats of which only about five are known along the perimeter of the peninsula, two of which have now been considerably and perhaps irrevocably compromised. Current plans for major developments along the highly sensitive Spit along the estuary are cause for great concern as considerable and perhaps irreparable damage may be done. (See zoning plan, Part F, and various other references)

2.1.4.2 Human impacts on the vegetation and management implications

The severe impact of human activities on the vegetation of the VCWS is clearly evident. Human settlements were widespread and everywhere in evidence. In many parts of the peninsula not only now abandoned clusters of planted fruit trees, but also remnant patches of thicket and forest plants, parts of the former vegetation communities in those areas, indicate that considerable impoverishment has taken place. More recent developments have impacted on other communities as outlined previously.

Most human activities that impacted on the vegetation can be split into three main components, each of which has already had a negative impact on the vegetation as follows:

Agriculture

Throughout the peninsula subsistence agriculture in the form of slash-and-burn has been in progress for an estimated 100 years (Richter pers. comm.). In this process an area of woody vegetation is chopped down anywhere between the level of the soil and a height of one metre. The cut down vegetation is piled up and burnt to enrich the soils with minerals taken up by these plants over time. This is followed by cultivation by hand by means of hoes. Crops are planted but once soil fertility wanes, which happens within two or three years, the land is left fallow and the rooted stumps coppice and a dense growth of saplings follows. This results in a mosaic of different size and age classes as well as woodland density.

Permanent villages and fields have been widely established and fruit trees planted including Coconuts *Cocos nucifera*, Cashew nuts *Anacardium occidentale*, Mangoes *Mangifera indica*, Papayas *Carica papaya* and others. Sometimes these village sites are abandoned, perhaps when someone in the village has died of unknown causes. The trees however continue to grow and become naturalized. Such sites were evident throughout the peninsula. The combined effects of these disturbances and browsing by goats have drastically altered the vegetation communities on the peninsula. This is most evident in the narrow strips of beach terraces which were probably covered by a dune thicket and forest and which are now merely fragmented, impoverished relicts of what was once present. These sites were perhaps first settled by fishing communities and therefore have been impacted on the most. Further evidence exists in the area of "Baobab valley", an area of roughly 2 km wide by 8-10 km long where large Baobabs *Adansonia digitata* and typical forest species were recorded.

Many known thicket and forest species were recorded from these areas including: *Craibia zimmermannii*, *Diospyros natalensis*, *Strychnos henningsii*, *S. decussata*, *Suregada zanzibariensis*, *Rawsonia lucida*, *Drypetes arguta*, *Sapium ellipticum* and *S. integerrimum*, *Inhambanella henriquesii*, *Millettia grandis*, *Albizia adianthifolia*, *Chlorophora excelsa*, *Dialium schlechteri*, *Erythroxylum emarginatum*, *Azelia quanzensis*, *Tabernaemontana elegans* and many others.

What has been lost can only be speculated upon, but further evidence of impacts can be seen in the large numbers of burnt tree trunks that lie scattered about. Large areas were bare of vegetation as the fertility of the sandy soils was depleted to a stage that could no longer support life. Patches of dense thicket still occurred in small sections along the seashore but some clearing had taken place here, resulting in the thicket being replaced by scrub.

This problem is going to be exacerbated by the planned construction of houses and other infrastructure in this vegetation type along the northern tip of the sanctuary, while that in the east along the western side of the mouth of the estuary will be partly fenced out of the Reserve area due to the density of people already living there and those due to be moved there.

Fire

Fire has been an important formative agent of the vegetation on the peninsula. This is largely a man-made factor and a result of the frequency and intensity of veld fires. The impact has been as much if not more than the physical removal of the vegetation, and compounded together, have been responsible for much of the vegetation composition, density and distribution on the peninsula. Miombo woodland has some resistance to fire and is perhaps stimulated by the occurrence of fires. This has possibly increased the distribution of this vegetation type at the expense of other less tolerant vegetation communities. The visible effects of fires on bushclumps within the miombo woodland again support this assumption. Everywhere such bushclumps are seemingly decreasing in size and extent. The effect of fire has been a continual eroding away of the bushclump margins, exposing more and more of the inner vegetation to desiccation by wind and sun. This enables fire to penetrate deeper and deeper into such bushclumps until they disappear altogether, leaving only a few more fire tolerant species standing, now forming part of the typical miombo community.

Bushclumps show close affinity to dune thicket/forest with many of the constituent plants common to both. It is likely that originally they were much larger and more contiguous but due to the effects of fire have decreased in area and in species richness. There is a correlation between the size of an area and species richness, which decreases with a decrease in size. Species such as *Olax dissitiflora*, *Gymnosporia heterophylla*, *Brackenridgea zanguebarica*, *Sarcostemma viminalis* and *Cissus quadrangularis* are considered thicket species (Tinley 1985, Wild & Grandvaux Barbosa 1967) yet are now isolated constituents of miombo woodland.

Fire has also been very detrimental to dune thicket/scrub and has contributed extensively to its degradation. Bare areas and large burnt tree trunks scattered throughout this community, were evidence of this. Along the margins fire has also made inroads, eroding away at the vegetation resulting in part in the current distribution pattern and condition.

Utilization

The long association of the local people with their environment and their dependence on the natural resources of the peninsula, has impacted on the plants of the area. For the sake of convenience and because the limited time for the survey has made it impossible to conduct an in depth assessment of what plants are utilised, only some generalities are herewith made. The uses of plants can be basically subdivided into five groups as follows:

Thatching material is mostly derived from a sedge which commonly grows in marshy conditions. *Cladium mariscus* is a tall tussock sedge which is harvested for its long foliage known locally as Jeka. The grass *Schizachyrium sanguineum* may also be used to close off the walls of huts. The plants are bound in bundles to form a mat that is then wrapped around the structure of poles. It is likely that some other grasses which may be locally common are also used for this purpose.

Wood from trees in the sanctuary is extensively used mainly for hut construction but also for dhow construction and maintenance, canoes, brine containers, utensils, utensil handles and many others, including firewood. Large trees with a diameter in excess of 60 cm were observed to have been cut down and hollowed out to form canoes, but which species were used is unknown at this stage. Some may be from old cashew *Anacardium officinale* trees. Some of these canoes were in use in the bay at the time of the survey while others were being used as brine baths for the daily fish catch. From the size and weight of such trunks the trees must have been cut down close to where they were currently in use. This supports the assumption that what is currently dune thicket and scrub, may have contained patches of forest. Further south along the dune field more pristine vegetation is present including many Pod mahogany *Azelia quanzensis*, but here taller forest patches only occur in hollows in the dunes perhaps where water is more readily available whereas along the slopes and dune crests a scrub and thicket vegetation is found which is mostly impenetrable.

Rope is made from the under bark of *Brachystegia spiciformis* and is either used as is, to tie up bundles of wood and in hut construction, or it is rolled on the upper thigh to produce a tough rope. This may have many purposes

including the construction of fish traps and in the making of snares for trapping animals. Bark from the baobab is also extensively used for this purpose. The fibre from the leaves of *Sansevieria metallica* is also used to make a strong string, frequently applied to household needs and in snare construction. The bark of *Brachystegia spiciformis* is often used to form temporary containers such as trays to carry honey in, or as a plate. It is also used for the construction of beehives that are then placed high in the branches of trees.

Many of the plants in the sanctuary produce edible fruits such as: *Adansonia digitata*, *Garcinia livingstonei*, *Sclerocarya birrea*, *Cordyla africana*, *Grewia spp.*, *Syzygium cordatum*, *S. guineense*, *Maclura Africana*, *Strychnos spinosa*, *S. madagascariensis*, *Ancylobotrys petersiana*, *Landolphia kirkii*, *Salacia kraussii* and *Vangueria infausta* to name some of the more prominent species. Others provide sap for alcoholic beverages including both *Phoenix reclinata* and *Hyphaene coriacea*. The fruits of *Artabotrys brachypetalus*, *Sclerocarya birrea*, *Garcinia livingstonei* and others also provide an alcoholic drink, some of which, including the fruit of Cashews, may be distilled for an even more potent drink.

Many species occurring on the peninsula are used for medicinal purposes. Some medicinal species utilised on the island of Inhaca (Mogg 1969) also occur in the sanctuary, and it is likely that the usage is the same. However there are many more known medicinal plants occurring in the sanctuary but whether they were utilized or not, could not be verified at this time for reasons already stated.

2.1.4.3 Species richness and diversity

Currently 5692 plant species have been recorded from Mozambique of which 177 are endemic and another 78 near endemic taxa (Golding in press). The relatively homogeneous habitats in the sanctuary have resulted in a low species richness with about 800 species to be expected (approximately 14 % of the total number of known species). This is largely a result of soil structure and composition, which reflects the aeolian origins of the soil. Also, being sand, nutrients leach out during the rainy season. The seasonal climate with relatively low temperatures in winter also retard chemical and biological breakdown of plant materials. This is followed by fires during the dry season with the subsequent exposure of the soil to greater insolation resulting in desiccation and further retardation of the breakdown process. This soil impoverishment is exacerbated by the slash-and-burn subsistence agriculture and fire as has already been mentioned. The impact of man has in all probability resulted in a reduction of the number of species that used to occur on the peninsula.

Some species of trees and shrubs considered elsewhere (Palgrave 1984) to be typical of this vegetation type and largely restricted to this vegetation community, such as *Terminalia boivinii*, *Hymenaea verrucosa*, *Commiphora schimperi*, *Turraea wakefieldii*, *Securidaca longipedunculata*, Tick berry *Chrysanthemoides monilifera* and many others have not been recorded in the sanctuary at this time. Whether this is a reflection of a survey artefact or due to the disturbed state of the dune thicket is not clear at this stage, particularly as the Tick berry is common under disturbed conditions elsewhere.

2.1.5 Conservation status and management implications

The vegetation of the peninsula includes some very interesting communities and species. Mention of these have already been made in the discussion above, for example the occurrence of *Marula Sclerocarya birrea* and *Acacia* sp. growing along the beach front. The sheltered shallow waters of the bay have promoted an unusual assemblage of plant species along the estuary and northern tip of the peninsula. This includes species typical of bushveld and that of forest and thicket. This vegetation is estimated as forming less than 1 % of the total area of the sanctuary and was in a very disturbed and impoverished state at the time of the survey. Every effort should be made to rescue the remainder and initiate rehabilitation (see section .. , Part ..below). This also applies to the bushclumps in the miombo woodland

According to Isidine & Bandeira (in press) there are 301 Red Data Book species in Mozambique or 5,3 % of the total number of species recorded from the country. In the sanctuary 10 RDB species have been recorded. It is likely that several others will also be found in time. Some of these such as *Eulophia petersii* and *Zanthoxylum schlechteri* are common in the sanctuary. However the siting of one of the tracks goes right over the only known population of *Tritonia moggii* in the sanctuary, which is an indication of why development should only follow on a detailed biophysical survey of an area to avoid damaging sensitive areas and communities.

2.2 AVIFAUNA

2.2.1 Introduction

The Quewene (San Sebastian) Peninsula comprises the southern end of the Bazaruto Archipelago and although there is relatively little information available on the avifauna of the Quewene Peninsula itself, the greater Bazaruto Archipelago has been the subject of several avifaunal investigations (Brooke et al 1981, Dutton undated, Kohler & Kohler 1996, Parker 1998, van Eyssen, 1958). This information has been considered in compiling this section of the BMP, but most of the information was gathered during a brief mid-winter visit by the avifauna specialist (Dr W Tarboton) to VCWS between 13 and 20 June 2002.

This brief survey has provided what is probably a reasonable indication of mid-winter bird populations in the Sanctuary. Without a similar mid-summer survey, though, this assessment of the Sanctuary's avifauna is obviously inadequate, and the conclusions drawn here on the avifaunal diversity and dynamics are inevitably speculative. For the same reason the recommendations and management implications for the conservation and sustainable utilization of the avian resource are very general in nature. A mid-summer follow-up survey will be undertaken during the implementation phase of the GEF project.

From a bird perspective the array of wetland types found in the Sanctuary provides the area's most outstanding feature. The diversity of these wetlands and the kaleidoscope of seasonally changing conditions (drying, flooding, etc) make for perpetual change in the suite of waterbirds that use them. The variety of waterbird species recorded here in June attests to the quality of these wetlands and the VCWS would undoubtedly qualify for Ramsar status on its waterbird communities alone. The coastal and marine wetlands probably offer the same variety, but their utilization by birds is more of a

summer than a winter phenomenon and will have to be verified during the follow-up survey.

By contrast, the woodlands in the VCWS are relatively homogeneous (Msasa *Brachystegia spiciformis* and *Julbernardia globiflora* dominated, with relatively low tree diversity) and, except for the northern-most part of the peninsula, they have been very extensively degraded. Slash-and-burn agriculture probably accounts for much of this, but extensive areas are dominated by thickets of coppiced trees (possibly fire induced regrowth) and only small remnants of tall, primary msasa woodland remain. Also, the coastal dune forest and sand forest, two coastal-plain forest-types that are seemingly not well-developed or degraded in VCWS, elsewhere, for example in South Africa's Zululand coast in KwaZulu-Natal, support interesting and distinctive bird communities that were not observed in the sanctuary. (These communities may be present or better developed in the areas to the south of the current VCWS that are considered for inclusion in the sanctuary). As a result, the woodlands in the Sanctuary area support a depauperate bird community and many of the 'icon' species of climax miombo are absent. Whether this observation also holds true in summer will be determined during follow-up surveys. In time, with the possible resettlement of farmers from some areas and restoration of the agriculturally-disturbed sections, a more diverse woodland avifauna may eventually re-establish.

It is perhaps an anachronism that the ecologically unacceptable slash-and-burn agriculture that is widely practised, actually contribute to increasing the overall bird diversity of the region. They provide open ground with an abundance of weedy plants that attracts a variety of seed-eating birds such as mannikins, waxbills, canaries, weavers, widow-birds and others, and the complete disappearance of these cultivated fields from the Sanctuary would have a negative impact on the overall biodiversity of the peninsula.

2.2.2 The Avifauna list

An annotated list of the 240 bird species so far recorded in the VCWS is given in Volume 3 of the BMP. This list is a compilation of (i) the 160 species recorded in the area during June 2002, (ii) a further 46 species recorded on the Quewene (San Sebastian) Peninsula (squares 2235AB and 2235AD) during the 1994-1998 Mozambique bird atlas survey, (iii) 24 additional species seen here at other times by resident staff, and (iv) 10 additional species of seabirds recorded within the Bazaruto Archipelago during counts made here by Kohler & Kohler between 1996-1998. Because the VCWS covers all of the Quewene peninsula, any reference to a species as occurring on this peninsula is taken as being in the sanctuary.

The species list given here for the VCWS area is obviously incomplete and it will probably increase to 300 species, or more, as additional surveys are done and as interest in the area's avifauna grows. For the purpose of this report, though, the list is restricted to only those species that have been recorded with certainty within the area of the Sanctuary - there is little point in extending the list by speculating or extrapolating, as this clouds the authenticity of the species actually recorded. The species listed by Parker and/or Dutton in various unpublished checklists as occurring on 'Bazaruto', 'Bazaruto Archipelago' or 'Coastal Mozambique' when no specific mention was made of these birds actually occurring on the Quewene/San Sebastian peninsula, were therefore purposefully excluded.

2.2.3 The bird and its environment and implications for management

2.2.3.1 Bird diversity vis-à-vis habitat

In terms of the avifauna, the Sanctuary divides into four broadly different habitat types and a break-down of how the 240 species recorded are apportioned in these is as follows:

Woodland (mainly miombo-dominated savannah, also agriculturally-disturbed lands) supports the highest proportion of the area's avian diversity (158 species, 66% of diversity). A wide cross-section of families is represented in this avifauna, and the dominant groups are shrikes (11 species), weavers and widows (11 species), birds of prey (11 species), warblers (10 species), sunbirds (7 species), and doves, cuckoos, swallows and bulbuls (all 5 species). Individually, the most numerous species encountered were Black-eyed and Sombre Bulbuls, Cape Turtle Dove, Fork-tailed Drongo, Black-collared Barbet, Southern Boubou, Puffback Shrike and Mozambique Batis.

Freshwater wetlands (endorheic pans, permanent lakes, seasonal and permanent marshes) support fewer species (68 species, 28% of diversity) but they include many very distinctive and striking-looking birds, and species that often gather in large concentrations. Ducks and geese (10 species), herons (10 species) and storks (5 species) contribute most to the diversity in this group. The majority (50) of these species are restricted to freshwater wetlands, but some (18 species) occur with equal frequency in the marine wetlands. Individually, the most numerous species encountered were Grey Heron, Reed Cormorant, African Jacana and Dabchick.

Marine wetlands (sandy shore, estuaries, mangroves, inter-tidal zone) support at least 33 species (18 being shared with freshwater wetlands); terns (5 species), scolopacids (5 species) and plovers (4 species) dominate this group. In June Greater Flamingo was the most numerous single species in this environment.

Open sea: although only one species is currently listed for the sanctuary (Greater Frigatebird), there are 20 or more candidate species likely to be recorded here in time to come (gannets, petrels, tropicbirds, etc).

2.2.3.2 Status and seasonality of the avifauna

The species listed as occurring in the woodland are largely (90%) year-round residents, and only about 10% of those listed visit the Sanctuary on a seasonal basis. This may be an artefact of most of the data coming from the June 2002 survey when migrants were absent from the region)

By contrast, the freshwater bird community probably fluctuates very widely over time in response to changing water levels and conditions. In June 2002 all the pans in the areas were full and they supported a diverse waterbird community. This will change dramatically as the pans dry up - some species (jacanas, Pygmy Geese, White-backed Duck and others) probably vacate the area altogether, while others will probably then resort to the permanent lakes (Lake Manhale and others). These lakes are likely to be

important drought refuges for many waterbirds, not only for those that live within the Sanctuary, but also for others from further afield.

The avifauna of the coastal wetlands (the intertidal zone, etc) is comprised very largely of seasonal visitors (flamingos, waders, terns, etc.) and this environment probably sees the highest seasonal fluctuation in bird numbers in the Sanctuary. The Palearctic migrants are largely summer visitors to the area, while the flamingos are probably erratic rather than seasonal in their occurrence. In June there were large numbers of Greater Flamingo (5000-6000) around the peninsula: these birds are likely to move about widely through the archipelago in response to changing food availability, and they probably leave the area entirely at times when conditions at their nearest breeding site (Makgadikgadi Pan in central Botswana) attract them there.

2.2.3.3 Large assemblages of birds

Species that assemble in large numbers at a few sites have special interest, not only because they are often more vulnerable than species that occur widely at low density, and so are candidates for possible conservation action, but also because they often provide interesting spectacles for visitors and tourists, having high 'charisma' value, and so having special ecotourism potential. The single most obvious bird in this category in VCWS is the Greater Flamingo, but the large flocks of waders, terns and seabirds are also candidates. The Greater Flamingos, as mentioned, probably move to central Botswana to breed - the Makgadikgadi is only one of two sites in southern Africa where they breed regularly, it being a sufficiently remote area for the birds to complete their breeding cycle undisturbed. The potential exists for a safe breeding area to be created within the Sanctuary, and the feasibility of this will be investigated.

The large numbers of migratory wading birds (plovers, sandpipers, etc, mostly visitors from the Northern Hemisphere) that use the shallow-water areas in the Bazaruto Archipelago in summer, apparently number thousands to tens of thousands of birds (based on counts made here during 1996-1998 by Kohler & Kohler). In the case of one of the species (Great Sandplover) it was estimated that this area constitutes the winter quarters for 1% of the world population. There was little evidence of this in June, but the nature of the shoreline around the San Sebastian peninsula indicates that this part of the archipelago is an important component of the overall area used by these waders. The Crab Plover, a summer visitor to the Mozambique coast from the Arabian Peninsula, apparently gathers (100+ birds) specifically in the mangrove lagoons at the north-western edge of San Sebastian (Palmerhina), making this a particularly important site within the Sanctuary.

At the southern end of Lake Manhale there are numerous dead trees standing in the water, and in June there were large numbers of darters (385 counted), and cormorants (419 counted) here, together with several Pink-backed Pelicans. At least 53 nests in the dead trees indicated that these birds had recently nested here. Many of the larger waterbirds (storks, herons, cormorants, pelicans, etc) gather at sites like this to breed colonially and where such sites provide durable, safe conditions for the birds, they are often reused year after year. A site like that at Lake Manhale could be managed towards this end (especially by restricting fishermen access to the vicinity of the nesting trees); at the same time, by safeguarding the colony, another visitor spectacle in the sanctuary would be created.

2.2.3.4 Threats

The actual or possible threats facing the Avifauna are likely to be the following:

- There is no obvious evidence of direct persecution of birds by local inhabitants taking place, although the general paucity of gamebirds (francolin, guineafowl, etc) may be a direct consequence of human depredation. Degradation of the natural habitat in the area appears to be the main factor impacting on the avifauna.
- Birds of prey are very poorly represented in the sanctuary. No vultures, for example, virtually no eagles, and very few accipiters were seen during the June 2002 survey. Their paucity possibly reflects the dearth of both small and large mammals in the Quewene peninsula area, and thus the absence of a sufficient prey-base to sustain, in some species, permanent populations in VCWS. Also missing, because of the absence of a large mammal fauna in the sanctuary, are oxpeckers. Both species (Red-billed and Yellow-billed) would have occurred here and once the large mammal fauna has been restored, consideration should be given to reintroducing these species.
- None of the areas of miombo woodland visited in the sanctuary in June contained the diverse avifauna one associates with climax miombo woodland such as one would find, for example, in other parts of southern Mozambique (Panda, etc). This depauperate avifauna is a consequence of the degraded state of this vegetation type in the Sanctuary - it is extensively coppiced, and the areas with the most fertile soils probably once supported the tallest woodland, most of which has apparently been cleared for agriculture. The cessation of slash-and-burn farming in the Sanctuary will no doubt lead to a gradual restoration of mature woodland at these sites and ultimately perhaps, to a more diverse and interesting miombo woodland avifauna.

2.2.3.5 Conservation priorities

Conservation initiatives generally require some form of ranking to establish what species or actions have priority, and the most appropriate point of departure in doing this is usually to consider whether, and at what level, the species being discussed are Red Data-listed. Red Data lists rank species in terms of risk of extinction, and this risk can be viewed at a regional or global scale - high risk at global scale obviously has a higher priority than high risk at regional scale, and so on down the scale. Risk is graded (from high to low) using the terms critical, endangered, vulnerable and near threatened. Nineteen of the species recorded in the sanctuary are Red Data-list and these are the species discussed here.

Thirteen of them are low-ranked ('near-threatened' in South Africa, but not listed as threatened in Mozambique, and not globally listed): White Pelican, Pink-backed Pelican, Woolly-necked Stork, Open-billed Stork, Yellow-billed Stork, Greater Flamingo, Pygmy Goose, African Marsh Harrier, Black-bellied Korhaan, Chestnut-banded Plover, Red-winged Pratincole, Caspian Tern and Lemon-breasted Canary.

Six species have a higher ranking: Saddle-billed Stork ('endangered' in South Africa; 'threatened' in Mozambique; not listed globally); Wattled Crane ('critical' in South Africa, 'endangered' globally; species apparently previously not yet recorded from

southern Mozambique); Lesser Jacana ('near-threatened' in South Africa; 'threatened' in Mozambique; not listed globally); Mangrove Kingfisher ('vulnerable' in South Africa; 'threatened' in Mozambique; not listed globally); Chestnut-fronted Helmet Shrike ('threatened' in Mozambique; not listed globally); Neergaard's Sunbird ('near-threatened' in South Africa and globally; 'threatened' in Mozambique).

Conservation action not only requires setting priorities, but to be effective it needs to be based on a clear understanding of the spatial distribution and dynamics of the populations involved, the preferred habitats of these, and an understanding of threats, if any, that they face. In this context, the Wattled Crane which is undoubtedly a high priority species for conservation action everywhere in its range, is probably irrelevant to any conservation program for the VCWS for the reason that this species has not previously been recorded anywhere in southern Mozambique, and the single sighting of it in the Sanctuary (January 2002) was probably a case of vagrancy. Lambrechts (*pers comm*), however, reported two pairs from an open plains area just north of the Save River, about 130 km due north of VCWS. By contrast, the Saddle-billed Stork - another high priority species for conservation action - would probably benefit from a conservation initiative in the sanctuary as there are certainly several resident pairs present here. In its case, the most effective conservation measure may simply be to locate the nesting sites of each of the pairs and ensure that human disturbance here is kept to a minimum.

Because 14 of the 19 candidate species for conservation attention in the sanctuary are waterbirds (especially freshwater wetland species) it is clear that actions taken to safeguard and manage these habitats appropriately, will have a broad beneficial effect for a spectrum of potentially threatened birds. An important component of a bird conservation plan (OP) for the sanctuary will be the avifauna of the freshwater wetlands. The starting point for this OP would be to map and characterise all the sanctuary's wetlands, and then to monitor a cross-section of them (measuring water-levels and birds present) to establish seasonal trends. This would identify key sites for target species, and conservation measures could be developed accordingly. For example, the near-threatened Pygmy Goose nests in holes in trees, but good nesting sites seem to be in short supply. Furthermore, no family groups were observed in June 2002, suggesting that the breeding success for the past season was not high. A simple and effective conservation measure would be to put up a few artificial nest sites (hollow logs, artificially constructed if need be) around the pans used most frequently by the Pygmy Goose and so boost recruitment.

2.2.3.6 Ecotourism potential of the sanctuary's birds

Bird-watching ('birding') is fast reaching the status in first-world communities of being one of the most widely pursued forms of outdoor recreation. In the USA, for example, birding today is more popular than hunting or fishing, and it ranks in that country second only to gardening as the nation's most popular outdoor leisure activity. The ecotourism potential of this interest is clear: ever-growing numbers of 'committed birders' (and there are perhaps half a million of these in the USA alone) travel widely to visit new places to see new birds, and the benefits of this to local economies are undisputed. 'New' countries hold obvious attractions to such ecotravellers, and in this context Mozambique has special appeal, given its lack of exposure in the past to this market.

The special attractions that a country offers such travellers are, firstly, ‘new’ species, and especially those that are endemic to the country. Secondly, the more striking, unusual, colourful or flamboyant species usually have high appeal (the ‘charismatic’ species), and thirdly, large assemblages of birds - thousands of flamingos or seabirds, for example - also have special appeal.

- **Endemics**

Mozambique does not have any bird species that are entirely restricted to the country, but there are five ‘near-endemics’, i.e. species that are largely confined to Mozambique. These are mainly restricted to the area south of the Save River, their ranges extending narrowly into northern Zululand, the eastern edge of Mpumalanga and southeastern Zimbabwe. I encountered only one of these in the Sanctuary (Lemon-breasted Canary) but another, Neergaard’s Sunbird, is listed in the Atlas as occurring here, and the remaining three - Pink-throated Twinspot, Rudd’s Apalis and Woodward’s Batis - may also be found in time, especially if there is some sand forest and coastal dune forest to be found in the area.

- **‘Charismatic’ species**

Apart from the birds listed as having special ecotourist interest because of their occurrence in large flocks or their endemism, there are a number of others in the Sanctuary that has ‘high charisma’ value. Opinions will differ in this selection, but my list of candidates, based on ‘prettiness’, exclusivity, and special association with the Sanctuary, is as follows:

Pygmy Goose (very colourful, tiny size, tropical connotation, common on lily pans in the Sanctuary)

African Fish Eagle (icon of African wetlands, ringing call, etc - probably 5-7 pairs in Sanctuary)

African Jacana, (another freshwater wetland icon, colourful, flamboyant habits)

Lesser Jacana (rare, Red Data status, easily overlooked, diminutive version of African Jacana)

Long-toed Plover (striking-looking, icon of tropical freshwater wetlands)

Crab Plover (striking looking, very restricted in occurrence, unusual migration - from Arabian peninsula)

Mangrove Kingfisher (icon of mangroves, rare, Red Data status, colourful)

Olive Bee-eater (probably the icon bird of the Bazaruto archipelago, this area constitutes its main breeding ground in Africa; it nests in colonies, and the sand banks on Chuinzine Point form one of its breeding sites)

Mascarene Martin (rarity and uniqueness in area - a rare and localised winter visitor to the Mozambique coastal plain from Mascarene islands)

2.2.3.7 **Bird-related ecotourism**

Over time, birds could become an important element of the ‘recreational package’ that the sanctuary offers to the owners and the visitors - as shown, there is certainly no shortage of charismatic, interesting or unusual species to be found here. In the short time that most visitors have available it is inevitable that many of these sought-after birds will be missed unless help is at hand. This provides opportunities for local community involvement, a practice that is gaining ground in many areas of Africa that are much visited by tourists. In Uganda, for example, many of the bird-rich lowland forests have very competent on-site bird-guides available to find and identify birds for visitors (Tarboton, 2002). Many of these are young people who have grown up in the bush and have an affinity with it; many of them also participate in whatever monitoring and research programs are being conducted at these sites, or they double up and do other tasks at lodges when they are not involved in bird-guiding. Within the Field Ranger complement employed to assist with reserve management, there could be a couple of rangers who are encouraged to develop their birding skills and extend these to undertaking routine monitoring, e.g. counts of waterbirds on selected pans, strip counts of woodland birds, etc. As their competence grows their duties can be extended to bird guiding.

BirdLife South Africa (info@birdlife.org.za) runs a bird-guide training program in South Africa in which etiquette and finesse in handling visitors is taught, and where they are trained in birding skills and in the basics of small business management. Most of their learning, however, has to happen on site and for this to be successful they need the resources, particularly in the form of binoculars and field guides. To be a successful guide in the sanctuary such a person should be able to identify every bird by sight and sound, and he/she should know the seasonal status of each species that occurs here, and where every species, on the basis of its preferred habitat, can be found.

Boat trips to sea to look for ocean-living (‘pelagic’) birds are growing in popularity with birders around the world and in the past 5 years several such trips have even been run out to sea from Vilanculos (by Vilanculos Dive Charters and others). The idea is to get about 25 km out and look for those species of oceanic birds (albatrosses, storm-petrels and the like) that seldom come inshore. Bait, in the form of fish oil, is often thrown out to lure the birds closer, or a fishing boat is followed. The Mozambique Channel offers special interest in that several tropical species seldom encountered in the temperate oceans - frigatebirds, tropicbirds, Sooty Terns and others - can be seen here with relative ease. Such trips also double up with dolphin and turtle viewing.

Hides and viewing platforms work well when they are situated alongside the type of wetlands that are found in the sanctuary. A host of potential sites for such structures occur throughout the VCWS. Hides not only provide pleasant viewing opportunities but they also provide focal points for visitors and if some form of interpretation or identification is provided as well at each site, the visitor experience is enriched. A few suitable sites for hides will be identified in the Sanctuary and hides or viewing platforms will be erected there.

2.2.3.8 Consumptive utilization of avifauna

The potential exists for some level of consumptive utilization of the avifauna. Some duck hunting, for example, if carefully managed, could take place on a sustainable basis. Or Pygmy Geese, which are much sought-after ornamental birds in the bird-trade industry, could be harvested should a nest-box program be put in place that

boosts the annual production of young. Lemon-breasted Canaries are also sought-after caged birds and thousands are trapped annually in southern Mozambique for the lucrative international bird trade. However, no form of consumptive use will be made of the avifauna. Unlike the situation with large mammal fauna, there is no need to manage bird populations by culling, as they are highly capable of dispersal. The limited benefits that could be derived from consumptive utilization, is scarcely worth the tarnished image to the Sanctuary that may result if large international organizations that are against the world bird-trade or against bird-hunting took up the cause.

2.3.3.9 Avifauna reasons for expanding the sanctuary

If the areas to the south that are earmarked for inclusion in VCWS include sand forest or coastal dune forest (that does seem to be the case), and if it includes areas of tall, primary miombo woodland, these habitats will substantially increase the overall bird diversity in the enlarged Sanctuary

2.3 HERPETOFAUNA

2.3.1 Survey method

A literature survey was conducted prior to the first site visit and all herpetofaunal species likely to occur in the area were listed. During the initial site visit the area was evaluated according to the presence of potential habitat for these species. The list could therefore be refined. Species observed during this survey were noted. Two series of pitfall traps and drift fences were erected in miombo woodland, one extending out from a pan. These were monitored twice daily for the period 29 July to 8 September. Two night drives with a spotlight were made and a third abandoned because of rain. Throughout the duration of the survey the area was combed for spoor and other signs of species that were then recorded.

2.3.2 Results

2.3.2.1 Distribution

Despite the timing of the survey (winter and early spring) a substantial number of species of reptiles and amphibians were recorded. The annotated species lists for reptiles and amphibians appear in Volume 3: Annotated Species Lists, of this BMP.

The herpetofauna of the peninsula was of great interest as several unexpected species were found, throwing new light on distribution patterns and relationships. A total of 51 species were recorded which represents about 67% of the species to be expected. Many of these represented new distribution records such as the Blue-tailed sandveld lizard *Nucras caesicaudata*, Peter's spiny agama *Agama armata*, Bazaruto dwarf burrowing skink *Scelotes insularis*, Bazaruto golden legless skink *Typhlosaurus aurantiacus bazarutoensis*, Bazaruto writhing skink *Lygosoma lanceolatum*, Sundevall's writhing skink *Lygosoma sundevallii*, Forest cobra *Naja melanoleuca* and especially the Forest tree frog *Leptopelis natalensis*. Many species were conspicuous by their absence.

Although many species were widely distributed within the sanctuary, some clear habitat preferences were evident:

Dune scrub/thicket/ Bushclumps

Many species occurring in dune thicket are limited to this habitat. Bushclumps found in miombo woodland also contained the same species as well as other more eurytopic species. Taxa such as *Lygosoma lanceolatum*, *Scelotes insularis*, *Typhlosaurus aurantiacus bazarutoensis* as well as the Long-tailed round-headed worm-lizard *Zygaspis longicauda* are restricted to this habitat. Other species that were more common here than elsewhere included the Eastern coastal skink *Mabuya depressa* and Common striped skink *M. striata*. The only specimen of the Waterlily reed frog *Hyperolius pusillus* was found in this habitat. The Forest cobra *Naja melanoleuca* appears to be mostly restricted to dune thicket and according to Broadley (1990, 1992) many other snake species such as *Dasypeltis medici* and *Prosymna jani* were only recorded from this habitat on the islands of the Bazaruto Archipelago.

Wetlands

Few reptiles were found in the many wetlands distributed throughout the sanctuary. Typical wetland species included Crocodile *Crocodylus niloticus*, Water monitor *Varanus niloticus* that was found commonly around pans and the Green water snake *Philothamnus hoplogaster* that was seen on several occasions in marshes. Frogs and toads were mostly recorded from around the pans and marshes. Particularly abundant were Red-legged kassinas *Kassina maculata*, Marbled reed frog *Hyperolius marmoratus* and Tinker reed frog *H. tuberilinguis*. Two forms of the Marbled reed frog occur on the sanctuary namely *Hyperolius marmoratus taeniatus* that appears to be the most common and *H. m. marmoratus*. Some overlap in colour pattern has also been seen indicating that the area lies in a transition zone.

The Olive toad *Bufo garmani* was common around pans in the north whereas the Gutteral toad *Bufo gutteralis* was only heard calling around the Jane marsh in the south. Here too the Brown-backed tree frog *Leptopelis mossambica* was heard calling and the Forest tree frog *L. natalensis* was collected. The Sharp-snouted grass frog *Ptychadena oxyrhynchus* was only recorded from a salt-/ freshwater marsh ecotone at Msasa camp while the Broad-banded grass frog *Ptychadena mossambica* was found in marshes along the estuary and at Jane marsh. Most other frog species were widespread around waterbodies in the sanctuary.

Miombo woodland

Although Miombo woodland covers most of the area in varying densities few reptiles or amphibians appeared to be restricted to this habitat. Most snakes seen in the area were in miombo woodland. These included Brown house snake *Lamprophis fuliginosus*, Herald snake *Crotaphopeltis hotamboeia*, Spotted bush snake *Philothamnus semivariatus*, Eastern green snake *P. natalensis*, Common python *Python natalensis*, Vine snake *Thelotornis capensis mossambicana* and others. Few lizards were only or mostly recorded here including the Variable skink *Mabuya varia*, Wahlberg's snake-eyed skink, Sundevall's writhing skink *Lygosoma sundevallii*, Cape rough-scaled lizard *Ichnotropis capensis* and Greater rough-scaled lizard *I. squamulosa*. No frogs or toads appeared to be exclusive although *Ptychadena oxyrhynchus* could be classed as such. The Northern mottled toad was frequently seen in Miombo woodland some distance from water.

Widespread species

Several species of reptiles occurred widespread throughout the sanctuary including the Cape dwarf gecko *Lygodactylus capensis*, Tropical house gecko *Hemidactylus mabouia*, Flat-headed house gecko *H. platycephalus* and to a lesser extent *Mabuya depressa*. The commonest amphibian present was *Bufo garmani*, which occurred everywhere. Others such as the East coast puddle frog *Phrynobatrachus acridoides*, *Hyperolius marmoratus* and *H. tuberilinguis* occur widespread around water, the latter also frequently found away from water around dwellings and other structures.

The fauna also exhibits the effect of lengthy human settlement in the area. The reptiles and amphibians have perhaps not been as adversely affected as the mammals but nonetheless have been impoverished by habitat destruction. Apart from crocodiles that were hunted for their skins and meat, only the snakes have probably suffered some direct persecution. The advent and frequency of fires has probably affected the distribution and abundance of the herpetofauna that may account for the paucity in the numbers of animals seen. This was also likely to have been influenced by the timing of the survey.

Many of the herpetofauna recorded during the survey were rare species, one only known from a single specimen, on which the description was based. These include the following (in the absence of a Red Data Book for Mozambique, the South African Red Data Book (SA RDB) status is given):

Species	SA RDB Status
<i>Naja melanoleuca</i>	Peripheral
<i>Python natalensis</i>	Vulnerable
<i>Nucras caesicaudata</i>	Peripheral
<i>Crocodylus niloticus</i>	Vulnerable
<i>Scelotes insularis</i>	not listed
<i>Typhlosaurus aurantiacus bazarutoensis</i>	“ “
<i>Lygosoma lanceolatum</i>	“ “
<i>Zygaspis longicauda</i>	“ “
<i>Leptopelis natalensis</i>	“ “

The Forest cobra has specific habitat requirements and can therefore only be expected in dune thicket and marshy areas. Although most of the distribution of the Blue-tailed sand lizard lies in the Gazaland it appears to be rare throughout and its status in Mozambique is likely to be Rare. Both the python and the crocodile are likely to retain the same RDB status. Four of these reptile species were described by Broadley (1990) from the islands of the Bazaruto Archipelago and were at the time considered insular species. All of these taxa qualify for inclusion into any future Red Data Book on the fauna of Mozambique. The occurrence of the Forest tree frog this far north is a new record for Mozambique and makes it a potential candidate for listing in the RDB.

2.3.2.2 Species richness and diversity

A total of 15 amphibians, 13 snakes, one tortoise, terrapin and turtle each, 19 lizards and one crocodile species were recorded from the sanctuary. A further three amphibians, 13 snake, one terrapin and three turtles, and three lizards have been recorded from the Bazaruto Archipelago, some of which could be expected to occur in the sanctuary. Many other species are to be expected but due to the timing of the survey, were not observed. It is in any event almost impossible to achieve a more complete list of species from such a large area as VCWS without having a far greater amount of time available and undertaking the survey during the summer months. If the VCWS and Bazaruto lists are combined then 18 amphibian, 26 snake, 24 lizard, one tortoise, two terrapins and five turtle species can occur on the sanctuary. However, on

examining the list and considering the suitability of the available habitat on the peninsula, it is doubtful whether some previously expected species would indeed be found.

While lizards have been well collected and only a few species have yet not been found, many snake species have yet to be recorded. In contrast to the mammals the lizards and amphibians have produced several surprises including many range extensions already mentioned. No attempt was made to ascertain invertebrate species richness as such a study was beyond the scope of the current survey.

2.3.2.3 Utilization of herpetofauna

The utilization of the fauna by the human community has been ongoing since the area has been settled. However, unlike some mammalian species that served as a source of protein, the utilisation of herpetofauna would largely have been incidental, or more commonly perhaps deliberate killing in the case of reptiles. The paucity of Crocodiles *Crocodylus niloticus* can be ascribed to two factors, human persecution and the abundance of Water monitors *Varanus niloticus*. Human persecution for the sake of skins and for consumption purposes has severely reduced the numbers of crocodiles in the sanctuary. Those that remain are adept at hiding and few signs were seen. The Water monitor, which is common in the sanctuary, feeds on the eggs of nesting crocodiles reducing the recruitment rate of these animals.

2.3.3 Conservation status

At present there is no Mozambique Red Data Book (RDB) for herpetofauna. However using the South African RDB some applications are possible. A list of specific candidate species has already been compiled earlier. The herpetofauna have been affected mostly by loss of habitat but also in the case of snakes and crocodile by direct persecution. The conservation status of the area's herpetofauna is therefore very poor at the current time, although housing some extremely rare species.

2.4 MAMMALS

2.4.1 Survey method

A literature survey was initially conducted and all mammal species likely to occur in the area were listed. During the initial site visit the area was evaluated according to the presence of potential habitat for these species. The list could therefore be refined. Species observed during this survey were noted. During a second site visit some trapping of small mammals took place in wetlands, miombo woodland and bushclumps and in dune thicket for three days and nights respectively, using Sherman live traps. No trapping for bats using mist nets was attempted at this time due to the paucity of bats at this time of the year. Two series of pitfall traps and drift fences were erected in miombo woodland, one extending out from a pan. These were monitored twice daily for the period 29 August to 8 September. Two night drives with a spotlight were made and a third abandoned because of rain. Throughout the duration of the survey the area was combed for spoor and other signs of species that were then recorded.

2.4.2 Results

2.4.2.1 Distribution

A total of 33 mammal species were recorded from the sanctuary (Refer to Volume 3: Annotated Species Lists, of the BMP for the list of mammals). Most of these were expected to occur but some such as the Grey climbing mouse *Dendromus melanotis* and Giant rat *Cricetomys gambianus* were unexpected. Similar to that of the herpetofauna, several species expected to occur were not found, which however may be an observation artefact and not reflect the true situation.

As far as the larger mammals were concerned the sanctuary was extremely impoverished in terms of species richness yet a surprising number and signs of small antelope such as Grey duiker *Sylvicapra grimmia* and Steenbok *Raphicerus campestris* were seen, even along the Spit (dune barrier cordon).

Some habitat preferences were evident but related more to vegetation characteristics than edaphic ones:

Dune thicket and Bushclumps

Again these two habitats were similar with regard to the species occurring in them, including among the rodents the Red veld rat *Aethomys chrysophilus* and perhaps the Giant rat *Cricetomys gambianus*. The Red duiker *Cephalophus natalensis* and Suni *Neotragus moschatus* are also restricted to dense bush that may also include thickets in miombo woodland.

Wetlands

Some mammals such as the Groove-toothed rat *Pelomys fallax*, the Multimammate mouse *Praomys natalensis*, Grey climbing mouse *Dendromus melanotis* Lesser red musk shrew *Crocidura hirta* and Greater cane rat *Thryonomys swinderianus* were only recorded from the vicinity of wetlands. It was interesting to note that the Multimammate mouse was only recorded in the wetlands. Whether it is forced there by competition with Peter's gerbil *Tatera leucogaster* that occurred along the ecotone can only be speculated on. The Multimammate mouse appeared to be more abundant in the wetlands than the Groove-toothed rat at a ratio of 3:1, but this could be a trapping artefact.

Miombo woodland

Most of the mammalian fauna of the sanctuary occur in miombo woodland which may be dense in parts, forming thickets thereby providing essential refuges to thicket loving species such as Red duiker, Greater galago *Galago crassicaudatus*, Forest mouse *Grammomys dolichurus* and Giant rat. Under more open conditions most of the other species recorded from the reserve occur. These include Grey duiker *Sylvicapra grimmia*, Steenbok *Raphicerus campestris*, Springhare *Pedetes caffer*, Scrub hare *Lepus saxatilis* and rodents such as Peter's gerbil *Tatera leucogaster*.

The latter appeared to be the only murid found although *Mus minutoides* was collected in a pitfall trap in the ecotone between woodland and pan. It is likely that other species will be recorded from this habitat from time to time including several bat species.

2.4.2.2 Species richness, rare and threatened species

The sanctuary has considerable species richness in terms of the fauna, which was unfortunately masked in part by the timing of the surveys as well as by the impact of humans on the area. This was evident when on one day in the southern part of the sanctuary (where human impact is less than at the northern tip), five snake species were recorded compared to two species in 10 days elsewhere. It is likely that many species were still present but in reduced numbers. The paucity of many of the larger mammal species such as hares, springhares, porcupine and others serves to emphasize this.

The mammalian fauna also exhibits the effect of lengthy human settlement in the area. All of the megafauna has been hunted out in the past with only a few small ungulates left, some such as the Grey duiker *Sylvicapra grimmia* and Steenbok *Raphicerus campestris* being able to withstand continuous harvesting while others such as the Red duiker *Cephalophus natalensis* and Suni *Neotragus moschatus* only able to exist by living in and taking refuge in the remaining scrub and thicket where hunting is difficult for man and dog. It was also noteworthy that few signs of smaller animals such as hares and springhare were seen in the more populated north, most signs being found in more remote localities. No signs of Antbear *Orycteropus afer* or their burrows were seen during the survey, which may be the reason why no Porcupine *Hystrix africae-australis* were seen nor signs of these animals found. It is possible that they never occurred here although recorded from the vicinity (Smithers & Tello 1976). It is possible that both Antbear and Porcupine were hunted to extinction already early on in the history of settlement of this area. The absence of such a keystone species such as the antbear and the lack of burrows to be utilised by other species, could have added to the impoverishment of the mammalian community to be found on the reserve.

Hunting with dogs and the use of snares have relegated populations of animals to very low levels. Evidence of continued persecution have been seen, several snares having been removed and dogs with and without people away from villages were widespread. Many feral cats *Felis catus* were also seen. Some have been left behind when people move and being semi-wild the cats have evaded capture and are left behind. It is unlikely that any cat is fed but is simply left to fend for itself, catching whatever prey is available. These cats readily hybridise with the African wild cat *Felis lybica* (Smithers 1986) which may eventually result in the local extinction (if it is still present) of this species unless steps are taken to eradicate feral cats.

A total of 33 mammal species were provisionally recorded from the sanctuary. A further eight mammals have been recorded from the Bazaruto Archipelago, some of which could be expected to occur in the sanctuary. A number of other species are to be expected but due to the timing of the survey (winter and early spring), were not observed. It is in any event almost impossible to achieve a more complete list of species from an area the size of VCWS without having a far greater amount of time available, and undertaking the survey during the summer months. Bats

are the most poorly represented and several species could occur. If the VCWS and Bazaruto lists are combined then 41 mammal species can possibly occur on the reserve.

However, on examining the list and considering the suitability of the available habitat on the peninsula, it is doubtful whether all of the “missing” species would be found. The presence of Samango monkey *Cercopithecus albogularis* on Bazaruto Island indicates that suitable habitat is still present there, despite anthropogenic degradation. It is therefore doubtful whether the species would occur in the sanctuary as the habitat which may have supported this species, Dune thicket and Sand forest, has been largely modified and degraded. Few patches of tall forest can be seen along the dunes in the south or elsewhere, making it unsuitable for these monkeys. At present Vervet monkeys *Cercopithecus pygerythrus* occupy and are mostly restricted to areas of Dune scrub and thicket, while Baboons *Papio ursinus* are found along the dunes south of the Lighthouse. The occurrence of the Lesser galago *Galago senegalensis* on Bazaruto Island (Downs & Wirminghaus 1990) is also an unusual occurrence as Smithers & Tello (1976) record the species occurring further west under more arid conditions and in different veld types. This is indicative of a translocation and it is doubtful if the species will occur on the peninsula.

Many species which should be present but which have not yet been found such as Antbear, Porcupine, Sun squirrel *Heliosciurus rufobrachium*, Pouched mouse *Saccostomus campestris* Single-striped mouse *Lemniscomys rosalia*, White-tailed mongoose *Ichneumia albicauda* and others may in time be recorded. Together with the planned relocation of some of the larger mammals that occurred previously in the area, a significant increase in species richness and the number of species recorded would be possible.

2.4.2.3 Utilization of mammals

The utilization of the mammalian fauna by the human community has been ongoing since the area has been settled and likely reached a zenith during the civil war when the remaining large mammals were hunted out. The last hippopotamus *Hippopotamus amphibius* was killed about 2 years ago. Snaring and hunting with dogs is ongoing and aimed at the remaining small ungulates such as Grey and Red duiker, Suni, hares, Springhares, Cane rats and a reptile such as the crocodile. Animals are also killed for their skins and other products that may form part of traditional medicine. D. Smart (pers comm.) recorded seeing two Civet *Viverra civetta* skins at a hut in a village. However no data exists concerning the dependency on such sources of food and other products.

Snares for small antelope such as Red and Grey duiker were seen on several occasions indicating existing pressure on the remaining fauna. Attempts to kill Springhare *Pedetes capensis* were seen close to a village in the southern part of the reserve. The use of fire to corner animals such as Cane rats *Thryonomys swinderianus* (a local delicacy) is widespread and has reduced numbers to very low levels. Few recent signs of their continued existence were found.

2.4.3 Conservation status

Although no Mozambican Red Data Book (RDB) exists at present, the lists of species in the South African context can be extrapolated to the Mozambique situation, where similar constraints exist. The following mammals can be considered in this qualified context:

Species	SA RDB status
<i>Neotragus moschatus</i> (suni)	Vulnerable
<i>Cephalophus natalensis</i> (red duiker)	Rare
<i>Paraxerus palliatus</i>	Vulnerable
<i>Viverra civetta</i> (civet)	Rare

It is evident that species such as Suni and Red duiker are only present at low densities due to persecution and loss of habitat. The conservation status of the mammalian fauna of the area, especially the ungulates, is very poor at present. Impacts on the remaining mammals, especially those species who provide a source of protein, could increase in severity and possibly result in local extinctions.

2.5 INVERTEBRATES

The invertebrates were only marginally examined based on incidental observations made during the course of searching for reptiles and amphibians. From such cursory observations the area appeared to be impoverished. Although this was partly due to the time of the year, it is likely that other factors such as fires were also responsible for this. It was apparent that the number of butterfly species seen during August/September had increased from that of the first visit in June.

A few cursory observations of species that were recorded during the survey can be noted as follows:

Hymenoptera: Ants, Wasps and Bees

By far the most common invertebrates found along the peninsula are the ants, family Formicidae. Among these the tree dwelling Tailor ant *Oecophylla longinoda* is one of the commonest. Everywhere their nests of leaves can be seen. These nests are comprised of leaves “sown” together with silk strands produced by silk glands of the larvae, which are manipulated by the worker cast. These ants are aggressive and quick to defend their nest if disturbed.

Another very common ant is the Cocktail ant *Crematogaster* sp. cf *castanea* that constructs large round football size nests on the underside of branches of trees. These nests are constructed from a mixture of chewed plant material and faeces (Ormel 1995). If one of these nests is accidentally disturbed these ants swarm out in large numbers and attack anything threatening the nest. They

are called Cocktail ants because of the habit of flexing the abdomen upwards and backwards. They bite fiercely.

An unusual member of the Order Insectivora is the so-called Velvet ant (Family Mutillidae) that has been recorded in the sanctuary. In reality a wasp, the female tends to be flightless and forages on the ground. It is easily recognised with its red brown thorax and black and white spotted abdomen. They have a painful sting. Other wasps include Paper wasps (Family Vespidae), which construct nests of pulp, prepared from plant material and formed into thin sheets with which the hexagonal larval chambers are constructed. These are attached by a thin stalk to plants or other structures such as buildings. Their stings can be very painful.

The African honey bee *Apis mellifera* was also been seen swarming during September and the many hollow trees which have been chopped open indicated that honey is an important source of food to the local inhabitants, so much so that they had constructed hives out of bark which had been deposited in trees throughout the sanctuary.

Coleoptera: Beetles

Beetles were not very common during the periods of survey with perhaps the exception of Ground beetles (Family Carabidae) of which several species including the large diurnal predatory beetles *Anthia* sp. and *Thermophilum* sp., which forage for other insects during the day, were observed. They have the ability to squirt formic acid in defence if disturbed. Related to the former but belonging to the family Dytiscidae were the Diving beetles of which large individuals were found during the survey of the fresh water wetlands. Not very common, probably because of the lack of dung, were dung beetles (Family Scarabaeidae). A large *Heliocopris* sp. was occasionally seen flying about presumably depending on the availability of human and canine faecal material for its continued existence. Also observed was a small species of beetle belonging to the family Buprestidae, a family of wood borers and flower feeders, which are characterised by having brightly coloured elytra and torpedo-shaped bodies. Several species of Darkling or Toktokkie beetles, Family Tenebrionidae were also seen, one of which takes refuge under the bark of dead trees during the day.

Lepidoptera: Moths and Butterflies

Few moths were seen during the surveys despite some rain during both periods, perhaps because of the time of the year. Only the Peach moth *Egybolis vaillantina*, a diurnal noctuid moth, was seen flying about, particularly during June. After a shower of rain on 6th September 2002, large numbers of a noctuid moth *Achaea lienardi* (Lienard's achaea) were flushed from leaf litter under trees in dune scrub at the northern end of the peninsula. A day later most had disappeared.

Butterflies were more common, particularly during the second visit at the end of August/ beginning of September. Many species were seen including the following:

Species	Common name
<i>Acraea eponina manjaca</i>	Small orange acraea

<i>Acraea zetes</i>	Large spotted acraea
<i>Colotis antevippe gavisia</i>	Red tip
<i>Colotis euipe emphale</i>	
<i>Danaus chrysippus</i>	African monarch
<i>Eurema</i> sp. cf <i>desjardinsii</i>	Angled grass-yellow
<i>Eurytela dryope</i>	Golden piper
<i>Hamanumida daedalus</i>	Guineafowl
<i>Hemiolaus</i> sp. cf <i>caeculus</i>	Azure hairstreak
<i>Junonia oenone</i>	Blue pansy
<i>Mylothris chloris agathina</i>	dotted border
<i>Phalanta phalantha</i>	African leopard
<i>Physcaeneura</i> sp. cf. <i>panda</i>	
<i>Princeps demodocus</i>	Citrus swallowtail
<i>Spindasis natalensis</i>	Natal barred blue

Hemiptera: Sucking bugs.

Ectrichodia crux, an Assassin bug of the family Reduviidae, which specialises in feeding on juliform millipedes, was also found on the reserve. The adults are black with a yellow margin to the wing cases dorsally and have a long proboscis, which is usually folded under the head and thorax. The nymphs or larval stages are red in colour. They prey on millipedes particularly the large blackish-brown taxa *Deratogonus* spp., piercing the body between the chitinous rings and injecting a digestive enzyme that immobilizes the millipede permitting feeding to take place.

Scorpiones: Scorpions

It was interesting to note that few if any recognisable scorpion burrows were found during the survey and in fact the only species found were all under bark or in rotting logs on the ground. Three scorpion species were found during the surveys, none very common. Most of these were found under loose bark on dead trees and stumps. One species, *Uroplectes chubbii* has the last two or three segments of the tail black on an otherwise olivaceous body. Another *Uroplectes* sp. has orange limbs and tail while the third scorpion was a black *Opisthacanthus* sp. with the sting segment off-white.

Diplopoda: Millipedes and centipedes

Millipedes and centipedes were found on the sanctuary, particularly the Juliform millipedes that were frequently encountered. In the dune thickets the Red millipedes *Chersastus* sp. were found, some climbing into bushes and in rotting logs. In miombo woodland a larger dark brown *Doratogonus* sp. was common as well as the striped *Doratogonus flavifilis*, the latter only seen following a shower of rain. Activity usually increases after rain when climatic conditions are most favourable.

Mollusca: Pulmonata - Snails

The Giant land snail *Achatina* sp. cf *immaculata* is very common on the peninsula. As its name suggests this snail is large, reaching a shell length of 12-15 cm. The large numbers of shells that can be seen lying about throughout the area attest to this. Most of these have been killed by veld fires. During unfavourably dry and cold periods these snails aestivate under logs and burrow under leaf litter in bushclumps and are therefore very vulnerable to winter and spring fires. These snails become active following rain and most activity is nocturnal. They are herbivorous feeding on plants and play a role in recycling nutrients.

It is difficult to assess what possible impact human settlement along the peninsula has had on the invertebrates. The degradation of habitats must have impacted on species restricted to areas such as dune thicket and bushclumps. The disappearance of large mammals from the area must have contributed to the paucity of dung beetles that depend on dung produced by elephant, buffalo and hippo. In order to establish this, a more detailed survey of the species still present in the area needs to be undertaken. Following the re-introduction of large mammals such surveys could be repeated to ascertain what has subsequently developed.

2.6 RANGE CONDITION, CARRYING CAPACITY AND WILDLIFE REINTRODUCTION PROGRAMME

2.6.1 Introduction

The primary objective of this activity of the PDF B project was to assess the suitability of the VCWS for wildlife, to undertake an initial assessment of the herbivore carrying capacity and to submit recommendations for a wildlife, or more specifically herbivore, reintroduction program. The study had to consider three areas, namely the Phase Ia area (the area of about 8 500 ha enclosed by the “temporary” game fence), the Phase 1 area complete (the total current VCWS of about 22 707 ha terrestrial area) and lastly with the proposed Phase II area of some 17 000 ha, giving a total land surface area of approximately 40 000 ha, included.

A field assessment of veld condition was done during a five-day visit to the VCWS during May 2002. An overflight of the area with a fixed-wing aircraft was done during a subsequent trip.

2.6.2 Ecological issues

2.6.2.1 *The impact of man*

Observations made during the field visit indicate that although human densities are relatively low in the VCWS, their impacts on the environment are none the less marked. Most if not all households depend largely on natural products obtained from the woodlands and grasslands. These take the form of fuelwood, timber, thatching grass, fruit and mushrooms among others. (The role of the freshwater and marine aquatic systems are dealt with in section 2.6, Part B, and section 2.7, Part B, respectively)

Slash-and-burn (ash fertilisation) agriculture is widely practised in the VCWS. The practice is common in the low-fertility miombo soils of Africa, particularly in the wetter regions (such as VCWS) where woody plant biomass is high and cut trees regenerate rapidly through resprouting

(Desanker, Frost, Frost, Justice & Schole 1997)(Figure 1). The technique involves the cutting and stacking of the foliage and branches of trees, whereafter they are allowed to dry out before being burned. By concentrating the brush into large piles a deeper bed of ash and somewhat greater fertility is achieved. This is especially important where livestock numbers are very low, such as in VCWS. The land is then cultivated until the enhanced fertility is exhausted or until the regenerating woody vegetation and weeds make cultivation unproductive (Desanker *et. al* 1997). The plot is then abandoned and new areas are opened up (see Figure).

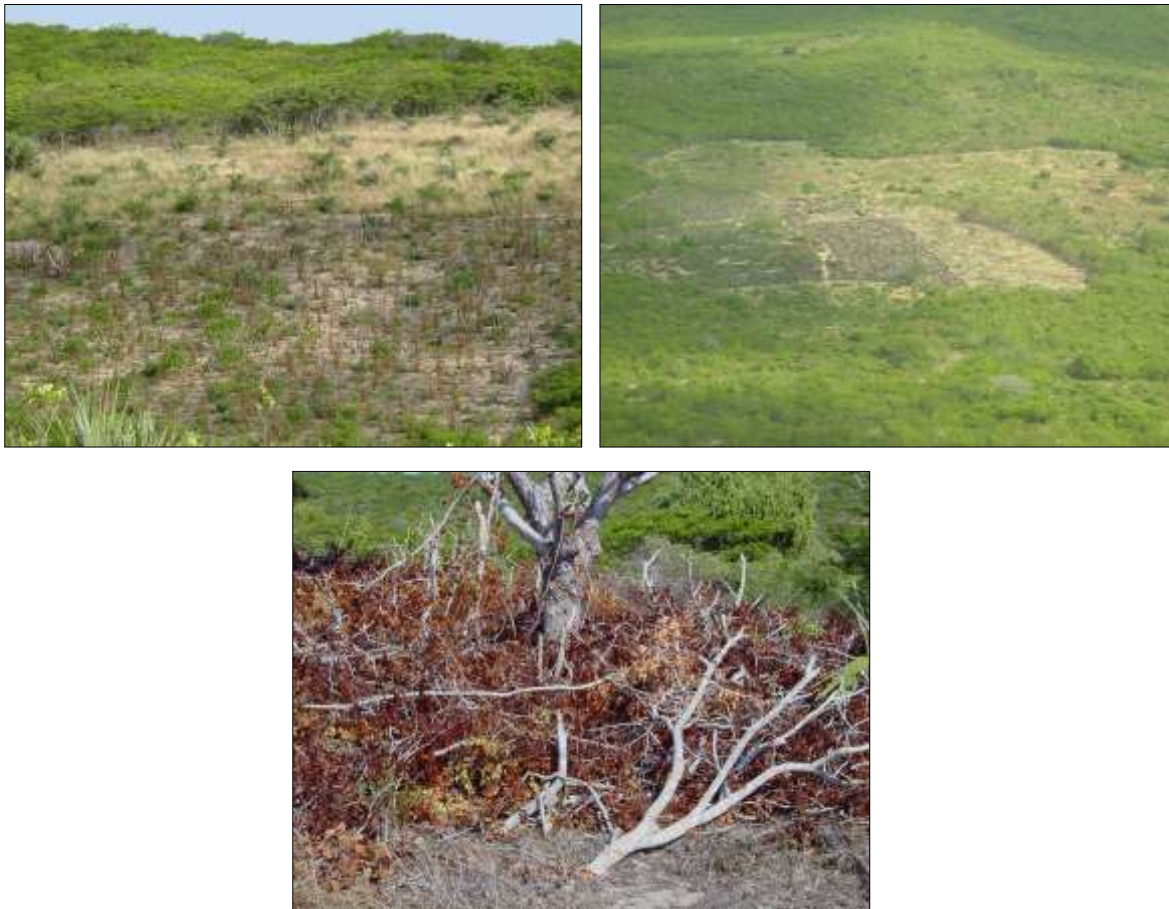


Illustration of stages of re-generation of Miombo Woodland in the VCWS. Top left showing higher successional stage in the background to re-generating miombo (middle- ground) to currently cultivated (foreground). Top right illustrates the same successional stages but note in particular the wood stacked up in the centre and ready to be burned. Bottom centre shows a close-up of a stack of wood to be burned.

Relatively large areas of miombo have been and continue to be transformed by people in the VCWS.

2.6.2.2 *The impact of animals*

The nutrient content of the foliage of miombo plants is generally low. The Nitrogen content of mature leaves of non-nodulated canopy tree species is significantly lower than that of the few nodulated N-fixing species (Desanker *et al.* 1997). In addition to this the grass nutritional quality is even lower than that of woody leaves for much of the year, and is in fact below the approximate level required to maintain grazing ungulates (Desanker *et al.* 1997). This is a major constraint to herbivorous animals in the absence of supplementary feeding.

Caution should therefore be the watchword when re-introducing large wild herbivores into the VCWS system. The biomass of indigenous large herbivores in conservation areas in other miombo woodlands is only about 20-30% of that expected at the same mean annual rainfall in African ecosystems with nutrient-rich soils (Desanker *et al.* 1997 and as given in Coe *et al.* 1976, Bell 1982 and Fritz & Duncan 1994). Specialist ungulate browsers are rare in these habitats and much of the biomass is normally made up of large bodied species such as elephant and buffalo and other grazers such as sable antelope.

Large herbivores such as elephant, white rhino, buffalo, and zebra have the ability to bring about drastic changes in unutilised climax vegetation, and are termed Type I feeders (Collinson & Goodman 1982). Species that decrease due to changes brought about by Type I feeders are termed Type II feeders and include roan, sable, tsessebe and waterbuck (Collinson & Goodman 1982). The latter species, which require relatively open areas with nearby thickets for shelter, do not cause substantial change to vegetation composition and structure (Collinson & Goodman 1982).

Species that increase in response to Type I utilisation are termed Type III feeders and include wildebeest and impala. Type III feeders have the ability to push the vegetation state induced by Type I feeders past the threshold point which would have resulted had Type III feeders been absent (Collinson & Goodman 1982). Type IV feeders may increase due to changes brought about by Type I and III species, but have little impact on the vegetation (Collinson & Goodman 1982). Examples of Type IV feeders include giraffe, kudu, black rhino, eland, and bushbuck.

An animal's basal metabolism (animal at rest) is inversely proportional to body mass. Smaller animals, made up mostly of Type III and Type IV feeders have higher metabolic rates, higher relative maintenance requirements and lower absolute requirements than larger animals. They therefore have a high intake, select a diet of high nutritive value and have a high digestive efficiency.

Furthermore, the effects of herbivory on the habitat include a reduction in plant and litter cover, reduced fire probability, reduced fire intensity, nutrient enrichment through dung and urine, soil compaction, trampling, reduced infiltration, increased runoff, and increased erosion on certain soils (Collinson & Goodman 1982). This is particularly important in areas where animal movement is restricted by fencing, especially in relatively small areas such as VCWS.

Herbivory results in compensatory growth by plants in the following ways:

- Under conditions of low defoliation, the plants compensate by just replacing lost tissue;
- Under moderate levels of defoliation and favourable moisture and nutrient conditions, overcompensation, with a resultant increase in plant production, may occur (McNaughton 1985); and
- Under severe defoliation regrowth does not compensate and, if continued, causes desirable species to diminish while facilitating the establishment of those species resistant to herbivory increase (Frost *et al.* 1986).

2.6.2.3 Carrying capacity

The term ‘carrying capacity’, although widely used, is rather nebulous with many definitions and is difficult to determine in heterogeneous environments experiencing variable environmental and resource conditions. The Large Stock Unit (LSU) has to date formed the basis of expression of ‘stocking rate’ and ‘carrying capacity’. The LSU uses the animal’s metabolic energy requirements and probable food intake, and comparisons between animals are generated and expressed as LSU’s (Meissner 1982). While the principles of this approach are valid and useful under certain circumstances (e.g. a single-herbivore cattle grazing system), the LSU is based on a heavy-bodied grazing ruminant (originally a 1 000 lb. ox) and does not take into account the feeding patterns (overlap) and digestive systems of different herbivores. In multi-herbivore systems this leads to confusion when calculating carrying capacity and stocking rates. Furthermore, the term ha LSU^{-1} assumes that systems tend to equilibrium (assuming stability and homogeneity).

In addition, some other shortcomings must also be considered:

The term indicates a decrease in magnitude with increasing livestock numbers (Danckwerts & Stuart-Hill undated). This is misleading and is contrary to the SI units system of nomenclature (Savage 1979; Taylor 1991);

Stocking rate is also an expression of the number of animals per unit area and the units must reflect this, i.e. LSU ha^{-1} . In fact, as the word ‘rate’ is used, a time dimension is presupposed so that LSU ha^{-1} are the units for stocking density and $\text{LSU ha}^{-1} \text{a}^{-1}$ are the correct units for stocking rate (Peel *et al.* 1999); and finally

The term is not linearly related to the number of animal units on an area of land (Danckwerts & Stuart-Hill undated).

An alternative approach was proposed by Coe, Cumming & Phillipson (1976) who related the **biomass** of animals carried on game areas to long-term annual rainfall. The formula uses the mean animal mass of herbivores where the biomass making up the animal component is summed for an area. The model importantly provides a range stocking densities for a given long-term mean annual rainfall. This allows management to take into account resource conditions at a variety of spatial and temporal scales (although this is not actually provided by Coe *et al.* (1976)).

The carrying capacity of an area is taken as the sum of its grazing and browsing capacities (Danckwerts & Stuart-Hill undated). The exact diets of animals are debatable and the point of

their division arbitrary. A model proposed by Collinson & Goodman (1982) divided herbivores into the following four classes:

- Primarily grazers (90 - 100%) feeding on medium to tall grass of moderate quality (*bulk grazers*);
- Primarily grazers (90 - 100%) feeding on short grass of high quality (*concentrate grazers*);
- *Mixed feeders* (11 - 89%) feeding on grass; and
- *Primarily browsers* (90 - 100%) feeding on the woody component.

Collinson & Goodman (1982) further recommended a species mix ratio of 45%:20%:20%:15% for classes 1 to 4 respectively.

For the VCWS the biomass and feeding class method, where stocking rates and species mix ratios are adjusted in accordance with rainfall and veld condition, will be used.

2.6.2.4 System functioning

The dynamics of miombo has been described for a variety of local conditions, but the description by Freson *et al.* 1974 who proposes a three-stage regressive series (dense dry forest-open miombo woodland-savanna) induced by the combination of woodcutting and fire seems to reflect the current situation in the VCWS. (See also the section on flora above) These multi-state models will be investigated as part of the envisaged research programme (See Part M). Such studies should investigate multi-state models where following the abandonment of cultivated fields (or combined impacts of clearing (by man or animals e.g. elephants) and fire there is a transition to open woodland. Fire is considered to be the driving force behind these transitions (with a longer than normal fire-free period to return to miombo dominated woodland)(Stromgaard 1986).

In terms of management options, it must be borne in mind that the VCWS system contains sizeable areas of higher potential “depressions” consisting of more palatable and productive grasses. Small pockets of *Acacia* and *Commiphora* woodland are also present.

At the outset therefore it is imperative that a clear set of conservation objectives be set from which management goals may be defined (see elsewhere in this BMP).

International norms and policies

The proposed wildlife re-introduction programme is, with a notable exception as will be indicated below, in line with current international norms and policies as embodied in the World Conservation Union guidelines (IUCN, Species Survival Commission, 1995):

(1) Ecosystem restoration

One of the global biodiversity strategies of the IUCN is the restoration of degraded ecosystems and the re-introduction of species where necessary (IUCN, *op cit*). This objective is also embodied in the objectives for VCWS, and is discussed in Part E of the BMP.

(2) Definition

The planned re-introduction is in line with the IUCN (1995) definition:

“An attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct”

(3) Aim and objectives

The programme is also compatible with the IUCN’s re-introduction aims and objectives:

Aims: “ ... to establish a viable, free-ranging population in the wild, of a species Which has become locally extinct, or extirpated, in the wild”

Objectives: “To enhance the long-term survival of a species; to reestablish a keystone species (in the ecological or cultural sense) in an ecosystem; to maintain and/or restore natural biodiversity; to provide long-term economic benefits to the local ... economy ...”

(4) Biological requirements

The planned re-introduction programme also complies with the following IUCN (1995) guidelines (unless otherwise indicated):

- A feasibility study was undertaken
- The taxonomic status of the populations that were extirpated is not known; it would thus not necessarily be animals of the same race or subspecies that will be re-introduced, though every effort would be made to source the animals from known populations of the same race/subspecies.
- The void left by the extirpated species was not filled by other species.
- There are no remnant populations left of the species to be re-introduced.
- The success of the re-introduction programme will be monitored.
- The VCWS will offer secure long-term protection.
- Although the habitat and especially the quality of the grazing of VCWS are marginal, the sanctuary has sufficient carrying capacity to support viable populations in the long run.
- The reasons for the extirpation of the species from VCWS will be eliminated.
- The source populations will be closely related genetically to the original native stock.
- The species that will be re-introduced are common elsewhere and the effects on donor populations will be negligible.
- The donor populations and the captured animals will undergo a veterinary screening process prior to being moved.
- The animals will meet all veterinary requirements of Mozambique.

(5) Socio-economic requirements

The performance of the company in this regard was not in all respects up to par, as is evidenced by the following (similar shortcomings were identified elsewhere in the BMP):

- No socio-economic study was undertaken to assess the impacts, costs and benefits of the re-introduction programme to the local people.
- No assessment of the attitudes of local people to the programme was undertaken.
- The local people may not (according to the social survey; see Part G) be in favour of the programme.
- Access by the local people to the Reserve area may be compromised due to the presence of potentially dangerous game.

By contrast, some positive factors are the following:

- Steps were taken to minimise the potential risk by resettling people out of the Reserve area.
- Adequate compensation was paid for involuntary resettlement of affected households.

(6) Legal requirements

All legal requirements will be complied with.

(7) Planning and preparation and post-release activities

The programme will be in compliance with all 14 of the IUCN (1995) planning, preparation and release guidelines as well as with the 10 post-release activities that are listed.

2.6.5 Methods

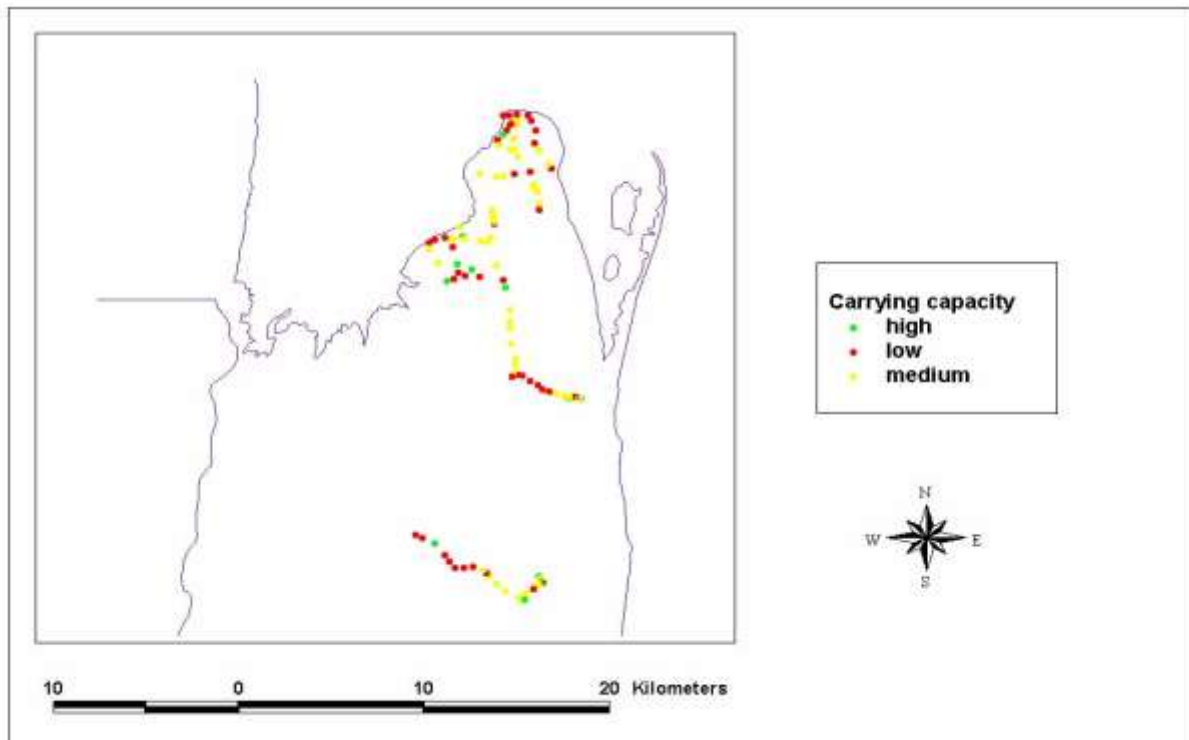
2.6.5.1 Approach

The field visit aimed at learning as much about the area in terms of the ecosystem functioning and land-uses as possible. The visit was used to effectively assess the system for the introduction of herbivores. A detailed description of the terrestrial area and the associated biota was not undertaken, because other TDY's on the multi-disciplinary planning team are dealing with other facets such as avifauna, mammals and plants.

2.6.5.2 Field Procedure

Five days were spent at the sanctuary. The first day was spent driving over as much of the area as possible with the resident scientist to get a general feel for the area. The remaining four days were spent assessing the landscape with a view to determining rangeland condition and large herbivore carrying capacity. During this time there was ongoing consultation with sanctuary staff as well as a meeting with a local senior Chief who knows the area well regarding the previous distribution of animals in the area.

A total of 121 sites were randomly selected for assessment during driving/walking transects (see figure) A flight of approximately 40 minutes duration was done by fixed-wing aircraft to reconnoiter the area. Particular attention was given to the inaccessible southern areas



Location of assessment sites on VCWS.

2.6.5.3 The vegetation assessment

Vegetation type based on the dominant tree and grass species and land-unit type (a broad structural classification of vegetation after Edwards (1983)) are important in determining suitable habitat for the species earmarked for re-introduction.

Soil moisture availability and soil nutrient status are critical in determining the structure and functioning of savannah systems in that they affect the balance between trees and grasses and patterns of primary production and plant quality (Frost *et al.* 1986). The latter influence the kinds and extent of herbivory, animal impacts, and fire frequency and intensity that in turn affects soil moisture and nutrient availability.

Sandy soils such as those that dominate in the VCWS allow rapid infiltration and percolation through the soil profile thus minimising evaporation through the soil surface (O'Connor 1985). Sandy soils have a potentially lower water holding capacity than clay soils but most of the moisture present is available to plants. Sandy soils also show less fluctuation in plant available moisture between seasons because they hold higher proportions of soil moisture than clay soils (O'Connor 1985).

It has been shown that as grass canopy cover decreases, so soil loss and rainfall run-off increase markedly. As the cover falls below about 25% so the surface run-off of water increases exponentially.

Grass tuft size and vigour may vary markedly within species and are important measurements that provide information on the stability, resilience and competitive status of species within the grass layer and between grasses and trees.

Utilisation and grass standing crop is an extremely important issue in rangeland management. The grass layer can be kept in a vigorous condition as long as it is utilised in a way that allows it to grow and reproduce. Major changes in vegetation are often caused by the interactive influence of herbivory and fire. Herbivory interacts with fire spatially and temporally, with grazers being attracted to newly burned areas. Grazers in turn reduce fuel loads resulting in a lower probability of the area sustaining another burn. Herbivory is usually specific and confined to certain favoured plant species and parts, and herbivore impact tends to be restricted in space but is more uniformly distributed in time (Frost *et al.* 1986). Fire on the other hand is periodic, can potentially extend over a large area, and is non-selective.

The following vegetation parameters were measured per site:

- Site number and Global Positioning System (GPS);
- Vegetation type and land-unit (see the full report in Volume 2 for a detailed outline, and section 2.6.5 below) was recorded at each site. This allowed for an approximation of the proportional contribution of the various veld types and land –units identified in the VCWS;
- Soil conditions (litter, erosion, capping, pedestals, compaction);
- Grass-cover was estimated on a six point scale (modified after Mueller-Dombois & Ellenberg 1974) on a continuum from 0.5%, 3%, 15.5%, 38%, 62.5% to 88%;
- Tuft size and vigour were estimated on a three point scale (1<50mm, 50-100mm and >100mm) and five point scale (1=low to 5=high) respectively; and
- Utilisation and standing crop were estimated on a four-point scale (1=low to 4 = high) and eight-point scale (1<500kgha⁻¹, 2=500-1 000 kgha⁻¹, 3=1 001-1 500 kgha⁻¹, 4=1 501-2 000 kgha⁻¹, 5=2 001-2 500 kgha⁻¹, 6=2 501-3 000 kgha⁻¹, 7=3 001-3 500 kgha⁻¹ and 8>3 500 kgha⁻¹) respectively.

2.6.5.4 Herbivore suitability assessment

In multi-species systems it is important to determine the proportional contribution of herbivore species to the total stocking rate. Decisions in this regard considered the following for the species proposed for re-introduction (based on Collinson & Goodman 1982):

- The objectives of the Sanctuary;
- The type and proportion of forage available; and
- The feeding habits of the species in question.

The following was estimated per site for animals that occurred in the area historically and those that would adapt to the conditions at VCWS:

- Habitat suitability based on a five-point scale (1=very low to 5=very high).

2.6.5.5 A preliminary assessment of the carrying capacity of the VCWS

Grossman (1984) describes ecological carrying capacity as the population size of an organism in an area as determined by the capacity of that area to support the individuals in that population and enable them to reproduce. Economic carrying capacity is the number of animal units per unit area of land that will achieve maximum animal production per unit input, but does not permit soil erosion or changes in the botanical composition that reduces the potential of the vegetation to produce animal products (Danckwerts 1982).

As discussed above the biomass method, where stocking rates are adjusted in accordance with rainfall is currently being used in this assessment, as is the division of herbivores into four feeding classes. The guidelines and limits will be refined for the study area during the planned monitoring process (see Part M).

A herbivore carrying capacity map was constructed using a Landsat Thematic Mapper satellite image. The latter represents a degraded image with a pixel size of 100 x 100 m compared to the original (and finer) 30 x 30 m pixel.

A step-wise approach was followed to identify areas of different carrying capacity:

- Firstly, the three spectral bands from the image were imported into the IDRISI Geographical Information System (GIS). A composite image of the three bands was generated. This composite was subjected to an unsupervised classification using a histogram peak technique of cluster analysis (Eastman 1992). Unsupervised classification allocates each pixel to a certain class based on its spectral characteristics only. No *a priori* assumptions are made regarding the information content of the LANDSAT image or of the classification clusters. For an unsupervised classification, no existing information on the ground situation is needed.
- Secondly, the GPS (Global Positioning System) coordinates of each of 121 field samples were imported into the GIS. The field sites were divided into three different groups; those representing low carrying capacity (>20 ha required per Animal Unit, as estimated in the field), medium carrying capacity (11-20 ha/AU) and high carrying capacity (<10 ha/AU).
- Thirdly, the meaning of the clusters of the classified image was explored using those GPS positions. The correspondence of the position of the field samples with different carrying capacity relative to the different clusters was used to assign a value of low, medium or high carrying capacity to the map. The clusters were then reclassified and lumped into three categories (low, medium and high carrying capacity respectively).
- Fourthly, the marshy depressions, which were identified in the field as being of higher carrying capacity, were subjectively delineated on the satellite image. Their perimeter was superimposed on the map with the three different carrying capacity classes. This effectively increased the extent of the area with a high carrying capacity.

The following was done on site:

- An estimate of carrying capacity per site ranging from 1 125 kgkm⁻² (>35 haLSU⁻¹), 1 500 kgkm⁻² (30 haLSU⁻¹), 1 800 kgkm⁻² (25 haLSU⁻¹), 2 250 kgkm⁻² (20 haLSU⁻¹), 3 000 kgkm⁻² (15 haLSU⁻¹), and 4 500kgkm⁻² (10haLSU⁻¹); and
- The herbivore carrying capacity map constructed.

2.6.6 Results, Discussion and Recommendations

2.6.6.1 Vegetation Type and Land Unit

As mentioned above, Freson *et al.* (1974) proposed a three-stage regressive series for miombo (dense dry forest-open miombo woodland-savannah). For analytical and management purposes, two stages, a re-generating miombo woodland and currently cultivated lands were added to this classification (See Figure A) in the case of VCWS. As previously mentioned, an important component in the VCWS system are the so-called “depressions” which have a much higher carrying capacity than the surrounding miombo, while the small areas of thickets, *Acacia* and *Commiphora* woodland will also attract the attention of mixed feeders and browsing herbivores (see Figure B). Figure B also illustrates the salt marsh and mangrove habitats



Figure A: Illustration of main successional stages of Miombo Woodland of the VCWS. Clockwise from top left. Dense-dry forest, savanna, open woodland, cultivated land and regenerating woodland.



Figure B: Illustration of other vegetation types in the VCWS. Clockwise from Top left – Depression, *Commiphora* thicket, Mangroves, *Acacia* veld, Salt marsh and Thicket.

The following tables broadly classify the VCWS into vegetation types and land-units (structural).

A preliminary description of vegetation types in the VCWS.

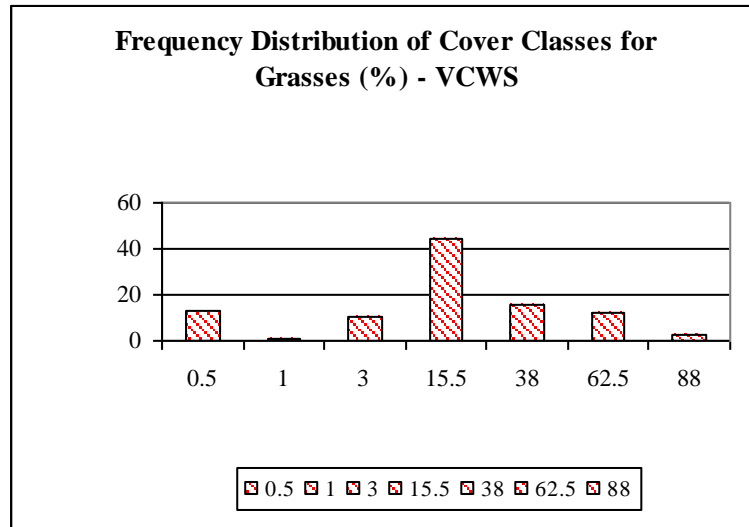
Broad Veld Type description	As percentage of sites assessed (%)
1) Miombo woodland	60
2) Depression/Pan areas	12
3) Cultivated areas	2
4) Regenerating miombo woodland	20
5) Thickets	3
6) Mangrove	1
7) Acacia veld	1
8) Salt Marsh	1

A preliminary description of the land-units found on VCWS (See above for a brief description, and refer to Peel's specialist report in Volume 4 of this BMP for a detailed explanation of land-units).

Land-Unit	As percentage of sites assessed (%)
113) Short forest	4
114) Low forest	10
122) Tall closed woodland	2
123) Short closed woodland	7
124) Low closed woodland	25
133) Short open woodland	1
134) Low open woodland	6
211) Short thicket	2
212) Low thicket	18
222) Low bushland	2
311) High closed shrubland	1
312) Tall closed shrubland	5
322) Tall open shrubland	2
332) Tall sparse shrubland	1
411) High closed grassland	1
412) Tall closed grassland	4
413) Short closed grassland	1
414) Low closed grassland	5
434) Low sparse grassland	2
511) Tall closed herbland	1

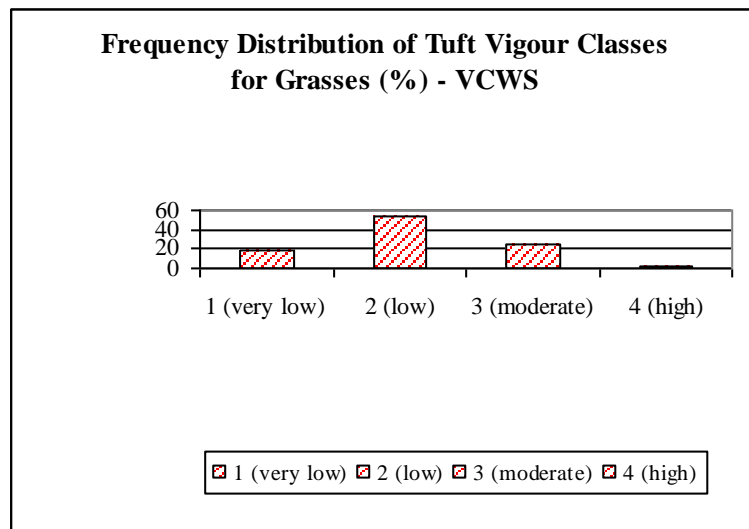
2.6.6.2 Grass cover

The grass cover is generally moderate for VCWS (Figure 4). The miombo can be said to be a typical moist-dystrophic savanna (Huntley 1982; Frost *et al.* 1986). As herbaceous cover decreases so soil loss and rainfall run-off increases. Herbaceous cover is therefore important in sandy soils such as those found on VCWS.



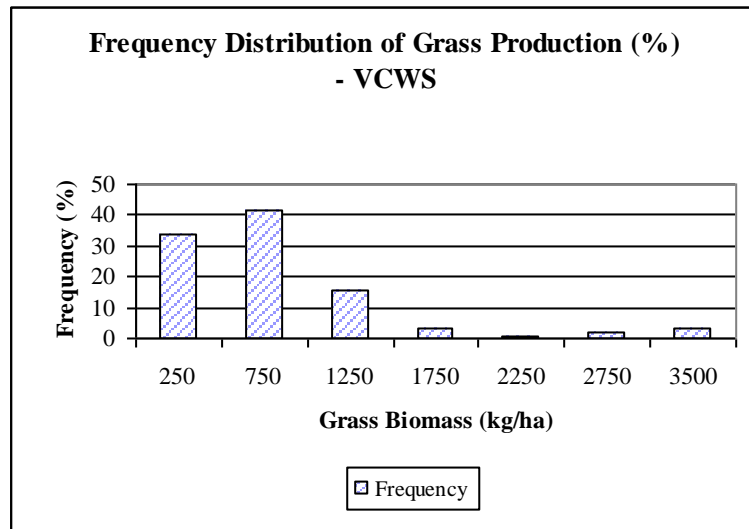
2.6.6.3 Tuft vigour

The tuft vigour for VCWS is, as expected on dystrophic soils, generally low as is evidenced from the following figure:



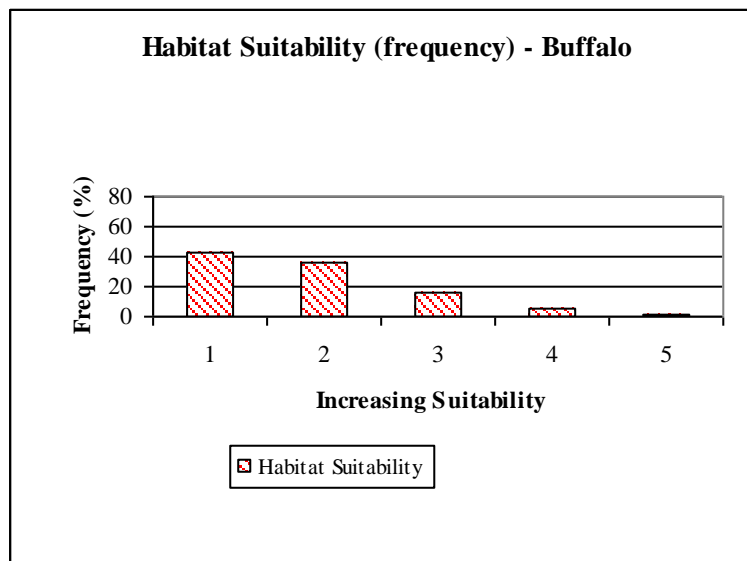
2.6.6.4 Grass standing crop

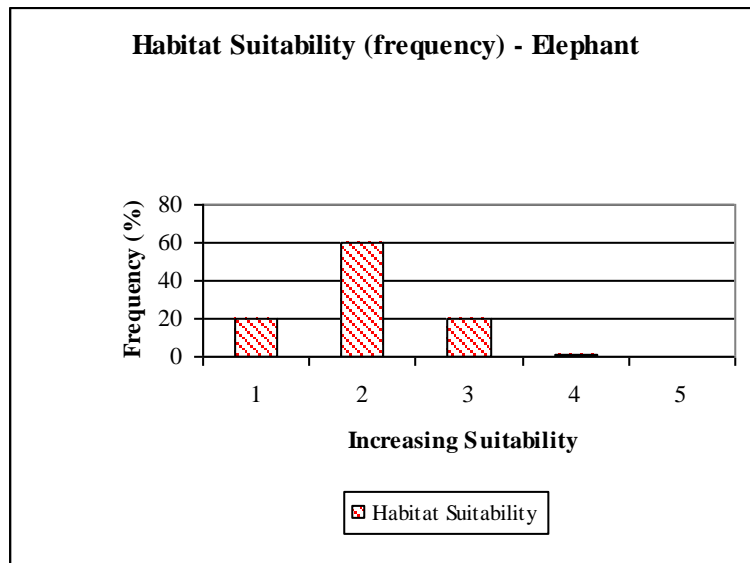
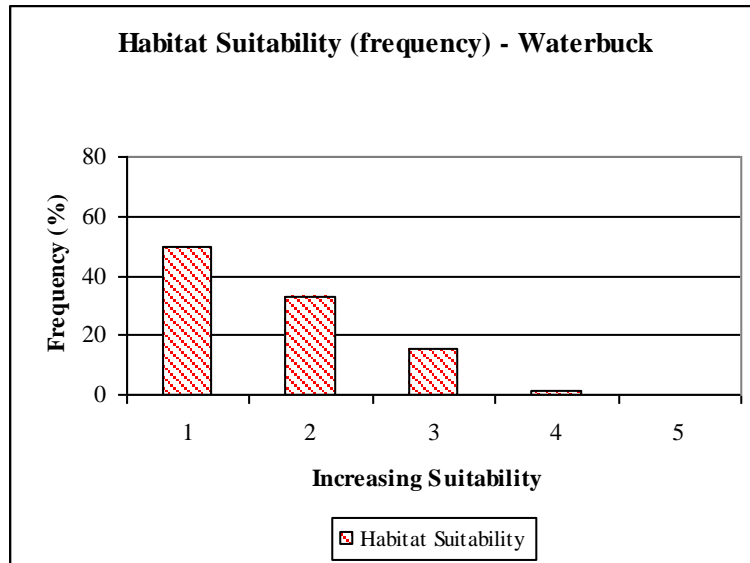
The grass standing crop can be said to be relatively low for VCWS with most sites having between 250 and 750kg/ha (Figure 6). Grass biomass is the biomass of grasses, forbs and sedges, i.e. the non-woody component of the vegetation. It is important because it indicates how much food is available for grazers, how much material there is for utilisation by man and how much material there is for burning. Grass standing crop, however, is a crude measurement as not all species are acceptable to herbivores. It is therefore combined with composition, structure and vigour estimates to indicate the amounts of acceptable forage available for grazers.



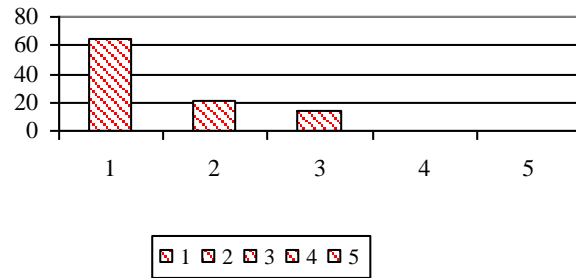
2.6.6.5 Habitat suitability for large herbivores in VCWS

Habitat suitability assessments are illustrated per Feeding Type in the figures below. (For an explanation of feeding types refer to the discussion above) It can be seen that the habitat suitability is largely low to very low. This corroborates the findings of both the vegetation and carrying capacity assessments.

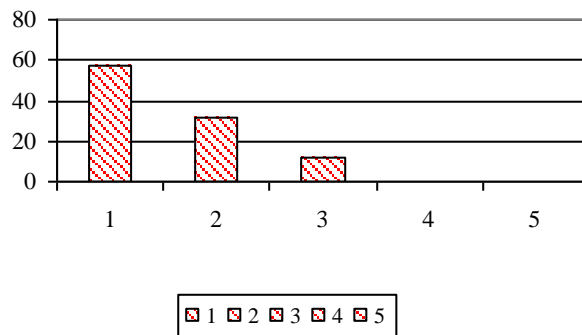


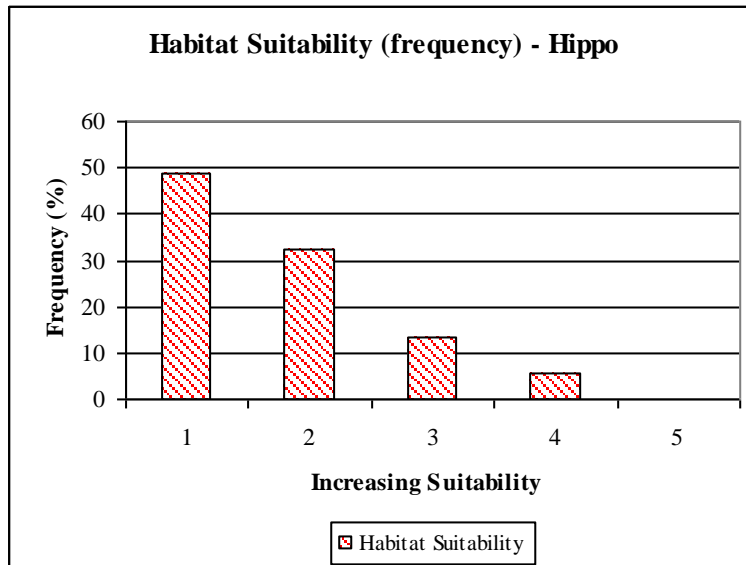
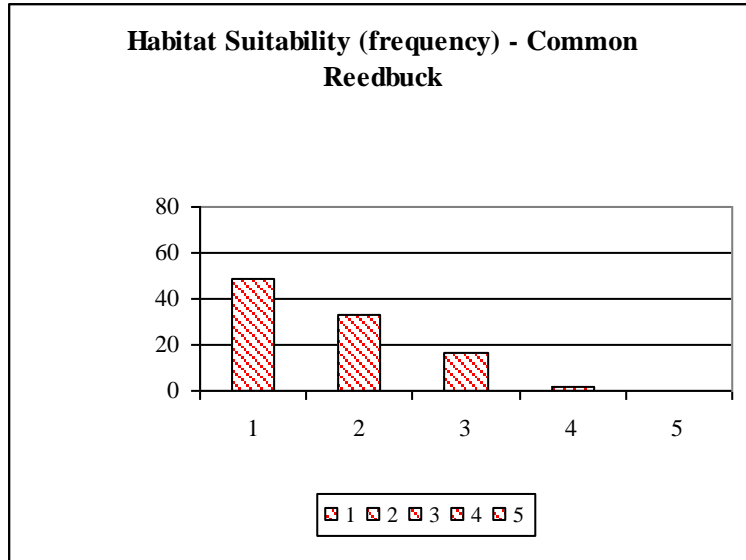


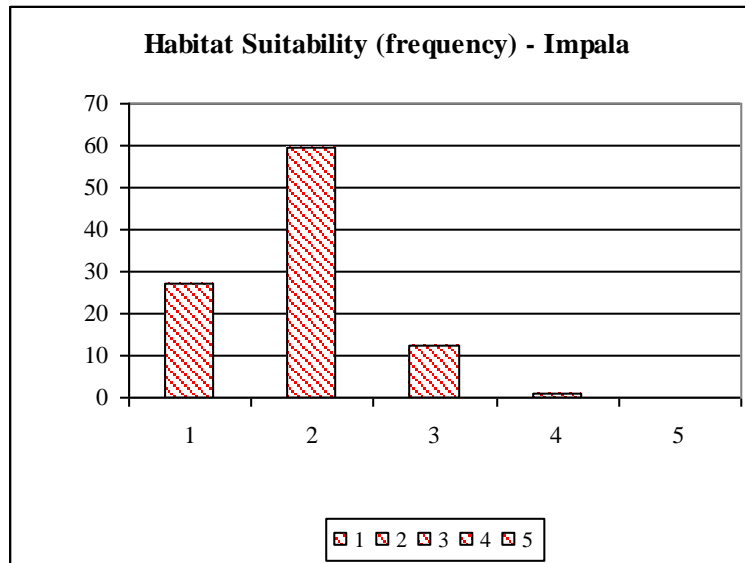
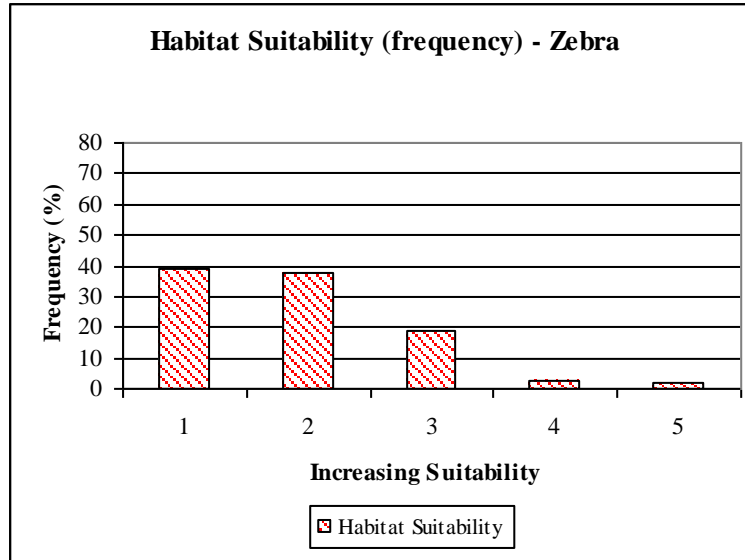
Habitat Suitability (frequency) - Sable

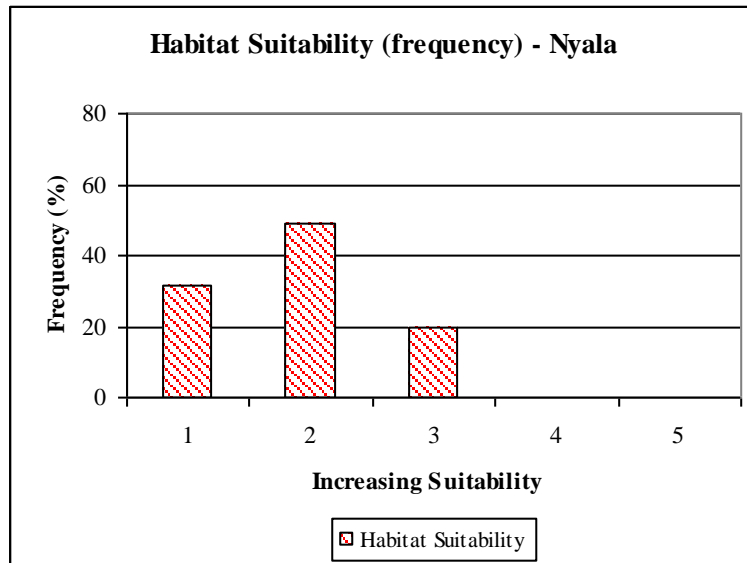
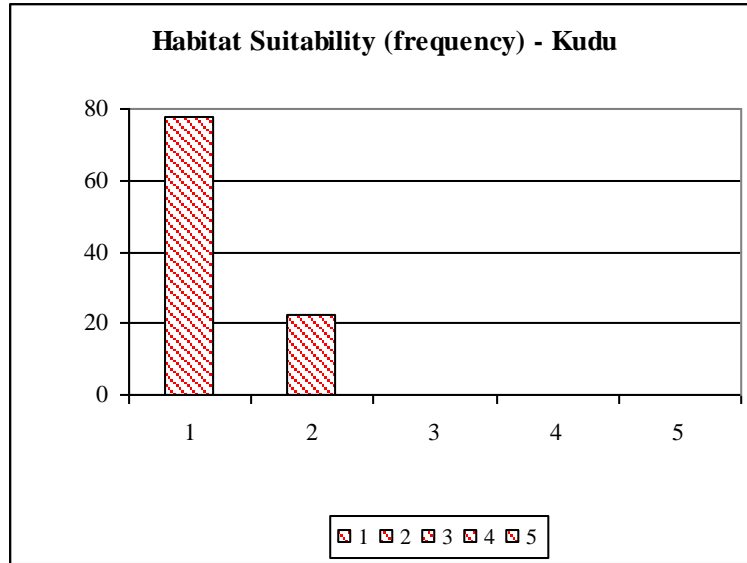


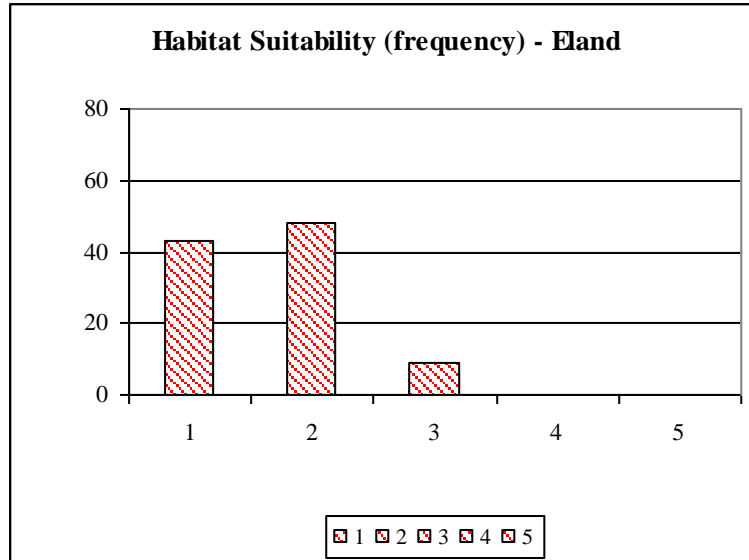
**Habitat Suitability (frequency) - Lichtensteins
Hartebeest**





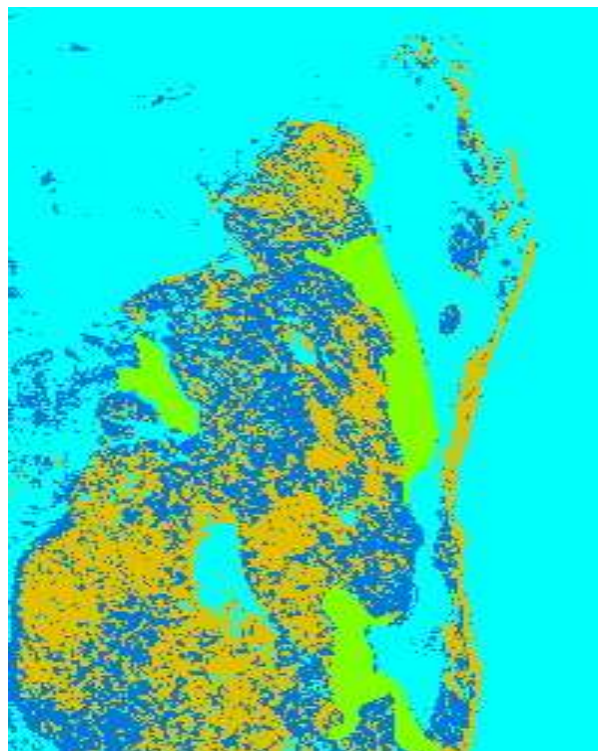






2.6.6.6 Carrying capacity assessments for VCWS

For VCWS the ecological carrying capacity approach (see above) will be applied. Results indicate that the area has a low herbivore carrying capacity as is illustrated by the following figures:



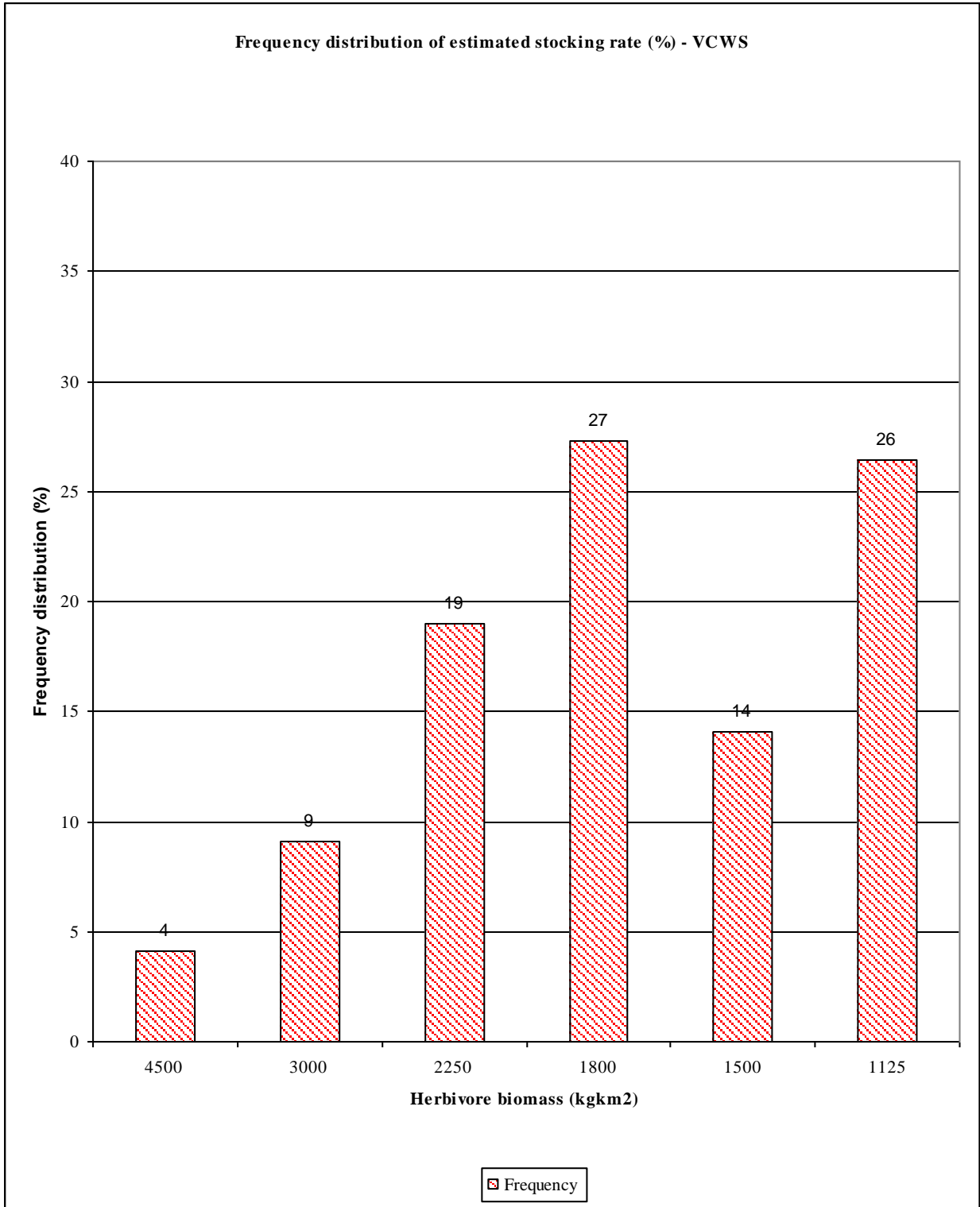
Frequency distribution classified image of carrying capacity for VCWS

Where: Frequency distribution classified image:

Yellow = very low carrying capacity 44.6%

Dark blue = low 44.7%

Green = moderate-high (depressions) 10.6%



2.6.6.7 Guidelines for large herbivore re-introduction

Due to the inherently low carrying capacity of the area, it is probable that large herbivores were never permanently resident in the VCWS. Although it could only be postulated on, it seems likely that the higher quality grazing of the extensive wetland to the west of the current Phase I

area of VCWS that effectively separates it from the mainland, at least at times served as the primary source of food for the area's herbivorous animals.

Initially, some 8 500ha of the northern portion of VCWS was fenced off as part of the first phase of the Sanctuary, the intention being the introduction of large herbivores into this "closed" system. It was subsequently decided not to re-introduce any wildlife during 2002 and a much larger area will probably be fenced by mid-2003. There is a possibility, though, of releasing animals into this smaller area during 2003 before dropping the fence to consolidate the larger area. This situation presents a unique set of challenges. Management is presented with an opportunity to, as it were, "start from scratch". Given the limited knowledge that we have of how the ecosystem will respond to the introduction of large wild herbivores, as well as the poor quality of the grazing, the initial introductions will be conservative.

Keeping the objectives of the Sanctuary in mind, introductions should be aimed at (given in order of priority after Collinson & Goodman 1982):

- Re-establishing wild herbivores which, according to available historical evidence, occurred in the area;
- Prioritising the introduction of populations of "drawcard" species (e.g. elephant – but in line with the first point);
- Maintaining other species in densities that do not compromise the success of the "drawcard" species;
- Maintaining all populations at numbers, sex and age structures and proportions which will not compromise the vegetation, soil and hydrological integrity of the VCWS;
- Given the low numbers of animals that are to be introduced, consideration will need to be given to maintaining the genetic diversity of the re-introduced large herbivore populations and some selective exchange of animals or additional reintroductions of male animals will require consideration in the future; and
- Obtaining revenues from the utilisation of surplus herbivores for the benefit of the surrounding rural communities.

2.6.6.8 Animal introductions

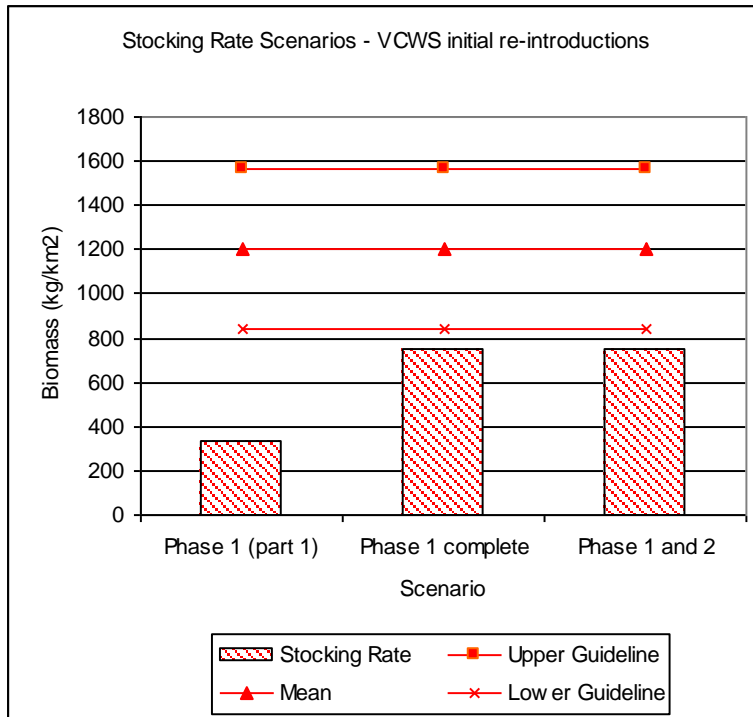
The following must be noted when considering introductions:

- The biomass capacity of miombo woodlands is only about 20-30% of that expected in areas receiving similar rainfall on nutrient rich soils. This was confirmed in the current survey;
- The initial introductions should be conservative; and
- The recommended numbers are based on the assumption that Phase 2 contains similar habitat to the surveyed Phase 1 area, since no visit to the Phase 2 area was possible.

In order to achieve the ecological objectives, the VCWS should initially be stocked at low levels. A three-phase approach is proposed:

- Firstly, should it be decided to use the temporary area of 8 500 ha (Phase 1a) for the initial introduction, only “non-dangerous” species should be released, with the exception of buffalo on the proviso that all the people living in the area have been resettled.
- Secondly, the introduction of additional animals and large herbivores such as elephant and hippo to the completely fenced Phase 1 area. The total terrestrial area of phase I is about 22 000ha, but the fenced area will be smaller because the community development area will have to be excised. In addition to the latter species, guideline figures are given for the other species that were introduced during Phase 1a (i.e. these are not natural increments but are considered sound when related to the increased size of the area).
- Thirdly, the numbers that may be kept after completion of Phase 1 and 2 (about 39 000ha; the total fenced Reserve area is still unknown). The approach taken will be an adaptive management philosophy. The slow build up of animals (particularly species such as elephant, buffalo and hippo – Type I feeders) towards those given in the following table in conjunction with a comprehensive monitoring programme is essential. Management action will be taken in the event of any signs of habitat degradation.

The following figure illustrates the stocking rates obtained from the above numbers (note again these are absolute numbers and are not the result of natural increases in the populations presented). The median stocking rate obtained from the assessment was 1 800kgkm⁻². As stated above the VCWS will initially not be stocked at this rate but at a more conservative rate. This conservative approach is also necessitated by the fact that the size of the eventual Reserve area is still unknown. The numbers will be allowed to build up while the response of the vegetation to re-introduced herbivores as well as the condition of the animals are carefully monitored). For ease of interpretation the stocking rate, expressed as Large Stock Units per 100ha (LSU/100ha) and the total LSU available for each scenario in the caption, is included as text below the following figure.



In addition to this during the first phase introduction scenario, animals such as Duiker (Red and Grey), Oriibi and Suni could be safely introduced (depending on availability).

A guideline for herbivore numbers for the initial phases for VCWS.

Herbivore species	Phase 1a 8 500ha	Phase 1 complete - 22 707ha ³	Phase 1 and 2 complete – 40 000ha ³
Zebra ¹	20	52	92
Buffalo ²	25	65	115
Waterbuck	20	52	92
Lichtenstein's Hartebeest	15	39	69
Nyala	20	52	92
Reedbuck	20	52	92
Sable	15	39	69
Bushpig	10	26	46
Hippo ²		12	21
Elephant ²		20	35

¹If suitable animals can be found (Grobler *pers. comm.*).

²Possible dangerous animals (elephant, buffalo and hippo) will only be reintroduced after all the people living in the natural area (fenced area) of the sanctuary have been resettled, the resident fisher community in the natural area has been fenced, and a comprehensive information programme to inform the local communities has been completed.

³ The actual sizes will be smaller, and will be determined by the size of the fenced-out community development area.

2.6.5 Management, research and monitoring programme

Refer to Part M for the future monitoring and research programme with regards to the wildlife of VCWS

2.7 FRESH WATER BIOTA

Refer to section 1.4 above for a description of the fresh water biota

2.8 DESCRIPTION OF MARINE BIOTA

2.8.1 Preamble

One would not normally start a section in a “clinical” document such as a biodiversity management plan with a preamble singing the praises of the environment or the place that is being planned. However, in this instance the specialist’s (MN Bruton) preamble to his report would be more than appropriate:

If you were to design a place with maximum diversity, choose a location on the tropical east coast of Africa, add a peninsula, a large bay, tidal sand flats, an estuarine lagoon, sea grass beds, freshwater lakes, extensive mangrove swamps and reed swamps, throw in coral and rocky reefs, idyllic sandy beaches, forested dunes and a wide tidal range, and then sprinkle it with over 400 species of fishes, including the elusive sea horses and mudskippers, thousands of rare and unusual invertebrates, nesting turtles, millions of jellyfish, the enigmatic dugong, giant manta rays and whales offshore. Improve the mix by adding items of cultural diversity, including traditional fisherfolk and life styles, Arabian dhows, expert boat builders, an historic lighthouse, ancient middens, a dark past but a bright future, thatched camps under satin skies, and the night-time drum beat of Africa. What do you have? The Vilanculos Coastal Wildlife Sanctuary in Inhambane province, Mozambique.

2.8.2 Introduction

The VCWS comprises a series of interlinked marine, coastal, estuarine, lagoonal, terrestrial and freshwater systems that, in combination, form one of the most diverse and interesting biodiversity hotspots on the east coast of Africa. Furthermore, the area has a rich and interesting cultural history that combines elements of Africa, Asia and Europe. The biological and cultural diversity of the place need to be considered together in order to appreciate its real value.

This section of the BMP deals primarily with the marine and coastal subsystems, including the offshore marine environment, coral reefs, inshore rocky reefs, sandy beaches, estuarine lagoon, San Sebastian Bay and its tidal sand flats and sea grass meadows, and the mangrove swamps, reed swamps and other shoreline habitat types found in the sanctuary. This is a vast array of habitat types with probably thousands of different species, many of which are poorly known. The relatively low energy sand flats are a dominating feature of the sanctuary and play host to a wide variety of marine animals, some of commercial value. Distinct patches of sea grass occur in the tidal flats. These meadows stabilize the shifting sand communities and provide habitat for a host of marine animals, including the dugong *Dugong dugon*. Extensive mangrove swamps occur along some shores of the Bay and along the Inhamambane Estuary.

The VCWS is washed by the southward flowing Mozambique Current with velocities of up to 2 m/sec (Dutton, 1990). The temperature of the seawater ranges from 23°C in winter to 27°C in summer. The average tidal amplitude is about 3 m during normal spring tides, reaching 4.39 m during equinox tides. The tidal flats between the San Sebastian Peninsula and Bangué Island experience strong currents, especially at high spring tides. These currents transport vast quantities of sand and silt, as well as the larval forms of many marine animals. There is therefore extensive interchange of organic and inorganic material between the sea and the lagoon.

Although the environmental importance of the coastal plain of Mozambique is appreciated internationally, it has been relatively poorly studied for a variety of reasons, including its remoteness, the presence of tropical diseases, the extended civil war, the relatively poorly developed transport infrastructure, and the lack of a strongly developed research infrastructure in Mozambique.

Inhaca Island, on the eastward edge of Delagoa Bay in southern Mozambique, is probably the best-studied part of the Mozambican coastal and marine environment (McNae & Kalk, 1962, 1969; Kalk, 1995, and references contained therein). Research was initiated there in 1911 by staff of the Museu Alvaro de Castro in (then) Lourenco Marques, and subsequently the Instituto de Investigacao Cientifica de Mocambique (from 1955) and the University of Witwatersrand in South Africa (from the mid-1930s). Fortunately, the marine and coastal environments of Inhaca Island are similar to those in the VCWS and extrapolations can be made, with a reasonable amount of certainty, from one to the other.

Tinley (1969) and Dutton (1990) carried out extremely valuable early surveys and quantitative research in the Bazaruto archipelago, which is invaluable today.

The marine specialist's (MN Bruton) extensive knowledge of the Lake Sibaya region of the Maputaland sandy coastal plain in northern Zululand (South Africa) (Bruton, 1979) could be applied to the very similar VCWS. The extensive literature on the Maputaland coastal plain (Allanson et al., 1974; Bruton, 1980a & b; Bruton & Cooper, 1980; Bruton & Haacke, 1980; Bruton & Kok, 1980; Bruton et al., 1980, and references contained therein) is therefore also of relevance to this study.

It nevertheless needs to be recognized that the marine survey was conducted on the basis of less than two weeks in the field and with access to a very restricted literature. Furthermore, the range of animals and ecosystems that had to be covered was huge: more than 39 classes of highly diverse, and often poorly known, animals placed in 13 phyla. Marine animals are also more difficult to survey, not only because they are under water, but also because many of them are small, cryptic, subterranean, nocturnal and/or elusive. Under these circumstances, it is impossible to give full justice to the diverse and complex biota of the VCWS, and to the complex environmental problems involved in their management.

During the survey time constraints only allowed for the documentation the major marine and coastal habitats, with little time to examine individual species. In addition, it was impractical to make large specimen collections from the marine and coastal environments due to the variety of gear that would be required and the severe time constraints. The amount of taxonomic research that could be carried out was therefore very limited.

This section of the BMP should therefore be regarded as a very preliminary account of a complex and diverse system, that will lead to more extensive research being undertaken in future (see Part M).

2.8.3 Present levels of exploitation

The full extent of exploitation of marine and coastal resources in the VCWS is not known but Odendaal (2002) concluded that the utilization has reached unsustainable levels. Useful comparable figures are available for the Bazaruto archipelago to the immediate north. Dutton (1990) reports that about 1500 people from 60 artisanal fishing communities in the Bazaruto archipelago commercialized over 1500 tonnes of dried marine products during 1989/90. The consumers of this fisheries yield were mainly Mozambicans residing in Vilanculos, Inhassaro and inland areas of the mainland. *Mapalo* sand oysters *Pinctada imbricata* have been a staple food in the diet of the local people for centuries (as evidenced by the extensive *mapalo* middens adjacent to their villages). Turtles and turtle eggs are harvested, but not on a sustainable basis although the eggs could possibly be used sustainably if the adult turtle population is protected. A well-organized semi-commercial fishery from Inhassaro, Vilanculos and the Bazaruto islands exported 4 610 tonnes of frozen fish, 42 tonnes of crayfish, 7 165 tonnes of dried fish, 500 tonnes of dried squid and 39 tonnes of dried sea cucumber in 1989/90 (Dutton, 1990).

It is clear from the above figures that the artisanal and semi-commercial fisheries of the Bazaruto archipelago, and, from preliminary observations by Bruton (2002) and Odendaal (2002) also for VCWS, provide considerable social and economic benefits to the Tsonga people of the region.

2.8.4 Holistic analysis of marine, estuarine and lagoonal systems

2.8.4.1 Coral reefs and open sea

The main requirements for the building of a successful coral reef are found off the coast of the sanctuary, i.e. consistently high sea temperatures (> 20°C), hard rocky substrata on which to build the coral reef, strong currents to wash away deposits of sand and to transport larvae and

nutrients, and a water column relatively free of sediment from large rivers. The coral reefs off this coast are of mid-Holocene origin (about 7000 years old; Dutton, 1990) and are therefore fairly recent. The coral reefs off the Sanctuary and the Bazaruto archipelago are not true barrier reefs, as in the Great Barrier Reef of Australia, as they are not comprised solely of new coral built on old coral in a continuous reef formation. They should rather be classified as coral-encrusted rocky reefs, or patch reefs, (see above) similar to those found off the coast of northern Zululand but richer in coral species. They have an extremely rich attached invertebrate fauna and are inhabited by a wide variety of free-living cephalopods, other molluscs, crustaceans, fishes and other life forms. The reef that the survey team examined appeared to be scoured by strong currents; this is apparently typical of reefs in the area. True coral reefs are found further north in Mozambique.

Coral reefs are as dependent on light as are green plants on land, as the cells of reef-building coral animals contain thousands of unicellular algae that contain photosynthetic chloroplasts. These algae must be exposed to light so that the corals will grow. The multitude of large pores (calyces) in the coral rock, which contain the coral polyps, allow for the penetration of light into the internal tissues of the coral in daylight. At night, polyps extend their tentacles to feed (Kalk, 1995). Corals can therefore not survive if they are covered with sand or submerged in turbid water.

The coral reefs of Inhaca Island are inhabited by over 100 species of animals that are associated with the living coral as commensals, lodgers or predators (Kalk, 1995) and a similar number of species can be expected to inhabit the coral reefs in the VCWS. Many additional species inhabit the dead coral bases. In addition, coral reefs are typically associated with sea meadows, reef flats, and open sandy habitats that are inhabited by further species. The overall community associated with a coral reef is one of the most diverse of any ecosystem in the world (Steene, 1990).

Coral-encrusted rocky reefs occur close to shore along the marine coast of the VCWS as well as well offshore opposite the entrance to the Bay and off the Bazaruto Archipelago. The former reefs may be accessible to snorkel divers operating from the shore on calm days whereas the latter are only accessible to scuba divers operating from boats.

The coral reef surveyed during the marine study in the entrance to San Sebastian Bay is inhabited by the following species, based on direct observations or records from other studies of coral reefs in southern Mozambique:

Phylum Protozoa: *flagellates, ciliates*: Single-celled animals, together with the larval forms of multi-cellular animals (especially sponges, arthropods, polychaetes, arrow worms and chordates), form the zooplankton that floats in midwater. The zooplankton typically feeds on the phytoplankton and forms the base of the food chain on a coral reef. All higher forms of life on a coral reef ultimately depend on the availability of phyto- and zooplankton.

Phylum Porifera: *sponges*: Sponges are primitive, sedentary animals that lack a mouth, digestive tract or any other conventional internal organ. Water and small food particles enter the sponge through numerous tiny pores and exit through large openings that are often raised like

turrets. Sponges reproduce either by budding or by producing planktonic larvae. Sponges are conspicuous inhabitants of rocky and coral reefs. Solitary sponges are common on coral reefs in Mozambique, both on the live coral as well as on dead coral and reef rubble. The cup sponge, *Ircinia* spp., forms a cup up to one metre across and is found on coral reefs in the sanctuary, as is the crumpled sponge, *Axinella waltneri*.

Phylum Cnidaria: hydroids, bluebottles, jellyfish, soft corals, sea fans, sea pens, sea anemones, zoanthids and hard corals: Cnidarians all have a simple body structure which is sac-like with an outer skin and an inner gut lining. They have a mouth but no anus, and there are no specialized organs for respiration or excretion. Notwithstanding their simplicity, cnidarians are extremely successful and abundant in the marine environment (less so in freshwaters). They were among the earliest forms of multi-cellular animals to evolve on Earth, having arisen at least 650 million years ago. They uniquely possess highly specialized stinging cells (nematocysts). They are both solitary and colonial animals.

Many unidentified sea anemones were seen on the coral reef. The giant anemone, *Radianthus ritteri*, occurs on coral debris and coral reefs in the VCWS as well as abundantly in the tidal shallows and sea grass beds of the lagoon, estuary and Bay. The giant anemone is an important component of the biota of the VCWS, and should be regarded as a flagship species; they should be the subject of more detailed study.

Zoanthids, such as the columnar sandy zoanthid, *Palythoa nelliae*, are colonial animals that, like corals, depend on microscopic symbiotic algae (zooxanthellae) for most of their nutrients, although they also prey on small organisms. Zoanthids form continuous carpets on reefs in the Mozambique region. Another species, *Zoanthus natalensis*, lies on the sand between corals and its surface is encrusted with sand (Kalk, 1995).

Jellyfish are bell-shaped, gelatinous creatures and are extremely common in marine and lagoonal habitats in the VCWS. The root-mouthed jellyfish, *Rhizostoma* spp., the largest jellyfish known, is commonly seen floating about 2 m below the water surface in offshore and inshore marine environments of the VCWS. Captured specimens were found to have several 'hitchhikers', in the form of small crabs, under the bell. These giant jellyfish, which average 30 cm in diameter, are unusual in that they lack tentacles and feed only on microscopic prey which are sieved out of the water by the manubrium. They often wash up on shore, where they are scavenged by plough shells, *Bullia* spp., and crabs.

The bluebottle or Portuguese man-of-war, *Physalia utriculus*, the raft hydroid, *Porpita pacifica*, and the by-the-wind sailor, *Velella* spp., which are all hydroids, were observed on the surface of the open sea off San Sebastian Bay. They are all driven along by the prevailing winds, and often strand on the shore.

Hard coral 'skeletons' belonging to the following genera were found on the reef and shoreline, and need to be studied further to determine the species present in the VCWS: *Acropora*, *Montipora*, *Porites*, *Favia*, *Meandrina*, *Pocillopora*, *Stylophora*, *Pavona*, *Platygyra*, *Leptoria* and *Dendrophyllia*. The following species were recognized: staghorn coral *Acropora irregularis* and plate coral *A. vasiformis*.

Phylum Ctenophora: comb jellies: These spherical, planktonic animals have rows of cilia along the sides of their bodies that are used for locomotion. They are carnivorous and feed on shrimp-like prey. Comb jellies, probably of the genus *Beroe*, were seen in the VCWS over the coral reef.

Phylum Platyhelminthes: free-living flatworms: Free-living flatworms were seen on the coral reef, but could not be identified. They are related to the parasitic flukes and tape worms, and feed on small crustaceans and molluscs.

Phylum Annelida: segmented worms, bristle worms: Bristleworms are among the commonest inhabitants of tropical rocky shores and coral reefs, and can be found under virtually every loose rock or colonial animal. The fireworm, *Eurythoe complanata*, and the beadworm, *Syllis* spp., were observed on the coral reef, and many more species are likely to be found in the VCWS in future. Unidentified tangleworms, feather-duster worms and coral-worms were seen on the rocky reefs. Bamboo worms, *Euclymene* spp., have been reported from Mozambican shores (Branch et al., 1994), but were not seen.

Phylum Arthropoda: copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs: Arthropods have jointed limbs and a segmented body that is covered by a hard, jointed exoskeleton made of chitin. Because the exoskeleton cannot expand, arthropods periodically shed their exoskeletons (moulting) in order to grow. Arthropods include the insects and spiders, which are abundant on land but hardly represented in the sea, and the crustaceans, by far the most diverse group in the sea. Some crustaceans, such as crabs, are remarkably successful on land, in freshwaters and in the sea. Most crustaceans have several larval stages that are planktonic and are dispersed widely by currents before they metamorphose into adults.

Copepods undoubtedly occur in the VCWS, either as free-living forms in the plankton or benthos, or as parasites of fishes. The east coast rock lobster *Panulirus homarus* and the penicillate spiny lobster *P. penicillatus* were observed in crevices among rocks on the coral reef. The painted rock lobster *Panulirus versicolor* and the ornate spiny lobster *P. ornatus* occur along the Mozambique coast (Branch et al., 1994) but were not seen. The cleaner shrimp *Stenopus hispidus* was recorded on the coral reef. Cracker shrimp *Alpheus crassimanus* probably also occur there but were not seen.

Phylum Brachiopoda: lamp shells: Lamp shells probably occur off the coast of the VCWS but were not recorded.

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squid: Oysters were seen on the rocky coral reef, probably Cape pearl oyster *Pinctada capensis*. The giant clams *Tridacna squamosa* and *T. maxima* are spectacular inhabitants of the coral reefs and should be regarded as a flagship species. Giant clams filter invertebrates from the water column and also 'farm' microscopic algae that are housed in the brightly-coloured mantle lobes. They reach their southernmost limit of distribution in southern Mozambique/northern Zululand.

A Spanish dancer *Hexabranchus sanguineus* was observed over the coral reef. These spectacularly colourful nudibranchs are predators on the reef, and are a delight for divers to see.

Their flamboyant colours warn potential predators of their unpleasant taste. Ridged nudibranchs, *Phyllidia* spp., may occur on the reef; they are dangerous as they produce toxic chemicals from their skin (Branch et al., 1994).

Phylum Echinodermata: starfish, brittle stars, sea urchins, sea cucumbers, sea lilies, feather stars, sand dollars: The echinoderms (five-rayed animals) are a flagship taxon for the VCWS due to their high diversity, abundance, importance in the food chain and importance to commercial and subsistence fishermen. Echinoderms are pentaradially symmetrical, a body form not found in any land animals. All five classes of echinoderms are present in the VCWS – starfishes, feather stars, brittle stars, sea urchins (including pansy shells) and sea cucumbers.

The beaded starfish *Pentaceraster mammillatus* is common on the coral reefs and sand flats between rocky reefs and is a great attraction to divers and underwater photographers. The crown-of-thorns starfish *Acanthaster planci*, which is a voracious coral predator and devastated corals on the Great Barrier Reef in Australia, has been recorded from the coast of northern Mozambique (Grindley, 1963) but has not as yet been recorded from Inhaca Island (Kalk, 1995) or elsewhere in southern Mozambique. The elegant feather star *Tropiometra carinata* was seen on the coral reef.

The needle urchin *Diadema setosum*, which has long, black, needlelike spines, inhabits crevices on coral and rocky reefs. The flower urchin *Toxopneustes pileolus*, which has lethally poisonous poison glands (Branch et al., 1994), was also seen. The spiny brittle star *Ophiocoma valenciae* and green brittle star *Ophiactis savigny* occur on the coral reef and debris; the latter often has six arms, as opposed to the five commonly found in echinoderms. Brittle stars are extremely common on the coral and rocky reefs and are by far the most mobile of the echinoderms; they are also very adept at hiding in crevices or under rocks when pursued.

Phylum Chordata: sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs: The marine fishes known from the VCWS are detailed elsewhere. The ichthyofauna of the Sanctuary and adjacent Bazaruto archipelago is extremely rich, with about 80% of all fish families in the world represented in the area. Dutton (1990) and Bruton (2002) estimate that the total species count of fishes in the area exceeds 2000. Most fishes in the area are of Indo-Pacific origin and many have wide ranges in the Western Indian Ocean. This applies particularly to the highly migratory game fishes, including billfishes and large sharks. The recruitment of new stocks into the Sanctuary is therefore reasonably secure. There are very few endemic fish species or species with narrow ranges.

Fishes observed over the coral reef included:

Giant sandshark *Rhynchobatos djiddensis*, honeycomb moray eel *Gymnothorax favagineus*, floral moray eel *Echidna polyzona*, blackedged conger eel *Conger cinereus*, scorpionfish *Scorpaenopsis* spp., devil firefish *Pterois miles*, squirrelfish *Sargocentron* spp., soldiers *Myripristis* spp., bigeye *Priocanthus* spp., cardinals *Apogon* spp., sea goldie *Anthias squammipinnis*, coral rockcod *Cephalopholis miniata*, yellowback fusilier *Caesio xanthonota*, stumpnose *Rhabdosargus* spp., moony *Monodactylus* spp., old woman *Pomacanthus rhomboides*, emperor angelfish *P. imperator*, jumping bean *Centropyge*

acanthops, threespot angelfish *Apolemichthys trimaculatus*, semicircle angelfish *Pomacanthus semicirculatus*, swallowtail angelfish *Genicanthus caudovittatus*, threadfin butterflyfish *Chaetodon auriga*, pearly butterflyfish *C. madagaskariensis*, other *Chaetodon* species, wedgetail filefish *Paramonacanthus barnardi*, halfmoon triggerfish *Sufflamen chrysopterus*, whitespotted boxfish *Ostracion meleagris*, bluefin kingfish *Caranx melampygus*, golden kingfish *Gnathodon speciosus*, other *Caranx* species, spotted hawkfish *Cirrhitichthys oxycephalus*, freckled hawkfish *Paracirrhites forsteri*, sweepers *Pempheris* spp., sergeant major *Abudefduf vaigiensis*, blackbanded cardinal fish *Apogon cooki*, twobar clownfish *Amphiprion allardi*, chocolate dip *Chromis dimidiata*, blue pete *Pomacentrus caeruleus*, hogfish *Bodianus* spp., wrasse *Halichoeres* spp., tripletail wrasse *Cheilinus trilobatus*, cleaner wrasse *Labroides dimidiatus*, ember parrotfish *Scarus cyanescens*, fivesaddle parrotfish *S. scaber*, blue emperor fish *Lethrinus nebulosus*, flame goatfish *Mulloides vanicolensis*, powder-blue surgeonfish *Acanthurus dussumieri*, epaulette surgeon *A. nigricauda*, convict surgeon *A. triostegus*, other surgeons *Acanthurus* spp., clown triggerfish *Balistoides conspicillum*, whitespotted blaasop *Arothron hispidus*, fourbar porcupinefish *Lophodiodon calori*.

The swallowtail angelfish *Genicanthus caudovittatus*, which was observed in a shoal over the coral reef, has previously been recorded only as far south as Pinda (14°C) in northern Mozambique. A more thorough survey of the coral reefs off the VCWS will reveal many more fishes, probably in excess of 400 species.

Other significant fish species that are likely to occur over coral reefs in and around the VCWS could include:

Whitetip reef shark *Triaenodon obesus*, potato bass *Epinephelus tukula*, bluebanded snapper *Lutjanus kasmira*, firegoby *Nemateleotris magnifica*, spotted ragged-tooth shark *Eugomphodus taurus*, and many more.

The stonefish *Synanceia verrucosa*, one of the most deadly fish in the world, probably also occurs on the coral and rocky reefs (as it does further south at Inhaca Island and in northern Zululand; pers. obs.). Kalk (1995) also reports that this species may lie half-buried in muddy sand between rocks near reefs. The stonefish discharges venom that may be lethal to humans within a few hours (Smith & Heemstra, 1986). For this reason it is essential that tourists (and researchers) should wear boots and gloves when venturing into these areas. The devil firefish *Pterois miles*, which also has venom in its spines, is found on the coral reef as well as in rocky pools and near substrates, such as jetties and logs, in the lagoon. Firefish are territorial and hunt crabs and small fishes. Firefish should not be handled as the venom may cause great pain although it is apparently not lethal to humans (Kalk, 1995).

Inflated and dried shortspine porcupinefish *Diodon liturosus* are sold in curio shops in Vilanculos, these would have originated from coral and rocky reef habitats offshore in the archipelago – VCWS region.

Game fish that occur in the open sea off the VCWS probably include the springer *Elops machnata*, eastern little tuna *Euthynnus affinis*, skipjack tuna *Katsuwonus pelamis*, king

mackerel *Scomberomorus commerson*, queen mackerel *S. plurilineatus*, sailfish *Istiophorus platypterus*, barracuda *Sphyraena barracuda*, black marlin *Makaira nigricans*, blue marlin *M. indica*, striped bonito *Sarda orientalis* and garrupa *Epinephelus fasciatus*. Giant sandshark *Rhynchobatos djiddensis* are also considered to be game fish in Mozambique. Dutton (1990) gives a comprehensive list of principal marine fish species that are exploited in the Bazaruto archipelago, and the method of exploitation.

Dutton (1990) also reports that 100-120 billfish were landed around the Bazaruto archipelago annually in the 1980s out of a total recreational catch of about 250 billfish per annum for the whole of Mozambique.

The whale shark *Rhincodon typus* and the giant manta ray *Manta birostris* are conspicuous inhabitants of the marine offshore environment; 6 whale sharks, 9 dolphins, 3 dugongs and 11 manta rays were counted off the coast and over the lagoon of the VCWS during a 57 minute air flight in July 2002. The whale sharks are the largest of all fishes and reach a length of 12 m whereas the mantas achieve a disc width of 6.7 m. Both these giant fishes feed on plankton. Manta rays perform spectacular cartwheels at the water surface, or jump entirely out of the water, landing with a slap that is audible for kilometers around (Smith & Heemstra, 1986).

The interesting possibility exists that the coelacanth *Latimeria chalumnae* may occur off the coast of the VCWS. Coelacanths have been caught off South Africa, northern Mozambique (near Pebane), Comoros, Madagascar and Kenya (Bruton & Stobbs, 1991). Recently they have been seen by scuba divers off the coast of northern Zululand near Sodwana (H. Fricke, unpubl. obs., 2002). The Sodwana coelacanths inhabit steep rocky canyons at depths of >100 m; whether such canyons occur off the sanctuary and the Bazaruto archipelago is not known. The coelacanth, which is classified as 'endangered' in the Red Data Book and appears on Schedule I of CITES, is a flagship conservation species and has been nicknamed the 'panda of the sea' (Bruton & Stobbs, 1991).

Five species of marine turtles (known collectively as *xinholua* locally) occur off the Sanctuary, the green turtle *Chelonia mydas*, loggerhead turtle *Caretta caretta*, leatherback *Dermochelys coriacea*, hawksbill *Eretmochelys imbricata* and the olive ridley turtle *Lepidochelys olivacea*. According to Dutton (1990), the loggerhead, leatherback and hawksbill nest on beaches in the area, whereas the others probably only feed in the area. On this survey direct evidence was only found of the green turtle – 9 carapaces were found in the bushes near the fishing village on the north shore of the sanctuary near Ponta Chiunzine. These specimens had been harvested some years previously. Dutton (1990) reported finding over 150 turtle carapaces on Bazaruto Island, two thirds of which belonged to green turtles. Yellow-bellied sea snake *Pelamis platurus* also occur off this coast. They spend their entire lives at sea and have potent venom.

Marine mammal species in and around the sanctuary include the dugong *Dugong dugon*, four species of dolphins (common dolphin *Delphinus delphis*, spinner dolphin *Stenella longirostris*, hump-backed dolphin *Sousa plumbea* and bottlenosed dolphin *Tursiops truncatus*), the humpback whale *Megaptera novaeangliae*, and the Cape clawless otter *Aonyx capensis*. Other whale species, such as the sperm whale *Physeter macrocephalus* and the killer whale *Orcinus*

orca, as well as the striped dolphin *Stenella coeruleoalba*, occur further offshore and are rarely seen.

The four dolphin species that frequent the sanctuary are itinerant visitors from pelagic marine environments. The common dolphin *Delphinus delphis* often occurs in large schools and feeds on shoaling pelagic fishes. The bottlenosed dolphin *Tursiops truncatus*, an inshore species, also forms schools and feeds mainly on fish but also on squid, which may be caught using organized group-hunting formations (Branch et al., 1994). This species regularly becomes entangled in shark nets in KwaZulu-Natal and concern has been expressed that their birth rate does not match their mortality rate. They have also been reported to have very high hydrocarbon levels in their tissues (Branch et al., 1994). Spinner dolphin *Stenella longirostris* and humpback dolphin *Sousa chinensis* have also been reported from the nearby offshore marine environment (Dutton, 1990). The humpback dolphins live in shallow water and their presence is important as they are severely threatened elsewhere in their range.

All dolphin species are strictly protected but are vulnerable to capture or damage in large gillnets and possibly on long lines set for sharks (for shark fin harvesting, which is known to occur in the area). Dolphins are also vulnerable to reductions in their prey fish densities due to game fishing and netting. Dolphins are seen on most boat trips to the entrance of the lagoon and out to sea, and are an important tourist attraction.

The humpback whale is a large baleen whale reaching a length of 14-15 m. They are characterized by their very long, narrow flippers, almost one-third the length of the body, and the small dorsal fin that is positioned far back. They spend the summer feeding on krill in the Southern Ocean and then migrate northwards along the west and east coasts of southern Africa to breeding grounds along subtropical and tropical coasts. Humpback whales use an unusual bubble curtain, formed while circling underwater, to catch their prey. They rely on their blubber reserves for nutrients during the winter feeding migrations. They perform spectacular breaches and jumps, and are sociable species. Their numbers were drastically reduced by hunting to less than 10% of the original population size before they were fully protected in 1963. Their populations have recovered strongly in recent decades, although not as strongly as those of the southern right whale *Balaena glacialis*. Repeated sighting of humpback whales off the coast of the Bazaruto/VCWS area may indicate that they have a preference for this area. Dutton (1990) reports seeing them feeding off the coast, possibly on the blue-line herring *Herklotsichthys quadrimaculatus*.

Other whales that occur off this coast include fin whale *Balaenoptera physalus*, minke whale *B. acutorostrata*, sperm whale *Physeter macrocephalus* (further offshore) and killer whale *Orcinus orca*. The southern right whale *Balaena glacialis* was previously extensively hunted off the coasts of Namibia, South Africa and Mozambique. Since they were protected in 1963 they have recovered strongly in South Africa (7-8%) but their recovery off Mozambique appears to be slower (Branch et al., 1995). Bottlenosed dolphin *Tursiops truncates* and spinner dolphin are common offshore. The striped dolphin *Stenella coeruleoalba* was not seen but probably also occurs here.

2.8.4.2 Sandy shores on sheltered and exposed coasts

Phylum Arthropoda: copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs: Unidentified species of isopods, possibly in the genus *Pontogeloides*, are common under logs and flotsam on the beach. Hermit crabs, probably the land hermit *Coenobita cavipes* or *C. rugosu*, were abundant on the beach above the high tide mark. The ghost crabs *Ocyopode ryderi*, *O. ceratophthalmus*, *O. cordimana* and *O. madagascarensis* are common on the beach at low tide and are particularly conspicuous at night when they forage in and above the tidal wash. *O. ryderi* is used as bait by local sea fishermen.

Ghost crabs prey on other crabs, such as the sentinel crab *Macrophthalmus* spp., as well as prawns and wedge mussels *Donax faba*. Juvenile ghost crabs achieve the fastest running speed of any crab (2.1 m per second; Kalk, 1995). Their main predators are man, birds and carnivorous crabs, including their own species. Ghost crabs are keystone ecological species due to their abundance and critical role in the beach ecosystem.

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squids: The burrows of shipworms *Bankia carinata* were found in wood flotsam on the beach. The striped periwinkle *Littoraria glabrata* is common above the high spring-tide level. Several cowries were collected on the sea beach including ring cowrie *Cypraea annulus*, Arabic cowrie *C. arabica*, tiger cowrie *C. tigris* and stippled cowrie *C. staphylaea*. Cowries are over-collected in many parts of the world and require protection.

The violet snail, *Janthina* spp., was observed washed up on the shore. They hang upside down on the sea surface using a bubble raft and feed on by-the-wind-sailors *Veleva* and bluebottles *Physalia*. The tropical plough shell, *Bullia* spp., either *B. mozambicensis* or *B. natalensis*, lives in the wave wash zone and feeds on dead animals, especially stranded jellyfish. The wedge mussel *Donax faba* is abundant on the wave-washed sandy beaches of the marine coast; off Inhaca island they reach densities of > 100/m² (Kalk, 1995). They burrow 2-5 cm beneath the sand surface and feed on diatoms. *D. faba* is unique to the east coast of Africa and occurs in over 30 different colour patterns.

Phylum Chordata: sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs:

Nine green turtle *Chelonia mydas* carapaces were found in the bushes near the fishing village on the northwest shore of the Peninsula near Ponta Chiunzine. They were probably caught in nets in the lagoon or estuary as this species does not normally nest on the African mainland but on central Indian Ocean islands (Branch et al., 1994). Juveniles eat small fish and crustaceans whereas the adults feed almost entirely on marine plants. Other sea turtle species that occur off the marine coast in the vicinity of the VCWS include the olive ridley turtle *Lepidochelys olivacea*, hawksbill turtle *Eretmochelys imbricata*, leatherback *Dermochelys coraicea* and the loggerhead turtle *Caretta caretta*. The loggerhead and leatherback probably nest along the marine coast, as they do in northern Zululand and southern Mozambique to the south. The loggerhead feeds on crabs, molluscs and sea urchins whereas the leatherback feeds on coelenterates, jellyfish and bluebottles. The breeding biology, abundance and conservation status

of the sea turtle species that nest on the coast of the African mainland have been very well documented (e.g. Hughes, 1974a & b).

The marine and coastal birds of the Sanctuary have been investigated in a separate report, and a few comments will suffice here. The most conspicuous aquatic birds are the greater flamingo *Phoenicopterus ruber* and the lesser flamingo *P. minor* (known collectively as *halawunha* locally), which occur in large flocks that vary seasonally in size. The lagoonal habitat in and around the Sanctuary is ideal for flamingoes and there is potential for the VCWS to become a world-renowned site for observing these spectacular birds, comparable to Lake Ngami in Botswana (now dry) and Lake Naivasha in Kenya. The greater flamingo feeds by disturbing the bottom sediments, often rotating in a circle, whereas the lesser flamingo feeds by filtering the water. Both feed on small aquatic invertebrates, and their feeding pressure is known to impact on the density of benthic organisms (Branch et al., 1994). Pollution of the lagoonal water would impact the density of prey organisms of the flamingo. The number of torch batteries that are left lying in the water by fishermen is a matter of concern; these batteries contain lead and other contaminants and should never be discarded in the water; 32 batteries were found lying in the water in the sanctuary during a period of 6 days, all near fishing villages. Every effort should be made to avoid contaminants, such as fuel and fuel residues, sewage, insecticides, herbicides, disinfectants and inorganic fertilizers, from entering the water in the sanctuary. Flamingoes have been hunted in the past in Mozambique (pers. obs., 1993 near Xai Xai) and may still be hunted clandestinely in the Vilanculos area.

The mangrove and reed swamps are rich habitats for aquatic bird species, including a variety of herons, cormorants, egrets and kingfishers. The shores of the estuarine lagoon, San Sebastian Bay and the marine sandy beach support a wide variety of waders, sandpipers, turnstones, sanderlings, plovers, gulls and terns.

2.8.4.3 Rocky shores

Phylum Porifera: sponges: The crumpled sponge, *Axinella waltneri*, was observed on inshore reefs.

Phylum Cnidaria: hydroids, bluebottles, jellyfish, soft corals, sea fans, sea pens, sea anemones, zoanthids and hard corals: The giant anemone, *Radianthus ritteri*, occurs on coral debris and coral reefs in the VCWS as well as in the tidal shallows and sea grass beds of the lagoon, estuary and Bay. They typically play host to commensal shrimps and clownfish, which are not affected by their stinging tentacles. The giant anemone is an important component of the biota of the VCWS, and should be regarded as a flagship species; they should be the subject of more detailed study (see Part M)

A zoanthid, *Palythoa nelliae*, forms carpets in pools in the inshore reef in areas that are periodically covered by sand. Other unidentified zoanthids also inhabit rocky ledges and pools. The root-mouthed jellyfish, *Rhizostoma* spp., is commonly seen floating about 2 m below the water surface in offshore and inshore marine environments of the VCWS. Hydroids form colonies of numerous individuals (polyps) and are tree-like or feather-like in form. Several hydroids were observed in rocky pools, possibly the bushy hydroid, *Eudendrium* spp., the thin-

walled obelia, *Obelia* spp, and the toothed feather-hydroid, *Aglaopenia* spp. The mushroom coral *Fungia actiniformes* occurs as individuals in intertidal pools.

Phylum Nemertea: ribbon worms: Ribbon or proboscis worms probably occur on rocky reefs in the VCWS but were not observed.

Phylum Sipunculida: peanut worms: Peanut worms probably occur on rocky reefs in the VCWS but were not observed.

Phylum Annelida: segmented worms, bristle worms: Mussel worms, *Pseudonereis* spp., were observed among mussels in the inshore reef. The fireworm, *Eurythoe complanata*, and the beadworm, *Syllis* spp., were observed on the rocky reefs.

Phylum Arthropoda: copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs: Goose barnacles, *Lepas* spp., were observed on flotsam on the sandy shore inshore of rocky reefs. Toothed barnacles, *Chthamalus* spp., occur on rocky reefs along the marine coast of the VCWS. Carapaces of the east coast rock lobster, *Panulirus homarus* and the painted rock lobster *P. versicolor* were found inshore of rocky reefs. Dutton (1990) reports that the above two species as well as the penicillate spiny lobster *P. penicillatuts* and the ornate spiny lobster *P. ornatus* are harvested by skin divers at Inhassoro to the north, with exports of lobster tails exceeding 400 tonnes pa. The yellow-banded hermit crab *Clibanarius virescens* and other species of hermit crabs are common in intertidal pools. The tuberculate crab *Plagusia depressa tuberculata* was observed in intertidal pools whereas the Natal rock crab *Grapsus grapsus tenuicrustatus* was conspicuous on rocky ledges above water at low tide.

Phylum Bryozoa: moss or lace animals: Many species of bryozoans inhabit the rocky reefs and intertidal rocky ledges, but their identity is unknown.

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squids: Brown mussels *Perna perna* occur in dense beds along the marine coast. The Cape pearl oyster *Pinctada capensis*, Natal rock oyster *Saccostrea cucullata* and the Cape rock oyster *Striostrea margaritacea* are found on shallow rocky reefs along the marine shore. They are exploited by local fishermen. The black chiton *Onithochiton literatus*, variegated topshell *Oxysteles variegata*, variable limpet *Patella concolor*, keyhole limpet *Fissurella natalensis*, blotched nerite *Nerite albicilla*, mulberry shell *Morula granulata* and the crowned turban shell *Turbo coronatus* all occur on rocky reefs in the VCWS.

The zonation of molluscs and other invertebrates in the intertidal zone of the VCWS, with the *Littorina* belt high on the tide line and other species occurring in characteristic bands, is similar to that described for Inhaca Island by Kalk (1995).

Octopus, probably *Octopus granulatus*, was harvested by local fishermen from intertidal pools in the sea but are reportedly less common now than before.

Phylum Echinodermata: starfish, brittle stars, sea urchins, sea cucumbers, sea lilies, feather stars, sand dollars: The blocked starfish *Fromia elegans* was seen on the rocky reef off the

lighthouse. The spiny brittle star *Ophiocoma valenciae* occurs under rocks on the reef. The oval urchin *Echinometra mathaei*, and other sea urchins, occurs in intertidal rock pools. The sea cucumber *Holothuria insignis* is found under rocks.

Phylum Chordata: *sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs:* A colony of striped eel-catfish *Plotosus lineatus* was seen under an overhang in the inshore reef near the lighthouse. Other fish species observed on this reef included devil firefish *Pterois miles*, bluebanded snapper *Lutjanus kasmira*, stonebreem *Neoscorpis lithophilus*, lizardfish *Synodus* spp., klipvis, probably *Pavoclinus graminis*, various gobies, barred flagtail *Kuhlia mugil*, flame goatfish *Mulloides vanicolensis*, rockskippers *Antennablennius* and *Istiblennius* spp. and cleaner wrasse *Labroides dimidiatus*.

Spotted grunter *Pomadourys commersonii*, santer *Cheimerius nufar*, slinger *Chrysoblephus puniceus*, Natal stumpnose *Rhabdosargus sarba*, river snapper *Lutjanus argentimaculatus* and kingfish *Caranx* spp. (the latter known locally as *hokote* or *karapao*) were recorded in fishermen's catches from the sea near the lighthouse.

Dutton (1990) reported that seine nets pulled over rocky reefs in the Bazaruto archipelago yielded catches of 50-150 kg/net and approximately 58 000 kg of dried fish per year. This level of exploitation does not appear to take place off the VCWS. Dutton (1990) also reported that spearfishing is common and lucrative in the Bazaruto area, with a harvest of over 40 000 kg per year.

2.8.4.4 Estuarine systems

Phylum Cnidaria: *hydroids, bluebottles, jellyfish, soft corals, sea fans, sea pens, sea anemones, zoanthids and hard corals:* The giant anemone, *Radianthus ritteri*, occurs on coral debris and coral reefs in the VCWS as well as abundantly in the tidal shallows and seagrass beds of the lagoon, estuary and Bay. The root-mouthed jellyfish, *Rhizostoma* spp., is commonly seen floating about 2 m below the water surface near the estuary mouth. The Portuguese man-of-war, *Physalia utriculus*, was observed in the estuary.

Phylum Annelida: *segmented worms, bristle worms:* Numerous unidentified segmented worms were seen. Estuarine nereids, *Ceratonereis* spp., and the case worm, *Diopatra* spp., are likely to occur in the estuary.

Phylum Arthropoda: *copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs:* Striped barnacles *Balanus amphitrit*, were recorded on fish trap fences in the estuary. The tiger prawn *Penaeus monodon* and the brown prawn *Metapenaeus monoceros* are harvested in the estuarine lagoon and in San Sebastian Bay. *P. monodon* and *M. monoceros* are very important commercial species in Mozambique (Branch et al., 1994). The blue swimming crab *Portunus pelagicus* is harvested in the estuarine lagoon. The mud crab *Scylla serrata* was observed while diving and wading in the southernmost reaches of the estuary near the path to the lighthouse, where it appears to be less exploited, and more common, than in San Sebastian Bay. The army crab *Dotilla fenestrata* occurs in huge colonies along the shores of the estuary, and is

particularly common on the embankment from which one embarks for the journey to the lighthouse. They use tiny pellets of processed sand to construct elaborate burrows.

Phylum Mollusca: *chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squids:* The brack-water mussel *Brachidontes virgiliae* and the estuarine mussel *Arcuatula capensis*, which live in estuaries, and are reported from Mozambique (Branch et al., 1994) and probably occur in the VCWS. The horse mussel *Pinna muricata* is common in suitable habitat and is a menace to people wading in the shallows. A community of small animals lives in association with them. Shells of the smooth platter shell *Loripes clausus* and the sunset clam *Hiatula lunulata* were collected from the estuary.

The shaggy sea hare *Bursatella leachi* was observed in the seaward entrance to the estuary. A slipper limpet, probably *Crepidula* spp., was found on a mangrove stem.

Phylum Echinodermata: *starfish, brittle stars, sea urchins, sea cucumbers, sea lilies, feather stars, sand dollars:* The beaded starfish *Pentaceraster mammillatus* is present in the deeper parts of the estuarine system and is often stranded at low tide. The heart urchin *Echinocardium cordatum*, locally known as *nungu*, is commonly found on the beach at the entrance to the estuarine lagoon, although Branch et al. (1994) report that this species only occurs as far north as Delagoa Bay. The pansy shells *Echinodiscus bisperforatus* (with two closed slits on the test) and *E. auritus* (with the slits extending to the edge of the test) are abundant in the seaward reaches of the estuary as well as in the tidal flats and sea grass meadows.

Phylum Chordata: *sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs:* The lesser sand shark *Rhinobatos annulatus*, bartail flathead *Platycephalus indicus* (locally known as *nhantsenze*), glassy *Ambassis gymnocephalus* and the smallscale pursemouth *Gerres acinaces* were recorded from the estuarine inlet near the path to the lighthouse. The honeycomb stingray *Himantura uarnak* and the largetooth sawfish *Pristis pectinata* probably occur in the estuarine inlet but were not seen or recorded in fishermen's catches. Sardinelles, *Sardinella* spp., wolfherring, *Chirocentrus* spp., ladyfish *Elops machnata*, thornfish *Terapon jarbua*, Natal stumpnose *Rhabdosargus sarba*, bigeye kingfish *Caranx sexfasciatus*, talang queenfish *Scomberoides commersonianus*, grunter *Pomadasys furcatum*, and bony *Thryssa vitrirostris* were found in fishermen's catches in the estuary and lagoon. Other species that are likely to occur in the estuary and Bay, but which were not seen, include oxeye tarpon *Megalops cyprinoides* and milkfish *Chanos chanos*. Flathead mullet *Mugil cephalus*, blue-tail mullet *Valamugil buchanani*, and other species of mullet, occur commonly in the estuary.

A very interesting cichlid fish, the black tilapia *Oreochromis placidus*, was seen while skin diving on the fringes of a mangrove swamp at the southern edge of the estuarine lagoon near the path to the lighthouse. This relatively rare cichlid has been reported from the coastal plain of Mozambique from the lower Zambezi River southwards to the Mkuze River in Zululand (Skelton, 1993) and was first reported in South Africa at Sodwana Bay by Bruton (1975). *O. placidus* is frequently found together with the Mozambique tilapia *Oreochromis mossambicus*, which is known to be extremely tolerant of seawater. *O. placidus* frequents well-vegetated, sheltered habitats in floodplain lagoons and coastal lakes.

2.8.4.5 Sea meadows and sand banks

Notes on the ecology of sea meadows: The sea grass meadows of the VCWS represent one of the most productive and diverse habitats in the marine subsystem, together with coral reefs. The sea grass beds are ‘anchored’ by vast meadows of submerged flowering plants that provide shelter for a mobile and sessile community of invertebrate and vertebrate animals. The sea grasses are typically coated with growths of red coralline algae that together provide a vast surface area under the water that provides shelter, holdfasts and food for the tidal flats community. The extensive system of rhizomes and roots of the sea grasses consolidates the loose, fine mud and sand in which many animals burrow. Furthermore, the sea grasses shed their leaves continuously and through their rapid decay they contribute hundreds of tonnes of detritus annually to marine and coastal systems (Kalk, 1993).

Their rate of production exceeds that of tropical forests and exceeds that produced by seaweeds (McRoy & McMillan, 1977). This detritus is the foundation of the food web of this ecosystem and the sea grasses therefore act as ‘nutrient pumps’ into the lagoonal system. The sea grass beds also act as a substrate for the sand oysters *Pinctada imbricata* that are heavily exploited by local people. They also provide a fascinating and easily accessible dive site for skin divers and glass-bottomed boat passengers. The plants themselves are eaten by few animals (as in freshwater macrophytes) but the leaves are covered with an epiphytic fauna and flora on which many species browse. The sea grass meadows are also valuable feeding and roosting areas for migrant waders and vast flocks of flamingos.

Kingdom Plantae, division Spermatophyta, subdivision Angiospermae: flowering plants:

The sea meadows comprise three main angiosperm species in the VCWS: the *Thalassodendron ciliatum*, *Cymodocea serrulata* and *Thalassia hemprichii*. These species occur in different proportions in the meadows of the tidal flats depending on the degree of exposure, water depth and distance from the sea.

Kingdom Animalia: animals

Phylum Porifera: sponges: A large unidentified sponge occurs in shallow water along the fringes of the tidal lagoon near the north shore of the VCWS. These sponges are situated in a hemispherical basin and form a protected microhabitat, in an otherwise very exposed environment, for a variety of commensals, including small crabs, brittlestars, cowries, cone shells, bristle-worms (polychaetes), nereids and shrimps. A bright yellow sponge, possibly *Haliclona tulearensis*, is also widespread in the sea grass.

Phylum Cnidaria: hydroids, bluebottles, jellyfish, soft corals, sea fans, sea pens, sea anemones, zoanthids and hard corals: The giant anemone *Radianthus ritteri* occurs abundantly in the tidal shallows and sea grass beds of the lagoon, estuary and Bay. They typically play host to commensal shrimps and clownfish *Amphiprion allardi*, which are not affected by their stinging tentacles.

The root-mouthed jellyfish, *Rhizostoma* spp., is commonly seen floating about 2 m below the water surface over sea grass meadows. The Portuguese man-of-war, *Physalia utriculus*, was observed in the Bay over sand banks. Comb jellies, probably in the genus *Beroe*, were seen in the Bay.

The mushroom coral *Fungia actiniformes* occurs as individuals in the sea grass beds. *Fungia* first grows on coral reefs as an attached colony but buds in the form of tiny discs, made by one polyp, which breaks off and is carried to sea grass meadows by currents. Here they sink to the bottom and grow (Kalk, 1995).

Among the most interesting benthic invertebrates on the submerged sandy flats in San Sebastian Bay are the sea feathers, *Virgularia gustaviana*, and the sea pens, *Vertillum leloupi*, which are burrowing coelenterates. *V. gustaviana* is an erect, brilliant orange colony of coelenterates in the shape of large feather over 200 mm tall. The 'feather' is supported by a stiff rod made of aggregated calcareous spicules, and the purple autozoid polyps are closely set on the stiff branches of the feather (Kalk, 1995). The submerged part of the orange shaft ends in a bulbous swelling that is buried in the sand. The sea pens have a more compact cream or mauve bodies with purple polyps that are supported by a stiff mass of spicules in a narrow rod. *V. leloupi* grows to about 120 mm tall and has a bulb at the lower end.

Both the sea pens and the sea feathers are supported by hydrostatic pressure by virtue of the water that is drawn into the enteron when the organism erects. When the colony is touched, or impacted by a strong bow wave, it contracts suddenly into the sand by expelling water rapidly through the opened orifices of the siphonozoids and the autozoids (Kalk, 1995; pers. obs., 2002). Sea pens and sea feathers are able to survive exposure at low tide by retracting into the sediment. They emerge again as the tide rises and catch zooplankton by means of their pinnate tentacles, which have typical coelenterate nematocysts (stinging cells). Sea pens and sea feathers are reported to be bioluminescent in the dark (Kalk, 1995).

The sea pens and sea feathers are remarkable examples of the way in which so-called 'lower invertebrates' are able to form complex colonies containing cells that are specialized for different tasks. The colony is thus able to perform tasks, and survive in hostile environments, in competition with highly advanced organisms. The specialized cells in sea feathers include feeding polyps (autozoids), pressure-maintaining polyps (siphonozoids) and stinging cells (nematocysts). The communities of sea pen and sea feather colonies are easily visible in water depths of 16 m in the shallow channels to the southwest and west of Dugong Camp, and should be of considerable interest to visitors.

Paul Dutton discovered extraordinary volcano-shaped fossil burrows of some unknown underwater animal in the waters surrounding the Bazaruto archipelago (Mason & Ramsay, date unknown); these fossil burrows were subsequently named after him (*Vulcanichnus duttoni*). During the VCWS marine survey similar burrows were discovered on the tidal flats of the VCWS (Bruton, 2002) to the west of the peninsula. The distribution and abundance of these fossil burrows needs to be investigated.

Phylum Annelida: segmented worms, bristle-worms: Bristle worms are common in the sea grass meadows, especially under sponges and in the shelter of fan shells.

Phylum Arthropoda: copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs: Unidentified species of amphipods and isopods were found among sea grass and sea grass debris.

The east coast rock lobster, *Panulirus homarus*, is harvested by local spearfishermen on a series of rocky reefs in the southern end of San Sebastian Bay. Judging from the small sizes of the carapaces at their fishing camp, this resource has probably been overexploited. The tiger prawn, *Penaeus monodon*, is harvested in San Sebastian Bay. The blue swimming crab or chinaman *Portunus pelagicus* (locally known as *ngange*) is extensively harvested over sea grass beds and tidal sandy flats in San Sebastian Bay, often as a bycatch of the sand oyster trawling. Local inhabitants use the crabs as a subsistence food. Dutton (1990) estimated that about 5 760 kg of blue crabs are harvested per year from the Bazaruto archipelago, with about 30% of the catch sold and the balance used for local consumption. *P. pelagicus* is commonly sold in markets on the mainland in Mozambique.

The mud or edible crab *Scylla serrata* occurs widely in the Bay but is heavily exploited. Pea crabs, *Pinnotheres* spp., were found inside the shells of bivalves in the sea grass beds. The elbow crab *Myra fugax*, which has very long chelipeds, is occasionally caught in fishermen's nets. Hermit crabs, especially *Dardanus* spp., are abundant in the sea grass beds and inhabit a wide variety of shells. The hermit crab *Aniculus strigatus* inhabits cone shells, *Conus* spp., and is abundant in some areas. They are used as bait by handline fishermen.

Shrimps and prawns are widespread in the sea grass beds and are caught in seine nets. The most common species is the pistol shrimp *Alpheus crassimanus*. This species, and other shrimps, were observed to share their burrows with gobies. The palaemonid shrimp *Harpilius brevicarpalis* was commonly seen in association with the giant green sea anemone *Heteractis magnifica* in the sea grass beds. The shrimps feed and hide among the tentacles of the anemone. Clown fishes *Amphiprion allardi* are also commensal with this anemone. Well-camouflaged green *Hippolyte* shrimps also inhabit the sea grass beds. Stomatopod shrimps, such as the mantid shrimp *Pseudosquilla ciliata*, make large mounds of sand in the sea grass beds. These remarkable shrimps have the second pair of legs modified into a pair of formidable claws similar to those of the preying mantis. They prey on small fishes and other crustaceans.

There is abundant apparently suitable habitat for the sand prawn *Callinassa kraussi* but they were not recorded; according to Branch et al. (1993), the northern range of their distribution is Delagoa Bay, and they do occur at Inhaca Island (Kalk, 1995).

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squid: Sand oysters *Pinctada imbricata* (locally known as *mapalo*) are collected extensively in the sand flats mainly for food but also for sale. The sand oysters are consumed fresh or salted for later use. *P. imbricata* occurs associated with the sea grasses *Thalassodendron ciliatum* and *Zostera capensis* where they attach themselves to the grass stems using their byssus threads. Dutton (1990) reports on a detailed survey of the densities and yields of *P. imbricata* to the traditional

fishery in the Bazaruto archipelago. He estimated that about 1.9 tonnes of dry *mapalo* are harvested each month, with each person collecting about 500 animals per day (6 kg wet weight) for the nine days each month during which they are harvested.

Two species of tropical fan shells (pinnid bivalves) inhabit the sea grass beds and surrounding sand flats. Their large, 10-20 cm long, triangular shells stand upright in the sand with the narrow end pointing downwards, and attached to buried stones by strong byssus threads. The outer edge of the shell, which is razor-sharp, lies at the sand surface. The horse mussel, probably *Pinna muricata*, and the fan shell *Atrina pectinata* are common in suitable habitats in and around sea grass beds. They are damaged by seine nets and trampling. They host commensal shrimps (*Anchistus* spp.), mantid shrimps *Pseudosquilla ciliata* and pea crabs (*Pinnotheres* spp.).

The tropical cockle *Trachycardium flavum* is abundant on the tidal sand flats where it burrows shallowly into the sand. Cockles can 'hop' by suddenly thrusting out the foot – a mechanism for evading predators. The beaked clam *Eumarcia paupercula* is abundant in the sea grass meadows and tidal sand flats, and is probably a keystone species ecologically. Their smooth, convex shells have a buff ground colour and a very variable range of radial markings ranging from cream to brown and purple, often with zigzags, flecks or rays. This species is so abundant that consideration could be given to collecting the dead shells for making ornaments and mobiles. Their shells are often penetrated by the holes of shell borers. The smooth trough shell *Macra glabata* is also commonly found buried just below the sand surface in the sea grass beds. A scallop, probably *Chlamys senatoria*, is found on the tidal sand flats. An otter shell, *Lutraria* spp., was collected; this is an unusual record as this genus is not reported from Mozambique by Branch et al. (1994). The coiled collars of eggs laid by the moon shell, *Polinices* spp., were seen on the sand flats. Periwinkles, probably *Littoraria* spp., are extensively harvested by fishermen at Ponta Chiunzine.

Two cowries are common in the sea grass beds – *Cypraea annulus* and *C. moneta*. *C. moneta* is the money cowrie of the nineteenth century slave trade, but has no commercial value anymore. The short-spined murex *Murex brevispinna* lives amongst sea grass on the tidal flats where it feeds on molluscs. Like many other sea grass inhabitants, they are caught in seine nets. Carnivorous cone shells, such as *Conus lividus*, were also recorded in the sea grass beds. They have poisonous secretions that kill their prey and are dangerous to humans. The cone shells feed on acorn worms and tunicates (Kalk, 1995). Small octopuses were caught in seine nets on the tidal flats where they live in the sea grass beds. Many species of unidentified, burrowing molluscs belonging to the genera *Tellina*, *Codakia*, *Macra* and others, occur in the sea grass meadows. Sea slugs were seen occasionally in the sea grass meadows. Cuttlefish *Sepia* spp. (locally known as *toni*) and common octopus *Octopus granulatus* (known locally as *nhamutununu*) were harvested in the entrance to the Bay by local fishermen and are dried on drying racks in the sun. A minute octopus was found in the shell of a bivalve in the sea grass beds.

Dutton (1990) gives a comprehensive list of the principal ornamental mollusc shells that are collected from the Bazaruto archipelago, with an indication of the demand for each species. His findings would apply to the VCWS as well.

Phylum Echinodermata: starfish, brittle stars, sea urchins, sea cucumbers, sea lilies, feather stars, sand dollars: The beaded starfish *Pentaceraster mammillatus* (known locally as *tsambalala*) is extremely common and conspicuous because of its large size (up to 22 cm across), bright colours and habit of sitting on top of the sand. They occur throughout the sandy tidal flats, sometimes in densities of $>1/m^2$, and are also common in the sea grass beds. They are often stranded at low tide and attempt to creep back to the water using their tube feet, but do not suffer serious desiccation over one tidal cycle. The colours are very variable, including yellow, green, brown, red and grey. Rows of brightly coloured knobs run down each arm and around the body margin. *Protoreaster lincki*, a related species, is also reported from Mozambique (Kalk, 1994). The sand starfish *Astropecten monocanthus* burrows just below the surface of the sand in channels; the five-rayed shape of the buried animal can be clearly seen from above.

The spiny brittle star *Ophiocoma valenciae* is abundant wherever there is cover in the sea grass, under sponges, next to tusk shells or under logs and rocks; other unidentified brittle stars (possibly *Amphiura* and *Amphipolis* spp.) also occur in these habitats. The burrowing brittle star *Amphioplus integer* is widespread in sandy mud where it burrows with two or three arms protruding above the mud for feeding. A pencil urchin, *Prionocidaris baculosa*, occurs in the sea grass meadows. Their banded spines are sold as ornaments. Dried specimens of a heart urchin, possibly *Lovenia elongatum*, were found stranded on the beach at the entrance to the estuary and in the sea grass meadows, where they were caught in seine nets by local fishermen.

The short-spined sea urchin *Tripneustes gratilla* reaches a test diameter of 145 mm and is common in the sea grass. They often accumulate pieces of algae on their tube feet, which serves as camouflage. Their dried tests often wash up on the shore. The needle urchins *Diadema setosum* and *D. savigny* are widespread in the sea grass beds where they graze on algae. They have an irritant toxin in their hollow spines and should be handled with extreme care. When approached they are able to move their spines towards the intruder as a defensive mechanism.

Sea cucumbers are very common in some parts of the estuarine inlet, in the tidal sand flats and in the sea grass meadows, sometimes in abundance, more so than the author has seen before anywhere along the southern African coast. These peculiar echinoderms have lost their star-shaped symmetry and are elongate with soft, leathery skins. The snake sea cucumber *Synapta maculata* (known locally as *tchekawandala*) reaches a length of >1.2 m and occurs in dense aggregations in deeper channels and shallow areas of the lagoon that remain flooded at high tide. They look extraordinarily like coiled snakes underwater, and often form intertwined masses on the sandy bottom. When they are picked up, they elongate alarmingly and their spicules attach to the skin or dive suite. A commensal shrimp *Periclimenes rex* lives in their cloaca (Kalk, 1995). The black sea cucumber *Pseudocnella sykion* also occurs in the tidal sand flats. A grey sea cucumber with orange markings, probably *Opheodesoma mauritania*, also occurs in the sea grass meadows.

The black tufted sea cucumber *Holothuria scabra*, known locally as *makajojo*, which is black above and grey below and often has sand adhering to its skin, is less abundant, probably because it has been extensively harvested by fishermen for sale in Vilanculos, where they are dried and exported for human consumption (Branch et al., 1994). Dutton (1990) reported that about 5 781 kg of dried *H. scabra* was exported to the mainland from the Bazaruto archipelago in 1989/90.

Over the same period a fishing organization PESCOM commercialized a total of 39 000 kg of *H. scabra* for the islands and adjacent mainland. *H. scabra* occurs singly in shallow water, sometimes half-buried in the sand, and they are harvested by fishermen using two- or three-pronged spears (pers. obs., 2002). They feed by swallowing large quantities of sand and sift out the organic matter. The drying of *makajojo* over a fire requires the use of large amounts of firewood, which also contributes to resource depletion.

Another black sea cucumber, *Holothuria leucospilota*, has the unpleasant (for predators) habit of expelling a mass of stiff, white sticky strings from the cloaca when it is picked up. *H. leucospilota* was found in deeper channels throughout the tidal sand flats.

The sand dollars or pansy shells *Echinodiscus bisperforatus* (100 mm across) and *E. auritus* (200 mm, which is deep purple in colour) are common in the tidal flats, estuarine lagoon and sea grass meadows. Care needs to be taken that they are not over collected by tourists, destroyed by seine nets pulled by local fishermen or trampled by gleaners of sand oysters.

Phylum Hemichordata: acorn worms: Concentric worm casts are a characteristic features of the sand flats and sea grass beds. These casts are produced by acorn worms, *Balanoglossus* spp., which are not ‘worms’ in the primitive sense of the word, but hemichordates that share some anatomical characteristics with Chordates, including the backboned animals. They have a dorsal notochord, a dorsal nerve chord and a rudimentary blood system. They burrow in the sand and can be extremely numerous. They probably play a critical role in releasing nutrients from the sediments into the water column.

Phylum Chordata: sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs: The lesser sand shark *Rhinobatos annulatus* (locally known as *livambelua*) and the devil firefish *Pterois miles* were seen at high tide over the sand flats, the latter somewhat out of its habitat. *P. miles* also colonized the artificial reef, and the jetty, established off Dugong Camp, as did the raccoon butterflyfish *Chaetodon lunula*. Three seahorse specimens, probably *Hippocampus kuda*, were collected (and released) on a sea grass meadow to the northwest of the Peninsula in the entrance to San Sebastian Bay. Despite subsequent searches using snorkels and goggles over a combined period of over four hours, no further sea horses were found and the species identity could not be confirmed. It appears that this protected species has been severely depleted by commercial collectors who sell the dried seahorses to a Chinese trader in Vilanculos, who exports them to the Far East. Sea horses apparently do not have a local Xitsua name but they are called *cavalho marinho* in Portuguese. Alligator pipefish *Syngnathoides biaculeatus* were more often found in the sea grass, but they are also exploited.

The vertically swimming shrimpfish or razorfish *Aeoliscus punctulatus* was also seen. Kalk (1994) reports the ghost pipefish *Solenostomus cyanopterus* from sea grass beds off Inhaca Island; they probably occur at the VCWS but were not seen. The ringed snake-eel *Myrichthys colubrinus* was seen guarding its burrows in the sea grass beds; this species has black rings on a yellow body and is often mistaken for a sea snake. The snake-eel is harmless but has a stiff, sharply-pointed tail with which it burrows backwards into the sand. The crested weedfish *Ablabys binotatus*, a well-camouflaged inhabitant of the sea grass beds, has poisonous spines,

like many other slow-moving fishes. Whitespotted rabbitfish *Siganus sutor*, domino *Dascyllus trimaculatus*, zebra *Diplodus* spp., tropical halfbeak *Hyporhamphus affinis* and bartail flathead *Platycephalus indicus* also occurred in the sea grass beds.

Fishes recorded in the seine net catches of fishermen harvesting the sea grass beds included blue-line herring *Herklotsichthys quadrimaculatus*, white sardine *Sardinella albella* and Indian scad *Decapterus russelli*, which made up the majority of the catch (as in Bazaruto; Dutton, 1990), as well as smaller numbers of sand smelt *Sillago sihama*, flathead mullet *Mugil cephalus*, blue-tail mullet *Valamugil buchanani* (known locally as *muxime*), alligator pipefish *Syngnathoides biaculeatus*, whitespotted rabbitfish *Siganus sutor*, cowfish *Lactoria diaphana*, thornfish *Terapon jarbua* (known locally as *xekelvao*), tropical halfbeak *Hyporhamphus affinis*, barred flagtail *Kuhlia mugil*, bartail flathead *Platycephalus indicus*, crested weedfish *Ablabys binotatus*, milkfish *Chanos chanos*, devil firefish *Pterois miles*, black pomfret *Parastromateus niger*, wolf-herring *Chirocentrus dorab*, porky *Stephanolepis auratus*, redspot goatfish *Parupeneus cinnabarinus*, blue-spotted pursemouth *Gerres filamentosus*, tropical flounder *Bothus mancus*, spiny cowfish *Lactoria diaphana*, evileye blaasop (known locally as *nhamulikiti*), lizardfish *Synodus* spp., juvenile kingfish *Caranx* spp. and queenfish *Scomberoides* spp. Many of these species swim in shoals and large numbers may be caught in one seine haul.

The spiny cowfish *Lactoria diaphana*, locally known as *chimbururu* (meaning ‘nice to eat’) is frequently seen in the sea grass beds and is also caught in seine nets. This species suffers particularly high mortalities as their spines are easily entangled in the nets. Dozens of their carcasses are strewn along the shore although they are included in fish stews in some villages. Although the evileye blaasop *Amblyrhynchotes honckenii* has extremely poisonous flesh, local fishermen have learned how to prepare them for human consumption.

Dutton (1990) reported that 35 different fish species were caught in seine nets in the Bazaruto archipelago. Catches averaged about 80 kg/net/day but harvests up to 840 kg/net/day were made during the months of March to September.

The twobar clownfish *Amphiprion allardi* shelters among the tentacles of the giant anemone *Radianthus ritteri* but their communalism is severely disrupted by seine nets that are constantly dragged over their territory. Local fishermen informed us that the electric ray *Torpedo sinuspersici*, which can deliver an electrical shock of up to 100 volts when disturbed (Kalk, 1995), occurs in the Bay and the estuary.

The dugong: The dugong *Dugong dugon* (known locally as *njanjinguluvi*), is one of four remaining members of the mammalian order Sirenia, (or sea cows), the only living group of mammals that is adapted to feeding exclusively on aquatic plants. Sirenians are distantly related to elephants (Proboscoidea). The three other sirenians are all manatees, the West African, Amazonian and Florida species, which mainly live in estuarine and freshwaters. All four sirenian species are listed as ‘Vulnerable to extinction’ by the IUCN and appear on Schedule I or II of CITES, depending on the population (Emanoil, 1994). A fifth, modern member of the Sirenia, the Stellar sea cow, which occurred only in the waters around Cooper and Beiring Islands in the North Atlantic Ocean, was hunted to extinction in the late 18th Century, less than 27 years after its discovery.

Dugongs reach a length of 2.5 – 3.2 m and weigh 170-400 kg as adults (Hughes, 1969; Smithers, 1983). They spend their whole life in the water, where they feed, breed and sleep. They are vulnerable, *inter alia*, to habitats changes that alter the availability of their food. Dugongs are known in Portuguese as *Peixe mulhere*, *Porco d'aqua*, *Makua name* or *mVua*, and in English as 'sea cows' or 'sea pigs'.

Distribution: Historically, the dugong's range extended throughout the tropical and subtropical coastal and island waters of the Indo-West Pacific from East Africa northwards to the Red Sea and eastwards to Vanuatu (Smithers, 1983). They are largely confined to seawater, rarely entering large river mouths (Hughes, 1969), and their distribution is broadly related to the distribution of their food plants, the sea grasses (mainly *Cymodocea*, *Holidule*, *Halophila*, *Syringodium* and *Zostera* spp.; Smithers, 1983). The dugong is now considered to be rare over most of its former range and is only represented by relict populations separated by large areas where it is close to extinction or extinct (Smithers, 1983). Interbreeding between these widely separated populations is unlikely, and the risk of genetic bottlenecking in small, isolated populations is high.

In Africa, the southernmost record for dugong is that of a specimen washed up at Umhlali, 50 km north of Durban, in KwaZulu-Natal, in 1966 (Hughes, 1969). Bruton (2002) examined a dugong carcass on the coast immediately south of Ponto do Ouro in northern Zululand in 1977. Besides these extraordinary records, dugongs are not currently found south of Delagoa Bay in Mozambique. The dearth of dugongs in South Africa is attributable to the lack of suitable seagrass beds in areas protected from heavy surf action.

Their preferred habitat is in coastal lagoons where coral reefs lying offshore provide sheltered conditions from the wave action of typical exposed beaches, and the sandy bottom allows for the growth of their food plants. Off the Kenyan coast, dugongs have been reported to move offshore to feed beyond the coral reefs when the sea is calm, and then to move into sheltered inshore bays when the sea is rough (Kingdon, 1971). Hughes & Oxley-Oxland (1971) reported similar movements off northern Mozambique.

Thirty years ago dugongs were reportedly abundant off the coast of Mozambique, Kenya and Somalia, and they were considered to be less threatened off the east coast of Africa than in the rest of their range; this is no longer the case. In the early 1970s dugongs were confined to isolated populations in Mozambique in Delagoa Bay, Inhambane Bay, the bay adjacent to San Sebastian Peninsula, the inshore waters of the Bazaruto archipelago, at Angoche, off Antponio Enes, off Mossuril, and off Mocimboa da Praia in the north (Hughes, 1971). The population in the Bazaruto area, which numbered about 110 animals in 1990 but has been reduced to 20-40 animals today (Duarte et al., 1997; Dutton, pers. comm. 2002; see also below), may be the largest single herd in East Africa. Hughes (1969) reported a small herd of 8-10 animals near Inhaca Island in Delagoa Bay. He also reported a herd of three animals at Citenguele, a group of 20 near Ponto de Bartholemew Dias, and groups of 3-4 in the Bay of San Sebastian. With regard to Inhambane Bay, Hughes (1969) commented that "dugong are still relatively common in that they are often seen in small groups of two to four individuals". Dugongs were apparently "quite

common” on the northern coast of Mozambique north of Moma in the Zambezia Province (Smithers, 1983).

Along the East African coast the distribution is discontinuous northwards to Egypt and the Red Sea; most East African populations have been hunted to extinction. Dugongs still occur off Moheli and Anjouan islands in the Comoros (observations by Bruton, 1976, 1977), but they are rare there. Dugongs were previously abundant off the coast of Madagascar in the early part of this century but few are left today. The large herds that occurred off the Mascarene Islands (including Mauritius) reportedly became extinct in 1859. Dugongs were previously common in the Red Sea (Glover Allen, 1942) but they had been reduced to small numbers by 1932 (Nishiwaki, 1972). Herds of over 100 and over 500 were previously recorded off the coasts of Kenya and Somalia respectively (Kingdon, 1971; Marsh et al. 1972).

The most extensive populations left in the world today occur off the northern coasts of Australia. Consequently, most of the data for this species is based on this population. In 1994 it was estimated that there were about 100 000 dugongs in the world; most occurred off northern Australia and in the Arabian region (Emanoil, 1994).

Biology: Dugongs are long-lived animals, with a potential longevity of 70+ years. They reach sexual maturity at about 2.5 m and females have their first calves at a minimum age of 9-10 years. They bear one calf at a time (rarely twins, Hughes & Oxley-Oxland, 1971), with long resting periods between pregnancies. In Mozambique, the young are typically born between November and January (Hughes & Oxley-Oxland 1971), which is also the time of mating. The first pregnancy may be delayed until the 15-17th year (Emanoil, 1994; Anon, 1995). With a possible life span of 70 years, and 5 years intervals between pregnancies, a female would normally produce not more than 12 calves during her lifetime. Pregnancy lasts for 12-13 months (one of the longest gestation periods of any vertebrate, exceeded only by the elephant and the coelacanth) and the calves are born at a length of about 1 m (20-35 kg). They remain close to their mother, frequently riding on or just behind her back. The young are pale cream in colour but darken in age to grey-bronze dorsally, lighter ventrally. Calves suckle milk for about 18 months from a teat located just behind the pectoral flipper. The dugong cow-calf bond is very well developed and the pairs may remain together for up to 2 years. The calving interval is usually 3-5 years but the average time between calves is variable – from 3-9 years (Anon, 1995).

The outer pair of incisor teeth in the dugong develops into a pair of tusks in males and some old females. Although these tusks are primarily used for uprooting plants during feeding, the parallel scars and scratches that are found on the backs of males and females indicate that they are also used during prenuptial aggression by males, and to position the female during mating.

Typical groups size now ranges between 2-13 animals depending on the total size of the population, although single animals are frequently sighted. Thirty to forty years ago dugongs were often sighted in herds of several hundreds; these large herds now only occur off Australia.

Dugongs spend most of the day browsing over seagrass beds, and consume 10-15% of their body mass in food each day (Best, 1981). The interlacing bristles on the snout are used for detecting and grasping seagrasses and the roughened mouth palate is used as a ‘tool’ for uprooting roots

and tubers. The pectoral flippers may also be used to stuff food into their mouths (Grzimek, 1972). The mouth forms a muzzle that is directed downwards and ends in a horseshoe-shaped disk, which is ideal for rooting through seagrass beds. This method of feeding results in the telltale 'feeding trails' left by dugongs as they move through the seagrass beds (although these 'trails' may also be caused by disturbed sediment). Feeding activity is actively linked with the tides as feeding usually takes place in water 3-4 m deep on an incoming tide, with the animal moving out into the deeper channels on the tide. They typically feed in water 1-12 m deep with a temperature range of 20°-30°C (Grzimek, 1972). In disturbed areas dugongs usually feed at night.

Dugongs have home ranges of 10-120 km² and may travel over long distances (>130 km) between feeding bays (Emanoil, 1994). They are easily visible from the air against the light coloured sands of their habitat.

Dugongs are spindle-shaped, tapering at both ends to produce a streamlined shape. They lack a dorsal fin (as found in some dolphins and whales) and the hind limbs are absent. The tail comprises two horizontally flattened flukes, similar to those of a whale (but dissimilar to those of a manatee, which are rounded like a beaver). The pectoral flippers are short and stubby, almost paddle-like. These limbs are flattened against the side of the animal when swimming, used as stabilizers, and are used for support when resting on the seabed. Dugong locomotion is similar to the porpoising action of dolphins, particularly when moving at their surprisingly high cruising speed of 8-10 km/h (4.3-5.4 knots; Smithers, 1983). When threatened, dugongs can accelerate to twice this speed for short distances. When at rest and feeding, they move slowly through the water column and to the water surface to breathe, lifting only the head and nostrils clear of the water. The skeleton is extremely dense and negatively buoyant and acts as ballast as the dugong moves along the sea bed looking for food. Dugongs generally remain submerged for one to six minutes (Anderson & Birtles 1978). The nostrils are situated on top of the head and are closed by powerful muscular valves when the animal is submerged.

Man is the main predator of the dugong, but they are also hunted by large sharks, saltwater crocodiles and killer whales (Emanoil, 1994). The Chinese community in Mozambique (especially in Vilanculos and Inhassoro) was identified as early as 1969 as one of the main causes of dugong mortalities (Hughes, 1969), and are still responsible for some dugong deaths today (P Dutton, pers. comm. 2002). Chinese fishers also hunt other endangered species such as sea horses in the Vilanculos area.

Conservation status: Little quantitative information on dugong abundance and distribution exists, but the results of occasional surveys, incidental sightings, accidental drowning and strandings, indicate their number have decreased alarmingly and they can be considered to be threatened throughout most of their historic range (see below). Dugongs possess many of the life-history characteristics of threatened animals. They are vulnerable to hunting and accidental death as they are large, long lived, relatively slow moving, slow reproductive rate, docile, have relatively poor eyesight (though very sensitive hearing), live in shallow inshore regions, and are easily entangled in gillnets. They are hunted for their flesh, which is tasty and generous. In addition, their tusks and ribs are used for jewelry, their tears for aphrodisiacs and their oil for medicinal purposes (Emanoil, 1994).

The dugong plays an important ecological role by converting marine angiosperm plants into nutrients, thereby filling a niche of considerable importance for other marine animals, including fishes (Dutton, pers. comm., 2002).

The main causes of dugong mortality are likely to be hunting, accidental death in gillnets (set for sharks) and fish traps (Hughes, 1969), and accidental death from collisions with boats (more frequent for manatees). Gillnets also cause mortalities of dolphins and turtles in Mozambique (Duarte et al, 1997). The loss of feeding grounds for dugongs due to coastal 'development', reduced salinities (due to high levels of river outflow into the sea), sewage discharge (Mackie et al., 1999), changing surface runoff, sedimentation caused by fish traps and other causes, pollution and other causes is an indirect population control mechanism (Emanoil, 1994; pers. obs.). Hughes (1969) reported that up to six dugongs were hunted and sold at the market per *month* at Antonio Enes in Mozambique, and that their catch in the rainy season was probably higher. He also recorded dugong catches of two per month off Mozambique Island, and active hunting in the Bay of Matibane and at Nacala Porto, where five had been caught in the previous four years.

Dugongs need to be strictly protected because of hunting pressures, accidental damage by boats and nets, their low fecundity and vulnerability, loss of habitat, and their status as 'flagship' species in the lagoonal-inshore marine habitat. The dugong and manatee are thought to be the inspiration behind myth of the mermaid, possibly because of their habit of lying on their backs and suckling their young, while supporting the young with a flipper. This legendary association with humans has not afforded them any protection, however, as they have been ruthlessly hunted in recent centuries, in the same way as the great whales. Unlike some of the smaller, more fecund whales, their reproductive rate is too low to support any type of commercial exploitation, and the challenge is to eliminate hunting and accidental deaths throughout their range.

Large scale, multiple-use marine and coastal reserves are the only long-term hope for the dugong, as it is impractical to conserve them and their habitat in isolation.

The most urgent research priorities on dugongs in Mozambique are: quantify causes of mortality, determine main demographic trends (population size and trends, breeding rate and success, longevity, mortality rate), quantify availability of food, and monitor public attitudes about the species.

Dugongs in Mozambique: Dugongs are protected in Mozambique and those responsible for their damage and death can, technically, be subject to heavy fines, but there is little implementation of this law. Dugongs are reportedly occasionally harvested and slaughtered in the Bazaruto area, reputedly even sometimes by public officials.

Dugong populations in the Bazaruto area have been surveyed by aerial census by Ken Tinley, Paul Dutton and others in the recent past. These surveys reveal a decreasing population size from >100 animals over 30 years ago to <50 in recent years (Dutton 1970, 1990; Tinley, 1970). The latest survey revealed 41 animals inshore of the Bazaruto archipelago. Cumming & Mackie (1995) estimated the size of the dugong population in the proposed Greater Bazaruto National

Park (BANP) to be about 25 (0.015/km²), based on extrapolation from seven direct sightings. The survey was conducted at low tide in “.near perfect weather conditions”. Mackie et al. (1999) conducted an aerial census of dugongs in the proposed BANP using the same method in 1999 and estimated the population size to be about 72 (on the basis of extrapolation from nine original observations), an (unlikely) increase of 47 in five years. This method may have questionable accuracy, and may overestimate the population; this is suggested by Dutton’s lower count of 41 in 1990. Whatever the biases of the various sampling methods, it is clear that the numbers of dugongs in the vicinity of the VCWS, and the BANP, are very low (<100).

In addition to monitoring population size, conservation activities on the dugong in Mozambique include declaration of the dugong as an endangered species, educational campaigns, controls over fishing gear (especially gillnets), surveillance of fishing activities and catches, support of research and conservation activities, establishment of marine sanctuaries and other protected areas, and media campaigns.

The dugong is a high profile species in Mozambique and appears on the logo of the Parque Nacional do Arquipélago do Bazaruto (BANP) and other conservation organizations. ‘Dugong Lodge’ in the VCWS is named after this enigmatic animal.

2.8.4.6 Mangrove swamps

Introduction to ecology: Five species of mangroves are known from the VCWS and the Bazaruto archipelago: red mangrove *Rhizophora mucronata*, black mangrove *Bruguiera cylindrica*, tagal mangrove *Ceriops tagal*, white mangrove *Avicennia marina* and the tropical mangrove *Sonneratia alba*. Mangrove roots are shallow and some have above-ground pneumatophores to allow them to breathe, exchanging carbon dioxide for oxygen from the air. The mangrove substrate, which is sandy and anoxic with hydrogen sulphide about 5 cm below the surface, is inundated only during spring high tides. The salt marshes associated with the mangrove swamps are colonized by the following plants: *Arthrocnemum perenne*, *Sesuvium portulacastrum*, *Salicornia perrieri*, *Sporobolus virginicus* and *Digitaria littoralis*, with the dune slack rush *Juncus kraussii* on elevated margins.

The mangrove trees grow in seawater on intertidal mud flats and form the anchor of an important community of plants and animals. Their roots consolidate and trap fine mud and their deciduous leaves contribute to the development of sediment that is very rich in organic detritus. Mangroves support several species of animals that are not found elsewhere, especially the mudhopper *Periophthalmus sobrinus* and two mangrove snails, *Cerithidea decollata* and *Terebralia palustris*.

The white mangrove is an early pioneer in the establishment of mangrove forests and provides a nursery for other species. Black mangroves typically grow in the middle of established *Avicennia* stands. The red mangrove forms thick hedges along the edges of creeks running through mangrove swamps, whereas the tagal mangrove forms landward thickets on the inner edge of the *Avicennia* forests.

Phylum Arthropoda: copepods, isopods, amphipods, krill, barnacles, prawns, shrimps, crayfish, crabs: Unidentified species of amphipods and isopods were found among benthic leaf debris in the mangrove swamps. Local fishermen harvested the tiger prawn *Penaeus monodon* in the mangrove swamps at high tide. Hermit crabs are extremely common in all the mangrove swamps. They commonly colonize the shells of the mangrove whelk *Terebralia palustris*, the knobbed horn shell *Rhinoclavis sinensis* and the truncated mangrove snail *Cerithidea decollata* and may form continuous moving carpets on the substrate in some areas. Barnacles, possibly the striped barnacle *Balanus amphitrite*, are commonly found on the mangrove stems.

The red-clawed mangrove crab *Sesarma meinerti* is extremely common in the mangrove swamps. The fiddler crabs *Uca annulipes* and *U. inversa* occur abundantly in the larger mangrove swamp on the southern end of San Sebastian Bay near the reed swamp. *Sesarma ortmanni*, the land crab *Cardisoma carnifex* and the edible crab *Scylla serrata* are also present.

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squid: The truncated mangrove snail *Cerithidea decollata* lives high on the trunks of mangroves and descends to the mud to feed on detritus during low neap tides (Kalk, 1995). The mangrove whelk *Terebralia palustris* is extremely common in the mangrove swamps and is a keystone ecological species. They are the preferred shell of hermit crabs living in the mangals. *T. palustris* crawls over wet mud feeding on diatoms and mangrove leaves. They are large, heavy snails, reaching a length of 120 mm.

Phylum Chordata: sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs: The bigfin mudhopper *Periophthalmus sobrinus* is sparsely distributed in the mangrove swamps, occurring in a pool to the south of the first mangrove swamp to the south of Dugong Lodge (where 20 were counted), and in stream courses in the midst of the large mangal at the southern end of San Sebastian Bay. This keystone species breathes air and can spend long periods out of water. They skip along the mud and take refuge in deep pools. They apparently have no local Xitsua name but are called *peixecobra* in Portuguese.

Other fish species seen in the mangroves included gobies, pipefish, thornfish *Terapon jarbua*, glassy *Ambassis gymnocephalus*, mullet, evileye blaasop *Amblyrhynchotes honckenii*, lesser sandshark *Rhinobatos annulatus* and estuarine roundherring *Gilchristella aestuarius*.

There is abundant evidence of the presence of the Cape clawless otter *Aonyx capensis* in the sanctuary in the form of their tracks and feeding marks, but they are rarely seen as they are primarily crepuscular. They appear to occur in all the mangrove swamps and reed swamps as well as along the estuarine lagoon. Their main prey is crabs, which are abundant in the mangrove and reed swamps and along the marine coast. On the marine coast they eat, *inter alia*, the tuberculate crab *Plagusia depressa tuberculata* whereas their prey in the mangrove swamps appears to be mainly fiddler crabs, *Uca* spp., especially Urville's fiddler crab *Uca urvillei*, and the pink-clawed fiddler crab, *Uca lactea annulipes*, which are abundant. On the edge of the estuarine lagoon evidence was found of otters feeding on the ubiquitous army crab, *Dotilla fenestrata*, and the mud crab, *Scylla serrata*. Otters also feed on fish and octopus (Branch et al., 1994).

2.8.4.7 Seascapes

The dramatic seascapes and coastal scenery should be regarded as part of the biodiversity of the sanctuary, and should be managed as such. Development should be carried out in such a way that the overall scenery is not damaged, i.e., buildings should be built using natural products and should blend in with the landscape and seascape, as Dugong Lodge does; any development in the vicinity of the old Portuguese lighthouse on the marine dunes should not mar the seascape; roads, jetties, pipelines, power lines, airstrips, rubbish heaps, sewerage disposal works, water purification systems, market gardens, aquaculture facilities, stock farming facilities should be planned and installed in such a way that they do not damage the overall aesthetics and 'personality' of the environment. These seascapes have considerable tourism appeal (see Part ..)

2.8.4.8 Cultural diversity

The traditional fishing villages within the VCWS are an important component of the cultural diversity of the sanctuary. Their values include traditional boat-building practices, traditional fishing tackle and methods, traditional salting, drying and cooking methods, and the diversity of their catches. Oral traditions in relation to fish and fishing are also important cultural elements.

The traditional fishing tackle used in the Sanctuary includes valve traps, set singly or in palisade fences, handmade rods, line and reels made almost entirely from the leaf, stem and branches of the *Phoenix* palm, and traditional fish throwing spears. Handmade seine nets and gill nets are no longer in evidence but would have been used before multi- and monofilament nylon and cotton nets became available.

Dugout canoes and wooden dhows are still made in the traditional way, although the availability of large tree trunks appears to be a limitation now. The ribs and elbow joints in the dhows are made from mangrove wood, and handmade as well as commercial nails and wooden dowels are used for attaching the hull planks to the ribs. Handmade adzes and axes are used to shape the timbers. The traditions of making dhows and dugout canoes are an important part of the local culture and should be properly recorded and archived.

Handmade items associated with the preservation and cooking of fishes include: gourds, clay pots, wooden basins, hollowed-out trunks and abandoned dug-out canoes that contain the brine solution used to salt fish; simple stick holders for smoking fish over a fire, reed or grass mats used for drying fish in the sun, usually suspended above ground level; handmade knives for scaling and filleting fish; baskets woven from lala palm leaves to carry the catch; small thatched huts for storing dried and salted fish.

2.8.5 Marine research priorities:

The following research priorities have provisionally been identified (see also Part M):

Phylum Porifera: The role of the large sponge that is common in shallow inshore habitats to the north of the Peninsula needs to be investigated as they appear to play an important role as shelters for other animals.

Phylum Cnidaria: The giant anemone, *Radianthus ritteri*, is an important component of the biota of the VCWS, and should be regarded as a flagship species; they should be subject to more detailed study in terms of their role as a shelter for other species in a harsh, exposed environment. The taxonomy, diversity and abundance of hard and soft corals on the coral and rocky reefs also need to be studied.

The rootmouthed jellyfish *Rhizostoma* spp. is a keystone species that should be surveyed in depth to ascertain its role in the system.

The extraordinary sea pens and sea feathers of the tidal flats should be properly surveyed in terms of distribution, abundance and conservation status. Their biology and ecology could then be investigated.

Phylum Arthropoda: The conservation status of prawns, crayfish, shrimps and walking and swimming crabs in the VCWS needs to be ascertained as some of these species are heavily exploited and may require special protection. The ecological role of hermit crabs in the mangrove swamps also needs to be determined.

Special attention should be given to the blue crab *Portunus pelagicus*, mud crab *Scylla serrata*, east coast rock lobster *Panulirus homarus* and tiger prawn *Penaeus monodi* because of their commercial importance, and to ghost crabs *Ocypode* spp., red-clawed mangrove crabs *Sesarma meinerti*, and the fiddler crabs *Uca* spp. and hermit crabs of the mangrove swamps, because of their vital ecological roles.

Phylum Mollusca: chitons, bivalves, tusk shells, snails, limpets, sea slugs, octopus, squids: Bivalves play a very important role in the reef and tidal flats environments and need to be properly surveyed in terms of taxonomy, diversity, abundance and conservation status. The abundant but small oysters on the trunks of mangrove trees offer an interesting opportunity for exploitation. It is obvious that there is a lack of suitable settling areas for the planktonic larvae of the oysters; the establishment of suitable settling stations may form the basis for a small oyster industry. Oysters are also abundant on inshore rocky reefs. Octopus and squid are probably overexploited throughout the Sanctuary. The mangrove whelk *Terebralia palustris* and the truncated mangrove snail *Cerithidea decollata* are very abundant and ecologically important in the mangals and also provides shells for hermit crabs that are major scavengers in that environment.

The giant clams *Tridacna squamosa* and *T. maxima* need to be properly surveyed in terms of abundance and conservation status, as do the cowries *Cypraea* spp., wedge mussels *Donax faba*, horse mussels *Pinna muricata*, fan shells *Atrina pectinata*, sand oysters *Pinctada imbricata* and beaked clams *Eumarcia paupercula*. Intertidal zonation on rocky reefs along the marine coast needs to be studied and compared with the pattern of zonation on Inhaca Island.

Phylum Echinodermata: starfish, brittle stars, sea urchins, sea cucumbers, sea lilies, feather stars, sand dollars: The echinoderms provide very rich opportunities for research in the fields of taxonomy, biology, ecology, sustainable exploitation and conservation status.

The species that are most deserving of further study are the snake sea cucumber *Synapta maculata*, beaded starfish *Pentaceraster mammillatus*, crown-of-thorns starfish *Acanthaster planci* (if it occurs), sand starfish *Astropecten monocanthus*, spiny brittlestar *Ophiocoma valenciae*, heart urchin ?*Lovenia elongatum* or ?*Echinocardium cordatum*, short-spined sea urchin *Tripneustes gratilla*, needle urchin *Diadema setosum*, black tufted sea cucumber *Holothuria scabra* and the sand dollars *Echinodiscus bisperforatus* and *E. auritus*.

The needle urchin *Diadema* spp. has been used internationally as an indicator species for marine habitat degradation (the greater the degradation, the higher their numbers), and should be monitored to determine whether its population is increasing or decreasing.

Phylum Chordata: sea squirts, salps, jawless fishes, sharks, rays, bony fishes, turtles, snakes, birds, whales, dolphins, otters, dugongs: Exciting opportunities also exist for further research on various vertebrate animals.

The most important candidates are:

Fishes: the commercially important game fish and reef fishes, whale shark *Rhincodon typus*, manta ray *Manta birostris*, devil firefish *Pterois miles*, coelacanth *Latimeria chalumnae*, black tilapia *Oreochromis placidus*, glassy *Ambassis* spp., lesser sandshark *Rhinobatos annulatus*, sea horse *Hippocampus* spp., bigfin mudhopper *Periophthalmus sobrinus*, blue-line herring *Herklotsichthys quadrimaculatus*, white sardine *Sardinella albella*, Indian scat *Decapterus russelli*, barred flagtail *Kuhlia mugil*, flathead mullet *Mugil cephalus*, cowfish *Lactoria diaphana*, milkfish *Chanos chanos* and the queenfish *Scomberoides* spp.

Reptiles: The five species of marine turtles.

Mammals: The dugong *Dugong dugon*, the four species of dolphins and the Cape clawless otter *Aonyx capensis*.

2.9 CURRENT UTILISATION STATUS OF MARINE BIOTA

2.9.1 Field survey

The specialist's field visit took place from July 1-16, 2002. The three-man survey team travelled and by car, speedboat, dhow, on foot, Cessna 210 and by helicopter. Systematic observations on numbers and types of fishers and type of craft used were made from the Cessna and the helicopter. Most days were spent in the vicinity of the three main villages where fishers are based, namely Marape, Chihunzuene and Chigonguine as well as coastal sensitive sites around the Peninsula. The latter included the Inhamambane estuary on the east coast, all three main fishing villages (Chigonguine, Chihunzuene and Marape) and their environs, the sand peninsula and the sand spits, the mangrove stand immediately south of Chihunzuene, etc. Two meetings took place in the town of Vilanculos with local stakeholders and from the Bazaruto Archipelago.

2.9.2 The marine and coastal component

For a detailed description of the marine and coastal component, see section 2.8 above.

2.9.3 Assessing the current levels of utilisation

An assessment of the current levels of utilisation of the marine resources of VCWS would be important because of two main reasons:

- Biologically the area is a true gem, both in terms of its species diversity, its range of ecological habitats and its beautiful and largely intact scenery. From a local and global point of view the natural heritage represented on the Peninsula and in the surrounding waters is well worth conserving.
- Furthermore, the Peninsula is home to a population of local inhabitants several thousand strong (about 9000, Thompson *pers comm*) that depends on the natural resource base for their livelihood. It is therefore important for their future well being that these natural resources be utilised in a sustainable manner.

2.9.4 Sustainability of utilisation

The following quote from the consultant's report (Odendaal, 2002) clearly states the seriousness of the problem that has been identified:

“..... it does not require a trained eye to recognise that the San Sebastian Peninsula is on a trajectory that will lead to the exhaustion of these resources as well as the degradation of the coastal and terrestrial habitats unless a substantial intervention is forthcoming”

Notwithstanding these concerns, it would seem as if human activity in the coastal and marine environment around the Peninsula is at a low to intermediate level compared to many coastal areas in the Western Indian Ocean, for instance most coastal areas in Madagascar where it is considerably higher (Odendaal 2002)

2.9.5 Fisher's profile

During interviews with the fishers themselves, augmented by casual observations, it was endeavoured to obtain the following information in order to compile a socio-economic profile for the fishers (structured sessions with formal questions were avoided):

- Personal data (including availability of foodstuffs to the family)
- Patterns of resource use (types of resources utilised; methods employed; ownership/access to boat; operate alone or collaboratively; fishing site(s); regularity of fishing)
- Estimation of resource abundance (stability or otherwise of resources; surmised reasons for observed changes)

- Basic resource economics (subsistence fishing or are products sold; prices realised; is income enough to satisfy basic needs; availability of markets; level of satisfaction with career)
- Data on other fishers (how many fishers operate from the village/shoreline; how many dhows are used for the purposes of fishing; awareness of the Fishers Association in Vilanculos)
- Opinion on the VCWS (awareness; awareness and opinion of resettlement; how can the situation regarding marine resources be improved)

Extensive gathering of personal economic data was avoided as other consultants were appointed to deal specifically with socio-economic aspects. Whenever possible, time was spent with interviewees in fishing situations over a period of several hours, for instance by going along on fishing forays. This allowed for much information to be gathered in a non-intrusive manner.

2.9.6 Results, discussion and management implications

2.9.6.1 Conversations and interviews

Mozambique is in the process of decentralisation and will soon start a process of integrated development planning at all levels of government. The ministries of Agriculture and Rural Development, Public Works and Education will play a large role in the development of the integrated development plan for the Vilanculos district. The planning process is required to be participative and organisations such as the Fishers Association and the Hotel Association will be playing an important role. It is important for the VCWS, as it is for other land development initiatives and protected areas, to be part of the development planning process to ensure the integration of such areas into district level planning.

The local representative of the Endangered Wildlife Trust/World Wildlife fund was a source of much local knowledge. Fishing was the major industry after tourism and the area exported fish in 200 kg containers to Maputo on a daily basis. He stressed that effective management urgently had to be put in place as reserves were declining; however, such a management system had to take the needs of the local population into account otherwise it would not work.

2.9.6.2 Observations on the effect of the social environment on the sustainable use of marine resources

In a region where poverty is rife, malnutrition is noticeable, jobs are almost unavailable, produce markets inaccessible or absent and access to schools and primary health care facilities are limited, the fishers appear to be the worst off, at least in comparison with those people who own *mashambas* and cultivate the land. Any incentives relating to more sustainable marine resource use that will also improve individual income are likely to be eagerly accepted. People were eager to engage in discussions on development and initiatives that would stimulate economic growth. The malaise and apathy that sometimes overtake heavily disadvantaged communities and can become their worst enemy appeared to be absent.

2.9.6.3 Reliance on marine resources

Somewhat conflicting results regarding the local people's dependence on marine resources were obtained by came to the socio-economic survey (Thompson, 2002) and the brief survey undertaken by the marine resources team. Thompson (2002) for example found that many of the VCWS fishers originated in Vilanculos and noted that a decline in bartering of fish in exchange for staple foods is causing some fishers to desist from fishing, whereas no such trends were determined during the current marine resources survey.

Almost all non-fisher families also catch freshwater fish and bartering with open sea fishers does take place. However, the latter have lost much of their market due to the increased reliance on freshwater fish since the floods several years back that increased the number and probably increased the longevity of seasonal lakes (Thompson 2002).

An extremely strong reliance on marine products by the people who live along and near the shore was found. For people who lived along or near the shore, had no job or other income generating activities, as was the case with almost everyone, and who did not own a *mashamba* inland, the main alternative appeared to be to find what they can from the sea. Several fishers bluntly pointed out that they had no schooling, and had no other alternative but to fish as their fathers did. Some even said that they hoped that their children would enjoy more options and that is why a school tended to be high on the 'wish list' of many people that were interviewed.

Almost all the interviewed fishers had no other income except fishing, and some people ate almost nothing except fish, salt and water (cassava or other vegetable material could only be enjoyed rarely). Some people who cultivate land also fish in the open sea, or *mashamba* owners who have sons would enlist them to also fish for additional income. Some of the poorest of the poor would collect oysters to cook and dry and then sell for a little income to other local people.

Reliance on marine products are extremely strong for some people who not only have fishing as their only income but also almost as their sole source of food.

2.9.6.4 Pressure on Marine Resources

(1) Types of Resources Utilised

Virtually any living marine resource that is not poisonous is taken. They are discussed below in different categories. However, unlike so many other tropical areas, the resources taken are not from coral reefs as the only reefs in the VCWS are on the east (open sea) side of the elongated sand peninsula and thus difficult to access by non-motorised craft.

The observed fish catches almost entirely consisted of species frequenting the estuarine or surf zone and seagrass beds. Species included thornfish (*Terapon jarboa*), purse mouths (*Gerres acinaces*), wolf herring (*Chirocentrus dorab*), ladyfish (*Elops machanata*), remoras (*Echeneis*), Hemiramphidae family, white-spotted robot fish (*Siganus sutor*), wrasse (Labridae family) and slender soapies (*Secutor insidiator*). Inshore reef fish were observed in catches in Vilanculos but not on the Peninsula.

The mostly women harvesters who work on the exposed flats during low tide collect big shell molluscs such as Murididae family, small shell molluscs such as Naticidae family, oysters of the Pteriidae family, boxfishes of the Ostraciidae family and swimming crabs of the Portunidae family. In the middens turtle shells were also found as well as the remains of small sharks and rays. Crayfish is eaten but mostly sold. Sea cucumbers are harvested but sold and not eaten.

(2) Techniques in Resource Utilisation

A wide range of techniques are employed in harvesting, including:

- Harvesting by hand of oysters, crabs and other intertidal organisms
- Diving for sea cucumbers and crayfish
- Seine netting
- Gillnets, both of monofilament and multi-filament materials
- Traditional stake nets, known as *gamboas*

No spearfishing equipment was seen anywhere on the Peninsula, probably because the reefs are difficult to get to as they occur on the open sea side of the sand peninsula and would thus be inaccessible to the inhabitants of the Peninsula in their dhows.

Unfortunately uncontrolled semi-industrial fishing does take place, especially by mainlanders who work under contract, and commercial fishing activity has been noticed at night near the mouth of the estuary. Long lines have been found on a number of occasions in the mouth of the estuary.

(3) The Bay of Vilanculos

Pressure on marine resources in the broader area of the Bay is impossible to estimate informally. However, indications are that considerable pressure exists. On July 6, flying on a trajectory from Vilanculos to Bangué and reaching 1000 m over Bangué, 30 – 40 dhows were visible. On this day the estuary along the east side of the Peninsula was filmed and three dhows with about fifteen people were noticed fishing with a net that extended almost right across the mouth of the estuary. The water was shallow enough for most people to be walking in the estuary working the net.

On the same day, 17 dhows were spotted in a semicircle with Vilanculos at the centre and extending 5 km out to sea, as well as 23 dugouts apparently engaged in fishing. Although this single observation cannot be quantified, the situation around Vilanculos and the Bay of Vilanculos was reminiscent of the situation in 1993 around the town of Maroansetra and the Bay of Antongil in Madagascar where marine resources have drastically declined over the last decade. (Odendaal, 2002) There is every reason to believe that Vilanculos and the Bay of Vilanculos have the same in store unless urgent mitigating measures are taken.

On 16 July 18 dugouts were spotted from the air near Marape working a shoal of fish; and on a semi-circular trajectory to Vilanculos 39 active fishing dhows were noted. However, the numbers of fishing boats appear to be varying greatly from day to day. Such one-off aerial counts are of

course meaningless unless they can be compared with time series, but at least they provide a very rough datum point for comparison in the far future.

More convincing evidence of pressure on the marine resources come from conversations with local fishermen along the beach in Vilanculos who are of the opinion that catches have been decreasing, as well as from the large number of reef fishes with spearfishing wounds that obviously (and sometimes by admittance of the bearer) have their origin in the Bazaruto National Park (BNP) and from the small gauge but long nets (in excess of 100 m in some cases) that are being used from the beach in front of Vilanculos. Unhappiness among fishers about the establishment of BNP that at least some of them view as an attempt to deny them access to the resources on which they depend, also serves as an indication of the limited nature of the resources.

During one survey along the shore in Vilanculos a total of 73 fishers in four groups fishing with two boats and four nets (14,16, 29 and 14 individuals respectively) were observed. The boats were used to lay the net that was then drawn in by hand by people in the water at low tide. These fishers were active along a section of 1.5 – 2 km of shoreline in a band about 200 m wide and were wading between knee and waist deep in the water.

A highly disconcerting observation was the number of reef fish, including large parrots (family Scaridae), that were collected by the use of spearguns on the archipelago (by admission of some fishers in the BNP itself). This resource will not last long and the unsustainable removal of these reef fish will have serious ripple effects throughout the finely balanced and highly sensitive coral reef ecosystem. Fish is exported daily in 200 kg refrigerated containers to Maputo and there are plenty of stories of plundering by foreign vessels (Asian and South African), especially at night on the outside of the Bay.

None of the situations presented above presents a conclusive picture about the state of the marine resources in the Bay of Vilanculos. However, the picture was reminiscent of situations elsewhere where the resources dwindled dramatically over the course of a decade or so, for instance in parts of Madagascar. Considering that the decline of fisheries in the Western Indian Ocean is well known, *the precautionary approach should be taken namely that everything possible should be done to get effective fisheries management in place over the wider area.* The establishment of the BNP is a good start, but the fishers association and other role players, particularly consumer groups (including hotels and exporters) and government enforcement agencies, should be united in a common strategy to prevent the continuing decline of marine resources.

(4) The Vilanculos Coastal Wildlife Sanctuary

That marine resources are declining in the VCWS is indisputable. The exact rate of decline is difficult to measure, especially during such a brief survey, but it should be considered so extensive that dramatic changes will be visible in a matter of a few years. The signs of decline are already abundant. The assertion that marine resources in the VCWS are declining and that rapid and pervasive action is needed is based on the following observations:

- Of the more than 20 fishers interviewed on the Peninsula all made it clear that catch size of netted fish have been declining and that there are marked differences in catch size between 5-10 years ago and the present. While previously fish was abundant, the fishers now sometimes go hungry and have too few fish to trade for other forms of alimentionation and materials.
- Net gauge is generally very small. There are basically two types of net, one being monofilament nylon and the most popular one (because, as one fisher put it, you can catch everything with it no matter how small) and the other being a multi-filament polypropylene net The arrival of small gauge monofilament nylon nets in the hands of a hungry local population in shallow water marine habitats can be considered the start of a fairly rapid decline in marine resources as observed elsewhere in the Western Indian Ocean. Odendaal (2002) witnessed a dramatic decline of artisanal fisheries due to a change from traditional (woven stationary and drag traps) fishing methods to nylon netting in the Northeast of Madagascar from 1992 to the present.
- Sea cucumber fishers, of which 4 with a mean involvement of 4,75 years were interviewed, all agreed that sea cucumber numbers are declining. The holothurians are easy to collect with a mask and snorkel and experience elsewhere, particularly Madagascar, points to the distinct possibility that their numbers can decline over the next decade to the extent that sea cucumber fishery will become defunct.
- Oysters are collected from exposed mud banks during low tide. The size of middens along the shore and as far as a kilometre inland is testimony to the abundance of the resource in the past. Interviewed harvesters all agreed that the resource has gone down greatly over the last few years, and the *in situ* damage inflicted to the oyster beds were witnessed at first hand.
- Sensitive breeding areas such as the Inhamambane estuary are hard hit. During an aerial survey on July 6, 2002, a total of 3 dhows were recorded between Chihunzuene and Lenene islands with approximately 15 fishers in the water working a net, or nets laid out at right angles to the longitudinal axis that spanned almost right across the very shallow estuary.
- In addition to sea cucumbers, excess marine resources in the form of dried and salted fish is being exported to the market in Vilanculos. How long this has been going on could not be established with certainty, but older fishers indicated that exporting excess fish did not always happen; perhaps with marine resources declining everywhere, including the mainland, and with human numbers rising, a flow of resources to where consumer numbers are the greatest could be expected.
- Apparently an increasing number of fishers are hired, to be remunerated either in cash or by share of catch, by boat owners from the mainland who supply them with materials to fish in the Bay and in the VCWS waters. Four of these migrant fishers were interviewed. They were poor and two of them did not even have contracts or a clear understanding of how their labour would be rewarded, and hence would be at the mercy of the boat owner.
- Coastal inhabitants have been observed to consume even the smallest creatures, some of which are considered unpalatable or undesirable elsewhere, including puffer fish and box fishes that have only tiny amounts of muscle on them. Hunger is endemic on the Peninsula and it can be expected that the “reality of the stomach” reign supreme.
- Unfortunately, quantitative baseline for the marine resources of the VCWS does not exist. However, the observations above indicate that the marine resources are under severe

threat and that without intervention the situation will likely worsen considerably over the next 5-10 years.

- To the fishers themselves the causes of the declining catch were generally clear. All but one fisher ascribed the main cause as there being too many people fishing for the same resource; several also added that fish are being robbed from their waters by foreign vessels; lastly, it was said that the number of fishers coming from the mainland, specifically from Vilanculos, to fish in VCWS waters has increased (this is in contrast to a remark by another consultant that there is a rumour that the establishment of the VCWS has led to increased pressure on the BNP).
- Potential solutions to the problem were less clear to the fishers. One sea cucumber diver called for intervention by government, especially in terms of patrolling to make sure that size regulations are adhered to; several others felt that an effective association would be helpful in encouraging its members to adhere to size and other regulations; a number of fishers thought that the only real solution to taking pressure off resources of the shallow waters will be to assist them to fish in the open sea. Sea cucumber fishers are thoroughly aware of the effect that middlemen have on the price of the product and several suggested that the prices should be regulated.
- All the fishers except one also ascribed the decline in catch size to there being too many fishers using the same resources

2.9.7 Notes on marine resource economics

The survey team did not have the time or the opportunity to make an in-depth study of local resource economics, but the following observations were made and led to the conclusions listed below:

(1) Sea cucumbers

Of the two species of holothurians that are harvested, a smaller one locally known as Areapreta, fetches about US \$1,25 each, while the larger one known as Makwalokwato (*Holothuria scabra*) fetches about US \$2,08 each in the cooked, salted and dried form. An unconfirmed price of US \$10,00/kg for dried Makwalokwato was quoted as being realised by one harvester. Catches observed from two cucumber-harvesting boats at Marape contained 7-9 holothurians caught by two or three divers and one deckhand. Apparently slightly more get caught in summer. A typical catch therefore fetches US \$12,5 - \$20,8, and if diving take place 20 days out of a month, which may be optimistic for the wet season, the total income per boat per month will be about US \$250 - 420. This income will normally have to be divided amongst four or five people, and will also have to cover all costs including maintenance. In another instance it was estimated that a Marape cucumber-harvester earned a maximum of about US \$85 per month (calculated at 2 – 5 cucumbers per day and 20 operational days per month). These operators concentrate solely on cucumbers and have no other income.

A full census of cucumber divers operating on VCWS was not possible, but it is unlikely that there are more than 10 divers who spend all or most of their income earning time on this activity. However, according to one harvester “many” women and children also engage in this activity.

Numbers of the sea cucumber resource is seemingly dwindling and during dives by the team relatively few (in comparison with the Seychelles or Masoala, Madagascar in 1993) were observed. It would seem as if the harvesting of this very slow growing resource has already reached unsustainable levels.

(2) Fish

With regard to the resource economics of fishing the following categories of fishing activity were observed, or noted down from conversations, mostly from the three main villages namely Chihunzuene, Marape and Chigonguine, as well as observations from the eastern shores:

Chihunzuene

It appears that the fish caught by the approximately six dhows, each typically with four or five crew, operating in this area is utilised primarily for subsistence reasons. According to the fishers, the catch has been getting poorer during the last decade or so, and it happens often that they barely catch enough for them and their families to eat. Surpluses from good catches are bartered for cassava, or may be sold in Vilanculos in dried form. One more progressive local inhabitant, however, not only farms with coconuts, cassava and millet, but had about 20 kg of fish on the drying racks that he would sell for about US \$0,35/kg in Vilanculos. This entrepreneur is assisted by four of his sons.

Marape

The situation in Marape appeared to be much the same as in Chihunzuene. The fisher population may be slightly larger (some seven dhows) and there is seemingly more activity as a result of this being the embarkation point for the shuttle between the Peninsula and the mainland. The following cases may be regarded as typical of the Marape region:

- In one case of a dhow with seven fishers (with the owner of the dhow residing in Vilanculos), each fisher received a small pile of fishes while two women were cleaning the rest to be dried and salted, and for this work they were to be paid in fish. The total catch was estimated to be 30 - 40 kg, of which about 20 kg would be sold with the proceeds going to the owners of the boat. The total value of the catch to the owner therefore would be about US \$7,00. A multifilament net was used with a gauge size of 1.5 cm.
- An older fisher that has been operating in the Marape area for more than 20 years, alleged that the fishing stock has greatly decreased during this time, apparently due to unsustainable pressure on the resource by too many fishers. These sentiments were echoed by two other locals, who also had only fish to eat.
- Migrant fishers from the mainland, who can be considered semi-industrial operators on account of their being hired by boat owners in Vilanculos rather than merely fishing for subsistence purposes, were encountered on two occasions at Marape. In one case two fishers were based near Marape for two weeks and appeared to net about 15 kg of dried fish per day. In the second instance the catch of a migrant fisher crew was examined, and the value of the six species of fish caught by them was estimated to be around US \$25,00

when fresh (they caught the fish during the afternoon and was about to leave for Vilanculos during the night to sell the fish on the market the next morning). Pricing would be fairly accurate as the fish was sorted into groups and each species and group priced independently. The catch consisted of (local names) lakanje (\$0,42 each), mokanje (\$0,42 each), chipakanje (\$0,42 for all), mogobwe (\$0,42 for all) and pescado (\$0,50 each).

Chigonguine

Discussions were held with various fishers as well as an informal forum of villagers. In everyone's opinion the size of catches have decreased. People use nets only, and sell their excess in Vilanculos in the form of salted dried fish. There are 9 dhows and approximately 40 fishers in the village. At night, lights on the sea from big boats have been noticed, apparently engaged in fishing activity. The most important fish caught are sardines, small mackerel and sometimes barracuda. The men fish while females wait for their husbands and then may trade some fish for cassava with families concentrating on agriculture.

The Eastern Shores

Sporadic bouts of intense fishing activity with long nets take place in the mouth of the Inhamambane estuary (noticed during the aerial survey, as well as observations by E Leason of Lenene Island Lodge). In this shallow lagoon such activities can be considered highly destructive. Local fishers complain that the resource has drastically declined, and they are hard pressed to catch enough for personal consumption. The fish resource inside the estuary has dwindled to a level where it can barely be considered an economic resource beyond providing subsistence to the local people living along the western shore of the estuary.

(3) Crayfish

According to one professional crayfish harvester operating in the Marape area, three other Marape fishers also specialise in crayfish. The interviewed fisher has practised the profession for five years and on a good day can catch up to fifteen, but usually less than 10 and sometimes nothing. He is quick to point out that he catches only the large ones, indicating that some awareness regarding regulations do exist. Crabs and oysters are also collected when conditions are not ideal for crayfish. According to him the crayfish resource has decreased considerably and people come from Vilanculos to buy crayfish from him. A crayfish fetched about US \$1,00 - \$1,50 each from buyers from the mainland, but their local value was much less because of the lack of a market. He therefore can allegedly earn as much as US \$15,00/day catching crayfish. The resource, however, is certainly not plentiful; during a dive with the fisher at a 3 – 4 m deep spot where the crayfish occur, none could be found over a period of 45 minutes.

(4) Oysters

An examination of the oyster catches of two female harvesters at Chihunzuene showed that each collected about 100. The morning's catch involving about 8 women was estimated at 900 – 1000 oysters that were being shelled at the edge of a midden 40 m x 12 m in extent and containing tens

of thousands of shells. Closer examination of the midden contents revealed *Conus* shells, crab shells, clams, sand oysters, other oysters, cuttlefish remains, a box fish, a turtle shell, a garfish and a stingray tail, but 99% of the midden consisted of sand oyster (*Pinctada imbricata*) remains.

On another occasion the team accompanied a group of eight women harvesting oysters on the tidal banks 1000 – 1200 m to the west and inshore of Chihunzuene. Spring tide has just passed so that the banks were more or less maximally exposed. Five groups totalling 27 women were observed in the area opposite Chihunzuene and slightly south of the village to about the mangrove islands. One group reworked the same area as the primary group that the consultant accompanied, and which consisted of eight women. The groups worked a strip of about 100 km wide and 3 km long. The marks on the substrate where they collected oysters were clearly visible. They took everything that could conceivably be eaten. Species harvested included boxfishes, small snails, crabs, conchs, etc. White razor clams, apparently poisonous, were not taken. The outing lasted three hours. It was estimated that the eight women collected 800 – 1000 oysters that were then shelled on the shore. The women collecting oysters at Chihunzuene will probably have a ready market in the new residential properties that will be constructed directly opposite the mudflats where the oysters are found. The exact effect that this new market will have is not clear, but a dramatic increase in the prices of the oysters can be predicted. It is even possible that the women will only need to collect oysters on demand, while still generating an appreciably higher income.

According to local harvesters who have been born in the region, the number of oysters has dropped considerably during the last decade, but especially during the last few years. The oysters are mostly used for personal consumption, but excess salted and dried oysters are currently sold for about US \$0,20 per 500g tin.

(5) Fishing as an economic resource

The various categories of fishing listed above, are very important to a number of people and for some represent their only livelihood. Monetary gains are however relatively low, and may dramatically be increased by the creation of a local market. Should other options become available, for example employment opportunities, it will have an obvious positive economic impact whilst at the same time lessening the current unsustainable pressure on the marine resources.

2.9.8 Estimation of fisher numbers

The survey team was not in a position to undertake a full census of fishers, but a rough estimation can be made based on information provided by the fishers themselves and on the number of dhows that were counted in the VCWS. The estimates below are thus only provisional; however, they do provide some idea of the size of the fisher population. It is unlikely that the number of fishers exceeds 140, and the number of active *bona fide* resident fishers (migrant and occasional fishers excluded) will probably be less than 100.

Locality	Fishing dhows	Fishers (est.)	Verification
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1	Marape	7 + some canoes	28	Julius, Jeremiah, Carlito, Azaria
2	Chihunzuene	6 + two canoes	24	Gustavo,
3	Chigonguine	9 + some canoes	40	Divani, Mindo
4	Other areas	Some dugouts	30 – 40	Chief Sinao, aerial survey
	Total	22	122-123	

An aerial survey gave similar results in terms of the number of dhows counted, which relates closely to the number of fishers. The six extra dhows that were observed were carrying materials to Dugong Lodge and were recorded in Areas A and B (see map). The motorised boats were mainly from tourist lodges.

Sector	Dhow	Motorised	Dugout	Fish Traps
A	14	0	2	0
B	11	2	0	0
C	3	7	2	3
D	0	1	9	8
E	0	1	0	0
F	0	1	0	0
Total	28	12	13	11

CHAPTER B3: THE AGRICULTURAL ENVIRONMENT

3.1 INTRODUCTION

The VCWS has, for agricultural purposes, been divided into three areas, as follows:

Area 1: Area under concession within game fence (the Reserve).

Area 2: Area under concession outside the Reserve

Area 3: Area outside VCWS, but bordering the concession area.

Area 1 accommodates all the tourism-based and biodiversity-related developments, including infrastructure such as lodges and residential estates, in addition to housing, wildlife and game. This area is separated from the Area 2 land by a game fence. Local communities previously residing and utilizing resources within this area have been (and are being) resettled on Area 2 land.

Area 2 still falls within the concession area, but is not to be utilized for tourism sector development. It is this area that is the focus of the Terms of Reference of the report with regard

to sustaining the local economy. In addition, Area 2 houses the schools and clinics and plans are underway to develop a community harbour and a local market.

Area 3 land falls outside of the concession area, but is adjacent to Area 2. As such, some consideration must be given to this area in order to maintain community and cultural boundaries and to prevent conflict by the provision of resources and assistance to some individuals and not to others.

3.2 INVOLVEMENT OF COMMUNITIES

The same underlying principle applying to the other community-related developments included in the BMP (marine, fresh water, terrestrial wildlife) will also be applied to the agricultural project: the community must take full ownership of the project and must drive the development programme. This implies that the views of the local community must be paramount when making decisions concerning them, and that the necessary channels and structures must be established to make it possible. Furthermore, any agricultural development initiative should take cognisance of the capacity of the community members to participate effectively, and their willingness and ability to adapt to new agricultural production technologies.

3.3 IMPLEMENTATION PRINCIPLES AND FOCUS

The sustainable small-scale agricultural development programme must dovetail with the broader objectives for VCWS and with the other community development projects as embodied in the BMP. Its main elements will thus include the following:

- Organic farming methods (permaculture or sustainable conservation farming) will be employed and will bring the Sustainable Agricultural Programme (SAP, see below) in line with the overall biodiversity objectives for VCWS. (For a more detailed description of organic farming see below)
- A holistic and integrated approach to the development of people and their social infrastructure will form the backbone of the SAP.
- The recognition that agriculture (and fishing) plays a central and anchor role to the well being of the local community.
- An appreciation of the social disruption, also affecting subsistence farming, occasioned by the development of the VCWS and the need to focus on the development of affected people through the judicious application of resources to be provided by the VCWS.
- The promotion of environmental awareness amongst the local community and the need for them to grasp and apply the principle of sustainable resource utilization.
- Job creation through direct participation of farmers and through indirect economic activities arising out of the farming and fishing enterprises.

The VCWS agricultural initiative would be comparable to a Sustainable Agricultural Programme (SAP) and would, of necessity, be a long-term undertaking. As in any other long-term development programme it would be essential to structure, implement and review the progress in the light of long-term objectives. The implementation of the programme would evolve around a

phased approach, with each phase targeting a particular focus area or goal that contributes to the long-term objectives, as indicated in the following table.

Anticipated focus areas during the long-term SAP

Focus	Aim	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
	Action research	xxx							
	Initiation of programme	xxx							
	Formation of Farmer's Association	xxx							
	Improvement in yields	x	xx	Xx	xxx	xxx	Xxx	Xxx	xxx
	Conserve/improve soil fertility	x	x	Xx	xxx	xxx	xxx	Xxx	xxx
	Marketing of surplus produce		X	Xx	xxx	Xxx	Xxx	Xxx	xxx
	Value adding to produce			X	xx	Xxx	Xxx	Xxx	xxx
	Provide agri-services and support				x	Xx	Xxx	Xxx	xxx

Legend

x Low-level focus
 xx Increasing focus
 xxx Maximum focus

During the initial stage of the SAP, the main focus will be on action research (to obtain baseline data), initiation of the programme and the formation of a farmers association. It is expected that during this stage, an appropriate farming system will be identified (in consultation with the farmers association) as well as applicable crop and animal production models. The focus for subsequent phases will then shift to the other aims outlined in the table.

3.4 METHODOLOGY

The agricultural survey/study included the following activities:

- Literature reviews
- Scoping exercise in the form of a three-day reconnaissance visit to the sanctuary
- Interviews with knowledgeable persons, organizations, farmers/ fishers and interested community members or role players (refer to the full survey report in Volume 4 of the BMP for details)
- Field trips to the sanctuary to obtain first hand knowledge and to:
 - Consult with and interview some the community members to obtain background information on the farming and fishing practices, as well as living conditions.
 - To acquaint the team with the area and to obtain background knowledge of the area.
 - Undertake soil sampling, soil profile description and analysis.
 - Undertake visual evaluation of the soil and water situation in terms of the natural resource potential.
 - Identification of and investigating suitable conservation/sustainable-farming methods.
 - Analysis, assessment and evaluation of data to formulate a strategic agricultural development plan.

During the brief scoping exercise (January 2002) and the subsequent site visits (August/September 2002) it soon became apparent that, primarily due to the lack of baseline data, it would not be possible to draw final conclusions and to select a formal or final structure and system. The agricultural development process that is outlined below takes cognisance of the

lack of knowledge at this early stage and sets up a procedure and phased system that will in time lead to the identification and selection of a fully appropriate and feasible SAP. The short-term agricultural development programme outlined below is in the meantime fully compatible with the aims, vision and objectives for VCWS.

3.5 NATURAL AGRICULTURAL RESOURCES

3.5.1 Climate

Climatic factors such as precipitation, temperature and evaporation rates would have a major influence on the SAP for the sanctuary. For a brief description of these factors, see Part B above.

The mean annual precipitation (measured over 15 years) for the nearby town of Vilanculos is 901 mm, with nearly 80% concentrated during the period November to March. The mean maximum temperatures vary between 31°C (summer) and 25°C (winter). No frosts are experienced. The annual evaporation averages 1083mm, which means that there is an obvious water deficit that needs to be taken into account when considering dry land cropping opportunities and practices. Drought is not a common feature but when it occurs it obviously has a negative effect on crop production in the area.

3.5.2 Soils

See also Part B above.

Soils have been sampled on two occasions: The first time during the scoping exercise (randomly) and the second time during the last site visit (systematic). All the soil samples, including the systematic samples discussed below, were analysed at a laboratory in South Africa. The results of the soil analysis can be seen in the full specialist report (See Volume 4 of the BMP: Specialist Reports)

Only a limited number of soil samples were taken and the results and recommendations must be seen as indicators and are not representative of the whole area. A detailed soil survey, especially of the agricultural area, will be undertaken during the implementation phase of the SAP

(1) Soil Information (random)

Topsoil (0 to 300 mm) samples were taken on different farms (machambas). Samples were taken from the following production areas:

Maize fields
Groundnut fields
Two profile pits.

The profile pits were photographed and samples were taken at depths of 0 - 300 mm, 300 - 600 mm and 600 - 900 mm.

The topsoil analysis indicates a neutral pH between 6.1 – 7.01, a and a low availability of calcium (Ca), magnesium (Mg), phosphor (P) and potassium (K). Although the subsoil indicates a presence of acidity, it would not be necessary to treat the topsoil with lime fertilizer (see discussion below).

The profile pit analysis however indicates a more acid pH of 5.21 – 5.78. This acidity is due to the water level fluctuation in the sub soil horizon. Acidity is the result of the replacement of the basic plant nutrients such as calcium, magnesium and potassium with hydrogen and aluminium. This replacement is a natural phenomenon and is caused by heavy rain and accelerated leaching due to the sandy soils. The profile pit was also low in calcium, magnesium, phosphor and potassium.

(2) Soil information (systematic)

A number of soil pits and topsoil samples were systematically sampled and analysed. The full results can be seen in the Specialist Report (Volume 4 of the BMP).

The following five samples are probably indicative of the general soil situation for VCWS, but will be augmented by a more comprehensive soil survey during the implementation phase of the SAP:

Sample 1: Profile pit at a newly established and slashed field. The organic matter was still fresh and had not been burned yet when the samples were taken. The results can be summarised as follows:

Soil pH:	Soil is slightly acid (virgin soil).
Resistance:	Topsoil is low indicating free cations in topsoil.
Cations:	All cations are low in the soil below 10cm. In the case of potassium the status is extremely low, is deficient for crop production and needs to be addressed. The sodium content is high in ratio to the other cations and this could also impact negatively on crop production.
Phosphate:	Very low quantities of P, needs addressing.
Aluminum:	Normal in topsoil but too high in subsoil. Needs liming.

General remarks: The soil has a poor fertility below 10 cm. The cation ratios indicate imbalances in nutrients and this will impact negatively on crop production. To rectify this soil for crop production dolomitic lime is needed (1000kg/ha), as well as K applications of 500kg/ha (KCl) and P applications of 1000kg/ha (Supers 10.5). If chicken manure is available it will substitute the K and P applications, and could be applied at 5 tons/ha. (Note: The planned organic farming system that will be used on VCWS may rule out the use of inorganic substances. A decision in this regard will still have to be taken, weighing the probable short-term need for inorganic substances with the longer-term requirements for conservation/organic farming)

Profile pit at a newly established field



Sample 2: Profile pit at an old field. Shifting agriculture was not practised and the same field was used year round. The results can be summarised as follows:

- Soil pH: Soil is moderately alkaline.
- Resistance: Topsoil is low
- Cations: Ca in this soil is sufficient and Na is again high in respect of the other cations. Both Mg and K are low and deficient.
- Phosphate: Very low and deficient.
- Aluminum: Normal.

General remarks: Soil has a poor fertility. The cation ratios indicate imbalances in nutrients and this will impact negatively on crop production. To rectify this soil for crop production soil pH should be lowered (below 7). Acidifying Nitrogen products like ASN may be considered. K applications of 500kg/ha (KCl) and P applications of 1000kg/ha (Supers 10.5) would be needed or, if chicken manure is available, it could be applied at 5 tons/ha to substitute the K and P applications. (Note: Refer to the remark about inorganic/organic practices above)

Profile pit at an old field



Sample 3: Existing field that has been worked for 4 years and rested for only two years. A maize crop was planted in June 2002. The fallow (resting) period was insufficient, as can be seen in the poor maize stand on the left of the photo. The yellowish colour indicates a shortage of plant nutrients, as is confirmed by the results of the analysis:

Soil pH: Soil is slightly moderately alkaline.
Resistance: Topsoil is low
Cations: Ca in this soil is sufficient and Na is again high in respect of the other cations. Both Mg and K are low and deficient.
Phosphate: Very low and deficient.
Aluminum: Normal.

General remarks: Soil has a poor fertility. The cation ratios indicate imbalances in nutrients and this will impact negatively on crop production. To rectify this soil for crop production soil pH should be lowered (below 7), and the soil treated as indicated above for the previous two samples.

Sample 4: Topsoil samples where taken from the neighbouring farm that also planted maize in June 2002 This farmer however has rested the field for a four-year period. In the photo it is clearly evident, as this maize crop is healthier and has access to nutrients in the soil. The plant colour is an indication that sufficient nitrogen was available for the plant development. The soil analysis also confirms this and is as follows:

Soil pH: Soil is alkaline.
Resistance: Normal

Cations: All cations are low but sufficient. Na in relation to the other cations is normal.
Phosphate: Much better than the previous sample but still deficient.
Aluminum: Normal

General remarks: The increase of nutrients is due to burning of the natural vegetation. Although some nutrient imbalances still occur this soil could sustain a small crop. K applications of 500kg/ha (Potassium Chloride) and P applications of 750kg/ha (Superphosphate 10.5) or, if chicken manure is available at 5 tons/ha to substitute the K and P applications, will be needed. (Note: Refer to the remarks about inorganic/organic farming above)

Maize crop planed in June 2002: Left fallow period of 2 years; right 4 years



Sample 5: Newly slashed field, before the plant material was burned. The results of the soil analysis can be summarised as follows:

Soil pH: Very alkaline
Resistance: Topsoil is low
Cations: Ca in this soil is sufficient and Na is again high in respect of the other cations. Both Mg and K are low and deficient.
Phosphate: Very low and deficient.
Aluminum: Normal.

General remarks: Soil has a poor fertility. The cation ratios indicate imbalances in nutrients and this will impact negatively on crop production. To rectify this soil for crop production soil pH should be lowered (below 7), and treatment as indicated for samples 1 to 3 would be needed.

Concluding remarks

From the soil analysis results it is evident that the soils sampled were very poor for agricultural production. The soils have a low nutrient status and are generally unbalanced. This situation would impact negatively on the planned SAP, and could be addressed as follows:

- Identify areas with more fertile and suitable soils for crop production. However, given the restricted area available for agriculture and the current land use patterns in the settled areas, this option would probably have very limited application value. Furthermore, fertile soils may be impossible to find.
- Alternatively, the poor soil fertility may be regarded as a given, and steps taken to improve the quality of the soil as outlined above. Farming practices need to be evaluated and new techniques and strategies, such as organic farming, implemented.

(3) Soil classification

The two soil types identified from the soil analysis are Eutric Planosol and Rhodin Ferralsol types. Both are sandy soils with poor water retention capabilities but excellent water infiltration tempos.

Eutric Planosol is a highly leached soil type, which consist of an orchic topsoil horizon overlaying an E- horizon. The yellow colours in the E-horizon gives an indication of a fluctuating water table, leaching nutrients from the topsoil. The soil structure is poorly developed with leaching of soil colloids. Due to leaching of nutrients and temporary but frequent water saturation this is classified as a very poor agricultural soil.

Rhodin Ferralsol is a well-developed soil type, which consist of an orchic topsoil horizon overlaying a yellow - brown apadale sub-soil horizon. The apadale horizon consists of well-developed soil but with a poorly developed soil structure. The yellow colours give an indication of periodic temporary water saturation, but not to the same extent of the E-horizon mentioned above. The Clovelly soil type of Rhodin Ferralsol is for instance suitable for maize production.

3.6 CURRENT AGRICULTURAL PRODUCTION PRACTICES

3.6.1 Demography

The demographics of the people living in VCWS has been surveyed during the comprehensive social study (see Part F), and provides indispensable information for the deployment of the SAP.

The implementation of a successful SAP and more specifically the preparation of the planned Strategic Agricultural Development Plan (SADP, see below), would need to harness information on the number of households involved, the composition of the households, levels of training, levels of education and literacy, income streams and numbers of agriculturalists, to mention only a few.

3.6.2 Current agricultural practices

3.6.2.1 General remarks

The principal land use activities in the area are subsistence farming and the utilisation of natural resources. The crops planted include inter alia the following:

- Maize – as ‘sweet corn’ and ‘maize on stalks’
- Groundnut
- Sunflower
- Sorghum
- Beans
- Cassava
- Sugar cane – primarily for alcohol production
- Fruit trees – papaya, mango, orange
- Cashew nuts
- Coconut palms

Animal husbandry is practised on a limited scale and includes small-scale poultry, pig and goat farming.

It is safe to say that the larger part of the population in the VCWS area will in future still rely on agriculture or to a lesser extent fishing for their livelihood. A relatively small number of the population will be accommodated in the tourism and conservation part of the VCWS development. It is foreseen that most of the present farmers will continue farming within the boundaries of the VCWS, whilst some have or will have to be moved out of the Reserve or game area to the community development area.

The area south of the temporary fence line are densely populated and used by the local population as machamba land. These households are spread out and mostly situated near water on the fringes of the lakes and pans. At present the land appears to be fairly heavily cultivated, with some large machambas that appear very neat and orderly.

The climatic conditions are such that cash crops (maize etc.) can be planted throughout the summer months.

Some farmers make use of rotational cropping, where maize will follow the bean and groundnut planting. Inter-cropping is also practiced. Both these methods when practiced correctly can be very successful and can enhance yields and prevent the build-up of insects and diseases. Some fishermen supplement their income with crop/animal productions while the same is true for the farmers of which some can supplement their income with fishing.

Both farming and fishing are primarily done on a subsistence basis. The household cash income is however dependent on the sale of surplus products in mainly the town of Vilanculos. Normally the household first of all lives off the land or sea and pay for clothes, schools and household needs from the surplus income, if any.

3.6.2.2 Current cultivation practices

The sandy soils of the area are of recent marine or aeolian origin and are so deficient in plant nutrients that the annual harvesting of crops on the same field cannot be sustained. To overcome this problem of rapid nutrient depletion the farmers, not only in this region but over large areas of central and southern Africa, have developed and adopted a slash-and-burn or

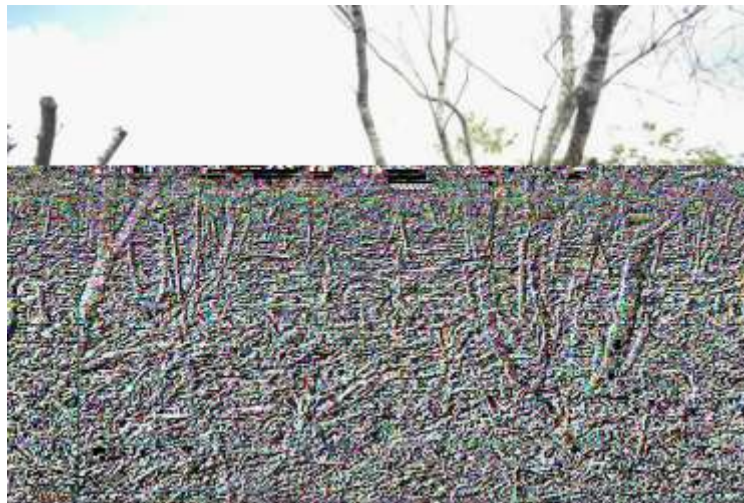
shifting cultivation system over many years. This system requires little or no outside help and can be handled by the average family, and is universally practiced in VCWS.

The natural vegetation cover is rich in organic material (biomass) and in mineral nutrients. When the natural vegetation is cut down and burned and crops planted, the small quantities of nutrients and organic matter in the soil are soon depleted or leached from the soil. In the photograph this slash-and-burn effect can be seen on the soil and natural plants.

This slash and burn method involves three major steps:

- 1) Cutting and burning of trees and natural vegetation with their ashes left on the soil.
- 2) Growing crops on the cleared area for a period of 1 to 5 years, thereby using nutrients left from the burning of the natural vegetation. After the cultivation period the soil is depleted of nutrients and minerals.
- 3) Fallowing the area for a period of 1 to 4 years thereby permitting re-growth of the natural vegetation and trees that rejuvenate the soils. Nutrients are accumulated in the plants and nitrogen is released into the soil. The cutting and burning is then repeated and the cycle starts again. During this fallowing period crops such as sugar cane and cassava are left on these fields.

What is disturbing is that in some cases the farmers, forced by the need to provide food for large families, practice a system where the land is fallowed for very short periods (1 – 2 years) before cultivating it again. This leads to lower crop yields and greater exposure to erosion. The negative effect on the soil nutrients can clearly be seen in the photo.



Slash-and –burn field with freshly planted maize crop

The advantages of the slash-and-burn technique are:

- The conservation, accumulation and recycling of nutrients.

- Erosion control due to natural vegetation covering the soil, especially during fallow periods.
- Burning and killing of weed seeds, unwanted insects and disease organisms.

Various techniques exist and can be applied to enhance soil fertility as an alternative to the existing slash-and-burn system, for example mixed tree crops, modest inputs of fertilizers and lime, the selection of acid tolerant crop cultivars and the inclusion of legumes in crop rotations to help sustain crop yields.

Another alternative, which is related to the mixed tree crop, is *alley cropping*. This involves the growing of food crops in alleys, borders of which are formed by fast growing trees or shrubs. These woody species are usually leguminous and fix nitrogen in the soil. The hedgerows are pruned to prevent shading of the food crops. The mulch is then used as a source of nutrients for the food crop; it helps to control weeds, prevents excessive water run-off and thus erosion and reduces evaporation from the soil surface. A possible plant to be considered that is suitable for the above-mentioned system is *Leucaena leucocephala*. It can either be used as a food supply to animals or as mulching.

The best alternatives would be determined during the planning phase of the preparation of the Strategic Agricultural Development Plan (SADP) as outlined below.

3.6.2.3 Current grain storage and seed selection

The VCWS farmers store their harvested grain in silos made out of local material with a thatched roof. This method allows insects and pests to eat and multiply in the food supply. Before planting the next crop, grains are selected and those without visible insect damage are used as seeds for the new planting period. The quality of the seeds that are stored by the farmers are very poor and this is one of the main reasons why they have to plant up to 20 seeds per planting hole. Even then seed germination is normally very poor. For proper care, seeds need to be stored at specific temperatures and must be kept disease and insect free.



Numerous maize plants planted in the same hole

In the past, vegetables were apparently also cultivated locally, but due to the lack of seeds, very little has been planted during the previous years. Should the quality of the soil be improved as recommended above, vegetables could be successfully cultivated on these soils.

3.6.2.4 Animal husbandry

Animal husbandry involves mainly chickens and goats and is practiced on a very limited scale, primarily for the provision of meat and very seldom for commercial gain. The poor quality grazing and the land tenure system are not conducive to the keeping of large goatherds and therefore the individual farmers only have a few animals. The goats are normally tied to a tree branch to keep them from grazing freely and from eating and damaging crops.

3.6.2.5 Soil tillage

Land preparation is mostly done by hand hoeing or sometimes done by oxen. In both cases only the topsoil is cultivated.

3.7 AGRICULTURAL AND RURAL DEVELOPMENT OPPORTUNITIES AND CONSTRAINTS

Notwithstanding the development of the VCWS and all the opportunities that it brings about, the major part of the population in the VCWS area will in future still rely on agriculture or fishing for their livelihood. It is foreseen that most of the present farmers will continue farming within the boundaries of the VCWS, even though some will have to be resettled out of the Reserve area.

Some of the most obvious opportunities and constraints to rural agricultural development in VCWS may be listed as follows.

3.7.1 Opportunities

Farming is an established and respected culture in the region. Most if not all of the current farmers grew up to become farmers, and in many instances that is probably what they really want to do. They only need some guidance and assistance to really become successful farmers.

The natural resource potential of the land is high enough to allow sustainable agricultural practices under properly managed conditions. The project offers a unique opportunity to establish organic farming. The following data (in tabular format) indicates the removal of nutrients (nitrogen N, phosphorus P and potassium K) from the soil during cropping, and the potential to recover these losses by means of organic composting. (See below for a more detailed discussion on organic farming)

Maize crop fertilizer requirements to produce 1 ton of marketable product

ITEM	Nitrogen kg	Phosphorus	Potassium kg
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		kg	
Grain	15	3	3.5
Whole plant	27	4.5	20
Potential to be recovered through composting	44%	33%	80%

Bean crop fertilizer requirements to produce 1 ton of marketable beans

ITEM	Nitrogen kg	Phosphorus kg	Potassium kg
Beans	30 –40	5.2	11.8
Whole plant	> 50	8	28
Potential to be recovered through composting	30%	35%	57.85%

The current developments in the Vilanculos area such as the VCWS and the Sasol gas pipeline, will most probably create larger markets for produce and commodities to be sold by the local population. Improved infrastructure and services (access, transport, market etc) that will result from the VCWS development will facilitate sustainable rural development, including agriculture.

3.7.2 Constraints

The following list shows serious constraints that the local small farmers (and fishers) may encounter and they and/or VCWS will have to cope with:

- Poor infrastructure: almost no roads, no electricity and no telecommunications.
- Lack or inadequacy of production inputs: Good seed and plant material (vegetables, grains and fruit trees), day old chickens and fertilisers.
- Present inadequate level of training and experience of farmers with regard to good farming practices.
- Transport of produce to markets on the mainland is dependent on dhows.
- Depletion of the natural resources by present farming practices, which will have a long-term negative impact on future production.
- Possible lack of training and extension services to farmers.
- Undue emphasis on sugar to alcohol production as an income source will lead to social problems in the area (or it could have resulted in that already).
- Lack of market information for the commercial exploitation of potential crops such as vegetables, cashew nuts, coconuts and fruits.
- Lack of permanent employment opportunities
- Lack of income generation activities

3.8 ORGANIC FARMING

According to Schrock (1998) organic matter improves soil tilth and prevents soil compaction and crusting. It increases the water-holding ability of the soil and provides a more favourable soil environment for earthworms and beneficial microorganisms. It slows erosion, and in later stages

of decay, organic matter releases nitrogen and other nutrients to growing crops. Carbon dioxide from decaying organic matter brings minerals of the soil into solution, making them available to growing plants. Many soils of the world have been ruined, mainly because they have been depleted of organic matter from prolonged cultivation without proper soil management (as is the case in VCWS).

Sourcing organic matter in the VCWS area would be somewhat problematical, with a preferred source such as animal manure not freely available locally (due to the absence of cattle in the sanctuary and in the region). Other local sources that could be exploited would be compost (to be produced by the farmers), green manuring (growing a cover crop and to till it in), and sawdust (from the sawmills in Vilanculos).

While some materials, such as manure, add organic matter as well as fertility, other organic fertilizers are not suppliers of organic matter. One of the major benefits of organic fertilizers is that they break down slowly and are less likely to release nutrients rapidly enough to burn plant roots if used in large amounts (Schrock 1998). The availability of nutrients from organic fertilizers depends on their breakdown by soil organisms, which in turn depends on weather and soil conditions. Release of nutrients is much slower when the soil is cool or heavily saturated with water. Also, breakdown slows during drought unless soil is irrigated or heavily mulched to keep in soil moisture and keep temperature more constant. Many of the organics have a fertilization lag and their nutrients are not available to plants until the organic matter has decomposed.

Some commonly used sources of organic fertilizers such as dried blood, hoof and horn meal and fishmeal (all sources of nitrogen), bone meal and rock phosphate (sources of phosphorus), and seaweed (source of potash) would be difficult to obtain in the VCWS region.

Environmentally friendly techniques can also be applied to control diseases. The planting of disease resistant varieties would be preferable, whereas crop rotation also helps to prevent the spread of plant diseases. All-in-all organic farming is a much-preferred technique to be applied in a sensitive area such as VCWS.

3.9 KEY ENVIRONMENTAL ISSUES AND IMPACTS

The existing and resettled communities and the nature of their agricultural practices have an unavoidable a negative impact on the natural and socio-economical environment. Important impacts may include:

- *Loss of natural vegetation:* The natural environment cannot indefinitely sustain the current slash-and-burn practices by the subsistence farmers. The need to provide food for the relatively large families forces the average farmer to shorten the fallow period, therefore the soil is not allowed to be rejuvenated and this leads to lower crop yields and greater exposure to erosion. Normal population increases will inevitably also lead to more and more fields being opened up.

- *Loss of habitat for wildlife:* While some animals, for example certain bird species as pointed out above, may benefit from the agricultural fields, the opposite would generally speaking be true for most species of wildlife.
- *Loss of access to natural resources:* Local people currently use the natural resources of the area for:
 - Fuel wood
 - Building material
 - Food source
 - Craft material
 - The agricultural fields are obviously non-productive as far as these resources are concerned. More fields will increase the demand on the remaining natural areas.

3.10 KEY ISSUES INFLUENCING FUTURE AGRICULTURAL DEVELOPMENT

The following issues, whether in isolation or collectively, will have a determining influence on the future development of the agricultural project:

- *Resource potential.* The nutrient-poor sandy soils of the area have a low potential for rain-fed cash crop production as presently practiced by the farmers.
- The relatively low *experience and training* levels of the present farmers with regard to agricultural production will influence the rate at which development can take place.
- The implementation of the *organic farming technique* must be regarded as a long-term investment in sustainable resource use and may not in the short term adequately address the urgent need to enhance soil fertility.
- The *poor infrastructure* in terms of roads and communication will have a negative effect on the cost and availability of production inputs (fertilizers, seeds and pesticides) as well as the sale of produce (market access).
- The *number of people and families* residing in the area are unknown but it is evident that the resources can probably only sustain the present population. Future population growth, whether natural or an influx from outside the area, will negatively affect the sustainability of the agricultural base.
- The establishment of effective *community structures* to enable the communities and VCWS to enter into a co-management or collaborative management system (see below) would be a prerequisite for a successful community agricultural project.
- The intervention of the *development support* by the VCWS will be necessary to make the area socio-economically sustainable. The nature and duration of this support will have to be long-term, to ensure that an acceptable level of self-sustainability would indeed be reached.

These key issues form the basis for the proposals to follow (see Part D, for the Strategic Agricultural Development Plan (SADP)).

PART C: AIMS, CLASSIFICATION, VISION AND OBJECTIVES AND THREATS

CHAPTER C1: PURPOSE AND ECOLOGICAL SIGNIFICANCE OF THE AREA

Mozambique is poorly represented with official protected areas. The country of 801 590 km² has only a relatively small number of protected areas of any note, as was indicated above (Part A). Accurate sizes are not available for these protected areas, but it is estimated that these areas constitute less than 2% of the total surface area of the country, which is significantly below the internationally recommended portion of each state that should be designated in a natural protected area system.

Most of these protected areas are poorly staffed (or not at all in some cases), all of them are inadequately funded (if at all) and, with the possible exception of Gorongosa National Park and Niassa Nature Reserve, poorly managed. Mozambique, with an annual *per capita* income of less than US \$90, is one of the poorest countries in Africa and can, notwithstanding a progressive conservation policy, not channel adequate financial and other resources to the protected area system.

During the civil war of the 1980's, when civil order largely collapsed, the abundant wildlife of Mozambique was subject to such severe over-exploitation that mere remnant populations survived. Although no figures are available to illustrate the extent of the population crash of the national herd, it may be described as a conservation catastrophe of global proportions. The following figures indicate the alarming decline of wildlife numbers for Gorongosa National Park since the outbreak of the civil war (Lambrechts, 1999):

	Pre-1981 numbers	1997
Elephant	7 000	19
Buffalo	18 000	13
Hippopotamus	5 000	10
Wildebeest	2 000	?
Zebra	18 000	13
Waterbuck	20 000	944

The only area that escaped most of the destruction, was in far northern Niassa and Cabo Delgado provinces, where healthy populations of for example elephant and buffalo survived.

The extensive system of so-called Coutada's (hunting blocks), have suffered the same fate as the protected areas and the rest of the country. The Ministry of Tourism allocates these Coutadas to private concessionaires on a contract basis, granting them the right to conserve and utilise the biodiversity resources of the area. However, the wildlife in these blocks has unfortunately been decimated to the point where sustainable and economically viable use is only possible in a mere

handful of the areas. At the moment, these areas therefore make a minimal contribution to the restoration and conservation of the country's depleted wildlife resources.

The relative paucity of formally protected areas in the country was not considered as a serious problem prior to independence in 1975, because most of the sparsely populated and more remote rural areas harboured large free-ranging populations of wildlife in any case. However, after the abovementioned collapse of the national wildlife herd, this shortcoming has become more apparent and of much greater significance. The rehabilitation of existing and the establishment of new protected areas have thus assumed great importance if the current precarious situation with Mozambique's wildlife has to be stabilised and turned around. A new national park, the Limpopo bordering on South Africa's Kruger National Park and the first step in a planned huge transfrontier conservation area, is currently in the process of being established.

The establishment of VCWS is the first major protected area development involving a private sector initiative. Although the sanctuary is only 42 000 ha in extent (including 19 260 ha sea) and thus seemingly insignificant, it will nevertheless play a significant role in a number of respects:

- The biodiversity of the sanctuary, outranking that of extensive and world-famous African protected areas such as Kruger National Park and East Africa's Serengeti, makes the area of global conservation significance.
- The marine and fresh water wetlands of VCWS would greatly enhance the conservation status of Mozambique's extensive but poorly conserved wetlands.
- The conservation status of the almost 3 000 km coastline of Mozambique is very poor, as was pointed out in Part A. The addition of VCWS, with an estimated 120 km shoreline along the Indian Ocean coast, the Inhamambane Estuary and the bay of Vilanculos, would make a significant contribution in this regard.
- VCWS would greatly enhance the potential of the Bazaruto Archipelago – Quewene peninsula complex to be proclaimed as a UNESCO World Heritage Area (WHA). The Mozambican government have already indicated their desire to have the Quewene – Bazaruto area nominated as a WHA.
- VCWS would, especially in Mozambican terms but even on a global scale, be a well staffed, adequately funded and properly managed protected area. Although accurate figures are not available yet, it is estimated that the mean annual biodiversity and related aspects budget for the first five years would compute to about US \$2 000 per km², which is far higher than the estimated global mean budget of US \$766/km² (James *et al*, 1997). However, it must be borne in mind that in the event of the VCWS being enlarged, this budget would not change appreciably and the mean budget per km² would be correspondingly lower. It also seems highly likely that the budget allocation would be considerably lower after the first five years, when most of the major research projects would have been completed, all the structures put in place and the necessary equipment provided. The spending would even then probably still be much higher than the mean for sub-Saharan Africa of US \$143 per km² (James *et al*, *op cit*, 1997).

The conservation status and ecological significance of VCWS would be greatly enhanced by the inclusion of further land to the south (See Part E). The areas to the south are very sparsely

populated and are largely uninhabited, whereas the vegetation has been less subject to man-made influences than the northern portions of the Quewene peninsula forming the current sanctuary. An area of not less than 20 000 ha but even as large as 40 000 ha will be considered for inclusion. The area is especially rich in fresh water wetlands.

The planned wildlife re-introduction program (see above) will be the second major wildlife relocation exercise ever undertaken in Mozambique, after the recently established Limpopo National Park. Although the numbers to be relocated are going to be relatively low, it would be indicative of an upswing in conservation fortunes in the country. The relocated species could also in the medium and long-term act as a reservoir for the relocation of animals to other depleted areas.

If the BMP and the subsidiary OP's are properly implemented, then VCWS would be the best managed protected area in Mozambique and would rank in the upper echelon on the African continent. As such it could serve as an example for others to follow.

The comprehensive research projects and ecological surveys that would be launched as soon as the proposed GEF grant becomes available, would contribute sorely needed knowledge on the biodiversity of the region in particular and the coastal regions of Mozambique in general.

CHAPTER C2: MISSION FOR VILANCULOS COASTAL WILDLIFE SANCTUARY

To ensure the effective conservation of the unique and fragile natural marine and terrestrial resources by means of low intensity, rigidly controlled and environmentally sensitive commercial development to the benefit of the local communities, investors, the region and the people of Mozambique.

CHAPTER C3: OBJECTIVES

3.1 PDF B PROJECT OBJECTIVES

The PDF B project objectives support two major thrusts, namely the restoration of the area's unique biodiversity and the creation of a diversified sustainable local economy. The seven objectives as listed in the PDF Block B proposal to secure the current GEF grant are:

- Effective and strategic protection of the threatened species and promotion of the sustainable use of terrestrial and marine resources;
- Restoration of the terrestrial faunal biodiversity;
- Active involvement of the local communities in the management of the wildlife sanctuary;
- Equitable sharing of the benefits of biodiversity conservation with the local communities, including ownership of wildlife;
- Development of a diversified local economy based on the sustainable use of the area's resources;

- Development of low impact ecotourism facilities and activities, to finance the establishment of the sanctuary and provide a revenue stream for the community development activities;
- Support for the formulation of local government policy on sustainable tourism development.

3.2 NEW OBJECTIVES

During the planning phase leading to the compiling of the BMP, the following new objectives were formulated. These objectives do not materially alter the meaning of the previous objectives, but should rather be viewed as a refinement to bring it in line with modern concepts and principles.

3.2.1 BIODIVERSITY/RESOURCE MANAGEMENT OBJECTIVES

- To investigate and pursue the proclamation and maintenance of a Category VI protected area, managed mainly for the sustainable use of the natural ecosystem, with elements of Categories V (protected area managed mainly for landscape/seascape conservation and recreation) and 1b (protected area managed mainly for wilderness protection) according to the IUCN (1994) classification system. (See boxes C5.1, C5.2 and C5.3 below)
- To perpetuate in as natural a state as possible, representative samples of physiographic areas, biotic communities, genetic resources and species to provide ecological stability and diversity.
- To secure and maintain the habitat conditions necessary to protect significant species, groups of species, biotic communities or physical features of the environment where those require specific human manipulation for optimum management.
- To protect natural and scenic areas of regional, national and international significance for spiritual, scientific, educational, recreational, tourist and/or investment purposes.
- To eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation.
- To promote sound management practises for sustainable production purposes.
- To manage visitor use for inspirational, educational, cultural and recreational purposes at a level that will maintain the VCWS in a pristine or near pristine state.
- To investigate and pursue the proclamation of VCWS and the region as a World Heritage Area and a Ramsar Wetland if international significance.
- To monitor and evaluate all activities undertaken on VCWS to ensure that these take place in accordance with internationally accepted guidelines and standards and at a level consistent with the realisation of the objectives.
- To provide opportunities for education, interpretation and public appreciation at a level consistent with the foregoing objectives.
- To undertake and/or provide opportunities for applied research at a level consistent with the foregoing objectives.

3.2.2 COMMUNITY AND REGIONAL DEVELOPMENT OBJECTIVES

- To maintain the harmonious interaction of nature and culture through the protection of landscape and/or seascape and the continuation of traditional land uses, building practises and social and cultural manifestations.
- To support life styles and economic activities which are in harmony with nature and the preservation of the social and cultural fabric of the communities concerned.
- To bring benefits to, and contribute to the welfare of the local community through the provision of natural products and services.
- To encourage and support scientific and educational activities which contribute to the long-term well being of resident populations and to public support for environmental protection of the area.

3.2.3 ECONOMIC SUSTAINABILITY

- To ensure that revenue generating development and economic activities are viable, profitable and in harmony with nature.
- To provide for the funding of specific socio-economic and related biodiversity conservation initiatives out of income derived from the abovementioned ventures.
- To encourage and seek donor funding to enhance the attainment of socio-economic and biodiversity-related objectives.

3.2.4 OBJECTIVES RELATING TO INTERNATIONAL CRITERIA AND CLASSIFICATION

The objectives stated above are in line with the international management objectives applying to the IUCN’s criteria for the three relevant categories of protected areas (IUCN *ibid*), as indicated in boxes C5.1, C5.2 and C5.3 below.

In addition to the proposal to designate VCWS as a Category VI (IUCN, 1990) protected area, two additional international instruments also appear to be appropriate and desirable:

- Wetlands of International Importance, designated in terms of the Ramsar convention (see discussion below)
- World Heritage Area, designated in terms of the UNESCO guidelines. (See discussion below)

Box C5.1
Management objectives for a Category VI Protected Area: Managed Resource Protected Area (Protected area managed mainly for the sustainable use of natural ecosystems)
<ul style="list-style-type: none"> • To protect and maintain the biological diversity and other natural values of the area in the long term • To protect the natural resource base from being alienated for other land-use purposes that would be detrimental to the area’s

biological diversity

- To promote sound management practises for sustainable production purposes
- To contribute to regional and national development

Box C5.2

Management objectives for a Category V Protected Area: Protected Landscape/Seascape (Protected area managed mainly for landscape/seascape conservation and recreation)

- To maintain the harmonious interaction of nature and culture through the protection of landscape and/or seascape and the continuation of traditional land uses, building practises and social and cultural manifestations
- To support lifestyles and economic activities which are in harmony with nature and the preservation of the social and cultural fabric of the communities concerned
- To bring benefits to, and contribute to the welfare of, the local community through the provision of natural products (such as forest and fisheries products) and services (such as clean water or income from sustainable tourism)
- To encourage scientific and educational activities which contribute to the long-term well-being of the resident populations and to public support for environmental protection of such areas
- To maintain the diversity of landscape and habitat, and associated species and ecosystems
- To eliminate where necessary, and thereafter prevent, land uses and activities which are inappropriate in scale and/or character

Box C5.3

Management objectives for a Category 1b Protected Area: Wilderness Area (Protected area managed mainly for wilderness protection)

- To ensure that future generations have the opportunity to experience understanding and enjoyment of areas that have been largely undisturbed by human action of a long period of time
- To maintain the essential natural attributes and qualities of environment over the long term
- To provide for public access at levels and of a type that will serve best the physical and spiritual well-being of visitors and maintain the wilderness qualities of the area for present and future generations

3.3 DIVERSITY OF OBJECTIVES

The diversity of objectives as outlined above, is far more complex and diverse than would normally be expected of a relatively small protected area such as VCWS. The sanctuary after all constitutes only 0,04% of the surface area of Mozambique and should therefore seem to be insignificant.

However, the following aspects all contribute to the fact that VCWS plays a far bigger role than would otherwise have been the case:

- The extremely rich biodiversity of the area and the surrounding region make it a globally significant biodiversity hot spot.
- Mozambique has a dearth of operational, well-managed, well-staffed and adequately funded protected areas, especially along the coast.
- The depleted biodiversity of the VCWS would need to be restored, providing an example for similarly depleted official protected areas elsewhere in the country to follow.
- The natural resources of the sanctuary would need to be utilised in a sustainable manner to the benefit of all role players, including the local people residing in the area.
- The development of VCWS would make a highly significant contribution to the economy of the region.
- The local communities residing in the sanctuary would need to be accommodated in a fair and equitable manner, within the framework of the vision and objectives of the VCWS.
- The interests of the developers of, and the investors in, the sanctuary would need to be served.
- The conservation, development and sustainable use of such an important protected area has been entrusted to the custodianship of a private company with no government control or even direct inputs. The government has furthermore identified the VCWS as a model for any similar developments that may be contemplated elsewhere.

The custodianship of the VCWS that was entrusted to EAW therefore does not come cheap, and goes with a huge responsibility and accountability. The management of very few public protected areas anywhere in the world are faced with such a complexity of objectives.

CHAPTER C4: MANAGEMENT AND CO-MANAGEMENT PHILOSOPHIES

4.1 MANAGEMENT

In order to realise and maintain the management requirements for Categories VI, V and 1b protected areas as indicated above (boxes C5.1, C5.2 and C5.3), as well as the vision and comprehensive objectives of VCWS, management intervention would be needed at various

levels. The conservation and sustainable use of the biodiversity and natural resources of VCWS would be the primary focus of management attention.

Adaptive management

Equal in importance for management to focus on realising the objectives of VCWS as embodied in this and other plans, would be the need to realise and acknowledge that no plan is cast in concrete and that management intervention would constantly have to adapt to new knowledge and even new priorities. To ensure that management adhere to a long-term approach and that the necessary level of flexibility is maintained, the so-called adaptive management (“learning-by-doing”) approach (Kelleher, 1999) has been adopted. Since the policy of co-management has been accepted (Lambrechts 2001) for VCWS by EAW (see section 4.2 below), the only management philosophy and approach with any hope of success would be that of adaptive management.

4.2 CO-MANAGEMENT

In the case of both marine and terrestrial resources, the local people inhabiting the VCWS would be actively involved in the management of these resources (see Part D for the management philosophies and procedures that would be followed for marine and terrestrial resources respectively). The local communities would thus be regarded as partners and not merely as passive bystanders (Lambrechts, 2001).

The advantages to be gained by actively involving communities are evident from the following quotes (SustainAbility & IFC, 2002):

“Businesses can reduce ... reputational and political risks by engaging with stakeholders. Understanding the concerns and interests of employees, customers ... and politicians helps a company to manage environmental and social expectations better”

“Community understanding of private sector activity, sometimes called a ‘local license to operate’, can be a major factor in a firm’s operations”

According to Kelleher (1999) the benefits arising from the involvement of local communities, are numerous and are of value to both the implementing agency (in this case the VCWS) and the community themselves:

- More effective management due to the harnessing of local skills and knowledge
- Lower enforcement costs because of voluntary compliance
- Shared management responsibilities lessen the burden of the agency (VCWS)
- Mutual action against resource exploitation by outsiders
- Increased mutual trust between the two parties leading to a greater commitment to implementation of decisions
- An increased sense of stability and security leading to a long-term vision and sustainability of the project
- Less likelihood of disruptive disputes

- Easier integration of conservation efforts and ideals with the social, economic and cultural concerns of the communities.

If co-management works, it generates a virtuous circle in which the local people become volunteer guardians of the protected area, but it is unfortunately a time-consuming process to establish, and it may be vulnerable to corruption and pressure from vested interests, as well as a lack of an established ethic of local democracy (IUCN, 1999). These potential drawbacks will need to be acknowledged and reconciled in the VCWS model.

In the case of VCWS a combination of a bottom-up (strong involvement of the local people) and top-down (company driven) approach will be used (Lambrechts, 2001). The best model for VCWS would be one where the advantages of both systems are harnessed, by going as far along the path of full partnership as is consistent with the achievement of the VCWS objectives. On a continuum ranging from full VCWS control on the one hand to full control by the community on the other, the VCWS model would lie about in the middle, with shared control.

Co-management

This formal sharing of authority and responsibility between VCWS and the local communities would entail a system of joint management of the marine and terrestrial resources of the sanctuary, and is known as co-management or collaborative management. Marine and terrestrial resource management plans for the VCWS as embodied in this BMP, would employ and build on the proven elements of a management partnership, i.e. recognise the best *context* for the development of the partnership, launch the partnership by means of an acceptable *process*, define and implement an *agreement* that will clarify all the essential elements of management, and finally the management structure or *institution* that will be set up to implement the agreement (Kelleher, 1999).

An essential prerequisite for setting up an effective co-management structure, would be to involve all the stakeholders, and especially the local communities, from the onset of the programme. Unfortunately, most of the community-related recommendations contained in the 2001 Bio-Business Plan for VCWS (Lambrechts 2001b) have not been implemented. These recommendations will again be included in the BMP, albeit cloaked in a somewhat different format (Thompson 2002 and various sections elsewhere in the BMP.)

CHAPTER C5: PRINCIPAL THREATS

The VCWS is faced with, and have to deal with, a variety of threats. In addition to the following list of real or potential threats that may impact negatively on the realisation of the vision and objectives for the sanctuary, specific topic-related or secondary threats are also listed in various other chapters and sections of the BMP:

- Proper management of the complex biodiversity resources of VCWS, would require an in-depth knowledge of the interaction and interdependence between the various systems and with man. Although certain baseline studies have already been undertaken, for example the surveys that led to the compilation of the BMP, a number

of aspects have been identified where knowledge of systems and/or processes are inadequate or even non-existent.

- The local communities residing in the VCWS will have to adapt to a new way of life in many respects. They will, possibly for the first time ever, be subject to rules relating to the sustainable use of biodiversity resources. Many of them will be employed for the first time, and virtually all of them will have to cope with an appreciable improvement in their standard of living. Should the communities find it difficult to adapt to these rather abrupt socio-economic changes, it will have a negative impact on the management and operations of VCWS. Unfortunately, a number of crucial recommendations in the Bio-Business Plan (Lambrechts, 2002b) that would have addressed some of the community-related or social problems, were not implemented.
- It is rare indeed for a private sector company involved in a nature-based commercial venture and operating within the constraints of profitability, to be entrusted with full custodianship of such a unique and globally significant protected area. The holding company EAW, and the development company GeoAfrica, are thus faced with challenges that few if any of their peers have ever been confronted with.

PART D: CONSERVATION, UTILISATION AND MANAGEMENT OF BIODIVERSITY RESOURCES

CHAPTER D1: THE BIODIVERSITY OF THE VCWS IN PERSPECTIVE

The contribution that a properly developed and managed VCWS can make to the conservation of Mozambique's biodiversity resources is evident from various chapters and sections of the BMP. These facts and figures will not be repeated in the following discussion.

Some of the more salient aspects can be highlighted as follows:

- The current state of Mozambique's terrestrial biodiversity resources, especially the wildlife, is generally extremely poor. Only isolated remnant populations have survived two decades of unsustainable over-exploitation. Although VCWS is almost insignificantly small with a total terrestrial area of only 22 707 ha for phase I (with the potential of another 17 000 ha being added during phase II), the proposed wildlife reintroduction programme may prove to be a turning point. It can pave the way for other private sector developers to follow and will support the government's outspoken desire to stem the tide of over exploitation and to establish new or rehabilitate the existing protected areas.
- Similarly, VCWS has the potential to make a huge contribution towards protecting Mozambique's coastline. Currently only 0,26% of the country's coastline (excluding VCWS) (Motta *et al*) is formally protected. The 19 260 ha sea and about 105 km coastline (for both phases) of VCWS will be hugely significant.
- VCWS is blessed with a rich biodiversity, especially with regards to marine and fresh water aquatic resources. This diversity more than compensates for the relatively small size of the area.
- All of the officially protected areas in Mozambique are hamstrung by a lack of funds and are thus uniformly poorly managed, if at all. VCWS, by contrast, will be relatively well-funded and will have access to modern infrastructure and facilities on a scale unheard of in the country. The sanctuary therefore easily have the potential to become the best managed protected area in Mozambique.
- The local communities residing in VCWS will become the owners of the reintroduced wildlife, and will actively participate in the implementation of most of the strategic and utilisation plans contained in this BMP. Given the importance of VCWS, such an involvement of the local people in the conservation and utilisation of biodiversity resources will serve as an example for others, both public and private, to follow.
- VCWS has identified the conservation of the dugong as a priority project and has already raised a considerable sum of donor money (February 2003) towards the protection of the species. The Bazaruto-Quewene region may become the last stronghold of this endangered marine mammal along the east coast of Africa.
- VCWS has accepted a regional conservation strategy, as embodied in the BMP, to ensure that all role players in the Bazaruto-Quewene region realise the importance and necessity

of a concerted conservation action and actively participate in the formulation and implementation thereof.

- By adhering to the principles and policies embodied in the BMP, VCWS will be a key contributor towards the implementation of the government's National Environmental Management Programme with regards to:
 - The development of inter-sectoral policies for sustainable development.
 - The development and promotion of integrated resource-use planning.
 - The promotion of sector legislation and of establishment of norms and criteria for environmental protection and sustainable use of the country's natural resources.
 - The creation of favourable conditions for effective law enforcement and environmental monitoring.
- The long-term contract with the government (50 years, renewable for another 50 years) will ensure that VCWS's positive biodiversity contribution will effectively become a permanent asset.

CHAPTER D2: SOIL AND SUBSTRATE CONSERVATION AND MANAGEMENT

2.1 PRINCIPLES AND POLICIES

The deep aeolian sand of the Quewene Peninsula and the surrounding regions, and especially the dynamic dune cordon along the coast, contribute to the extremely sensitive and vulnerable environment of the VCWS. Management actions will thus be directed at preventing, or at least minimizing the effect, of any activity or land use which could result in interference with natural dynamic processes or that may lead to unacceptable levels of soil disturbance

2.2 MANAGEMENT OBJECTIVES

The specific management objectives for soil and substrate conservation are:

- To maintain the structural and ecological integrity of the dynamic dune cordon system along the coast, and to identify the system as an area of special concern.
- To maintain and control all man-made structures such as roads and landing strips in a state that will not deleteriously affect natural systems or biota.
- To identify any eroded or unstable areas (such as the seemingly naturally-eroded dune faces at Mazarette and Marape) that may warrant special attention, and to draw up, if necessary, a specific OP to deal with the rehabilitation and management of such areas.
- To implement a system of organic agriculture (permaculture).

2.3 THREATS

The principal threats include the following:

- The instability of the soft unconsolidated sand jeopardises the construction of roads and will necessitate strict control of vehicular activities.
- Poorly designed, sited or constructed buildings and other structures, especially those on unstable and/or fragile areas.

2.4 MANAGEMENT PRIORITIES

The primary management priorities would be the following:

- Compile proper EIA's for any structures that may impact negatively on the soils or substrate.
- Implement management actions that will ideally prevent or rule out all of the threats mentioned above, or at least mitigate the potential negative effects.

2.5 MANAGEMENT OPTIONS AND ACTIONS

Management options and actions that will be taken include the following:

- OPs will be compiled for the following aspects:
 - The road network, including planning, siting and construction
 - The stabilising of the eroded dune faces at Mazarette and Marape, if a scoping exercise should indicate the need.
- The stipulations and provisos with regards to soils and substrates of the existing and any additional approved EIAs that may be prepared, will be adhered to.
- The dynamic and mobile eastern dune barrier cordon necessitates special management attention:
 - Hard structures will probably affect the dynamics of the system. The erection of such structures should thus be avoided or, if such structures are unavoidable, an in-depth EIA will have to be prepared to determine any negative effects and to propose mitigative measures, before any building activities will commence.
 - Any interference with the natural dune vegetation, the *Casuarina* pines excluded (see the discussion below) will be avoided.
 - A baseline geological survey will be undertaken to determine the physical processes that shaped the VCWS, or that are still taking place, in order to identify management priorities and to formulate proper and feasible management actions.
 - Establish a monitoring system of the eastern dune cordon to determine any long-term dune accretion rates as well as seasonal variations, if any.
- Special management attention will be focused on the exotic *Casuarina* pines growing along the eastern dune cordon and the Inhamambane estuary:
 - An OP dealing specifically with the *Casuarinas* will be prepared.
 - Local inhabitants will be encouraged to remove established *Casuarina* trees along the eastern shores and estuary for firewood.
 - Any trees that may be regarded as protecting the disused San Sebastian lighthouse against wind erosion, will, in anticipation of the recommendations of the abovementioned OP, for the time being be left intact.

- The VCWS is comprised of unconsolidated sand and is thus easily disturbed by any vehicular activity. The following guidelines will be implemented to mitigate the negative effects arising from the construction of roads/tracks:
 - The extent of the road network on VCWS will be limited to those that are absolutely necessary.
 - The condition of all roads will be monitored and corrective measures will be taken as and when necessary.
 - Any vehicular activity on the tidal sand flats will be prohibited. (According to Wright, 1996, vehicles will disturb the protective algal cover, causing an alteration of the sediment dynamics of the flats)
 - Similarly, any vehicular activity on the sensitive supratidal salt marshes will also be prohibited. Vehicle tracks may act as moats, or may funnel the advancing or receding water to form channels and cause erosion (Wright, 1996), thereby upsetting the natural balance of these sensitive and fragile systems.

2.6 MONITORING

Monitoring surveys will be based on the overall monitoring principles as outlined in Part M., and will include surveys of all man-made structures such as roads, buildings, tracks and buildings for signs of environmental degradation.

2.7 OPERATIONAL PLANS

The following OP's have been identified with regards to soil and substrate conservation and management:

- Stabilising the eroded dune faces at Mazarette and Marape (If a scoping exercise should indicate that it warrants attention)
- The road network (including planning and construction)
- The *Casuarina* problem along the eastern dune cordon and the estuary.

CHAPTER D3: CONSERVATION AND MANAGEMENT OF MARINE RESOURCES

3.1 PRINCIPLES, POLICIES AND OPPORTUNITIES

An underlying principle in the establishment of the VCWS, as embodied in the mission of the sanctuary, was the effective conservation and management of the biodiversity, including marine resources.

The policy would thus be to firstly improve the current status of those species about which concern has been raised (see discussion above) by means of an effective conservation action, and secondly to manage and utilise the marine resources in accordance with acceptable international norms and standards.

The major incentive for the conservation of coastal and marine environments in the VCWS is to maintain essential ecological processes and life-support systems so that the marine and coastal environments continue to function naturally and productively, for human and non-human users. A healthily functioning environment provides many free products and services to users, such as food, water, building materials, means of transport, recreational opportunities, educational opportunities, at little cost. In contrast, a severely disrupted environment provides reduced products and services and is very costly to maintain, even at a level of lower productivity, as it is impossible for man to attempt to replicate or fix the multiplicity of natural processes that can break down.

The conservation attributes of the VCWS should be seen as a combination of the biotic and cultural diversity of the place. The biotic diversity includes not only the diversity of plant and animal species, but also the diversity of interspecies relationships (commensalisms, symbioses, parasitisms, predator-prey relationships, ecological dependencies, recruitment of planktonic larvae from the sea, etc.) and fossil burrows, as well as the diversity of habitats (seascapes, lagoons, estuaries, sandy shores, muddy shores, mangrove and reed swamps, sea grass meadows, tidal flats, dunes, coral reefs, rocky reefs, sandy bottoms), important ecological events (tidal ebb and flow, seasonal changes, day and night changes in animal behaviour and abundance, inundation and draining of the tidal flats and mangroves). The cultural diversity includes traditional harvesting practices, traditional methods of resource management, traditional fishing gear, traditional fish preservation and cooking methods, boat-building and sailing styles, traditional knowledge about the coastal and marine environments and their biota, middens and other evidence of past exploitation, and introduced or transplanted coastal plants and trees.

It is neither practical nor desirable to attempt to manage the coastal and marine environments of the VCWS as pristine ecosystems – they have been exploited by traditional users for centuries, and will continue to be exploited. Furthermore, the creation of the VCWS relies partly on the ability of tourists to use the resources of the sanctuary on a sustainable basis.

It is also impractical and undesirable to attempt to manage the VCWS in isolation. The Sanctuary is part of a larger marine and coastal system, and most of its important species originate from outside the system. Conservation within the Sanctuary will only be successful if conservation actions are also successful around the Sanctuary in San Sebastian Bay, around the Bazaruto archipelago, and offshore.

As was already pointed out, the preparation of an effective management strategy for VCWS is hampered by the fact that very little quantitative data on the occurrence, distribution and ecology of most marine taxa exists. The baseline marine biological survey commissioned by the GEF is lacking in some important respects (due mainly to a lack of time) and will have to be supplemented by extensive future inventory surveys and applied research.

The following general management strategy for the marine resources of VCWS should be considered in conjunction with the strategic utilisation plan for marine resources. It differs from the utilisation plan in one main respect: whereas the utilisation plan is primarily aimed at establishing structures and procedures to incorporate and integrate the local fishers in every aspect of the utilisation of marine resources, this general management strategy has a broader-

based approach and is not primarily aimed at the local fishers *per se*, but rather at the management of marine resources in a more holistic context. The two actions, although discussed separately, both deal with the same resource and should be regarded as two sides of the same coin.

3.2 MANAGEMENT OBJECTIVES

It has already been noted that very little baseline data exists on the current status and ecology of the marine resources of VCWS. Until such time as numerous priority research projects have been undertaken and the available baseline data has been broadened, the following management objectives for the marine resources of VCWS should be regarded as provisional:

- To focus management attention on the priority species, systems and habitats as indicated below.
- To ensure that firstly the local and in due course the regional fishers are informed about the objectives and realities of the marine resources conservation and management strategy and support the venture.
- To ensure that all non-local employees, investors, estate owners and visitors are informed about and adhere to the management requirements as outlined below.
- To apply the detailed principles, policies and operational procedures as outlined below for the marine resources strategic utilisation plan, where relevant, to this broader and more general management strategy and conservation action.
- To ensure that VCWS management is equipped and empowered to conserve and manage the marine resources effectively.
- To determine the levels of exploitation of marine resources that can be sustained over time, taking into account the combined needs of local and visiting communities.
- To view the conservation and management of the shared marine resources as a regional priority and to involve other role players from further afield in a concerted and unified action (by utilising the procedures and principles outlined elsewhere in the BMP)

3.3 PROBLEMS AND THREATS

The marine resources of the VCWS are faced with a number of problems and threats. These threats will not be repeated here, but some of the principal threats can be listed as follows:

- Unsustainability of the harvest of a number of marine species.
- Lack of understanding of the dynamics of the marine system by many of the resource users.
- The poor socio-economic status of the fishers contributing to over-utilisation.
- The lack of a coherent regional marine resources action or management plan, including the impacts of tourism and insensitive development.
- The lack of infrastructure (for example transport systems), facilities (for example cooling facilities) and capabilities (for example law enforcement).
- The increased availability to local fishers of very efficient, and often destructive, fishing gear, such as monofilament gillnets and long lines, is a major problem and needs to be

controlled. This development, combined with increases in the local human population, is probably the main threat to the coastal and marine environments of the VCWS.

3.4 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS

Adaptive management and co-management

Due to the lack of baseline data and the general paucity of information regarding marine systems and biota, the policy of adaptive management, as discussed above, will be applied. The presence of the local fisher communities and their established rights to utilise the marine resources of VCWS, would necessitate a policy of co-management with the communities, through their representative committees, being involved with all the facets of the management and utilisation of the resource (see especially the marine resources strategic utilisation plan below).

3.4.2 Marine conservation needs

3.4.2.1 Critical conservation aspects

The largest and most extensive components of the marine and coastal environment within the VCWS are the tidal flats and sea grass beds in San Sebastian (Vilanculos) Bay, the elongate estuarine lagoon, the offshore rocky and coral-encrusted reefs, the open sea environment, and the mangrove and reed swamps. Fortunately the recruitment of invertebrates and fishes into the inshore tidal flats areas in the lagoon and estuary is largely by means of planktonic larval stages that originate in the open sea and from offshore reefs. The condition of the offshore environment, which is subjected to less intensive harvesting pressure than the inshore environment, will therefore determine the recruitment rates into the shallower, inshore areas. This is a fortunate situation as it means that the inshore environments will constantly be restocked. This regular replenishment will only take place, however, if the offshore environments, including the open sea and coral and rocky reefs, remain in good condition, and the habitats in the inshore environment are not excessively damaged by the harvesting practices. There is a real danger of the latter as the enormous seine nets that are pulled across the tidal flats and in the estuarine lagoon cause devastation to benthic communities (and have probably been doing so for decades).

It is also very important that populations of animals that spend their whole lives in the lagoon and estuary are not exploited to low levels as they each have a role to play in the ecosystem and their depletion will eventually impact on the ability of offshore species to settle in the inshore environments.

The easy accessibility of the tidal flats, sea grass beds and estuarine inlet make them vulnerable to over-exploitation by netting, spearing, rod-and-line fishing, trapping, the use of tidal traps and pollution. Many of the fishes inhabiting these areas swim in shoals, which increases their vulnerability to nets. Furthermore, many of the invertebrates are relatively sedentary and have means of defense other than mobility, including strong spines; these spines often entangle in nets and result in their capture. Netting mortalities of bycatch, i.e. animals that were not originally targeted by the netting operation but which are killed anyway, is a serious issue, as evidenced by the piles of unused carcasses along the shore after each net haul, and the trail of dismembered,

uprooted and disrupted benthic animals that is found if one swims over an area that has recently been seined. Animals that form commensal and symbiotic relationships with one another are particularly vulnerable to disturbance by constant seine netting.

The rarest commodity in the exposed tidal flats and estuarine lagoon is shelter from predators and from the tidal rip. Any plant, animal or other object that provides shelter, whether it is a sea grass, fan shell, sponge, large starfish or log, is therefore colonized by a wide variety of smaller animals that benefit from its protection. When these shelters are uprooted by seine nets and other harvesting practices, the entire community suffers. The sea grass beds, in particular, provide a relatively sheltered and stable habitat in an otherwise harsh environment, as evidenced by the vast difference in biodiversity in a sea grass bed as opposed to the barren sandy areas around it. The ploughing up of sea grass beds by weighted seine nets should therefore be a matter of concern, especially as our observations revealed that the catches are meager, and that many of the animals caught are not utilized yet die from dismemberment and desiccation.

The inshore environments of the sanctuary are vast and complex and it would take decades of study to comprehend even fragments of their ecological interrelationships. Common sense practices based on adaptive management will therefore have to be implemented until this knowledge is available.

3.4.2.2 Coral reefs and rocky reefs

The main conservation threats and priorities and actions to be taken are (note that some of the following aspects are also addressed in the chapters on tourism below):

- Crayfish: A closed season for harvesting crayfish should be introduced during the crayfish reproductive season to allow the stocks to recover, as suggested by Dutton (1990)
- Gill nets: The use of gill nets over coral and rocky reefs should be banned.
- Physical damage to the reef through anchoring: Create mooring buoys for anchoring and do not allow anchors to be dropped onto coral reefs. Rocky reefs are less vulnerable to damage.
- Spearfishing: Spearfishing using scuba should be strictly banned over coral and rocky reefs, as it is throughout the world. Spearfishing using snorkels and goggles should also not be allowed on coral reefs in the sanctuary, and should only be allowed for game fish over rocky reefs, if at all. All semi-commercial spearfishermen hunting over rocky reefs should be officially registered and provided with appropriate identification documents.
- Setting of nets, traps and long lines: Fishermen should not be allowed to set gill nets, fish traps or long lines over the coral or rocky reefs in the sanctuary.
- Netting over the reefs: Fishermen should not be allowed to pull seine, trawl or purse seine nets over the coral or rocky reefs in the sanctuary.
- Rod-and-line fishing: Rod-and-line fishing should not be allowed for any species over the coral reefs, but could be allowed for game fishes over the rocky reefs, subject to control by sanctuary staff.

- Trampling and direct breakage by divers: Do not allow divers to stand on the coral reefs or to touch them; ensure that all divers are appropriately qualified for open sea diving before they undertake a dive, and ensure that they have the correct buoyancy. Many of the rocky reefs also have fragile encrusted animals and the same rules should apply to them.
- Removal of biota from the reef: Do not allow divers to remove any material from a coral or rocky reef, whether it is live animals, such as *Fungia* corals, pansy shells or cowries, or dead shells, coral skeletons, sea urchin tests, etc. The small-scale removal of organic material from reefs eventually accumulates into a large-scale export of material that is vital to the survival of the reefs.
- Proper education: Ensure that divers and dive supervisors are properly educated about the ecology and vulnerability of coral and rocky reefs before they dive, so that they are part of the management team during a dive rather than opposed to it. The establishment of an interpretation centre at the Camp would assist this process. The education of divers should continue during a dive. The dive supervisor should point out important animals and ecological processes, and should carry an underwater slate for conveying messages and doing drawings. Waterproofed illustrations of prominent fishes and other animals should also be carried under water. Eventually, underwater signs that assist with the identification of prominent reef inhabitants could also be introduced. The education of divers should continue after the dive during debriefing sessions and discussions. Dive supervisors should be encouraged to become competent underwater photographers so that they can record the highlights of a dive, which can be discussed afterwards. (Proper education also applies to the management of all the other ecosystems in the sanctuary.)
- Invasion by crown-of-thorns starfish *Acanthaster planci*: Monitor the presence and abundance of *A. planci* should it be recorded on the coral reefs. The invasions of *A. planci* on the Great Barrier Reef in Australia have recently been shown to have been a natural phenomenon that has taken place over millennia (Steene, 1990), although man-made disturbances to the reef may exacerbate the problem. If *A. planci* is recorded on a coral reef within the sanctuary, professional advice should be sought. It is possible to remove the crown-of-thorns starfish population by systematic collection if the invasion is discovered at an early stage. Thick gloves should be used, and the specimens should be destroyed on land; if they are cut up and replaced in the sea, they may survive.
- Pollution of reef: Care should be taken not to drop batteries or any other foreign objects on any reefs, or to release fuel over a reef.
- Noise pollution: Care should be taken not to create excessive noise over the reefs with outboard motors, sharp objects striking the hull of the boat, or other means.
- Sedimentation of the reefs: This is an ongoing natural cycle about which man can do very little. If increased sedimentation is due to erosion in the catchment of nearby rivers, this erosion could be checked, but this is unlikely to be an issue in the area of the sanctuary. Any factors that may impact on the dune barrier cordon on the shore and that may lead to increased erosion or sediment in the off-shore current, may in turn lead to increased sedimentation of the reefs and should be prevented or controlled.

- Overdiving of reef: Reef visits should be organized in such a way that the reef does not become congested with divers, which decreases the quality of the diving experience and increases the risk of damage to the reef.
- Ornamental fish collecting: The collection of marine fishes for the international aquarium trade should not be allowed in the VCWS.

Operational plan: An OP dealing specifically with the management of coral and rocky reefs will be compiled. The OP will also include a section on managing diving on the reefs. The assistance of a contracted TDS may be enlisted.

3.4.2.3 Open sea

The main conservation threats and priorities and actions to be taken are:

- Boat damage to large surface-swimming animals: Boat skippers should be experienced enough to avoid collisions with sea turtles, whale sharks, dugongs, manta rays and humpback whales
- Setting of nets, traps and long lines: It is recommended that the setting of multi-or monofilament gillnets, long lines, fish traps, or the pulling of trawl or purse seine nets, in the open sea environment of the sanctuary should not be allowed.
- Rod-and-line fishing: Rod-and-line fishing for bottom fish should be strictly controlled in the open sea environment of the sanctuary. Angling for game fishes should be allowed using boats operated by the sanctuary staff, subject to local legislation.
- Shark long line fishery: The long line fishery for shark fins that takes place off the Bazaruto archipelago also occurs within the boundaries of the sanctuary and is a potential threat to sharks as well as to pelagic animals that are caught as a bycatch. This method of fishing should be banned within the VCWS.
- Incidental catch of marine mammals and reptiles: The incidental capture of dolphins, dugongs and sea turtles in gill nets set in the open sea or deeper lagoons is a threat that needs to be handled strictly and in close collaboration with the conservation authorities and national and international conservation bodies.
- Harvesting of marine mammals: Any harvesting of marine mammals (dolphins, whales, dugongs) should be banned.

Operational plan: An OP dealing specifically with the management of open sea resources reefs will be compiled. The assistance of a contracted TDS may be enlisted.

3.4.2.4 Sheltered and exposed shores:

The main conservation threats and priorities and actions to be taken are:

- Overfishing: Closed seasons should be introduced to coincide with those recommended for the Inhassaro area to the north (1st July – 1st October) by Dutton (1990). PESCOM and other fish commercializing agents should not purchase undersized *Holothuria scabra*.

- Harvesting marine turtles and turtle eggs: Measures to protect nesting turtles and turtle eggs need to be introduced. The killing of adult turtles should be completely banned. Vehicle traffic over turtle nesting beaches at night should be strictly controlled.
- Pollution: Local fishermen have the habit of discarding torch batteries in the water, where lead and other pollutants leaks out. Diesel and oil pollution, and contamination of the aquatic environment by fragments of discarded monofilament gillnets and seine nets, are also problems.
- Netting: All nets should be registered to ensure that they conform with mesh size requirements.
- Hunting of turtles: Evidence that turtles had been hunted was found at the northernmost fishing village on the peninsula. These turtles had probably been caught in nets as the species concerned (*Chelonia mydas*) does not normally breed on the mainland. All turtles are protected internationally and their exploitation in the VCWS should be banned.
- Interference with nesting turtles: There is a risk that visitors will interfere with loggerhead and leatherback turtles while they are nesting. The rule internationally is that visitors should stay well away from turtles when they emerge from the water at night, dig their nests and lay their eggs. The visitors can, under control of informed guides, move closer while the turtle is covering her nest in order to observe the turtles and take photographs. The turtle hatchlings emerge about three months after being laid and immediately scurry into the sea. This event is of much shorter duration than nesting and is therefore difficult to observe.
- Four-wheel drive vehicles: Four-wheel drive vehicles have the potential to cause disruption and damage to marine and coastal beach environments. The damage caused by these vehicles, as well as by four-wheel motor scooters, includes noise pollution, compacting the sand, disturbance of nesting turtles, creation of deep tracks that hatchling turtles have to cross, direct damage to crabs, bird nests and mollusks, providing access to remote and sensitive areas, damage to dune vegetation, damage to crab and mollusk burrows, and the formation of unsightly vehicle tracks on pristine beaches. Four-wheel drive vehicles will thus not be allowed on the marine beach except for essential management and research purposes.
- Damage to dune vegetation: Dune vegetation may also be trampled by hikers and by the development of inappropriate coastal accommodation on primary or to a lesser extent secondary dunes. In general, no development, except for boardwalks for pedestrians, should take place on primary or secondary dunes. (See various references elsewhere in the BMP to the planned construction of tourist lodges on the dune barrier cordon)
- Sewage disposal: The disposal of human sewage is normally a problem in remote coastal areas with high water tables, but this problem has been adequately dealt with in the VCWS.
- Risks from pesticides and herbicides: The use of pesticides and herbicides in the VCWS should be minimized so as to reduce the risk of pollution of aquatic environments and ground water.

Operational plan: An OP dealing specifically with the management of sheltered and exposed shores will be compiled. The assistance of a contracted TDS may be enlisted.

3.4.2.5 Tidal flats and sea grass meadows:

The main conservation threats and priorities and actions to be taken are:

- Dredging: Dredging of channels across sea grass meadows for boat access at low tide should not be allowed.
- Moorings: Boat moorings and jetties should not be established in sea grass beds.
- Seine netting: (see also the marine resources strategic utilization plan below)
 - Seine netting unquestionably causes major damage to the sea grass meadows and other biodiverse communities in the tidal sand flats. This damage is caused directly on the plants and animals by the net and through the death of the catch and bycatch, and indirectly due to the severe disruption of the ecological functioning of benthic and pelagic communities.
 - The animal groups that are mainly damaged by seine netting are: sea anemones, *Fungia* corals, crabs, bristle-worms, free-living shrimps and prawns, bivalve molluscs, fan shells, horse mussels, snails, octopus, starfish, brittlestars, sea urchins, pansy shells, sea cucumbers, skates, rays, and a very wide variety of small, benthic bony fishes (see above).
 - Some animal groups benefit from adaptations for surviving tidal fluctuations to minimize damage by seine nets, whose imminent arrival they detect through the bow wave. They include: sea pens, sea feathers and feather stars (which retract), burrowing gobies, prawns and shrimps (which retreat into their burrows), hermit crabs and large molluscs (which retreat into their shells), some pelagic, fast-swimming fishes and squids (which swim away), communities of animals living under sand anemones, large sponges, fan shells and logs (which hide under their protectors), and survivors of the bycatch (which are adapted to survive exposure to air and desiccation for short periods, such as starfish, sea cucumbers, scallops, hermit crabs, pulmonate molluscs, etc.).
 - The number and kinds of seine nets that are allowed for use in the sanctuary should be determined so that some control can be exercised over the damage caused. The number of seine nets should be restricted and these nets should be multifilament and designed to capture shoaling pelagic fishes that live over the sea grass meadows and tidal flats, rather than benthic species that live on or beneath the substrate.
 - The nets should therefore be lightly weighted so that damage to benthic communities is minimized. Such nets have been designed and used with considerable success elsewhere (Bruton, 2002). The mesh size of the nets should be as large as possible (>5 cm bar mesh, i.e. knot to knot) so as to allow juveniles and specimens that are too small to utilize to escape. Furthermore, the fishers should be encouraged to throw the bycatch back into the water immediately after capture. Fishers should also be encouraged to use

- methods of fish drying, salting and preservation, and cooking, that minimize wastage and loss through predation by birds.
- If possible, traditional methods of allocating fishing territories should be re-instituted so that the fish resource is divided equitably among all fishing villages. The allocation of territorial fishing rights in the tidal mud and sand flats surrounding Inhaca Island has been carried out with good effect for centuries, and also occurs in many other parts of Mozambique, in Maputaland (South Africa) and elsewhere in the tropics. On Inhaca Island the fishing territories are even marked with poles stuck in the mud to denote boundaries (Bruton, 2002). In the Bazaruto archipelago traditional forms of oyster conservation include a voluntary stoppage of oyster gleaning between November and February, and the ‘ownership’ of oyster gleaning areas (Dutton, 1990).
 - In general, it would be desirable to re-introduce as many traditional methods of control of resource use as possible. The palisade fish traps of the Kosi estuary in northern KwaZulu-Natal (South Africa) have yielded catches for centuries through the continued use of traditional methods of resource management. The palisade fish traps in several places in the estuarine lagoon of the VCWS appeared to have fallen into disuse as they are not properly maintained and many of the fish traps are missing. The reasons for this disuse need to be ascertained.
 - The relocation of fishing villages within the VCWS will cause disruptions to patterns of resource use and may create an opportunity to redefine the methods, intensity and efficiency of fishing practices in the sanctuary.
 - Furthermore, the use of seine nets in the sanctuary should be restricted to fishermen who are resident in the sanctuary. All seine fishermen should be officially registered and provided with appropriate identification documents.
 - Gill netting: (see also the marine resources strategic utilization plan below)
 - The capture of fishes using monofilament nylon gill nets is one of the most difficult aquatic resource management issues in the tropics. Monofilament gill nets are undeniably efficient and cost-effective; they are also light, fairly durable, cheap, easy to set (though not easy to untangle), and easy to repair. They are therefore ideally suited to use by subsistence and semi-commercial fishermen operating in remote environs. The problem with gill nets is that they are super-efficient, indiscriminate in their catch, virtually invisible underwater, and difficult to detect and control. It is nevertheless imperative that the use of gill nets in the VCWS is strictly controlled otherwise some species will be lost completely or at least severely depleted. Furthermore, there is the risk that, as local fishers become more affluent, they will buy even more gill nets and decimate the resource further.
 - It is essential, therefore, that strict control over the use of gill nets should be implemented immediately. The following recommendations are made: (1) all gillnets used in the sanctuary should be owned by, or at least registered with, the sanctuary authorities, (2) there should be strict control over the number of gill nets allocated to each fishing village, (3) fishermen who are not resident in the sanctuary should not be allowed to deploy gill nets there, (4) only

multifilament gill nets should be used in the sanctuary, no monofilament gill nets, (5) the gill nets should always be surface set so that they catch pelagic fishes and squids and not benthic species, (6) the mesh size of the gill nets should be strictly controlled by the sanctuary authorities; small mesh sizes (<3 cm bar mesh) should be avoided if possible.

Operational plan: An OP dealing specifically with the management of seine and gill netting will be compiled. The assistance of a contracted TDS may be enlisted.

3.4.2.6 Estuarine lagoon

The main conservation threats and priorities and actions to be taken are:

- Seine netting: The same concerns on the use of seine nets in the sand flats apply to the estuarine lagoon, except that the estuary is a narrower, more confined environment that is probably easier to over-exploit and which probably has less efficient recruitment of planktonic larvae and other juvenile life-history stages from the sea. The relocation of fishing communities to the estuarine lagoon should therefore be carried out with caution as the estuary almost certainly has a far smaller exploitable standing stock than the lagoon.
- Gill netting: The same concerns with regard to the use of gill nets apply in the estuary, but the estuary is likely to be even more vulnerable to their capacity to overexploit a resource. Gill nets are already extensively used in the estuary and will unquestionably have to be controlled.
- Collection of specimens, collection of curios, pollution, spearing of benthic animals: noise pollution: as above

Operational plan: An OP dealing specifically with the management of the estuarine lagoon will be compiled. The assistance of a contracted TDS may be enlisted.

3.4.2.7 Mangrove swamps

The main conservation threats and priorities and actions to be taken are:

- Clearing for building works: Mangrove swamps should not be cleared for marinas or other coastal developments, nor closed off for causeways or bridges (such actions will in any case be contrary to the provisos of the EIA).
- Seine netting: The mangrove swamps are very important nurseries for invertebrates and fishes in the sanctuary and should be afforded an extra level of protection compared to the rest of the lagoon. The aerial breathing roots of many of the mangrove trees offer natural protection against the use of seine nets but the mangals are still vulnerable to overexploitation by other methods. There are also large areas of water around the mangals that can be seined, especially at high tide. This is regularly done, for instance, using long seine nets in the small bay on the northwest corner of the Quewene peninsula.

- Gill netting: Gill netting is carried out in the mangals at high tide, mainly to catch lagoonal fish that venture into the mangals to feed. The recommendations with regard to the use of gill nets in the tidal flats mentioned above should apply to the mangals as well.
- Collection of specimens, collection of curios, pollution: as above
- Removal of timber: The wood of mangrove trees is used to make the elbows and other joints of dhows, as well as small canoes. This use is probably sustainable but should be investigated further.
- Drainage: There is some evidence of drainage channels being dug in the mangals (see also the discussion on the drainage of a portion of a marsh for a landing strip elsewhere in the BMP). This is undesirable as it will interfere with the natural functioning of the mangal, which relies on the twice-daily ebb and flow of the tides for its proper ecological functioning.

3.4.2.8 Other conservation and management actions

Some other important conservation threats and priorities and actions to be taken are:

- Collection of marine specimens: Strict control should be exercised over the collection of pre-selected species of invertebrates or fishes for commercial exploitation, such as *Fungia* corals, crabs, crayfish, prawns, scallops, cowries, other attractive molluscs and their shells, octopus, starfish, brittlestars, sea urchins and their tests, pansy shells and their tests, sea cucumbers, sea horses, pipefishes, flatfishes, blaasops, and other species. There is evidence that sea horses, tufted black sea cucumbers and crayfish are overexploited; many other poorly studied species may also be threatened. Particular attention should be given to species that are regarded as threatened by the IUCN, such as sea horses.
- Collection of curios: The collection of animals and animal tests, shells and skeletons by tourists for curios also needs to be strictly controlled. The best practice would be to ban collecting completely, but this is probably impractical as everyone wants a memento of their visit. Certified collectors and sellers of selected mollusc shells and echinoderm tests could be appointed, and tourists would be required to make purchases from them (probably from the community market at Goshen). Collections could be restricted to the dead shells and tests of common species, such as wedge shells, sand oysters, some sea urchins, mussels, horse mussels, fan shells, cockles, clams, ribbed venus shells, chitons, limpets, topshells, periwinkles, nerites, mangrove whelks, dogwhelks and plough shells. Export permits must be issued for all animals and animal products that are exported. Certain sites should be regarded as core conservation areas and no collecting should be done there. The collection by tourists and collectors of the shells (or live animals) of tritons (especially the trumpet triton *Charonia tritonis*), cowries, giant clams (*Tridacna maxima*), venus ears, turbans, murexes, cones, sea hares, nudibranchs, Spanish dancers, octopuses, squids, starfishes, feather stars, brittlestars, pencil urchins, heart urchins, and sea cucumbers, *inter alia*, should not be allowed.
- Pollution: Pollution of the tidal flats by discarded batteries, fuel oils, bilges, discarded net fragments, human waste and other pollutants should be eliminated.

- Spearing of benthic animals: Flatfishes, sea cucumbers, crabs, sand sharks and other species are speared from above water using two- and three-pronged spears, and pelagic and benthic fishes are speared using single-pointed spears. These traditional practices are probably sustainable within limits, except with regard to the sea cucumbers which are very vulnerable to exploitation at low tide in shallow water.
- Spearfishing: Fishers from at least one village in the Bay use snorkels and goggles and standard spearfishing equipment to catch crayfish that inhabit a rocky reef within the lagoon. The crayfish that they capture are small and appear to be overexploited; the fishermen agree with this view. Control needs to be exercised over this fishery.
- Killing of dugongs: The dugong population of the region may be on the verge of extinction (refer to various references in the BMP) and is in urgent need of conservation attention. The causes of their decline include accidental capture in gill nets and loss of feeding grounds. As the dugong is a flagship species, every effort needs to be made to implement controls over their accidental and deliberate killing by local people and visiting exploiters of marine resources. The conservation of dugongs (and all other wide-ranging species) will have to take place in close collaboration with the Mozambican authorities and will need a concerted regional strategy and action (as was discussed in various other sections of the BMP).
- Noise pollution and boat accidents: Excessive use of powered boats in the Bay and over the sea grass beds will be disruptive to the natural community and to other visitors. Whenever possible, tourist visits should be made using non-powered craft, such as dhows, kayaks or canoes, or from the shore. It is recommended that all powered craft that are used in the sanctuary should be owned and operated by sanctuary staff, and should be available for hire by visitors. The uncontrolled use of privately owned powered boats will cause major problems in terms of the management of the living resources and of people. Treacherous seas and currents are encountered in some parts of the sanctuary, particularly near the entrance to the Bay, over the coral reefs, in the surf zone and offshore of the marine beach and rocky reefs. Only experienced skippers who are knowledgeable about local conditions should be allowed to take boats to these areas.
- Lack of knowledge on population sizes of exploited species: Stock assessment surveys need to be carried out urgently on the most important commercial species.

3.4.3 Marine conservation priorities

Conservation priorities in marine and coastal systems of the VCWS include the following:

- The protection of Red Data Book species, as well as flagship and keystone species, that are known to be threatened in the Sanctuary (sea horses, tufted black sea cucumber, dugongs, blue crabs, mud crabs, rock lobster, turtles);
- The development of a management plan for the sustainable use of species with commercial value, such as game fishes;
- The development of OP's for maintaining common but ecologically important species at appropriate population levels so that they can play their ecological roles while also being visible to visitors;
- The maintenance of essential ecological processes and life-support systems.

3.4.4 Sustainable utilisation of marine and coastal resources

3.4.4.1 Strategic utilization plan

A strategic plan for the sustainable utilisation of the marine resources of VCWS appears in below. However, the strategic plan focuses primarily on the involvement of the local fishers in the management and utilisation of the marine resources, whereas this section will deal with management aspects of a more general nature, including coastal resources. A number of the aspects mentioned below, are also dealt with in the discussion on tourism below.

3.4.4.2 Hiking, canoeing, horse-riding and diving trails

The VCWS has considerable potential for separate or combined hiking, canoeing, horse-riding and/or diving trails. Nighttime hikes should be organized into local mangrove swamps in order to witness the remarkable transformation of these dynamic habitats after dark.

Operational plan: Should it be decided to offer any or a combination of these trails, it will have to be based on a proper OP being compiled.

3.4.4.3 Coral reef diving

The reefs comprising coral-encrusted rocks off Bazaruto and the San Sebastian Peninsula offer world-class SCUBA diving opportunities for experienced, properly-qualified open sea divers. As sea conditions over these reefs may vary from benign to dangerous, it would be essential to have experienced boatmen (and –women) as well as experienced dive supervisors and buddy divers. As safety would be of paramount importance, it would be essential to meet, and preferably exceed, the safety regulations that are stipulated in Mozambique and South Africa with regards to boating and diving.

The reefs off the VCWS have spectacular and very diverse populations of invertebrate and vertebrate life, with many true tropical species that cannot be observed at popular dive sites in South Africa, such as Sodwana. The large populations of pelagic and bottom fishes, giant clams, diverse communities of echinoderms, and the diverse symbiotic and commensal associations of animals, are particular attractions. The overall appeal of a diving excursion, during which one is also likely to see dolphins, whale sharks, humpback whales, manta rays and turtles, and to catch pelagic game fish on rod-and-line, adds to the unique experience.

Damage to the reef by boat anchors should be avoided by banning anchoring or by establishing mooring points attached to buoys that are suspended just below the water surface, as is done in the Red Sea, Great Barrier Reef and the Caribbean Sea. Spearfishing and bowfishing, and any collection of live or dead marine animals, including seashells on or near the reefs, should be completely banned throughout the year, whether using free-diving gear or SCUBA, or any collecting apparatus.

Furthermore, divers should not be allowed to touch or stand on the reef; ensuring that all divers are neutrally or slightly positively buoyant is therefore important. The use of buddy lines should be avoided as they often snag the reef. A diver who is so insecure that they need a buddy line should preferably confine his/her diving to shallow inshore waters. No diving apparatus or fishing equipment should be discarded on the reef. Bottom fishing should not be allowed on or near any reefs adjacent to the VCWS although controlled midwater fishing for migratory, pelagic game fishes could be allowed.

Operational plan: The OP that will be prepared for the management of reefs will include a section on diving management.

3.4.4.4 Dhow rides

The Arab-type dhows that ply the waters of San Sebastian Bay are a very attractive feature to visitors from South Africa, Europe and North America, many of whom are unlikely to have encountered these majestic craft before. Their slow pace, dependence on the wind, and historic character will add unique value to the VCWS experience. Dhow rides could be offered to and from Vilanculos but preferably in the bay off Dugong Camp as half-day trips.

3.4.4.5 Canoe and kayak rides

The bay adjacent to the VCWS is relatively safe and amenable to use by canoes or, preferably, the safer and easier-to-use and maintain sit-on-top fibreglass sea kayaks. Kayak trips would add considerably to the quality of the individual visitor experience at the VCWS, without detracting from the visitor experience of others. The dangers that would have to be taken into account when managing sea kayak trips would include: the tidal rip during the change of tide at spring high tide, the sudden appearance of sand banks and shallow shoals at low tide, the threat of being blown away from the camp or the shore by strong offshore winds, exposed rocks and mangrove breathing roots at low tide in some areas, and fatigue, dehydration and heat exhaustion by less-than-fit tourists.

All persons embarking on a canoe trip would need to log their journey, take suitable all-weather clothes and walking shoes (in case they have to walk back), and take drinking water, food, extra paddles, a waterproof map and a whistle. Canoeing excursions should preferably be carried out with a knowledgeable guide who will not only ensure that the journey is safely completed, but also make the overall experience more fulfilling.

Canoeing excursions could be carried out from Dugong Lodge south-eastwards towards the mangrove swamps and fishing villages, southwards towards the exposed tidal flats (at low tide), and westwards and then northwards towards the exposed tidal flats, sheltered mangal bay and northern fishing villages. In addition, canoeing trips could be undertaken in the elongate estuarine lagoon on the seaward side of the VCWS using craft based there.

Operational plan: An OP dealing with canoe/kayak safaris will have to be prepared, with specific attention to emergencies and guiding.

3.4.4.6 Use of speed boats, water scooters and other powered water vehicles

The use of powered water vehicles (speed boats, water scooters, hovercrafts, etc.) within the VCWS should be strictly controlled, and those vehicles that are used in the sanctuary should preferably not be privately owned. If this recommendation is not implemented the potential exists for the wilderness atmosphere of the VCWS to be completely destroyed by irresponsible and excessive use of powered vehicles. The risk to the natural environment, from fuel pollution, noise pollution, direct disturbance of fishes, reptiles, birds and mammals, as well as of traditional fishermen and dhow operators, would also be considerable.

A small fleet of low-powered outboard-powered boats could be available for rent by tenants and visitors. Such a step would ensure that boat numbers, their destinations and methods of use could be strictly controlled. These boats should be clearly coloured and numbered so that they can easily be identified. In addition, the workboats that would be required by the VCWS to operate the sanctuary, conduct guided tours, bring in supplies and conduct reef dives, should be clearly marked, should be operated by trained VCWS staff only, and should be used for those purposes only.

3.4.4.7 Guided tourism

Guided tourism is one of the fastest growing industries in the world, and the VCWS is an ideal place for this form of tourism. The discriminating tourists who visit the VCWS will expect boat tours, hikes, canoe trips and dives that are lead by expert guides, preferably properly trained local people, but also foreign experts. The environment and biota of the VCWS is so diverse, and so different from that with which most visitors will be familiar, that it would be essential for it to be interpreted to them. Guided tours should not only cover the obvious tourist attractions, such as big game, trees, and conspicuous birds, but also subtleties of nature such as mangrove ecology, the impact of tidal fluctuations, insects and other terrestrial invertebrates, aquatic invertebrates, amphibians, reptiles and small birds and mammals, and understory and woodland plants, fungi and algae.

The diversity of aquatic invertebrates, in particular, is stunning and a great deal of it can be appreciated by people of all ages, skills and fitness levels as it can be accessed by walking at low tide. The abundant and diverse communities of echinoderms (starfishes, sea cucumbers, sea urchins, heart urchins, sand dollars), sponges, crabs, molluscs and shrimps, although submerged, can easily be seen, interpreted and discussed on foot. This experience can be further enhanced using free-diving gear, glass-bottomed boats and underwater viewing devices (plastic buckets with the base replaced with transparent Perspex). The symbiotic and commensal communities of invertebrates living under sponges and giant starfish in the shallow waters to the west and north of the San Sebastian Peninsula are a special attraction, as are the sea horses and pipefishes in the seagrass beds, the mudhoppers, mangrove snails and crabs in the mangrove and swamps, and the aquatic birds, crocodiles and lungfishes in the freshwater lakes. There are few places on Earth where such a variety of life can be seen without specialized equipment or without traveling long distances

3.4.4.8 Establishment of artificial reefs

As far as the free-living marine animals in the bay off the VCWS are concerned, the limiting commodity in their environment is a place to hide or attach oneself. This is indicated by the extent to which any object on or above the sand (rock, shell, mangrove branch or root, boat hull, debris) is festooned with attached life forms, or serves as a focal point around which swimming animals congregate. The establishment of artificial reefs in San Sebastian Bay is therefore likely to be highly successful, on condition that these artificial reefs cannot be moved by the tidal rip or by wind-induced currents.

Artificial reefs provide many services to the visitor and park manager: they provide reefs in shallow water that are inhabited by a wide variety of life forms (plants, invertebrates, fishes), these reefs are accessible by snorkel divers as well as by passengers in glass-bottomed boats, they can increase biodiversity in the immediate vicinity of tourist facilities, and provide prey for birds. Series of artificial reefs can even provide a sustainable harvest of fishes and invertebrates. Artificial reefs also provide an excellent research opportunity by concentrating species in a small area, and by introducing new researchers to the biota. The colonization patterns of artificial reefs also provide interesting study opportunities for professional and amateur biologists alike.

Artificial reefs are best constructed from natural materials, such as logs and rocks, or from materials that are associated with the lagoonal environment, such as the hulls of old dhows. The ribs and hulls of several abandoned dhows are strewn along the shores of the mangal bay to the northwest of Dugong Lodge, and along the lagoon to the south, near the fishing villages. These hulls would make efficient and picturesque artificial reefs.

An artificial reef project was started off Dugong Lodge during August 2002. Fishes that colonized the artificial reef during the first week after its establishment included firefishes (*Pterois*, Scorpaenidae), mullet (Mugilidae), juvenile kingfishes (Carangidae), hawkfishes (Cirrhitidae), gobies (Gobiidae), boxfishes (Ostraciidae), blaasops (Tetraodontidae), lizardfishes (Synodontidae), flagtails (Kuhliidae), goatfishes (Mullidae), wrasses (Labridae), seabreams (Sparidae) and butterflyfishes (Chaetodontidae).

3.4.4.9 Use of glass-bottomed boats

Rowing boats, or low-powered powered boats with outboard engines, fitted with transparent acrylic panels in their hulls would provide people who cannot dive with a spectacular view of shallow undersea life in the lagoon. These boats would be most effective in the lagoon to the south, west and northwest of Dugong Lodge, in mangal bay, along the fringes of mangrove swamps, and in the estuarine lagoon. The boats should ideally have a small aquarium in them into which hardy forms of marine life, collected by divers, could be temporarily placed for the visitors to examine. These life forms could include starfish, sea cucumbers, large crabs and mollusks. Waterproof sheets illustrating and identifying the most common forms of sea life should also be made available in these boats (and to divers).

Glass-bottomed boats should be used for leisurely, short-distance trips on which the emphasis is on learning about marine life. They should always be accompanied by trained divers/guides. Glass-bottomed boats are used extensively in tourist destinations where clear, warm, shallow

water is found, such as in the southern continental USA, Hawaii, Caribbean nations, Red Sea, Australasia, and in south-east Asia.

3.4.4.10 *Use of water bicycles*

Bicycles equipped with flotation devices, rudders and propellers make excellent, stable, safe and non-polluting means of transport on calm lagoons without strong wave action; they would work perfectly in the VCWS. Commercially available water bicycles are impossible to capsize and are easy to ride; they could be manufactured locally in the sub-continent. During adverse weather conditions, such as strong off-shore winds, their use would temporarily be curtailed. Water bicycles would provide an unusual form of non-polluting, quiet recreation for visitors, and would generate income for the VCWS. A small maintenance workshop, and some expertise in bicycle maintenance and fibreglass repair, would be required.

3.4.4.11 *Use of water boots*

Various designs of floating boots are available for recreational use for walking on water. Although these boots are safe and practical to use, it is difficult to make much progress across the water as a particular technique, similar to that used in cross-country skiing, has to be mastered.

3.4.4.12 *Aquaculture*

Several species of fishes that inhabit the freshwater lakes in the VCWS would be suitable for aquaculture, especially Mozambique tilapia *Oreochromis mossambicus*, black tilapia *O. placidus* and sharptooth catfish *Clarias gariepinus*. The yield from the aquaculture venture could provide a steady supply of fresh table fish, without depleting fish resources in the lagoon, if the aquaculture project is properly managed.

While the regular harvesting of fishes using seine nets from the freshwater lakes would yield a small catch, this catch is unlikely to be sustainable. Enhanced feeding of stocked fish in a small natural lake, from which most predators have been excluded, and which is regularly fished to enhance the growth of the remaining stock, would be a more practical solution.

Should it be decided to embark on a small-scale aquaculture venture, the following aspects will be considered and/or applied:

- A feasibility study will be undertaken prior to any decision being taken. A TDS may be contracted to undertake the study.
- Local entrepreneurs will be identified, through the CRC and the various project sub-committees, to be trained to operate and manage the venture.
- It may be best to extensively net a small natural lake to remove all the fishes except for large Mozambique tilapia. This lake could then be stocked with additional large, healthy adult specimens of this species, and commercially available (but cheap) fish food should be fed to these fishes on a regular basis. Several reaches of shore should

- be cleared of all submerged and floating vegetation so that a seine net can be efficiently set, pulled and landed.
- As the Mozambique tilapia is a sand-nesting species, it is essential that areas of open sand are available for nesting. The lake should also have gradually sloping, well-illuminated gradient shores where the tilapias can feed on diatoms and other algae (Bruton & Bolt, 1975). The adult fishes need deeper water (>3 m) in which to shelter from aerial predators, and in which they will find well-oxygenated water that does not fluctuate widely in temperature. They reach sizes of >4 kg although the fishes harvested from the lakes in the VCWS are likely to be in the 0.5-1 kg range.

3.4.4.13 *Keeping of aquarium fishes*

Several marine and freshwater fishes in the VCWS would be suitable to keep in aquaria for the interest of visitors and staff. However, only suitable indigenous species that have been identified as positively occurring in the VCWS will be allowed. Specialists will be consulted prior to permission being given to keep aquarium fish.

It is also **not** recommended that any fishes be exported from the VCWS for the international aquarium fish trade, although this possibility could be entertained in the future once the distribution and abundance of the locally occurring killifishes, topminnows, squeakers and cichlids has been determined.

3.4.4.14 *Harvesting of marine species*

Although certain marine fishes could be lightly harvested from San Sebastian Bay, the estuarine lagoon and from the adjacent marine coast on an ongoing basis in order to provide fresh fish for the lodges and staff, it will not be allowed. The only harvesting rights of fish resources will be granted to local members of the Sanctuary Fishers Association (as discussed below). They would be allowed to trade commercially.

CHAPTER D4: UTILISATION AND UTILISATION MANAGEMENT OF MARINE RESOURCES AND SYSTEMS

4.1 PRINCIPLES FOR THE SUSTAINABLE USE OF MARINE RESOURCES

4.1.1. The Broader Context

‘No Place is an Island’ and this is also true for the San Sebastian Peninsula. In this regard several broader contexts are worth considering.

(1) The Geographical Context

As discussed above, the San Sebastian Peninsula forms the southern tip of the Bazaruto Archipelago. Without effective protective management being established in the Bazaruto Archipelago, it would be impossible to safeguard the marine resources of the Peninsula,

especially the more mobile ones such as the endangered dugong. Similarly, if the Peninsula is placed under effective protective management it will boost the conservation of the biodiversity of the larger Bazaruto Archipelago as a whole. It does not matter which one is placed under protective management first because they are part of the same ecological system; however, considering the larger area and number of fishers and constraints in resources experienced by the BNP, the VCWS might be an easier target to start with. BNP management should therefore be made fully aware of, and included as much as possible, in decision-making concerning the development and management of VCWS.

(2) The Political and Administrative Context

As was pointed out above, the VCWS fits into all the applicable policy and legal frameworks of Mozambique and has political blessing at the highest levels. Management should therefore make every effort to link into, and to be part of the larger administrative entities in the region that share the aim of protecting the marine environment and biodiversity. VCWS should be developed as a model that can be emulated elsewhere, and in this regard success will be determined on how well the VCWS is moulded into other broader political, administrative, conservation and developmental frameworks of the region.

(3) The Developmental Context

The plan for the sustainable use of coastal and marine resources that follows below (referred to as the Marine Resources Strategic Utilisation Plan, MRSUP) does not stand on its own. It is fully cognisant of, and fits into the larger development plan and BMP for the sanctuary. At this early stage it should be viewed as a strategic plan rather than a specific management plan, as the latter can only be worked out with the full involvement of role players, in particular the fishers, the VCWS management and the authorities.

From the point of view of overall development on the VCWS the MRSUP takes particular note of and reflects the following developments and issues:

- A vastly expanded local market will be created for marine products on the Peninsula through the introduction of three new lodges as well as fifty high-end housing units and other facilities such as Msasa and Chiefs Camp. The planned new market place at Goshen in Marape village from where produce can be exported to the mainland, and the possibility of using refrigeration facilities and charter flights to export produce as far as South Africa, will be an added bonus.
- A positive result of the above development will be the hugely increased value of the marine resources, and with that their ownership; on the negative side the developments will bring vastly increased pressures to these same resources that must be controlled and mitigated from the word go, coupled with stiff penalties on any developers, investors, estate owners, tourists and tourism operators who violate the rules.
- There will be many other livelihood options that developments on the Peninsula may bring to the fishers and their families, including aquaculture, protected area management and tourism development. Such opportunities must be carefully assessed so that human potential can be timeously developed to reflect needs and employment opportunities.

- Partnership possibilities are immense, not only with regards to the utilisation of marine resources but in general, and needs to be carefully analysed and firmed up early on in the project. This means assessing carefully the costs and benefits that will be incurred by each set of partners (private sector, community, government and donors) and drawing up clear Memoranda of Understanding followed by detailed agreements.

4.1.2 Lessons learned

The following “lessons learned” emerged from numerous projects in the western Indian Ocean (WIO) and elsewhere, and need to be heeded with regards to the conservation, management and utilisation plan for the marine resources of the sanctuary that follows, as well as for all the other VCWS plans involving the community in some capacity. While the list may appear comprehensive there is no doubt that the VCWS project will yield its own “lessons learned”.

(1) Timing (or: “Timing is Everything”)

Through the years it has become clear that the timing of projects can greatly influence their success rate. When timing is wrong, projects can be put on hold for many years, or a premature start may have exactly the opposite effects to those that were intended. From interviews with a range of players the marine survey team got the impression that the Vilanculos District, and perhaps Mozambique as a whole, is ready to try innovative approaches that will increase the chances for the rapid delivery of sustainable projects. People seem to be tired of waiting for development, and are open-minded with respect to partnerships such as business-driven ventures that previously were probably viewed with scepticism.

Certainly on the Quewene Peninsula itself people are ready to try whatever it will take to bring about a better life. District level government is also willing to try the new approach as outlined below. No real resistance to the VCWS project was detected from any particular quarter, and the impression is that everyone is adopting a wait-and-see attitude.

The VCWS project could probably not have arrived at a better time. If it came earlier it would have run into obstacles such as reluctance to veer away from the conventional NGO- or government-led projects; if it came much later the Quewene Peninsula undoubtedly would have been further degraded and the social situation more desperate.

(2) Scale (or: “Do not Chew off more than you can Swallow”)

Like timing, scale is critical for the success of projects. Both in terms of geography and human numbers, the VCWS project is tractable. Only a hundred or so of the estimated 9000 people (Thompson 2002) living in the sanctuary will be bona fide fishers. The latter can be contacted easily and, in contrast to many other coastal regions that contain vastly larger numbers of fishers, all of them can become involved in a marine and coastal resource management programme relatively easily.

The physical characteristics of the coastal areas of VCWS are such that they are highly manageable; all areas can be reached easily in a short space of time and can be monitored much

easier than, say, the larger Bazaruto Archipelago. The main lesson to be learned here is that it will be wise to make a success of the strategic plan (or the “ten-point plan” presented below) on the VCWS first before expanding it to the larger Bazaruto Archipelago (provided that the external authorities and other stakeholders are involved in the VCWS programme from the onset).

(3) Project Size (or: “Small is Beautiful”)

It is well known that size of projects matter a great deal; smaller projects are easier to manage and in general project managers agree that it is better to start small and then have projects grow larger than to start large and not be able to manage it properly. The ten-point plan outlined below therefore focuses on small projects that as far as possible follow priorities identified by the communities themselves.

(4) Communication (or: “How can people support something if they do not understand it?”)

Communication is a first key step in the process, and it will need to encompass all role players and all imaginable directions: vertically, laterally, all levels of government, between all groups, etc. Inadequate or poor communication may lead to misunderstandings, delays and wastage of scarce resources. (Refer also to Part H)

The following points need to be considered:

- Enough time will need to be allocated to raise awareness before the program starts, not only for the entire ten-point plan, but for each step as well
- Appropriate communication media will have to be used– a newsletter does not work when most people can’t read; the radio may prove more useful, but personal or group contacts will probably prove to be most effective.
- Formal mechanisms for communication with other projects will have to be established with all levels of government, donors etc., and the regular use will need to be monitored.
- Incorporating information into the school curriculum can be very effective to spread information to the broader society

(5) Participation (or: “Beware of the Illusion of Inclusion”)

Participation can mean many things to different people, but it does not mean to simply broadcast or announce plans. In the VCWS context it means recognising that all parties, and especially the local communities, are important and that they, like everyone else, are intensely interested in their future and have a lot to say about it (and can in fact make many positive contributions in plotting the way ahead).

Some points worth mentioning are:

- Participation does not happen automatically and an all-inclusive process will be needed. To concentrate on one system alone would not be enough, and it would be better to

employ as many as possible (for instance, simply working through the chiefs is not enough as traditional government is in transition and even chiefs have their own interests)

- Issue identification should involve as many stakeholders as possible and there are definite techniques that can be employed – the one that will work best for a particular group will be chosen
- Workshops are often inappropriate as a group or an individual can easily dominate them; a balance between workshops, participative rural appraisal, pilot activities and traditional systems will be more effective
- Information is power, and therefore does not spread automatically. Hence, beware of the “privatisation of information” that is a notorious obstacle in community development
- Developing a shared Vision and employing a Logical Framework Approach (LFA) are useful lines of action to spread information and increase participation of a wide range of stakeholders. The Integrated Development Planning (IDP) recipe of local government in South Africa can easily be modified to situations such as VCWS in order to balance input from the community with that of other stakeholders

(6) Decentralisation (or: “Riding the wave make things easier”)

Decentralisation involves the devolution of power and responsibility from central government to provincial, district and local tiers. The decentralisation policies for Mozambique will need to be understood in order to embed integrated coastal zone management principles and indeed the VCWS project itself in them as far as possible. This will not only avoid gaps between VCWS and government, but can give a lot of impetus to the project in terms of broader political frameworks. The District of Vilanculos is about to begin its integrated development planning process and this provides great opportunities for the VCWS project in terms of institutionalisation, communication, broader frameworks, etc.

(7) The Human Resource (or: “It is NOT a Man’s World only”)

African society, as much of the rest of the world, tends to have more power and opportunities focused on males than females or youth. This means a lot of human potential is missed when projects are developed. Furthermore, based on experience gained elsewhere (Odendaal 2002), those projects that have a good gender balance (and sometimes include more women than men) tend to be more successful than projects with a strong gender bias. Also, youth is a resource that can be very energetic and generally learn very quickly.

The VCWS marine (and other) project will therefore take note of the following:

- Every effort will, within reason, be made to integrate gender and youth issues into projects, without alienating males along the way. Participation of all sex and age classes will be regularly assessed without forcing the issue; the ideas put up by the disenfranchised groups themselves may prove to be acceptable to all the role players.
- The Constitution of Mozambique, as well the constitutions for the various community committees at VCWS, will provide the necessary backing up for steps that must be pursued to attain equality in opportunity

(8) Cost and Benefits (or: “Nothing for Nothing and Something for Something”)

To ensure that the VCWS communities realise the cost and benefit implications of the marine and other projects, the following “lessons learned” will be heeded:

- Behavioural change is not easy for any society and should not be forced. The focus would rather be on local realities such as the “reality of the stomach” (see below).
- It would be unrealistic to expect the local communities to make changes that cost them time, energy or effort without them gaining any benefits.
- The focus will be on achieving quick results. Programmes can have long-term goals (in the case of the ten-point plan this will be the sustainable utilisation of coastal and marine resources) but must include short-term and high visibility community benefits (such as increasing the immediate value of the resources).
- Providing alternative livelihood programmes can work but people must understand what the costs and benefits are, and what they will need to sacrifice and when. Only if they understand the plan and the benefits to be gained will they be willing to sacrifice.

(9) Partnerships (or: “Who owes Who, and Who gains What”)

Partnerships are frequently invoked but few people know what they mean or if they do, they don’t explain it. Partnerships are not simply loose associations that are driven by one partner only. When that happens it is usually for that party’s benefit only with the illusion that everyone else is gaining. Partnerships, as envisaged for VCWS, are sets of real-life agreements that should be carefully worked out in terms of who gains what, sacrifices what, and who does what – and these relationships must be clearly understood and agreed to by the different parties. The lesson in this for VCWS is clear: understand the dynamics of a partnership otherwise it will fall apart just like any other poorly constructed business relationship.

(10) Private Sector Involvement (or: “Beware the Community Trap”)

It is critically important to get away from the notion that there are communities on the one side and the private sector on the other. Communities consist of individuals and all of them have private concerns as well as community concerns, the former often over-riding the latter. This happens more and more as traditional societies such as at VCWS adapt to a global world and new sets of rules. The fostering of private sector initiatives inside communities, such as developing individual or small group entrepreneurial activities, should be encouraged.

Incentives for individuals often are as important in communities as they are in the commercial private sector. What stymies development of entrepreneurship is often the lack of small amounts of cash, without which no one can develop a business, and therefore an amount of funding for small grants is included in the budget of the ten-point plan (see Part L).

Donors should not try to perpetuate their own ideas of what communities should be by providing funding only for what they, the donors, perceive to be “community benefits”. In other words, the old division of “communities” OR “private sector” is crumbling with the rise of civil society.

There now exists, as was the case always (although masked by strong group characteristics), various private sector groups as part of the community.

(11) Monitoring and Evaluation (or: “Who is monitoring Who?”)

Needless to say, those affected by the project should form an integral part of monitoring. In the case of the VCWS the Sanctuary Fishers Association (SFA) (see below) should follow a clear LFA to ensure that what is supposed to be happening is in fact happening and that all parties, including the SFA are fulfilling their obligations.

(12) Research and Data Collection (or: “Whose Science is This?”)

Much effort and funding is spent on research. Unfortunately the chasm between scientist and community continues to persist. Every effort should thus be made to bring science into the realm of their everyday lives:

- Demystify science. Science can be fun. Trends and phenomena are really not that complicated to understand.
- Involve locals as far as possible. Local people have a wealth of knowledge and to involve them as far as possible in data collection is prudent and a cheap source of assistance – besides, this technique has proven to be one of the most effective ways to spread information to the local population
- Make the scientific effort relevant and useful by undertaking only management orientated research aimed at addressing and solving problems (see Part M).
- In projects of this nature, management should steer science as opposed to science steering management
- Preference will be given to local scientists, it suitably experienced and qualified persons are available. As Shah (1995) has noted: “we need expat experts on tap not on top”.

(13) Sustainability (or: “The Pillars of Development”)

Based on experience in poverty alleviation and other projects gained elsewhere (Turner *et al* 2002; Odendaal 2002a) it could be predicted that building human capacity during the ten-point plan will be the most important ingredient necessary for sustainable coastal and marine resource management. The local people will be taken along every step of the way, and every possibility of building local capacity must be used fully, not only with regards to the fisher community but beyond to the community at large.

(14) Ownership (or: “Whose Reality Counts?”)

Volumes have been written on ownership and it has often been said that local people must take ownership. Indeed this is true, but project managers and donors must also take every effort to create situations in which this can happen, not in a token manner but with the realisation that the project is meant to benefit the local people and that, no matter where the funding comes from, the marine (and the sustainable agricultural project as discussed below) project really is theirs. It

is their reality that will be altered by the project, and it is they that will have to carry most of the responsibility.

4.1.3 From lessons to principles

The following principles were considered and accommodated in the formulation of the MRSUP:

- History has shown that complicated management plans requiring a great deal of behavioural changes over a short time are difficult to implement. The same is true for management plans that require sustained intervention in terms of outside funding and enforcement. When this happens the onus to manage resources and accountability are in fact transferred away from the users, who should ultimately manage them, to donors and outside agencies with disastrous effects over the long term.
- Logic dictates that management plans requiring decreasing reliance on fragile resources by a hungry human population will fail if no viable alternatives are provided. To reflect the overriding influence of hunger in subsistence fishing the term “the reality of the stomach” was coined (for example Moffat *et al* 1998) and should be recognised by coastal resource managers. The strength of this reality must not be underestimated.
- Plans that have their origin inside the pool of users who then automatically have a large degree of ownership of the plan with experts contributing mostly to the technical details, have the best chances of succeeding. In fact, the principal audience of this report should be the resource users themselves in conjunction with the management structures of the VCWS. The MRSUP document, once “approved” in principle by the facilitating authority (VCWS), will be workshopped formally with the various parties. Once the different parties are in agreement on the way forward, a summarised version in Portuguese will be prepared.
- Formal community structures for VCWS were recommended and approved in the 2001 Bio-Business Plan (Lambrechts, 2001) but were unfortunately not implemented. This matter was again raised during the preparation of the PDF B project brief below. Without these structures being put in place, the implementation of the MRSP would be impossible.
- The following principles were thus employed to guide the formulation of the MRSUP:
 - Simplicity in planning and execution
 - Accountability lies with those who will be most affected by the success or failure of the plan, and therefore they must be equipped to play their role properly
 - The “reality of the stomach” (translating to the need to provide for alternatives)
 - Psychological and functional ownership of the plan will be vested in the resource users themselves (as soon as they have been empowered to do so by

the creation of the necessary structures) according to the principle of co-management.

4.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR A MARINE RESOURCES STRATEGIC UTILISATION PLAN

Note: The Marine Resources Strategic Utilisation Plan that follows is presented in more detail than would normally be expected of a management plan, and does not only deal with the “WHAT” and “WHY”, but to a certain extent also with the “HOW” (see Part A). The purpose behind this intentionally elaborate plan is primarily to provide guidance for other plans to follow and to illustrate the complexities inherent in dealing with even a relatively minor aspect such as the sustainable utilisation of marine resources.

4.2.1 A 10-Point Plan for marine resources management in VCWS

A simple ten-step process is proposed for a MRSUP for the VCWS. The steps are interlinked in a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may even cause coastal and marine resource management to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion. Clarity has, for example, not been reached as to whether Step 10 (the last step) should not perhaps be Step 1. A final decision in this regard will be taken prior to the MRSUP being launched. Most of the steps also require a lead period of awareness building.

The ten steps are:

- Step 1: Limit the number of fishers, recognise their rights and register them
- Step 2: Establish the Sanctuary Fishers Association (SFA) and develop a Vision for the SFA
- Step 3: Mitigate and reduce the current impact on resources through education
- Step 4: Add value to existing resources through local economic development
- Step 5: Create complimentary and alternative livelihood opportunities
- Step 6: Protect the most sensitive areas and abstain from the worst practises
- Step 7: Develop new fishing grounds outside the sanctuary
- Step 8: Develop low technology aquaculture ventures
- Step 9: Embed the plan in wider geographical and institutional context
- Step 10: Transfer management of marine resources to appropriate structures

4.2.2 Application of the 10-Point Plan

For each step the purpose is briefly noted, the rationale is given, and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers is given.

STEP ONE: APPOINT STAFF, LIMIT THE NUMBER OF FISHERS, RECOGNISE THEIR RIGHTS AND REGISTER THEM

(1) Purpose

The purpose of this step is to limit the number of fishers that are active in VCWS waters and to prevent new ones from elsewhere from joining their ranks. The process of registering fishers who can fish in VCWS waters will help to install a strong sense of ownership of the resources in the fishers so they will have increased motivation to look after the resources and the environment. Also, staff will be appointed to deal specifically with the development and management of the MRSUP (see Part L)

(2) Rationale

The right of the fishers to the coastal and marine resources is undeniable. Not only have the fishers, and in many cases their direct ancestors, utilised these resources for a long time, it is also fishing that in most cases stands between the fishers and their families and hunger. Their right to fish and exploit marine resources is fully recognised in the PDF Block B proposal and by the VCWS authorities that would be involved in the facilitation and implementation of the 10-point plan.

The MRSUP points the way to how the right to fish and exploit marine resources can be exercised so that patterns of resource use will be sustainable and these resources can continue to support the fishers and their families in the future.

However, several points should be realised and recognised before the onset of the programme:

- Firstly, it is important to let the fishers know that their right to fish in VCWS waters is not being questioned. This can be accomplished by recognising their rights in a formal manner. Only when a vested right is being recognised will the owner feel any responsibility toward looking after the resource. At the moment fisheries rights are treated very much like the classic commons in Hardin's original paper (Hardin, 1967) and no other outcome than the "Tragedy of the Commons" can be realistically expected, namely the eventual demise of the resources and the trashing of the environment in which they occur. This is a pattern that has been observed over and over again in the Western Indian Ocean and it is estimated that probably 50% of fishers in that region will lose their livelihood because of the overexploitation and the resulting decline of coastal resources (Ngoile, 1998).
- Secondly, it is important that fishers realise that rights are of little use if the resources continue to be damaged and are eventually liquidated. Fortunately, the fishers in VCWS waters already understand this very well. Over 90% of those interviewed have placed the blame for the declining resources on too many fishers being active in the area. This is a great start as in many other areas people first need to be convinced that marine resources, although renewable, can withstand only a certain amount of pressure over a period of time. Therefore, there will be little if any resistance from *bona fide* resident fishers in VCWS to registration if this will restrict plundering of

the resource from the mainland or from the side of the open sea by semi-commercial and commercial enterprises.

- Thirdly, it must never be forgotten that the marine environment is an open system. It would thus be pointless to exercise strict control of the harvesting and other forms of marine resource exploitation within the boundaries of the VCWS, but not at all outside the boundaries. Therefore, the realisation should continuously be promoted that effective management of marine resources needs to be put in place and promoted in the areas beyond the physical boundaries of the VCWS, and in fact across the entire Bay of Vilanculos and the Bazaruto Archipelago. Considering the size of this area, it is easy to understand that marine resource management will only work if the fishers are thoroughly informed and in agreement with the plan.

The successful completion of step one will be that the number and types of fishers will be known, that their rights as fishers are recognised (which is the first step to owner-driven resource management), and that they can be organised in a manner that will assist in effective resource management.

(3) Actions to be taken

Actions to be taken with regards to the implementation of Step One, include the following:

- Determine who currently fish in VCWS waters. This will require simple mapping of resource users and should not be preceded by major publicity beforehand as there will always be “fast” people that may perceive this as an opportunity to establish certain rights. All the local chiefs who are involved with the utilisation of marine resources chiefs as well as the relevant authorities at district government level should be involved. Care should be taken that the action of registration not be perceived as a threatening posture on behalf of the VCWS management toward the fishing community, but that it should be presented in such a manner that it will be viewed as an opportunity for the fishers to safeguard their future. The reasons for registration should be explained thoroughly to fishers encountered both along the shore and in vessels on the water. The registration period should be as short as possible, but still long enough to establish the popular legitimacy of the action and achieve complete registration. All resident fishers living along the shore or immediately inland can be registered by a small team of workers accompanied by a government official. Thereafter, again over as short a period as possible, all vessels that are active as well as all fishers on foot can be registered for VCWS territory. Again, the geographic scale and numbers of fishers involved favour the successful completion of the exercise. Unlike the larger Archipelago region, there will not be large numbers of fishers to be surveyed. Resident open water fishers in the VCWS probably range between 50 and 70 while less than 100 people are estimated to harvest other marine resources regularly. For each person the following details should be recorded:

Name

Locality of residence

Type of resource utilised (fish, crabs, oysters, sea cucumber, etc.)

Owner of boat (self, resident or outsider)

Equipment Used

Area where fishing takes place

- Should additional socio-economic information be needed, full use will be made of the results of the current social survey. Should any data then still be lacking, collection will be left until after a fishers association has been established.
- It is important that a definition be decided upon for what constitutes a *bona fide* resident fisher, in other words someone who can legitimately continue to fish in sanctuary waters and will be “owning” the resource, following the partnership philosophy between the EAW and the local community. The fishers fraternity should be directly involved in arriving at an acceptable definition. Also, some form of validation would be necessary for those individuals who claim to be *bona fide* fishers. Each interview should be validated. Two witnesses who are known residents of the VCWS will be required to validate the interview data of people who fulfil the criteria for bona fide fishers. The interview data can be ‘signed off’ by the chief of that particular area, following the same system of thumb printing that was used in the resettlement programme.
- All role players, including the relevant government ministries and the fishers themselves, would need to be informed that this local registration would not override nor replace membership in the fishers association based in Vilanculos, nor is it a substitute for any registration or regulation that may be required by the official marine authorities. If any resistance to the registration process should be encountered from official quarters, then these officials should be encouraged to view this arrangement as a local co-management experiment with a five-year limitation during which time positive results have to be achieved, or it will become null and void.
- Should any disputes arise with regards to the VCWS registration or non-registration of a particular fisher, the case will be referred to the fishers association on the mainland and to the District Administrator for a recommendation. However, the final decision will rest with the local Sanctuary Fishers Association (SFA) (see below).
- Funds to create public awareness of the programme would be provided in the overall GEF project budget (see Part L). Various avenues, for example radio talks and public meetings, would be exploited.
- Staff will be appointed to deal specifically with marine management aspects and the development and management of the plan.

(4) Potential threats to the implementation of Step One

- Fishers from the mainland may also want to claim ownership of the resources in VCWS waters. This can be rebuked readily as all fishers from the mainland encountered during the study were hired hands working for absentee boat owners from the mainland. Furthermore, they only based themselves for logistical reasons temporarily on the shore in the VCWS, and in reality fished deeper in the Bay rather than inshore in VCWS waters.
- There is an existing fishers association on the mainland who may feel that the registration of fishers by the VCWS may infringe on its authority. However, few fishers on the VCWS seem to have actually heard of this association, and the problem

can easily be solved by encouraging fishers in the VCWS to also become members of the larger fishers association and by providing support for this association in the form of an effective Secretariat.

- Barring these relatively minor possible threats, no serious problems or difficulties are anticipated in accomplishing the tasks in Step One.

STEP TWO: ESTABLISH THE SANCTUARY FISHERS ASSOCIATION AND DEVELOP A VISION

(1) Purpose

The purpose of this step is to organise the fishers into an association, the Sanctuary Fishers Association (SFA) that will pursue a common vision based on the sustainable utilisation of coastal and marine resources of the VCWS.

(2) Rationale

Once a discernable group of registered VCWS fishers has been identified, they would be assisted in setting up an association that will become the main tool for the management of coastal and marine resources in the VCWS. The association will be able to maintain itself as a local interest group that will become a focal point for the concerns of its members and for interaction with other entities (such as VCWS management, the district and local authorities, technical assistants in line ministries, and so on).

The SFA will not be established in opposition to the regional fishers association whose chairperson is based in Vilanculos; instead, with its concerns and geographical focus highly localised it can be a support tool for the larger fishing association and other structures concerned with marine and coastal management. The SFA will therefore represent a group of resource users that will share a common vision for the use of marine resources in the VCWS. This common vision will originate from them with the aid of skilful but non-manipulative facilitation.

The threefold purpose of forming the SFA would firstly be to limit the number of fishers operating in Sanctuary waters and those who base themselves along the Sanctuary shoreline, secondly to define an easily identifiable group of people that can be assisted to develop their own skills and to utilise their resources in a sustainable manner and lastly (although not as important as the first two), to establish an organised group that may lobby government for better regulation of the shared marine resources.

There are a number of models that can be followed when drawing up a constitution for the SFA that embraces sustainable development, promotes human skills development, encourages collaboration with other organisations that share similar goals (hopefully also the regional fishers organisation of whom they can be an affiliate, or to whom its members can individually belong to), and ascribes to the laws of the country. Potential models include the establishment of the Fishing and Mariculture Development Association (FAMDA) in the Northern Cape Province of South Africa, the Marine and Coastal Management (MCM)'s approach to subsistence fishers in South Africa, and East African coast examples such as the Tanga Project. Most important,

however, will be to recognise and accommodate aspects peculiar to the VCWS, to actively involve the fishers in the process and to give them ownership of the resources that they utilise. VCWS management will play a facilitating role and will arrange for technical assistance.

Once the SFA is established the fishers would be assisted to develop a common vision for the management of their resources, to formulate the mission and objectives of the association, and how it should function – in short a constitution that will provide the template not only for how the association will function but the grounds upon which assistance to them can be provided. The constitution will help to foster a common understanding upon which partnerships can be developed, not only with the EAW and donors, but also with other interested parties in the industry. The constitution will also help to prevent small influential cliques from “hijacking” the association, or outside parties from manipulating the association to suit their own agendas. A grievance redress mechanism and procedure will be built into the constitution, to ensure that any grievances that could not be resolved internally within the SWA structures are timeously addressed and solved.

The constitution will need to be approved by the VCWS General Manager (VCWS-GM), as will any future changes to the document. The document will also be available in Portuguese.

(3) Actions to be taken

Actions to be taken with regards to the implementation of Step Two, include the following:

- The costs, benefits and advantages of belonging to an association will need to be discussed with the fishers. It is critically important that the fishers establish ownership of the association from the onset to avoid dependencies on the VCWS and other entities from developing, and to counter the monopolisation of the association by small groups.
- The vision, missions and objectives of the SFA will need to be workshopped, and the association assisted to write a simple but practical constitution that governs its operations.
- Physical space will be made available for the SFA to operate from (the community centre at Goshen or the market at Marape will possibly be a good locality).
- The fishers will be assisted in getting the SFA off the ground without creating dependencies. By using a simple participatory logical framework approach (LFA), tasks for the SFA will be defined so that results could be delivered quickly and the small amount of cash that will be necessary for it to operate effectively, generated. The SFA will be assisted to determine the type of assistance that its members will need so that they would be empowered to play an ever-increasing role in the implementation of the 10-point plan, including training and capacity building needs. This will increase the SFA’s ownership of this plan and hence the onus that rests on its members to make it happen.
- The establishment of the SFA will also be viewed as an educational opportunity. The effective management and sustainable use of the marine resources of VCWS will stand or fall with this association.

(4) Potential threats to the implementation of Step Two

With proper facilitation and knowledgeable guidance no threats or dangers are anticipated.

STEP THREE: MITIGATE AND REDUCE THE CURRENT IMPACT ON MARINE RESOURCES THROUGH EDUCATION

(1) Purpose

To mitigate and decrease the current unacceptable levels of impact on the marine resources by firstly educating the fishers, followed by the introduction of simple techniques that will show results fairly quickly.

(2) Rationale and actions to be taken

Building on the establishment of the SFA and the skilfully facilitated development of a common vision, the scene is set for environmental education. Changing behaviour is never easy, and in the case of the relatively unsophisticated VCWS fisher community will not happen unless they clearly understand why changes should be made. Exploratory methods in which the environmental educator works hand in hand with the fishers in ways that are guided by relevance, are far more effective than trying to achieve change by means of “higher knowledge” brought in from the outside.

The following points should be considered and/or actions taken (see also “lessons learned” above):

General points:

- Education should as far as possible be tied to practical applications that make sense to the fisher. Start with their own ideas if at all possible.
- Start with easy actions that will cost the fishers relatively little in terms of lost time or revenue.
- Do not underestimate the value of the fishers understanding the biology of the living marine resources that are utilised by them.
- If incentives are available behaviour will change more easily, but they should not be “hollow” or unrelated to the welfare of the resource. Simply paying people to comply with something is meaningless and does not change behaviour; however, an increase in gains in resource yield related to behavioural change will have a better chance of success when it comes to cultivating new habits.
- People tend to look after resources better if such resources are not in a “commons” but if people have real ownership of them.
- Self-sanctioning by fishers will be far more effective than enforcement of rules by outside agencies (Hardin’s proposed self regulation by “mutual consent”)(Hardin, 1967)
- An experienced temporary duty specialist (TDS), preferably a marine specialist with conservation education experience, will be contracted to launch the programme.

Some neutral actions that will be taken:

- The fishers will be involved in monitoring catch composition and size classes using local name. The survey team found that fishers were eager to discuss their catches and to provide common names. A small team comprised of local people that monitors catches can be highly effective in terms of getting fishers to discuss the composition of their catches as well as making comparisons between areas and with the past.
- Promising fishers will be selected to take on the task of educating their peers with respect to environmental concerns. The focus will be on leading members of the SFA rather than outsiders. Individuals can be trained both as monitors and education officers to run informal education workshops, for instance while fishers are waiting for the tide to go out, or by accompanying fishers to the fishing grounds. These fishers will be trained by the TDS mentioned above.

Some easy behavioural changes that will be encouraged:

- Put back female crabs carrying loads of eggs.
- Put back undersize lobster and undersize sea cucumbers.
- Put back or leave oysters that have small ones piggybacking on them, or place the shells back after harvesting the adults (see below). (Incentives are discussed below.)
- Put back resources with little protein load such as box and puffer fish.

More difficult actions to be considered:

- Change from monofilament nets to polypropylene multifilament nets that are more visible and degrade easier.
- Increase gauge size of the nets. Nets are replaced every six months to a year. When this happens nets with acceptable gauge can for instance be subsidised or otherwise encouraged (provided the owner does not also use unsuitable and especially destructive nets).

Changing the habits and behaviour of fishers can happen when there are clear incentives for them. If changing to a multifilament net brings more advantages then this will happen easily. The immediately felt disadvantage of catching less fish, or having the smallest one pass through a larger gauge net can for instance be offset by an improved market situation (see Step Four below) for those fishers who comply with the rules and regulations devised and agreed upon by all members of the SFA.

Self-sanctioning can be greatly assisted from the market end. Access to the market by the fishers can be conditional, or preferential by favouring fishers who look after their resources better. In that way fishers who comply with the rules will experience a dramatic increase in the value of some of the resources. Resource utilisation is very easy to control from the market end, and notoriously difficult to accomplish when a black market exists. *It is therefore absolutely essential that the market, namely the homeowners association, the hotels and lodges and the marketplace at Marape comply with the rules and do not erode them. A heavy penalty should be imposed on transgressors by the management of the VCWS.*

An easy tool for environmental education as well as monitoring is to devise a simple system by which an extension worker and eventually the fishers themselves can analyse catches using the common names. This will be relatively easy on the Peninsula where diversity in catches is not very high and fishers appear to have names for all the species that they catch. This method was employed with good results on the Masoala Peninsula, Madagascar (Odendaal, 2002).

STEP FOUR: ADD VALUE TO EXISTING RESOURCES THROUGH LOCAL ECONOMIC DEVELOPMENT

(1) Purpose

To assist the members of the SFA by increasing the value of the coastal and marine products through the creation of a better market. This brings further advantages to belonging to the SFA and adhering to rules and regulations that will protect the resource.

(2) Rationale

The economic gains from existing marine resources that flow to the fishers themselves fall far short of their potential. The situation is similar to what is observed over much of the world's tropical areas and certainly elsewhere in the Western Indian Ocean. Most fishers who do the work and sometimes put their lives at risk gain very little from the harvested resources beyond feeding themselves, and quite often they cannot even feed or clothe their families properly.

Fortunately for the fishers of the Sanctuary there are several ways in which great value can be added to the marine resources by creating new and enhanced markets, thereby increasing resource values dramatically and creating incentives to look after them.

The VCWS market components are:

The Market Place at Goshen

There currently exists no local market place for the VCWS fishers. Virtually their only options are to sell excess fish (after their own needs are met) to other local people who are usually cash-strapped themselves, or to barter fish for labour (such as going out fishing or cleaning and salting fish) or for land-based resources such as cassava.

To take fish to the market in Vilanculos is expensive both in time and money, and with the lower prices that can be realised for salted fish is not economically viable. VCWS will create a local market at Goshen (Marape) that will probably fetch far better prices for fish than the salted product exported to Vilanculos as the hotels, lodges, and members of the home owners association will buy their fish there. Otherwise, should excess products become available, the SFA may pool their resources to get their products to the market in Vilanculos, and for many the export of fresh produce will become possible.

The following rules will apply to the establishment and management of the Goshen market:

- i) Only members of the SFA will be allowed to sell their produce on this market, at least until (and if) such time as access to non-members has been granted by the SFA and approved by VCWS management.
- ii) No fisher that violates the rules of the SFA or the country would be allowed to sell his or her produce on this market.
- iii) Products collected by members of the SFA shall be sold locally only on this market, or at the two additional markets mentioned below, so as to regulate catches as well as prices both for the protection of the seller and the consumer.

The Estate Owners Association and Hotels, Lodges, and Msasa Camp

The influx of a large number of wealthy families (54 residential units, each employing locally recruited staff), the establishment of lodges and hotels (a total of 100 beds) and the Msasa research facility (together with the satellite Chief’s Camp) will create a demand for marine products many times more than is currently the case. This will bring tremendous opportunities for the members of the SFA to demand realistic prices for their products. Needless to say the dangers of this increased market are huge, and if unmanaged will inflict far more damage on the resources than the fishers can ever do on their own accord. Therefore this market has to be very well managed and strictly regulated. In this regard at least the following principles would apply, and should be written into the different sets of rules and regulations that govern the VCWS:

- i) The Estate Owners Association and hotels, lodges, and Msasa/Chiefs Camp (hereafter referred to as the “market components”) shall buy products only from registered members of the SFA at the market, or by special arrangement (since the market is far from some of the houses who are located between the market and the fishing grounds) upon the production of a badge by the seller. The “market components’ will refrain from the unfortunate “lets find a bargain because it is a poor country” attitude that has ruined many local societies and pay fair prices agreed upon between the SFA and the VCWS management.
- ii) The entities referred to above shall not be in competition with the SFA for marine resources, in other words they shall not fish, collect or otherwise harvest marine resources along the Sanctuary coastline or in sanctuary waters but instead will fish only along the shore bordering the open sea and then only on a catch-and-release basis, following the example of Lelene Lodge. Stiff penalties will without exceptions be imposed on transgressors by the VCWS management and such fines will be used to boost SFA development and/or the Kawene Community Trust.

The South African Market

A ready market exists in Gauteng restaurants for fresh fish that can be delivered to restaurants on the same day from Mozambique. It should be possible to set up a system whereby aircraft returning empty can fly fresh fish in coolers back to Gauteng where it could be sold on the same day on a commission basis. Cooling facilities at the lodges or the market at Marape can be made available for this purpose. Profits accrued from such products can be divided equally between the

Kawene Community Trust and the SFA's development and education fund. A feasibility study will be undertaken before embarking on this venture.

Proper market practises are bound to increase the income of SFA members considerably, and with that the incentive to manage and look after the marine resources will increase. It is a vastly improved market with associated benefits to those "that play the game" that will form the most important basis for sustainable marine resource management.

(3) Threats

No special problems and dangers are envisaged if the SFA develops into a strong structure and the market components adhere to the rules.

STEP FIVE: CREATE COMPLIMENTARY AND ALTERNATIVE LIVELIHOOD OPPORTUNITIES

(1) Purpose

To assist the fishers and especially the youth to develop alternative livelihood options to fishing, thereby decreasing their reliance on marine resources.

(2) Rationale

Microeconomic development has many facets, especially in a situation where large-scale developments come to a poor community. The PBF Block B proposal (based on mid-2001 estimates) notes that a conservatively estimated 275 full-time jobs will be created by the VCWS project. More recent (unofficial) estimates go as high as 1000 jobs, but the actual figure would probably be somewhere between 300 and 350 and possibly as high as 500. The effect of this will obviously be vast on a population that live in a region where, barring the jobs already created by VCWS, there exist virtually no opportunities for employment at present. It stands to reason that at least some fishers, and more likely young people ready to become fishers, will be tempted away from fishing when presented with an opportunity for employment. However, the effect that this will have on the demographics of the current fisher population is open to conjecture.

Tourism, including community-based (CB) tourism development, is dealt with elsewhere but does pertain to the fishers in several ways that are worth mentioning here:

- The dhow has been the traditional craft for centuries. It presents a quiet, attractive opportunity to travel in the safe waters surrounding the Peninsula. A round trip from the residential settlements in the vicinity of Chihunzuene to the sand spits east of the Peninsula take at most a few hours and gives the visitor a highly attractive experience with a distinct local flavour. It is possible that dhow owners may make more money renting out themselves and their vessels to residents and tourists than they will by selling their excess fish. Fishing forays by dhow can also take along paying tourists who often show an interest in local activities (tourists were found mingling with fishers pulling their nets on the beach in Vilanculos).

- Interested fishers can also be trained as community-based guides that can take their client on overnight camping visits to the lagoon on the east side. Beach hiking has equal potential considering the size of the VCWS (half-day, 1-day and 2-day hikes can be considered). It is suggested that a small amount of funding be made available for developing simple CB tourism products focused on the fishers and for outfitting craft with safety equipment. The friendliness and basic honesty of local population and the safety on the Peninsula makes it an ideal destination for low to medium level hiking experiences (in terms of level of exertion and distances). Community-based overnight camps can also be developed where visitors can enjoy traditional food and customs. However, a more comprehensive feasibility study will have to be undertaken before such a venture could be launched. Should the results of the feasibility study prove to be positive, it is recommend that a group of young people be engaged in training and planning by experienced CB tourism developers and that a small amount of money be budgeted for developing simple CB tourism products focused on the fishers and for outfitting craft with safety equipment.
- Special emphasis should be placed on the development of the youth. Like elsewhere in the developing world they mature quickly, and people as young as eight years were observed fishing from dhows. Obviously there will be no possibility for all the children of each fisher to also become fishers – therefore provision must be made early on to develop the human potential of the youngsters so that they can find alternative options to fishing on the Peninsula or develop the necessary skills to make a living elsewhere. The population growth curve is probably steep (see Part G) and will catch up with the VCWS long before the fifty-year lease has run out. Tourism development, because of the diverse skills needed and involved in the industry, has proven to be a highly successful tool for the development of human potential in a range of poverty alleviation projects implemented in South Africa (Turner *et al* 2002, Odendaal, 2002)
- Finally, it should be borne in mind that tourism is often a two-edged sword and that the benefits tend to go to one group while the environmental and social costs end up being shared by local communities. Therefore its development should proceed with caution; for this purpose guidelines that are also relevant to the VCWS situation have been developed (Grange & Odendaal, 1999).

(4) Threats

Ad hoc and poorly planned CB tourism development should be regarded as the main threat. Once bad habits have taken root they are difficult to change.

STEP 6: PROTECT THE MOST SENSITIVE AREAS AND ABSTAIN FROM THE WORST PRACTISES

(1) Purpose

To protect the most sensitive areas by zoning them as limited access or no-go zones, encourage and facilitate the withdrawal of fishers from these sensitive areas and to prohibit/abolish deleterious fishing practises.

(2) Rationale and discussion

At this stage of the implementation of the 10-point plan, the members of the SFA will have started to reap the benefits of belonging to the association. At this point a further step can be implemented that will help to preserve the coastal areas and marine habitats of VCWS, and in doing so protect their highly improved market that was created and maintained by tourism (by protecting the environment that have brought the tourists there in the first place).

This step will involve further retraction of destructive activities from especially sensitive areas by introducing zoning into the marine and coastal part of the VCWS. The borders of the different zones or areas on the following map have no particular biological significance. The VCWS waters were divided up in these areas for the ease of flying transects and studying the VCWS waters from the air (counting fishers, noting particular activities, etc.).

The different areas/zones indicated on the map can briefly be described as follows:

Area A

Area A currently experiences a fair amount of harmless dhow traffic due to the proximity of Marape. However, development plans of the VCWS destines this area as one of three for the development of high income housing that potentially will have a large impact on the coastline (far greater than the informal dwellings of the current fishers population). Therefore EIA regulations have to be clearly followed with Project Implementation Plans (PIPs) in place and clearly understood by all, including and especially the labourers who can easily cause damage to fragile vegetation and coastal habitat due to ignorance.

Hardly any fishing occurs in Area A *per se*, although dhows pass through here on the way to the fishing grounds in the Bay itself that fall outside the VCWS borders, and to fishing grounds located in the eastern parts of Area B₁ in the vicinity of the sand spits. The threat to this area does not come from the fishers but from coastal development, including the housing developments and the construction of the proposed Marape harbour and community centre at Goshen. Again, such damage must be mitigated by EIA and its application. Therefore, nothing much has to change in terms of the fishers' behaviour in Area A and it is *likely that a total restriction on any fishing activity in VCWS waters in this area will meet with no resistance* as not much fishing takes place there anyway.

Area B

Area B₁ contains the largest coastal mangrove stands in the VCWS. These are highly sensitive and important habitats and breeding places for pelagic fish and other marine creatures. Surprisingly, not much damage has been inflicted upon these mangrove stands; however, VCWS management should loosely monitor their continued welfare. As wood becomes scarcer the mangroves may come under siege. Again, the main potential threat is probably the housing development that should be subject to strict EIA regulations and continued monitoring for damage to the environment.

Fishers that live along the shore are being relocated to a new village eastward along the shore of B₂ and west of Chigonguine. This new settlement should be carefully planned and positioned with a PIP that will ensure that damage to the environment is minimised.

To avoid unnecessary traffic through the sanctuary it is proposed that an outstation for the new market at Marape is created here where the estate owners from area B1 can buy fresh fish and marine products, while excess produce can be transported to Goshen on a daily basis. This outstation can serve both the new settlement and Chigonguine. Much work need to be done with the population of Chigonguine in terms of environmental education, both on land where the wetlands near the village are apparently regularly burned, as well as on the mudflats where crabs and oysters are collected.

Precisely how many women and youth collect crabs are not certain but the number is probably below 50 in total (during low tide no more than seven were noticed on the mudflats at any given time, both from land and from the air) and it should be relatively easy to organise them, divide up the mudflats and put a rotating system in place with the reward of highly increased prices for their produce as incentive.

Fishing does occur in the vicinity of the sand spits, which seems to be a favourite spot for the current fishers located at Chihunzuene that will be relocated to the new settlement. The current impact on the marine resources is considered to be minimal as the fishers net pelagic and typical sandy bottom species. The sand spit is not permanently inhabited.

There are no parts of Area B that fishers need to be withdrawn from entirely. However, oyster and crab harvesting should be managed based on a rotating system where groups of harvesters have access to different geographical areas at different times. Such a rotating system can only succeed when it is carefully planned with the harvesters themselves and the greatest measure of success will be achieved when specific groups of people have claims on specific areas, thereby increasing location-specific ownership and the incentive to look after the particular resources.

There are a number of implementation or harvesting models that can be followed, but the best one will be the one worked out among the harvesters themselves.

Areas C and D

Area C is a highly sensitive area, considering it is the mouth of an estuary that contains sensitive habitats such as mangroves, islands, shallow lagoons and offers feeding grounds to populations of flamingos, etc. Unfortunately this area already experiences considerable pressure, and this pressure is apparently on the increase. The Lenene Island Lodge reported sharply increased fishing activity with nets and even long lines (also confirmed by Dugong Lodge and others) over the last year. Seven motorised craft were recorded in Area C during an aerial survey on July 14, 2002, four of them in the vicinity of Lenene Island Lodge.

Area D is equally sensitive, but is probably more vulnerable to the localised effects of pollution because of less current activity and to fishing by nylon net as the estuary is narrow and very shallow.

Potential threats to the sensitive habitats and biodiversity of Area C and D, particularly west of the sandy island, come from several sources and damage from all of them should all be mitigated as far as possible:

i) Chigonguine

Fishers in this village need to be organised and exposed to environmental education as soon as possible. The best route to follow would be through the proposed SFA and by utilising the influential local Chief Gabriel. This village is one of three major fishing villages in VCWS, and the relocation of fishers from Chihunzuene to just West of Chigonguine may increase pressure from fishers.

ii) Lenene Island Lodge

Lenene Island Lodge has a critical locality in terms of sensitive habitat, but also in terms of monitoring activities in the estuary. Fortunately the owner understands the importance of protecting the environment and a superficial glance at the lodge conveyed good environmental practises being implemented by the owner. It is recommended that Lenene Lodge be fully involved in all marine management initiatives of the VCWS, particularly in terms of monitoring.

It will be good if their 2-stroke outboard boat engines could be replaced by 4-stroke engines at some point, and a standard setting environmental audit of the lodge and their operations will be helpful to them and the VCWS.

iii) New Lodges # 1 and # 2

Two new lodges are proposed on the sensitive eastern dune barrier cordon (as is pointed out in various sections of the BMP), one on the sand peninsula opposite Chilonzuine Island (see Map) and the other on the site of the disused San Sebastian lighthouse. It is of the utmost importance that comprehensive EIAs are done on these proposed structures and proper PIPs be drawn up – for the benefit of the environment and the lodge owners themselves.

iv) Fishers operating in Areas C and D

While area C and D contain a large number of less damaging traditional fish traps, some of them forming “fences” that extend almost across the width of the estuary, nylon netting by locals are unfortunately on the increase. According to a local fisher, seven fishers operate with nylon nets within a four-kilometre stretch of the western shore of the estuary. According to this fisher, marine resources have dramatically declined over the last decade.

Nylon nets in Areas C and D must be prohibited entirely. The incentives for abandoning nylon nets will need to be different from incentives offered to fishers along the northern and western shores of the VCWS. Two steps are suggested:

- That the prohibition of nets are well advertised by messengers on foot and through the chief's system, and that an offer is made for a once off buying of nylon nets after which their possession or usage along the estuary shore are strictly prohibited and punishable (perhaps not in a direct manner such as a fine but by providing other opportunities such as those that may arise from tourism). Traditional traps, however, pose no problem and as fishing stocks recover they should provide sufficient food for people like Mr Shiboana for subsistence but probably not for selling.
- That the CB tourism feasibility study proposed above is undertaken as a matter of urgency. Depending on the outcome of the study, it is proposed that the area should be developed in terms of camping, hiking and overnight excursions along the shoreline. All the people living along this shoreline, and there are probably only 7 or so families living within 50 m of the shore in Area D, have access to dugouts that are not only traditional but also highly suitable (and perhaps the only) craft that can negotiate the shallow waters of the estuary. Rustic overnight accommodation in the form of traditional fishing shelters can be maintained for hikers and campers, who may collect their own fish in the traditional traps for a small fee that will in all probability exceed the income from selling dry fish collected in this area in Vilanculos. There are plenty of nice photo opportunities and the youth that live here in low numbers indicated that they would be very interested in tourism opportunities. If the youth has a stake in tourism development they will quickly become a major force in conservation, following the experience in the Richtersveld, South Africa and the Masoala Peninsula, Madagascar (Odendaal, 2002)

Various reports have been received of destructive (and illegal) long lines being used in the mouth of the estuary, as well as of fishers from further afield coming into the estuary. Commercial foreign fishing vessels were noticed just outside the mouth of the estuary. Again, Lelene Island Lodge can be tasked by VCWS management to monitor irregular activities and promptly report them.

Area E

Area E contain coral reefs of aeolian sandstone that are fairly deep and can be relatively easily protected, following simple procedures that are now in place in many marine parks where coral reefs occur. These procedures include induction of divers before excursions, rules designating areas where boats can drop anchor, permits for anyone operating there, a total taboo on spearfishing, etc. (See also Part I: Tourism Plan) Fortunately these reefs are rather well protected by their locality that prevents artisanal fishers from visiting them, as well as by the depth of the reefs. Consequently their conservation status is good and there is no evidence of coral bleaching. However, a careful watch should be kept over them to guard them against destructive visitors

such as foreign fishing vessels, and this will be easy once the lodge at the old lighthouse is in place. Management by private sector operators have proved to be successful in places such as Biscayne National Park in Florida where corals are recovering since concessions were made available with strict guidelines (Odendaal, 2002)

Area F

Area F is not considered a particularly sensitive area with respect to fishing with dhows although motorised craft with large nets can undoubtedly cause damage to dugong and turtle populations, or disturb the large groups of manta rays that were observed from the helicopter. The history of manatees (a marine mammal similar to the dugong) and motorised craft in Florida is not a happy one. A blanket ban should be placed on fishing in the area. This should not meet with much resistance as no vessels were observed there during the peak fishing hours on the helicopter survey.

Regulations regarding littering, etc. should be enforced on Bangué Island, and the feasibility of the issue of permits to anyone who visits the island will be investigated. The island has significance to fishers in the bay who use it both as a stopping over point and as a beacon. The island falls both within the Bazaruto National Park (BNP) and the VCWS and therefore is a useful starting point for co-management and the eventual possibility of merging the management of VCWS and the BNP. It is advisable that any land use or enforcement of rules by VCWS on the island should only be undertaken after consultation with the mainland fishing association and the BNP, and preferably with the assistance of the BNP authorities. This can lead to continuing and expanding dialogue and the issue will be approached in a non-confrontational and co-operative manner.

(3) Threats

If proper EIA procedures are followed and appropriate CB tourism development is practised, no threats are envisaged.

STEP SEVEN: DEVELOP NEW FISHING GROUNDS OUTSIDE VCWS

(1) Purpose

To assist a certain number of fishers to develop new fishing grounds in exchange for them no longer fishing in VCWS waters.

(2) Rationale

Some of the fishers indicate that “fishing is in their blood”, that they have done it all their lives and their fathers before them and that they, in spite of being very poor, are not interested in pursuing other careers even if they had the option to do so. These fishers would obviously remain fishers and would have to be accommodated as such.

One way of decreasing the number of fishers in VCWS waters is to develop new fishing grounds that will, hopefully substantially, reduce the number of SFA members that actually rely on fishing in VCWS waters. At this stage of the implementation of the 10-point plan, it would be clear how many fishers actually fish *in the waters of the VCWS itself*. The fishers tend to operate in groups of 4 – 7 fishers per vessel, the owner of the vessel normally being one of them. It also seemed as if these groups are fairly well organised already, and that the composition of the groups are reasonably stable. The steps that preceded this one will have stabilised these groups further.

At this point the organised groups can be approached through the SFA with an offer to supply them with motorised craft so that they can fish in the open sea. The trade-off will be that they can no longer fish in VCWS waters unless it happens by traditional methods only.

This is not as drastic an intervention as it may appear at first glance:

- Firstly, many fishers have expressed the desire to actually fish in the open sea but do not feel safe to venture there in their often not too sturdy dhows. The enthusiasm for the new venture would thus be strong.
- Secondly, the current crews of three dhows can share a motorised craft on a rotating basis with one designated co-ordinator who also looks after the boat and engine. They will still catch more, and larger fish than they do going out every day with their dhows. They will also have a ready demand for their catches in the hotels, lodges and the Goshen and South African markets. The initiative should be practised on strict business principles and should not be viewed as a handout to get fishers out of VCWS waters.
- Thirdly, the same suggestion was encountered in conversations with fishers and a local NGO representative in Vilanculos. This motorised craft initiative can act as a pilot project for the larger Bazaruto Archipelago region where similar incentives and alternative livelihood options may be necessary to decrease pressure on the reef system.

Obviously this venture should be planned and regulated very well, with appropriate training, and safety measures and equipment put in place. A feasibility study will thus precede any implementation decisions being taken, with special attention focused on the economics of the venture and up-front capital needs.

(3) Threats

The following potential problems and/or threats to the implementation of the proposal, will be addressed during the feasibility study phase:

- Financial viability of the proposed venture
- Provision of setting-up capital, linked to expensive equipment
- Maintenance of equipment, especially the boats
- Logistical realities such as fuel provision
- Sharing of expensive equipment and the related problem of “ownership”
- High technology seamanship will be required (safety factors and access to the open sea)

STEP EIGHT: DEVELOP LOW TECHNOLOGY AQUACULTURE VENTURES

(1) Purpose

To investigate, by means of a feasibility study, the possibility of establishing a low-technology mariculture (coastal aquaculture) enterprise in VCWS

(2) Rationale

Mariculture is a rapidly developing sector in the world economy. It is likely that it will continue to grow significantly in future years. However, the often rapid, unplanned and unregulated development of mariculture ventures has led to serious cumulative environmental impacts in many parts of the world.

The mariculture feasibility study, which will only be scheduled for year three after inception of the GEF project and will not be funded by VCWS (see below), will take cognisance of the following mostly aggravating factors:

- Mariculture tends to involve considerable research, not only with regard to the resource itself and the local conditions but also with respect to available markets and cost-benefit analysis.
- Mariculture can damage the environment and reduce its value to other income generating options, including harvesting of populations of naturally occurring marine resources and tourism. Effective Environmental Assessment requires a strong national legal framework for aquaculture that is not quite in place yet in Mozambique
- The matter of funding of the project will have to be addressed. It would be preferable, if the decision to go ahead with the venture were taken, for such funding to come from separate sources after cost-benefit analyses and Environmental Impact Assessments (EIAs) have been completed satisfactorily.
- The VCWS is still being established. Until it is fully operational it will be difficult to undertake the critical siting and scoping procedures necessary for sound mariculture development, and an assessment of the capacity to undertake sophisticated mariculture development will be equally difficult.
- Development of mariculture requires pervasive public participation and a needs and skills analysis of the local population in order to establish what benefits they may get from such a development. It is therefore advisable to take the “deal with first things first” approach namely to get current marine resource use on a sustainable footing and appropriate structures developed before launching into mariculture development.

For the purposes of marine resources development of the VCWS a small amount would need to be budgeted to investigate small-scale projects requiring a low-level technological input, such as the following:

- The breeding of octopus in clay pots that can be purchased locally, the enhancement of the current oyster banks by placing back small oysters that occur on the shells of harvested oysters, and maybe the creation of an artificial reef where the current

harvesting of crayfish occurs in the upper reaches of the Bay (however, the flow of incoming and outgoing tides need to be studied to determine the feasibility of building an artificial reef before any serious attempt to do so is undertaken).

- The cultivation of freshwater species such as *Tilapia* in the numerous lakes that occur on the VCWS could be considered. Such an initiative will proceed with the greatest caution and full use will be made of the guidelines available for aquaculture, which includes public participation and economic analysis.
- The mariculture of sea horses may present a real opportunity; not only are they under threat everywhere in the Western Indian Ocean and the market for them is insatiable, but they are relatively easy to breed.

STEP NINE: EMBED THE PLAN IN A WIDER GEOGRAPHICAL AND INSTITUTIONAL CONTEXT

(1) Purpose

To link the conservation and utilisation of the marine resources of VCWS to an umbrella marine resources plan for the Bazaruto – Vilanculos – VCWS region

(2) Rationale

The need for effective regional conservation measures and management structures has been elucidated in various sections of this BMP. Such a regional management regime will be acceptable to VCWS and EAW, provided that effective management is realised and maintained. Direct talks with the BNP management will be instigated by VCWS management at the earliest opportunity.

The route outlined in Step 10 below, will then be followed.

(3) Threats

The BNP is hamstrung by a serious lack of funds and therefore the capacity to effectively manage the Park is also lacking. Should this state of affairs not be overturned, it would jeopardise the vision of the VCWS waters being managed by a regional management structure controlled by the BNP.

STEP 10: TRANSFER MANAGEMENT OF MARINE RESOURCES TO APPROPRIATE STRUCTURES

(1) Making it happen

When it comes to the application of the ten-point plan there are two main aspects that require attention: firstly, the plan has to carry broad approval and allow for ongoing input from key role players united into a marine resources Steering Committee (MRSC), and secondly its practical implementation has to be driven by an effective Project Implementation Team.

(2) Marine Resources Steering Committee

The plan has to be acceptable to those affected most and immediately by it, namely the fishers resident in the VCWS (to be united in the SFA that will be established early on in the rolling out of the plan), as well as to other key role players. The latter includes the traditional authorities, represented by the chief council, the existing Steering Committee for VCWS, the Kawene Community Association, the Action Committee for the VCWS, relevant line function departments of local and district government, the administration of the Bazaruto National Park (BNP), NGOs active in the area, and so on. It is not only important that these key role players support the plan but that they have a mechanism that allows them to contribute to the final draft that will be implemented, give ongoing input when necessary, and generally keep up to date with its implementation.

These key role players can contribute best when united in a broad steering committee. The Marine Resources Steering Committee (MRSC) will be established at a workshop where the plan will be presented for detailed comment, with the opportunity of making changes and ameliorations to it. This workshop will be arranged and facilitated by VCWS management and held in the sanctuary. During the workshop a collaborative LFA will be drawn up with clear components, steps, time lines and benchmarks. The structure and composition of the Marine Resources Project Implementation Team (MRPIT) will also be finalised at the workshop (see paragraph (3) below). The MRSC will have a clear Terms of Reference which broadly speaking, will ensure that the implementation of the Ten-Point Plan will proceed in an acceptable and satisfactory manner, and will stay on track (delivering on time and within budget). The MRSC will serve as the interface between the community, the government, the donors and other sets of players. The Chairperson of the MRSC need not be a representative of VCWS, but could for example be the Director of the BNP.

The MRSC will be a specialised sub-committee of the over-arching Community Representative Committee (CRC), who will be the democratically elected body representing the local communities residing in VCWS (see Part L).

(3) Marine Resources Project Implementation Team

The Marine Resources Project Implementation Team (MRPIT) will be responsible for implementing the 10-point plan. The MRPIT will focus on the tasks at hand and will not get side-tracked by political or other issues that fall in the ambit of the MRSC to which it reports in the form of bi-monthly reports. The Project Team Leader reports directly to the MRSC.

3.3 MONITORING AND EVALUATION

Monitoring and evaluation (M & E) will be a key component in managing the process outlined above and in ensuring the successful deployment of the 10-point plan. As such it will be based on the comprehensive M & E guidelines outlined in Part M below.

In the case of M & E of the conservation and utilisation of marine resources, all role players will be involved:

- The SFA as main beneficiaries of the marine resources project will be a key M & E component.
- The MRPIT will undertake systematic M & E of all the steps during the process.
- The independent M & E unit outlined in Part L will be involved in a supervisory M & E capacity.

3.4 FINANCIAL IMPLICATIONS

The financial implications of implementing the 10-point plan for the management of the VCWS marine resources are dealt with in Part L

3.5 OPERATIONAL PLAN

The need for and purpose of Operational Plans (OPs) was pointed out above. In keeping with this policy, an OP will be prepared for the sustainable use of the marine resources of VCWS. This OP will be based on the principles, procedures and information presented in the abovementioned MRSUP, but with more detail in certain respects. The VCWS-GM, in consultation with the GEF Project Manager (Implementation) (see Part L), may opt to prepare separate OP's for specific aspects or steps of the MRSUP. Should this option be taken, it will make the individual plans less bulky and thus easier to prepare, to understand and to implement.

The OPs will also be made available in Portuguese.

CHAPTER D5: CONSERVATION, UTILISATION AND MANAGEMENT OF FRESH WATER AQUATIC RESOURCES AND SYSTEMS

5.1 PRINCIPLES AND POLICIES

The extensive freshwater aquatic systems of the VCWS, like wetlands everywhere, are extremely sensitive. The wetlands will, as required by the EIA and in keeping with the overall mission and objectives of VCWS, be protected from all development including peripheral development that could cause environmental damage. Management attention will focus on the class B categories (see Part B) and especially on the rehabilitation of the airstrip construction that took place at the so-called Airstrip Marsh (see below).

5.2 MANAGEMENT OBJECTIVE

The all-encompassing overall objective is:

To preserve the physical, chemical and biological integrity of the freshwater aquatic system associated with the VCWS

5.3 CONSERVATION AND MANAGEMENT PRIORITIES

5.3.1 Ecological criteria and issues

One of the main functions of any biodiversity management plan would be to identify conservation needs and priorities. With regards to the freshwater aquatic systems of VCWS, this identification followed an approach of identifying the important ecological issues relevant to these systems.

The following principal criteria apply to the selection of such ecological issues:

Naturalness: Most freshwater habitats of VCWS have been influenced by man to some extent and are no longer in an unimpacted or natural state. Wetlands that have been least impacted are therefore of higher conservation value. The naturalness of the different freshwater bodies is presented as the integrity of the sites as determined above (see Part B).

Habitat diversity: Habitat diversity can give an indication of the potential of a site. A site with greater habitat diversity is generally able to support greater species diversity and would thus warrant a higher conservation priority.

Species diversity: Sites that contain high species diversity are generally speaking of high conservation value and thus also a management priority.

Extent: In general, larger sites contain greater diversity, simply because they cover a larger area and are more likely to contain a greater variety of habitats. Large sites are also more resistant to changes. It was not possible to do an evaluation of the extent of the different water bodies, since aerial photographs that would have allowed for the quantification of the surface area of the different water bodies, were not available.

Rarity: Species or habitats that are rare or occur outside of their normal distribution at a particular site are of high conservation priority. Unique sites are important.

Fragility (vulnerability): Some species have very specific requirements and are vulnerable to changes in their environment.

Representativeness: The full range of variation in a region should be protected. In other words, all species should be represented in a protected area. This is possible by having either one large reserve or several small reserves.

The outcome of the analysis of these criteria is presented in the table below. From this table it is evident that several of the freshwater components associated with the sanctuary are of significant conservation importance. The threats identified above are used as the basis for prioritising the conservation actions that would be required for the different water bodies.

5.3.2 Priorities

Each of the different freshwater bodies sampled during the field survey which warrants specific management attention, is described separately as follows:

(1) Lake Manhale

Lake Manhale is situated in a relatively densely populated region and offers a significant fisheries resource to the local people. The impacts affecting the lake are as a result of this the highest of all the sampled lakes and pans. Since this lake represents a large system, the fragility of the lake is however regarded as much lower than, for example, that of the Ecotone marshes. The urgency of conservation and restorative actions are therefore regarded as of a lower priority than addressing those impacts threatening Msasa marsh. The impacts threatening Manhale includes cropping, burning, erosion, resource utilisation, villages as well as indigenous vegetation removal. The integrity of Manhale is listed as of a class B (*Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the basic ecosystem functions are essentially unchanged*). Due to the high importance of the Manhale fish resource to the local people, implementation of a socio-economic evaluation to assess the importance of the resource, versus the status of the resource, is of utmost importance and should be implemented over the short term. Such a program can at the same time serve a purpose as the basis for a community participation program to implement restorative actions that would curb the impacts threatening the lake e.g. burning, erosion and indigenous vegetation removal.

(2) Lake Nhone

Lake Nhone probably represents the most unique inland aquatic system on the sanctuary. It is a turbid lake with a high salt load, which hosts a unique (within the boundaries of the sanctuary) gobiid species. The lake further supports the highest habitat diversity of all the pans and lakes visited during the dry period. The lake is threatened by resource exploitation, the presence of villages, burning, water quality alteration (probably natural, but the actual cause of the high salt loading is not known) and inundation as a result of the 2000 floods. The lake is regarded as of a class B (See the definition for Lake Manhale above): Largely natural with few modifications. The same approach is recommended for Njone as for Manhale i.e. over the short-term implement a socio-economic evaluation to assess the importance of the resource, versus the status of the resource. Such a program could easily be expanded to include to a restoration initiative to address the threats currently affecting the lake.

(3) Airstrip Marsh

Excavation and an airstrip have recently impacted on the so-called Airstrip Ecotone marsh. The drainage line that naturally supported the Ecotone and the salt marsh has been excavated to facilitate storm and flood water drainage away from the airstrip. This development was implemented during the dry season and the onset of likely effects that might result from the channelisation of the drainage line, have at the time of the survey not affected the functioning of the marsh. The threat posed by this development to the functioning of the marsh as well as the alteration of a natural drainage line caused a B classification for the marsh. It is recommended

that mitigative actions be implemented immediately to alleviate the erosion threat posed by this development to the overall functioning of the marsh.

(4) Msasa Marsh

Msasa Marsh presents a diverse habitat and probably supports a red data species (*Cloiria spp*). The presence of this species could however not be verified. Erosion, trampling and roads through the marsh have already impacted on Msasa Marsh, and relatively intensive development of the immediate area has either been completed (Dugong Lodge) or will commence in the near future (upgrading of Msasa Camp, marina, jetty, access road etc). The ecological functioning of the marsh is however still regarded as natural, but these impacts as well as erosion that resulted from the 2000 floods, needs to be addressed to ensure that the marsh is maintained as a class A marsh.

Identification of Important Ecological Attributes.

		Lake			Ecotone marsh					Marsh		Pan				
		Manhale	Njone	Mukwe	Madaca'munhu	Airstrip	Msasa	Mazolo	Marapi	Jane	Xilwane	Tirweni	Switsangweni	Nhahotsane	Jacana	
Clarity		Mod	Low	Mod	-	-	-	-	-	Mod	Mod	Mod	Mod	High	Mod	
Conductivity		Mod	High	Low	-	-	-	-	-	Low	Low	Low	Low	Low	Mod	
Diversity	Habitat	Low	High	High	Low	Low	High	High	Low	High	High	Low	Mod	Mod	Low	
	Bio	Macro-inverts	Mod	Mod	Mod	*	*	*	*	*	Mod	High	Low	Low	Mod	Low
		Fish	Low	Mod	Low	Abs	Abs	Mod	Mod	Mod	High	High	Low	Low	Low	Low
		Unique taxa	Abs	Pres	Pres	?	?	Pres?	Pres	Pres	Abs	Abs	Abs	Abs	Abs	Abs
		Red data	?	?	?	?	?	Pres?	?	?	?	?	?	?	?	?
Integrity (Naturalness – Table 6)		B	B	A	A	B	A	A	A	A	A	A	A	A	A	
Resource use		High	High	Low	Low	Low	Low	Low	Low	Mod	Low	Low	Low	Low	Low	
Fragility		Low	Low	Low	High	High	High	High	Mod	Low	Mod	Mod	Mod	Mod	Mod	
Threats		Mod	Mod	Low	Low	High	High	Low	Low	Low	Low	Low	Low	Low	Low	
Conservation action required		Short	Short	Med	Med	Imm	Imm	Med	Med	Med	Med	Med	Med	Med	Med	

- = Not applicable

* = Not sampled

? = Not known

Mod = Moderate

Abs = Absent

Pres = Present

Short = Short term future 1-2 years

Med = Medium term future 2-5 years

Imm = Immediate

RED = Important issues

5.4 MANAGEMENT OPTIONS AND ACTIONS

5.4.1 Management/conservation objective

The success of any conservation strategy depends entirely on the realm within which the day-to-day running of such a strategy occurs. Any management strategy therefore has to take cognisance of all threats and pressures that could jeopardize the success of the overall conservation strategy. Any trade-offs such as socio-economic versus ecological needs to be justified in accordance with the overall conservation objective. Such a management/conservation objective has been formulated for the fresh water aquatic system to ensure that the conservation thrust is dedicated towards achieving a certain goal (see section 4.2 above).

Ascribing to the objective will further ensure accountability and will facilitate performance evaluation.

5.4.2 Management framework

The following framework that will be used to realise the abovementioned freshwater aquatic systems objective, involves an interactive strategy that would facilitate a process of adaptive management based on the outcome of ongoing research and monitoring. The management framework for the freshwater aquatic system is built on a three-legged approach where all *conservation actions* are implemented within a *legal framework*, supported by sound *scientific evidence* generated from ongoing research.

(1) Conservation management framework

The conservation framework is regarded as the operational component of the overall strategy and will include the following tasks:

- Approve the freshwater aquatic systems conservation objective
- Design conservation goals to ensure facilitation of the objective
- Implement tasks to achieve goals which should include:
 - Impact assessments
 - Ongoing monitoring
 - Restoration and rehabilitation
- Undertake ongoing evaluation of the conservation framework

(2) Legal framework

The conservation objective will have to be scrutinized at a legal and institutional level to evaluate whether existing legislation (national and communal) provides a sound basis for the protection of the freshwater aquatic system. Sectoral issues that may affect or hamper achievement of the conservation objective (use of scarce resources or introduction of exotics) needs to be identified and action plans must be designed to ameliorate such threats. The tasks that are provisionally associated with the legal framework are the following:

- Review existing institutional and legal frameworks
- Review existing national and communal laws
- Identify issues (if any)
- Design and implement action plans

(3) Research framework

The implementation of an effective aquatic systems conservation strategy for VCWS, would need to be based on a sound ecological knowledge of the system and of all the social and physical factors that may impact on it.

The following two research fields have been identified as priorities:

Resource utilization

The extent of resource utilization from the freshwater aquatic system is currently not known. Research is required as to the importance of the resources associated with the freshwater aquatic system as well as the status of such resources. OP's for the use of these resources are required to ensure sustainability.

Ecological attributes

Research regarding ecological attributes is required in the following fields:

- *Species assessments*
 - Biodiversity assessments
 - Distribution and abundance
 - Population dynamics
 - Habitat requirements
- *Functional assessments*
 - Habitat support systems
 - Source/ habitat interactions
- *Integrity assessments*
 - Identify reference conditions
 - Develop bio-criteria

5.4.3 Operational plans

The abovementioned research and monitoring activities will culminate in an OP (or more than one if necessary) dealing specifically with the management of the freshwater aquatic systems of VCWS. It is also likely that it will necessitate changes to the BMP.

The research will be undertaken by a contracted TDS. Changes to the BMP and the compilation of the OP will involve the VCWS General Manager and GEF Project Manager (Implementation) (see Part L), assisted by the abovementioned TDS.

CHAPTER D6: CONSERVATION, UTILISATION AND MANAGEMENT OF FLORA

6.1 PRINCIPLES AND POLICIES

A description of the vegetation appears in Part B above.

The policy for vegetation management of VCWS would be to prevent if possible but at least minimize further negative man-induced impacts on the vegetation, especially in the Reserve area, and to ensure that herbivory impacts are in accordance with the calculated grazing capacity for the sanctuary (see Part B)

Special management attention will be focused on the conservation of bushclumps, wetlands (pans and marshes), the unique plant communities along the northern part of the estuary and the northernmost tip of the peninsula, the salt marsh community and dune communities.

6.2 MANAGEMENT OBJECTIVES

The objectives for the management of the vegetation of VCWS arise from the problem areas identified above (see Part B) and the following discussion on management priorities, and could be summarised as follows:

- To conserve the plant biodiversity resources at community and species levels in the long term, and to prevent the regression in the status of any plant species or communities due to human impacts or activities.
- To ensure that adequate management attention is given to maintain the status, or improve in the case of specially identified species, of any endemic, rare or threatened plant species, and the control of alien invasive vegetation.
- To closely monitor the effect of the reintroduced herbivores on the vegetation in general and on vulnerable communities and species in particular.
- To regulate and monitor the effect of development actions or activities on the vegetation, and to ensure that adequate impact assessments and biophysical surveys are undertaken and mitigative actions implemented.
- To closely monitor the effect of fires on vulnerable species and communities such as bushclumps, and to investigate and implement an applied burning programme and fire control system as would be necessary to maintain fire-dependent plant communities.
- To regulate the introduction into VCWS of all plants.
- To monitor and regulate the use of indigenous plants in especially the Reserve area by local communities and estate owners.

6.3 THREATS

A number of real and/or potential threats have been identified, and are addressed in the BMP:

- Uncontrolled wildfires, especially man-made fires that are lit for purposes other than the maintenance of the fire-dependent communities.
- Uncontrolled and/or insensitive physical developments.
- Possible unsustainable use of plant resources especially wood and thatching.
- Possible unsustainable use of certain species and/or communities by herbivores.

6.4 MANAGEMENT PRIORITIES AND ACTIONS

6.4.1 Herbivory

As has been indicated elsewhere the quality of the grazing in VCWS is poor. The reintroduced wildlife, especially the species that would be more tolerant of wet conditions such as buffalo and elephant, may thus end up overexploiting the more palatable and nutritious vegetation of the wetlands, or the more open and fertile areas adjacent to the

wetlands. The herbivory impacts on these sensitive areas may prove to be unsustainable, in which case corrective measure will have to be employed. The monitoring of the effect of grazing animals on the vegetation as well as any subsequent remedial actions, would be covered by a OP.

6.4.2 Managing and minimising anthropogenic impacts

All impacts on the vegetation appear to be anthropogenic. Therefore initial management should be aimed at reducing such impacts. This implies proper planning, which to date has not been manifest in all respects. The siting of most of the current and proposed infrastructure development along the shores of the bay and elsewhere, has apparently not considered the impacts of such developments on the vegetation, and is likely to further impoverish sensitive vegetation communities. Instances of this are the construction of airfields in sensitive areas such as wetlands, contrary to the provisos of the EIA.

6.4.3 Utilization of indigenous vegetation

The development of infrastructure on VCWS rely, at least to a certain extent, on the use of local building materials such as Jeka for thatching purposes, and the local communities will still be permitted to utilize the natural resources as in the past (provided, of course, that it happens in a sustainable manner). It is therefore imperative to firstly ascertain what, how much and which species are utilized. At present there has been no specific monitoring project aimed at ascertaining what and how much is being used by the inhabitants. This will be addressed as uncontrolled harvesting could lead to further impoverishment of the biodiversity of the peninsula. Once this information has been obtained it needs to be compared to the distribution and abundance of these resources in order for any operational management plan to be compiled. Sustainable utilization can only succeed if it is managed properly. An OP will be compiled to deal with the utilisation of natural plant material.

6.4.4 Alien vegetation

The distribution of alien plants, particularly cashews, is widespread in the sanctuary, but has not reached crisis proportions yet.. Although evidence exists that this species coppices if cut down and is seeding itself out, it is considered unnecessary at this stage to initiate a control campaign, but rather to wait and see what impact the introduction of elephants might have on these plants. Should this not affect the alien species then trees should be cut down and the stumps treated with an acceptable and suitable arboricide. The aspect of alien plants will be dealt with in an OP

6.4.5 Dune vegetation

The removal of the causative agents of destruction in dune forest will have a beneficial effect on the vegetation, allowing some regeneration to take place. De Koning & Balkwill (1995) found on an evaluation of aerial photographs, that with protection over a period of 30 years, the dune forest and thicket community on Inhaca Island had shown signs of recovery. This could be further enhanced and speeded up by the planting of seedlings of the larger

constituent species. However the siting of the housing sites within this vegetation community along the northern terrace, will have a considerable negative impact. Each site permits an area of 25 m from the site peg or 500 m², to be developed. In total the vegetation in the north would be reduced by 5000 m², or half a hectare. This does not sound like much but the extent of the vegetation is only a few hectares much of which a sizeable percentage has already been opened up by the previous inhabitants (who resettled recently as an effect of the VCWS development). The effect on the remaining vegetation will be greater because of the anticipated clearing of the undergrowth including small trees and shrubs for construction purposes, allowing further desiccation to take place. An access road has already been put through this vegetation, further reducing the extent and condition of the vegetation. On site accommodation for caretakers as well as access to the property by such persons and their visitors will still have to be provided. The problem of sewerage disposal as well as other waste products, have been addressed in the EIA (Lambrechts, 2001c), but the situation will have to be carefully monitored. All of these will have to be managed and areas of disturbance minimised by rehabilitation, using plants occurring locally. The existing housing estate rules will be augmented by the preparation of an OP dealing specifically with dune and foreshore/littoral vegetation.

6.4.6 Beach access

Access to beaches and boat launching and mooring sites will be strictly controlled to avoid damaging the sand binding plants located along the strand or littoral zone. Such access would be via boardwalks constructed, especially in mangrove areas, above the air roots to prevent the indiscriminate trampling of these roots.

6.4.7 Mangroves

Former settlements may have resulted in the deterioration of the mangrove community, in which case the area should be rehabilitated by the planting of hypocotyls or seedlings. A survey to determine if any undue damage did indeed take place, will need to be undertaken.

6.4.8 Development affecting the dune barrier cordon

The dune barrier cordon (or Spit) on the Indian Ocean coast has, due to the sensitivity of the young and dynamic dune system been zoned as a natural area with no formal lodge development being allowed (see Part F). However, two lodges with a total of 80 beds must still be developed and indications are that the VCWS developers are looking at the dune barrier cordon in this regard. Should development along the Spit take place notwithstanding the zonation of the area, then extensive dune stabilization, based on the results and recommendations of an in-depth EIA investigation, will have to be undertaken. Areas where blowouts have occurred should also be investigated and vegetation re-established. There are many plants suitable for dune rehabilitation including grasses such as *Sporobolus virginicus*, sedges such as *Cyperus crassipes*, forbs such as *Carpobrotus junodii*, *Ipomoea pes-caprae*, *Canavalia rosea* and *Scaevola plumieri*. This may be done using the seeds or in some cases the cuttings of the plants. The exposed sand should be covered by brush lying between pegs to prevent it being blown away and the area seeded. Shrubs including *Sophora*

inhambanensis, *Diospyros rotundifolius* and trees such as *Acacia* sp. cf *grandicornuta* could also be seeded out at the same time. Success has been achieved on Inhaca Island using this approach (De Koning & Balkwill op. cit.). There are many other plants available which are common constituents of dune vegetation and which could also serve this purpose. The EIA's will, if such development should indeed take place, provide strict rehabilitation guidelines to be adhered to and mitigative measures to be taken by the developers. An OP dealing with the dune vegetation has already been mentioned above.

6.4.9 Plant nursery

In order to assist shareholders and developers to obtain the right plants to rehabilitate areas disturbed during construction, it is recommended that plants specific to those areas be propagated. This requires that provision for a small nursery be made, constructed and operated by a motivated person. The use of such plants would be mandatory and not optional, and they would be sold to the developers. In addition such a venture would create jobs for local inhabitants. It is imperative that such an undertaking be started as soon as possible in order to have plants available for current developments. Any future development planning should involve the nursery to ensure that sufficient plants of the right species be propagated and available when required. The VCWS-GM will investigate the possibility of utilising the new indigenous nursery that has recently been established on the mainland at Vilanculos, rather than setting up a separate nursery in VCWS.

6.4.10 Roads and airstrips

It is important to site roads and airstrips where these will impact least on sensitive plant and animal communities. This means avoidance of ecotones, seepages, dune forest, salt marshes and mangroves, and compliance with the EIA's. Such development cannot be properly planned without the aid of aerial photos, but the following aspects need to be followed up:

- Where current roads threaten the integrity of sensitive habitats, populations of plants or animals these should be re – routed. One such road is that between Msasa camp and Dugong lodge. No road should traverse the salt marsh and the only approach should be the main track, which should swing wide to avoid the marsh as far as possible. Elevating the roadway on stilts in the most sensitive areas should be considered.
- The construction of the latest airfield on the edge of a salt marsh took place contrary to the provisos of the EIA (Lambrechts 2001c). Current efforts at draining the salt marsh adjacent to the airfield cannot be condoned and is unlikely to solve the problem. This airfield should be rehabilitated and a properly planned airfield constructed under proper supervision in an area of lesser sensitivity.
- The road through the colony of *Tritonia moggii* (see Part B) should be rerouted to the fence line which runs close by, allowing the population to recover. Wherever Red Data Book (RDB) plants are threatened or in any way likely to be affected by a development such development should be re-sited. Where this turns out to be impossible, plants could be relocated to safer sites nearby should this be feasible.

6.4.11 Fire management

Burning programme: Due to the time constraints and lack of baseline data that faced the TDS's involved with the compilation of the BMP, it was not possible to investigate the need for and to prepare a burning programme. The impact of fire on the area has already been discussed (see Part B). Fire is an essential management tool if one is going to manage the area for both the fauna as well as the flora. It will, however, be necessary to prevent fires in dune thicket/ scrub and to reduce their effect on bushclumps as far as possible. This is essential if one is trying to maximise the utilization of the area by the fauna and at the same time promote the regeneration of these communities. Increasing the size of bushclumps and re-establishing the integrity of the coastal thicket will recreate lost or damaged habitats for thicket loving species such as Nyala, Bushbuck, Red duiker and Suni. This can be done by reducing the frequency of fires, by subdividing the area into burning blocks creating a mosaic of conditions, with a burning frequency of every 2 -3 years, or according to the build up of moribund material. Depending on the objective burns may be "hot" or "cold", the former used to control woody vegetation and the latter to reduce the effect on such vegetation. Cold burns are usually implemented following rain, when the vegetation does not burn with an intense heat. Burning should not take place on windy days as such fires cause extensive damage to bushclumps and forest fringes. Where possible burns should be away from forest areas towards open miombo woodland and not *vice versa*. It may be necessary to create firebreaks around the thickets in order to protect them. The re-establishment of these communities should be considered a priority as they currently house the rarest and most threatened plant and animal species. The burning programme will be included in a fire management OP, and will be compiled with the aid of a contracted TDS.

Firebreaks are essential to control wild and set fires in the sanctuary. With the assistance of aerial photographs firebreaks can be planned for maximum effect according to the objectives of the burning program. The principles and procedures regarding firebreaks will be included in the fire management OP

Fire records: The VCWS-GM will ensure that accurate records of all fires, planned or otherwise, be kept. These will consist of a fire record sheet and a fire map (as indicated in the OP). The record will include the extent of the fire, date, time, weather conditions, intensity of the fire, actual or assumed cause of the fire, and an account of any suppressive actions taken.

Photographic monitoring of vegetation: Prior to the introduction of large mammals, it would be prudent to take a series of fixed-point photographs of different vegetation communities in order to assess possible changes that may take place as a result of the re-introduction and associated management practices. This could be used as an early warning system for management techniques to be amended as necessary, and would assist in executing the policy of adaptive management.

Indicator species: An easily recognisable species such as Torchwood *Balanites maughami*, who is a typical associate of bushclumps, could also be used as indicator species of potential change. Monitoring the numbers of trees per unit area will be a convenient starting point.

Operational plans:

A number of OP's that will need to be compiled in order to effectively manage the vegetation of VCWS have been identified above, and will need to be compiled. The assistance of contracted TDS's will be enlisted as necessary, with both the VCWS-GM and the GEF PM (Implementation) being involved.

CHAPTER D7: CONSERVATION, UTILISATION AND MANAGEMENT OF AVIFAUNA

7.1 PRINCIPLES AND POLICIES

The avifauna of VCWS has been described in Part B.

Due to the limited time available during the planning process that led to the compilation of the BMP, and the fact that, in common with much of the coastal regions of Mozambique, very little quantitative data on the avifauna of the Quewene Peninsula exists, future inventory surveys as listed below will need to be undertaken. Such surveys would be undertaken by a suitably experienced TDS with an extensive conservation background. If such a specialist turns out not to be a Mozambican, the assistance/involvement of a knowledgeable Mozambican(s) would be enlisted if at all possible.

It is inevitable that the follow-up survey would necessitate some changes to the avifauna chapters of this BMP, and would result in an updated conservation and management section. An OP with the provisional title: *Conservation and Management of the Avifauna of VCWS* would thus be compiled as soon as the follow-up avifauna survey has been completed.

7.2 MANAGEMENT OBJECTIVES

7.2.1 Rationale

In anticipation of the OP mentioned in section 6.1 above, the following specific avifauna management objectives must be regarded as reflecting the current rather limited knowledge of the avifauna of VCWS. The approach has been to use the best available information and expertise to identify priority species that may require special conservation measures.

This provisional list of species and management objectives will be broadened as and when additional data becomes available. Changes to the avifauna chapters of the BMP would inevitably be the result of the follow-up baseline surveys that will be undertaken.

7.2.2 Specific avifauna management objectives

The provisional objectives for management of the avifauna of VCWS are:

- To undertake a follow-up avifauna survey during mid-summer.

- To compile an OP as indicated in section 6.1 above.
- To ensure that the general vision and objectives of VCWS (see Part C) are adhered to with regards to the conservation of the avifauna.
- To ensure that adequate management attention is given to the priority species indicated in Part B above.

7.3 THREATS

The avifauna of the VCWS is currently not faced with any serious man-induced threats (see Part B). The situation will be reevaluated as a result of the planned follow-up baseline survey.

7.4 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS AND MONITORING

The following provisional management priorities, options and actions and monitoring needs have been identified, and will be fully dealt with in the OP:

- A mid-summer survey of the Sanctuary's avifauna is needed. This should ideally be undertaken by two or more specialists over a period of at least a week. During this survey all the habitat types represented in the VCWS should be covered.
- A set of recent aerial photographs (ideally, but not necessarily in colour and ideally at a scale of 1:20000 or less) of the Sanctuary would greatly facilitate the mapping of different habitats, including the woodland types, the swidden areas and all the wetlands, and would enable allow the extent of these habitats to be measured. This has many practical avifauna applications, including the estimation of population sizes of key species. Recent aerial photographs are unfortunately not available, and site-specific photographs will have to be taken.
- Because of the importance of the waterbird community, all the wetlands should be mapped. From this a cross-section of wetlands should be flagged for monitoring. Water levels at the selected sites should be measured at regular intervals and regular counts should be made of all the waterbirds on these wetlands. This should be ongoing, ideally done by resident staff, so as to build up a picture of the seasonality, diversity and dynamics of the waterbird community.
- A field checklist of birds should be prepared for general distribution (e.g. a folded card, or a single-side A4 sheet) and an effort made to involve both resident staff and visitors with an interest in birds to use these to record all the birds they encounter in the Sanctuary. The lists should be compiled on a monthly basis and will help build up a more complete inventory of the Sanctuary's bird life. It will also provide a means of noting supporting details when new species are recorded.
- A quantitative survey that focuses on the 19 threatened bird species recorded in the Sanctuary should be considered. This should aim to determine population sizes, preferred areas and seasonal status of each. It would of necessity need to cover several months and could be undertaken by for example a graduate or post-graduate student as a course project.
- Sites for a few hides/viewing platforms should be selected and, when visitors numbers grow, have these built. A bigger number of smaller (max of 10 people) hides

are always better than a smaller number of large (>10 people) hides. The structure and layout of the hides will be based on other well-designed and comfortable hides.

- Several species-specific conservation actions have been mentioned above (flamingo breeding site, oxpecker introduction, Pygmy Goose nest-box plan, Saddle-billed Stork nest location and monitoring; heron breeding site on Lake Manhale). Each of these would require individual investigation and would be dealt with during the fieldwork phase of the OP.
- A proposal to have the Sanctuary recognised by the Ramsar Convention as a wetland of international importance will be drawn up and submitted in due course. This will require a more quantitative assessment of the avifauna of the wetlands to be made and for more information of the waterbird populations in the area in general to be obtained. The surveys mentioned above will provide the necessary motivation for the application.

Operational plans:

A number of OP's that will need to be compiled in order to effectively manage the avifauna of VCWS have been identified above, and will need to be compiled. The assistance of contracted TDS's will be enlisted as necessary, with both the VCWS-GM and the GEF PM (Implementation) being involved.

CHAPTER D8: UTILISATION OF TERRESTRIAL WILDLIFE

8.1 POLICIES AND PRINCIPLES FOR THE SUSTAINABLE USE OF TERRESTRIAL WILDLIFE

8.1.1 The operational context for the Terrestrial Wildlife Strategic Utilisation Plan

8.1.1.1 Ownership of terrestrial wildlife

The principle stated in the 2001 Bio-Business Plan (Lambrechts 2001a) namely that the terrestrial wildlife of VCWS, including the relocated wildlife, would belong to the local communities, has been reaffirmed. The following Terrestrial Wildlife Strategic Utilisation Plan (TWSUP) has been structured to accommodate and reflect this principle, and to provide a framework for the implementation of the plan.

8.1.1.2 Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the following model for the utilisation of the terrestrial wildlife of VCWS is largely based on the abovementioned model (the 10-point Marine Resources Strategic Utilisation Plan or MRSUP) for the utilisation of marine resources (see Part D). The TWSUP is, for the sake of brevity, not described in the same detail as the marine resources plan. Many of the principles and explanations embodied in the MRSUP would *situ situ* also

be applicable to the terrestrial plan, and should be read in conjunction with the TWSUP that follows below.

Unless it is stated otherwise in the text, the term “wildlife” as used in this section would primarily refer to mammals.

8.1.2 The Political and Administrative Context

The political and administrative context for the development and deployment of the TWSUP is the same as for the MRSUP (see above). Unlike the marine resources, where a shared resource is at stake with VCWS being one of a number of role players, the wildlife of VCWS could be regarded as a demarcated and controlled resource where the necessity of regional cooperation and compliance with regional frameworks would not be as critical.

8.1.3 The Developmental Context

The plan for the sustainable use of the terrestrial wildlife resources (referred to as the TWSUP) that follows below does not stand on its own. It is fully cognisant of, and fits into the larger development plan and BMP for the sanctuary.

From the point of view of overall development on the VCWS the TWSUP takes particular note of and reflects the following developments and issues:

- Whereas the terrestrial wildlife of the sanctuary in the past had only a limited local value as a source of food and possibly by-products such as skins, the relocated wildlife would have a huge monetary value. The most attractive form of utilisation, at least from the viewpoint of the local communities, would be the consumptive use of the resource by means of trophy hunting. The VCWS, and especially the southern portion of Phase I and Phase II to the south, would offer an almost unparalleled trophy hunting experience: the unspoilt and undeveloped coast to the east and the miombo woodlands and wetlands on the land, all in one package. To add to the uniqueness of the package, the hunting client would also have the opportunity for deep-sea sport fishing on offer. The hunting safaris would, at least for the duration of the GEF project but probably much longer, be offered and run by experienced, contracted hunting outfitters on behalf of the local communities. This facet will be dealt with and managed in accordance with an OP that will be compiled in due course.
- Although the local tourist market from the three lodges and the 50 upmarket residential units will be expected to pay a donation for the privilege to visit the remote areas of the sanctuary and to view the wildlife, the revenue to be gained by the local communities from these user fees would be relatively small. Free access to the VCWS was implicit in all the buyer’s contracts, but a system of voluntary contributions to the Community Development Fund (see Part L) by means of strategically placed donations boxes would be implemented.
- The possibility to train and equip local guides for guided walks by tourists and/or residential estate owners in the wildlife area of the sanctuary, will be investigated. An OP will be a prerequisite before embarking on this venture.

- Experienced and qualified staff will be appointed to deal with the development and management of the plan.

8.1.4 Lessons learned

In the “lessons learned” section of the marine resources plan (MRSUP) particular attention was devoted to lessons that could be learned from past experience and other projects. These lessons were discussed in some detail and would not be repeated here. Notwithstanding the fact that they dealt with a marine resources plan, they could be universally applied and should also be considered when planning, implementing and managing the terrestrial wildlife utilisation plan (TWSUP). The following “lessons” were listed:

- Timing (the time is ripe to launch the terrestrial wildlife programme)
- Scale (the plan is tractable)
- Project size (the 7-point plan breaks the TWSUP down in manageable units)
- Communication (local communities to be informed; use appropriate channels)
- Participation (TWSUP must have maximal community involvement)
- Decentralisation (use the local civil authorities: support; advice)
- The human resource (also involve women and youth)
- Cost and benefit (real benefits will lead to behavioural change)
- Partnerships (who owns who and who gains what)
- Private sector involvement (foster private sector initiatives inside community)
- Monitoring and evaluation (involve community)
- Research and data collection (involve community)
- Sustainability (build human capacity)
- Ownership (vested in the community; concept of co-management)

As far as could be determined, the VCWS model where the local communities are empowered to the extent that full ownership of valuable and expensive relocated wildlife would be transferred to them, is unique in the southern African region and probably in Africa as a whole. The VCWS management would therefore have no access to other similar experiences and could not directly benefit from lessons learned by them.

Notwithstanding the groundbreaking nature of this venture, the following factors borrowed from related projects and activities elsewhere will be considered when setting up and managing the process:

- It would be totally impossible for the local people to accept and cope with all the responsibilities inherent in their ownership of the wildlife overnight. Aspects such as population structures (sex and age), habitat conditions and distribution and dispersment of animals would be totally alien to them and could thus hardly be delegated. VCWS management would therefore have to retain a large degree of operational autonomy when dealing with these aspects on behalf of the communities.
- Sustainable use requires proper assessments of resources and mechanisms for effective regulation (IUCN 1999). The short, medium and long-term management

of the relocated wildlife populations of VCWS would be dependent on a degree of scientific sophistication that would be lacking in the communities for some time to come. Quotas to be harvested, for example, as well as deciding on suitable harvesting methods, would need to be determined by specialists. Again, a direct involvement by VCWS management to guide and manage the process would be inevitable.

- Trophy hunting requires not only a good product, but also excellent facilities, effective marketing and highly experienced and trained staff. In this regard the Zimbabwean “campfire” (an acronym for “communal areas management programme for indigenous resources”) programme could serve as an example of the sustainable and profitable utilisation of a product (wildlife) by means of an acceptable process (trophy hunting) through a contracted specialist (professional hunter) on behalf of the people living in the area (financial gain). In the communal areas of Zimbabwe’s game rich rural districts, the local people are greatly benefiting from the proceeds of trophy hunts of excess wildlife inhabiting the areas under their jurisdiction. The monetary value attached to a potentially destructive large animal such as an elephant, far outweighs the damage that it could cause to crops, with the result that wildlife conservation became the norm. The campfire programme started in 1989 and by 1997 26 out of 57 districts in Zimbabwe were active participants (IUCN 1999). In VCWS it could be anticipated that the local communities would eagerly accept a similar system. Unlike Zimbabwe, where the programme is managed at district level and the benefits thus tend to be greatly diluted before it actually reaches the people themselves, in VCWS bureaucracy would play only a minor role and it would be possible to devolve a larger percentage of the financial benefits down to grass-roots level.

8.1.5 From lessons to principles

The principles that were considered and accommodated in the formulation of the TWSUP are generally similar to those used for the marine plan and may be summarised as follows:

- The plan will be as simple as possible in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.
- The plan will not be built on sustained outside intervention and funding, but implementation and accountability will be transferred to the “owners” of the resource as soon as possible.
- The plan will only succeed if the local communities perceive and experience the benefits to be real and sustainable.
- The TWSUP, once the BMP is approved, will be workshopped with the local people to ensure that psychological and functional ownership of the plan is vested in the “owners” of the resource according to the principle of co-management.
- Without the formal community structures as outlined in the TWSUP below and elsewhere in the BMP being put in place, the implementation of the plan would be jeopardised.

8.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE TERRESTRIAL WILDLIFE STRATEGIC UTILISATION PLAN.

8.2.1 A seven-point procedure for implementing a terrestrial wildlife strategic utilisation plan for VCWS

A simple 7-step process, based on the same principles as the MRSUP is proposed for the TWSUP for the VCWS. The steps are interlinked in a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may cause the entire management process for terrestrial wildlife to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion. Most of them also require a lead period of awareness building.

The seven steps are:

- Step 1: Identify interested stakeholders and appoint appropriate staff to develop and manage the process and the implementation of the plan.
- Step 2: Establish the Sanctuary Wildlife Association (SWA), develop a vision and elect a Terrestrial Wildlife Steering Committee (TWSC)
- Step 3: Draw up a constitution for the SWA
- Step 4: Undertake an effective information and education programme
- Step 5: Establish channels for meaningful contact/interaction and co-management with VCWS management and the Community Representative Committee (CRC)
- Step 6: Partake in appropriate VCWS management actions
- Step 7: Establish structures and procedures for the equitable distribution of benefits

8.2.2 Application of the 7- point plan.

For each step the purpose is briefly noted, the rationale is given, and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers (threats) is given.

STEP 1: IDENTIFY INTERESTED AND INVOLVED STAKEHOLDERS AND APPOINT DEVELOPMENT/MANAGEMENT STAFF

(1) Purpose

The purpose of Step 1 would be to identify all the stakeholders who should be involved in the management and utilisation of the terrestrial wildlife of VCWS and to appoint staff to deal with the development and management of the plan..

(2) Rationale

The decision that the wildlife of the VCWS will belong to the local communities, has already been taken in 2002 (Lambrechts 2001b). The implications of this decision are far reaching and include the following:

- Unlike the easily identifiable and relatively restricted fisher community dealt with above, the stakeholders who would be involved with the wildlife management project would thus include the total community residing in the VCWS, about 9000 people. The wildlife resource would thus belong to everybody, including the fishers.
- The terrestrial wildlife resource that used to occur in the VCWS region, has been overexploited to the point of local extinction for all the major species, including herbivores and carnivores. The wildlife population has thus already arrived at the point where some of the more vulnerable marine species are currently headed.
- In contrast to the acknowledged and long-established rights of the fisher community to utilise the marine resources, the original vested rights of the local communities residing in the VCWS to harvest the terrestrial wildlife resources, have lapsed with the local disappearance of the resource. They can thus strictly speaking not lay claim to a resource that would be re-established by the developers of the land. This fact notwithstanding, the developers (EAW) will only act as custodians of the land on behalf of the people of Mozambique, therefore the decision to transfer ownership rights of the wildlife to the local communities was taken as a gesture of goodwill. By doing so, the company also indicated that making money from the wildlife resource would not be a prime objective. Nevertheless, the utilisation model that will be employed will be based on the principle of co-management and will certainly not rule out the need for the commercial exploitation of the resource.
- The wildlife restoration and management plan would thus start from zero, with no existing base to operate from and no established ethic of sustainable utilisation present amongst the inhabitants of the sanctuary. The local communities would thus obtain ownership of a totally new resource, and one that would be almost alien to especially the younger generation. Although it proved to be extremely difficult to determine with any degree of accuracy when the bigger ungulate species disappeared locally, it seems likely that it took place even prior to the civil war of the 1980's. Some of the older men, however, can still remember having seen or heard of elephant and buffalo in the region as recently as 12 to 15 years ago.
- The situation with regards to ownership of the terrestrial wildlife would thus be totally different from the current situation with regards to marine resources. On the one hand (marine) we are looking at conserving, utilising and managing an existing resource, on the other (terrestrial) at establishing an effective conservation, management and utilisation system for a newly introduced resource.
- Unlike the marine programme where the resource is known, appreciated and understood by the resource users, in the case of the terrestrial resource such a knowledge base would be totally absent. Whereas active involvement and even enthusiastic cooperation by the fishers to implement the marine management plan could be anticipated, such a level of involvement would, initially at least, probably be lacking for the terrestrial resources and would have to be established over time.
- Whereas the Marine Resources Strategic Utilisation Plan dealt with a resource that is shared amongst the fisher communities of the Bazaruto – Quewene – Vilanculos

region, the fenced-in wildlife of VCWS must be viewed as a closed entity. Outside influences and participation in the conservation, management and utilisation of this VCWS-owned resource would thus be negligible. However, civil servants will play a role in a number of existing and proposed new structures that have been or will be established to deal with the management of VCWS's marine and terrestrial resources.

- Permanent staff will have to be appointed to deal with the development and management of the plan (see Part L)

(3) Actions to be taken

- A full population census of the human residents of VCWS should have been completed by the fourth quarter of 2002. This census would indicate who the role players in the TWSP would be. However, it would be impractical to regard the scattered population of an estimated 9 000 people inhabiting a relatively large area as a single audience. It would also, due to the distances involved and the total lack of a transport system, be impossible to arrange for a single mass meeting to inform everybody simultaneously of the pending actions.
- A series of community meetings will thus be held to inform the local people of the intention to firstly involve them as partners in the venture, secondly to transfer ownership rights of the to-be-released wildlife to them, thirdly to establish a Sanctuary Wildlife Association (SWA) and finally to nominate persons to represent them at the meeting where the SWA will be formally established. (See Step 2 below). The community meetings will be the same meetings where similar actions will be taken with regards to the agricultural development plan (see Chapter D12 below). Both topics will be dealt with at the same time.
- Appropriately qualified and experienced staff will have to be appointed to deal with the development and management of the plan.

(4) Threats

- No serious problems and certainly no threats are foreseen that may jeopardise the implementation of Step 1.

STEP 2: ESTABLISH THE SANCTUARY WILDLIFE ASSOCIATION, DEVELOP A VISION AND ELECT/APPOINT APPROPRIATE STRUCTURES

(1) Purpose

The purpose of Step 2 would be to establish structures to represent the community's interests with regards to terrestrial wildlife.

(2) Rationale and actions to be taken

It would be totally impossible to involve the amorphous mass of people inhabiting the sanctuary as a single entity in the management and utilisation of the terrestrial resources of

VCWS. However, the same democratic principles built into the marine resources management system outlined above, would be applied in this case too.

At the series of mass meetings mentioned above (Step 1), the objectives and establishment of the Sanctuary Wildlife Association (SWA), the need for an elected committee (the Terrestrial Resources Steering Committee or TRSC) to represent the communities and the need for an implementation team (the Terrestrial Resources Project Implementation Team or TRPIT) would be discussed. A draft mission, vision and objectives will also be discussed. The venues and arrangements for the meetings will be the responsibility of VCWS management, but the demarcated Chief's regions or circles may be the most practical option.

In the case of the SFA all the fishers could, and need to be, accommodated as members of the association, due to the small numbers of individuals involved and also because all the fishers are directly involved in the utilisation of the marine resources. The situation with regards to the terrestrial wildlife, however, differs appreciably from that of the marine resources management system outlined above.

The following aspects and principles will guide the establishment of the terrestrial wildlife management system:

- Only a small number of the VCWS inhabitants would be directly involved in the management of the terrestrial wildlife. It would be impractical to try and involve everybody.
- Membership of the SWA would thus be limited to three elected representatives or delegates from each of the regions or circles. These representatives would represent their specific regions on the SWA.
- Knowledgeable outsiders will be co-opted onto the SWA, for example representatives from the District Administrator's Office in Vilanculos and the Director of the Bazaruto National Park.
- The effective scientific management of the terrestrial wildlife resource would be dependent on a high level of experience and expertise from the practitioners. The real management actions will thus of necessity be the responsibility of wildlife management specialists, as will the compilation of Operational Plans (OPs).
- To ensure meaningful participation in the process by the "owners" of the wildlife, the duties and responsibilities of the SWA will make provision for direct and ongoing dialogue with the TRPIT (see below) and/or VCWS management.

The regional delegates to the meeting/workshop where the SWA will be established, will be expected to elect a Terrestrial Resources Steering Committee (TRSC). The TRSC will be chaired by a person elected to the post. The composition of the TRSC will not be prescribed in any way, and will not necessarily reflect the regional composition of the SWA. The best individuals for the job will hopefully be elected, irrespective of where they live. A representative from the District Administrator's office in Vilanculos, possibly from the local Directorate of Agriculture and Rural Development, will be invited to serve on the TWSC.

The TRSC will be a specialised sub-committee of the over-arching Community Representative Committee (CRC), who will be the democratically elected body representing the local communities residing in VCWS (see Part L).

The TRPIT will be headed by a specialist appointed by VCWS management, or, if necessary, initially by a contracted Temporary Duty Specialist (TDS). The TRPIT will be composed of specialist conservation practitioners (whether employees of the company or contracted TDS's) and no provision will be made for local representation on the team. The interests of the SWA will be safeguarded by the fact that the TRPIT will report to the TRSC.

The reasons for having a TRSC and a TRPIT would be comparable to that mentioned above for the similar committees of the MRSC:

- In the case of the TRSC, the committee will act as representative of the SWA and mouthpiece of the local communities regarding all terrestrial wildlife-related aspects of VCWS.
- The TRPIT will be responsible to get the job done and will deal with implementation according to the OP (see below).

During the meeting the draft vision, mission and objectives for the SWA will be discussed and finalised, as well as terms of references for both the TWSC and the TWPIT.

Physical space will need to be made available for the SWA and especially the TWSC to operate from. It would be a good idea if the facility could be shared with the fisher community (the SFA and MRSC, see section .. , Part ..) The community centre at Goshen or the nearby market at Marape will possibly be a good locality.

(3) Threats

No threats are foreseen that may hinder the establishment of the SWA and the associated committees.

STEP 3: DRAW UP A CONSTITUTION FOR THE SWA.

(1) Purpose

A constitution will need to be drawn up to regulate the activities of the SWA, the TWSC and the TWPIT.

(2) Rationale and actions to be taken

A concise but clear constitution for the SWA would be necessary to ensure that the vision, mission and objectives of the association are met. The constitution will spell out the responsibilities and actions of the various role players involved with the management and utilisation of the terrestrial wildlife resource of VCWS, as well as the procedures to be followed to ensure orderly operations. A grievance redress mechanism and procedure will be

built into the constitution, to ensure that any grievances that could not be resolved internally within the SWA structures, are timeously addressed and resolved.

The constitution will be compiled by the TRPIP, assisted if necessary and at the discretion of the VCWS General Manager (VCWS-GM), by a TDS. The document will need to be approved by the VCWS-GM as well as the GEF Project Manager (Implementation) and will also be available in Portuguese.

(3) Threats

No threats that may thwart the establishment of the SWA are foreseen.

STEP 4: UNDERTAKE AN EFFECTIVE INFORMATION AND EDUCATION PROGRAMME

(1) Purpose

The purpose of Step 4 would be to inform the local communities of the wildlife reintroduction programme in general and the adopted terrestrial wildlife management system in particular.

(2) Rationale and actions to be taken

As was pointed out above, the VCWS communities would be faced with a totally foreign situation virtually overnight. The decision to re-introduce the wildlife species that used to occur in the region in historical times to VCWS, had, or will have in the near future, a variety of far-reaching social impacts:

- A number of households had to be resettled in order to minimize the potential harmful impacts of large and potentially dangerous species such as buffalo, elephant and hippo
- A game-proof electrified fence had to be erected to prevent the relocated wildlife from leaving the VCWS and moving onto communal lands where crop damage would take and conflict with humans would arise. The fence would not only keep the wildlife “in”, but would also restrict or at best hinder the free movement of the local people onto some of the areas that they used to frequent in the past.
- The presence of wild dangerous big game in the natural area of the VCWS would, even though access to the area would not be prohibited, hinder the free movement of the local people to gather firewood, wild fruit and berries; to fish in the fresh water lakes or in the sea and estuary, or even to harvest fruit crops such as cashews and coconuts from trees growing in the fenced-in area. A system of controlled access to the natural area will be provided, but the presence of big game could still be experienced or perceived as an aggravating circumstance. A negative perception of the presence and value of the wildlife would then inevitably take root.
- Most of the local people, on an individual basis at least, would be unaware of the advantages that the re-established wildlife would hold for them. They would either be

unaware that “ownership” of the terrestrial wildlife would be centred in the communities, or that the wildlife should be regarded as a major asset with huge economic benefits for all

- An unknown number of local people still hunt the small game such as duikers that have survived in VCWS, albeit in relatively low numbers. These hunting activities would have to be curtailed in the natural area of the sanctuary, and especially as far as the reintroduced wildlife are concerned. Poaching may become a problem if the local hunters could not be convinced of the real advantages, especially in economic terms, arising from the presence of the big game animals.

A so-called Consultation and Information Disclosure Programme (CIDP), based on principles prescribed by the International Finance Corporation (IFC) was accepted for VCWS in 2001 (Lambrechts 2001b), but has not been implemented due to various constraints. This CIDP will be revitalised during the implementation phase of the BMP and will amongst others deal with the information and education needs identified in the TWSP (see Parts G and H)

As part of the education programme, selected members of the SWA, all of them probably serving on the TWSC, would be exposed to big game situations elsewhere, possibly on wildlife areas in the eastern Lowveld of South Africa. They would then be better equipped to “spread the word” about what it means to be in close proximity to species such as elephant and buffalo. After the arrival of the relocated big game, other leading members of the local community would receive the same on-site “training” or exposure.

A comprehensive information programme, aimed at the whole community but harnessing the TWSC and especially the SWA, would be launched as part of the CIDP to ensure that everybody is informed about the following:

- Ownership of the wildlife
- The benefits arising from such ownership
- How these benefits would be shared
- How the terrestrial wildlife resource would be managed
- The role of the SWA, TWSC and TWPIT.
- The co-management process
- The role of VCWS staff in the management process
- Grievance redress procedures and mechanisms

This information programme would be the responsibility of VCWS management, but the VCWS-GM may at his discretion enlist the services of a contracted TDS to ensure that the message is presented in an acceptable and effective manner.

STEP 5: ESTABLISH CHANNELS FOR MEANINGFUL INTERACTION AND CO-MANAGEMENT WITH VCWS MANAGEMENT AND THE COMMUNITY REPRESENTATIVE COMMITTEE

(1) Purpose

The purpose of step 5 would be to establish effective channels of communication between all the role players who would be involved with the implementation of the TWSP

(2) Rationale and actions to be taken

After the establishment of the SWA and the TWSC, procedures would have to be put in place to allow meaningful and effective two-way communication between the TWSC representing the SWA on the one hand, and the VCWS management staff and structures on the other. Open lines of communication must also be established with the Community Representative Committee (CRC) (see Part L)

The community association and committee dealing with the marine resources (the SFA and MRSC respectively, as identified above), would, due to the hands-on involvement of the fishers with the proposed management structure, find it relatively easy to become and remain involved in co-management or collaborative ventures involving the marine resources. The fishers would effectively be the driving force behind the marine resources management actions.

In the case of terrestrial resources, as was pointed out above, such a direct or hands-on involvement by the SWA and the TWSC would not be feasible. The actual management actions would need to remain the responsibility of experienced and properly trained staff in the employ of the company. However, ownership of the resource would remain vested in the local communities, and structures and channels of communication would have to be established to ensure that management policies and actions reflect the wishes and serve the best interests of the owners of the resource.

The structures recommended above (the SWA and TWSC) would represent the communities, whereas the following channels of communication, actions and/or policies to be communicated and procedures are envisaged:

- The terrestrial resources strategic plan, as well as all the other plans that will have an impact on the management and utilisation of the terrestrial resources, will be workshopped with the appropriate community structures (SWA and TWSC).
- The TWSC will have an open and direct channel of communication to appropriate VCWS management staff, especially the TWPIT. If the TWSC should so choose, they may also channel the communication through the CRC.
- The TWSC will also have an open and direct channel of communication to the CRC (and *vice versa*).
- These communications or contacts may be on a personal basis (handled by one or more delegates) or in written format, and may be formal (a pre-arranged meeting or a letter) or informal. In all instances, irrespective of the mode of communication that was used or the type of contact, the responsible VCWS staff will minute the proceedings and will provide a copy to the TWSC and/or the TWA.

- VCWS management staff, especially TWPIT members, will meet with the TWSC on a frequent basis, but not less than quarterly. Either party may request more frequent meetings if the need should arise.
- At the quarterly meetings, VCWS staff will present a quarterly report (verbally and in writing) to the TWSC. Particular attention will be paid to any problems, possible changes to policies, finances, consumptive or non-consumptive utilisation actions and the current status of the wildlife populations.
- The SWA will meet on a six-monthly basis, which meetings will be attended by VCWS management staff. The TWSC will meet as often as they wish, but not less than quarterly. VCWS management staff may be invited to attend these meetings. The proceedings of all meetings will be minuted and the minutes will be distributed to all concerned.
- VCWS management staff will, during the setting up period, assist the SWA and the TWSC in the administration of their activities with regards to record keeping and filing.
- The VCWS-GM will prepare and submit an annual report on the terrestrial wildlife of the sanctuary to the SWA. This report, as well as the other formal reports dealt with above, will also be available in Portuguese.

STEP 6: PARTAKE IN APPROPRIATE MANAGEMENT ACTIONS

(1) Purpose

The purpose of Step 6 would be to ensure that the local communities partake in relevant terrestrial wildlife management or related actions as identified in the constitution for the SWA.

(2) Rationale and actions to be taken

After the establishment of the abovementioned channels of communication, the next step would be to effectively harness these channels to allow active participation by the local communities in wildlife management or related affairs.

The constitution for the SWA would provide parameters for such an involvement. It may include, but will not be limited to, the following aspects:

- The appointment of staff that would be involved with terrestrial wildlife management in any capacity, should preferably be cleared with the TWSC or, if prior consultation should not be possible, discussed with them afterwards. The ideal would be for the VCWS-GM to submit a short list of candidates to the TWSC for their comments and recommendation.
- Certain terrestrial wildlife management plans or OPs may provide for hand-on involvement by non-employed members of the community. The VCWS-GM will ensure that such an involvement indeed takes place.
- The VCWS-GM will clear any anticipated changes to existing terrestrial wildlife management plans or policies with the TWSC.

- Disciplinary actions, including actions arising from law enforcement activities, will be communicated with the RWSC. In the case of envisaged internal disciplinary actions against a local transgressor of national laws or local policies, the assistance and recommendation of the TWSC will be mandatory in arriving at suitable punishment for the accused.
- The TWSC would be expected to bring any transgressions of wildlife laws that they may be aware of, to the attention of the relevant VCWS staff.

STEP 7: ESTABLISH A MODEL, STRUCTURE AND PROCEDURES FOR THE EQUITABLE DISTRIBUTION OF WILDLIFE-RELATED BENEFITS

(1) Purpose

The purpose of Step 7 is to establish a model, structure and procedures for the equitable sharing of benefits arising from the utilisation of terrestrial wildlife resources.

(2) Rationale and actions to be taken

Since ownership of the wildlife of the sanctuary resides with the local communities, it stands to reason that at least some of the proceeds emanating from the commercial and other exploitation of the resource will accrue to the communities.

The following possible types of utilisation and sources of income have provisionally been identified:

- As far as the communities are concerned, the most lucrative form of utilisation, financially speaking, would be trophy hunting safaris. (For a description of the policies that will apply and the procedures to be followed, see Chapter D8).
- Live animal sales would vie with trophy hunting for the number one spot in terms of financial returns (the operational expenses involved with live capture operations may, however, result in hunting returning the best net income).
- Excess meat, especially from trophy hunting safaris but at a later stage possibly also from culling operations, will be available for local distribution.
- Tourists and estate owners traversing the sanctuary will be expected to pay a “voluntary” donation for the privilege. Donation boxes would be placed at strategic points. (From the community viewpoint the ideal would have been to charge a standard access fee to all users. The contractual agreements between the developers and the investors, however, would rule out the mandatory payment of an access fee).
- Various other forms of non-consumptive commercial utilisation of the more remote regions of the sanctuary are currently under consideration, for example wilderness trails and even elephant-back safaris. Exactly how the local communities will benefit from these kinds of trails and safaris, have not been determined yet, but it seems likely that a percentage of the proceeds will be channelled to them.

The same principle that applies to the scientific management of the terrestrial wildlife resource, namely that it could only be handled by trained and experienced personnel, also

applies to the sustainable consumptive and non-consumptive utilisation of the resource. The communities would at best be ill equipped to offer and manage multi-faceted utilisation forms such as trails and especially trophy hunting safaris and elephant-back safaris.

This means, in effect, that the “owners” of the resource would have to contract knowledgeable operators to run the commercial enterprises on their behalf. The proven principles of the so-called campfire system in Zimbabwe would be applied to the VCWS situation. This system could briefly be described as follows:

- The local people would retain ownership of the terrestrial wildlife resources.
- The resource would be managed on their behalf according to the principles outlined above.
- The SWA and TRSC would be actively involved in all the decision-making processes and in formulating policies and procedures.
- Experienced operators would be contracted to ensure that the commercial ventures are financially viable.
- The provision and maintenance of the necessary infrastructure would be the responsibility of and for the account of the operators.
- The commercial operators would be expected to pay a predetermined annual fee for the specific rights, plus a percentage of the gross turnover.
- The operator’s contracts would be relatively long term in order to make the ventures financially viable.
- VCWS management, or the operations company that will succeed the development company GeoAfrica, will enter into contracts on behalf of the communities and will also be responsible for administering the contracts.
- The contracts as well as the procedures and policies that will be applied, will fall within the ambit of the SWA and the TWSC. The TWSC will “supervise” the different ventures on behalf of the communities.

It has, for obvious reasons, not been possible to estimate the amount of money to be generated by the abovementioned commercial ventures with any degree of accuracy. The turnover of trophy hunting safaris, as an example, would be determined by the availability of excess animals, the species and numbers that are available, and the number of hunts that could be accommodated. Although substantial sums of money may be generated it must be borne in mind that the VCWS happens to be inhabited by about 9 000 people, all of them being owners of the wildlife resource. Should the money be evenly distributed on a household or *per capita* basis, it would mean that each recipient would only receive a relatively meagre sum. The extent of money to be generated by trophy hunts has not been calculated yet.

However, it seems likely that the community funds generated by these commercial ventures, would be paid into the Community Development Fund (CDF; see Part L), which in turn will be managed and controlled by the CRC. Should the CRC decide to distribute the money evenly to all households in the sanctuary, it would be within their prerogative to do so. They may also opt to rather spend the money on community projects.

(3) Threats

The implementation of Step 7 probably faces no threats, but problems may arise if the community do not perceive the distribution of money and other benefits as being fair and equitable. The active involvement of the SWA and TRSC will go a long way towards preventing any unhappiness.

(3) Operational Plan

A detailed OP will be drawn up to deal with the implementation of the TWRSUP. Specific OPs may be needed for specific aspects such as the model, procedures and structures needed for Step 7. A decision in this regard will be taken by the VCWS-GM in consultation with the GEF Implementation Manager. All the OPs will also be available in Portuguese.

CHAPTER D9: CONSERVATION AND MANAGEMENT OF TERRESTRIAL FAUNA

9.1 PRINCIPLES AND POLICIES

An underlying principle in the establishment of the VCWS was the rehabilitation of the severely depleted biodiversity of the sanctuary, and the reintroduction of those terrestrial species that locally disappeared due to unsustainable utilisation.

The policy would thus be to firstly improve the status of the indigenous faunal population by means of an effective conservation action, augmented by a structured reintroduction programme, and secondly to manage and utilise the terrestrial biodiversity resources in accordance with acceptable international norms and standards (see above for the utilisation plan).

9.2 MANAGEMENT OBJECTIVES

It should be noted that very little baseline data exists on the current status and ecology of the wildlife of VCWS. The fact that the first phase of the wildlife reintroduction programme will only take place by mid-2003, also means that the success of the programme and the effects (ecological and otherwise) thereof will only become apparent at a later stage. The following management objectives for the terrestrial fauna, including domestic animals, of VCWS take cognisance of this fact, and should be regarded as provisional:

- To determine the status of the existing and reintroduced populations of herbivores using appropriate census techniques;
- To continue to develop baseline data on the occurrence of small terrestrial mammals by means of systematic trapping and to gradually develop a complete inventory;
- To establish the success or otherwise of the planned herbivore reintroduction programme;
- To identify any species that may need additional or special conservation measures or management attention;

- To monitor the effects of the relocated herbivores on the habitat in general, with specific attention to elephant and hippo;
- To prevent any long-term deterioration of the habitat such as accelerated soil loss, bush condensation or encroachment, or an unfavourable shift in herbaceous and woody species composition and structure.
- To control problem animals such as feral dogs.

In order to realise the more complex objectives outlined above, experienced TDS's would be contracted to assist the VCWS-GM.

9.3 PROBLEMS AND THREATS

It is clear from many of the points raised elsewhere in this BMP that the herbivore reintroduction programme would be fraught with a number of problems, some of which may even threaten the programme itself:

- The presence of potentially dangerous game in the fenced-in area would make access by the local people to the area problematical if not altogether undesirable. Such access to gather wood and fruit and to fish would be allowed, and provision has been made for a number of access points in the fence. The local people are totally inexperienced with regards to big game, and would find it very difficult to almost overnight cope and deal with the presence of dangerous game at close quarters. This problem has not been satisfactorily addressed yet, notwithstanding the approved recommendations of the Bio-Business Plan (Lambrechts, 2001b)
- Vehicular accessibility of most of VCWS would be problematical at best, and impossible as far as the extensive wetland areas are concerned. Monitoring and management of the herbivore populations would thus be a difficult undertaking.
- The poor quality of the grazing of VCWS, as was discussed in a number of sections elsewhere in this BMP, provides some reason for concern. The reintroduction programme may ecologically speaking thus be subject to problems of adaptability, malnutrition and environmental stress.
- The re-introduction and containment of large herbivores have been shown to impact extensively on the vegetation, even to the extent of altering structure and communities. This is especially relevant to elephant *Loxodonta africana*. Such introductions will be considered and weighed against proven former occurrences in the area, as their effect in an enclosed environment will be commensurately greater than under "natural" conditions. All introductions should be accompanied by an operational plan for that species.
- Although the age-old culture of hunting has largely disappeared with the demise of the large herbivore populations, a number of subsistence hunters are still known to operate in the sanctuary. They use indiscriminate techniques such as snaring and may kill valuable and scarce animals such as sable antelope. Poaching may, if firm steps are not taken right from the beginning, escalate into a serious problem. The system of co-management and ownership residing in the local communities, would hopefully lead to the local people regarding poachers as persons stealing from the community.

Internal displeasure may do more to combat poaching than law enforcement. However, law enforcement will not be neglected and culprits will be apprehended.

- Stray dogs and feral cats are commonly observed in the sanctuary, including the Reserve area. These animals have to hunt to stay alive, and especially in the case of the dogs may impact on the smaller ungulates and species such as hares.

9.4 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS

9.4.1 Adaptive management and co-management

Due to the lack of baseline data and the general paucity of information regarding resettled wildlife in poor-quality miombo woodlands, the policy of adaptive management will be applied.

The presence of the local communities and their status as the owners of all the terrestrial wildlife resources of VCWS, would necessitate a policy of co-management, with the communities, through their representative committees, being involved with all the facets of the management and utilisation of the resource.

9.4.2 Herbivore reintroductions

The rationale behind the herbivore reintroduction programme, the species and numbers to be reintroduced, and the suitability of the grazing were dealt with above. The main purpose would be to re-establish and maintain viable populations of game animals that previously occurred in the region.

The following management priorities, options and actions will arise from the reintroduction programme and the presence of game herds on VCWS:

9.4.2.1 Establish and maintain viable and healthy herbivore populations

Due to the inherent poor quality of the grazing of VCWS, as was pointed out above, only relatively low numbers of wildlife could be sustained, and it would be prudent to relocate conservative numbers.

The low carrying capacity of the Phase I area (22 000 ha land) would mean that only a smallish number of animals could be accommodated at full capacity:

Zebra 52; Buffalo 65; Waterbuck 52; Lichtenstein's hartebeest 39; Nyala 52; Reedbuck 52; Sable antelope 39; bushpig 26, Hippo 12 and Elephant 20.

The ecological viability of these smallish populations would be greatly increased should the 17 000 ha of the Phase II area be added. An across-the-board increase of about 43% in the numbers of animals to be carried in the enlarged sanctuary would then be possible, thus increasing the viability of the populations.

The re-introduction and containment of large herbivores have been shown to impact extensively on the vegetation, even to the extent of altering structure and communities. This is especially relevant to elephant *Loxodonta africana*. Such introductions should be considered against former occurrences in the area, as their effect in an enclosed environment will be commensurately greater than under “natural” conditions. All introductions should be accompanied by an operational plan for that species.

Re-introductions are not necessarily all negative as there are many positive spin offs as well. Grazing of grasses stimulates growth and the formation of a sward as well as reducing combustible material, which with fire stimulates the establishment of a mosaic of subcommunities, enhancing the suitability of the vegetation to a wide range of herbivores. However, the real effects will have to be closely monitored and managed if necessary.

The dung of animals such as hippo, elephant and buffalo as well as that of other animals will contribute to soil fertility and enrich aquatic systems making them more eutrophic. Dung will also be of great benefit to many other organisms throughout the system and in particular dung beetles. The effect on the marshes will also be beneficial as the animals will open up the vegetation permitting water flow. Again, the extent of this opening up will have to be monitored to ensure that the levels of sustainability are not exceeded.

Subsistence agriculture has led to the establishment of dense thickets of Msasa *Brachystegia spiciformis* mostly in different stages of development and poor in species richness. The field layer inside such mostly monotypic stands is very poor because of the poor light. The opening up of such stands by larger animals such as elephant would allow grasses and other plants to grow, providing a habitat for other thicket loving species of animals and birds.

Due to the low carrying capacity of the VCWS and the concomitant low numbers of prey species that could be accommodated, it is not envisaged that any of the major predators, for example lion and leopard, would be reintroduced to the area. Sustainable predation would be out of the question. Furthermore both these species, but especially the leopard, would be difficult at best but more likely impossible to contain, even with the electrified game-proof fence that is currently being erected. These major predators could certainly not be tolerated in the relatively densely populated regions to the west of the sanctuary.

Great care would be exercised in sourcing potentially dangerous species such as elephant, buffalo and hippo from areas where they were accustomed to people. With elephant this would be especially important, to the extent that, if at all possible, family herds led by a docile matriarch would be selected and captured. The same principle would apply to adult bulls.

The reintroduction of the three potentially dangerous species elephant, buffalo and hippo will not take place unless all the families living in the fenced-in or natural area of the sanctuary has been moved either to the community development area or, in the case of the Mazarette fishers that will relocate to the Inhamambane estuary, have been fenced off by means of an electrified fence. The relocation of plains game will not be affected by this proviso. The

capture, translocation and release operation would take place under the control of an experienced veterinary surgeon. An OP has already been drawn up for the exercise.

VCWS had no other option but to erect a game-proof fence between the natural area of the sanctuary (the fenced-in or Reserve area) and the community development area (the fenced-out area). When the original wildlife herds of days gone by still roamed the region, the animals were free-ranging and they had the option of moving to areas with better grazing if necessary. It seems likely that the extensive open plains wetland system to the west of the community development area, provided better quality grazing to the herbivores of the region than would have been the case for the present-day sanctuary. Certain species, for example buffalo, zebra and sable, probably only spent a part of their time in what is today the VCWS. However, access to these areas to the west has been denied with the erection of the fence. The VCWS herds would be restricted to what they have in the sanctuary, which means that any local shortages in the quantity or quality of food may escalate into a major management problem. To prevent such a situation from arising, careful monitoring as described below and elsewhere will have to be undertaken.

Based on superficial observations, it would seem as if the sandy soils may be lacking in certain essential micro-elements. To address this problem, supplementary feeding in the form of game blocks would be placed at selected sites during winter, with salt licks being made available in summer. No additional feed such as lucerne or hay will be considered, even during periods of drought. The biomass of herbivorous animals that could be sustained on VCWS would be kept within the capacity of the grazing, without the need for drastic artificial management interventions such as additional feed.

9.4.2.2 Population control

The primary objectives of this activity would be to assist in achieving a dynamic equilibrium between vegetation and animal, and to prevent, or at least minimise, resource-related die-offs.

Specific actions to be taken include the following:

- Identify the species and numbers that may be utilised on a sustainable basis;
- Identify the most cost-effective method of utilisation in the case of a culling operation;
- Identify the most economically viable method in the case of a commercial exploitation;
- Identify the best method for dealing with excess meat in a fair and equitable manner;
- Increase removals of selected herbivores during periods of stress such as drought to minimise or prevent any resource-related die-offs.

9.4.2.3. Trophy hunting

A final decision on whether to offer trophy hunting safaris or not, would be taken at a later stage. The decision would be dependent on or at least influenced by the following aspects:

- Without the addition of the area of 17 000 ha to the south, the economic viability of offering only Phase I as a trophy hunting destination may be questionable. The wildlife numbers of the current VCWS /would be too low to sustain a high enough level of consumptive utilisation, and the profitability of the enterprise will be jeopardised. With the Phase II area included, the numbers will still be low for such a large terrestrial area, but will be large enough to offer viable hunts.
- The envisaged new addition of 17 000 ha of prime and even spectacular wilderness to the existing VCWS, would greatly enhance the marketability of the venture.
- A major factor that will influence the decision, would be how well the relocated herbivore populations adapt to their new environment. The (albeit limited) uncertainties about the suitability of the habitat for herbivores, would first have to be satisfactorily resolved. Monitoring of the reintroduced populations should provide the answer within two years.
- The uniqueness of the VCWS as a hunting destination, coupled to the major draw card of offering both marine and terrestrial environments in the same hunting area, would have to be augmented by international-standard facilities and services. The provision of a competitive hunting camp with the necessary supporting infrastructure and the offering of high quality services by experienced and well-trained staff, would all add to the establishment cost of the venture.
- A full financial viability analysis would have to be undertaken before a decision to go ahead is taken. This analysis will also investigate the advantages and disadvantages of offering the trophy hunts in-house versus contracting it out.
- If a decision to go ahead is taken, an EIA would need to be drawn up with regards to the site that has been chosen and the development of the necessary infrastructure.

Any decision to offer trophy-hunting safaris on VCWS, will be in compliance with relevant Mozambican legislation.

9.4.2.4 Removal of excess game by culling or live capture

It is not envisaged that culling would, in the foreseeable future at least, be the method of choice to control herbivore numbers. The primary product of a culling operation would be meat, and the meat of the culled animal would be worth a lot less than the value of the live animal. There would also not be a ready market available for the sale of game meat, and to distribute the product to the local communities would create a multitude of practical problems. There would just not be enough meat available to give a portion to every “owner” of the resource. However, should culling turn out to be unavoidable, then the authority of the SWA, the TWSC and especially the CRC would need to be enlisted in order to ensure a fair and equitable distribution of either the common resource (meat), or of the returns (money)

Live capture operations in VCWS would present a number of logistical difficulties. The inaccessibility of the terrain, the loose sandy soils, the extensive wetland systems and the distance from markets would all combine to make live game capture and sales a bit of a logistical nightmare. Furthermore, the presence of endemic serious wildlife diseases such as foot-and-mouth disease, malignant bovine catarrh and bovine tuberculosis in Mozambique

would almost rule out the sale of live animals to the lucrative South African market. Should permission be granted to export live animals to South Africa, the animals would have to be quarantined for such a lengthy period of time that it would only be profitable for high-demand and expensive species such as sable antelope.

Commercial live game sales would thus be restricted to the much less lucrative, or to be more precise almost non-existent, local market. However, given the precarious state of Mozambique's wildlife populations and the extreme paucity of animals even in the National Parks, there would still be a huge demand for live animals to restock the denuded protected areas. If such live capture operations could be sponsored by donor agencies and the animals bought at realistic prices, then live capture will undoubtedly be considered.

9.4.2.5 Game that moved onto community lands

Although the electrified game-proof fence would prevent the movement of animals out of VCWS under normal circumstances, the fence itself should only be regarded as a deterrent and not as an escape-proof barrier. Frightened animals, especially large-bodied species such as buffalo, may barge through the fence and thus end up on communal lands settled by people.

The following management actions, or a combination thereof, would be considered to deal with animals that moved through the fence:

Any breakout, irrespective of the species and numbers of animals involved, will be reported to the VCWS-GM at the earliest possible opportunity. Should potentially dangerous animals be involved, the CRC and TWSC will be informed as soon as possible. Any reported breakout, especially of a potentially dangerous species is involved, will be confirmed by senior management as soon as possible.

If the breakout only involved ***non-dangerous plains game***, then the VCWS-GM will decide on appropriate actions to be taken. Such actions may include, but will not necessarily be limited to, the following:

- Determine the whereabouts of the animals and endeavour to chase them back.
- If this should turn out to be impossible in the case of scarce and valuable game such as sable antelope, arrange for a specialised game capture operation undertaken by an experienced operator at the earliest possible time.
- Should common and less valuable animals be involved, the capture operation will be undertaken by VCWS staff.
- If small numbers of non-valuable species are at stake and the cost of a capture operation would far outstrip the value of the escaped game, the decision might be to leave them where they are, in which case the VCWS-GM assisted by the CRC, will negotiate with the inhabitants of the area as to the value of the animals.
- In extreme situations, for example where the animals are under considerable stress and face the prospect of being injured, the VCWS-GM may decide to put them down.

(Standing permission to do so would be arranged with the relevant civil authorities in Vilanculos)

- If the breakout involved potentially *dangerous species* such as buffalo and hippo and especially elephant, then the VCWS-GM will decide on appropriate actions to be taken. Such actions may include, but will not necessarily be limited to, the following:
 - Immediately inform the local inhabitants of the area where the animals may find themselves and warn them of potential dangers.
 - Immediately inform the relevant local authorities in Vilanculos.
 - Determine the whereabouts of the animals and endeavour to chase them back.
 - If this should turn out to be impossible, arrange for a specialised game capture operation undertaken by an experienced operator at the earliest possible time.
 - Should an escaped animal prove to be under stress and aggressive and impossible to be chased back to the sanctuary, it will be put down as soon as possible. (Standing permission to legalise such an act will be arranged with the relevant civil authorities beforehand) The meat of such an animal will be distributed according to the wishes of the CRC, in consultation with the inhabitants of the area where it was put down.

9.4.2.6 Population monitoring of terrestrial wildlife

The objectives of this activity would firstly be to quantify on an annual basis the absolute or relative trends of herbivore species, but especially the species of specific or special interest such as elephant, buffalo and sable, and secondly to quantify other parameters which will help in making objective management decisions.

Full use will be made of structured observations by all ranks of field staff, in accordance with modern trends and techniques.

Suitable census techniques will be experimented with, and will include both ground and aerial counts. Helicopter counts are budgeted to take place in years three and (if the first count returned meaningful data) five. A two-seater micro light aircraft will be available on-site for contract work, including observations on the numbers and distribution of herbivores. An experienced TDS will be contracted to plan and execute the census programme.

The paucity of roads on the sanctuary and the relatively dense Miombo woodland, would make it difficult to monitor the movements of the relocated animals. To enable management to obtain this important information, a few animals (specifically elephant, buffalo and sable antelope) will be radio-tagged for telemetry purposes. The aid of a university (probably South African), on a dual venture basis with the University of Eduardo Mondlane in Maputo (if possible), would be contracted to undertake the telemetry work.

Specifically, the monitoring goals and actions would be to:

- Detect any changes which conflict with general or specific objectives;
- Undertake radio-telemetry monitoring of selected species;

- Undertake replicable population censuses to gauge the success of the reintroduction programme;
- Evaluate the success of management actions and recommend, where necessary, corrective action in terms of stocking rates, species mixes and physical condition (including diseases and parasite infestations);
- To identify areas of concern that may require research intervention.

For a more detailed discussion of the research and monitoring activities involving terrestrial wildlife populations, refer to Part M

9.4.2.7 Involvement of local communities

As was already pointed out elsewhere, it would be impossible to involve the local communities in any hands-on manner in the day-to-day management of the terrestrial wildlife resources. However, the communities will in effect own the wildlife resource, which will be managed on their behalf by the company, and thus need access to management channels with regards to policies and implementation. These channels will operate through the SWA and TWSC, as well as the CRC.

The communities need not only be involved through the respective community structures, but also need to be informed about the wildlife programme in general and aspects such as ownership and dangerous game in particular. These aspects will receive particular attention in the Public Consultation and Disclosure Plan (PCDP) (see above and Part H)

9.4.3 Feeding of wildlife and dependency on garbage

The dumping of offal and foodstuffs at a rubbish dump may attract the attention of Vervet monkeys, honey badgers and even elephant. It is therefore imperative that steps are taken to adequately contain all waste and to ensure that it does not attract animals that may become a problem at the lodges, the estate homes and especially to tourists visiting the sanctuary. Containers of wood with lids placed above the ground and fitted with a security device should be constructed, inside which refuse bags can be stacked awaiting removal. The central garbage dump(s) should be placed inside a fenced off enclosure, secure against the depredations of animals as well as wind. Garbage can become a serious problem and consideration should be given to having it transported by dhow to the mainland for proper disposal.

Feeding of wild animals and in particular monkeys, baboons and honey badgers which may visit housing areas should not be permitted as it could have disastrous consequences to the animals, and even to humans being bitten/attacked by wild animals that have become habituated to being fed. Watering points for the birdlife and other small mammals may be located close to the dwellings.

9.4.4 Game-proof electrified fence

The ideal situation would have been to do without any game proof fence at all. However, as was already pointed out above, a fence would be needed to contain the re-introduced wildlife

to the Reserve area. Free-ranging populations of wildlife, especially crop-raiding and potentially dangerous big species such as elephant and buffalo, could not be accommodated or tolerated in close proximity of densely settled areas with extensive agricultural fields.

A standard electrified game fence of 2,4 m high with 19 strands and wooden posts has been erected for the first enclosed area of about 8 500 ha. A similar fence will be erected for the rest of the Phase 1 area and for Phase 2. The total length of the fence, inclusive of Phase 2, will be about 46 km. The fence will be patrolled on a daily basis by teams of fence guards.

Access through the fence to the Reserve area would be provided to the local people, at points determined in consultation with all affected parties.

9.4.5 Operational Plans

Operational Plans, providing details on how to deal with various topics related to the conservation and management of terrestrial herbivores, will need to be compiled. TDS's may be contracted to assist with the preparation of the following plans:

- Placement of the game-proof fence, including Phase II
- Elephant management
- Buffalo management
- Hippo management
- Ungulate management
- Supplementary feeding for herbivores
- Censusing of terrestrial wildlife
- Radio-telemetry of selected species
- Herbivore population control
- Trophy hunting safaris
- Excess game: culling and live capture
- Game moving onto community areas
- Law enforcement

CHAPTER D10: CONSERVATION AND MANAGEMENT OF AMPHIBIANS, HERPETOFAUNA AND INVERTEBRATES

10.1 PRINCIPLES AND POLICIES

An underlying principle in the establishment of the VCWS was the rehabilitation of the severely depleted marine and terrestrial biodiversity of the sanctuary. As was pointed out above (see Part B) the conservation status of the herpetofauna of VCWS could be regarded as poor.

The policy would thus be to improve the status of the indigenous faunal population by means of an effective conservation action. Although much more difficult to achieve in the case of herpetofauna than with the re-introduced herbivores, the underlying conservation principle would remain the same.

10.2 MANAGEMENT OBJECTIVES

It should be noted that very little baseline data exists on the current status and ecology of the herpetofauna of VCWS. The following management objectives for the herpetofauna of VCWS take cognisance of this fact, and should be regarded as provisional:

- To determine the status of the herpetofauna using appropriate survey techniques;
- To identify any species that may need additional or special conservation measures or management attention;
- To monitor the effects of the relocated herbivores on the habitat in general, with specific attention to elephant and hippo;
- To prevent any long-term deterioration of the preferred habitat of vulnerable and possibly endangered species such as dune thicket and bushclumps;
- To include the herpetofauna in concerted educational actions as part of the Public Consultation and Disclosure Plan (PCDP; see Part H);
- To compile, in due course, an OP dealing specifically with the conservation of herpetofauna.

10.3 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS

From a herpetofaunal conservation perspective, the following needs to be recognised, addressed and/or undertaken:

- That the conservation status of the herpetofauna of VCWS seems to be poor
- That extensive baseline surveys will need to be undertaken to augment the superficial 2002 survey. The follow-up survey will be undertaken by a contracted TDS, with specific attention to priority species for conservation action and conservation and management proposals.
- That the conservation of reptiles, including the crocodile, will receive specific attention in the Public Consultation and Disclosure Plan (PCDP, see Part H). The almost universal animosity towards, or fear of, especially snakes are probably as pronounced in VCWS as anywhere else. Snakes and the crocodile are probably actively persecuted and man would be their greatest enemy. The fact that large sections of the sanctuary would be unpopulated by humans after completion of the resettlement programme, would undoubtedly lead to the removal of a major conservation threat and an improvement in the conservation status of reptiles.
- That an improvement in the conservation status of rare and possibly endangered herpetofaunal species would come about should the preferred habitat of these species, specifically dune thicket and bushclumps, be properly protected.
- That the frequent and ecologically damaging fires that occurred on an annual basis will need to be managed, especially with regards to sensitive plant communities such

as the dune scrub/thicket and bushclumps, thus benefiting the scarce and/or rare herpetofauna that are predominantly restricted to those areas.

- That the possible Red Data Book species mentioned in Part B above, be identified for specific management attention according to the provisions of an OP.
- That an OP will need to be compiled dealing with the conservation and management of priority species of amphibians and reptiles

CHAPTER D11: REGIONAL CONSERVATION STRATEGY

11.1 Principles and policies

Both the VCWS and the Bazaruto Archipelago share the same marine and terrestrial ecosystem, and exhibit similar biophysical characteristics. The two areas were actually connected as recently as 7 000 years ago, when the level of the sea was about two to four meters lower than the present level (Ramsey, 1989).

A common conservation action plan that would be able to accommodate all interested and affected parties, including formal and traditional resource harvesters, tourism enterprises, private investors such as at VCWS, as well as local, provincial and national government agencies, especially conservation authorities, would therefore be needed. This aspect was mentioned in various sections of the BMP.

11.2 Management objectives

The objectives of such a regional conservation action plan would be the following:

- To unite all the role-players and affected parties behind a common and mutually acceptable conservation action.
- To encourage the sustainable use of the region's biodiversity resources.
- To focus on those habitats and resources known to be subjected to or threatened by inappropriate developments, non-sustainable harvesting and/or improper fishing techniques.
- To pursue the proclamation of the VCWS – Bazaruto Archipelago complex as a World Heritage Area. The Mozambican government is a signatory to UNESCO's World Heritage Convention, and the Ministry for the Coordination of Environmental Affairs (MICOA) has allegedly already lodged a nomination with UNESCO for the Bazaruto National Park to be proclaimed as a World Heritage Area. VCWS will explore the possibilities of having the Quewene peninsula, the proposed Phase II area and the extensive wetlands to the west of VCWS included in the application.
- To pursue the designation of the VCWS as a Ramsar Wetland of International Importance. Mozambique is unfortunately not yet a signatory to this convention.

11.3 Threats

The proposed regional conservation action will be or is already faced with the following real or possible threats:

- Lack of interest from one or more of the crucial role-players that might derail the process.
- Inability of government to submit the necessary motivation for proclamation as a World Heritage Area, and/or inability or unwillingness to become a signatory to the Ramsar Convention.
- Lack of funds to ensure that a proper conservation action plan is drawn up, implemented and monitored.
- The apparent deterioration in the status of the endangered Dugong *Dugong dugon* (Dutton *pers com* estimates that the number of these locally-endangered animals in the region declined from 110 to about 30 in seven years between 1995 and 2002)
- Hotel and/or lodge developments which impact or may impact negatively on the social, ecological and aesthetic integrity of the region and do not comply with the relevant EIA regulations for Mozambique.

11.4 Management priorities

Management priorities to ensure that the proposed regional conservation action plan is properly executed, will be included in the plan itself.

11.5 Planning and management actions

The following planning and management actions have been identified:

- For VCWS to facilitate and fund the process that will lead to the necessary survey being undertaken and for the plan itself to be prepared.
- To ensure that the regional conservation action plan is approved and accepted by all relevant parties, duly implemented and the results monitored.

CHAPTER D12: THE STRATEGIC AGRICULTURAL DEVELOPMENT PLAN

12.1 PRINCIPLES AND POLICIES

12.1.1 Operational context

(1) Compilation of an agricultural development plan

At this stage of the agricultural investigation it is, notwithstanding the lack of sufficient baseline information as was pointed out above (see Part B), possible to propose a strategy for

the agricultural development and to provide a layout for a Strategic Agricultural Development Plan (SADP), as part of the SAP. The SADP that follows indicates the proposed route that the agricultural development should follow, but only delineates and defines the strategic activities for the initial phase of the plan.

The feasibility of the planned agricultural developments for VCWS cannot be detailed at this stage due firstly to the many aspects that are still uncertain, secondly the unavailability of essential information, and thirdly the complex and long-term nature of the development programme. More information will be obtained and outstanding issues addressed, as the project develops. It would only then be possible to determine the feasibility of each project element and sub-project.

(1) Ownership of the project

The agricultural resources of VCWS belong to the people that “own” and till the land. “Ownership” of the SADP, in all its facets, would thus also be vested in the local communities.

However, as would be clear from what has been stated above and the following discussions, external management assistance and even intervention would be needed in order to make the plan work. The principles of partnership and active participation as embodied in the developmental policy of co-management (collaborative management) as described elsewhere in the BMP would be applied, to ensure that the farming community retain collective control of the project and of their individual destinies whilst operating within the parameters of the SADP .

(2) Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the following model for the agricultural development of VCWS is largely based on the abovementioned models for marine resources and terrestrial wildlife (the 10-point Marine Resources Strategic Utilisation Plan or MRSUP and the seven-point Terrestrial Wildlife Strategic Utilisation Plan or TWSUP). The SADP is, for the sake of brevity, not described in the same detail as the marine and terrestrial resources plans. Many of the principles and explanations embodied in the MRSUP and TWSUP would *situ situ* also be applicable to the agricultural plan, and should be read in conjunction with the SADP that follows below.

12.1.2 Political and administrative context

The political and administrative context for the development and deployment of the SADP is the same as for the MRSUP and TWSUP discussed above.

Unlike the marine resources, where a shared resource is at stake with VCWS being one of a number of role players, but similar to the wildlife of VCWS, the agricultural resource could be regarded as a demarcated and controlled resource where the necessity of regional cooperation and compliance with regional frameworks would not be as critical. However, as

was pointed out above, the SADP must take cognisance of the farmers living and farming in the area immediately adjacent (to the west) of the current VCWS. These farmers would have to be accommodated in some way or other, and would have to be dealt with in the final phases of the SADP.

Developmental context and strategic framework

The agricultural development plan (the SADP) for VCWS that follows below does not stand on its own. It is fully cognisant of, and fits into the larger development plan and BMP for the sanctuary.

From the point of view of overall development on the VCWS the SADP takes particular note of and reflects the following developments and issues:

- The current level of knowledge of the agricultural scenario of VCWS is inadequate and does not allow for a full and comprehensive SADP to be compiled. The structure of the SADP that follows below, makes provision for the plan to be adapted and the final phases completed as and when information becomes available.
- Rural development anywhere in the world is by nature a slow process. The development of people from a very low base in relation to technological know-how, exposure to modern techniques and literacy, takes both time and very sound developmental techniques and skills. The development of a SADP for VCWS would thus be viewed as a long-term project requiring a long-term involvement and commitment from all role players.
- The proposed strategic framework for the agricultural development is based on the information obtained to date. The two major development constraints that determined the strategic framework are:
 - The limited soil potential for cash crop production (see Part B). The sandy soils are not suitable for high yields under rain-fed conditions and irrigation is not advisable due to the environmental impact on the lagoons and underground water.
 - The apparent current inadequate agricultural ability of the local community, especially about the to-be-introduced organic farming or permaculture system. The communities are conversant enough to produce for local consumption and mainly for household production, but with their level of experience and training at the lower end of the commercial agricultural production scale.
- The strategic framework for the SADP follows a phased approach with a gradual transition from one phase to the other. This provisional version of the SADP mainly involves and describes phase 1 of the process:
 - **Phase one** entails the enhancement of the present agricultural production methods (crops and animals) to a higher yield level in order to create a sustainable economical base and to move out of the present situation of seasonal uncertainties. The principle of organic farming will gradually be established and phased in, especially for the families who resettled during the middle of 2002 and would need to establish new “machambas”.

- **Phase two** entails the consolidation of high yield rain-fed cash crop production parallel to the establishment of permanent tree crops (cashew and coconut palms), further consolidation of the new organic farming process, and value adding to all the crops for export to markets outside of the production area. Phase two will gradually follow phase one as the community masters the improved production and marketing opportunities that would firstly be based on present practices, and secondly organic farming. (See diagram below)

Diagrammatic view of the proposed strategic framework Phases 1 and 2

Phase 1	Phase 2
Enhanced existing production practices	New production and value adding enterprises

12.1.3 Agricultural development vision and objectives

The overall agricultural development vision for the VCWS can be defined as follows:

To create an enabling environment, provide inputs and develop institutional arrangements to establish agricultural production for sustainable socio-economical livelihoods of the present community in the project area.

The specific objectives for the agricultural development of the VCWS can be summarised as follows:

- To enhance the socio-economical situation of the community involved in agricultural production by assisting with the development of a stable society and by value adding (processing) of their produce for own use and commercial applications.
- To concentrate on and achieve the production of high yield, high quality organically grown cash crops, vegetables and livestock during the first phases.
- To progress to permanent crop production (for example cashew and coconut palms) to derive an income from export to the areas outside of the project area.
- To establish small-scale agro-industries to add value, e.g. slaughtered poultry, egg production, pre-packed vegetables, coconut oil, pre-packaged cashew nuts
- To establish ancillary agribusinesses such as mat weaving and the manufacture of reed furniture.

12.1.4 Lessons learned

In the “lessons learned” section of the marine resources plan (see above) particular attention was devoted to lessons that could be learned from past experience and other projects. These lessons were discussed in some detail and would not be repeated here. Notwithstanding the fact that they dealt with a marine resources plan, they could be universally applied and

should also be considered when planning, implementing and managing the strategic agricultural plan. The following “lessons” were listed:

- Timing (the time is ripe to launch the sustainable agricultural programme)
- Scale (the plan must be tractable; break down in phases)
- Project size (the 12-point plan breaks the SADP down in manageable units)
- Communication (local communities informed; use appropriate channels)
- Participation (SADP must be community driven)
- Decentralisation (use the local civil authorities)
- The human resource (also involve women and youth)
- Cost and benefit (real benefits will lead to behavioural change)
- Partnerships (who owns who and who gains what)
- Private sector involvement (foster private sector initiatives inside community)
- Monitoring and evaluation (involve farmers)
- Research and data collection (involve farmers)
- Sustainability (build human capacity)
- Ownership (vested in the farmers; they carry the responsibility)

The results of many hundreds of agricultural development projects in developing countries have been fully chronicled. The successes and failures and the reasons for it are well known, as are the many pitfalls that should be avoided. In the case of VCWS there would thus be no need to reinvent the wheel, although it has to be acknowledged that the concept of organic farming is still in its infancy in Mozambique and would thus necessitate some experimentation.

In other areas with similar nutrient deficient sandy soils, the system of organic farming has led to enriched soils. Composting in sandy soils add organic matter that helps with nutrient and water retention. Compost also increases the activity of soil microorganisms that release nutrients and other growth-promoting materials into the soil, and goes hand in hand with animal/poultry production.

The slash-and-burn method of crop production as applied locally is oddly enough a form of organic farming, and does not involve the use of any inorganic substances (egg fertilizers) at all. The farmers should therefore easily relate to an advancement or refinement of a technique that has been in use for generations.

The local farmers would have to be involved in an active and participatory manner right from the beginning. The principle of co-management will be applied to ensure that the SADP becomes owned and driven by the local farmers themselves.

12.1.5 From lessons to principles

The principles that were considered and accommodated in the formulation of the SADP are generally similar to those used for the marine resources (MRSUP) and terrestrial resources (TWSUP) discussed above and may be summarised as follows:

- The plan will be as simple as possible in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.
- The plan will not be built on sustained outside intervention and funding, but implementation and accountability will be transferred to the “owners” of the resource as soon as possible.
- The plan will only succeed if the local communities perceive and experience the benefits to be real and sustainable.
- The SADP, once the BMP is approved, will be workshopped with the local people to ensure that psychological and functional ownership of the plan is vested in the “owners” of the resource according to the principle of co-management.
- Without the formal community structures as outlined in the SADP below and elsewhere in the BMP (see Part L) being put in place, the implementation of the plan would be jeopardised.

12.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE STRATEGIC AGRICULTURAL DEVELOPMENT PLAN

12.2.1 A 12 – point procedure for implementing a Strategic Agricultural Development Plan for VCWS

A simple 12-step process, based on the same principles and procedures as the marine (MRSUP) and terrestrial wildlife (TWSUP) plans will be applied to the implementation of the Strategic Agricultural Development Plan (SADP) for VCWS. The steps are interlinked in a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may cause the entire management process for terrestrial wildlife to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion. Most of them also require a lead period of awareness building.

The 12 steps are:

- Step 1: Identify stakeholders
- Step 2: Establish the Sanctuary Farmer’s Association (SAFA), develop a vision and elect/appoint appropriate structures
- Step 3: Draw up a constitution for the SAFA
- Step 4: Obtain additional baseline information
- Step 5: Plan the Phase 1 development of the SADP
- Step 6: Undertake an effective information, education and training programme
- Step 7: Establish channels for meaningful contact/interaction and co-management with VCWS management and the CRC
- Step 8: Implement the Phase 1 development of the SADP
- Step 9: Monitoring and evaluation of Phase 1
- Step 10: Plan the Phase 2 development of the SADP
- Step 11: Implement the Phase 2 development of the SADP
- Step 12: Monitoring and evaluation of Phase 2

12.2.2 Application of the 12-point plan

For each of the steps the purpose is briefly noted, the rationale is given and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers (threats) may be provided.

STEP 1: IDENTIFY STAKEHOLDERS

(1) Purpose

The purpose of Step 1 would be to identify all the stakeholders who should be involved in the development of the SADP.

(2) Rationale

At the beginning of this phase, a suitable candidate for the post of Agricultural Extension Officer will be recruited and appointed. The officer will need to be conversant in the local language (Sitshwa) and obviously also Portuguese.

The establishment of VCWS had no effect on the ownership of the sanctuary's agricultural resources: it remained vested in the local communities and specifically the farmers. However, a number of farming households had to be resettled from project development areas to make way for infrastructure and other facilities, and the families living in the so-called Reserve area would in time be resettled to the Community Development Area (CDA). These two factors will have the following implications with regards to the identification of agricultural role players:

- The agricultural stakeholders would thus include all those inhabitants of the sanctuary who are in some way or other involved with or dependent on agricultural practices. They are thus an identifiable group.
- However, unlike the fishers who can be regarded and dealt with as a single entity or group, the farming community is composed of small farmers with each family farming a specific unit of land. The agricultural stakeholders will thus be involved as a uniform group with a common bond or interest, but consisting of individuals each with different expectations and capabilities.
- The resettled farmers will be regarded as a specific sub-group and will be targeted for preferential attention according to the SADP, and not merely as role players in a crowd.
- Within the group of farmers, a further sub-group that will be identified are those individuals who exhibit the potential, based on their current performance as farmers, to become practitioners and proponents of the system of organic farming.

(3) Actions to be taken

- The results of the full population census would be available by the fourth quarter of 2002, and will serve to identify all the farmers and where they live.
- Two sub-groups will be specifically identified viz the resettled farmers (who deserve special assistance) and farming leaders (who can become influential supporters of the sustainable agriculture programme)
- A series of community meetings will be held to inform the farmers of the new agricultural development programme, secondly to inform them of the planned establishment of the SAFA, and finally to nominate persons to represent them at the meeting where the SAFA will be formally established.
- The community meetings will be the same meetings where similar actions will be taken with regards to the terrestrial wildlife resources plan. Both topics will be dealt with at the same time.

STEP 2: ESTABLISH THE SANCTUARY FARMER'S ASSOCIATION, DEVELOP A VISION AND ELECT/APPOINT APPROPRIATE STRUCTURES

(1) Purpose

The purpose of Step 2 would be to establish structures to represent the farming community's interests.

(1) Rationale and actions to be taken

It would be totally impossible to involve the amorphous mass of people inhabiting the sanctuary as a single entity in the development of a sustainable agricultural programme for the VCWS. However, the same democratic principles built into the marine and terrestrial resources management systems outlined above, would be applied in this case too.

At the series of mass meetings mentioned above (Step 1), the objectives and establishment of the Sanctuary Farmers Association (SAFA), the need for an elected committee (the Agricultural Resources Steering Committee or ARSC) to represent the communities and the need for an implementation team (the Agricultural Resources Project Implementation Team or ARPIT) would be discussed. A draft mission, vision and objectives will also be discussed, as well as terms of references for the various committees.

The venues and arrangements for the meetings will be the responsibility of VCWS management, but the demarcated Chief's regions or circles (see Part G) may be the most practical option.

In the case of the SFA all the fishers could, and needed to be, accommodated as members of the association, due to the small numbers of individuals involved and also because all the fishers are directly involved in the utilisation of the marine resources. The situation with regards to the farmers, however, differs appreciably from that of the marine resources management system outlined above and is more directly comparable to the terrestrial wildlife scenario.

The following aspects and principles will guide the establishment of the sustainable agriculture management system:

- Membership of the SAFA would, due to the large number of farmers living in the sanctuary, be limited to elected representatives or delegates from each of the Chief's regions. These representatives would represent their specific regions on the SAFA. The SWA would be composed of about three persons from each of the regions or circles. Some of the SAFA representatives may also serve on the terrestrial wildlife association (TWA).
- Knowledgeable outsiders will be co-opted onto the SAFA, for example representatives from the District Administrator's Office in Vilanculos, including the District Director for Agriculture and Rural Development.
- The planning and establishing of a Sustainable Agriculture Programme (SAP) for VCWS would be dependent on specialised inputs from agricultural experts, who would need to be qualified in dealing with organic farming and unsophisticated farmers. Experience in the Mozambican context would be a prerequisite. Initially, the real management inputs and actions in setting up and monitoring the SAP will thus of necessity be the responsibility of contracted TDS's.
- To ensure meaningful participation in the process by the "owners" of the land, the farmers, the duties and responsibilities of the SAFA will make provision for direct and ongoing dialogue with the ARPIT (see below) and/or VCWS management.

The regional delegates to the meeting/workshop where the SWA will be established, will be expected to elect an Agricultural Resources Steering Committee (ARSC). The ARSC will be chaired by a person elected to the post. The composition of the ARSC will not be prescribed in any way, and will not necessarily reflect the regional composition of the SWA. The best individuals for the job will hopefully be elected, irrespective of where they live.

A representative from the District Administrator's office in Vilanculos, hopefully the District Director of Agriculture and Rural Development, will be invited to serve on the ARSC.

The ARSC will be a specialised sub-committee of the over-arching Community Representative Committee (CRC), who will be the democratically elected body representing the local communities residing in VCWS (see Part L).

The ARPIT will be headed by a specialist appointed by VCWS management, or, if necessary, initially by the GEF Project Manager (Implementation). The ARPIT will be composed of specialist agricultural practitioners (whether employees of the company or contracted TDS's), including the agricultural extension officer mentioned below. The interests of the sanctuary's farmers will be safeguarded by the fact that the ARPIT will report to the ARSC.

The reasons for establishing the abovementioned agricultural committees a TRSC would be comparable to that mentioned above for the similar committees dealing with marine resources:

- In the case of the ARSC, the committee will act as representative of the SAFA and mouthpiece of the local communities regarding all agricultural aspects of VCWS.
- The ARPIT will be responsible to get the job done and will deal with implementation according to the OP (see below).

Physical space will need to be made available for the SAFA and especially the ARSC to operate from. It would be a good idea if the facility could be shared with the corresponding community structures for the fisher community and the terrestrial wildlife group. The community centre at Goshen or the nearby market at Marape will possibly be a good locality.

STEP 3: DRAW UP A CONSTITUTION FOR THE SAFA

(1) Purpose

A constitution will need to be drawn up to regulate the activities of the SAFA, the ARSC and the ARPIT.

(2) Rationale and actions to be taken

A concise but clear constitution for the SAFA would be necessary to ensure that the vision, mission and objectives of the association are met. The constitution will spell out the responsibilities and actions of the various role players involved with the development of a sustainable agricultural programme for VCWS, as well as the procedures to be followed to ensure orderly operations. A grievance redress mechanism and procedure will be built into the constitution, to ensure that any grievances that could not be resolved internally within the SAFA structures, are timeously addressed and resolved.

The constitution will be compiled by the ARPIT, assisted if necessary and at the discretion of the VCWS General Manager (VCWS-GM), by a TDS. The document will need to be approved by the VCWS-GM as well as the GEF Project Manager (Implementation) and will also be available in Portuguese.

STEP 4: OBTAIN ADDITIONAL BASELINE INFORMATION

(1) Purpose

To provide additional baseline information that is needed to launch and maintain an effective sustainable agricultural programme (SAP) for VCWS.

(2) Rationale and actions to be taken

At this stage, the dearth of baseline information on the agricultural scenario in VCWS would rule out any possibility of implementing a large-scale SAP. The following baseline information would be obtained as soon as the SAP is launched:

- The data collected by other GEF-studies, especially the hydrological, social and terrestrial biodiversity projects that were undertaken, would be studied and incorporated in the planning process that will precede the implementation phase.
- If necessary, the social survey data may need to be augmented by agriculture-specific information on the size of agricultural fields and crops grown.
- Aerial photographs (currently not available) with two metre contour intervals and a scale of 1: 10 000 (or even 1: 15 000) would be used for planning purposes (the unavailability of aerial photographs also impacted negatively on most of the other GEF surveys). Aspects such as the extent of the machambas, topography and even soil sub-types may be studied from aerial photographs.
- The very superficial soil survey that was undertaken will be expanded to include more samples and more sample areas, in order to provide the necessary inputs to the organic farming system that will be employed.
- In specific areas within the agricultural development zone, it may prove to be necessary to undertake additional sampling of fresh water lakes and wetland systems, and to determine both quality and quantity.
- All available sources will be investigated with regards to additional climatic data.

At the end of this activity, the TDS that would be contracted to undertake the work would provide a report with recommendations to the VCWS-GM and the GEF PM (Implementation). Some of the operational actions of the next (planning) phase would have started already.

STEP 5: PLAN THE PHASE 1 DEVELOPMENT OF THE STRATEGIC AGRICULTURAL DEVELOPMENT PLAN (SADP)

(1) Purpose

The purpose of step 5 would be to plan the implementation of the first phase of the SADP (steps 6 to 9 below) to ensure that the objectives for the programme are met.

(2) Rationale and actions to be taken

The implementation phase could only commence after completion and approval of a number of operational plans. The next steps of the SADP would thus be dependent on the following OPs being prepared:

Agricultural land use plan: The land use plan would consider aspects such as the following:

- Involvement of the community in the planning process through the abovementioned SAFA and ARSC.
- Appropriate steps to minimize or prevent agriculture-induced damage to the natural resources, such as water, soil and natural vegetation
- Establishing the system of organic farming, including measures such as mulching of bare soils, mixed tree cropping, inter cropping, prevention of excessive runoff from rainwater and composting

- Rejuvenation of the soil fertility
- Controlling slash-and-burn agriculture

Crop use plan: The crop use plan would involve the following aspects, considerations and actions:

- The selection of suitable crops would be determined by:
 - Crops that are currently cultivated by the farmers would be the first priority; they already have the experience and knowledge of the local crop potential.
 - The soil suitability and related natural resources.
 - Family food security and local potential market demand for the specific crops.
- Identifying suitable agricultural development models and management models:
 - The current farming system in use depends on slash and burn, to maintain adequate levels of plant nutrients. It is a practice which has been in existence for many generations and has generally succeeded in meeting the food requirements of the people. However the natural population expansions will eventually render the practice unsustainable as the rotation from the land progressively shortens and production declines. The excision of part of the area for the wildlife sanctuary contributes further to the reduction of land that could be used for traditional farming practices.
 - Introducing alternative measures to improve and maintain soil fertility would thus be a first priority. Improvement in soil fertility is a long term and expensive process, particularly on these free- draining sands. Some of the technologically appropriate measures will involve:
 - Conservation of organic matter such as crop residues and farmyard manure, for example chicken and goat litter and composting of plant residue. A major drawback with this practice is the relatively poor plant biomass production, both natural and anthropomorphic, in the area.
 - Reducing the dependence on annual crops such as maize, mapira, cassava and sugar cane, by introducing more fruit bearing trees that are adaptable to the area such as cashew, coconut and citrus trees. These fruit bearing trees are less demanding on plant nutrients than annual crops and causes little disturbance to the topsoil.
 - Inorganic fertilizers will be considered as a last resort and only to ensure that farmers meet their subsistence food needs. Inorganic fertilizers are fast acting and would thus be an effective remedy for the current imbalances in the soil. Inorganic fertilizers would only be used (if at all) as part of a long term plan to build up soil organic matter by means of organic farming (permaculture) and the use will be restricted to the initial stages of the program.
 - The introduction of fruit trees (Mango, Cashew, Coconuts and Citrus) through an out-growers programme would be included in the crop production plan. Fruit trees would be introduced that are disease resistant, quicker in full production and adapted to the climate. The agricultural extension officer can possibly manage a tree nursery (see below) and can hand out the plants to the

farmers at the transplanting stage. Training in planting methods, spacing, management and disease control would have to be undertaken (see Step 7).

Livestock and poultry production plan: One or both the following options would be considered:

- Fowls for Africa is a programme specifically developed for poor communities where chicken breeds that are adapted to the specific local conditions are introduced into the community. Indigenous chickens that are disease resistant and in this case heat tolerant, are bought and sold as breeding stock to individual farmers. These breeds are good layers and produce tasty meat.
- Egg production is feasible where the hens are bought at point-of-lay and kept for a laying season of one year. During this period they are expected to produce 240-250 eggs each under conditions of natural daylight. The hens are slaughtered at the end of their production cycle. Enough eggs can be generated not only for own consumption but also for selling.

Capacity enhancement and training plan: The training programme of step 6 would be based on a proper OP being prepared. The following capacity enhancement and training aspects will be addressed in the OP:

- The farmers and the community at large would need to be convinced of the need for proper resource utilisation and conservation, i.e. to fully exploit the environmental opportunities of the area in a sustainable manner.
- The establishment, operation and management of community driven farmer's institutions.
- The establishment of community-based institutions to deal with non-agricultural aspects such as clean water, health and entrepreneurial development.

Storage and marketing plan: It can be foreseen that, with the improved agricultural techniques that would be applied on soils with improved fertility, that surpluses of grain, fruit and even fresh produce will be produced. These surpluses will have to be stored by upgrading the current unsatisfactory system, by providing a suitable transport system to the market, and by developing a market. These aspects will be dealt with in the OP.

Infrastructure development plan: The sustainable agricultural programme would not involve a collective farming system, which means that the individual farmers will operate according to a free enterprise philosophy and would be masters of their own destinies. Each farmer would thus have to provide his own infrastructure, concomitant with his production capabilities. A rudimentary level of infrastructure would also be needed to manage the SAP, for example office facilities for the extension officer and administrative space for the community association and committees. (The OP for this activity will be included in the plan for the following item)

Implementation resources plan: The implementation resources plan will *inter alia* provide for the following:

- The recruitment, training and application of an extension officer.
- Determining the manpower needs (full-time and part-time) to operationalise the SADP
- Determining the support services and equipment that would be needed to implement the SADP
- Determining operational costs and compiling and managing a budget

Farmers resettlement plan: Possible relocation areas for the resettling agricultural households will be identified, with a preliminary placing of the relocating homesteads in the proposed areas. These areas will be outside the Reserve area in the community development area.

The TDS who was contracted to deal with the planning phase would be expected to submit a final implementation plan to the VCWS-GM and the GEF PM (Implementation). Prior to the submission of the implementation plan, the go-ahead to continue with certain aspects of the implementation of the SADP, based on completed and approved OP's, could have been given by the VCWS-GM, in consultation with the GEF PM (Implementation).

STEP 6: UNDERTAKE AN EFFECTIVE INFORMATION, EDUCATION AND TRAINING PROGRAMME

(1) Purpose

The purpose of Step 6 would be to inform the local communities of the agricultural programme in general, the specific objectives of the programme and the role of the communities and the to-be-established community structures, and to ensure that all role players are adequately trained.

(2) Rationale and actions to be taken

The VCWS agricultural fraternity, which includes most of the people living in the sanctuary, have had virtually no access to modern (or at least modernised) agricultural techniques and principles in the past. They were pretty much left to their own devices and could not rely on any co-operative support, financial assistance, production or development loans, modern implements or proper training, and had at best access to a rudimentary extension service.

Now all of this will have to change. Any continuation of the old systems and procedures would lead to a further deterioration in the agricultural environment, and the growing population would increasingly be faced with food shortages. The implementation of new techniques such as organic farming is long overdue and could be regarded as a necessity, but will nevertheless confront the farmers with a new and strange situation.

The following steps will have to be taken to ensure that the farmers are informed, educated (agriculturally literate) and trained:

- During a series of community meetings as discussed above the new SAP will be “sold” to the farmers, and the vision, objectives and expected benefits of the SADP

will be shared with them. These meetings will be arranged by the VCWS-GM in consultation with the ARSC, but will be presented by a contracted TDS. The first meetings will take place during Step 2, will be followed up during this phase (Step 6) and thereafter as often as necessary. The meetings will probably later develop into proper “farmer’s days” with the accent on demonstrations and the evaluation of successful ventures on the ground. The local agricultural extension officer will play a leading role in presenting the farmer’s days, and will be assisted by the contracted TDS.

- The SAP/SADP will be one of the major focus areas of the consultation and information disclosure programme (CIDP) for VCWS (see Part G). As was already pointed out above the original CIDP for the sanctuary unfortunately never got off the ground, and the backlog that has built up will need to be addressed. The CIDP will be the responsibility of the VCWS-GM, but he will be assisted by contracted TDS’s wherever necessary, such as in the case of the agricultural programmes.
- An extensive training programme would be built into the SADP. The training plan will be drawn up during Step 5 (see above), and will be implemented during this phase (Step 6) and later phases, especially during Phase 2 (see Steps 8 and 9). The training programme will include orientation/demonstration visits to an organic farming venture on the mainland, and will be undertaken by the local extension officer assisted/supervised by a TDS.

The SAP and SADP will be based and developed on the principle of co-management. Throughout the process as outlined above, the farmers themselves, the ARSC and the SAFA will be involved to give effect to this policy. The ideal would be if, in time, the ARSC as the voice of the SAFA, could take over control of the programme with VCWS staff acting in a support role only.

A grievance redress mechanism will, in common with the marine and terrestrial wildlife programmes discussed above, be built into the agricultural programme and the procedures to be followed in dealing with a grievance, will be made known to all role players.

STEP 7: ESTABLISH CHANNELS FOR MEANINGFUL CONTACT/ INTERACTION AND CO-MANAGEMENT WITH VCWS MANAGEMENT AND THE COMMUNITY REPRESENTATIVE COMMITTEE

(1) Purpose

The purpose of Step 7 would be to establish effective channels of communication between all role players who would be involved with the SAP and SADP.

(2) Rationale and actions to be taken

The rationale and implementation actions for establishing effective contact/interaction in the agricultural programme, would be almost identical to the procedures to be followed for the terrestrial wildlife programme discussed above.

After the establishment of the SAFA and the ARSC, procedures would have to be put in place to allow meaningful and effective two-way communication between the ARSC representing the SAFA on the one hand, and the VCWS management staff and structures on the other. Open lines of communication must also be established with the Community Representative Committee (CRC) (see Part L)

The community association and committee dealing with the marine resources (the SFA and MRSC respectively), would, due to the hands-on involvement of the fishers with the proposed management structure, find it relatively easy to become and remain involved in co-management or collaborative ventures involving the marine resources. The fishers would effectively be the driving force behind the marine resources management actions. The same situation would apply to the agricultural programme, but not, as was pointed out in Step 5 above, to the terrestrial wildlife programme.

The agricultural programme structures recommended above (the SAFA and ARSC) would represent the communities, whereas the following channels of communication, actions and/or policies to be communicated and procedures to be followed are envisaged:

- The agricultural resources strategic plan, as well as all the other plans that will have an impact on the agricultural programme, will be workshopped with the appropriate community structures (SAFA and ARSC).
- The ARSC will have an open and direct channel of communication to appropriate VCWS management staff, especially the implementation team (ARPIT). If the ARSC should so choose, they may also channel the communication through the CRC.
- The ARSC will also have an open and direct channel of communication to the CRC (and *vice versa*).
- These communications or contacts may be on a personal basis (handled by one or more delegates) or in written format, and may be formal (a pre-arranged meeting or a letter) or informal. In all instances, irrespective of the mode of communication that was used or the type of contact, the responsible VCWS staff will minute the proceedings and will provide a copy to the ARSC and/or the SAFA.
- VCWS management staff, especially ARPIT members, will meet with the ARSC on a frequent basis, but not less than quarterly. Either party may request more frequent meetings if the need should arise.
- At the quarterly meetings, VCWS staff will present a quarterly report (verbally and in writing) to the ARSC. Particular attention will be paid to any problems, possible changes to policies, finances and marketing.
- The SAFA will meet on a six-monthly basis, which meetings will be attended by VCWS management staff. The ARSC will meet as often as they wish, but not less than quarterly. VCWS management staff may be invited to attend these meetings. The proceedings of all meetings will be minuted and the minutes will be distributed to all concerned.
- VCWS management staff will, during the setting up period, assist the SAFA and the ARSC in the administration of their activities with regards to record keeping and filing.

- The VCWS-GM will prepare and submit an annual report on the agricultural programme to the SAFA. This report, as well as the other formal reports dealt with above, will also be available in Portuguese.

STEP 8: IMPLEMENT THE PHASE 1 DEVELOPMENT OF THE STRATEGIC AGRICULTURAL DEVELOPMENT PLAN

(1) Purpose

The purpose of Step 8 would be to implement the planned and programmed actions of the preceding steps of the process and to get the sustainable agricultural programme operational..

(2) Rationale and actions to be taken

The precise details of the Phase 1 implementation programme would only be known once meaningful progress has been made with the preceding steps (especially Step 6).

The implementation programme would to a large extent rely on ongoing inputs by a contracted TDS, assisted by the full-time local extension officer.

The implementation programme may involve the following actions:

- An intensified agricultural extension and training programme. Training in specific aspects of farming would be provided, preferably by private sector institutions involved in product sales and services.
- Provision of inputs particularly for maize and seedlings for vegetables and later fruit trees. Improved cultivars better adapted to the tropical climate will be used.
- Identification and development of markets for farmer produce.
- Improved methods to store food supplies and seeds will be investigated and implemented. Training and assistance in the effective storage of surplus products and seeds will have to be given.
- An economically sustainable farming program will be heavily influenced by the ability of the farmers to get their produce to markets, either to the community market on VCWS (see section .. , Part ..), or the mainland, or both. The surpluses are currently carried by hand to the nearest beach from where it is transported by dhow to Vilanculos. Hence the development of reliable access routes on the peninsula and to the mainland will be a pre requisite for an economically sustainable farming program.
- The implementation process will very much be a hands-on and practical process of teaching, training, demonstrating, mentoring, support, motivation etc.

STEP 9: MONITORING AND EVALUATION OF PHASE 1

(1) Purpose

The purpose of Step 9 would be to monitor and evaluate the effectiveness of the sustainable agricultural programme, as embodied in the SADP, to date.

(2) Rationale and actions to be taken

Monitoring and evaluation principles and procedures are indispensable in developments of this nature. Therefore the monitoring and evaluation should be considered an integral component of the agricultural development process.

The primary focus of the sustainable agricultural programme would be on the improvement of agricultural productivity. Important objectives and/or criteria to be monitored therefore include the following:

- Success of the organic farming enterprise
- Co-management successes
- Improved crop yields
- Enhanced household food security
- Improved earnings
- Enhanced knowledge
- Sustainable environmental management

STEP 10: PLAN THE PHASE 2 DEVELOPMENT

(1) Purpose

The purpose of Step 10 would be to plan the implementation of the second phase of the SADP (steps 11 and 12 below) to ensure that the objectives for the programme are met.

(3) Rationale and actions to be taken

Phase 2 (see above) entails the consolidation of high yield rain-fed cash crop production parallel to the establishment of permanent tree crops (cashew and coconut palms), further consolidation of the new organic farming process, and value adding to all the crops for export to markets outside of the production area. Phase two will gradually follow phase one as the community masters the improved production and marketing opportunities that would firstly be based on present practices, and secondly the introduction of organic farming.

It is obviously at this stage not possible to elaborate on actions to be taken during the planning process for Phase 2, but the principles and rationale would be similar to those for Phase 1 (see especially Step 5 above).

The TDS who was contracted to deal with the planning of phase 2 would be expected to submit a final implementation plan to the VCWS-GM and the GEF PM (Implementation). Prior to the submission of the implementation plan, the go-ahead to continue with certain aspects of the Phase 2 implementation of the SADP, based on completed and approved OP's, could have been given by the VCWS-GM, in consultation with the GEF PM (Implementation). There would thus be no watertight separation between the two phases.

STEP 11: IMPLEMENT THE PHASE 2 DEVELOPMENT OF THE STRATEGIC AGRICULTURAL PLAN

STEP 12: MONITORING AND EVALUATION OF PHASE 2

Purpose, rationale and actions to be taken

Although the purposes, rationales and actions for the implementation and monitoring and evaluation of phase 2 would obviously not be identical for those of Phase 1, the principles and broad application would be the same (see Steps 8 and 9 above). The detail could thus not be provided at this stage.

12.2.3 Operational Plans

A number of OP's have been identified above for the first phase of the SAP/SADP and will need to be prepared at the appropriate stages. The OP's for Phase 2, if any, will only be known at a later stage.

The compilation of the OP's will be the responsibility of the VCWS-GM, assisted as and when necessary by contracted TDS's, and will need to be submitted to the GEF PM (Implementation) for approval.

PART E: EXPANSION AND RESTORATION

CHAPTER E1: EXPANSION ACTION PLAN

1.1 INTRODUCTION

Protected area networks worldwide are often not the result of systematic planning but rather of opportunism where land not required for other purposes was used for conservation. Or, as happened in the case of VCWS, where factors and motivations other than environmental considerations played a deciding role. The challenge is therefore to consolidate and expand the current system of protected areas in regions such as the VCWS in such a way that it represents the biodiversity of the area and allows for the effective conservation of ecological systems and processes. Phase I of the VCWS initiative will cover some 42 000 ha (22 707ha land) with an additional 17 000ha land proposed for Phase II (proposed terrestrial area 40 000ha).

1.2 RATIONALE

When the current VCWS developers first investigated the opportunities for ecotourism along the Mozambican coast from the air, they were immediately impressed by the scenic beauty and diversity of the Quewene (San Sebastian) Peninsula, and by the obvious possibilities and potential for a nature-based tourism development.

However, ecological considerations played only a minor role when an area was demarcated for application to the government for a concession:

- The area was inaccessible by road, and the developers had to rely on aerial observations.
- The southern boundary was arbitrarily chosen and bisects the large Jane Marsh.
- The western boundary is based on an old track.
- The number of people living in the area was seriously underestimated, and a sizeable area has had to be “excised” from the Reserve area to accommodate the families that had to be resettled.
- The grazing capacity for herbivores turned out to be poor, which necessitated a conservative wildlife reintroduction approach and placed a question mark over the ecological viability of the area to accommodate large game species such as elephant and to a lesser extent buffalo.
- The low numbers of herbivores that can be kept on the current Reserve area in turn jeopardise the economic viability of the venture.

It was soon realised that it would be hugely beneficial, especially with regards to ecological considerations but to a lesser extent also economical, if the VCWS could be expanded to the south. This necessity was in principle accepted in mid-2001 (Lambrechts, 2002b).

The rationale behind such a step would be the following:

Ecological integrity: The aim would be to have an area large enough to allow for, as far as possible, the natural functioning of ecosystem processes. The principles of the Man and Biosphere Programme may be considered where there is co-ordination between formal protected areas, and adjacent landowners/communities. Should the VCWS be expanded to include the Phase II area as shown on the map, the terrestrial area would be enlarged to about 39 000 ha, which would still not make it the ideal size for a protected area from the viewpoint of big game, but at least a viable one in terms of ecological integrity and diversity. The miombo woodlands of the Phase II area appear to be in more pristine condition than the woodlands of the more densely populated northern regions.

Ecological sensitivity: The boundaries of the Phase II expansion would be such that all sensitive areas such as marshes and other wetlands would be avoided.

Ecological diversity: The proposed expansion to the south would include extensive wetlands such as the Muangane Marsh, the southern half of the Jane Marsh and the wetlands around Lake Zevane. A large number of smaller lakes would also be added to the protected area system, as well as the large (500 ha+) Lake Nhamanene. The dune barrier system along the coast in the Phase II area are more developed and stable, and thus more vegetated with better examples of dune forest and thicket, than the younger dunes further to the north in the current sanctuary. The major part of the Inhamambane Estuary's catchment area would be included (thus avoiding the current necessity of bisecting the Jane Marsh). The miombo woodlands of the Phase II area appear to be in more pristine condition than the woodlands of the more densely populated northern regions.

Grazing capacity: The specialist who undertook the grazing capacity survey did not have enough time for a proper survey of the inaccessible phase II area, and could only manage a brief visit to the northern boundary region. No analysis of the quality of the grazing could thus be undertaken, but based on subjective assessments and analysis of satellite-photos the grazing potential, especially due to the extensive open wetland systems (Peel, 2002), would seem to be appreciably better than most of the current sanctuary. The recommended herbivore numbers would for example increase from 52 to 92 for zebra, 65 to 115 for buffalo, 39 to 69 for sable, 12 to 21 for hippo and 20 to 35 for elephant. These increases would also increase the genetic viability of the herds.

Wilderness atmosphere: The Phase II area seems to be very sparsely populated, with very limited signs of human habitation and man-made interferences. It is totally inaccessible to motorised vehicles. The area would probably turn out to be the prime wilderness section of the VCWS, and has provisionally been zoned as a wilderness area. A small-scale wilderness-based tourism development may be considered for the area, if an EIA assessment should prove it to be acceptable and if it would be economically feasible.

Wetlands to the west: The inclusion of the extensive wetlands to the west of the VCWS, between Quewene and the mainland, was originally considered for inclusion in the Phase II

expansion. However, the area between VCWS and the wetland is relatively densely populated and its inclusion would have far-reaching and unacceptable social impacts. It was thus not considered for inclusion.

Economic viability: Du Plessis (2002) calculated that the inclusion of the Phase II area would greatly enhance the economic viability of the sanctuary. Consumptive utilisation of the wildlife (trophy hunting) would generate about US \$71 075/annum for the current area, whereas the corresponding figure for the expanded area (39 000 ha) would be \$122 425 or an increase of 72%. This would be enough to pay for direct conservation management activities and expenses, plus to generate a sizeable income for the owners of the resource, the local communities. The current temporarily fenced portion of 8.500 ha would in all respects be too small to accommodate viable populations of herbivores, and certainly not any of the larger species such as elephant and hippo.

International recognition: Plans are already afoot to have the Bazaruto region recognised as a World Heritage Area (WHA). The inclusion of the sanctuary in the WHA application would contribute greatly to the motivation, and with the inclusion of the Phase II area it would almost become a *fait accompli*. The phase II area would also expedite any application for the VCWS to be proclaimed as a Ramsar wetland of international importance.

Ownership of wildlife: The wildlife of the sanctuary, including any reintroduced species, would “belong” to the local communities. Any profits accruing from the utilisation of the wildlife, would thus go to the local people. It would obviously be to their advantage to have the Phase II area included in the sanctuary.

1.3 MANAGEMENT ACTIONS

The following actions will have to be taken before an application for the expansion of the sanctuary is submitted to government:

- A feasibility study will have to be undertaken to determine/deliver the following:
 - Ecological feasibility
 - Grazing capacity
 - Species and numbers to be relocated
 - Economical feasibility
 - Utilisation possibilities (consumptive and non-consumptive) and model
 - Exact location of the new area
 - Routing of the fence
 - Social impact assessment (including attitudes of the local people)
 - Development costs
 - An operations plan and schedule
- Should the feasibility study indicate the desirability of the venture, an application will be lodged with government through the prescribed channels.

Responsibility for the project will lie with the VCWS-GM, assisted by a contracted TDS and with the involvement of the GEF Project Manager (Implementation).

CHAPTER E2: ECOSYSTEM RESTORATION PLAN

2.1 INTRODUCTION

The rationale behind the establishment of a new protected area is often based on one or more urgent conservation needs, such as maintaining or enhancing the ecological integrity of the area or conserving biodiversity. The motivation may be built on a combination of factors such as biodiversity in general, landscapes or ecosystems (or more often parts thereof), or it may be narrowed down to the conservation of rare and endangered species or habitat types.

In the case of VCWS, as was pointed out above, the commercial potential of the area for ecotourism purposes played a deciding role in the decision to apply for a leasehold of the land. The conservation needs of the area were not at the time not known to the developers, nor were they fully aware of the impressive biodiversity of the marine and terrestrial habitats and the extreme sensitivity and fragility of some of these habitats. However, no area would qualify to be developed as a viable ecotourism destination if it did not fit with the universal criteria for a successful ecotourism development: it must be a natural area that conserves the environment in a natural state. In this regard, the VCWS turned out to be even more than the developers expected: it has an almost unparalleled richness in biodiversity and an impressive scenic beauty.

Given the professional background and experience of the developers, i.e. the development of natural areas for tourism and ecotourism purposes in neighbouring South Africa, it was almost a foregone conclusion that they would stick to the proven success recipe that was established over a period of more than two decades. The venture thus centers around an upmarket low impact – low density – high value ecotourism and estate development built around a typical African big game scenario, with the marine environment added as a huge bonus. The early decision was thus to rehabilitate the wildlife of the Quewene peninsula by reintroducing those species of wildlife that used to occur in the area prior to the devastating civil war of the 1980's. That would have allowed the area to be marketed as a unique marine and coastal environment with an impressive array of terrestrial flagship species such as the elephant, hippo and buffalo thrown in as an added incentive.

2.2 LINKAGES

The Ecosystem Restoration Plan (ERP) is not a stand-alone document and cannot be regarded or implemented in isolation. Many of the positive and negative aspects discussed elsewhere in this BMP and all of the strategic plans are linked in some way to the restoration of the ecosystem. The ERP is thus in effect a collation of some of the restoration principles and actions of all of these plans. The overall BMP is essentially a restoration plan because it deals with the establishment of a new protected area that has been inhabited, and altered, by humans for a long time.

For the sake of brevity and ease of understanding, full reference will not be made in the following text to statements, recommendations, principles or actions that were already

mentioned elsewhere in the BMP. It would also be unnecessary (and impossible) to again list all the restoration actions that have been included in the strategic and management plans contained in the BMP. Only some of the more relevant actions will be included in the following discussion. All of the aspects broached below, have therefore been dealt with elsewhere in the BMP.

All the aspects that are listed below should be viewed in the light of the purpose and objectives of the ERP and their link to restoration activities.

2.3 PURPOSE AND OBJECTIVES OF THE ECOSYSTEM RESTORATION PLAN

2.3.1 Purpose

The purpose of the Ecosystem Restoration Plan (ERP) is in line with the overall mission of VCWS (see Part C) and is compatible with the purpose and objectives of the international Convention on Biodiversity (CBD):

To restore/rehabilitate the natural resources of VCWS to a level where sustainable use and equitable benefit sharing would be feasible, by implementing the various strategic and sector-specific management plans contained in this document.

2.3.2 Objectives

The following objectives have been identified in order to achieve the purpose of the ERP:

- To compile and implement an ERP.
- To take cognisance of and correlate with the variety of strategic plans mentioned above, all of which have ecosystem restoration objectives and would thus impact on the deployment of the ERP
- To compile an Operational Plan (OP) to provide the details of the ERP.
- To take cognisance of and maintain/enhance the positive biodiversity restoration aspects that have been identified (see below)
- To address the negative biodiversity aspects and/or influences that have been identified (see below)
- To take cognisance of and maintain/enhance the positive social restoration aspects that have been identified (see below)
- To address the negative social aspects and/or influences that have been identified

2.4 PRINCIPLES AND POLICIES FOR THE ECOSYSTEM RESTORATION PLAN

2.4.1 The Broader Context

- It is clear that there would have been no VCWS development without an economic incentive and without the possibility of the sanctuary being utilized in a profitable

manner. The underlying principle of the development is thus conservation through utilization.

- The project sponsors opted to develop a relatively large area (30 000 ha for the current sanctuary plus an envisaged 20 000 ha for the planned phase II expansion) rather than merely choosing a small site for a safari-style lodge. The development and management costs inherent in such a venture would obviously be of a much greater magnitude than would have been the case for a small site where only tourist infrastructure had to be provided. The viability of the VCWS venture would thus be directly dependent on the ability of the developers to offer and sell the product at a profit.
- The development and marketing of a sizeable African protected area such as the VCWS normally goes hand in hand with big game. The current size of the sanctuary actually makes big game a non-negotiable imperative, otherwise the area would either have to be scaled down considerably or the company would end up with a non-viable commercial venture and inevitably a financial disaster. The marine environment, impressive as it is, would on its own not be enough to ensure financial viability for such a large area.
- The rehabilitation/restoration of the biodiversity of the VCWS has been formulated as a basic principle and requirement for the development of the sanctuary, and has been accepted as such by the government in granting the concession. The wildlife relocation plan, linked to the broader restoration of the ecosystem of the Quewene region, has thus been built into the concession contract with the government as one of the main deliverables of the project.
- With regards to the wildlife relocation programme, it has been proposed by the project sponsor and accepted by government that firstly only species that historically occurred in the area would be considered for relocation, and secondly that full ownership of the wildlife, including the relocated species, would be vested in the local communities of the sanctuary. The direct financial benefit of the wildlife would thus be in the hands of the “owners”, whereas the benefits to the developers and the investors would be indirect and would be determined by the mere presence of the animals.
- Notwithstanding the small size of VCWS when compared to Mozambique or to other African protected areas, it is destined to play an important role in a country where well-managed, properly staffed and adequately funded protected areas are almost non-existent. Only 0,26% of the coast, excluding VCWS, is currently protected and it stands to reason that the sanctuary would make a much bigger contribution to the conservation of marine and coastal systems than would be apparent at first glance.

2.4.2 The Biodiversity and Conservation Context

(1) General aspects

The conservation and restoration/rehabilitation of a relatively large protected area such as VCWS would not normally be the function of a private company. Nature conservation is globally accepted as a responsibility of government that should be executed as such on behalf of the people of the country. However, the government of Mozambique is currently still ill

equipped to shoulder this responsibility and are largely dependent on private companies such as EAW to fill the gap. In this instance the company will make a contribution to the conservation of biodiversity that will rank as significant on a global scale.

The extreme richness of the VCWS in terms of biodiversity means that the company has contractually accepted a huge conservation responsibility. This responsibility has been accepted and acknowledged as such in all the management and development plans that were compiled for the sanctuary (Lambrechts 2001 a, b and c). In this respect they can thus be held accountable by government to deliver on their contractual obligations.

The restoration of the sanctuary will add another unique feature to an already unique tract of land and sea: it would become the only place in Africa where the visitor would have the privilege to experience endangered marine mammals such as the Dugong and the biggest land mammal, the Elephant, during one visit to the same site. Something that has once been will thus be restored.

During the protracted civil war of the 1980's and in its immediate aftermath when people could move more freely, many wildlife species (especially herbivores and the major predators that were dependent on them) in Mozambique were decimated to the point of local extinction, or reduced to mere remnants of previous populations. With regards to the VCWS and the ERP, the following should be noted:

- The Quewene region did not escape this carnage and all of the bigger herbivores and carnivores have disappeared. Accurate data is hard to come by, but apparently elephant and buffalo were last seen in the region about 10 years ago and the last hippo was killed a few years ago.
- Only relatively low numbers of the smaller ungulates such as grey (common) duiker, red duiker, suni and steenbok as well as bush pig have survived. The same fate overtook the Nile crocodile. Without the establishment of the sanctuary, all these remaining species would also have disappeared in time.

The establishment of the so-called Reserve area (the fenced portion where the main objective would be the conservation of biodiversity and natural systems) will of necessity lead to the involuntary resettlement of the people living there, whereafter access will be controlled due to the presence of potentially dangerous big game species. The extensive human pressure and impacts on the vegetation and the remaining wildlife of the Reserve area will thus be removed.

The establishment of the VCWS will be accompanied by a number of control measures and incentives to turn around or at least regulate the current unsustainable levels of resource exploitation by the resident communities. The catastrophic results of the over-exploitation of the terrestrial wildlife resource has been summarized above, while it is a foregone conclusion that over-exploitation of the marine resources is heading the same way. The ERP and the relevant strategic plans will hopefully restore these imbalances.

Even though adaptive management would be inevitable due to insufficient data on the complex natural systems being available, the specialist inputs by the members of the planning team led to a much better understanding of the complexities of the natural systems of Quewene. The same applies to the social environment. The required restoration actions can thus be approached with much greater confidence.

(2) *Mammals*

The precarious situation of the sanctuary's ungulate population has already been referred to, and the planned restoration action will be dealt with in section 2.4.3 below.

It is evident that forest or thicket loving species such as Suni and Red duiker are only present at low densities due to persecution and loss of habitat. The general conservation status of the mammalian fauna of the area, especially the ungulates, is very poor at present. Human impacts on the remaining mammals, particularly those species that provide a source of protein, if not halted, could increase in severity and possibly result in local extinctions. The ERP will address this situation.

(3) *Avifauna*

Although the general paucity of game birds (francolin, guinea fowl, etc) may be a direct consequence of human depredation, the degradation of the natural habitat in VCWS appears to be the main factor impacting on the avifauna. Birds of prey are very poorly represented in the sanctuary. No vultures, for example, virtually no eagles, and very few accipiters are to be seen. Their paucity possibly reflects the dearth of both small and large mammals in the Quewene peninsula area, and thus the absence of a sufficient prey-base to sustain, for some species, permanent populations in VCWS. Also missing, because of the absence of a large mammal fauna in the sanctuary, are oxpeckers. Both species (Red-billed and Yellow-billed) would have occurred here and once the large mammal fauna has been restored, consideration should be given to reintroducing these species.

The miombo woodlands of VCWS do not contain the diverse avifauna normally associated with climax miombo woodland. This depauperate avifauna is a consequence of the degraded state of this vegetation type in the Sanctuary - it is extensively coppiced, and the areas with the most fertile soils probably once supported the tallest woodland, most of which has apparently been cleared for agriculture. The cessation of slash-and-burn farming in the Reserve area and in time also the rest of the sanctuary will no doubt lead to a gradual restoration of mature woodland at these sites and ultimately to a more diverse and interesting miombo woodland avifauna.

The Saddle-billed Stork, a high priority species for conservation action, would benefit from a conservation initiative in the sanctuary as there are several resident pairs present. The most effective conservation measure may simply be to locate the nesting sites of each of the pairs and ensure that human disturbance here is kept to a minimum.

Because 14 of the 19 candidate species for conservation attention in the sanctuary are water birds (especially freshwater wetland species) it is clear that actions taken to safeguard and manage these habitats appropriately, will have a broad beneficial effect for a spectrum of potentially threatened birds. The near-threatened Pygmy Goose, for example, nests in holes in trees, but good nesting sites seem to be in short supply. A simple and effective conservation measure would be to put up a few artificial nest sites (hollow logs, artificially constructed if need be) around the pans used most frequently by the Pygmy Goose and so boost recruitment.

(4) *Herpetofauna*

The current poor status of the sanctuary's herpetofauna can be attributed to a few factors:

- Human persecution in the case of reptiles, particularly snakes and the crocodile (although in the case of the crocodile, the abundance of water monitors that feed on the eggs also play a meaningful role)
- Habitat changes for those species that favour vegetation types that were significantly altered by man, such as dune scrub and thicket.

The management actions that will be aimed at the restoration of the vulnerable plant communities, will also have a beneficial impact on the restoration of the associated herpetofauna. The restorative effect that the planned Consultation and Information Disclosure Plan (CIDP), focusing on broad conservation and social aspects, will have on the sanctuary's herpetofauna is open to conjecture at this stage. With time, however, the effect may be significant.

(5) *Vegetation*

The vegetation of the VCWS has been subject to considerable man-induced changes, most of them having had a negative impact:

- The severe impact of human activities on the vegetation of the VCWS is clearly evident. Human settlements are widespread and in many parts of the peninsula not only now abandoned clusters of planted fruit trees, but also remnant patches of thicket and forest plants, parts of the former vegetation communities in those areas, indicate that considerable impoverishment has taken place.
- Throughout the peninsula subsistence agriculture in the form of slash-and-burn (shifting) agriculture has been practiced for a long time. In this process an area of woody vegetation is chopped down and burned to enrich the soils with minerals. Crops are planted but once soil fertility wanes, which happens within two or three years, the land is left fallow and the rooted stumps coppice and a dense growth of saplings follows. This results in a mosaic of different size and age classes as well as much denser woodland.
- The combined effects of these anthropogenic disturbances and browsing by goats have drastically altered some of the more unique vegetation communities on the peninsula. This is most evident in the narrow strips of beach terraces which were

probably covered by a dune thicket and forest and which are now merely fragmented, impoverished relicts of what was once present.

- This problem is going to be exacerbated by the planned construction of houses and other infrastructure in this vegetation type along the northern tip of the sanctuary, while that in the east along the western side of the mouth of the estuary will be partly fenced out of the Reserve area in order to separate the fisher community from potentially dangerous wildlife.
- Other tourism developments are unfortunately adding to the destructive processes in that plant communities which in the past were minimally affected by the local communities such as the ecologically sensitive Mangrove-Salt marshes, have been partly degraded and perhaps irreparably damaged by the construction of lodges and airfields. Current plans for major tourist lodge developments along the highly sensitive Spit along the estuary are cause for great concern as considerable and perhaps irreparable damage may be done.
- Fire has been and will continue to be a natural phenomenon in miombo woodlands. However, the frequency and intensity of veldt fires, most of them set by man, have been such that fires have been responsible for much of the vegetation composition, density and distribution on the peninsula. Miombo woodland has some resistance to fire and is perhaps stimulated by the occurrence of fires. The species-rich and ecologically important bushclumps are seemingly decreasing in size and extent. The effect of fire has been a continual eroding away of the bushclump margins, exposing more and more of the inner vegetation to desiccation by wind and sun. Fire has also been very detrimental to dune thicket/scrub and has contributed extensively to its degradation. Bare areas and large burnt tree trunks scattered throughout this plant community, were evidence of this. Along the margins of the bushclumps fire has also made inroads, eroding away at the vegetation resulting in part in the current distribution pattern and condition.

The ERP and the planned vegetation management actions such as a controlled burning regime and the replacement of shifting agriculture with environmentally friendly conservation agriculture techniques and the gradual restoration of the severely degraded dune forest vegetation, can cope with most of the negative impacts mentioned above. However, the situation will be hugely complicated by the fact that some of the negative impacts arise from insensitive VCWS development activities.

(5) *Marine environment*

The marine surveys have come up with the inescapable conclusion that the utilization of the marine resources of the Quewene waters, and probably of the whole region, has reached such high levels of unsustainability that a collapse of the resource would be inevitable unless drastic and urgent steps are taken to stem the tide. The innovative strategic plan that has been drawn up to regulate marine resource use has the ability to achieve exactly this.

(6) *The agricultural environment*

The negative impacts of shifting agriculture will be replaced by the long-term positive impacts of conservation farming (permaculture or organic farming). The abandoned slash-and-burn fields in the Reserve area from where the farmers have (or will) been resettled, will in time be restored by natural succession.

(7) *Other positive conservation spin-offs*

The establishment of VCWS will contribute to a vastly improved conservation status for the region, and will provide additional motivation for the area to be designated as a World Heritage Area and a Ramsar Site. With the addition of the Phase II area of 20 000 ha to the south, impressive wetland areas will be added to the current reserve. It seems likely that the VCWS will become the best-managed protected area in the whole of Mozambique.

Prior to the establishment of VCWS, all the human inhabitants of the area were dependent for their livelihoods on what the natural environment had to offer. It seems likely that upwards of 300 and even as many as 500 employment opportunities will be created at full development. Such an event will not only entail a huge socio-economic benefit, but will have equally beneficial environmental impacts. Whereas in the past all these workers and their dependents had to rely on nature, they will now have a fixed income and would have no need to continue with the destructive environmental practices of the past. Job creation will thus lessen the impact on the environment and will indirectly contribute to the restoration of the sanctuary's depleted biodiversity resources.

2.4.3 The Wildlife Reintroduction Context

One of the main contentious aspects of the VCWS development, almost on a par with the resettlement programme, is the planned wildlife re-introduction programme. The primary objective of the programme is to restore the severely depleted herbivore population of the sanctuary. As such it will be the second wildlife restoration action in the country (the first is the current Limpopo National Park programme) and, given the national paucity of wildlife and of protected areas with viable wildlife populations, the motive cannot be questioned.

It must be remembered, as was pointed out above, that the government has approved the re-introduction of suitable species of wildlife when the application for a concession was granted. The company furthermore used the presence of big game as an important incentive or draw card during the marketing of the estate sites and the safari lodge sub-concessions. The company will thus be contractually obligated to deliver on this undertaking and all arguments to the contrary may in effect be immaterial.

However, the wildlife restoration (re-introduction) programme has both a positive and a negative, or at least precautionary, side as is evidenced by the following:

(1) *Positive factors*

Although relatively small numbers of herbivores will be re-introduced, the programme will be second only after the recently established Limpopo National Park. It will be indicative of

the ability and willingness of a private company to contribute materially to the restoration of Mozambique's wildlife and as such it will play a far bigger psychological role than merely the relocation of a few dozen wild animals.

The objectives of the herbivore re-introduction programme are fully compatible with the objectives of the ecosystem restoration plan, and largely also with international guidelines for the restoration of herbivores (although there are a few significant provisos; see the discussion below). The species mix and the numbers to be relocated are based on sound ecological principles: only species that historically occurred in the region have been identified for relocation and the numbers will be in line with the carrying capacity of the range. The relocation programme in its entirety meets with the requirements and approval of the relevant Mozambican authorities.

Ownership of the re-introduced wildlife will be vested in the local communities and the resource will be managed according to the principles outlined elsewhere in this BMP. All the "profits" generated by the planned consumptive utilization of the resource will accrue to the local communities and will be controlled and spent by them according to their own preferences and priorities.

The re-introduced wildlife, mainly elephant, buffalo and hippo but also the smaller species, will also have a positive spin-off on the restoration of some other species, habitats or systems:

- i) In the absence of cattle, dung beetles have disappeared from the region with the demise of the last of their "host" species (elephant, buffalo and hippo), and they will either find their way back in due course, or they may be relocated.
- ii) The hippo will undoubtedly settle in aquatic habitats of their preference in the sanctuary, and will be hugely beneficial in opening up the wetlands that have become overgrown with hygrophilous vegetation.
- iii) Oxpeckers are also absent from the area due to the absence of hosts for ticks. These specialized birds will be re-introduced following on the successful establishment of viable herbivore populations.
- iv) The accumulation of moribund plant material in those areas that would have been sheltered against the burns that occurred annually, is almost as harmful as overgrazing. The herbivore populations would, in time, be instrumental in getting rid of moribund material and in restoring the vigour of the grazing.

The positive psychological effect of the re-introduction programme should not be discarded. The communities of other regions in the country will undoubtedly become aware of the implications and positive impacts of the VCWS programme, and may agitate in favour of the restoration of the wildlife that has disappeared from their regions.

It must be remembered, as was pointed out above, that the government has approved the re-introduction of suitable species of wildlife when the application for a concession was granted. The company may thus be contractually obligated to deliver on this undertaking

(2) Negative/precautionary factors

Soils samples indicated that the nutritive value of the deep sandy soils of the sanctuary is very poor. This obviously impacted negatively on the quality of the grazing, which is also poor, and it correspondingly lowered the conservation potential of the planned herbivore re-introduction programme.

The habitat of the sanctuary may therefore be regarded as marginal for grazing animals. It is possible, even probable, that the larger herbivores of days gone by, with the exception of hippo, moved out of the area that is currently the sanctuary during the winter months to utilize the better quality grazing of the extensive wetland systems to the west. The wildlife populations in those days were totally free ranging and they could move at liberty to areas that offered better grazing during certain times of the year. With the current sanctuary of necessity being fenced, the animals would be confined to the sanctuary and would be dependent on what is available inside the fenced area. The restoration action may thus place the re-introduced species, or at least some of them, under stress. However, should the wildlife be managed effectively and in accordance with the ecological requirements of the species and the potential of the habitat, the stress levels could be lowered to acceptable limits.

The limited numbers of prey species that could be carried on the sanctuary linked to the relatively small size of the fenced area, would rule out any major predator restoration action. The wildlife restoration programme could thus only be regarded as partial and would not be aimed at total restoration.

The presence of big game species will have direct and far-reaching impacts on the daily lives of many of the original human inhabitants of the VCWS. These negative impacts are discussed below under social impacts.

The currently fenced area of about 8500 ha would be too small to accommodate viable ungulate populations and would certainly be far too small to consider the release of elephant. The area will thus (as is indeed planned) have to be enlarged considerably. The larger than anticipated human population will mean that much more land will have to be set aside for human habitation than was originally planned. It will also mean that the inclusion of the Phase II area will become an absolute necessity, otherwise the already marginal habitat will not be able to sustain viable herbivore populations.

2.4.4 The Social Context

The wildlife re-introduction programme will probably prove to be an ecological success, notwithstanding the negative habitat factors that were listed above. However, the social impacts of the programme may turn out to be more important than any ecological considerations and may jeopardize the success of the restoration action. The following social impacts, some of them positive and some negative, will thus have to be acknowledged and addressed otherwise the programme, notwithstanding the good intentions, will not meet the expectations.

The ecosystem restoration plan will also have a number of other non-wildlife related (social) positive and negative impacts, as is evidenced from the following discussion.

(1) Positive factors

Although the right of access for subsistence purposes to local natural resources is entrenched in Mozambican legislation, the local communities of VCWS will be in the unique situation that they will effectively become the owners of the wildlife that is fenced and controlled by the sanctuary. The right to commercially exploit the re-introduced species, including elephant and buffalo, will be inherent in this ownership provided that the utilization takes place in a sustainable manner and according to the management plan..

The VCWS ecosystem restoration project will in addition to the abovementioned wildlife benefits, have an impressive number of other positive impacts (listed in random order):

- i. Health care will be immeasurably improved with the opening of the first hospital/clinic facility in the region. The impact of the planned malaria control programme will be equally positive.
- ii. Whereas no formal job opportunities were available in Quewene, more than 300 and even as many as 500 permanent jobs will be created in the sanctuary
- iii. The standard of living will increase dramatically due to the large (in local terms) amounts of money that will be in circulation.
- iv. The upgrading of the two existing schools will increase the educational standards and this, in conjunction with the higher standard of living, will increase the literacy levels of the local people.
- v. The project also has positive spin-offs on the mainland with regards to the sourcing of material, consumables and services, as well as hugely increased demands on the operators of the transport dhows.
- vi. The community market at Goshen will provide an outlet for local produce and will stimulate entrepreneurial development.
- vii. The Community Development Fund will be administered by the community and will place appreciable amounts of cash at their disposal for community projects.
- viii. The employees of the company will receive in-service job training and will thus for the first time in their lives be qualified for jobs other than their traditional livelihoods.

(2) Negative factors

Given the positive objectives of the VCWS development and especially the progressive social empowerment policy, the ecosystem restoration impacts on the local communities should have all been positive. That this turned out not to be the case could be blamed firstly on inaccurate baseline information, secondly inadequate planning, thirdly the ineffective or non-implementation of existing social and biodiversity plans and finally financial considerations that contributed to the plans and policies not being implemented.

The following project-related social factors and impacts should all be regarded as negative influences on the eventual success or otherwise of the ERP:

- The comprehensive recommendations of the mid-2001 bio-business plans for the sanctuary were not implemented. Implementing these recommendations would have prevented most if not all of the deficiencies that are now encountered. Steps will have to be taken, as indicated in this BMP, to ensure that approved recommendations are translated into actions otherwise the shortcomings as identified during the social survey will develop into major problems.
- One of the most significant aspects that were not implemented was the public consultation and information disclosure programme. The social survey that was undertaken as part of the BMP process, indicated that the objectives of the project were either not devolved down or understood at grass-roots level. Uninformed or poorly informed people, especially those that experienced no direct benefits such as employment, would tend to view the development as a threat. The “new way of life” project, had it been implemented, would have gone a long way in solving the problem.
- Some households have to be resettled to make place for physical developments or to prevent conflicts with free-ranging wildlife following on the establishment of the Reserve. This programme was fraught with a number of shortcomings and caused or encountered various real or potential problems:
 - A poor information programme led to unease amongst both the resettling and host communities
 - The programme did not consider the wishes of and impacts on the host communities
 - Not enough land was available to accommodate the larger than anticipated number of resettling people (the original calculation was that approximately 16 households would have to resettle; this number has now increased to an estimated 86 households)
 - Indications are that the programme will increase pressure on vulnerable groups
 - Increased population densities in the resettling area may lead to disruption of the social fabric
- The original “official” estimate of the number of people living in the sanctuary was 1089. Current estimates (not confirmed because the results of the current census are not yet available) indicate a population of about 9000 people. This huge difference impacts on resettlement plans, the size of the area needed to resettle people, the area available for wildlife, the placing of the game proof fence, the distribution of benefits that have decreased eight fold in value on a per capita basis, the number of people that will not receive direct project benefits etc.
- Other negative social side effects of the VCWS project that detracts from the ERP are the following:
 - The fisher community at the mouth of the estuary will, for their own protection, be fenced off from the Reserve area and will for all intents and purposes become isolated from their friends and families living in the

community development area about 15 km away. They will also be isolated from other services and amenities such as schools, the clinic and the market at Goshen.

- Although v-gates have been provided in the fence line to grant access to the local people to resources such as water and firewood in the Reserve area, the presence of potentially dangerous game may make the right of access meaningless. This will be a case of a positive restoration action having a negative social impact.
- The main direct benefit of the project, employment, will be limited to a smallish select group of people. Those who are not employed due to reasons such as that they live in remote areas, will obviously tend to be more negative about the project.
- The communities living to the west of the official sanctuary, i.e. between the sanctuary and the western wetlands, should for all for all intents and purposes be regarded as the same population. Their numbers are unknown, but they will increase the existing pressure on services, facilities and benefits that are to be shared.

2.4.5 The Political and Administrative Context

The ERP must be viewed against the company's contractual obligations. The contract with the government requires a number of actions to be undertaken, one of which is the re-introduction of suitable species of wildlife. The sales of the residential stands and the safari lodge sites were also linked to access to a Reserve area where a variety of wildlife including big game, would be present. In general terms the re-introduction of wildlife could thus be regarded almost as a *fait accompli*.

2.4.6 The Developmental Context

All the guidelines contained in the VCWS bio-business plan and in the EIA, point to a non-negotiable environmentally friendly development ethic. In theory the development should thus have been beyond reproach, with active and effective mitigative steps taken in those instances where the development of infrastructure would have impacted on the environment. As such the development would have been in line with the requirements of the ERP.

However, these stipulations were not in all instances adhered to:

- An airstrip was constructed on a sensitive mangrove – salt marsh system (in contravention of the requirements of the EIA)
- Another equally sensitive salt marsh was impacted on by an already constructed safari lodge.
- A number of other poorly planned landing strips were constructed and abandoned.
- Two hotel lodges are planned for the sensitive mobile dune system to the east of the estuary (this area has been zoned as a natural area in the BMP)
- The development of a housing estate in the north of the sanctuary impacts on a small but significant plant community.

- Doubts have arisen about the company's assurances that the two lakes/wetlands that will provide water to the housing estate and headquarters developments contain enough water to meet the demand. Indications are that neither of these sources is of a permanent nature.

2.4.7 The Operational Context

To be able to meet the requirements for a successful ecosystem restoration action, the company will have to employ contracted specialists (TDS's) on a frequent basis. A comprehensive set of Operational Plans will have to be compiled to deal with the complexity of restorative actions that will require attention.

2.5 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR AN ECOSYSTEM RESTORATION PLAN

2.5.1 A 7-point procedure for implementing the ERP

A simple 7-point procedure has been devised to implement the ERP. The seven points are as follows:

- Step 1: Determine linkages with other restoration-orientated strategic plans
- Step 2: Prepare an Operational Plan (OP) and draw up a schedule to implement and manage the ERP
- Step 3: Provide the organizational capacity to implement the plan
- Step 4: Link the ERP to the consultation and information disclosure plan
- Step 5: Execute the ERP in tandem with other biodiversity and social plans
- Step 6: Monitor progress with the implementation and success of the ERP
- Step 7: Establish report back procedures to report on progress/problems

2.5.2 Application of the 7-point plan

STEP 1: DETERMINE LINKAGES WITH OTHER RESTORATION-ORIENTATED STRATEGIC PLANS

(1) Rationale

All the other strategic plans that are dealt with in this BMP, deal to some extent with restoration-linked aspects. The ERP will thus in effect be a combination of all these plans, with the accent on the restoration impacts.

(2) Actions to be taken

The VCWS-GM will delegate the task to a member of staff to determine the linkages and to identify all the aspects that need to be included in the ERP.

STEP 2: PREPARE AN OP AND DRAW UP A SCHEDULE TO IMPLEMENT AND MANAGE THE ERP

(1) Rationale and actions to be taken

All the biodiversity and social implications and impacts arising from the establishment of the VCWS will be addressed by the various strategic and management plans of the BMP. However, if viewed and implemented in isolation, these divergent implications/impacts may or may not satisfactorily address the objectives of the ERP. It would thus be necessary to prepare an OP specifically for the ERP to lay down guidelines how the plan will be implemented, as well as to draw up an implementation schedule and to identify suitable milestones.

STEP 3: PROVIDE THE ORGANIZATIONAL CAPACITY TO IMPLEMENT THE ERP

(1) Rationale

Unlike the strategic plans where considerable long-term management inputs will be required, the ERP would only require part-time attention from a designated member of staff. Responsibility for the execution of the ERP will lie with the VCWS-GM, but capacity to manage the plan will have to be created, and channels to keep the local communities informed will need to be established and utilized.

(2) Actions to be taken

The following actions need to be taken:

- Designate a member of staff to be responsible for the execution of the plan
- Establish channels to inform the community committees, especially the Community Representative Committee (CRC) and the project-specific biodiversity and social committees
- Inform the GEF Project Manager (Implementation) of pro-active steps that will be taken

STEP 4: LINK THE ERP TO THE CONSULTATION AND INFORMATION DISCLOSURE PLAN (CIDP)

(1) Rationale

Some of the most serious negative impacts of the VCWS project are related to the failure of the company to implement an effective CIDP. For the ERP to realise its objectives, care would have to be taken to prevent a recurrence of past mistakes.

(2) Actions to be taken

The CIDP in itself will not be specifically geared to the ERP, but rather to assist with the implementation of the other plans. The ERP as such will thus not feature prominently in the CIDP, but the various restoration activities contained in the other plans will be monitored. If the need should arise, actions aimed specifically at restoration principles will be built into the CIDP.

STEP 5: EXECUTE THE ERP IN TANDEM WITH OTHER BIODIVERSITY AND SOCIAL PLANS

(1) Rationale and actions to be taken

The ERP, although it has been defined as a specific plan with specific objectives, will be executed as part of the other strategic and management plans, including both social and biodiversity plans, of the BMP. The ERP will piggyback on those plans. The guidelines of the OP will thus need to be integrated with that of other plans.

STEP 6: MONITOR PROGRESS WITH THE IMPLEMENTATION AND SUCCESS OF THE ERP

(1) Rationale and actions to be taken

Progress, or otherwise, with the implementation of the ERP would tend to be obscured by the other plans on which it would piggyback. However, the ERP OP will provide guidelines as to how this can be affected in practice. The linkages that have been established with other plans, as identified in Step 1, will provide the necessary backup in this regard. Other than the normal project-specific monitoring activities, the M&E procedure as outlined in Part M will also come into play.

STEP 7: ESTABLISH REPORT BACK PROCEDURES TO REPORT ON PROGRESS/PROBLEMS

(1) Rationale and actions to be taken

The ecosystem restoration plan overlaps with all of the other strategic and management plans of the BMP. Report back on these plans will thus by implication also cover at least some ecosystem restoration principles and actions. In view of the importance of the restoration objectives and activities, however, specific ERP-related feedback would be required. Such feedback would take the form of written quarterly reports, to be compiled by the responsible member of staff and submitted to the CRC, the Board of the development company, the Board of the Kawene Community Association and the GEF PM (Implementation). ERP activities will be included in the annual report of the VCWS-GM.

PART F: ZONING PLAN AND INTEGRATED COASTAL AREA MANAGEMENT

CHAPTER F1: ZONING

1.1 THE ZONING PROCESS

1.1.1 Need for zoning

The zoning plan for a protected area establishes the framework for management and is, according to Kelleher (1999), normally the primary document from which the management plan is derived. Eagles *et al* (2002) concur with this view and state that zoning should apply to all activities occurring within a protected area and should appear in the management plan to guide the way in which the area is managed. The National Park Service of the United States of America also adhere to a strict zoning regime and use zoning as a framework for specific planning and management decisions on the use and development of their national parks (US Department of the Interior, 1988).

The main objectives of a zoning plan could be summarized as follows (Kelleher 1999, Eagles *et al* 2002, Bainbridge 1998):

- To provide protection for critical or representative habitats, ecosystems and ecological processes;
- To separate conflicting human activities;
- To protect the natural and/or cultural qualities of the protected area while allowing a spectrum of reasonable human uses;
- To reserve suitable areas for particular human uses, while minimizing the effects of these uses on the protected area; and
- To preserve some areas of the protected area in their natural state undisturbed by humans (if the area is large enough, as is the case with VCWS).

1.1.2 Existing zoning plan for VCWS

The provisional Bio-Business Plan for VCWS (Lambrechts, 2001b) erred by not including a zoning plan, nor was a proper zoning plan subsequently drawn up before development started. Most of the areas selected for development thus took no cognisance of a broad-based development philosophy with the result that the areas selected for development were identified in a rather haphazard manner. The three areas selected for the Mazarette Estate development, for example, obviously included an assessment of aspects such as the suitability of the soils, the provision of services and accessibility, but the global environmental and other consequences could, in the absence of a guiding zoning plan, not be considered. The same shortcoming applies to the selection of sites for the safari lodges, the extent of the community development area and the alignment of the game-proof fence.

1.2 ZONE CLASSES

Many first-world conservation agencies have adapted universal zoning systems to suit their own needs, but in all instances the same basic principles are applied in order to meet the above zoning objectives. In any protected area that is accessible to man, a visitor risk management programme need to be drawn up. In the case of VCWS, where nature-based and ecotourism are the mainstays of the establishment and development of the sanctuary, together with the large number of people inhabiting the area, such risks would be of a much greater magnitude than would have been the case if the sanctuary had been identified as a wilderness area with only wilderness-type development being allowed.

The United States National Park Service (USNPS) apply a simple zoning category system based on four zones:

- Natural Zone: Managed to conserve natural resources and ecological processes, with visitor uses restricted to ways that would not adversely affect these resources and processes.
- Cultural Zone: Managed for the preservation, protection and interpretation of cultural resources. Development must be compatible with the preservation and interpretation of these cultural values.
- Development Zone: Managed to provide and maintain facilities serving the visitors and the park managers.
- Special Use Zone: Managed for specialized uses.

To augment this system, the USNPS developed a detailed visitor management framework (the Visitor Experience and Resource Protection framework or VERP; Eagles *et al* 2002) to determine visitor carrying capacity in terms of the quality of the resources and the quality of the visitor experience. This multi-disciplinary approach provides guidelines to determine and measure Limits of Acceptable Change (LAC) and Visitor Impact Management (VIM) and entails a detailed monitoring plan to determine the effectiveness of the zoning system.

Other systems similar to the VERP system, include the Visitor Activity Management Process (VAMP) developed by Parks Canada and the detailed Recreation Opportunity Spectrum (ROS) model of the US Forest Service and Bureau of Land Management. All these visitor risk management programmes were developed to allow the respective agencies to identify, analyse and control the broad range of visitor risks that may threaten the ability of a protected area to achieve its objectives. These programmes are thus at the heart of the zoning process and are applicable to the current VCWS scenario. (See discussion below)

1.3 ZONING OF VILANCULOS COASTAL WIDLIFE SANCTUARY

1.3.1 Zoning system: Terrestrial environment

The following terrestrial zoning plan for VCWS is based on the Parks Canada zoning system, linked to the VERT visitor management model (see above). The Parks Canada classification allows for the following zone classes:

- I Special Preservation
- II Wilderness
- III Natural Environment
- IV Recreation
- V Park Services (expanded to “Service and development”)

Of these, only the zone class Special Preservation will provisionally not be used for the terrestrial area at VCWS. A Special Preservation zone denotes a specific area or feature that deserve special preservation because it contains or support unique, rare or endangered features or the best examples of such features. Only strictly controlled and non-motorised access would be allowed. It was considered to classify the salt marshes and the dune barrier cordon of VCWS as Class I Special Protection zones, but in the absence of aerial photos to facilitate mapping they ended up being zoned as Class III Natural Environments. It must be stressed, however, that the following zoning plan should be regarded as an interim measure and that an OP will need to be compiled to develop the plan in more detail. The zoning plan will be revised once aerial photos become available. The zoning plan outlined below will probably be refined and Zone I Special Preservation will in all likelihood be added. In the meantime, all salt marshes and the dune barrier cordon will be treated as if their reclassification as special preservation zones is pending.

Once a protected area has been zoned, changes to the zones will only be considered if conclusive arguments in favour of the change could be advanced. In the case of VCWS such changes will have to be based on an in-depth assessment of the reasons, and must be approved by the GEF Project Manager (Implementation) after referral to the GEF coordinating body. However, this proviso will not be stringently applied with regards to the western boundary of the Natural Environment Zone due to uncertainties about the delineation of the community development area (see discussion below).

1.3.2 VCWS terrestrial zone classes

The following terrestrial zones were provisionally identified (see map):

Zone Class II: Wilderness

Zone purpose: The purpose of the wilderness zone is to preserve and maintain the identified area in a wilderness state.

Boundary criteria: The international criteria for designation of a wilderness area is 2 000 ha and greater. The designated wilderness area for VCWS has not been surveyed, but it easily exceeds this requirement.

Management framework: Management will be aimed at preserving the natural environment setting. Internal access will be by non-motorised means only, whilst activities consistent with resource preservation will be allowed. Development will be restricted to primitive camping facilities.

Implications for VCWS: The designated wilderness areas are situated in the region to the south of the Inhamambane Estuary, including the wetlands and coastal dunes. The Phase II enlargement would include a large tract of designated wilderness, whilst making provision for the wilderness-type development of a to-be-identified natural environment site for tourism development. (This site has not been identified yet) Should trophy hunting be allowed, which seems likely based on the current plans with regards to the reintroduction of large game, parts of the wilderness zone would be suitable for such use. Any development would be subject to an EIA. Any development and changes to the boundaries of the wilderness zone would be subject to an EIA.

Zone Class III: Natural Environment

Zone purpose: An area that will be maintained as natural environments and which can sustain a minimum of low-density outdoor activities with a minimum of related activities

Boundary criteria: The extent of the natural environment providing outdoor opportunities.

Management framework: Internal access will be by non-motorised and limited motorized means. If any accommodation development takes place, it will be restricted to rustic, small-scale, permanent, fixed-roof structures for visitor use and operational use. Camping facilities, if any, will fit in with this theme and will be rustic or semi-primitive.

Implications for VCWS: The major portion of the sanctuary has been zoned as a Zone Class III Natural Environment, with only very limited development being allowed. The sensitive dune barrier cordon along the coast is included in this zone. As was pointed out elsewhere in the BMP (see Parts B and C), the sensitivity of the dynamic dune system would seemingly rule out any infrastructure development. Should plans to develop the two remaining lodges on this dune system go ahead, both the developments would have to be subject to stringent EIA procedures and guarantees that environmental degradation could and would be kept within acceptable limits, would have to be forthcoming. Any development and changes to the boundaries of the wilderness zone would be subject to an EIA. The western boundary of the natural environment zone, where it borders on the community development area, has not been finalized yet and the mapped area should be regarded as only an approximate. This uncertainty was brought about by the fact that the number of local residents in the sanctuary turned out to be much more than originally estimated, which means also that a much larger area would have to be set aside to accommodate firstly the to-be-resettled households and secondly future population growth.

Zone Class IV: Recreation

Zone purpose: Clearly defined areas of limited extent that can accommodate the planned range of outdoor recreation opportunities and related facilities in such a way that the natural landscape is respected.

Boundary criteria: The extent of outdoor opportunities and facilities and their area of immediate impact.

Management framework: Management would be oriented to minimizing the impact of activities and facilities on the natural landscape. Tourist facilities will be of the basic serviced kind, and small and decentralized accommodation facilities would be allowed.

Implications for VCWS: The development philosophy of VCWS is such that very limited Zone IV recreation would need to be accommodated. No such terrestrial areas are currently indicated on the map, but may eventually include facilities such as bird viewing hides, picnic points along the tourist roads etc. Any development would be subject to an EIA.

Zone Class V: Service and Development

Zone purpose: This zone would accommodate all the areas with a high concentration of visitor services such as the Mazarette Estate, sanctuary support services, administration functions, staff villages and the community development area.

Boundary criteria: The extent of the services and facilities and their immediate area of impact.

Management framework: Management would be oriented to emphasizing the VCWS setting and values in the location, design and operation of the visitor support services and sanctuary administration and operations functions. In the case of the developments that will take place in the community development area, it will be guided by the various plans contained in this BMP. Access will be by motorized and non-motorised means, and the activities and services have been centralized as much as possible. The Mazarette Estate development, the lodges, the marina, the community center at Goshen and the community harbour and market fall within this category. The site for the airstrip has not been finalised yet which means that it has not been identified as such on the zone map. The Community Development Area has been zoned as a Zone Class V area for development.

Implications for VCWS: The global EIA that was compiled for VCWS provide approved guidelines for a number of the facilities that would be needed, for example the Mazarette Estate homes need not provide additional site-specific EIA's before building operations may commence, and architectural drawings will suffice. However, in a number of instances the general EIA does not cover specific developments and certain service facilities such as a landing strip, the marina and access to the lodges, to mention but a few, would be subject to the preparation of EIA's.

Zoning system: Marine environment

The zones for marine environments, whilst also meeting with the abovementioned objectives for zoning, obviously differ in nomenclature and application from the terrestrial zone classes. A marine wilderness zone, for example, would be inappropriate.

The following zoning system is largely based on the principles advanced by Kelleher (1999) and is specifically adapted to the VCWS situation. The same provisos applicable to the terrestrial zoning system outlined above also apply to the marine zoning exercise, plus of course the fact that the marine resources are actively being utilised in a consumptive manner by the local fisher community. The marine zoning plan is thus also provisional and will be updated as soon as aerial photos become available and will especially be dependent on progress with the implementation of the Marine Resources Strategic Utilisation Plan (MRSUP). The MRSUP provisionally identifies certain areas as non-fishing areas due to their environmental and ecological sensitivity (see Part D).

The intertidal zone is regarded as a marine environment. All the mangrove areas as well as the mud flats and the whole of the Imhamambane Estuary are thus included in the marine zone plan.

An OP will need to be compiled to develop the marine zone plan in more detail. The plan will firstly be built on new and more reliable data from the marine research and monitoring programme (see Part M) and secondly on the lessons learned from the implementation of the MRSUP. Effective public consultation will play a crucial role in this respect (see Part H), and especially the special preservation zones will only become effective once the support of the local fishers have been obtained.

The following marine zone classes have provisionally been identified:

- I Special Preservation
- II Controlled Use
- III General Use
- IV Service and Development

1.3.4 Zone classes: Marine environment

The following marine zone classes have provisionally been identified (see map):

Zone Class I: Special Preservation

The primary objective for the special preservation marine zone is as follows:

To provide for the preservation of the identified areas in their natural state with no detrimental interference or disturbance by human activities.

All of the mangrove swamps, with the exception of the small area around the terrestrial service and development zone at the reserve HQ complex, those occurring in the community development area as well as the mangroves at the enclosed fisher village at Chigonguene, are

included in this zone. All of the Inhamambane Estuary south of Lenene Island also falls in this zone. As was pointed out above, as soon as the MRSUP has been accepted by the fisher community and effective implementation of the Plan can take place, it is likely that the mouth of the Estuary will also be rezoned to be included in this zone. It is a highly sensitive area that deserves strict protection. (See also Step 6 of the MRSUP; Part D). It corresponds roughly with Area C as indicated in the map included in the MRSUP.

Only strictly controlled and non-motorised access will be allowed and no development of whatever nature will take place. The two new lodges that are planned to be built on the mobile dune barrier cordon will, if the plans should go ahead, seriously impact on not only the dune barrier cordon itself, but even more so on the Inhamambane Estuary. Overland access to the sites would be impossible, which means that relatively intensive motorised boat traffic in the estuary will be unavoidable. Environmentally speaking and without considering economic realities, the lodges should be built elsewhere at less sensitive locations.

The incomplete lodge that existed on the dune barrier cordon prior to the establishment of VCWS, will have to be subject to strict rules with regards to access from the Estuary.

Zone Class II: Controlled Use

The primary objective for the controlled use marine zone is as follows:

To provide for the preservation of the identified areas in their natural state with the least possible interference or disturbance by human activities; any use should be strictly controlled.

The most extensive area in this zone is the mouth of the Estuary. This sensitive and highly productive area is deserving of the status of a special preservation zone, but current resource use practises will first have to be addressed during the MRSUP process (See Step 6). An area corresponding to roughly Areas B1 and B2 of Step 6 of the MRSUP (see Part D) is also included in this zone. Both oyster and crab harvesting will be controlled/regulated by a rotating system as indicated in the MRSUP (Step 6), and the use of nylon filament nets will be prohibited.

The utilisation of the coral reefs to the east of the dune barrier cordon (see area E of the map illustrating Step 6 of the MRSUP) will be permitted, but will need to be controlled.

Appropriate control measures are briefly mentioned in the MRSUP, and elaborated on in the Sustainable Tourism Development Programme (STDP; see Part I).

Zone Class III: General Use

The primary objective for the general use marine zone is as follows:

To provide opportunities for reasonable general use, consistent with the conservation of the marine resources as embodied in the vision and objectives of VCWS (See Part C)

All the remaining marine environments of VCWS are included in the general use zone.

Zone Class IV: Service and Development

The primary objective of the service and development marine zone is as follows:

To provide for the development of marine-based infrastructure consistent with the conservation of the marine resources as embodied in the vision and objectives of VCWS.

This zone will include jetties, a marina, slipways and other coastal infrastructure that will be needed to ensure the safe use of a variety of boats. These structures will be permitted at the Mazarette Estate localities and at Lenene Island Lodge (the lodge is situated in the mouth of the Estuary and was in the process of being built when VCWS was established).

1.4 DEVELOPMENT PLANS

Node Development Plans (NDP; for example for the Msasa development node) and Site Development Plans (SDP; for example for the Msasa research facility), based on the guidelines of the zoning plan, should have been, but were not, prepared for all the facilities that were constructed to date. All future facilities such as picnic sites, nature trails and viewing hides, however, will be subject to an NDP and SDP process.

1.5 DEVELOPMENT RISK MANAGEMENT

The zoning plan need to achieve the zoning objectives as outlined above, otherwise there would be no sense in zoning the sanctuary. With the zoning plan as baseline for management, a framework to determine the limits of acceptable change (LAC) due to visitor impacts and development needs to be put in place.

The management implications of the tourism development of VCWS have been dealt with elsewhere in this BMP (see Part J). The following summary of a LAC process for VCWS (Eagles *et al* 2002) must therefore be considered in conjunction with the tourism development plan:

- The LAC process focuses on determining the desirable environmental and social conditions for the visitor activity
- The process as it will be applied to VCWS involves the following steps:
 - Identify special values, issues and concerns
 - Identify and describe recreation opportunity zones
 - Select indicators of resource and social conditions
 - Inventory the existing resource and social conditions
 - Specify the standards for resource and social conditions in each of the opportunity classes

- Identify alternative opportunity class allocations
- Identify management actions for each alternative
- Evaluation and selection of a preferred alternative
- Implement actions and monitor conditions

Unfortunately much of the VCWS developments that already took place were not subject to either a zoning process or to an LAC plan and may thus be regarded as a *fait accompli*. However, the implementation of a LAC process will still provide valuable insights as to the applicability of the zoning plan and the impacts of the development that took place. In this regard it is important to recognize the following challenges that may arise from the implementation of the LAC process (Eagles *et al* 2002):

- It will require funding, time and staff
- Some vital information about visitor-related impacts may be lacking and will necessitate subjective assessments
- Even when limits are exceeded, appropriate management action may still not be taken due to a lack of resources or an unwillingness or inability to take unpopular decisions.

1.6 ZONING OPERATIONAL PLAN

An OP will need to be compiled to deal with the LAC, and will link to the abovementioned zoning OP. An experienced TDS will be contracted to assist the VCWS-GM with the compilation of both of the OP's, with operational inputs from the GEF Project Manager (Implementation).

CHAPTER F2: INTEGRATED COASTAL AREA MANAGEMENT

2.1 BACKGROUND

The “need for zoning” motivation as outlined above (see paragraph 1.1.1) also provides the rationale for an Integrated Coastal Area Management (ICAM) process. The zoning plan for VCWS establishes the framework for management and guides the way in which the area would be developed, managed and utilised.

ICAM is a method that focuses not only on specific natural components of a coastal area, but that considers the broader coastal zone. In the case of VCWS this approach would be essential because land and sea affect each other through the estuaries and wetlands; the coral reefs, mangrove forests and seagrass beds protect the land from storm erosion; agriculture, housing development, roads and wildlife may have damaging impacts on these coastal resources (Talbot and Wilkinson 2001).

The terrestrial and marine systems of VCWS are closely interlinked, and planning, development and management must take this into account. The implementation of an ICAM procedure would be the only way to ensure that these interdependent systems are managed in an integrated and cohesive manner.

Unfortunately, in the absence of a zoning plan for the sanctuary, the process starts off at a major disadvantage. Due to the fast pace at which development took place, it would also not be possible to make up for lost ground and in a number of instances management would have to be aimed at dealing with a *fait accompli*, instead of building on the results of proper integrated planning.

2.2 INTEGRATED COASTAL AREA MANAGEMENT FOR VILANCULOS COASTAL WILDLIFE SANCTUARY

By diligently applying ICAM procedures, the planning and management of VCWS will:

- Involve all parts of the sanctuary;
- Integrate all sectors (agriculture, wildlife, fisheries, tourism etc); and
- Will be in line with local, regional and national policies

Talbot and Wilkinson (2002) identified the following “golden rules” for successful coastal management:

- **Equitable use** of the resources should be a non-negotiable
- Human use and development must be **sustainable**
- **Impact minimization** should be at the core of all developments and management actions.
- **Involvement** of all role-players should be ensured by a combined bottom-up and top-down management approach
- ICAM will depend on adequate **funding** for background and applied studies.
- The ICAM process should be viewed as a **long-term** commitment.
- There must be good **communication** and information sharing between all stakeholders.

The implementation of a successful ICAM procedure for VCWS would be dependent on the following (Talbot and Wilkinson 2002):

- Set achievable objectives progressively
- Identify the problems
- Set goals and timetables co-operatively
- Gain integrated support for all policies and plans
- Achieve top-down and bottom-up involvement
- Policies and goals must be aimed at sustainability
- Undertake cost-benefit analyses
- Undertake monitor and review

The following factors should be recognized as possible negative impacts that may cause the failure of the ICAM process for VCWS (Talbot and Wilkinson 2002):

- Poor information

- Poor understanding of the process
- Poor co-operation between stakeholders
- Conflict between users and managers
- Inadequate budgets
- Shortage of trained people
- Inadequate enforcement of laws and regulations
- Poor communication

The ICAM procedure would be dependent on local participation at all levels from developer to community to government agencies. The co-management procedure as described elsewhere in the BMP will ensure that the desired level of local participation is indeed achieved.

Although a number of planning, development and management shortcomings have been identified, as pointed out in this BMP, the general and specific plans discussed in this document (marine resources use, agriculture, tourism and wildlife) conform to the ICAM principles. ICAM should thus not be regarded as a separate or stand-alone process, but rather as a guiding principle or procedure to ensure proper and effective planning and management of VCWS.

PART G: SOCIAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY: PART G

Some 1,036 families whose livelihoods are currently mainly based on subsistence agriculture and small-scale artisanal fishing inhabit the sanctuary. The majority of these families will continue to live in the project area but approximately 8% will be moved to make way for the installation of the protected area.

Socio-economic environment

Patrilineal Xitswa language speakers occupy the project area. The mobility of communities in the area belies their fairly socially cohesive organisation based on clan lineage relations and marriages that have mostly been between people from Quewene Locality where they live. Traditional authorities and clan leaders managed natural resource-use prior to Independence and the civil war, after which many of the resources were wiped out and the socialist regime removed power from them. Today some of these elderly leaders have been reinstated as traditional authorities with sanctioned rights to work together with the local representation of the State Administration in the governance of local communities. The most significant sources of influence in the day-to-day lives of the community are the local leaders and the religious institutions.

The area is physically isolated and has almost no public services or infrastructure save two primary schools, one community well and a health centre in the final stages of construction. The road network was almost non-existent and is currently still poor. There is no electricity supply to the area and no public transport. The only means of communities reaching the hinterland is by dhow or a two to three day walk.

The level of education is low with approximately 19% of the population able to read and write. The average family size is estimated at five people, and these mostly live in traditional round reed and grass houses. Fields tended by women surround most houses. The majority of the population carries out subsistence swidden (shifting/slash-and-burn) agriculture with only approximately 4% depending solely on fishing for their livelihoods. Almost half the population carry out agriculture and fishing.

Fishers use boats and nets or lines and also catch fish in traps. Most of their catch is dried or smoked for sale in Vilanculos town on the mainland. Freshwater fish are caught in the various lakes on the peninsula and are eaten fresh by the local community or smoked and dried. The most frequently traded agricultural produce is the distilled product of sugar cane and fish. There is little money circulating in the area as a result of these transactions and a barter trading system also functions in parallel. Labour is sold for portering services, cultivation and fishing, and paid for in agricultural products or cash. The only other source of employment is with the sanctuary project. Small informal traders have opened stalls on the peninsula and the numbers are rapidly growing. Their trade is in basic foodstuffs and some basic household manufactured goods.

Constraints to development are perceived as the lack of capital for investing in development activities and the lack of market facilities and transport on the peninsula, requiring travel to Vilanculos for sale of produce and purchase of household products. The most pressing health problem of the area is considered to be malaria. Generally people's health seeking strategies involve home remedies and the services of the healing churches and traditional healers before seeking additional assistance from the hospital in Vilanculos.

The community is economically poor with few assets and cash incomes ranging from about \$5-20 USD a month for subsistence farmers and fishers to around \$100 US a month for the best-established farmers and fishers. The average monthly family income calculated for 2001 was \$21 US with the highest annual income generated by families with income from employment and the sale of cane spirit.

Social impact assessment

Overall the project is designed to reduce or reverse most of the negative environmental impacts of public and community use of the land and sea areas through the establishment of sustainably managed conservation and resource-use strategies. Involvement of the community in the management and benefits of the eco-tourism enterprise is foreseen. The project concept already takes into account some of the basic negative economic and resource-use trends and aims to control or reverse them through community development activities. The social impacts of the project are complexly interrelated and it is not easy to deal with issues without referring to direct, indirect, short and longer-term impacts at the same time. By far the most significant negative social impacts of the project on the population are the results and potential consequences of installing a fenced-in Reserve or protected area from which a number of families must be removed, and where others will lose access to resources they have customarily used.

Negative socio-economic impacts are almost all related to resource-use practices. This includes the loss of agricultural land and access to the Inhamambane Estuary on the eastern side of the peninsula and to lakes inside the Reserve area for fishing. Displacement caused by the implantation of the protected area and resettlement of relocated families in a 'village' system may result in concentrating intensive resource-use in smaller areas with negative short and longer-term effects. The Reserve area impedes socio-economic links and communication within the peninsula and will bring about the physical and social isolation of the fishers of Chingonguene and Chihunzuine from the rest of Quewene. In addition there are potential security problems related to entering and crossing the protected area once the potentially dangerous large game species have been re-introduced.

In terms of social impacts, the effects of the project working directly with a local leadership that is firstly not a trusted structure or secondly one that does not encourage open and free communication around it, has a direct negative impact on almost all families in the project area. It is most acutely felt among the families involved in the resettlement process as well as women who tend to be excluded from formal communication events in any case. Women and youth isolated by lack of communication and opportunities presented to them for participation in development activities, and the families living in regions distant from the

management centre of the project, may suffer the same kind of isolation. Socio-economic stagnation or deterioration will probably result with concomitant negative social and health ramifications.

The resettlement process has a number of risks associated with it that may affect relocated families and host families negatively, but the two most pressing current risks are firstly the potential to end up with poorer quality land than the land that they vacated (due to lack of clarity about the land available), and secondly the lack of a transparent system for ensuring equity. The weakest will lose most if there is competition for land and resources in the area, further undermining their survival capacity. Contributing to the risks is the potential of losing the expected benefits of compensation for tree and annual crops, if the cash compensation is used for immediate short-term lifestyle improving investments.

The additional demands on natural resources such as land, surface water supplies, marine resources and materials for construction made by the project will augment those of the community in the instances where the community has productive trading and supply relationships with the project. This will have cumulative negative effects on the natural (re)productive capacity of the resources in the community areas. By including most of the area that was available for settlement prior to the project in the Reserve area, the land area available for use by the local community has been significantly reduced. These factors will be likely to compound the effects of the rapid degradation of existing resource capacities – particularly the soils, potentially raising the risk of impoverishment of the people using them.

The most important direct positive impact of the project on the community is the employment offered by the project. The indirect and cumulative effects of the increase in money flowing into the area would be really significant if the local market can be stimulated so that it retains a sufficient quantity of the money on the peninsula. With the advent of electricity to the peninsula, this will add one more factor of stimulation to the local economy, potentially making it a force that can compete more effectively with Vilanculos in the supply of fresh fish for example.

The most significant social and economic impacts of the sanctuary project can be seen in the following table. Their impact is classified as direct or indirect and significance scores are also allocated. Two of the four most significant impacts identified, are related to the resettlement process and two to the unsustainable use of natural resources in the sanctuary.

Socio-economic impacts of the project		Positive		Negative Impacts	
		Impacts		Significance	
Type of Significant Impact		Dir	Idir	(consequence x likelihood)	
<i>Socio-economic</i>	The social and economic isolation of the Chingonguene fishing community from the rest of the peninsula	x	x	20	
	Potentially discriminating competition for natural resources in the Marape resettlement area	x		12	
	The risk of cash compensation not being used for longer term livelihood restitution	x		25	
	Unsustainable community use of natural land-based resources	x	x	25	

	Widespread lack of understanding about the objectives and implications of community involvement in the Sanctuary project		x	x	16
	Loss of access to the Inhamambane Estuary for fishing		x		20
	Potentially uneven development in the Sanctuary between regions, communities and families		x	x	12
	Women's non-participation (and that of their younger children) in the benefits of development			x	16
	Employment of local people in the project	x			0
	Improvement of markets, marketing systems, production systems and transport	x			0
	The supply of electricity to the peninsula	x			0
<i>Social</i>	Widening social distance between communities and their leaders		x	x	20
	Women's vulnerability to marginalisation from project benefits because of exclusion from formal communication processes		x	x	16
	Lack of trusted communication channels for the communication of grievances.		x	x	25
	Compensation for the loss of cultural heritage on the part of the <i>hossi ya missava</i> Uantene Singo		x	x	12
<i>Cumulative</i>	Community competition for productive resources augmented by project requirements		x	x	25

Management and mitigation

Avoidance or mitigation of most of the negative socio-economic impacts of the Sanctuary project identified in this report can be brought about through the adoption of an approach to community development that espouses communication and participation. The planned and systematic use of communication is the prime means by which attitudinal and behavioural changes are brought about in development.

Communication as a participatory community development approach can reach and strengthen the position of the most vulnerable, those who may be marginalised, those who must learn new ways of doing things through the acquisition of skills and knowledge, and those who want to work together in groups or teams for developmental purposes. Communication helps people to become fully aware of their situation and their options for change. It provides them with a means by which they can improve their condition and society.

A communication approach is expected to be able to mitigate the risks surrounding the resettlement programme as well as providing the means to provide opportunities for the involvement of women and other high-risk groups in obtaining due benefits from the project. It will provide a methodology for listening to and responding to grievances, making management decisions and handling requests for development assistance as well as facilitating participatory monitoring of certain activities and impacts.

Intermediaries will have to be employed/seconded to assist in this process. They must be trained in interpersonal communication and skill training to help them facilitate the

participatory process (with community groups and other stakeholders). The use of visual media among illiterate people is very effective. Where appropriate, video could be used to show information and testimonials of different individuals in Quewene that would trigger debates about different issues and collective decision-making about how communities can help themselves to improve their situations.

One of the initial objectives of the community development programme using a planned and systematic communication strategy, should be the creation of platforms for communities to be able to negotiate conflicts that may occur in relation to the sanctuary project. The process of involving the community and its sanctioned leaders in the management of the conservation initiative is part of the communication strategy. Fundamental to the success of the conservation component is the need to convince community members and their leaders of the genuine intentions of the project to listen and learn from the local residents. Working with the communication facilitators, using appropriate media and concentrating initially on listening and responding to focused key issues such as community participation in deciding about the fence alignment, will have a major positive impact on the perceptions of the community. The communication strategy recommended in the 2001 Bio-Business Plan (Lambrechts 2001a) would have addressed this shortcoming, but was unfortunately not implemented.

By implementing an improved communication campaign to provide information about the project and encourage discussion of its messages, awareness about the objectives of the project and the process of resettlement should be raised. Included in the information delivered should be highlighting of the development opportunities, how to present grievances and how to learn of responses to these.

By systematically operating a planned communication strategy to facilitate community participation and development, the project could also gain added value in the creation of material for publicity about the process and the partnership models being developed. In the longer term the community may be encouraged to run the communication strategy planning and implementation on its own. Decentralising the management and implementation of this aspect would occur in coordination with increasing the capacity of the local people to manage the conservation initiative.

Resettlement

Groups exposed to specific risks in the resettlement programme include women, poorer households, the fishers resettled in Chihunzuine/Chingonguene who risk socio-economic isolation, elderly people, the infirm and the physically handicapped and finally the subsistence farmers living in Chibo Circle who also fish, but whose access to Inhamambane Estuary will be impeded by the Reserve area and will suffer partial economic displacement as a result.

The first phase of the resettlement programme has been completed with 24 families relocated to Marape in Matsopane Circle. In terms of planning however, the process is unfortunately still in its formative stages. The most important measures to mitigate the potential negative

effects of resettlement are described in this report and the details may be found in the Resettlement Action Plan (RAP) below.

Specific mitigation actions would need to include the following:

- Assessment prior to resettlement of potential settlement sites and the adequacy of available resources in terms of sustainability options.
- Facilitating resettlement and development decisions affecting the community, at the level of the community. Communication facilitators should assist in the process of rebuilding trust.
- A scheme for awarding compensation as part of a livelihoods repair package offered as an alternative to cash so that there is a better guarantee that the funds will be used for rebuilding livelihoods rather than spent on short term improvements to the families' lifestyles.
- Livelihoods restoration activities should focus on women in the roles they habitually take as part of the farming cycle, fishing tasks and other resource collecting and processing activities.
- Priority access for resettling people to employment opportunities during the period of privation of subsistence from agricultural activities.
- Learning about and obtaining adequate support to develop alternative low-cost, low-input farming methods that permit families to reduce the land-size cultivated without any loss of total production value, and perhaps even gain
- In the case of families highly dependent on fishing for their livelihoods, if the loss of access to fishing is for any reason not solved by providing alternative fishing locations and assistance to establish the activity again, special attention should be paid to prioritising these families for fishing-related income generating activities, other income generating activities or skills development for tourism related activities.

Other key issues

Incorporating the local people's views on the choice and design of conservation measures – from the alignment of the fence to involvement in management and implementation of specific activities - should be an integral part of the management design. This will increase the intrinsic value and benefits gained from the project to all parties. Unfortunately, this aspect has been neglected in the past.

For alternative livelihood sources to be taken up easily they should not involve a major change in activity. Thus permaculture (organic farming), improved marketing systems and eventually appropriate agribusiness activities, aquaculture, protected area management and tourism development should be encouraged. (these aspects are discussed elsewhere in the BMP). Provision of credit and savings facilities should depend on the availability of expert advice in the area and be based on rigorous repayment schedules. This would most effectively be offered, at least initially, to the traders and fishers who have the best bases for repayment.

CHAPTER G1: LINKAGES BETWEEN BIODIVERSITY AND SOCIAL ASPECTS

In most instances where biodiversity management plans for unpopulated protected areas are at stake, the planners mainly have to deal with biodiversity resources as their first priority, with only secondary attention being paid to tourists and other visitors. In VCWS, however, the protected area is populated, albeit sparsely in most areas, by local communities who have been living there for many years.

The local inhabitants are therefore as much a part of the planning scene and process as the sanctuary's biodiversity resources, tourist facilities and infrastructure. Actually, the needs, rights and aspirations of the local people are more important than any other factor in the planning process. It would be senseless, for example, to plan for the protection of sensitive areas and for the conservation of the endangered dugong, without having the local people on board. Without real community involvement and positive support, the VCWS project would be doomed to failure.

The local communities would thus have a direct, ongoing and lasting effect and influence on the deployment of the project and would have to be integrated into the process right from the beginning. Therefore, although this plan is by nature based on biodiversity principles and established conservation structures and procedures, it includes two parts dealing with community affairs: this part (G) deals with social impacts, and Part H below deals with social action plans.

The sensitivity of plans dealing with people, linked to the multitude of prescribed social aspects that need to be considered, led to an in-depth social survey and the compilation of detailed social plans for VCWS. It would have been impossible to include all the social documentation in this volume of the BMP, and the reader is thus referred to the full social reports in Volume 3: Specialist Reports.

CHAPTER G2: SOCIAL IMPACT ASSESSMENTS

2.1 PURPOSE

The need for a social impact assessment (SIA) for the VCWS is clearly evident from the following project-related impacts:

- Some 1,030 families whose livelihoods are currently mainly based on swidden (slash-and-burn) subsistence agriculture and small-scale artisanal fishing inhabit the sanctuary. The majority of these families will continue to live where they are, but approximately 8% will be moved to make way for the installation of a protected area (the so-called "Reserve").
- Development of the Reserve area requires cessation of agriculture activities, and in order to promote a sustainable basis for land-use, burning the vegetation to practice swidden farming (slash-and-burn or shifting agriculture) is also prohibited. It is

proposed to help the relocated families use alternative agricultural techniques such as organic farming and irrigated gardens to enable more intensive agricultural production on smaller plot sizes (Refer to the agricultural plan above).

- Some restrictions will be applied to artisanal fishing (types of catch and catch limits), and domestic livestock will not be permitted in the Reserve area. Few households currently own livestock; these are limited to goats, chickens, ducks and some pigs.
- It is expected that employment by the Sanctuary project and private investors, and entrepreneurial opportunities (supply of goods and services for employees and visitors) will provide for alternative livelihood sources. It has originally been estimated that in its operational stage the project will directly employ about 275 workers (Lambrechts 2002b), but current estimates are that this figure would probably be closer to 350 and even higher.
- None of the resettling households will need to be resettled outside the Sanctuary. Currently it is estimated that 86 households belonging to artisanal fishing and subsistence farming communities will need to be resettled. Two settlement areas exist at present. One small group of fishers have been moved approximately four kilometres east of their original residential area on the north coast to make way for the housing development at Mazarette. The bulk of the relocated families will move five to ten kilometres further south and west from their present homes in the protected area. Finally a small group of families has already been moved to Marape Zone to make way for the private property developments (the so-called Mazarette Estate) and the community development centre at Goshen.

When the International Finance Corporation (IFC) became involved in the project, it was classified as a Category A project according to its Operational Policy on Environmental Assessment (OP 4.01). The category reflects a potential “significant adverse environmental impacts that are sensitive, diverse, or unprecedented” if the relationship between the development, the people and their environment is not managed with great care.

As a result the IFC required adequate baseline information to enable an analysis of potential impacts and the preparation of appropriate and comprehensive management plans to address social issues as well as issues related to impacts on the marine and terrestrial environments. Terms of Reference (ToRs) were prepared in March 2001 for the assembly of socio-economic baseline information, social impact assessment, and public consultation, resettlement and community development plans.

Subsequently the developer prepared an Interim Community Affairs Report (July, 2001) (Lambrechts 2001b) that contained the three interim social action plans. However further information needed to be added: the socio-economic baseline information survey and Social Impact Assessment (SIA) had to be carried out and the plans needed to be revised and finalised as part of the brief for the proposed IFC/GEF Project (see Part A).

2.2 THE SOCIAL IMPACT ASSESSMENT PROCESS

An initial scoping exercise (documentation review, site visit, review of existing activities) to identify information gaps and activities required to complete the social aspects of the project

brief for the proposed IFC/GEF project was carried out in March 2002. Subsequent input in assisting with completion of the socio-economic baseline survey, social impact assessment and the social action plans was provided from May through September 2002.

The initial scoping exercise required a review of existing documentation (in particular the Interim Community Affairs Report that contains the initial Resettlement Action Plan (RAP), Community Development Plan (CDP) and Public Consultation and Disclosure Plan (PCDP) and a short site visit in March. During this exercise various gaps in the RAP, CDP and PCDP that required filling were identified. The output of the scoping phase were recommendations and ToRs to carry out a full baseline socio-economic survey and Social Impact Assessment (SIA) in order to produce the RAP, CDP and PCDP.

2.2.1 IFC / World Bank Guidelines

The following list covers the most important guidelines or Operational Policies relevant to this SIA report.

OP 4.01 Environmental Assessment	<p>The project is categorised as Category A subject to a full EIA.</p> <p>The OP ensures that appropriate levels of environmental and social assessment are carried out as part of project design. It also requires a public consultation process to be undertaken, which should ensure that the views of project-affected groups and local NGOs are taken into account. The views of minority groups or economically or socially disadvantaged groups should be covered, and the OD 4.30 should deal with specific plans to mitigate and compensate for negative impacts.</p>
OP Note No. 11.03 Cultural Property	<p>The IFC will not fund projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage.</p> <p><i>The VCWS project will not destroy any cultural sites, although there may be restricted access for cultural purposes to land and lakes that have cultural value.</i></p>
OD 4.20 Indigenous Peoples	<p>The project is not expected to have specific impacts on ethnic minorities, but there may be impacts on other minority social groups not included in decision-making processes. Their rights and interests will be protected through the OP 4.01 and OP 4.12.</p> <p><i>The project is directly concerned with managed access to natural resource systems, although no access or management agreements have yet been defined with communities. These may include controlled use of marine</i></p>

resources and obtaining benefits from the sustainable use of the terrestrial wildlife resource. Although there are no “indigenous groups” in the project area, it will have impacts on social groups such as women and female-headed households that are usually marginalised from decision-making processes, and some isolated fishing families. The project will need to ensure that the access and use rights of these minority groups are identified and provided for in any agreements.

OP/BP 4.12 Involuntary Resettlement

OP 4.12 - Involuntary Resettlement ensures that the population displaced by a project receives benefits from it including those with usufruct or customary rights to the land or other resources taken for the project. The policy is inclusive, ensuring that all those affected both directly and indirectly by project developments are compensated as part of the project. Affected people include those with income derived from informal sector and non-farm activities, and from common property resources. The absence of legal title does not limit rights to compensation.

The principles covering household resettlement and restricted access rights are specifically clarified where the loss of access rights is linked to the management of protected areas. The guidelines are clear that there is a need to involve communities in the planning and implementation of interventions that result from these policies. Conflict resolution mechanisms should also be identified as part of the above planning and implementation. Particular attention must be paid to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples and ethnic minorities.

The policy also states that people may lose the right to use resources without losing possession of them, which is also defined as involuntary resettlement.

Approximately 86 families will be physically displaced and resettled, and changes to natural resource access rights/usufruct rights will have to be negotiated.

The Sanctuary project aims to preserve community rights to ownership of both marine and terrestrial resources that are co-managed.

Doing Better Business Through Effective Public Consultation and Disclosure:

Guidelines on carrying out public consultation and disclosure activities through the project’s life-cycle.

A Good Practice Manual

Investing in People: Sustaining Communities Through Improved Business Practice	Guidelines on community consultation, trust building, capacity development and setting goals and reporting on progress, strategic partnerships and planning for sustainability.
IFC Handbook for Preparing a Resettlement Action Plan	Guidelines that specify procedures and actions to properly resettle and compensate project affected people and communities.

2.2.2 Mozambican social assessment and resettlement recommendations

Mozambican regulations on Environmental Impact Assessment (EIA) (Decree 76/98 of 1998) stipulate the need for an EIA of plans, programmes and projects that may affect directly or indirectly environmentally sensitive areas and that imply the displacement of populations in their execution. The regulations are comparable with those of the IFC requiring public consultation, the assessment of the scope of impacts and their potential, overall and cumulative effects as well as their reversibility. National standards for social aspects such as community and public involvement in environmental conservation and management are found in the Environmental Law 20/97, the National Programme for Environmental Management and the General Directive on Environmental Impact studies issued by the National Directorate for Environmental Impact Assessment in July 2000 (see Part A)

In addition the Forestry and Wildlife Law (Law 10 of 1999) and the regulations of this law currently in development provide further guidelines on procedures and standards for community involvement in management of wildlife and forest resources. The responsibility for all conservation activities with a tourism element (including eco-tourism initiatives) has recently been transferred to the Ministry of Tourism. Although the Tourism Master Plan (2002) is very recent, the scope of the conservation component has not yet been confirmed. The Mozambican Government through its Ministry for Co-ordination of Environmental Affairs (MICOA) and Ministry of Public Works and Habitation endorses IFC's more general recommendations on resettlement and requires that the location and size of resettlement areas be planned in a participatory fashion so as to allow for natural demographic growth, provision and maintenance of services, and generation of local income opportunities from access to benefits deriving from the resettlement programme.

MICOA drew up environmentally sensitive guidelines for resettlement planning in 2000. (For a summary of the resettlement criteria, refer to the full report in Volume 3 of the BMP).

2.2.3 Methodology for the SIA survey

Following the preliminary scoping activity, a full socio-economic baseline survey and SIA were designed and carried out. Information collection focused primarily on households actually located within the sanctuary boundaries, but also included those households in the zone of immediate influence (approximately five kilometres beyond the western boundary).

The additional area includes many family groups that consider themselves contiguous with communities resident within the sanctuary. It includes households whose daily use of productive resources usually extends to areas within the sanctuary.

The criteria of the IFC Policy on Involuntary Resettlement focus on identifying which households will be physically and/or economically displaced. Households in and outside of the sanctuary range from those whose livelihoods are totally dependent on the resources of the sanctuary and those who make occasional and limited use of sanctuary resources. The SIA identifies the households variously affected by the sanctuary and estimates their numbers and their eligibility for compensation. Final identification of the numbers of affected households and social groups will depend on the results of the current household census conducted by the sanctuary project that has unfortunately not been concluded by January 2003.

In the absence of reliable census data, a baseline survey comprising both qualitative and quantitative assessments of the socio-economic status of communities living in and around the sanctuary was carried out. Local language speakers with facilitation, interviewing and recording skills were employed to carry out the fieldwork. All the research team members had previous experience of processes and methods of gaining trust and information from women and men. Participatory methods such as disaggregated focus group discussions (sex, age, principal occupation, and residential area), semi-structured interviews and participatory rural appraisal techniques were used to produce resource-use maps, wealth ranking, historical timelines and social mobility maps.

The qualitative assessment focused on identifying the dynamics of social organisation, decision-making and leadership, livelihood strategies, the identification of effects of the project, and opportunities for social rehabilitation of resettled families and community development activities. It identified parameters and indicators for use in the quantitative survey, as well as for monitoring, evaluation and corrective action.

A quantitative household survey using questionnaires was carried out based on a random non-probabilistic sample of 12 of the total target population identified following the informal qualitative research. The sample was stratified according to a set of categories defined by location and potential degree of impact, and emphasis placed on households located within the sanctuary. An initial pilot questionnaire was tested on a small sample before its finalization. The sample size was largely controlled by the time and financial resources available to carry the survey out, particularly in view of the distances between households and the necessity of carrying out the survey on foot. Limited logistical support was provided to the field teams by the sanctuary and the whole process of fieldwork and follow-up activities took five months.

Only one feedback meeting was carried out with communities in the sanctuary. It was intended to share the results of the qualitative and quantitative assessments and preliminary conclusions with at least two groups, but due to coordination and a certain reticence by people to participate in meetings, no more than one actually occurred within the time available. The objective of this meeting was to ensure accuracy of the analysis and

conclusions and to discuss identified and new mitigation and development initiatives to counter identified negative impacts. Unfortunately the sanctuary had no representatives present during this meeting, thus the facilitated consultation cannot be considered to have reinforced communication and relationships of trust with the sanctuary.

A review of appropriate Mozambican legislation was carried out and national and international standards have been applied to assessment of the project situation. Field results were analysed based on socio-economic and legal criteria in order to group the social impacts and assess their significance.

The SIA and mitigation recommendations that follow assume and/or accept the following:

- A rapid assessment by the project sponsor of directly affected families requiring physical resettlement produced an estimated total of 62 families still living within the protected area. This figure does not include 24 families who were relocated in the first phase of resettlement. An addendum to this report and the RAP (and also the BMP) will be required after the census results are made available in 2003 and the scale of resettlement is clear.
- Fence alignment around the Reserve area may be changed after this SIA is complete and may require an addendum to update the scale of impact and adjust mitigation and management plans.
- The total area available for resettlement has not yet been defined or mapped; the addendum and the completion of the RAP will include updated information about this.
- Resource use strategies are based on findings from this SIA and the marine resources strategic utilisation plan (MRSUP, see Part D and Odendaal 2002). In addition, the findings of the strategic agricultural development plan (SADP; see Part D and Theunissen 2002) that irrigation should not be attempted from the surface lakes, that the soil is of poor quality and that swidden farming with short fallow cycles depletes this even further, but that sustainable dry land farming should be possible with agricultural improvements in techniques and inputs to improve soil quality.
- Government support would be forthcoming with regards the resettlement programme, monitoring and provision of public service support during the life of the project.

2.2.4 Public consultation

Stakeholder consultation is a vital component of the SIA process. The consultation process used provides information on the project from the primary stakeholders; their comments and concerns on key issues, their verification of information through triangulation, and identification of potential impacts and omissions. Stakeholder consultation focused on primary and secondary or indirect stakeholder groups, the community groups and members of the government respectively. Consultation helps develop a sense of ownership of the project and awareness that people's concerns are taken seriously. This was the primary motive for the process adopted for the SIA, and facilitators constantly tried to help

participants feel confident that the issues they raised, if relevant, would be addressed in the SIA process and be considered in project design refinement.

Following the initial information collection phase, the process aimed to provide the opportunity for a limited number of meetings to provide feedback concerning the research findings and seek further community inputs to verify the accuracy and appropriateness of findings, conclusions and proposed mitigation measures. Unfortunately, as was pointed out above, only one of these meetings was carried out.

Field research activities did not involve sanctuary personnel to any great degree, and the absence of sanctuary personnel at the feedback consultation meeting mentioned above, limited its effectiveness in terms of confidence and trust building. Although community participants, and indeed other stakeholder groups including development facilitators and relevant government authorities were confident that the issues raised by them would be reported in the SIA, it was evident that the sanctuary must become directly involved in community consultation with increased frequency. This apparent limited interaction between community and sanctuary is further indicated by the fact that very little of the social recommendations contained in the 2002 Bio-Business Plan (Lambrechts 2002b) seemingly received attention.

Consultation is a continuous process that will continue throughout the establishment of the sanctuary and should be a fundamental element of its on-going operation. The SIA Public Consultation and Disclosure Plan (PCDP) will outline how communication can be enhanced and institutionalised as part of the development process. An initial Draft PCDP is presented in Part H of the BMP.

2.3 SURVEY LIMITATIONS

2.3.1 Limitations on the survey

The consultation process undertaken as part of this SIA was limited to results of fieldwork by the baseline survey team at local level. Although a review of information of consultation carried out by the sanctuary management at national, provincial and local levels is included in the PCDP, it is not nearly complete due to insufficient records having been kept.

Full census results were not presented by the project development/sponsor early enough to inform this SIA. This missing data is fundamental for the analysis of the scale of impact and in order to produce useful mitigation and management plans. The assessment and plans presented in this SIA should thus be regarded as provisional and will have to be revised and updated. The updated version will be included in the second iteration of the BMP (during year 2), but will be implemented before that time.

Insufficient information has been collected and organised by the project developer to be able to take a decision about the final alignment of the fence around the protected area. The SIA therefore focuses on impact and mitigation based on the existing fence alignment, although it is understood that it is not going to be the full extent of the eventual fenced-in Reserve area. The final Reserve area will therefore probably cause the need for resettling more families and the loss of access to more natural resources for affected families. A process involving the

negotiation of trade-offs will accompany the final alignment of the fence and community consultation will be essential to the decision-making process.

This decision-making process will require inputs from the census, from the estimates of land available for settlement which have not yet been finalised, estimations of land-size required per family from the baseline covered in this report, and technical inputs from agricultural experts.

2.3.2 Compliance with international guidelines

To date the sanctuary project has complied with the abovementioned involuntary resettlement policy (OD 4.12) insofar as:

- resettlement has been minimized wherever possible;
- involuntary resettlement is treated as a development programme and it is expected that relocated families be provided with sufficient investment resources and opportunities to share in project benefits. Displaced people have been compensated for their losses, assisted with the move and are receiving support in their efforts to improve their former living standards;
- some community participation in planning and implementing resettlement has occurred, and appropriate patterns of social organisation have been agreed to in the first phase;
- land, housing and infrastructure and other compensation was and will continue to be provided to those who have usufruct or customary rights to the land and other resources taken for the project, even in the absence of legal title to land.

The links between settlers and host communities are however non-existent or at best weak, so that their institutions are not integrated and host communities are vulnerable. This lack of consultation with host communities is the primary reason for the lack of awareness amongst the project-affected people about the size of the area available for settlement. The reason why the recommendations of the Bio-Business Plan (Lambrechts 2002b), which would have addressed this shortcoming, have not been implemented, is not clear.

An incomplete RAP was prepared by the project sponsor, and although this is in the process of replacement, its completion will only occur after all information required for it has been received.

2.3.3 Limitations of the database

The database used for this SIA does not include basic census data for the area. Census data will only be available some time in early 2003. Data extrapolated from the household survey carried out in August 2002 therefore had to be used to assess the potential scope of project impacts.

Information concerning the area of land available for resettlement is not yet available, pending the results of a study carried out by the project developer.

CHAPTER G3: SOCIAL IMPACT ASSESSMENT BACKGROUND AND DESCRIPTION

The background, both physical and socio-economic, pertaining to the SIA will only be briefly dealt with in the BMP. For a more detailed description and a full list of references, refer to the specialist report in volume 3 of the BMP.

3.1 SOCIAL INDICATORS

Mozambique has recently fallen below two countries to lie fourth from the bottom of the pile of worst off countries. However, the National Human Development Index shows Inhambane province rising about 4.5% from 1999 to 2000.

The 1997 National Census indicated that of the ten provinces, Inhambane has the seventh highest illiteracy rate among men (41%) and ninth highest among women (64%). The national average was 41% for men and 76% among women. The National Poverty Assessment shows Inhambane having the lowest (with the exception of Maputo city) chronic malnutrition rate (stunting) among under fives (25.5%) and the third highest population after Niassa and Zambézia without access to clean piped water in or close to the home. Infant mortality in the same year was the fourth highest at 151:1000

Sixty nine percent of nine-year-old children in Inhambane were enrolled in school in 1999 while approximately 57% in Vilanculos District were enrolled. Performance at schools may be measured as the proportion of graduates of first level primary school in relation to the 11-year-old population. The age of eleven years is the average ideal age at which children should graduate at this level. The provincial average at 38% is one of the highest in the country, but Vilanculos only reaches 29%, and on average only half of these are reached in the rural areas with the proportion of girls consistently lagging behind that of boys.

In 1999 Inhambane had the fifth lowest expenditure on health in the country. The estimated national ratio of inhabitants to health worker was 2,450:1 in 1999 while in Inhambane during the same period it was 2,578:1. The percentage of births assisted by a health professional in Inhambane is estimated at 56%. The registered incidence of HIV/AIDS is still relatively low in Inhambane in comparison to the rest of the country. In 1999, 11,1% of blood donors were HIV positive, however the incidence in Vilanculos was lower than the average.

3.2 INHAMBANE'S PROVINCIAL DEVELOPMENT STRATEGY

Inhambane's provincial strategic vision through to 2010 is to ensure that the majority of families living in the province have access to income and social services that guarantee them their well-being, health and active participation in society. The focus of the development strategy is consistent with the Government Programme through to 2004. Inhambane has prioritised activities in the area of education, health and rural development to reduce the effects of poverty in parallel with increasing economic growth and creating a favourable ambience for private sector development.

The strategy addresses major constraints identified in the poverty studies of the province; these include migration (leaving a high number of female-headed households), low literacy levels (particularly of women), lack of access to potable water for a large proportion of the population, poor coverage of agricultural extension services particularly in the areas with lower agricultural potential, governance weaknesses, few economic initiatives, socio-cultural factors that encourage the youth to leave the province.

Relevant parts of the strategy include the short term focus on tourism development in a more organized fashion, based on structural plans and the protection of the interests of local communities and the environment, particularly in relation to forestry and game farms. The private sector is seen as a key engine for development and its collaboration with the government is seen to be the most effective way to move the province forward.

Population growth at an annual rate of 2.7% in the province is expected to create further pressures on the restricted employment market in the province. The strategic vision thus tries to incorporate economic growth with job creation and community participation through the medium of an increased investment programme. In this context many sectors are targeted for investments, key ones meriting government support include tourism-orientated ventures that are integrated into provincial development through increased local circulation of capital, involvement of local labour and observation of environmental norms. In this respect the participation of and benefits to communities in the protection and sustainable management of natural resources is a priority. Vilanculos district is included among those prioritised for the elaboration of physical geographic plans.

3.3 SOCIAL OBLIGATIONS

Some noteworthy social obligations of VCWS towards the communities are the following:

- The sanctuary aims to establish and maintain an indigenous wildlife population based on historically endemic species of the area. Full ownership of the terrestrial wildlife, including the reintroduced species, will be vested in the local communities (see Parts B and D). Due to technical necessities, the developers will retain considerable influence in the management of the wildlife but will follow the principle of co-management.
- There are plans to extend the project area to include the woodlands and the extensive system of wetlands and fresh water lakes to the south of the current Phase I area in order to enhance the ecological viability of the sanctuary. This expansion will substantially increase the sustainability potential of the protected area and enhance the sanctuary's capacity for carrying big game, thus directly benefit the local communities as "owners".
- Plans shared with the Quewene community in the first public consultation meeting concretely identified the project's intentions to *inter alia*:
 - Construct a community water source in the resettlement area.
 - Construct houses for the local chiefs and pay a monthly subsidy to them;
 - Grant permission for fishing activities only to local fishermen;

- Facilitate the killing of animals for consumption by the resident population once a year;
- Supply paraffin stoves and a permanent supply of fuel for cooking and illumination to some of the project affected families;
- Create a committee that will hold regular meetings with the objective of verifying, monitoring and coordinating the agreements made with the community.

3.4 FENCING AND GAME INTRODUCTION SCHEDULE

A provisional game enclosure (the Reserve) of about 8 500 ha was fenced to allow for the first reintroduction of wildlife that was scheduled to occur in 2002, but which eventually turned out to be not possible. The fence has 13 v-gates for people to pass through distributed along its length where there are settlements or main transverse paths. The gates currently allow access to the Reserve area for people who still use resources inside. The gates will remain when the game is introduced into the protected area and theoretically passage will remain open for community members to cross or enter the Reserve area. It is not yet fully clear what the real effects of introducing large game into the fenced area will be; whether the density of game and the potential danger posed by it will permit regular use of these gates or not. However, it seems unlikely that unrestricted access would indeed be possible.

3.5 RESETTLEMENT

All the residents located within the Reserve area have been earmarked for resettlement, which must take place according to IFC regulations concerning resettlement. As such the process for establishing the scope of resettlement, the sites for relocation and the means by which people will be assisted to repair their livelihoods is recognised as the responsibility of the VCWS project. By mid-September 2002 the Sanctuary had carried out the resettlement of 24 families within the general guidelines of the IFC.

A census has not yet been carried out to verify the exact population and its physical settlement pattern in the sanctuary. Provisional figures identify 62 families still living inside the Reserve area.

To date all families have been settled in areas that they have selected, and have expressed satisfaction with their new locations, houses, compensation and resources. Physical resettlement appears to have been a relief to at least some participants, allowing them to finally get back to living again. A key challenge would be to ensure that the to-be-resettled families living on the eastern side of the sanctuary are resettled with as much ease and satisfaction, given that they will have to change their principal fishing grounds from Inhamambane Estuary to Vilanculos Bay.

3.6 COMMUNITY DEVELOPMENT

An area of eight hectares has been demarcated to serve as a community development centre at Goshen in Marape Zone. Construction of the centre has commenced and it will be

constituted by simple round houses with cement floors, windows and doors, an open-sided cement floored meeting house and an area for the demonstration of improved low-input organic farming methods. It is located on the sea-front and is close to an old trading post that will be renovated to serve as a community market place. Port facilities for local transport and fishermen's boats will be constructed near the market to facilitate the local transport of goods produced by agricultural development initiatives.

Visits have been initiated to a private organic farming enterprise near Vilanculos where demonstrations of techniques to enhance the productive capacity of soils comparable to those of Marape have been carried out. Participants prioritised are those who have recently been resettled. It is expected to develop a similar initiative at Goshen to help local communities learn about the benefits of various improved farming methods (see Part D)

The project is following a policy of preferential employment for local men and women, and is currently employing men for construction work and in some longer-term hospitality and administrative posts, and young women (selected from a very large number of candidates) are working in the hospitality business. In August 2002 the project employed 163 local people from Quewene, 21 from outside of the peninsula, and 16 foreigners. Of these, 109 were fully contracted workers, the remaining ones were seasonal workers involved in tasks of short duration such as fence construction.

The project has contributed to the construction of a health centre (Type 3) on the border of the sanctuary. The proposed construction of a school has not yet begun. Identification and feasibility studies of different small enterprises that will benefit the communities and the Sanctuary project have not yet been carried out. The use and potential of marine resources for sustaining livelihoods has been investigated (Odendaal 2002), and the results of the draft report are accounted for in the present SIA report.

The Kawene Community Association, a trust created to operationalise the community-company partnership was formally launched in November 2001. Funding is presently being sought to address the operationalisation of sustainable development objectives in the areas of conservation and the community. The SIA will contribute to the design of the Kawene Community Association with regard to ownership of wildlife resources, access to fishing grounds, and sustainable use of agricultural areas within the Sanctuary to ensure that the communities equitably share in the benefits of the project. It is expected that a participatory process will be used to define the Association's role in the areas of conservation management, community development, jobs training and preferential employment.

3.7 KEY STRATEGIES GUIDING FUTURE DEVELOPMENTS

Three key strategies will define the model for community development in the Sanctuary project:

- The aim of securing community ownership of the terrestrial resources and application of usufruct rights in a sustainable way.

- Community involvement in conservation management financed by the eco-tourism initiative.
- Socio-economic development of the community in the project area based on environmentally sensitive and sustainable use of natural resources.

CHAPTER G4: THE EXISTING SOCIAL AND ECONOMIC SITUATION

4.1 HISTORICAL BACKGROUND

A comprehensive historical overview is included in the full report (Volume 4 of the BMP, available on the attached CD). Only a very brief overview is included in this section.

Since no formal written history exists of the region, it proved to be difficult to patch together an historical background for the VCWS area. Most of it is based on interviews with local traditional leaders and others.

History has it that the original settlers of the Quewene peninsula were hunter-fishers transiting from Massinga and Pomene (in southern Inhambane province) before the Nguni wars of Ngungunhane. At that time they fished in the lakes and hunted. Over time they abandoned hunting (due to game becoming scarce?) and turned more to agriculture and fishing. The Tswa linguistic group is part of the larger Tswa-Ronga linguistic group occupying a large part of southern Mozambique. The peninsula administratively known as Quewene is populated by Matswa people who speak the Xitswa language. This group is divided into a number of clans represented in Quewene who cite various origins. For example the Vilanculos clan, which is one of the numerically dominant clans in this area and the rest of Vilanculos District, claims to have come from Zimbabwe from where its people were expelled by Ngungunhane's men until they settled in South Africa, from where they were also expelled by the Zulus.

Quewene is divided into a number of administrative areas that are named after the individuals who historically came to rule the areas. From the oral histories obtained from interviews and focus group discussions rather an inconsistent picture is built up about the area. At the time of Ngungunhane many people took refuge from the war in this area. Some fled to the north and took refuge on the islands, returning to Quewene only when it was peaceful again. Others, as the Vilanculos clan claims, fled up the hinterland and then returned south again when the Nguni and Zulus withdrew. The first arrivals in Quewene staked their claims and defended these in skirmishes with one another until uneasy peace reigned following the dispatch of representatives of the traditional authorities who were sent to keep the peace. These men took over as rulers in their turn, staking out claims to parts of the land. It is their successors who still rule the area today.

Quewene was initially divided in two parts: Chiquinine and Matsopane. Conflicts between the 'owners of the land' (the '*hossi ya missava*') brought a certain Chibo in to manage the situation. He eventually took over all the areas he conquered and installed himself definitively. Today a 'Chibo' is said to be one who is 'rooted with a stump that can cause

trouble without him moving, he is resistant, and can hurt those who tread on him while he remains unharmed’.

Régulo (‘traditional’ territorial leader officially recognised by the colonial government) Chibo after he was installed received two brothers, Matsopane and Macaxe. They took over the areas, which have kept their names. The first *régulos* and *cabos* (assistant to the *Régulo*) of the land were almost all of the Punguane or Vilanculos clans who stayed and had successors. *Machuquele* means ‘observer’. *Machuquele* was sent by the *Régulo* of Mapinhane to resolve land conflicts between the two *hossi ya missava*, Chiquinine and Chibo. Not surprisingly he ended up by keeping a part of the land for himself - the area that is now known as Machuquele.

The area east of Lake Manhale today known as Inhamambane was originally uninhabited except for some scattered groups. An influx of families from Chipanzane and Massinga in the hinterland made the area more habitable and the wild problem animals (such as monkeys and bushpig) were pushed back. The people began to practice agriculture and settle. Out-migrations occurred again during the war when the area was largely left uninhabited for 10 years (during the 1980’s).

The Singo family dominates the northern part today known as Matsopane. The people of the area are said to be a mixture of families of different clans due to being near to the port of entry. Most of the current residents of Marape and Chicucacuane were born in the area. The northern tip of the peninsula is unique in that it was settled by fishermen arriving from the north. Chihuzuene/Chingonguene is today the area that belongs to the Mazelete clan. They apparently arrived in 1919.

4.2 INSTITUTIONAL STRUCTURES

4.2.1 *Traditional structures*

The *régulo* was responsible for the well-being of the people in a territorial area, and the territorial sub-divisions were ruled by his subordinates. He worked with elderly advisers, the *maganacana*. From 1975 to mid 2002 the power of the *régulo* was limited simply to maintaining the lineage of governance. Since July 2002 the traditional authorities have been officially reinstated as participants in local leadership processes and contributors to good governance at local level.

Prior to Independence the *régulo* had the responsibility of resolving problems such as adultery, fights between families and non-fatal assault. There were also fights over territories between prevailing leaders which were resolved by the *régulo*’s supervision of the ritual called ‘to eat earth’ (*kuga missava*), which obligated the two leaders in dispute to eat a handful of earth, swearing on his ancestors. It was believed that whoever was not the owner of the land would die.

In Quewene today, the traditional leaders are all subordinate to the *Régulo* of Mapinhane. The *Cabo* or colonially defined ‘corporals’ and *hossi ya missava* identified below are all holders of positions of traditional authority in Quewene:

Traditional leadership position	Present occupier of the post
<i>Régulo</i> of Mapinhane	Ziowa Vilanculos
<i>Cabo</i> Machuquele	
<i>Sub-cabo</i> Chicuinine	Mahtlewe - Sarmiento Macauze
<i>Sub-cabo</i> Machuquele	Xavier Saúte
<i>Sub-cabo</i> Mahatsela	Arnaldo Chipenete Vilanculo
<i>Hossi ya Missava</i> Matsopane	Lampião Uanetene Singo
<i>Hossi ya Missava</i> Chibo	José Quetane
<i>Hossi ya Missava</i> Chiquinine	Mahtlewe - Sarmiento Macauze
<i>Hossi ya Missava</i> Machuquele	Xavier Saúte
<i>Hossi ya Missava</i> Mahatsela	Arnaldo Chipenete Vilanculo

The colonial government attributed the positions of *régulo*, *cabo* and *sub-cabo* to the leaders of the time, in order to facilitate their governing task. As can be seen from the list above, the *cabos* in Quewene are all the traditional “owners of the land” or *hossi ya missava*. Thus, the *Régulo* of Mapinhane who lives in the Mapinhane area, is responsible for the *Cabo* of Machuquele, his subordinate responsible for the Quewene area. Quewene region was subdivided territorially into five areas ruled by Sub-cabos of Matsopane, Chibo, Chiquinine, Machuquele and Mahatsela (outside of Sanctuary Phase 1).

The Land Chiefs (*hossi ya missava*) are also distributed by the same five territorial divisions. They are responsible for the well-being of the land. They are called to perform rituals to bring rain for example. These same five men are also responsible for the well-being of the sea (*hossi ya bimbi*), and also perform rituals when fishing is extremely poor etc.

4.2.2 Administrative structure

Quewene is administratively categorized as a Locality consisting of five Circles. Immediately superior to the Locality in the administrative hierarchy, is the Administrative Post of Vilanculos. Quewene Locality is administered by the President of the Locality. In Quewene this task is for all practical purposes carried out by the President's son (Sinai Damião), since his father (Damião Massuanganhe) is elderly and not as educated as his son. Through him, the four Circle and 32 Zone chiefs are responsible for administering families within the Sanctuary boundaries. Mahatsela Circle is outside of the present Sanctuary boundary, although this area is being considered for inclusion as part of the project expansion.

The sub-units of Circles each have their own Zone Chief responsible for the families in the territory. Zones are created as a function of the number of families living in an area. Ideally 20 families was the basis for establishing a Zone. In this sense the evacuation of Chicucacane after resettlement will extinguish that Zone. In Marape, where many of the resettled families

are moving to, new zones may result from the higher population density. The Locality President nominates Zone leaders.

The Administration leaders are responsible for the same territorial divisions as the traditional authorities, the five administrative ‘Circles’. Each Circle is administered locally by a Secretary, supported by an Assistant Secretary.

Administrative position	Post holder
Presidente da Localidade	Damião Massuanganhe
Secretário do Círculo Matsopane	Johane Vilanculos
Secretário do Círculo Chibo	Julião Tingane
Secretário do Círculo Chicuinine	Alexandre Malale
Secretário do Círculo Machuquele	Mateus Lamucela
Secretário do Círculo Mahatsela	Arnaldo Mulombe

Each Circle is divided into Zones:

<u>Circle</u>	<u>Zones</u>
Matsopane	Singo, Chicume A to E, Marape, Chicuacuane, Maçaúle, Chingonguene, Chihunzuene.
Chibo	Central, Nhaxil, Manhale, Quile, Macaxe, Chihlambane (outside the Sanctuary), Chibite (outside the Sanctuary).
Chicuinine	Central, Inhamambane, Nhamuhalate A and B (outside the Sanctuary), Manguela (outside the Sanctuary), Chiciocio (outside the Sanctuary).
Machuquele	Central, Marovane, Boane, Guelevene, Muzimbane A and B.

As in the rest of the country, the administrative Circle divisions are also territorial divisions of the Frelimo Party (political) structure. Thus each Circle has an Administration Secretary and a ‘Party Secretary’. Usually in areas dominated by the Frelimo Party, as is most of Quewene, these posts are occupied by the same individual.

The Ministry of State Administration pays salaries to the level of the Chief of the Administrative Post, the position above Locality President. As part of Mozambique’s public reform programme for Local Authorities there is a move to extend remuneration to Locality Presidents. To date, the only ‘incentive payments’ made to personnel below the level of Chief of the Administrative Post are usually made by the Frelimo Party. Hence administrative tasks are not and cannot be separated from political party interests until this system changes.

The Administration headquarters of the Locality is located in Chiquinine Circle outside of the Sanctuary boundary. Its location in Chiquinine is a product of activities taking place

following Independence, probably symbolically representing the government claim to the most hotly disputed area during the war. The war provoked intensive political party, military and governing activities. Chibo area was the Frelimo base for defense. Chiquinine was the intersection where both sides used the lakes and fishing / hunting resources. Renamo controlled the Machuquele end of Lake Manhale and Mahatsela area. Frelimo controlled the Chiquinine end of Lake Manhale, Chibo and Matsopane. The traditional leaders lost legitimacy with the ascendance of the political parties during the war and Chiquinine became the no-man's land area between the two fighting fronts.

4.2.3 Social communication and leadership

Leadership in Quewene tends to be conservative and historically legitimised so that individuals once installed have tended to hold their positions of influence until death. This is partially the result of a lack of space for challenge. The people occupying leadership positions even when elected or nominated, are usually from locally influential families whose authority is legitimated by the clan position of authority. A certain lack of faith in current leaders is registered among one third of families who were not satisfied with the performance of their leaders, and 8% of families who noted that a key impediment to the community's development is poor leadership.

As has been described above formal leadership is divided into two main groups: the administrative structure and the traditional authorities. There is a complete integration of Frelimo Party and Administration channels of information and authority.

Traditional authorities

Since the restitution of recognised authority of the traditional authorities in June 2002, the *régulo*, *cabos* and *hossi ya missava* in Quewene have taken up their roles as parallel authorities in the administration of order and justice in the area. They have installed new physical areas for meetings alongside the Administration's areas, they hold meetings together with the Administration authorities, and it appears that the Administration authorities are significantly influenced by the traditional authorities.

The *hossi ya missava* carries out activities in partnership with the (party political) secretaries, with the chain of command being family to the Zone leader, Zone leader to Circle leader, Circle leader to the Locality President and the Locality President to the Community Court. The Circle also relates horizontally to the political secretaries, the *hossi ya missava* and elders, all being of a similar authority level.

Government authorities are separated from the communities by a significant social distance. The *hossi ya missava* however has always been recognised by the people as having the functions of locally administering justice within his community and regulating group life as an intermediary managing important aspects of social knowledge, norms and customs. The *hossi ya missava* also is responsible for the safety of the community which he ensures through consultations with the ancestors.

Importantly the *hossi ya missava* is the final arbitrator and decision-maker in the following situations:

- Land allocation inside the territory that he administers, as well as deciding who will cultivate which land. Generally, cultivation of the land is decided through inheritance resulting in families cultivating within the same piece of land for generations. Owners of this land may cede it to others, but the transaction is generally legitimated by a small ceremony involving libation to the ancestors performed by the *hossi ya missava*.
- Allocation and management of resources such as hunting, fishing, the distribution of territory for pasture, as well as controlling the burning and cutting of trees. This responsibility is also delegated to certain clans and their leaders who are responsible for a single type of activity, such as the Buine clan in relation to hunting for example.

Lineage membership entitles a family to land. Families and individuals acquire customary rights to land through the *hossi ya missava* and maintain them continuously unless ceded or lost in a conflict situation. *Hossi ya missava* may attribute land use rights to people from outside of the community, thereby legitimating their claims. All other kinds of land occupation may be perceived as 'illegal' and can potentially provide cause for punishment from the ancestors of the legitimate 'owners'. 'Illegal' occupants may also be socially ostracised from mutual security networks, or in the case of a community occupant, can cause open conflict.

The relationship of the traditional leaders with the communities is dominated by the fact of their unquestionable legitimacy. In the past the *tihossi ya missava* (plural) were individuals who had the responsibility for carrying out all major rites because they communicated with the ancestors. As such, community members were invited to meet and take a decision about an action, and the *hossi ya missava* carried out the rites to secure the ancestors' positive intervention over issues such as crocodile attacks, plagues invading crops, deaths while fishing and lack of rain.

Today the *tihossi ya missava* tend to associate with the elders who are their advisors. There is little official proximity between them and the families resident in their areas of influence unless they are involved in a case requiring resolution.

The Community Court

The Community Court is an institution established to ensure justice at community level in cases not requiring the intervention of the civil or criminal courts. It is led by a Community Court judge nominated by the District authorities and is mainly concerned with family issues, cases involving witchcraft or similar influences, robbery, adultery and violence. The Community Court is held to be sensitive to local social dynamics and in Quewene its leader is critical of cases resolved outside of Quewene which later "may even cause murder as a result of feelings of injustice". This institution is invested with the right to arbitrate disputes over land.

The Community Court is a trusted local arbitrator, but has no authority to make a verdict. Unfortunately it is overlooked by some of the authority structures that send cases straight to Vilanculos for sentencing. Lamentably, according to the Court judge, this included local cases of unauthorised fishing or uncontrolled burning in VCWS that was referred to the police in Vilanculos by sanctuary management staff.

Religious institutions

The influence of the churches in Quewene is pervasive and powerful. It is a preferred source of communication, arbitration and counselling for the women and youth of the peninsula. Importantly however, the church leaders are very often leaders in political, government and development spheres as well. At least five main religious groups are active in the sanctuary area. Since their open acceptance after the Peace Accord, these churches have spread from their points of origin in the area and cover Quewene as a very influential source of moral and social support, organisation and learning.

The churches are seen as social structures supported by the regular contributions of money or material goods of their believers. They perform services of remembrance for the dead; moral counselling about respecting elders etc.; organise collective church plots for cultivating; and members carry out visits to offer assistance in the cases of ill health or death. Initiation rites are still dealt with as they used to be traditionally.

Other local influence leaders

Maritime Delegate: The Delegate is responsible for collecting payment for authorization to fish, for mobilization of fishers and transmission of information about the periods of the year when fishing is prohibited, the legal requirements for fishing and about protected species. He has mobilized local people to join a Fishers' Association based out of Vilanculos, with the aim of establishing representation in Quewene. In addition he initiated a Quewene-based Fishers' Committee that he used to lobby and succeeded in obtaining an agreement with the Association in Vilanculos to lower the license costs this year (2002). The Committee is informal while the Association is formal with autonomous legal powers.

The Delegate like so many other local leaders, holds a number of positions with various conflicting interests, and yet retains his integrity by allying with the fishers. He is: the fishers' representative, the government representative as Maritime Delegate, point person linking with the Sanctuary, supervisor and inspector on behalf of the government concerned with protection and conservation, and a fisher representing other fishers seeking to ensure that their interests are protected.

Teachers: The teachers at the two largest first level primary schools of Chibo and Machuquele are a mixture of long standing State employees (18 – 25 years) and unqualified local teachers. Although they have many constraints to their being effective, including apparent lack of interest from parents in the educational development of their children, the teachers are generally well thought of. They are sources of impartial influence and often

serve as informal means of communicating information to parents via their children at school.

AMETRAMO: The local branch of the Association of Traditional Medicine Practitioners of Mozambique was established in Quewene in 1994 as an initiative of the organization based in Vilanculos, but with fifteen male members does not seem to be very active.

OMM: The local Mozambican Women's Organization began in Quewene in 1975 at the start of Frelimo's political activities. Many of the leaders of the OMM still hold positions of leadership in the church. The OMM was originally initiated as the women's branch of Frelimo, and in the mid nineties after the Peace Accord it was felt that it should separate itself from politics by becoming an independent non-political organization. This effort although laudable, was not financially feasible, and it rejoined Frelimo in 2000. Its reintegration into the party has not altered its politically neutral activities; the women are aligned in their identification with different churches rather than their affinity for a political cause. The OMM supported those affected by the floods in 2000 by constructing houses for the elderly. The OMM organization in Quewene is thus a particularly syncretic organization insofar as from the Locality through to the Circles and Cells its representatives are from various churches in the communities.

Renamo Party: Following the Peace Accord, the Renamo political party was installed in Quewene in 1994 with the objective of mobilising, organising and fund raising. Its headquarters is in Matsopane. Although a minority group the influence of its political activities is considered to be growing. Party members are dispersed throughout Quewene, but the area of greatest Renamo influence is Machuquele. The *hossi ya missava* of Machuquele is the pastor of the Catholic Church (Xavier Saúte) and member of Renamo. He influences the followers of the church to a certain degree to join the party, and many have joined. As a result the branches of the Catholic Church in Chicuinine and Machuquele are dynamic sources of Renamo influence.

4.2.4 Gender and social organization

The Matswa, like other Bantu groups from southern Africa are patrilineal, inheriting property through the male line, in a fairly rigidly gerontocratic society that recognizes the merit of age in leadership. This social management by the older men by its nature serves to reinforce the values of their power. The practice of patrilocal residential organization where a man's son may bring his wife to his parent's homestead and build his own home there creating an extended family settlement, is now largely superseded by fragmented organization of sons leaving home to start their family homes separately from their parents. In extended family homesteads kinship classifies the group members in categories organised hierarchically by reference to sex and age, integrating the members into a network of social norms and rights. Women can be seen as classic socio-economic intermediaries, insofar as they reproduce and reinforce the network of relations between alliance groups, neighbours or association members.

Some women may assume positions of public authority based on their lineage, ancestors, and political / magico-religious knowledge, thus becoming leaders, managers and traditional medicine practitioners or spiritual intermediaries of their lineage following on from deceased brothers or husbands. In Quewene no powerful women leaders were identified, however the presence of women healers and spiritual intermediaries testifies to their potential for using their mediating positions to influence others.

Inheritance of property generally passes from a man to his first-born son. If no son is available this passes to brothers of the dead man. The eldest son should also inherit the responsibility of looking after the widow of a brother for as long as she stays within the clan. A widow cannot marry outside of the clan after the death of her husband.

From the point of view of the woman, the death of her husband means that since all 'her' property (children, farms, material goods) passes to the family of the deceased husband, she is 'obliged' to marry a brother of the dead man so that she may continue to 'own' the property and preserve the family name. However of course there are cases where women do forsake their children and leave the family of a deceased husband. The social pressures are great, and it is commonly held that women who feel unhappy about their lack of rights to own property can cause misfortune or death. Indeed a principle reason cited in cases of misfortune or death in the family is the woman who left her husband's family - if she is known to have been frustrated about her lack of access to her children or other property after the death of her husband.

Marriage used to be predominantly polygamous, but the influence of the various churches, the socially destructive effects of the civil war and the relative poverty families find themselves in today have served to relegate polygamy to the status of the unusual and often even undesirable. Monogamous marriages are currently much more common in Quewene and most, if possible, are celebrated in a church.

A girl's initiation is marked by the girl's seclusion, 'traditional tattooing' with traditional medicines and instruction on being a woman, so that she may enter the world of adulthood prepared. Her guides during the period of instruction are aunts and other women elders. The treatment of a woman at her death reflects her value to the social group in life, and accordingly she will be provided with religious, traditional or simple family ceremonies. Female ancestors are only influential if they had been influential on earth, so that traditionally influential women and spirit mediums may continue to influence the living and require propitiation. If a 'bad death' occurs, living relatives should be particularly careful to propitiate the ancestors to prevent the same thing occurring twice. A bad death may happen to a woman or a man, but appeasement will be sought from the male ancestors, being the most influential.

Women's secondary status in relation to their men means that their husbands tend to intercede on their behalf. Even when a woman practices an activity to the exclusion of men, speaking about it to an outsider is a man's task. Thus a woman has no direct formal links with the male leadership. The only area where this gap is bridged is in the churches, where

women freely relate directly to the religious leaders, and they may also hold positions of leadership themselves, as a result communication is much less hampered.

The OMM is an institution that has long been accustomed to managing women's issues, and insofar as it is mainly constituted by elderly religious women has had an important role as mediator in the resolution of conflicts in marriages, rape of minors, premature pregnancies and undesired marriages. Reflection by the elderly OMM women noted their lack of influence due to the debilitating effects of the war on their health, the fact that they cannot read and are elderly. They have difficulty in reconciling the need to ensure their own survival through subsistence activities and other social or political activities.

4.2.5 Recent political developments

Over the past year Renamo has systematically been emphasising its feeling of marginalisation from political life and development activities due to proscription by Frelimo. It has focused on families in the process of resettlement for example, reaching those with grievances to advise them against accepting the terms defined by outsiders if they are not happy with them. The feelings of the Renamo leadership have been underlined by the monetary assistance provided to the administrative and traditional leaders by the Sanctuary. They hold the idea that this is disadvantageous and discriminatory to them.

The Sanctuary has since reduced the intimations of injustice felt by Renamo by inviting the district financial and administrative representative of Renamo to participate as a community representative with regard to the sanctuary project and work together with it and the families in the process of resettlement from July 2002 onwards.

4.3 CULTURAL HERITAGE

4.3.1 Background

No sites of archaeological significance were discovered during field work in Quewene. Numerous grave sites of families and clans exist in Quewene, but the propitiation of clan and family ancestors occurs at other sites held sacred such as trees or small forested areas. These are focal points for defining identity, social relationships and relationships with the land, as well as being centres for important religious rituals and where a family congregates. The transfer of a home from one place to another may require the transfer of the spirits previously occupying a sacred tree or forest to another place. Since these sites are associated with the lineage, only the original family homesteads tend to have them, unless the ancestors have demanded another additional site near an extended family member's home due to difficulties experienced in the past.

Communities' belief that the ancestors determine the regulation of land and natural resources use requires that each action carried out in the community environment, for instance fishing, needs the ancestors' approval through a religious ritual of consultation and appeasement. For the activity to be performed normatively it must be legitimated through the rituals. This process involves reaffirmation of norms and negotiation of new situations so that they are

normalised. Group unity is created and reinforced through sharing the use of common resources. To this end the lakes in Quewene have a special significance as common resources of great communal value; the *hossi ya missava* are responsible for propitiation of the ancestors at some of these sites, in particular Lakes Nhone and Manhale.

Although graves sites are considered of significant importance by families and are centres for ritual practices, they have a different social value. Historical migrations and the effects of the war have undermined the values associated with these sites in favour of the sacred trees, the latter being more easily transferable.

4.3.2 Recent cultural trends

Quewene is a physically isolated location. It served as a refuge for the earliest settlers and continues to isolate its residents from many changes occurring in the rest of the province and country. Few people on Quewene have experience of employment, the level of education is low due to the difficulty in obtaining access to schools and even the circulation of cash has until recently been insignificant.

Despite being apparently culturally conservative, the traditional leaders claim to have lost their influence with the entry of Frelimo, and the churches have been responsible for most of the more recent syncretic development of belief systems and attitudes on the peninsula. Quewene's isolation has meant that few people from outside of the community have settled in the area, and new ideas are now largely the domain of the churches and youth. However, many of these youth have not had much experience outside of the peninsula and are limited by their lack of resources to influence change.

4.4 COMMUNITY RESOURCES

4.4.1 Background

The natural resources of Quewene are almost all considered common, with the exception of the land. Thus access to and the use of lakes, the sea, forests and wild animals has all been customarily considered as free and dependent only on the authorisation of the ancestors through the *hossi ya missava* and clan leaders responsible for the continued well-being of certain sites and activities.

The clans are separately responsible for particular hunting activities: birds are the responsibility of one clan and bushpig another. Use of the different lakes is still the domain of different clans. The men of Marovane, the Buine's for example, controlled hunting in the forests of Nhangome and Chiliko near the Inhamambane Estuary. Access to Lake Chivassine was controlled by the *hossi ya missava* Muzembane and access to the forests by an elder called Banze whose family were the forest guardians. His family's task of controlling access was delegated by the Buine clan leaders.

4.4.2 Spatial organization and land use

Spatial organisation of domestic groups is based on the lineage and marriage relationships. If the lineage is dispersed through various geographical locations, its members take with them their name and occasionally the spiritual site. Homes in Quewene are not only physical sites with structures but they are also the representation of the value system that defines the relationship of the people to each other and the natural resources in the area.

Dispersed settlement ensures access to and use of geographically dispersed resources over time. The area occupied for housing and animal husbandry directly depends on the household size, its structure (extended or nuclear), and on the surrounding ecological zones. Each family makes the effort to control space sufficient to guarantee survival and reproduction of the overall domestic unit. Experience of varying production over the years has produced risk avoidance behaviours by using alternative resources so that families can survive droughts for example. It is this experience that determines their relation to the environment and requires the use of various tracts of land by each household - to the extent of its labour provision capacity.

The table below shows that in Quewene the average cultivated land size of 1.6 hectares per family may easily be doubled when residential, fallow and pasture land areas are taken into account. However, between 40% and 45% of families interviewed in the household survey did not have pasture and fallow lands. Thus just over half the number of families sampled managed land areas of approximately 3.3 hectares on average – including cultivated land, residential area, pasture and fallow land.

Land use: Areas for cultivation and other uses

Land specifications	Land use area (ha)			N
	Mean	Minimum	Maximum	
Cultivated lands	1.6	.0	25.0	114
Rented lands	2.9	.1	15.0	18
Non cultivated lands	1.7	.0	9.6	122
Residential area	0.2	.0	1.9	122
Pasture lands	2.3	.1	30.0	49
Fallow lands	1.5	.0	9.5	55

The degree of dispersal in which the population lives depends to a large extent on the productivity of the soil and location of water sources. The sustainable use of these resources means that families must ensure the regeneration of fallow lands, or acquire new land so that the agricultural system is maintained.

The only 'landless' household units in Quewene are those of some of the fishers of Chingonguene and Chihunzuene who do not have significant cultivated areas, having habitually depended on the internal barter with agricultural families of the peninsula or on purchasing the food they need. More recently the sanctuary's development plan which includes the resettlement of some 24 families in its first phase, has caused these people to express their insecurity in the face of being made effectively 'landless' when prohibited from carrying out further cultivation activities while awaiting resettlement.

4.4.3 Basis of land tenure

Due to the land of the sanctuary being authorized for private use, and also in consideration of the development objectives including the importation of large game into a fenced off area, it has been classified as a *fazenda* or game farm. As such, animals introduced into the concession area are legally considered the property of the sanctuary by the government. All other animals are the property of the State. Since one of the objectives of the sanctuary is to facilitate the realization of an integrated conservation and development project, it is subject to the laws and regulations of the forestry and wildlife and tourism sectors as well as the environment (See Parts A and C). The regulations governing management of natural resources must be applied through a specific development plan which identifies specific recognized natural resources for exploration.

All land in Mozambique is the property of the State. The Land Law provides the instruments to defend the use rights of communities in the face of the legal acquisition of use rights by individuals and companies of their land. Communities' land rights are defined according to their customary norms, and that of individual residents by the length of their residence in the area. Thus normally individuals' right to claim to title would be based on their residence being for longer than 10 years. All other claims are subject to the acquisition process.

The following aspects should be recognised when determining land tenure:

- The Land Law requires that concessions be authorised only after prior consultation with communities about the areas proposed for projects of any nature. The objective of the consultation is to ensure that the land area is free of occupants. The Sanctuary concession recognises occupation of the area and it prescribes programmes to improve the people's socio-economic status and stability (as is clearly indicated in the objectives; see Part C)
- Interpretation by the developer's legal advisor provides the understanding that for the project to be carried out, "the existing occupants will be removed, in consultation with them".
- This forms the basis for removal of families occupying areas destined for development of houses, lodges and the holding of large game within the protected area.
- There is no law in Mozambique governing involuntary resettlement. As was pointed out above, MICOA (Ministry for the Coordination of Environmental Affairs) produced guidelines concerning the resettlement of families in rural areas. These were produced to assist with the process of resettlement after the floods of 2000.
- Authorisation of the sanctuary concession provides special rights for the company to facilitate the transfer of title for land use and benefits to individual external investors.
- Communities retain use rights to land outside of the protected area in the private concession though they forfeit the right to title.

Although it is assumed that community entitlement to land title is suspended until the end of the concession, the situation is not entirely clear and might require further investigation.

It is understood by implication that sustainable community land use within the sanctuary is a direct interest of the development company. The definition of regulations and a management strategy to ensure the sustainability of resources requires community participation and adherence to guidelines from the National Directorate for Forestry and Wildlife and the Ministry of Tourism.

If the land for resettlement is ceded by traditional means, as it is being ceded in the sanctuary, then it must be verified that the host families offering the land are not prejudiced by this and where appropriate are integrated into development benefits in the resettlement area.

4.4.4 Access to land: conflicts

At community level in Quewene, the *hossi ya missava* and the Community Court have the authority to arbitrate in cases of conflicts over use of land resources. Only one case was recalled by the community judge, when in 2002 a man was accused of planting palm trees on another's land with the intention of claiming compensation when the latter was due to be removed for settlement.

Government Decree no 66/98 presenting the Land Law Regulations recognises collaboration between traditional leaders (as community representatives) and the local authority on behalf of the local community. The regulations require agreement by communities to new land claims in areas they currently occupy, and the District Administrator must act on their behalf in stating the terms by which a partnership may be defined between those with customary rights and the requesting individual. The law protects the rights of the first claimant of the acquired right or if an individual acquisition has lasted at least 10 years.

The Land Law emphasises the role of the community in identifying its claims, being assisted to delimit areas and to avoid conflict by clearly identifying the boundaries of claims. The whole process of involving communities in changes of use and access to land resources is through systematic consultation. As was already pointed out in various sections of the BMP, the public consultation process of the development company did not receive nearly enough attention. It is essential that the trust required on the part of the communities should be obtained through transparent deliberations and involvement of trusted institutions to carry out the exercises whether customary or not.

The sanctuary's development plans should take into account these legal bases for conflict resolution since it is contractually responsible for ensuring the well-being and stability of the communities. Adherence to the guidelines of this BMP should go a long way towards alleviating the abovementioned shortcoming and in complying with the requirements of relevant legislation..

4.4.5 Water supplies

Lakes are the principal water supply for families in the Sanctuary. Water is generally collected from hand-dug shallow wells in the immediate vicinity of the lakes. These are

simple unprotected holes, and when they collapse another hole is dug. They range between two and three meters deep and half to one metre in diameter.

Only one concrete ring-lined community well was identified in the Sanctuary area, at Chibo School. The water is sweet and is the result of rain and some artesian type springs. It is not maintained clean, it has no headworks to prevent seepage and contamination of the water from inside and outside of the lining rings. Potential water users are approximately 320 children frequenting the school and neighbouring community members. Recharge is insufficient to provide water throughout the day, and the well probably requires deepening.

4.5 POPULATION CHARACTERISTICS

4.5.1 Background

The total number of the population living in the Sanctuary will be obtained from the census carried out by the project developer during the latter half of 2002 and early 2003. The developers seriously underestimated the number of people living in the sanctuary when development started in early 2001, and the mid-2001 estimate was only 1 089 people (Lambrechts 2001b). Baseline data used to guide understanding of the characteristics of the population in and outside (up to 5km west of the road) of the Sanctuary is for the purpose of this SIA obtained from the household survey carried out with a sample of 122 households. The profile of principal activities of the random sample is seen below:

Distribution of Households in Survey Sample

Location of Residence	Principal Activity of Household				Total	Total %
	Agriculture	Fishing	Agriculture / Fishing	Other		
Inside protected area	4	3	11		18	15%
Outside protected area / Inside the Sanctuary	50	2	37	3	92	75%
Outside the Sanctuary	5		7		12	10%
Total number of households in sample	59	5	55	3	122	

Results of the household survey demonstrate that around 93% of the population surveyed are agriculturalists. Forty eight percent depend solely on agriculture, 4% solely on fishing and 45% on a mixture of fishing and agriculture. The remaining 2% depended on private employment and the remittances of dependents. Thirty six percent of families had at least one member earning a salary.

The most ascribed to religion among families surveyed is the Zionist Church (35%). This is significant since it is a healing church that serves the poorest at no cost. Fifty two percent of the remaining interviewed families are from the Methodist, Velhos Apóstolos and Catholic churches. Only three percent of families professed to be animists. The Zionist Church was the most active with member families all going to church at least once a week and some families up to four times a week.

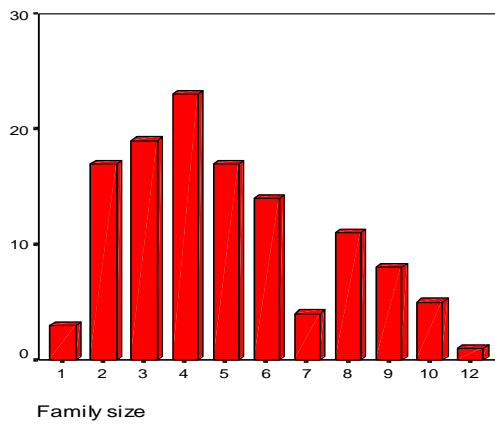
Living conditions: The household survey identified the average number of houses per family as 2.5, the majority (over 65%) of which are constructed of cane and grass with plastered walls. Few other improvements were evident (only four families had cemented the floors of one or more houses). However, 11% of families reported having recently invested in house construction or improvement and 29% planned to invest in further construction activities.

Most homes were reasonably well conserved and had clean surroundings. Seven percent of the homes had traditional latrines (in Singo and Machuquele) and personal hygiene was observed only to be poor in about seven percent of homes.

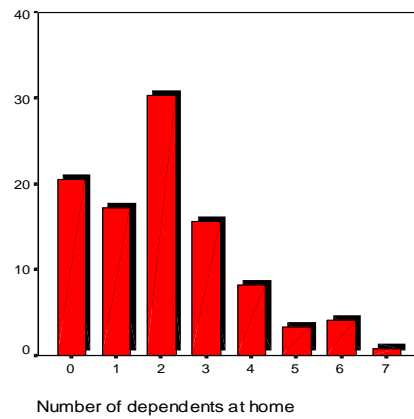
4.5.2 Demography

Data from the total household survey sample of 122 families or 605 people shows the family size ranged from one to 12 members with an average family size of five and a distribution of 100:67 of women to men. Eight percent of household heads are women. The age of household heads varies from 15 to over 85 years old, with 52% being between 26 and 45 years old. Dependency ratios of members not contributing to family livelihoods showed 30% of families with two dependents living at home and 20% with none. This is clearly seen in the graphs below:

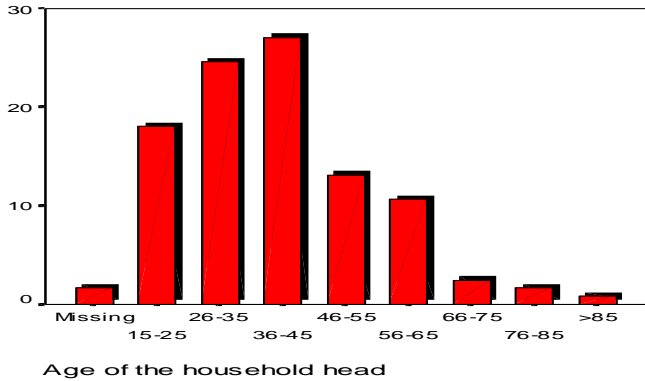
Graph 1. Number of family members



Graph 2. Number of dependents per family



Graph 3. Age of heads of household



While 58% of families interviewed had their origins in the location in which they now live, 42% had moved to the place they live after the 1950s. The families of this extremely mobile community that were interviewed identified 28 different places of provenience, 17 of which are different locations in Quewene and most of the rest are locations in the immediate hinterland in Vilanculos District. Of the families who had moved to the area, the longest period of residence mentioned was 55 years. The majority (26%) had moved to their areas of residence after the Peace Accord while approximately 16% moved to the area before this - from the 1950s onwards.

Twenty five percent of families have at least one person living away from home outside of Quewene. In six percent of families two members are absent and in five percent, three members.

The average family size being fairly low, the lack of dependents and the dispersed settlements (over half those interviewed live between 100 and 300 metres from their closest neighbours, and seven percent half a kilometre or more) of small families in the sanctuary are worth remarking on. Obviously seriously affected by the war, the low number of extended family homesteads and dispersal of homes are factors that help families to survive in an area

with very poor soils and high risks of annual rainfall extremes undermining their reliance on agricultural production.

4.5.3 Education

Fifty eight percent of the families interviewed have illiterate household heads, the rest being able to at least read and write. Forty six percent of the families had no members able to read and write and only 19% of family members in the whole sample were able to read and write or had been to primary or secondary school. Forty four percent of these people were women and only four men in the whole sample had secondary level primary education.

The table below shows that three percent less women than men had achieved the most basic level of education.

Gender disaggregated education levels in Quewene

Population Sex	Education Level			Total	Total %
	<i>Can read/write</i>	<i>EPI</i>	<i>EP2</i>		
Male	36	25	4	65	11%
Female	23	28	0	51	8.4%
Total	59	53	4	116	19.4%

One of the teachers in Quewene expressed his hope that increasing education facilities will help to lower the common age of entry into school of children in Quewene to below 10 years (11 years old is the expected age for graduating from first level primary schooling). At the moment only those of approximately 10 years or more are able to walk the long distances to the existing schools.

4.5.4 Health

Data from the household survey reveals that approximately half the families interviewed had major health problems in the last year. Two young members of interviewed families died before completing their treatment in the last year – providing a mortality rate of 0.3% in the total sample (two babies of less than one year died of malaria having received only local treatment).

Malaria symptoms (which were not confirmed or diagnosed in a health unit) had caused problems for approximately 20% of families over the two weeks prior to interview, and recall from the previous year confirmed this proportion as constant. Although half of the respondents did not recall any illness in the past two weeks, coughs were mentioned by 24% of the rest, and only 6% mentioned diarrhoea.

The absence of health facilities in Quewene resulted in 40% of families with illnesses mentioned as occurring in the last year treating them without recourse to a modern health facility or to the drugs that are often available on sale in Quewene. An average of \$3.6 US was recalled as spent on health seeking strategies during the illness episodes of the year. This figure is the result of recall over a very long period and should not be used as more than an

indicator that health costs money; 90% of illness cases reported paid something for their treatment.

4.6 ECONOMIC ACTIVITIES: LIVELIHOOD SOURCES

4.6.1 Background

Information from the qualitative assessment and the quantitative household survey forms the basis of the following baseline status report.

The main sources of livelihood in Quewene are swidden (shifting) agriculture and fishing. Almost all the people eat fish as part of their daily diet, by catching it themselves or acquiring it through barter or purchase. Distribution of principal activities practiced in Quewene according to the focus group results is as follows:

Circle / Zone	Principle activities practiced
Matsopane: Matsopane Sede	Agriculture and fishing for sustenance and income.
Matsopane: Marape/Chicuacuane	Agriculture and fishing for subsistence and income.
Matsopane: Chihuzuene and Chingonguene	Fishing with supporting agriculture in small areas.
Chibo: West of road	Agriculture for subsistence and income, fishing, hunting and collecting.
Chibo: Macaxe/Quile	Agriculture for subsistence and income, fishing from the open sea and lakes, collection of forest products and hunting.
Chibo: Manhale	Lake-fish for subsistence and barter and subsistence farming.
Chibo: Nhaxil	Fishing for food and income supported by agriculture for subsistence and income.
Chiquinine: West of road	Agriculture for subsistence around the home.
Chiquinine: Central	Agriculture for subsistence and income. A few people make a living solely from fishing.
Machuquele: Marovane	Subsistence agriculture and some products for sale; fishing is felt to be very important to them.
Machuquele: Boane, Guilevene and Muzimbane	Agriculture and fishing for subsistence and income.

Principal Activities

The highest numbers of families depending solely on agriculture were found in Matsopane (32%) and Machuquele (37%) Circles, and families with mixed activities were mainly in Matsopane (40%) distributed through Chicume, Maçaule and Chingonguene. Interestingly the highest number of mixed-activity families at zone level were found in the Inhamambane zone in Chiquinine Circle. The families interviewed who solely obtain their livelihoods from fishing live in Chingonguene and Inhamambane.

Indicators of security and wealth in relation to the activities practiced above were identified in the qualitative assessment as can be seen in the following table:

Security / wealth indicators of ranked activities

Circle / Zone	Ranked activities	Activity-related security / wealth indicators identified by focus groups
Matsopane: Marape/Chicuacuane	Fishing:	Use of boats, nets and traditional stake nets or <i>gamboas</i> indicates greater financial stability.
Matsopane: Chihuzuene and Chingonguene	Fishing for income: Fishing for food:	Owning the means of work Possession of lines, nets and seasonal labour.
Chibo: Nhaxil	Fishing: Farming:	Income from fishing Possession of their own means of fishing. Those who can sustain themselves.
Machuquele: Marovane	Fishing: Other occupation: Farming: Seasonal fishers:	Fishing with a boat and/or drag net, Owning the boat. Obtaining a salary working for the Sanctuary. The size of the <i>machamba</i> indicates the status of a farmer. Self sufficiency

Quantitatively, results of the household survey show that one family in Chicume has four boats, one in Chingonguene has three and the remaining 12 boat-owners have only one boat. The area with the highest number (5) of boat-owning families was Inhamambane in Chiquinine Circle. Fifty seven percent of boats were used in the Inhamambane Estuary and 14% in Lake Manhale. Sixty four percent of boat-owners practice both agriculture and fishing. Despite not being identified by focus groups as a priority indicator, the frequency of corrals for the keeping of pigs and goats is an important indicator of capital retained by a family. Seventeen percent of homes visited had corrals.

Levels of income are very low in Quewene, and the calculated monthly income for 2001 is approximately 62% of the current national prescribed minimum wage at US \$21 a month. The sources of income as can be seen in the summary table below, include wages and other income, remittances, income from sold agricultural produce and from the sale of fish. Noticeable is the difference incomes from agriculture and fishing; the majority of people practicing fishing earned less than US \$167 during the whole of 2001. Only three of the families declaring their income from fishing depended solely on fishing for their livelihoods, evidence that the majority do not sell very much fish, and that the value of it is extremely low. Almost one quarter of families selling agricultural produce on the other hand, said they earned over US \$330 during the year. This income is principally derived from sugar cane sold as cane spirit, a product that is harvested throughout the year and provides the main source of cash aside from employment, on the peninsula.

Average income and expenditure

Average Income and Expenditure	USD	Min / USD	Max / USD	N
Other incomes (not agricultural or fishing) in 2001	340.3	0.9	2,150.0	51
Remittances in 2001	23.7	2.1	83.3	31
Agriculture income in 2001	124.2	3.1	713.5	63
Fishing income in 2001	44.2	2.5	462.5	53
Total average income in 2001	252.3	3.1	2,250.0	112
Calculated monthly income in 2001	21.0			
Recalled expenditure January - July 2002	29.3	0.3	372.5	105
Weekly expenditure	15.5	0.3	226.0	121
Monthly expenditure	18.5	0.2	102.1	110

Cash expenditure recalled by survey respondents appears to be most accurate for the more recent recall of monthly and weekly expenditure. These two figures were calculated from separate questions and their disparity is based on this difference. The problem with recall of income and expenditure is the vagueness of memory (no written records were kept), and really the only way to establish concrete figures would be to register them at the time of occurrence.

An examination of the areas of expenditure identified by respondents can assist understanding of the areas of priority even if the amounts are assumed to be merely indicative. Thus as would be expected expenditure on food accounts for by far the most money spent on the peninsula, this is followed in declining order by expenses linked with fishing, clothes, small business activities and travel / transport. Very few families interviewed have responsibilities linked with fishing (9%), however almost all purchased some food and around 60% paid for transport and soap. Approximately half the respondents said they spent money on small business activities and fishing, providing an indication of the level of interest in areas with potential for generating income.

Average monthly expenses by category

Expenses	Average Monthly Expenditure		
	USD	N	% families
Fishing (boats, salaries, equipment)	73.1	9	7%
Savings or credit contributions	27.6	5	4%
Clothes and shoes	10.3	43	35%
Small business	10.1	54	44%
Debts	7.6	2	2%
Transport and travel	4.8	73	60%
Education	4.6	11	9%
Ceremonies	4.2	6	5%
House renewal	3.9	4	3%
Health (medicines / healer)	3.7	31	25%

Soap	1.7	81	66%
Community contributions	1.6	2	2%
Church contributions	0.8	36	30%
Others	2.8	3	2%
Food	36.1	120	98%

Constraints to development were perceived by some 62% of survey respondents to be directly related to a lack of money. Investments in all activities carried out by respondents and their families over the past year were from their own funds except for 10% who obtained loans from families and neighbours. Eight percent of families used loans for ceremonies, buying food and health. The lack of a market and market facilities for agricultural and marine produce (47%) and the lack of members of the family sufficient to help develop families' resources (17%) were also cited as major constraints to community development.

Opinions about the development situation in Quewene at present are mixed. The most pertinent observations refer to the need for more infrastructure and facilities (17%), the fact that people feel their lives are not moving ahead (14%) and that they have lost their lands (12%). Comments about the positive impact of recent development in the area mention infrastructure construction (32%) and employment opportunities (3%) as indicators of this.

4.6.2 Customary resource management

Customary resource management as described above meant that up to the mid 1970s, the *hossi ya missava* and clan leaders were responsible for managing hunting, forests, and use of the lakes and sea.

Today there is little left to hunt (see Part B). The Buine clan is still renowned for its role as regulator of hunting practices, although it is no longer active. The Buines regulated the bushlands (*kwati*) where hunting was carried out and made supplications (*pacihar*) to their lineage ancestors. A hunter's destiny, it was explained, is linked with the life or death of animals and therefore his link to a traditional healer to intercede with the ancestors is essential to ensure his good fortune. The Buines ensured that only traps and bow and arrows were used. Hunting was controlled in the Nhangome bushland close to the Inhamambane Estuary where unless the Buine clan leader carried out the appropriate rites a hunter risked death. The clan leader managed the use of the area under his jurisdiction: he regulated when the area could be burned for hunting, what equipment should be used and the periods when no hunting was done so the animals could "grow". He also decided which animals could be hunted in any given season.

Although access to lakes for drinking water is freely available, the use of clay pots to collect water, for example, is prohibited in Lake Manhale. Customs and required rites to guarantee access and use of the water resources for drinking, other domestic uses and fishing are regulated by the *hossi ya missava*. When someone becomes ill, there is an accident or other strange occurrence associated with the lakes within the jurisdiction of a particular *hossi ya missava*, it is he that will offer supplication to the ancestors at this place. For example access to and use of Lake Nhone inside the Reserve area is authorised by the responsible *hossi ya*

missava through rites carried out at its edge together with those requiring authorisation to use it. Rules of use such as the prohibition of rafts for fishing or transport on Lake Manhale or of washing clothes in Lake Nhone, are made by *hossi ya missava* together with their elders and community. Fishing in Lake Manhale is the responsibility of a particular clan which together with the *hossi ya missava* managed it in the past.

As was pointed out above, the *hossi ya missava* is the supervisor of land access and use. Procedures for obtaining rights to access to land may be divided into three main categories: a) requests within the family (clan), b) requests to cede land from another family, and c) requests for use of 'free land'. The *hossi ya missava* plays no role when use is allocated within a family or clan of land commonly known to be 'owned' by the clan, the blessing for the productivity of the land is requested from the lineage ancestors by a clan leader. In the second case, a requesting family that does not 'own' the land must obtain use rights from the owner. This is not the same as becoming the 'owner' of the land. To be an owner, a person must be born into the clan or become a member of the owning group by marrying (although a woman is without full property ownership rights) a member of the clan that owns the land. In the third case, if the land has never been worked on by anyone it is considered 'free'. Use of this land requires the applicant to seek the intercession of the *hossi ya missava*, who with a ceremony will offer supplication to the ancestors and request their influence for good productivity, following which the land may be used, but not 'owned'.

Each family automatically becomes the 'owner' of the forest resources on the land area they use with the exception of lakes and traditionally of *ntzonzo* (*tambeira/messassa[msasa]* or *Brachystegia spiciformis*). Special management of areas where clusters of this species of *Brachystegia* grow is practiced.

Competition for land has not really been felt in Quewene up to now given the relative freedom of selection of areas to settle and cultivate. The soil quality is generally poor throughout the peninsula and the population scattered as a result. Family dispersal has aided the avoidance of conflicts, as has the lack of any particular areas which have better quality soils than others, except the lowland areas around the lakes and Estuary which have to date been enough to meet the people's needs.

From the 1970s through to the 1990s when the influence of the *hossi ya missava* gave way to the Frelimo authorities and later to the local administration, their roles were often taken over by the government officials. However, most community members still agree, as do the elders themselves that in order to avoid sanctions from the ancestors, and ensure good productivity that the *hossi ya missava* should maintain their regulating and intercessionary roles. In practice the *hossi ya missava* and other traditional authorities have only recently been reinstated officially, and since this date they have shown a much more forceful presence in terms of demanding respect for their authority. It is estimated that their influence will continue to grow as it is relevant locally and is now sanctioned by the government.

Knowledge of the most powerful medicinal plants, their location and effective use is held by the clan leaders, *hossi ya missava* and traditional healers. A broader knowledge among the community as a whole is held of plants that are commonly available and are used as

treatment for relatively common and mild ailments. Focus group discussions revealed that there do not appear to be particular areas where medicinal plants are protected for use. Access and use is defined by the status of the person aiming to use them for healing. The effects of uncontrolled destruction of animals during the war, of the decline of customary practices during the years of greatest influence of Frelimo, and the privation of use rights of certain areas and products of the peninsula by the VCWS authorities are viewed as parts of a growing malaise undermining people's sense of security and identity. However the security offered by traditional healers and customary activities are fairly widely claimed to "not (be) important since the entry of the churches". The influence of the churches pervades social life in Quewene and it is a major force behind the currents of change.

4.6.3 Land use: agriculture

The current baseline assessment followed a dry year where the people in Quewene were feeling the effects of low production. Indicative of this was the fact that only 26% of the families interviewed in the household survey were using granaries at the time. The average land area used by surveyed families for cultivation is 1.7 hectares. Fifty four percent use less than one hectare, and 33% of these use less than half a hectare. Six percent use over 4.5 hectares, these being families living in Inhamambane, Marrovane and Chicume.

Most families with only two or three family members who cultivate more than two hectares of land, and hire labour are found in Machuquele Circle with single examples in Singo and Inhamambane.

Interestingly it is also these same areas of Machuquele and Inhamambane where 10% of the survey sample also uses other people's land on which to cultivate – the majority using the land of family members. However, two cases of families paying for the use of the land were identified in Boane and Marrovane.

Most agriculture is practiced for subsistence. Approximately 88% of the agricultural produce from the past year was used for subsistence. Dry land crops are grown by approximately 93% of families, although wherever possible and if seeds are available, farming of vegetable crops around the lakes is highly valued. Around 34% reported having fields in the drier higher land as well as the lower wetter lands. For example, in Matsopane Circle the best area for agriculture is said to be around Lake Nhone, while around Lake Nhamaloi is good for sugar cane, and Lake Nhamaculoculo for onions, sugar cane and vegetables. The lowlands in Muvavane are said to be preferred for the cultivation of vegetables and rice, sugar cane and bananas. In Machuquele in the south, the low-lying areas of the lakes (Manhale, Zevane, Nhawarro, Chivassino, Muyanquilo and Chicome) are preferred for planting sweet potato, banana trees, and sugar cane.

Location of plots is an important indicator that helps one to understand the nature of dispersed settlement on the peninsula. Cultivated plots are usually located within or adjacent to a family's residential space, and much less frequently they also have larger plots or lowland fields around the lakes located further away. Households are not customarily clustered.

Planting is generally practiced in two seasons. Farmers prepare soils in September, and in November/December they plant for the first (main) season. The first cycle usually involves planting maize, cowpeas, pigeon peas, peanuts, pumpkins, cassava and sorghum. For the second cycle the soil is prepared in January/February and planting takes place in March/June. Maize, cassava and pumpkins were cited as being commonly planted in the second cycle. Bananas and sugar cane, both important crops on the peninsula are perennials. Crop production estimates recalled by survey respondents indicate more sugar cane is produced on the peninsula than any other crop, followed by maize and in third position, bananas.

Small animals are also raised, though very few per family (over 50% of families interviewed had five or less animals): goats and pigs are family 'banks' for use when it is necessary to pay for a marriage, journeys to accompany children at the beginning of the school year, in-patients at the hospital etc. Chickens and ducks are sold to buy soap, sugar, oil, schoolbooks etc.

The coconut palm is said not to be a traditional crop of Quewene. The first palms were planted in 1963, and a widely held belief that to plant coconuts would lead to untimely death suppressed extensive planting.

Crops for subsistence and exchange with fishing families:

Families throughout Quewene except the fishing families in Chingonguene and Chihunzuene, try to ensure that a major proportion of their livelihood sources are from agriculture. They plant maize, peanuts (poor produce due to drought), sorghum, cassava, pigeon peas, cowpeas and sweet potatoes as primary crops. In the second cycle families who have seeds plant vegetables and maize. Rice used to be planted in the lowlands of Macaule in Matsopane. Intercropping is widely practiced in smaller fields of about 0.5 - 1.5 hectares. Since the floods in 2000, cassava in many parts of the area has been attacked by a plague killing the plants.

Children eat sugar cane, and it was noted by the women of Matsopane that coconuts now tend to be eaten instead of peanuts in periods of drought. When a market is unavailable families eat or barter bananas, mangoes, oranges and pineapples (grown in the south). Peanuts, cow peas, cassava flour, coconuts, paw paw and sweet potatoes are also used for exchange to obtain basic necessities such as soap, sugar, school books etc. In Machuquele cowpeas, peanuts and cassava are used for eating and to 'pay' for education, health, clothes and labour in fields during the planting season. Coconuts, sweet potatoes, pumpkins mangoes, cashew juice and cashew nuts are exchanged for fish, crabs and other crustaceans. The exchanges based out of Machuquele are made locally in a radius that extends to Chibo, Mahatsela and to Inhamambane.

Tree crops grown include cashew (fruit for juice, nuts for eating ground in meals), coconut palm, mangos and *jambo* trees. In the south of the peninsula, there is no market close enough to sell their produce. Even the bananas grown around the lakes are too far to take to a market,

so not many are produced. The family Muzimbane used to produce many bananas and cultivated land around the lake of the same name.

Crops for sale:

Sugar cane was introduced into Quewene around 1956/7 with the migrant labourers returning from the sugar plantations at Chibalo in Xinavane. Sugar cane became one of the most important crops on the peninsula. It is distilled and sold in response to permanent demand in Vilanculos and Quewene. Survey results confirmed that the sale of alcohol distilled from sugar cane is the most common agricultural marketing item (over 50% of families interviewed participate), and is the highest source of income from agricultural products at an average of just over \$100 US per month). Men and women are differentially involved in specific roles in its harvesting, processing and sale. Income from sugar cane has assisted various families to initiate mixed product trading enterprises and it is one of the most highly valued crops for generating income.

Cashews were important for trading in Vilanculos until the civil war when production stopped. Bananas grown and commercialised by men (average \$64 US / month to 5% of families) and mangoes sold by women (average of \$7 US / month for 7% of families) are sold in Vilanculos. Palm trees only became important after the war when people returned to their plantations and coconuts are now used for eating in periods of drought.

Other crops used for the making of drinks are cashew trees producing cashew juice (*mujambane*) and distilled alcohol, coconut and doum palms producing the tapped wine (*sura* and *uchema* respectively), oranges and bananas. Citrus and mangoes are sold by women to pay for education, health, clothes and to save.

The most important market is considered to be Vilanculos, although people occasionally come from other districts for trade and barter.

Constraints to improving agriculture were identified by the respondents of the household survey. As a result of the small size of so many families in Quewene, twenty two percent of families identified the lack of labour for the workforce as the main constraint. The lack of seeds available for planting was mentioned by 16% of families. The 12% of families who identified the lack of arable or appropriate land for cultivating were all from areas that will become part of the Reserve area, highlighting the impact of the project's instructions to cease cultivation. A small proportion (2.5%) of enterprising people living in the south and centre of the sanctuary claimed that the lack of animal traction is hindering their agricultural development.

4.6.4 Natural resource-use: land based products

Grass for thatching and reeds for construction are found on the eastern side of the peninsula on the Maçuale lowlands; Lakes Nhaxil and Macaxe are good for reeds and grass come from the Chilovane lowlands. Women collect firewood from as close to their homes as possible.

Trees and plants are important for the provision of medicines, construction materials, fruit for consumption, and in periods of famine, for the provision of drought foods as can be seen from the table below.

Local plants and their uses

Local plant name	Uses
Madocomela, massala, tichinzo, jambo Tsondzo Matite, mamambe?, mucovele, tikhuri Palmeira brava	Fruit for eating and distilling alcohol Famine fruit eaten in 1950 and 1972 Fruit for eating Making <i>uchema</i> and <i>sura</i> (drinks), fruit (<i>tichinzo</i>), woven goods – baskets, hats, cord and granaries from the fronds. Fish traps (made by elders).
Mitsomuatane, manheho	Flexible thin sticks for weaving and fortifying house construction
Nulo Mwakwane	Pillars of a house in construction, pounding sticks, boats Pounding sticks, building poles, cord, firewood, fish traps and <i>gamboas</i>
Ntsondzo (tambeira/messassa) Canhueiro, mbondjo, chene (chamfuta), tingare and domestic cashew, mafureira and jambueiro	Cord, bark for distilling containers (still) Boat and house building
Cacana Mugova Titsulo Mahanga palm Mitchindzo (tamarind palm)	Canoes for fishing & transport, and for producing alcohol which is drunk, sold and exchanged Cure malaria Grass for thatching Weaving mats Weaving baskets and hats Use pulpy part to substitute maize or sorghum as a famine food.
<u>For Healing:</u>	
Nhambehu Chimbenhana and mabophe Mugahomo Liswa-tima and muhokwe or mugahomo Tambambe, pacama, chinhawanhawane and nhamurecuane Mugahomo, tambambe and pacama Gulula and mumuluco Macalazjile Chilhanhangate Madjassa Manguintes	Removal of bad spirits General treatment for many ills Curing <i>nhocane</i> (convulsions of recently born babies) Treating convulsions including <i>nhocane</i> Mixed for treatment of asthma Mixture of roots for asthma treatment Rheumatism Applied to recently born babies as a 'vaccine' and for rheumatism Leaves are used for headaches. Abscesses Allergies

Xiximbaximbane	Leaves used for treating epilepsy
Kuakua	The root restricts the effects of snake venom
Chiganho	The root is used for bone aches (rheumatism)
Dhladhlagate	Fevers
Tsatsu	To reduce swelling with a deep heat effect
Nhaucare	Ear lesions

Hunting is a traditional activity of the area, and was valued for enriching the diet. Hunting was principally for food before the war, at which time hunters also came from the islands to hunt with bows and arrows and traps. Men used to hunt antelope, bush pigs, monkeys, guinea fowl and hares. The meat was smoked so the women could take it to exchange for fish in the areas closer to the sea such as Marape and Chicucane.

In Machuquele the men’s focus group explained that “medicinal plants are collected by healers to guide the hunters etc. so it is not necessary for everyone to know the plants for healing. These people are here to ensure that mental health, women's health and injuries up to bad fortune/witchcraft are dealt with.” However, although healers have specialist knowledge of plant use, the plants used to treat the illnesses listed above are common knowledge and any community member may use these roots for their health since there are no alternative resources.

The various natural resources for sale include products for construction purposes, alcohol and animals for meat and hides. See the table below for the favoured markets:

Preferred markets for sale of gathered or hunted items

Natural resource	Market location and use
Reeds and grass	Originally Vilanculos and now Quewene (the VCWS development), for construction, though they are bulky and not often transported long distances.
Palms	Make drinks and exchange with the fishermen for fish or sell in Vilanculos.
Fruit of <i>madokomela</i> , <i>massala</i> , <i>tichinzo</i> , <i>jambo</i> and <i>tikhuri</i>	Making drinks for sale in Quewene and Vilanculos.
Animals hunted	Mapinhane, Vilanculos or Mavanza

Frequency of use: Mobility mapping of activities performed within the domestic sphere was traced from responses to the household survey. The most frequently realized activities were identified as subsistence crop production and marine fishing – both conducted on almost a daily basis. It would appear too that marine fishing demands the most distance covered in the daily movements, to an average of some three kilometres, while all other activities on average are carried out closer to the home. Selling crops, collecting firewood and marine fishing at an alternative site are also frequent, being done around five times a week. Freshwater fishing is carried out more rarely (average 4 times a week) and collecting wild plant and wood products may be carried out once or twice a week. The fact that families are used to not travelling very far on a daily basis means that they are also used to being able to

obtain all the resources they need on average within a radius of less than three and a half kilometres.

The time spent carrying out the tasks also illustrates how people organize their lives. See the table below for details:

Domestic mobility profile of frequent tasks and time spent on the activity

Time period	Tasks	Mean time	Minim	Maxim	N
Mins	Firewood collection	31	5	180	120
	Water collection	32	5	420	121
Hours	Roots/medicine collection	2	0	8	11
	Wild fruit /food collection	2	1	5	5
	Freshwater fishing (second priority area)	2	1	4	5
	Building /handcraft material collection	3	0	10	24
	Reed cutting	4	1	12	24
	Cultivation of crops for sale	4	0	24	51
	Cultivation of subsistence crops	5	1	144	103
	Freshwater fishing (first priority area)	13	1	168	22
Days	Fish selling	2.5	1	15	33
	Marine fishing (second priority area)	3	1	7	8
	Barter products for fish	3	3	3	1
	Cane spirit selling	3	1	11	58
	Crops products selling	3	1	11	13
	Marine fishing (first priority area)	5	1	11	31

Fishing areas of greater value are progressively further away from the homes and the time spent fishing is the longest away from home. This may be an indicator of scarcity of appropriate fishing conditions as well as the nature of the activity performed from camps away from home. Most productive and collection activities are practiced daily for less than half the day.

Although the numbers are not high, it is evident from the table below that some families use resources and carry out essential activities inside the Reserve area. Twenty one percent of families living outside of the fence fish from marine and fresh water sites within the Reserve. Five percent of families living outside said they have cultivated areas located in the Reserve, and between five and seven percent of the families living close to the fence line collect water and firewood from within the Reserve.

Livelihood activities performed in the Reserve area by families living outside it.

Activity carried out by families resident outside of the Reserve area	# Families whose activity is inside the Reserve area	% Families affected
Construction and craft materials	0	0%
Cut reeds and grass	4	4%
Cultivate for income	1	1%
Subsistence cultivation	4	4%
Principal lake fishing site	8	9%
Principal sea fishing site	11	12%
Drinking water collection	6	7%
Firewood collection	5	5%

Constraints to natural resource-use as cited in relation to hunting include the lack of game and the sanctuary's prohibition of the activity. The constraints on uses of natural resources

are seen as compounding the effects of the sanctuary's restriction on cultivation within the protected area. One of the focus groups remarked that: "The sanctuary has now influenced it all with its ban on cutting trees and plants, and on burning which makes it difficult to collect some of these resources - but (without fields to cultivate) there is no alternative." People also lamented the prohibition of use of useful roots and leaves for the treatment of common ailments.

Information about prohibited activities is not clear to most people, since they know very little about the sanctuary (around 90% of the surveyed families claimed not to know about the sanctuary's objectives and activities), however imposition of the regulations is enforced by the subsidised local leaders and recently also the game-proof fence.

The greatest constraint to marketing collected products is the high cost of transport - particularly of reeds and grass, which also demand much strength from porters and space.

4.6.5 Natural resource-use: lakes

Most families catch fresh water fish using 3.5 inch nets and lines. The fish are *xibaha* and *tilhavi* (*Tilapia* species) and are used for eating, sale or barter. The market for fish from the lakes is local. They can be smoked, impaled on stakes or traded fresh. These fish are caught by men, young men and sometimes women. Lake fishing is not considered to be an activity that awards status, but simply a means for sustenance – much as the fields are. Fifteen to twenty percent of the respondents in the household survey said catching freshwater fish is one of their principal activities – these represent 32 – 42% of all fishers.

Lake 'Grande Manhale' is very important for fishing, and its productivity and management is the responsibility of one clan. The leader must, together with the *hossi ya missava* perform the ceremonies for productivity, to still the aggression of crocodiles, and each time a new boat is used in the lake for example. Where the sea is considered too far away (20 - 30 kms) as in the south and centre of the peninsula, fishing is primarily from the lakes. The eight most important lakes used for fishing are Manhale, Nhone, Nhawaro, Chivassine, Nhamire, Muaquene, Zevane and Nhamaluko. Many of these are populated by crocodiles and Chivassine reputedly (unconfirmed, but unlikely; the last hippo apparently disappeared a few years ago) with hippo. All require the intercession of the *hossi ya missava* before being able to fish in them.

4.6.6 Marine resource-use

This section should be read in conjunction with the relevant chapters of Part B.

It was recalled that in the 1940s and 50s the dugong was hunted, and it was obligatory to give part of this animal to the *hossi ya missava* as a form of respect. The fact that the numbers of the threatened dugong are still declining may be attributable to the use of gill nets, rather than hunting (see Part B). Fish are now caught by line, net and the traditional stake net or 'gamboa', crustaceans are caught in nets and by hand, and molluscs are collected. *Mbilibiza*, *carapau* and other small species are salted and sold in Vilanculos. Prawns are smoked and

dried and sold in Vilanculos. *Santola* the large estuarine crab when caught is sold in Vilanculos. Prawns are caught with nets of “0 inches”, *santola*, squid, crabs and various fish are caught with nets of 1.5 inches. (The consequences of these actions are discussed in Part B).

Oysters are a great source of food and income to women. Seventy eight percent of marine products are dried or smoked after catching. The table below shows that 49% families surveyed catch marine and freshwater fish, and of these, over half catch the commercially categorised second quality fish and *xibaha* lake fish. The third most commonly fished marine resource according to the survey is prawns, 18% of fishing families pursue prawn fishing.

Fish types caught in the past year and process of conservation

Type of Fish	Process			Total	% Total
	Dry	Smoked	Fresh		
Third quality fish	8	1	0	9	8%
First quality fish	8	1	1	10	9%
Second quality fish	26	2	3	31	29%
<i>Xibaha</i> freshwater fish	5	7	15	27	25%
Small marine crabs	0	0	3	3	3%
Large estuarine crabs	0	0	1	1	1%
Prawns	9	10	0	19	18%
Oysters	4	3	1	8	7%
Total	60	24	24	108	
% Total	55,6%	22,2%	22,2%	100%	

When the sea is within easy walking distance, people tend to use it for fishing. Twenty seven percent of families interviewed in the household survey said that marine fishing was their primary occupation. Six percent carried out both marine and freshwater fishing (16% of families focus on freshwater fish). Families who live by the sea and carry out fishing for subsistence and to supplement their income are distinguished from the fishers who live in fishing camps and practise fishing as their sole or principal livelihood source. The main fishing camps are at Chihunzuene, Chingonguene, Inhamambane on the estuary of the same name, and on the island of Lenene. It is at these fishing camps where the boats and nets are used primarily for catching commercially categorised (1st to 3rd grades) fish.

The two areas mentioned most frequently for marine fishing are Inhamambane Estuary and Vilanculos Bay. Inhamambane is the preferred site (18% respondents) while no-one identified Vilanculos Bay as a site of preference. The latter is said to offer less variety and smaller fish. People in the centre of the peninsula said they do not use the sea to the west of Chiquinine because it “does not offer appropriate conditions: it has plants which make navigation difficult, and fishing with traps requires proximity so the work can be accompanied – and it is distant. The types of fishing are restricted in this area”.

Marine fishing is preferred to lake fishing, the catch having a much greater status because it can be sold more easily at a high price, is tastier, and is made up of different varieties.

Certain locations are preferred above others for fishing and collecting marine products. This can be seen in the table below:

Preferred locations for marine based activities

Type of marine resource-use activity	Preferred locations
Fishing using nets, lines and <i>gamboas (mahule)</i> for rays, crabs, squid, <i>serra</i> and <i>caramulo, mbiliviza, kululwa</i> and <i>maguama</i> . Prawns for smoking and sale in Vilanculos by women. <i>Santola</i> crabs.	Inhamambane Estuary.
Oyster collection	Lenene, Muvavane and Chilonzuine islands
Fish such as <i>tainha, carapau</i> and <i>mbiliviza</i> , prawns (caught with nets), crabs and <i>santola</i> crabs.	Marape area

In comparison to Inhamambane Estuary, focus group participants explained that Vilanculos Bay is only a priority when it is closer to people’s residences and because it is closer to the sale point in Vilanculos. As a result the costs of portering are lower, and control and management of fishing equipment better since the boats and nets are at hand and can be constantly attended.

Fishing, like hunting, is associated with different clans, for example the Inhamambane area is preferred for prawn fishing, and the clan that manages prawn fishing in this area is the Zunguza clan. Different clans were known to be the best fishers of different fish types and charged with this responsibility. Nowadays this practice is much less adhered to.

Focus group participants explained that fishing is carried out all year except from September to October when a partial protection period is observed. During this period only one type of fishing is curtailed namely the use of nets; line fishing can continue. In Vilanculos Bay and in the Inhamambane Estuary fishing is carried out in cycles of alternate weeks in a month. *Mafesso* is the name of the period when they fish. This is when the ‘tide is dead’ or low between 0900hrs and 1300hrs and occurs for about 14 days a month. During *kholote* when the tide is high during these hours of the day, visibility is bad and fish more difficult to locate, fishing is therefore not practiced (see also Part B). Fishing is carried out in a tidal bay (Bay of Vilanculos) and an estuary (Inhamambane) on each side of the peninsula, where according to the focus groups the *mafesso* periods are slightly different in the bay from the estuary. This means that sometimes they may fish in one when the other is not appropriate. Given these demands, families who fish but are less financially stable are the ones who usually break from the activity first.

The *Capitania* or maritime authorities control fishing of certain species of fish and dugong. Transgressors of rules are taken to *Capitania* with their boat, their caught fish and means of catching fish. “Pirates who do not have licences to fish” have been caught this way and their fishing equipment retained until they have bought a licence.

The main constraints to fishing identified by focus groups are bad weather (intense rain), the obligatory protection period to permit the best management and development of the fish for two months between September and November, *kholote* periods, and a lack of materials and labour. Labour on boats is seasonal and payment is generally in fish caught, thus reducing the owners' income from sales. If a fisher has the capacity, during the protection period (Sep/Oct/Nov) he can move towards Inhassoro where at this time they are said to continue fishing. To trade in marine fish in the western and southern areas of Quewene some people must walk 15 - 20 kilometers.

Respondents in the household survey identified the principal constraint to improving fishing activities as the lack of capital (27%) and ancillary problems related to this were the lack of nets, wood for boats and workforce (a total of 18% of families mentioned these).

Over seventy five percent of caught fish is dried or smoked and some is sold in Vilanculos. It is only eaten fresh locally. There are no storage facilities for fresh fish on Quewene hence the need for processing. Oysters and fish are smoked, salted and dried and sold in Vilanculos and further afield such as Chimoio in Sofala province. Prawns and fish are smoked and sold in Vilanculos. Main marketing problems centre on the dominance of the Vilanculos clients over Quewene fishers in the pricing of Quewene fish. Locally this is not the case and the fishers may name their own prices. A second problem is the length of time needed to conclude sales in Kewene, Vilanculos and Chimoio.

4.6.7 Gender: roles, resource access, use and production

Women are generally responsible for agricultural activities and the daily search for natural and agricultural food products with which to cook meals. Matswa men generally have the responsibility of bringing regular economic support to the household. Women are frequently restricted to the private sphere of subsistence agricultural production. This has limited their access to economic power, in comparison to men. In households with market-oriented production of agriculture and fishing the activities are generally led by men, although both men and women are directly involved in many of the productive activities.

Thus men are responsible for clearing the land, building granaries, constructing houses and planting trees, growing, transporting and selling bananas. Women and children cultivate maize, peanuts, sorghum, beans, pigeon peas, cassava, and sweet potato around their homes (*'belekene'* or 'the place where our fields are'). Women plant, cultivate, harvest and transport products from the fields to the home. Women collect water from lakes – the lakes only associated with women's use are considered the less important ones. Plastering mud walls is a woman's activity, as is domestic work and production of handicrafts. Women's productive activities can be carried out with certain autonomy even if they are married; a woman may be granted her husband's permission to control her own corral, plot for bananas or sugar cane

Hunting and honey collection was carried out by men only. According to men, it was they who carried out all income generating agricultural activities before the war. Since then, due to famine and various problems, women have become involved in the area. Frelimo is also

perceived as having contributed to the reduction of taboos and liberalization of previously gender specific activities.

In the use of marine resources it is exclusively men who fish from boats, use lines and nets from boats and *gamboas* in the Inhamambane Estuary. Men explained this by saying, “women cannot handle nets and lines because of traditional prohibitions related to her monthly period which gives bad luck. She does not have enough strength to pull a net, nor skill with a line”. Women on the other hand claimed that they do not fish because they do not have the physical strength or time available away from their work in the home and fields and not because of any restrictions.

Women catch prawns that are smoked and sold in Vilanculos by them. Lake fishing is also open to women. Women were also associated with the sale of pearls from local oysters to outsiders, often visitors passing by in boats. Women often together with their husbands catch fish, crustaceans and molluscs not requiring nets or boats. Women said they sometimes also fish with nets, despite the men’s claims to the contrary. Now that oysters are returning after the 2000 floods they are returning to being a great source of food and income to women. Women recalled the period when the NGO Adventist Development and Relief Agency (ADRA) bought oyster shells for road building in Vilanculos providing an excellent opportunity for income generation. In the south and interior of the peninsula where families are predominantly farmers, fishing is difficult. Women there stated that it was even more difficult for them “since the men also find it a problem”.

Women recounted how they acquire fish from Inhamambane to sell in Vilanculos. Some women are assisted by their children home from school for the holidays, who are of great value because they know the market. With regard to the processing and sale of different products, men are mostly responsible for processing crops and women participate in the sales of these. While the roles are not rigidly separated in reality, generally only women can pound (sugar cane), and usually men distil. The installation of the still is the only task that cannot be performed by a woman. It was said that only old women and widows tend to operate in the distilled alcohol trade. Women make fermented drinks and sell distilled products. Income derived from most of these activities by a married woman is considered her husband's.

Women can sell bananas, but men plant and collect them. With regard to tree crops, mangos are women's responsibility, women produce and sell cashew nuts, men distil the fruit juice that is produced and often sold or bartered by women for fish or flour. Men are associated with the production of goods from the *canhueiro* and the wild palm, while women are associated with trees producing food, and with the sale of the products of the palm.

4.6.8 Resource use in times of stress

Focus groups were asked to recall the periods of crisis and their survival strategies in these periods. The earliest recollections were from 1950/1 when a *chikele* (smallpox) epidemic decimated the population. At this time people used a plant called *phessane* to cure it by covering the body of the sick person with the sap. The person was isolated to avoid contamination, and anyone who had had sexual relations the day before was also prohibited

from visiting because they would cause it to become worse. As such the ill person could only have an elderly woman helper.

There was a famine at this time too called *Chihangane* when people ate the fruit of *tsondzo*, *madokomela* and *massala*. It was recalled that “white people from Vilanculos helped this year with maize, cow peas, peanuts and maize meal.” They also depended on the bulb of the water lily extracted from the lakes called *xitsekele* and from the bush they used the root of *mucovela* for making flour.

In 1970 or 1972 a drought caused many deaths in Quewene. People ate flour made from *mucovela*, and *xitsekele* bulbs from the lakes, or exchanged this for fish, “which they did not habitually eat at that time”. The famine was called *Waundzi tsunha*. It was recalled that many elders were buried alive calling “*waundzi tsunha*” or “you are blinding me”, so that younger people should survive. The name is also interpreted as meaning “put sand over the face” describing those who fainted from hunger being buried alive. It was recalled that during this drought all the lakes except Nhone and Nhambibitswa dried up in the Matsopane area. They also ate the fruit of *tsondzo*, *madokomela* and *massala*.

In 1982/3 another famine forced the people to depend on what they could buy from Vilanculos. They crossed to Vilanculos on foot and then they made long queues for the product they sought because there was not enough for everyone. Solutions included help from ADRA, the *mucovela* plant, fish from Marape, Manhale and Inhamambane, and wild fruits. During this period many people came to Quewene from other areas of Imhambane to settle in the area because of its fishing resources.

In 1987/9 another severe drought which caused Lake Manhale to almost dry up had little effect locally because most people had fled from Quewene with the intensification of the war. Lake Manhale only returned to its normal level with the floods of 2000. (The effect of the drying up of lakes on the water reticulation plans of VCWS development has already been pointed out above)

By the end of the war in 1992 part of the population was in Vilanculos where they survived from selling fish, cutting and selling firewood, and carrying loads. Those remaining ate *mucovela*, fish and shellfish.

Focus group participants commented that droughts, floods, soils that are not fertile or are exhausted are among the pressures they have had to manage in recent years. Famine food they said “is *cacana* throughout the year”. This is one of the few resistant creeper species that is considered a basic food for when one has no other resources. They also mentioned the concept of famine in relation to the lack of a market to sell fish and other products, lack of employment, and lack of a place to store fresh fish.

4.6.9 Informal trade and markets

The lives of fishing families and agriculturists have been linked for years by exchanging goods such as food and labour. Good neighbourliness is grounded in actions taken in food-

scarce periods and barter is practiced from people's homes. Fish is the most frequent exchange product and according to the agricultural families, “the fisherman gains most since he can gain other products”. Labour activities in exchange for products or cash include piece work, pounding sugar cane, and the transport of sugar cane by foot.

A summary of products and labour exchanges in Quewene

Product	Exchanged for
Fish	Salt, bananas, mangoes, cassava and cassava flour, palm wine and other alcohol, labour, cash.
Bananas and mangoes	Coconuts, fish, cash
Clothes and <i>capulana</i> cloths brought from Vilanculos or other districts	Alcohol, cow peas, cash.
Labour in carrying loads, fishing, agriculture	Chickens, fruit, cassava, lake fish, food products from the activity performed, oranges, bananas and mangoes paid for weeding fields.

The results of the household survey show that the internal market in Quewene is dominated by the sales of distilled sugar cane; half the families interviewed trade in the alcohol more frequently than any other product (average of 1.9 times per week). The rest are principally occupied by selling fish (22%) and agricultural produce (12%) on average about twice or three times a week. Despite the interest in the barter trade apparent from focus group discussions, only 3% of families interviewed reported that they carry it out with any frequency.

Before the war, women recounted how they would go to Vilanculos on foot taking three days to sell cashew nuts and use the proceeds to buy soap, clothes and sugar among other essential goods. The journey on foot was prior to boats (dhows) being used for transport from Quewene to Vilanculos.

Commercialisation of produce is still seen as a problem despite the introduction of boats, due to the distance from the production areas to the markets and transport costs. The cost of transporting headloads is high, and the effort arduous. For those living to the south and east of Lake Manhale, they mentioned the necessity of walking right round it; and the concurrent costs of portering to Dombwe on the western side of the peninsula, the only port. A load bound for Vilanculos might cost about US \$4 or more as a headload, this is doubled by the cost of transport in “unsafe expensive boats”, and finally the cost of staying in Vilanculos is also high. As a consequence, the load is often sold as fast as possible in order to return to Quewene. For many people the market in Vilanculos is perceived to be unknown and even hostile. Prices and the demand for different produce are not known before arrival. People said that when they arrive in Vilanculos “we appear to be treated as people who know nothing.” As a result they say prefer to sell in Mapinhane and even Mavanza (on the main EN1 road).

Fourteen trader owners (all men) of small stalls were interviewed and provided the bulk of the information about this type of trade on the peninsula. The average age of these men is approximately 35 years. The most common products sold from between seven and 10 of the

stalls in Kewene are beer, soft drinks, rice, cigarettes, cooking oil, maize flour, sugar and batteries. In about a third of the stalls are sold soap, school books and distilled alcohol. The highest valued items purchased from Vilanculos for sale in Quewene are batteries, sugar, condensed milk, sacks of maize flour and chairs. The lowest valued items resold singly are plastic bags at US \$0.02 each. Sweets, razor blades, chewing gum, boxes of matches are sold individually at US \$0.00 each.

The first of these stalls was initiated in 1996 by a youth of 15 years of age who had made his first million and a half Meticias (currently about US \$67) from working in Vilanculos and moved back to Quewene to set up his stall. This enterprising man now works for the Sanctuary and still maintains his stall operational. He buys his goods in Vilanculos, transports them by boat and porter (or tractor if he is lucky) to Chiquinine where his stall is. He believes that business is improving now that there is more passage of people on the road and more cash. The goods with the greatest turnover he identified as sugar, rice, maize flour and beer. He aims to develop the business by expanding the variety of goods, buying scales and increasing the size of the stall itself, currently roofed with corrugated iron sheets. He plans to install an oven for baking bread, thereby providing in a long-felt need.

The rate of growth in active traders in Quewene appears to be sharply increasing. Seven stalls had been initiated by the end of 1999, four more by the end of 2001 and approximately six more by August 2002. In June 2002 at the time of the qualitative survey the number of small stalls that were engaged in trading manufactured goods in Quewene increased from June to August by at least three, demonstrating a direct effect of the increased circulation of cash due to the VCWS development.

In this period only one of these closed as a result of being swept away in the 2000 floods. Most stalls are located within a family's homestead as a strategy to ensure that there can always be someone available to tend to customers when the owner is absent. This has naturally privileged families living along the north-south road delimiting the western boundary of the Sanctuary project.

Start-up strategies can be seen in the following profile:

Traders's start-up strategies

Number of traders	Start-up strategies
7	Profits from fishing used to buy cigarettes then beer and soft drinks, finally food and distilled alcohol.
4	Capital from the sale of alcohol distilled from sugar cane.
1	Employment in Vilanculos.
1	Other trade.
1	Low investment as yet, sold in open air.

A rapid cost analysis of the products with the highest turn-over, taking into account the transport and portering costs shows that the greatest profits are made on sacks of sugar at an

average profit of about five and half dollars and rice of three dollars. The profit on a carton of cigarette packs is an average of about one dollar and a crate of beer at just less than a dollar. The prices of beer and cigarettes are common throughout the peninsula, whereas the price of rice varies depending on the trader; the highest prices and profits on rice being in Chingonguene and Macaxe/Quile. Highest prices and profits on sugar sales are found in Chibo and Matsopane.

In general, retail prices for goods of the same type from stalls in Quewene are fairly constant between the areas requiring no portering such as Marape and Chihunzuene. Prices in Chingonguene (and sometimes Marape) are high, probably as a reflection of the competition and more available cash. The prices in Chibo, Chiquinine and Machuquele are remarkably similar given that distances to the stalls are significantly different. The portering rates double between 8 and 10-20 kilometres. Average portering and transport costs may be seen below:

Transport and portering costs

	Chingonguene/ Chihunzuene	Marape	Chibo	Chiquinine	Machuquele
Goods transport by boat	<u>Sack of rice / sugar</u> \$0.6-1.7 US, or free on own boat. <u>Crate of beer:</u> \$0.2 US, or free on own boat.	<u>Sack of rice / sugar</u> \$0.4-0.6 US, or free on own boat. <u>Crate of beer:</u> \$0.2 US, or free on own boat.	<u>Sack of rice / sugar</u> \$0.6-0.8 US. <u>Crate of beer</u> \$0.2 US	<u>Sack of rice / sugar</u> \$0.4 US. <u>Crate of beer:</u> \$0.2 US.	<u>Sack of rice / sugar</u> \$0.6US. <u>Crate of beer:</u> \$0.2 US.
Trader's boat passage	\$1.7 US or free on own boat.	\$1.7 US or free on own boat.	\$1.7 US	\$1.7 US	\$1.7 US
Porter in Vilanculos	<u>Sack of rice / sugar:</u> \$0.4 – \$0.6 US <u>Crate of beer:</u> \$0.2 US	<u>Sack of rice / sugar:</u> \$0.4 – \$0.6 US <u>Crate of beer:</u> \$0.2 US	<u>Sack of rice / sugar:</u> \$0.4 – \$0.6 US <u>Crate of beer:</u> \$0.2 US	<u>Sack of rice / sugar:</u> \$0.4 – \$0.6 US <u>Crate of beer:</u> \$0.2 US	<u>Sack of rice / sugar:</u> \$0.4 – \$0.6 US <u>Crate of beer:</u> \$0.2 US
Porter in Quewene	<u>Sack of rice / sugar:</u> 0 <u>Crate of beer:</u> 0	<u>Sack of rice / sugar:</u> \$0.6 US <u>Crate of beer:</u> 0	<u>Sack of rice / sugar:</u> \$1.3US <u>Crate of beer:</u> \$0.5US	<u>Sack of rice / sugar:</u> \$1.7 US <u>Crate of beer:</u> \$0.5 US	<u>Sack of rice / sugar:</u> \$1.7US <u>Crate of beer:</u> \$1.3 US

Stall owners in Chingonguene and Chihunzuine noted various constraints in their clientele made up mainly of fishing families and some sanctuary workers. They claim they are restricted in the product range they can sell because of logistical difficulties and demand. One noted the distance from them “to Quewene” is so great that it is as good as absent in terms of influencing their market. In Chingonguene both the highest and the lowest prices among all stalls surveyed was found. The attitude of the trader with the lowest prices was that there was no point in raising them when all the products available between stalls are the same. On the other hand the highest prices for rice were found here where the stall owner noted that its sale is guaranteed by its demand, even at that price.

The issue of a need for a wholesale market on Quewene where goods can be acquired for retail sale without having to travel to Vilanculos was taken up by all of the traders. One in Chingonguene said that he would become a wholesaler if he had the capital. Others further south saw this as something to be carried out by a third party. Linked to the need to bring markets to Quewene to reduce people's dependency on Vilanculos and increase demand locally, was the mention of the need for someone to initiate a transport service. The costs of porters in Quewene increase the costs of goods enormously. In order to expand their activities all noted that increased capital would facilitate this, four stall holders suggested credit could be sought from family, friends, or wholesalers already being used, four others suggested the sanctuary might offer credit if asked. One mentioned that he had started to get people interested in a *xitique* rotating savings scheme. None of these stallholders had ever received credit before for their businesses.

Another constraint mentioned was the apparently new problem of sanctuary workers not paying at the end of the month for items bought on credit. Some traders said they had debts of up to two or three months with these people.

The worry about the low education levels of those who work for them in their stalls, the application of taxes and difficulties with accounts was expressed throughout Quewene. This preoccupation led one stall owner to suggest a commission be set up to assist stalls with respect to legislation, markets, information, accounts, and to assess the possibility of offering credit to groups of stall owners for products. Others suggested that interventions from the district level or the sanctuary would assist these matters. The case of the owner of one of the largest stalls in Quewene who obtains and sells a wide range of goods from Maxixe and Vilanculos to the people of Chiquinine is due to good business sense, and access to and the use of relevant information.

One of the other main preoccupations among those who manage their businesses on their own is the constant need to make time-consuming journeys to Vilanculos to replenish stocks; this lowers profits and breaks the traders' service provision stream. They all noted the need to improve access to goods.

Another issue raised was making the market in Quewene more attractive to outsiders, particularly if there was a fish market in Chingonguene. It was reasoned by one stallholder that "then people would come to purchase from various institutions on the mainland. This would stabilize the population and encourage them to purchase from local stalls, and others would come from outside to purchase as well". Another stallholder mentioned that awareness-raising among the population to buy locally instead of in Vilanculos would stimulate businesses to improve on their own.

Two of the stall owners in the centre-south of the peninsula were making plans to build bread ovens, bread being seen as a product with very high demand, which would easily bring in profits to repay credit and increase their businesses. The opinions of focus group participants endorse most of the observations by traders about the constraints to the development of trade in Quewene, particularly the lack of a market at which they can sell their agricultural, fish

and collected products. Distance was cited repeatedly and the associated costs of transporting goods to the port at Dombwe to transport to Vilanculos for sale.

4.6.10 Mobility

Historically the people of Quewene have experienced large-scale migrations: firstly evacuation during the civil war, and now, in certain instances, relocation due to the VCWS project. In their day-to-day lives they are highly mobile, walking everywhere as a result of the lack of transport, and using boats whenever journeys involve reaching Vilanculos. Communication with the mainland was historically by land. Women and men walked across the swamps up to their armpits at high tide and tops of legs at low tide to Belane, Vilanculos and Mapinhane.

Results from the household survey show that family day-to-day mobility outside of Quewene revolves around Vilanculos. It is the principle destination for purchasing manufactured goods and selling fish, agricultural products and distilled alcohol. The next most frequent reason for visiting Vilanculos was mentioned as the pursuit of treatment for ill health at the rural hospital (on average twice a year). The frequency of visits to Vilanculos for buying goods (three times a month on average) appeared to be higher and carried out by more people than for the sale of produce (twice a month). This indicates that there is more money leaving Quewene on these visits than there is returning. The findings are probably due to the number of people visiting the town to buy goods for their trading stalls as well as those families purchasing goods for domestic consumption.

It was evident from the survey that the majority of trips (an average of two per month) to sell produce in Vilanculos were for the sale of fish – almost none of this fresh. The second most important reason for visiting Vilanculos for commerce was the sale of distilled alcohol, carried out as frequently as fish sales but by less people. Travelling to Vilanculos by boat requires money and reasonable weather. These were the two most cited reasons for impeded travel. Health was the third most cited reason for travel impediment for trading reasons.

Other destinations for the sale of dried fish cited include Chimoio and Massinga. Many more destinations were mentioned for the specific reason of family or socially motivated visits which almost every family carried out between twice a month and twice a year.

Children in Quewene only have access to two first level primary schools in Chibo and Machuquele. All schooling above this level is only offered in Vilanculos. Children walk to school if it is up to five kilometres from their homes, more than this and they generally have to stay with local families. The main external point of reference for youth interviewed in Quewene, is Vilanculos but some had also been to Beira (about 550 km by road from Vilanculos and the second biggest city in Mozambique)

Health-seeking strategies of people in Quewene involve local healers, churches and plants at the first level, and only when all else fails and the patient is gravely ill, is he/she taken to the rural hospital in Vilanculos. The hospital in Vilanculos is expensive to reach and be treated in. Some medicines are sold locally, acquired by the local health agent or purchased

informally in Vilanculos. Old women mentioned how difficult movement is for them and this is why they plant healing plants close to their homes and fields so they can treat themselves easily. If they cannot resolve their own problems they seek help from their neighbours, a traditional healer, or the Zionist Church. Traditional healers or churches are favoured because of their approaches as well as their being the closest solutions. From Lake Manhale south people in need of health service assistance must walk or be carried to Mapinhane approximately 30 kilometres inland, or to Vilanculos. This situation will be greatly improved by the imminent opening of the grade 3 hospital near Lake Manhale on the border of VCWS..

Use of forest resources has been constrained because of prohibitions imposed by the sanctuary. Although people are unaware of exactly what will happen when animals are introduced into the fenced in area, some are beginning to realise that they may lose their access to Inhamambane Estuary.

4.6.11 Employment

The only opportunities for employment in Quewene were for many years the informal arrangements among community members for selling their labour for fishing or agriculture. Employment has been sought in the hinterland, Vilanculos and the islands in the past and particularly during the years of refuge during the war when piecework was sought by families with no other livelihood source. Only since the advent of the VCWS project has the opportunity of employment in the location become a real possibility. Since its initiation the sanctuary has, according to the policy of preferential employment, provided the major proportion of its employment opportunities to local people, so that in August 2002, 163 people from Quewene were employed, 21 from outside of the peninsula, and 16 foreigners (all involved in specialised tasks). Of the total number, 109 were working with contracts and the remaining ones were seasonal workers carrying out short duration tasks such as fence construction. It is well known in the Vilanculos / Inhassoro area that the sanctuary offers better salary conditions than most of its competitors; as a result, the quality of staff recruited from outside of Quewene is good.

Despite this positive reality, there is a concern among communities living further away from the sanctuary management centre in the northern part of the peninsula, that the processes for obtaining employment does not provide equal opportunities to all residents in the sanctuary. There is a well-formed opinion that only by 'knowing someone' is employment obtained and that this may also be facilitated by contacting the foreign 'employers' directly. People also complained that the sanctuary promised to prioritise employment of women and demobilised soldiers, which they do not see happening.

In order to address this real or perceived problem, the President of the Locality has been involved in identifying people to be employed and a list was submitted to the sanctuary. It is not clear if the list is or was used at all. Although sanctuary administrative staff explained that a quota system is being used to ensure groups are recruited from all Circles, this is not evident to the community. No communication concerning concrete employment opportunities appears to have been provided publicly, thus groups in meetings are still able to cite claims such as "in Chibo only one person works for the sanctuary, and this is the son of

the Circle Chief'. This problem will be dealt with during the deployment of the consultation plan (see Part H).

4.6.12 NGO activities

Focus group participants in Machuquele said they think their lives will be improved with the construction of the health centre, and that it will be easy for them to use. This is being constructed by the Catholic Church, German Agro Action and the sanctuary. Further north, in Marape and in particular in Chingonguene and Chiunzuene families do not perceive that the health centre will be of any use to them, it being too far away. Outside of Machuquele, few people know the names of the organisations assisting in the construction.

The only other NGO remembered for its positive influence in Quewene is ADRA, an NGO based in Vilanculos. ADRA provided food to the peninsula during the most recent droughts and floods, and it also provided a lucrative market for oyster shells for the construction of roads in Vilanculos town in the early 1990s.

Some of the churches in Quewene carry out community development activities, such as the Catholic Church. The Jesus Alive Mission plans to carry out activities to help improve the nutrition status of school children.

4.6.13 Water supply and electricity

There is no public water supply infrastructure on Quewene aside from the one lined shallow well at Chibo School mentioned above. There is no electricity infrastructure on the peninsula either. There are plans and a feasibility study produced for the provision of electricity from the gas supply on the mainland to the sanctuary. This should have benefits for some parts of the community. One of the highest community demands for electricity is for refrigeration of fish. Refrigeration facilities will allow for better management, and raise the value of the product in Vilanculos. Freezing facilities are envisaged at the community market at Goshen.

4.6.14 Public services

The only public social services in Quewene are two first level primary schools in Chibo and Machuquele and the abovementioned health centre at Machuquele. Chibo primary school has 321 children enrolled and three teachers. In Machuquele the primary school which was started in 1963 has four teachers and 400 children who attend in eight rotas of 50 children each. Both schools have three classrooms each made of local materials in a very bad state of repair. Prior to these schools the only opportunities for going to school were in Mapinhane on the EN1 main road and Vilanculos.

Since Independence the churches are thought to have helped in providing education, and in fact there are at least three informal community schools in Quewene run via different religious groups (including Velhos Apostolos Church community school in Marape, and a Methodist community school in Manhale).

There is a routine vaccination campaign in Quewene organised by the District Directorate of Health three to four times a year. In 2002 it has had the support of the Sanctuary in transport, food and accommodation in the Circles of Matsopane (Marape), Chibo, Chiquinine, and Machuquele.

There are no other public services on the peninsula. The private development of the sanctuary is likely to impact on the areas that should be covered by government public services.

CHAPTER G5: SOCIO-ECONOMIC IMPACT

5.1 BACKGROUND

The following assessment of social impacts will cover direct and indirect, long- and short-term, individual and cumulative impacts over the life-cycle of the project. These are organised in thematic areas to permit discussion of local livelihoods and social systems prevalent in the Sanctuary project area.

Scenario One: No project

The trends of a no-project scenario are difficult (and hypothetical) to comment on because of the advanced stage of construction and resettlement that has been induced by the project at the time of this SIA, the effects of which are already felt throughout the sanctuary area in different ways.

Scenario Two: Project 'as is'

The impacts described of the current scenario of a fenced-in Reserve area of approximately 8 500 hectares with v-gates permitting access by communities, and the example of Phase I of the resettlement programme with relocation conducted to Marape area in Matsopane Circle.

Scenario Three: Expansion of the protected area

Once the fence has been moved to include a larger Reserve area (which will have to happen because the current fenced area is not large enough to harbour viable populations of herbivore species), it is unknown how many more people will be affected in the absence of any census data. If the v-gates in reality do not permit access to the Reserve because of the dangers posed by the wildlife, then the intensity and scale of negative impacts will also be changed.

Analysis of scenarios

Overall, a no-project scenario would probably have included the following significant longer-term trends:

- Without a protected area, natural resources would suffer unsustainable depletion as their use continues without any substantial form of control.

- Public services would be unlikely to improve rapidly since Vilanculos District on the whole is underserved and has priority areas with much easier access and much higher population densities.
- The continued service developments promoted by the Catholic Church would probably be of a smaller scale than has been possible by the collaboration with the project.
- The peninsula population would not be able to achieve any substantial socio-economic development without some kind of external assistance, and in the absence of this would continue to be highly vulnerable to disease, malnutrition, weather excesses and gradually reducing availability of local subsistence and income resources.
- No resettlement would be necessary, which would remove the stress induced by this.
- Without a protected area communities would be more dispersed through the peninsula and with their normal use and constraints to expanding development, would put less pressure on resources for a longer period than with the project in place.
- The Sanctuary project is authorised, has already invested significant time and effort, and plans to invest money in the development of the area. As a result, the no-project scenario is not considered further in this report.

Due to lack of information it is not possible at this stage to assess the scope of social impacts likely in the third scenario, except to note that the density of settlement will rise with every new family relocated, progressively increasing the risk to the whole community of land use cultivation becoming unsustainable. It stands to reason that a follow-up analysis of Scenario 3 will need to be undertaken as soon as the missing information becomes available.

Scenario 2 is discussed below, and the socio economic impacts of this scenario are analysed.

5.2 SUMMARY OF KEY ISSUES

Key issues can be grouped according to three general categories: those affecting access and use of resources, those with implications on the sustainable use of resources, and lastly social issues. The following list of key issues includes those with the most important impacts that may influence the social and economic development of the communities living in the VCWS area:

- The isolation of the Chingonguene fishing community (in the far north-eastern tip of the peninsula) from the rest of the peninsula, and the loss or changes in various social and economic relationships with the people living in the sanctuary on the south-western side of the protected area, will undermine their socio-economic development.
- Potentially discriminating competition for natural resources in the Marape resettlement area. The lack of transparent planning and clarity about available land and poor communication between the project and communities could trigger this negative impact. It should be noted that a total of approximately 146 hectares of land suitable for cultivation would be the lowest possible requirement for land-for-land based compensation of the approximately 81 families who need to be resettled. Household survey results indicate that for the same number of families and including

cultivation, pasture, residential and fallow land, an area of approximately almost 270 hectares would be required:

- The real risk of cash compensation to the resettling families not being used for longer term livelihood restitution reducing the capacity of families to regain their former living standards.
- The unsustainability of community use of natural land-based resources since the population density is already three times higher than the recommended carrying capacity for this type of land and climate.
- Widespread lack of understanding about the objectives and implications of community involvement in the sanctuary project which may ultimately impede sustainable management of land and marine resources.
- Loss of access to the Inhamambane Estuary for fishing by a proportion of the population of Chibo (and some other areas) will affect their livelihood strategies.
- Potentially uneven development in the sanctuary between regions, communities and families due to limited capacity to facilitate community development may ultimately contribute to the deterioration of lifestyles and socio-economic status for some families
- Women's participation (and that of their younger children) in the benefits of development is dependent on their uptake of opportunities presented to them. If no special efforts are made to target women specifically in agricultural and fishing improvement activities it is unlikely that change will be positive.
- The direct impact of employment of local people in the project is the rising level of money in circulation on the peninsula. This is positively stimulating local trade and will have the capacity to catalyse development with positive results in the longer term.
- Improvement of markets, marketing systems, production systems and transport will be likely to undermine the current demand for goods and services from Vilanculos, thereby inverting the power balance in the economic relationship between the two areas.
- The supply of electricity to the peninsula combined with the increase in money circulating among the population, should be significant catalysts to increasing the value of caught and refrigerated marine products and thereby the livelihoods of most families in Quewene (However, this needs to be balanced against the already unsustainable level of use of marine resources, as pointed out in Part B).
- Community competition for productive resources will be augmented by the project's additional demands for these same resources, thus increasing the potential rate of their depletion.
- Widening of the social distance between communities and their leaders due to perceptions and actions reinforcing these, that the leaders are instruments of the project rather than representatives of the communities. This will reduce the opportunities for community ownership of project developments in the longer term.
- Women's vulnerability to being marginalised from the benefits of the project's community development activities as a result of their being excluded from the formal communication process.
- Lack of trusted communication channels for the communication of grievances. The impeded flow from families being resettled to the project and back means that some

important issues that could help the project to better carry out the resettlement and compensation processes are suppressed.

- Compensation for the loss of cultural heritage on the part of the *hossi ya missava* Uantene Singo.

Each of these issues is discussed in detail in the following sections.

5.3 SOCIO-ECONOMIC IMPACT

Background

A significant expected outcome of the Sanctuary project is the improved socio-economic status and stability of the resident population. For this to occur, local communities will be involved in conservation and management activities that ensure the sustainable use of the resources in the area (refer to the natural resources plans in Part D). Among expected direct benefits will be:

- employment opportunities for approximately 275 (and maybe as many as 350) local people during the construction and operational phases of the project;
- improved health, education and agricultural practices as a result of community capacity development interventions, investments in infrastructure and public services;
- investments in community development as a result of income derived from eco-tourism activities.

It is thus expected that although around 86 families may have to be resettled to outside the Reserve area, that these people and the host communities will be among the first to benefit from the capacity development and in the case of relocated families, compensation packages. The involvement of the community of Quewene in managing resource-use inside and outside the Reserve area is a long-term goal; it will be facilitated by the creation of structures for community participation in management decision-making (co-management; see Part C) and by capacity development in all areas of group organisation for development.

5.3.2 Impacts on the family and gender issues

Of the total of approximately 1,036 families (estimate pending the results of the census) living in the Sanctuary's 22,000 ha terrestrial area:

- at least 86 families are directly affected since they are or have been living inside the Reserve area and are included in the resettlement programme;
- an unknown number of families in the host population will be affected by reducing their land size by ceding it to the families being resettled;
- monetary compensation is likely to benefit men in families more than women, given the customary dominance of men in decisions over use of money;
- employment of local men and women by the sanctuary will be likely to change relationships within their families, and increase the employability of people who learn skills;

- employment of people from outside of Quewene may affect social relationships with co-workers and others;
- representation of the OMM, and thereby women's interests on the Project Steering Committee and the Community Affairs Committee, will affect the way women are involved in the VCWS development project;
- women's position at the end of the communication line from leaders through husbands and brothers makes them vulnerable to misinformation or no information about the changes occurring due to the sanctuary's development programme.

Taking these points individually, the actions and impacts are analysed below:

Resettlement:

The Sanctuary aims to remove all families living inside the Reserve area and to resettle them in a location of their preference. The sanctuary is promoting resettlement in two areas at present, Chihunzuene / Chingonguene, an area four kilometres east of where some fishing families were previously living, and Marape for all the remaining families. Houses are being built that are of better quality than previous or existing residences and in Marape they have chosen land on which to cultivate.

Sixteen families have so far been relocated and are satisfied with their new situation. Access to land for cultivation is based on their use of customary methods for negotiation and acquisition of rights where necessary. This may result in unequal opportunity for all families, particularly for women and access restriction due to increasing the density of settlement when others also move into the area. The problem will grow more acute with the passage of time as the pressure on land resources rises naturally as the result of a settled population. This may cause stress and alienation between families, particularly since a number of men identified their fears of moving on the basis of the need to begin negotiating a new life with new neighbours etc. they do not know.

The fishers' way of life in Chihunzuene / Chingonguene is mainly focused on fishing and selling the products, however they do depend on economic and social relationships with members of their own and other families elsewhere on the peninsula. These are likely to be curtailed when the protected area effectively isolates them from land access to others on the peninsula.

The idea of living in a 'village' or *aldeia* in Marape has connotations of the communal village settlement programme enforced during the socialist era, and families have already expressed concern that they would prefer not to live in a 'village' settlement as a result. This confusion will undoubtedly be clarified as more people move to the area and the notion of it being forced is reduced, given the VCWS objective of facilitating families living in the area of their preference.

Natural population growth will double the population in an estimated period of 25 years. A larger young population will increase the pressure on the search for labour and economic activities. This may increase the income per capita at household level, and therefore improve

the poverty situation for some. On the other hand, it will augment pressures on land and the social pressures of people living closer to one another than is customary.

The consequences of living in a more densely populated area for the first time will probably be felt by women in particular. The concept of '*belekeni*' is based on the notion that a woman's fields are arranged around her home, and that the joint image of field and home are contained in this one word. It is important because it is one of the spatial organisation mechanisms customarily ensuring that homes close to one another are indeed from the same clan / family and are trusted neighbours. If resettlement houses are located in clusters, the area around the house where women customarily cultivate will be reduced, and women will have to depend on the arrangements made between men to identify additional farming areas. As long as families can choose, with assistance from the sanctuary (to consider potential needs for the future) they should make sure that they are located in areas that satisfy their needs to establish '*belekeni*' in the new place. The less powerful will always be at risk of losing out, if the process is not transparent and supportive.

Ceded land:

The current practice of resettling on land ceded by the host population reduces the land available to host families for cultivation in the future. The land size referred to in quantitative terms will only be available after the conclusion of a survey currently being conducted by the project developer. This will identify land ownership according to customary rights and the amount of land available for resettlement.

If the available land area in Marape is limited (which is probably the case) and linked to the nutrient-poor white sandy soils, host and settler families may not have enough space to practice an appropriate crop rotation cycle, soil fertility will deplete, productive capacity drop and crop production will not meet expectations nor demands. This may result in the need to resort to off-farm income generation and the consequent dangers of low income, poor health and increasing poverty.

Compensation:

Compensation for families being relocated is partially in-kind, with housing and land provided; partially in cash to compensate for losses of livelihood sources from agriculture and fishing; and partially in a kit to assist families to start up their lives in a new area. The kit consists of domestic utensils and equipment that will benefit men and women directly.

Compensation in monetary form is handed over to men during the process of resettlement. The plans for the use of this money in an area where people are not used to having large amounts at their disposal will depend on the habitual relationship of the family members, and perceived priorities of needs. The risk of families not using the cash to restore their livelihoods was underlined by one of the household heads scheduled to be resettled. He stated he would use his cash compensation to buy a double bed, a radio, clothes, some pots and pans and the rest he would use for drinking. This family has a boat moored close by that requires replacement of some of its wooden structure. If this was rather done, it would

increase their capacity to improve their livelihood base – but the cost would take up most of the family's compensation. The household head preferred the more immediate improvement to the family's lifestyle. Women's influence over how cash compensation is spent will differ with each family but in general she and her children are likely to benefit less from the cash compensation in the short and long term.

Local employment:

Employment by the VCWS will provide men and women with skills to improve their lives through further employment opportunities with the sanctuary, or outside of the area. They may also secure skills that help them to improve their way of living in terms of health and hygiene, construction skills and food preparation. Income derived from employment is likely to benefit families in the short and long term, both economically and by improving their social relationships with others as a result.

Potential negative impacts may include creating dependence on salary incomes by reducing agricultural and fishing activities by other family members. A family's independence, food and social security may all be put at risk by any of them stopping these activities. Overall a family's risk-avoidance strategies are based on a diverse range of livelihood activities so that failure in one may be compensated by others. When family members stop contributing to the family's livelihood, whether they are the salaried or not, the impact on the other members is significant.

Employment of strangers:

To date people employed by the Sanctuary have very little contact with families outside of the workplace. With the initiation of the eco-tourism activities this may not remain so. People employed by the Sanctuary from outside of Quewene are generally in positions requiring greater skill levels. The positive impact of their employment in Quewene is their capacity to transmit skills and knowledge to local people.

The potential negative impact is in their relationships with local men and women whose status is generally perceived as lower, and the potential for dealing with local people without considering the longer-term implications. This includes non-transparency in the selection of local people for employment; the purchase of goods for use by the sanctuary based on convenience (proximity and price) rather than equal opportunity; lack of adequate explanations about the way employment systems function causing confusion and feelings of injustice on the part of locally hired or dismissed people; and the potential for local women and girls to become involved in relationships that are not socially sanctioned. Raised levels of promiscuity, whether perceived or actual, will generally result in social conflicts.

Marginalisation of women:

Women in the community may be marginalised from the benefits of the VCWS project if they have inadequate representation. Representativeness may be assessed based on the frequency and openness of two-way communication between representatives of the sanctuary

and women in the community. The involvement of the representative from the OMM in a decision-making body concerned with project development will have the major benefit of providing a mechanism for potential transmission of information to all areas through the OMM secretaries and through the churches where women are significant adherents. The age of the current OMM representative is an advantage in terms of her gaining the respect of others, and a disadvantage as she herself has claimed, due to having less physical capacity to walk long distances and assist in the organisation of activities; she is also unable to read and write. This may limit her capacity to systematise the information she receives and passes both to the sanctuary and from it, to the community.

Consultation with women community members in the sanctuary identified their general isolation from information and activities related to the project. They had very little knowledge about the objectives of the project, and the reasons for its activities. They did however show optimism, not shared by the men so widely, that the sanctuary project would somehow benefit the community.

Women's marginalisation from decision-making and indeed any information about the project will negatively affect the women and the project, both becoming the poorer for the experience. However while men are there to speak on behalf of women, there is every risk that women's lack of participation can be overlooked for longer.

5.3.3 Resettlement related impacts

(1) Background

Sixteen families from inside the Reserve area have already been resettled to Chihunzuine /Chingonguene and Marape. There remain approximately 62 families to be resettled from inside the Reserve area as it is currently defined by the existing fence line. This fence will be extended to the south to include a larger area prior to the introduction of wildlife in 2003. The scale of the final resettlement programme is thus not yet known, but it will obviously be bigger (scenario 3) than the current scenario 2 predictions.

Forty seven simple houses were constructed for the twenty four families who have been moved, in areas of their selection. The main relocation site at Marape was identified by the sanctuary together with local leaders. This site is already occupied by host populations, and while there is 'free land' there for settlement, the areas of greater agricultural potential in Marape are generally owned by families already, and have to be ceded according to traditional methods to the new settlers. This has already begun, and competition for the same pieces of land has already been encountered due to prospective settlers also contacting owners to cede their land. The second relocation site is in Chihunzuene on the northern edge of Chingonguene, on a piece of high land close to the previous residential area of a group of fishers who were moved.

The families that have been relocated have been compensated in kind with houses and space for farming (though the latter has not been explicitly defined with the sanctuary, rather it has been left to the discretion of the families to make their own arrangements in their areas of

settlement). Families have also received cash compensation for their lost tree crops and lost access to products from cultivation that has been prohibited in the protected area since 2001. Following the prohibition on cultivation the sanctuary distributed maize flour to all affected families based on a monthly allowance of 50kg for every three members of a family. The distribution however was not very regular and logistical difficulties are among the major constraints. Some families complained of never having received maize meal; that it all goes “to the chiefs”.

Families’ cultural property was also accounted for, insofar as the minor costs of the ceremony of transference of the spirits were supported by the project for all families. Interestingly only 36% of families interviewed in the household survey identified possession on their land of a sacred place such as a tree or small thatched house where their clan ancestors are supplicated. Strictly it should only be the transference of these cultural values / spirits that require project support, and ceremonies should not be required for all families.

Settlers’ attitudes towards their chiefs are generally negative based on the lack of information received about the sanctuary’s intentions and plans. They complain of insecurity as a result of this, and they worry that the chiefs are benefiting somehow, at the settler’s cost.

Experiences of negotiations with the first group of settlers demonstrated to the VCWS authorities that negotiation between the sanctuary and the individual families was not easy given the variable understandings of the value of their property, and resulting in enormous variation in final figures. As a result a new negotiation team is being constituted that involves members of the district government and other interest groups such as political parties. This is an effort to ensure justice is served and that the interests of the families are seen to be protected.

Families being resettled in Marape are all participating in an awareness raising and initial learning phase about improved agricultural techniques, particularly permaculture, the initial phase lasting approximately ten days.

Key issues related to the impacts of the resettlement process include:

- the process for identification and acquisition of land for cultivation by settlers is not clear, leaving settlers to negotiate their own space with host communities;
- poor communication between the sanctuary, leaders, settlers and host communities resulting in those settlers with initiative obtaining the first and best options on land and settlement conditions;
- lack of guidance and support immediately following settlement to assist families as to how the space around them will be used;
- large amounts of cash compensation being handed over at the risk of this having a short rather than longer term impact;
- the process of consultation needs to be improved so that two way communication flows facilitate the following issues:

- the need for clarification together with families about the impact of alternative farming technologies in reducing the amount of land required for farming per family;
- the need for clarification to families about assistance available to them to re-establish their livelihoods and whether preferred employment is an alternative for these families;
- for the compensation and the resettlement process, trusted communication channels between families being relocated and the sanctuary must be available to communicate grievances which many people expressed. These issues are important and include:
 - confusion about the permanence of their relocation to the ‘village’ areas; some people consider it a temporary stop while they look for more permanent sites that satisfy them;
 - dissatisfaction with compensation amounts, and the process of negotiating these which give the final decision to the sanctuary and not the property owner;
 - timeliness of relocation, and information to help families understand the process involved;
 - the expressed need to have more community meetings to learn about the general process of resettlement, their roles and expected benefits to compensate for their loss of livelihoods, as well as the idea of the changes required for living in a more densely populated ‘village’ area, and the implications of this;
 - expectations of prospective settlers that they benefit from houses, land for cultivation and pasture, improved water supplies, employment when they have no other sources of income and that they can select where they want to live definitively.
- Uneven documentation of the resettlement process, particularly the gaps that are evident in the 2002 part of the process, and incomplete information about the land availability for resettlement hinders understanding and hence decision-making and planning in a more participatory way.

It is well known that the risks of inadequately planned resettlement, particularly for families moving into more densely populated areas than they ever have before, are that in fact people are unable to regain their livelihoods rapidly, and that some families may end up worse-off than they were before. Key areas to watch out for are creating landlessness; the loss of families’ or clans’ cultural space and identity, or cultural impoverishment; economic and social marginalization; increased morbidity and mortality often as a result of more dense settlement patterns; food insecurity from reduced self-sufficiency and the need to change local arrangements for food supply; loss of access to common property such as woodlands, water bodies and grazing lands that may cause livelihood deterioration; and finally social disintegration as a result of changed community structures and social organization and changes in informal networks and relationships that undermine and impoverish the people (Cernea 1997).

(2) Policies, legislation and procedures

There is no legislation in Mozambique that directly covers involuntary resettlement. In this respect most resettlement procedures undertaken to date by private / public sector development initiatives that have required resettlement of rural families, have generally followed the World Bank's OD 4.30 on Involuntary Resettlement (see Part C).

However in addition to this:

- The Land Law 19/97 provides the basis for defining affected people's land use rights.
- Compensation for losses incurred as a result of relocation does not have any official guidelines other than the basic compensation tables produced by the Ministry of Agriculture and Rural Development covering the minimum values attributed to various tree crops.
- In 2000 MICOA produced the Criteria for Resettlement of Populations in Rural Areas that were aimed to facilitate the process of resettlement after the floods.
- For the provision of infrastructure and services for resettled populations, relevant national technical laws and regulations would include:
 - The Water Law (16/91), National Water Policy (1995) and Social and Technical Implementation Manuals (2002/3);
 - Technical specifications for the construction of health units from GACOPI, the Office for Coordination of Public Investments of the Ministry of Health;
 - Technical specifications from the Planning Department of the Ministry of Education;
 - Quality control for all other construction of public utilities should minimally follow standards used by the Provincial Directorate of Public Works and Housing.

It should be noted that all Mozambican guidelines point to the importance of involving the Local Administration (District level and below) in the process of resettlement to ensure it is locally appropriate, and so that government personnel may learn and apply similar procedures to other instances of resettlement in their territory.

The IFC Handbook for Preparing a Resettlement Action Plan (RAP) of 2001 is probably the most significant guideline for this SIA and the subsequent RAP and was used extensively.

(3) Methods used to assess the scale of resettlement

Implantation of the sanctuary project involves the physical relocation of people resulting in their loss of shelter, productive assets and access to productive assets to various degrees. In IFC terminology, this is considered *physical displacement*. In addition to physical displacement, there are also families affected by *economic displacement*, the results of actions which interrupt or eliminate their access to productive assets, although they themselves will not be physically relocated. The IFC's involuntary resettlement policy is designed to ensure that people who are physically or economically displaced as a result of the

project are no worse off than they were before. The additional potential of the sponsor to provide means of restituting livelihoods should in fact result in their being better off than they were before.

In order to assess the degree of impact on livelihoods the peninsula may be divided into three geographic areas in which communities live:

- *Impact zone 1:* Inside the Reserve area, which is presently game-fenced with access in areas where there are settlements or major paths, via game-proof v-shaped gates. This area covers approximately 8 500 ha.
- *Impact zone 2:* Outside the currently-fenced Reserve area but within the Sanctuary’s authorised land area, approximately 14 000 ha.
- *Impact zone 3:* Outside the Sanctuary, from Chicume south to Machuquele, an area of approximately five kilometres wide bordered to the west by the sea and swamps (approximately 4 000 ha.).

The fence line separating the first two zones is not in its final position. A decision with regards to the final placement of the fence and thus the eventual extent of the Reserve area will need to be taken shortly. *This SIA only deals with the scale of impact in relation to the present fence alignment, and an addendum will update the information once the final alignment is decided.*

The estimated number of people presently affected by the project may be categorised as follows:

Categories of project affected families

Impact Zone	Description	Total Families Affected
I.	Families living in the Reserve area.	62
Full physical and economic displacement.	Families already relocated to Marape and Chingonguene.	16
II.	Families relocated from Goshen to Marape	8
TOTAL - Physical & economic displacement		86
Partial economic displacement	Fishers and families who fish & practice agriculture from Chibo (Nhaxil, Quile and Manhale) and Matsopane losing access to Inhamambane Estuary.	~124
III	Fishers and families who fish & practice agriculture from Chibo (west of the road) losing access to Inhamambane Estuary.	~10
TOTAL		Maximum 220

Until the results of the census are analysed the number of families affected by partial economic displacement (zone II) in Chibo is estimated based on existing population figures from the Local Administration and the results of the household survey. The census will not include families outside of the Sanctuary. The partial economic displacement (zone III) noted in Chibo is the result of a focus group discussion on the west side of the road, hence the

figure of affected families has been estimated. In this area the elders and women use Vilanculos Bay while the young men travel on foot all the way to Inhamambane Estuary. Men from this area (and women who fish for prawns) move to fishing camps on the Estuary during the *mafesso* periods of the month.

The physically and economically displaced households in impact zones 1 and 2 are, or will all be relocated and compensated for their losses. Some of the partially economically displaced households of impact zones 2 and 3 will lose direct access to one of their main fishing resources. The alternative fishing area is around Dombwe in Vilanculos Bay. This is distant from the centre of Chibo and is, according to the fishers, less well endowed with fish than the Inhamambane Estuary.

(4) Updated list of affected families and population estimates

Details of the numbers and losses of affected families have not yet been identified but should be available early in 2003.

The present SIA updates the interim RAP prepared by the project containing information on 12 households to be resettled, and augmented in February 2002 with a Special Report on Procedures and Progress with the Resettlement Programme. The progress report covers the following:

- An outline of the settlement process up to February 2002;
- Original hand-written records in Portuguese and in English of community consultation meetings for data collection concerning assets and income. They trace negotiation of agreements on compensation from September 2001 to mid February 2002;
- Thirteen signed resettlement contracts with hand-written addenda identifying compensation details (one household has three separate contracts made with the woman household head and her two married sons, and one contract is missing from the report);
- Social survey data and assets inventories for eleven households to be resettled (Social Survey, October 2001) and,
- Reports from the district authorities monitoring and facilitating part of the negotiation process.

Currently, an assets inventory collected by the project exists for 24 of the total 86 households estimated as involved in the resettlement process.

- The total figure of 86 is the sum of the 24 families already relocated and the 62 families counted in a rapid estimate by the project who are still living in the Reserve area. The estimate of families living in the protected area is based on the beneficiary lists for maize flour distributed to families due to be resettled verified by the zone leaders of each area.
- The socio-economic assets data was collected between 29.09.01 and 05.05.02.

(5) Location of resettlement areas

Resettlement areas are located in Marape and north of Chingonguene. Affected fishing families from Chihunzuine were relocated to a clustered settlement north of Chingonguene. All other families are to be relocated to Marape in an area authorised by the Circle Chief and the President of the Locality.

Resettlement north of Chingonguene is for fishers that were living on the head of Mazarette Point in fishing camps. They have moved approximately four kilometres east in order to make space for an approved private residential development. No cultivation of any fields is permitted in the area. The residents keep goats and other animals however. Fields owned by at least two of the settlers are located in Marape/Matsopane area. Although access will remain using v-gates, the freedom to move easily will be reduced when potentially dangerous animals are introduced into the Reserve area.

In Marape, families using marine resources have been relocated in areas of their preference closer to the sea. The actual dimensions of the resettlement area in Marape are not known. The project is in the process of establishing this. The resettlement area has a host population, also of unknown numbers, and 'owning' an unknown quantity of terrain. The area of land required for settlement, cultivation, fallow and pasture in Marape may be 267 hectares or more (based on current numbers with no population increments included; see above).

It is not possible to estimate responses to any of the key issues below however, due to the lack of information:

- What is the potential density of the settlement area and what are the implications of this?
- Is there is enough space for resettled families to carry out their farming activities as they did customarily?
- Will they have to farm smaller areas and therefore adapt their livelihood systems to include off-farm production?

Marape lies adjacent to the community development centre at Goshen, and close to the market centre that will be rehabilitated and made functional once more. The soils are nutrient deficient white sand and in some instances compare unfavourably with the areas that had to be vacated.

Marape is close to the sea, and to the port that will be developed at Goshen. Although it is more distant to fish for sea cucumbers for the two affected families who are sea cucumber fishers, and more distant to Vilanculos Bay for some of the fishers who lived closer to the sea previously, it is in an area that will be strategically advantageous for marketing produce. The challenge will be to grow marketable produce in the poor soils (see the agricultural sections of Parts B and D).

(6) Public consultation and attitudes towards the Project

Recorded meetings on the peninsula with the aim of public consultation may be characterised in four forms:

- Public meetings with government and VCWS management / directors present to create awareness or address a specific plan (four in 2001/2).
- Individual meetings carried out between the sanctuary and families scheduled to be resettled to assess and negotiate value of property for compensation (127 in 2001/2).
- Community meetings carried out to create awareness about the sanctuary project and the resettlement programme carried out by sanctuary staff (10 in 2002).
- Focus group discussions carried out throughout the sanctuary without the presence of Sanctuary representatives to provide input for this SIA (27 in 2002).

An unknown number of unrecorded meetings also took place. Sanctuary staff held meetings together with local leaders and the latter were held responsible to pass on information. In the areas where resettlement must occur, at least some meetings were recalled by the people in the process of being resettled, however, these were one-off meetings. Indeed the people being relocated were some of the most critical of all of the lack of leadership, communication and assistance from the leaders, to the extent that the resettlement process was unclear, they were insecure, and some were simply angry and frustrated.

Practically no consultation has taken place in the area east of Lake Manhale and very little in the south east of Machuquele. These two remote areas are populated with many families who have no notion about the Sanctuary and its objectives. They are very curious about the boundary markers being constructed, and claim to be marginalised from the project and its benefits due to their location far from the management centre.

Overall, communication is found wanting, and throughout the sanctuary, communities and individuals requested that their grievance or request messages be transmitted to the sanctuary. Their lack of trust in present communication channels with the sanctuary serves to further isolate them, because they do not have confidence that their preoccupations and ideas will be heard either by elders or by sanctuary translators. In many areas the Managing Director was allegedly called on to appear in person so that the people could take up their list of issues directly with him. They requested that messages be transmitted to him and that he choose another translator, or preferably more than one, and come and speak to them about issues of great importance to all. As was already pointed out, the introductory but nevertheless comprehensive guidelines for consultation included in the 2001 Bio-Business Plan (Lambrechts 2001b), that would have addressed this shortcoming, were not implemented.

(7) Resettlement and compensation issues

Issues related to resettlement must be carefully managed in order to avoid direct short-term negative impacts and possibly longer term negative impacts. The lack of procedures and a process for land delimitation and attribution to settlers so that their compensation is

transparent could result in reduced access to land or in worst cases, landlessness of some families / family members, as the weaker personalities give way to the stronger ones who negotiate for more land. The host population may become the object of conflicts if land is not ceded openly and if competition for the same pieces of land occur as settler densities rise.

The clustered form of settlement is not customary for the majority of settlers; while there are advantages in terms of facility of provision of services, and subsequent access to these, living closer to one another may result in conflicts about use of resources close to the homes, the area where women plant most of their crops. Witchcraft and other social conflicts often arise in situations of families living closer than they might normally. Competition for resources and deforestation close to the homes may also result from resettlement in a village.

Poor communication and lack of recourse for hearing grievances could result in higher levels of dissatisfaction with the resettlement process than that expressed by the people interviewed. Many of them have now been moved to their new locations and none expressed grievances during the process. All accepted their compensation, apparently with satisfaction. The two sides of this coin should not be ignored. Distrust and negative attitudes against the sanctuary at any point and at any level are undesirable, and all attempts should be made to avoid them.

Compensation negotiation was carried out so that families felt the sanctuary and the government were not being fair and just by taking the final decisions about the amounts to be paid. In general almost all of the settlers felt that it was the right of the person whose property is being lost to name the price and be the one to close negotiations, not the other way round. Most felt that they had no option but to accept what was offered even if they did not agree with it, as many claimed they did not. (As was pointed out above, however, they were uniformly “satisfied” with the compensation that they received)

The payment of cash compensation has been made at the moment of moving to the new home. There is a risk that this money has not been used for investment in activities that will bring about longer term livelihood benefits to the family. There are no banking facilities on Quewene and most of the people receiving money do not have accounts in Vilanculos. Keeping money safe may become problematic. Some people are investing in small stalls for trading, but the opportunities for investment are limited: there are no seeds, tools, seedlings, fishing nets etc. on Quewene to buy. By not using the compensation on investments that will help recuperate the losses, families are opening themselves up to the risk of their standards of living declining.

5.3.4 Impacts on authority and leadership

The Sanctuary project design assumes complete collaboration between communities and their leaders in order to implement shared management processes and achieve benefits based on shared awareness and responsibility towards conservation and sustainable management of local resources. As first steps in making its own links to this social system, the Sanctuary has carried out three major actions as planned:

- Created a Project Steering Committee made up of key local stakeholders;

- Selected and is paying a monthly subsidy to at least 16 local ‘chiefs’ in order that they may control and prevent the misuse of natural resources;
- Provided infrastructure (made from local materials and a cement floor) so that the chiefs may meet and share information relevant to their leadership tasks, and so that accommodation can be provided for visiting specialists / trainers to assist in capacity development.

An immediate effect of these actions has been a widening of the social distance between communities and their leaders. Leaders who suddenly received a subsidy equivalent to about twice the official minimum suggested wage have been perceived by all as having become instruments of the sanctuary, and paid to ensure the interests of the sanctuary are suspected by the communities. Reinforcing this image is the fact that their messages have, to date, mostly been negative and restrictive, referring to controlled use of certain local resources, prohibition of the use of others and the need to abandon all use of resources in the protected area.

Communities throughout Quewene noted that, since they began to be paid by the sanctuary, the chiefs no longer pay attention to their needs and concerns. Social distance between leaders and community is not new. However the subsidy payments have exacerbated an existing weakness so that communities’ levels of trust and confidence in the leaders are being further eroded. Indeed all the privileges offered to the chiefs (shirts, caps, watches etc.) by the sanctuary have been viewed with envy by other leaders who are not involved. To date this has resulted in:

- Renamo initiating activities to assist families to express grievances and not to cooperate in the resettlement process unless they agreed with it.
- The Steering Committee incorporating a means by which all political parties could be heard and their interests represented, with the result that the political antagonism died down.
- Religious and other traditional leaders lamenting their non-recognition by the sanctuary, and consequently their lack of a subsidy.
- Families in the resettlement process and others lamenting that the chiefs do not listen to their problems any more, instead they only look to the sanctuary.

The leaders may become progressively more autocratic, until such time as this causes problems for the sanctuary as well as the community. In the longer term social fissions could occur due to the leaders’ reluctance to share development-related information or receive it from the communities. Tension between leaders who are receiving subsidies from the sanctuary and those who are not will probably rise. Historically the different groups of Quewene have shown tendencies to dispute over power and the recent continuation of Renamo in this vein should be indicators of the potential for social disruption.

The leaders’ role as transmitters of development information is currently hardly taken up. In the household survey half the respondents reported that they knew nothing about the sanctuary project, and its activities. Only 9% reported having a good understanding of the project, and these few were distributed throughout the project area, and even outside of it.

The isolation of communities and families from information about the sanctuary and its development programme, particularly information referring to needs for labour, effects of the to-be-introduced wildlife, instructions about prohibitions, plans for resettlement etc. will all impede community participation.

In the longer term, the greatest risk generated by this situation is the potential lack of representativeness of the leaders who no longer listen to the people and become remote from them. This situation would completely undermine the aims of the sanctuary to involve the community in the management and ownership of the project.

5.3.5 Impacts on cultural heritage

Creation of a protected area with free-ranging large game will in theory not restrict the access of people to the Reserve area. Access to family grave sites and clan sacred areas will remain possible through the v-gates located at certain points along the length of the fence line. Lake Nhone is important to the Singo clan, and as the leading clan of the area, to all communities residing in the central part of Matsopane. The importance of the lake is principally related to its use. By losing the use of the lake many of the rites important to its users will become irrelevant and the impact insignificant. However, it is a site held sacred to the clan and community to guarantee its well-being, and inability to access it to appease ancestral spirits would have a significant negative impact.

Although the density of large game may not be high enough to discourage people from entering the Reserve area, it is unclear how this will be managed in reality given that some of the game is potentially dangerous.

The transfer of the sacred areas to another place would be difficult since they are intrinsically related to the territory which belongs to the Singo clan and is the *hossi ya missava*'s zone of influence. The identity of the people of the clan and community are linked to the relationship of the *hossi ya missava* with the ancestral spirits. It is not clear how the *hossi ya missava* will negotiate the question of his legitimacy if he is not responsible for the use of the resources in the protected area

5.3.6 Impacts on livelihood strategies

(1) Background

The Sanctuary project aims to create a protected area for wildlife with the management apparatus for its development being implemented with community participation. It aims to construct three lodges with a maximum total of 100 beds and 50 residential development areas along the western and northern parts of the peninsula. A number of natural resource management research projects will be undertaken by external research institutions. The conservation and management of endangered marine species such as the dugong and the leatherback and loggerhead turtles will be prioritised as part of the sustainable use of the natural resources in the Sanctuary.

Local community participation in project development will include:

- New employment opportunities for at least 275 or even 350 or more people and involvement of approximately fifty more in informal employment in agribusiness ventures and micro-enterprises. There will be a policy of preferential employment for local people with the aim of raising their standard of living.
- Full usufruct rights of the natural resources of the Sanctuary, including the re-introduced wildlife.
- Community capacity development for management of community development projects and a community development fund (see Parts H and L).
- Community development projects including improved agricultural and livestock rearing activities and assistance with establishing an effective marketing system, and rehabilitation of a market place in Marape next to Goshen.
- The provision of a school and health centre infrastructure and the initiation of a malaria control programme.

Analysis of the impacts of these objectives on people's livelihood strategies is discussed below.

(2) Impacts on customary resource management

By introducing a protected area on the peninsula, management of resources by traditional leaders in this area will largely be curtailed. Natural resource-use by communities within the Reserve area is completely prohibited in certain respects (such as hunting), and will be regulated in others (such as the gathering of reeds and thatch). As such, leaders cannot continue being responsible for the management of these resources. Leaders may suffer the loss of part or all of their legitimacy insofar as their assistance cannot be invoked to intercede with the spirits for safe use of resources outside of their reach. If their area of influence is totally isolated, they will be rendered powerless. Historically, changes in power bases have been common. Over time, the local leaders who stand to lose their traditional power-base (one or two *hossi ya missava*, and some clan leaders with already diminishing traditionally based influence), may succeed in substituting this with an acceptable alternative. If not, the people will follow the more relevant leadership of others.

An excellent example of this is the *hossi ya missava* of Machuquele: he was an influential religious leader at the same time as being a member of Frelimo in the early years. He was then thrown out of the Frelimo party local leadership structure because of this inconsistency. Over time, he became sympathetic to Renamo's cause. Now, having been recently reinstated as a traditional authority, he still combines three (though different) sources of legitimacy for his popular leadership: first the Catholic Church of which he is the local leader, then his traditional legitimacy and finally his adherence to Renamo.

Influence of the Buine clan leaders in hunting management is already diminished, despite a lingering pride in their past position in the social hierarchy because of the prestige associated with hunting. The wildlife utilisation plan, with community involvement being an inherent part of the management system (see Part D) should take cognisance of this historical fact.

Leaders' influence in the management of lake use will continue freely outside of the Reserve area. The traditional avoidance of use of *Brachystegia spiciformis* woodlands by any individual (i.e. the land could not be cleared for farming), may be undermined due to increased population density over time. However, the sanctuary's continued respect of customary land use rights would ensure the *hossi ya missava* could be involved in decisions in this respect.

No areas were specifically identified, in or outside of the Reserve area as specially harbouring medicinal plants. It is assumed that although they probably occur more abundantly in the less populated Reserve area, they also occur outside of it. The impact of this on the leaders with special knowledge of traditional medicine is not easily accessible information, and was not available to the research team.

(3) *Natural resource-use*

The creation of the Reserve area will not only directly affect those being moved but others living inside and outside of the sanctuary as well. From the baseline data it can be estimated that aside from the losses of the 86 families being resettled, the most significant loss will be of access to fresh water fishing sites for approximately 9% of the population living outside of the Reserve area. Although 12% identified their potential loss of access for marine fishing on the east of the peninsula, the situation is complex. Theoretically these fishers will retain access to Inhamambane Estuary through the v-gates left in the game fence, however, since some of them live for periods up to a week or so in impermanent houses or lean-tos inside the protected area, they will lose the freedom to continue doing this. In this sense it will be necessary to verify which fishers actually stay on-site and will truly lose access, and which can cross the protected area to fish in a day trip. Even day trip access may be compromised if the danger from free-ranging game is too high. Loss of access for cultivation and collection of natural resources will also affect between four and eight percent of families in the sanctuary living outside of the Reserve area. No surveyed families outside of the sanctuary identified a potential loss of access to resources inside the protected area.

The indicative profile of losses below is based on the household survey and on extrapolating the results to the estimated population in the Sanctuary.

Estimated number of families living outside of the Reserve area and affected by loss of access to resources in the Reserve area

Type of Loss	Estimated no. of families affected
Access for freshwater fishing	93
Access for marine fishing	< 124
Access for cultivation	52
Access for use of trees, plans, reeds	41
TOTAL	311

These figures are only indicative given the lack of census data, but they do indicate that the loss of access to fishing sites will have a negative economic affect on enough families

outside of the Reserve area for the issue to receive serious attention. The loss of access may be easy to repair for some people who can change their fishing strategies without a great deal of difficulty, but there may be others who will be more seriously affected. Families living outside of the Reserve area while cultivating areas inside the fence should be identified and compensated for their loss.

The concentration of people to the southern and western sides of the peninsula without access to the natural resources in the Reserve area will intensify their use of these in the unprotected area. Marine and fresh water fish and bird species may be more heavily exploited. Forest and bush lands may be damaged by increased fuel and forest products gathering unless alternative sources of building materials and fuel can be obtained. People living in Maçuale, Macaxe and Singo commented that in situations of drought such as was starting this year, they would be forced to depend on the natural resources that they have habitually used. They commented that this will be difficult now that they have been prohibited by the sanctuary from using any parts of trees, which only leaves fishing to depend on.

Loss of access to the medicinal plants inside the protected area is unlikely to be significant since these are distributed throughout the peninsula. Some species will be at more risk than others of depletion, but the impact of this would require a specific study of the use of these plants to discover whether it is intensive enough to cause scarcity.

The Inhamambane Estuary has a variety of habitats not found in other parts of the peninsula. This is the only location which, if isolated from the population due to the barrier created by the Reserve area, could cause loss of access to some useful plants and trees. It used to be a logged area that provided commercial quality wood. Some of this still remains and clandestine attempts at exploiting it are reportedly still made by outsiders from the north (and possibly also by locals; refer to Part B).

Prohibitions on hunting made by the Sanctuary require little serious changes in behaviour while there are almost no wild animals in the area. However, based on the attitudes of many community members about the intrinsic value of game animals over people, the reintroduction of small and large game is likely to generate cases of poaching and conflict, particularly at times of food scarcity. Without a clear understanding of the objectives and operation of the sanctuary project, community members are justified in their incomprehension of why they should have to evacuate an area so that animals may live there. While this attitude persists, it will be difficult to engage community members in truly collaborative development of the wildlife component of the project.

This perception, if not checked in a convincing manner, may also be responsible for continued use of resources - plant and animal - in ways that are prohibited by the sanctuary. At present the situation is defined on an “us” and “them” basis, with an enormous gap between the two, despite the sanctuary’s rhetoric. The leaders’ alliance with the sanctuary is not necessarily seen as progressive; almost all the communities in the peninsula perceive that they have simply “been bought off”. The prohibitions on resource-use articulated by the leaders distance them further from communities who are not convinced of the reasons why

they are being prohibited. The pessimistic outlook about the loss of access to resources and the potential conflicts communities foresee “as people continue to carry out activities for which they may now have to go to court”, are the immediate reactions of people unaware of or unconvinced by the words they hear. This aspect, as was already pointed out elsewhere, reflects the historical inability of the developers to implement a proper consultation and information disclosure programme, and will have to be addressed as one of the sub-plans contained in the BMP (see Part H).

One focus group of elders in Matsopane and a group from Chiquinine, ranked the effects of the sanctuary on their lives as being equivalent to the war in terms of their loss of access to resources – particularly hunting.

The short term impact of the loss of access to hunting will be intensified many times if the negative uncomprehending attitudes about this situation continue. The longer term effects may be antagonistic towards the sanctuary and/or towards the local leaders. This may result in actions of sabotage or poaching for example, which may be locally perceived as justifiable, particularly in years when rainfall is poor and production low.

The additional demands on natural resources, such as land, surface water supplies, marine resources and materials for construction made by the project will augment those of the community in the instances where the community has productive trading and supply relationships with the project. This will have cumulative negative effects on the natural (re)productive capacity of the resources in the community areas. By including a large chunk of the area that was available for settlement prior to the project in the specially protected Reserve area, the land area available for use by the local community is significantly reduced. (The eventual size of the Reserve is not yet known, but it is estimated that it may constitute about 70% or more of the current sanctuary.) These factors will be likely to contribute to the more rapid degradation of existing resource capacities.

Given that it is an expressed objective of the sanctuary to involve communities in the conservation management of the VCWS, once this is fully understood, including the longer term implications, and it is clear who will benefit and why, only then will the positive benefits expected contribute to the increased socio-economic status and well-being of many communities.

(4) Agriculture

The most immediate impact of the sanctuary on agricultural practices has been the prohibition on cultivation and agricultural development in the Reserve area. In the period between cessation of activities and relocation, the sanctuary is supplying each family with 50kg of maize flour for every three members of the family. Fishing families have expressed great satisfaction, since it has probably augmented their diet. Informal traders have commented that it has undermined their sales of maize flour in these areas. Some of the agricultural families receiving the maize meal have noted their increased sense of insecurity at having to depend on the sanctuary for their basic food – while not even being able to ensure their future by clearing new fields.

As a result of this ultimate preoccupation, some families have already taken steps to reduce their insecurity, making arrangements with owners of land in Marape so that they are ceded areas they can clear and cultivate. The scale of this strategy is not clear, though at least three fields had been cleared in Marape area by prospective settlers during two weeks in August 2002. This situation is likely to escalate. As long as population densities remain relatively low in Marape, it is unlikely that serious conflicts will emerge. However even the Community Court judge foresees conflicts over claims for use of land in the area. In this respect, the lack of information about the current host land owners in Marape settlement area, the extent of their land, the amount of land they would be willing to cede, and the amount of 'free land' in the area means that it could indeed become ripe for conflicts in the short and longer term.

The average area of land used for cultivation, including fallow and pasture land, of families in Quewene is 3.3 hectares. This means that at least this amount of land should be available in Marape for each family to be settled there (an approximate total of 270 hectares). Taking into account population growth and fallow cycles in this poor earth, without any agricultural improvement techniques (such as composting and mulching) the likely area needed may be in the region of 800 hectares for this population size, or half this with agricultural assistance (such as establishing a system of organic farming; see Part D). If there is not sufficient land, the project's community development initiatives in the area of agriculture will have to ensure that families are able to augment the value of their production without augmenting their land-use space, or indeed reducing it. The effects of natural population growth will intensify the need for adequate space for cultivation.

In the longer term, increases in population density as a result of visitors attracted because of improvements and services in the area, as well as natural population growth, will raise the demand for resources for subsistence.

The importance of sugar cane production to the local economy and family livelihood strategies has been a key factor in stimulating local investments and life-improvement strategies such as setting up stalls and trading manufactured goods. If the Marape area is less appropriate for sugar cane this may have a negative impact on the income potential of approximately half the number of families moving there.

Twenty two percent of respondent families in the household survey identified that they would be directly impacted by the loss of land as a result of the project. An additional 13% claimed that they would lose access to natural plant resources. Over half of these will be compensated through the resettlement programme; the others may lose a significant part of their income and their stability may be undermined due to the loss.

The livestock numbers which settlers will bring to the Marape area are likely to be low, but with improved husbandry methods the population of domestic animals will probably rise and cause competition for pasture resources with host animals. Positive impacts from agriculture will arise from the planned training inputs to assist all new settlers to learn about organic farming (permaculture) methods and their advantages.

The notorious failures of agricultural technique transmission by demonstration (Thompson 2002) will limit the expansion of these techniques and the impact of their application unless interventions are followed up by extension workers, as will indeed be the case (see Part D). Without adequate investment in experienced community development facilitators, impacts will be minimal; indeed given the responsibility of women in this context, female facilitators would improve the impact significantly.

It is not yet clear how improved agricultural techniques can be learned by members of the community outside of the settlement areas but it is clear that the community centre at Goshen, near to Marape will be the catalyst for this. The physical distance of Goshen from many areas within the sanctuary that believe themselves to be marginalised (Machuquele and parts of Chiquinine) from its benefits at this early stage of its project cycle will mean that its impact may be limited. In the longer term other areas will also become secondary focal points for agricultural skills development, and these demonstration areas will be closer to the southern communities who continuously express their desire to become involved in sanctuary-linked activities. The sustainable agriculture development plan is dealt with in Part D. It will involve a full-time agricultural project officer and full-time extension officers as well as ongoing inputs from agricultural specialists (see also Part L).

(5) Fishing

Fishing is perceived as a lifeline for survival in Quewene. Almost all communities mentioned that if they lose access to their farm land and were prohibited from using the resources in the Reserve area, they would have to depend on fishing. Some of the families in the process of resettlement at that time were surviving in exactly that way, while also receiving maize flour from the Sanctuary. The monetary and social valuation of marine fish and other products above that of fresh water fish will contribute even further to the already obvious unsustainable use of especially the marine resources, if fishing is not controlled (see also Parts B and D).

With regard to potential impact it is interesting to note the difference between recall from fishers of their catch over the past month (information gathered for resettlement compensation by the sponsor, and as part of the baseline household survey), in relation to the calculations presented in Odendaal's report (2002) based on field verification. Fish caught in Chihunzuine were calculated to provide a particular boat owner income of approximately UIS \$175 a month, based on 20 days of fishing and catching some 20kg (dry weight) per day (Odendaal *op cit*). The same fisherman's estimate of his monthly income from fishing for compensation purposes was US \$104 a month. The baseline study identified an average income of only US \$4 per month among all fishers in the sanctuary. The difference may be explained by the fact that firstly fishing may not be practiced for much more than the 14 days a month the fishers claimed they can fish due to the tide being appropriate (*mafesso*), secondly that some of the catch is consumed or bartered and not sold, and finally that most fishers earn very little from the occupation explaining why the majority of them also practice agriculture. Even if they try to fish when the conditions are not optimal, as the fishers themselves explained, if the tides are not appropriate then the catch will be less.

Fishers' income barely covers their needs, particularly when they do not have agricultural plots to supplement their food. The household survey showed that income from fishing in recent months was used for further investment by only 9% of fishers who purchased equipment and in one case a boat. Many more (20%) were interested in further investing to improve their fishing business, although the source of the money was problematic. The loss of fishing income will severely handicap those families with a high dependence on income from the activity, since they have no capital reserves, and some have no alternative livelihood sources.

Loss of access to part of the Inhamambane Estuary will affect all those living in the Reserve area close to the Estuary who will be relocated in Macaule and Macaxe. Fishers and families who fish as well as practice agriculture from Chibo are at present the only ones affected by the Reserve area barring them from habitual access to Inhamambane Estuary. From east to west, Chibo residents placed a very high priority on their access to Inhamambane Estuary. Four fishermen from Macaxe and Quile have formed an association and opened four stalls for trading on the basis of their fishing income. Focus group participants from as far as the west of the road, in other words outside the sanctuary, said they had family members who use the Estuary for fishing. Extrapolation from the household survey revealed the number of affected families outside of the Reserve area as possibly being in the region of 124. Without census data it is not possible to quantify exactly the scale of the potential impact.

The families of approximately 40 fishers in Chingonguene will be isolated from the rest of Quewene by the game fence. These people will lose easy access to the hinterland to carry out any bartering or trading that will help them to balance their diets with vegetable and grain products. This may force them to increase their incomes to cover the need to purchase more food. The significantly expanded market that is likely to develop with eco-tourism activities will increase the value of their catches many times over (Odendaal 2002). With more disposable income it is possible that entrepreneurs may develop a more effective sales point for needed goods (as one of the traders has already indicated he would like to do). If this does not occur, the increase in income may end up being spent in Vilanculos losing part of the advantage of the home market for the fish.

The isolation of the fishing families in Chingonguene is already affecting them socially as well as economically. Without the barter and trade relationships to cement their social relations with families in the hinterland, their network of social support will become so diminished that it may collapse. Members of some families will effectively be separated by the Reserve area. The people of Chingonguene will have no access to social services. The Local Administration, based in Matsopane, which already has difficulty transmitting information to Chingonguene, will be impeded further. The Maritime Delegate, who lives in Chingonguene, will be isolated from the rest of the maritime areas in the hinterland, if he does not travel by sea all the way round the north of the peninsula, and south to Marape.

Although Chingonguene is isolated with a fence around it, the residents have been prohibited from cultivating for the last two agricultural cycles or more, and they experience their lack of knowledge about the sanctuary as frustrating and demoralising. Men and

women are anxious about whether or not they will have to leave. The absence of information to the people of this area is underlined by their views that the chiefs are the only ones who are informed by the sanctuary and they never pass this information on. The cumulative negative impacts will undermine the viability of the fishers continuing to live in Chingonguene, with their quality of life diminishing due to the loss of contact with the rest of the peninsula population.

Lake fishing will be lost to all those using Lake Nhone inside the Reserve area. Focus groups from Matsopane, Sede and Marape outside of the Reserve area, and Singo inside, all indicated that people from these areas use Lake Nhone for fishing. Estimates extrapolated from the household survey show that aside from those living in the protected area, approximately 90 families living outside will be affected by the loss of access to lakes for fishing – principally Nhone. There are many lakes outside of the protected area close to the resettlement area, although none as big as Lake Nhone. Lake Nhamaculoculo is the only comparable permanent alternative, although it is not high on any groups' list of preferred sites.

(6) Trade and the local economy

Various key factors will influence the local economy in Quewene as short-term direct impacts of the Sanctuary project:

- the increased circulation of cash from Sanctuary employees;
- the isolation of fishers in Chingonguene; and
- high expectations of assistance with marketing and transport to facilitate the growth of local trade.

In the medium and longer term the impacts of the above situations will be influenced by the following:

- high demand from a local market for good quality products for the eco-tourism activities;
- established employment benefiting a fixed few;
- a market centre near Goshen and transport improvements;
- larger numbers of outsiders using Quewene to trade with;
- the advent of electricity from a gas connection serving some residents and facilities for freezing fish for example.

Monitoring the number of small-scale traders operating from fixed stalls in Quewene would indicate the growth of purchasing power in the community, and the demand for locally available manufactured goods. Household survey results showed that 33% of families had made some kind of investment recently and that a total of 8% had invested their own money in augmenting or establishing trading stalls. Indeed among investment options cited, informal trade was the most favoured with 25% of survey respondents planning to establish or improve small stalls. Overall, most impacts in the area of trade and the internal economy in the short and long term should be positive. The increased circulation of money provides

greater purchasing power and potentially greater use of stalls in Quewene - rather than shops in Vilanculos. It may also facilitate the creation of local savings and credit associations that in the long term can help trigger further development in trade with small increases in investments. Both these short term impacts are already incipient in the community.

The current lack of markets to sell produce has created an expectation that the sanctuary will somehow be able to assist to unblock this bottleneck. If this happens and Goshen is developed so that a community development learning centre is created, with the market created by the sanctuary's clients, the conditions for economic improvement of many families will be established.

It is likely that with development activities being much more evident in the medium and long term, when the eco-tourism activities are operational, that more outsiders will be attracted to Quewene. Although the sanctuary reserves the right to prohibit entry to the sanctuary, it is unlikely that all access will or could be prohibited. As such family members and friends may return to Quewene in search of employment, opportunities to participate in community development activities, or simply to obtain access to social services (when these are improved). If these people are absorbed into the local economy as a result of their experience elsewhere, it may further stimulate development. If they become dependents, they will reduce families' capacity to meet their basic needs for sustenance and development.

Women identified the potential for sale of handicrafts and products from group income generating schemes with the development of the sanctuary project. If this opportunity is exploited it could prevent women being marginalised from the improving economy, having a greater impact in the longer term when families and children will be likely to benefit in particular from an improved life-style.

The introduction of electricity to Quewene would be an enormous stimulus to the fishers who could markedly increase the value of their produce. The high cost of this electricity on the general market may exceed the capacities of local people, unless they are subsidised or used for community group activities / benefits.

The potential direct negative impacts on the local economy also include the effect of the isolation of Chingonguene forcing that area to trade with the sanctuary on different terms to the rest of the peninsula. The potential for uneven development may be exacerbated for Chingonguene by its isolation, more so than Machuquele, though both are almost equidistant from Marape/Goshen. While the real value of products such as fish and agricultural produce is likely to rise as a result of the internal market with the sanctuary, this will favour those who are involved in improved agricultural and fishing schemes and who produce better quality goods. The internal barter economy is likely to reduce with the increase in money, marginalising those who are poorer and with no access to marketable goods. Trade and production improvements may marginalise women who participate less in the public sphere, and even when performing sales, generally pass the income to the male head of household. Deterioration in payment of debts by Sanctuary workers is already causing some stall owners to demand cash rather than credit, and in the long term this problem will probably be overcome in this way.

(7) Water supply from lakes

Impact on water supply from lakes for communities should be negligible. The sanctuary project aims to improve and conserve the management of the natural resources in the area. The quality of the water may deteriorate as the lakes dry up and the greater densities of people living around and using them may result in some contamination due to the washing of clothes and poor sanitary habits.

Most families, or groups of neighbours tend to make shallow hand dug traditional wells alongside lakes from which to collect drinking water. These wells are rarely covered, and thus may be easily contaminated from above. In addition the use of different containers brought by individual families from their homes raises the risk of contamination. Wells may collapse in the rainy season and be more easily contaminated by run off if the surrounding area is used for defecation.

Water supply from the lakes within the Reserve area will be lost immediately. However there are many alternative sources close at hand throughout most of the peninsula. During drought years in the future, dependence on the permanent lakes may deplete their resources more rapidly, or result in their contamination due to people moving to live and cultivate around them. There may be a cumulative effect of the extra demand on water resources due to the VCWS project that in times of drought may cause competition for resources with the community. Indications are that the two lakes that have been earmarked as the source for water to the project, may in fact be ephemeral and may dry up during periods of drought.

(8) Local employment impacts

Providing local employment is one of the largest direct economic impacts of the VCWS project. The impact of the salaries of the VCWS employees on the local economy is dealt with in Part K and will not be repeated here. Traders lamented that they cannot retain this potential market in Quewene, but instead people who have to go to Vilanculos for various reasons, invariably spend their money there. In the short term this will continue to undermine the local economy. However, given the rate of growth of stalls due to the increase in circulation of cash, and the raised potential among employees of the sanctuary to save and offer loans to others, it is likely that over time the range of products on sale in Quewene will increase, and prices will lower in the longer term if transport becomes available.

The impact of greater purchasing power in Quewene will encourage demand for better social services on the peninsula, as people start sending family members to Vilanculos, because they can now afford it. Over time it is likely that secondary developments initiated by family members will emerge, based on investments made from salary income. Women may become small enterprise managers more frequently as their husbands provide the majority of the labour. The limitations imposed by the low level of education in Quewene however, will always impede the effective growth of small enterprises.

The present profile of employees on the sanctuary project's payroll favours those living closer to the worksites and the management headquarters in the north of the peninsula. Although it is evident that the policy of employing local people is being followed, it is not evident to the majority of the population that the system provides equal opportunities for all residents in the sanctuary. If one of the policies is to employ those who lose their source of income for a period due to resettlement, this is not evident either. If employment continues to be perceived as favouring those 'with contacts' over the rest of the community, schisms will continue to grow between those who benefit and those who are left out.

The amount of money entering the sanctuary as a result of salaries is high enough to make a significant impact on people's lives over time, and with their increased knowledge and experience, employees are likely to improve their lifestyles too. This however may occur only in isolated areas of the sanctuary as a result of uneven recruitment methods. Attitudes of people living in areas where no one has been or is employed in the shorter term will become antagonistic towards the project (as they are already becoming), and may result in open protest. In the longer term, these areas may develop more slowly than other areas as a result, unless the community develops another economically beneficial relationship with the project or one of the activities generated by it.

(9) Impacts of improved access

The Sanctuary project will improve access by sea, air and road to the peninsula. Already the access roads cover various parts of Matsopane and the consequent passage of project vehicles are seen by local communities as a positive impact. Lifts may be forthcoming now, but it is the community's expectations of the roads stimulating the start up of a local commercial transport service that is really motivating their appreciation. Discussions in various parts of the peninsula always returned to transport as being one of the key constraints to progress in the area. No-one was forthcoming about how this could be resolved since all are aware that the terrain is difficult for the passage of vehicles, it requires four-wheel drive almost constantly and this has high costs. The high costs of management and maintenance may prevent community initiatives, given that investment levels throughout Quewene rarely reach US \$500 at any one time by an individual - for the construction of a boat for example.

The operation of a commercial transport system in Quewene would certainly assist in the local marketing of agricultural produce and some of the construction materials that are produced by communities in the more remote parts of the peninsula. It will facilitate the creation of a central market that will be able to provide a better basis for equal opportunities to carry out business with the sanctuary project.

5.4 OTHER ECONOMIC IMPACTS

5.4.1 In-migration

With the development of the eco-tourism facilities, provision of social services for the community and in particular the families being resettled, and community development initiatives in marketing, the peninsula will become more attractive to live in. Absent family

members may begin returning looking for employment and other opportunities. Extended family members may also move in to benefit from a service or opportunity that is better in Qewene than in their previous place of residence.

Rough calculations put the population density in the sanctuary outside of the Reserve area with the fence line in its present position at approximately one family per 10.6 hectares. This is a comfortable figure for this kind of land today, and most families actually use areas that are much less than this. However, recommendations from MICOA on rural settlement density on this kind of land in similar climatic conditions identify the sustainable minimum size at three times more than this (33 hectares). Given that population density will double in 25 years at a normal growth rate, and in-migration may inflate this figure further, increased competition for resources can be expected within this time frame. This may put pressure on the conservation initiative as food is sought from all nearby sources.

5.4.2 Economic opportunities

(1) Background

The local market for marine and terrestrial products will be increased substantially with the establishment of the eco-tourism facilities. Plans to rehabilitate the market infrastructure near Goshen in Marape will stimulate local trade, as will the advent of electricity for refrigeration of fish, and improved communications for sale of produce on the peninsula as well as outside. It has been noted (Odendaal 2002) that the effects of these developments will raise the value of marine resources and the pressures thereby produced will need to be controlled and mitigated immediately. Marine resource extraction is likely to be unsustainable if practices continue in the same way as presently. It is evident that agricultural and natural resource-use on the land available outside of the Reserve area is already heading towards a similar demise unless its management is controlled, production capacity enhanced and non-farm livelihoods alternatives promoted.

(2) Eco-tourism activities

The three lodges and fifty residential developments will provide employment in the hospitality and service areas for local people. The physical distance of these developments from all the community areas and separation by the Reserve area and game fence will reduce most of the transactions between the private developments and communities to a formal level. This will be likely to include trade in foodstuffs, handicrafts and services as guides for diving and fishing for example. Tourism initiatives linked to communities' knowledge of the land and its natural resources may also develop. The greater the interaction of the community with the various tourism activities that promote the value of the environment and the community's relationship to it, the greater their awareness will be of the benefits of the development to them.

The development of the protected animals and tourism component will be one of the most difficult aspects to manage from the community point of view. Their present incomprehension about the implications of the introduction of large wildlife into the

protected area means that without significant investment and involvement of the community in the conservation initiative in positive ways, their buy-in will be slow. The success of the eco-tourism venture depends to a large extent on community buy-in and support until such time as they take the responsibility as owners of the conservation initiative. This is a long term perspective which requires that confidence and trust are built on strong foundations. A plan on how to achieve this is included in Part D

The development of Quewene's communities with very few assets, in a precarious relationship with their environment that is bordering on the unsustainable in some respects and have reached unsustainable levels in others, faced with the opportunities offered by a private enterprise of the size and nature of the sanctuary, should aim to transform their relationships with the land and sea to becoming less exploitative and of higher value. Their livelihood base must therefore as much as possible be converted from natural resources for consumption into income from service provision and commercial developments that are spin-offs from the main development project.

It is at this stage of the development too early to comment on the impact of the eco-tourism and conservation project developments. However, it is a tendency anywhere for the less powerful to become instruments for the interests of the more powerful. The disparities of power (economic, political and rights-based) between the communities and the VCWS project itself, are so enormous that it will take a great deal of commitment to genuine community development facilitation to encourage realistic sharing of ownership in the economic and social benefits that accrue. This kind of commitment will entail a major investment costing time and money, the scale of which is often not fully grasped by developers. With adequate investment in skilled facilitation, dialogue, and appropriate development opportunities, the expected positive impacts on the community will probably be forthcoming. (See Part H for the relevant plans to achieve this)

(3) Access to manufactured goods and services

The government is responsible for the provision of public services, and while the sanctuary may catalyse and take responsibility for the construction of facilities, the government must provide staff for these. All over the country there are problems with shortages of qualified staff in the health and education sectors who are willing to live in remote rural areas (Thompson 2002). Staff have been promised for the health centre being constructed in Machuquele. Access to services is very poor currently and there are no health facilities in the resettlement areas of Marape or in Chihunzuene / Chingonguene. There is no school within walking distance for children in Marape. There are no potable water supplies in the settlement areas either.

The planned improvements to social services in Quewene will have a major medium-term impact in stabilising the population in the peninsula rather than having to seek these outside. If other services such as roads, transport, electricity supply and trade goods become available locally, with the increased purchasing power of many members of the population they should prove viable initiatives that stimulate economic development in the community. The tendency to invest cash from compensation and salaries in providing manufactured goods

from mobile or small fixed stalls is an indicator of the high demand for such goods, and the willingness to undertake informal trading as an option.

It must be recognised however, that not all families and areas will benefit equally from the sanctuary's development promotions and the most isolated will always benefit least. Given the potential reduction in natural resource availability in the medium term, these families left to continue to seek their livelihoods in the customary spheres will be the ones most negatively affected. They may suffer from food deficits that lead to chronic malnutrition and lifestyle deterioration.

(4) Water supply and electricity

The supply of clean water from sealed wells with hand pumps (the cheapest and most sustainable community source), or education on how to ensure that drinking water is free from contamination are significant components in the promotion of good health. The supply of clean water at social service facilities and to the resettled communities should assist in reducing the mortality and morbidity rates due to water-borne diseases. Ensuring clean water supply and the hygienic management of water will be particularly important if the settlement density is such that poor sanitation practices cause illness.

Electricity supplied to the peninsula is not likely to be cheap. Communities will have to be organised to use it, so that it brings added value to enterprises such as freezing fish. It will be of major benefit to the health and education facilities in providing lighting for working in the evenings (higher school intakes will result), and at night, especially important for emergencies and deliveries at the health unit, and in the running of vaccine fridges, and sterilizing equipment.

If affordable, electricity would also act as a development trigger to families and local traders and other income-generating enterprises that will increase their productivity through lighting and possibly cooling facilities.

5.5 CUMULATIVE SOCIAL IMPACT

5.5.1 Background

The livelihoods of Quewene communities are inextricably dependent on the availability of natural resources. The most important of these are marine and freshwater fish, and the productivity of the land. The sanctuary project will alienate a portion of the land from them, will relocate some families who will have to re-establish their livelihoods again, and will control their use of all natural resources in the project area. In the long term it is predicted that these resources will become scarcer and their availability subject to greater competition. Interventions assisted by the project aim to redirect the livelihoods of families affected by it, so that they gain income from more productive agricultural activities, and the increased value of the fish and agricultural produce they harvest, as well as potential off-farm activities. Without the project the resource base would have declined anyway, although probably a little

slower due to lower demand for the products. It is this precise process that the project aims to slow down through sustainable management of resource-use.

However the project is itself causing an increase in density of the population which means that they will have to manage changes in social relationships that this brings about, as well as to manage the consequences of more intensive use of resources close to the settlements. Physical and mental health status may potentially decline and social disturbances and conflicts may rise in relation to increased pressure on the use of available resources. The potential influx of family members and other outsiders drawn to Quewene's development opportunities will aggravate these pressures.

5.5.2 Pressure on public services

Increased population densities may call for special measures to address sanitary and public health conditions where none were needed before. People living in the resettlement areas will benefit from health, education and water supply services and this will undoubtedly attract more members of the surrounding community to use these services. As public services become available and the amount of money in the peninsula rises through continued income from employment, it is likely that demand will grow. Conflict with the conservation interests of the project may occur as the demand for transport rises and the use of vehicles and greater mobility of people as well as their consumption of more manufactured goods begin to affect the environment around the roads and homes.

Learning how to manage their lives in an environmentally sustainable way will be a great challenge in view of the trends predicted. Major input from the project will be required to assist in the education of children and their parents in ways to ensure win-win solutions. Solid waste disposal, more effective use of fuels and water supplies may be among the needs generated.

5.5.3 Health-related impacts

Moving from no health services on the peninsula to a situation where seeking modern health solutions is a realistic option that will put a demand on the quality of these services. It is widely known that the quality of service and availability of medicines are major constraints to the effective delivery of health services in remote areas. If the quality of health service proves to be less than expected it is likely that people will continue to depend on existing alternatives such as traditional treatments and the use of the churches for healing. For psychosocial ills the continuation of these alternatives will be invaluable. Communities will be facing new situations which they have never experienced before, they will be stressed and lack reference points, and very often will seek recourse in familiar remedies.

If living more closely together and increased mobility raises the vulnerability of the population to contagious diseases (through poor sanitation and greater interaction), including HIV/AIDS, then the effectiveness and acceptance of the modern health alternatives will become indispensable. For families marginalised from the benefits of these development initiatives, malnutrition and greater vulnerability to disease will prevail. The vicious cycle of

poverty means that these people will have less purchasing and social power to obtain health treatment from traditional or modern sources. These will constitute the bulk of members of the healing churches such as the Zionists.

5.5.4 Gender-related impacts

Women's participation in the benefits of development, and often consequently that of their younger children, is dependent on their uptake of opportunities presented to them. If no special efforts are made to target women specifically in agricultural and fishing improvement activities it is unlikely that they will change their ways simply because their husbands are. The gender division of labour militates against this in many of the tasks which only women perform.

Women's expressed desire to participate in income generating activities is a positive sign that they want to become involved in development activities. The improvement of the socio-economic situation of women in Quewene will help their children, may provide them with time to be able to participate in adult education classes and increase their value to their families by losing their dependence on their children or husbands for managing the domestic economy.

In societies where the dominance of men is customary, changes brought about by women's active participation in their own development is a slow process. The solidarity shown by women in the past towards other women and their children is the strongest point from which they will be likely to develop. Thus women organised in groups are likely to be able to improve their economic status. Their development may however cause social stress within families and conflicts where women show a degree of independence that is frowned upon by men. It will be necessary to ensure that support structures exist for them to resolve their problems without disrupting the social fabric altogether. The churches are taking this role in many more developed areas of Mozambique.

5.5.5 Impacts on community relations

If development foci are created as a result of greater investments in certain geographical areas and less in others, relationships between communities will change.

The resettlement area is the most immediately prone to the need to negotiate new relationships as the new residents establish themselves and the host communities adapt to their presence. Fears expressed by prospective settlers about their reception in the new area, as well as comments by some older people about the amount of strength required to begin a new life in a new place point to the reality of the potential social stresses of involuntary relocation. The establishment of new relationships and lives will depend very much on the basis upon which this is offered to the new settlers. If their rights and claims are not honoured openly, or if these impinge on those of host communities or each other, their fears will be realised. Social tensions may turn into open conflicts.

Community cohesion in Quewene is much higher than in many other parts of the country (Thompson 2002) and the continuation of identification with clans and lineages the

foundation of community solidarity and alliances. The relationships between neighbours is however an increasingly relevant source of social cohesion, and when these are broken and distrust emerges, as is already commented on in some areas, community relations will break down into competitive isolation. The negative pressures of the customary social framework are that they are conservative and act against innovation and individual development. In this sense the process of development itself will break up the social fabric as it is known currently. However, it would be hoped that new alliances will be formed in the process and that these continue to bind people on different bases. Those left out of development initiatives may become isolated and therefore not only economically, but also socially poorer.

5.5.6 Impacts on the quality of life

The quality of life for many, particularly younger adults and children will change as the values of work and education become realities that award them with more opportunities for improvement than they had before. The older generation will participate less in this change and their relevance to new ways of life will become more remote.

With more education and more money, higher expectations will be born, and demands for higher standards of living created. This will probably result in changes in housing materials and designs, the amount and type of domestic equipment and furniture owned, desire to be connected to an electricity supply to support refrigeration equipment and radios for example, and consumption patterns.

The quality of life will also be influenced greatly by people's buy-in to the conservation effort and their environmentally sensitive management of their surroundings and local resources. If the new values are genuinely taken up not only will people have improved their living conditions, but they will also continue to live in an environment that has been conserved by their own application and effort, which will certainly generate satisfaction.

CHAPTER G6: MITIGATION AND MANAGEMENT MEASURES

6.1 INTRODUCTION

The Sanctuary project is not simply a conservation and eco-tourism enterprise, but one of the fundamental aspects of the project design is commitment to integrating the success of the core business with the participation of the community in the development programme. It is expected that community development activities will be sustained from revenue generated by the tourism activities. Recognising the advantages of partnership potential the project also aims to create a process whereby in the longer term, conservation management will shift away from the company towards the community. By promoting the sense of ownership and invoking the community's use rights of the Sanctuary's natural resources this is expected to establish the basis for their sustainable management.

6.2 MITIGATION AND MANAGEMENT MEASURES: A COMMUNICATION APPROACH

6.2.1 Background

The ambitious aim of the company to develop an eco-tourism business and eventually pass the conservation management and ownership of one of the most complex parts of the business to the local community is laudable. Managing the sustainable development of any environment is difficult, but in Quewene many transformations in the way of life of local communities will be needed before the land, the sea and the protected area in the sanctuary can be managed harmoniously and sustainably. The starting point for this kind of process is as important as reaching any one of the milestones and it is for this reason that the consultation process becomes so important.

A key means of catalysing change and development can be the planned and systematic use of communication to help individuals and communities to accept and introduce change in a transparent way. Communication is the basis for creating awareness, for consensus building, for generating participation in processes of change and development, for making informed decisions and for resolving conflicts.

Communication is also the means by which attitudinal and behavioural change can be brought about so that in the case of the sanctuary, new methods of management of the environment, of peoples' everyday lives, of gender relationships for production, of people's most habitual activities which are the hardest to change, can be encouraged.

Development communication and participation are, according to most experts, "two sides of the same coin" (Fraser and Retrepo-Estrasa 1998).

The practical use of a communication approach in a community development programme would be likely to focus on three levels:

- Debate and awareness-raising involving a cycle of reflection and analysis, followed by participatory decision-making and action.
- Assistance in facilitating people's acquisition of new knowledge and the skills they need.
- Creating an enabling environment by promoting better teamwork and coordination between the groups involved in development activities.

Risk mitigation

Effective participatory development will prevent or significantly reduce the following risks:

- The marginalisation of women from livelihoods restitution and development processes;
- Poor settler-host relations that result in unequal and unjust distribution of land access and use;
- Resettled families with less initiative who cannot repair their livelihoods;

- The lack of community understanding about, buy-in and sense of responsibility towards the Sanctuary programme;
- Uneven development between regions, communities and families constrained by poor capacity to facilitate equitable community involvement;
- The continuously widening social and communication gap between settlers, community and leaders undermining conservation management plans;
- Grievances related to the resettlement processes that are suppressed.

Critical issues such as clarification about rights and obligations to the families being resettled, and even the process for land allocation can be easily made part of a communication campaign. Information would be encouraged to pass both ways, so that after information is presented, or testimonies stated, discussion and reflection would help people understand the situation better.

Implementing a participatory approach

The main community target groups in the Sanctuary are outlined below:

- The physically displaced population who will be compensated in kind, in cash, and automatically included in activities to help them regain their lost livelihoods, over time developing these to a sustainable level;
- The economically displaced population eligible to a certain amount of compensation for loss of access for fishing and farming will be compensated for their partial loss of livelihoods, and invited to take up productive income generating activities;
- The rest of the community is potentially eligible to participate in community development activities, but their involvement will probably depend on targeting communication campaigns to facilitate their participation.

Specific activities would be directed at each of the target groups – the resettling families would be assisted to regain and establish their livelihoods. Resettling families and other project affected community groups in the Sanctuary would receive compensation for their losses and would have to be prioritised over the rest of the community in proposing development projects which may merit assistance from the Sanctuary to help broaden their livelihoods base and increase their household security.

The process for involving these groups in activities to ensure their socio-economic development may include the following elements:

- As a first step *a communication strategy* would be formulated to create awareness among the communities about the project and its benefits, the resettlement process, eligibility and options for participation in development activities, and how they can apply to participate. A communication campaign would consist of groups listening, seeing, discussing and analysing among themselves what they should do in relation to processes (such as resettlement) and opportunities presented. They would be

encouraged to take up certain rights or entitlements (in the case of resettling families), or to make requests for assistance with specific local development projects.

By choosing certain entitlements as part of the resettlement programme or requesting to participate and agreeing to meet stipulated criteria in order to benefit from project assistance, groups would effectively begin a buy-in process into the programme.

Eligibility criteria for community groups and the requirements for submitting requests would be transmitted as part of the communication campaign. Criteria might include geographical quotas, gender criteria, and evidence of commitment to undertake the project. These kinds of criteria can ensure transparency and equal opportunity.

Over time most requests would be responded to and some groups might even build on initial successful requests with repeated applications. Requests would be verified to ensure that the proposed number of community members would actually be involved, and that the proposal is technically and financially viable.

- *Intermediaries* would have to be chosen to assist in this process. They would be trained in interpersonal communication and skill training to help them facilitate the participatory process (with community groups and other stakeholders). Technical assistance would probably be required to verify the viability of proposed projects.
- A *strategic alliance* with the Vilanculos community radio and television station staff (Rádio Televisão Vilanculos) could enhance the quality and approach of the communication strategy enormously. The use of visual media is even more memorable than radio and in particular among illiterate people is very effective. Where appropriate, video could be used to show information and testimonials of different individuals in Quewene that would trigger debates about different issues and collective decision-making about how communities can help themselves to improve their situations.
- By combining the participatory communication *approach* with a focus on *livelihood restoration and development* the resettled families can be assisted directly. A participatory approach to sustainable environmental management can be developed and an enabling environment promoted for communities to become more empowered and genuinely participate in the environmental management and conservation programme.
- *Planned communication* would facilitate the development and implementation of a strategy to support community projects that conserve and promote sustainable use of natural resources. It could be used to publicise credit facilities and the criteria for their use, or training opportunities available through the sanctuary. As the sanctuary develops the resources to support different community development initiatives, information about these would be included in the communication material.

- *Examples of successful projects* can be recorded and shared with others so they can learn from them. By systematically operating a planned communication strategy to facilitate community participation and development, the project could also gain added value in creating material for publicity about the process and the partnership models being developed.
- In the longer term the *community should be encouraged to run the communication strategy planning and implementation on its own*. Decentralising the management and implementation of this aspect should occur in coordination with increasing the capacity of the local people to manage the conservation initiative.

A consultation and information disclosure plan will be implemented to give effect to these principles (see Part H).

Communication channels and information

SIA preparation involved what might be considered audience research in communication terms. Preferred communication channels were discussed with different groups or audiences, and communication maps made to show their preferences.

The results of this research are shown below:

Social groups and their preferred communication channels		
Social group / Audience	Preferred communication channel per specific message type	
Women	Development information – from their husbands, community members, elders (when family), religious leaders and the zone chiefs.	Informal information - between women when transporting goods for sale (work in groups), school meetings, church meetings, in the fields and on paths.
Men	Development information – traditional leaders, zone chiefs and Church leaders who are also administrative leaders. Fishing information - President of the Fishermen’s Committee, then the Sea Corporal.	Informal information - settlers and others in Marape, family, neighbours and friends
Youth	For development information – the church is the most direct for girls and boys. Otherwise they always have to pass through elders (men and women).	

Most people, women, men and youth preferred that the church become involved in the formal circulation of information because they felt secure that the information was correct and that they could provide their own information unhindered. Otherwise a greater use of the Zone Chiefs as opposed to their superiors, the Circle Chiefs, was recommended. People’s preference was based on reasons of greater trust in those who they know better and who are not part of the group receiving a subsidy from the sanctuary.

6.2.2 Mitigation measures related to resettlement

(1) Background

The resettlement programme, although underway, is only in its formative stages with regard to planning. The most important mitigation measures will be described below, and details can be found in the Resettlement Action Plan (RAP) below (see Part H).

Results of the household survey show that although 60% of respondents had no suggestions to offer of how to reduce the negative impacts of the sanctuary project on the community, 13% favoured direct compensation as a solution. Nine percent suggested construction of infrastructure (houses etc.), and a small number of others mentioned attribution of land, subsistence resources and obtaining collaboration between the community and its leaders (together 15%). Employment was not suggested by very many people (3%) despite its prominence in discussions with focus groups.

(2) Compliance with international guidelines

The project is currently carrying out the census required to identify the exact number of people to be resettled. It is also initiating a consultation process whereby the host population will indicate how much of the land is free, how much is theirs, and how much they are willing to cede to the settlers. Figures and maps of the area to be settled should be available as a result of this. Consultation, recording of assets and agreeing on compensation forms and levels is yet to be carried out, as is planning and preparation of settlement sites. The RAP (see Part D) will be updated as information is made available and as the resettlement process proceeds.

(3) The resettlement programme

Once the exact number of people to be resettled is confirmed, assessment of potential settlement sites and the adequacy of available resources for their settlement and use should be carried out. This should take place in a participatory fashion together with the host families in the resettlement area. The decision about how many families should settle in Marape should be reached by consensus. Acceptance of the relocated families by the host population should be increased by the latter's involvement in the resettlement process. It should be clearly identified during this process how much land will be provided by the host population for settlement by displace families. Estimates of their own needs in the future must also be considered so that they are not prejudiced by their offers.

Alternative agricultural methods for greater productivity from the same or less land should be assessed together with groups of relocated families. When considering the size of land required areas to be left as pastures for domestic animals and forested areas that may be used for firewood will also be planned for. MICOA recommends that future population growth be taken into consideration when planning the amount of space required for a family to settle in. All these factors should be accounted for in the calculation of land area to be attributed to each family. These criteria should be made public and discussion about their application encouraged so that all the people involved are fully aware of the process of allocation and can participate in this.

It is not planned to settle any more people in the north eastern part of the Sanctuary. By implementing an improved communication campaign to provide information and encourage discussion of its messages, awareness about the objectives of the project and the process of resettlement should be raised. Included in the information delivered should be options on how to present grievances and how to learn of responses to these.

The process of negotiating compensation must be changed to ensure the interests of the relocated families are adequately represented in the compensation packages agreed on. If the new process is identified as still not meeting expectations, the project should be willing to adjust it to the satisfaction of all parties.

Identification of the partially economically displaced households in Chibo and elsewhere who lose their access to Inhamambane Estuary for fishing should be facilitated by the census. People's compensation options and preferences should be discussed with them soon after this. Meetings should be iterative and a list of alternative solutions developed. Those who can easily resolve their problems by seeking alternative marine and freshwater fishing grounds should be encouraged to do so. Others who demonstrated that they can not should be assisted to choose viable alternative livelihood sources. These may be activities that build on their fishing skills, their fish conservation or marketing skills. Acceptable solutions may range from no action required to the need for technical and/or financial assistance provided by the project to add value to the product of their alternative activity.

(4) Groups exposed to specific risks

Specifically targeting women for assistance programmes in the areas of agriculture and fishing should help them not to be marginalised by the necessity of adapting to new livelihoods activities and local social and physical environments. Elderly people who are relocated, and the infirm or physically handicapped should also be paid special attention so that they are also able to adapt effectively to their new living conditions.

Fishers resettled in north of Chingonguene, like the rest of the fishing community in the fenced out area, risk a socio-economic isolation from the rest of the peninsula. Families of subsistence farmers living in Chibo who also fish and whose access to Inhamambane Estuary will be impeded by the impossibility of setting up temporary camps in the protected area, will suffer partial economic displacement.

(5) Relocation sites and processes

If it is discovered that there is not enough land for settlement in Marape, additional sites should be identified by the people to be resettled together with the chiefs responsible for the administration of the areas identified. The same process as carried out in Marape for involving the host population in preparation for reception of the settlers should be undertaken.

The household survey revealed that almost all present residents of Maçuale inside the Reserve area, when asked to identify their first preference as an alternative site for residence, identified Matsopane.

(6) Administration and public services

Given the mistrust expressed by families in the process of resettlement towards their leaders, it is recommended that as many decisions as possible are facilitated at the level of the community. The intervention of communication facilitators should assist in the process of rebuilding trust. This should be possible by using methods that involve open discussion of issues and where relevant involve leaders and communities together to encourage leaders' accountability to communities and families.

It is recommended that facilities are installed so that resettled families have access to potable water from community wells (one for five hundred people, dependent on distances involved), and that health and education services are also provided.

The development of marketing facilities close to Marape will be invaluable to the development of the area and the restitution of people's livelihoods.

(7) Restitution of livelihoods

The payment of large amounts of cash in compensation for loss of crops and other assets should be avoided where possible. It is advisable that a scheme for awarding compensation as part of a more varied rehabilitation package is offered so that there is a better guarantee that the funds are used for rebuilding livelihoods rather than spent on short term improvements to the families' lifestyles. This may be carried out via the Kawene Community Trust if appropriate.

Livelihoods rehabilitation activities focusing on women should promote the roles they habitually take in the farming cycle, fishing, resource collecting and processing activities.

Alternative livelihoods repair strategies offered should be made known to families to be resettled during their first encounters, and discussions about compensation should explicitly include this subject. Opportunities should include:

- Prioritised access to employment opportunities during the moments of privation of all subsistence income from agricultural activities;
- Relocation to places outside of the settlement area in Marape if the socio-economic advantages of this can be shown, adequate space is available, and the leaders and host population are in accordance;
- Learning about and obtaining adequate support to develop alternative low-cost, low-input farming methods that permit families to reduce the land-size cultivated without any loss of total production value, and perhaps even gain;
- Prioritised access to off-farm income generating activities promoted by the project;

- In the case of families highly dependent on fishing for their livelihoods, if the loss of access to fishing is for any reason not able to be solved by alternative fishing locations and assistance to establish the activity again, special attention should be paid to these families being prioritised for fishing-related income generating activities, other income generating activities or skills development for tourism related activities for example.

6.2.3 Mitigation measures related to cultural heritage

A significant case of lost cultural heritage is that of the *hossi ya missava* Uantene Singo. It is not possible to avoid affecting him since the area he is responsible for lies in the heart of the Reserve area. The sanctuary recently came to an agreement with him to compensate his family with a very large amount of cash, continued access through the v-gates nearby and extra land and houses that were accepted as adequate in relation to their losses.

Short-term monetary compensation for the long-term loss of cultural heritage, however, is not really an appropriate compensation but if it is accepted then it is one way of managing the issue. It does however create a negative precedent and expectations of compensation levels that may not be understood by other potential resettlers if the justification is not clearly shared as common information initiated by the sanctuary and Singo himself.

Offers were made to include this leader in the conservation management of the protected area but apparently this was declined in favour of cash recompense. This is unfortunate since it would have been a useful precedent. In respect of the cultural values surrounding the figure of the *hossi ya missava*, it is recommended that Uantene Singo and the other *tihossi ya missava* are among the first to be approached with the intention of involving them in the shared management of the protected area.

6.2.4 Other impacts

(1) Conservation programme planning and management

Since their arrival on the peninsula, the people of Quewene have tried to regulate their social relationships and their relationships with the natural resources around them. They perceive that the value of natural resources is integrally related to their use, and people's behaviour in relation to this. They agree that the ancestors may be called upon by people to return anomalous situations to the norm, or to balance the imbalanced. Land owners and the *hossi ya missava* (supported by some traditional healers who are also clan leaders) are recognised as the legitimate people with the rights to act on behalf of others and in the interests of the community to secure continued good relationships with their physical and spiritual environments.

In this respect, the concept of conservation of natural resources is well known. The 'ownership' and use of resources is the basis of their valuation. The differences between these values and those underlying the management systems the sanctuary project will use in relation to protected game kept for the purpose of tourism, needs to be fully explored by both

parties and a common basis of understanding reached. The control and management of resource-use in and outside of the Reserve area and how this positively affects communities is not understood by the communities at present. This is an example of one of the difficult areas to be addressed with the community.

Other key and complex areas to be addressed must include:

- The concept of land ownership (and use-rights and community priorities) which is already understood on one level as having been lost - sold to the sanctuary. Widespread perceptions that the sanctuary is “taking away our lands” will all have to be carefully discussed and rights clarified as part of the process of creating awareness about the project and encouraging participation in its development.
- The *hossi ya missava* of Matsopane refused a role in conservation management of the area presented as compensation. His refusal to participate in the management of the area as a compensation condition should not be seen as a reason not to involve him and the other traditional leaders in the conservation management system. However, promoting community responsibility for the area must be as coherent and consistent as possible; otherwise it will be lost altogether.
- The role of the ‘chiefs’ or local leaders should not be that of policing as it has been. Their traditional roles, of sanctioning use and regulating use through facilitation and intercession are not easily promoted when the regulations they impose are not their own. Diminishing the “us” and “them” situation prevailing at present is essential if communities are to respect and willingly support their leaders and external conservation principles.

Mitigation must take into account the following conditions:

- Local people’s views on the choice and design of conservation measures – from the alignment of the fence, on to involvement in management and implementation of specific activities – must be considered at all times. Incorporating community views in decision-making should be an integral part of the management design, in order to compensate them in ways that have equal or more intrinsic value than before the arrival of the project. Subsidising the elders to monitor and control misuse of the environment is a part of the management system, but currently it is taken out of context for a number of reasons, most of which are very difficult for the project to directly redress, since they are part of a historical legacy of political motivation and the insensitive role of past governments.
- Fundamental to the success of the process of involving the community and its traditional leaders in the management of the conservation initiative is the need to convince communities and their leaders of the genuine intentions of the project to listen and learn from the local residents. Up to now, this has not been evident, with some approved plans, policies and procedures that would have gone a long way to prevent the current situation, not having been implemented after more than 18 months (Lambrechts 2002b). Working with the communication facilitators, using appropriate media and concentrating on listening to key issues such as community participation in

deciding about the fence alignment, will have a major impact on the perceptions of the community.

(2) Conflict management

Conflicts arise in communities and between groups who perceive their interests about a shared history or a common resource as different. One of the initial objectives of the community development programme using the communication strategy should be the creation of platforms for communities to be able to negotiate conflicts occurring in relation to the impacts of the Sanctuary project.

In the first instance the existing systems of leadership, decision-making, dispute arbitration, and other components of local management systems must be recognised by the project. The customary system as has been shown in the baseline study has weaknesses and suffers increasingly from its irrelevance in the face of changing needs and lifestyles. Thus it should be a medium term objective to bring the following elements effectively into collaborative decision-making:

- The importance of the *tihossi ya missava* (pl) and their support structures in providing the basic values and regulatory systems;
- The rising role of the churches in which new local leaders have emerged, some regaining lost authenticity and others acquiring it for the first time;
- The role of the legally legitimated Community Court system.

At community level, many experts agree that local management systems and systems for resolving conflicts may be better understood and used by working with communities to visually illustrate processes and systems (Thompson 2002). Identifying resource-use and interaction patterns with local residents might start with the land in the resettlement areas. Local perceptions of resource rights and the community's history in the area will be revealed and discussed. The focus on different interpretations of past events and agreements that have given rise to conflicts should help pave the way for management potential conflicts in the future. Participatory mapping and recording situations will provide the raw material for management of collaboration and management of conflicts.

Baseline research identified some of the existing processes for conflict management at community level. Conflicts are treated differently depending on their subject matter as can be seen below:

- Family or domestic conflicts that have not caused physical injury can be dealt with by the family or the church;
- For conflicts involving women's issues, particularly related to marriage, these are generally discussed by women initially and where impossible to resolve between them, are resolved by men - elders, husbands and religious leaders. Of this group, often the religious leaders are preferred;

- Wider clan or community issues such as inheritance, access to land or ones involving rituals to rectify, are dealt with by the community and Zone Chiefs initially, who may pass this to the *hossi ya missava* and Circle Chief;
- Disputes involving land generally terminate with the *hossi ya missava* who has the customary authority to adjudicate and resolve them;
- Cases of theft, adultery and physical injury may be passed on to the Community Court which has the authority to resolve them at this level;
- Civil and criminal cases are generally dealt with by the police and District Court in Vilanculos, thus assault and deaths are dealt with outside of Quewene.

General development issues are usually handled by the Administration structure with support from the *hossi ya missava*, and with reference to fishers, by the Fisher's Committee and President. Development related conflicts are usually the business of the Local Administration: the Zone and Circle Chiefs and the President of the Locality. From the President of the Locality cases may pass to the Community Court, but these days they tend to be sent straight to the police in Vilanculos.

The Sanctuary has been seen to be encouraging the by-passing of the Community Court, particularly concerning transgressors of the conservation regulations who have been dealt with in Vilanculos. However it should be noted that a little over half of the cases of theft dealt with by the sanctuary have actually involved people originating from Vilanculos.

(4) Alternative livelihood sources and participatory planning processes

Opportunities for employment with the project are a priority expectation of most able people in the sanctuary – particularly of families being resettled. The prioritisation of people to be employed in the seasonal labour groups should indeed include members from the families being resettled.

It has been noted that marine resource-use and probably terrestrial resource-use will not be sustainable in the longer term (in the case of the larger ungulates and other herbivores, the resource has been over-exploited to the point of local extinction; see Part B and D). For alternative livelihood sources to be taken up easily they should not involve a major change in activity. Thus the suggested areas of aquaculture, protected area management and tourism development should be encouraged together with permaculture, improved marketing systems and other appropriate agribusiness activities such as market gardening, improved small animal production and honey production. Off-farm activities such as the promotion of cottage industries for handicrafts and of cultural activities by youth groups might also be considered.

Provision of credit and savings facilities should depend on the availability of expert advice in the area and be based on rigorous repayment schedules. This would most effectively be offered, at least initially to the traders and fishers who have the best bases for repayment.

Participatory planning at community level will permit the project to learn about and respond to community needs in the most appropriate ways. Participatory planning should be

facilitated by trained personnel. Their training and preparation to carry out the process should be a prioritised investment. These people should be recruited locally where possible, and should benefit from full-time supervision by someone experienced in community development and communication processes. The spread of this approach to all decision-making affecting communities should be espoused and promoted through structures and systems that are established for consultation and feedback as a core management tool of the project.

(5) Support links with relevant services and programmes

Setting up an effective system for integrating the community into the conservation initiative as well as providing them with opportunities for participating in local development activities may be done through contracting an external agency or a TDS on a temporary basis with the aim of building local capacity to manage the process in the future, or by recruiting individuals directly so that they work for the project or the Kawene Community Association. A third alternative might be a mix of the above two, so that supervision is provided by a staff member and a hired or seconded field team is drawn from an organisation dedicated to participatory community development facilitation that has staff members that speak the local language.

Appropriate organisations that could be contracted to provide development intermediaries or facilitators might be international NGOs based in the province or district with good track records in the field. Local NGOs might be useful, but while they use field workers to facilitate their projects, very often restricted budgets and the steep learning curve that they must go through in order to become established do not lend to the production of effective facilitators – instead they tend to be people who lead rather than facilitate from behind. However there are exceptions and these may be useful to the Sanctuary project, since they are generally cheaper and have the potential of being more sustainable.

If a commitment is made to establishing an effective communication-based model for participatory development, participation of the Vilanculos community radio and television station to provide technical assistance and facilities might be very advantageous. Other quasi-government agencies familiar with the approach might include the rural water programme and the low cost sanitation programme, and the independent improved latrines project animators in Vilanculos, all of which use facilitators or animators in a (social) marketing approach.

The District Directorate of Agriculture and the Provincial Agricultural Extension Services might be useful to provide supervision or possibly implementation support to the agricultural development programme, to assist the full-time extension officers who will be employed.

(6) Monitoring land use in sensitive areas

If participatory mapping is carried out as a means of better understanding the land ownership and use systems and preparing platforms for future management in the resettlement areas, the creation of a community organisation to manage or supervise the cede and use of the land

would be highly appropriate. As was pointed out elsewhere in the BMP (Part L), an elected Community Representative Committee (CRC) together with various sub-committees dealing with specific aspects (marine and wildlife utilisation and agricultural development) will be established. Among the responsibilities of the CRC would be its involvement in monitoring land use.

Land-use monitoring should allow participants to learn about the effects of improved agricultural and resource-use systems, and lessons learned can be incorporated into the wider conservation management participatory planning process. It would be useful to link monitoring and learning lessons about land management in the community areas with activities in the protected area, so that the learning process and buy-in to the conservation effort may become more widespread.

(7) Incentives to conservation accountability

A basis for accountability may be established by sharing lessons learned during development of the community related components of the project and involving local leaders in a process which analyses progress and impact and recommends best practices. Awareness of the negative consequences of unsustainable resource use may force people to change their habits, but opportunities for securing their livelihoods in ways that are more productive and/or profitable than previously will obviously be a more attractive way of encouraging change. As such, the careful design of eco-tourism and conservation oriented livelihoods alternatives can provide examples that raise awareness about the added value of improved practices.

The use of communication tools to provide testimonials and to record stories of success and failure would be key to the process of convincing people to change their ways, thereby becoming accountable themselves.

(8) Influx management

It is assumed that development activities on Quewene will attract outsiders. Although the project reserves the right of admission to the area, in-migration is likely to be a process that is subtle and initiates with the return of family members and extended family members to the peninsula hoping to obtain access to some of the opportunities available.

Communities on the peninsula are very aware of the distinction between themselves and 'outsiders'. Already they are involved in identifying fishers who are not from the area, social pressures tend to isolate these people and the local community is aware of competition for resources. To date this has been mostly associated with fishing practices, where local fishers have noted the depletion in fish in recent times (Odendaal 2002). In relation to employment with the project, the people have also been quick to criticise apparent preferences for outsiders in various positions. Community awareness that resources and opportunities are limited is a useful premise for managing potential stresses on services or loss of opportunities for local people by the influx of others from outside the area.

The project should use the channels established for the communication process to assist in identification of signals of influx, and together with the communities who identify this, decide together what action should be taken. The implications of increasing population numbers should be shared with the communities as part of the awareness-raising task of the communication strategy.

A programme to raise awareness of the negative health impacts of influxes of outsiders into the community might include issues such as reproductive health and HIV/AIDS prevention. When the new health unit has permanent staff, this task will build on their normal health education responsibilities, and they may consider training local health promoters in this respect.

6.3 EXECUTION OF MANAGEMENT AND MITIGATION MEASURES

6.3.1 Implementation structures and procedures

The management and execution of the multitude of community-based factors dealt with in the preceding discussion, will be dealt with according to the same principles as outlined for the other programmes (marine resources, terrestrial resources and agriculture) elsewhere in the BMP, and by the same and/or new management structures.

This has the following implications:

- The VCWS-GM and his community affairs staff will be directly involved.
- Temporary Duty Specialists (TDS) will be appointed as and when necessary to give effect to the above recommendations.
- The CRC will play a leading role in all respects, including the sub-committees dealing with various levels community-based projects and also the community structures (traditional leaders) as outlined above.
- The GEF Project Manager (Implementation) (see Part L) will be involved in the appointment of TDS's, in the Operational Plans (OP) (see below) and in monitoring and evaluation.

6.3.2 Operational plans

The Resettlement Action Plan (RAP), Community Development Plan (CDP) and Public Consultation and Disclosure Plan (PCDP) will be dealt with separately in Part H of the BMP below and will address and/or include the abovementioned recommendations and shortcomings. A number of OP's will be compiled, with the assistance of a TDS, to give effect to the implementation of the RAP, CDP and PCDP, thus dealing with the abovementioned recommendations.

CHAPTER G7: MONITORING AND COMPLEMENTARY STUDIES

Participatory monitoring and evaluation putting emphasis on community involvement in data collection for monitoring key areas such as land and resource-use monitoring, grievance

monitoring from the resettlement process and other key issues will also provide data for assessing the impact and effectiveness of communication inputs. Monitoring wherever possible would be participatory so that the opportunity for raising awareness about changes for good and bad are built into the management system. (As such it would be in line with the principles of co-management and community involvement outlined for the other projects such a marine and terrestrial resource utilisation and agricultural development; see Part D) Monitoring of baseline data should take place at regular intervals with annual evaluations that can more firmly establish the changes in impact.

7.1 LAND USE AND NATURAL RESOURCE-USE MONITORING

7.1.1 Background

The exercise of participatory mapping of land ownership and use rights must be carried out so that actual use of the land can be updated in the form of overlays over time. The use of resources within the settlement areas and outside of them can be monitored at the same time through overlaid mobility maps, and assessments of the status of the resources being used made by the communities involved. This process will raise the awareness about the need for appropriate management of resources. It will also provide data for the communities and project to use in participatory planning exercises and if necessary in the management of conflict situations that may emerge.

The priority areas for monitoring will initially be the resettlement areas. Other sensitive areas where competition for land and natural resources may cause conflicts should be identified by communities as the project develops and may also be included in the monitoring programme.

Also refer to the RM&E strategy and projects outlined in Part M of the BMP.

7.1.2 Combined natural resource management study

It would be necessary to carry out a study of the customary management and use of common resources, wildlife and forestry use rights for consumption and recommended regulations for the management of these. This would be used as the basis for the articulation of community participation in conservation management of the protected area. Alternative management models might be beneficially discussed. The results would be written up as an OP.

7.1.3 Study of access to the protected area

The construction of v-gates in the game fence is intended to allow for the passage of people at any time into the Reserve area. After the introduction of large game into the area, albeit well dispersed, people passing through the Reserve area will not be safe, even though the risk of a major mishap would be relatively small. A study of the potential dangers that the wildlife may have on people using walking access into the protected area and an assessment of the effects of this on their resource-use and socio-economic status should be conducted. Part of this study should be carried out in a participatory fashion with primary stakeholders.

Their participation will generate their awareness of the options and potential consequences and may result in better acceptance of the results.

7.2 RESETTLEMENT MONITORING

Monitoring of the socio-economic status of resettled families would need to be undertaken so that the most vulnerable, those who are not using improved farming techniques or participating in alternative livelihoods improvement activities may be identified early. This will facilitate targeting assistance to prevent an increase in their vulnerability. Monitoring may be carried out by the facilitators to update information on key indicators that were used in the baseline survey. Other indicators of participation and reference to the individual assets inventories for each family obtained prior to their leaving their original residences should also be made use of.

Monitoring indicators such as land size cultivated, investments made, mobility mapping for social and economic tasks, and ownership of key goods (proxy wealth indicators) will permit assessment of the socio-economic impact of resettlement and livelihood restitution, and provide forewarning if families are encountering difficulties in re-establishing their lives.

7.3 HEALTH MONITORING

While health is a significant indicator of development progress, reliable information about health is not easy to acquire. The operationalisation of the health centre in Machuquele might be useful for carrying out monitoring of the illnesses treated there. The figures will not however be useful absolutes initially because the start-up phase of such a service will go through all sorts of local experimental visits as the people test out the treatment and decide if it is a worthy alternative to their customary health-seeking behaviours. Furthermore, as was already pointed out, especially the northern communities would find it difficult to access the hospital due to the distance involved and their ailments would not be reflected in the statistics. After one or two years, the statistics will start to reflect the prevalence of illnesses in the area, as people have become convinced of the usefulness in visiting the centre.

There are many intrinsic problems with the statistics collected from basic health centres, including the registration of problems that the health centre can manage and not of the others. A classic case is the classification without the aid of laboratory proof of most fevers, headaches, and many types of diarrhoea and other problems as malaria. Other real diagnostic difficulties also influence the statistics.

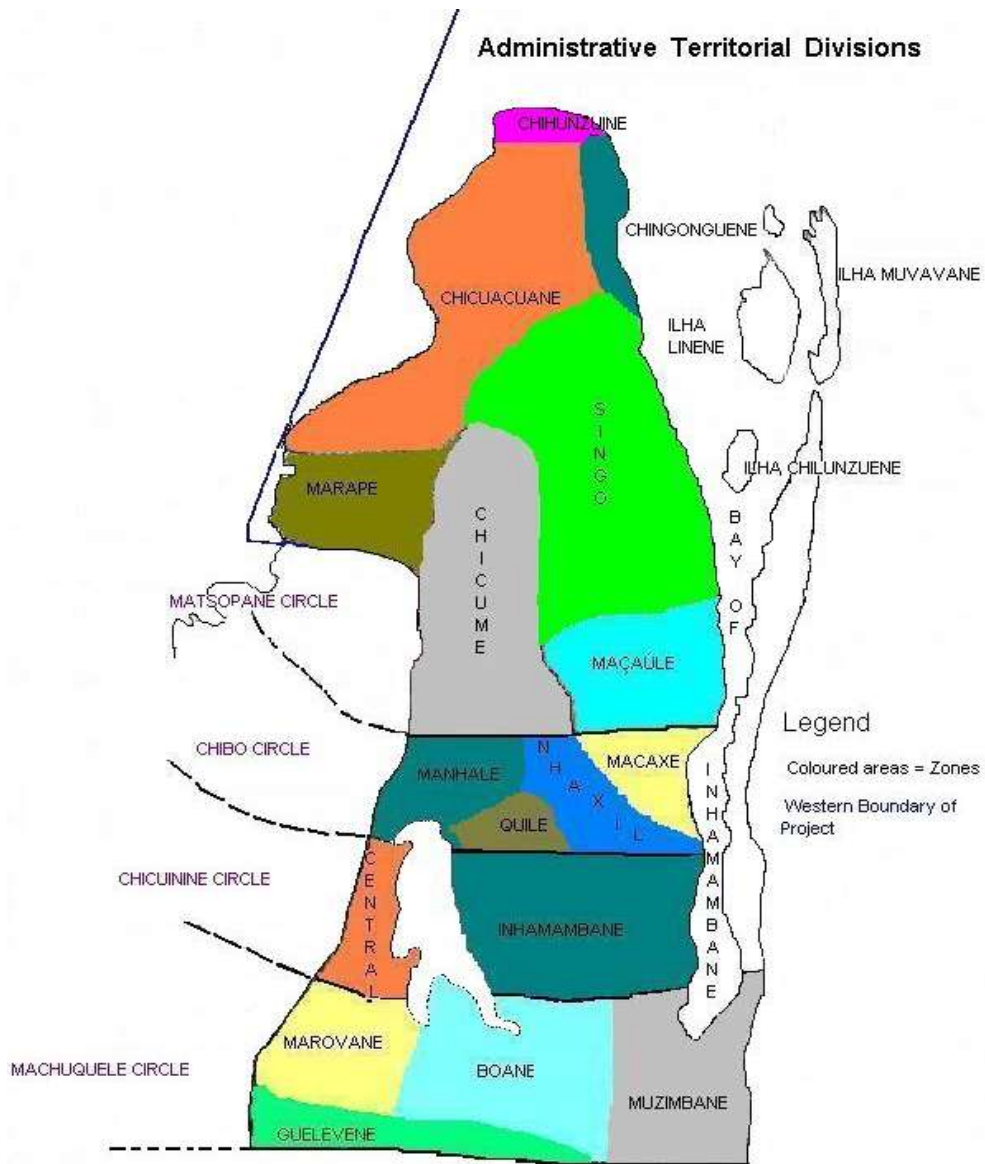
Collecting health information directly from families through monitoring surveys is useful up to a certain point. However, recall is very poor over long periods. This undermines the validity of responses about illness occurrence over long periods of time. Thus it may be useful to have a small group that is monitored fairly regularly and others who are monitored at longer intervals but using questions based on short recall periods such as two weeks.

- The group monitored fairly regularly could be a group of women who live close to the health centre or could be a group of school children in each of the two existing

schools. These are vulnerable groups and can provide information about disease prevalence and could possibly be requested to present themselves for physical monitoring of nutrition-related indicators.

- Monitoring at longer intervals might be most usefully conducted with a sample that includes families who have been resettled and others who have not. It might include a sub-component where school children are asked to monitor the nutrition of their families over a period of a week for example. This participatory exercise is often seen as fun, it gives children a book to write in and a task, and helps them to learn about the relationship of food, nutrition and health at the same time.

Participatory maps – Administrative divisions, historical migrations and resource-use



PART H: COMMUNITY AFFAIRS: SOCIAL ACTION PLANS

The three Social Action Plans that follow are based on the Social Impact Assessment (SIA) and rationale discussed in Part G above.

CHAPTER H1: RESETTLEMENT ACTION PLAN (RAP)

1.1 PRINCIPLES AND POLICIES FOR THE RESETTLEMENT ACTION PLAN (RAP)

1.1.1 Purpose

The purpose of this RAP is to document the resettlement process that will be undertaken to physically resettle 62 households (and more during the following phase once the fence has been finalised) and to develop alternative livelihoods for these and other households currently mainly reliant on swidden/shifting agriculture (which is not permitted in the sanctuary) and artisanal fishing, which will be restricted to some extent.

1.1.2 Operational context

The planning principles that led to the formulation and the structure of the RAP are based on the World Bank Operational Policy OP 4.12. (December 2001) and the IFC's draft "Handbook for Preparing a Resettlement Action Plan" (February 2001). The most important of these principles may be summarised as follows:

- The OP 4.12 on Involuntary Resettlement ensures that the population displaced by a project receives benefits from it. This covers those with usufruct or customary rights to the land or other resources taken for the project.
- The OP is inclusive, ensuring that all those affected both directly and indirectly by project developments are compensated as part of the project.
- Resettlement covers *physical displacement* and *economic displacement*. Thus the need for resettlement and compensation not only refers to the impact of the development on displaced people having to move from A to B, but also to the impact on the economic resource base and means of livelihood of local communities. The absence of legal title does not limit rights to compensation. Preference should be given to land based resettlement strategies for displaced people whose livelihoods are land-based. If the provision of land should adversely affect the sustainability of a protected area, or sufficient land is not available, non-land-based options built around opportunities for employment or self-employment should be provided in addition to cash compensation for land and other assets lost. The lack of adequate land, if any, must be demonstrated and documented.
- The policy clarifies the principles covering household resettlement and restricted access rights. The policy is specific about the resettlement in the case of loss of access rights linked to the designation of protected areas.

- The need to involve communities in the planning and implementation of interventions that result from these policies is stressed.
- Conflict resolution mechanisms should be identified as part of the above planning and implementation.
- Particular attention must be paid to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples and ethnic minorities.
- Implementation of resettlement activities must be linked to the implementation of the investment component of the project to ensure that displacement or restriction of access does not occur before necessary measures for resettlement are in place. Measures prior to displacement include provision of compensation and of other assistance required for relocation, and preparation and provision of resettlement sites with adequate facilities. In particular, the taking of land and related assets may take place only after compensation has been paid and, where applicable, resettlement sites and moving allowances have been provided to the displaced persons.
- Cash compensation for lost assets should be paid for livelihood sources that are not land-based. Compensation levels should be sufficient to replace the assets at full replacement cost in local markets. The World Bank Environmentally and Socially Sustainable Development Network (ESSD) definition of losses requiring compensation also includes the case of people who may lose the right to use resources without losing possession of them. Such involuntary loss of access to resources may also be considered involuntary resettlement. Payments may be staggered to facilitate their use for livelihood restitution where appropriate.
- Displaced persons and their communities, and host communities receiving them, should be provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement. Appropriate and accessible grievance mechanisms must be established for these groups.
- Infrastructure and public services must be provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities.
- Alternative or similar resources should be provided to compensate for the loss of access to community resources such as fishing areas, grazing areas and fuel resource areas.
- Patterns of community organization appropriate to the new circumstances should be based on choices made by the displaced persons.

1.1.3 Socio-economic context

For a full background on the social and other factors that may influence the resettlement action on VCWS, see Part G above. The following brief socio-economic outline indicates the socio-economic context within which the RAP was developed:

- Some 1,036 families whose livelihoods are currently mainly based on subsistence swidden agriculture and small-scale artisanal fishing inhabit the VCWS area. The majority of these families will continue to live in the project area but approximately

8% will be moved during the first phase to make way for the installation of the protected area and some of the private tourism developments. This number will increase once the final Reserve area has been demarcated and fenced and the people living there have to be resettled.

- Results of the household survey demonstrate that around 93% of the population surveyed are agriculturalists. Forty eight percent depend solely on agriculture, 4% solely on fishing and 45% on a mixture of fishing and agriculture. The remaining 2% depend on private employment and the remittances of dependents. Thirty six percent of families have at least one member earning a salary. In the past people hunted and gathered many wild products. Now this practice is only pursued during times of food scarcity, or for the collection of materials for construction or healing for example.
- Fifty eight percent of the families interviewed have illiterate household heads, the rest being able to at least read and write. Only 19% of family members in the whole sample were able to read and write or had been to primary or secondary school. Forty four percent of these people were women and only four men in the whole sample had second level primary education
- The highest numbers of families depending solely on agriculture were found in Matsopane (32%) and Machuquele (37%) Circles, and families with mixed activities were mainly in Matsopane (40%) distributed through Chicume, Maçuale and Chingonguene. The families interviewed who solely obtain their livelihoods from fishing live in Chingonguene and Inhamambane.
- Indicators of security and wealth in relation to the activities practiced above were identified as fishers owning boats and fishing equipment, and agriculturalists cultivating larger than average land sizes. Interestingly 64% of boat owners were found to carry out both fishing and agriculture. The household survey showed that one family in Chicume has four boats, one in Chingonguene has three and the remaining 12 boat-owners have only one boat. Fifty seven percent of boats were used in the Inhamambane Estuary and 14% in Lake Manhale. Marine resources are more highly valued than fresh water fish because the catch can be sold more easily at a high price, is tastier, and is made up of different varieties.
- The average land area used for cultivation is 1.7 hectares. Only 6% of families use over 4.5 hectares, these being families living in Inhamambane, Marrovane and Chicume. Most families with only two or three family members who cultivate more than two hectares of land, and who hire labour, are found in Machuquele Circle with single examples in Singo and Inhamambane. Approximately 88% of the agricultural produce from the past year was used for subsistence. Survey results confirmed that the sale of alcohol distilled from sugar cane is the most commonly marketed agricultural product (over 50% of families interviewed participate), and is the highest source of income from agricultural products at an average of just over US \$100 per month.
- Despite not being identified by focus groups as a priority indicator, the frequency of corrals for the keeping of pigs and goats is an important indicator of capital retained by a family. Seventeen percent of homes visited had corrals.
- Constraints: People cited the lack of money, or in the case of fishers and traders investment capital, as one of the main constraints to improving or expanding their activities. Twenty two percent of families identified the lack of labour for the

workforce as the main constraint to improving their agricultural situation. The lack of seeds, lack of arable or appropriate land for cultivating and a small proportion of enterprising people living in the south and centre of the sanctuary claimed that the lack of animal traction is hindering their agricultural development. One of the greatest constraints to improving the value of livelihood activities is the lack of facilities for markets and marketing. There is no land transport and the costs of portering of goods are very high. Most valuable products are drawn out of the area to be sold in Vilanculos, thus undermining the local market.

- The rapid expansion of small businesses through the peninsula in the last months has been phenomenal in comparison to the past six years of steady increase. This is a result of increased money circulating in the area due to the employment of various people on the project and compensation payments being used to purchase goods and set up more small businesses. Although the aspiration of most people is to do well in business, it is not easy, and the handicap of not having a high enough education is acutely felt here, particularly by women left to tend stalls for their husbands.
- The peninsula has no electricity. It does have two first level primary schools constructed of local materials and in very poor states of conservation, one community shallow well in a bad state of degradation and hygiene, a few single track sand roads and a health centre in its last phase of construction. Access to improved public services is only available in Vilanculos town eighteen kilometers across the bay, or two days walking away.
- Socio-economic status of displaced households: A detailed baseline survey of all households whose built structures will be displaced by the development and those whose existing economic activities will be displaced has not yet been carried out. This is one of the first activities scheduled to be carried out as part of the resettlement action plan. Results of this inventory will provide the basis for analysis in this part of the report.
- A review of data for the 24 families moved in Phase I of the resettlement programme has not yet been made available by the sanctuary project (November 2002).

1.1.4 Ownership of the project

The land and other natural resources of VCWS belong to the people that “own” and till the land. “Ownership” of the RAP, in all its facets, would thus also be vested in the local communities.

However, as would be clear from what has been said above (see also Part D) and the following discussions, external management assistance and even intervention would be needed in order to make the plan work. The principles of partnership and active participation as embodied in the developmental policy of co-management (collaborative management) as described elsewhere in the BMP (see Part C) would be applied, to ensure that the community retain collective control of the project and of their individual destinies whilst operating within the parameters of the RAP.

Although “ownership” rests with the local people, accountability to make the RAP work and responsibility to carry it out, rests squarely with the developers.

1.1.5 Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the following model for the resettlement of affected households in VCWS is loosely based on the abovementioned operational policies of the IFC as well as the models for marine resources, terrestrial wildlife and agriculture as discussed in Part D of the BMP. The RAP is, for the sake of brevity, not described in the same detail as the marine, terrestrial resources and agricultural plans. Many of the planning and operational principles embodied in these plans would *situ situ* also be applicable to the resettlement plan, and should be read in conjunction with the RAP that follows below.

1.1.6 Lessons learned

In the “lessons learned” section of the three plans mentioned above, but especially the marine resources plan (see Part D) particular attention was devoted to lessons that could be learned from past experience and other projects. These lessons were discussed in some detail and would not be repeated here. Notwithstanding the fact that they dealt with a marine resources plan, they could be universally applied and should also be considered when planning, implementing and managing the resettlement plan.

The following “lessons” were listed:

- Timing (little time is left to launch and execute the RAP)
- Scale (the plan is complex but still tractable)
- Project size (the 12-point plan breaks the RAP down in manageable units)
- Communication (local communities need to be informed; poor communication of the past need to be rectified)
- Participation (RAP must be community driven, although execution will largely be a sanctuary management responsibility)
- Decentralisation (use the local civil authorities)
- The human resource (also involve women and youth and prevent their exploitation)
- Cost and benefit (real benefits will lead to behavioural change)
- Private sector involvement (foster private sector initiatives inside community)
- Monitoring and evaluation (involve the community)
- Research and data collection (involve the community)
- Sustainability (build human capacity)
- Ownership (vested in the affected people; they must have a say in their own destiny)

The results of many resettlement projects in developing countries have been fully chronicled. The successes and failures and the reasons for it are well known, as are the many pitfalls that should be avoided. In the case of VCWS there would thus be no need to reinvent the wheel, although it must be stressed that the shortcomings of the first resettlement exercise in particular and the lack of proper community structures and poor communication in general, need to be addressed.

The local communities, but especially those that would be affected in some way or other by the resettlement programme, would have to be involved in an active and participatory manner right from the beginning. The principle of co-management (see Part C) will be applied to ensure that the RAP becomes owned and driven by the local people themselves.

1.1.7 From lessons to principles

A resettlement plan deals first and foremost with people, and only involves the environment and specifically biodiversity in a peripheral and almost incidental manner. Such a plan will obviously differ in many respects from natural resources-based plans. The planning and execution principles that were considered and accommodated in the formulation of the RAP, however, were generally similar to those used for the abovementioned marine, terrestrial and agricultural plans and may be summarised as follows:

- The plan will be as simple as possible in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.
- The plan will not be built on sustained outside intervention and funding, but implementation and accountability will be transferred to the “owners” of the resource as soon as possible.
- The plan will only succeed if the local communities perceive and experience the plan to be fair and transparent.
- The RAP, once the BMP is approved, will be workshopped with the local people in a organised manner involving facilitators and modern communication techniques.
- Without the formal community structures as outlined in the RAP below and elsewhere in the BMP (see Part L) being put in place, the implementation of the plan would be seriously jeopardised.

1.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE RESETTLEMENT ACTION PLAN

A 11 – point procedure for implementing the Resettlement Action Plan for VCWS

A simple 11-step process, based on the same principles and procedures as the abovementioned marine, terrestrial and agricultural plans, will be applied to the implementation of the RAP for VCWS. The steps are not as closely interlinked as for the natural resources plans, but nevertheless form a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may cause the entire resettlement management process to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion.

The 11 steps are:

- Step 1: Establish an organisational framework
- Step 2: Draw up an implementation schedule

- Step 3: Determine potential impacts and magnitude of displacement
- Step 4: Identify key issues
- Step 5: Review of legal and policy framework
- Step 6: Determine eligibility and entitlement
- Step 7: Evaluate assets
- Step 8: Determine resettlement options
- Step 9: Influx management and control
- Step 10: Establish and implement grievance procedures
- Step 11: Establish procedures for and undertake monitoring and evaluation

1.2.2 Application of the 11-point plan

For each of the steps the purpose is briefly noted, the rationale is given and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers (threats) may be provided.

STEP 1: ESTABLISH AN ORGANIZATIONAL FRAMEWORK

(1) Purpose

The purpose of Step 1 would be to ensure that the organisational frameworks that would be necessary to implement the RAP, is established.

(2) Rationale

As was the case with the marine, terrestrial wildlife and agricultural plans dealt with elsewhere in the BMP, the RAP would be dependent on similar organisational structures to ensure that the plan gets implemented in an orderly fashion.

(3) Actions to be taken

Resettlement and compensation of project affected people will involve the *Sanctuary Steering Committee* as the decision-making body regarding application of policy and operational planning, coordination and supervision, after consultation with the *Community Representative Committee* (CRC). The Steering Committee should analyse the results of the population census currently being undertaken, and recommend investigative follow-up for all identified cases of people affected by the project activities. The Steering Committee should review progress with resettlement issues at its monthly meetings and will, together with the CRC, also be responsible for the redress of grievances.

A *Community Development and Resettlement Task Force* comprised of the Project Leader: Community Affairs, at least two members of the District Government which include a representative from the District Directorate of Agriculture and Rural Development, the Community Development Advisor from Goshen Community Development Centre, the President of the Locality, nominated Circle and Zone Chiefs for the inhabited areas inside the protected area, two members of the CRC and a contracted TDS would need to be established

and should be responsible for organizing and where possible participating in consultation and negotiation of compensation alternatives with the project affected people. The Task Force should also be pro-active in verifying which fishers use the Inhamambane Estuary based out of temporary camps in the protected area in order to verify individual claims made to this effect.

The government members of the Task Force should be drawn from the team delegated to the sanctuary project by the District Government. Their participation should be financially assisted so that their costs of travelling and staying in the sanctuary are covered. The Task Force should supervise physical resettlement and compensation payment ensuring that the whole process is documented adequately from the initial meetings, through negotiation and contract agreements on compensation and timing, to receipt signature for all compensation.

Responsibility for monitoring and providing follow-up assistance to resettled families should be organized from this level through a team of approximately four hired or seconded local *social plan facilitators*. The facilitators should each be allocated between 25 and 30 households to carry out the tasks of providing information about the resettlement process, the compensation policy, listen to grievances and to communicate with the Task Force member responsible for management of community development and resettlement so that problems may be identified early and dealt with in a timely fashion.

When additional technical assistance is required for the supervision or quality inspection of activities such as water supply, agricultural extension and communication these should be sought from TDS's, and/or government and/or NGO sources in the District or from elsewhere in Mozambique.

At the level of the community the two resettlement areas should each have a *Resettlement and Development Committee* constituted by members of the host and resettled community, local influence leaders from the church and other institutions at this level. If new resettlement areas are identified they too should create a local Resettlement and Development Committee. Women should be represented on the Committee as settlers or members of local institutions of influence. The Committee's principle objectives are to ensure justice and equity at local level and to channel grievances to the Task Force. Committees in Marape and Chingonguene / Chihunzuene should be set up as early as possible (in the latter case to manage the first phase resettlement monitoring, grievances related to re-establishment of livelihoods and the effects of living isolated from the rest of the peninsula), in order to facilitate the smooth application of appropriate assistance and providing help to families in selecting appropriate livelihoods strategy alternatives.

None of the resettlement structures should be dismantled until full rehabilitation of relocated families has been achieved. It is expected, however, that by that time the structures themselves will have changed their roles so that they are monitoring and facilitating the process of development in the community rather than of rehabilitation.

STEP 2: DRAW UP AN IMPLEMENTATION SCHEDULE

(1) Purpose

The purpose of Step 2 would be to draw up an implementation schedule to guide the implementation of the RAP.

(2) Rationale and actions to be taken

A draft implementation schedule has already been prepared (Thompson 2002) and appears below. The Task Force (see above) must consider/adapt the draft and approve a final implementation schedule.

Summary Implementation Schedule – Resettlement Action Plan

Resettlement Phase II (and communication programme)	Agencies Responsible	Quarters											
		Year 1				Year 2							
		1	2	3	4	1	2	3	4				
Design communication strategy	Project Leader, communication specialists, facilitators	■											
Develop materials	Communication specialists		■										
Complete census	Census team	■											
Demarcate settlement land	Social Development Task Force, host population	■											
Recruit / second facilitators and extensionists	Steering Committee, Social Development Manager	■											
Design and implement facilitation and communications training and capacity development programme	Project Leader, communication specialists, trainers, facilitators		.....									
Verify project affected people and raise awareness about process of resettlement	Task Force and facilitators												
Complete assets inventories and establish compensation amounts	Task Force and facilitators	■											
Establish grievance communication and redress system	Task Force, Steering Committee, Social Development Committee, facilitators, CRC		■										
Help families choose settlement sites and land areas	Community Development Centre (Advisor & extensionists), facilitators		■										
Complete housing & related infrastructure	Community Development Centre		■										
Pay compensation	Task Force, Steering Committee, Social Development Committee, CRC			■									
Establish Community Resettlement and Development Committees (CDRC)	Task Force, Steering Committee, CRC	■											
Train new settlers in permaculture	Community Development Centre (Advisor & extensionists)					.....						
Assist in the re-initiation of principal & alternative livelihood activities	Community Development Centre (Advisor & extensionists), facilitators					.....						
Adapt and refine the resettlement programme in response to M & E reports	Task Force, Steering Committee, CRC									.....		

Design and implement monitoring systems	Steering Committee, Task Force, Social Development Committees, facilitators, extensionists, resettling families	.....
Produce quarterly, six monthly and annual reports	Steering Committee, Task Force	- - - - -
Carry out external evaluations	Steering Committee, GEF Project Manager (Implementation), external GEF evaluation team	- - - - -

STEP 3: DETERMINE POTENTIAL IMPACTS AND MAGNITUDE OF DISPLACEMENT

(1) Purpose

The purpose of Step 2 would be to determine the social impacts and the magnitude thereof that need to be addressed in the RAP.

(2) Rationale and actions to be taken

It is well known that the risks of not adequately planning resettlement (Cernea 1998), particularly of families moving into new locations and living more densely populated than they ever have before, are that in fact people are unable to regain their livelihoods rapidly, and that some families may end up worse-off than they were before. Key areas to watch out for are creating landlessness; the loss of families' or clans' cultural space and identity, or cultural impoverishment; economic and social marginalization; increased morbidity and mortality often as a result of more dense settlement patterns; food insecurity from reduced self-sufficiency and the need to change local arrangements for food supply; loss of access to common property such as woodlands, lakes and grazing lands that may cause livelihood deterioration; and finally social disintegration as a result of changed community structures and social organization and changes in informal networks and relationships that undermine and impoverish the people.

The most significant negative social impacts of the project on the population are the results and potential consequences of installing a fenced in protected area (the "Reserve") from which a number of families must be removed, and where others will lose access to resources they have customarily used.

Negative socio-economic impacts are almost all related to resource use practices. This includes the loss of agricultural land and access to the Inhamambane Estuary on the eastern side of the peninsula and lakes inside the Reserve area for fishing. Displacement caused by the implantation of the protected area and resettlement of relocated families in a 'village' system may result in concentrating intensive resource use in smaller areas with negative short and longer-term effects mainly due to depletion of poor soils. The Reserve area impedes socio-economic links and communication within the peninsula and may bring about the isolation of the fishers of Chingonguene and Chihunzuine. The fishers will be physically and socially separated from their families and others on the peninsula. In addition there are potential security problems related to entering and crossing the Reserve once game has been installed.

It is estimated that 86 households will be physically displaced by the project, 24 of whom have already been moved as part of the first phase of resettlement. Families who will be economically displaced have not been identified concretely yet; however data extrapolated from the socio-economic baseline study carried out for the whole Sanctuary area and immediate neighbourhoods suggests that approximately 124 families may be affected by

partial economic displacement due to their loss of access to fishing resources, and others as illustrated in the table below may also be affected by loss of cultivated fields and access to lakes for fishing.

Estimated number of families living outside of the Reserve area and affected by loss of access to resources in the Reserve area

Type of Loss	Estimated no. of families affected
Access for freshwater fishing	93
Access for marine fishing	< 124
Access for cultivation	52
Access for use of trees, plans, reeds	41
TOTAL	311

A detailed summary overview of the expected magnitude of displacement and expected loss caused by resettlement can only be provided after the census has been completed early in 2003.

In terms of social impacts, the effects of the project working directly with a local leadership that is not a trusted structure or one that encourages open and free communication around it has a direct negative impact on almost all families in the project area and may undermine the smooth implementation of the resettlement plan. It is most acutely felt among the families involved in the resettlement process and women who tend to be excluded from formal communication events.

The resettlement process has a number of risks associated with it that may affect relocated families and host families negatively, but the two most pressing at this moment are the potential for loss of opportunity to obtain the use of equal or better land in equal or better quantity than prior to moving due to lack of clarity about the land available and a system for ensuring equity. The weakest will lose most if there is competition for land and resources in the area, undermining their capacity to re-establish their livelihoods. Contributing to the risks is the potential of losing the expected benefits of compensation for tree and annual crops if cash compensation is used for immediate short-term lifestyle improving investments. The additional demands on natural resources, such as land, surface water supplies, marine life stocks and woody materials for construction and fuel made in and around the more densely populated resettlement areas will raise the risk of their depletion and degradation and the impoverishment of their users.

STEP 4: IDENTIFY KEY ISSUES

(1) Purpose

The purpose of Step 4 would be to identify the key issues that need to be addressed during the development and implementation of the RAP, and the potential consequences that the Phase I resettlement process has on the design of the Phase II programme.

(2) Rationale and actions to be taken

The resettlement of 24 families from inside the protected area to Chihunzuine/northern Chingonguene and Marape has already been carried out in the first resettlement phase. There remain approximately 62 families to be resettled in a second phase from their present residences inside the protected area as it is currently defined by the existing fence line. This fence will in the near future be moved to include a larger area prior to the introduction of wildlife in 2003, which means that more families will have to be resettled. The scale of the final resettlement programme is not yet known. Key issues relating to and impacting on the resettlement programme include:

Compensation

- The risk of cash compensation not being used for longer term livelihood restitution and the consequential reduction of capacity of families, particularly women and children to regain their former living standards. Indications so far have shown that not all household heads are considering the longer term consequences of their use of this money. This is a particularly sensitive issue that should be monitored from the start of resettlement.
- Monetary compensation is likely to benefit men in families more than women, given the customary dominance of men in decisions over use of money;
- Compensation for the loss of cultural heritage on the part of the *hossi ya missava* Uantene Singo: compensation to this family was made as if for physical assets. The *hossi ya missava* refused to be compensated by joining in the management of the protected area that was his domain – preferring to retain access through v-gates in the fence and to receive cash compensation. His dispossession of perceived responsibility for continuing management of the natural resources of the area may be encouraged by cash compensation. This may effectively undermine other efforts by the project to gain genuine partners in managing the natural resources of the Sanctuary.
- Potentially discriminating competition for natural resources in the Marape resettlement area: The lack of transparent planning and clarity about land available for resettlement and existing poor communication between the project and communities could trigger such competition. It should be noted that a total of approximately 146 hectares of land for cultivation would be the lowest possible requirement for land-for-land based compensation for approximately 81 agricultural families. Household survey results indicate that if consideration is taken of cultivation, pasture, residential and fallow land for the same number of families, an area of approximately 270 hectares would be required. This area does not take into account the need for additional land to allow for natural population growth (an estimated doubling its size in 25 years). Informed estimates (Theunissen *pers comm.*) suggest that between five and 10 hectares is probably a reasonable land size per family in the sanctuary – meaning a total of between 400 and 800 hectares would be required. The successful implementation of the planned organic farming system, would probably decrease the demand to the lower figure.

Preparation for resettlement

- The land area for resettlement has not been demarcated and settlers must negotiate and acquire customary use rights themselves for areas beyond the immediate vicinity of their houses. While the process is culturally appropriate and accepted, the lack of knowledge about who benefits and who loses, and the lack of opportunity for ensuring equity in land-for-land compensation raises the risk of the weaker families and family members losing out without planning alternative livelihoods. In addition an unknown number of families in the host population will be affected by having to reduce their land size by ceding it to the families being resettled.
- If land area is limited in Marape where the white sandy soils are low in nutrients and host and settler families do not have enough space to practice a crop rotation cycle that involves fallow land for a reasonable period (four years would be needed; Theunissen *pers comm.*), soil fertility will deplete, productive capacity drop and crop production will not meet expectations. This may result in the need to resort to significant off-farm income generation and the consequent dangers of low income, poor health and increasing poverty for people unused to the type of occupation, particularly women.

Resettlement sites

- The fishers' way of life in Chihunzuene / Chingonguene includes economic and social relationships with members of their own and other families further south and west of them. These are likely to be curtailed when game is introduced into the Reserve area and this effectively isolates them from land access to others on the peninsula.

Communication

- Channels for the communication of grievances: families being resettled currently have no trusted or reliable channel of communication to the project and there is no effective guarantee of feedback. So far this has meant that some important issues that could have helped the project to better carry out the resettlement and compensation processes were suppressed.
- Families in the resettlement process lamented that the chiefs do not listen to their problems any more, instead they "only look to the sanctuary". This is one of the effects of paying chiefs a subsidy (of over double the minimum wage in most cases) to perform certain regulation enforcement tasks for the sanctuary. Historical rifts between the people and their leaders have been exaggerated by the effects of the subsidy payments. The implications of this will be difficult to manage.
- The process of consultation needs to be improved so that two way communication flows facilitate the following issues (a process that was already accepted in mid-2001 but not implemented):
 - Involvement of host communities in taking decisions about resettlement processes;

- Understanding about the impact of alternative farming technologies in reducing the amount of land required for farming per family;
- Clarification to families about assistance available to them to re-establish their livelihoods and whether preferred employment is an alternative for these families;
- Trusted and reliable communication channels to communicate grievances.
- Uneven coverage of documentation of the resettlement process with major gaps in 2002 in particular, and incomplete baseline data on families in the resettlement process means that the RAP and other social action plans are unsubstantiated in many areas.

STEP 5: REVIEW OF LEGAL AND POLICY FRAMEWORKS

(1) Purpose

The purpose of Step 5 would be to ensure that the resettlement process takes place in accordance with relevant local legislation and policies and IFC policies.

(2) Rationale and actions to be taken

There is no legislation in Mozambique that directly covers involuntary resettlement. Most resettlement procedures undertaken to date by private / public sector development initiatives that have required resettlement of rural families, have generally followed the World Bank's OD 4.30 /OP 4.12 on Involuntary Resettlement.

However in addition to this other national legislation or policies are relevant for guiding specific aspects of the resettlement process (see also Part A):

- The Land Law 19/97 provides the basis for defining affected people's land use rights, providing the details of rights based on customary claims and the procedures for acquisition of title for use and benefits by communities and individuals. The law recommends a consultation-based process that recognizes customary rights as the means for identifying the claims of communities and individual members of communities without title. Art 24 identifies that in rural areas local communities participate in: a) the management of natural resources, b) the resolution of conflicts, c) the process of obtaining title as established in no 3, of Art. 13 of this law, and d) in the identification and definition of the boundaries of the land they occupy. In the first two activities (a and b) local communities use among others customary practices.
- The fundamental principles of the Mozambican Land Policy are:
 - Maintenance of the land as the property of the State.
 - Security of access and use of land by the population and investors recognising the customary rights of access and management of the land of rural resident populations promoting social and economic justice.
 - Guarantee of access and land use rights for women.

- Promotion of national and foreign private investment without prejudicing the resident population ensuring benefits to them and to the national public exchequer.
- Active participation of nationals as partners in private undertakings.
- Definition and regulation of basic directive orientations for the transfer of rights of land use between citizens or national companies whenever investments have been made in the land.
- Sustainable use of natural resources in order to guarantee the quality of life for the present and future generations, guaranteeing that the areas of total and partial protection maintain their environmental quality and the particular ends for which they were constituted. Included here are the coastal zones of high biodiversity and the land along interior waters.
- Compensation for losses incurred as a result of relocation does not have any official guidelines other than the basic compensation tables produced by the Ministry of Agriculture and Rural Development covering the minimum values attributed to various tree crops of different ages. Tables are available and produced at provincial level for the purpose of respecting the local values of items.
- In 2000 the Ministry for Coordination of Environmental Affairs (MICOA) produced extensive guidelines on the Criteria for Resettlement of Populations in Rural Areas that were aimed to facilitate the process of resettlement after the floods. These cover the need to provide access to resources adequate for the development of families after resettlement based on land size, distance to used resources and provision of public services.
- The provision of infrastructure and services for resettled populations would need to follow relevant national technical laws and regulations including:
 - The Water Law (16/91), National Water Policy (1995) and Social and Technical Implementation Manuals (2002/3);
 - Technical specifications for the construction of health units from GACOPI, the Office for Coordination of Public Investments of the Ministry of Health;
 - Technical specifications from the Planning Department of the Ministry of Education;
 - Quality control for all other construction of public utility should minimally follow standards used by the Provincial Directorate of Public Works.
- The Provincial Directorate for Women and Coordination of Social Action and the sector's National Institute of Social Action are responsible for subsidizing the poorest and indigent members of the population, and for ensuring that the rights of the most vulnerable are respected. While there are no specific legal guidelines for the social aspects of resettlement, Mozambique's ratification of the International Conventions of the Rights of the Child and Human Rights, Elimination of All Forms of Discrimination Against Women, Mozambique's agenda on Human Settlement and the

Labour law define specific rights based on equity and equal opportunity without discrimination to the benefits of private enterprise and investments.

- It should be noted that all Mozambican guidelines point out the importance of involving the Local Administration (District level and below) in the process of resettlement to ensure it is locally appropriate, and so that government personnel may learn and apply similar procedures to other instances of resettlement in their territory.
- People living in Quewene prior to the concession for private use was granted to VCWS, legally maintain their community use rights to land outside of the Reserve area, although they may not claim title to any land until after the end of the sanctuary project. Customary use and management of natural resources is recognized in Mozambique as a legal basis for the defence of community rights and community involvement in conservation and environmental protection initiatives.
- IFC policy recommends that people affected by the project must be consulted regarding resettlement activities, provided with timely compensation for lost assets at full replacement cost, provided with alternative sites for relocation and their livelihoods must be restored to standards comparable to and preferably exceeding, those that prevailed before resettlement.

STEP 6: DETERMINE ELIGIBILITY AND ENTITLEMENT

(1) Purpose

The purpose of Step 5 would be to determine the criteria that would qualify an individual, family or group for eligibility under the RAP.

(2) Rationale and actions to be taken

Implantation of the Sanctuary project involves the physical relocation of people resulting in their loss of shelter, productive assets and access to productive assets to various degrees. The IFC considers this *physical displacement*. In addition to physical displacement, there are also families affected by *economic displacement*, the results of actions which interrupt or eliminate their access to productive assets, although they themselves will not be physically relocated. The IFC's involuntary resettlement policy is designed to ensure that people who are physically or economically displaced as a result of the project are no worse off than they were before. The project developer has the additional potential of providing means of restituting livelihoods which aims to ensure resettled families become better off than they were before.

Assessment of the degree of impact on livelihoods the peninsula was carried out through the baseline survey and SIA. For this purpose Quewene was divided into three geographic areas presently occupied by families:

- Inside the Reserve area (presently game fenced) with access in areas where there are settlements or major paths, via game-proof v-shaped gates. This area covers approximately 8 500 ha.
- Outside the Reserve area but within the Sanctuary's authorised land area, approximately 14 000 ha.
- Outside the Sanctuary, from Chicume south to Machuquele, an area of approximately five kilometres wide bordered to the west by the sea (Bay of Vilanculos) and swamps (approximately 3,500 ha.).

The fence line separating area I from area II is not in its final position. It is expected that by early 2003 the size of the protected section will be finally delineated and fence alignment agreed to.

This RAP only deals with the scale of impact in relation to the present fence alignment, and an addendum will update the information once the final alignment is decided upon. The estimated number of people affected by the project proposed at present are categorised as follows:

Impact Zone	Description	Total Families Affected
I. Full physical and economic displacement.	Families living in the Reserve area.	62
	Families already relocated to Marape and Chingonguene.	16
II. Full physical and economic displacement.	Families relocated from Goshen to Marape	8
	TOTAL - Physical & economic displacement	86
Partial economic displacement	Fishers and families who fish & practice agriculture from Chibo (Nhaxil, Quile and Manhale) and Matsopane losing access to Inhamambane Estuary.	~ 124
III Partial economic displacement	Fishers and families who fish & practice agriculture from Chibo (west of the road) losing access to Inhamambane Estuary.	~ 10
	TOTAL	Maximum 220

Until the results of the census are analysed the number of families affected by partial economic displacement (Impact Zone II) in Chibo is estimated based on existing population figures from the Local Administration and the results of the household survey. Verification through consultation may show the number of affected families to be lower than the above estimate. This is due to the complexity of the category.

The fishers will retain access to Inhamambane Estuary through the v-gates left in the game fence for that purpose, however, since some of them live for periods up to a week or so in

impermanent houses and lean-tos inside the Reserve area, they will lose the freedom to continue with this customary use. In this sense it will be necessary to verify which fishers actually stay on site and will truly lose access, and which can cross the Reserve area to fish in a day trip.

Loss of access for cultivation and collection of natural resources will also affect between four and eight percent of families in the sanctuary living outside of the Reserve area. The profile of losses as indicated above indicate that the loss of access to fishing sites will affect enough families outside of the Reserve area for the issue to have to be addressed systematically. The loss of access may be easy to repair for some people who can change their fishing strategies without a great deal of difficulty, but there may be others who will be more seriously affected.

The current census will not include families outside of the sanctuary. The partial economic displacement (Impact Zone III) of some families noted in Chibo is the result of a focus group discussion on the west side of the road, hence the figure of affected families had to be estimated. In this area the elders and women use Vilanculos Bay while the young men travel on foot all the way to Inhamambane. Men from this area (and women who fish for prawns) move to fishing camps on the Estuary during periods of the month when the tides are low in the morning.

The physically and economically displaced households in impact zones I and II are, or will all be, relocated and compensated for their losses. Some of the partially economically displaced households of impact zones II and III will lose direct access to fishing and agricultural resources. The alternative fishing area is around Dombwe in Vilanculos Bay. This is distant from the centre of Chibo and is apparently less well endowed with fish than the Inhamambane Estuary.

Procedures for assessing entitlement and other forms of assistance

- A census of all people who will be affected by the project must be carried out in order to identify those eligible for assistance and to discourage an inflow of people ineligible for assistance. Names of all family members and their relationship to the head of the household, details of resource use and location and household location using GPS coordinates should be registered.
- Together with the local Zone Chief, *hossi ya missava*, Circle Chief and a representative from the government the sanctuary should investigate the basis of each of the identified claims of the identified families. Initially this should be based on interviews with the local leaders on their own, and then be followed up with visits to each affected family. Assessment of the families with partial economic displacement claims should be sensitive to their customary methods of obtaining access and using resources, so that it may be established which families will genuinely lose access and/or use of these as a result of the sanctuary's development activities.
- The decision about entitlement should be made following analysis of all claims. Each family eligible for compensation or other assistance must be informed of the basis of the decision and the options for assistance that they have.

- This process should be fully documented including the decisions taken and their reasons at every step of the way. Should complaints be lodged against decisions about eligibility, these must be dealt with through the established procedures for communicating grievances described below.

STEP 7: EVALUATE ASSETS

(1) Purpose

The assets of all the affected households need to be assessed in order to ensure transparency and fairness.

(2) Rationale

The IFC emphasises the importance of establishing compensation rates that should be applied consistently throughout the life of the project in order to protect the developer from unjustified and exaggerated claims. The format for evaluating assets and reaching agreement on compensation amounts in the sanctuary project takes into account the procedures already carried out by the developer in the first phase of resettlement. Where the first phase has shortfalls in relation to IFC policy and guidelines, these are identified and recommendations made.

The valuation of assets would be carried out through a process of consultation and negotiation with the heads of households owning the assets. It is customarily recognized in Quewene that the owner of assets should identify the compensation value of these. It is also widely felt in the area that the closing of negotiations about compensation values should only be considered when the assets owner pronounces satisfaction with the results. Thus, based on experience of the sanctuary in negotiations of compensation to date, attributions of value should be approximately standardized taking into account past compensation values paid and respecting the following basic principles:

- Agreement of the affected population with the rates, deeming them fair and adequate, should be established at the start through consultation with representatives of the community;
- The compensation level should be sufficient to enable people to restore or better their standards of living after resettlement;
- Compensation payments should be made before assets are acquired by the project and prior to resettlement - unless payments are staggered after resettlement to permit use of the money for its intended purpose, the restoration of livelihoods;
- Local currency payments should be indexed to the US dollar to protect local people against local currency fluctuations and inflation.

Fishers are more formally organized in their fishing activities and a significant proportion of their catch is prepared for sale. As a result they are much more aware of the value of their activity than agricultural families who rarely sell their produce. Experience in negotiating compensation with these two groups in the Phase I resettlement activities demonstrated that

the assessment of the values of lost opportunity to produce or practice their activities resulted in the fishers providing income values that were much higher than those of agriculturalists – despite the fact that agriculture-based livelihoods take much longer to repair, and that the level of subsistence of many fishing and agricultural families is below or just bordering on the poverty line. The sanctuary and government representatives noted this difference in perception and the greater fortitude of the fishers in demanding their requests be honoured at the risk of their not agreeing to move. The sanctuary and government subsequently raised the total values for compensation of the agricultural families. The lump sum increases adjusted the total amounts so they became more comparable with the total amounts of compensation of the fishers.

Despite the lump sum increases made to the agricultural families who had undervalued their assets in Phase I, overall, the total compensation paid to each family was still lower than if the assets to be compensated had been attributed rates equivalent to the recommendations made by the DPADER and replacement costs. This baseline of compensation values now that it has been initiated should be continued. It is probably more important not to unnecessarily inflate the local market and cause potential conflict by attributing higher compensation values to individual assets for the families in Phase II.

All shelter assets should be carefully examined and measured so that it is ensured that houses constructed in substitution are of better quality than the original ones. The Sanctuary is presently constructing ‘traditional’ houses that are improved with concrete floors and doors. The quality of construction should be carefully monitored so that these houses that are temporary by nature, endure for at least a period of three years without need for substitution. The quantities of other assets associated with livelihoods such as permanent tree and annual crops should be assessed according to the norms of the Provincial Directorate of Agriculture and Rural Development together with a representative of the sector so that size, age and productivity of the assets may be adequately identified. The table of compensation values used in Inhambane Province as a baseline for reference should be used when families are unable to identify a value for their crops due to a lack of experience in this. The table will have to be used with discretion as a result of prior undervaluing of assets.

The overall approach to community participation activities using planned communication to facilitate these processes will be used to create awareness about the project, and should also present information about resettlement. An illustrated information sheet explaining eligibility, compensation rates and other entitlements, a timetable for implementation and information about grievance procedures could be produced as the first of a flow of information that should be regularly updated, about progress in the resettlement process. In order to avoid grievances and misunderstanding, it is essential that effort is put into ensuring that affected community members are informed about their rights and responsibilities, and that they can discuss these so that they understand them.

Using facilitators who are accepted by the community, speak the local language and possibly even come from Quewene, should permit organisation of discussions about the procedures and implications of the resettlement process. Concerns of vulnerable groups may be transmitted through the channels created for grievances, or they may be presented in

facilitated discussion groups. When communities see that their problems and queries are addressed and hopefully remedied, they will gain the confidence to participate more strenuously in group activities. Currently they are somewhat inhibited and mistrusting of group meetings that are seen to achieve nothing.

(3) Actions to be taken

Approximately 62 families will be resettled in Phase II using the following procedures.

Procedures for evaluating assets of affected households

An *inventory* should be made of the assets that will be lost by each family, including physical structures: houses, latrines, wells and corrals; crops in the ground, land area for cultivation, residence, pasture and fallow; tree crops; income from fishing and other off-farm activities and a list of the animals that will be moved. It is important to gather enough information to be able to identify the total income per family and the proportion that will be interrupted or lost due to project activity.

Procedures for calculation of compensation values involve:

- Identification of all shelter assets with the objective of the sanctuary replacing these with buildings of a better quality in locations chosen by the resettling families.
- Attributing monetary values to the crop assets affected by the project according to rates per crop agreed on between the government representatives and the sanctuary in relation to the recommended compensation values for the Province and local market replacement values. Permanent crops should be identified in numbers of trees, and annual crops by the area planted with registered crop types. The compensation value of annual crops should be calculated based on the local market value of the average productivity of the area for one annual cycle of each key crop. The common system of intercropping complicates this process and compensation must be made based on special rates for intercropped areas that should be agreed with the government.
- The loss of other livelihood sources should be assessed to decide if alternatives are easily accessible and the time in which the claimant can take these up. If assistance is necessary to re-establish livelihoods from these or other sources it must be registered by type, value and duration of assistance. Compensation for the work stoppage of small businesses and interruption during relocation or the loss of access to fishing grounds would be examples of aspects to be considered. The calculation of compensation should estimate the period of interruption of the activity and the income derived during that period, in order to decide on the type of assistance and options that may be presented. Options may be cash compensation, employment, or incorporation into a development activity relevant to the loss that is being assisted or promoted by the project.
- Loss of access to natural resources such as wood fuel, plants for medicinal uses and for construction must be redressed in the choice of resettlement location. No compensation will be provided for the loss of access to plants / trees whose use has

been prohibited for conservation reasons, instead assistance will be provided to find other acceptable solutions.

- Alternative fishing grounds should be identified and agreed to with affected fishers. If these mean that different techniques will have to be used for fishing from those they previously used, provision should be made for fishers to be assisted to do this. Affected fishers may also be prioritised for assistance with community development initiatives related to improving the value and sustainability of their fishing activities.
- Loss of income from small businesses located in the Reserve area should be assisted with replacement of infrastructure and compensation for loss of income during the period of interruption of business. Affected people may also be prioritised for access to credit if this is their preference and they comply with the financial eligibility criteria.
- Loss of cultural property: Although graves sites are considered of significant importance by families and are centres for ritual practices, their social value requires consideration but not necessarily compensation. Historical migrations and the effects of the war have undermined the values associated with these sites in favour of sacred trees and small houses where ancestor spirits are appeased. Compensation for the transfer of individual family or clan sacred areas consists of the transfer of the spiritual home and may require a contribution of liquor and food but these are not considered payments. Other cultural assets such as sacred areas around lakes and forests are considered common clan and community assets. Compensation for loss of use of areas held sacred around lakes and forests is a subject that should be discussed with the head of the clan or *hossi ya missava* responsible for the area and the community of users. Incorporation of the people customarily responsible for the management of the resource into the conservation management component of the project is the most appropriate form of compensation (see Part D). However if this is not acceptable, then a monetary value might have to be agreed on or an alternative supply of additional land or houses might be a solution (as has already been provided in the one case mentioned above). The solution should be discussed with the individual or group identified as losing the assets.
- The transitional period before resettlement when food subsidies are required should also be calculated and included into the compensation package. This period is calculated for the period prior to resettlement through to the first harvest of replanted crops. In the case of compensation for the loss of income for fishers, assessment should be based on their estimations of the loss that will be incurred due to interruption of their activity.
- Since food assistance will be provided during the transition period until families are able to reinitiate their livelihood activities, the re-initiation of cultivation and other activities should be monitored carefully to verify that families are not trying to continue unnecessary claims for assistance.
- During the transitional period, temporary employment with the sanctuary should be offered to appropriate members of resettling families as one of the forms of compensation. Such temporary employment would cover the period between cessation of the primary livelihood providing activity until the family livelihood is re-established. Families benefiting from income from employment might require less food assistance as a result.

- Land areas provided under the land-for-land compensation policy should be of equivalent or better productive potential to the original land cultivated, should be in an area of preference of the people being displaced reasonably close to the original land area, and it should be clearly identified prior to resettlement. If, as has been carried out up to now, clearing and levelling of the land occurs after resettlement, and this is carried out by each family in an environmentally sensitive way, and in line with the permaculture/organic farming instructions they receive upon settlement, then the total land area to which they will have access and use of should be shown to them prior to resettlement.
- The technical assistance provided initially for women and men to learn about the advantages and techniques of permaculture/organic farming and other methods for improving agricultural productivity should be followed through with outreach provided by trained extensionists who preferably should be a mixture of outsiders trained in communication and extension methods and local people involved in resettlement. Given the lack of seeds on the peninsula, the resettlement start-up kit should include appropriate seeds for the new forms of agriculture proposed.
- If the land size in Marape is too small to adequately accommodate the resettling population, taking into account their future needs for at least the next 25 years (the population may have doubled its number in this time) and the effects of obtaining development assistance from the sanctuary, families who are being resettled should be offered alternative livelihood source options. Resettling families should have priority access to community development initiatives supported by the sanctuary for income generation and skills and knowledge development.

It should be noted that although all people living in the sanctuary have been prohibited from continuing burning the vegetation in order to carry out swidden farming, the abandoning of this practice will not be compensated. Instead it is hoped that communities will be able to learn about the sustainable management of their environment as resources become scarcer and use different methods of managing their land.

The entitlement matrix below indicates how each category of affected people is entitled to various types of compensation and other benefits from the project.

Compensation processes

Resettlement planning will require that the area designated for resettlement is identified, demarcated and ceded by host communities prior to resettlement. The customary procedures required for this should be carried out during the period that families are waiting to be resettled. The final spatial plan for resettlement should be designed and approved by the Project Steering Committee and local government representatives, in consultation with the CRC.

The design of houses should follow those already initiated, unless affected families have any particular valid reason to request an alternative.

Compensation payment and assistance procedures

Moving assistance for relocating families should be provided to permit the transfer of all assets to the new settlement site.

The start-up kit provided to each resettling family up to now should include agricultural tools and seeds appropriate for the types of agriculture being promoted through technical assistance and extension support.

Cash compensation may be paid as a single lump sum, but it is preferable that, in the case of large amounts (over \$800), families are given the option of receiving payments in instalments. This will permit people to use the money for its intended purpose of re-establishing livelihoods.

Wherever possible payments should be made by cheque and deposited in a bank in Vilanculos by the recipient. Cash received and stored in Quewene is insecure and families run the risk of losing some or all of it due to theft. A cheque or coupon made out in the name of the beneficiary may serve as alternatives which can be cashed in a prearranged system with a bank or other location of convenience.

Credit facilities may be offered to families being resettled and small businesses that have been displaced by the project; however this should be viewed as a development activity requiring strict adherence to rules of application and repayment.

Entitlement Matrix

Category of Project Affected People	Type of Loss	Entitlements			
		Compensation for loss of Structures	Compensation for loss of Assets	Compensation for loss of Income	Other assistance
Families living in the protected area.	Loss of physical assets and loss of livelihood sources (marine, terrestrial and small businesses)	Replacement of all structures	Cash compensation for lost crops and provision of alternative land for cultivation	Cash compensation for interruption of small business income	Assistance with food subsidies or employment until livelihood reestablishment; moving assistance; a start-up kit of domestic materials, equipment and agricultural inputs; post-resettlement support with technical assistance; extension support; skills training and access to credit.
Agricultural families who also fish living in the Sanctuary but not in the protected area	Loss of access to Inhamambane Estuary and lake fishing in the protected area			Cash compensation for interruption of income & to develop an alternative fishing activity	Assistance with involvement in community development activities related to fishing.
Agricultural families living in the Sanctuary but not in the protected area	Loss of access to cultivated areas in the protected area		Cash compensation for loss of crops and provision of alternative land for cultivation		
People living in the Sanctuary but not in the protected area	Loss of small businesses	Replacement of all structures		Cash compensation for interruption of small business income	Access to credit facilities.
Clans and <i>hossi ya missava</i>	Loss of use of lakes or other sites of ritual significance in the protected area		Possible cash compensation but difficult to quantify & expensive		Option to join the conservation management structure and participate in the continued management of the assets
Agricultural families who also fish from west of the road (mostly in Chibo) outside the Sanctuary	Loss of access to Inhamambane Estuary for fishing				Assistance with involvement in community development activities related to fishing and/or marine aspects of the eco-tourism project.

STEP 8: DETERMINE RESETTLEMENT OPTIONS

(1) Purpose

The purpose of Step 8 would be to ensure that the various resettlement options are identified to the project-affected families and that satisfactory options are selected.

(2) Rationale and actions to be taken

Project-affected families should be informed of all compensation entitlement options that can help them restore their livelihoods. They should actively select from this menu the compensation form and method they prefer. If cash compensation is not appropriate in the case of compensation of loss of cultural heritage for example, or the land offered is not sufficient to restore the income of the family, other livelihood options must be made available to them. This may also be the case for people affected by partial economic displacement in the case of fishers who lose access to a customary way of fishing by spending time in temporary accommodation in the protected area.

It is not yet clear whether there will be enough land in Marape, whether the resettled families will have access to use it, and whether it is better quality or worse than the areas they previously lived in. It is clear though that the soils are poor, and any dense settlement by agriculturally based families creates the risk of the settlement being unsustainable even with the application of organic farming techniques.

Should it be determined that the land cannot support the planned resettlement numbers a choice must be made by the sanctuary to either identify another resettlement site, or increase the opportunities for participating in alternative livelihood activities (and guarantee the viability of these options for income generation). The Social Plan Facilitators will work with the families being resettled to assist them in making decisions about the options presented to them and in understanding the consequences of each one.

Each facilitator should be responsible for a group of resettled families based on their geographical proximity at resettlement. Prior to resettlement the facilitator may be responsible for them or others depending on how they are organized once they are resettled, and what their preferences are for this (each family will select the area for resettlement and monitor the construction of houses and other preparations prior to their arrival).

Prior to resettlement families should all be consulted on the principle forms in which they would prefer to receive their compensation. Information provided at this time should inform them of all options open to them. Thus it should be explained that aside from replacement of housing and land all families who are resettled in Marape or elsewhere will receive:

- technical assistance to explain and demonstrate the advantages of permaculture or organic farming as part of the general compensation package;
- follow-up extension services to assist families to apply and experiment with what they have learned, and

- 250g of maize meal per person per day as a food subsidy for the period in which their main livelihood source is interrupted.

They will also be informed that:

- one family member will be eligible for temporary employment with the sanctuary from the moment they are instructed to cease cultivation in the protected area;
- after moving, families organised in groups may be eligible for other development assistance which they may propose to the sanctuary for financial or skills acquisition support;
- entrepreneurs may propose projects to be assisted with credit as long as they abide by the loan rules;
- the types of projects that will be able to receive support initially will be in the areas of agriculture (market gardening, animal production, marketing and sales), fishing (fish storage and marketing), small business (literacy, accounts and management) and development promotion (learning facilitation and communication skills)

Prior to being resettled families should have been made aware of these options through contacts from the facilitators employed for this purpose. Their only option for alternative livelihood support prior to moving is the possibility of employment with the sanctuary on a temporary contract related to the construction works being carried out. Families opting for this should register the names of candidates for work and this must be passed to the Project Steering Committee via the CRC for consideration and action when a vacancy appears. The commercial project should allocate at least 60 positions in its labour force for potential employees drawn from the pool of those families being resettled. Information delivered to all families should note that the option for one member of a family to be employed is made under the condition that they abide by the work norms and that should they, for example, fail to perform adequately, they will lose their job as any other employee would.

As soon as the family is resettled, they become eligible for additional support. They will all obtain support to learn how to best obtain productive results from the nutrient-poor sandy soils on which they are settled. In addition, whether in groups or individually, they may submit a project proposal through the Resettlement and Development Committee to obtain assistance with agricultural initiatives, fishing initiatives or small business initiatives. Support may be in the form of loan funds, agricultural extension assistance, or in skills training for small businesses.

It would be useful for the Sanctuary to encourage its own administrative staff to become involved in skill-sharing and training small business people in the areas of basic accounting and the legal requirements of their activities.

Resettlement carries the risk of impoverishing the families involved although it is difficult to assess this without reference to the resettlement areas. All families will be able to carry out agriculture as they previously practiced it, however the soils of Marape are poor (as were the soils that they vacated). The aim of the sanctuary is to involve all families in learning new skills related to organic farming/permaculture. While the techniques are not difficult to apply, learning any new techniques cannot assume 100% take-up, and there will be families who do not adopt

the new methods. The risk of these families not being able to sustain themselves in the short term is probably not high. In the medium term however, when the soils have become depleted and the alternative locations for cultivation are limited, the risk will rise. In this sense, it should be relatively easy to identify farmers with problems in adopting the new ideas early on. These people should be assisted so that the extensionists learn why the techniques are not being applied. If the family prefers not to take up the technology they should be offered another alternative such as learning about market gardening, animal production or obtaining support for an off-farm activity.

One of the options will be for apt individuals drawn from the resettling families to opt to learn development communication and facilitation skills so that they may assist with community organization and awareness raising. They might receive a small subsidy from the project for this. If they subsequently demonstrate enough potential they could be employed and trained as local facilitators and communicators.

Alternative agricultural improvements should be presented as a matter of course by the extensionists working closely with families. The development facilitators supervised by the Task Force should also be aware of difficulties families have in taking up agricultural and alternative livelihood options. Problem identification and resolution will be one of the main development approaches to working with resettling families with the aim of trying to help them regain their autonomy. New ideas for livelihood activities may result from their work with groups of resettlers and individual families, and where these appear viable, but have no structure established for their support within the sanctuary's organization, they should be proposed to the Task Force and Steering Committee (again via the CRC) for consideration and resource allocation planning if necessary.

All project proposals presented that are within the sanctuary's capacity to respond should be presented via the extensionists in the case of agriculture, or via the facilitators in the case of any other activity. These may also be presented directly to the local Community Development and Resettlement Committee for passing on to the Task Force via the CRC, but with the extensionist/facilitators also being involved.

The risk of cash compensation not being used for the purpose it is intended has been mentioned as a critical issue. This will be monitored and facilitators prepared specially to provide support and advice on useful alternatives. In this way the facilitators will also be on hand to monitor the use of this money and earmark families who do not use it for its intended purpose, identifying their potential vulnerability. This kind of case is sensitive and will require patience and encouragement to try and involve defaulting families in activities that will guarantee their livelihoods nonetheless. In this sort of situation special attention should be given to women, children and the elderly or handicapped, and if necessary, their participation in specific income generating development activities encouraged.

Families who suffered partial losses to their income flow due to lost access to fishing grounds should be offered support to develop their fishing activities in an alternative location, possibly with alternative means. The sanctuary should provide assistance for this to be made possible. This may take the form of cash compensation and/or of assistance in developing a group based

fishing activity of their suggestion. Those families suffering partial loss of income due to their fields being located inside the Reserve should be compensated for the crops and alternative land areas of equivalent productivity identified for them. If the land is not of adequate quality, they should be offered the opportunity of learning about the permaculture techniques to improve their production and sustainable use of the soils.

Any compensation that is required for loss of cultural heritage should be dealt with on a case by case basis, and settled according to the wishes of the *hossi ya missava* and the community. The options presented should include cash compensation and/or involvement in the management programme for the use of the area on the understanding that they will retain continued freedom of access for the performance of rituals etc. The transfer of sacred sites / clan spirits to the new home does not require compensation but may require assistance with the execution of the traditional ceremony accompanying the transfer.

Although host communities are not eligible for compensation for land they cede to resettling families, they are eligible to participate in the community development activities. Locally influential host community members should be members of the Resettlement and Development Committee. Host community families should receive extensionist's assistance if requested as well as any other agricultural or fishing project support they may request. The form of request should follow the same process as that of the resettling families. The request should be initially presented to the Resettlement and Development Committee before being substantiated and passed on to the CRC, Task Force and Steering Committee if necessary. It will be necessary to identify who constitutes the host community in order to distinguish requests for assistance from them in relation to any others in the Sanctuary. A simple rule of thumb might be the definition of all those sharing the same resources and services as the resettling community, particularly those who have ceded land for the resettlement programme.

(3) Threats

The main threats to the resettlement programme not being implemented smoothly are related to its scale. The sanctuary project has so many activities being undertaken at once, in difficult conditions, and with a limited number of skilled human resources that providing adequate attention to the resettlement process will tax these significantly. It is therefore important that the Project Leader: Community Affairs devotes sufficient time to these activities, and that enough staff are made available to cope with the task (see Part L). Another threat to the successful execution of the RAP would be a continuation of the mistakes of the past, such as non-compliance with company plans and policies that led to certain community actions not being taken and structures not established, as was pointed out above. The largest investments in any community work are in time and people – the VCWS management should always remind itself of this, when deciding about the staff to employ for the resettlement and community livelihoods development programme. Integration of resettlement activities with the overall communication oriented development approach is an essential starting point that will ensure the best possible success of the undertaking.

STEP 9: INFLUX MANAGEMENT AND CONTROL

(1) Purpose

The purpose of Step 9 would be to ensure that the difficulties inherent in the resettling programme are not exacerbated by an uncontrolled influx of outsiders to the sanctuary.

(2) Rationale and actions to be taken

It could safely be assumed that development activities on Quewene will attract outsiders. Although the project reserves the right of admission to the area, in-migration is likely to be a process that is subtle and initiates with the return of family members and extended family members to the peninsula hoping to obtain access to some of the available development opportunities.

Communities on the peninsula are very aware of the distinction between themselves and 'outsiders'. Already they are involved in identifying fishers who are not from the area, social pressures tend to isolate these people and the local community is aware of competition for resources. In relation to employment with the project, the people have been quick to criticise apparent preferences for outsiders in various positions. Community awareness that resources and opportunities are limited is a useful starting point for community management of any increased stress on services or loss of opportunities for local people by the influx of others from outside the area.

The local Resettlement and Development Committees would have the responsibility for organizing the first level of management of any influx from outside. They should identify the people and their motives and judge how they may be advantageous or present threats to the community's sustainable use of resources in the area. If problems are identified that are not resolvable at community level, these should be transmitted to the Task Force, the CRC and the Steering Committee using the channels for communicating grievances. Decisions about action to redress a situation should always be taken together with the communities who identified the problem. If necessary the local authorities should be the second level brought in after the clan or family leaders to deal with the matter as an internal issue. The implications of increasing population numbers should be shared with the communities as part of the awareness-raising task of the communication strategy.

Influx management should be extended to include reproductive health awareness raising and initiatives to assist women and men with HIV/AIDS awareness and prevention activities. These activities may be built on to the tasks of the health unit staff and community development facilitators. Educators and health promoters might be assisted to work with the churches and other groups.

STEP 10: ESTABLISH AND IMPLEMENT GRIEVANCE PROCEDURES

(1) Purpose

The purpose of Step 10 would be to establish procedures whereby resettlement-related community grievances could be satisfactorily addressed.

(2) Rationale

The need to establish functional and acceptable communication channels for grievances is among the priority issues for the resettlement programme. (The grievance redress procedures recommended in 2001 were unfortunately not implemented; Lambrechts 2001b) Effective consultation and providing feedback to stakeholder groups in and outside of the project area will continue to build trust and confidence. At present there are mixed feelings in Quewene about the project and most of these are the result of lack of information and frustration due to not being able to communicate with the sanctuary on issues seen as important by various groups in the community.

Following analyses based on information from the baseline survey, it is recommended that grievance mechanisms, structures and procedures should be established:

- The local religious leaders, the Zone Chiefs and in Chingonguene, the Maritime Delegate will provide a first listening level. Feedback through them should be able to reach even the most isolated groups. These leaders should be involved in the local Development and Settlement Committees and be provided with the tasks of creating awareness that they may be used for the transmission of grievances;
- The relevant land chiefs or *hossi ya missava* will be involved when the grievance is land or resource use related in order to obtain advice at the community level, potentially resolve the problem without taking it any further, or passing it on to the next level having heard the advice of this leader;
- The local Development and Settlement Committee may be able to resolve the problem itself. This should be encouraged, however if not, a representative should channel the grievances to the Task Force through the CRC and the Project Leader: Community Affairs. The issue may be redressed at this level and a response communicated back rapidly, or if it is more complex or requires the opinion of the Steering Committee members, then it will be presented in a regular meeting, or in the event of great urgency, the VCWS General Manager will be located to report the issue.
- Grievances heard in Steering Committee meetings should be followed by a decision on redress and its communication to the complainant in the timeliest way possible. Information should normally be returned to the community using the same channels as for its initial transmission. However urgent cases should be dealt with directly by the level responsible. The results should be communicated to all other levels at the same time for coordination and awareness purposes.
- An alternative channel for the transmission of grievances may be through the facilitators employed to provide assistance to groups involved in community development activities. A facilitator working in a specific geographical area will provide a direct means of transmitting information. The facilitator would communicate this information to his/her

supervisor and the Project Leader who will either address it directly, or pass it on to the Steering Committee to take a decision.

- Responses to grievances should have an established time limit (such as 15 days from the date of presentation), within which the Sanctuary guarantees a response / action. This sort of approach will promote greater trust in the communication system and improve attitudes about the project within the community.
- Grievances may be submitted in writing, however if they are not, facilitators and the project Leader should ensure that the grievance details are recorded in written form when they are passed on to the Steering Committee. All grievances and redress actions should be recorded by the level taking redress action, and included in regular progress reports.
- If the person or community who lodged the complaint is not satisfied with the decision of the Steering Committee, then as an ultimate recourse he/she/they may submit it to the District Administrator or the Provincial Governor.
- The same channels used to address formal grievances, should also be encouraged to address informal problems and conflicts so that the causes of grievance are mitigated. The emphasis in these cases should however be on the solution of the problems at local level, beginning with the complainants themselves.

STEP 11: ESTABLISH PROCEDURES FOR AND UNDERTAKE MONITORING AND EVALUATION

(1) Purpose

The purpose of Step 11 would be to establish procedures for the effective monitoring and evaluation of all the processes and impacts relating to the RAP.

(2) Rationale and actions to be taken

The overall research, monitoring and evaluation (RM&E) strategy for VCWS appears in Part M and should be read in conjunction with the following M&E strategy for the RAP.

Monitoring should cover both the process and the impacts. Monitoring the implementation process should cover the physical progress of resettlement and rehabilitation activities, and compensation payments. Impact monitoring carried out with community participation would assess the effectiveness of public consultation and participation activities, the use of compensation payments and the sustainability of income restoration and development efforts. Monitoring provides a means of providing information on progress and learning about problems so that these may be dealt with as early as possible. Evaluation of impact in a participatory way is a process that will allow communities and facilitators to reflect qualitatively and analyse their perspective on the effects of the resettlement programme on theirs and others' lives.

M&E should be carried out as part of the project implementation process. Regular reporting on progress provides one means of registering process monitoring by the project implementers. Impact monitoring on the other hand may be undertaken internally after enough capacity has been built among facilitators and their supervisory staff, with initial inputs and involvement by a contracted TDS. A process very similar to the baseline survey would be carried out and key

indicators would be monitored for change. This would mean that qualitative focus group discussions would be used as well as small quantitative surveys to verify particular aspects of the resettlement and development programme.

Indicators measured in the quantitative baseline survey were identified during the qualitative assessment. In the same way it would be most effective to work with individual Community Development and Resettlement Committees to identify impact indicators that they can participate in monitoring from the start. Achievement of success by measuring such indicators can stimulate groups and individuals into becoming more involved and more committed to the development ideas being promoted. By the same token their early awareness of negative trends can help mitigate the consequences of problems left unattended.

The provisional monitoring plan below is indicative of the kinds of issues that should be monitored and evaluated. Some of these may prove to be invalid, less relevant or too difficult to monitor and may be exchanged for others if necessary.

Resettlement Action Plan - Provisional Monitoring Plan

Activity	Suggested Milestones / Indicators	Sources of information	Agency responsible	Frequency / Report Audience & use
Performance Monitoring	<p>Public meetings held</p> <p>Census complete</p> <p>Settlement land demarcated</p> <p>Facilitators recruited / seconded</p> <p>Communication campaign for awareness raising about resettlement</p> <p>Project affected people verified</p> <p>Assets inventories complete</p> <p>Grievance redress system in place and operating</p> <p>Settlement sites and land area chosen</p> <p>Housing & related infrastructure complete</p> <p>Compensation paid</p> <p>Resettlement and Development Committee established and operating</p> <p>Permaculture training underway</p> <p>Principal & alternative livelihood activities initiated & underway</p> <p>Monitoring systems operational</p> <p>Timely reporting</p> <p>External evaluations carried out & reports submitted</p> <p>Timely refinements made to the resettlement programme in response to M & E reports</p> <p>All grievances responded to / redressed within stipulated time</p> <p>Project resettlement assistance to PAPs limited to technical assistance and skills transmission after one year</p>	<p>Monthly steering Committee Reports</p> <p>Monthly Task Force Reports</p> <p>Consultation records</p> <p>Facilitators field reports</p> <p>Six monthly and Annual progress and financial reports</p> <p>Evaluation reports</p>	<p>Project Steering Committee</p> <p>Resettlement Task Force</p>	<p>Six monthly and annual reporting as required by the Sanctuary management and IFC / GEF</p>

Activity	Milestones / Indicators	Sources of information	Agency responsible	Frequency / Report Audience & use
Impact Monitoring	<p>Host community and settlers' attitudes to project & to one another: # satisfied with resettlement process / resettlement staff / mechanisms for grievance & problem solving / involvement in decision-making / development opportunities etc. % of crop production achieved in relation to prior to relocation Time lapse before families feel they have reached the same / and better life than prior to relocation # of grievances presented to Steering Committee / to Task Force / to <i>hossi ya missava</i> % resolved at each level in stipulated time % families successfully using permaculture methods Proportion of land attributed that is used each year Conservation of residence # families with new investments in livelihood improvements # loans repaid on time # stalls , # stalls employing labour # projects not supported by the Sanctuary developed by community groups & individuals % subsistence : % crops sold # settlers temporarily / permanently employed by the Sanctuary</p>	<p>Six monthly quantitative and qualitative surveys</p> <p>Regular public meetings, consultation with people affected by the project Review of facilitator's reports, Task Force and Steering Committee reports on grievance mechanisms</p>	Resettlement Task Force with external consultant support	Annual or as required by the Sanctuary management and IFC / GEF
Completion Audit	<p>Final evaluation of baseline indicators</p> <p>% compliance with IFC involuntary resettlement policy</p> <p>Evaluation of relevance, replicability and sustainability of resettlement programme</p>	<p>Resettled families, host population and others in Sanctuary Review of all project reporting and consultation documentation</p>	Contracted external audit and social evaluation company	On completion of RAP timetable as agreed by Sanctuary project and IFC/GEF

CHAPTER H2: COMMUNITY DEVELOPMENT PLAN (CDP)

2.1 PRINCIPLES AND POLICIES FOR THE COMMUNITY DEVELOPMENT PLAN

2.1.1 Purpose

The purpose of this CDP is to provide guidelines for the community development programme for VCWS.

2.1.2 Operational context

Much of the following discussion has been dealt with above, but for the sake of clarity and to ensure that the developmental and operational context of the CDP is properly presented and understood, certain issues and facts will need to be emphasised once again.

Operationalising the CDP will largely depend on establishing and maintaining effective communication channels. This facet of the CDP will be dealt with in the Public Consultation and Disclosure Plan that follows below.

Some 1,036 families whose livelihoods are currently mainly based on subsistence agriculture and small-scale artisanal fishing inhabit the project area. The majority of these families will continue to live in the project area but approximately 8% will be moved to make way for the installation of the first phase of the Reserve area and some of the private tourism developments. Once the final Reserve area has been demarcated and fenced, those additional families residing in the enlarged area, will also need to be resettled and will become priority targets for the CDP. Their numbers are not known at this stage, and the CDP therefore only deals with the current situation.

Current IFC social policy expects all resettlement activities to be considered as development programmes. The aim should be to ensure that households are at least as well off as they were before resettlement, and that development initiatives aimed at the restoration of incomes and services are sustainable. Since all existing households will remain in the sanctuary, and be affected by its establishment to a greater or lesser extent, the target group for the Community Development Plan (CDP) is all households in the sanctuary.

The CDP will thus address issues concerning relocating households and those whose existing economic activities will be displaced. The plan also addresses other groups such as those who are using the area for artisanal fishing, agriculture and trading.

The approach for community development in the sanctuary is based on two main lines of community development thinking: a livelihoods approach on the one hand, and the participatory communication approach that facilitates this on the other.

In terms of the priorities of the sanctuary project, three main entry points have been identified:

- Rebuilding the livelihoods of the resettled families;
- Developing a participatory approach to sustainable environmental management;
- Developing an enabling environment for communities to become more empowered and genuinely participate in the biodiversity and social programmes of the VCWS project.

The three entry points are also related in an evolutionary sense; they are the iterative steps towards achieving the project objective of shared community management of the conservation programme. Initially the main focus of activities will be the provisioning of the resettled communities with food, water, shelter and other essential needs. As this process progresses the next step is to ensure that the livelihoods of the resettled population are protected and promoted. Given the recognition of the poverty level of the resettling population and others in the sanctuary, assistance will be provided to helping prevent a decline in household livelihood security, through activities to develop early warning systems of decline. Redress focuses on improving the resilience of households. This will involve programmes that focus on: savings and credit, crop diversification and marketing, reproductive health, institutional development, personal empowerment or community involvement in service delivery activities. Most livelihood promotion activities are longer-term development projects that increasingly involve participatory methodologies and an empowerment philosophy.

In order to ensure the greatest possibility of success a number of lessons learned by practitioners in the area (Carney *et al* 1999) should inform the community development plan.

These include:

- Focusing on skills development among staff (particularly around participatory approaches) before attempting to introduce new livelihood frameworks.
- Ensuring that introduction of a livelihoods approach is not viewed merely as a centrally-driven initiative; the benefits of the approach need to be clear.
- Use of a conceptual framework that is seen to be inclusive of other approaches, and focuses on core community development programming principles.
- Allowing any framework to be adapted as lessons are learned, so that multiple actors can contribute to the framework evolution.
- Extending the approach by building on successes, using case studies and encouraging those involved in them to promote wider uptake.

People tend to change when they understand the nature of the change and view it as beneficial, so that they make an informed and conscious choice to include it in their list of priorities. Unless their circumstances are taken into account, and their felt needs are met, no efforts to encourage change will be successful. People need to be informed and consulted, or they do not feel part of the effort. Involving target populations at every level and stage of development - from identifying problems to finding solutions, from resource mobilisation to project implementation - is critical to the success of any development project. The concept of dialogue and interpersonal communication should apply throughout the whole continuum of

activities. The continuum itself provides a framework for mutually supportive activities across a broad range.

Communication helps to design better and more sustainable projects. It helps to mobilise people for development action, and to promote coordination and linkages. It also spreads knowledge about successful experiences. It points people to sources of information and advice, education and learning, and planning and decision making, and facilitates the establishment of systems for exchanging information between all actors in the development process. Communication also improves the reach and impact of training and extension. Introducing a comprehensive communication strategy effectively provides a framework for action, in which existing efforts can be improved through an effective communication approach. It is the primary vehicle for role change, for participation and stakeholder involvement in successful sustainable livelihoods development.

The practical use of a communication approach in the community development programme focuses on three levels:

- Debate and awareness-raising involving a cycle of reflection and analysis, followed by participatory decision-making and action.
- Assistance in facilitating people's acquisition of new knowledge and the skills they need.
- Promoting better teamwork and coordination between individuals, organizations and groups involved in the development activities.

The communication process is reflexive and building the capacity to carry out an effective communication strategy in itself facilitates identification and planning of the livelihoods objectives, for they are the content of the programme.

Two basic principles that will guide capacity development actions are:

- The need to ensure access to information for all stakeholders in the process;
- The need to strengthen the ability of all stakeholders to articulate, disseminate information and make their own decisions.

The practical process of communication capacity development is based on visual aids that strengthen the communities' ability to analyse, plan, implement, monitor and evaluate development programmes.

It is in this way a growth in awareness and the creation of solutions to local problems rests with the local communities, while technical assistance plays a facilitating role. The emphasis is on promoting communities' proactive self-help actions rather than their remaining passive bystanders of the sanctuary's development process. This paradigm presupposes fundamental changes in attitudes: change agents and technical experts should facilitate and not lead, communities must focus on ensuring effective local leadership and ownership of preparation and planning activities. Strengthening these capacities also creates the conditions for a more sustainable institutionalisation of participatory planning methods.

The installation of mechanisms to allow a flow of information between the sanctuary management team and the programme beneficiaries is a fundamental part of creating an enabling environment for development. Participatory monitoring and evaluation planning should not be too ambitious remembering that:

- Effective monitoring is only possible if all the participants share the same understanding and commitment in the usefulness of the process and its implications.
- Indicators should include assessment of the quality of the communication and capacity development process that is taking place.
- The team approach in monitoring should support and enhance the aptitudes of participants to learn together and to manage the inherent flexibility of the programme.

2.1.3 Socio-economic context

For a full background on the social and other factors that may influence the resettlement action on VCWS, see Part G above. The socio-economic context within which the CDP was developed is largely identical to that of the RAP discussed above. However, for the sake of clarity it is deemed necessary to briefly allude to it once again:

- Some 1,036 families whose livelihoods are currently mainly based on subsistence swidden agriculture and small-scale artisanal fishing inhabit the VCWS area. The majority of these families will continue to live in the project area but approximately 8% will be moved during the first phase to make way for the installation of the protected area and some of the private tourism developments. This number will increase once the final Reserve area has been demarcated and fenced and the people living there have to be resettled.
- Results of the household survey demonstrate that around 93% of the population surveyed are agriculturalists. Forty eight percent depend solely on agriculture, 4% solely on fishing and 45% on a mixture of fishing and agriculture. The remaining 2% depend on private employment and the remittances of dependents. Thirty six percent of families have at least one member earning a salary. In the past people hunted and gathered many wild products. Now this practice is only pursued during times of food scarcity, or for the collection of materials for construction or healing for example.
- Fifty eight percent of the families interviewed have illiterate household heads, the rest being able to at least read and write. Only 19% of family members in the whole sample were able to read and write or had been to primary or secondary school. Forty four percent of these people were women and only four men in the whole sample had second level primary education
- The highest numbers of families depending solely on agriculture were found in Matsopane (32%) and Machuquele (37%) Circles, and families with mixed activities were mainly in Matsopane (40%) distributed through Chicume, Maçuale and Chingonguene. The families interviewed who solely obtain their livelihoods from fishing live in Chingonguene and Inhamambane.
- Indicators of security and wealth in relation to the activities practiced above were identified as fishers owning boats and fishing equipment, and agriculturalists

cultivating larger than average land sizes. Interestingly 64% of boat owners were found to carry out both fishing and agriculture. The household survey showed that one family in Chicume has four boats, one in Chingonguene has three and the remaining 12 boat-owners have only one boat. Fifty seven percent of boats were used in the Inhamambane Estuary and 14% in Lake Manhale. Marine resources are more highly valued than fresh water fish because the catch can be sold more easily at a high price, is tastier, and is made up of different varieties.

- The average land area used for cultivation is 1.7 hectares. Only 6% of families use over 4.5 hectares, these being families living in Inhamambane, Marrovane and Chicume. Most families with only two or three family members who cultivate more than two hectares of land, and who hire labour, are found in Machuquele Circle with single examples in Singo and Inhamambane. Approximately 88% of the agricultural produce from the past year was used for subsistence. Survey results confirmed that the sale of alcohol distilled from sugar cane is the most commonly marketed agricultural product (over 50% of families interviewed participate), and is the highest source of income from agricultural products at an average of just over US \$100 per month.
- Despite not being identified by focus groups as a priority indicator, the frequency of corrals for the keeping of pigs and goats is an important indicator of capital retained by a family. Seventeen percent of homes visited had corrals.
- Constraints: People cited the lack of money, or in the case of fishers and traders investment capital, as one of the main constraints to improving or expanding their activities. Twenty two percent of families identified the lack of labour for the workforce as the main constraint to improving their agricultural situation. The lack of seeds, lack of arable or appropriate land for cultivating and a small proportion of enterprising people living in the south and centre of the sanctuary claimed that the lack of animal traction is hindering their agricultural development. One of the greatest constraints to improving the value of livelihood activities is the lack of facilities for markets and marketing. There is no land transport and the costs of portering of goods are very high. Most valuable products are drawn out of the area to be sold in Vilanculos, thus undermining the local market.
- The rapid expansion of small businesses through the peninsula in the last months has been phenomenal in comparison to the past six years of steady increase. This is a result of increased money circulating in the area due to the employment of various people on the project and compensation payments being used to purchase goods and set up more small businesses. Although the aspiration of most people is to do well in business, it is not easy, and the handicap of not having a high enough education is acutely felt here, particularly by women left to tend stalls for their husbands.
- The peninsula has no electricity. It does have two first level primary schools constructed of local materials and in very poor states of conservation, one community shallow well in a bad state of degradation and hygiene, a few single track sand roads and a health centre in its last phase of construction. Access to improved public services is only available in Vilanculos town eighteen kilometers across the bay, or two days walking away.
- Socio-economic status of displaced households: A detailed baseline survey of all households whose built structures will be displaced by the development and those

whose existing economic activities will be displaced has not yet been carried out. This is one of the first activities scheduled to be carried out as part of the resettlement action plan. Results of this inventory will provide the basis for analysis in this part of the report.

2.1.4 Ownership of the project

The land and other natural resources of VCWS belong to the people that “own” and till the land. “Ownership” of the CDP, in all its facets, would thus also be vested in the local communities. The importance of establishing, strengthening and maintaining community involvement and participation is thus stressed at all levels of the development and implementation of the CDP.

However, as would be clear from what has been said above (see the RAP) and the following discussions, external management assistance and even intervention would be needed in order to make the plan work. The principles of partnership and active participation as embodied in the developmental policy of co-management (collaborative management) as described elsewhere in the BMP (see Part C) would be applied, to ensure that the community retain collective control of the project and of their individual destinies whilst operating within the parameters of the CDP.

Although “ownership” rests with the local people, accountability to make the CDP work and responsibility to carry it out, rests squarely with the developers.

2.1.5 Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the following model for the development of affected households in VCWS is loosely based on the abovementioned operational policies of the IFC for resettlement (read: development) (see the RAP) as well as the models for marine resources, terrestrial wildlife and agriculture as discussed in Part D. The operationalisation of the CDP is, for the sake of brevity, not described in the same detail as the marine, terrestrial resources and agricultural plans. Many of the planning and operational principles embodied in these plans would *situ situ* also be applicable to the resettlement plan, and should be read in conjunction with the CDP that follows below.

2.1.6 Lessons learned

In the “lessons learned” section of the three natural resources plans mentioned above, as well as the RAP, particular attention was devoted to lessons that could be learned from past experience and other projects. These lessons were discussed in some detail and would not be repeated here. Notwithstanding the fact that they dealt with natural resources plans, they could be universally applied and should also be considered when planning, implementing and managing the development plan.

The following “lessons” were listed:

- Timing (the time is ripe to launch and execute the CDP)
- Scale (the plan is complex but still tractable)
- Project size (the 8-point plan breaks the CDP down in manageable units)
- Communication (local communities need to be informed; poor communication of the past need to be rectified)
- Participation (the CDP must be community driven, although execution will largely be a sanctuary management responsibility)
- Decentralisation (use the local civil authorities)
- The human resource (also involve women and youth and prevent their exploitation)
- Cost and benefit (real benefits will lead to behavioural change)
- Private sector involvement (foster private sector initiatives inside community)
- Monitoring, evaluation and data collection (involve the community)
- Sustainability (build human capacity)
- Ownership (vested in the people; they must determine their own destiny)

The results of many development projects involving local communities in developing countries have been fully chronicled. The successes and failures and the reasons for it are well known, as are the many pitfalls that should be avoided. In the case of VCWS there would thus be no need to reinvent the wheel, although it must be stressed that the shortcomings of the past such as the failure to establish proper community structures and poor communication, need to be addressed.

The local communities, but especially those that would be affected in some way or other by the development programme, would have to be involved in an active and participatory manner right from the beginning. The principle of co-management will be applied to ensure that the CDP becomes owned and driven by the local people themselves.

2.1.7 From lessons to principles

A development plan deals first and foremost with people, and only involves the environment and specifically biodiversity in a peripheral and almost incidental manner. Such a plan will obviously differ in many respects from natural resources-based plans. The planning and execution principles that were considered and accommodated in the formulation of the CDP, however, were generally similar to those used for the abovementioned marine, terrestrial and agricultural plans and the RAP and may be summarised as follows:

- The plan will be as simple as possible in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.
- The plan will not be built on sustained outside intervention and funding, but implementation and accountability will be transferred to the “owners” of the resource as soon as possible.
- The plan will only succeed if the local communities perceive and experience the plan to be beneficial, fair and transparent.

- The CDP procedures, once the BMP is approved, will be workshopped with the local people in an organised manner involving facilitators and modern communication techniques.
- Without the formal community structures as outlined in the CDP below and the RAP above being put in place, the implementation of the plan would be seriously jeopardised.

2.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE COMMUNITY DEVELOPMENT PLAN

2.2.1 A 8 – point procedure for implementing the Community Development Plan for VCWS

A simple 8-step process, based on the same principles and procedures as the abovementioned marine, terrestrial, agricultural and resettlement plans, will be applied to the implementation of the CDP for VCWS. The steps are not as closely interlinked as for the natural resources plans, but nevertheless form a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may cause the entire resettlement management process to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion.

The 8 steps are:

- | | |
|---------|--|
| Step 1: | Establish an organisational framework |
| Step 2: | Review of legal and policy frameworks |
| Step 3: | Identify key issues |
| Step 4: | Determine eligibility |
| Step 5: | Identification of community development projects |
| Step 6: | Establish and implement grievance procedures |
| Step 7: | Draw up an implementation schedule |
| Step 8: | Establish procedures for and undertake monitoring and evaluation |

2.2.2 Application of the 8-point plan

For each of the steps the purpose is briefly noted, the rationale is given and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers (threats) may be provided.

STEP 1: ESTABLISH AN ORGANIZATIONAL FRAMEWORK

(1) Purpose

The purpose of Step 1 would be to establish an organisational structure in order to implement the CDP.

(2) Rationale

As was the case with the marine, terrestrial wildlife, agricultural and resettlement plans dealt with in Volume 1 and above, the CDP would be dependent on similar organisational structures to ensure that the plan gets implemented in an orderly fashion.

(3) Actions to be taken

Resettlement and compensation of project affected people will involve the *Sanctuary Steering Committee* as the decision-making body regarding application of policy and operational planning, coordination and supervision, after consultation with the *Community Representative Committee* (CRC). The Steering Committee should analyse the results of the population census currently being undertaken, and recommend investigative follow-up for all identified cases of people affected by the project activities. The Steering Committee should review progress with resettlement issues at its monthly meetings and will, together with the CRC, also be responsible for the redress of grievances.

A *Community Development and Resettlement Task Force* comprised of the Sanctuary's Project Leader: Community Affairs, at least two members of the District Government which include a representative from the District Directorate of Agriculture and Rural Development, the Community Development Advisor from Goshen Community Development Centre, the President of the Locality, nominated Circle and Zone Chiefs for the inhabited areas inside the protected area, two members of the CRC and a contracted TDS would need to be established and should be responsible for organizing and where possible participating in consultation and negotiation of development projects and alternatives with the project affected people. As was the case with the marine, terrestrial wildlife and agricultural plans dealt with elsewhere in the BMP, the CDP would be dependent on similar organisational structures to ensure that the plan gets implemented in an orderly fashion. The Task Force would thus deal with resettlement (decreasing in importance) and community development (increasing in importance).

The government members of the Task Force should be drawn from the team delegated to the sanctuary project by the District Government. Their participation should be financially assisted so that their costs of travelling and staying in the sanctuary are covered.

At least four experienced community development facilitators should be hired or seconded to the project from Vilanculos or the province. They may be acquired from international NGOs such as CARE, World Vision, Acçao Nord Sud (working in Panda, the gas project 100 km north of Vilanculos), and other NGOs carrying out similar community development programmes with staff who speak Xitswa. Another option is to recruit these people independently and directly. There are many people who have previously worked in community development programmes in the province and who are currently out of work. This latter option may take longer, be more risky and will still require a field coordinator for them (the Deputy Project Leader will fulfil this role; see Part L). Secondment from a government institution is also an alternative; for example through the rural water programme, the improved latrines project and low cost sanitation programme or the health or agriculture

sectors. All these sectors employ field level animators or facilitators of varying quality and characteristics. The Task Force will need to submit proposals in this regard to the VCWS-GM.

When additional technical assistance is required for providing inputs to specific activities such as agricultural extension and communication these should be sought from experienced government and NGO sources in the District or Province, or, more likely due to sporadic availability of “official” sources, from a contracted TDS.

The two Resettlement and Development Committees in Marape and northern Chingonguene constituted by members of the host and resettled community, local influence leaders from the church and other institutions at this level may not be sufficient to meet the development needs of the communities in the south of the sanctuary. A local Community Development Committee will need to be initiated in the south to cover the new area that will be included once the fence line has been moved to establish a bigger Reserve area. The VCWS-GM will be advised by the Task Force at what stage such an additional committee would be needed. Women should be represented on the Committees as settlers or members of local institutions of influence. The Committees’ principle objectives are to ensure justice and equity at local level and to channel grievances to the Task Force.

It is expected that by the time the resettled families have managed to regain their livelihoods, the resettlement structures themselves will have changed their roles so that they are monitoring and facilitating the process of development rather than rehabilitation, in the community.

The key figure for coordination purposes is the Project Leader: Community Affairs. This is the point person to whom all information should flow from the bottom upwards, and from whom it should flow to the Steering Committee and back down again. He/she should be working full-time on the two issues of community development (about 25%) and resettlement (about 75%). As working priorities shift with the establishment of a development orientation rather than the rehabilitation of resettled families, the time commitments of the Project Leader would be shifted in response. The facilitators constitute the Team Leader’s field team and they are supervised by his/her Deputy.

Additional local facilitators and extensionists may be identified as the programme progresses, and these will slowly be added to the team in the effort to build local capacity. As they are absorbed, gain capacity and skills, and if working schedules permit, they should eventually replace most of the facilitators employed from outside of Quewene.

Coordination between the Project Leader: Community Affairs and the Community Development Advisor (CDA) at Goshen should be direct and regular. They should plan together with both their teams (facilitators and extensionists) whenever possible so that meetings with communities and families are not mis-programmed. Once clarity as to the continued involvement of the Goshen Advisor has been reached, the duty sheets of these two senior social personnel should be reevaluated.

Development and Resettlement Committees should be assisted to meet every month initially, and later less frequently, to exchange experiences and learn from these so that they can improve their role and effectiveness as a result.

STEP 2: REVIEW OF LEGAL AND POLICY FRAMEWORKS

(1) Purpose

The purpose of Step 2 would be to ensure that the community development programme takes place in accordance with relevant local legislation and policies and IFC policies.

(2) Rationale and actions to be taken

For a general discussion of relevant laws and policies, refer to Part A.

The participation of local communities in land and natural resource management is governed by the Land Law 19/97 and its regulations, the Forestry and Wildlife Law 10/99 and its draft regulations, and the Environmental Law 20/97 and regulations. Community participation in natural resource management of private and public protected areas used for tourism is now covered by the Ministry of Tourism, although the legal basis for this has not yet been fully developed.

Since the beginning of the 1990s, various studies were commissioned in rural areas with the objective of identifying local communities' management systems of land and other natural resources. The principles of the National Land Policy (10/95) aim to ensure the rights of Mozambican people to the land and other natural resources, and the promotion of investment with an equitable and sustainable use of the resource. The revised Land Law of 1997 introduced the figure of the local community as a subject with active land-use rights.

Communities became responsible for:

- Management of natural resources;
- Conflict resolution;
- Participation in the titling process, through consultation;
- Identification and definition of the boundaries of the land they occupy.

The use of customary practices is legally recognized, among other means of managing natural resources and resolving conflicts. Local communities occupying the land according to customary practice acquire the rights to use of the land except in legally reserved areas or those that are partially protected.

The Land Law recognizes the constitutional rights of various actors and systems in relation to access and management of the land. Included are customary rights of transfer and inheritance as well as the role of local leaders in the prevention and resolution of conflicts and in the legitimisation and legalization of the occupation of a determined area.

The Forestry and Wildlife Law sees the local community as the active agent in the preservation of common interests through the protection of residential, agricultural and forested areas. This role also extends to areas of cultural importance, pastures and fallow lands, water sources and hunting areas. The community's use relationship with wildlife and forest resources is seen as being carried out for sustenance only and on the basis of customary practices.

Two relevant principles endorsed by the law are the:

- Conservation, management and use of forest and wildlife resources should promote their sustainable use and not prejudice customary practices within a framework of decentralization.
- Education and exchange of experiences between local communities with the objective of building their capacity to manage and conserve forest and wildlife resources.

Community hunting rights are recognized in multi-resource use areas (including wildlife "farms" such as VCWS) for the sole purpose of consumption, except where the wildlife resource is controlled by the concessionaire (fenced, such as VCWS) and the species have been reintroduced by the concessionaire (again, such as the VCWS). This is an activity subject to licensing and is carried out according to local custom with the local councils in coordination with the sector authorities.

The Local Council for Management of Forestry and Wildlife Resources is an institution governed by the national legal framework for associations created by the Forestry and Wildlife Law to facilitate the management of forest and wildlife resources. It is constituted by representatives of local communities, private sector, NGOs, associations and the local authorities with the aim of protecting, conserving and promoting the sustainable use of the resources.

Its responsibilities cover a particular geographical area in which it is established and include:

- requests for authorization to use the resources,
- the development of activities promoting sustainable use of the resources and thereby raising the quality of life of local communities,
- taking into account mechanisms for conflict resolution that involve all the stakeholders using the local resources, as well as the strategic lines of the management plans for the area,
- collaboration with the State's inspectors and guards,
- contribution to the control of uncontrolled fires and,
- improvement of the legislation and policies.

Resource management must ensure the participation of local communities in the exploitation of the forest and wildlife resources and in the benefits generated by their use. The draft regulations of the Law currently pending approval by parliament, note that management plans for protected areas must be made with the participation of the stakeholders including local communities.

The Environmental Law bases its principles on the rational use and management of environmental elements for the improvement of the quality of life. It recognizes and values the role of traditions and knowledge of local communities and the contribution of these to the conservation of natural resources and the environment. The active participation of all people is seen as the basis of the National Environmental Management Plan (1996). Sustainable development in an environmental context refers to development based on environmental management that meets the needs of the present generation without compromising the needs of future generations.

STEP 3: IDENTIFY KEY ISSUES

(1) Purpose

The purpose of Step 3 would be to ensure that key issues that may influence or impact on the CDP are identified and taken into consideration

(2) Rationale and actions to be taken

The project concept already takes into account some of the negative economic and resource-use trends and aims to control or reverse them through community development activities. The effectiveness of these activities may be constrained by unexpected impacts of project implementation including:

- The effects of working directly with a local leadership that is not a universally trusted structure or one that does not encourage open and free communication around it. This has a direct negative impact on almost all families in the project area, but it is more acutely felt among the families involved in the resettlement process and women who tend to be excluded from formal communication events.
- The potential for relocating families to lose the opportunity for obtaining the use of equal or better land in equal or better quantity than prior to moving, and the lack of clarity about the land available and a system for ensuring equity. The weakest will lose most if there is competition for land and resources in the area, undermining their survival capacity.
- The potential of losing the inherent long-term value of tree and annual crops that are compensated for in cash which is then used for immediate short term lifestyle improving investments.
- The additional demands on limited natural resources, such as land, surface water supplies, marine resources and materials for construction made by the project will augment those of the community in the instances where the community has productive trading and supply relationships with the project. This will have cumulative negative effects on the natural (re)productive capacity of the resources in the community areas and encourage the impoverishment of the poorest/weakest resource-users.

The CDP must be able to respond to the general and very real risks associated with the resettlement programme but it must also be able to address specific community development issues including:

- Trust building with the leaders and community;
- Improving communication, particularly with women and the resettling families;
- Ensuring an equitable system for land allocation and its sustainable use;
- Ensuring development of livelihood-building strategies that are appropriate, viable and resource supported;
- Ensuring equitable access to opportunities for sustainable livelihood development activities;
- Providing means of genuine empowerment of communities through the joint conservation management strategy and its implementation;
- Ensuring that community partnerships with the commercial project do not overburden the productive capacity of the land or the people.

STEP 4: DETERMINE ELIGIBILITY

(1) Purpose

The purpose of Step 4 would be to determine eligibility criteria to identify all the stakeholders who should be involved in the CDP.

(2) Rationale and actions to be taken

Potentially all families in the sanctuary may participate in the community development programme. Priority targets will be project-affected people who are eligible to development assistance as groups. Some of this will be part of their entitlement due to loss of assets or access and use of resources, and other assistance may be part of remedial strategies for assisting vulnerable households. These families also retain a priority position of eligibility for opportunities to participate as groups in activities promoted as part of overall the community development programme.

The eligibility of project-affected families is based on their losses due to the effects of the project's creation of the Reserve area for wildlife conservation and the Phase I resettlement families who were moved from other areas to make way for other development activities. The following eligibility matrix shows physically displaced families as having the highest priority for involvement in group-based livelihoods development activities, followed by the partially economically displaced groups. Community groups from anywhere in the sanctuary may also make requests for development support from the project. Their categorization as interest groups (women, host population, fishers, youth, traders, and farmers) would allow for the prioritising of applications for assistance. The host community and women are priorities among these social groups, the rest would all have equal opportunities for consideration if they make a request for support. Finally the last three categories are for individuals whose involvement may be of mutual benefit to the community development activities. Thus aspiring individuals who are interested and meet the criteria below may learn

how to become trainee or local extensionists, development facilitators or members of the natural resource management team.

The types of activity identified in the eligibility matrix in the column on the left are options for community capacity development and income generation. This list is the product of analysis of the participatory baseline survey, being direct and indirect means of responding to identified needs. The list should be regarded as a suggestion only and as a first step it will be necessary for the sanctuary to assess its own capacity to provide assistance in each case and act to establish its capacity to respond to community development needs. For example, employment opportunities with the sanctuary at the time of removal will be in the construction of buildings for the commercial enterprise and as the tourism infrastructure begins to be used, in the hospitality business.

The position of Project Leader: Community Affairs does not exist yet, and neither do the facilitator and extensionist positions. The expertise required to design assistance strategies together with communities that are sustainable and viable should come from the above-mentioned team. Once the sanctuary has established the necessary capacity, then it will be able to respond to community needs in a much more effective fashion, cultivating community trust in the project by doing so.

Eligibility Matrix

	PRIORITY LEVEL	1	2	3	4	1	4	4	4	3	4	4
	Activity type/Target Group	Physically displaced	Partial economic displacement	Women's groups	Fishers' groups	Host community groups	Youth groups	Traders' groups	Farmers' groups	Aspiring Development Facilitators	Aspiring Trainee Extensionists	Local Influence Leaders
1	Employment with the Sanctuary project											
2	Credit for project development											
3	Permaculture techniques & applications.											
4	Market gardening or animal production											
5	Agricultural marketing											
6	Fish storage & marketing											
7	Accounting skills											
8	Literacy											
9	Small business management											
10	Facilitation & communication skills											
11	Reproductive health awareness & activities											
12	Conservation management skills											
13	Other types of project proposed											

Note: The highest priority target group for participation in community development activities is to the left and the lowest to the right of the spectrum. The levels of priority from 1 to 4 denote highest to lowest priority of eligibility. The groups eligible for activities are listed under the priorities.

While the target group ranking shows which groups should be prioritised above others, the prioritisation of proposed projects, would be subject to the criteria identified below.

Criteria for establishing eligibility

Criteria	Eligibility
a) Priority social group is women. b) Size of group – largest impact with greatest effectiveness. c) Group is not benefiting from other assistance from the Sanctuary at the time of application. d) Group must demonstrate viability of idea (experience / funds / cost-sharing / capacity) and requests that cost over US \$800 must be accompanied by some sort of guarantee. e) Group must contain at least one member who is literate or demonstrate how will manage project without. f) Group must demonstrate that all members live in the sanctuary. g) Group is from a pre-selected prioritised geographical area. h) Members should preferably not include chiefs (who provide recourse in times of conflict and difficulty) but have a trusted leadership structure. i) Group must develop a proposal with a monitoring plan.	All or most community development options (see matrix above) according to interest and experience of group.
Individuals with interest, social aptitude, and education higher than 6 th class	Extensionist trainee
Individuals with interest, social aptitude, and education higher than 8 th class or equivalent in experience	Local development facilitators
Local influence leaders interested in natural resource management	Conservation management programme, & other supportive projects

Assessment of project proposals from community groups would be carried out by the Task Force and their recommendations would pass to the Steering Committee via the CRC for the allocation of resources.

STEP 5: IDENTIFICATION OF COMMUNITY DEVELOPMENT PROJECTS

(1) Purpose

The purpose of Step 5 would be to identify the community development projects which may qualify for inclusion in the CDP.

(2) Rationale and actions to be taken

Processes of identification

The community livelihoods development activities identified in the Eligibility Matrix above are the product of synthesizing the discussions in focus groups and responses to the household survey which together provide the socio-economic baseline data for the project. Discussions with groups throughout the sanctuary revealed their ideas for those activities that they would be interested in participating in. The majority wanted activities that would assist them to be able to market their agricultural produce more cost-effectively and without having to carry everything as head loads. Thus physical markets,

market systems and transport (land and boat) were all rated highly as priorities. Suggested assistance with agricultural inputs included provision of seeds and assistance to carry out the cultivation of vegetables in irrigated gardens around lake edges.

Fishers were very interested in improving their fishing capacity and means of storage. They expected that if they have facilities for freezing fish they would need no assistance with marketing their catches. Others were interested in participating in the development of fishing businesses since they had no fishing equipment themselves.

Small traders identified their interest in obtaining access to credit so that they could expand their activities. Others noted their interest in participating in credit and savings activities so that they could finance their own expansion. Income generation activities were a priority for women in the south of the peninsula – they identified a range of activities from the making and selling of handicrafts, to collection and sale of grass and reeds for construction. Youth groups identified capacity development and income generating activities in the areas of arts, crafts and tailoring for example. The idea of a vocational training centre was mentioned.

The list of project activity types in the matrix above are suggested as the initial options for the CDP. It is assumed that the resources to respond to these needs will be reasonably close to hand, and it is suggested that they are sought from the sources identified below:

<u>Selected Community Livelihoods Development Activities</u>	<u>Support Resources Required</u>
1 Employment with the Sanctuary project	<p>Funded posts for four development facilitators (excluding the two management posts), and subsidies for up to ten local facilitators (depending on the availability of funds; the company may generate donor interest to cover these costs)</p> <p>Funded posts for four trained agricultural extensionists and subsidies for four more (depending on the availability of funds; donor funding may make it possible).</p> <p>Priority given for employment of physically displaced family members during their transition period prior to resettlement and re-establishment of livelihoods.</p>
2 Credit for project development	Community development fund allocation & in-house management advice; exchanges of experiences & additional technical assistance from CARE Intl. or others.
3 Learning and application of permaculture techniques	Goshen Community Development Centre and exchange of experiences with successful ventures in Vilanculos.
4 Market gardening or animal production	Goshen Community Development Centre.
5 Agricultural marketing	Goshen Community Development Centre.
6 Fish storage & marketing	Goshen Community Development Centre.
7 Accounting skills	Sanctuary administrative staff as trainers in a collaborative

		(remunerated) activity.
8	Literacy	Subsidies for local teachers (donor assistance may be needed).
9	Small business management	Sanctuary in-house resources / contracted trainers from Vilanculos.
10	Facilitation & communication skills	Consultant / NGO / government training inputs, then training of trainers and support from local institutions.
11	Reproductive health awareness and HIV/AIDS prevention	Facilitators, health unit staff, District health authorities.
12	Conservation management skills	Sanctuary in-house resources and TDS inputs.
13	Other types of project proposed	In-house or strategic alliances with NGOs and private sector.

Community livelihoods development activities may be augmented as the project is implemented following one of two activities:

- Monitoring and evaluation of the resettlement and community development programmes will identify needs for additional or different activities;
- Community groups may identify new projects and request sanctuary assistance with their development.

Community livelihoods development options may only be increased or changed following verification of the need through a) cross checking in the field and with other groups in other areas, b) verifying the results of the baseline and later updates of information, and c) ensuring the sanctuary has the capacity (resources) to respond. The Community Services Division (see Part L) will be the responsible body for this activity.

Four processes will be used for identification and selection of projects in the future:

- All resettling families (physically and partially economically displaced) will maintain a one-to-one relationship with a development facilitator from as early as possible in the process up to the point where they agree that they are no longer vulnerable to a decline in livelihood due to incapacity or lack of resources. It is envisaged that this project will run for the duration of the five-year GEF contract. This relationship will be characterized by needs identification, skill and capacity development and promotion of opportunities for joining income generating activities with others, and promoting group membership to augment resilience. However if early warning signs are detected (via the monitoring of use of compensation or the level of adoption of agricultural innovations for example), that a family is experiencing difficulties in managing, it will become eligible for counselling and encouragement to enter a relevant development group that will bring benefits to the family. Isolation is very often one of the principle signs and underlying factors of poverty, and it is usually reassuring and stimulating to

belong to a group. Such families should not be treated as subjects to rehabilitate with supplies of food etc. unless a real emergency is foreseen.

- The widest access to projects is through this second component - the core communication and community development component:
 - The process for identification of projects with communities begins with a communication campaign that will raise awareness about the programme, describe its components, the rules of application and how this can be done. The idea is to work with development facilitators who will present this information and encourage discussion and analysis with community groups to help them analyse their own positions and decide how best they can improve them. Such a campaign may be planned so that only certain areas of the sanctuary are covered initially, and as capacity to respond grows, then the awareness raising and discussion groups move into new areas.
 - Community groups deciding that they would like development assistance with a project should make an official request to the development facilitator or to a local Community Development and Resettlement Committee. This request should be channelled to the Project Leader: Community Affairs who would then organize the development facilitators to verify and develop each one of the requests together with the requesting communities.
 - The work would be prioritised according to the target group priority allocation in the eligibility matrix above. The facilitator would work with relocated people's groups, women's groups and others to jointly assess the feasibility of the proposed project, and whether it complies with the basic criteria.
 - If the facilitator is faced with a situation that has technical aspects he/she is unequipped to assess, then he/she should call in expert assistance via the Project Leader. The outcome of this phase, if positive, would be a viable project proposal produced with the assistance of the facilitator and possibly additional technical assistance.
 - The community and the facilitator will present the proposal to the Community Development and Resettlement Committee for passing to the Task Force via the CRC. If the assessed proposal is considered adequate by the Task Force it will be passed to the Steering Committee for approval and allocation of resources.
 - Any project that is rejected must be returned to the community that submitted it with an adequate explanation of why it was rejected. If there are inadequate funds for activities at any time, or it is decided that only certain periods or certain amounts of funds will be allocated for new projects identification, this situation must be publicized widely and a temporary halt be called on project requests when necessary.
 - During the implementation of projects, and at the conclusion of support, groups will be encouraged to exchange experiences with others in the area and outside to share lessons about how best to carry out activities.
- Individuals who would like to participate actively in the community development programme may make their requests via the Resettlement and Development Committees or via a development facilitator or extensionist. A formal request should pass through to the Task Force and become the responsibility of the Project Leader who will be tasked with verifying the criteria for application and the

aptitude of the candidate. Following an agreement to begin collaboration, initially in a test period of six months, the candidate would be incorporated in capacity development training and on-the-job learning in areas of mutual preference. If after six months the individual is evaluated and is assessed as apt for the task, then he/she will continue working as a local development promoter with a subsidy from the Sanctuary.

- Infrastructure improvements for social services such as the present construction of a health centre in Machuquele and plans to construct facilities for at least one of the primary schools are already planned by the project. In addition, the resettlement programme will need health facilities, potable water supplies and probably education facilities located in the resettlement areas. Aside from these, new public infrastructure projects will probably be identified as a result of awareness raising and the Sanctuary's demonstration of interest in community development. Such projects would require on-site verification and then ensuring
 - compliance with national sector norms and coverage requirements,
 - project inclusion in the district's development plans, and
 - the existence of a sustainable source of staffing / maintenance / support.

If these conditions do not exist or the need for the infrastructure is not recognized, but the capacity and conditions exist to construct and operate the facility, all national standards should be observed and efforts should be made to ensure that the district's plans reflect the proposed activity.

Community Development Fund (CDF)

Although the communities did not specifically identify the need for a CDF to be controlled and administered by themselves (it is in any case unlikely that individuals would have proposed such a fund), it has already been decided in mid-2001 to establish a community-based fund (Lambrechts, 2001b). This fund has not yet been established, but it will be administered according to the following principles and procedures:

- VCWS will collect all the identified CDF monies on behalf of the Community Representative Committee (CRC; see Part L).
- The CDF will be controlled and administered by the CRC.
- The CRC will open a bank account in Vilanculos.
- VCWS will assist the CRC in formulating a constitution for the CDF and to determine procedures and safeguards for the allocation of funds.
- The CRC will determine its own priorities for allocating the money. VCWS will subtly advise the CRC in this regard.
- The fund will be administered according to Generally Acceptable Accounting Practices (GAAP). VCWS will provide training and guidance in this regard.
- The financial statements will be subject to annual auditing.

Various sources of income have been identified for the CDF. These include but will not be limited to the following:

- A certain percentage of the Mazarette Estate levies (around 7%) will be channelled to the CDF.
- Guests at the Safari Lodges will be levied at a flat rate per night. The rate has not been decided yet, but it will probably be in the vicinity of US \$5,00/night.

Calculated at 60% occupancy for the 100 tourist beds, such a levy will contribute about US \$110 000,00 per annum to the fund.

- Once the re-established game populations in the VCWS have reached levels where a sustainable off-take could take place, a significant amount of money could be generated annually. (See Part K).

STEP 6: ESTABLISH AND IMPLEMENT GRIEVANCE PROCEDURES

(1) Purpose

The purpose of Step 6 would be to establish and implement procedures to deal with any personal or group grievances that may arise during the CDP process.

(2) Rationale and actions to be taken

Communication channels should facilitate the passage of information to the appropriate people in a timely fashion, even if they have diverse origins. In recognition of the diversity of origins of grievances, the grievance communication channels should first be identified in terms of who will be able to use them.

Stakeholder groups identified during the baseline survey and their levels of awareness about issues in Quewene are instructive in the identification of communication channels. It is evident that sanctuary staff need to know about the communities and families and vice versa. Channels with the best potential for transmission of grievances must be devised between influence leaders with high awareness levels of family and community issues who can link with those with high awareness of the Sanctuary project.

Religious leaders provide a link mentioned by the most silenced of the groups - women and youth - as being trusted and open to communication at all levels. Religious leaders have however lamented their lack of admission into the circulation of information from the sanctuary and indeed they have a limited knowledge about its activities and objectives.

Using the matrix identified in the Public Consultation and Disclosure Plan (PCDP) as a guide (see Chapter G3 below) grievance mechanisms should:

- Involve the local religious leaders, the Zone Chiefs and in Chingonguene, the Maritime Delegate in providing a first listening level. Feedback through them should be able to reach even the most isolated groups. These leaders should be involved in the local Development and Settlement Committees and be provided with the tasks of creating awareness that they may be used for the transmission of grievances;
- Involve the relevant *hossi ya missava* when the grievance is land or resource use related in order to obtain advice at the community level, potentially resolve the problem without taking it any further, or passing it on to the next level having heard the advice of this leader;
- Encourage the local Development and Settlement Committee to resolve the problem itself. This should be the ideal, however if not, a representative should channel the grievances via the CRC to the Task Force through the Social Development Manager. The issue may be redressed at this level and a response

communicated back rapidly, or if it is more complex or requires the opinion of the Steering Committee members, then it will be presented in a regular meeting, or in the event of great urgency, the Project Leader will be located to report the issue.

Grievances heard in Steering Committee meetings should be followed by a decision on redress and its communication to the complainant in the timeliest way possible. Information should normally be returned to the community using the same channels as for its initial transmission. However urgent cases should be dealt with directly by the level responsible. The results should be communicated to all other levels at the same time for coordination and awareness purposes.

An alternative channel for the transmission of grievances may be through the facilitators employed to provide assistance to groups involved in community development activities. A facilitator working in a specific geographical area will provide a direct means of transmitting information. The facilitator would communicate this information to his/her supervisor and the relevant Project Leader who will either address it directly, or pass it on to the Steering Committee to take a decision. The Project Leader will ensure that the CRC is informed about the particular grievance. If the CRC, as the ultimate representative of the communities, is unhappy about this alternative channel, it will be abolished.

Responses to grievances should have an established time limit (such as 15 days from the date of presentation), within which the Sanctuary guarantees a response / action. This sort of approach will promote greater trust in the communication system and improve attitudes about the project within the community.

Grievances may be submitted in writing, however if they are not, facilitators and the Project Leader should ensure that the grievance details are recorded in written form when they are passed on to the Steering Committee. All grievances and redress actions should be recorded by the level taking redress action, and included in regular progress reports.

If the person or community who lodged the complaint is not satisfied with the decision of the Steering Committee, then as an ultimate recourse he/she/they may submit it to the District Administrator or the Provincial Governor.

The same channels used to address formal grievances, should also be encouraged to address informal problems and conflicts so that the causes of grievance are mitigated. The emphasis in these cases should however be on the solution of the problems at local level, beginning with the complainants themselves.

STEP 7: DRAW UP AN IMPLEMENTATION SCHEDULE

(1) Purpose

The purpose of Step 7 would be to draw up an implementation schedule to ensure that the CDP is implemented in an orderly manner.

(2) Rationale and actions to be taken

A provisional implementation schedule has been drawn up (see below) and will be considered (and adapted if necessary) by the Project Leader and submitted to the VCWS-GM via the Task Force for approval.

Community Development Plan: Implementation Schedule Summary

		Quarters											
		Year 1				Year 2				Year 3	Year 4	Year 5	Year 6
Community Livelihood Development Activities	Agency Responsible	1	2	3	4	1	2	3	4				
Carry out communication campaign in specific priority locations	Project Leader, communication specialists, facilitators				—				—	—	—	—	—
Receive project requests	Task Force, Steering Committee												
Assist in preparing project proposals	Facilitators				.....							
Approve project proposals and initiate operation	Steering Committee, Task Force												
Train interested farmers in permaculture	Community Development Centre (Advisor & extensionists)				.....							
Employ people in the Sanctuary construction and commercial activities	Task Force, Steering Committee												
Establish and operate a Sanctuary credit facility	Task Force, Steering Committee												
Support market gardening/animal prod. initiatives and agribusiness development	Community Development Centre (Advisor & extensionists)												
Support development of marketing system for agricultural produce	Community Development Centre (Advisor & extensionists)												
Support development of marketing system for fishing products	Community Development Centre (Advisor & extensionists)												
Train traders and others in accounting	Task Force, Steering Committee, Sanctuary staff												
Provide support to literacy groups	Task Force, Steering Committee, teachers, DDE												
Initiate and carry out small business management training	Task Force, Steering Committee, Sanctuary staff												

Design and implement facilitation and communications training and capacity development programme	Task Force, Steering Committee, communications specialist, trainers
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Community Livelihood Development Activities	Agency Responsible	Quarters								Year 3	Year 4	Year 5	Year 6
		Year 1				Year 2							
		1	2	3	4	1	2	3	4				
Initiate and carry out reproductive health awareness raising and initiatives	Task Force, Steering Committee, health unit staff, DDS	.....										
Carry out conservation management training and education	Project Manager, Social Development Manager, trainers					.....						
Adapt and refine the community development programme in response to M & E reports	Task Force, Steering Committee					.....						
Respond to grievances within stipulated time	Task Force, Steering Committee				.....							
Monitor and evaluate the community development programme	Task Force, facilitators, Community Development Centre	.....										
Carry out periodic evaluation of the community development programme	Task Force, facilitators, external evaluators, Community Development Centre				—				—		—		—

STEP 8: ESTABLISH PROCEDURES FOR AND UNDERTAKE MONITORING AND EVALUATION

(1) Purpose

The purpose of Step 8 would be to establish procedures for and undertake a monitoring and evaluation action to determine whether the CDP is on the right track

(2) Rationale and actions to be taken

The full M&E strategy for VCWS is indicated in Part L. The following discussion deals specifically with the CDP.

A plan for monitoring process, impact and outcomes should be developed with the identification of every community development intervention. In the initial stages of the community livelihoods development programme, awareness raising and capacity development for participation will be among the principal activities. Arguably the desired outcomes signalling the success of the communication strategy are the project requests, manageable grievances and a smooth resettlement programme. However the way these outputs are produced are also influenced by many other things, making it necessary to identify specific results and indicators to measure progress of these activities when the activities are planned.

Indicators should include assessment of the quality of the communication and capacity development process taking place. The team approach to monitoring should support and enhance the aptitudes of participants to learn together and to manage the inherent flexibility of the programme. A complementary balance of both qualitative and quantitative research approaches should be employed in monitoring and evaluation. The decisions about which methods to use at which time should be based on issues of time, comparability with existing data, skills available to carry out the work and logistical support for this.

Participatory methods are more effective in identifying intangible outcomes and unforeseen impacts, and can help to give voice to those who are often ignored, providing opportunities for discussion and analysis amongst community groups. They have the added benefit of strengthening the capacity of local individuals and groups to have more control in the development process. The design of innovative and culturally appropriate methods should be encouraged, for instance involving video, photography, dance or drama

Livelihoods development involves dynamic processes that require a dynamic monitoring and evaluation approach. For the resettlers, the strategy should take into account that not everyone is equally at risk and therefore study of their coping and adaptive strategies should turn into the entry point for developing livelihoods strategies with them.

Some indicators may also be devised as tools for communication. Sensitively constructed and chosen communicative indicators that articulate the problems and educate the participants and the public by providing appropriate information may be used. In doing so it is hoped that they engender a sense of social responsibility for the problems they measure. This will arguably raise awareness about the issue and contribute towards the

behaviour-change sought. In this sense the monitoring and evaluation process is not objective or passive, but becomes part of the evolving development process itself.

Monitoring and evaluation processes provide ways to identify the needs for additional or different activities in the community livelihoods development programme. The community development interventions have a wide-ranging scope that should aim to use a few pertinent indicators for monitoring during implementation, while the broader and deeper assessment takes place with external support during evaluation periods. Each community project should be developed with its own objectives, expected results, indicators for monitoring and evaluation and success benchmarks. These should be assessed separately from assessment of the main community development component.

Evaluation should focus on a mix of process and impact indicators and implementers should expect to learn about the effectiveness of the approach in relation to the intended and unintended outcomes. It should focus on learning and not policing, involve all partners and aim to strengthen internal commitment and capacity. The outputs of monitoring and evaluation will help the CDP make corrective actions along the way, will provide information for planning and will permit continuing capacity development through learning.

Livelihood indicators and their variables for socio-economic impact evaluation at household level might include the ones listed below, and other more relevant ones developed at the start-up of field activities. The Social Impact Assessment Report (see Part G) provides the quantitative baseline for most of the indicators mentioned below:

Indicator	Variables
Vulnerability Seasonality Shocks/stresses Resource trends	Most difficult times of the year: Food stocks. Resettlement; drought; cyclone/floods; pest disease attacks; rainfall patterns. Permanent and seasonal migration; income opportunities; poor land productivity.
Assets Land/trees Water Livestock Physical assets Human capital Financial	Use/rented/leased Access to irrigation facility; Number of adult/young pigs/goats/poultry/ducks. Housing condition/furniture; bicycle, radio, boat, fishing equipment, agricultural equipment. No. in household; dependency ratio; literacy levels; female headed. Type of health seeking strategy used; cost of health. Remittances; saving/loan status.
Policies/Institutions / Processes Local networks Marketing Gender Conflict	Participation in community activity; membership in local organisations; contact with external organisations; access to financial institutions; access to extension; access to project loan Who participates? Nature of marketing – private trader, middleman, individual initiative, exchange within community Frequency of women coming together; movement within and outside community; level of control over household decisions. Involved in any conflict with household within the village
Strategies Income sources/ time allocation Coping strategies Adapting strategies Labour Investment	Homestead agriculture; field agriculture; daily field labour; external labour; own boat fishing; labour for fishing; selling grass /reeds; wholesale business; fruit and vegetable production; short-term migration; small business – stalls / mobile; production & sale of cane spirit. Selling trees; utensils; loans; child/women labour; migration to towns; illegal hunting and use of trees. New activities - diversification; migration Number of days sold by gender; contract arrangement – advance selling ; wage rate in peak and lean Current savings; loan/savings use.

Outcomes	
Food security	Number of months from own production. In difficult months – feed adequately – no. of meals/day
Education	Number of children in school; Number of years in school
Environment	Number of trees/household; livestock to land ratio; use of organic matter – fuel vs. field; access to common property resources. Energy use;
Sustainability	Under five wasting; under five stunting; Incidence of diarrhoea
Health	Health, food, clothing, education
Expenditure	Participation in projects and expenditure;
Women's empowerment	Frequency of women coming together; movement within and outside community; level of control over household decisions

Qualitative community monitoring and evaluation discussions through focus groups and semi-structured interviews should focus on opinions about activities, progress, roles and relationships analyses (the four “R’s”: rights, responsibilities, revenue and relationships; Thompson 2002) and SWOT analysis. Capacity mapping and role negotiation exercises may also be carried out to learn more about the situation as well as plan remedial actions. The draft community development monitoring plan appears below.

Community Development Plan: Monitoring Plan

Activity	Suggested Milestones / Indicators	Sources of information	Agency responsible	Frequency / Report Audience & use
Performance Monitoring	Facilitators recruited / seconded Communication campaign planned Communication campaign carried out in specific areas Resettlement and Development Committees established and operating # project requests # project proposals # project proposals approved and operating Permaculture training underway # people employed by the Sanctuary project # loans supplied % repayments on time # market gardening / animal production initiatives underway Marketing system established for agricultural produce Marketing system established for fishing products Accounting training under way Literacy groups operational Small business management training under way Facilitation and communications training and capacity development programme designed and underway Reproductive health awareness raising underway and initiatives taken up Conservation management training and education underway Monitoring systems operational Timely reporting External evaluations carried out & reports submitted Timely refinements made to the community development programme in response to monitoring and evaluation reports All grievances responded to / redressed within stipulated time	Monthly steering Committee Reports Monthly Task Force Reports Consultation records Facilitators field reports Quarterly and Annual progress and financial reports Evaluation reports	Project Steering Committee Resettlement Task Force	Six monthly and annual as required by the Sanctuary management and IFC / GEF
Impact Monitoring	As noted in table above plus qualitative indicators such as: Balance of responsibilities between stakeholders Health of relationships between stakeholders Strengths and weaknesses of policies Relationship of policies and community attitudes Needs for changes in relationships Assessment of objectives and results of project in terms of roles and responsibilities and institutional strengths and weaknesses Opportunities for improvement Constraints to improvement Benefits of training	Six monthly quantitative and qualitative surveys Regular public meetings, consultation with people affected by the project Review of facilitator's reports, Task Force and Steering Committee reports on grievance mechanisms	Resettlement Task Force with external consultant support	Annual or as required by the Sanctuary management and IFC / GEF

1.4 EXECUTION AND OPERATIONAL PLANNING

Executing the CDP will be the ultimate responsibility of the VCWS-GM, assisted by the Project Leader: Community Affairs and the various organisational structures and specialists indicated above and with M&E playing an important role.

The CDP provides an indication of the way ahead, but does not, in keeping with the objectives of the BMP, provide full details of the exact implementation processes and procedures that would be applied. The VCWS-GN will thus ensure that detailed Operational Plans (OP's) are prepared to give effect to the nine steps outlined above. A contracted TDS will be employed to assist with the preparation of the OP's, linked to an involvement by the GEF Project Manager (Implementation) as outlined in Part L.

CHAPTER H3: PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)

BACKGROUND

Effective public consultation and disclosure is a cornerstone of IFC's approach to implementation of development projects. The Public Consultation and Disclosure Plan (PCDP) is a program for on-going public consultation and information disclosure during the construction and operational phases of the Vilanculos Coastal Wildlife Sanctuary Project. In recognition of the importance of the communication process and need to gain buy-in from a large group of local stakeholders, consultation is integral to social management plan implementation. The community development approach itself focuses on communication, consultation and feedback provision, making sure that capacity is built for carrying this out adequately. The plan outlined in this PCDP underlines the need to invest resources in this area given the sensitivity of the project at all levels.

3.1 PRINCIPLES AND POLICIES FOR THE PCDP

3.1.1 Operational context

Public consultation started early on in the project design and planning phase. The first full public meeting at site level was held in Quewene with the participation of around 200 people on 15th December 2000. The objective was the presentation of the project by its proponent to the principal local stakeholders and the issues covered included the components of the project, its social benefits and the regulations that will have to be imposed in order to protect the environment.

The process of disclosure of the project EIA involved public hearings which were held in Inhambane on 15 November, in Vilanculos on 16 November and in Maputo on 19th November 2001.

In Quewene the project has been presented to various groups of the community by local project staff members in the course of their work. Initially large meetings for the whole

community and local leaders and later the schools were carried out with the senior members of the sanctuary management present (October through to February 2002). Following these, meetings others with surrounding populations in smaller groups and individually were carried out by local staff. The objectives of the project, the benefits and needs for some families to have to move were all explained at the meetings. Consultations specifically related to the resettlement programme were documented and a summary is presented in the full specialist report (Volume 4 of the BMP). Other meetings were also held in the course of project implementation in the construction phase and have been documented.

However, and this would probably be the root cause for the information and disclosure shortcomings and deficiencies indicated in a number of sections above and in Part .. , the comprehensive stipulations and recommendations of the company's Public Consultation and Disclosure Plan (PCDP) (Lambrechts 2002b) were either not carried out or implemented, or received only superficial attention.

The focus group discussions and semi-structured interviews carried out for the socio-economic baseline study were all documented and a summary of these can be seen in the full specialist report in Volume 4 of the BMP. Key opinions expressed were all recorded and their synthesis and analysis is presented in the socio-economic baseline study and SIA. Documented information of consultations undertaken as part of the resettlement process has not been presented for the period 14th May to date (30th September), or concerning other public awareness and consultation activities with the exception of the IFC consultant's records of focus group discussions and semi-structured interviews with local stakeholders. (See note above about non-compliance with the PCDP).

3.1.2 Ownership

Although the various community committees mentioned above and in Volume 1 (marine, terrestrial, agriculture, resettlement and development) will all be involved in the PCDP to channel information, the PCDP will be the responsibility of VCWS management. The communities will thus in effect be the client, and ownership will rest with the company.

3.1.3 Procedures and processes

The structure of the following PCDP model is based on the other plans contained in the BMP. The procedures and processes applicable to these plans, as well as many of the principles, also apply to the PCDP and should be read in conjunction with the PCDP that follows.

3.1.4 Lessons learned

In the "lessons learned" section of the three natural resources plans mentioned above (Volume 1), and to a lesser extent also the RAP and CDP, particular attention was devoted to lessons that could be learned from past experience and other projects. The principles behind these lessons were discussed in some detail and would not be repeated here. Notwithstanding the fact that they dealt with natural resources plans, they could be universally applied and

should also be considered when planning, implementing and managing the PCDP. The following “lessons” may also apply to the PCDP:

- Timing (the time is ripe to launch and execute the PCDP)
- Scale (the plan is complex but still tractable)
- Project size (the 12-point plan breaks the PCDP down in manageable units)
- Participation (PCDP must be viewed as a responsibility from the company towards the client; execution will largely be a sanctuary management responsibility)
- Decentralisation (use the local civil authorities)
- The human resource (also involve women and youth)
- Monitoring, evaluation and data collection (involve the community)
- Sustainability (build human capacity)

The results of many public consultation and disclosure programmes involving local communities in developing countries have been fully chronicled. The successes and failures and the reasons for it are well known, as are the many pitfalls that should be avoided. In the case of VCWS there would thus be no need to reinvent the wheel, although it must be stressed that the shortcomings of the past that led to the communities being poorly informed will need to be identified and addressed.

3.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE PUBLIC CONSULTATION AND DISCLOSURE PLAN

3.2.1 A 7 – point procedure for implementing the Public Consultation and Disclosure Plan for VCWS

A simple 7-step process, based on the same principles and procedures as the abovementioned marine, terrestrial, agricultural, resettlement and development plans, will be applied to the implementation of the PCDP for VCWS. The steps are not as closely interlinked as for the natural resources plans, but nevertheless form a chain that bring accumulative strength with every subsequent step added. Leaving one out, or not doing it thoroughly may cause the entire chain to fall short of the mark, and may cause the entire resettlement management process to fail entirely. It is important to note that some of the steps are overlapping, and that some of them can be implemented concurrently rather than in a linear fashion.

The 7 steps are:

- | | |
|---------|--|
| Step 1: | Establish an organisational framework and implementation capacity |
| Step 2: | Review of regulations and requirements |
| Step 3: | Identify all stakeholders in the PCDP process |
| Step 4: | Identify and define the public consultation and disclosure programme and process |
| Step 5: | Draw up a PCDP implementation schedule |
| Step 6: | Establish and implement grievance procedures |
| Step 7: | Establish feedback channels |

3.2.2 Application of the 7-point plan

For each of the steps the purpose is briefly noted, the rationale is given and discrete actions to be taken are listed. Finally, where applicable, an assessment of potential problems and dangers (threats) may be provided.

STEP 1: ESTABLISH AN ORGANISATIONAL FRAMEWORK AND IMPLEMENTATION CAPACITY

(1) Purpose

The purpose of Step 1 would be to establish responsibility within the organisational framework for the PCDP.

(2) Rationale and actions to be taken

As was already pointed out in various sections above, the performance of the company in the critical field of consultation was not up to par. Adherence to the guidelines of the following PCDP will ensure that this identified shortcoming will not be repeated.

Implementation of the social management programme will require the employment of a full time Project Leader (see Part L; this will be a contracted five-year post). This key person will be responsible for all social development activities and will liaise with the existing Community Development Advisor (Goshen). The manager will be responsible for the early recruitment of at least four social programme facilitators and four qualified agricultural extensionists to carry out the considerable amount of field work. Efforts will be made to identify local people who can reinforce the field teams, and replace them eventually, who can be trained to assist and who can operate with a subsidy from the sanctuary.

Communication training will be required for all personnel involved in the programme. This will be effected by using the services of consultant trainers and communication specialists. In addition for the first two years these people should remain involved in the monitoring and evaluation processes that involve participatory methods.

Provision must be made for the development of visual communication materials to help community members understand the objectives and activities of the project and their potential roles and benefits of involvement.

Adequate time must also be allocated for adequate training and preparation of field staff, and for communicating information about the project. A badly prepared programme will have qualitatively poor results. The opportunity for carrying out activities that can bring positive changes to the people of Quewene should not be endangered by rushing, and allowing people who are not involved to form their own – possibly justifiable - negative opinions about why they are not involved.

STEP 2: REVIEW OF REGULATIONS AND REQUIREMENTS

(1) Purpose

The purpose of Step 2 would be to ensure that the PCDP is prepared and implemented in accordance with relevant legislation, regulations and policies.

(2) Rationale and actions to be taken

Environmental impact assessments (EIA) and environmental audits are the key instruments for providing information related to environmental management (Environmental Law 20/97) and by definition also to the public consultation and information process. Decree 76/98 provides the regulations for environmental impact assessment. Public consultation is understood to be “the process of listening to the opinions of various sectors of civil society, including corporate or individual persons, directly, indirectly or potentially affected by the proposed activity.”

EIA regulations assume that consultation occurs throughout the process of the environmental impact assessment based on methods appropriate to the context. Project affected communities must be informed in a timely fashion by the project developer of the period and procedures for public consultation, publicity and receiving petitions.

All environmental impact studies should include a non-technical study covering the main questions dealt with and the conclusions proposed for the purposes of public consultation. Granting of an environmental license from MICOA after the submission of an EIA for approval must take into account all oral submissions and presentations made at public hearings as well as written ones presented to local government bodies or the Ministry up to 10 days prior to the close of the period of review of the environmental impact study. Public hearings in which all citizens with interests in the project have the right to participate, may be called by the Ministry if the scale or likely effects of the project warrant, or when this is requested by any legally constituted entity interested in the activity or the environment. A descriptive report of the public consultation is required and should specify the diligences undertaken, the participation that took place, questions raised in the debates, submissions and presentations received in due time and the replies and conclusions drawn.

It should be noted that the EIA that was compiled to obtain government approval for developing the VCWS (Lambrechts 2001c) project did not in all respects meet with the appropriate government stipulations with regards to consultation, even though an environmental license was granted. This consultation shortcoming will be addressed during all future impact assessments.

STEP 3: IDENTIFY ALL STAKEHOLDERS IN THE PCDP PROCESS

(1) Purpose

The purpose of Step 3 would be to identify all the stakeholders who should be involved in the PCDP.

(2) Rationale and actions to be taken

Key stakeholder groups and individuals affected by and/or influencing the outcomes of the sanctuary project may be classified in three groups: primary, secondary and external. For the purposes of a rapid analysis the main groups are classified according to their importance and influence in the development dynamic and outcomes of the sanctuary's project activities, as follows:

CLASSIFICATION

Primary stakeholders:

Group with direct interests but that perceives itself as having low influence in decision-making processes.

Secondary stakeholders:

Those involved in the implementation of the project; they are important and influential and are integral to its success.

External stakeholders

Those who can be influential to outcomes but have low direct importance to the Sanctuary project management.

STAKEHOLDER GROUP

Primary stakeholders:

Community resident in Quewene.

Secondary stakeholders:

The Sanctuary management, staff, involved NGOs and government departments. Also the GEF Project Manager (Implementation) and the IFC/GEF/IUCN

External stakeholders

NGO and other lobbying groups and central government

The purpose of this method of analysis is to categorise the groups who will have to participate in or negotiate agreement on decisions that define the direction of the sanctuary's development activities as well as the approach adopted for their implementation.

Key stakeholder groups can be categorized as seen below, and a very rapid analysis made to show their principal interests or influence over project outcomes. It is the potential conflicts of these interests that form the main management issues that have to be dealt with through consultation and feedback provision. It should also be remembered that a single stakeholder group may also have conflicting interests of its own, which must also be managed through consultation and an analytical process in which they must prioritise the interests that must be addressed. These are summarized below:

STAKEHOLDER GROUPS	INTEREST	CONSULTATION METHOD
<u>A. PRIMARY STAKEHOLDERS</u>	A.	A.
<u>Quewene community living in the Sanctuary</u>	1. Ensuring the well being of community groups from the customary, social, political and religious perspectives.	Socio-economic baseline qualitative focus discussion groups and semi-structured interviews.
1. Traditional leaders	2. Continued access and use of the marine and lake fishing resources, improved fish storage and marketing systems.	Qualitative monitoring and evaluation using qualitative methods.
Religious leaders	3. Improvement of agricultural and manufactured goods markets and marketing system.	Communication strategy (audience research, feedback, communication campaigns to present information and analytical discussions and decisions about taking up opportunities).
Political leaders	4. Obtaining adequate compensation for their losses and re-establishing their livelihoods and social networks.	Facilitated discussions and meetings with individual families to carry out group and individual planning.
2. Fishing organizations and interest groups, including the community committees	5. The practice of customary and improved agricultural methods in areas of their choice with sufficient production of crops their value.	Use of local project-specific committees (social development, marine resources, terrestrial wildlife resource, agricultural resource etc) for communication, joint planning, feedback and grievance channelling.
3. Traders	6. Opportunities for continued employment and good employment conditions.	Use communication media to record lessons learned and use facilitators to share these with other stakeholders so they can learn from each other.
4. Relocated families	7. To become involved in development activities and decision making about their lives, be recognized by the sanctuary so they can set up income-generating projects. Expect improved access to public and social services.	Committee meetings: CRC, project-specific committees (marine, wildlife, agriculture, social), Steering Committee and Task Force.
5. Swidden farming families	8. Preservation of lifestyles, survival and accessible social services.	Meeting minutes recorded and reports compiled regularly.
6. Sanctuary workers – local & not local	9. Obtain support from their government sector to improve their working conditions, increase social services capacity and quality.	Dissemination of reports to Committee participants.
7. Women, Youth	10. Obtaining subsidies and leadership tasks from the sanctuary in the conservation activities, including the reintroduced wildlife.	Communication and information exchange with Lenene Island.
8. Elderly and infirm	11. Sanctuary support of local resolution of problems rather than its resorting to Vilanculos.	
<u>Others</u>	12. Access for fishing to Inhamambane Estuary, access to social service benefits.	
9. Local development facilitators	13. Ensuring privacy, collaboration and continued access to resources for tourism.	
10. Administrative leaders Maritime Delegate		
11. Community court judge		
12. Quewene community not living in the Sanctuary		
13. Lodge on Lenene Island		

**B. SECONDARY
STAKEHOLDERS**

1. Sanctuary project management
 2. Private property investors
 3. NGOs
 - Catholic Church
 - German Agro Action
 - Jesus Alive
 - 4 District government representatives delegated to the sanctuary (Task Force and various other group members, for example marine, wildlife and agricultural teams)
- Global Environment Facility;
GEF Project Manager
(Implementation)

**C. EXTERNAL
STAKEHOLDERS**

1. District government and
 - District Administrator
 - District Labour office
2. Provincial government and
 - Provincial Governor
3. Central government and programmes
 - Ministry for Coordination of Environmental Affairs
 - Coastal Marine and Biodiversity Management Project – MICOA
 - Ministry of Agriculture and Rural Development
 - Ministry of Tourism

- B.
1. Commercial eco-tourism success. A sustainable natural resource-use model involving a complementary community development programme that supports the commercial development initiatives and joint conservation management.
 2. Value for money in tourism opportunities, enjoyment and participation in scientific research for relevant conservation management models.
 3. Pursuing development investments in Quewene to support the local communities. Opportunities for increased participation in community development initiatives.
 4. Defence of the interests of the government in the name of the people of Quewene with reference to justice in compensation, resettlement, and employment as well as ensuring relevant improvements in access to public and social services.
 5. Defence of the interests of the GEF

- C.
1. Ensuring regulations are followed and opportunities for employment etc. are not given to outsiders. Interest in income spin-offs (and taxes).
 2. Compliance with laws, regulations, and provincial development strategy. Raising income in the province from private sector investments. Increasing conservation coverage. Socio-economic gains for the Quewene and district communities.
 3. Compliance with laws, regulations and policies. Sharing of lessons with other parts of the country.
Monitoring this initiative as a model of its kind, learning for successes and failures.
 4. Coordination and collaboration to learn from one another and gain in the aim of conservation by sharing similar premises and pooling protection resources.
 5. Watchdog interest in compliance with

- B.
- Steering Committee meetings, minutes and dissemination of these among participants.
- Six monthly and annual progress and financial reports provided.
- Various project-specific committee and/or Task Force meetings, minutes and dissemination of these to participants.
- Specified GEF/IFC reporting schedules applying to the GEF Project Managers (Implementation and Logistical Support)

- C.
- Six monthly and annual progress and financial reports provided.
- Community approved visual and audio media records for sharing with stakeholders and for fund raising for community identified projects.
- Use communication media to share lessons learned with external stakeholders so they can learn from each other.

National Services of Geography and Cadastre	local, national and international standards.
Ministry of Labour	6. Investment returns with a publicly positive image.
National Directorate of Health, Ministry of Health	7. Development of a private/public model for conservation management in this part of the world. Conservation interest based on biodiversity. Interest in ensuring compliance with international and IFC standards.
Ministry of Education	
National Directorate of Water Affairs, Ministry of Public Works and Housing	

4. Conservation NGOs:

Bazaruto National Park
World Wildlife Fund
Endangered Wildlife Trust
IUCN

5. Private sector and individuals of influence.

6. Donors

IFC/GEF

STEP 4: IDENTIFY AND DEFINE THE PUBLIC CONSULTATION AND DISCLOSURE PROGRAMME AND PROCESS

(1) Purpose

The purpose of Step 4 would be to identify the contents of and define the public consultation and disclosure programme and process.

(2) Rationale and actions to be taken

Social management programme

The public consultation and disclosure process that will take place in the course of implementation of the project's social management programme is an integral part of the implementation of the component. The activities outlined below are therefore detailed and involve local capacity building to make communication and public consultation or participation the backbone of the community development programme. The PCDP outlined below and in this Chapter, concentrates on social and/or community development aspects. Similar outlines need to be drawn up for the other development and management plans dealt with elsewhere in the BMP (see reference to the marine, terrestrial wildlife and agricultural management programme below)

Implementation Activities

A. Community Capacity Development and Communication Programme

Design communication strategy
Develop materials
Recruit / second facilitators and extensionists
Design and implement facilitation and communications training and capacity development programme
Design and implement monitoring systems
Produce quarterly, six monthly and annual reports
Carry out external evaluations

B. Resettlement Phase II

Complete census
Demarcate settlement land
Verify project affected people and raise awareness about process of resettlement
Complete assets inventories
Establish grievance communication and redress system
Help families choose settlement sites and land areas
Complete housing & related infrastructure
Pay compensation
Establish Community Development and Resettlement Committees (CDRC)
Train new settlers in permaculture/organic farming
Assist in the re-initiation of principal & alternative livelihood activities
Adapt and refine the resettlement programme in response to monitoring and evaluation reports

Public Consultation and Disclosure Activities - Community Level -

Audience research – consult all community stakeholder groups on what people know, how they hear it and assess what they need to know and how.

Field testing of materials to verify effectiveness of messages.

Training of facilitators in person-to-person communication methods, use of media, community capacity development and group facilitation techniques

Design monitoring systems in a participatory manner; where possible use visual or audio media to record events and opinions, to share with others in other parts of Quewene at a later date.

Distribute annual reports to all stakeholders

Distribute annual evaluation reports to all stakeholders

Share community approved visual and audio testimonials of local situations and development processes with stakeholders.

Individual consultation with ‘landowners’; use of participatory methods to identify boundaries and map these, and verify customary processes of decision-making for land cede for resettlement.

Consultation at family and group levels with project affected people; raise awareness about resettlement process and objectives of project.

Communication campaign should include information about the objectives and activities of the project, resettlement process and the grievance communication mechanisms

Consultation should continue at family and group levels to verify for grievances and to monitor progress until all compensation and rights are met in respect of resettling families

Build capacity of CDRC in use of communication methods, the identification of monitoring indicators, counselling, managing information and monitoring.

Involve district and local government teams in progress and impact monitoring as a joint learning process.

Regularly monitor status of settlers through consultation.

C. Community Livelihood Development Activities

Carry out communication campaign in specific priority locations	Publicise opportunities available to communities via the communication campaign. Explain available options, conditions for applying, procedures for applying and who to contact.
Receive project requests	
Assist in preparing project proposals	
Approve project proposals and initiate operation	Explain the overall rationale for community development and a conservation project; use the communication campaign to project images of potential results.
Train interested farmers in permaculture	
Employ people in the Sanctuary project	
Establish a Sanctuary credit facility	
Support market gardening / animal production initiatives	Invite discussion groups to identify problems and analyse best ways of resolving.
Support development of marketing system for agricultural produce	Use communication media to record lessons learned and use facilitators to share these with other stakeholders so they can learn from each other.
Support development of marketing system for fishing products	
Train traders and others in accounting	Develop educational materials about conservation and sustainable natural resource management using experiences from the Sanctuary.
Provide support to literacy groups	
Initiate small business management training	Use community approved visual and audio media records for sharing with stakeholders and for fund raising for community identified projects.
Design and implement facilitation and communications training and capacity development programme	
Carry out conservation management training and education	
Adapt and refine the community development programme in response to monitoring and evaluation reports	
Respond to grievances within stipulated time	

Marine, terrestrial wildlife and agricultural utilisation and management plans

The social management programme outlined above include peripheral reference to other plans and/or activities that are not directly related to the RAP and the CDP, but does not deal in any detail with the multitude of impacts emanating from the management/utilisation plans for marine resources, terrestrial wildlife resources and agriculture dealt with elsewhere in the BMP (see Part D). Specific implementation activities for these projects as well as the concomitant public consultation and disclosure activities need to be identified (in Operational Plan format; see below) and added to the social management programme outlined above. Separate PCDP's may be prepared for each of these projects, but it will probably be decided to rather prepare a single PCDP document for the whole VCWS project.

Public consultation with stakeholders outside of Quewene at provincial, national and international levels will be carried out as necessary and disclosure of all legally required EIA reports is planned. Consultation and disclosure have been carried out to date with some difficulties at all levels. With the knowledge that it is a key means of gaining support for the development of the project it should be prioritised in the future and enough resources allocated. All new construction and project interventions legally requiring an environmental impact assessment will be bound by the regulations governing this process, to consult all affected stakeholders and disclose plans for intervention according to MICOA regulations.

STEP 5: DRAW UP A PCDP IMPLEMENTATION SCHEDULE

(1) Purpose

The purpose of Step 5 would be to draw up an implementation schedule to give effect to the PCDP.

(2) Rationale and actions to be taken

The effective implementation of the comprehensive PCDP would be dependent on the preparation of an implementation schedule. The following provisional schedule concentrates on social development aspects, and details of the marine, terrestrial wildlife and agricultural programmes will have to be prepared and incorporated in the final schedule.

Implementation Schedule: Public Consultation and Disclosure Activities - Community Level

	Agency responsible	Principal stakeholder groups involved	Quarters										
			Year 1				Year 2						
			1	2	3	4	1	2	3	4			
<i>Capacity development and communication</i> Audience research - consult all local stakeholder groups on what people know, how they hear it and assess what they need to know and how.	Sanctuary, communication adviser	Communities living inside Sanctuary	█										
Field testing of materials to verify effectiveness of messages.	Communication specialists	Communities living inside Sanctuary		█									
Training of facilitators in person-to-person communication methods, use of media, community capacity development and group facilitation techniques	Sanctuary, communication adviser and trainers	Recruited facilitators, extensionists and other key communicators in the project area	█	█	█	█	█	█	█				
Implement communication campaigns	Project Leader, communication specialists, facilitators	Communities living inside Sanctuary	█	█	█	█	█						
Design monitoring systems in a participatory manner, where possible use visual or audio media to record events and opinions, to share with others in other parts of Qewene at a later date.	Sanctuary, Steering Committee, Project Leader	Sanctuary management, Resettlement and Community Development Task Force and community Committees, community groups from all of Sanctuary	█										
Distribute annual reports to all stakeholders	Sanctuary, Steering Committee	All external stakeholder groups						█					█
Distribute annual evaluation reports to all stakeholders	Sanctuary, Steering Committee	All external stakeholder groups						█					█
Share community approved visual and audio testimonials of local situations and development processes with stakeholders.	Sanctuary, Steering Committee	Qewene and all external stakeholder groups							█	█	█	█	█
<i>Resettlement Phase II</i>													
Individual consultation with 'landowners'; use of participatory methods to identify boundaries and map these, and verify customary processes of decision-making for land cedence for resettlement.	Sanctuary, Steering Committee, Project Leader	Host communities, facilitators and local leaders responsible for area, local government representatives	█										
Consultation at family and group levels with project affected people; raise awareness about resettlement process and objectives of project.	Project Leader, facilitators	Project affected families identified for resettlement	█										

STEP 6: ESTABLISH AND IMPLEMENT GRIEVANCE PROCEDURES

(1) Purpose

The purpose of Step 6 would be to establish and implement effective procedures and mechanisms to deal with grievances.

(2) Rationale and actions to be taken

The need to establish functional and acceptable communication channels for grievances is among the priority issues for the overall community involvement programme. The need for consultation with stakeholder groups in and outside of the project area from the earliest moment possible is an excellent way of building trust and confidence. At present there are mixed feelings within Quewene about the project and most of these are the result of lack of information and frustration due to not being able to gain access to communicate with the sanctuary on issues seen as important by various groups in the community. The grievance redress mechanisms and procedures included in the 2001 Bio-Business Plan (Lambrechts 2001b), which would have addressed the problem, were not implemented to date.

Communication channels should facilitate the passage of information to the appropriate people in a timely fashion, even if they have diverse origins. In recognition of the diversity of origins of grievances, the grievance communication channels should first be identified in terms of who will be able to use them.

Stakeholder groups identified during the baseline survey and their levels of awareness about issues in Quewene are instructive in the identification of communication channels:

	Stakeholder Group in Quewene	Level of awareness about the Sanctuary project	Level of awareness about community issues	Level of awareness about family issues
Community	Women and youth	Low	Medium	High
	Men: husbands / fathers / leaders	Medium	High	High
	Families living in the most remote and isolated parts of the Sanctuary (Machuquele Circle, Inhamambane, Chingonguene)	Low	High	High
	Families involved in the resettlement programme	Medium	Medium	High
Influence leaders	Religious leaders	Low/Medium	High	High
	Zone leaders	Low/Medium	High	Medium
	Hossi ya missava – Land chiefs	Low/Medium	High	Low
	All other leaders	Medium/High	Medium/High	Low
	The Community Court judge	Low	Low/Medium	Low/Medium
	The Maritime Delegate / Fishers' Committee rep.	Medium	High	High
P	Teachers, community health workers and other development facilitators	Low/Medium	Medium	Medium
	The Sanctuary management	High	Medium	Low

	Sanctuary staff from outside of Quewene	High/Medium	Low	Low
	Local Sanctuary staff	Low/Medium	Medium	Medium

The channels of best potential for transmission of grievances (in bold in the table above) must be devised between influence leaders with high awareness levels of family and community issues who can link with those with high awareness from the sanctuary project. Religious leaders provide a link mentioned by the most silenced of the groups – women and youth - as being trusted and open to communication at all levels. Religious leaders have however lamented their lack of admission into the circulation of information from the project and indeed they have a limited knowledge about it.

The grievance redress mechanism and procedures outlined above for the CDP would also apply *situ situ* for the PCDP but will be repeated here for the sake of clarity

Using the matrix above as a guide, grievance mechanisms should meet with the following requirements:

- The local religious leaders, the Zone Chiefs and in Chingonguene, the Maritime Delegate should be involved in providing a first listening level. Feedback through them should be able to reach even the most isolated groups. These leaders should be involved in the local Development and Settlement Committees and be provided with the tasks of creating awareness that they may be used for the transmission of grievances;
- The relevant *hossi ya missava* should be involved when the grievance is land or resource use related in order to obtain advice at the community level, potentially resolve the problem without taking it any further, or passing it on to the next level having heard the advice of this leader;
- The local Development and Settlement Committee may be able to resolve the problem itself. This should be encouraged, however if not, a representative should channel the grievances via the CRC to the Task Force through the Project Leader. The issue may be redressed at this level and a response communicated back rapidly, or if it is more complex or requires the opinion of the Steering Committee members, then it will be presented in a regular meeting, or in the event of great urgency, it will be reported to the VCWS-GM.
- Grievances heard in Steering Committee meetings should be followed by a decision on redress and its communication to the complainant in the timeliest way possible. Information should normally be returned to the community using the same channels as for its initial transmission. However urgent cases should be dealt with directly by the level responsible. The results should be communicated to all other levels at the same time for coordination and awareness purposes.
- An alternative channel for the transmission of grievances may be through the facilitators employed to provide assistance to groups involved in community development activities. A facilitator working in a specific geographical area will provide a direct means of transmitting information. The facilitator would communicate this information to his/her supervisor and the Project Leader who will either address it directly, or pass it on to the Steering Committee to take a decision. This relatively short chain of involvement should speed up the process considerably. However, should the CRC not be in favour of direct

contact between facilitator (who would be a paid employee) and Project Leader (also a paid employee) then this channel will be abolished

- Responses to grievances should have an established time limit (such as 15 days from the date of presentation), within which the Sanctuary guarantees a response / action. This sort of approach will promote greater trust in the communication system and improve attitudes about the project within the community.
- Grievances may be submitted in writing, however if they are not, facilitators and the Project Leader should ensure that the grievance details are recorded in written form when they are passed on to the Steering Committee. All grievances and redress actions should be recorded by the level taking redress action, and included in regular progress reports.
- If the person or community who lodged the complaint is not satisfied with the decision of the Steering Committee, then as an ultimate recourse he/she/they may submit it to the District Administrator or the Provincial Governor.
- The same channels used to address formal grievances, should also be encouraged to address informal problems and conflicts so that the causes of grievance are mitigated. The emphasis in these cases should however be on the solution of the problems at local level, beginning with the complainants themselves.

STEP 7: ESTABLISH FEEDBACK CHANNELS

(1) Purpose

The purpose of Step 7 would be to establish proper and effective feedback channels to disseminate information.

(2) Rationale and actions to be taken

Results and feedback from public consultation and information disclosure at community level will be reported according to the following scheme:

A: Community Capacity Development and Communication Programme	Inputs to audience research activities will be reflected in the messages produced for the communication campaigns.
	All monitoring information will be included in monthly, six monthly and annual reports.
	Adaptations to the programmes as a result of feedback from monitoring will also be monitored, and reported on.
	Reports on all grievances reported and/not redressed will be included in the six monthly and annual reports.
	Feedback from external stakeholders on the contents of annual reports, annual evaluation reports and audio-visual reports on project activities will be provided directly through a meeting at District level with district level stakeholders, and through individual meetings and written feedback from provincial and national levels.
	Annual stakeholder meetings should be held at District level to provide a forum for feedback that includes the most directly affected stakeholders. Reports of annual stakeholders meetings will be circulated within 15 days of the conclusion of the meeting.
	Each annual report should include a compilation of all feedback provided during

	the year from stakeholders at all levels. The report will address the activities undertaken in response to this feedback.
B. Resettlement Phase II Programme	<p>Feedback from all participatory planning activities carried out with respect to the resettlement programme will be recorded in the monthly, six monthly and annual resettlement reports provided by all levels of staff directly involved in the programme.</p> <p>District government participation in resettlement management, implementation and monitoring structures will permit the recording and circulation of reports at district government level of the consultation and feedback activities taking place in Qewene.</p>
C. Community Livelihoods Development Programme	<p>Feedback following the communication campaign will be recorded together with the whole consultation process ensuing from initial project requests in facilitators' monthly reports, their supervisor's monthly reports, six monthly and annual project reports.</p> <p>Feedback from sharing audio-visual records of lessons learned inside Qewene will be recorded in the normal project reporting process. These materials may be circulated among external stakeholders and other interested agencies. Their feedback will be reported in six monthly and annual project reports.</p>

3.3 RECORD OF COMMUNITY CONSULTATION/CONTACT

For a detailed record of all recorded community consultation and/or contacts prior to the preparation of the PCDP, refer to the relevant specialist report in Volume 4 of the BMP (available on the attached CD)

PART I: TOURISM DEVELOPMENT

CHAPTER II: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

A full-blown tourism development plan is not normally regarded as an essential prerequisite for the preparation of a biodiversity management plan for a protected area. The managers and planners of protected areas where the accent falls on biodiversity conservation, tend to separate biodiversity plans from development plans.

In the case of VCWS, however, the mission for the sanctuary (see Part C) embodies the three universally accepted objectives for protected areas in developing countries, namely conservation, sustainable utilization and sharing of benefits. An interdependency between conservation, utilisation and benefit sharing has been established from the onset of the project. The commercial activities that will take place on VCWS will pave and pay the way for the conservation of the biodiversity resources, whilst at the same time being totally dependent on maintaining (or establishing in certain respects) a healthy environment and the goodwill and support of the local communities.

It also stands to reason that the commercial development of VCWS may impact in a number of ways on the environment on which it depends. The commercial activities will necessitate structures to be built, roads to be constructed, mooring facilities and landing strips to be provided and large numbers of people to be employed, to mention but a few. Tourism and tourism-related activities are thus inseparable from the biodiversity resources, and will thus of necessity be dealt with in the BMP. However, the full tourism development plan that was prepared as part of the GEF planning project, will not be included in the BMP. Only the applicable (with relevance to biodiversity) sections, policies and recommendations will be dealt with in the following discussions. For the full text, refer to Volume 4: Specialist Reports, of the BMP (attached as a CD)

1.2 BACKGROUND

1.2.1 Objectives for sustainable ecotourism development

The general objectives for sustainable ecotourism development at VCWS as embodied in the Terms of Reference for the tourism survey could be summarized as follows:

“The primary objective of this component (sustainable ecotourism development) is to develop ecotourism facilities and activities within the Sanctuary that are both sensitive to a biodiversity-rich ecosystem and beneficial to the conservation of the ecosystem, as well as forming a basis for financial self-sustainability. A secondary objective is to ensure that the rapidly expanding ecotourism developments in the Vilanculos area are also environmentally sustainable. The component will include the following elements.

- 1 Implementation of a strategic tourism development plan for VCWS
- 2 Implementation of a Biodiversity Business Plan for the project

- 3 Supporting institutional development in the local tourism sector, to encourage a focus on sustainability”

More specifically, the tourism development objectives for the tourism study were defined as follows:

- To develop a strategic tourism development plan which will establish a set of principles, frameworks and mechanisms on which the ecotourism development will be based, to ensure the integration of biodiversity conservation and sustainable use objectives into this commercial venture (providing the link between tourism and biodiversity)
- To review the existing tourism industry body in the Vilanculos area, and to make suggestions for improving its effectiveness as a vehicle for promoting sustainable tourism.
- To suggest codes of practice (drawing on the Kijani biotools - see below -and on best practice from other parts of the world).
- To review current and prospective community benefit-sharing and make recommendations for its maximization.

1.2.2 Methods employed

The preparation of the Strategic Tourism Development Programme (STDP) included the following:

- Reviewing of available documents to determine the applicability and sufficiency of information to determine the tourist carrying capacity of the sanctuary, and to identify additional information, which will be required in order to prepare a STDP.
- A visit to VCWS to observe the project site and meet with appropriate stakeholders took place in June 2002.
- Reviewing the existing regional tourism industry body, which included discussions with tourism developers and operators active in the Vilanculos area to address the need for, and their interest in, a sustainability focus for tourism development in the area.

CHAPTER I2: SUSTAINABLE TOURISM DEVELOPMENT PROGRAMME

The sustainable tourism development programme is presented in four modules as follows:

MODULE 1: A STRATEGIC TOURISM DEVELOPMENT PLAN FOR VCWS

1.1 PRINCIPLES AND POLICIES: THE TOURISM-BIODIVERSITY LINKAGE

1.1.1 The operational context

(1) Compilation of the strategic tourism development plan

The strategic tourism development plan will establish a set of principles, frameworks and mechanisms on which the eco-tourism development will be based, to ensure the integration of biodiversity conservation and sustainable use objectives into this commercial venture.

Any tourism development plan for a protected area should ideally be based on the carrying capacity of the area for different tourist services. In the case of VCWS this carrying capacity assessment of the sanctuary has not been completed to date. Further field data is required. The discussions, plans and proposals that follow are therefore of necessity based on the current situation and summarises frameworks and mechanisms that are already in existence. This shortcoming is not regarded as too serious, though, because the BMP will be formally revised at the end of years two and four, at which times the tourism plan could be upgraded.

In the meantime the principle of adaptive management (see Part C) will be applied to alleviate the impacts of this shortcoming. Therefore the strategic plan strategies below aim both to:

- recommend necessary action, and
- outline mechanisms by which this feedback loop can be made effective, and feed into further management decisions and action

(2) Ownership

The Strategic Tourism Development Programme (STDP) for VCWS has, unlike the counterpart strategic plans for the marine, terrestrial wildlife and agricultural resources (see the relevant chapters of Part D), no direct linkage to the local communities. It is not, in contrast to the other strategic plans, a community-driven and managed plan but is imbedded in and aimed at the commercial developers at all levels.

Notwithstanding this exclusive nature of the plan, it still shares all the community-based principles and policies as contained in the BMP. The sustainable tourism development programme has as one of its principal objectives the equitable sharing of tourism-related benefits by the local communities (see Part E of the BMP).

(3) Tourism on VCWS

The ecotourism facilities in the sanctuary will be a “high quality - low density - low impact - high value” safari style development” (Lambrechts 2001c). The concession allows for a maximum total of 100 tourist beds, and 50 non-commercial residential units (stands), each with a maximum of 12 beds. At full capacity (700 beds) the tourist density will be 1 : 36,5 ha.

Access from the mainland (Vilanculos) is via powerboat or direct by private plane to the sanctuary. There is an existing (temporary) landing strip behind the Dugong Lodge, two other attempts have been abandoned, a fourth has been partially constructed and abandoned and now a fifth (controversial) strip has been built. (The EIA states that one landing strip is to be built). There are to be three boat launching slipways; one at each of the residential estate development areas.

Non-consumptive/non-exploitative activities for tourists are plentiful in this environment: activities that may be offered are, for example: rustic overnight stays in the old lighthouse (until it is developed?); picnics on Bangué island; trips to the fresh water lakes of *Manhale* and *Nyoni* for sundowner cruises on flat bottom boats; fly fishing (strict limitations will need to be placed); diving with an on-site dive master and instructor; sailing; game fishing (catch and release is advocated where possible), and competition fishing with other lodges (saltwater fly fishing, bottom fishing, deep line fishing, surf fishing and spinning on the reefs).

Possible future proposals for activities include canoe, diving and hiking trails; the use of glass bottom boats, boats with touch pools, or boats using Perspex-bottomed buckets; the making of artificial reefs, and a museum/education centre.

(4) *International and national tourism*

Tourism has become one of the most important economic activities in the world. It accounts for more than 10% employment, 11% of global GDP (Gross Domestic Product), and total annual tourist trips are predicted to increase to 1.6 billion by 2020 (*WWF, 2001*). The expected increase would be at a rate of at least 4% per annum according to the World Tourism Organisation (*WTO, 1998*).

Ecotourism will be benefiting from the change of consumers' preference from traditional to more nature-based tourism. Ecotourism is already emerging from its niche status and beginning to be combined with other mainstream tourist activities such as cultural, rural and sun & beach tourism. This is seen in the increasing numbers of visitors to Kenya for example where 80% of the tourism market is ecotourism-based (*Ministry of Tourism, Trade and Industry, Kenya, 2001*). In South Africa between 1986 and 1998, the number of visitors to game and nature reserves has grown by 108% (Department of Environmental Affairs and Tourism, South Africa, 2001).

According to the WTO in the year 2001 international tourist arrivals totalled 689 million compared to 697 million in 2000 (experts state that 2000 was an exceptional year for tourism, with special millennium events boosting the growth rate estimated at 7.4% - its highest annual growth rate in nearly a decade and almost double the increase of 1999). Growth in the normally buoyant tourism sector slipped by 1.3% due to the terrorist attacks of September 11th 2001 in the United States of America, and reflects the business sector in general. Recovery is expected as business travel resumes and consumer confidence returns.

Regional highlights show for Africa that international arrivals increased by 3% in 2001, with most of that gain achieved by the North African countries of Tunisia and Morocco, which showed strong growth of 10% and 8% respectively (*WTO, 2002*).

As such, ecotourism has a major and increasing impact on both people and nature. As the industry expands into new areas, it presents new opportunities and risks for host communities and natural environments. In response to new market opportunities, tourism has emerged as an integral part of national and regional strategies to maximise foreign exchange earnings, increase employment and provide financial resources to preserve natural and cultural heritage.

However, as the international market develops, local tourism industries are vulnerable to a range of national and global events that lie beyond the control of people at the local level. Political unrest and outbreaks of disease cause significant fluctuations in arrivals, whilst local climatic factors and leisure patterns in originating countries create marked seasonal variation. External tour operators and transport networks play a pivotal role in defining and maintaining tourism flows to remote rural destinations.

The National Policy and Strategy for Mozambique, 2002 (www.mozambique.mz/turismo/politica/general.htm) includes market studies and from this the market potential has been identified. It is clear that for the international market South Africa acts as a transit point for countries such as Botswana, Lesotho, and Swaziland. Mozambique is in competition with the Seychelles, Mauritius and the Comoro Islands for sun and beach holidays and with Kenya, Tanzania, Zimbabwe and Botswana and South Africa for photo-safari or game parks. This is, however, a possible market in which to compete. The regional market is seen as the most important market and whilst the domestic market needs cultivating and promoting.

Albino Celestino Mahumane, Director of Planning and Cooperation of the Ministry of Tourism for Mozambique stated at a regional preparatory meeting for the International Year of Ecotourism:

“The Government of Mozambique considers tourism to be a priority area in the current process of economic recovery, minimisation of poverty and development. Mozambique has a policy for promoting sustainable tourism but its success depends on the availability of resources. Although these are limited, concrete steps are being taken to achieve the objectives but the process is relatively slow” (*‘Ecotourism in Mozambique’, 2001*).

(5) The biodiversity context

The Convention on Biological Diversity (CBD) (1992) definition of biological diversity is:

“‘Biological diversity’ means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.”

Conservation of biodiversity in this context is focused on the three levels: genes, species and ecosystems, as noted above.

The CBD provides a conceptual and political baseline for a biodiversity business:

“The objectives of this convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources...”

Ecotourism is a frequently debated term. The *Ecotourism Society (1991)* describes it thus:

‘Ecotourism is responsible travel to natural areas that conserves the environment and improves the well-being of local people.’

Ecotourism is of special interest for its relationship with conservation, sustainability and biological diversity. As a development tool, ecotourism can and should advance the three basic goals of the CBD:

- Conserve biological and cultural diversity, by strengthening protected area management systems (public or private) and increasing the value of sound ecosystems.
- Promote the sustainable use of biodiversity, by generating income, jobs and business opportunities in ecotourism and related business networks.
- Share the benefits of ecotourism developments equitably with local communities and indigenous people, by obtaining their informed consent and full participation in planning and management of ecotourism businesses.

These goals reflect a ‘triple bottom line’ for businesses, focusing corporations not just on the economic value they add, but on the environmental and social value they add and destroy. That triple bottom-line emphasises the need to address all three of the areas reflected in the goals above (see below).

Private investment, such as that at VCWS, aims to operate on market-based, commercial lines, whilst advancing biodiversity goals. This philosophy of ‘harnessing capitalism for conservation’ perhaps sits less easily with grass-roots-based models.

A key concern for the VCWS development therefore is the appropriate interaction between biodiversity conservation planning and tourism planning and development (as reflected in this BMP). “Carefully planned and implemented tourism development can play an important role in conservation” (*Conservation International, 2002*).

1.1.2 Developmental context and strategic framework

(1) Business biotools

The Kijani Trust is a joint initiative of the IUCN and the IFC to develop and invest in biodiversity business in Africa, and has developed the Kijani Business Biotools for Tourism Development (2001). These innovative tools provide guidance in the development of a biodiversity business and allow an assessment of the current frameworks and mechanisms in use at VCWS, in order to make future recommendations in accordance with the three basic goals (see above) of the CBD. The CBD goals thus provide the fundamental principles for shaping the strategic tourism development plan (STDP) for VCWS.

For the purpose of the development of the STDP, the Biotools principles will be used to facilitate the development of ecotourism in VCWS by considering/ measuring the mission, objectives and planning goals and evaluating the key issues, dilemmas and sensitive areas.

(2) Mission and objectives

The mission statement for VCWS (see Part C) contains the three component parts of the CBD (see above) and can thus be an effective tool for the management of tourism and biodiversity and for ensuring poverty alleviation.

The comprehensive biodiversity, community and general objectives for VCWS as outlined above (see Part C) are also compatible with the Kijani Biotoools measuring instrument.

1.1.3 Evaluating the key issues, dilemmas and sensitive areas

Evaluation identifies critical areas for examination and considers the likely impact of the proposed project. These are addressed under the heading of each of the CBD goals that focus respectively on:

Biodiversity and Conservation (BD&C)
Economically Sustainable Use (ESU)
Social Benefit Sharing and Responsibility (SBSR)

(1) Biodiversity and Conservation (BD&C)

VCWS has involved international experts in the field of BD&C and tourism from the inception of the project. It is consistent with the BD&C aspects of CBD.

Issue: Consistency with National Plans, Policies and Regulations

As was pointed out elsewhere, the development of VCWS is consistent with national plans, policies, regulations and relevant laws of Mozambique. However, the Mozambican EIA legislation and regulations stipulate that the development all tourist facilities should be subjected to a full-blown EIA. This would ensure that the developments are in line with appropriate plans; policies and regulations, with frameworks and mechanisms already built in which safeguard the future integrity of the sanctuary. This legal requirement has not consistently been met in the development of the sanctuary, for example with regards to landing strips, and warrants attention.

Issue: Awareness of, and collaboration with, other actors in the field of biodiversity and tourism

VCWS has already started to engage with other tourism actors locally (the hotel and tourism association [of Inhambane province] northern sector or HTNS) and this collaboration will need to be further strengthened (see below). Similarly, the necessity for closer collaboration with the other local and regional actors in the field of biodiversity which are addressing the same goals are dealt with elsewhere in the BMP (see for example below and Part D)

Issue: Consistency with the key biodiversity priorities (current trends, pressures, future plans and themes) found within the bio-neighbourhood

VCWS needs to give the "big picture" of how it fits into the region. The feasibility of a bio-neighbourhood map would be investigated, showing the project area, the wider bio-neighbourhood and the other actors involved in BD&C. The compilation of such a map (if

any) will be based on an OP being drawn up. Closer collaboration with the neighbouring Bazaruto National Park and pursuance of the declaration of VCWS as a World Heritage Area and Ramsar Wetland also fall in this category.

Issue: Tourism impacts and carrying capacity

There is a need for qualitative and quantitative data with regards to tourism carrying capacity and defining the limits of acceptable changes (for the ecosystem and site) to assess what impact the project will have, positive or negative, and to ascertain rigorously whether the ecosystem can absorb the anticipated managed level of visitation without undue damage. A detailed tourism carrying capacity survey, including an analysis of biophysical data, will be undertaken as a matter of urgency (for details of such a strategy, see discussion below).

(2) Economically Sustainable Use (ESU)

The main ESU components of the CBD are embedded in the mission statement and objectives for VCWS (see Part C).

Issue: Government support and consistency with national tourism and regional planning policies

The National Policy and Strategy of Tourism states as a general objective:

“Tourism is to achieve, on a sustainable basis, the maximum social and economic benefits for the people.”

The target objective pertinent to VCWS is:

“To contribute to rehabilitation, conservation and protection of natural and man-built property, especially that of ecological and historical value and to add value to the cultural property” (ibid).

The VCWS project has been classified as a category “A” development by the Mozambican government and will be fulfilling these target objectives.

Issue: Project viability and market assessment, in the light of existing networks and facilities

VCWS is operating in the light of a realistic understanding of the market and the potential demand (although it apparently has not compiled a written assessment). Those assessments that have been performed, or implicitly accepted, need to be documented and presented clearly, in order to summarize for other parties with a possible future financial interest, aspects such as (for a detailed discussion, refer to the full report in Volume 4 of the BMP; CD attached):

- The patterns, profiles and interests of existing visitors to the area.
- The location in respect to established tourist circuits in the country and region.

- The level, nature and performance of existing ecotourism products, which are competitors and also collaborators.
- The activities of inbound tour operators and ground handling agents in the country and region and coverage by international tour operators
- Existing information and promotional mechanisms in the area
- Factors likely to impact future demand

Issue: An integrated sustainable approach, using technologies to promote the harmonization of the project with the landscape

The following aspects should all be regarded as tourism-related impacts that must be addressed at an early stage of development. Most of the (potential) impacts have already, or would in future, been included and dealt with in EIA's and elsewhere in the BMP, and will thus only be stated briefly (refer to the full report in Volume 4 for a more detailed discussion):

- *Fuel from sustainably managed local sources:* Increased energy requirements may necessitate a sustainable woodlot for providing fuel wood (see the STDP below)
- *Indigenous species in landscaping used wherever possible:* The establishment of an indigenous nursery has been recommended in Part D above, and only indigenous plants may be planted.
- *Use of sustainable resources for food supply:* One of the objectives of the sustainable agricultural programme is to produce organic food for local consumption by the tourism industry. Any shortfalls will be augmented from other suppliers from the mainland.
- *Architectural design and construction:* The stated policy "to adhere to an environmentally friendly development ethic" (Lambrechts 2001b) will be adhered to in all designs and construction.
- *Environmentally friendly cleaning products:* Detergents are used for laundry, in the kitchens, to wash vehicles etc. A commitment to using biodegradable products in all these areas should be an explicit requirement.
- *Suppliers who minimize the waste implications of their products:* VCWS needs to find suppliers who will minimize their packaging on their products and recycle packaging where possible so as to keep waste to the minimum.
- *Non-biodegradable packaging materials:* Plastic bags can almost be regarded as "toxic" waste in a protected area such as VCWS and should be banned. Soft drinks in returnable/refundable bottles should be preferred above canned drinks.
- *Transport:* The use of local dhows to transport building and other material between Vilanculos and the sanctuary created a thriving local economy. For the sanctuary there are, however, other transport implications that would need to be addressed:
 - Each of the 50 stands plus the lodges and VCWS management will operate 4x4 vehicles. This will lead to possible unsustainable use of the limited sandy roads that will be available.
 - More than 50 power boats may be based on the sanctuary. These vehicles will need to be garaged, fuelled and maintained on site.
 - Innovative solutions such as a water taxi service, car and boat pools etc may be considered.

- *Benign methods of energy generation:* For example maximal use of solar power and natural gas/electricity is used at the camps currently, but not in huge quantities
- *Sustainable source for water supply, water saving possibilities and minimizing impacts on other users:* The main domestic supply of water for the development will be from Lake Msasa, with a calculated supply for 22 years at an estimated demand of 84 375 litres per day. (It is not clear whether evaporation at 1083mm/year or the effect of droughts has been taken into consideration, but it does not seem like it. Indications are that all but a few major lakes dry up during prolonged periods of drought, as has already happened a number of times). It is also not clear from where the fresh water supply to the planned new lodges will be sourced. It should be recognized that increased abstraction of the fresh water lakes must be balanced against the needs of the environment. The question of long-term replenishment of the water extracted from the lake should be investigated. Water-saving possibilities need investigation, such as strategies for cutting domestic consumption in the lodges and stands. The possibility of moving away from the current practise of providing bottled water in plastic holders in favour of reusable/refillable souvenir bottles should be investigated.
- *Reduction of consumption, re-use of products, recycling and responsible disposal procedures for waste, residues, etc.:* Although a responsible and environmentally friendly waste disposal system will be implemented, the following aspects will need further attention:
 - Placement of the soakaways to prevent pollution to ecologically sensitive areas
 - Cans should not be buried on site, but rather removed to the mainland for further disposal

(3) Social Benefit Sharing and Responsibility (SBSR)

The project is consistent with the SBSR aspects of the CBD. This topic is further dealt with below, and in the STDP.

1. 2: MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE STRATEGIC TOURISM DEVELOPMENT PLAN

1.2.1 A 11-strategy procedure for implementing the Strategic Tourism Development Plan

A simple 11-strategy process, roughly based on the same principles and procedures as the MRSUP, TWSUP and SADP above (see Part D), will be applied to the implementation of the Strategic Tourism Development Plan (STDP) for VCWS. The strategies are not, however, nearly as closely interlinked as are the case for the other strategic plans and their application or execution will overlap considerably. It is nevertheless imperative for all the strategies to be executed as an interlinked chain, and to be linked to the achievement of the overall objectives of the plan. The VCWS-GM will prioritise the various strategies for attention.

The 11 strategies are:

- Strategy 1: Establish the sanctuary Tourism Task Force and a Sanctuary Tourism Forum
- Strategy 2: Preparation of a bio-neighbourhood map
- Strategy 3: EIA's of future developments
- Strategy 4: Assessment of key impacts of tourist visitation to VCWS and determining acceptable levels of tourist use
- Strategy 5: Apply the zoning plan to tourism development and management
- Strategy 6: Identify performance indicators
- Strategy 7: Collaborate with other role-players in the fields of biodiversity and tourism, and contribute to existing regional and national frameworks
- Strategy 8: Establish and implement codes of conduct
- Strategy 9: Community development, participation, capacity-building and consultation
- Strategy 10: Sustainable use of resources
- Strategy 11: Tourism-related community/social issues

1.2.2 Application of the 11-point plan

STRATEGY 1: ESTABLISH THE SANCTUARY TOURISM TASK FORCE AND TOURISM FORUM

(1) Purpose

The purpose of Strategy 1 would be to establish a Sanctuary Tourism Task Force (STTF) and a Sanctuary Tourism Forum (STF)

(2) Rationale and actions to be taken

The policy of adaptive management, especially as it would apply to the STDP, would necessitate continuous monitoring of the tourism development and operations by VCWS management staff. Adaptive management is especially essential in relation to tourism where time lags, level of uncertainty (absence of complete knowledge) and interaction with social construct are all interwoven. It is a form of management that allows flexibility in policy-making and implementation, and must include a process or mechanism for feedback to be carried forward into further planning.

A STTF should therefore be established, with the VCWS-GM as chairman. The VCWS-GM would, at his discretion, appoint other members of staff to serve on the task force. Such appointments may, for example, include the Resident Scientist and one or more of the Project Leaders. This internal task force would fulfil a watchdog function over all tourism and tourism-related activities or impacts in VCWS, with the STDP as a point of departure. The STTF would determine its own operating procedures.

Responsibility to act in accordance with the provisions of the STDP, BMP and EIA's and the constitution of the Home Owners Association (HOA), lies with the tourism operators themselves. It would thus be to their advantage to establish a Sanctuary Tourism Forum (STF). Membership of the STF could be determined by the operators themselves, but would possibly include all the lodges, a representative(s) of the HOA, a representative of the development company and the VCWS-GM or his deputy.

STRATEGY 2: PREPARATION OF A BIO-NEIGHBOURHOOD MAP

(1) Purpose

The purpose of Strategy 2 would be to prepare a bio-neighbourhood map to ensure consistency with the key biodiversity priorities, current trends, pressures, future plans and themes, found within the bio-neighbourhood

(2) Rationale and actions to be taken

VCWS needs to work within the "big picture" of how it fits into the region; a bio-neighbourhood map should be prepared, showing the project area, the wider bio-neighbourhood and other actors involved in BD&C. The map will include detailed biodiversity and conservation information (from the BMP, EIA, scientific studies, other local and regional actors, NGOs etc.) This bio-neighbourhood map will be an indispensable tool for assessing tourist impacts (see below).

The preparation of the bio-neighbourhood map will be viewed as an OP, and the services of a contracted TDS will be enlisted to assist with the compilation of the first map.

STRATEGY 3: EIA'S OF FUTURE DEVELOPMENTS

(1) Purpose

To ensure that EIA's are prepared for all tourist developments (and indeed all other new developments involving physical structures) on VCWS.

(2) Rationale and actions to be taken

According to current Mozambican legislation (see Part A) the development of tourist facilities (lodge construction, road construction, domestic sewage treatment and disposal, waste management, etc.) must be subjected to a full-blown EIA. This would ensure that the developments are in line with appropriate plans, policies and regulations, and with frameworks and mechanisms already built in to safeguard the future integrity of the sanctuary.

It is recommended (Odendaal 2002) that a memorandum of understanding should be drawn up between EAWC and the EIA Unit (of MICOA) regarding the protocols for EIA and EIA review, and the granting of an environmental licence for the myriad of developments anticipated under the current project. This will ensure transparency in the development process, ensure compliance of the proponents (EAW) with existing legislation, and afford the opportunity for MICOA EIA unit staff to develop a structured approach to tracking project development in a monitoring context.

Two new lodges are proposed, the intention being to construct one on the sand peninsula (dune barrier cordon; see Part B) opposite Chilonzuine Island and the other on the site of the disused San Sebastian lighthouse, also on the dune barrier cordon. The northern (dynamic, as opposed to stable) portion of the dune barrier cordon has been zoned as a

natural area where no infrastructure should be allowed (see Part F). Should these intentions be followed through, it is of the utmost importance that comprehensive EIAs are done on these proposed structures.

STRATEGY 4: ASSESSMENT OF KEY IMPACTS OF TOURIST VISITATION TO VCWS AND DETERMINING ACCEPTABLE LEVELS OF TOURIST USE

(1) Purpose

The purpose of Strategy 4 is to assess the key impacts of tourist visitation to VCWS as a base for determining acceptable levels of tourist use

(2) Rationale and actions to be taken

Tourism on VCWS will inevitably have an impact on the biophysical and the socio-cultural environments. To determine acceptable levels of tourist visitation and to arrive at a viable carrying capacity, an assessment of key impacts will have to be undertaken:

An Inventory of Ecotourism Attractions

The inventory will divide attractions into three categories:

- *Focal or Flagship* - which provide the main reason for visiting the area? For example, the VCWS has a variety of habitats ranging from virgin coral reefs to tidal flats, mangrove swamps, salt marshes, wetlands, a prime example of an estuary, coastal dunes, dune scrub forest, miombo woodlands and savannah elements. And it offers some real “flagship species” such as the dugong and sea turtles and to a lesser extent terrestrial species such as the elephant. The sanctuary can furthermore be regarded as a national asset and is of global biodiversity significance
- *Complementary attractions* – activities such as birding, diving, fishing, swimming, etc. which give added value to the area and encourage a longer stay for a tourist
- *Supporting attractions* - the physical facilities and tourist services on offer such as the ecotourism lodges and Mazarette stands

The first two categories correspond to the natural and cultural heritage of the area. The latter category facilitates visits to the area. Once this data is available it will give a clear picture of tourist visitation and will feed into the data collection necessary when assessing acceptable levels of tourism visitation.

Map of attractions and activities

A map of attractions is needed for both terrestrial and marine environments and should be made available to all stakeholders. Some examples of activities to be mapped at VCWS are diving and snorkelling on coral reefs; canoe, diving and hiking trails; guided walks; fishing; birding; picnics, etc. This will indicate where the activities will take place and show the zones of most frequent use. It will be collated and integrated with the bio-neighbourhood map (see above) to assess the potential impacts on Marine Values and Terrestrial Values arising from ecotourism, to evaluate risks to biodiversity, to develop

possible mitigation strategies, and to feed into the zonation exercise described below and in Part F.

Tourism carrying capacity assessment

A Tourism Carrying Capacity Assessment for VCWS is vital in order to ascertain:

“the maximum intensity of use that a tourism site can sustain without undergoing unacceptable physical or biological deterioration and without causing appreciable impairment of the tourist experience or cultural well-being of host communities at a given level of management” (IFC/GEF 2002, with respect to the Komodo National Park in Indonesia).

This is an immediate high priority. The establishment of maximum allowable visitor/participant numbers in a range of activities is important for the biophysical and socio-cultural well being of the project, not simply a qualitative discussion of impacts.

There are conflicting estimates of the intended total number of tourist beds in the Sanctuary as a whole. The two original tented camps/lodges (Msasa and Jacana) are to be retained, but are not featured in any calculations of beds available in the Sanctuary (700 total). Bearing in mind the contractual limitation of 100 lodge-beds, VCWS should clarify this in the documentation so as to be seen to be transparent in their plans.

For the carrying capacity assessment, the Komodo National Park definition above could also apply to VCWS. It is seen to:

- highlight the multi-dimensional nature of carrying capacity
- acknowledge that value judgments are involved
- focus on change
- and recognise the critical role of management

The impacts of potential tourism visitation should be investigated and considered under the headings of:

- *Biophysical impacts*: recognizing that no biophysical system can withstand unlimited utilization (Ecological Carrying Capacity)
- *A Coral Reef Carrying Capacity Assessment* is crucial as part of the above
- *Visitor Satisfaction or Psychological Component*, referring to the maximum number of visitors for whom the area is able to provide a quality experience at any one time
- *Socio-cultural impact*, recognizing that detrimental socio-cultural impacts on local populations will occur if tourism exceeds a certain level
- *Managerial component* referring to the maximum visitation level that can be managed at any given time (all available facilities or infrastructure are saturated)

The results of the assessment will be incorporated into management strategies and techniques for the control or mitigation of tourist impacts. Those will include *direct controls* that regulate or restrict activities, and *indirect* approaches that attempt to influence tourist behaviour:

- *Direct Controls* – limiting numbers, dispersal of visitors, fixed viewing places, properly designed and designated trails and zoning, which are seen as imperative to conservation of biodiversity.
- *Indirect approaches* – education of the visitor, accompanying guides, interpretative experiences, guidelines and codes (which VCWS are compiling for the guests to the Lodges, home owners and for Diving and Snorkelling, see the discussion on ‘Codes of Conduct’, Module 4, below).

In the following table a summary of suggested responses to the impact of various activities and areas is given in a ‘Sustainability Strategy’ (the impacts analysis is based on the number of people (commercial and non-commercial units that the sanctuary will host at 40% occupancy rate). This provides a basic model and starting point for VCWS to develop into a more comprehensive carrying capacity assessment.

Sustainability Strategy Matrix for VCWS Recreational Activities

Basic Strategies that can make the activity more sustainable	Zone areas for boating ,launching areas etc Restrict motor boats in sensitive, areas & limit speed	Licensing of number of game vessels restrict visitor numbers, bag & sizes. Species to be fished to be identified Discourage fishing on reefs No spear fishing, Catch & release only	Provision of mooring buoys Limit length of stay at mooring buoys Use codes of practice. See section 4 Only dive with instructors	Limit areas (zone) Codes of practice – leave only footprints etc.	Use of guides, limit group size, Encourage specific bird trails so that it can be managed and bird hides .For more than 1 hour walks toilet provision	Zone areas eg tourist zones Operating waste disposal and controlling unauthorised dumping Require all visitors to rake away all litter	Closure of activity during mating & breeding season, Licenses for operators, limit numbers Canoe operators should maintain certain distances between their boats and the flocks	Controlled tours e.g. using only sanctuary vehicles & with guides Codes of conduct
Probability	High	High	Medium	Low	Medium	Low	Low	Medium
Expected impact on environment - (Physical and biological)	Disturbance of marine habitat and ecosystem Turbidity in shallow waters -Water pollution	Habitat loss Change in population dynamics Fish scarcity	Damage to corals & habitats Dissemination of aquatic weed nuisances Damage is accumulative over time	Pollution on sand beaches Aesthetic degradation e.g. plastic on beach	Disturbance of habitat and ecosystem, deserted habitats Wetland degradation, Erosion, weed invasion	Debris, pollution Encourage birds& animals to eat food debris –maybe harmful Change of wildlife behaviour	Disturbance of flora & fauna Disturbance of nesting & breeding areas Birds may desert water-bodies	Pollution - noise &air & dust Change in behaviour of animals Disturbance of flora & fauna Erosion weed invasion
Problem cause/risks of impact	- Non-motorised-sailing etc - Motorised - discharge & effluence, Pollution - noise,-release oil & fuel, Speed impacts Scare away & injury to marine life	Removal of pelagic species Over fishing Oversize/undersize fishing Repeated taking of bait fish	Anchoring Excessive usage Damage by t/standing on corals Removal of shells	Littering Intensive usage overcrowding	Presence of people in areas may scare birds	Visual pollution – litter- food & solids Impairment of visitor experience	Presence of people may cause disturbance to wildlife Agitation of water by canoes	Disturbance to wildlife Road erosion by tour vehicles Overcrowding
Recreational Activities	Boating	Fishing	Diving	Swimming/ Sunbathing	Bird walks	Picnics	Canoeing in lakes	Safari tours

STRATEGY 5: APPLY THE ZONING PLAN TO TOURISM DEVELOPMENT AND MANAGEMENT

(1) Purpose

The purpose of Strategy 5 would be to apply the zoning plan (see Part F) to the development and utilisation of tourism-related infrastructure and services.

(2) Rationale and actions to be taken

The zoning plan for VCWS would be the principal method to deploy visitors, and embodies mainly the strategy of concentrating tourism development and thus also visitor use to restricted areas. It was designed to allocate geographical areas for specific levels and intensities of human activities and of conservation (Eagles *et al* 2002).

The objectives of the VCWS zoning plan are based on maintaining a balance between the two main priorities as embodied in the vision for the sanctuary (Part C), namely the *sustainable use of a protected area*. Non-adherence to the zoning plan would inevitably lead to unacceptable biophysical and/or socio-cultural impacts

Monitoring (systematic observation) would be required as an instrument to detect tourism-induced changes over time attributable to the operation of the tourism facilities or activities in question. See Strategy 6 below for an outline of tourism-specific monitoring and evaluation.

STRATEGY 6: IDENTIFYING PERFORMANCE INDICATORS

(1) Purpose

The purpose of Strategy 6 would be to identify performance indicators through monitoring and evaluation.

(2) Rationale and actions to be taken

The general objective of the research, monitoring and evaluation activities on VCWS would be "... to design the mechanisms whereby the project activities can be informed, and their replicability enhanced by the generation of timely and useful results from management orientated research, monitoring and evaluation", with monitoring of the social, economic and environmental impacts of the tourism facilities and activities in the Sanctuary as a sub-objective.

Tourism monitoring will be kept simple and feedback will need to be obtained from all stakeholders:

- Training of local participants in the monitoring processes is required
- M&E should run throughout the life of the project from the beginning of the consultation process through to every-day running of the operation.

- Simple indicators (see examples in the table below) should be agreed and made known to everyone through the strategies developed in the synthesis stage. A specific OP will be prepared.

INDICATORS	SUGGESTED MEASURES
BD&C	
Site protection	IUCN site protection category - Important as VCWS is of global significance and as such will attract visitors
Endangered / Vulnerable / Threatened Species	A number count of key indicator species in each of the three levels is important, since species such as the Dugong are a prime attraction to this site, and money from bed levies helps pay for conservation.
Biodiversity benefits	Indicators appropriate to the specific project as identified at the synthesis stage
ESU	
Sustainable use of natural resources	% energy using non renewable resources & carbon footprint
Stress	Numbers of tourists visiting the site per annum/peak month Ratio of tourist numbers to locals in peak periods and per annum
Waste management	Water - fecal coli form count heavy metal count Other - measurement of visual Pollution e.g. Litter count
Waste minimization	% of waste recycled/reused
Fresh water use	Volume of water used by tourists/ volume used by local population on a per capita basis
SBSR	
Benefit sharing	% of income from project retained in local community
Procurement from local sources	The value of food sourced locally as a ratio to the total value
Local participation	% of local employed at each level of the organization
Consultation	% of local people on stakeholder committees
Local satisfaction	Questionnaire based
Health and Safety	Number of incidents reported
Awareness Raising/Environmental Education	Questionnaire based
Basic Skills opportunities reading & writing	% of employees studying
Gender balance	% of female employees
Visitor / consumer satisfaction	Questionnaire based

Evaluation should be carried out using key strategy areas identified at the synthesis stage and taking account of the findings of the monitoring indicators.

STRATEGY 7: COLLABORATE WITH OTHER ROLEPLAYERS IN THE FIELDS OF BIODIVERSITY AND TOURISM, AND CONTRIBUTE TO EXISTING REGIONAL AND NATIONAL FRAMEWORKS

(1) Purpose

The purpose of Strategy 7 would be to collaborate with other biodiversity and tourism role-players in the region and to contribute to existing frameworks at local and national levels

(2) Rationale and actions to be taken

The need for VCWS to establish links with and to become part of the greater regional picture has already been stressed elsewhere in the BMP. This principle does not only apply to biodiversity aspects (for example collaboration on marine matters) but equally so to tourism.

The STTF and, to a lesser extent, the STF discussed in Strategy 1 above, would be the vehicle to establish and maintain contact with other regional role-players and to contribute to existing frameworks. The procedures to be followed for inter-sectoral cooperation and communication would be determined by the VCWS-GM. crucial and VCWS can catalyse cooperation here. The Hotel and Tourism Association Northern Sector (HTNS) will be a vital mechanism for using the tourism networks already in place in the Inhambane Province.

This aspect is dealt with more fully in Module 2 of the sustainable tourism development programme below.

STRATEGY 8: ESTABLISH AND IMPLEMENT CODES OF CONDUCT

(1) Purpose and rationale

Refer to Module 2 of the sustainable tourism development programme below.

STRATEGY 9: COMMUNITY DEVELOPMENT, PARTICIPATION, CAPACITY-BUILDING AND CONSULTATION

(1) Purpose and rationale

The need for participative community involvement in virtually all of the activities that will be undertaken in order to realise the objectives of VCWS, has been stressed in various other sections and chapters of the BMP, and will not be repeated here. These principles will also apply *situ-situ* to tourism on VCWS.

Refer specifically to Parts G and H of the BMP.

STRATEGY 10: SUSTAINABLE USE OF RESOURCES

(1) Purpose

The purpose of Strategy 10 would be to ensure that tourism-related use of VCWS resources take place in a sustainable manner.

(2) Rationale and actions to be taken

The emphasis that is placed on the sustainable use of resources runs like a thread through the BMP, and would also apply to the tourism industry in all its facets.

Rigorous mechanisms for measuring resource use, waste and consumption are part of the 'National Responsible Tourism Guidelines' for the South African Tourism Sector (included as an annex to the full tourism report in Volume 4 of the BMP). These are suitable for application at VCWS, having been tried and tested in similar situations. They cover water use, electricity consumption, fuel, energy sources, sewage and waste products. The purpose of the guidelines is to provide an overall framework for management, and mechanisms to make it effective. The identification of key performance indicators (see Strategy 6 above) and their incorporation into an adaptive management framework are considered to be key elements in this regard.

STRATEGY 11: TOURISM-RELATED COMMUNITY/SOCIAL ISSUES

(1) Purpose

The purpose of Strategy 11 would be to ensure that all tourism-related social issues are identified and addressed.

(2) Rationale and actions to be taken

Policy and management issues that need to be addressed include job creation (gender and employment equity), alternative livelihoods, personal financial management, alternative fuel sources, education and awareness raising.

These aspects have been raised and dealt with elsewhere in the BMP and will thus, although they all relate to the STDP in particular and the sustainable tourism development programme in general, not be repeated here. (Refer in particular to Parts G and H of the BMP).

1.2.3 Executing the 11-point plan and Operational Plans

The VCWS General Manager will be responsible for executing the STDP. The services of a contracted TDS will be enlisted to assist with the planning of the process, and with the execution of some of the more specialised strategies. TDS inputs will also be contracted to deal with some of the OP's indicated above. The GEF Project Manager (Implementation) (see Part L) will be involved in an advisory capacity.

MODULE 2: INSTITUTIONAL DEVELOPMENT IN THE TOURISM SECTOR IN THE VILANCULOS AREA

2.1 BACKGROUND

For a more detailed discussion of the following synoptic outline, refer to the full tourism report in Volume 4: Specialist Reports of the BMP (attached hereto in CD format).

The government of Mozambique considers tourism to be a priority area in the current process of economic recovery, minimisation of poverty and development. The success of the sustainable tourism programme is unfortunately inhibited by limited resources and the process is therefore relatively slow (French 2002).

The Government of Mozambique has taken a number of actions to further the important role of tourism:

- The National Tourism policy was approved in 1995.
- The Ministry of Tourism was created in 2000.
- Guidelines for the development of 4 priority strategic areas were approved.
- The Commission for Facilitation of Tourism was set up, this being an inter-ministerial committee at ministerial level which aims to remove obstacles and speed up the process of tourism development (see discussion below for more details)
- The legislation is being reviewed with a view to adapting it to the current situation, especially with regard to dealing with environmental matters in the process of the development of tourism activities

One of the basic principles of the National Tourism Policy is to "promote initiatives where they assure the maintenance of ecological integrity, the preservation of the landscape value and the sustainable use of natural resources, and improvement of the quality of life of the local population". The recent transfer of the control of protected areas from the Ministry of Agriculture and Rural Development to the Ministry of Tourism, could also be regarded as one of the important steps for the implementation of the objectives defined in the National Tourism Policy for sustainable development of tourism and ecotourism.

The promotion of inter-sectoral linkages is seen by the Government as vital for the success of tourism. There have been examples of very complex projects promoting inter-sectoral linkages on a large scale in agriculture, which clearly show that the private sector and its associations have an important role to play.

2.2 REVIEW OF THE LOCAL AND NATIONAL TOURISM SECTORS

2.2.1 National

The National Policy and Strategy of Tourism recognises that tourism is a complex system for which planning demands the creation of a number of mechanisms and rules for its regulation and organisation. It recognises that "tourism should remain an activity of essentially private sector initiatives which evolves through a number of services and infrastructure provided by the Hotel Industry, Travel Agents, Tour operators, Carriers, Sporting and Leisure activity providers, including all their respective associations" (*General Principles, National Policy and Strategy of Tourism, 2002*).

The Objectives of the National Policy of Tourism are to:

- Contribute to a better quality of life for the Mozambican population
- Contribute to a reduction of exchange deficits
- Contribute to equitable development of the country
- Contribute to national unity and development of the people
- Contribute to rehabilitation, conservation and protection of natural and man-built property, especially that of ecological and historical value and to add to the cultural property.

The Development Strategy highlights strategic zones for a short/medium term exploration based on criteria such as the value of attractions in relation to expected markets and costs and benefits resulting from both social and economic impacts. The Vilanculos Zone is seen as the most important zone for short-term exploration and its suitability for regional and intercontinental tourism via South Africa and Zimbabwe. “Future works of expansion of the hotel industry in the area should be allowed along the sea-shore from where boat trips to the Bazaruto Islands and eventually other locations would depart ... development will only take place in one vector, instead of spreading. Thus the necessary facilities to be established and developed must be of the highest quality possible” (*National Policy and Strategy of Tourism, 2002*).

Within the Action Plan strategic measures are specifically related to areas of priority intervention. These are:

- Tourism development
- Planning
- Professional training
- Investments
- Tourism promotion

The organisational structure of the tourism public sector includes:

- The National Board of Tourism, with main functions to formulate policies and strategic plans of development and ensure their implementation; to collaborate with institutions concerned with tourism development; to build up and develop international co-operation with other countries and bilateral or multilateral organisations in order to expedite the development of sustainable tourism.
- The National Fund of Tourism
- The National Tourism Company
- The National Committee for Facilitation of Tourism: this is an inter-ministerial body whose main functions are to co-ordinate and conduct the development of tourism as well as to liaise with sectors so as to facilitate and increase inflows of tourists and travellers. It shall have the following tasks:
 - “to co-ordinate actions with various ministries, bodies and agencies involved in tourism, so that the objectives of development can be easily achieved
 - to recommend on the necessary legislation, regulations and other measures
 - to examine master-plans that were drawn up for zones of tourism and submit them to the Council of Ministers for approval

- to guarantee and strive for the implementation of master-plans with various government sectors of central, provincial and local administration
- to establish sub-committees to deal with specific problems and to act as a permanent forum for the discussion of problems of tourism among various governmental bodies, and between these bodies and the private sector”
(*National Policy and Strategy of Tourism, 2002*)

2.2.2 Local

Vilanculos town is in all respects a boom town with new investments pouring in. Tourism is seen as the greatest economic force in the Vilanculos Region and is estimated at 80% of the total income of provincial revenue. Vilanculos is the gateway to the Bazaruto Archipelago, Bazaruto National Park and VCWS. Odendaal (2002) states that current plans for the Bazaruto Archipelago involve the gazettelement of all five islands within a greater Bazaruto National Park (BNP), and the adoption of legislation promoting both conservation and sustainable use of the natural resources of the Archipelago. Government has recently approved the proposed extension of the boundaries of the National Park increasing its area from 600 km² to about 1,500 km².

The Ministry for the Co-ordination of Environmental Affairs (MICOA) has identified the Bazaruto Archipelago as one of two priority areas in Mozambique for consideration as a World Natural Heritage Site. This nomination should be lodged with UNESCO shortly.

The Inhambane Provincial Hotel and Tourism Association (IPHT) acts as the mouthpiece for tourism in the province, and has been divided in three sectors, with the Bazaruto Archipelago, Vilanculos (mainland), Inhassoro and the VCWS constituting the Northern Sector. The Hotel and Tourism Association Northern Sector (HTNS) was articulated and registered in 1999. The IPHT is represented at local government and municipality levels monthly.

Most of the major hotels and lodges of the area belong to the HTNS. The membership is diverse and the association encourages all stakeholders to be members, from cafés to hotels. Members pay an annual subscription.

The following objectives of the IPHT are fundamental to the HTNS:

- Work with the Government and the industry of tourism regarding the legislation and promotion of tourism as well as the implementation of the regulations
- Promote tourism in Mozambique and the province of Inhambane in particular, both internally and internationally.
- Be a mouthpiece for the tourism industry in all aspects.
- Disseminate information to both the tourism authorities and tourist operators about regulations, activities and all information pertaining to the tourist industry.
- Train personnel in the hotel and tourism industry, from grass roots to training schools.
- Assist in the security of tourism.
- Regulate the standards of the tourism industry.
- Assist in the development of the industry by offering advice and support to new operations.

- Assist in the protection and implementation of legislation regarding the environment.
- Propose regulations that are functional and beneficial to both government and the tourist industry as a whole.
- Develop the tourist industry into a dynamic movement.
- Be a forum for stimulating ideas and co-operation within the industry.

These objectives are embodied in the proposed mission statement for the HTNS, which is:

“Our Mission is to consolidate the efforts of all concerned in creating an environment of responsibility, solidarity and understanding between all tourism members and stakeholders that encourages and promotes sustainable economic growth in the tourism industry of the northern sector”

Membership of HTNS covers a diverse area with some of the members operating in the National Park in the Bazaruto Archipelago under Park restrictions and regulations, whilst the Park policies and legislation do not cover the rest of the members. Concerns about sprawling developments (seemingly unregulated), numbers of tourist activities, controls and safety aspects, limited resources and infrastructure are all very real. This also applies to the area covered by the VCWS, where half a bay is protected by regulations and the other wide open to the above problems.

Biodiversity is seen as a business asset and the protection of the environment is seen as fundamental. However, very real problems are experienced with the law and its enforcement. Lodge boats are sometimes used to aid law enforcement, although the boats are actually intended for tourism use. The need to find alternative livelihoods is recognized, giving local communities other sources of income that do not involve killing or capture of endangered species. Other operational aspects for the businesses involve areas such as aspects of waste disposal and environmental protection.

The proposed Codes of Conduct for tourism in VCWS (see Module 4 of the sustainable tourism development programme below) cover cultural aspects pertinent to the local communities; environmental issues and sustainable practices could also be of value to the HTNS. The association will compile Codes of Conduct in discussion with the members and decide on the way forward and implementation procedures. This is a valuable step forward and will enhance the authority of the association. The HTNS intends to employ a paid staff member, to have a permanent office and to move forward towards putting sustainable tourism firmly on the map.

Certain members of the association are experimenting with innovative developments to let the local communities share in tourism benefits, for example the community trust (funded by tourist levies) established by the two lodges on Benguerua Island and the extensive community development programme at VCWS as discussed in this BMP.

2.3 RECOMMENDATIONS

2.3.1 National Government

The National Policy and Strategy for Tourism recognises the complex, inter-disciplinary and inter-sectoral phenomena involved in tourism planning policy. This is seen in the National Committee for the Facilitation of Tourism, which has been tasked to build mechanisms for inter-sectoral co-ordination. (It is not clear if there are linkages with biodiversity conservation planning.)

The following shortcomings have been identified at a national level and may be followed up with the relevant authorities:

- There is an urgent need to develop effective inter-sectoral mechanisms "that will ensure the harmonious interaction among all stakeholders and a symbiotic linkage between biodiversity conservation planning and tourism planning and development" (*H.Ceballos-Lascurain, 2001*). The promotion of inter-sectoral linkages is seen as crucial and "studies are to be carried out" (*Albino Celestino Mahumane, 2001*). It is important that this be followed through effectively. One query in this respect concerns the transfer of areas of conservation to the Ministry of Tourism as stated by the Director of Planning and Cooperation from the Ministry of Tourism in 2001. Legislation with regard to environmental matters and development of tourism are currently being reviewed, but it is not clear how this review is taking place, who are the parties in discussion and whether all levels of government would be involved.
- It would be necessary to create a body for co-ordinating activities promoting an adequate biodiversity/tourism interaction. This will create the dynamic and practical inter-sectoral mechanisms recommended above. Local and national level bodies should be set up. These joint entities should have representatives from both government (National Committee for the Facilitation of Tourism) and non-government institutions, including the tourism industry (VCWS, and the HTNS in the Vilanculos area/zone), local community organisations, Universities and NGOs. Objectives for the coordination bodies can include the following (many others will evolve once the bodies have been formed):
 - Develop the ability to generate economic support for conservation of natural areas and for the development of sustainable tourism (including ecotourism)
 - Enhance the socio-economic advancement of local communities
 - Contribute to safeguard natural areas from unplanned and uncontrolled development
 - Establish specific training programmes for tourism enterprises and protected areas staff
 - Coordinate efforts of conservation NGOs (both national and international), bi-lateral and multi-lateral development agencies, the private sector, local communities and other interested parties, so as to avoid confusion and conflicts
 - Develop short term and long term plans as a joint effort among the private sector, the government, and NGOs (including local communities)
 - Develop cooperation with other regional biodiversity/tourism bodies, to enable interchange of information, to network and establish policies from the regional level to the national level and vice versa

(The above are based on **best practice guidelines** compiled by *H. Ceballos-Lascurain, 1998*)

2.3.2 Vilanculos

The proposed mission statement of the HTNS does not fully reflect the overarching concept of biodiversity conservation reflected in the major concerns and problems currently felt by the membership in the sector (for example: exploitative use of resources, direct hunting of Dugong as well as accidental/careless capture and slaughter in fishing nets, cray fish being speared and sea cucumbers harvested, dried and sold for the Chinese market, over-fishing by locals and foreign deep sea commercial operators). The wording would benefit from the inclusion of the concepts of the Convention on Biological Diversity (1992) that provides a conceptual and political baseline for biodiversity businesses and recognizes that responsible environmental stewardship is a fundamental business issue. The wording of the proposed mission statement could perhaps be altered to:

“Our Mission is to consolidate the efforts of all concerned in creating an environment of responsibility, solidarity and understanding between all tourism members and stakeholders that encourages and promotes *environmental stewardship*, sustainable economic growth and that *all stakeholders share in the benefits in a fair and equitable manner* in the tourism industry of the northern sector”

The HTNS can look at examples of best practice to model themselves on in order to integrate biodiversity conservation into the tourism sector, such as Belize and Canada (French 2002), whilst acknowledging that both biodiversity conservation planning and tourism planning and development are complex, inter-disciplinary and inter-sectoral phenomena (Ceballos-Lascurain, 2001)

Given the necessity for inter-sectoral co-ordination in tourism, the inter-sectoral membership of the HTNS could be widened to include NGOs who have expertise in areas of conservation, ecotourism and community projects. Also, experts could be brought in depending on the topics discussed, to give specific guidance. Representatives from the local government would also be appropriate.

The Mozambican national and regional planning strategies reflect the importance attached to sustainable tourism and provide a real lever to HTNS to lobby on behalf of environmental protection that provides the key to the long-term survival of their businesses. The positive role that the Gambian tourism body ASSET played in similar circumstances, can serve as an example (French 2002)

HTNS should consider accepting and applying universal *Codes of Conduct* (see Module 4 below) as one of the means towards developing an effective tourism impact managing strategy for the region.

A cross-sectoral effort is needed to ensure law-enforcement on critical biodiversity issues. For example, the use of gill nets needs to be regulated because of their adverse impact on dugong and turtles, and the conservation of the dugong should be embraced as a regional priority. An example of where this has been done successfully is the Komodo National Park, Indonesia, where the greatest threat comes primarily from outside fishermen and destructive fishing practices as well as over-fishing. A ban on gillnet use with the

establishment of no take zones in most coral reef areas has been implemented there. The current enforcement system in the Komodo National Park involves a cross-sectoral effort, with park authorities, police, fisheries services, the army, the navy, legislative bodies and local communities. This is complemented by an awareness programme highlighting the threat from destructive fishing practices through workshops, exhibition panels and slide shows. Education is seen as a vital ingredient in the process (Pet and Yeager 2000). This pattern of enforcement may seem difficult in Vilankulos but with the belief that it can be done and the ideas that come from this initiative there is a very real opportunity for HTNS to initiate an effective enforcement policy (see Part D)

A collaborative management scheme needs to be set up to oversee the diverse stakeholders affected by the biodiversity and other problems facing the industry. The HTNS can initiate a dialogue between the relevant Government ministries – locally and nationally, NGOs, National Park authorities, VCWS etc, as has happened in the abovementioned Komodo Initiative where the goal is to protect the biodiversity effectively, enhance fisheries, maximize benefits to the local communities and ensure the use of the resources for tourism and education in a sustainable way.

There is also an opportunity for cooperation of the members of HTNS in operational aspects of the businesses linked to environmental protection such as waste disposal. For example, establishing a can-crushing facility and transporting the cans to Maputo for recycling would be more feasible if the tourism businesses in the area worked together on such an initiative. Plastic bags are a danger to wildlife and their burning creates toxic air pollution. The use of plastic bags could be banned in the members' businesses and paper used instead. These bags can also be used for promoting good practice guidelines for visitors, as in the Southern Stockholm Archipelago in Sweden (Svenska Turistbyrå, 2002)

Tourism in the area would benefit from the development of an inventory of regional ecotourism attractions. Such an overview will provide information about activities and tourist numbers and areas of usage (zones) - both on land and in the marine environment – as well as the unique (and in some instances threatened) biodiversity of the region.

Safety aspects of tourism need to be addressed as rescue boats, emergency healthcare, etc. are lacking. The tourism infrastructure must be able to provide the necessary safety for tourists and workers in the tourist industry. In all recreational activities on land and sea - for example when diving, swimming and boating - hospitalisation procedures must be in place, as well as first aid and rescue plans.

2.3.3 Executing the recommendations of Module 2

Although biodiversity conservation and the tourism sector of VCWS would benefit directly if the above recommendations were implemented, the sanctuary could at best play a motivating role in this regard. Most of the actions would require an inter-sectoral and multi-disciplinary approach, with the HTNS playing the leading role. Both the STTF and STF would need to be involved in a motivating capacity, and with the STTF being in a position to offer concrete assistance.

MODULE 3: CODES OF PRACTICE

3.1 PRINCIPLES AND POLICIES

Indirect strategies for managing tourist impact are those that aim to modify the behaviour of visitors. One of the most important ways to achieve this is to educate visitors about the potential disturbance they can cause and to provide advice on how to reduce it.

“Significant additional benefits can be achieved through improving communication. These benefits include greater awareness of environmental and social issues, modifying behaviour when visiting, and generating direct support for local communities and conservation causes” (*WWF International, 2001*).

The management tools required to reduce the impacts arising from tourism may range from visitor information centres, to specialized guides, to informal contact with park/sanctuary staff, to guidelines/codes of conduct. In any given situation, the management tools may be any of the above, or a combination of all of them. “Each situation will require a careful balancing of all potential gains and losses to determine optimal levels and types of tourist use, including: visitor satisfaction, conservation priorities, social, economic and political considerations and ecological considerations” (*IIED, 1997*).

Tourists are often enjoined to “leave only footprints.” Codes of practice and conduct provide a mechanism for achieving this, giving advice on how to be a responsible tourist. A number of codes have been produced. Some are generic; others are area or site specific. These tend to cover questions such as prior reading and understanding, selection of operators and destinations, respect for local cultures, minimizing environmental impact, purchasing decisions, activities to avoid and conservation issues to support. Best practice for drawing up codes of conduct is that they should be compiled with stakeholder participation, which was the case at VCWS where the local community has been asked for their opinions (French 2002).

There are codes used all over the world, for example: WWF’s Ten Principles for Arctic Tourism (AWARTA), Wildlife Tourism Guidelines for Guidance for Visitors to the Antarctic, The Himalayan Code, Capriona Guidelines Ecuador, UNEPTIE, PATA, Tourism Concern, www.responsibletravel.com. For specific activities such as Snorkelling and Diving, the Coral Reef Alliance, UNEPTIE and PADI have excellent guidelines for practitioners (French 2002).

The draft codes drawn up specifically for VCWS (French 2002) provide detailed guidelines on “how” it should be done, and thus meet with the requirements for an OP. As was pointed out above this BMP of necessity deals only with the “why” and the “what” of the VCWS development, while the “how” (implementation) are dealt with by means of topic-specific operational plans. The codes presented in full in the specialist report (see Volume 4 of the BMP) are based on best practice, were compiled especially for VCWS (French 2002) and are to be adapted with stakeholder participation in due course. They can be made available to the snorkellers and divers by the lodges, instructors, etc. as well as included with any literature sent out to guests. The codes for the lodges should be placed in each room and reception area as well as sent to guests before they arrive. An explanation of the codes should be part of the welcome procedure. The homeowners should be given these codes and the Association of Homeowners should be able to participate in their

further development. A VCWS website would be an ideal location to display the codes in the future.

3.2 CODES OF CONDUCT

3.2.1 Coral friendly diving and snorkelling guidelines

The coral reefs off the eastern seaboard of VCWS, but still inside the sanctuary, are in remarkably good condition (see Part C; also Odendaal 2002 and Bruton 2002), and every effort would be made to maintain the reefs as such. The reefs would in time become a major attraction for tourists to the sanctuary.

Responsible diving and snorkelling is crucial to protecting coral reefs, which are one of the world's most fragile and endangered ecosystems. "Coral reefs cover only one per cent of the planet, they are vital nurseries for fish and are believed to harbour promising new medicines" (*UNEP, 2001*). It is therefore important to avoid or minimise any potential damage to the reefs, and the draft diving and snorkelling guidelines need to be finalised and implemented.

VCWS management need to identify and GPS-plot all coral reefs within the sanctuary.

3.2.2 Ecotourism code of conduct for visitors to lodges

Although the visitors to the lodges would be under supervision of lodge staff during so-called "game-drives" in the reserve area, they would be allowed to walk in the vicinity of the lodges. An ecotourism code of conduct dealing specifically with lodge visitors would thus be advisable, and could be based on the abovementioned draft document included in the specialist report (Volume 4 of the BMP; see attached CD)

The code of conduct for lodge visitors may include reference to the VCWS mission statement and to environmental, social and economic policies and responsibilities. Rules and/or suggestions alluding to the role of the visitor in protecting the environment, to respect local traditions and cultures and to maintain local pride will also be included.

3.2.3 Ecotourism code of conduct for homeowners

The owners of the Mazarette Estate homes could, in theory at least, become the biggest single factor impacting on the resources of the VCWS. They would not be supervised and could actually be regarded as co-owners of the resource (the wildlife excluded that will belong to the local communities) with relatively unrestricted access to the Reserve area.

In addition to the strict Mazarette Association rules applying to all the owners who bought properties in the sanctuary, a comprehensive code of conduct for homeowners will need to be drawn up and adhered to. The codes for homeowners will be more extensive than those for lodge visitors and will need to cover areas such as environmental degradation, waste and pollution that would be of little or no concern to casual visitors. The applicable rules of the Mazarette Association will be included in the code of conduct. The draft codes included in the specialist report (Volume 4 of the BMP; see attached CD) will provide an

excellent basis for finalising the codes. The Mazarette Homeowners Association (HOA) will play an important role in finalising the document and in acting against transgressors.

MODULE 4: INTERPRETATION PROGRAMME

4.1 INTERPRETATION CENTRE

4.1.1 Rationale

Most if not all the visitors to the VCWS would welcome the opportunity to learn more about the biodiversity, cultural history and social dynamics of the sanctuary. The provision of a small interpretation centre would serve this purpose admirably. However, the numbers of tourists and estate owners would never be high enough to warrant a properly equipped centre. A full-blown interpretation centre is notoriously difficult and expensive to manage, maintain and upgrade.

It is nevertheless recommended that a very basic interpretation centre should be established as a means of educating visitors and staff about the diversity of marine, estuarine, freshwater and terrestrial life in the VCWS. This centre could include material/exhibits on the following: freshwater and marine aquaria; terraria of live reptiles, amphibians and insects; small museum of dried and preserved animal specimens, including sea shells; an herbarium of dried, pressed plant specimens; geological and soil samples; satellite photographs of the VCWS (past and present); small reference library; touch pool of common and hardy marine animals (starfishes, crabs, molluscs, changed regularly); simple monocular microscope for viewing small and microscopic animals; TV and collection of relevant terrestrial and marine wildlife videos; computer with access to the Web; poster displays on the natural history of the VCWS; and a three-dimensional scale model of the VCWS.

The interpretation centre should also include items of cultural history interest, including arts and crafts from the local community, including jewelry and beadwork; toys made by local children; locally made household goods, such as clay pots and basketware; locally made traditional fishing tackle and hunting equipment; scale models of local architectural styles; photographs of local people and their methods of harvesting fishes, mammals and plants.

4.1.2 Actions to be taken

Before any development action is taken, a feasibility study to determine the need, viability, development costs and operational expenses of an interpretation centre will be undertaken. A suitable TDS will be contracted to undertake the study. The GEF Project Manager (Implementation) would be involved in the process, but the VCWS-GM will be responsible for execution should the decision to go ahead be taken.

4.1.3 Operational Plan

If a decision is taken to establish an interpretation centre, an operational plan (OP) will be prepared by the same TDS who undertook the feasibility study.

4.2 FIELD GUIDE

4.2.1 Rationale

It would be highly beneficial to the management and appreciation of the VCWS by visitors and staff, for an illustrated field guide to be produced on the ecology of the sanctuary. This field guide could begin modestly as a monochrome pamphlet and could eventually build up to become a substantial tome, similar to the field guides on the coastal plain of Maputaland (Bruton & Cooper, 1979), the eastern Cape coast (Lubke et al., 1988) and the whole coast of southern Africa (Day, 1974; Branch et al., 1994). The field guide would summarize the state of knowledge on the ecology of the VCWS and would indicate/stimulate further research.

4.2.2 Actions to be taken

A feasibility study by a contracted TDS (probably the same individual who will undertake the interpretation centre study) will be undertaken prior to an implementation decision being taken.

The guide would be sold at cost and will need to be updated frequently, especially during the first few years as the results of research projects and surveys become available. It will be available at suitable outlets such as the VCWS Headquarters, at the interpretation centre, at the Goshen Community Centre, at all the lodges and other tourist facilities in VCWS and possibly at selected outlets in Vilanculos.

The guide may eventually develop into a comprehensive pamphlet dealing with the whole Quewene – Bazaruto – Vilanculos region.

4.2.3 Operational Plan

In the event of a decision being taken to prepare the field guide, an OP will be drawn up by the TDS mentioned above, with inputs from the GEF Project Manager (Implementation). The project will be executed by the VCWS-GM.

4.3 INFORMATION BOARDS

4.3.1 Rationale

Information boards are commonly erected in coastal and marine sanctuaries around the world. Such boards could be erected at key locations in the VCWS to inform people about the most important ecological characteristics of an area. Commercial companies could possibly sponsor these boards. Information boards could, for instance, be erected near a visitor-accessible mangrove swamp, fishing village, reed swamp, inland lake, tidal flats, estuarine lagoon, dhow harbour, dhow wreck, bird colony, artificial reef, mudskipper habitat, crab colony, etc.

4.3.2 Operational Plan

The type, structure, layout, contents and location of the information boards will be planned as an OP by a contracted TDS.

PART J: CONSERVATION INITIATED OPPORTUNITIES

EXECUTIVE SUMMARY

The development of the sanctuary and tourist facilities has had a huge impact on the lives, livelihood and lifestyle of the local people residing in the peninsula. The developments have already led to increased wealth and prosperity.

The conservation-initiated opportunities (CIO's) cannot easily be quantified. They emanate from an ongoing process and care should be taken that it does not stagnate and become of little value to the community. However, these conservation benefits can lead to a huge advantage to the community if efficiently managed. New CIO's should be developed and implemented. The possibilities are not limited to the ideas listed in this Part, but a creative approach should be followed and new incentives should be investigated and implemented on a continuous basis.

It should be accepted that the community would need assistance to optimise the benefits from the CIO's. One form of assistance will be the provision of capital to initiate projects. The capital required for implementing CIO schemes will depend on the amount available and on the scale on which the incentives/opportunities will be implemented. Needless to say, the bigger the advantage to the community, the better they will cooperate with, and support the conservation initiative. Although an indication of the capital requirements of each CIO is given, further research in this regard is essential.

It is accepted that the income generated from the consumptive utilisation of game will be applied to cover the running and management costs of the sanctuary and will not in total be regarded as a direct benefit to the community.

Managing the CIO scheme will be an ongoing process, and provision should be made to establish such a capacity.

Continued monitoring will be essential to ensure that the natural resources are not depleted over time. The advantage of the CIO's to the community, will correlate with the amount that will have to be spent to ensure enforcement of sustainable utilization measures. Healthy ecosystems support healthy people, sustainable companies, sound economies and hence sustainable development.

CHAPTER J1: INTRODUCTION

The eventual success of the VCWS development will ultimately be decided by its sustainability: both ecologically and economically. The project is, and will in future, be extremely dependent on the initiatives, dedication, support and inputs of the various role-players. Proper planning, efficient management and an innovative approach will be of the utmost importance to ensure that the objectives of the project do materialise and the expectations of all role-players are met.

Eloff (1999) said that "conservation, to be successful, has to pay its own way." This principle, which is accepted as the standard in modern conservation practices especially in developing countries, can only be adhered to if the major role-players eventually benefit from the project - the private sector with their specific requirements, as well as the local community with their needs.

The development of the wildlife sanctuary itself is of such magnitude that all other activities in the area are shadowed by it. However, it is imperative that the wildlife sanctuary should not be seen in isolation or as a stand-alone development, but as an integrated part of the total development scenario. Krynauw (2001) said in this regard that "wildlife conservation in Africa cannot be viewed in isolation from larger economic and social factors. Conservation and development need to be balanced. Conservation in Africa implies that a resource should be used, whether consumptively and/or non-consumptively." Therefore, in this chapter the sustainable use of natural resources of the area, the identification of opportunities created from tourism developments and the consumptive and non-consumptive utilisation practices in the sanctuary will be integrated.

The impact that the VCWS development will have on the local community will be far-reaching in many respects (see Part G). The local community certainly have certain project-related expectations, regardless of whether these expectations are realistic or justifiable. A lot has already been said about 'conservation incentives', but unfortunately the community can easily understand incentives as 'hand-outs'. For this reason preference is given to the term 'conservation initiated opportunities' rather than the more commonly used term 'conservation incentives'. Opportunities are more descriptive of the actual benefits that would be derived by the local community, viz sustainable opportunities to improve their lifestyle over the long term rather than handouts that will only benefit them for a very short period of time. "Incentive-based conservation works and has led people to understand the value of their wildlife resources and the need to protect them" (Hopcraft: 2001).

In order to achieve this, the VCWS community will have to be educated - not only to adapt to the presence of potentially dangerous wildlife, but also to understand the benefits that can be reaped from the presence of the wildlife, as well as to realise the importance of their own contribution towards the success of the conservation action. The lessons learnt in Tanzania can be helpful in this regard: "It also became clear that wildlife education, revenue sharing and donating water pumps and school buildings were equally not purposeful. People thought well about wildlife and the park afterwards, but poaching levels remained the same. Poaching had an economic basis and without changing the economic incentive system for villagers, all efforts would bear no fruits. This was the lesson learnt in the Selous Game Reserve" (Baldus: 2001).

The conservation action that is focused on the wildlife component, will probably have the biggest influence and disruptive effect on the local community. The presence of potentially dangerous animals, the cessation of slash-and-burn agricultural practices, the limitation on freehold grazing rights, restricted freedom of movement and access to food sources and the inevitable resettlement of households are but a few of these influences (Thompson, 2002). It is therefore essential that the implementation of potentially disruptive actions must be effectively planned in consultation with the community and then

cautiously applied. This will cause minimum conflict and guarantee the continuous cooperation and goodwill of the local community. (See Part H)

In Tanzania, "there is no conflict between wildlife conservation and rural development because game is an important economic resource in many rural areas." (Balduz: 2001). However, the cooperation of the community is a definite prerequisite for success. "The communities that live on the land will ultimately decide the fate of the wildlife" (Hopcraft: 2001).

Therefore, a specific, directive approach to especially wildlife management is required to ensure that the community will eventually benefit (see Part D). Andrew Conroy (2001), past President of the South African Game Ranchers' Organisation, said that "game ranching (read *conservation efforts*) with its attendant consumptive and non-consumptive modes is capable of creating more employment and human skills development than traditional agriculture ever can. From that point of view, it is also a winner. "

The two major role-players and interest groups in the VCWS, which are directly affected by any development decisions, are the private sector developers and the local community. Private sector is the driving force behind the development, and the local community is basically the affected party that should benefit to a large extent from the development. Although the importance of other groups such as NGO's and the Mozambique Government cannot be disregarded, their concern is not primarily affected by the practical development activities.

As mentioned before, it must be accepted that a conflict of interests between the two major groups do exist. This conflict can be to the detriment of the development if not correctly managed. It is also important to realise that the local community will be largely dependent on the private sector, not only for the creation of opportunities, but also in order to teach them how to utilise them. Therefore, it is assumed that the private sector will be willing, capable and enthusiastic participants in the project and that they will train, advise, direct, manage and supply logistical support, especially in creating conservation initiated opportunities to the community (how this will be effected, is discussed elsewhere in the BMP).

Any incentive scheme or project should be properly planned and should be acceptable to the local people, politically as well as socially. It must also be assured that adequate capacity for planning, implementation and operation exist.

CHAPTER J2: OBLIGATED COMPENSATION FOR THE COMMUNITY

The developments in the sanctuary area will impact to a great extent on the local community - as a matter of fact, to such an extent that their whole lives, lifestyle and livelihood will change. This effect should not necessarily have to be to their disadvantage and can be changed to their advantage. However, one must accept that the community will have to make sacrifices. Their freedom of movement will be limited, their agricultural practices in the Reserve area will have to be terminated, some of them will have to be

resettled and their traditional way of earning a living may even be jeopardised. For this, and for the use of their land, a fully negotiated agreement will have to be reached, as is discussed in Part H. Some or other form of compensation must be negotiated.

In order not to re-invent the wheel, and also to avoid making the same mistakes others have made, a page should be taken from the lessons learnt at Benguerua Island. A Community Trust Fund has been established for the 188 families resident on the island. The sacrifice the community had to make, was partially compensated for by those who benefited from the sacrifice: the tourists and the lodges. This trust is therefore funded through a levy imposed on tourists who stay at the lodges on the island, currently at \$6 per bednight. The lodges provide the administrative and logistical support to the fund, but a committee on which the community is well-represented controls the fund. Currently an amount of approximately \$15 000 is annually distributed by the committee to better the livelihood of the resident families, either to improve health and education services, direct food supply or as compensation to stop slash-and-burn activities. An annual contribution to conservation activities, such as dugong-patrols, is also part of the spending. Conservation is encouraged to enhance the product (the environment) which enable the tourism activity, and therefore also the generation of the funds. A similar fund will be established on VCWS (see Part L)

Subsistence agriculture has for all the local peoples' lives been part of their history, traditions, culture and way of living. Being resettled away from fertile areas of their choice, everything possible should be done to encourage continued agricultural production. Projects aimed at the enhancement of organic agriculture practices should be encouraged and supported, financially, educationally and by any other possible means.

CHAPTER J3: CONSERVATION-INITIATED OPPORTUNITIES

3.1 GENERAL

The conservation-initiated opportunities (CIO) resulting from tourist developments and other VCWS initiatives, can basically be classified into three groups:

- Indirect lifestyle opportunities created by the fact that the Quewene has been 'discovered' and that some economic activity has already been established on the Peninsula.
- Opportunities that originate from the development of tourist resorts, lodges, private houses and the tourism activities related to it
- Opportunities that derive from the development of a wildlife sanctuary

However, the benefits that derive from the above are inter-linked and a clear distinction between them cannot be drawn.

A few types of CIO, and examples of those types, are given and discussed in this chapter. It should be emphasised that the CIO's that can be derived from the development of the sanctuary and the tourism facilities, will not be limited to those mentioned below. An innovative approach is required to:

- develop new incentives,
- optimise the benefits of the CIO's and to
- optimise the benefits from opportunities created by the conservation activity for the local people of the area.

It must also be stressed that it is almost impossible to estimate the input required to establish and implement CIO's, as well as to calculate the impact of such opportunities on the lives of the local people. Figures supplied in this regard, should therefore be regarded as guidelines only.

3.2 LIFESTYLE OPPORTUNITIES

Due to the remoteness and inaccessibility of the area, the local community was largely isolated from the rest of the world before the advent of the VCWS development. Poverty, limited food resources and a very basic lifestyle characterised the settlements. Education and health-care facilities were almost non-existent, and the people were almost entirely dependent on nature and natural resources for their survival (Thompson, 2002)

The VCWS development has brought dramatic change. A clinic has been built, a community market is in the process of development, the two formal schools will be upgraded shortly and regular contact with Vilanculos is expanding. For the first time ever money is in circulation and trading is rapidly expanding (Thompson, 2002)

These lifestyle opportunities have made a real difference to the lives of the local people. However, quantifying lifestyle opportunities and the impact they have made on the people, is not possible. It can be stated that the discovery of this area by the outside world, and especially the developments currently taken place, have brought more prosperity, wealth and welfare to the community over the past year than ever before in their history. Human dignity and the standard of living of the local people, as well as the conservation awareness of the area, are for the first time in history more or less at par with what it should have been long ago. (The negative impacts stressed by Thompson (2002), however, should not be discarded. See for example Part G of the BMP)

Although a market for fresh produce, offering local people the opportunity to sell their products and trade with others, is in the process of development, capital should be invested in the project to avail, for example, freezing facilities and other essential equipment and constructions. With the increased tourism potential of the area and 50 houses to be built, a lack of demand for especially fresh produce and fish should not be a problem. A stipulation that only produce from 'registered' agents of the market may be bought by tourists and other visitors, will ensure an increased demand. Accessibility of the current location of the market at Goshen (Marape) may create problems for especially some of the more distant estate owners, but a system of 'vendors' can be implemented, which in turn will create even more incentives for the community.

The establishment of a market will enhance lifestyle and commercial opportunities on the peninsula. Currently essentials are difficult to obtain, and when available, at excessive prices. The current prices for products on offer are below market value, but without alternative and competitive distribution channels the situation cannot be improved.

3.3 OPPORTUNITIES ORIGINATING FROM TOURISM ACTIVITIES

The development of tourism facilities, and especially the lodges and privately owned houses, have already contributed, and will in future contribute, to the upliftment and prosperity of the local community. Pieters (1998) estimated that 2,7 direct employment opportunities at remote eco-tourism destinations are created by tourist facilities for every one tourist they can accommodate, and that as many as 9 individuals will benefit if the incentives flowing from such visits are to be optimised. Direct employment opportunities on the peninsula is expected to be even higher due to the remoteness of the area, the non-existence of modern supply channels and service providers, as well as the fact that even more people will have to be employed due to the present unskilled nature of the local labour force.

Zaayman (1996) has calculated the multiplying effect of tourism expenditure at 1½, which implies that the accumulating and ripple effect of the money spent by tourists are much higher than the actual expenditure.

The awareness of the area amongst tourists will definitely create opportunities for members of the local community to embark on community-based tourism activities. For example, the communities could if such a service should eventually be on offer, provide accommodation for hikers in the more remote areas of the sanctuary.

3.3.1 Construction phase

In order to optimise the benefits to the community during the construction phase of tourism facilities, priority should be given to the usage of local material and local labour. The usage of local material creates many indirect employment opportunities and prevents the drainage of invested currency. This aspect has already been addressed by the construction standards and conditions laid down by the developers for construction activities on the peninsula, and benefits are flowing to the community. It is estimated, based on South African standards and prices, that as much as 72% of the total investment on construction of tourism facilities, is spent in Mozambique and is not subject to further currency drainage. Furthermore, it is estimated that labour costs forms about 35% of total construction costs and that this is a direct benefit to local Mozambican citizens.

The usage of local material ensures a larger spending in Mozambique, and more specifically in the Vilanculos region. The collection of grass, reeds and jeka initiates business opportunities for local people; the same with the cutting and trimming of local wood required for construction. Although the production of bricks can take place on the premises, a large quantity of bricks is also transported by dhow from the mainland.

If it is assumed (based on the developers estimates) that the total construction costs of lodges on the peninsula will amount to about US \$10 million and that of the 50 private houses to about \$16,2 million, then the spending of construction costs within Mozambique will amount to about \$18,8 million, of which labour cost (direct and indirect) has been estimated at \$9,1 million.

It is accepted that the bulk of the proposed tourism facilities will be constructed within the first 6 years and that the impact of this benefit to the community will eventually cease.

However, after this initial construction phase, continuous maintenance will be required, ensuring that some craftsmen will have a guaranteed income over the long-term.

3.3.2 Operational phase

(1) Direct employment opportunities

It was already mentioned that the capacity for one tourist creates as many as 2,7 permanent employment opportunities and, if correctly directed, as many as 9 indirect employment opportunities. The impact of these employment opportunities on the local people must be seen in the context of the basically non-existence of opportunities prior to the development of the sanctuary and tourism facilities.

The following will create direct employment opportunities:

- Direct employment at the lodges
- Direct employment at the privately-owned estate houses
- Rendering of services to the lodges and privately-owned houses (eg refuse removal, security, electricity supply, maintenance, mechanical services, etc)

The current prescribed minimum wage payable to a full-time employee in Mozambique amounts to approximately US \$38,00. It is estimated that a minimum of 275 new employment opportunities and even 350 or more will be created at full operational capacity in VCWS. This implies that a huge benefit will be derived from direct employment opportunities for the community.

(2) Indirect employment opportunities

It was mentioned that as many as nine people will indirectly benefit from the capacity that has been created for every one tourist. Indirect employment opportunities are normally associated with the rendering of services to tourist operations (lodges, privately-owned houses, etc) and to tourists themselves.

Creative management, with the support of the lodges and the owners of the private houses, are required in order to optimise the benefit that can be derived from indirect employment opportunities. The following potential indirect employment opportunities have been identified. Needless to say that this list is not complete and should be expanded on a continuous basis (“OP” denotes the need for an operational plan to be prepared):

- Maintenance of private homes
- Growing of vegetables for consumption by tourists
- Manufacturing of local curios for sale to tourists
- Collection of firewood for sale to lodges and private homes, if sustainable (OP)
- Catching of fish for sale to lodges and private homes, if sustainable (OP)
- Collection and selling of pearls, if sustainable (OP)
- Laundry services to lodges and private homes
- Garden services to lodges and private homes
- Selling of fishing bait to tourists, if sustainable (OP)

- Guiding services to tourists (OP)

Especially guiding services to tourists can easily be implemented. The diversity of the area can be explored by hikers in numerous ways: beach hiking, bird watching, lake trails and others. Game viewing guides should be in demand, and local expertise on fishing should be explored to the maximum.

Operational Plans: An OP needs to be prepared for the activities indicated above. In the first three examples (fish sales, pearls and bait) the question of sustainability will need to be addressed (and obviously also logistics, profitability, control etc), whereas guiding will especially be influenced by the need for effective counter measures in dealing with the presence of potentially dangerous large game. The VCWS-GM may opt to prepare more than one OP. Assistance may be rendered by contracted TDS's if deemed necessary. The GEF Project Manager will be involved in the process (see Part L).

(3) Entrepreneurial opportunities

Many opportunities exist for local people to use their entrepreneurial skills and start a small business. The lack of capital will be a tremendous obstacle for local people to enter the business world (Thompson, 2002). However, if this drawback can be overcome, huge potential exist for local people. Due to their lack of business skills and business experience, local entrepreneurs will have to be guided and trained in order to develop these skills.

The following opportunities for local entrepreneurs exist (the list could in time be expanded; see also Odendaal, 2002; Thompson, 2002 and Bruton, 2002, as well as numerous similar references elsewhere in the BMP):

- Dhow transport for goods and tourists from the mainland to the peninsula (which is already done with great success; 13 dhows have been contracted)
- Fibre-glass bottom boats for fish and coral reef viewing
- Guided dives; scuba, etc
- Freelance boatmen
- Makoro-type trips on channels in the peninsula for game viewing and bird watching

3.4 OPPORTUNITIES THAT DERIVE FROM THE DEVELOPMENT OF A WILDLIFE SANCTUARY

The development of the wildlife sanctuary (or Reserve) forms the basis of all developments on the peninsula: without the sanctuary, tourist developments would have been very limited and would have been restricted to possibly a safari-type lodge, if any development took place at all.

Although the CIO's incentives derived from the sanctuary as such, will be overshadowed by those of the tourism facilities, they should not be regarded as less important. Ensuring sustainability and proper maintenance of the natural resource, are of utmost importance - without the sanctuary there will be no tourists!

The CIO's to be derived from this groundbreaking conservation action can be classified in the following groups:

Direct employment opportunities	Administrative and management functions Field rangers Fence patrollers Marine guards Gate operators Maintenance staff Workshop assistants Extension and training services Management, maintenance and operation of picnic sites Management, maintenance and operation of wilderness trails Supervisors
Indirect employment opportunities	Guides for hiking trips, game viewing and bird watching Collection of medical plants, if sustainable Collection of firewood, if sustainable Collection of aloe juice, if sustainable
Associated activities	Cultural centre, traditional dances, etc Training and education centre/Skills training Research station Organic agricultural methods
Consumptive utilisation of game	Trophy hunting Game meat supplies Selling of live game

INDIVIDUAL CONSERVATION INCENTIVES AND CONSERVATION-INITIATED OPPORTUNITIES

Category	Remarks and/or recommendations	Input required	Expected monthly outcome
1. Obligated compensation for the community	Compensation for the use of the land and the sacrifices made by the local community in order to accommodate the development of the sanctuary and tourism facilities in a mutually satisfactory manner. (Community Trust Fund)	Logistical support	1 200 bednights x \$6 \$7200 (100 beds @ 40% occupancy)
2. Lifestyle opportunities	Developments on the peninsula have created an awareness of the area and economic activities resulted in improved standards of living.	Market: Construction \$3000 Equipment \$1000	Indirect benefit to community
3. Opportunities originating from tourism activities:	Tourism is generally regarded as the fastest growing industry in the world and Mozambique, with its scenic beauty, is ideally positioned to gain an advantage from it.		
3.1 Construction phase	Estimated total construction costs: \$26,2-million. Construction of tourism facilities and privately owned houses has created, and will create in future, many direct employment opportunities as well as indirect benefits to local people. Maximising the use of local material and labour resulted in increased spending in Mozambique, to the extent of some \$18,8-million.		
3.2 Operational phase	It is estimated that approximately 80 permanent employment opportunities will be created by the lodges, plus some 75 opportunities by the privately owned houses. Many indirect opportunities exist for members of the local community as well.		80 x \$50 wage pm \$7750 75 x \$50 wage pm
3.3 Indirect opportunities	The lodges and private houses will require certain services from the community, as well as products that can be supplied/produced by the local community.		

Maintenance of private houses	Private houses will require continuous maintenance (painting, re-thatching, new jeka, etc). Labour can be supplied by the local community.		10 houses pa x \$2000 Per month	\$1667
Vegetable produce	Fresh produce will be difficult to obtain. Members of the local community can sell surplus products to the lodges and private houses	Training		± \$3000
Manufacture of curios	Local curios are in short supply, but should be in great demand by visiting tourists	Training Tools \$1000		± \$500
Catching of fish for sale	The local community can sell surplus fish to the lodges and private houses.	Monitoring		± \$500
Collection and selling of pearls	If sustainable, pearls can be collected and used for curio manufacturing or direct sales to visiting tourists	Monitoring		± \$200
Laundry services	An indirect employment opportunity should be offered by basically every private house			± \$400
Garden & security services	Employment opportunities, either on a permanent basis or as indirect employment, should exist.			± \$2000
Fishing bait	Fishing bait can be sold to visiting tourists and private house guests.	Monitoring		± \$100
Guiding services	The vastness of the area should ensure that visiting tourists/private house guests will require guiding services to optimize their Africa experience.	Supervision Training Reservation assistance	25 groups x \$5	\$125
3.3 Entrepreneurial opportunities	Although hampered by a lack of capital funding, numerous opportunities exist for local people to become entrepreneurs and reach a decent standard of living.			
Dhow transport	Dhow transport between the mainland and the peninsula can be a unique Africa experience for many tourists. A specially equipped vessel will have to be used. Dhow transport of goods is already, and will continue to be, an entrepreneurial opportunity for local dhow owners.	Limited supervision Reservation assistance \$3 500 =	20 tourists x \$7,50 10 trips x \$15	\$150 \$300

Fibre-glass bottom boats	Ocean viewing in fibre-glass bottom boats can be a unique experience for tourists and an excellent opportunity for a local person to become an entrepreneur. Specially built vessels are required.	Limited supervision Reservation assistance \$9 000	50 pax x \$7,50	\$375
Guided dives	Diving is an increasingly popular sport. Although special equipment and specialised training for dive masters are required, it offers ideal opportunities for local entrepreneurs. Alternatively, local people can be sub-contracted as dive masters by lodges.	Specialised training Limited supervision Reservation assistance \$7 000 Alternative: sub- contracted	40 dives x \$10	\$400
Freelancing boatmen	Some of the owners of the privately owned houses may require capable boatmen to captain their boats, or will be in need to hire boats. Although a high investment is required, it should offer an excellent opportunity to one of the many very experienced boatmen to own and operate his own boat	Employment Limited supervision Reservation assistance \$25 000	10 x \$50 20 x \$40 x 2 pax	\$500 \$1600
Picnic site operators	The physical extent of the area makes it possible that remote picnic sites can be operated by locals. This will contribute towards the comfort of tourists.	Limited supervision Reservation assistance \$300 per site	10 groups x \$3	\$30
Wilderness trail operators	A wilderness trail, managed by a knowledgeable local operator for his own account, can enhance the Africa experience of tourists.	Limited supervision Training Reservation assistance \$2 000 development	30 pax x \$5	\$150
Makoro-type trips in lake area	Botswana-style makoro trips on channels and between lakes offer an adventurous experience for tourists and can easily be run by local people.	Limited supervision Training Reservation assistance ±\$500 per makoro	20 pax x \$5	\$100
4. Opportunities created by the Wildlife sanctuary	The sanctuary forms the basis of all developments on the peninsula. Apart from the important conservation outcomes, many incentives for the local community arise from the sanctuary. The sustainable use of the primary resources should be monitored and maintained at all times.			

4.1 Direct employment opportunities	<p>Effective management and the continuous monitoring and efficient maintenance of this primary resource necessitates the appointment of a number of permanent people. Training for personnel must be provided.</p> <p>The suggested staff structure, as explained in the budget, necessitates the appointment of ± 15 people in management positions and ± 79 in operational and support positions.</p> <p>Although salaries and wages are normally not regarded as 'conservation incentives', it should be seen as a benefit to the community.</p>	Supervision Training Monthly wages	±\$325 000 pa ±\$27 000 pm
4.2 Indirect employment opportunities	<p>Many services to the sanctuary itself, or tourists visiting the sanctuary, can be provided by temporary employment or freelance operators. Limited training will be required and knowledge and experience of local people can be utilised in this regard, offering them the opportunity to improve their lifestyle.</p>	Supervision Training	
Guiding (Hiking trips, game viewing and bird watching)	<p>The knowledge of local people can be explored in guiding tourists around the sanctuary. At the same time it will prevent tourists getting lost and ensure an income to local people on part-time employment.</p>	Supervision Training Reservation assistance	
Collection of medicinal plants	<p>The collection, selling and possible processing of medicinal plants can offer income-generating opportunities to local people if it can be done on a sustainable basis. Research will be required to establish the medical characteristics of plants. Control and supervision will be necessary.</p>	Research Supervision Training Monitoring	\$200
Collection of firewood	<p>Firewood will be in great demand by the lodges and private houses. Although a task that can be easily performed, damage to the environment can be done. Therefore proper control will have to be exercised. Scientific inputs will be required to determine the sustainability of this incentive.</p>	Supervision Monitoring	200 x \$1 per bundle \$200
Collection of aloe juice	<p>Further research is required to determine the feasibility of such a project, as well as its sustainability. Efficient control will have to be exercised in light of the international demand for aloe products.</p>	Supervision Training Monitoring	

4.3 Associated opportunities	The Afro-environment with its unique customs, traditions, habits and history should be utilised and preserved.		
Cultural centre	Although a cultural centre can be explored by tourists, the value of such a centre will mostly be to the advantage of the community itself. Traditional musical instruments and dances, customs and their unique everyday practical activities should not be lost to future generations.	Planning Construction; \$10 000 Supervision	100 tourists x \$2 \$200
Training and education centre	Conservation and sustainability can only be enhanced by training and education, especially for future generations and for adults who never had the opportunity in the past.	Planning Construction; \$10 000 Operation; \$2 000 per month	
Research station	The sanctuary comprises of such unique, complex and diverse characteristics, of which little is known, that the establishment of basic research facilities are essential. Local people can assist scientists with research projects, for which they can be remunerated.	Planning Construction: \$15 000	
Organic agriculture	Having been agriculturists all their lives, and with current limitations on historical agricultural practices, it seems only logical that organic agricultural methods should be promoted amongst the members of the community.	Supervision Training \$18 480 initial project costs \$16 800 pa	
4.4 Consumptive utilisation of game	Introduction of game. (The cost of introducing game, and the income derived from that game, should not be regarded as a direct incentive to the community.)	Introduction costs \$264 000	Future income Consumptive \$78 000 pa Non-consumptive Nil
Trophy hunting	Trophy hunting will be the most profitable utilization option and maximum number of surplus game should be utilized using this option. Trophy hunting should be outsourced.	Supervision Training	Future income
Game meat supplies	Surplus, non-trophy animals should be hunted and the meat utilised	Supervision Training	Future income
Selling of live game			

	Estimated totals:	As per above list: \$148 380 Game \$264 000	Estimated potential gross income: Incentives \$27 647 pm \$331 764 pa Salaries & wages \$27 000 pm \$325 000 pa Game utilisation \$78 000 pa
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- Assumption 1: ± 4 900 tourists visiting the peninsula annually, spending ± 14 400 bednights on the peninsula
(100 beds x 360 days pa @ 40% occupancy)
- 2: US\$1 = R10,00

An amount of approximately US \$150 000 for capital expenditure to create new conservation incentives can be used for budgetary purposes, with a resulting ± US \$28 000-monthly benefit to the local community, excluding monthly salaries of ± \$27 000.

PART K ECONOMIC ISSUES AND ANALYSIS

Editor's note: Due to circumstances beyond my control Part K was not edited to fully comply with the structure and layout of the BMP. Furthermore, although the intention was to do so, the writer of this Part (PC du Plessis) did not have the opportunity to adapt the economic analysis to bring it in line with the draft budget included in Chapter L2 (Part L) below. The economic analysis that follows is thus based on an outdated draft budget, and not on the budget presented in Part L below. Du Plessis is not to blame for this unfortunate situation.

CHAPTER K1 ECONOMIC ISSUES AND ANALYSIS

1.1 INTRODUCTION

The civil war, stretching over decades, has changed Mozambique into one of the poorest countries in the world. There were basically no economic activities during that period, and the average Mozambican struggled to survive.

Even the smallest developments after the war caused ripple effects. The economy was at such a low level that any development or growth had a huge impact on the nation as a whole. However, growth based on such low levels indicated a positive trend that was not really reflected by the actual extent of that growth.

The almost non-existence of economic activities changed after the war and today, only a few years later, some degree of prosperity can already be seen.

The inhabitants of the proposed sanctuary are still living in a state of poverty - a community that struggles to survive with only the natural resources of the area available to them to earn a living. Although a change has taken place and the economy is slowly recovering, it should be accepted that there will still be some uncertainty and that, for the near future, huge pressure on the natural resources will continue to exist.

The incentives initiated by the proposed conservation action on the sanctuary, is discussed in Part J of the BMP. The impact of these incentives was estimated and is summarised below.

For the purposes of this study, a distinction was drawn between the incentives originating from the proposed conservation action for the community, and the economic results from operating the sanctuary as such. While the economic incentives are a direct advantage to the community, the community will probably only gain in the net operating profits of the sanctuary. This is besides indirect benefits such as employment opportunities and others. The expenses and costs incurred in order to manage the sanctuary efficiently, should be deducted from the income generated by the sanctuary before the net result and possible gains to the community can be calculated. It is assumed that the sanctuary project will be self-sufficient over the longer term.

The aim of this study is that the sanctuary as such, and the activities within the sanctuary, must be managed in a sustainable manner. In order to conserve and sustainably use the biodiversity assets of the sanctuary, mechanisms to ensure effective management should be established. Protected areas cannot exist in isolation. Economic realities, such as growth in neighbouring countries, international tourism trends, security-related issues, development of infrastructure and others will have a huge impact on the economic assessment of the sanctuary.

The scope of the economic analysis includes (i) an estimation of the economic value of the project, (ii) to design appropriate economic mechanisms to maximise the biodiversity benefits of project activities and (iii) to determine a cost-benefit analysis of the project. Economic incentives are discussed in Chapter ...

Data was gathered during a field trip to the sanctuary. Discussions were held with sanctuary management, local lodge operators and other stakeholders. I have to mention that very little data could initially be obtained from sanctuary management, either during the field trip and after. Information regarding budget standards, capital expenditure, resettlement costs, wage structures and other economic matters are essential for this study but could initially not be obtained. Therefore certain assumptions had to be made to bridge gaps in the available data in order to determine the economic feasibility of the project.

1.2 ECONOMIC BACKGROUND

Mozambique, a country of approximately 802 000 sq km and a population of 19 million (2000 estimate), with a population growth of 1,47%, is located in Southern Africa. The long civil war and recurrent droughts have resulted in increased migration to urban and coastal areas with adverse environmental consequences. (www.germanchamber.co.za).

Mozambique gained independence on June 25, 1975. Before the peace accord of October 1992, Mozambique's economy was devastated by a protracted civil war and socialist mismanagement (www.germanchamber.co.za). It is believed that in 1994, Mozambique was one of the poorest countries in the world.

Since 1996, inflation has been low and foreign exchange rates stable. Albeit from a small base, the country achieved one of the highest growth rates in the world in 1977-99 (www.germanchamber.co.za). In spite of these positive aspects, Mozambique still depends to a large extent on foreign assistance to initiate further growth and to pay for the trade imbalance, with imports exceeding exports.

Statistical information is very difficult to obtain. Even those given by reputable institutions, such as the Mozambican Government's National Statistics Institute, World Bank and USAID, differ drastically in value. This is primarily due to different weights placed on the data by the various institutions.

	1996	1997	1998	1999	2000	Source
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National Growth Rate (Note 1)	6,4	6,3	10,0	10,0	5,7	
Inflation	17	5	-1,3	4,5	11,4	
GDP (US\$ bn)	1,66	1,76	3,9	4,3	3,8	
GDP per head (US\$)	106	109	236	256	219	
Prime interest rate	Not available					
Exchange rate (US\$)	11,295	11,430	11,853	12,446	15,164	
Unemployment		21%				
Earnings per capita	Figures are not available It is estimated that more than half of the population lives beneath the poverty line					
Population (Note 2)	16,18 m	16,54 m		19,29		
Foreign Reserves (Excl gold)	344,1	517,4	608,5	651,6	725,1	
GDP per sector (MT bn):						
Agriculture	9969	12011	12670	13779		
Fishing	1311	1549	1595	1557		
Construction	2060	2597	4118	4360		
Transport /	2826	4381	4552	4816		
Communication	7915	9253	9738	9903		
Business	278	491	563	605		
Restaurants/hotels	592	787	1098	1384		
Education & Health	<u>3929</u>	<u>4460</u>	<u>4957</u>	<u>5676</u>		
Other services	32719	40554	46427	50827		
Agriculture		34%				
Industry		18%				
Services		48%				
Minimum wages (MT)		301,6				www.agoa.mu

Source: Dept of Foreign Affairs, RSA (Unless otherwise stated)

Note 1: Averaged 6,7% between 1993 to 1999

Floods of 2000 caused a major slump in growth

Note 2:Urban population: 36,5% (Growth 1997: 8,5%)
Children per women: 6,2 (1998)

It should be noted that although 45% of total land area is suitable for agriculture, only about 6% is actually cultivated (www.places.co.za). 80% of the labour force is involved in agriculture, and only about 9,5% in industry.

The unemployment rate is extremely high (21%, 1997 est), with 70% of the population below the poverty line (www.agoa.mu).

Mozambique, with a unique historical and cultural heritage, tropical beaches, coral reefs, spectacular landscapes, rich architecture and small desolated islands close to the coast, has a huge tourism potential which is only now starting to bloom. As recently as only five years ago, this would have seemed an improbable tourist destination for all but the most adventurous of travelers.

The VCWS-project must be assessed against this background.

1.3 CONSERVATION INCENTIVES

The conservation incentives identified in Part J, can be listed as follows:

- Obligated compensation for the community
- Conservation-initiated opportunities
- Opportunities that originate from the development of tourism facilities
- Lifestyle opportunities
- Tourism activities
- Opportunities that derive from the development of the sanctuary
- Direct employment opportunities
- Indirect employment opportunities
- Associated activities

It was estimated that an amount of approximately US\$110 000 would be required as capital expenditure to ensure the implementation of the suggested incentives, with a resulting \pm US\$23 000-monthly benefit to the local community. However, it must be emphasised that these amounts should only serve as guidelines for budgetary purposes and not as the alpha and omega of the actual situation. A proportional equation between development capital and conservation benefit exists and the benefit to the local community can be increased by a higher capital investment. Unfortunately the opposite is also applicable.

The financial success of the incentives will depend on the following:

- Logistical support to the entrepreneurs
- Management assistance and involvement in incentive schemes
- The number of tourists that will eventually visit the sanctuary, e.g. economics of scale

- The approach of the local people as far as their involvement, commitment and attitude are concerned.

The benefits that derive from conservation incentives, tourism activities and sanctuary management are inter-linked and a clear distinction between them cannot be drawn. The creation of an employment opportunity can be regarded as income to the community and an incentive to conserve, but at the same time as expenditure to the sanctuary. A holistic approach is required to estimate the total impact of the project on the lifestyle and lives of the local community and, at the same time, to measure the economic impact of the project in monetary value.

1.4 THE ECONOMIC VIABILITY OF THE PROJECT

The economic viability of the project should be judged against the economic background of the country - the country is in a sensitive stage of economic recovery and the community still struggles from poverty, but growth potential does exist and the inhabitants of the country treasure the idea of improvement. It is therefore essential that this project not be judged in isolation of the economic realities in the country.

The unique nature of the project, with continuous involvement of private investors guaranteed, can be regarded as a benchmark for future developments. However, private sector involvement to this extent necessitates sound conservation management, a well-planned tourism development strategy and a monitoring and evaluation system to assess the impact of the development on the environment on a continuous basis.

Conservation initiatives and development initiatives cannot be separated. The development of basic infrastructure will be a direct benefit to the community, it will facilitate the development of the sanctuary but will also serve the needs of private investors and tourists.

It is argued that without tourism developments there would be no conservation initiative, and *vice versa*. As a matter of fact, management draws no distinction between tourism development costs and the costs to conserve the environment. They regard it to be integrated to such an extent that it should be treated as total project costs without any attempt to allocate parts to either tourism development or environmental development.

However, it would be difficult to motivate the construction of a landing strip or that of the gas pipeline purely from an environmental perspective - it can be accepted that the private investors and visiting tourists will benefit to a much larger extent from these constructions. At the same time it can be argued that no tourism development would be possible without a landing strip or the gas pipeline and that these development costs should be seen as an opportunity cost that ultimately benefits the environment.

There is no doubt that the development of the sanctuary will positively contribute to the economic growth of the country in general, and the area in particular.

The total development budget amounts to approximately \$32,6-million, of which a major portion will be spent in Mozambique with limited dollar drainage to neighboring countries. An amount of approximately \$3-million can be directly associated with the conservation and environmental components of the project.

Annual operating costs are estimated to be in the region of \$450 000, which would comprise probably the largest single economic activity in the area.

Although the accuracy of annual expenditure estimates can be questioned, or the efficiency of the amounts to be spent, the bottom line dictates that the more money is spent, the bigger the advantage to the community, the area and the country.

What should be questioned is the long-term economic sustainability of the development. Annual operating costs is estimated to be approximately \$450 000, with expected annual income at about \$312 000. The expected annual 'net loss' on the project seem to be about \$138 000.

The short- and medium term expectations should not deviate from the above estimation. There is little reason to believe that any adjustments to those figures will occur in the first six years of the project's life, other than those caused by inflation. Only after 6 years can any real change or improvement be expected, due to the fact that game will only then be consumptively utilised. However, effective management should still be required to ensure break even after the sixth year.

Management should ensure at this early stage that the annual shortfall of about \$140 000 for the first sixth years of the project's life should be provided, which amounts to a total requirement of approximately \$840 000.

An analysis of the expected annual income does not prove to be of any convenience to management either. The bulk of the expected income ($\pm 67\%$) will be generated from tourism levies and there is little hope that this source can be increased without penalising the burdened contributors to an unrealistic level. Other income sources are already tapped to their fullest extent and no significant increase can be expected.

Private investors, tourists and other visitors to the sanctuary would be willing to contribute to the running costs of the sanctuary, as long as they are convinced that the money contributed will be used for that purpose. Maintaining sanctuary integrity and creating tourism infrastructure should be worthwhile causes for contributions, but even with low elasticity, upper limits for levy levels do exist.

An analysis of annual operating costs is alarming - except for human resources (57% of total expenditure), no clear-cut savings can be suggested.

The medium term sustainability of the project is in question. The critical period is the first 6 years of the project's life, after which period it should break even because of additional income that can be generated through the consumptive utilisation of surplus game.

However, and very important, it should be noted that benefits to the community through conservation incentives have not been taken into consideration in the above

calculations, as is the case with the conservation benefits. The macro impact to the community may well justify the financial shortfall - not to mention the conservation benefit that will be derived from the establishment of the sanctuary. However, the bottom line is that someone has to pay the shortfall of \$140 000 per year during the first six years of the project's existence - be it the developers, the private investors or some or other international donor agency.

PART L: VCWS ADMINISTRATION

CHAPTER L1: MANAGEMENT PROGRAMME AND STRUCTURES

1.1 MANAGEMENT APPROACH AND STRUCTURES

1.1.1 Company management approach, policy and structures

(1) Approach and policy

Should a well-trained and experienced personnel corps have been available, the management approach to be followed at VCWS would have favoured the bottom-up or consultative approach with the staff consulted or involved in an active manner, rather than the more prescriptive and less inclusive top-down approach driven by senior management.

Neither of the two approaches is individually fully appropriate to the VCWS situation, and will be sensibly combined. The VCWS-GM will effectively take decisions and will ensure that they are implemented, whilst acknowledging the need for a consultative approach. Consultation will be integrated into the management system to the maximum extent possible, as is evident from the following system that will be employed.

(2) Management system: internal line and staff structures

The management system that would be followed, is evident from the discussion below. It involves the following structures, entities, procedures and functions:

Company Board of Directors

The mission and biodiversity functions (equals project objectives) of the Board and Executive Chairman are illustrated in the following box. It should be noted that the Board and chairman would for all four of the groups of functions, be responsible for laying down applicable policies in order for the objectives to be realised within the parameters as laid down by the BMP, other biodiversity-related plans and the EIA's

BOARD OF THE COMPANY AND EXECUTIVE CHAIRMAN
MISSION (ROLE) To ensure the effective conservation of the unique and fragile natural marine and terrestrial resources by means of low intensity, rigidly controlled and environmentally sensitive commercial development to the benefit of the local communities, investors, and the region.

OBJECTIVES (FUNCTIONS)

Biodiversity/resource management

- To establish and maintain an effective management system for the VCWS;
- To understand and maintain established ecological processes through dedicated planning and management orientated research, and to disseminate information and experience for the benefit of conservation in general;
- To secure, restore and maintain physiographic areas, biotic communities, genetic resources and species, thereby to contribute to ecological stability, diversity and sustainable use in the VCWS and region;
- To implement practices for sustainable use of natural resources in the VCWS and region;
- To eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation.

Resident and regional community development

- To promote and facilitate resident community participation and ownership in the development of the Sanctuary
- To empower resident and local communities by supporting and contributing to the maximum extent possible, to lifestyles and economic activities which are sustainable and in harmony with nature;
- To exploit opportunities for participation in regional and national scientific, economic and social development

Economic sustainability

- To ensure that revenue generating development and economic activities are viable, profitable and in harmony with nature;
- To ensure funding of specific socio-economic and conservation initiatives out of income derived from the above mentioned ventures;
- To encourage and secure donor and institutional support to achieve socio-economic and conservation objectives of the VCWS.

Tourism

- To promote and provide for visitor use for inspirational, educational, cultural and recreational purposes;
- To ensure that visitor use and behaviour does not impact negatively on the VCWS biodiversity;
- To facilitate and promote entrepreneurial opportunities for resident community members in the tourism trade*

GEF Managers

Refer to the discussion below for an overview of their roles and functions

General Manager

The VCWS General Manager (VCWS-GM) will be the most senior executive (line function) officer on site. He will execute policies and will be responsible for the global management of the VCWS. He will also liaise with the Home Owner's Association (HOA, see below), the Kawene Community Association (KCA, see below), the two GEF Project Managers and the various community committees as and when necessary. The role and functions of the VCWS-GM are as indicated in the following box:

GENERAL MANAGER
<p>ROLE To ensure that Biodiversity Management- and Community Services are provided and improved in accordance with the policy and objectives of the Board</p>
<p>FUNCTIONS</p> <p>Assist in the formulation of policy to give effect to the achievement of Company objectives; On instruction represent the Board in advisory committees and other forums; Oversee (manage)* Resource Conservation-, Community- and Administrative Support Services.</p> <p>* Manage: Policy Formulation, Organisation, Staffing, Financing (budget) and Planning as empowered at this level of the hierarchy</p>

Deputy General Manager and Operations/Support Staff

The last tier in the line function hierarchy represents those who are responsible for the day to day running and maintenance of the Sanctuary and the services provided. A very brief description of the role and functions of the Deputy Sanctuary Manager is provided in the following box. To give an indication of the scope of what is to be delivered, a few of the more important activities of the staff/operational divisions are listed under each service.

ROLE, FUNCTIONS AND SERVICES PROVIDED BY THE DEPUTY GENERAL MANAGER AND OPERATIONS DIVISIONS	
<p>ROLE To render effective Resource Conservation-, Community-, Administrative Support and Strategic Plan Services</p> <p>FUNCTIONS Assist in the formulation of policy to give effect to the achievement of Company objectives; On instruction represent the Board in advisory committees and other forums; Oversee (manage) Resource Conservation-, Community-, Administrative Support and Strategic Plan Services</p>	
RESOURCE MANAGEMENT	COMMUNITY SERVICES

<p>FUNCTIONS <u>Field services</u> (aquatic and terrestrial) Provide and maintain infrastructure as per approved plans; Control alien and invasive species Undertake rehabilitation projects such as slash and burn areas Monitor species and systems as per management plan (eg.checklists) Monitor introduced species. Undertake burning programmes and monitor effectiveness. <u>Security Services</u> Police the consumptive utilisation of resources Enforce legislation and policy measures as per instruction Patrol fences and borders Guarding of facilities <u>Visitor and Education Services</u> Provide and maintain infrastructure Undertake surveys to establish visitor satisfaction and needs Provide and maintain educational facilities and material <u>Scientific Support Services</u> Assist TDS's and scientists with surveys and undertake specific monitoring projects Maintain data bases and infrastructure</p>	<p>FUNCTIONS <u>Community liaison</u> Establish and attend forums for liaison purposes</p> <hr/> <p><u>Supervise Non-strategic Community projects</u> Market Marketing Transport <u>Monitor consumptive utilisation</u> Plants Marine and freshwater species <u>Provide educational services</u> Facilities Programs Material</p> <hr/> <p>STRATEGIC PLAN SERVICES</p> <hr/> <p>FUNCTIONS Strategic Marine Resources Plan: implementation (refer to text) Strategic Terrestrial Wildlife Plan: Implementation (refer to text) Strategic Agriculture Plan: Implementation (refer to text) Strategic community plans: Resettlement and Development: Implementation Consultation Plan: Implementation Tourism Plan: Implementation Operational Plans: Compilation and Implementation</p> <hr/> <p>ADMINISTRATIVE SUPPORT</p> <hr/> <p>FUNCTIONS Personnel Budget and Finance Stores and equipment Purchases Maintenance Registry Communications</p>
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(3) Staff establishment

The proposed staff establishment includes the planned Phase 2 extension to VCWS. The staff establishment and allocation of staff to the operations/support divisions can be summarised as follows:

Senior management staff

General Manager

Deputy General Manager

Project Leader: Strategic Marine Resources Plan (implementation)

Project Leader: Strategic Terrestrial Wildlife Plan(s) (implementation)

Project Leader: Strategic Agricultural Resources Plan (implementation)
Project Leader: Community Services (plans, projects and implementation)
Project Leader: General Services (including tourism and consultation programme)
(The five Project Leader Posts are contracted posts for the duration of the GEF project)

Division Heads (Middle Management Staff)

Field Services and Security Services
Community Services (excluding agriculture)
*Marine Services**
*Terrestrial Wildlife Services**
General Services (including tourism, consultation programme and interpretation)
*Agricultural Services**
Scientific Support Services
Administrative Support Services

(* Contracted posts for the duration of the GEF project. Where applicable, the Division Heads will be directly involved with the implementation of strategic and other plans)

Operations and support staff

(1) Field Services Division:

<i>Support Staff Unit</i>	<i>1 x Mechanic</i> <i>1 x Handyman</i> <i>1 x Storeman</i> <i>3 x Skippers</i> <i>3 x Boathands</i> <i>3 x Driver</i>
<i>General Assistants Unit</i>	<i>1 x Senior Chief</i> <i>2 x Section Chief</i> <i>18 x General Assistants</i>

(2) Security Services Division:

<i>Field Ranger and Fence Patrol Unit:</i>	<i>1 x Senior Chief</i> <i>3 x Chief</i> <i>8 x Field Ranger</i> <i>8 x Fence patrol</i>
<i>Guards unit</i>	<i>6 x Guards</i>

(3) Community Services Division: 1

<i>Social Plans Facilitators</i>	<i>4 x Facilitators</i>
<i>Non-strategic Plan actions</i>	<i>2 x Assistants</i>

also be made available to the Global Environment Facility (GEF) project managers (see below).

Staff forum

A staff forum will be established comprising all the sanctuary employees, and will be chaired by the DGM. The GM will normally attend the meetings. Proceedings will take place in English and Portuguese.

The forum will meet at least bi-weekly, to be attended by all employees based at or in the vicinity of VCWS headquarters. The Division heads will be responsible to disseminate information to those members of their divisions based at outstations, or who could not attend the meetings due to other official commitments.

The forum will facilitate interchanges of ideas and information of relevance to the management of VCWS, staff welfare and other pertinent issues. The proceedings of the forum will not be minuted, but an action list of decisions taken and recommendations made at each meeting will be recorded, for report-backs at the next meeting.

Government Liaison Task Force

The Government Liaison Task Force (GLTF) has been established to keep the civil authorities at district level (Vilanculos) informed about the establishment and development of VCWS, and to provide a forum for a bilateral exchange of ideas and the discussion of problem areas. The GLTF is Chaired by the District Administrator and includes all the district directors of relevant government ministries, as well as senior VCWS staff.

Some of the TDS's involved with the compilation of the BMP have suggested that the scope of the GLTF should be broadened to also involve the civil authorities at provincial and national level. The GM will investigate this possibility and will submit a proposal to the Chairman of the company Board.

Home Owner's Association

The HOA will have no line function authority with regards to the management of VCWS. However, they have certain vested contractual rights on matters such as free access to the sanctuary. The GM or any of his staff, who will have to ensure that any decisions or actions that are implemented are in accordance with these rights, may not infringe these rights on.

Should the HOA wish to query any decisions or actions taken by VCWS staff, they could establish personal or written contact with the GM. The GM will be the contact person for the HOA, and neither he nor any member of his staff will be liable to take instructions from the HOA or from any individual member. Should the HOA not be satisfied with the feedback that they received, they could take the matter up with the Chairman of the Board of Directors of the company.

The HOA will draw up their own constitution to safeguard their rights and to regulate their activities. This constitution will take cognisance of the stipulations/guidelines of the BMP, OPs and any EIAs and will not come into conflict with any of these plans.

Kawene Community Association

The Kawene Community Association (KCA) has been established to act as an impartial body on behalf of the local communities. The association is not operational yet, but will have the non-executive authority to act on behalf of the communities in any manner that they see fit. The KCA will operate according to a constitution that will be drawn up by themselves in due course.

The KCA is composed of appointed influential individuals, chosen for their standing in society and their ability to render a service to VCWS in general and the communities in particular. Most of them are Mozambicans. The members will receive no compensation for their services.

The following bilateral policies and procedures will be applied to ensure that the KCA meets with its objectives:

- The GM, Project Leader: Community Affairs and possibly also the Division Head for Community Affairs will attend all KCA meetings.
- The GM will submit all policies (as requested by the company Board of Directors), plans and operational plans pertaining in any way to the communities, to the KCA for their consideration and recommendation. Should they not be in favour of a particular submission, they may refer the matter back to the GM for reconsideration. Should a stalemate situation arise, the Board of Directors of the company will take a final decision on the matter.
- The VCWS quarterly reports (see below) will be made available to the KCA for their information.
- The KCA would also have the authority to instigate policies and to submit recommendations in this regard to the company Board of Directors through the GM.

Reporting schedule

The GM will draw up a list of all internal reports to be kept, and how and to whom these reports will be circulated. The GM will submit a monthly report to the Board of Directors, with copies to the HOA. The monthly reports will be in English.

In addition, the GM will also draw up quarterly reports in English and Portuguese, to be circulated to the company Board of Directors, the KCA, the CRC, the HOA and the GLTF.

1.1.2 Management system: GEF supporting and regulatory functions

It stands to reason that the GEF may and will not make funds available to another party, without building some safeguards and controls into the system to ensure that the money is spent in accordance with the project brief and the objectives for the

project. The GEF biodiversity projects worldwide normally involve grants and/or support to government agencies and/or parastatals, sometimes also including major NGO's. These service-orientated organisations will normally have well-established structures in place to deal with the allocated funds, and would be accustomed to operate strictly according to approved budgets and within the normally strict parameters of financial control. They would furthermore seldom if ever have any profit motive and would primarily be geared towards achieving biodiversity conservation objectives. Research and monitoring and conservation-based planning would be part and parcel of the proponent's everyday activities. In such cases, the recipients of the grant would have the capacity and the experience to deal with a major biodiversity project, and it would be relatively easy to put GEF control measures in place.

For the proposed VCWS project, however, the situation is totally different. The development company is primarily geared towards a profit motive and to serving the best interests of the investors, and all the paraphernalia that are usually attached to a public sector conservation project could not be expected to be part of the company's operating culture. The same operating culture with the same inherent limitations could be expected of the successor to the development company, the management company. It is furthermore not normally expected of a private company to undertake or supervise specialised biodiversity research projects, or to be responsible for in-depth environmental monitoring actions, such as would be the case at VCWS. The VCWS project is also a mixture of commercial (residential development and upmarket tourism) and non-commercial (conservation) activities on the same area, often undertaken by the same staff with dual responsibilities.

EAW is thus not well equipped or fully geared towards implementing or managing a full-blown "pure" conservation project, nor does it have the experience, training or expertise to do so without depending on and receiving considerable inputs from conservation specialists. The GEF would obviously be concerned about addressing and solving this problem and in putting structures in place to address these shortcomings or limitations.

These shortcomings can be alleviated by a combination of the following factors:

- Employ more conservation specialists, either full-time (which would be prohibitively expensive) or, as is suggested in this document, by using contracted TDS's on a need-to basis.
- Structure the organisational chart of the company in such a manner that the maximum possible separation could be achieved between commercial and conservation activities.
- Build in a GEF involvement by means of operational monitoring procedures (which is normal for any GEF project) and, specifically tailored for the VCWS situation, direct but non-executive control measures.

The following two-point implementation and control system is thus proposed:

GEF Project Manager: Logistics co-ordination and control

The main functions and job characteristics of the GEF Project Manager (Logistics co-ordination and control) (GEF-PM [Logistics]) would be the following:

- The incumbent would be responsible for the following tasks on behalf of the GEF:
 - Budget control (all GEF-related functions/items, including specialist surveys/research)
 - Financial statements and reports, including auditing (as per GEF contract)
 - Contract administration including honoraria, salaries and *per diem* expenses of TDS's
 - Staff establishment (GEF staff, including appointments, training and staff codes: monitoring according to the relevant plans)
 - Logistical support to all GEF-related activities by specialists (on-site transport including vehicles, boats and aircraft; air charters and commercial flights; accommodation (on-site and en-route); communications and publications (including scientific reports)
 - Liaison (media and otherwise) and public relations with regards to the GEF project
 - All other non-scientific GEF-related activities as included in the BMP and OPs
- Most of the activities/tasks mentioned above would be included in the duty sheets of the VCWS-GM and his staff. The GEF-PM (Logistics) would thus act as a monitoring supervisor, without any on-site direct line function authority. The VCWS-GM would, however, be obliged to submit any reports that may be required and to act on valid instructions from the GEF-PM (Logistics).
- The GEF-GM (Logistics) would to a large extent operate independently, but would be supervised within the established GEF control and supervising channels. The incumbent would have a direct line of communication to the following functionaries:
 - The GEF supervisor
 - The company Chairman of the Board
 - The VCWS-GM
 - The GEF Project Manager (Implementation) (see below)
 - The GEF-PM (Logistics) would have access to the services of certain administrative staff members of the company, for example budget clerks, bookkeepers and auditors.
 - The incumbent could, if necessary, be provided with office space and administrative support at the company HQ.
 - It would be a part-time position.

GEF Project Manager: Implementation co-ordination and control

The main functions and job characteristics of the GEF Project Manager (Implementation co-ordination and control) (GEF-PM [Implementation]) would be the following:

- The incumbent would be responsible for the following tasks on behalf of the

GEF, but only with respect to those activities that are funded by the GEF grant:

- Global supervision of all GEF-related scientific and/or specialist activities namely planning (including the revision of plans), research and monitoring. On-site supervision and control would be the responsibility of the VCWS-GM.
- Ensure that all plans (BMP, OPs and social plans) are executed according to the requirements of the plan documents by the line functionaries
- Appoint and supervise all natural and social scientists and planners (TDS's) as per approved plans. On-site supervision and control will be the responsibility of the VCWS-GM.
- Assist the GEF with the evaluation of the GEF project activities as per approved plans.
- Advise the Resident Scientist if and when necessary.
- All other GEF-related scientific activities as indicated in the BMP and OP's
- In the case of activities funded by the company, including those activities and projects funded by sponsors, the GEF Project Manager (Implementation) would only have peripheral inputs to ensure that the particular activities take place in accordance with the BMP and other relevant plans or documents such as the EIA.
- Some of the activities/tasks mentioned above would also be included in the duty sheets of the VCWS-GM and his staff. In these instances the GEF-PM (Implementation) would act as a monitoring supervisor, without any on-site direct line function authority. The VCWS-GM would, however, be obliged firstly to submit any reports that may be required, secondly to execute GEF activities according to the appropriate plans and thirdly to act on valid instructions from the GEF-PM (Implementation).
- The GEF-PM (Implementation) would to a large extent operate independently, but would be supervised within the established GEF control and supervising channels. The incumbent would have a direct line of communication to the following functionaries:
 - The GEF supervisor
 - The company Chairman of the Board
 - The VCWS-GM
 - The GEF Project Manager (Logistics)
- The GEF-PM (Implementation) would, in order to meet the objectives for setting up the unit, be the supervisor for all the contracted TDS's who are involved with activities emanating from the BMP and OP's. Such supervision would, however, be restricted to global support, drawing up of Terms of References (ToR), assistance with and approval of project plans, monitoring of progress, monitoring of professional and/or scientific inputs and outputs, evaluating and editing of written reports, and evaluation of recommendations.
- All scientific and planning activities would be launched only after consultation with the VCWS-GM and with his active support, and after approval of the appropriate project plans and ToR's by the company Chairman of the Board. The VCWS-GM will control all on-site activities by the scientists and planners, within the parameters as defined by their respective ToR's and their

project plans. An unsupervised group of natural and social scientists with total freedom of movement and operating according to their own priorities and agendas, will not be created.

- The GEF-PM (Implementation) will furthermore obtain the advice and/or views of the VCWS-GM on any scientific activity that may impact on the management of VCWS. All plans and scientific/social reports will need to be approved by the company Chairman of the Board (and by the relevant GEF functionary?) before they may be implemented.
- Logistical and administrative support to the implementation unit (GEF-PM (Implementation) and scientists) would be rendered, as and when necessary, by the GEF-PM (Logistics)
- In order to fulfil his functions, the GEF-PM (Implementation) would be totally independent of any of the structures or establishments of the company. The incumbent would not report to anyone in the company's hierarchy; would undertake no work, contracted or otherwise, for the company or any other subsidiary of EAW; would not have any links whatsoever with any commercial activity or venture taking place in VCWS, and would thus not be influenced by any considerations of profitability in the execution of his work. This independence would be fully compatible and in line with the structures and proven operational procedures of conservation agencies worldwide, and could be regarded as a non-negotiable prerequisite for rendering an impartial and effective specialist service. Any specialist service, such as the one envisaged for the GEF-PM (Implementation) that does not operate independently from the line function of the organisation would inevitably be influenced by non-biodiversity related considerations and the service would consequently be doomed to failure.
- The incumbent would have to be a suitably qualified person with wide-ranging experience in the field of biodiversity conservation and all the related activities such as biodiversity-related planning, research, monitoring and evaluation.
- It would be a part-time position

The implementation and control system outlined above would not interfere with or hinder the line functionaries in the execution of their tasks, but would, at very little cost (see the budget below), fill the abovementioned scientific, biodiversity and control gaps that would otherwise be inherent in the execution of the GEF/VCWS project.

1.1.3 Community management policy, structures and procedures

The policies and procedures that will apply to the management of the local communities, have been discussed in various sections elsewhere in the BMP and could be summarised as follows:

(1) Management policy

The policy of co-management will be implemented throughout, whilst realising that it would be, with the exception of the marine resources utilisation plan (MRSP) and agricultural resources strategic plan (SADP) as well as the social plans (Resettlement,

Community Development) outlined above (see Parts D and H) difficult or mostly impossible for the VCWS-GM to actively involve the communities in all decisions and management actions. This problem will to some extent be alleviated by establishing and using a variety of community structures.

(2) *Community structures*

Planned community structures that will be aimed at specific core activities, are the following:

- Marine resources: The SFA and MRSC will not only act as mouthpiece for the VCWS fisher community, but will actually undertake the relevant management actions (see Part D) under the guidance of experienced professionals.
- Terrestrial wildlife resources: Although ownership of the terrestrial wildlife resource will be vested in the local communities, technical problems and a local lack of expertise would make it impossible to delegate the management authority to them (see Part D). The SWA and the TRSC will be established to firstly represent the interests of the communities, secondly to act as the conduit between management and community with regards to the flow of information and consulting about management policies and procedures, and thirdly to be involved with the distribution of benefits.
- Sustainable agriculture: The SAFA and the ARSC (see Part D) will be the primary implementing structures of the sustainable agriculture project, assisted by the relevant VCWS staff and specialists as outlined above.
- Community development: A system of committee structures to deal with the resettlement programme and the community development programme, inclusive of community committees, has been outlined above.

In addition to the abovementioned core activity community structures, an overall or global representative committee will be established:

Community Representative Committee (CRC):

The CRC will be the overarching committee representing all the communities and interest groups of VCWS. The project-specific committees for marine resources, terrestrial wildlife, agriculture and community resettlement and development, will all in effect be sub-committees of the CRC.

The establishment of the CRC has already been approved in mid-2001 (Lambrechts, 2001b), but the committee has for some reason not been formed. The structure, responsibilities and operations of the CRC could be summarised as follows:

- To monitor all project-related aspects that may in any way impact on the daily lives of the local people, whether it is on a communal or individual basis.
- To liaise with any project related organizational structures and/or individual person on behalf of the local people.
- To assist the development company in getting the local communities to realise the need for and advantages to be derived from the VCWS development in general and the various community committees in particular.

- To represent the communities in any negotiations regarding future projects and/or developments that may influence or affect them in any way whatsoever.
- To manage the Community Development Fund (CDF) (see below) according to generally acceptable accounting principles on behalf of the local communities.
- To determine CDF priorities.
- To distribute those CDF monies earmarked for distribution in a fair and equitable manner to all the stakeholders.
- To propose new Community Development Plan (CDP) projects and/or changes to existing CDP projects as and when necessary.
- To supervise the activities and performance of the project-specific community committees.

The CRC would be an elected body comprising of persons who meet with the requirements to be classified as stakeholders in the project (Thompson, 2002; see Part G). All the identified stakeholders would form the electorate, who would elect their representatives and the chairman at a public meeting by a show of hands. The VCWS-GM would appoint or request an individual, possibly someone from the District Administrator's office, to chair the electoral proceedings.

The CRC would comprise of not less than 10 and not more than 15 individuals. The company would not be prescriptive as to the composition of the Committee, but would suggest that the majority of the Committee should not be comprised of current members of the Project Steering Committee and the Chiefs Committee, who are all part-time employees of the company and may thus experience a clash of interests with regards to contentious matters.

The CRC will decide on its own *modus operandi* with regards to meetings, procedures, minutes, priorities, liaison, discipline, a bank account etc. The company will assist the Committee to formulate a basic constitution, and will provide logistical and administrative support as well as training/guidance when necessary.

The CRC may appropriate CDF monies to cover administrative and other expenses.

As a general rule VCWS management will liaise and consult with and report to the communities through the CRC. In some instances dealings will be directly with the various project-specific community committees.

(3) Capacity building and training

A combination of historical factors, as outlined elsewhere in the BMP, caused the vast majority of the potential local workforce to be singularly ill equipped to be gainfully employed. The VCWS project already had, and will continue to do so at an accelerated rate in future, a huge impact on the socio-economic realities of the Quewene peninsula. The population were cast from a poor subsistence economy with no formal employment opportunities, to an all-encompassing development that would forever alter the shape of what used to be. The communities are literally faced with a new way of life almost overnight (Lambrechts 2002b).

Furthermore, as was pointed out above, there is a need to subtly change the historical role of women from silent partners to active participants with regards to the composition of project related community committees and structures (see Parts G and H; also Thompson, 2002).

These handicaps will impact on the following biodiversity management aspects, and will have to be addressed:

- The local people are not accustomed to operate in committee structures, and will have to be subtly guided in order for the various community biodiversity committees to operate smoothly and effectively.
Almost all of the community committees will be faced with economic incentives and financial realities on a scale that most would find it difficult to relate to. They will have to be guided on how to deal with money in general and income and expenses in particular.
In most if not all instances, the biodiversity objectives of VCWS and the GEF project would be somewhat alien to the new “owners” of the resource, the communities themselves. Although there were promising indications from the marine resources study that the fishers rightly identified over-exploitation as a major cause for the decline in the harvest of marine products (see Part B), the concept of sustainability that would form the basis for all kinds of utilisation, would have to be put across.
Some of the community members will be elected to positions on the committees, or appointed to fulfil management tasks on behalf of the communities, where administrative skills and a certain level of literacy would be advantageous or even essential. To prevent outsiders from having to be co-opted to positions of authority on the committees, those incumbents or members-elect who are lacking in the necessary skills, will have to be assisted to overcome their shortcomings. Skills training would be an imperative, even though it will be a long-term project. The VCWS-GM may at his discretion appoint suitable members of his staff to act as unofficial secretaries in order to take minutes of meetings.
Women will have to become more involved in community structures and committees, as was pointed out in Parts G and H. The company will need to play a subtle role in this regard, and will have to operate through the Community Affairs Division and especially the social facilitators.

1.2 PERSONNEL MANAGEMENT

1.2.1 Principles and policies

Personnel management at VCWS will be in line with modern principles and policies applying to protected areas, and will be based on a comprehensive General Staff Code (GSC) that will be drawn up specifically to suit the VCWS situation.

The personnel management procedures that will be applied, will take cognisance of relevant Mozambican labour legislation and related laws and policies.

The authority to implement sound personnel management principles and policies rests with the VCWS-GM, but accountability for such actions remains vested in the company Board of Directors.

1.2.2 Overall personnel management objectives

To develop a sound, effective and acceptable personnel management system for VCWS, the following objectives have been accepted (Bainbridge 1998a):

- To establish and maintain a transparent and equitable personnel management system;
- To ensure the promotion of optimal personal growth for each staff member;
- To foster a sense of belonging and to promote *esprit de corps*;
- To provide appropriate and adequate training opportunities;
- To ensure that personnel performance is focussed towards achievement of the objectives for the sanctuary.

1.2.3 General Staff Code

The VCWS-GM will be responsible for drawing up a comprehensive General Staff Code (GSC). The GSC will deal with all aspects relating to personnel management, including but not limited to employment contracts, salaries, promotions, duty sheets, annual leave, sick and compassionate leave, bonuses, personnel administration, training, discipline and termination of service, as well as a code of conduct.

The VCWS-GM may, at his discretion, base the GSC on existing and effective examples from other conservation agencies. It will contain no requirements or rules that may be in conflict with any Mozambican legislation or labour policies.

The GSC will be updated as and when necessary and will also be available in Portuguese.

The GSC will in effect be an OP.

1.2.4 Sanctuary Standing Orders

The VCWS-GM may opt to include the Sanctuary Standing Orders (SSO) in the GSC, but will refrain from doing so if the GSC becomes a cumbersome document (which is quite likely).

The SSO will cover aspects not dealt with in the GSC, such as the following:

- Keeping of livestock, poultry and domestic animals in the Reserve
- Visitors to staff living in staff quarters
- Access to the sanctuary, especially the Reserve, tourist facilities and estate homes, by staff, their families and guests, and vehicles
- Boat transport to and from Vilanculos

- Utilisation of biodiversity resources, including fishing, diving and collecting of firewood
- Staff flower, vegetable and fruit gardens
- Maintenance, storing, garaging and cleaning of official equipment
- Using official equipment for private purposes
- Official structures (including staff homes), facilities and gardens
- Off-road vehicular access

1.2.5 Preferential employment

A preferential employment policy has been accepted for VCWS in 2001 (Lambrechts 2001b), and could be summarised as follows:

- Preference will be given to local inhabitants of the Quewene peninsula, and specifically to individuals living within the sanctuary
- Mozambicans from further afield will only be considered for appointment in those instances where the required expertise or experience for a specific post is unavailable or lacking amongst the local inhabitants, or if suitable candidates cannot be recruited locally.
- Expatriates will only be appointed to posts if suitable Mozambicans are not available.
- The preferential employment policy will also apply to commercial operations such as the tourist lodges, as well as to the staff to be employed by the members of the HOA.
- In those instances where candidates from further afield, and especially expatriates, were of necessity appointed, local understudies will be identified and trained to eventually take over after the expiry of the incumbent's contracts.
- The same basic principles will apply with regards to specialised tasks undertaken by contracted TDS's. Every effort will be made to find suitable Mozambicans for these tasks; alternatively relevant Mozambican institutions (such as the university) will be encouraged to partake in a joint venture capacity.

The preferential employment policy will be included in the GSC discussed above.

1.2.6 Staff training, capacity building requirements and training programme

The following general principles will apply to staff training requirements and programme:

- An OP dealing with training will be compiled.
- Each member of staff will receive the necessary in-service or specialised external training to equip him/her to cope with the task at hand. Such training will be undertaken according to the training schedule included in the OP.
- In-service training will apply to all members of staff.
- In-service training by external specialists/institutions will be undertaken *in situ* or *ex situ*, depending on the specific requirements, at the discretion of the VCWS-GM.

- More than one competent agency/institution/specialist may be contracted to handle specific training aspects or courses.
- The VCWS-GM, or his Deputy if he so wishes, will monitor and formally evaluate the training programme on a biannual basis.
- The VCWS-GM will appoint a training officer to co-ordinate training. (The training officer will also have other duties)

1.3 INFRASTRUCTURE MANAGEMENT

1.3.1 Rationale

This BMP deals primarily with biodiversity aspects. Brief discussions of peripheral aspects such as infrastructure management will thus only be included in this document for the sake of completeness.

1.3.2 Principles and policies

Infrastructure management includes the planning, construction, maintenance, replacement, control (including stock control) and monitoring (including inspections) of all fixed non-commercial structures, equipment and other movable assets. It will be done in accordance with generally accepted norms, standards and practices, as prescribed in the OP, and according to any EIA's dealing with the topic.

1.3.3 Overall objectives

The overall objectives of the infrastructure management system will be as follows (Bainbridge 1998b):

- To ensure that all infrastructure is used and/or stored and/or maintained in a responsible manner and according to manufacturing prescriptions (if applicable).
- To delegate responsibility for specific infrastructure to individual members of staff
- To prevent mistreatment of infrastructure
- To indicate the need for maintenance and/or replacement of specific infrastructure
- To ensure that the maximum service life of the infrastructure is realised
- To assist with the compilation of infrastructure budgets

1.3.4 Fixed structures, equipment and movable assets

Fixed structures (roads, fencing and buildings), equipment and movable assets (including communication systems, power supply and water supply plant, motorised transport, boats etc) will be inspected on a regular basis by staff members appointed by the VCWS-GM, according to specific OP's.

1.3.5 Operational Plans

OP's will be prepared as indicated above

1.4 WASTE MANAGEMENT

1.4.1 Rationale

Improper or ineffective waste control may impact on the environment. However, waste management has been dealt with fairly comprehensively in the original EIA (Lambrechts 2001c) and is also addressed in a subsequent Environmental Due Diligence report (Wood 2002). Future EIA's will obviously also address the problem. It will therefore only be cursorily addressed in this BMP.

The waste management system described for two protected areas in the Kingdom of Lesotho (Bainbridge 1998 a and b) was adapted for the following discussion.

1.4.2 Principles and policies

The basic principle for waste management is the effective collection, treatment and environmentally friendly disposal thereof.

The following waste management policy will apply:

- Acknowledgement of the fact of waste generation and the need for disposal thereof
- Environmental sensitivity would be built in the planning, design, construction and management of waste disposal facilities
- An effective waste management and monitoring and control system will be drawn up and implemented
- The management system will include waste generated by the tourism industry and estate homes

1.4.3 Objectives

The objectives of waste management for VCWS are the following:

- To prevent or at least minimise environmental impacts or pollution during waste disposal.
- To provide adequate capacity for waste management
- To minimise the possibilities of health risks to humans

1.4.4 Threats

The threats to be considered are:

- Smells/odours emanating from decaying organic matter, compounded by the high humidity and temperatures of VCWS.
- Fauna attracted by the above (flies, maggots, bacteria)
- Scavenging by people, monkeys, rodents and birds.
- Visual impact of poorly planned waste disposal
- Littering in general, especially non-degradable matter

- Smoke/air pollution originating from cooking fires
- Groundwater contamination through effluent soakaways
- Dust generated by increased vehicular traffic
- Increased noise from vehicles, boats and generators
- Vandalism

1.4.5 Management priorities

Priority is to be given to the following waste management aspects:

- Determining the extent of waste generation
- Planning and design of appropriate facilities to meet with modern standards
- Construction of effective waste disposal facilities
- Management/operation of such facilities

1.4.6 Management options and actions

The management options are:

- On-site treatment and/or disposal, where all or part of waste treatment/disposal will take place on site
- Off-site treatment and/or disposal, where some aspects of treatment/disposal will take place off site
- Prevention of pollution, for example oil and petrol pollution from boats and vehicles
- A combination of the above

Management actions include the following:

- Solid waste management will involve the collection, storage, and transport of kitchen refuse, general refuse and packaging material to garbage sites on VCWS or transporting by dhow to the municipal waste disposal facility in Vilanculos (the latter action was specifically requested by government)
- Effluent management typically involve the collection, transport, treatment and disposal of effluent emanating from kitchens, ablution facilities and toilets.

1.4.7 Monitoring of waste management systems and procedures

The most important aspects to be monitored are:

- Groundwater quality, to determine possible pollution by effluent through soakaway pits or other man-made sources
- Quality of water in the fresh water lakes that could possibly be polluted by human actions or activities
- Possible occurrence of sea water pollution (oil leaks from boats, solid waste etc)
- General pollution emanating from any of the abovementioned sources

1.4.8 Operational Plan

A waste management OP will be prepared.

1.5 SECURITY MANAGEMENT AND LAW ENFORCEMENT

1.5.1 Principles and policies

The management and protection of the biodiversity and other natural resources of VCWS, as well as the structures and movable assets entrusted to the VCWS management staff, carry with it a great responsibility and the need to develop and implement an effective security management system.

1.5.2 Objectives

The objectives for security management are as follows:

- To control the natural resources, biodiversity, infrastructure and movable assets of VCWS in a responsible and effective manner on behalf of all the stakeholders (the company and the local communities)
- To establish effective lines of cooperation and communication with the official law enforcement agencies in Vilanculos
- To investigate the possibilities of selected VCWS security personnel, for example the Field Rangers, being granted powers of arrest.
- To clarify the status and authority of the VCWS with regards to the legal status of the sanctuary, which is directly tied to the authority to do law enforcement.

1.5.3 Priorities

The following priorities pertain to security management:

- To draw up and implement security management procedures for the sanctuary.
- To ensure that the marine and terrestrial biodiversity resources are protected against unauthorised and/or unsustainable use or damage, and are utilised in accordance with the relevant plans, policies, actions and systems as embodied in this BMP and the applicable OP's
- To ensure that security measures including law enforcement are executed in such a manner, that the rightful needs and aspirations of the local communities are protected against excessive security procedures.

1.5.4 Threats

The following threats inherent in the application of security measures will be considered and addressed:

- Law enforcement, although it will always have a positive objective, could easily be perceived and experienced by the local people as a negative action.
- Access control to areas in the Reserve that could previously be accessed at will by the local communities, may create ill feelings

- The Field Ranger unit will not have any powers of arrest and would find it very difficult and frustrating to act against transgressors

1.5.5 Management options and actions

The establishment of an effective security system for VCWS would be dependent on implementing the following options and taking the appropriate actions:

- The security system and procedures will be included and motivated in the public consultation and disclosure programme (see the PCDP in Part H).
- Access by local inhabitants of the sanctuary to specified resources and/or areas in the sanctuary in general and the Reserve in particular, will be allowed in accordance with the principles outlined in various sections in this BMP and in appropriate OP's
- Access to the Reserve will take cognisance of the presence of potentially dangerous game and will be regulated and managed according to procedures yet to be determined by the VCWS-GM
- To counteract the fact that the Field Rangers do not have powers of arrest, and may never be granted such powers under current Mozambican legislation, the possibility of establishing a satellite police station of the District Station in Vilanculos on the sanctuary. Such a step will place the onus for a negative action such as law enforcement on the Police, with no possibility of a negative backlash on VCWS. However, it would still be a sensitive matter and may be viewed by the local populace as a vindictive and acting against the company's stated policy of good neighbourliness. Before such a step is contemplated, the attitudes of firstly the various community committees and secondly a cross section of the community will be determined by means of discussions and interviews. If a strong endorsement is received, the setting up of a satellite police station will be further investigated
- Field patrols will be undertaken on a continuous basis by the Field Ranger component. Due to the inaccessibility of most of the Reserve area, arrangements would be made for setting up a roving patrol system. Temporary ranger outposts will initially be provided, possibly to be replaced by more permanent structures and facilities at a later stage.
- Policing of own staff will be handled by the Field Rangers, in collaboration with the police if a satellite police station should be established
- The Field Rangers will be armed in accordance with Mozambican legislation.
- Effective security measures will be implemented with regards to the handling, transport and banking of money.

1.5.6 Operational Plan

A security management OP will be prepared

1.6 HEALTH MANAGEMENT

1.6.1 Principles and policies

In a remote and relatively inaccessible area such as VCWS, with only basic or even rudimentary medical and health care facilities available in Vilanculos, the sanctuary will need to be involved with primary health care for its workers and their dependents, and prepared for medical emergencies that may arise amongst tourists and/or estate owners and staff.

1.6.2 Objectives

The objectives of health management would be to ensure that:

- Proper medical care is available to staff;
- Emergency medical plans and procedures are available for staff and visitors alike and that
- Steps are taken for the control of endemic tropical diseases such as malaria

1.6.3 Priorities, options and actions

Evacuation procedures will have to be put in place for the sanctuary and for the lodges in case of medical emergencies.

The soon-to-be-completed Grade 3 hospital on the western boundary of the sanctuary, will be operated and staffed by the Ministry of Health. However, it can be foreseen that the facility will probably suffer from a lack of resources in most respects: poorly staffed; poorly funded; lack of drugs; lack of equipment; poor access etc. The sanctuary will have to contribute to the operational costs of the facility, and to provide ways and means of getting the sick and infirm to the hospital when needed.

The facility will have no local capacity to deal with real medical emergencies, nor to properly cope with diseases requiring specialised attention. Arrangements will have to be made for visiting specialists in a number of disciplines to do locum work in the sanctuary and at the hospital according to a prearranged schedule if possible.

It is conceivable that the hospital staff may not be adequately trained in all the medical fields that will require their attention. Avenues and procedures to assist with such training, will be explored by the sanctuary.

The operations of the facility would probably be hampered by lack of even basic hospital equipment, and it is highly unlikely that a vehicle would be available to operate a clinic system to the more distant outlying areas that would place the hospital out of reach of the needy. The sanctuary would need to take the lead in bridging these gaps, for example by soliciting donor assistance or funds.

The prevalence of tropical diseases such as especially malaria gives cause for grave concern (Thompson, 2002; see Part G). Most of the malaria control recommendations of the 2001 Bio-Business Plan (Lambrechts 2001b) have not been attended to as yet, but it is imperative that a proper and effective malaria control programme be launched as a matter of urgency. For such a programme to be effective, it will have to be tackled on a regional scale with the involvement of the other tourist operators and the local and regional health authorities.

The prevalence of malaria specifically would negatively impact on the flow of tourists to the area. This situation will be turned around in the event of a successful control programme such as the Lebombo Spatial Development Initiative in southern Mozambique and neighbouring areas of South Africa and Swaziland (Lambrechts 2001b).

A few selected members of VCWS staff will have to be trained in first-aid.

1.6.4 Operational plan

An OP will need to be prepared by a contracted TDS to deal with the above and other aspects relating to primary and secondary health care on VCWS.

CHAPTER L2 FINANCIAL MANAGEMENT AND BUDGET

2.1 GENERAL FINANCIAL MANAGEMENT

The following discussion is based on Bainbridge (1998):

2.1.1 Background

In general, sound financial management is aimed at the following:

- The maintenance of accurate records of the financial implications of all the project related activities undertaken in VCWS.
- Maximising benefits from the funds expended in the process of achieving the management objectives of the VCWS as embodied in the BMP.

In the context of the BMP, financial management is thus to be seen as:

- The accurate recording of the financial implications of past activities;
- Control over the management of funds;
- The implementation of guidelines according to General Accepted Accounting Practices (GAAP) for recording, control and planning;
- Reporting on the financial aspects of project-related operational activities in VCWS;
- Separation of expenditure on commercial and non-commercial or project-related activities;
- Reporting on the assets and liabilities of the VCWS;
- Assisting the CRC to manage the Community Development Fund (CDF);
- Managing the operations budget (see below).

2.1.2 Principles and policies

It is accepted that:

- Financial management would be executed according to GAAP as formulated by the accounting profession; and that
- The financial process would be subject to external auditing.

2.1.3 Overall objectives

The overall financial objectives include the following:

- The most effective deployment of the available capital/cash resources;
- Establishing a clear separation between expenditure on commercial and non-commercial (or project-related) items or activities;
- Assisting the CRC to administer the Community Development Fund (CDF) (see below);
- Continuous striving towards attainment of the VCWS objectives;
- Efficient planning of future activities/projects;
- Accurate reporting on all financial matters, including the status of the budget;
- Effective financial control over the financial aspects and assets of VCWS; and
- Financial accounting according to GAAP.

2.1.4 Management actions

The following actions will be undertaken:

- Establishment of an OP containing guidelines and procedures for the financial management function (a TDS may be contracted at the discretion of the VCWS-GM to prepare the OP);
- Ensuring that all involved employees are acquainted with the guidelines and procedures; and
- Ensuring that the financial management is executed according to these guidelines and procedures.

2.1.5 Monitoring

The whole process of financial management of VCWS will be monitored by the Head: Administrative Support Division, the VCWS-GM and ultimately the GEF Project Manager (Logistics).

2.2 COMMUNITY DEVELOPMENT FUND (CDF)

The CDF will be established as one of the cornerstones of the principle of benefit sharing. The fund will be controlled and administered by the CRC according to the abovementioned financial principles and procedures. See also the community development plan (CDP) in Part H for more detail on the CDF.

2.3 GLOBAL ENVIRONMENT FACILITY OPERATIONAL BUDGET

2.3.1 Budget principles

The following principles apply to the compilation, management and interpretation of the GEF operational budget:

- The budget covers the five-year span of the GEF contract.

- The budgeted amount is considerably more (by some ~~xxxxx~~ 42%) than the expected US \$3 000 000,00 that may be allocated by GEF.
- The startup phase of the budget (year 1) contains items and/or activities that may qualify for GEF funding, but that may of necessity have to be spent prior to the GEF project being approved and the money becoming available. Any money spent prior to the advent of GEF funds will be for the account of VCWS and no *post facto* repayments will be possible. The possible GEF-allocation will in any case have to be matched by an equal or larger sum by the company, according to the GEF principle of co-financing.
- Similarly, no expenses of whatever nature incurred prior to the compilation of this budget have been included.
- Only non-commercial or GEF-related items are included in the budget. VCWS will compile an in-house budget dealing with all commercial or non-GEF items.
- In a number of instances items or activities are included that have a dual GEF-VCWS objective and application. The percentage calculated to be a GEF responsibility is indicated as such in the appropriate column. The difference between the GEF allocation and the total amount needed is deemed to be a VCWS/company responsibility.
- Inflation-related cost increases are not taken into consideration.
- The expected GEF allocation of US \$3 million is not enough to cover all the biodiversity and social needs of the project for the first five years. The budget is nevertheless presented without resorting to severe cuts that may firstly make certain projects impossible to implement, or secondly that may effectively strangle the implementation of the budget due to insufficient funds. The company will either accommodate the shortfall, or other sponsors may become involved by funding certain activities (thus losing money that could be redistributed to other activities), or, if neither of these two options should materialise, the budget may have to be redrafted to bring it in line with the upper limit of the GEF allocation.
- The GEF budget will be managed and controlled by the VCWS-GM according to the financial principles outlined above, with direct inputs by the GEF Project Manager (Logistics) who will also need to approve all changes. The GEF Project Manager (Implementation) will be consulted with regards to any changes that may impact on any project or activity that falls under his/her portfolio.
- Funds may be rolled over from one year to the other, except in Year 5, the final year of the GEF contract.

2.3.2 FIVE YEAR OPERATIONAL GEF BUDGET FOR VCWS

See Appendix 1: Excel Spreadsheet Called "OPERATIONAL BUDGET"

PART M: RESEARCH, MONITORING AND EVALUATION (RM&E)

CHAPTER M1: THE RESEARCH, MONITORING AND EVALUATION PROCESS

1.1 DESIGNING AN EFFECTIVE RM&E PROGRAM

The design and structure of an effective RM&E program for a protected area is directly proportional to the complexity of the biodiversity resources, the baseline data that exists with regards to these resources, social impacts, the availability of and adherence to management and development plans, the expertise and ability of the development agency and the level of management intervention that would be needed to realise the objectives for the area. All these aspects play a major role in the case of VCWS and it is clear that a properly structured RM&E strategy would need to be designed and adhered to.

To design a RM&E strategy encompassing the transitional phase and the envisaged fully-fledged administration system for VCWS involved the following steps:

- Assessment of the current impacts on the biodiversity of the region to provide a rough estimate of the scope and extent of management requirements;
- Assessment of the extent of current knowledge regarding biodiversity and resident communities to facilitate decision making, and to identify gaps in existing data;
- Assessment of social impacts;
- Analyses of the proposed administrative structures to indicate monitoring and evaluation “centres” at all levels of the organisation and to facilitate participation of resident communities;
- The design of a RM&E Strategy to meet the requirements of stakeholders;
- Proposals on an information dissemination plan to keep stakeholders informed on progress.

1.2 CURRENT IMPACTS ON THE BIODIVERSITY

1.2.1 Climate and land formation

These include the effects of global warming and adverse conditions such as hurricanes of which 12 high intensity and 38 low intensity hurricanes have been recorded over the last 50 years (Dutton, 2002). The latter author, as well as Ramsey (1989) and Wright (1996) also postulated on the formation of dunes, the presence of mobile dunes and the landward shifting of the islands.

With a total annual mean precipitation of 901mm and evaporation average of 1083mm, there is an obvious water deficit, which needs to be taken into account when considering agricultural projects and water provision in general (Theunissen, 2002). Severe droughts seem to occur at regular intervals.

1.2.2 Population growth and human pressure

There is clear evidence of immigration to the Vilanculos and Sanctuary area (Odendaal, 2002). It is estimated that the resident population may double in the next 25 years (Thompson, 2002). In addition, the increasing number of tourists will place an additional burden on the resources. The guest water requirement in the VCWS for instance is expected to be 350 litres per person per day and a further 100 litres per person per day for gardens, boat washing, swimming pool top up and indirect staff use is planned for. The total demand (based on 40% occupancy for the lodges and 25% occupancy for the houses at a given time) is thus an estimated 84375 litres per day.

1.2.3 Excessive or unsustainable exploitation of resources

Certain marine resources are already severely threatened whilst freshwater fish and plants may be exploited in the future for commercial purposes (Bruton; Odendaal; Rall, 2002.) There is also a possibility that the fresh water resources that will be utilised by the Mazarette Estate homes, the lodges and for management purposes, may be ephemeral.

1.2.4 Illegal exploitation

The illegal exploitation of resources is a common occurrence (Dutton, 1990; Odendaal, 2002). Despite legislation there is a thriving trade and consumptive utilisation of many threatened species. Commercialisation of natural products through initiatives of the VCWS may also create markets and thus stimulate the illegal exploitation of resources.

1.2.5 Development

The town of Vilanculos has all the attributes to become one of the major growth centres in Mozambique. The associated improvement in living standards and affluence, infrastructure development and the by-products of human society poses a threat to the environment. The VCWS project already provides more than 200 job opportunities, chartered dhows contribute more than US \$ 5 000 to the local economy per month and the anticipated tourist and resident community development will most certainly have a major impact on the environment and living standards of locals.

1.2.6 Destructive land use practises

Slash-and-burn activities have not only left their scars in the sanctuary but threaten large areas of the country. Livestock may feature more prominently when living standards rise. Visitor facilities and other infrastructure that are not designed and constructed in accordance with EIA's also belong in this category

1.2.7 Exotics and invaders

There are several notable examples of exotic and possible invasive plants in the sanctuary as well as domesticated animals such as cats and dogs.

1.2.8 Institutional support

Current legislation and environmental rules and regulations are not extensively enforced and this is aggravated by the fact that for most communities the utilisation of resources is a matter of survival. Secondly, relevant government agencies seem to have limited capacity to co-ordinate and drive regional, and in particular coastal development within the framework of stated national policy. It is imperative that the VCWS pursues the establishment and maintenance of co-ordinating structures under the auspices of government.

1.2.9 Other factors

Considering the unique situation at hand the attitudes, perceptions and participation of resident and surrounding communities in the development of the VCWS is of vital importance. Negative perceptions were indeed identified by Thompson (2002) and have the capacity to cause serious consequences.

CHAPTER M2: RM&E OBJECTIVES, SCOPE AND CONSTRAINTS

2.1 OBJECTIVES

The objective of the RM&E strategy is as follows:

To design the mechanisms whereby the project activities can be informed, and their replicability enhanced by the generation of timely and useful results from management orientated research, monitoring and evaluation.

The strategy includes the following elements:

- Scoping of a management orientated research program;
- development of a monitoring and evaluation strategy; and
- preparation of a dissemination plan.

The monitoring and evaluation strategy will set out the basic features of the planned monitoring and evaluation work, namely:

- Continuous assessment of the state of the sanctuary's terrestrial and marine resources;
- Monitoring of the effectiveness of Sanctuary management;
- Monitoring the process and impacts of micro-enterprise and community development programs; and
- Monitoring the social, economic and environmental impacts of the tourism facilities and activities in the Sanctuary.

2.2 CONSTRAINTS

The following were recognised as constraints in the development of the RM&E Strategy:

- Prior to the appointment of the planning specialists, very little recently published information about the natural resources and resident communities of the Sanctuary was available. Also, current data does not reflect seasonal variations and occurrences of species (key indicators);
- A RM&E strategy could not be designed by merely incorporating it in an existing operational system. In the case of a private sector initiative such as VCWS there are no support systems or government subsidies at hand. This is a concern as the extensive biodiversity management component is entirely dependent on the viability of the revenue-generating facet of the company.

CHAPTER M3: RESEARCH AND MONITORING

3.1 RESEARCH AND MONITORING STRATEGY

3.1.1 Research and monitoring objectives

Monitoring objective:

“To detect and warn of changes which conflict with the objectives of the area, to evaluate the success of management actions, and to generate questions for research”

Research objective:

“To conduct such research as is necessary for the effective management of the area and to achieve the objectives of the area”

3.1.2 Research and monitoring proposals

(1) Biodiversity (marine and terrestrial)

A number of the specialists on the planning team have accentuated over-exploitation and unacceptable land use practices as the main threats to the natural resources of the Sanctuary, and have indicated that this downward spiral of diminishing resources could become uncontrollable if remedial actions are not taken (Dutton; Jacobson; Peel; Odendaal; Rall; Tarboton, 2002). It is therefore important that biodiversity research and monitoring be focused on management interventions such as controlled and/ or prohibited resource utilisation and the resettlement of communities.

The Sanctuary cannot, however, be managed or researched in isolation as the marine component and migratory species represent shared resources. Regional cooperation in biodiversity monitoring and research should be given the same priority rating as the internal interests. Full funding of these joint ventures out of the IFC/GEF grant or internal revenue will certainly not be possible, and alternative sources of funding should be addressed in the planning phases.

Bearing in mind that the annual evaporation exceeds precipitation and the fact that the system of lakes and pans is essentially driven by the groundwater system under the dunes, it is essential that the freshwater systems need to be understood and managed with absolute care (Theunissen; Rall 2002). It is suspected that the individual basins or catchment areas could be linked through the groundwater. Monitoring of pollutants and sewage seepage is thus of critical importance.

A survey of the availability of natural resources in the freshwater, marine and terrestrial environment is regarded as essential to determine current and anticipated resource use. It seems a foregone conclusion that the utilization of marine resources has reached unsustainable levels (Bruton 2002, Dutton 2002 and Odendaal 2002).

As for the botanical component of the VCWS, management in the medium term will need to focus mainly on three major areas: the preparation of a botanical map, a possible prescribed burning programme and the effect of the planned wildlife reintroduction programme.

Although Bruton (2002) provided a comprehensive list of marine species that need to be researched, practical realities (especially time and funds) dictate that only a mere handful of marine research priorities would receive attention. Attention will be focused on major projects including the consumptive exploitation of important ecosystems.

(2) Social and community aspects

The establishment of the Reserve area within the Sanctuary will have a direct effect on more than 1000 families of which approximately 86 are to be resettled. The implementation of the resettlement- and subsequent social development programme is going to be an intricate and challenging operation, and key issues emanating from the operation will have to be extensively monitored and evaluated (Thompson, 2002).

(3) Tourism

French (2002) has accentuated the fact that adaptive management will have to prevail in the development of eco-tourism facilities within the boundaries of the VCWS. She has, however, also indicated certain deficiencies in the approach to provide and maintain eco-tourism infrastructure and opportunities e.g. EIA requirements (also raised by Odendaal, 2002), tourism carrying capacities and limits of acceptable change.

INVENTORY AND BASELINE DATA SURVEYS THAT SHOULD BE UNDERTAKEN

COMPONENT	ACTION	COMMENT
<u>Biodiversity</u>		
Birds	A complete mid-summer survey of bird species to supplement the winter survey data (Tarboton, 2002).	Urgent: TDS (Temporary Duty Specialist) Estimated time: 14 days
	Cross section of representative wetlands to be flagged, water levels measured and monitored at regular intervals to build up a picture of seasonality, diversity and dynamics (Tarboton, 2002).	Field staff. Technique to be developed. (OP) Estimated time: 24 days

	Observe and record species encountered throughout the year	Field staff Standard format required Estimated time: 36 days
Mammals	Annual game counts supplemented by all observations and recording of species encountered throughout year; A complete mid-summer survey of mammal species to supplement winter survey data (Jacobson, 2002)	Field staff Techniques to be determined (OP) Estimated time: 36 days Urgent: TDS Estimated time: 14 days
Plants	Annual plant surveys supplemented by all observations and recording of species encountered throughout the year A complete mid-summer survey of plant species to supplement the winter survey data, and to prepare a vegetation map (Jacobson, 2002)	Field staff Techniques to be determined (OP) Estimated time: 36 days Urgent: TDS Estimated time: 28 days
Herpetofauna	A complete mid-summer survey of herpetofauna species to supplement the winter survey data (Jacobson, 2002)	Urgent: TDS Estimated time: 14 days
Freshwater systems	A complete mid-summer survey of freshwater systems and associated species to supplement the winter survey data (Rall, 2002)	Urgent: TDS Estimated time: 20 days
Sustainable utilisation	An assessment of identified plant species used for building, medicinal and cultural purposes with special emphasis on providing quantitative guidelines on sustainable utilisation (French; Theunissen; Peel; Thompson, 2002) An assessment of the current, and anticipated utilisation of freshwater fish in the freshwater systems of the VCWS with particular emphasis on the allocation of quotas/rights and recognition of the cultural and traditional systems (Rall, 2002)	TDS Estimated time: 30 days Local consultant Estimated time: 30 days
<u>Climate</u>	The establishment and maintenance of meteorological monitoring stations and analysis/dissemination of data for scientific and management purposes.	Priority project (Automated installation to be used)

<u>Community</u>		
Health	The monitoring of the incidence of water borne diseases in the VCWS region	Clinic and hospital records
Water quality	The monitoring of the quality of groundwater and drinking water in settled areas	Field staff Estimated time: 24 days
Legislation/rules	A study of the customary management and use of common resources, wildlife and forestry use rights for consumption and recommended regulations for the management of these.	TDS Estimated time: 20 days
<u>Tourism</u>		
Carrying capacity	A quantitative and qualitative assessment of the carrying capacity and determination of limits of acceptable changes.	TDS Estimated time: 30 days
<u>Agriculture</u>		
Soil analyses	A complete analyses of soils in farmer settlement areas to facilitate resettlement and agriculture extension services (Theunissen, 2002)	TDS Estimated time: 15 days

TDS: Temporary Duty Specialist

OP: Operational Plan

OUTCOME FOCUSED RESEARCH AND MONITORING

COMPONENT	ACTION	COMMENTS
<u>Biodiversity</u>		
Birds	Maintain checklists on the avian diversity in the <u>woodlands</u> to ascertain if remedial actions i.e. stopping slash-and-burn and diminished human presence, has had an effect (Tarboton, 2002)	Field staff Long term, continuous observation and recording. Estimated time: 24 days
Mammals	Evaluate the introduction of large mammal species to the Sanctuary with special reference to impacts on plant communities and the viability of the respective translocated groups. Interventions and monitoring to be based on Thresholds of Probable Concern (Peel, 2002).	Field staff and TDS; Estimated time: 30 days Time scale at least 3 years;

Plants	<p>Monitor the rehabilitation process in selected slash and burn degraded areas (Peel, 2002).</p> <p>Monitor the effects of management induced fires and firebreaks (Peel, 2002)</p>	<p>Field staff Technique to be decided on (OP) Estimated time both: 36 days Field staff Technique to be decided on (OP)</p>
<u>Communities</u>		
Social development	An evaluation of the resettlement and social development programme in the VCWS with special reference to socio economic and cultural impacts.	TDS: priority project Estimated time: 60 days
<u>Tourism</u>		
“Carbon print”	Design of a “Carbon footprint” and collecting and monitoring of data;	Field staff Estimated time: 24 days
Visitor perceptions	Monitoring and evaluation of tourist and site owner’s perceptions on tourism opportunities and activities.	Field staff Estimated time 48 days TDS questionnaires: Estimated time: 10 days
<u>Pollution</u>		
Water quality	An assessment of the water quality and sources of contamination in the Bay of Vilanculos and settlement areas in the VCWS, and the provision of guidelines on practical and affordable parameters to be monitored to evaluate change	TDS Estimated time: 30 days

TDS: Temporary Duty Specialist

OP: Operational Plan

APPLIED RESEARCH AND MONITORING

COMPONENT	ACTION	COMMENTS
<u>Biodiversity</u>		
Birds	Quantitative survey of 19 threatened bird species. Would include determination of population sizes, preferred areas and seasonal status (Tarboton, 2002	To be considered as an NGO project: Overheads: 30 days
Wetlands	The ecology of the tidal mudflats of the San Sebastiao Peninsula with specific reference to the sustainable utilisation of key species e.g. oysters, blue crab and sea cucumbers. (Bruton;	University/institutional Priority project Estimated time: 30 days

	Dutton; Odendaal, 2002); The classification and ecological significance of the freshwater wetland system in the VCWS, procurement and collating and of prescribed data	TDS Priority project Estimated time:15 days
Estuary	The ecology of the Inhamambane Estuary Bruton; Dutton 2002; Lambrechts, 2001.	University/institutional Priority project Estimated time: 60 days
Turtles	The incidence and management implications of turtle nesting sites on the beaches of San Sebastiao Peninsula- Bazaruto Archipelago complex	Priority project To be initiated and funded by mutual agreement of relevant stakeholders and authorities Contribution: 20 days
Mammals	Ecology and status of <i>Dugong dugon</i> in the coastal waters of the San Sebastiao Peninsula- Bazaruto Archipelago complex. (Dutton, 2002; Lambrechts 2001)	Priority project To be initiated and funded by mutual agreement of relevant stakeholders and authorities Contribution: 20 days
Marine resources	The status of the marine resources of the San Sebastiao Peninsula- Bazaruto Archipelago complex with specific reference to the sustainable utilisation of these resources (Dutton: Odendaal, 2002)	Priority project To be initiated and funded by mutual agreement of relevant stakeholders and authorities. Contribution: 40 days

3.1.3 Resources required

(1) Personnel

The RM&E strategy will be implemented and coordinated by the GEF Project Manager (Implementation). Field execution will be the responsibility of the VCWS-GM. The development phase of the sanctuary is going to be characterised by an enormous amount of research, monitoring and planning as is evidenced from the tables above. Posts for a resident scientist and assistant were therefore provided in the proposed staff establishment.

(2) Infrastructure

The necessary accommodation, transport and basic working facilities will be provided for visiting TDS's/consultants and evaluators in the Sanctuary. Msasa and Chiefs camps will be renovated to provide sleeping quarters, communication- and basic working facilities for visiting researchers and other specialists.

(3) Funding

For funding purposes the projects listed in the tables above have been categorised as follows:

- Surveys by specialists to provide baseline-, outcome based and applied biodiversity and socio economic data.
- Specified monitoring projects to be done by Sanctuary staff
- Cross border (regional) research and monitoring (costs to be shared)
- Research to be undertaken by academic institutions (including post-graduate projects)
- Amateur and/or retired specialists

The RM&E budget is included in the overall VCWS budget (refer to Part L of the BMP)

3.2 DEVELOPMENT OF A RESEARCH AND MONITORING STRATEGY

3.2.1 Identifying a framework

The World Commission on Protected Areas of the IUCN has recently published a report titled "Evaluating Effectiveness. A Framework for Assessing the Management of Protected Areas" (Hocking *et al* 2000). This contemporary document provides excellent guidelines on the design of monitoring and evaluation strategies. Throughout the investigation the following summarised version of the basic 6-point framework was adhered to:

"... monitoring and evaluation of protected areas management require that a series of questions be asked relating to:

Design issues- i.e. context (where are we now?) and planning (where do we want to be and how do we get there?)

Appropriateness of management inputs (what do we need?) and processes (how do we go about it?)

Delivery of protected area objectives: Outputs (what did we do and what products were produced?) and outcomes (what did we achieve?)

3.2.2 Terminology and standards

Definition of terms (after Hocking et al 2000)

Evaluation (assessment)

“ the judgement or assessment of achievement against some predetermined criteria, usually a set of standards or objectives;

Criterion

“A major category of conditions or processes- quantitative or qualitative- which together helps defines the six elements of the framework. It is characterised by a set of related indicators”

Indicator

“A measure-quantitative or qualitative- that provides useful information about a criterion”

Monitoring

“the process of repeated observation, for specified purposes, of one or more elements of the environment (or process of management), according to pre-arranged schedules in space and time and using comparable data collection methods” (Meijers, 1986).

Biological diversity

In terms of the Convention on Biological Diversity (1992) biological diversity is:

“ the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”

3.2.3 Proposed management system and structure

(1) Development of a new structure

Monitoring and evaluation focus on the processes and impact of management to effect positive change, therefore the functions, activities and deliverables of the key components had to be defined and presented in an orderly manner and an acceptable management structure and associated functions had to be designed. This aspect is dealt with in Part L.

(2) Policy formulation

The mission and objectives as set out above is a refinement of the existing mission and objectives as embodied in the Bio-Business Plan (Lambrechts, 2001a) and should be regarded as the all encompassing policy directive of the Company. This is the premise on which the agreement with Government is based and emphasises the intention to develop the Sanctuary in accordance with internationally recognised conservation principles. It is what the Board of the Company (or CEO) is accountable for.

(3) Organisation

The line function/executive management structure for the Sanctuary caters for four distinct executive components namely Resource Management, Community Services, Business Enterprises and Tourism. These components all impact on the RM&E strategy.

(4) Staffing

The company staff or GEF specialists that will be responsible for or involved with the RM&E strategy are indicated in the abovementioned section of the BMP. The Resident Scientist and specialist support staff as well as contracted TDS's will play a major role in this regard.

(5) Funding

The allocation and handling of GEF funding, that will form the basis for the implementation of the RM&E strategy, will be subject to contractual agreements between the Company and the agency.

(6) Planning

Planning is an essential element of the management process and thus also of RM&E.

3.3 THE RESEARCH, MONITORING AND EVALUATION STRATEGY

3.3.1 Key indicators

Due to the limited capacity of the organisation to monitor the various activities and maintain the data bases for internal and external evaluations, the number of key indicators was correspondingly limited.

3.3.2 Management effectiveness

(1) Project launch workshop

The management system of the VCWS has to be transformed from a planning and basic infrastructure providing component to a fully operational organisation that must effectively implement the BMP and deal with all the other activities. Most of the stakeholders, and in particular the resident communities, have not been fully informed on the scope and content of the BMP. It is therefore suggested that once all the planning documents have been submitted and approved, a project launch workshop be arranged.

(2) Internal Monitoring and Evaluation

To maintain the management system a continuous internal process of monitoring and assessing the various administrative *processes* would be needed. Monitoring will focus on adherence to, and the practicality and effective pursuance of prescriptions taken up in guidelines such as procedure manuals, codes of conduct, financial rules and regulations, personnel code etc.

3.3.3 Biodiversity resource management/interventions

(1) Rationale

The objectives of biodiversity management have been clearly defined above. The basic approach in pursuing these objectives is best summed up by Bruton (2002):

- The coastal and marine systems of VCWS have been exploited for centuries and are no longer pristine. The management goal should therefore be to determine the levels of exploitation that can be sustained over time, taking into account the combined needs of local and visiting communities”.
- It would be impractical and undesirable to attempt to manage the VCWS in isolation. Especially the marine resources plans need to be part of a larger plan for the whole biome.

A variety of management interventions will have a positive impact on the biodiversity and status of the sanctuary and surrounding areas. These include the resettlement of resident communities to alleviate the pressure on biodiversity in the protected areas, introduction of species previously known to inhabit the area, habitat manipulation (for example burning programmes), the curbing or prohibiting of unsustainable resource exploitation and educational programmes. On the other hand the influx of visitors and the associated provision of outdoor recreational facilities and infrastructure may have a detrimental effect if not managed in a responsible and accountable manner. The selected indicators will provide a yardstick for measuring the effectiveness of these interventions and management actions.

(2) Indicators

Marine: The marine resources within and outside the borders of the VCWS have been subject to over exploitation. Sand oysters and crabs would be ideal indicator species to determine the success of the marine resources plan. For longer-term evaluations the status of water grass and the dugong could be used.

Terrestrial: For the first five-year cycle it is anticipated that an improvement in habitat due to restricted human pressure would be reflected by those species that bore the brunt of human presence and poor agricultural practices. Francolin, guinea fowl, eagles and accipiters, springhares, grey duiker and steenbok should be monitored as indicators of change. Long-term indicators would include the stabilisation of the miombo woodland and it’s associated bird life (Tarboton, 2002) and selected re-introduced species

Freshwater: Rall (2002) has presented a unique and most practical “Habitat Integrity Assessment” monitoring system for the freshwater systems of the VCWS. His analyses indicate an exceptional water quality and high conservation value and with the exception of contamination of groundwater, the most imminent threat namely human pressure is now alleviated with the resettlement initiative. It is therefore suggested that the range of invertebrates (as well as fresh water sponges and *Oreochromis mossambicus*) at the various sites and physical parameters be sampled on an annual basis to indicate changes in the current status.

3.3.4 Community development and regional/international recognition

(1) Community development and resettlement indicators (after Thompson, 2002)

Development and resettlement issues

The establishment of the Reserve area and the resettlement of a number of families will have a major effect on these communities. This is best described by Thompson (2000):

Livelihoods of Quewene communities are inextricably dependent on the availability of natural resources. The Sanctuary project will alienate a portion of the land from them, will relocate some families who will have to re-establish their livelihoods again, and will control their use of all natural resources in the project area. In the long term it is predicted that these resources will become scarcer and their availability subject to greater competition.

Impacts

Impacts that will need to be considered and integrated in the M&E programme include the following:

- Pressure on public services
- Health-related impacts
- Gender-related impacts
- Impacts on community relations
- Impacts on the quality of life

Resettlement as an indicator

Resettlement is at present a highly contentious issue and distrust, problems relating to compensation, allocation and quality of land, access to resources and cultural issues are all impeding the social development initiative. Successful resettlement has been included as an indicator and part of the M&E programme, mainly because it entails detailed planning and establishment of functional structures, training of facilitators and monitoring responsibilities of the various participants.

KEY SOCIAL INDICATORS THAT WOULD BE MONITORED FOR CHANGE

Baseline Status Socio-Economic Indicators	Quantity
<i>Social infrastructure</i>	
Chibo School	320 children
Machuquele School	400 children
Improved water supply	1 ring lined shallow well.
Machuquele Health Centre (Type 3)	In construction
<i>Livelihoods data</i>	
Practice agriculture	93%
Depend solely on agriculture	48%
Depend solely on fishing	4%
Mixture of fishing and agriculture	45%
Depend on private employment or remittances	2%
At least one family member earning a salary	36%
Identified Inhamambane Estuary as preferred fishing site	18%
Identified Vilanculos Bay as preferred fishing site	0%
Families with boats used in Inhamambane Estuary	57%
Families with boats used in Lake Manhale	14%
Boat owners who practice agriculture and fishing	64%
Agricultural produce for subsistence	88%
Family owns 5 or less small animals/poultry	50%
Families participating in the production and sale of cane spirit	50%
Average income from cane spirit	~\$100 US
Families participating in the sale of bananas	5%
Average income from bananas per month	~\$64 US
Families participating in the sale of mangoes	7%
Average income from mangoes per month	~\$7 US
Average distance travelled to perform marine fishing	3 kms
Average radius from house within which a family obtains all resources on a daily basis	< 3.5 kms
Average period of time marine fishers spend away from home at their first priority fishing grounds	5 days
Families catching second commercial quality marine fish	25%
Families catching freshwater fish <i>xibaha</i>	22%
Families with marine fishing as primary occupation	27%
Families carrying out marine and freshwater fishing	6%
Families carrying out freshwater fishing only	16%
Fishing catch dried or smoked for sale	~75%
Families trading in cane spirit (average 1.9 times a week)	50%
Families occupied in trading in fish 2-3 times a week.	22%
Families occupied in trading in agricultural products 2 -3 times a week.	12%
Average age of small business stall owners	35 years
Local employees working for the Sanctuary project (August 2001)	163
Total employed by Sanctuary project including foreigners	200

(2) Status of biodiversity resources and international recognition

Advances towards and formal recognition of the following would serve as indicators:

Inclusion in the UN List of Protected Areas.

Formal recognition as a nationally established protected area is necessary for inscription on the UN List and would assist in any future consideration of the VCWS as part of a World Heritage Area.

Ramsar Designation.

There is no doubt that the wetlands of the VCWS would satisfy the criteria to become a major and valuable Ramsar Site. The Government of Mozambique is in the process of becoming a Contracting Party to the Convention, so the legal instrument for designation of new Ramsar sites will be in place shortly (Wilson, A and E Wilson, 2002).

World Heritage Status

Designation of the Bazaruto Archipelago – Quewene Peninsula would be an excellent indicator of local and regional progress with the conservation of biodiversity resources.

UNESCO/MAB Biosphere Reserve

UNESCO's Programme on Man and the Biosphere (MAB) is a science-based initiative which 'develops the basis, within the natural and social sciences, for the sustainable use and conservation of biodiversity, and for the improvement of the relationships between people and their environment globally.

3.3.5 Tourism

The design, development and monitoring/evaluation of the tourism opportunities for the VCWS will include a process of compiling an inventory of the natural assets and appropriate use, mapping and zoning of these areas, determining visitor carrying capacity and management controls and establishing M&E procedures.

(1) Community participation

Community involvement in monitoring and evaluating the development and implementation phases of tourism infrastructure and activities is absolutely vital.

(2) Impact assessment

It is anticipated that the unique entrepreneurial opportunities resulting from the multitude of tourism activities and provision of associated services and infrastructure on VCWS will be beneficial to all role players and will be monitored. What are not

explicitly mentioned or clear are the effects visitors might have on local cultures. Examples of negative visitor behaviour are described in several tourism-orientated codes of conduct quoted by French (2002). According to Wilson (2002) 'negative impact' indicators might include: the number of conflicts arising in local communities as a result of perceived inequities in benefit sharing; the number of complaints filed by local communities about visitor behaviour; increases in local food costs (e.g. as a result of preferential marketing to tourists); social disruption caused by changes in lifestyles and changes in expectations etc. A number of 'positive impact' indicators should also be included, such as reduced levels of illegal activity as a result of increased economic security, etc. It is imperative that not only visitor perceptions and attitudes be monitored and evaluated but that the views and experiences local communities are included to assess the above.

(3) Indicators

The following tables include a list of indicators suggested by French (2002), but it is obvious that when the tourism operational plan are implemented these would have to be added to. Carbon footprinting of the tourism component is an effective and uncomplicated tool, and it is suggested that it be implemented. The basic data required for carbon footprinting would be the following:

Variable	Unit
Energy consumption	KWh / month
Car usage	Km /month
Car fuel efficiency	Km/ litre
Airplane flights	Miles/ year
Paper consumption	Reams of X kg / year
Publications	Kg paper/ year
Paper disposal	% recycled and % not recycled

INDICATORS TAKEN FROM FRENCH (2002)

INDICATORS	SUGGESTED MEASURES
BIODIVERSITY AND CONSERVATION	
Site protection	IUCN site protection category - Important as VCWS is of global significance and as such will attract visitors
Endangered / Vulnerable / Threatened Species	A number count of key indicator species in each of the three levels is important, since species such as the Dugong are a prime attraction to this site, and money from bed levies helps pay for conservation.
Biodiversity benefits	Indicators appropriate to the specific project as identified at the synthesis stage
ECONOMICALLY SUSTAINABLE USE	
Sustainable use of natural resources	% energy using non renewable resources & carbon footprint
Stress	Numbers of tourists visiting the site per annum/peak month Ratio of tourist numbers to locals in peak periods and per annum
Waste management	Water - fecal coli form count heavy metal count Other - measurement of visual pollution e.g. Litter count

Waste minimization	% of waste recycled/reused
Fresh water use	Volume of water used by tourists/ volume used by local population on a per capita basis
<i>SOCIAL BENEFIT SHARING AND RESPONSIBILITY</i>	
Benefit sharing	% of income from project retained in local community
Procurement from local sources	The value of food sourced locally as a ratio to the total value
Local participation	% of local employed at each level of the organization
Consultation	% of local people on stakeholder committees
Local satisfaction	Questionnaire based
Health and Safety	Number of incidents reported
Awareness Raising/Environmental Education	Questionnaire based
Basic Skills opportunities reading & writing	% of employees studying
Gender balance	% of female employees
Visitor / consumer satisfaction	Questionnaire based

3.4 IMPLEMENTING THE MONITORING AND EVALUATION STRATEGY

3.4.1 Responsibility for implementing the plan

To be effective, M&E must become an integral part of the management process at all levels. Sanctuary field and administrative staff will ultimately be involved in collecting data for both process- and impact indicators (the latter mostly confined to the resident scientist and assistant). The principle of budgeting by objectives forms the basis for ongoing control and evaluation. A budget is nothing but an operational plan and with technology available could be broken down to measure and compare the effectiveness of individuals and groups. This, together with agenda items and reports at regular staff meetings and follow up and guidance by top management will form the basis for adaptive management.

Collecting field data to elucidate the impact indicators will be undertaken by local (normal) and contracted (in specialised cases) expertise. Collating the data for external evaluation, and for that matter internal adaptive management, should be the responsibility of the Resident Scientist answerable to the Sanctuary Manager. The GEF Project Manager (Implementation) will coordinate the RM&E strategy and will thus by implication also be involved in an M&E role.

3.4.2 Preliminary timetable for evaluation (based on Wilson & Wilson 2002)

YEAR	PLANNED RM & E ACTIVITY
1(mid)	All planning, research, community development and M & E deliverables completed and endorsed by stakeholders at project launch workshop. All baseline data available for monitoring project progress against objectives.
2 (end)	1 st full external evaluation of project against original project objectives and indicators with opportunity to adapt objectives and indicators for the balance of the project based on lessons learned in years 1 and 2.

3 (mid)	Mid-term report on initial 30 months of project implementation and revised plan approved by key stakeholders for second half of project.
4 (end)	2 nd full external evaluation of project to review progress against revised objectives and indicators. Results of external review used to develop a plan for the future biological, social and economic sustainability of the VCWS.
5 (mid)	Convene an investor/donor conference to discuss draft final report, publicize project achievements and to develop support for long-term sustainability of the VCWS. Revise final report based on conference input and submit to GEF/IFC and GoM.

3.4.3 External validation

External validation will be undertaken according to standard IFC/GEF procedures and policies, and is scheduled to take place in years 2 and 5.

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