

BIODIVERSITY MANAGEMENT PLAN

FOR

VILANCULOS COASTAL WILDLIFE SANCTUARY

(SOFALA PROVINCE, REPUBLIC OF MOZAMBIQUE)

VOLUME 1

CONDENSED PLAN

March 2003

**VILANCULOS COASTAL WILDLIFE SANCTUARY PLANNING TEAM
29 HOMESTEAD ROAD, RIVONIA, 2128, SOUTH AFRICA**

Prepared by AvW LAMBRECHTS

For:

VILANCULOS COASTAL WILDLIFE SANCTUARY (PTY) LTD

and

**GLOBAL ENVIRONMENT FACILITY
(PDF B contract)**

BIODIVERSITY MANAGEMENT PLAN

VOLUME 1: CONDENSED PLAN (THIS DOCUMENT)

Available as hard copy and on CD (attached)

- PART A: POLICY AND LEGAL CONTEXT**
- PART B: GENERAL DESCRIPTION**
- PART C: VISION AND OBJECTIVES**
- 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 INCENTIVES**
- PART K: ECONOMIC ISSUES AND ANALYSES**
- PART L: ADMINISTRATION**
- PART M: RESEARCH, MONITORING AND EVALUATION**

VOLUME 2: THE BIODIVERSITY MANAGEMENT PLAN

Available on CD (attached)

VOLUME 3: ANNOTATED SPECIES LISTS

Available on CD (attached)

VOLUME 4: SPECIALIST REPORTS

Available on CD (attached)

VILANCULOS COASTAL WILDLIFE SANCTUARY

BIODIVERSITY MANAGEMENT PLAN

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)

VOLUME 1: CONDENSED PLAN

ABBREVIATED CONTENTS

EXECUTIVE SUMMARY

GLOSSARY OF TECHNICAL TERMS AND ACRONYMS

ACKNOWLEDGEMENTS

INTRODUCTION

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

PART A: LEGAL STATUS AND POLICIES

CHAPTER A1: LEGAL STATUS

- 1.1 Official proclamation
- 1.2 National legislation and policies
- 1.3 Community-based natural resources management

CHAPTER A2: INTERNAL POLICIES

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

CHAPTER B1: PHYSICAL ENVIRONMENT AND FRESH WATER
AQUATIC SYSTEMS

- 1.1 Climate
- 1.2 Geology, geomorphology and physical processes
- 1.3 Soils, substrates and coral reefs
- 1.4 Fresh water aquatic systems, biota and hydrology

CHAPTER B2: BIOLOGICAL ENVIRONMENT

- 2.1 Vegetation
- 2.2 Avifauna
- 2.3 Herpetofauna
- 2.4 Mammals
- 2.5 Invertebrates
- 2.6 Range condition, carrying capacity and wildlife reintroduction

programme

- 2.7 Description of marine biota
- 2.8 Current utilisation status of marine biota

CHAPTER B3: THE AGRICULTURAL ENVIRONMENT

- 3.1 Involvement of communities
- 3.2 Implementation principles and focus
- 3.3 Natural agricultural resources
- 3.4 Current agricultural production practises and impacts
- 3.5 Agricultural and rural development opportunities and constraints
- 3.6 Organic farming
- 3.7 Key issues influencing future agricultural development

PART C: AIMS, CLASSIFICATION, VISION AND OBJECTIVES AND THREATS

CHAPTER C1: PURPOSE AND ECOLOGICAL SIGNIFICANCE OF THE AREA

CHAPTER C2: MISSION

CHAPTER C3: OBJECTIVES

- 4.1 PDF B project objectives
- 4.2 New objectives
- 4.3 Diversity of objectives

CHAPTER C5: MANAGEMENT AND CO-MANAGEMENT PHILOSOPHIES

CHAPTER C6: PRINCIPAL THREATS

PART D: CONSERVATION, MANAGEMENT AND UTILIZATION OF BIODIVERSITY RESOURCES

CHAPTER D1: THE BIODIVERSITY OF THE VCWS IN PERSPECTIVE

CHAPTER D2: SOIL AND SUBSTRATE CONSERVATION AND MANAGEMENT

- 2.1 Principles and policies
- 2.2 Management objectives
- 2.3 Threats
- 2.4 Management priorities
- 2.5 Management options and actions
- 2.6 Monitoring
- 2.7 Operational Plans

CHAPTER D3: CONSERVATION AND MANAGEMENT OF MARINE RESOURCES

- 3.1 Principles, policies and opportunities
- 3.2 Management objectives
- 3.3 Problems and threats
- 3.4 Management priorities, options and actions

CHAPTER D4: UTILIZATION AND UTILIZATION MANAGEMENT OF MARINE RESOURCES AND SYSTEMS

- 4.1 Principles for the sustainable use of marine resources
- 4.2 Management objectives, priorities and actions for a
Marine Resources Strategic Utilisation Plan

CHAPTER D5: CONSERVATION, MANAGEMENT AND UTILISATION OF FRESH WATER AQUATIC RESOURCES AND SYSTEMS

- 5.1 Principles and policies
- 5.2 Management objectives
- 5.3 Conservation and management priorities
- 5.4 Management options and actions

CHAPTER D6: CONSERVATION, MANAGEMENT AND UTILIZATION OF FLORA

- 6.1 Principles and policies
- 6.2 Management objectives
- 6.3 Threats
- 6.4 Management priorities and actions

CHAPTER D7: CONSERVATION, UTILIZATION AND MANAGEMENT OF AVIFAUNA

- 7.1 Principles and policies
- 7.2 Management objectives
- 7.3 Threats
- 7.4 Management priorities, options and actions
and monitoring

CHAPTER D8: UTILIZATION OF TERRESTRIAL WILDLIFE

- 8.1 Policies and principles for the sustainable use of
terrestrial wildlife
- 8.2 Management objectives, priorities and actions
for the Terrestrial Wildlife Strategic Utilization plan

CHAPTER D9: CONSERVATION AND MANAGEMENT OF

TERRESTRIAL FAUNA

- 9.1 Principles and policies
- 9.2 Management objectives
- 9.3 Problems and threats
- 9.4 Management priorities, options and actions

CHAPTER D10: CONSERVATION AND MANAGEMENT OF AMPHIBIANS, HERPETOFAUNA AND INVERTEBRATES

- 10.1 Principles and policies
- 10.2 Management objectives
- 10.3 Management priorities, options and actions

CHAPTER D11: REGIONAL CONSERVATION STRATEGY

- 11.1 Principles and policies
- 11.2 Management objectives
- 11.3 Threats
- 11.4 Management priorities
- 11.5 Planning and management actions

CHAPTER D12: THE STRATEGIC AGRICULTURAL DEVELOPMENT PLAN

- 12.1 Principles and policies
- 12.2 Management objectives, priorities and actions for the Strategic Agricultural Development Plan

PART E: EXPANSION AND RESTORATION

CHAPTER E1: EXPANSION ACTION PLAN

- 1.1 Introduction
- 1.2 Rationale
- 1.3 Management actions

CHAPTER E2: ECOSYSTEM RESTORATION PLAN

- 2.1 Introduction
- 2.2 Linkages
- 2.3 Purpose and objectives of the Ecosystem Restoration Plan
- 2.4 Principles and Policies for the ERP
- 2.5 Management objectives, priorities and actions for the ERP

PART F: ZONING PLAN AND INTEGRATED COASTAL AREA MANAGEMENT

CHAPTER F1: ZONING

- 1.1 The zoning process

- 1.2 Zone classes
- 1.3 Zoning of VCWS
- 1.4 Development plans
- 1.5 Development risk management
- 1.6 Zoning Operational Plan

CHAPTER F2: INTEGRATED COASTAL AREA MANAGEMENT

- 2.1 Background
- 2.2 Integrated coastal area management for VCWS

PART G: SOCIAL IMPACT ASSESSMENT

Executive summary

CHAPTER G1: LINKAGES BETWEEN BIODIVERSITY AND SOCIAL IMPACTS

CHAPTER G2: SOCIAL IMPACT ASSESSMENT

- 2.1 Purpose
- 2.2 The social impact assessment process
- 2.3 Survey limitations

CHAPTER G3: SOCIAL IMPACT ASSESSMENT BACKGROUND AND DESCRIPTION

- 3.1 Social indicators
- 3.2 Inhambane's provincial development strategy
- 3.3 Social obligations
- 3.4 Fencing and game introduction schedule
- 3.5 Resettlement
- 3.6 Community development
- 3.7 Key strategies guiding future development

CHAPTER G4: THE EXISTING SOCIAL AND ECONOMIC SITUATION

- 4.1 Historical background
- 4.2 Institutional structures
- 4.3 Cultural heritage
- 4.4 Community resources
- 4.5 Population characteristics
- 4.6 Economic activities: livelihood sources

CHAPTER G5: SOCIO-ECONOMIC IMPACTS

- 5.1 Background
- 5.2 Summary of key issues

- 5.3 Socio-economic impact
- 5.4 Other economic impacts
- 5.5 Cumulative social impact

CHAPTER G6: MITIGATION AND MANAGEMENT MEASURES

- 6.1 Introduction
- 6.2 Mitigation and management measures: a communication approach
- 6.3 Execution of management and mitigation measures

CHAPTER G7: MONITORING AND COMPLIMENTARY STUDIES

- 7.1 Land use and natural resource-use monitoring
- 7.2 Resettlement monitoring
- 7.3 Health monitoring

PART H: COMMUNITY AFFAIRS: SOCIAL ACTION PLANS

CHAPTER H1: RESETTLEMENT ACTION PLAN

Executive summary

- 1.1 Principles and policies for the Resettlement Action Plan
- 1.2 Management objectives, priorities and actions for the RAP

CHAPTER H2: COMMUNITY DEVELOPMENT PLAN

Executive summary

- 2.1 Principles and policies for the Community Development Plan
- 2.2 Management objectives, priorities and actions for the CDP
- 2.3 Execution and operational planning

CHAPTER H3: PUBLIC CONSULTATION AND DISCLOSURE PLAN

Executive summary

- 3.1 Principles and policies for the PCDP
- 3.2 Management objectives, priorities and actions for the PCDP

3.3 Record of community consultation/contact

PART I: TOURISM DEVELOPMENT

CHAPTER I1: INTRODUCTION AND BACKGROUND

1.1 Introduction

1.2 Background

CHAPTER I2: SUSTAINABLE TOURISM DEVELOPMENT PROGRAMME

MODULE 1: A STRATEGIC TOURISM DEVELOPMENT PLAN

1.1 Principles and policies: the tourism-biodiversity linkage

1.2 Management objectives, priorities and actions for the Strategic Tourism Development Plan

MODULE 2: INSTITUTIONAL DEVELOPMENT IN THE TOURISM SECTOR IN THE VILANCULOS AREA

2.1 Background

2.2 Review of the local and national tourism sectors

2.3 Recommendations

MODULE 3: CODES OF PRACTICE

3.1 Principles and policies

3.2 Codes of conduct

MODULE 4: INTERPRETATION PROGRAMME

4.1 Interpretation centre

4.2 Field guide

4.3 Informational boards

PART J: CONSERVATION INITIATED OPPORTUNITIES

Executive summary

CHAPTER J1: INTRODUCTION

CHAPTER J2: OBLIGATED COMPENSATION FOR THE COMMUNITY

CHAPTER J3: CONSERVATION-INITIATED

OPPORTUNITIES

- 3.1 General
- 3.2 Lifestyle opportunities
- 3.3 Opportunities originating from tourism activities
- 3.4 Opportunities that derive from the development of a wildlife sanctuary

PART K: ECONOMIC ISSUES AND ANALYSIS

CHAPTER K1 ECONOMIC ISSUES AND ANALYSIS

- 1.1 Introduction
- 1.2 Economic background
- 1.3 Conservation incentives
- 1.4 Economic viability of the project

PART L: ADMINISTRATION

CHAPTER L1: MANAGEMENT PROGRAMME AND STRUCTURES

- 1.1 Management approach and structures
- 1.2 Personnel management
- 1.3 Infrastructure management
- 1.4 Waste management
- 1.5 Security management and law enforcement
- 1.6 Health management

CHAPTER L2 FINANCIAL MANAGEMENT AND BUDGET

- 2.1 General financial management
- 2.2 Global Environment Facility operational Budget

PART M: RESEARCH, MONITORING AND EVALUATION

CHAPTER M1: THE RESEARCH, MONITORING AND EVALUATION PROCESS

- 1.1 Designing an effective Research, Monitoring and Evaluation Programme
- 1.2 Current impacts on the biodiversity

CHAPTER M2: RESEARCH, MONITORING AND EVALUATION OBJECTIVES, SCOPE AND CONSTRAINTS

- 2.1 Objectives
- 2.2 Constraints

CHAPTER M3: RESEARCH AND MONITORING

- 3.1 Research and Monitoring Strategy
- 3.2 Development of a Research and Monitoring Strategy
- 3.3 The Research, Monitoring and Evaluation Strategy
- 3.4 Implementing the Monitoring and Evaluation Strategy

EXECUTIVE SUMMARY

EXPLANATION

The length of Volume 2 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; this document), 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 Inhambane 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 almost 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 reintroduced will probably be released into this enclosure, while the rest of the current Sanctuary and possibly also the Phase 2 expansion are in the process of 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 practice 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 practice/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

Refer to Volume 2 of the Biodiversity Management Plan

ACKNOWLEDGEMENTS

Refer to Volume 2 of the Biodiversity Management Plan

GENERAL REMARK

Due to practical limitations imposed by the desired length of Volume 1 (the Condensed Plan; this document), virtually no graphs, figures or photographs that were used to illustrate Volume 2 and the specialist reports, could be included. Furthermore, the Main Plan (Volume 2) was condensed by about two-thirds. The unfortunate result of these unavoidable limitations is that some sections may have been condensed to the extent that some of the context and logic may have been lost. The following Chapters and Sections are especially subject to these limitations:

PART B:	Chapter B1, 1.4 Chapter B2, 2.6 and 2.8 Chapter B3
PART D:	Chapter D5 Chapter D12

The reader who is particularly interested in any of these Chapters or Sections *should therefore rather refer to the specific sections in Volume 2.*

INTRODUCTION

Mozambique's system of formal protected areas falls far short of the recommended international norm. The country's national parks and formally designated reserves 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 and inputs.

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 (surveyed at 41 967 ha for Phase 1, including 22 707 ha terrestrial area), 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 decision has since been changed for practical reasons; the eastern boundary now follows a straight line as indicated on the map), and the Islands of Lenene (200 ha) and Chilonzuine (100 ha) (Map 1). 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 marine resources has been entrusted and delegated to a private company (Vilanculos Coastal Wildlife Sanctuary (Pty) Ltd).

The VCWS is contiguous with the Bazaruto Archipelago and thus the Bazaruto National Park, 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 authorization grants rights of land use and benefit to the company for a period of 50 years, renewable for a further 50 years. The authorization empowers EAW with sweeping rights, including the rights of sole management of VCWS and the protection of the area against poaching, pollution and unauthorized 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 utilization guidelines, the natural resources section of the plan (Part 1) was not based on any extensive 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

The format of the Biodiversity Management Plan (BMP) document that follows is loosely based on the planning document guidelines of the KwaZulu-Natal nature conservation agency in South Africa (Ezemvelo KwaZulu-Natal Wildlife). The plan layout that was used for the compilation of two conservation, development and management plans for protected areas in the Kingdom of Lesotho (Bainbridge, 1998a & b), with which the senior editor of the BMP has been involved, 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. 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 sheer volume of work and diversity of topics that had to be included in the BMP meant that the document would 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. This 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 Temporary Duty Specialists (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 2000 and all

the surveys were completed by mid-September 2002, with one report only becoming available (due to circumstances beyond the control of the relevant TDS) 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.

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. The fact that the surveys were restricted to the winter season, negatively impacted on a number of the surveys. Follow-up surveys will need to be undertaken during the implementation phase of the project once the expected GEF involvement materializes.

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. The individual specialist reports are published as a separate volume to the BMP (Volume 4: Specialist Reports) (see attached CD)

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. 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.

OPs will be concise documents, containing only essential data relevant to the specific topic. These plans/operational documents are identified in the appropriate sections in the text of the BMP. The BMP and the subsidiary OPs will be working documents that will endeavour to provide operational and management guidelines during the development stage of the project.

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 and management of the biodiversity resources of VCWS and could therefore not be dealt with in separate documents.

It should be noted that the BMP in its current format would only become effective if and would only be implemented in full when the envisaged main GEF grant is approved and the funds become available. 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

Other than the reference to a “private nature reserve” that was authorized in Resolution 4/2000 by the Council of Ministers on 17 October 2002, 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 utilization of VCWS has 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.)

This BMP has been compiled, and the VCWS project will be developed, in compliance with these laws and policies.

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. The rapidly expanding tourism sector in Mozambique has been identified as a key player in community-based natural resources management (CBNRM).

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 VCWS model of empowering the local communities could play an important role in assisting government 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 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 specifically for the Quewene peninsula. Automatic weather monitoring stations would be installed and the data logged. The climate falls into Koppen's type (Aw) or equatorial dry season type. (Tinley 1985).

The following climatic data for the period 1987 - 2001 for the nearby (20 km) coastal town of Vilanculos, situated across the bay on the mainland, may be regarded as reflective of the situation on Quewene.

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 mean rainfall for Vilanculos for the years 1987 – 2001 is 901 mm, with the wettest month being February (mean 234 mm) and the driest July (mean 19 mm).

Due to the sub-tropical climate the summer months have high temperatures (mean of 31° C for January through March), and the winter temperatures are also relatively high with a mean maximum of 26.2°C.

Relative humidity varies depending on the season, and averages 80,25% with the maximums measured during the winter months. The annual evaporation at Vilanculos averages 1083mm. With a total annual mean precipitation of 901mm, there is an obvious water deficit. During the summer months the average evaporation rate averages more than 100 mm. During periods of drought, the levels of the fresh water lakes will drop and some will dry up altogether.

According to Tinley (1985) the wind direction for the region is primarily southeast to east. The average wind speed at 15h00, at Beira that is 250 km due north of Vilanculos, 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.

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 landform 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 Inhamambanane 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, 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 that 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 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 (now disused) 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 was, however, undertaken. Two deep sandy soil types, Fernwood and Griffon, both with excellent water infiltration but poor water retention, were identified. The topsoil has a neutral pH (between 6.1 and 7.01) and is 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. These leached deeper soils are 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 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.

Motta, Helena, M.A.M. Pereira and M.H. 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 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 southwestern 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. The VCWS reefs are fairly deep (10 – 40 m), with the result that man-induced damage to the reefs was found to be negligible.

1.4 FRESH WATER AQUATIC SYSTEMS, BIOTA AND HYDROLOGY

1.4.1 Introduction

The survey involved the following tasks:

- (1) Classification of the freshwater aquatic system
- (2) Determining the conservation importance of the freshwater aquatic system associated with the area by considering naturalness, diversity, rarity, extent and sensitivity.
- (3) Identification of threats

- (4) Development of a fresh water aquatic systems and hydrology (FASH) management plan

1.4.2 Assumptions and limitations

Due to the limited time available, the focus of the FASH survey was to identify and analyse aquatic ecological attributes. A detailed classification of the aquatic biota and habitat types associated with the VCWS could not be undertaken. 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.

1.4.3 Methodology, data collection and interpretation

(1) 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. A total of 13 sites were sampled.

(2) Interpretation

Classification of freshwater bodies

The freshwater bodies were classified based on major readily identifiable and replicable characteristics. The classification system was based on characteristics such as type, size, hydraulics and the presence of biotopes.

Hydrology

In situ water quality data was collected from most of the 13 sampled sites. Temperature (°C), conductivity/TDS (ppm) and turbidity (cm secchi) were measured in the field.

Aquatic invertebrates

Due to time constraints only a superficial study of the aquatic invertebrates of VCWS was possible. 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.

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, as were sites supporting rare and sensitive taxa.

Fish

Fish were collected using standard sampling strategies, which included electro fishing and both small and large seine nets as well as gill nets but no poisons. 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.

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.

The following real or potential threats were identified during the field survey: water abstraction; infilling (erosion); exploitation of biotic resources; modification of water quality (washing); inundation; exotic macrophytes and aquatic fauna; removal of indigenous vegetation; encroachment of exotic vegetation; erosion; villages in the catchment; burning; cropping; trampling and 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), through small, moderate, large and serious to critical impairment (25).

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. The weighted score for each criterion at each site was calculated and the 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 categorized 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 minor modifications.
60-79	C	Moderately modified.
40-59	D	Largely unmodified.
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 changes may be irreversible.

1.4.5 Results and discussion

1.4.5.1 Classification of aquatic systems

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 could dry up on a seasonal basis and were divided into vegetated pans and non-vegetated pans.

Lakes

Lakes are not necessarily closed water bodies and are much larger and deeper than pans. Lakes are generally permanent and are maintained through run-off, groundwater recharge or surface water inflows.

Freshwater marshes

The freshwater marshes on the sanctuary 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, and are maintained either by inflow of surface or by freshwater seepage. The marshes 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.

1.4.5.2 Hydrology

The fresh water aquatic system of VCWS 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 originates from 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.

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 barrier cordon to the east of the Inhamambane estuary may fulfill the same role, thus contributing to the extensive wetland system on the leeward side of the dunes.

Water quality

Analysis indicated that the quality of the water of VCWS was generally of a high standard and no major pollution sources were identified.

1.4.5.3 Aquatic invertebrates

A total of 37 aquatic macro invertebrate taxa were sampled at nine sites (none of the ecotone marshes were included) during the survey. Some invertebrate taxa that could be regarded as sensitive to water quality impairment were collected (seed shrimp, pale burrower etc) from all sites. Freshwater sponges, another taxa sensitive to water quality impairment, were also collected from two sites.

Diversity of taxa

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. Only one marsh had a high diversity score (more than 67% of the taxa present), five had medium scores (34% - 66%) and three had low (less than 33%) diversity scores.

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.

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 Lake Nhone the only species collected from the endorheic pans.

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. From the length frequency distributions, with different size classes present, it is evident that the populations associated with the different lakes cannot be regarded as over exploited.

Issues of conservation importance

- The likely presence of *Cloiria* within the Ecotone marshes.
- An unidentified gobiid from Lake Nhone.
- 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). An evaluation of the impairment levels of the sampling sites indicated that the habitat integrity of the different freshwater systems associated with the VCWS is generally of an exceptionally high status. The only real exception to this is the impacts on the Airstrip Ecotone marsh that could result from the excavation associated with the newly constructed landing strip.

CHAPTER B2: BIOLOGICAL ENVIRONMENT

2.1 VEGETATION

2.1.1 Introduction

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, and would have allowed a low resolution vegetation map of the area to be prepared.

2.1.2. Results

2.1.2.1 Classification

The VCWS lies within the Flora Zambesiaca area and according to Wild & Grandvaux Barbosa (1967) the vegetation in the sanctuary could be 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, VCWS is relatively poor in habitat diversity. In addition the area has also been subjected to human habitation and its attendant destructive processes for upwards of 200 years.

2.1.2.2 Species richness, rare and threatened species

A total of 505 species of plants were recorded from Phase 1 of the VCWS during the introductory survey, and include more than 40 new distribution records. 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. (See Volume 3 for an annotated plant list)

The provisional plant list includes 10 rare or endangered species, including the near threatened *Azelia quanzensis* and *Encephalartos ferox*. A further eight species could be regarded as endemics or near endemics to Mozambique. The vegetation of the VCWS is therefore of considerable interest, especially those species which as yet have not been recorded or identified.

2.1.2.3 Communities

Although no quantitative analysis of the vegetation has been undertaken, the vegetation types has been subdivided into broad communities as follows:

(1) *Sea Grass Community*

The “sea grasses” are not really grasses but are related angiosperms growing totally submerged in shallow sea waters (<3 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.

(2) *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 sedges, sedge-like plants such as *Juncus kraussi*, mangrove ferns and, under drier conditions, salt tolerant grass species such as *Sporobolus virginicus* that may form extensive monotypic swards.

(3) *Mangrove Community*

The mangrove communities are contiguous with the salt marsh communities but tend to be dominated by woody plants. Mangrove is a loose term for halophytes that have adapted to living with their roots submerged for lengthy periods of time in seawater. 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 many of the mangrove communities there were plants without such modifications but still highly tolerant of saline conditions. These plants may form monotypic stands under suitable conditions, usually on the landward side of the mangroves.

(4) *Dune Community*

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

Fore dune/Strand sub community

Along the lower and middle littoral zone few plants occur and the sand is mostly bare. Some grass such as *Sporobolus virginicus* may occur on the west and north facing slopes, sometimes forming substantial swards. A prostrate rhizomatous herb *Sesuvium portulacastrum* also grows along the lower slopes. These species increase in density further up the slope, especially the grass, with which the *Sesuvium* is unable to compete. These plants help in maintaining dune stability by binding the loose sand, enriching the soil, increasing water-holding capacity and providing humus.

Dune Thicket and Scrub sub community

In the east, the plateau regions of the peninsula is somewhat isolated from the prevailing strong south-easterly 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. It is only at, or near the crest that plants such as *Ipomoea pes-caprae* form extensive mats.

In the lee of the dunes the vegetation cover increases and includes stands of grass as well as woody species, in particular *Diospyros rotundifolius*. In hollows where rainwater 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. 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.

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. The vegetation varies 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 are especially species rich, with more than 100 taxa recorded in the narrow northwestern terrace. Woody species predominate, forming a more stable habitat for forbs and other plants to grow in.

The remnant dune thicket was patchy, sometimes impenetrable but normally represented by scrub and open areas. The dunes south of the estuary are characterized 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. The vegetation of this area is very complex and a proper assessment was not possible.

In the north behind the dune scrub the beach terrace dips 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*.

(5) *Wetlands*

The sanctuary has two basic freshwater wetland types:

Pans

The sanctuary has many pans, some seasonal and others perennial, ranging in size from small depressions that hold rainwater for short periods to a lake of about 1000 ha and several meters deep. 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. The vegetation of these pans is similar throughout the peninsula.

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. At the margin of more perennial pans vegetation commonly occurs, sometimes forming monotypic stands. 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.

Marshes

The freshwater marshes are mostly restricted to the eastern side of the peninsula and comprise extensive stands of vegetation separated by areas of open water, usually covered by the leaves of water lilies. In most instances the ecotone between the marshes and the surrounding woodland is relatively narrow. The marshes show a similar vegetation community to that of the pans, comprised largely of rooted water lilies and emergent stands of reeds, bulrushes, sedges, Nile grass, swamp fig and ferns.

(6) *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 species of trees and shrubs grow in miombo woodland, either solitary or in clumps.

Typical miombo woodland may have an open to closed canopy interspersed by a field layer of grasses in more open areas, as well as sedges and forbs.

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.

(7) *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*. A variety of other trees and shrubs also occur. The field layer is largely bare, particularly in the shade, but the stoloniferous fern *Microsorium scolopendria* forms extensive stands inside the bushclumps. Grasses are sparse, but climbers are especially common.

(8) *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 fruit trees may be planted. 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 that took advantage of the lack of competition to flourish.

2.1.3 Discussion

2.1.3.1 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.

2.1.3.2 Human impacts on the vegetation and management implications

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.

The severe impact of human activities on the vegetation of the VCWS is clearly evident. Remnant patches of thicket and forest plants, parts of the former vegetation communities in those areas, indicate that considerable impoverishment has taken place.

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

(1) Agriculture

Throughout the peninsula subsistence agriculture in the form of slash-and-burn is evident. In this process an area of woody vegetation is chopped down anywhere between the level of the soil and a height of one meter. 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 happen within two to 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.

Such sites are 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 “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.

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 are 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 occur 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.

(2) 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 has 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. Certain species that are considered thicket species (Tinley 1985, Wild & Grandvaux Barbosa 1967) 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, are 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.

(3) *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. The uses of plants can be basically subdivided into five groups namely thatching material, wood (firewood and for construction), rope made from tree bark, edible plants and medicinal plants.

From the size and weight of tree trunks that lie scattered around, 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.

(4) *Project development activities*

Current tourism developments are unfortunately adding to the destructive processes. Some of the ecologically fragile 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 (dune barrier cordon) along the estuary are cause for great concern as considerable and perhaps irreparable damage may be done.

2.1.3.3 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 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.

2.1.4 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, bearing in mind that the northern area is one of the three development hubs of the Mazarette Estate. The urgent need for conservation 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. The siting of one of the road 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

Although there is relatively little information available on the avifauna of the Quewene Peninsula, 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 the avifauna specialist gathered most of the information during a brief mid-winter visit.

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 winter (June) attests to the quality of these wetlands. 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 miombo woodlands in the VCWS are relatively homogeneous and, except for the northern-most part of the peninsula and some areas near the estuary, they have been very extensively degraded. As a result, the woodlands in the Sanctuary area support a depauperate bird community and many of the normal 'icon' species of climax miombo are absent.

It is perhaps an anachronism that the ecologically unacceptable slash-and-burn agriculture that is widely practiced, 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 provisional 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.

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 breakdown of how the 240 species recorded are apportioned in these is as follows:

Woodland (mainly miombo-dominated savanna, 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).

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.

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 artifact of most of the data coming from the mid-winter (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 area 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) will 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 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 potential exists for a safe breeding area for Greater Flamingo 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. The nature of the shoreline around the Quewene 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 northwestern 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:

- 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. 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-listed.

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 (Operational 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. 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.

The special attractions that a country offers such travelers 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'. 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 south-eastern Zimbabwe. Only one of these was observed 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.

- **'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 have 'high charisma' value. A tentative list of such species include the Pygmy Goose, African Fish Eagle, African Jacana, Lesser Jacana, Long-toed Plover, Crab Plover, Mangrove Kingfisher, Olive Bee-eater and Mascarene Martin.

2.3 HERPETOFAUNA

2.3.1 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 of this BMP.

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. On the other hand, many species were conspicuous by their absence.

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

(1) ***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.

(2) ***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*. Frogs and toads were mostly recorded from around the pans and marshes.

(3) ***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.

(4) ***Widespread species***

Several species of reptiles occur widespread throughout the sanctuary including four species of gecko. The commonest amphibian present is *Bufo garmani* that 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 herpetofauna 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, which may account for the paucity in the numbers of animals seen.

2.3.2 Species richness and diversity

A total of 15 amphibian, 13 snake, one tortoise, terrapin and turtle each, 19 lizard and one crocodile species were recorded from the sanctuary. A further three amphibian, 13 snakes, 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. 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.

2.3.3 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* (which feeds on the eggs of nesting crocodiles)

2.3.4 Conservation status

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 sanctuary's herpetofauna is very poor, although housing some extremely rare species.

2.4 MAMMALS

2.4.1 Distribution

A total of 33 mammal species were recorded from the sanctuary (Refer to Volume 3 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. Several species that were expected to occur were not found, possibly due to time constraints.

As far as the larger mammals are concerned the sanctuary is 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:

(1) *Dune thicket and Bushclumps*

Again these two habitats are similar with regard to the species occurring in them, including among the rodents the Red veld rat and perhaps the Giant rat. The Red duiker and Suni are restricted to dense bush that may also include thickets in miombo woodland.

(2) *Wetlands*

Some mammals such as the Groove-toothed rat, the Multimammate mouse, Grey climbing mouse, Lesser red musk shrew and Greater cane rat were only recorded from the vicinity of wetlands.

(3) *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, Forest mouse and Giant rat. Under more open condition species such as Grey duiker, Steenbok, Springhare, Scrub hare and rodents such as Peter's gerbil were recorded.

2.4.2 Species richness, rare and threatened species

It is likely that many unrecorded species are still present but in reduced numbers. 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 of the smaller ungulate species left. 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 or their burrows were seen during the survey which may be the reason why no Porcupine were seen nor signs of these animals found. It is possible that they never occurred here although recorded from the vicinity (Smithers & Tello 1976). The absence of 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.

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. The planned relocation of large herbivores would obviously increase the number of mammal species on the sanctuary.

2.4.3 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. The use of fire to corner animals such as Cane rats (a local delicacy) is widespread and has reduced numbers to very low levels.

2.4.4 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. The establishment of the fenced Reserve area, should alleviate these pressures.

2.5 INVERTEBRATES

The invertebrates were only marginally surveyed 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 frequent fires were also responsible for this. The degradation of habitats probably 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, which depend on dung produced by elephant, buffalo and hippo.

2.6 RANGE CONDITION, CARRYING CAPACITY AND WILDLIFE REINTRODUCTION PROGRAMME

Note: The descriptive figures illustrating the report are only included in Volume 2. The reader is strongly advised to refer to these figures.

2.6.1 Introduction

The primary objectives were 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 herbivore reintroduction program. Three areas had to be considered, namely the Phase Ia area (the area of about 8 500 ha enclosed by the “temporary” game fence), the Phase 1 area complete (i.e. the total current VCWS of about 22 707 ha terrestrial area) and lastly including the proposed Phase II area of some 17 000 ha, giving a total land surface area of approximately 40 000 ha .

2.6.2 Ecological issues

2.6.2.1 *The impact of man*

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, grasslands and aquatic habitats.

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).

2.6.2.2 *The impact of animals*

The nutrient content of the foliage of miombo plants is generally low whilst 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.

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 which 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 which 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.

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.

2.6.2.3 *Carrying capacity*

The term ‘carrying capacity’, although widely used, is rather nebulous with many definitions. The Large Stock Unit (LSU) has to date formed the basis of expression of ‘stocking rate’ and ‘carrying capacity’, but its application is influenced by so many variables that the **biomass** approach proposed by Coe, Cumming & Phillipson (1976) who related the biomass of animals carried on game areas to long term annual rainfall, has been selected for VCWS.

The carrying capacity of an area is taken as the sum of its grazing and browsing capacities (Danckwerts & Stuart-Hill undated). Following Collinson & Goodman (1982), the to-be-released herbivores will be divided into 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.

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. Fire is considered to be the driving force behind these transitions (Stromgaard 1986).

2.6.3 Methods

2.6.3.1 Field Procedure

A total of 121 sites were randomly selected for assessment during driving/walking transects.

2.6.3.2 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, which 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).

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.

The following vegetation parameters were measured per site:

- Site number and Global Positioning System (GPS);
- Vegetation type and land-unit;
- 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<500kg ha^{-1} , and 8>3 500 kg ha^{-1}) respectively.

2.6.3.3 Herbivore suitability assessment

In multi-species systems it is important to determine the proportional contribution of herbivore species to the total stocking rate. Habitat suitability based on a five-point scale (1 = very low to 5 = very high) was estimated at each sampling site.

2.6.3.4 A preliminary assessment of the carrying capacity of the VCWS

A herbivore carrying capacity map was constructed using a Landsat Thematic Mapper satellite image. A step-wise approach was followed to identify areas of different carrying capacity, firstly by employing the IDRISI Geographical Information System (GIS), then the Global Positioning System coordinates of the 121 sample sites, followed by assigning carrying capacities to the image clusters and finally by superimposing the marshy areas with a higher carrying capacity on the satellite image.

At each of the sampling sites the carrying capacity was estimated on a scale ranging from 1 125 kg km^{-2} (>35 ha LSU^{-1}) to 4 500kg km^{-2} (10ha LSU^{-1})

2.6.4 Results, Discussion and Recommendations

2.6.4.1 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 in the case of VCWS. An important component in the VCWS system is 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.

For carrying capacity purposes, the vegetation of VCWS was divided into eight types: miombo woodland (60% of the sites assessed), depressions/pans (12%), cultivated areas (2%), regenerating miombo woodland (20%), thickets (3%), and mangrove, *Acacia veld* and salt marshes (each 1%). For the same purpose a description of land-units was done, including forest (2 unit classes), woodland (5 classes), thicket (2 classes), bushland (1 class), shrubland (4 classes), grassland (5 classes) and herbland (1 class)

2.6.4.2 Grass cover, tuft vigour and grass standing crop

The grass cover is generally moderate for VCWS and the tuft vigour is, as can be expected on dystrophic soils, generally low. Similarly, the grass standing crop is also relatively low with most sites having between 250 and 750kg/ha. 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.

2.6.4.3 Habitat suitability

The habitat suitability of VCWS for large herbivores is largely low to very low. This corroborates the findings of both the vegetation and carrying capacity assessments.

2.6.4.4 Carrying capacity assessments

For VCWS the ecological carrying capacity approach has been applied. As expected, results indicate that the area has a low herbivore carrying capacity.

2.6.4.5 Guidelines for large herbivore re-introduction

The planned wildlife re-introduction programme for VCWS meets with almost all of the IUCN's biological guidelines for re-introductions (IUCN, Species Survival Commission, undated). However, some basic shortcomings in the available habitat and the poor quality of the grazing are inhibiting factors that must be taken into consideration. Also, certain of the IUCN guidelines with regards to socio-economic factors (attitude assessments, social impacts and consulting being the most prominent) have not been implemented.

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. Given the limited knowledge that we have of how the ecosystem will respond to the introduction of large wild herbivores, 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 that historically 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 environment in any manner;
- Maintaining the genetic diversity of the re-introduced large herbivore populations;
- And obtaining revenues from the utilisation of surplus herbivores for the benefit of the local communities.

2.6.4.6 Animal introductions

The following must be noted when considering introductions:

- The biomass capacity of miombo woodlands is only about 20-30% of that in areas receiving similar rainfall on nutrient rich soils;
- 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. 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.

A provisional guideline for herbivore numbers for VCWS.

Herbivore species	Phase 1a 8 500ha	Phase 1 complete - 22 000ha	Phase 1 and 2 complete – 39 000ha
Zebra	20	52	92
Buffalo	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		12	21
Elephant		20	35

2.7 DESCRIPTION OF MARINE BIOTA

2.7.1 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. 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. During the survey time constraints only allowed for the documentation the major marine and coastal habitats, with little time to examine individual species. The amount of taxonomic research that could be carried out was therefore very limited.

The total sea area included in the sanctuary is 19 260 ha.

2.7.2 Present levels of exploitation

The full extent of exploitation of marine and coastal resources in the VCWS is not known but Odendaal (2002) (see also below) concluded that the utilization has reached unsustainable levels. The artisanal and semi-commercial fisheries of VCWS provide considerable social and economic benefits to the people of the region.

2.7.3 Holistic analysis of marine, estuarine and lagoonal systems

2.7.3.1 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.

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. The coral reef surveyed during the marine study in the entrance to San Sebastian Bay and the pen sea beyond are inhabited by at least 11 phyla, based on direct observations or records from other studies of coral reefs in southern Mozambique.

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 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.

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.

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 humpback whale is a large baleen whale reaching a length of 14-15 m. 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. Repeated sighting of humpback whales off the coast of the Bazaruto/VCWS area may indicate that they have a preference for this area.

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).

2.7.3.2 Sandy shores on sheltered and exposed coasts

Three phyla were observed: Arthropoda, Mollusca and Chordata

2.7.3.3 Rocky shores

This system yielded 10 phyla.

2.7.3.4 Estuarine systems

Six phyla were observed in this highly productive but fragile system.

2.7.3.5 Sea meadows and sand banks

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, which 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. The plants themselves are eaten by few animals 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.

A total of 10 phyla were recorded, including the Dudong in the Phylum Chordata.

Dugong: The dugong *Dugong dugon* 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. 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).

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).

Thirty years ago dugongs were reportedly abundant off the coast of Mozambique, Kenya and Somalia. In the early 1970s dugongs were confined to isolated populations in Mozambique including the Bazaruto-Quewene region (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), may be the largest remaining single herd in East Africa. 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. Their numbers have decreased alarmingly over most of their former range, with the exception of the northern coasts of Australia. 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).

Man is the main predator of the dugong, but they are also hunted by large sharks, saltwater crocodiles and killer whales (Emanoil, 1994). The main causes of dugong mortality are likely to be hunting, accidental death in gillnets (set for sharks) and fish traps (Hughes, 1969). 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 of VCWS.

2.7.3.6 Mangrove swamps

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 a 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*. A total of three phyla were recorded in the mangrove swamps.

2.7.3.7 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; specifically, any development in the vicinity of the old Portuguese lighthouse on the marine dunes should not mar the seascape

2.7.3.8 Marine conservation and cultural diversity

The traditional fishing communities 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.

2.8 CURRENT UTILISATION STATUS OF MARINE BIOTA

2.8.1 Sustainability of utilisation

The following quote from the specialist’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 still 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)

2.8.2 Results, discussion and management implications

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

In a region where poverty is rife the fishers appear to be the worst off, at least in comparison with those people who own *mashambas* and cultivate the land. However, 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.

2.8.2.2 Reliance on marine resources

An extremely strong reliance on marine products by the people who live along and near the shore was found. Almost all the interviewed fishers had no other income except fishing, and some people ate almost nothing except fish. Reliance on marine products are thus extremely strong for those people who not only have fishing as their only income but also almost as their sole source of food.

2.8.2.3 Pressure on Marine Resources

(1) Types of Resources Utilised

Virtually any living marine resource that is not poisonous is taken. The observed fish catches almost entirely consisted of species frequenting the estuarine or surf zone and sea grass beds. The mostly women harvesters who work on the exposed flats during low tide collect molluscs, oysters, boxfishes and swimming crabs. 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

No spearfishing equipment was seen anywhere on the Peninsula. Unfortunately uncontrolled semi-industrial fishing does take place, especially by mainlanders who work under contract, and commercial fishing activity, including the use of long lines, has been noticed at night near 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, there are clear indications that considerable pressure exists. Observations also indicate that large and probably unsustainable numbers of reef fish are taken. Conversations with local fishermen along the beach in Vilanculos indicate that catches have been decreasing.

(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 and rapid and pervasive management intervention would be needed to stem the tide.

All of the fishers interviewed on the Peninsula made it clear that catch size of netted fish have been declining. Net gauge is generally very small. 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.

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.

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 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 kilometer 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 is readily apparent.

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.

2.8.3 Notes on marine resource economics

(1) Sea cucumbers

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. It has been estimated that a full-time cucumber harvester earns about US \$85 to \$100 per month.

Numbers of the sea cucumber resource is seemingly dwindling and during dives by the survey team relatively few were observed. It would seem as if the harvesting of this very slow growing resource has already reached unsustainable levels.

(2) Fish

Observations from the three main villages namely Chihunzuene, Marape and Chigonguine indicate that the fishers operate primarily for subsistence purposes. 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. The fishers readily admit that harvesting of the resource has reached unsustainable levels. In the case of the eastern shores, sporadic bouts of intense fishing activity with long nets take place in the mouth of the Inhamambane estuary. In this shallow lagoon such activities can be considered highly destructive and the resource has drastically dwindled to a level where it can barely be considered an economic resource beyond providing subsistence to the local people.

(3) Crayfish

According to one professional crayfish harvester operating in the Marape area, three other Marape fishers also specialise in crayfish. The crayfish resource in the region has apparently decreased considerably.

(4) Oysters

Sand oysters (*Pinctada imbricata*) are mostly harvested by groups of women at low tide on the sand banks. Upwards of 1000 oysters may be harvested by a group of eight women during a single operation lasting three hours. The marks on the substrate where they collected oysters were clearly visible. They took everything that could conceivably be eaten. According to local harvesters who has been born in the region, the number of oysters has dropped considerably during the last decade, but especially during the last few years.

(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.

2.8.4 Estimation of fisher numbers

A full census of fishers could not be undertaken, but it is unlikely that the number of fishers exceed 140, and the number of active *bona fide* resident fishers (migrant and occasional fishers excluded) will probably be less than 100.

CHAPTER B3: THE AGRICULTURAL ENVIRONMENT

3.1 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.

3.2 IMPLEMENTATION PRINCIPLES AND FOCUS

The sustainable small-scale agricultural development programme will 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.
- 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) play 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.
- 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.

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 agricultural development process that is outlined below takes cognisance of the current lack of baseline data 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.

3.3 NATURAL AGRICULTURAL RESOURCES

3.3.1 Climate

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, which needs to be taken into account when considering dry land cropping opportunities and practices.

3.3.2 Soils

Only limited soil sampling has been undertaken and the results and recommendations may not be representative of the whole area. All the samples indicate poor soil fertility and a concomitant negative impact on crop production. Deficiencies in calcium, magnesium, phosphor and potassium were especially noticeable. These deficiencies would have to be addressed during the implementation phase of the SAP.

3.4 CURRENT AGRICULTURAL PRODUCTION PRACTICES AND IMPACTS

3.4.1 Demography

The demographics of the people living in VCWS has been surveyed during the comprehensive social study (see Part G), 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 Part D), 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.

3.4.2 Current agricultural practices

3.4.2.1 General remarks

The principal land use activities in the area are subsistence farming and the utilisation of natural resources, for example fishing. The majority 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.

3.4.2.2 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. The slash-and-burn method will gradually be replaced by an environmentally sensitive system of organic farming (see below).

3.4.2.3 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. Not surprisingly, 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.

3.4.2.4 Animal husbandry

Animal husbandry involves mainly chickens and goats and is practiced on a very limited scale. The poor quality grazing and the land tenure system are not conducive to the keeping of large goatherds.

3.5 AGRICULTURAL AND RURAL DEVELOPMENT OPPORTUNITIES AND CONSTRAINTS

3.5.1 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 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.

3.5.2 Constraints

Some serious constraints that the local small farmers (and fishers) may encounter and will have to cope with, include the following: poor infrastructure; lack or inadequacy of production inputs; inadequate level of training and experience of farmers; depletion of the natural resources by current present farming practices; lack of an extension service to

farmers; undue emphasis on sugar to alcohol production as an income source will lead to social problems in the area; shortage of permanent employment opportunities and lack of additional income generation activities

3.6 ORGANIC FARMING

The system of organic farming will gradually be implemented in the sanctuary. According to Schrock (1998) organic matter improves soil tilth and prevents soil compacting and crusting. It increases the water-holding ability of the soil and provides a more favorable 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).

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.

3.7 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, 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.

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. 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.

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. The only region that escaped most of the destruction is in far northern Niassa and Cabo Delgado provinces, where healthy populations of for example elephant and buffalo survived.

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.

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 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. 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).
- 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). It also seems highly likely that the budget allocation would be considerably lower after the first five years, when most of the major monitoring and survey 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 proposed inclusion of further land to the south. 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 in 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 Part D below) will, after the new Limpopo National Park, be the second major wildlife relocation exercise ever undertaken in Mozambique. 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, albeit on a small scale, 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 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.
- 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 practices 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 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 practices 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.

3.3 OBJECTIVES RELATING TO 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.

3.4 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
- 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
 - World Heritage Area designated in terms of the UNESCO guidelines.

3.5 DIVERSITY OF OBJECTIVES

The spectrum 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. 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 macro herbivores 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.

CHAPTER C4: MANAGEMENT AND CO-MANAGEMENT PHILOSOPHIES

4.1 MANAGEMENT

In order to realise 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

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 approach (Kelleher, 1999) has been adopted. Since the policy of co-management has been accepted (Lambrechts 2001) for VCWS by EAW, 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. The local communities would thus be regarded as partners and not merely as passive bystanders (Lambrechts, 2001).

The numerous benefits arising from the involvement of local communities (Kelleher 1999) will generate a virtuous circle in which the local people become volunteer guardians of the protected area. 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.

The principle of 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, with the result that management may currently be faced with something akin to a vote of no confidence (Thompson 2002).

CHAPTER C5: PRINCIPAL THREATS

The VCWS is faced, and have to deal with, a variety of threats.

- 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. The current level of knowledge is unfortunately inadequate.
- The local communities residing in the VCWS will have to adapt to a new way of life in many respects. VCWS management will be hard pressed to ensure that all their rightful expectations are met and that all the social obligations are dealt with efficiently.
- 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. VCWS will thus be 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: SOIL AND SUBSTRATE CONSERVATION AND MANAGEMENT

1.1 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

1.2 Management objectives

The specific soil and substrate management objectives are:

- To maintain the structural and ecological integrity of the dynamic and mobile 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 (including exposed dune faces) that may warrant special attention.
- To implement a system of organic agriculture.

1.3 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.

1.4 Management priorities

The primary management priorities for soil and substrate management 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.

1.5 Management options and actions

Management options and actions that will be taken include the following:

- Operational Plans (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 to do so.
- 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 indigenous dune vegetation will be avoided.
 - A baseline geological survey should 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.
 - A monitoring system of the eastern dune cordon will be established 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).

CHAPTER D2: CONSERVATION AND MANAGEMENT OF MARINE RESOURCES

2.1 PRINCIPLES, POLICIES AND OPPORTUNITIES

An underlying principle in the establishment of the VCWS, as embodied in the mission of the sanctuary, is 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 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.

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.

The preparation of an effective marine 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 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, the general management strategy has a broader-based approach and is aimed at the management of marine resources in a more holistic context. The two actions deal with the same resource and should be regarded as two sides of the same coin.

2.2 MANAGEMENT OBJECTIVES

Until such time as 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.
- 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 marine management requirements.
- To apply the relevant principles, policies and operational procedures for the marine resources strategic utilisation plan to the 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.

2.3 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS

2.3.1 Marine conservation needs

2.3.1.1 Critical conservation aspects

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. The inshore environments will therefore constantly be restocked, provided that the offshore environments, including the open sea and coral and rocky reefs, as well as the inshore environment are not excessively damaged by unsustainable 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.

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, is therefore colonized by a wide variety of smaller animals that benefit from its protection. When seine nets and other harvesting practices uproot these shelters, 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.

2.3.1.2 Coral reefs, rocky reefs, open sea, sheltered shores, exposed shores, tidal flats, sea grass meadows, estuarine lagoon and mangrove swamps

The main conservation threats and priorities and actions to be taken are:

- Crayfish: A closed season for harvesting crayfish should be introduced during the crayfish reproductive season.
- 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.
- Spearfishing: Spearfishing-using scuba should be strictly banned over coral and rocky reefs, as it is throughout the world.
- 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.
- Removal of biota from the reef: Do not allow divers to remove any material from a coral or rocky reef .
- Proper education: Ensure that divers and dive supervisors are properly educated about the ecology and vulnerability of coral and rocky reefs before they dive.
- Invasion by crown-of-thorns starfish *Acanthaster planci*: Monitor the presence and abundance of *A. planci* should it be recorded on the coral reefs.
- 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.
- Sedimentation of the reefs: 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.
- Ornamental fish collecting: The collection of marine fishes for the international aquarium trade should not be allowed in the VCWS.
- Boat damage to large surface-swimming animals: Only trained and experienced skippers should be used.
- Setting of nets, traps and long lines: 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.
- Shark long line fishery: Should be banned.
- Incidental catch of marine mammals and reptiles: Needs to be handled according to strict guidelines.
- Harvesting of marine mammals: Any harvesting of marine mammals (dolphins, whales, dugongs) should be banned.
- Over fishing: Closed seasons should be introduced to coincide with those recommended for the Inhassaro area to the north.
- 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.

- Pollution: Discarded torch batteries in the water, diesel and oil pollution, and contamination of the aquatic environment by fragments of discarded monofilament gillnets and seine nets, should be controlled.
- Netting: All nets should be registered to ensure that they conform with mesh size requirements.
- Hunting of turtles: All turtles are protected internationally and their exploitation in the VCWS should be banned.
- Interference with nesting turtles: Visitors should stay well away from turtles when they emerge from the water at night, dig their nests and lay their eggs.
- Four-wheel drive vehicles: Four-wheel drive vehicles will 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 secondary dunes. In general, no development, except for boardwalks for pedestrians, should take place on primary or secondary dunes.
- Sewage disposal: Will be dealt with according to the EIA.
- 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.
- 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 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 number and kinds of seine nets that are allowed to be used in the sanctuary should be determined so that control can be exercised over the damage caused.
 - If possible, traditional methods of allocating fishing territories should be re-instituted so that the fish resource is divided equitably among all fishing villages.
 - In general, it would be desirable to re-introduce as many traditional methods of control of resource use as possible.
 - The use of seine nets in the sanctuary should be restricted to fishermen who are resident in the sanctuary.
 - 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.
- Gill netting: (see also the marine resources strategic utilization plan below) Gill nets are super-efficient, indiscriminate in their catch, virtually invisible underwater, and difficult to detect and control. It is essential, therefore, that strict control over the use of gill nets should be implemented immediately.

- 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).
- Removal of timber: The wood of mangrove trees is used to make the elbows and other joints of dhows, as well as small canoes, and also for building purposes. This use is probably sustainable but should be investigated further.
- Drainage channels on salt marsh: The drainage channels that were dug on the edge of a salt marsh to accommodate a landing strip for aircraft should be rehabilitated as soon as possible.
- Collection of marine specimens: Strict control should be exercised over the collection of pre-selected species of invertebrates or fishes for commercial exploitation. There is evidence that sea horses, tufted black sea cucumbers and crayfish are overexploited.
- Collection of curios: The collection of animals and animal tests, shells and skeletons by tourists for curios also needs to be strictly controlled. 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).
- 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.
- Killing of dugongs: The dugong population has declined alarmingly and is in urgent need of conservation attention. The conservation of dugong will have to take place in close collaboration with the Mozambican authorities and will need a concerted regional strategy and action.
- Lack of knowledge on population sizes of exploited species: Stock assessment surveys need to be carried out urgently on the most important commercial species.

2.3.2 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
- The development of an operational plan (OP) for the sustainable use of species with commercial value
- The development of an OP 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.

CHAPTER D3: UTILISATION AND UTILISATION MANAGEMENT OF MARINE RESOURCES AND SYSTEMS

3.1 PRINCIPLES FOR THE SUSTAINABLE USE OF MARINE RESOURCES

3.1.1. The Broader Context

The Quewene 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 Sanctuary is placed under effective protective management it will boost the conservation of the biodiversity of the larger Bazaruto Archipelago as a whole. The 19 260 ha sea area of the VCWS will thus become of major importance.

VCWS enjoys political blessing at the highest levels. The Sanctuary 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.

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. 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
- A positive result of the above development will be the hugely increased value of the marine resources, and with that their ownership
- A negative side effect of the development will be the vastly increased pressures on these same marine resources
- The VCWS development will bring many other livelihood options to the fishers and their families.
- Immense partnership possibilities will be created by the development
- Additional staff will need to be appointed in order to deal with the development and management of the MRSUP.

3.1.2 Lessons learned

The following “lessons learned” need to be heeded with regards to the conservation, management and utilisation plan for the marine resources of the sanctuary:

(1) Timing (or: “Timing is Everything”)

Through the years it has become clear that the timing of projects can greatly influence their success rate. In the case of VCWS, the project could not have arrived at a better time, both with regards to conservation and social requirements.

(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. The fisher population of the Sanctuary only number a hundred or so individuals, and the physical characteristics of the coastal areas of VCWS are such that they are highly manageable.

(3) Project Size (or: “Small is Beautiful”)

The ten-point plan outlined below 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.

(5) Participation (or: “Beware of the Illusion of Inclusion”)

In the VCWS context participation means recognising that all parties, and especially the local communities, are important and that they need to participate in all aspects that may impact on their lives.

(6) Decentralisation (or: “Riding the wave make things easier”)

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.

(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. Those projects that have a good gender balance tend to be more successful than projects with a strong gender bias.

(8) Cost and Benefits (or: “Nothing for Nothing and Something for Something”)

The VCWS communities must be made aware of and realise the cost and benefit implications of the marine and other projects.

(9) Partnerships (or: “Who owes Who, and Who gains What”)

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.

(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. The fostering of private sector initiatives inside the communities, such as developing individual or small group entrepreneurial activities, should be encouraged.

(11) Monitoring and Evaluation (or: “Who is monitoring Who?”)

Those affected by the project should form an integral part of monitoring.

(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.

(13) Sustainability (or: “The Pillars of Development”)

Building human capacity during the ten-point plan will be the most important ingredient necessary for sustainable coastal and marine resource management.

(14) Ownership (or: “Whose Reality Counts?”)

The project is meant to benefit the local people and, no matter where the funding comes from, the marine (and indeed all the other development projects with a social impact) 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.

3.1.3 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 or sustained intervention, are difficult to implement. The MRSUP must thus be as simple as possible.
- 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” (for example Moffat *et al* 1998) will play a pivotal role in the formulation and deployment of the MRSUP.
- 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. Psychological and functional ownership of the plan will be vested in the resource users themselves.
- Formal community structures for VCWS were recommended and approved in the 2001 Bio-Business Plan (Lambrechts, 2001) but were unfortunately not

implemented. Without these structures being put in place (Thompson 2002), the implementation of the MRSUP would be impossible.

3.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR A MARINE RESOURCES STRATEGIC UTILISATION PLAN

3.2.1 A 10-Point Plan for marine resources management in VCWS

The MRSUP is a comprehensive plan that is based on a simple ten-step process.

The following ten steps are discussed in detail in Volume 2:

1. Appoint suitably qualified and experienced staff to deal with the development and management of the MRSUP, limit the number of fishers, recognise their rights and register them
2. Establish the Sanctuary Fishers Association (SFA) and develop a Vision for the SFA
3. Mitigate and reduce the current impact on resources through education
4. Add value to existing resources through local economic development
5. Create complimentary and alternative livelihood opportunities
6. Protect the most sensitive areas and abstain from the worst practices
7. Develop new fishing grounds outside the sanctuary
8. Develop low technology aquaculture ventures
9. Embed the plan in wider geographical and institutional context
10. Transfer the management of marine resources to appropriate structures

CHAPTER D4: CONSERVATION, UTILISATION AND MANAGEMENT OF FRESH WATER AQUATIC RESOURCES AND SYSTEMS

4.1 PRINCIPLES AND POLICIES

The extensive freshwater aquatic systems of the VCWS are extremely sensitive and are acknowledged as such in the mission and objectives and the EIA. The wetlands will, be protected from all development including peripheral development which could cause environmental damage.

4.2 MANAGEMENT OBJECTIVE

The overall objective is to preserve the physical, chemical and biological integrity of the freshwater aquatic system associated with the VCWS

4.3 CONSERVATION AND MANAGEMENT PRIORITIES

4.3.1 Ecological criteria and issues

One of the main functions of the BMP with regards to the freshwater aquatic systems of VCWS would be to identify the important ecological issues relevant to these systems. The following principal criteria apply to the selection of such ecological issues:

- Naturalness: Least impacted wetlands have the highest conservation value.
- Habitat and species diversity: Wetlands with greater diversity have a higher conservation priority.
- Extent: In general, larger sites contain greater diversity and are more resistant to changes, simply because they cover a larger area and are more likely to contain a greater variety of habitats.
- Rarity: Species or habitats that are rare or occur outside of their normal distribution at a particular site are of high conservation priority.
- 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.

The outcome of the analysis of these criteria is presented in the table below. It is evident that several of the freshwater components associated with the sanctuary are of significant conservation importance.

4.3.2 Priorities

The conservation status and priorities of the various wetlands that were sampled are indicated in the following table.

Identification of Important Ecological Attributes.

		Lake			Ecotone marsh					Marsh		Pan				
		Manhale	Njone	Mukwe	Madaca'munhu	Airstrip	Msasa	Mazolo	Marapi	Jane	Xilowane	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 yrs
Imm = Immediate **RED** = Important issues

4.4 MANAGEMENT OPTIONS AND ACTIONS

4.4.1 Management/conservation objective

Any management strategy 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 should be justified in accordance with the overall conservation objective. The management/ conservation objective for the fresh water aquatic system (see above) is dedicated towards achieving a certain goal.

4.4.2 Management framework

The framework that will be used to realize the freshwater aquatic systems objective, involves an interactive strategy that would facilitate a process of adaptive management. The management framework for the freshwater aquatic system is built on a three-legged approach where all *conservation actions* (goals, actions and evaluation) are implemented within a *legal framework* (review laws, identify issues and take action) supported by sound *scientific evidence* (extent of resource utilization and ecological attributes such as species-, functional- and integrity assessments) generated by ongoing research.

CHAPTER D5: CONSERVATION, UTILISATION AND MANAGEMENT OF FLORA

5.1 PRINCIPLES AND POLICIES

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.

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.

5.2 MANAGEMENT OBJECTIVES

- 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 mitigation 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 of all plants into VCWS.
- To monitor and regulate the use of indigenous plants in especially the Reserve area by local communities and estate owners.

5.3 THREATS

A number of real and/or potential threats have been identified:

- Uncontrolled/unplanned wildfires.
- 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.

5.4 MANAGEMENT PRIORITIES AND ACTIONS

5.4.1 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. In such a case corrective measure will have to be employed.

5.4.2 Managing and minimising anthropogenic impacts

All negative impacts on the vegetation (natural fires excepted) appear to be anthropogenic and initial management should be aimed at reducing such impacts. 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.

5.4.3 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 and the estate owners will still be permitted to utilize the natural resources as in the past. This situation needs to be monitored to provide levels of sustainability.

5.4.4 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.

5.4.5 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. The siting of the housing sites within the fragile vegetation community along the northern terrace, will have a considerable negative impact.

5.4.6 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.

5.4.7 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.

5.4.8 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 mobile dune system been zoned as a natural area where no extensive development should be allowed. However, two lodges with a total of 80 beds must still be developed and 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.

5.4.9 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. Where current roads threaten the integrity of sensitive habitats, populations of plants or animals, such as the Msasa-Dugong Lodge road, these should be re-routed. The construction of the latest airfield on the edge of a salt marsh took place contrary to the provisos of the EIA (Lambrechts 2001c). This airfield should be rehabilitated and the road through the only known colony of *Tritonia moggii* should be rerouted.

5.4.10 Fire management

Burning programme: Due to time constraints and lack of baseline data, it was not possible to investigate the need for and to prepare a burning programme. Fire is an essential tool in the management of the fauna as well as the flora of VCWS. It will, however, be necessary to prevent fires in dune thicket/ scrub and to reduce the effect on bushclumps as far as possible. Increasing the size and health of bushclumps and re-establishing the integrity of the coastal thicket will recreate lost or damaged habitats for thicket loving species. 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. The re-establishment of these communities should be considered a priority as they currently house the rarest and most threatened plant and animal species.

Firebreaks are essential to control wild and set fires in the sanctuary.

Fire records: The VCWS General Manager will ensure that accurate records of all fires, planned or otherwise, be retained.

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.

Indicator species: An easily recognisable species such as Torchwood *Balanites maughami*, who is a typical associate of bushclumps, could be used as indicator species of potential change.

CHAPTER D6: CONSERVATION, UTILISATION AND MANAGEMENT OF AVIFAUNA

6.1 MANAGEMENT OBJECTIVES

6.1.1 Rationale

The following specific avifauna management objectives must be regarded as reflecting the current rather limited knowledge of the avifauna of VCWS. This provisional list of species and management objectives will be broadened as and when additional data becomes available.

6.1.2 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 dealing specifically with avifauna management.
- To ensure that the general vision and objectives of VCWS are adhered to with regards to the conservation of the avifauna.
- To ensure that adequate management attention is given to the priority species.

6.2 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS AND MONITORING

The following provisional management priorities, options and actions and monitoring needs have been identified:

- A mid-summer survey of the Sanctuary's avifauna is needed.
- A set of recent aerial photographs of the Sanctuary would greatly facilitate the mapping of different habitats, including the woodland types, the shifting agriculture areas and all the wetlands, and would allow the extent of these habitats to be measured whilst at the same time providing for an estimation of population sizes of key species.
- Because of the importance of the waterbird community, all the wetlands should be mapped and some identified for monitoring.
- A field checklist of birds should be prepared for general distribution.
- A quantitative survey that focuses on the 19 threatened bird species recorded in the Sanctuary should be considered.
- Sites for a few hides/viewing platforms should be selected.
- Several species-specific conservation actions have been identified (flamingo breeding site, oxpecker introduction, Pygmy Goose nest-box plan, Saddle-billed Stork nest location and monitoring; heron breeding site on Lake Manhale) and will be investigated.
- 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

CHAPTER D7: UTILISATION OF TERRESTRIAL WILDLIFE

7.1 POLICIES AND PRINCIPLES FOR THE SUSTAINABLE USE OF TERRESTRIAL WILDLIFE

7.1.1 The operational context for the Terrestrial Wildlife Strategic Utilisation Plan

7.1.1.1 Ownership of terrestrial wildlife

The Terrestrial Wildlife Strategic Utilisation Plan (TWSUP) has been structured to accommodate and reflect the principle that the terrestrial wildlife of VCWS belongs to the communities.

7.1.1.2 Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the model for the utilisation of the terrestrial wildlife of VCWS is largely based on the structure of the 10-point Marine Resources Strategic Utilisation Plan (MRSUP) discussed above.

7.1.2 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.

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.

7.1.3 The Developmental Context

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 (food and skins), the relocated wildlife would have a huge monetary value. Financially the most attractive form of utilization 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, a variety of large herbivores and the opportunity for deep-sea sport fishing, all in one package.
- 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.
- The possibility to train and equip local guides for guided walks by tourists and/or residential estate owners in the Reserve area of the sanctuary, will be investigated.
- Experienced and suitably qualified staff will be appointed to deal with the development and management of the plan.

7.1.4 Lessons learned

The “lessons learned” discussion of the marine resources plan discussed above, could also be applied to the TWSUP:

- 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 will be informed and appropriate channels will be used)
- Participation (TWSUP will have maximal community involvement)
- Decentralisation (the local civil authorities will be used for support and 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.

Notwithstanding the groundbreaking nature of this venture and the absence of similar models to build on, 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. Initially, 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. Again, a direct involvement by VCWS management to provide specialist inputs and 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). 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.

7.1.5 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 MRSUP and may be summarised as follows:

- The plan is uncomplicated in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.

- The plan does not be built on sustained outside intervention and funding, and 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 TWSP below and elsewhere in the BMP being put in place, the implementation of the plan would be jeopardised.

7.2 MANAGEMENT OBJECTIVES, PRIORITIES AND ACTIONS FOR THE TERRESTRIAL WILDLIFE STRATEGIC UTILISATION PLAN.

7.2.1 A seven-point procedure for implementing a terrestrial wildlife strategic utilisation plan for VCWS

A simple 7-step process would be implemented as follows (refer to Volume 2 for a detailed breakdown):

- | | |
|---------|--|
| Step 1: | Identify stakeholders who should be involved in the utilisation and management of the wildlife resource and appoint staff to deal with the development and management 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 wildlife-based 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 wildlife-based VCWS management actions |
| Step 7: | Establish structures and procedures for the equitable sharing of benefits arising from the sustainable use of wildlife resources. |

CHAPTER D8: CONSERVATION AND MANAGEMENT OF TERRESTRIAL FAUNA

8.1 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.

8.2 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.

8.3 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 Reserve 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 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 elsewhere 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 with poor grazing 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.

8.4 MANAGEMENT PRIORITIES, OPTIONS AND ACTIONS

8.4.1 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.

8.4.2 Herbivore reintroductions

The main purpose of the reintroduction programme would be to re-establish and maintain viable populations of game animals that previously occurred in the region but have since disappeared. The following management priorities, options and actions will arise from the reintroduction programme and the presence of game herds on VCWS:

8.4.2.1 *Establish and maintain viable and healthy herbivore populations*

Due to the inherent poor quality of the grazing of VCWS 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 (22 707 ha land, of which an unknown acreage will be taken up by the community development area and would lie outside the Reserve area) 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 land area 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.

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 sub-communities, enhancing the suitability of the vegetation to a wide range of herbivores.

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.

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.

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 have 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.

VCWS had no other option but to erect a game-proof fence between the Reserve area of the sanctuary (the fenced-in 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 of the more selective 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 available in the sanctuary, which means that any local shortages in the quantity or quality of food may escalate into a major management problem.

Based on superficial observations, it would seem as if the sandy soils may be lacking in certain essential microelements. Supplementary feeding in the form of game blocks would thus 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 natural capacity of the grazing.

8.4.2.2 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.

8.4.2.3 Trophy hunting

A final decision on whether to offer trophy hunting safaris or not, would be taken at a later stage. The following aspects would influence the decision:

- 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 because the wildlife numbers of the current VCWS would be too low to sustain a high enough level of consumptive utilization.
- A major factor that will influence the decision would be how well the relocated herbivore populations adapt to their new environment.
- A full financial viability analysis would have to be undertaken before a decision to go ahead is taken.
- 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 for the base camp and the development of the necessary infrastructure.

8.4.2.4 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. Live capture operations in VCWS would be faced with a number of logistical difficulties such as inaccessible terrain and the presence of endemic serious wildlife diseases such as foot-and-mouth disease, malignant bovine catarrh and bovine tuberculosis. Commercial live game sales would thus be restricted to the much less lucrative local market and would be dependent on sponsors being willing to carry the costs of the venture.

8.4.2.5 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.

If the breakout involved potentially *dangerous species* such as buffalo and hippo and especially elephant actions to be taken would include informing the local inhabitants and the civil authorities of the breakout, trying to chase them back, arrange for a specialized capture operation or putting the animal (s) down if necessary.

8.4.2.6 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. Suitable census techniques will be experimented with, and will probably include both ground and aerial counts.

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.

8.4.2.7 Involvement of local communities

It would not be feasible to involve the local communities in any hands-on manner in the day-to-day management of the terrestrial wildlife resources, at least not initially. 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 and information channels with regards to policies and implementation.

8.4.2.8 Game-proof electrified fence

The ideal situation would have been to do without any game proof fence at all. However, 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.

CHAPTER D10: CONSERVATION AND MANAGEMENT OF HERPETOFAUNA

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 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 herpetofaunal population by means of an effective conservation action.

10.2 MANAGEMENT OBJECTIVES

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 herpetofaunal 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)

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.

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.

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 regional conservation action plan is drawn up, implemented and monitored.
- The deterioration in the status of the endangered Dugong *Dugong dugon*
- 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 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

Due to the lack of baseline data, the Strategic Agricultural Development Plan (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. It should therefore be regarded as a provisional plan.

(2) 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 be vested in the local communities. External management assistance and even intervention would nevertheless 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) would be applied.

(3) Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the model for the agricultural development of VCWS is largely based on the structure and principles for 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).

12.1.2 Political and administrative context

Unlike the marine resources, where a shared resource is at stake with VCWS being one of a number of role players, the agricultural resource of VCWS, in common with the relocated wildlife, 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, 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.

12.1.3 Developmental context and strategic framework

The agricultural development plan (the SADP) 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.
- 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 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 potential of the nutrient-poor soils for cash crop production
 - The apparent current inadequate agricultural ability of the local community, especially about the to-be-introduced organic farming or permaculture system.
- 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 allow the principle of organic farming to be gradually established and phased in.
 - **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.

12.1.4 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) as soon as possible.
- To establish small-scale agro-industries and ancillary agribusinesses such as mat weaving and the manufacture of reed furniture.

12.1.5 Lessons learned

In the “lessons learned” section of the marine resources plan particular attention was devoted to lessons that could be learned from past experience and other projects. These lessons are just as pertinent to the strategic agricultural plan. 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 (e.g. 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.

12.1.6 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)

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 MRSUP and TWSUP will be applied to the implementation of the Strategic Agricultural Development Plan (SADP) for VCWS.

- | | |
|---------|--|
| Step 1: | Identify stakeholders and appoint staff to deal with the development and management of the plan. |
| 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

PART E: EXPANSION AND RESTORATION

CHAPTER E1: EXPANSION ACTION PLAN

1.1 INTRODUCTION

In the case of VCWS, factors and motivations other than environmental considerations played a deciding role in the size and geographical characteristics of the current area. The challenge is therefore to consolidate and expand the VCWS in such a way that it best represents the biodiversity of the area and allows for the effective conservation of ecological systems and processes. Phase I of the VCWS initiative covers some 22 707ha terrestrial land with an additional 17 000ha proposed for Phase II.

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 nature-based tourism development. However, ecological considerations played only a minor role when the 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 will have to be “excised” from the Reserve area to accommodate the families that will need to be resettled.
- The grazing capacity for herbivores turned out to be poor, which necessitated a conservative wildlife reintroduction approach. This placed a question mark over the ecological viability of the area to accommodate fenced-in large game species such as elephant and to a lesser extent buffalo and hippo.

- 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. Such a step would contribute to the ecological integrity of the protected area, would ensure that ecologically sensitive wetlands are not bisected by Reserve boundaries, would greatly add to the ecological diversity of the area, would enhance the grazing capacity and the wilderness atmosphere, would add expansive wetlands, would increase the economic viability and would be beneficial to the local communities who would “own” the biodiversity resources. This necessity was in principle accepted in mid-2001 (Lambrechts, 2002b).

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 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 cognizance 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 cognizance 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 cognizance 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 (42 000 ha for the current sanctuary including 19 260 ha sea, 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 to some extent 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 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 one of only a handful of places 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.

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, hereafter 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 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 favor 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:

- 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.

(6) 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.

(7) 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.

(8) 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 what nature could provide, they will now have a fixed income and would have no real need nor the time and hopefully the inclination 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, by reintroducing species that historically occurred in the region and in numbers concomitant with the poor quality of the grazing. The major predators will not be reintroduced due to the low numbers of potential prey species that can be carried. The programme 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 turn out to 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, as was pointed out above, the programme will still be of huge conservation significance. 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:

- 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.
- 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.
- 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.

- 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 bulk-grazer component of the herbivore populations would, in time and linked to an effective burning regime, 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 habitat-induced stress. However, should the wildlife be managed in accordance with the ecological requirements of the species and their numbers maintained within 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 envisaged. 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.

(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):

- 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.
- 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
- The standard of living will increase dramatically due to the large (in local terms) amounts of money that will be in circulation.
- 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.
- 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.
- The community market at Goshen will provide an outlet for local produce and will stimulate entrepreneurial development.
- The Community Development Fund will be administered by the community and will place appreciable amounts of cash at their disposal for community projects.
- 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 social and biodiversity plans that were already accepted in 2001 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 towards 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 wildlife 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 (Refer to volume 2 for a detailed discussion):

- 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

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.

1.3.3 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. 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.

CHAPTER F2: INTEGRATED COASTAL AREA MANAGEMENT

2.1 BACKGROUND

The “need for zoning” motivation as outlined above also provides the rationale for an Integrated Coastal Area Management (ICAM) process. 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 sea grass beds protect the land from storm erosion; and agriculture, housing development, roads and wildlife may have damaging impacts on these coastal resources.

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 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

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 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 single 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 the BMP is by nature based on biodiversity principles and established conservation structures and procedures, it includes two parts dealing with community affairs: this part E (this part) deals with social impacts, and Part F 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 deal with the multi-faceted social plans in this condensed version of the BMP and the reader is thus referred to either Volume 2 for a more detailed discussion, or to the full social reports in Volume 3: Specialist Reports, of the BMP.

CHAPTER G2: SOCIO-ECONOMIC ENVIRONMENT

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.

Patrilineal Xitswa language speakers occupy the Sanctuary. 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 the area 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 all the traditional 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 very 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 only 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. Most houses are surrounded by fields tended by women. The majority of the population carries out subsistence swidden shifting or slash and burn) agriculture with only approximately 4% depending solely on fishing for their livelihoods. Almost half the population carries out agriculture and fishing.

Fishers use boats and nets or lines and also catch fish in traps. Most of their catch is used for local use, but the surplus 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, 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 their numbers are rapidly growing, probably as a result of more cash being in circulation due to the establishment of the VCWS. 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 those families with income from employment and the sale of cane spirit.

CHAPTER G3: 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. Direct involvement of the community in the management and utilization of the biodiversity resources is foreseen, as is sharing in the benefits. 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 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 moment. 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 project 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. The Reserve area impedes socio-economic links and communication within the peninsula and may bring about the physical and social isolation of the fishers of Chingonguene and Chihunzuine. In addition there are potential security problems related to entering and crossing the protected area once the anticipated large and potentially dangerous game is installed.

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 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 and 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 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 at this moment are firstly 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

secondly a 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 cash compensation is then used for immediate short-term lifestyle improving investments.

The additional demands on natural resources, such as land, surface water supplies, marine life stocks 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 more than half 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 is 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 should be 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.

Impacts	Type of significant impact	Positive impact	Negative impacts		
			Direct	Indirect	Significance *
Socio-economic	The social and economic isolation of the Chigonguene 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 terrestrial resources		X	X	25
	Widespread lack of understanding about the objectives and implications of community involvement in the sanctuary project		X	X	16
	Lack 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			X	16

	younger children) in the benefits of the project				
	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
Social	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
Cumulative	Community competition for productive resources augmented by project requirements		X	X	25

* Consequence x likelihood

CHAPTER G4: MANAGEMENT AND MITIGATION OF SOCIO-ECONOMIC IMPACTS

Avoidance or mitigation of most of the negative socio-economic impacts of the Sanctuary project 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. Without effective communication they run the risk to flounder in a rapidly changing world.

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.

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 to 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 and approved in the 2001 Bio-Business Plan was unfortunately not implemented, otherwise at least some of the current negative perceptions would have been avoided.

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 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 various partnership models (marine, wildlife and agriculture) 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 and other participatory projects.

CHAPTER G5: RESETTLEMENT

The main groups that will be 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, 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.

The resettlement programme has completed its first phase and relocated 24 families to Marape in Matsopane Circle during mid-2002. In terms of planning however, it is still in its formative stages. The most important measures that will need to be taken to mitigate the potential negative effects of resettlement are described in Volume 2 and the details may be found in the Resettlement Action Plan (also Volume 2).

Specific mitigation actions will have 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.
- Establishing 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 or improving living conditions, rather than spent on short term improvements to the families' lifestyles. This may be carried out via the Kawene Community Trust if appropriate.
- 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, at least during the period when their normal activities have been curtailed due to the resettlement.
- Providing adequate support and training to allow the resettling people 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.
- In the case of those families that are highly dependent on fishing for their livelihoods, if the loss of access to fishing for any reason is not able to be 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.

CHAPTER G6: OTHER KEY ISSUES

The local people will need to be actively involved in all community-based projects or indeed all projects that may impact in any way on their daily lives, such as for example the alignment of the fence. The structures and processes that will be established to deal with the marine-, wildlife- and agricultural development and utilization plans are built on this principle.

For alternative livelihood sources to be endorsed and accepted by the local communities, they should not involve a major change in activity. Thus permaculture, improved marketing systems and eventually appropriate agribusiness activities, protected area management and tourism development should be encouraged. 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.

An indispensable key element in implementing the various community-based projects would be the establishment of the necessary formal community structures (such as the Community Representative Committee) and project structures (for the agricultural, marine and wildlife projects as described in the BMP). These community committees would ensure that the voice of the people is heard and that their interests are safeguarded.

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)

SUMMARY OF KEY PRINCIPLES, PROCESSES AND ACTIONS

Approximately 8% of the population of some 1,036 families living in the VCWS will be moved *during the first phase of the resettlement programme* and resettled in areas of their choice within the sanctuary. This involuntary resettlement programme is necessitated by the establishment of a nature reserve that will involve the relocation of big game to the area, and the development of private residences and lodges as part of an integrated eco-tourism initiative. (The *second phase* of the resettlement action will only take place once the final Reserve area has been demarcated and fenced; the extent of the second phase movement is unknown at this stage but it will probably be on a smaller scale than the first phase).

The first part of the first phase of resettlement has already been undertaken in which 24 families were moved to new locations. This activity was carried out in close collaboration with Mozambican government representatives and has been carried out up to now within their expectations. This Resettlement Action Plan (RAP) deals only with the second part of the first phase of the resettlement action. The principles embodied in this plan will also apply to subsequent resettlement actions.

Almost all families living on the peninsula are subsistence farmers and a minority is fishers. Almost half of the families are farmers who also fish to subsist. The way of life in Quewene is not easy: the soils are poor and agricultural production is sensitive to shortages of rain, and there is no modern social service infrastructure (except for a health centre currently in construction in the south of the Sanctuary with the assistance of the project). The level of education is very low with approximately 80% of the population being illiterate, and the health status of the population does not appear good. One of the most common activities carried out (50% of families interviewed participate) is the production and marketing of distilled sugar cane products. It is the highest source of income from agricultural produce in Quewene.

Data from the baseline survey shows that the average land area used for cultivation per family is 1.7 hectares. If residential areas, those used for pasture and fallow fields are included, the average size of land used is 3.3 hectares per family. Families identified a shortage of labour for farming (average family size is five people) and a lack of seeds as constraints, but by far the biggest constraint they felt was the lack of a market and marketing system. This holds true for both fishing and agricultural activities. As a result hardly any produce is ever sold – except for cane spirit, which is easy to carry as a headload, and transported to Vilanculos for sale.

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 has evidently been triggered by the increased money circulating in the area due to employment on the project and compensation payments being used to purchase goods and set up more small businesses.

Key issues related to the proper planning of the resettlement programme, include the urgent need for up-to-date information about the affected population from a census of families living in the protected area, in order to define the scale of resettlement impact and to assist the project in protecting itself against unwarranted claims. A complementary issue is the need to map out the area of land available for resettlement in the Marape area so that the total area is known and new settlers can choose their areas to live while also knowing the limits of their boundaries prior to resettlement.

Assessing the scale of the resettlement programme will also depend on the final alignment of the game-proof fence. At present an area of about 8 500ha has been fenced as a temporary measure. This area will be enlarged in the near future to include most of the remaining Phase 1 area to the south, because the current fenced-in area is not large enough to accommodate a viable herbivore population. As a result the numbers of families requiring resettlement will be increased. The schedule for introduction of game to the Reserve area is in the second quarter of 2003, the time by which the Reserve area must also be free of people.

The families being resettled expressed their opinions about difficulties, the most important being problems with communication and awareness about the process and methods being used in their resettlement. A particular difficulty is their understanding of the basis for awarding compensation, and the negotiation process for attributing a compensation value. Although none of the families resettled to date have made any formal complaints, there was a great deal of distress expressed by them in informal interviews about their lack of information about plans and procedures. One of the sources of this problem is the lack of trust between them and many of their leaders (who are all employed by VCWS).

The receipt of large amounts of cash as compensation is not only a security risk, but more insidious is the risk of it not being used for its intended purpose in the restoration of the family's livelihood. This will require close monitoring and recommendations are made to stagger payment in installments if the amount is over US \$800, rather than paying the contracted amount in a lump sum on the date of resettlement. If compensation is not used for the family's benefit it is most likely that women and children will be the losers since they do not have any decision-making power in the household regarding the use of large amounts of money.

Another risk is that of using cash to pay all compensation, even for cultural heritage losses, among people who have very little experience in dealing with cash and value it above almost all else as the route to a better life. This was also exemplified in the treatment of fishers with strong group unity who were able to negotiate higher compensation amounts in comparison to the isolated farmers who were unable to put money values to their subsistence crops. The significant disparities between compensation amounts were partially redressed by the sanctuary unilaterally raising the amounts paid to the farmers. It

is unclear however, what the basis of calculating an amount for compensation was, since all negotiations and addenda to contracts were made in lump sums.

Resettled and other fishers in Chihunzuene / Chingonguene have economic and social relationships with members of their own and other families further south and west of them. They are, for safety and security reasons, fenced out of the Reserve area although v-gates remain for their continued access. Access, however, is likely to be curtailed when free-ranging animals are introduced to the area, effectively isolating the fishers from overland access to other people on the peninsula.

Presently the only area considered as a site for resettlement is Marape on the western side of the peninsula with its western boundary being the Bay of Vilanculos. There are many unknown factors at present and it is not possible to discern whether the available land area will be large enough for the resettling population, and what scale of alternative livelihoods must be offered to them if the land area is insufficient for example. The resettlement process to date has relied on informal customary negotiations between settlers and the host community in securing land for cultivation further away from their houses. The planning process will have to become more transparent with the larger number of incoming settlers, in order to ensure that all are aware that they are receiving what they justly deserve, and so that the host population in the resettlement area is not prejudiced by the resettlement programme.

The RAP follows the format of the other utilisation and development plans included in the BMP, and outlines a plan in which settlers in Phase II will be assisted by trained community development facilitators to become aware of the resettlement process and learn of the options available to them once the process has been initiated. Affected families automatically become eligible for a food subsidy as soon as they stop cultivating their land, and it is suggested that they may also recommend one family member to work for the sanctuary during this period if anyone is suitable.

They will receive assistance to move and will be helped to learn permaculture methods so that they may be able to more obtain greater value from farming. Their efforts to re-establish their livelihoods will be monitored by the facilitators, and extension officers will help them to learn about agricultural improvements. They will have the opportunity to join in groups and apply for project assistance to develop other income generating or skill enhancing projects to enable them to improve their standards of living. Women's groups will be prioritized for these activities.

The provision of potable water supplies, health and education facilities will also be necessary in the resettlement areas. Putting these facilities into operation will have to be agreed to by the relevant District Directorates of government ministries who provide teachers and health staff. It is necessary that such commitments be included in the district plans to ensure financial and other resource support.

At community level Community Development and Resettlement Committees will be set up to assist families with communicating information, channeling grievances and monitoring using early warning indicators to identify families that may not be managing to re-establish their lives for different reasons. The committees will be comprised of local leaders, members of the host community and settler community. They will include religious leaders

and Zone Chiefs who will specifically be tasked with being the listening boards for grievances, since it was they who were identified as being the most trusted leaders in the community.

A Community Development and Resettlement Task Force will be formalized from the incipient team already existing, and a full time Social Development Manager must be allocated the task of managing all the community aspects on the project. This structure will liaise firstly with the Community Representative Committee and secondly with the Project Steering Committee, which will provide oversight of the component and make sure it integrates into the activities of the other project components.

Relocation of all families must be concluded before mid-2003, at which time the introduction of big game to the enlarged Reserve area is scheduled to take place. The final fence line will have been erected by this time, and activities in the resettlement areas will focus on rehabilitating the lives of the resettlers and getting them involved in livelihoods development activities that aim to enhance their ways of living. Monitoring will proceed throughout the process and all activities will continue to be documented. Participatory monitoring of key indicators such as illness episodes, the increase in numbers of traders' stalls and variety of goods on sale in Quewene, and the prices for goods sold will help communities keep track of information that is also useful to them.

Monitoring information of project progress through assessment of the achievement of critical benchmarks and the evaluation of impact in the community will all be compiled and presented in bi-annual and annual reports to donors and other stakeholders. All monitoring will be undertaken in-house, but evaluations will require the additional services of external specialists.

1.1 PRINCIPLES AND POLICIES FOR THE RESETTLEMENT ACTION PLAN

1.1.1 Purpose

The purpose of this Resettlement Action Plan (RAP) is to document the resettlement process that will be undertaken to physically resettle 62 households (the second part of the first phase of the resettlement plan) and to develop alternative livelihoods for these and other households currently mainly reliant on swidden/shifting agriculture (which is not permitted in the Reserve area) 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).

1.1.3 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, 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) would be applied, to ensure that the community retains 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.

1.1.4 Standardising on procedures and processes

In order to enhance the marketability and replicability of the management procedures and processes that will be used, the 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.

1.1.5 Lessons learned

In the “lessons learned” section of the three plans mentioned above, but especially the marine resources plan, particular attention was devoted to lessons that could be learned from past experience and other projects. 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” are all applicable to the RAP:

- 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 (the RAP must be community driven, although execution will largely be a sanctuary management responsibility)
- Decentralisation (use the local civil authorities in a supervisory and monitoring capacity)
- 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 the 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.

1.1.6 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 is simple in terms of structure and execution and will not necessitate extensive behavioural changes over a short period of time.
- The plan does not built on sustained outside intervention and funding, and 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 an organised manner involving facilitators and modern communication techniques.
- Without the formal community structures as outlined in the RAP and elsewhere in the BMP being put in place, the implementation of the plan would be seriously jeopardised.

1.2 THE RESETTLEMENT ACTION PLAN

A simple 11-step process, described fully in Volume 2 and 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:

- | | |
|----------|---|
| Step 1: | Establish an organisational framework and appoint staff to implement and manage the RAP |
| 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 |

CHAPTER H2: COMMUNITY DEVELOPMENT PLAN (CDP)

SUMMARY OF KEY PRINCIPLES, PROCESSES AND ACTIONS

All communities in the sanctuary will be affected by the VCWS project insofar as general regulations applying to their controlled use of land and marine based resources will affect their lives. A resettlement programme (see Resettlement Action Plan) is being developed to assist the families that will relocate to an area to the north east of the community part of the Sanctuary to re-establish their livelihoods.

A community development programme will be carried out by the sanctuary project to enable the resettling population to regain and further develop their livelihoods and to assist the rest of the population in the sanctuary to gain the opportunity to improve their standards of living.

The people of the Quewene peninsula are isolated and most of them have to survive on an income of less than half the minimum prescribed salary for Mozambique. Their health does not appear to be very good (there are no health facilities to obtain statistics of their status) and the reported mortality rate for 2001 extrapolated from the baseline survey is 0.3%.

Resettlement is taking place to an area with poor soils and a low carrying capacity. The resettling families are all being compensated for their physical and economic losses, however their dependence on subsistence agriculture based on swidden farming, fishing and collection of natural resources for sale and use are all capacities that will continue to be affected to some degree by the sanctuary. Controls on burning vegetation in the sanctuary and limiting the use of trees and plants to outside of the Reserve area as well as likely controls on fishing in the future affects almost everyone.

The Community Development Plan (CDP) focuses on three target groups: the resettling families, the rest of the population in the sanctuary, and the development facilitators. Specific community development activities will be directed at each one of these groups – the resettling families will be assisted to regain and establish their livelihoods, they and other community groups in the sanctuary will have the opportunity of proposing development projects which may merit assistance from the sanctuary to help broaden their livelihood source base and increase their household security.

The third group is the development facilitators themselves. They will benefit from training and capacity building so that they can develop a communication strategy and then implement an awareness raising communication campaign that provides information about the resettlement programme – process, timing and compensation procedures; about the menu of different kinds of activities that can be supported by the sanctuary on the basis of an approved proposal – hence information will include the types of project that can be supported, rules and procedures for application, and the criteria and process used to assess the project for approval; and about channels for communication of grievance procedures.

A communication procedure will be used that will turn the development process into a participatory and problem solving approach. It will depend on one-on-one communication, group discussions and an analysis of situations and identification of potential solutions. Participatory methods will be employed and visual materials for facilitation of better communication and provoking interest will be used. The CDP facilitators will be trained to use these methods, and with the collaboration of local communication specialists will

develop the capacity to manage the use of audio and visual means of recording. The use of these techniques will encourage exchanges of experience, self-analysis by groups of their development solutions and of the processes for achieving these, learning lessons and sharing them and sharing with others outside of the sanctuary who are interested stakeholders or donors.

Various potential community development project alternatives will be assisted by the sanctuary project to start up and become established. The suggestions outlined in this CDP are based on the results of the baseline survey and people's ideas and needs expressed at that time. New ideas will have the opportunity to be expressed during the discussion groups that will be used by the facilitators to assist communities develop the elements of a viable project proposal, as well as during other assistance and monitoring visits.

All the community proposals should include ideas for monitoring progress in their achievement of objectives. Assistance may be in the form of learning skills to improve activities they already carry out in the areas of current livelihood sources – agriculture, fishing and trading / marketing. This range may be expanded or changed as demands increase and as the sanctuary's capacity to respond grows over time. Reproductive health awareness-raising will be introduced into facilitator's programmes and promoted at the health unit in order to mitigate the potential effects of the entry of outsiders into Quewene, and improved communication with the hinterland and elsewhere.

In addition, education and basic training in the area of conservation and natural resource management will permit key participants in the management process to learn from each other about how best to manage the resources they have. The development of activities in this area will be dependent on the sanctuary's conservation and sustainable resource use programme, as embodied in the various utilization plans. It should however be participatory and thereby permit learning by the community as well as the external specialists. In addition, during this process educational material on conservation and sustainable resource use for use in the schools can be developed as appropriate.

The management and coordination of this component will depend on a simple four-tiered structure composed of two to three Community Resettlement and Development Committees (CRDC) at the base. These will be organized in each resettlement area (including Phase 1 resettlement areas), and also in the south as well where there is currently no resettlement, but where development projects and, in the near future also resettlement, will be carried out. The Committees will be responsible for coordination and information management. They will help supervise and monitor activities in their areas and serve as one of the first lines of reception of grievances.

The CRDCs will liaise directly with the Community Development and Resettlement Task Force. This second-tier structure is led by the Sanctuary-employed Social Development Manager and made up of members of the district government, representatives from the community in the Sanctuary, and members of the local government and local leaders. The Social Development Manager will be responsible for the coordination and supervision of all the social development activities; he/she will supervise the field workers directly, and will also be a member of the third-tier Project Steering Committee. The Steering Committee is chaired by the VCWS GM and is the main mechanism for bringing together local stakeholders and for guaranteeing the operational progress of the project. This is the

most senior site-based management tool of the project and is ultimately responsible for all community related activities. The fourth tier of the structure will be the Community Representative Committee, an elected over-arching body representing all the people of the VCWS and to which all the project-specific committees (community development, marine, terrestrial and agricultural) are affiliated and report to. (The level of involvement of the CRC in the baseline activities and projects need still to be determined)

The monitoring system will be based on information gathered at community development project level, indicators will be monitored by the facilitators and community in participatory learning events, and also from periodic monitoring visits by facilitators and members of the district government for example. All monitoring information will be updated and reported on in monthly reports as well as the six monthly and annual report shared with donors and other stakeholders.

2.1 PRINCIPLES AND POLICIES FOR THE COMMUNITY DEVELOPMENT PLAN

2.1.1 Guiding principles

The main initial thrust of the CDP will be aimed at the resettling households. 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 will 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.

In order to ensure the greatest possibility of success a number of lessons learned in similar programmes elsewhere will be harnessed to guide the CDP:

- 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.

The concept of dialogue and interpersonal communication will be applied throughout the whole continuum of CDP activities. Introducing a comprehensive communication strategy effectively provides a framework for action, in which existing efforts can be improved through an effective communication approach. It will be the primary vehicle for role change, for participation and stakeholder involvement in successful sustainable livelihoods development.

The practical use of the communication approach in the CDP 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.

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, which 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.

2.1.2 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, 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 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.

2.1.3 Standardising on procedures and processes and lessons learned

The model for the development of affected households in VCWS applies the same basic procedures and processes and shares the same lessons as the models for marine resources, terrestrial wildlife and agriculture as discussed above and in Volume 2 of the BMP.

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 lack of proper community structures and poor communication, need to be addressed.

2.2 PRIORITIES AND ACTIONS FOR THE COMMUNITY DEVELOPMENT PLAN

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 and is described in detail in Volume 2 of the BMP.

- | | |
|---------|--|
| 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

Community Development Fund (CDF)

One of the community development projects discussed in Step 5 is the establishment of the Community Development Fund (CDF)

Although the communities did not specifically identify the need for a CDF to be controlled and administered by themselves, 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:

- i) VCWS will collect all the identified CDF monies on behalf of the Community Representative Committee (CRC; see Part L).
- ii) The CDF will be controlled and administered by the CRC.
- iii) The CRC will open a bank account in Vilanculos.
- iv) VCWS will assist the CRC in formulating a constitution for the CDF and to determine procedures and safeguards for the allocation of funds.
- vi) The CRC will determine its own priorities for allocating the money. VCWS will subtly advise the CRC in this regard.
- vii) The fund will be administered according to Generally Acceptable Accounting Practices (GAAP). VCWS will provide training and guidance in this regard.
- viii) 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:

- i) A certain percentage of the Mazarette Estate levies (around 7%) will be channelled to the CDF.
- ii) 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.
- iii) 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)

CHAPTER H3: PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)

SUMMARY

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 VCWS 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. A number of full public meetings at site level were held in Quewene to present the project to the principal local stakeholders. The process of disclosure of the project EIA also involved public hearings, which were held in Inhambane, Vilanculos and Maputo.

In Quewene the project has been presented to various groups of the community by local project staff members in the course of their work. The objectives of the project, the benefits that could be expected from the project and the need for some families to have to move were all explained at the meetings. Consultations specifically related to the resettlement programme were documented. However, and this would probably be the root cause for the information and disclosure shortcomings and deficiencies indicated in the BMP, 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.

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 clients, 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.

3.1.4 Lessons learned

The "lessons learned" sections of the three natural resources plans mentioned above, and to a lesser extent also the RAP and CDP, dealt with universally applicable principles and should also be considered when planning, implementing and managing the PCDP.

3.2 PRIORITIES AND ACTIONS FOR THE PUBLIC CONSULTATION AND DISCLOSURE PLAN

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 PCDP is discussed in detail in Volume 2.

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 grievance procedures
Step 7:	Establish feedback channels

PART I: TOURISM DEVELOPMENT

CHAPTER I1: INTRODUCTION AND OBJECTIVES

1.1 INTRODUCTION

Interdependency between conservation, utilisation and benefit sharing has been established from the onset of the VCWS 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. Tourism and tourism-related activities are thus inseparable from the biodiversity resources.

The general objectives for sustainable ecotourism development at VCWS 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.”

More specifically, the tourism development objectives were defined as follows:

- To develop a biodiversity friendly strategic tourism development plan which will establish a set of principles, frameworks and mechanisms on which the ecotourism development will be based;
- To review the existing tourism industry body in the Vilanculos area;
- To suggest codes of practice for the industry;
- To review tourism-based current and prospective community benefit-sharing and make recommendations for its maximisation.

CHAPTER 12: 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

Any tourism development plan for a protected area should ideally be based on the carrying capacity of the area for different 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. In the meantime the principle of adaptive management will be applied to alleviate the impacts of this shortcoming.

(2) Ownership

The Strategic Tourism Development Plan (STDP) for VCWS has, unlike most of the other counterpart strategic plans, 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.

(3) Tourism in 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.

(4) The biodiversity context

The developmental and utilization policy of VCWS, and thus also the tourism development, is in line with the triple bottom line business approach of the Convention on Biological Diversity (CBD) (1992) namely the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits.

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).

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. These innovative tools provide guidance in the development of a biodiversity business, and will be used to facilitate the planning and development of ecotourism in VCWS.

(2) Mission and objectives

The mission statement for VCWS 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.

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.

(1) Biodiversity and Conservation (BD&C)

Issue: Consistency with National Plans, Policies and Regulations

The development of VCWS is consistent with national plans, policies, regulations and relevant laws of Mozambique. However, the legal requirement with regards to EIA's has not consistently been met in the development of the sanctuary, for example with regards to landing strips.

Issue: Awareness of, and collaboration with, other actors in the field of biodiversity and tourism

The current ties with other tourism and biodiversity enterprises and role-players need to be strengthened.

Issue: Consistency with the key biodiversity priorities 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.

Issue: Tourism impacts and carrying capacity

There is an urgent need for qualitative and quantitative data with regards to tourism carrying capacity and defining the limits of acceptable changes to assess what impact the

project will have and to ascertain rigorously whether the ecosystem can absorb the anticipated managed level of visitation.

(2) Economically Sustainable Use (ESU)

Issue: Government support and consistency with national tourism and regional planning policies

The target objective pertinent to VCWS of the National Policy and Strategy of Tourism is to contribute to the 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

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 has not compiled an assessment on paper).

Issue: An integrated sustainable approach, using technologies to promote the harmonization of the project with the landscape

All tourism-related impacts (refer to Volumes 2 and 4 for a comprehensive list) will need to be identified and addressed at an early stage of development.

(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

A simple 11-strategy process roughly based on the same principles and procedures as the other strategic plans discussed above, will be applied to the implementation of the Strategic Tourism Development Plan (STDP) for VCWS. For a full discussion of the STDP refer to Volume 2 of the BMP.

- | | |
|-------------|--|
| Strategy 1: | Establish the Sanctuary Tourism Task Force (STTF) 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 (inventory of tourism attractions; map of attractions and activities; ecotourism carrying capacity) |
| 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

MODULE 2: INSTITUTIONAL DEVELOPMENT IN THE TOURISM SECTOR IN THE VILANCULOS AREA

2.1 BACKGROUND

The government of Mozambique considers tourism to be a priority area in the current process of economic recovery, minimising of poverty and development, and has taken a number of actions to further the important role of tourism including the formulation of a tourism policy in 1995 and the setting up of a Commission for Facilitation of Tourism.

2.2 REVIEW OF THE LOCAL AND NATIONAL TOURISM SECTORS

The National Policy and Strategy of Tourism recognises that tourism should remain an activity of essentially private sector initiatives and that it should contribute to a better quality of life for the Mozambican population, to equitable development of the country and to the 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 Vilanculos Zone is seen as the most important zone for short-term exploration. Tourism is seen as the greatest economic force in the Vilanculos Region.

2.3 RECOMMENDATIONS

The following shortcomings have been identified at a national level and may be followed up with the relevant authorities:

- 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 need to be developed.
- The promotion of inter-sectoral linkages is seen as crucial.
- A body for co-coordinating interaction between biodiversity and tourism need to be created.

The proposed mission statement of the northern sector tourism organisation of Inhambane province does not fully reflect the overarching concept of biodiversity conservation, and a section on environmental stewardship need to be included.

Furthermore, the organization 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 in the Vilanculos region to ensure effective law-enforcement on critical biodiversity issues such as the use of gill nets and the conservation of the critically endangered dugong.

Tourism in the area would benefit from the development of an inventory of regional ecotourism attractions (highlighting for example the threatened biodiversity of the region), and safety aspects of tourism need to be addressed as rescue boats, emergency medical care, etc. are lacking.

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 management tools that may be used to reduce the impacts arising from tourism is getting the tourists to adhere to codes of conduct. Tourists are often enjoined to "leave only footprints." Codes of practice and conduct provide a mechanism for achieving this.

The comprehensive VCWS codes (see Volumes 2 and 4) are based on best practice, were compiled especially for VCWS (French 2002) and are to be adapted with stakeholder participation in due course.

3.2 CODES OF CONDUCT

The VCWS codes of conduct provide guidelines for diving and snorkeling the coral reefs, for visitors to the lodges and for Mazarette Estate homeowners.

MODULE 4: INTERPRETATION PROGRAMME

4.1 INTERPRETATION CENTRE

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. An interpretation centre is notoriously difficult and expensive to manage, maintain and upgrade, but 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.

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.

4.2 FIELD GUIDE

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. A feasibility study will be undertaken prior to an implementation decision being taken.

4.3 INFORMATION BOARDS

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.

PART J: CONSERVATION INITIATED OPPORTUNITIES

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 constantly be developed and implemented.

It should be accepted that the community will 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 which will have to be spent to ensure enforcement of sustainable utilization measures.

CHAPTER J1: INTRODUCTION

The eventual success of the VCWS development will ultimately be decided by its sustainability: both ecologically and economically. 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 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 need to be integrated. The impact that the VCWS development will have on the local community will be far-reaching in many respects. They 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, incentives can easily be understood by the community as 'hand-outs'. For this reason preference is given to the term 'conservation initiated opportunities' rather than the more commonly used term 'conservation incentives'.

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.

A specific directive approach to especially wildlife management is required to ensure that the community will eventually benefit. The two major role-players and interest groups in the VCWS that are most 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. 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.

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.

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 bed-night. The lodges provide the administrative and logistical support to the fund, but the fund is controlled by a committee on which the community is well represented. 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.

Subsistence agriculture has for all the local peoples' lives been part of their history, traditions, culture and way of living. Being resettled away from more fertile areas of their

choice, everything possible should be done to encourage continued agricultural production. Projects aimed at the enhancement of organic agriculture practices will be encouraged and supported, both 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 Peninsula 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. The benefits identified and discussed in the BMP are by no means exhaustive and new incentives should constantly be developed and added. 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

The VCWS development has brought dramatic change to the lifestyles of the local Quewene people. 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.

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.

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. 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.

3.3.1 Construction phase

In order to optimise the benefits to the community during the construction phase of tourism facilities, priority will be given to the usage of local material and local labour. The usage of local material creates many indirect employment opportunities and prevent the drainage of invested currency. 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 Mozambiqan 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.

The developer estimated the total construction cost of the lodges at \$10m and that of the 54 private houses at \$16,2m. Therefore, total spending of construction costs within Mozambique will amount to approximately \$18,8-million (72% of total), of which labour costs (35%; direct and indirect) will amount to approximately \$9,1-million.

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 current prescribed minimum wage payable to a full-time employee in Mozambique amounts to approximately US \$32,50. 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 9 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.

(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.

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 Reserve, tourist developments would have been very limited.

Although the CIO's derived from the Reserve 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 innovative conservation action can be classified in the following groups: direct employment, indirect employment, associated activities and consumptive utilization of game.

4. 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
1. 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
--	-------------------	--	---

- 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.

C>:Sanctuary1/MSWord

PART K ECONOMIC ISSUES AND ANALYSES

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.

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
--	------	------	------	------	------	--------

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 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>
---	---

(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)
(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>

(4) General Services Division:

<i>General Services Assistants</i>	<i>2 x Assistants</i>
<i>(5) <u>Scientific Support Services Division</u>¹</i>	
<i>Support to TDS's, scientists</i>	<i>2 x Assistants</i>
<i>(6) <u>Agricultural Services Division:</u>¹</i>	
<i>Agricultural Extension Officers</i>	<i>4 x Extensionists</i>
<i>(7) <u>Terrestrial Wildlife Services Division:</u></i>	
<i>Wildlife Services Officer</i>	<i>1 x Wildlife Officer</i>
<i>(8) <u>Marine Services Division:</u>¹</i>	
<i>Marine Plan Assistants</i>	<i>2 x Marine Officers</i>
<i>(9) <u>Administrative Support Services Division</u>¹</i>	
<i>Administrative support</i>	<i>1 x Bookkeeper 3 x Clerk</i>

¹ *The staffing of these Divisions are influenced by the GEF projects as embodied in the BMP. These Divisions will therefore in all likelihood be scaled down or some of them even dissolved altogether after expiry of the GEF contract. Decisions in this regard will be taken some time during the deployment of the GEF project and will be influenced firstly by the sustainability of the specific service and secondly the ability of the project to continue offering and sponsoring the service. It is suggested that most of the appointees to these posts, at the discretion of the VCWS-GM, be appointed on a contractual basis with a specific contract period that could be linked to the GEF contract.*

(4) Staff and liaison structures

Sanctuary Management Committee

- (i) The Sanctuary Management Committee (SMC) will be chaired by the GM and with the DGM, Project Leaders and Division Heads as members.
- (ii) The GM may at his discretion co-opt other members to the SMC, or may invite other role players to attend specific meetings.
- (iii) The main function of the SMC will be to ensure that the sanctuary is developed, managed and utilised in accordance with this BMP and the relevant OPs.
- (iv) The GM will specify the frequency of meetings and will determine meeting procedures to be followed. Proceedings will be minuted, and the minutes will 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:

- (i) The GM, Project Leader: Community Affairs and possibly also the Division Head for Community Affairs will attend all KCA meetings.
- (ii) 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.
- (iii) The VCWS quarterly reports (see below) will be made available to the KCA for their information.
- (iv) 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:

- (i) 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.
- (ii) Structure the organisational chart of the company in such a manner that the maximum possible separation could be achieved between commercial and conservation activities.
- (iii) 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:

- (i) 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
- (ii) 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).
- (iii) 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)
- (iv) 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.
- (v) The incumbent could, if necessary, be provided with office space and administrative support at the company HQ.
- (vi) 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:

- (i) 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
- (ii) 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.
- (iii) 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).
- (iv) The GEF-PM (Implementation) would to a large extent operate independently, but would be supervised within the established GEF control and supervising channels.
- (v) 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)
- (vi) 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.
- (vii) 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.
- (viii) 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.
- (ix) 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)
- (x) In order to fulfill his/her 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.

- (xi) 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.
- (xii) 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 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:

- (i) 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.
- (ii) 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.
- (iii) 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.
 - (iv) 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.
 - (v) 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 focused 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 can 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 realized
- 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 treats 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 PCDDP 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 will be investigated. 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 only covers the GEF contracted period.
- The budgeted amount exceeds the maximum possible GEF allocation of US \$ 3 million.

- 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 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. A variety of worthwhile activities that are included in the BMP, will thus not be able to be financed by GEF funds. These activities were nevertheless retained in the text for possible follow-up funding at a later stage.
- 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 the final year of the GEF contract.

2.3.1 Operational GEF budget for VCWS

See Appendix 1(Excel Spreadsheet Called "OPERATIONAL BUDGET")

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 with all but the major lakes drying up.

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.) The abovementioned drying up of most of the freshwater lakes during periods of extensive droughts will thus have serious consequences for the VCWS development and place a question mark over the current estimates of the sustainability of the resource.

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 should focus 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). Cross section of representative wetlands to be flagged, water levels measured and monitored at	Urgent: TDS (Temporary Duty Specialist) Estimated time: 14 days Field staff. Technique to be

	regular intervals to build up a picture of seasonality, diversity and dynamics (Tarboton, 2002). Observe and record species encountered throughout the year	developed. (OP) Estimated time: 24 days 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	Priority project (Automated installation to

	analysis/dissemination of data for scientific and management purposes.	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

* Note: The maximum GEF funds that may become available would not allow all of these activities to be undertaken. A priority list will be drawn up by the VCWS-GM in consultation with the GEF Project Manager (Implementation) Refer to the RM&E strategy below.

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	Monitor the rehabilitation process in selected slash and burn degraded areas (Peel, 2002). Monitor the effects of management induced fires and firebreaks (Peel, 2002)	Field staff Technique to be decided on (OP) Estimated time both: 36 days Field staff Technique to be decided on (OP)
<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

* Note: The maximum GEF funds that may become available would not allow all of these activities to be undertaken. A priority list will be drawn up by the VCWS-GM in consultation with the GEF Project Manager (Implementation) Refer to the RM&E strategy below.

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; Dutton; Odendaal, 2002); The classification and ecological significance of the freshwater wetland system in the VCWS, procurement and collating and of prescribed data	University/institutional Priority project Estimated time: 30 days 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

* Note: The maximum GEF funds that may become available would not allow all of these activities to be undertaken. A priority list will be drawn up by the VCWS-GM in consultation with the GEF Project Manager (Implementation) Refer to the RM&E strategy below.

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/upgraded 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.

(2) 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.

(3) 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.

(4) 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. (Refer to Part L)

(5) 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 its 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 (AFTER THOMPSON 2002)

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 traveled 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 regional/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
<i>BIODIVERSITY AND CONSERVATION</i>	
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
<i>ECONOMICALLY SUSTAINABLE USE</i>	
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>SBSR</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.
	1 st full external evaluation of project against original project

2 (end)	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.

* There is a possibility that the GEF project will only cover a period of 5 years, in which case the scheduled RM&E activities will move back to year four.

3.4.3 External validation

External validation will be undertaken according to standard IFC/GEF procedures and policies.

REFERENCES

The comprehensive list of references for Volumes 1, 2 and 3 of the BMP is included in Volume 2, the full report, and will not be repeated here. Refer to the attached CD for Volume 2. Each specialist report (Volume 4) has its own reference list.

