Strategy and Action Plan for the Conservation and Management of Elephants in Mozambique 2010-2015

Maputo
March 2010

Revision 1.4

ACKNOWLEDGEMENTS

_____

EXECUTIVE SUMMARY

Over the past 40 years in Mozambique there has been an overall contraction of both numbers and range of the African elephant *Loxodonta africana* population. The national strategy for elephant management drawn up in 1999 viewed elephant as a valuable natural resource and a key component of Mozambique's development options for sustainably utilizing forest and wildlife resources.

It is now 10 years since this strategy was produced, during which time the country's elephant population has increased to an estimated 22,000 elephants. In the interim further changes, most notably human and elephant population increases, have taken place in Mozambique which have acted both positively and negatively for elephant conservation. Thus the existing elephant strategy and plan is in need of updating.

Mozambique has a total protected and conservation area network of ~136,000 km^2 corresponding to 17% of Mozambique's land surface, and comprising national parks, national reserves, hunting areas, community conservation areas and game farms. Although all these PAs enjoy legally protected status within which people should not be resident, most if not all are settled to a greater or lesser extent. These areas are presently administered and managed by two Directorates, DNAC and DNTF.

The 1999-2009 National Strategy for the Management of Elephants in Mozambique was able to meet its higher-level goal targets, specifically a 20% increase in its elephant population; management plans and biodiversity inventories produced for the majority of the country's protected areas; and the return of at least 20% of gross wildlife revenues to communities has been entrenched in legislation. However disbursement mechanisms are such that the perception of many communities is that they do not receive benefits from wildlife.

Whilst the present population increase to 22,000 elephants ranges over 52% of the country, elephant numbers and range are probably decreasing as human population numbers increase and natural habitat is modified and exploited. There are four to six main sub-populations or clusters of elephants in 3 main regions of the country, in the north, centre and south. Each of these sub populations has existing links with transboundary populations in South Africa, Tanzania, Zimbabwe and Zambia. Internal as well as cross-border poaching of elephants exists and current field protection and law enforcement measures are weak.

Each of the sub populations (North, Central and South) will need their own set of management objectives and accompanying action plans, together with management plans for the relevant conservation and protected areas within which they occur. The management objectives set for these populations will need to meet political, social, technical, economic, ecological and institutional requirements. The key conservation issue will be to create and implement the enabling conditions for people and elephants to co-exist where they occur together.

These conditions will need to be both long term, through appropriate spatial planning including participatory land use planning, zonation and consolidation of arable agriculture and the application of farmer-based human elephant conflict (HEC) mitigation measures in the short term. For HEC management to be effective in the long term, actions have to be taken at all levels. There have been few efforts to address root causes. This requires actions at higher levels including cross-sectoral planning within and amongst government agencies.

If elephants and other large wild indigenous mammals in Mozambique are to survive both in and outside of conservation areas, and the problems of HEC are to be overcome, the benefits to local people of living with this wildlife must exceed the costs of living with it and the benefits of living without it. In other words wildlife must provide added value if behavioral responses to wildlife are to change for the better. Community based conservation must include the further development and establishment of community associations which are empowered with skills, knowledge, responsibility and accountability for, and the rights to use, trade and benefit from, their natural resources.

The National Strategy and Action Plan for the Conservation and Management of Elephants in Mozambique seeks to maintain and, where possible, increase the numbers and range of elephant populations, their habitats and associated biodiversity, ensuring full economic benefit to national and local development, including the communities with whom they share the land. This will be achieved by conserving elephants and their range through the provision of effective protection; managing elephant populations in collaboration with local stakeholders; reducing HEC through mitigation, spatial planning and increased community benefits; ensuring an efficient and effective institutional and organisational framework for elephant management; enhancing elephant conservation through policy and legislative change and unified management; and better communication at all levels and sectors of society.

_____

ABBREVIATIONS AND ACRONYMS USED

AED	African Elephant Database
CBD	Convention on Biodiversity
CBNRM	Community Based Natural Resource Management
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DNAC	National Directorate of Conservation Areas
DNFFB	National Directorate of Forests and Wildlife
DNTF	National Directorate of Land and Forests
DPA	Provincial Directorate of Agriculture
DPTUR	Provincial Directorate of Tourism
FR	Forest Reserve
GoMz	Government of Mozambique
HEC	Human Elephant Conflict
HWC	Human Wildlife Conflict
MADR	Ministry of Agriculture and Rural Development
MINAG	Ministry of Agriculture
MICOA	Ministry for Coordination of Environmental Action
MITUR	Ministry of Tourism
NP	National Park
PA	Protected Area
PAC	Problem Animal Control
PH	Professional Hunter
SDAE	Serviços Distritrais das Actividades Económicas
SO	Safari Operator
SPFFB	Provincial Services of Forests and Wildlife
TFCA	Transfrontier Conservation Area
ZIMOZA	Zimbabwe-Mozambique-Zambia (future TFCA)

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

ABBREVIATIONS AND ACRONYMS USED

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Land use
1.2 Development, human populations and demographic change
1.3 Conservation areas

2. INSTITUTIONAL FRAMEWORK

2.1 Policy and law
2.2 Conservation agencies

3. NATIONAL STRATEGY FOR THE MANAGEMENT OF ELEPHANTS IN MOZAMBIQUE 1999-2009

3.1 Goal targets

4. CONSERVATION STATUS OF ELEPHANTS IN MOZAMBIQUE

4.1 Numbers, range, trends and mortality
4.2 Elephant sub-populations

5. KEY ELEPHANT CONSERVATION ISSUES

5.1 Elephant numbers, range, trends and mortality
5.2 Protection of elephant
5.3 Management of elephant
5.4 Institutional framework
5.5 Legislation
5.6 Unified wildlife management

6. COEXISTENCE BETWEEN ELEPHANTS AND PEOPLE

6.1 Human populations
6.2 Elephant habitat requirements
6.3 Human elephant conflict
6.4 Community based conservation

7. NATIONAL STRATEGY 2010-2015

7.1 Vision and long term objective
7.2 Goal
7.3 Objectives, Targets and Activities
7.4 Assumptions to be met

8. IMPLEMENTATION PROCEDURES

_____

_____

1. INTRODUCTION

Over the past 40 years in Mozambique there has been an overall contraction of both numbers and range of the African elephant *Loxodonta africana* population (MADR-DNFFB 1991, AGRECO 2008, Ntumi *et al.* 2009). Formerly abundant, hunting, poaching and agricultural development reduced elephant numbers during colonial times, estimated at >50,000 in 1974, together with habitat and range. Two decades of civil war following Independence contributed to further declines, reducing numbers to ~13,000 by 1991 (MADR-DNFFB 1991), at which time the first plan for elephant conservation in Mozambique was drawn up.

This was largely a funding plan focused on three prioritised areas of activity: (i) the development of a new protected area network; (ii) re-establishment of the government agency responsible for conservation and (iii) the development of tourist facilities. Consequently the plan went beyond just elephants although elephants were a strong justification for the plan as elephant numbers continued to decline despite the 1989 CITES Appendix 1 listing at the time, primarily due to poaching for both ivory and meat.

The national strategy for elephant management drawn up in 1999 (MADR-DNFFB 1999) viewed elephant as a valuable natural resource and a key component of Mozambique's development option for sustainably utilizing forest and wildlife resources. It is now 10 years since this strategy was produced, during which time the country's elephant population has increased to an estimated 22,000 elephants (AGRECO 2008). In the interim further changes have taken place in Mozambique, most notably human population increases which have acted both positively and negatively for elephant conservation.

Thus the existing elephant strategy and plan is in need of updating. There has been institutional change in government relating to wildlife conservation, growth in human populations has contributed to the loss of wild habitat and fragmentation of elephant populations, and human-elephant conflict has increased. At the same time the transformation and further development of protected areas within Mozambique, coupled with transboundary initiatives and their regional economic importance, has heightened the awareness of the role elephants can play in these initiatives. Hence the need and desire to review and update the existing management strategy for elephants in Mozambique, and to prepare a detailed action plan for their continued conservation and management.

1.1 Land use

Mozambique covers ~800,000 km^2 along the east coast of southern Africa with a long Indian Ocean shoreline of over 2,000 km. Much of the country is made up of a ~300 km wide coastal and often swampy strip below the continental escarpment and plateau. Centrally, the country extends inland up the Zambezi valley, and further south along the Limpopo-Save river systems. In both, mopane (*Colophospermum mopane*) woodlands dominate while dry and moist miombo (*Brachystegia* spp.) woodlands are common in the north and central areas above the Zambezi where the southern tip of the Rift Valley drives a wedge into the country. Here a more temperate climate prevails above 800 m asl. With an inter-tropical climate, rainfall varies from 1,000 -1,200 mm per annum and temperatures are generally high.

Covering nearly 25% of the country, the primary land use is subsistence agriculture with cassava, millets, maze and sorghum the staple foods. Small stock (chickens, pigs, goats) are widespread while cattle occur mostly in the centre and south of the

country. Principal cash crops include sugar, coconut, sisal, cotton, tobacco and cashew nut production with limited intensive irrigation in river valleys.

Forests and other natural vegetation, covers nearly 60% of Mozambique (Table 1), although across much of the country, and especially along the coastal hinterland, this is a mosaic of settled cultivated land interspersed with natural vegetation (AGRECO 2008). Set within this is some 135,631 km^2 of protected areas (PAs) established for conservation and wildlife protection purposes. Nevertheless, nearly all PAs have people living in them, with varying densities and settlement patterns

Table 1. Major land uses in Mozambique (MADR 2007)

Land use	Area (ha)	Area (km^2)	%
Protected Areas	13,563,100	135,631	17
Forests and natural vegetation	47,200,000	472,000	59
Agriculture	18,000,000	180,000	22.5
Urban development	2,000,000	20,000	2.5
TOTALS	80,000,000	800,000	100

1.2 Development, human populations and demographic change

The GoMz has defined as its main objectives, poverty reduction, primarily through agriculture, rural development and development of human capacity, so as to ensure the social and economic integration of the most vulnerable population groups.

Mozambique currently has a human population of 20.2 million people (INE 2007), increasing at ~2.2% per annum. This population has doubled over the past 28 years from an UN estimate of 10 million people in 1979 and 12,000,000 by 1980 (INE 1980). The rural population numbers 14.8 million people or 72% of the total population (Table 2). Nevertheless, as Table 1 shows, over 50% of the landscape is still made up of forests and other natural vegetation.

Table 2. Rural population numbers in Mozambique by Province (INE, 2007)

Province	Total population	Males	Females	Area km^2	Population density
Tete	1,522,569	738,604	783,965	100,646	15
Maputo	376,875	178,239	198,636	23,622	16
Gaza	922,382	409,713	512,669	75,324	12
Inhambane	989,172	436,385	552,787	68,772	14
Manica	1,055,042	497,899	557,143	62,324	17
Sofala	1,014,167	481,313	532,854	67,704	15
Cabo Delgado	1,271,173	612,391	658,782	77,872	16
Niassa	901,177	439,563	461,614	122,400	7
Zambezia	3,848,276	No data	No data	103,076	37
Nampula	2,845,531	1,395,465	1,450,066	78,171	36
Total	14,746,364	5,189,572	5,708,516	779,911	19

In rural areas across all provinces, women outnumber men, with 52% comprising women and 48% men overall. These demographic statistics are not unrelated to elephant and other problem animals (e.g. crocodile, hippopotamus, lion) as households are often women headed, at least seasonally in the absence of wage

earning husbands working elsewhere. Consequently women often have to bear the responsibility and the consequences of dealing with wild and potentially dangerous animals.

In terms of economic development, GDP per capita has doubled from $236 in 1998 to $476 in 2008 (www.ine.gov.mz), growing at 6.7% p.a. Nevertheless most rural people's livelihoods depend very much on the use of natural resources, largely in an informal and sometimes, illegal context.

1.3 Conservation areas

In Mozambique, there are six National Parks, six National Reserves, 4 clusters of State Hunting Concessions or Coutadas (4 & 5; 7, 9, & 13; 6 & 15; 10, 11, 12 & 14) numbering 11[1] in all, and 11 Forest Reserves. Of these 3 are marine PAs (Quirimbas NP is both marine and terrestrial), one coastal PA (Marromeu NR) and the remainder terrestrial PAs (Table 3). Elephant are present in all the terrestrial PAs and Marromeu as well as in 2 Forest Reserves, Moribane in Chimanimani, Manica and in Mecuburi in Nampula Province. Numbers, distribution and density of elephant in these PAs differs widely from small isolated populations (e.g. Moribane FR) to large, wide ranging populations with transfrontier linkages (e.g. Niassa NR).

National Parks and National Reserves total over 86,000 km^2, Coutadas ~50,000 km^2 and Forest Reserves a further 4,500 km^2 (Table 4), providing the country with a total protected area network of ~136,000 km^2 (Table 3), corresponding to 17% of Mozambique's land surface (Table 1). Although all these PAs enjoy legally protected status under the Forest and Wildlife Law, which suggests that people should not be resident, most if not all are settled to a greater or lesser extent. While the Forest and Wildlife Law remains silent on this, and the Land Law requires traditional and/or time-specified special approval (Soto 2009), *de facto* settlement continues. The creation of Game Farms within the wildlife sector provides an additional land category for wildlife conservation and presently totals nearly 2,500 km^2 of land.

National Parks and National Reserves

National Parks are defined by the Forest and Wildlife Law as zones of total protection for the propagation, protection, conservation and management of vegetation and wildlife, and for the protection of local landscape and geological formations of particular scientific, cultural and aesthetic value representative of the national heritage, for public recreation. National Reserves are defined as zones of total protection for protecting rare, endemic and/or endangered species of flora and fauna, and fragile ecosystems (e.g. wetlands, dunes, mangroves and coral reefs).

A third category provides for zones of use, historical and/or cultural value according to norms and customary practice of local communities. Communities have rights over such areas and declaration is merely a formality. MITUR is responsible for national parks and reserves while local communities are directly responsible for zones of use and cultural value.

_____

[1] A 12th area, Coutada 8 of 310 km^2 in Sofala has been given over mostly to cotton production and Coutadas 5, 6 and 14 are also under competing land use pressures due to ambiguities over their partial protection status (Soto 2009).

Coutadas

Coutadas or State Hunting Concessions, enjoy partial protection but government may allocate this land to other uses (see Footnote 1). All *Coutadas* suffer from human encroachment and increasing resource use as communities can settle without restrictions. *Coutadas* urgently require a revision of their legal status to ensure their long term conservation integrity and use for what they are primarily intended. This should include planned and regulated multiple resource use options (Soto 2009).

Forest Reserves

Only 25% of Forest Reserves have approved plans, with the most valuable forests being in Cabo Delgado, Sofala and Zambezia. Timber extraction still mostly operates under the annual simple licence model as opposed to the more sustainable long term concession model. But even many of these forest areas still have no management plans. Inimical human activities include slash and burn agriculture, uncontrolled extraction and charcoal production. Elephants occur in Moribane and Mecuburi FRs. The former population, whilst isolated, has greater chances of remaining viable as Moribane is a part of the Chimanimani TFCA.

Game Farms

The establishment of Game Farms (*fazenda do bravio*) under DNTF is a relatively recent development within the wildlife sector and provides an additional land category for wildlife conservation (Table 5). Whilst policy can limit size to 10,000 ha (100 km^2), larger areas are acceptable provided commercial viability and financial sustainability is demonstrated (P.Barros, pers.comm.). Thus game farms can be increased to provide aggregated block(s) comprising ~10,000 ha units or thereabouts. Security of tenure is enabled through issuance of a *DUAT* which confers legal "ownership" and the unit(s) may be fenced.

The concept of a game farm may have positive implications for Coutadas under threat, existing community conservation areas and also cater for Open Areas where potential opportunities for wildlife management exist. However, clarification is still required for those situations where large and/or dangerous game, e.g. elephants, buffalo, lions, is to be part of the mammal community making up a game farm. This has implications for minimum size criteria and carrying capacity requirements. Game farms may also be viewed as "conservancies" which feature in other southern African countries such as Namibia and Zimbabwe. To date 14 such areas have been established in Mozambique, totaling 248,163 ha (2,482 km^2) with an average size of 17,726 ha (Table 5).

Community conservation areas

Tchuma Tchato

The Tchuma Tchato community conservation programme was originally initiated in 1995 in Tete Province at Chinthopo, nearby the Zambezi River where the borders of Zambia, Zimbabwe and Mozambique meet, and subsequently at Daque, midpoint along the Cahora Bassa lakeshore, both in Magoe District. In order to provide a legal mechanism for Tchuma Tchato, an inter-Ministerial Decree officially recognised the programme and provided for the return of 33% of safari hunting revenues to the resident communities in the Tchuma Tchato area. In 2002 the project moved from MADR to MITUR.

In pioneering the concept that local communities should be responsible for, and benefit from wildlife and other natural resources, Tchuma Tchato has made important progress and raised much interest in laying the foundations for the development of community-based natural resource management (CBNRM) in Mozambique.
It has raised awareness of the need for conservation and the potential contribution that wildlife and tourism can make to rural development. The programme has returned significant financial benefits to villages in Magoe District (see Table 6) and was able to establish a law enforcement capability that, combined with increased community commitment to conservation, contributed to reducing poaching (Jones 2002).

Chipanje Chetu

The Chipanje Chetu community conservation area of some 6,500 km^2 is located in North Sanga in the northwest of Niassa Province in Sanga District and includes the Administrative Posts of Matchedje and part of Macaloge. The area has a population of 2,578 (a very low density of less than 0.5 people/km^2) and 650 households distributed between 5 villages.

The Chipanje Chetu programme commenced in 1998 with the primary aim of transferring rights and responsibilities for land and resource management to local community residents as a pilot CBNRM initiative (Anstey 2009). In the early 2000s local community land rights were secured through a *DUAT* and Certificate of Delimitation, and a Management Plan was completed for the delegation of resource management rights. Significant economic benefits amounting to $51,000 were generated from trophy hunting fees between 2001 and 2004. Local investment in resource protection is reflected in the results of the 2004 aerial survey of Chipanje Chetu (Craig and Gibson 2004). This revealed that resource management indicators such as wildlife densities, elephant carcass ratios and the prevalence of fire were similar to or better than those of the adjacent Niassa NR.

In 2007 Chipanje Chetu was declared a 'Community Based Conservation Area' by the Provincial Government of Niassa This classification exists nowhere else in national legislation. While the uncertain legal status of the present Management Council (COGECO) as a body representative of the *DUAT* certificate and holder of delegated resource rights still present challenges (Anstey 2009), Chipanje Chetu provides an important evolving and adaptive model for community management of wildlife and other natural resources.

Open areas

Open areas are those communally-occupied areas which still support wildlife populations, including elephants but for which there are no formal management arrangements or plans. The Lurio area of Marrupa-Maua-Nipepe in Niassa is one example as is Meluco District in Cabo Delgado where safari operators have entered into local agreements to either hunt elephants as trophies and/or to assist with problem animal control. There is also the need to establish corridors in a number of open areas. Proposals for a number of these areas including potential Coutadas, game farms and/or community conservation areas have been drawn up and in some cases decisions are awaited from the GoMz political bodies.

Summary

For most, if not all conservation areas described above, residents practise numerous activities inimical with the generally accepted purpose of a protected area, including slash and burn agriculture, livestock rearing and wildlife poaching. Additionally human wildlife conflict has become a major problem (Foloma 2009, DNTF 2009). Opportunities and different management options for dealing with these concerns are currently being explored by government, which this strategy and plan considers and provides remedial and mitigating actions in the context of elephant conservation and management.

Table 3. National parks, reserves and Coutadas in Mozambique (adapted from Soto 2009 and DNAC 2006)

Protected Area	Area (km^2)	Province	Type & elephant presence*	Conservation & management planning status	Biodiversity inventories completed	Plans approved
National Parks	**37,476 4.7%**					
Gorongosa	5,370	Sofala	Terrestrial*	Plans in preparation	Yes	No
Quirimbas	7,506	Cabo Delgado	Marine & Terrestrial*	Plans in place	No	Yes
Zinave	6,000	Inhambane	Terrestrial*	Re-planning 2010	No	No
Limpopo	10,000	Gaza	Terrestrial*	Plans in place	No	Yes
Bazaruto	1,600	Inhambane	Marine	Plans in place	No	Yes
Banhine	7,000	Gaza	Terrestrial*	Re-planning 2009	No	No
National Reserves	**48,440 6.1%**					
Chimanimani	1,740	Manica	Terrestrial	Re-planning 2009	No	No
Pomene	200	Inhambane	Coastal	No plans	No	No
Niassa	42,200	Niassa	Terrestrial*	Plans in place	Yes	Yes
Marromeu	1,500	Sofala	Coastal*	No plans	No	No
Maputo	700	Maputo	Coastal*	Re-planning 2009	Yes	No
Gile	2,100	Zambezia	Terrestrial*	Re-planning 2009	Yes	No
Coutadas	**49,717 6.2%**					
4	12,300	Manica	Terrestrial*	Plans in place	Yes	Yes
5	6,868	Sofala	Terrestrial*	No plans	No	No
6	4,563	Manica	Terrestrial*	No plans	No	No
7	5,408	Manica	Terrestrial*	No plans	No	No
8	310	Sofala	Terrestrial	See Footnote 1	-	-
9	4,333	Manica	Terrestrial*	Plans in place	Yes	Yes
10	2,008	Sofala	Terrestrial*	Plans in place	No	Yes
11	1,928	Sofala	Terrestrial*	Plans in place	Yes	Yes
12	2,963	Sofala	Terrestrial*	Plans in place	Yes	Yes
13	5,683	Manica	Terrestrial*	Plans in place	Yes	Yes
14	1,353	Sofala	Terrestrial*	Plans in place	Yes	Yes
15	2,000	Manica	Terrestrial*	No plans	No	No
Totals	**135,631**					

	17%					

Table 4. Gazetted Forest Reserves in Mozambique

Protected Area	Area (km^2)	Province	Type & elephant presence*	Conservation & management planning status	Biodiversity inventories completed	Plans approved
Forest Reserves	4,471					
Moribane	53	Manica	Terrestrial*	Plans in place	Yes	Yes
Mecuburi	2,300	Nampula	Terrestrial*	Plans in place	Yes	Yes
Marronga	83	Manica	Terrestrial		Yes	No
Zombe	29	Manica	Terrestrial		Yes	No
Matibane	199	Nampula	Terrestrial	Plans in place	Yes	Yes
Baixo Pinua	196	Nampula	Terrestrial		No	No
Mapalue	43	Nampula	Terrestrial			No
Ribaue	38	Nampula	Terrestrial			No
Derre	1,700	Zambezia	Terrestrial		Yes	No
Mucheve	91	Sofala	Terrestrial			No
Licuati	19	Maputo	Terrestrial			No

Table 5. Gazetted Game Farms in Mozambique (Data from DNTF 2010)

Game Farm	Province	District	Area (Ha)	Activity	Year
Adolfo Bila	Gaza	Massingir	10,000	Hunting	2004
Africaca	Gaza	Mabalane	5,000	Hunting	2003
Cabo Delgado Biodiversity	C Delgado	Macomia	32,931	Hunting	2000
Eco Safari Mucapana	Maputo	Moamba	24,000	Hunting	2005
Imofauna	Gaza	Massangena	20,000	Hunting	2005
Mafuia Safaris	Manica	Macossa	37,932	Hunting	2003
Mahimba Game Farm	Zambezia	Chinde	17,600	Hunting	2000
Mbabala Safaris	Gaza	Chicualacuala	20,000	Hunting	2004
Mozunaf Safaris	Sofala	Cheringoma	10,000	Hunting	2002
Negomano Safaris	C Delgado	Montepuez	10,000	Hunting	2001
Nguenha Project	Gaza	Massingir	10,000	Hunting	2005
Paul & Ubisse	Gaza	Massingir	30,000	Hunting	2002
Sabie Game Park	Maputo	Moamba	35,500	Hunting	2000
Sapap	Maputo	Moamba	5,200	Hunting	2002
TOTALS	**6 Provinces**	**10 Districts**	**248,163**		

2. INSTITUTIONAL FRAMEWORK

2.1 Policy and law

Wildlife conservation in Mozambique is guided by the Forest and Wildlife Law and Act No 10 of 1999 and accompanying Regulations, and builds on the Policy for Forests and Wildlife (DNFFB 1996).

The Act acknowledges the economic, social, cultural and scientific importance of Mozambique's natural resources to Mozambican society and provides legislation

_____

capable of promoting sustainable utilisation of these resources. It also encourages initiatives that will guarantee the protection and conservation of forest and wildlife resources for improvement of the Mozambican citizens' quality of life.

The Act defines the status of national parks, national reserves and other areas of national importance and outlines permissible activities within these. Regulations are provided for protection, conservation, exploitation, management and/or control of natural resources through licensing systems, by-laws (*diplomas*) and approved management plans.

Punishable offences with aggravating and extenuating circumstances are listed together with the nature and value of fines

Instruments for applying the law include:
a) National institutional, technical and scientific co-operation agreements;
b) International treaties and conventions;
c) Concession contracts and activity permissions (permits, transit passes and certificates);
d) Environmental impact assessment;
e) Forest and wildlife development fund;
f) Specific and complementary regulations;
g) Forest and wildlife inventories;
h) Lists of plant and animal species;
i) Compensation and environmental damage restoration measures;
j) Management plans;
k) Fire prevention programmes;
l) Forest and wildlife zoning;
m) National forest and wildlife programmes.

2.2 Conservation agencies

Until 2001 Mozambique's natural resource and conservation areas were administered by the Ministry of Agriculture and Rural Development (MADR) through the National Directorate of Forests and Wildlife (DNFFB). In 2001, Ministerial Diploma 17/2001 transferred responsibility for protected areas (NPs, NRs and Coutadas) to the Ministry of Tourism (MTUR) through its new Directorate of National Conservation Areas (DNAC). The Diploma details the mechanisms for the process of transferring this responsibility and authority.

At the Provincial level MADR is represented by its respective Provincial Directorates of Agriculture (DPA) to whom Provincial Services of Forests and Wildlife (SPFFB) report. SPPFB is tasked with implementation and monitoring of wildlife policy and associated legislation at Provincial level and below. DNAC through its Provincial Directorate of Tourism (DPTUR) presently also relies on SPFFB to meet certain PA tasks, but the primary responsibility of DNFFB, now DNTF, is for wildlife outside of PAs. At District level SDAE offices are responsible for, and integrate, all economic activities taking place in the district. These include wildlife and other natural resources, community issues relating to PAC, HEC mitigation and wildlife revenue disbursements to communities.

In terms of international obligations and conventions, e.g. CITES, CBD and RAMSAR, the Management Authority for wildlife has been DNFFB which responsibility it (as DNTF) still holds, but now on behalf of DNAC as well. This is especially relevant in the context of consumptive use programmes, such as trophy hunting. The University of Eduardo Mondlane in Maputo is the Scientific Authority but

the coordinating role, i.e. the Management Authority, has now passed to the Ministry of Environment, MICOA.

3. NATIONAL STRATEGY FOR THE MANAGEMENT OF ELEPHANTS IN MOZAMBIQUE 1999-2009

The country's first elephant management strategy was constructed around the country's development agenda, to which wildlife was seen as contributing significantly, as reflected in the policy and strategy for forests and wildlife. The need to manage elephants in accordance with this policy led to the National Strategy for the Management of Elephants in Mozambique (MADR-DNFFB 1999). Achievement of the goal as reflected in the three goal targets, are outlined below. Target 1 has been achieved and targets 2 and 3 to a large extent, although implementation may still be lacking.

3.1 Goal targets

1. By 2010 increase elephant numbers by 20%, maintaining the current number of populations and their range.
2. By 2010, management plans with inventories of key species, habitats, and other measures of biodiversity approved for all National Parks, 75% of National (Game) Reserves and 50% of Coutadas (hunting areas) with elephants.
3. By 2010, mechanisms in place whereby 5 or more communities within the elephant range benefit directly from the presence of elephants and at least 5 new tourism related operations established.

1. Numbers and range

Over the past 10 years the country's elephant population has increased by ~ 20% to its present estimate of 22,114 elephants (AGRECO 2008), exceeding the AED estimate of 20,084 elephants (Blanc et al. 2007) and compared to the 1999 baseline of ~ 18,000 (MADR-DNFFB 1999), meeting a primary target of the strategy. The ranges of the 3 major sub-populations (Northern, Central and Southern) have expanded compared to the baseline of DNFFB in 1999, but have contracted overall compared to the AED in 1995 (Said et al. 1995) and since prior to the 70s (Smithers and Lobão Tello 1976, AGRECO 2008, Ntumi et al. 2009).

2. Management planning and conservation of biodiversity

All but one of the country's National Parks either have current management plans in place, or are being re-planned (Table 3). Plans for Gorongosa NP are in preparation. Apart from Marromeu and Pomene National Reserves which currently have no plans in place, the remainder (66%) either have plans or are being re-planned. In the case of Coutadas, 7 have plans which have gone through formal planning processes and now needs to be accomplished for the remaining 5 given the importance of these areas for safari hunting. Biodiversity inventories have been completed for 33% of Parks and Reserves and for >50% of Coutadas.

There appears to be five principal areas where the species richness of wildlife is relatively high:

- northern Mozambique including Niassa National Reserve, the Chipanje Chetu Community Conservation Area and Quirimbas National Park

- western Tete Province, north and south of Lake Cahora Bassa, including the Tchumu Tchato Community Conservation Area
- central Mozambique including Gorongosa National Park, Marromeu National Reserve and Coutadas 6, 7 and 9 to15
- the area encompassing Limpopo, Banhine and Zinave National Parks and adjacent landscape and
- Maputo (Special Elephant) National Reserve.

Approval of management plans is through the Council of Ministers and its approval have been confirmed for 3 National Parks, 1 National Reserve and 7 Coutadas (Table 3) or 50% of all conservation areas.

3. Community benefits

Tchuma Tchato in Tete Province was the first community based wildlife conservation and management programme in Mozambique. Tchuma Tchato commenced in 1995, and through a special dispensation from Government, was able to return 33% of earnings from wildlife, mostly high valued safari hunting, to communities, initially in Magoe District. Between 1996 and 2008, community disbursements have totaled 10,831,014 Mt (USD$401,149), amounting to USD$30,858 per annum.

Following on the success of Tchuma Tchato, community involvement in CBNRM spread to other wildlife producing provinces and districts in the country. This was accompanied by formal legislation requiring all commercial wildlife activities to return at least 20% of income to local communities. Chipanje Chetu is a special case (see 1.3 above) whereby through its *DUAT* and other mechanisms, 57% of revenues were disbursed directly to local communities, 23% re-invested in resource management (community scout costs, committee capacity building) and 20% to District and sub district local government bodies to meet their costs in supporting the Chipanje Chetu programme. In this way between 2001 and 2004, the programme earned $51,000 or $12,750 on average per year.

Disbursements through central and provincial governments to districts were initially sporadic and variable, but during the latter half of the past decade there has been considerable improvement with total earnings accruing to district community committees amounting to the equivalent of USD$490,315 or USD$163,438 per annum (Table 5) which is increasing (Fig.1). Mechanisms and dividends for disbursement can still be improved and this will be particularly important for the current elephant management plan in mitigating the growing human elephant conflict problems.

Table 6. Wildlife dividends (Meticais) paid to communities in 16 different conservation areas over the period 2006-2008

Province	Àrea	2006	2007	2008	Total
Maputo	REMaputo	393,612	265,986	295,682	955,280
Gaza	PNLimpopo	690,000	423,542	620,412	1,733,954
Inhambane	PNABazaruto	240,000	220,000	400,000	860,000
Manica	Coutada 9	102,316	103,317	60,450	266,083
	Coutada 13	28,000	14,109	28,000	70,109
	Coutada 4	0	25,456	25,456	50,911
	Coutada 6	6,600	52,000	134,666	193,266
Sofala	Coutada10	121,040	182,839	190,728	494,607
	Coutada 11	238,940	301,191	306,764	846,895
	Coutada 12	142,300	88,182	193,718	424,200
	Coutada 14	63,860	49,320	30,752	143,932
	PNGorongosa	166,560	354,496	148,670	669,726
Cabo Delgado	PNQuirimbas	100,000	119,166	348,748	567,914
	Lipilichi & Nipepe	0	0	69,234	69,234
Niassa	Hunting Blocks	629,840	236,747	333,287	1,199,874
Tete	TchumaTchatu	1,274,087	1,949,036	1,469,397	3,418,432
TOTAL		**4,197,156**	**4,385,387**	**4,655,963**	**13,238,506**

Tourism-related operations have been the primary source of community benefits to date, largely through the leasing of hunting concessions, mostly in Coutadas and community conservation areas such as Tchuma Tchato and Chipanje Chetu. In National Parks community benefits have come through the development of tourist facilities such as lodges and tourist receipts. The hunting blocks in Niassa NR have provided the main source of community benefits.
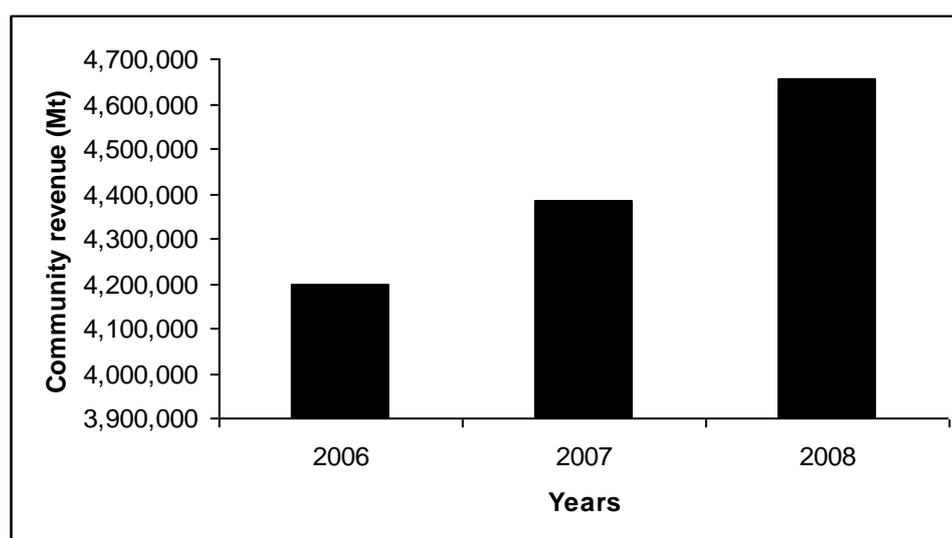
Fig. 1. Community dividends 2006 - 2008

Despite the disbursement of these revenue dividends, the structured community interviews carried out by AGRECO (2008) in its recent study of HWC, revealed,

however, that nearly all interviewees believed that they received little or no benefit from wildlife, except occasionally in the form of bush meat (in those districts where interviewees admitted that the hunting of small animals occurred), or meat from animals officially killed in response to human-wildlife conflict situations. Clearly there are difficulties with disbursement mechanisms, lack of understanding and poor communication networks between central government agencies (DNTF, DNAC), and provincial and district structures relating to the payments of these 20% community dividends. This is a major source of concern which requires addressing and clarification.

4. CONSERVATION STATUS OF ELEPHANTS IN MOZAMBIQUE 2010

4.1 Numbers, range, trends and mortality

Numbers

The extensive, low-intensity national wildlife aerial survey and census in 2008 (AGRECO 2008) provided an estimate of 22,144± 26% (16,393-27,894 95%CL) elephants, compared to 14,079 definites and 12,009 probables, possibles and speculatives estimated in 2006 (Blanc et al. 2007). Approximately 50 % of these elephants were in Niassa National Reserve. Elephant densities varied from <0.05->0.35 elephant/km^2 with highest densities in Magoe District and Niassa Reserve.

The AGRECO (2008) estimate is based on combining estimates of recent previous surveys in areas not surveyed by AGRECO, i.e. Magoe District in Tete Province and Niassa NR, plus the estimate of the 2008 survey, based on the actual sighting of only 187 elephants due to the very low sampling intensity. Furthermore, AGRECO did not provide any breakdown of results by area, as described in 1.3 above. Table 7 attempts to do this by providing known present elephant numbers and density for those areas where such data are available but in full recognition that this is incomplete and not accurate. Nevertheless, Table 7 accounts for >20,000 elephant compared to the AGRECO estimate of 22,144 elephants and falls within the 95% CL. of that estimate.

Table 7. Known present (2009-2010) elephant numbers and density in conservation and other areas in Mozambique

Conservation Area	Size km^2	Known present elephant population size	Current density elephants/km^2
NORTHERN			
Niassa NR incl. Hunting Blocks	42,612	11,800	0.28
Quirimbas NP	5,800	~ 1,000	0.20
Chipanje Chetu	6,500	?	?
Lurio Reserve	10,000	High 100s	?
Mecuburi FR	195	5	<0.1
Gile NR	2,100	15-25	<0.1
CENTRAL			
Marromeu NR	1,100	800	<0.2
Coutadas 10,11,12,14	8,252	?	?
Gorongosa NP	3,750	400	0.10
Coutada 9	4,333	333	0.15
Coutadas 7,13	11,091	?	?
Coutadas 6,15	6,563	?	?
TT Magoe	2,621	1,628-3,209=2,418	0.92
TT Daque	na	500	?

TT Cabora Bassa N	3,708	1,718	0.46
Moribane FR	185	22	0.12
SOUTHERN			
Maputo NR	900	200	0.20
Limpopo NP	10,736	630	<0.1
Banhine NP	7,000	0	<0.1
Zinave NP	5,000	0	<0.1
Coutadas 4,5	19,168	0	<0.1

Range

Elephant range covers 52% or 334,786 km^2 of the country (Blanc et al. 2007) of which 15% is in protected areas (PAs cover 17% of country). Elephant sightings, carcasses, tracks and other sign during the 2008 survey all indicate regions of Mozambique that are within the elephant distributional range on a year-round basis.

Evidence of elephant presence was concentrated around Niassa NR, in Magoe, south of Cahora Bassa, in Marromeu Reserve, and adjacent Coutadas as well as in border regions adjacent to Gonarezhou NP in Zimbabwe, Kruger NP in South Africa, as well as in Limpopo NP. There is also an isolated presence of elephants west of Inhambane (Banhine), in Gile NR, Mecuburi FR and the Chimanimani-Moribane Transfrontier Conservation Area on the Mozambique-Zimbabwe border. Ntumi et al. (2009) provide a contemporary reduced and fragmented range compared to that of 1940-1960 (see Fig. 3), as does AGRECO (2008), comparing changes in elephant distribution in Mozambique since the pre-1970s (Fig. 2).
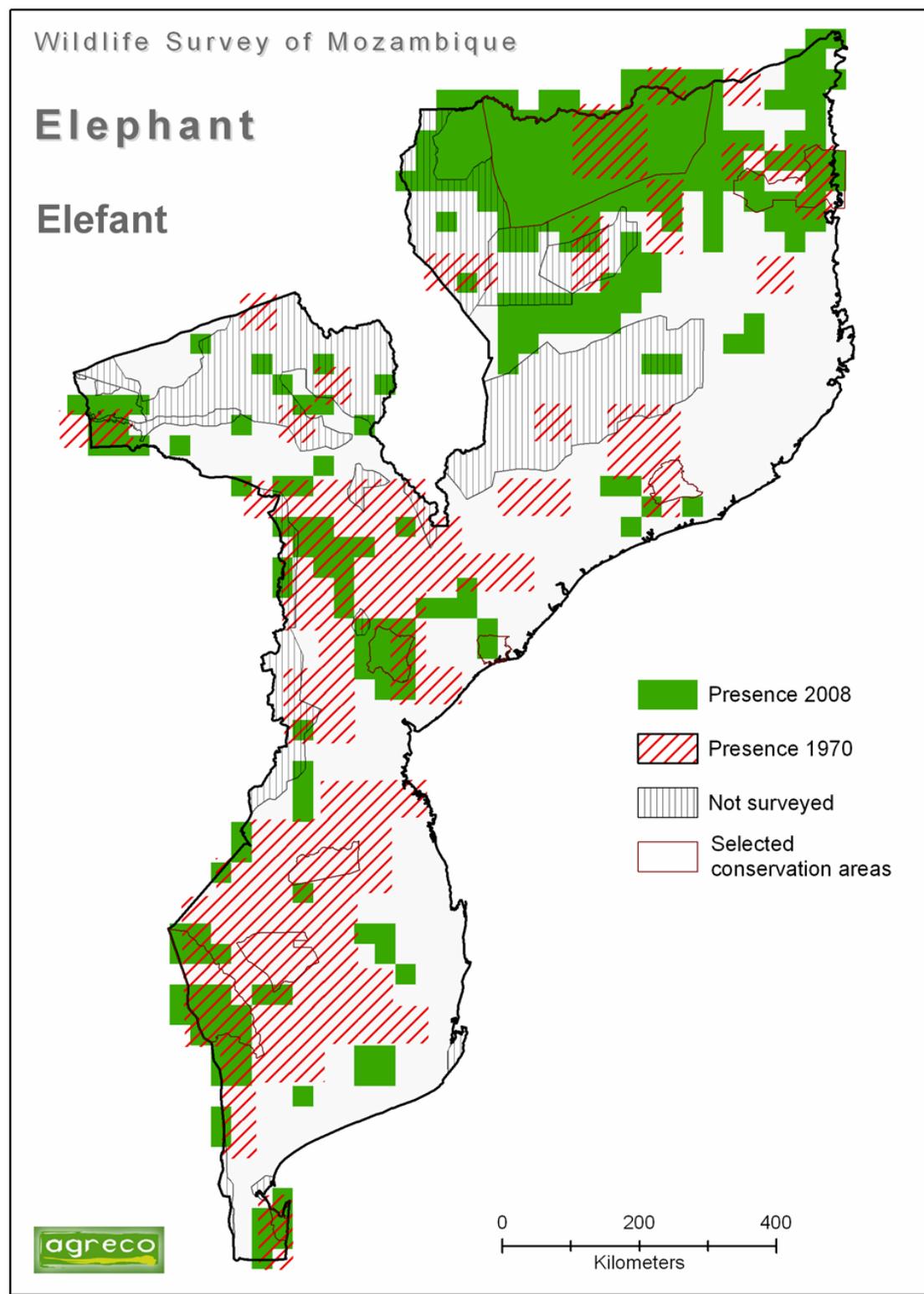
Fig. 2 Changes in elephant distribution in Mozambique since the pre-1970s. Cells coloured green are those where elephants were recorded recently and red-striped cells are those where elephants were recorded by Smithers & Lobão Tello (1976) prior to the 1970s. (Source: AGRECO 2008)

Trend

Whilst elephant range has reduced significantly since historical times (AGRECO 2008, Ntumi et al. 2009), an increase in numbers is indicated since 1999 (DNFFB 1999), by at least 2,000 animals, which are largely site specific increases, e.g. in Niassa NR. Local range expansion is also probably taking place but overall, elephant numbers are declining as human population numbers increase (Fig. 3) and natural habitat is modified and exploited (Ntumi et al. 2009).
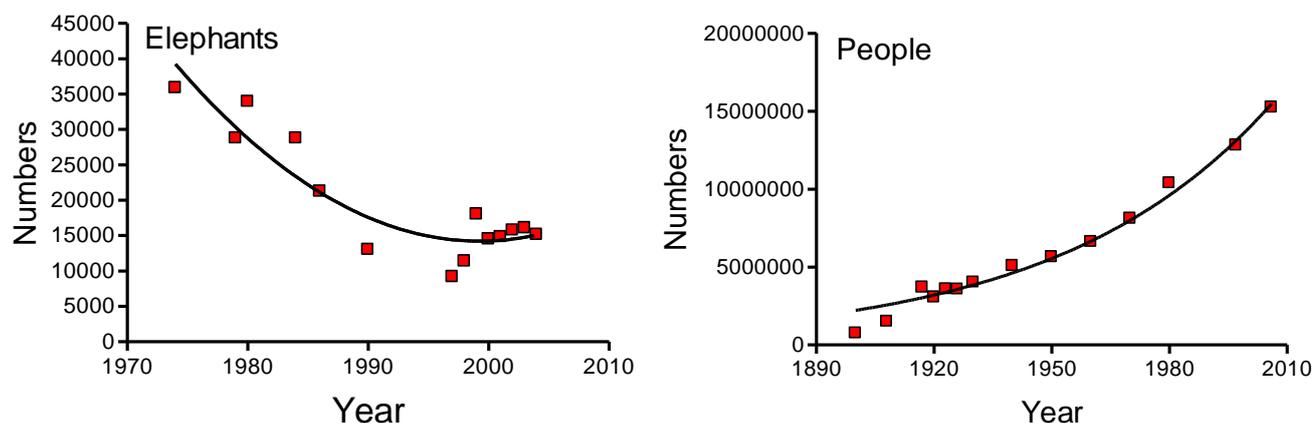
Fig. 3 Estimates of elephant (1974-2004) and human population (1900-2009) numbers in Mozambique (From Ntumi et al. 2009)

Mortality

It is possible to determine the recent trend in elephant population numbers from estimates of carcass ratios (Burrill and Douglas-Hamilton 1987). The carcass ratio is defined as the ratio of dead elephants (all 4 carcass categories) to all elephants (dead plus live animals), and is a useful index of mortality. Douglas-Hamilton *et al.* (1991) suggest a carcass ratio of 2 - 8% as being normal for a stable or increasing population, while a ratio of over 9% indicates a declining population.

The number of elephant carcasses seen during the 2008 survey and preceding years was relatively low at 4.4% (AGRECO 2008), which suggested that elephants within the survey area had not been subjected to heavy poaching recently. However, this may be somewhat misleading since two key areas in which poaching of elephant has been taking place, Magoe District in Tete Province and Niassa NR in Niassa Province were not included in the 2008 survey.

In Magoe and Zumbo Districts in 2003 and 2005 carcass ratios were 8.4 and 11% respectively. In Niassa NR, the overall carcass ratio is low at 4.7 and 4% in 2006 and 2009 respectively, but much higher in specific areas adjacent to the Ruvuma river on the Mozambique-Tanzania border where ratios were as high as 18% in 2009. This is confirmed through PIKE (Proportion of Illegally Killed Elephants) values for Niassa which is a MIKE (Monitoring Illegal Killing of Elephants) site for the CITES-MIKE Programme. These have risen from 0 in 2004, 0.33 in 2006 to 0.88 in 2007. Illegal activity, i.e. poaching is clearly an important factor in these two conservation areas adjacent to international borders.

4.2 Elephant sub-populations

In referring to elephant sub-populations in Mozambique, contiguous populations refer to those that are near to or in contact with each other but not necessarily connected; connectivity between adjacent populations is achieved when the adjacent populations are in contact either spatially and/or temporally on a regular basis, seasonally or year-round.

AGRECO (2008) suggest there are 4-6 elephant sub populations in Mozambique:

1. Maputo (Special/Elephant) NR
2. Southern Inhambane Province
3. Limpopo/Gaza Complex
4. Zambezi Valley, Tete Province and central Mozambique
5. Northern Mozambique
6. Gile

However, both Maputo and Gile populations are isolated; even though Maputo NR is linked to Tembe in South Africa, it is isolated from other populations in Mozambique. Thus this strategy suggests there are probably 4 main sub-populations or clusters in 3 main regions of the country (Fig. 4):

SOUTHERN

1. Maputaland cluster comprising the Maputo National Reserve and Futi Corridor; a part of the Maputo-Futi-Tembe TFCA.

2. Limpopo cluster, comprising elephant populations in Limpopo NP, south of Banhine NP and the Save river, north of Banhine to Zinave NP and adjacent Coutadas 4 & 5; a part of the Great Limpopo TFCA.

CENTRAL

3. Zambezi cluster, comprising elephant populations in Gorongosa NP, Marromeu NR, and Coutadas 7, 9 & 13; Coutadas 6 & 15 and Coutadas 10, 11,12 & 14; Tete Province: Tchuma Tchato areas mostly south west Cahora Bassa (Magoe-Chinthopo & Daque-Mukumbura) and possible populations north of Cahora Bassa. These are probably part of cross-boundary populations with Dande in Zimbabwe and will comprise populations in the future ZIMOZA TFCA.

A small isolated population resides in Moribane FR in the Chimanimani NR area.

NORTHERN

4. Niassa cluster, comprising elephant populations in Niassa NR and surrounding hunting blocks, Chipanje Chetu; Quirimbas NP; Lúrio open area (the Marrupa-Maua-Nipepe triangle). There is already cross-border elephant movement between Mozambique and Tanzania so that these populations will be a part of the planned Rovuma NR and the Selous Niassa TFCA in Niassa and Cabo Delgado Provinces.

More isolated populations are in Mecuburi FR and further south in Gilé NR and surrounding populations.

_____

Connectivity

Elephants within the 3 sub-populations described above can be considered either presently contiguous or that conditions either exist or can be created for these populations to become so.

For Northern sub-populations connectivity between patchy and/or fragmented elephant ranges can be achieved through a natural gradient facilitated by habitat similarities, which act as "habitat stones" (Chetkiewicz et al. 2006). For example, the area between Quirimbas NP, Niassa NR and Chipanje Chetu to the west, and south to the Lurio river through the Marrupa-Maua-Nipepe triangle is presently not acting as a sub-population, but could do so through reinstating the natural gradients.

Similar possibilities exist between PAs and habitats in the Central sub-populations. From the Zambezi delta (Marromeu, Coutadas and habitats between, and thence up the Zambezi valley, across to Gorongosa and adjacent Coutadas through to the Tchuma Tchato community conservation areas in Tete and across borders into the planned ZIMOZA TFCA.

_____

```
                              ┌─────────────────┐
                              │   Mozambique    │
                              │    Elephant     │
                              └─────────────────┘
```

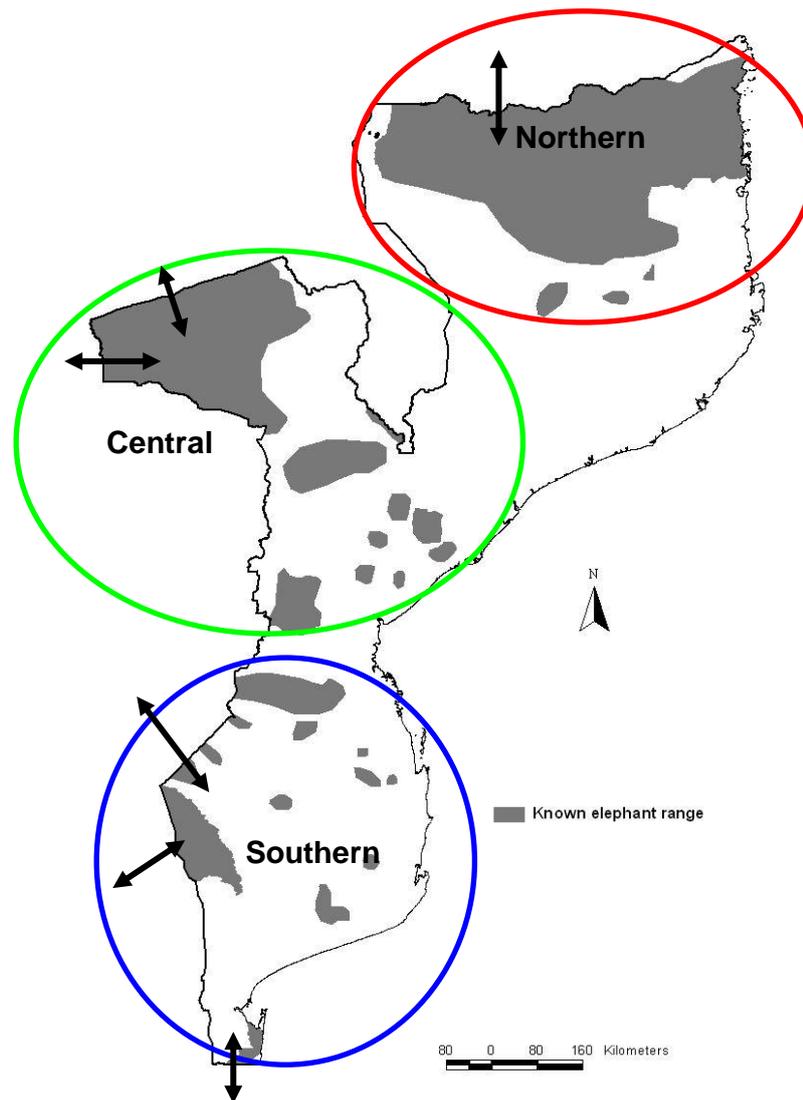| NORTHERN POPULATIONS	CENTRAL POPULATIONS	SOUTHERN POPULATIONS
Niassa NR including hunting blocks Quirimbas NP Rovuma NR Rio Lurio [Marrupa-Maua-Nipepe] Mecuburi FR Gile NR	Marromeu NR Gorongosa NP Coutadas (7,9,13); (6,15); (10,11,12,14) Tete: Tchuma Tchatu – Magoe (Chinthopo); Daque (Mukumbura); Other? Moribane FR (Chimanimani)	Maputo Special Reserve (Futi Corridor) Limpopo NP Banhine NP (?) Zinave NP Coutadas (4,5?)
Great Ruvuma TFCA	**ZIMOZA TFCA**	**Maputo-Futi-Tembe & Great Limpopo TFCAs**
Mozambique Tanzania	Mozambique Zambia Zimbabwe	Mozambique South Africa Zimbabwe

Fig. 4. Elephant sub populations in Mozambique and their regional links as identified in this strategy

Amongst the Southern populations, connectivity exists between Limpopo, Banhine and Zinave NPs as well as along suitable areas of the Futi Corridor south of Maputo National Reserve into Tembe, South Africa.

Elephants in Magude-Moamba Districts may be fragmented groups from Kruger NP; others in Inhambane Province may also be groups from Coutada 16. Isolated populations would appear to include elephants in Mecubúri FR and Gilé NR in the north, Moribane FR in the centre of the country, and those fragmented populations in the south that may have become isolated.

Fig. 5 Present elephant range in Mozambique showing the Northern, Central and Southern sub populations showing transboundary linkages (Adapted from Ntumi et al. 2009)

5. KEY ELEPHANT CONSERVATION ISSUES

5.1 Elephant numbers, range, trends and mortality

Numbers

While the 2008 country-wide wildlife survey was an important first step in assessing the present status of wildlife in Mozambique, it covered only 80% of the country at a low sampling intensity of 2.35%. Unsafe mountainous areas suitable only for block counts (nine areas totaling 151,600 km^2) and conservation areas and other areas where wildlife had been surveyed from the air within the previous five years (nine areas totaling 75,186 km^2) were not surveyed.

Key areas were not censused, e.g. northern and western Mozambique and in certain cases, no elephant were observed in areas known to support elephant, e.g.

Gorongosa NP. Apart from Niassa Reserve, few other recent surveys and censuses beyond the AGRECO 2008 countrywide survey have been undertaken.

Range

Apart from Protected Areas and Coutadas, where people now also live at varying human densities, outside of these areas elephants are dispersed in a matrix of human dominated landscapes, with some isolated ranges in central and southern Mozambique. An important challenge will be to maintain present range and develop mechanisms for connectivity for contiguous sub-populations.

Decisions need to be made as to where Mozambique wants to protect, manage and/or control elephants. This will include co-existence with people under different management regimes depending on national and area-specific objectives and will need to be linked to the numbers and densities of elephants in different administrative areas, i.e. Protected Areas, Coutadas and other conservation and non-protected areas.

Trends and Mortality

Downward trends need to be avoided if Mozambique is to maintain and re-establish its identity as an important elephant range state. Certain sub-populations, however, may need to be held at present numbers and density, and others allowed to increase.

In Magoe[2], recorded carcass ratios of 8.4 and 11% respectively are excessively high. These levels of mortality are unsustainable for both population stability and/or growth. Carcass ratios have been low in Niassa, suggesting an insignificant impact on the northern population and providing strong evidence that the population is increasing.

While the current rate of loss is insufficient to threaten these elephant populations, illegal activity, i.e. poaching, is increasing. If such poaching is strongly selective on larger animals, it could have an impact on the potential sustainable yield of hunting trophies.

Mortality needs to be continually monitored through measures such as carcass ratios and MIKE PIKE values through ground-based patrols. Both Magoe and Niassa are CITES MIKE (Monitoring Illegal Killing of Elephants) sites for which there appears to be no systematic data collection or records.

Furthermore, natural mortality rates (2-8% carcass ratios) are being influenced not only by poaching, but also uncontrolled excessive PAC (Problem Animal Control) activities and operations.

5.2 Protection of elephant

Illegal activity and poaching

In Tete commercial elephant poaching for ivory is increasing following a relatively stable period between 1991 and 2002. At least 40 elephants were reported poached in 2009 in the Mussenquezi area to the south-east of Chinthopo in Magoe District. Large numbers of firearms (muzzle loaders) were also confiscated. There is cross-

_____

[2] Both Magoe and Niassa are MIKE sites and the only two areas where elephant numbers, including carcass ratios have been recorded over the past 10 years

_____

border illegal movement of ivory transported in pick-up trucks, with ivory often being concealed in dried fish bags. A similar situation pertains on the north bank of Cahora Bassa in Zumbo District.

Similarly, cross-border elephant poaching for ivory is increasing in Niassa, together with other illegal natural resource extraction activities (timber, minerals). In both these areas carcass ratios and/or MIKE site data, where available corroborate these observations. It was reported that ivory was fetching 1000 Mt/kg (USD36/kg) with internal links to adjacent countries such as Tanzania and Zimbabwe.

Within the country, poaching, PAC and trophy hunting quotas are being deliberately misused through confusing management directives. Unlicensed firearms are being employed to kill so-called PAC elephants and/or being sold to unscrupulous safari operators. In Sofala, 6 radio transmitter-collared elephants originating in Gorongosa NP were killed in this way. Hunting clients may be charged up to $20,000 for an illegally sport-hunted elephant.

Local elites are also involved in commercial meat poaching with meat being supplied from Mwanza and Cheringoma to markets in Dondo and Beira. At Cheringoma three poachers were apprehended but they were subsequently released and there were demands that the Park outpost be dismantled.

In Marromeu unemployment linked to declining sugar production on adjacent sugar estates is leading to people looking for alternative income sources. Subsistence hunting using community quotas is becoming commercialized with poachers undertaking night hunting excursions into *Coutadas.* For example, Chemba District (and other districts) feed off this hunting, with meat coming in from elsewhere as well. This not only damages the resource base but, understandably causes conflict with safari operator concessionaires.

In Niassa Province widespread elephant poaching by local inhabitants hunting with muzzle loaders was reported, although frequently disguised as subsistence hunting. Areas involved include Maua, Nipepe and in Nampula District across the Lurio River in Cabo Delgado. Wounded elephants are not uncommon as a result and these in turn are frequently responsible for attacks on humans. In Niassa NR, there is an escalation of cross-border elephant poaching between Mozambique and Tanzania.

Field protection

Field rangers and scouts are under-resourced in terms of personal and operational equipment. Because the law requires that game scouts [fiscais] be remunerated the same as general workers and labourers, these men are being grossly under-valued.

In a number of instances there are no planned field enforcement schedules and controls, whilst elsewhere good anti-poaching records are available. However, scout density is inadequate for effective protection and enforcement in most conservation areas (see Section 8 Implementation Procedures). There are, however, informer networks which work well in some areas.

Law enforcement

There is a lack of capacity to enforce the law for which SPFFB is responsible and often unable to meet enforcement needs outside of PAs. Field documentation of ivory collections from PAC and illegal seizures is weak, e.g. recording, marking and weighing of ivory at field offices. These shortcomings are not in keeping with CITES requirements. There is no consistent and common approach to enforcement.

The regulations regarding law enforcement are weak and/or not being enforced, with a lack of substantial penalties for illegal wildlife activity. Subsequent actions following the apprehension of poachers are weak in terms of successful prosecutions and convictions. Compensation values are either not used or bear little relation to the severity of the crime. The responses of the local (district) administration, police and judiciary to wildlife infractions are not well coordinated or harmonized.

Coordination between DNAC and DNTF is not clear. There are cases when MADR-DNTF through its *fiscais*, undertake law enforcement in areas which are the responsibility of MTUR-DNAC without communication and/or collaboration with each other. In relation to the collaboration with the Police, the law supports the involvement of the police whenever requested and needed.

In relation to the payment of fines and hunting taxes, DNTF has been investigating the best approach for payment of fines at provincial or district level. This includes payments into the bank nearest to the conservation area. The approval of an instrument to solve coordination problems between different law enforcement agencies and the payments of fines arising from infringements in conservation areas is due shortly.

CITES

Mozambique is a signatory to CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and as such has certain compliance procedures and obligations which are detailed in Annex Conf.14.3. In the context of elephants it has two additional major responsibilities, namely support for ETIS, the Elephant Trade Information System, and implementation of MIKE, the Monitoring of Illegal Killing of Elephants. MIKE is a field-based monitoring programme whilst ETIS is to do with monitoring ivory seizures relating to trade in elephant products, both domestic and international.

MIKE

There are two MIKE sites in Mozambique, one in the Tchuma Tchato community conservation area in Tete Province, and the other in Niassa NR. Data collection has been sporadic with centralised collation and reporting not always efficiently executed, partly because of split responsibilities between DNAC and DNTF. There have also been difficulties at many sites elsewhere in Africa with the MIKE protocol and this is being rectified by CITES-MIKE (CITES-MIKE 2009a, b).

The obligations which Mozambique is required to meet but failing to fulfil include:

- Designation of a CITES MIKE Focal Point person as member of the MIKE Sub-regional Steering Committee.
- Lack of appointment of a MIKE National Officer and the two Site Officers (one for Cabora Bassa and the other for Niassa).
- No submission of monthly MIKE data to the MIKE Sub-regional Steering Committee.
- Failure in some cases to take up capacity building opportunities offered by CITES Secretariat and MIKE.

_____

ETIS

ETIS deals with internal and external trade issues, such as illegal domestic ivory markets, and in-country and international ivory seizures. It relies on range state cooperation for seizure data and information flow, for which it is able to provide valuable feedback to both individual range states and CITES on current levels of global trade in ivory. This also includes analysis of legal ivory sales for those countries allowed to market their ivory through the one-off sale mechanism, presently Botswana, Namibia, South Africa and Zimbabwe.

In the most recent ETIS analyses (CoP15 Doc.44.1 Annex), Mozambique is indicated as problematic due to the continuation of its large and unregulated domestic ivory market, recent movements of considerable volumes of ivory to Tanzania and Viet Nam and on-going thefts of ivory stocks from government custody. The likely development of organised crime as is occurring elsewhere in southern Africa, impacts on law enforcement capacity and effective response from GoMz authorities. For example, law enforcement actions remain sporadic and insufficient, as ivory products continue to be sold openly throughout the country. There is an urgent need for stronger and improved commitment to management of government ivory stocks, law enforcement and regular reporting to ETIS.

Export quotas

CITES monitors the export of elephant trophies for non-commercial purposes. These arise from quotas set by range states for the sport hunting of elephant. Quotas need to be set within sustainable limits to ensure maintenance of trophy quality (normally set at <1% of total population size), and taken together with PAC and illegal offtakes, should not exceed 3-5% of population size. Thus for example, some 40 elephants have been killed annually on PAC (see below 4.4 PAC) which figure is equivalent to 40% of Mozambique's current trophy export quota of 100 elephants, raising questions of sustainability. The recent increase in this quota further emphasises the importance of good quota and PAC mangement.

Export of any CITES species requires conditions that must be met. The CITES Scientific Authority must ensure that exportation does not impact on the survival of the species and it can demonstrate that the specimen obtained did not infringe any legal conservation requirement.

In relation to the increase of a CITES quota the following must be considered:
 • Why the quota is being increased
 • What are the advantages of the increase?
 • Increase to which quantity per year
 • What will be its distribution?

Ivory stockpiles

The secure and safe keeping of ivory accumulations from legal (natural, PAC and hunting) and illegal (seizures, confiscations) elephant mortalities is extremely important in the context of CITES and trade in ivory. TRAFFIC provides clear guidelines on stockpile management which need to be strictly adhered to. Regular internal audits are an important part of stockpile management and in meeting legal and CITES compliance requirements. Currently in Mozambique, there is a need to record all ivory and put in place a robust Ivory Stock management system with assistance if needed from TRAFFIC to register all ivory according to CITES criteria.

This must also be accompanied by the implementation of revised and stricter legislation on the domestic trade in worked and raw elephant products to meet CITES criteria for internal trade in ivory, as emphasised in the ETIS analysis outlined above and detailed in CoP15 Doc.44.1 Annex.

5.3 Elephant management

Population management

There is the need to ensure that elephant management objectives meet political, social, technical, economic, ecological and institutional requirements. These elements were partially captured in the 1999 elephant management strategy, especially in relation to social and economic development goals, the sustainable use of natural resources and biodiversity maintenance. However, they have not all been adequately met, and need to be broadened in this strategy.

The acquisition of adequate information to manage elephants effectively is extremely important. For example, incomplete and imprecise numbers and density limits their usefulness to management. Likewise with the other management components which follow below. Management options currently available for elephants in southern Africa (Cumming and Jones 2006) are detailed in Appendix 1.

Each of the sub populations (North, Central and South) will need their own set of management objectives and accompanying action plans, together with management plans for the relevant conservation and protected areas within which they occur. For example, the management policy and objective in Gorongosa NP is to allow the population to reach its previous level of 2,000 which is likely to take up to 20 years, and then to review the situation. But this needs to be accompanied by regular monitoring and assessments in the interim.

Problem Animal Control

During July 2006 to September 2008 DNTF records show that 85 elephants were killed as PAC animals in response to human-elephant conflicts. This is equivalent to about 6 elephants per month. However, these elephants were a part of 1,071 HEC incidents recorded in 2007 and 2008 across Gaza, Maputo, Tete, Niassa and Cabo Delgado Provinces. In Cabo Delgado at least 27 elephants were destroyed in 2009 alone.

As human elephant conflict (HEC) problems grow, the response by DNTF and SPFFB to dealing with these, and in executing effective PAC has become a key issue politically and socially. In large part this is due to the massive logistical problems faced and the lack of resources (men, vehicles) available to deal with widespread HEC and associated mitigation measures including PAC.

Key issues include communication with, and response time of officials to an incident. Invariably located a considerable distance from the scene of the incident, a control officer may have to source firearms from the police armoury and find transport before departing for the scene, if at all. In PAs, e.g. Quirimbas NP, there appears to be no clear coordinating and communicating mechanisms for apportioning PAC responsibilities between DNTF (SPFFB) and DNAC (DPTUR and PA management authorities), so either the response is one-sided or not at all. One future option is a PAC Unit falling under one Directorate comprising officials with data collection, collation, analyses and reporting responsibilites at Provincial level.

Importantly, PAC and associated HEC cannot be managed by unqualified persons. This worsens stress on elephants and increases conflict. There is the need for specially trained PAC Units which can do control work effectively and efficiently. Such units can be placed at either District or Provincial level but if at district level strong control and accountability to Provincial level is required. DPTUR and SPFFB could be unified within SDAEs at District level and then under DPAG (Agriculture) at Provincial level. The idea of a PAC Unit made up of the two responsible agencies is not new but it needs focused and coordinated attention.

Hunting

Trophy hunting is marketed by private sector safari operators to foreign-based clients.

Quotas

Participatory quota setting was introduced to DNTF and DNAC at a WWF-facilitated workshop in Maputo in April 2005 (WWF SARPO 2005a) which met with strong ministerial and directorate support. This was followed by a practical quota setting workshop at Gorongosa NP Wildlife Training School for DNTF and DNAC staff together with safari operators in Manica and Sofala Provinces later that year in November 2005 (WWF SARPO 2005b). At the same time WWF MCO in conjunction with DNAC and DNTF produced a Quota Setting Manual.

Presently quotas are based on feedback from safari operators, scouts and in some instances communities in the different hunting areas. This provides the basis for quota recommendations which go to DNAC and/or DNTF for final approval. One problem relates to different quotas being derived from a common pool of animals, which is not sustainable in terms of trophy quality. Quotas are also being set and allocated by DNAC/DNTF in Maputo with no reference to Provinces which still issue variable elephant quotas without recourse to the annual country-wide recommended quotas.

Monitoring

Monitoring in elephant management is an essential activity in ensuring conservation and management goals are being met. Key monitoring components include population trends; protection and law enforcement; PAC and hunting quotas and offtake in relation to sustainability; socio-economic performance and organisational and institutional performance.

Presently there is no overall monitoring programme in place nor databases to capture, collate and archive data for subsequent analyses. Data should be collected in the following categories, using the methodologies outlined[3].

- *Population trends*
  Aerial surveys and census, together with ground-based methods, are the currently accepted methods for esablishing long term trends

- *Protection and law enforcement*
  Emerging monitoring protocols include the use of MOMS &/or MIST with an essential requirement being measurement of effort

_____

[3] Monitoring in the context of management activities is discussed further under section 9

- *Sustainability of use*
  Quota, offtake and trophy quality monitoring

- *Socio-economic performance*
  PAC and HEC monitoring
  Community benefits and management inputs
  Governance

- *Organisational and institutional performance*
  Management performance
  Policy guidelines

Research

There is no clear elephant research programme currently in place to address ecological, biological and other related management questions. Independent and largely applied research is being undertaken e.g. by UEM and WWF. However, it is not clear the extent to which this research part of a formal research policy and programme and whether it is addressing urgent management questions.

5.4 Institutional framework

Many of the root causes of the problems and issues identified are institutional in nature. Coordination, collaboration and communication between Directorates and Ministries within government are poor or weak or altogether absent. Although many of the problems are recognized, narrow sectoral interests prevail.

The need for planning at provincial, district and local level is seen as urgent and important but central government is slow in doing the same. Coordination is often better at district level but at provincial level tourism, fisheries and agriculture all seem to pursue their own direction.

A framework is needed for institutional collaboration especially with regard to spatial and temporal planning. Regulations are either lacking and/or need improvement. Thereafter these need to be applied and adhered to. The following flow diagrams

indicate how communication presently occurs and how it may be improved.
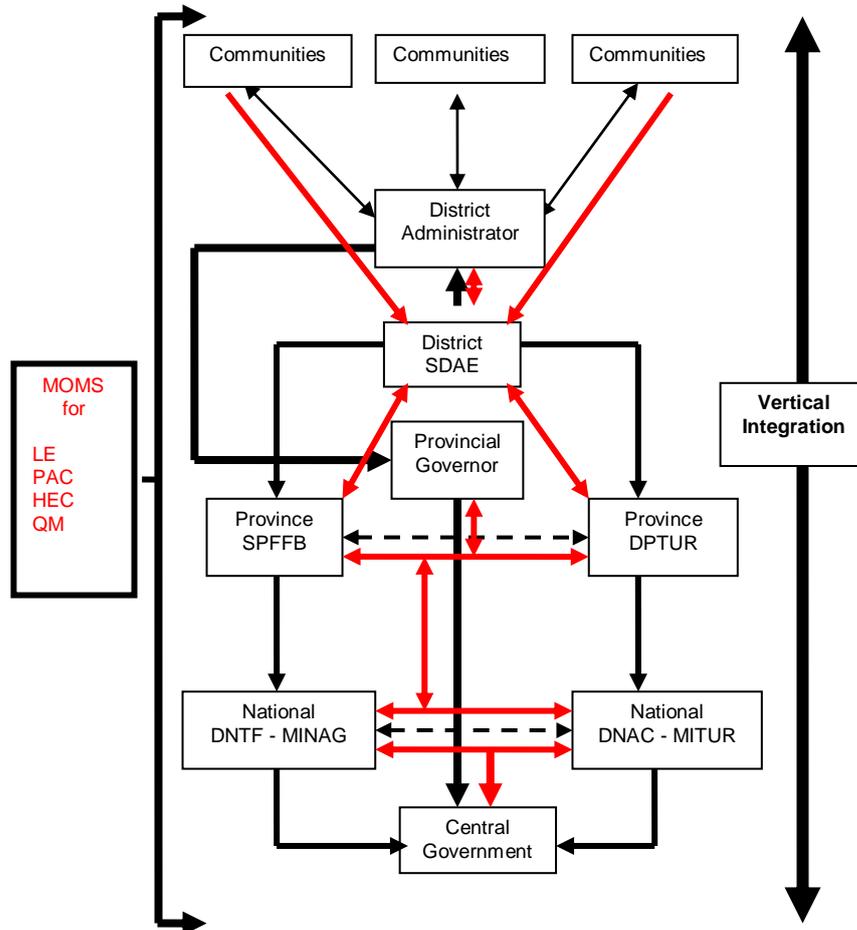
Fig. 6 Existing (black) and suggested (red) communication flows. MOMS = Management Oriented Monitoring System; LE = Law Enforcement; PAC = Problem Animal Control; HEC = Human Elephant Conflict; QM = Quota Management

5.5 Enabling legislation for unified wildlife management

A new draft Conservation Policy has recently been formulated through MICOA "Proposta de Política de Conservação e Estratégia de Sua Implementaçã" (GoMz 2009) and approved. This policy will address many of the anomalies in the application of present wildlife legislation and improvement in wildlife management. This will also deal with many of the elephant related concerns and issues outlined in this strategy.

These new proposals will also greatly assist a more unified approach not only to wildlife management but to the management of elephant as well. Especially important will be the delegation of responsibilities in implementing any new policy to a coordinating or unified wildlife management agency.

6. COEXISTENCE BETWEEN ELEPHANTS AND PEOPLE

6.1 Human populations

Numbers

The rural population in Mozambique numbers 14.8 million people or 72% of the total population (Table 2). This population is distributed over 780,000 km^2 among the country's 10 Provinces. Nevertheless, as Table 1 shows, 60% of the landscape is still made up of forests and other natural vegetation, so that the ensuing pattern of settled and unsettled areas is largely a mosaic in a mostly human-dominated landscape as Ntumi (in prep.) clearly demonstrates. Even so numbers of people vary more than fourfold between provinces from 900,000 in Niassa to 3.8 million in Zambezia.
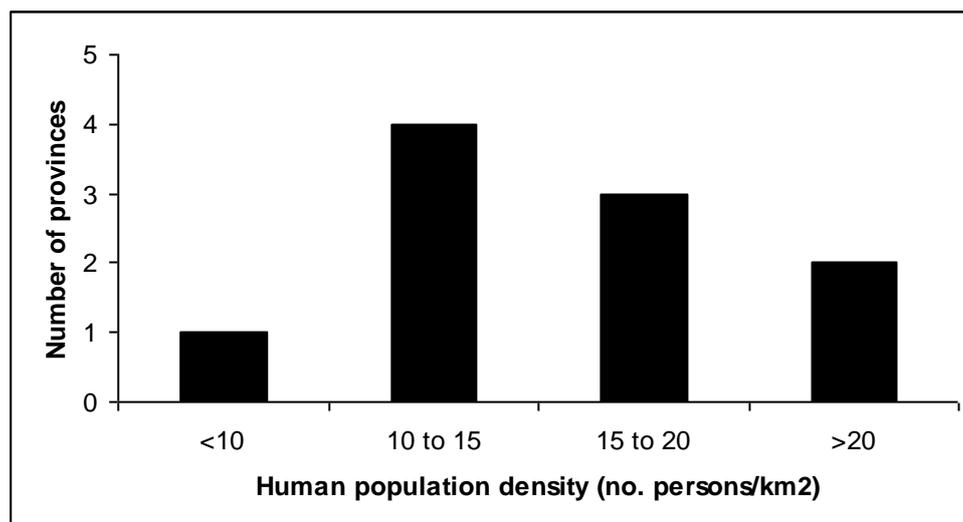
Density

This is also reflected in the density distribution of people, the frequency of which by province is shown in Fig. 7 where it can be seen only one province, Niassa has a population density <10 persons/ km^2. For Gaza and Inhambane in the south, and Sofala and Tete in the centre of the country, human density is 10-15 persons/ km^2, while in Cabo Delgado, Maputo and Manica, 15-20 persons/ km^2 are supported. Only in Nampula and Zambezia is population density >20 persons/ km^2.

As a broad guideline, elephant densities are correlated with both human density and the proportion of available habitat, i.e. elephants will persist at human densities of 10-15 persons per km^2 and >50% intact habitat, allowing elephant densities from 0.1 to at least 0.5 animals per km^2 (Appendix 11.2). Consequently at a coarse level of examination, opportunities do exist for the co-existence of elephants and people in certain situations and this is further amplified by Ntumi (in prep.).

Settlement patterns

Settlement patterns in Mozambique are determined through the needs of a subsistence economy based on agriculture and the use of other natural resources. As the country is prone to natural disasters, often leading to population displacements, settlement policy and practice is largely ineffective, especially as settlement patterns tend to favour more productive coastal zones.

Despite the opportunities for their co-existence, in most provinces where elephants and people occupy the same land, there appears to be no clear settlement policy. Land-use planning is mostly absent and where there is either some form of policy or plan it is largely ignored. Often local administration supports or does not limit settlement in conservation areas, over-riding decisions and requirements of MITUR-DNAC and MADR-DNTF as well as other Ministries and Directorates in government. This lack of adherence to plans is also reflective of poor inter-ministerial and inter-departmental communication, collaboration and coordination.

Fig. 7 The frequency distribution of human density across provinces in Mozambique

Homes and fields are generally scattered but connected through social networks. The proximity of potable water is important as is access to natural resources. Woodlands are important sources for construction materials such as poles for building homes and grass for thatching. Fuelwood is needed for energy and non-timber forest products provide edible foods. Recent settlement and in-migration has led to competition for space and water exacerbating human-elephant conflict and the perception amongst many communities is that HEC has increased.

Cultivation

Most agricultural production is of a subsistence nature based on slash and burn and a pattern of establishing new fields every few years. Crop yields are low and large stock is largely absent except in the south. Millets, cassavas and sorghums are the main crops with some maize grown. Consequently there is a strong reliance on natural resources, including numerous plants, rodents, herbivores and birds.

Conservation Agriculture

Conservation agriculture (CA) is becoming an increasingly important strategy because it helps to increase crop yields through active soil, water and fertility conservation measures.   This is achieved through improved field layouts, tillage practice, crop rotations, the use of cover crops and fallow periods. Better post-harvest crop storage prevents damage to stored grain crops by primates, small herbivores, birds, rodents and insects. This is a part of both CA and HEC which is mostly ignored and there is need for wider understanding and adaptation by agricultural extension workers of the improvements new farmer-based technologies can provide such as better protection, improved crop yields and greater market accessibility.

6.2 Elephant spatial and habitat requirements

Scale and connectivity

Habitat, including space, food and water are key requirements for elephant populations. These key resources will need to be maintained at a scale commensurate with that at which elephants function in terms of meeting their ecological, biological and social needs. Contiguous and adjacent populations will need to be in contact with each other on a

regular basis in order to maintain connectivity in terms of social networks and genetic diversity. Thus needed habitat will be in proportion to population size and density.

Generally, elephants display wet season dispersal and dry season concentration movement patterns, largely determined by food and water availability, but fire and temperature gradients can also modify such movement. Fire is a natural agent of the African landscape, and has contributed to its evolution over millennia. It is also a key anthropogenic factor which has been responsible for the increased frequency, severity and extent of fires in more recent times as human populations have increased and expanded. These fire patterns can cause elephant movements and create food bottlenecks for herbivores especially in the dry season, and lead to greater HEC problems where people and elephants are in close proximity.

Corridors

The establishment of corridors linking suitable habitats is an important management option which will benefit elephants and people. Corridors provide space for dispersal and support the movement of elephants (and other wildlife) between PAs, the provision of refugia during critical times (traditionally resource shortages; nowadays more from human-associated impacts) and the maintenance of genetic diversity (Jones *et al.* 2009).

The absence of planned local level land use and zonation leads to unorganised settlement amongst a matrix of different land use options. The development of corridors will help attempts to improve spatial planning as it involves the identification of settlement and arable agricultural areas and the establishment, maintenance and restoration of wildlife corridors.

Corridors have been established nominally and demarcated in a number of areas, e.g. Futi in the south, Tchuma Tchato areas in Tete, Nipepe-Maua in Niassa Province and Nairoto-Massalo in Montepuez and Meluco Districts, a part of Quirimbas NP in Cabo Delgado Province. However, presently many such corridors are not functioning adequately and have fallen into dis-use and are in need of institutionalisation and incentive–based local adherence and enforcement.

The Futi corridor appears to be the only formalised and respected institutionalised corridor in Mozambique.

Spatial planning

The proportion of intact and cleared habitat, settlement and cultivation needs to be assessed at the scale of individual conservation areas, together with an assessment of elephant population numbers and densities, together with human population and habitat statistics for those areas presently identified and supporting elephants. Appendix 11.2 provides currently available information on actual and potential elephant numbers and density together with human population densities and habitat criteria, for a number of conservation areas. However this information needs to be updated and further refined and extended to areas outside protected areas with potential for elephant conservation and management.

Spatial planning for people and elephants must include local level land use planning, zonation for settlement, separation of elephants and people through corridors, consolidation of arable holdings and improved agricultural production. In extreme cases, such as Quirimbas NP, physical separation e.g. fences, may become inevitable, but should follow a planned and negotiated process, which does not isolate or fragment elephant sub-populations

_____

These measures need to be accompanied by clear policy directions which exclude settlement, agriculture and infrastructural development in corridors in all categories of conservation areas, including NPs, NRs, Coutadas, game farms and community conservation areas. Maintaining separation is crucial and needs to be accompanied by local level mitigation methods applied by farmers themselves, with assistance from government and/or NGO partners.

Quirimbas NP provides an extreme example where the need for spatial planning is urgent. There are 96,000 people in the Park with a further 130,000 inhabitants in the surrounding buffer zone areas. The Park supports c.1,000-1,400 elephants and HEC is a major problem, with people and elephants both highly traumatized and insecure. Consequently elephants have become aggressive, especially when harassed by Park and SPPFB scouts, and army personnel attempting to deal with problem elephants.

6.3 Human wildlife conflict (HWC)

DNTF records and overview of human wildlife conflict

AGRECO (2008) used DNTF records of human-wildlife conflict and structured interviews amongst local people and officials in 32 districts to provide a description of human-wildlife conflict in Mozambique over the past few years 2006-2008.

During the 27 months from July 2006 to September 2008 inclusive, 265 people were reported killed and 82 injured during conflicts with wildlife. Crocodiles, lions, elephants and hippos were responsible for most deaths, but crocodiles killed 66 % of people. Crocodile, elephant and hippopotamus, in that order were the species most frequently shot in response to conflict. Elephant and hippopotamus were also shot more often in response to crop-raiding.

Long-term trend in numbers of problem animals killed

There was a clear increase in the numbers of each of the major species – crocodile, elephant, hippopotamus and lion - killed annually in response to conflict between 1997-2003 and 2006-2008. Conflicts caused by elephant, hippopotamus and crocodile were perceived as also having increased in frequency during the last five years.

Remedial actions

For all HWC, the commonest response of local people was to inform the government authorities. Some people have attempted to reduce crop-raiding by elephant and hippopotamus through consolidation of their fields, using rope barriers to deter crop-raiders, guarding fields, or using noise and fire to drive off crop-raiders. Killing of problem animals was the most popular suggestion for the most appropriate way of responding to human-wildlife conflicts, regardless of which species caused the conflicts (see also Table 8).

6.4 Human elephant conflict (HEC)

Elephants damage crops across much of Mozambique (45 districts), being particularly common in northern Mozambique, southern Tete province and southern Mozambique, in districts bordering Gonarezhou NP in Zimbabwe, or Kruger NP in South Africa, and in southern Inhambane. Elephants raid crops more frequently during March-October than during other months of the year. Elephants are responsible for 15 % of human deaths and 7 % of injuries caused by wildlife, but constitute 31 % of all problem animals killed. The 22 districts where people have died as a consequence of elephant attacks occur across the country, but most are in northern Mozambique (AGRECO 2008).

During July 2006 to September 2008 DNTF records show that 85 elephants were killed as PAC animals in response to human-elephant conflicts (Foloma 2009). This is equivalent to about 6 elephants per month. However, these elephants were a part of 1,071 HEC incidents recorded by Ntumi (in prep. in 2007 and 2008 across 15 HEC hotspots (Table 7).

Much of the focus in dealing with HEC is on addressing its symptoms. However insufficient attention is paid to the causes of HEC (FAO 2009). In Mozambique these include (Foloma 2009):

- Lack of land use planning
- Settlement in conservation areas
- Poaching and fires
- Shifting cultivation
- Lack of infrastructure and access to potable water
- Limited management capacity

HEC Hotspots

Ntumi (in prep.) has identified human-elephant conflict hotspots across the country and this analysis reveals that there are 15 hotspots located in 5 of the 10 provinces, namely Maputo, Gaza, Manica, Tete, Niassa and Cabo Delgado (Table 8).Of these, 9 sites are chronic, i.e. with continuous or on-going problems, and 8 face acute or severe problems. There are 5 chronic and /or acute sites in Gaza, one in Manica, 3 in Tete, one in Niassa and 2 in Cabo Delgado, confirming the broader analysis of AGRECO (2008). This type of analysis can assist prioritizing PAC activities and HEC mitigation measures so that interventions become more effective and meaningful.

Mitigation measures

In addition to the HWC remedial actions identified above by AGRECO (2008), information provided by a sample of national parks authorities, districts and communities (Table 9) shows that mostly short term reactive measures to dealing with HEC are currently employed. All 9 areas use traditional methods, only 33% use modern methods or technology, while 66% have relied on lethal PAC, although all reflect the application of one or more of these approaches. Two areas have used trophy hunting as a refinement of lethal PAC

Table 8. HEC hotspot sites by province, detailing those sites with chronic and severe conflict

Maputo	Gaza	Manica	Tete	Niassa	Cabo Delgado
ALL HOTSPOT SITES					
Magude	**Chicualacuala**	**Mossurize**	Changara	**Nipepe**	**Macomia**
Matutuine	Chokue	Tambara	**Magoe**		**Quissanga**
	Massingir				Palma
	Guija				
	Mabalane				
CHRONIC					
	Chicualacuala	**Mossurize**	**Magoe**	**Nipepe**	**Macomia**
	Mabalane				**Quissanga**
	Massingir				Meluco
SEVERITY					
	Changara		Cabora-Bassa		**Macomia**
Moamba	**Mabalane**		**Magoe**		**Quissanga**
	Massingir				

Only half these areas have attempted longer term measures of planning, zonation and consolidation of settlement and agriculture. It is where HEC problems are most chronic and severe, in Quirimbas NP in Cabo Delgado that long term solutions are also being sought. Niassa Province has also embarked upon a broad land use zonation exercise.

In addition to participatory local-level land use planning, zonation, corridor identification and consolidation of settlement and agriculture in elephant-affected areas, there are many tools available for on-site application to deter elephants (Osborn and Parker 2002, Parker et al. 2007, AfESG 2009, CIRAD-BIOHUB-FAO 2010). However, even though training may have been provided, materials and equipment such as chillis, rope, and grease are often not available. Communities then fall back on the use of traditional methods.

<u>Wider application of problem animal control</u>

A number of districts are engaging safari operators to undertake PAC work through the marketing of these animals to hunting clients. However the practice of "control" hunting by operators is essentially trophy hunting, or very selective PAC. Some operators will assist communities with non-lethal PAC but can be authorized to destroy animals, in which case they may then be used for trophy hunts, but under no clear policy guidelines. These arrangements also appear poorly managed and likely to affect sustainable trophy hunting, as well as potential revenue earnings at community, district and national levels. Only in some instances in which PAC elephants were shot as trophies, were 20% of earnings returned to communities. Whilst this approach is open to abuse, if appropriately managed and regulated through an approved quota allocation, it could be both beneficial to HEC mitigation as well as generating additional community benefits.

A number of districts favour this approach, although current arrangements are developed locally (Provincial and/or District) and these need greater formalization. Park authorities in Quirimbas are keen to try the approach which can also be extended to the wet rainy season when crop raiding generally begins. This however would require a change in the hunting regulations which presently preclude hunting at this time of the year. This model has been used in Zimbabwe (Taylor 1993) but abuse must be guarded against (see 5.2 above) and careful marketing must be undertaken by safari operators, ensuring that genuine problem animals are identified and hunted. From 2010, a similar approach is being piloted in community sites using the hunting quotas in three community sites in Gaza province (Foloma pers. comm.).

An open and transparent approach would be to treat problem elephant as follows:

- Non-trophy non exportable elephants only to be shot on control, i.e. non commercial

- PAC undertaken by approved bona fide hunters, Government and Safari Operator PHs (Lists to be provided)

- Allocation of community elephant management quotas

- Establish a unified PAC elephant database between DNAC and DNTF

Table 9. HEC mitigation options being used or tried by a sample of National Park authorities, Districts and communities across 5 provinces

Province	C.Delgado	Sofala	Tete	Niassa	Niassa	Nissa	C.Delgado	C.Delgado	C.Delgado
Area	QNP	GNP	T.Tchato	Nipepe	Maua	Mutera	Mbau	Macomia	Meluco
HEC measures Short Term									
Traditional methods	●	●	●	●	●	●	●	●	●
Modern methods e.g. chilli pepper	●			●	●				
PAC lethal control	●	●	●	●	●				●
PAC trophy hunts				●	●				
HEC measures Long term									
Local level land use planning									●
Zonation, e.g. Corridors	●		●	●					●
Consolidation of settlement and arable holdings	●			●					
Conservation Agriculture	●								
Separation, e.g. Fences	●								

Summary of HEC

Currently, the problems of HEC across the entire African elephant range can be summarized as follows (Niskanen 2005):

- There are no "blueprints" for mitigation and there is the need for the whole tool box of mitigation measures
- One intervention alone will never ameliorate HEC
- There is need to address the problem at all levels – symptoms <u>and</u> underlying causes
- There is need to study more thoroughly and respond more directly to the human dimension of HEC
- Successful long-term management of HEC requires solid support from all levels of government
- This must be supported by clear policies and legal frameworks at the local, district and national levels
- Conflict mitigation must have strong local participation and be integrated with other elephant, wildlife and land management activities

HWC Policy

In response to the widespread occurrence, nature and severity of HWC in Mozambique, and reports on this topic by Anderson and Pariela (2005) and AGRECO (2008), DNTF has now produced a policy document on HWC (DNTF 2009).

Vertical integration model

To date, most HEC mitigation has focused on short-term deterrence methods at the conflict site. This has often been applied in an *ad hoc,* uncoordinated manner, and has consequently achieved little long-term success in alleviating the problem. For HEC management to be effective in the long term, actions have to be taken at <u>all</u> levels. There have been few efforts to address root causes. This requires actions at higher levels including cross-sectoral planning within and amongst governments.

For example, for HEC management to be effective at the site level, local communities may need to be given more authority to decide how elephants should be managed while developing strategies to improve local livelihoods. This needs a supportive legislative and policy framework requiring the involvement of relevant local and national-level authorities. In other words, actions need to be coordinated and planned "vertically' upwards from a local level through district, provincial and national levels.

This will require the involvement of donors, investors and other sectors to encourage integrated approaches that can simultaneously improve human livelihoods while helping conserve elephants. Poorly conceived development projects that may exacerbate HEC, such as irrigation schemes, cash crop plantations, exploitation or extraction in key elephant range should be actively discouraged. The IUCN SSC African Elephant Specialist Group is taking a lead role in developing a Vertical Integration Model to incorporate these needs into HEC and is presently supporting a pilot project in Mozambique and Tanzania.

6.5 Community based conservation

If large wild indigenous mammals in Mozambique are to survive both in and outside of conservation areas, and the problems of HEC are to be overcome, the benefits to local people of living with this wildlife must exceed the costs of living with it <u>and</u> the benefits of living without it. In other words wildlife must provide added value if behavioural responses to wildlife are to change for the better.

Community based conservation must include the further development and establishment of community based organizations (CBOs) or community associations which are empowered with skills, knowledge, responsibility and accountability and the rights to use, trade and benefit from their natural resources (Roe et al. 2009). Examples already evident in Mozambique include the legal standard 20% return to, and retention by communities of wildlife incomes, and innovative challenging models such as Tchuma Tchato and Chipanje Chetu, which seek to enhance empowerment, management responsibility and benefit at community level.

This will take time, resources and incremental progression in training and capacity building, both within Government structures as well as amongst communities.

7. NATIONAL STRATEGY

Analysis of the above sets of issues and options provide the basis for formulating a strategy and action plan for the conservation and management of elephants. This is accompanied by a logical framework incorporating the needed set of actions or activities. Targets, their indicators, means of verification and assumptions are established at the Goal and Objectives (Outputs) level.

***Vision*:**

> Elephants and people provide mutual benefit to each other

7.1 Long term objective

> People and wildlife contribute to the social, ecological and economic development of Mozambique through protection, conservation and sustainable use of the country's wildlife resources

7.2 Goal

> Maintain and, where possible, increase the numbers and range of elephant populations, their habitats and associated biodiversity, ensuring full economic benefit to national and local development, including the communities with whom they share the land

Goal Targets

Target 1. Ensure the persistence of key elephant populations and the viability of other important elephant populations

Target 2. Human-elephant conflict reduced

Target 3. Wildlife conservation-related net benefits to local communities optimised

7.3 Objectives, Targets and Activities

1. Elephant populations and their range conserved

Target 1.1 Critically establish elephant numbers, range and trend

Activities
1.1.1 Assess data requirements, especially for unsurveyed areas
1.1.2 Develop country-wide aerial survey programme, plan and budget
1.1.3 Conduct regular standardised systematic aerial and other surveys to monitor elephant populations

Target 1.2 Levels of illegal killing of elephants critically etablished

Activities
1.2.1 Re-establish MIKE sites and ensure systematic and regular data collection, collation and analysis
1.2.2 Measure and establish critically carcass ratios in areas not surveyed in 2008; monitor carcass ratios closely in known areas of illegal activity
1.2.3 Examine 2009 Niassa Reserve aerial survey carcass ratio data when available, for detection of any change compared to previous surveys 1998-2006
1.2.4 Make use of patrol-based collection of elephant carcass data (see 2.1 below)
1.2.5 Plan establishment of elephant corridors (see also Targets 4.1 & 4.3 below)

2. <u>Elephant populations effectively protected</u>

Target 2.1 Field protection enhanced and strengthened

Activities
2.1.1 Provide equipment and suitable facilities for field staff
2.1.2 Increase and improve numbers of anti-poaching units
2.1.3 Monitor illegal hunting and law enforcement effort
2.1.4 Provide performance-linked incentives to anti-poaching personnel

Target 2.2 Law enforcement capacity and procedures strengthened

Activities
2.2.1 Establish a DNAC-DNTF/DPTUR/SPFFB special unit coordinating legal proceedings from arrest to conviction
2.2.2 Strengthen the judiciary and train specialised wildlife prosecutors
2.2.3 Assist selected prosecutors to specialise in wildlife law (Forestry and Wildlife legislation)
2.2.4 Provide in service training for customs, police, army and DNTF/SPFFB staff
2.2.5 Strengthen links with police and improve their support and understanding
2.2.6 Establish effective collaboration and coordination mechanisms between customs, police, army and DNAC/DNTF on enforcement issues
2.2.7 Establish a register in DNTF/DNAC (SPFFB & DPTUR) and take control of the issue and use of all weapons

Target 2.3 Internal and external trade issues regularised

Activities
2.3.1 Register and put in place robust Ivory Stock management system with assistance if needed from TRAFFIC to register all ivory according to CITES criteria
2.3.2 Revise and implement stricter legislation on the domestic trade in worked and raw elephant products to meet CITES Criteria for internal trade in ivory

3. <u>Elephants effectively managed in collaboration with local stakeholders</u>

Target 3.1 Acquisition of adequate information for DNAC/DNTF to manage elephants effectively

Activities
3.1.1 Assess data requirements
3.1.2 Establish monitoring programmes to establish ecological and biological trends, protection & law enforcement, PAC, trophy hunting, socio-economic performance, organisational and institutional performance – use and adapt MIST and/or MOMS
3.1.3 Implement monitoring programmes
3.1.4 Establish databases
3.1.5 Develop systems within DNTF and DNAC to coordinate and collaborate on data collection and analysis

Target 3.2 Ensure management objectives meet political, social, technical, economic and financial and ecological requirements

Activities
3.2.1 Set up a committee or planning unit to oversee elephant management planning
3.2.2 Review the current status and progress of management actions at least annually
3.2.3 Update plans according to current conditions

Target 3.3 Development of management plans for elephant sub populations (North, Central and South) and the relevant protected areas and community conservation areas within which they occur

Activities
3.3.1 Develop planning template
3.3.2 Undertake participatory planning at community, district and provincial levels
3.3.3 Identify and develop a elephant corridor strategy and plan and undertake participatory feasibility studies

Target 3.4 Problem Animal Control (PAC)

Activities
3.4.1 Develop and implement vertically integrated Decision Support Systems (DSS) (see also 4.1.1)
3.4.2 Develop and implement standardised PAC protocols (reports, response & monitoring) based on national HEC/HWC policy
3.4.3 Develop Vertical Integration Model for HEC
3.4.4 Set indicative PAC "quotas", limit offtakes and minimise where possible, shooting valuable trophy elephant males
3.4.5 Ensure close coordination and communication between DNTF & DNAC as well as between Provincial and District structures on PAC offtakes, i.e. use DSS as above
3.4.6 Clarify criteria and regularise (develop and implement single policy administered by one responsible authority) on shooting of PAC elephant

Target 3.5 Sport hunting

Activities
3.5.1 Regularise and control (develop and implement policy) shooting of PAC elephant as trophies (see 3.4.6 above)
3.5.2 Regularise quota setting and allocation in relation to sustainable offtakes using participatory quota setting methodologies, avoiding excessive mis-allocations
3.5.3 Establish an effective and efficient administrative system for the issue and control of hunting licences and other permits, e.g. PAC if appropriate, including clear communications channels-national-provincial-district
3.5.4 Develop and implement a code of conduct and ethical practice for sport hunting

4. Human elephant conflict reduced through mitigation, spatial planning and increased benefits

Target 4.1 Reduction of human-elephant conflict

Activities
4.1.1 Develop national guidelines to deal with human-elephant conflict (HEC) – Vertical Integration Model (see also 3.4.1)
4.1.2 Identify problem areas and establish priorities
4.1.3 Coordinate conflict management
4.1.4 Train staff in damage assessment and problem animal control (PAC) techniques
4.1.5 Involve local communities in conflict management
4.1.6 Formulate and initiate projects in conflict areas

Target 4.2 Improved and sustained return of material benefits to elephant-affected local communities

Activities
4.2.1 Generate tangible benefits from elephant conservation and utilisation

_____

4.2.2 Establish mechanisms to ensure that local communities benefit directly as well as indirectly

4.2.3 Inform recipient communities about the source of benefits directly as well as indirectly

4.2.4 Enable members of rural communities to take part in exchange programmes

4.2.5 Use the presence of elephants to stimulate tourism development to generate employment and other benefits to local communities (see also 4.1.6 above)

4.2.6 Promote tangible benefits to establish community-based conservation activities

Target 4.3 Participation in improved spatial planning and zonation in relation to land use at local community level

Activities

4.3.1 Develop and implement participatory community-based land use and zonation planning incorporating corridors

4.3.2 Extend planning to the identified 15 priority hotspot districts

4.3.3 Prioritize spatial planning and coordination for district towns and Administrative Posts and localities.

4.3.4 Guarantee basic services (health and education) in these areas

4.3.5 Mobilize communities to improve adherence to development prorities

4.3.6 Redesign Conservation Areas taking in account human development priorities

4.3.7 Promote conservation activities around Conservation Areas (buffer zone) reducing conflicts in the long term period.

4.3.8 Explore short term strategic fencing options in Conservation Areas to deter elephants and secure human life and well being.

5. <u>Efficient and effective institutional and organisational framework in place</u>

Target 5.1 Improvement of institutional and technical capacity through the provision of adequate resources based on sustainable funding mechanisms

Activities

5.1.1 Identify management activities and set priorities for their initiation including establishing a balance between operational and administrative responsibilities

5.1.2 Evaluate the status of existing funds, facilities, staff, equipment and other necessary resources

5.1.3 Provide performance-related incentives to government staff involved in wildlife management

5.1.4 Establish in-service training programmes and develop relevant curricula for staff education including practical field training

5.1.5 Improve technical capacity and effective management by exchanges of experience, skills and knowledge through SADC

5.1.6 Develop sustainable funding mechanisms

Target 5.2 Communication and coordination within and between wildlife sector agencies (DNAC, DNTF, MICOA) improved in implementing the elephant management strategy and plan

Activities

5.2.1 Develop and disseminate demonstration materials appropriate for each target audience on laws and regulations and aspects of elephant conservation

5.2.2 Establish a system by which relevant stakeholders can communicate with government hierarchies

Target 5.3 Communication and coordination within and between wildlife sector outside of Government

Activities
5.3.1 Establish effective communication channels between government and private sector in the wildlife industry
5.3.2 Establish effective communication channels between government and civil society, CBNRM fora and local level communities

6. Elephant conservation enhanced through policy and legislative change

Target 6.1 New improved enabling wildlife policy and legislation adopted

Activities
6.1.1 Pursue the process of developing, enabling and implementing new policy and legislation timeously and as an important priority of Government

7. Elephants managed effectively and efficiently under one agency

Target 7.1 Field protection, PAC, hunting administration and monitoring, community conservation and HEC all unified under the framework of a single responsible agency

Activities
7.1.1 Progress the process of creating a single agency timeously and as an important priority of Government

8. Communication on elephant issues improved

Target 8.1 Communication and coordination within and between stakeholders and role-players improved

Activities
8.1.1 Determine communication needs at each level and type of stakeholder, e.g. Government, NGO, civil society, media
8.1.2 Develop communications material appropriate to stakeholder type and level of understanding
8.1.3 Distribute communications material
8.1.4 Undertake communications feedback, i.e. is communications strategy working?

Target 8.2 Dissemination and explanation of the national elephant management strategy to relevant stakeholders and the development of elephant management plans for protected areas (PAs)

Activities
8.2.1 Publicise and disseminate elephant management strategy and action plan locally and internationally
8.2.2 Demonstrate that Mozambique fulfils internationally accepted standards and requirements for elephant management
8.2.3 Publicise sub population management plans in relation to spatial planning, corridors and HEC mitigation

Target 8.3 Improved awareness by all levels of society of the value and benefits of elephants

Activities
8.3.1 Encourage educational institutions of all types to include elephant issues in curricula
8.3.2 Deal with public relations and education concerning the elephant
8.3.3 Publicise the value of elephants in schools and to wider audiences in civil society

7.4 Assumptions to be met

Goal Level:

- Wildlife sector recognised as an important economic activity and contributor to growth and development
- All sectors of society recognise and understand full (direct & indirect utility, existence and future) value of elephants
- Elephants and their habitats are accepted politically, socially and economically
- Elephants contribute to economic growth and development
- Costs of local communities living with elephants offset by the benefits elephants bring

Objectives Level:

- Expertise, knowledge, skills and equipment together with funds available to undertake aerial surveys and ground-based law enforcement patrols
- Government commitment to meet costs of field protection. i.e. c. USD$100-200/km^2
- Government commitment to law enforcement within the wildlife sector
- Government commitment to combating organised national and international wildlife crime
- Expertise, knowledge, skills and equipment together with budgeted funds available to administer and/or undertake management activities

- Communities willing to participate and collaborate
- MADR and MITUR and respective Directorates understand need for institutional change
- GoMz , relevant Ministries and Directorates see and recognise need for single agency
- Need for communications strategy recognised by all stakeholders

8. IMPLEMENTATION PROCEDURES

Some of these issues are not specific to elephant conservation but relevant to the overall functioning of the government agencies involved and to the conservation of all natural resources in Mozambique. For instance the lack of resources and capacity, outdated legislation and inadequate policies and other issues have been identified as constraints in the Forestry and Wildlife Sector Investment Programme of 1997 (DNFFB 1997) which also make more detailed recommendations for capacity building in these and other respects.

8.1 Elephant numbers and distribution

While the 2008 country-wide wildlife survey was an important first step in assessing the present status of wildlife in Mozambique, it covered only 80% of country at a low sampling intensity of 2.35%. Approximately 227,000 km^2 were not surveyed including northern and western Mozambique and Gorongosa NP.

Elephant numbers, range and trend will need to be established for these unsurveyed areas. Requirements for these unsurveyed areas need to be assessed and a country-wide aerial survey programme, plan and budget developed. Thereafter a regular standardised systematic aerial survey programme will be needed to monitor elephant and other wildlife populations. The standards for such surveys should comply with the CITES-MIKE requirements (Craig 2009).

8.2 Management requirements

Decisions need to be made as to where Mozambique wants to protect, manage and/or control elephants. This will include co-existence with people under different management regimes depending on national and area-specific objectives and will need to be linked to the numbers and densities of elephants appropriate to different ecological settings and administrative areas, i.e. Protected Areas, Coutadas and other non-protected areas (see Appendices 11.1 & 11.2).

8.3 Management and development plans

The development of management plans for elephant sub populations (North, Central and South) and the relevant protected areas and community conservation areas within which they occur will also need to ensure management objectives meet political, social, technical, economic, financial and ecological requirements. Management at large scales should involve the development of collaborative co-management regimes across administrative and tenurial landscape boundaries.

8.4 Operational budgets and resource requirements

The following sections provide very basic guidelines. Requirements obviously vary according to the conditions prevailing in different areas and detailed recommendations should be made for each conservation area in individual management plans. Variables include proximity to and status of human settlements; proximity to international borders, size of elephant populations, habitat availability, and land use practices currently in force. Projects which reduce incentives for poaching also reduce the requirements for large anti-poaching units.

Considerable funds are required to support adequate law enforcement staff and have been calculated to be about USD200.00 per km^2 per annum (Martin 1990, Cumming 2004). However, in Zambia, Jachmann (1998) has estimated that ~USD80 per km^2 per annum is sufficient for a high level of law enforcement. This is recurrent expenditure which includes salaries, field allowances, training, vehicles, equipment and staff accommodation.

Funds are also required for incentives to informers if this system should be put in place.

8.5 Personnel

Numbers

A number of discussions on appropriate staffing densities have resulted in the conclusion that to reduce illegal hunting of elephants to very low levels, there has to be no less than one man per 50 km^2 (Cumming et al, 1984, Martin 1990, Jachmann, 1998). This is seldom achieved. Large areas such as the Niassa National Reserve and the conservation area around it would require about 800 scouts – clearly an unrealistic figure. However, other parameters contribute to reduction in poaching (the presence of tourists or safari hunting for example) and if it is accepted that there will be a low level of illegal hunting, lower staffing densities can be sufficient.

Training

Different levels of training and expertise are obviously required at different levels within the management system.

- Wardens – ideally should have a university or tertiary qualification in an appropriate subject (e.g. wildlife management) and have obtained experience working in the field.
- Rangers – should have a diploma from a specialist wildlife college with in-service training in relevant management skills, including lawe enforcement.
- Scouts – should have secondary school education and have been trained in-service in identification of animals and dominant plants, map reading, tracking and law enforcement.
- Technicians – should have a BSc in biology or ecology and have also had training in the use of computers and relevant software.
- Biologists – should have a higher degree (B.Sc. Hons. or above) in appropriate subjects and have an ability to design and conduct research and monitoring programmes without close supervision.

Equipment

Uniforms, vehicles, camping equipment, rucksacks, binoculars, firearms, radios are all basic requirements for wildlife management field operations.

9. GUIDELINES FOR MANAGEMENT ACTIVITIES

9.1 Elephant surveys

The most cost-effective way to provide a baseline estimate of the numbers and distribution of elephant is to undertake aerial surveys. These should cover the entire possible elephant range, and include areas where their occurrence is in question. It may also useful to conduct surveys in both wet and dry season to account for seasonal changes in distribution.

In order to obtain information about population trends, surveys should be conducted annually for at least five years, and thereafter less often. Additionally they should take place at approximately the same time of year to ensure similar conditions prevail to allow comparisons to be made between successive surveys.

If it is necessary to reduce costs, only those areas or elephant populations of particular interest or importance should be surveyed repeatedly. In such cases, efforts should be made to include the whole of a population, as it will become difficult to determine whether population trends are due to migrations or demographic changes.

There are different survey methods appropriate for different conditions (Norton-Griffiths 1978). All surveys should result in an estimate of animal numbers, a measure of the precision of the estimate in the case of sample counts, and maps of the distributions of animals.

Recommended methods are described very briefly below.

Systematic Reconnaissance Transect Counts

A widely used method of sampling wildlife (Norton-Griffiths,1978), this method is suitable for areas which are not mountainous and where vegetation is not too dense to impair visibility, at least during the dry season. It involves (e.g. Dunham 2010, Gibson 1998) flying a fixed-wing aircraft accurately along predetermined lines at required sampling intensities, maintaining constant height above ground level using a radar altimeter. Experienced observers call out sightings of animals between markers which are placed on the aircraft according to a required strip width on the ground.

Block Counts

An aerial survey technique commonly used for sampling wildlife in broken terrain where the maintenance of a constant height above ground is not possible. The block counting technique is also used when a radar altimeter is not available, or when dense vegetation requires repeated searching over the same area. It is also an appropriate sampling method for use from a helicopter. It involves (e.g. Caughley 1977, Gassaway et al.1986) intensively searching the ground within pre-selected blocks. The area of each block should be between 10 and 15 km^2 and sufficient blocks should be selected to allow the required sampling intensity to be achieved.

Total Counts

As the name implies, total counts are intended to count all the animals within the survey area (rather than sampling a selection of them). A minimum counting time of 1km^2 per minute is necessary for a reliable count, but it is unlikely that even total counts actually manage to count all animals, unless conditions are optimal (good visibility, animals not hidden under vegetation etc) and the area is small enough to be covered within a short time (to avoid counting animals more than once or missing animals that have moved).

While aerial surveys are most efficient, there are some circumstances when ground counts provide useful information. They are most appropriate, for example, when elephants are not visible from the air because of dense vegetation. Techniques for counting animals from the ground can be either indirect (signs left by animals are used to obtain estimates of their numbers) or direct (animals are seen and counted). Examples are described below.

Dung Counts

Dung counts are an indirect sampling method for estimating elephant numbers or for producing indices of relative abundance (Barnes 1996). The method is used particularly in dense forests where animals are difficult to see either from the air or ground. It requires the counting of the numbers of dung-piles within a fixed strip along transects, the calculation of the defecation rate of elephants and the estimation of the length of time for dung to decompose.

Line Transect Counts

This method samples elephant populations by counting animals seen by observers walking or driving along transects. In order to calculate densities, the area in which the elephants are seen is required. This is obtained either by only counting animals within a fixed strip on each side of the transect, or by measuring the distance of the animals from the transect and then applying a probability function to calculate their densities (e.g. Burnham et al, 1980).

it is likely that funds for survey projects will have to be sought externally as they are expensive to conduct. Aerial surveys are usually the most efficient method of covering large areas within a short time and are therefore cost effective. Ground surveys may be less expensive, if members of staff (say of DNAC/DNTF) are available and qualified to conduct them, but they take a long time and cover only small areas.

9.2 Habitat monitoring

Vegetation Mapping

Maps of the vegetation in areas of interest (National Park, Game Reserve or other parts of the elephant range) can assist in assessing management requirements and provide a basis for monitoring programmes. The procedures for mapping vegetation can be summarised as follows:

- Stratify the entire area according to the geology, soil and topography and also on the basis of vegetation structure. This can be done most easily using satellite imagery and aerial photography.
- "Ground truth" the strata by selecting plots within each stratum and estimating the abundance of dominant plant species.
- Classify the plots using ordination techniques such as "Canonical covariance" or "Reciprocal Averaging".

Monitoring Vegetation Change

This should be done by tracing the fate of individual trees within major vegetation types or in habitats considered to be a risk of damage by elephants. Most simply, this can be done by establishing transects along which individual plants can be assessed for damage or death. Fixed photo point 360° panoramas taken at regular intervals also provide a simple and relatively robust method of monitoring vegetation change.

9.3 Law enforcement methods

LE Patrols

A patrol group usually comprises a number of scouts with their assistants (junior staff who carry equipment), a scout able to keep records of the patrol and a more senior scout as leader. Patrols, usually made on foot from a base camp, can be daily or longer (typically 10 days). Patrols can be deployed by vehicle to allow a bigger area to be covered. Personnel are usually armed. Activities include searching for illegal activities, e.g. poached animals, recovery of snare and/or traps, making arrests, removing snares and so on. Jachmann (1998) provides detailed analyses of the effectiveness of law enforcement patrols, with emphasis on measuring patrol effort. This is an important component of the MIKE LE protocols, which are turning more to new simpler monitoring methods such as MIST and MOMS. Importantly, MIKE standards must not only be applied at the two official MIKE sites, but shoud be adopted country-wide as a national standard.

LE Investigations

These include sources of information other than field operations. They might include interrogation of offenders (including poachers and dealers) and members of the public who can also provide useful information. The establishment of intelligence systems with the provision of rewards for information leading to arrests can be a very important means of reducing elephant poaching (Jachmann 1998).

Monitoring Illegal Hunting and Law Enforcement

This is the subject of at least one book and experience and requirements within wildlife agencies of different countries are likely to differ. However, the following summary may provide a useful guideline (Jachmann 1998):

- Design standard recording forms (bearing in mind their later analysis) to allow information about patrol route, sightings of dead animals, cause of death, encounters with illegal activities or signs of illegal activity.
- Classify offences according to their seriousness.
- Record patrol routes even when there are no animal sightings or illegal activities (to provide information about effort).

9.4 Sustainable utilisation

It is clear from the Vision and Goal statements that, in line with the Forestry and Wildlife Strategy and Policy (1996), sustainable utilisation is the means by which elephants and other natural resources will be conserved in Mozambique, assuming mechanisms for other conservation and management practices are put in place.

Wildlife utilisation takes two forms – consumptive and non-consumptive. The relative advantages and risks are given with a brief description of utilisation practices below.

Consumptive Utilisation

Four types of consumptive utilisation can be identified.

a) Trophy Hunting

Trophy hunting involves the killing of animals for sport. It is often aimed at hunting those animals with large tusks, horns or bodies, depending on the species, and therefore involves killing mostly males rather than females, and consequently, has little impact on population growth rates.

Benefits of sport hunting include:
- revenue – high financial returns for the removal of relatively few animals
- the presence of armed safari operators within the elephant range provides a security presence which might otherwise be lacking and which discourages illegal activities
- rural communities in the areas may benefit directly by demanding fees for access to the area, a percentage of trophy fees etc. Indirect benefits might include improved access from their villages, employment, meat etc.
- trophy hunting can be a "draw card" to attract visitors to other parts of the country
- sport hunting attracts investment in Mozambique

There are also a number of risks involved in sport hunting such as:

- hunting can conflict with benign tourism such as photographic "safaris", if both occur in close proximity to each other
- adverse international and national publicity can arise from poor hunting practices, lack of control and also from the anti-hunting and animal rights lobbies
- large sums of foreign currency involved are an inducement to corruption; this could lead to unsustainably large quotas being set, extra licences being issued, and so forth
- uncontrolled or excessive hunting is likely to reduce trophy quality and the value of the resource

Sections 9.5 and 9.6 outline further guidelines for trophy hunting and quota setting

b) Problem Animal Control

Problem animal control involves the killing of animals in response to damage to human property and injury or loss of life. Utilisation is a by-product of this activity.

Benefits from problem animal control include:

- a reduction in damage to crops and other property if done properly (i.e. target animals are killed *in situ* etc)
- meat from problem animals is often given to the relevant community as a form of compensation; other benefits, e.g. 20% revenues and/or compensation methods can be explored.

- the killing of problem animals demonstrates concern and efforts by the authorities to address the problems of rural communities.

Risks attached to killing problem animals include:

- the fact that effective problem animal control is dangerous to those carrying it out
- it is difficult to do properly – problem animals often raid fields at night and poor visibility could increase the chances of wounding animals; it is often difficult to identify the culprits and so on.
- it is expensive (the deployment or basing of staff in remote areas, the provision of arms and ammunition, the training of staff in proper procedures etc)
- it can be confused with sport hunting
- it is open to abuse – used as an excuse to kill above a sustainable quota; an additional source of ivory which is difficult to control, etc.

c) Live Animals Sales

This option is, arguably, a non-consumptive use of animals, as animals are not killed. However, in terms of their removal from their origin, it is consumptive. Where there are considered to be excess numbers of elephants, capture and translocation is now a feasible option of removing animals from an area.

Advantages of selling live animals include:

- humane considerations – animals are not killed
- favourable publicity (in contrast to the publicity from culling)
- potentially substantial revenue

Disadvantages of live animal sales include:

- human considerations – animals social organisation are disrupted if entire groups are not taken. Capture is extremely stressful to the animals
- the ill-treatment of captive animals can lead to bad publicity
- very costly
- numbers of animals captured and removed are not usually sufficient to reduce over population pressures
- there must be enough land elsewhere (even if not within Mozambique) to support translocated elephants and these are limited
- requires highly experienced and skilled operators and appropriate equipment.

Non-Consumptive Utilisation

This form of utilisation makes use of the presence of elephants without killing them or removing them from their range. Types of non-consumptive use include:

a) Tourism

Tourism usually takes a non-invasive form by which visitors (often foreign) simply visit an area to look at the animals or take part in photographic and filming "safaris".

There are a number of benefits from this type of utilisation including:

- the earning of foreign revenue
- the development of infrastructure in remote areas to the benefit of rural communities

_____

- year-round employment for local people
- the attraction of tourists to other in-country destinations (coastal resorts etc)

Despite its benign nature, however, there are a few drawbacks to tourism:

- it takes a long time for a country to gain a good reputation as a desirable holiday destination
- short term revenue and other benefits are not as great as those obtained from hunting
- many of the areas in Mozambique which have the greatest potential for tourism are extremely remote and therefore may be too costly to develop and too expensive to attract adequate numbers of tourists

b) Green Hunting

"Green Hunting" is an invasive form of non-consumptive utilisation whereby tourists seeking "adventure" types of holidays, pay to capture an animal (usually by darting) and then release it live, sometimes as part of a larger research or conservation programme.

The favourable aspects of green hunting are:

- it can attract significant revenue
- animals are not killed
- it can assist in reducing the costs of research projects (for example, when fitting radio collars to animals)

Disadvantages are:

- it will draw very few tourists
- ethical considerations – any kind of handling can stress wild animals and disrupt normal behaviour
- it is dangerous and requires experienced and skilled operators
- it can result in accidental deaths of elephants and/or tourists

c) Research and General Publicity

Elephants attract interest and are sought after as subjects for research, which brings publicity for the country, as well as research fees, although these are often insignificant compared to other income levels described above.

9.5 Recommendations for safari hunting

The safari hunting of elephant attracts investment and foreign revenue to Mozambique. However, it is necessary and important that conditions and restrictions are put in place to ensure that it is not detrimental to elephant conservation and that it is sustainable. The following recommendations and conditions should be considered:

- DNAC/DNTF monitoring must be in place, with systems for obtaining and analysing biological data as well as financial, economic and administrative information.
- Only elephant populations whose size and conservation status are known should be considered as targets for safari hunting.
- Only those elephant populations that are increasing or stable should be considered for safari hunting
- Target elephant populations must be above a threshold size sufficient to support a sustainable off-take.

- Illegal killing of elephants must be under control
- Designated hunting blocks must have been defined and, if possible, gazetted.
- Professional hunter's association/operators standards must be in place
- Central licensing systems must be functioning
- There should be full consultation with all involved parties before the regulations regarding hunting and other utilisation issues are passed
- Quotas must be set on an objective and scientific basis and managed adaptively
- In addition to using estimates of population size and trends from surveys, quotas should take into account information from other sources, using triangulation and participatory methods. Systems for recording hunting effort and for measuring trophy quality (including age of animal if possible) should be designed and put in place.
- Numbers of animals killed for other reasons (problem animal control, poaching, rations, etc) must be recorded and taken into account when setting the quota.
- There should be rational and transparent allocation of hunting opportunities. In this regard, quota setting should be done by a committee and never by single individuals, either in the field or at higher administrative levels. This will avoid the possibility of corrupt practices or the accusation of corruption becoming an issue.
- It could be advantageous to explore "minimum risk" option (e.g. the sale of quotas by auction versus the allocation of quota by concession).
- Systems for community benefits must be in place
- Contacts should be established with regional and international entities to discuss elephant related issues, e.g. CITES

9.6 Calculation of hunting quotas

Assuming the conditions for sustainable trophy hunting are in place, off-take quotas should be determined on a scientific basis and set in conjunction with monitoring of trophy size as well as regular monitoring of population size, hunting effort, PAC offtakes and illegal hunting. Should the first two for these parameters decrease significantly, or the latter two increase, quotas should be decreased.

It is necessary to decide whether a large number of small trophies or a small number of large trophies are required annually. Table 10 provides a guideline for trophy quotas.

Table 9. Approximate relationship between population structure and size/age relationship of ivory from Zimbabwe data (Craig and Gibson, 1993)

MEDIAN TROPHY AGE	% POPULATION KILLED	TROPHY SIZE kg/side	MIN. POP. SIZE FOR OFFTAKE OF 1 ELE/ANNUM
30	0.68%	20	147
35	0.49%	26	204
40	0.37%	33	270
45	0.27%	40	370
50	0.21%	49	476
55	0.16%	56	625

Further details for passive and active methods for elephant management are provided in Appendix 11.1.

10. REFERENCES

AGRECO (2008). National census of wildlife in Mozambique. Final Report. Ministério da Agricultura. República de Moçambique.

Anderson, J.L. and Pariela, F. (2005). Strategies to mitigate human-wildlife conflict in Moçambique. Direccão Nacional de Florestas e Fauna Bravia, República de Moçambique.

Anstey, S. (2009). Institutional change and community based natural resource management in northern Mozambique. The village goes forward: Governance and natural resources in north Niassa. D.Phil. Thesis, University of Zimbabwe.

Barnes, R (1996). Estimating forest elephant abundance by dung counts. In: Studying Elephants (ed. K Kangwana). AWF Technical Handbook Seris No. 7. AWF Nairobi.

Blanc, J.J., Barnes, R.F.W., Craig, G.C., Dublin, H.T., Thouless, C.R., Douglas-Hamilton, I. and Hart, J.A. 2007. *African Elephant Status Report: An update from the African Elephant Database.* Occasional Paper of the IUCN Species Survival Commission No. 33. IUCN, Gland.

Burnham, KP, Anderson, DR and Laake, JL (1980). Estimtion of density from line transect sampling of biological populations. Wildlife Monographs 72, 1-202.

Caughley, G (1977). Analysis of Vertebrate Populations. Wiley & Sons, Chichester.

CIRAD-BIOHUB-FAO (2010). Toolbox for Human Elephant Conflict (HEC) mitigation.
FAO, Harare.

CITES CoP (2004). Annex Conf. 14.3. Guide to CITES compliance procedures
Craig, GC (2009). Monitoring the Illegal Killing of Elephants: Aerial standards for the MIKE Programme. Approved by the MIKE Technical Advisory Group. CITES-MIKE, Nairobi.

Craig, GC (2009). Monitoring the Illegal Killing of Elephants: Aerial standards for the MIKE Programme. Approved by the MIKE Technical Advisory Group. CITES-MIKE, Nairobi.

Craig, G.C. and D.St C. Gibson (1993). Records of elephant hunting trophies exported from Zimbabwe 1987-1993. Unpublished Report, Dept. National Parks & Wild Life Management, Harare.

Craig, G.C. and Gibson, D.St C. (2004). Aerial survey of wildlife in the Niassa Reserve and Hunting Concessions. Unpublished Report, SGDRN, Maputo.

Cumming, D.H.M. (2004). Performance of Parks in a century of change. In: *Parks in transition: biodiversity, rural development and the bottom line*. Ed. B Child. Earthscan, London.

Cumming, DHM, Martin, RB and Taylor RD (1984). In: The Status and Conservation of Africa's Elephants and Rhinos (eds DHM Cumming and P Jackson). IUCN, Gland.

Cumming, D.H.M. and Jones, B.T. (2005). Elephants in southern Africa: Management Issues and Options.WWF SARPO Occasional Paper Number 11. WWF SARPO, Harare.

DNAC (2006). National parks, reserves and coutadas in Mozambique. Unpublished data. Maputo

DNFFB (1996). Forest and Wildlife Policy and Strategy. Maputo. Direccão Nacional de Florestas e Fauna Bravia, República de Moçambique.

DNTF (2009). Human wildlife conflict policy. Direcção Nacional de Terras e Florestas. Maputo, Mozambique.

Dunham, KM (2010). Aerial survey training course. AWF.

Dunham et al. (2010). Aerial survey of elephants and other large herbivores in Gonarezhou National Park (Zimbabwe) , Zinave National Park (Mozambique) and surrounds: 2009. Unpublished Report, Frankfurt Zoological Society, Chiredzi.

Foloma, M. (2009). Status of elephant population in Mozambique. Presentation at the Elephant Management Stakeholders Workshop, December 2009, Maputo.

Gasaway, WC, DuBois, SD, Reed, DJ and Harbo,SJ (1986). Estimating moose population parameters from aerial surveys. University of Alaska, Alaska.

Gibson, DStc (1998). Aerial Survey of Wildlife in and around Niassa Game Reserve. Unpublished Report, Sociedade para a Gestão e Desenvolvimento da Reserva do Niassa, Maputo.

GoMz (2009). Proposta de Política de Conservação e Estratégia de Sua Implementaçã. 18 de Agosto de 2009. Ministerio para a Coordenaccão da accão ambietal. República de Moçambique

INE (1980). www.ine.gov.mz

INE (2007) 3rd Recenseamento Geral da Populaçaão e Habitação. Instituto Nacional de Estatística, Maputo, Mozambique.

Jachmann, H (1998). Monitoring Illegal Wildlife Use and Law Enforcement in African Savanna Rangelends. Wildlife Resource Monitoring Unit. Environmental Council of Zambia, Lusaka.

Jones T, Caro T and Davenport TRB (Eds) (2009). Wildlife Corridors in Tanzania. Unpublished Report. Tanzania Wildlife Research Institute (TAWARI), Arusha.

Jones, BTB (2002). Tchuma Tchato Programme. Tete Province, Mozambique. Evaluation Report.

MADR-DNFFB (1991). Elephant Conservation Plan, Mozambique. Ministerio de Agricultura, Direccào Nacional de Florestas e Fauna Bravia. Maputo, Moçambique.

MADR-DNFFB (1999). National Strategy for the Management of Elephants in Mozambique. Maputo. Direccão Nacional de Florestas e Fauna Bravia, República de Moçambique.

Magane, S., Boulet, H., Chardonnet, P. and Lamarque, F. (2009). Avaliação Preliminar do Estado Actual da Caça Desportiva em Moçambique. Fundação IGF Contracto DNAC/AFD/01. Assistência Técnica á DNAC/MITUR para a protecção e gestão da fauna bravia nas zonas de caça em Moçambique.

_____

Martin, RB (1990). Illegal hunting in Zimbabwe. In: The Future of Botswana's Elephants (ed. P Hancock). Proceedings of the Symposium. Kalahari Conservation Society, Gaberone.

Niskanen, L.S. (2005). Presentation on Human-Elephant Conflict: Causes, Effects and Options for Mitigation Human-Elephant Conflict Working Group, African Elephant Specialist Group, SSC-IUCN.
Norton-Griffiths, M (1978). Counting Animals. Second Edition, African Wildlife Leadership Foundation, Nairobi.

Ntumi, CP, Ferreira, SM and van Aarde, RJ (2009).A review of historical trends in the distribution and abundance of elephants *Loxodonta africana* in Mozambique. *Oryx* **43**(4), 568-579.

Ntumi, CP (in prep.).A landscape approach to elephant conservation in Mozambique. PhD thesis, University of Pretoria. Pretoria.

Osborn, F.V. and Parker, G.E. (2002). Community-based methods to reduce crop loss to elephants: experiments in the communal lands of Zimbabwe. *Pachyderm*, **33**: 32-38.

Parker, G.E., Osborn, F.V., Hoare, R.E. and Niskanen, L.S. (eds.) (2007). Human-elephant conflict mitigation: a training course for community-based approaches in Africa. Participant's manual. Elephant Pepper Development Trust and Human-Elephant Conflict Working Group, African Elephant Specialist Group, SSC-IUCN. Livingstone and Nairobi.

Roe, D., Nelson, F. and Sandbrook, C. (eds.) (2009). Community management of natural resources in Africa: Impacts, experiences and future directions. Natural Resources Issues No.18. IIED, London.

Said, M.Y., Chunge, R.N., Craig, G.C., Thouless, C.R., Barnes, R.F.W. and Dublin, H.T. (1995). *African Elephant Database 1995*. Occasional Paper of the IUCN Species Survival Commission No. 11. IUCN, Gland.

Smithers, R.H.N. and Lobão Tello, J.L.P. 1976. *Check list and atlas of the mammals of Moçambique*. Museum Memoir no. 8. Salisbury.

Soto, B. (2009). Protected areas in Mozambique. **In**: Evolution and innovation in wildlife conservation: Parks and game ranches to transfrontier conservation areas. (eds.) Helen Suich and Brian Child with Anna Spencely. Earthscan, London.

Taylor, R.D. (1993). Elephant management in Nyaminyami District, Zimbabwe: Turning a liability into an asset. *Pachyderm* **17**, 19-29.

Taylor, R.D. (1999). Wilderness and the CAMPFIRE Programme: The value of wildlands and wildlife to local communities in Zimbabwe. Paper presented at the *Wilderness Symposium*. Waterberg Plateau Park, Namibia. 24-27 June 1996.

WWF SARPO (2005a).Workshop on the setting of wildlife quotas in Mozambique. !1-13 April 2005 Kaya Kwanga, Maputo. Unpublished Report, WWF, Maputo.

WWF SARPO (2005b). Workshop on the setting of wildlife quotas in Mozambique for Sofala and Manica Provinces. 6-7 December 2005 Training Centre for Game Scouts and Game Rangers, Gorongosa National Park. Unpublished Report, WWF, Maputo.

11. APPENDICES

Appendix 11.1 Management options &/or interventions available for managing elephants
A. Passive Methods (From Cumming and Jones 2006)

Method	Applicability	Advantages	Disadvantages/ Risks	Capacity issues
A. Passive Methods				
1. No action	• Self regulating, unconstrained populations, e.g. very arid areas, very large landscapes	• Low direct costs • Not controversial and ethically acceptable • Costs of potential long term environmental costs need to examined	• Loss of woodlands and associated species if population is growing rapidly and exponentially • Population reaches an unmanageable size	• Resources to protect expanding populations lacking in much of the region • Resources to monitor & assess ecological and other impacts are often lacking
2. Enlarge range	• Limited applicability except TFCAs • Requires unoccupied areas or areas of low human density • Expansion into settled areas will require high incentives and benefits to residents and responsibility for management	• Avoids lethal options • Ethically acceptable to most stakeholders • Conserves other species	• Increase in human-elephant conflict • May not reduce pressure on habitats in source areas • Cost of living with elephants become too high and landholders change their preferences • Associated sustainable use (SU) options may be opposed by animal rights and humane groups	• Capacity at agency and community levels to contain Human/Elephant conflicts • Capacity to realize full benefits from elephant products is a sustainable use option.
3. Fencing	• To protect selected habitats • Contain/protect elephants in developed landscapes	• Techniques readily available •	• Costs of erection and maintenance can be prohibitive • Breakout and spread of diseases • In rural settings in protection homes and fields has seldom been sustainable	• Human capacity and financial resources for maintenance
4. Manipulating water supplies	• Limited to areas where artificial supplies have been provided	• Non lethal • Targets elephant impacts rather than numbers	• May cause stress in drought years • Management strategies for elephants may have adverse knock –on effects on other species	• Few protected areas have the resources to maintain an effective artificial water supply programme let alone establish a reliable, long term manipulation programme

Appendix 11.1 Management options &/or interventions available for managing elephants

B. Active Methods (From Cumming and Jones 2006)

Method	Applicability	Advantages	Disadvantages/ Risks	Capacity issues
B. Active Methods				
1. Contraception	• Small confined populations • Not considered an appropriate tool in most southern African countries	• Non lethal • Favoured by animal rights and welfare activists	• Long delay before population declines • Has to be maintained over a long period • Long terms effects on behaviour and social organisation uncertain • Not favoured by neighbouring communities	• Only South Africa (?) presently has the technical capacity to implement it • High recurrent cost with no return other than containing elephant population growth
2. Translocation	• Appropriate for restocking areas Very limited applicability in cases of over-population	• Family group can be moved and so retain social cohesion in translocated animals • Can be used to re-stock areas with low populations	• Very high cost • Few areas left into which to move animals • Animals can return to original site	• Few (2-3?) teams available to carry out this type of operation on a large scale
3. Driving/disturbing	• Limited to moving herds short distances across a barrier that can be re-erected to prevent return of herds.	• Non lethal • A means of rapidly moving herds out of selected areas	• Limited to areas of suitable terrain	• Very people in the region with experience in this technique
4. Culling /cropping	• Technically feasible for any population where populations need to be reduced	• Rapid and effective means of reducing population size • Cost covered by recovery and sale of products • Can include local communities in direct benefits	• Opposed by some groups (e.g. animal rights activists and public opinion in many developed countries) • Maintains population in eruptive phase • Results in temporary disturbance of social and other behaviour	• Few experienced people left in the region after a gap of more than 15 years for ground culling and 10 years for aerial, drug assisted, culling

Appendix 11.2 Elephant numbers & density in conservation & other areas, together with human population density & habitat criteria

Conservation Area	Size km²	Known present elephant population size	Current density elephant/ km²	Human population size	Human density No/ km²	% habitat intact	Likely desirable elephant density km²	Potential elephant population size	Comments
NORTHERN									
Niassa NR incl. Hunting blocks	42,612	11,800 plus	0.28	25-30,000	0.6-0.7	>95	>0.5	>21,306	Cleared and settled= <500 km²
Quirimbas NP	5,800	~1,000	0.30	130,000	22	<40 ?	0.1-0.3	<,1000	Needs clear management plan
Chipanje Chetu	6,500			2,578	<0.5	>90	>0.5	>3,250	Good potential
Rio Lurio Marrupa-Maua-Nipepe	*10,000*	*High 100s*							More information required
Mecuburi FR	195	5	<0.1	?	?	>80 ?	>0.5	>100	More information required
Gile NR	2,100	*15-25*	<0.1	[32,000]	[15.8]	>95	<0.25	525	Dystrophic; people around NR
CENTRAL									
Marromeu NR	1,100	*800*	<0.2						Complex as whole w. Coutadas
Coutadas10,11,12,14	8,252								More information required
Gorongosa NP	3,750	400	0.10	3,500	<i.0	>95	>0.5	>2,000	People to move out of Parc?
Coutada 9	4,333	333	0.15				0.25	>800	More information required
Coutadas 7,13	11,091						0.25	?	More information required
Coutadas 6,15	6,563						0.25	?	More information required
TT Magoe	2,621	1,628-3,209=2,418	0.92		14	60?	0.35	>2,000	
TT Daque	?	500			As above	As above	As above		More information required
TT Cabora Bassa N	3,708	1,718	0.46		As above	As above	As above	1,300	More information required
Moribane FR	185	22	0.12						More information required
SOUTHERN									
Maputo NR	900	200	0.20	0 ?	0?	>95	>0.5	450	Are there people in Maputo NR
Limpopo NP	10,736	630	<0.1	20,000	<2.0	?	0.25-0.5	2,500-5,000	More information required
Banhine NP	7,000	0	<0.1			>95	<0.1	<700	Habitat protection
Zinave NP	5,000	0	<0.1			>95	0.5	2,500	More information required
Coutadas 4,5	?	?	<0.1				0.25		More information required

Elephant density No/ km²	Human density No/ km²	Intact habitat %
>0.5	0	100
0.5-0.6	5	>80
and0.4-0.5	10	60-80
0.3-0.4	15	50-60
0.2-0.3	20	40-50
0.1-0.2	25	>30
<0.1	30	>15

Source: Taylor (1999)

Appendix 11.3 Persons met and consulted

DNAC-UEM-AfESG Mission Team

Domingos Conjo   EMAP Team member DNAC (Field Trip 1)
Cornelio Ntumi   EMAP Team member UEM
Russell Taylor   EMAP Team member AfESG
Paulo Casamento Barros   EMAP Team member DNTF (Field Trip 2)

Tete Province

DPTur

Luis dos Santos Namanha   Director DPTur Tete Province
Firmino da Cristina Nyauuga   Director DPTF (DNTF) Tete Province
Cornelio Coelho Miguel   DPTur   [MIKE respondent]
Jose Matias Raso
Priscilla M'Kaugaza   Technician DPTur
Joana Jamino Serrote   Secretary

Fisheries

Samuel Sitoe   Chefe do Departamento de Administração do Pesquira
                                        DPP Tete
Heldir Feruqudas Valence   Técnico de Administração Pesqueira, DPP Tete

Magoe District Administration

Alfonse Lopes Cssamo   Director de Actividades Económicas
Matias M Sandramo   Técnico Profissional de Turismo

Daque

Conservation Committee   10 members including one woman; no names provided

Private Sector

Geoff Dean   Safaris de Mocambique

Sofala Province

Mateus Sidomio Ribaue   Chefe do Departamento de Áreas de Consevação
                                        Sofala

Carlos Lopes Pereira   Director Departamento de Conservação do Parque
                                        Nacional da Gorongosa
Alberto Amandi
Atanario Jujumen   Warden, Marromeu National Reserve
Jose Chiburre   WWF Zambezi Project
Rito Mabunda   WWF Country Office Maputo

Niassa Province

Lichinga

Ricardo A Rocha	Chefe de Repartição de Fauna
Dulcidio Luis Khombe	Substituto do Chefe dos Serviços Provinciais de Florestas e Fauna Bravia & Chefe de Repartição de Florestas
Geraldo Paulo Chizango	Técnico do Departamento dasÁreas de Conservação DPTUR
Manuel Simas	Técnico do Departamento das Áreas de Conservação DPTUR do Niassa
Joao J Chichava	Chefe dos Servços Provinciais de Geografia e Cadastro
João Juvêrncio	*Director Provincial do Tourismo do Niassa*
Domingos Zirsa Madane	*Director Provincial de Agricultura do Niassa*

Maua District

Pedro Mussossq	Chefe de Secretaria dos Serviços de Actividades Económicas de Maua
Orami Jackson	District Administrator, Maua District

Mutera Community Meeting

Headman (mweni = sabhuku) plus 6 other men including a policeman

Nipepe District

Francisco Tuia Mapira	Secretário Permanente do Distristo de Nipepe
Hilario Halua	Chefe de Secretaria dos Serviços de Actividades Económicas de Nipepe (SDAE)

Private Sector

Francis van Dyck	Mabarula Safaris SO Nipepe District

Cabo Delgado Province

Jose Diaz	Warden, Parque Nacional das Quirimbas

Pemba

Provincial Office DPTUR & DPMAG - DNTF

Oliveira Amimo	Director Provincial de Agricultura
Amilcar Mafumo	SPA/DPA
Mariano Matias	DPTur
Isaias Felix Lidimba	SPFFB
Celia Zelia Matumbo	DPTur
Abdala Abudo	DPTur
Castro Rassule	SPFFB Carbo Delgado

Cabo Delgado Province: Senior District Administrators Meeting, Nautilius Beach Resort Pemba 3 August 2009

Oliveira Lade Buraimo	Mecufi
Monica Patricio Clemente	Metuge
Anibal Pereira Mijai	Meluco*
Elsa F Rodolfo	Ibo
Manuel de Limas Mario	Quissanga
Pedro Romao Jemulu	Palma
Fernando Tomas Natal	Montepuez
Casimiro LD Calope	Namano
Arcanji Cassia	Mocimboa da Praia*
Carlos Nomufez	Chiure
Paulo Siheshe Pati	Balama
Henrique Geraldo Ndudo	Ancuabe
Leoncio Julai	Mueda
Melchior Focas	Nangade

* Districts visited by mission team

Parque Nacional das Quirimbas

David S Reynolds	Technical Advisor PNQ
Marcelino Denja	Measures (M&E) Officer PNQ

Posto Administrativo, Mbau, Mocimboa da Praia

Daudo Moulide	Chefe de Extensão
Filipe Cha	Auxiliar Administrativo de Posto Administrativo de Mbau
Chinyenga Likambe	Elder
Cornelio Chimiache	Chefe de aldeia
Jonas Livemuako	
Regina Juma	
Ana Manuel	

Macomia District SDAE

Marcia Matilde Deurce	Director, SDAE
Assane Sauege	Supervisor de Extensão Rural

Meluco District SDAE

Marinho Latibo	Director, SDAE
Luis Manuel	Tec. Prof. Agro Rec
Fugenio Silaga	Chefe do Poste PNQ

Maputo

Francisco Pariela	Director DNAC
Sansao Bonito	CITES Focal Point DNTF
Adamo Valy	Chair AMOS
Hubert Boulet	IGF Maputo
Marcelino Foloma	DNTF
Brit Reichelt-Zolho	A/Country Coordinator WWF Country Office
Roberto Zolho	IUCN Mozambique
Anabela Rodrigues	SGDRN, Maputo

_____

Vernon Booth	SGDRN, Maputo
Alessandro Fusari	DNAC
Simon Anstey	AfESG HEC consultant; Resource Africa UK
Emilio Zava	MICOA
Samiro Mangane	IGF, Maputo
Toni Wicker	Safari Operator AMOS
Rito Mabunda	WWF Mozambique Country Office
Rosta Simao Mate	IUCN Mozambique
Sergio Veiga	Professonal Hunter Palma
Milto Domingos Chauque	DNAC
Mike Kok	Wildlife Conservation Society

Harare

Kevin Dunham	Aerial Survey Biologist AGRECO
Sally Wynn	Zambezi Society
Rob Cunliffe	African Wildlife Foundation ZIMOSA Protected Area
Rob Cunliffe	Niassa Province Spatial Planning