Ministry of Environment and Tourism
Republic of Namibia

SPECIES MANAGEMENT PLAN

Elephants

Loxodonta africana

December 2007

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GLOSSARY AND DEFINITION OF TERMS

Acronyms

CITES   - Convention on International Trade in Endangered Species of Wild Fauna and Flora

DPWM   - Directorate of Parks and Wildlife Management

DSS   - Directorate of Scientific Services

DWNP   - Department of Wildlife and National Parks, Botswana

GEF   - Global Environment Fund

KAZA   - Kavango-Zambezi

MET   - Ministry of Environment and Tourism

NNF   - Namibia Nature Foundation

PAC   - Problem Animal Control

TFCA   - Trans-Frontier Conservation Area

UNDP   - United Nations Development Programme

WWF LIFE - World Wide Fund for Nature: Living in a Finite Environment programme

Definition of Terms

"Background Study": This refers to the *Background Study for Elephants* prepared under the Ministry of Environment and Tourism's **Transboundary Mammal Project** (Martin 2005).

"Caprivi" and "Caprivi Strip": The word 'Caprivi' is used throughout the Plan to refer to the 'peninsula' of land extending eastwards from the north-eastern corner of Namibia as far as its junction point with Botswana, Zambia and Zimbabwe at the confluence of the Chobe and Zambezi Rivers. The phrase 'Caprivi Strip' is reserved for the narrow 'isthmus' connecting the broader part of the peninsula to the main body of Namibia.

"Population and Subpopulation": In this report, the term subpopulation is loosely used to refer any geographically distinct subdivision of the overall population within a country.

"Kasane Workshop": A workshop was held in Kasane, Botswana on 30th November and 1st December 2002 in which representatives of the Namibian Ministry of Environment and Tourism and the Botswana Department of Wildlife and National Parks participated with the aim of collaboration on joint management issues affecting the buffalo population shared between the two countries. The *Background Study for Southern Savanna Buffalo* (Martin 2002) was presented at the workshop.

"Windhoek Workshop": A workshop was held in Windhoek on 23rd September 2003 in which representatives of the Namibian Ministry of Environment and Tourism and the Botswana Department of Wildlife and National Parks participated with the aim of collaboration on joint management issues affecting roan, sable and tsessebe. The *Background Study* and *Management Plan for Roan, Sable and Tsessebe* (Martin 2003) were presented at the workshop.

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ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

The status of elephants in the southern African region

The African elephant has achieved huge prominence in global conservation issues in the past 20 years. Few other species are capable of arousing emotions, polarizing viewpoints and causing controversy to the extent that *Loxodonta africana* has done. Within Africa opinions are divided on the subject of elephant management and the situation is no less contentious than in the international arena.

Elephants are classified as *Endangered* in the IUCN Red Data Book. In 1989, rightly or wrongly, the species was listed on Appendix I of CITES and legal trade in ivory was effectively banned. Although the Namibian elephant population was transferred to Appendix II in 1997, conditions attached to the listing have made it almost impossible for ivory to be traded.

In 2002, the population in the whole of Africa was estimated at about a half million elephants. The southern African region holds more than half of this population and, projecting at normal population growth rates, it is likely to be around 350,000 - 400,000 animals in 2007. Clearly, elephants are not threatened in southern Africa and this raises the question whether they can be validly classified as endangered at the continental level.

The largest concentrations of elephant in southern Africa are in a central zone extending across the continent between latitudes 15° - 20° south of the equator (**Map 1**). Within this zone, Botswana and north-western Zimbabwe hold some 250,000 elephants. The rapid expansion of these populations into neighbouring countries is affecting biodiversity and human livelihoods.

The 'elephant problem' is central in initiatives to create transfrontier conservation areas (TFCAs) in the region. The need for elephants to have access to far larger areas than those in which they are currently confined is recognized and, for many, TFCAs are seen as the solution to the increase in elephant populations. Unfortunately, a problematic legacy of national boundaries, coupled with a lack of coherent land-use planning in all of the participating countries including the Kavango-Zambezi (KAZA) TFCA (Angola, Botswana, Namibia, Zambia and Zimbabwe) means that this TFCA will undergo a long and difficult birth. Any respite arising from the increased range is likely to be short lived: at current rates of population increase, elephants will remain overabundant.

It would be highly desirable if a common management approach for elephants could be developed amongst the countries sharing the elephant range. However, the corollary to this is that, in the absence of any agreement with neighbouring countries, it cannot reasonably be expected that Namibia will not undertake management interventions in the best interests of its local peoples and conservation concerns.

The status of elephants in Namibia

Elephants occur across the entire north of Namibia (**Map 2**) with two main sub-populations in the north-east and the north-west. In 2004 the total population was estimated at over 16,000 animals and, allowing for underestimates on aerial surveys, the true number in 2007 is likely to be closer to 20,000.

The north-western population is about 4,000 animals and includes the elephants in Etosha. This appears to be growing at about 3.3% per annum and expanding its range. Elephants are being seen as far south as the Ugab River and in all of the river catchments which flow westwards to the Atlantic Ocean in the north. As yet, the extreme north-western part of the potential range along the Kunene River has not been re-colonized although elephants were present in this area until 1990.

The north-eastern population will probably reach 16,000 animals this year. The recent increases are well in excess of normal growth rates (which are less than 5% per annum) and must be attributed to the migration of the northern Botswana population (which consists of about 160,000 elephants) and the north-western Zimbabwe population of about 90,000 elephants.

The conservation status of elephants in Namibia is more than satisfactory – their numbers already exceed what many would consider desirable for the available habitats and they have been identified as a possible threat to other rare and valuable species which Namibia is trying to conserve. There are no limiting factors preventing an increase in their numbers.

Elephants are classified as *Specially Protected Game* under Namibian law. The original justification for such a listing may well have disappeared. To achieve the objectives of this Management Plan, several revisions to the legal provisions for elephants under Namibian legislation would be desirable.

Under Namibian environmental legislation, management plans are required for species that are rare or valuable and that share boundaries with neighbouring countries. Elephants are not rare but they are potentially valuable and, within multi-species wildlife systems, could provide a financial and economic return that greatly exceeds that possible from alternative land uses. A management plan that treats elephants as a valuable resource could transform the primary land use in northern Namibia.

The issues

In both the north-west and the north-east, conflicts with humans are escalating due to the increase in elephant and human population numbers. The benefits that communities receive from elephants on their land do not come close to compensating them for their losses. Farmers are not free to defend their livelihoods from elephant depredations and the current arrangements for control of problem elephants are too tardy to be effective. A potential threat to elephants is the inception of a wave of illegal hunting or retaliatory shooting by dissatisfied people.

In north-western Namibia, elephant populations have considerable latitude for increasing their range and the situation may not require management interventions for many years. However, in the north-east, the escalating levels of conflict between humans and elephants and the damage to vegetation suggest that the time for action has already been reached.

Initially, the problem in the north-east may appear intractable: the Caprivi, Khaudum and Nyae Nyae areas lie on the periphery of the largest elephant population in Africa. Management interventions carried out in isolation in Namibia will not affect the core elephant populations from where the problems emanate. The huge number of elephants south of the Caprivi presents Namibia with a management challenge: however, notwithstanding any decision by Botswana

and Zimbabwe not to manage their elephants, Namibia should take full advantage of the opportunity presented. The justification is that elephants are causing significant hardships for people and threatening conservation objectives in the north-east.

Namibia's short-term problem is to accommodate the current increase in elephants. However, it is not the long-term solution. Elephants do not regulate their own numbers at levels which maintain savanna woodland habitats – a process which culminates in population crashes. In the long term population reductions may be necessary. In the north-west, the management requirement may simply be to increase the range available to elephants: in north-eastern Namibia not only does the range need to be increased but, in some areas, the population may need to be reduced (**Fig.1** at the end of this Summary).

Technically, there are no good reasons why more land in Namibia should not be available to elephants. The highest valued land uses over most of this arid country (**Map 3**) are those based on management of natural resources. Moreover, the full potential is far from being realized at present due to national and international policy constraints that place wildlife at a competitive disadvantage with land use based on exotic species. Were subsidies to be removed from the domestic livestock industry and were it possible for elephant to play their full economic role in land use systems, it could reasonably be expected that large additional areas of land would be converted to wildlife management in areas where relatively low human densities would enable the co-existence of people and elephants, as elsewhere in the country – for example, parts of the northern Kavango, central northern regions and in the Eastern Caprivi. This would remove the short-term limiting factor of providing additional ranges for elephant.

The technical arguments for greater areas of Namibia to be put over to natural resource management will not, on their own, bring about the needed changes to remove this limiting factor for elephants. It will require a high level of political commitment and the correct suite of incentives to induce landholders (both communal and private) to convert to a land use based primarily on wildlife. The high level of political commitment is already in place. In a speech delivered on 3rd February 2004, His Excellency the Founding President, Dr Sam Nujoma, made the visionary statement that wildlife would be restored throughout the north of Namibia, that ownership of wildlife would be conferred on local peoples and that the economy would be transformed by diversification based on wildlife uses.

For elephants, two factors mitigate against realizing the Founding President's vision. The first is that the full value of elephant commodities (ivory, elephant skin and meat) cannot be realized due to international trading constraints. The second is that elephants in Namibia are effectively State property – which was clearly not the President's intent. These two major disincentives need to be addressed before the conditions for increasing elephant range will be achieved.

Full devolution of rights over elephants to landholders (on both communal and private land) is a prerequisite for creating the incentives to allow elephant populations to expand. It is a necessary but not a sufficient condition. Large areas co-managed between the State and relevant landholders will be necessary to provide viable ranges, to distribute the pressure of elephants on habitats and to allow population increase and expansion.

The Vision Statement developed under the current UNDP/GEF assisted project in Namibia provides for co-operation between stakeholders to achieve this far-sighted concept. Linkages

would be established under a co-management system which would both secure and increase the available range for elephant (**Map 4**).

In the north-east, elephant population reduction may be necessary. However, there are no simple answers to the question of how many elephants need to be removed – either to conserve biological diversity or to reduce conflicts between humans and elephants. The starting premise may be that the option of zero use is not a reality – elephants will be harvested illegally and unsustainably if facile attempts are made to debar their use. These all point towards a need for imaginative and innovative management. The aim should be to avoid routine cropping or culling programmes which attempt to impose constancy on naturally fluctuating ecosystems. The challenge is to make it sustainable, requiring an adaptive management approach.

Combining adaptive management with the arguments for co-management results in a classic situation where the principles of adaptive co-management in complex bio-economic systems need to be applied. The individuals who are most affected by elephants are those living in the north-east: together with the State authorities, they should decide how elephants should be managed.

MANAGEMENT PLAN

A feature of this management plan is just how few actions are needed to bring it to fruition. Success relies on a few administrative masterstrokes which will cost next to nothing – rather than a long list of expensive management activities. It would be as well for MET not to enter any co-management forums with preconceived moral positions on elephant. Having accepted that the solutions to the current 'elephant problem' may lie in innovative management inspired by the values of local people, a *tabula rasa* (or clean slate) is needed to accept with an open mind all options presented.

Vision, Goal, Objectives, Strategy and Actions

The Vision Statement begins with a preambular statement which expresses Namibia's desire to work with neighbouring countries and the international community to enhance the status of elephants, clarifies Namibia's position on elephants and draws attention to the fact that a policy of total protection for elephant will result in their available range being reduced to State protected areas and a decrease in their numbers. In contrast, a policy of sustainable use, as enshrined in the Namibian Constitution, will result in the expansion of the range available to elephants and an increase in their numbers. The goal and objectives then follow.

The **Strategy** consists of five actions which are listed below and shown in **Fig.2** (at the end of this Summary).

(1) **Devolution of authority for landholders, both communal and private, to manage elephants on their land**. This is a prerequisite for co-management institutions to be formed.

GOAL
**Namibia wishes to carry the maximum number of elephants
that is consistent with the conservation of biological diversity AND the
wishes of those primary stakeholders who have elephants on their land**

SOCIAL OBJECTIVE

1. **To reduce conflict between elephants and people**
2. **To create conditions under which elephants are a benefit to people**

ECOLOGICAL OBJECTIVE

1. **To increase the range available to elephant**
2. **To conserve biological diversity in State protected areas and promote the conservation of habitats outside State protected areas in the elephant range**

ECONOMIC OBJECTIVE

To enable the full economic potential of elephants to be realized according to the provisions for sustainable use in Namibia's Constitution

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(2) **Representations on the location of veterinary control fences**. This is a matter for the Ministry to pursue from the outset of the management plan. The influence of veterinary fences on the current elephant range both in Namibia and in the region is profound. In the vicinity of the Mahango Core Area within Bwabwata National Park, there is a bottleneck caused by the veterinary fences on the southern boundary of the Caprivi and along the international border between Botswana and Namibia, which affects the entire regional range for elephant across the central southern African region (**Map 5**).

(3) **The removal of the CITES constraints affecting Namibia's ability to trade in ivory.** These constraints exert a negative effect on conservation of elephant in Namibia and act as a disincentive to the adoption of wildlife management as a primary form of land use. However, the management plan is worth pursuing even if the full value of elephant products cannot be achieved immediately – there are substantial values to be derived from elephants through tourism and international trophy hunting even if they fall short of the ideal.

(4) **Establish co-management institutions between the State and primary stakeholders**. Namibia's record of an expanding wildlife industry over the past 10 to 20

years is impressive. The present mosaic of parks, conservancies and commercial farms provides a sound foundation for the 'scaling up' of institutions needed for the management of elephant.

The new high-level institutional structure proposed for the State wildlife agency under the MET/UNDP/GEF project is ideally suited to this from a geographical perspective. The new divisions, subdivisions and sections are well matched to the elephant ranges that will require co-management institutions.

(5) **Apply adaptive management principles to the decisions of co-management institutions.** The agenda for co-management institutions would include the setting and allocation of trophy hunting quotas, problem animal control and population reductions.

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The realization of the objectives in the Vision Statement should follow sequentially (**Fig.2**). Reduction of elephant populations in the north-east should help to conserve biological diversity; local communities should receive increased benefits from elephants and, hence, conflict will be reduced. With full devolution of rights over elephant, the incentives will be present for the elephant range to increase. The full economic objective will only be achieved when the permanent elephant range has expanded across northern Namibia (**Map 4**) and the last CITES constraints have been removed.

Risks

Given the escalating human-elephant conflict and the extreme modification of habitats in north-eastern Namibia, **the greatest risk to Government's position is to do nothing**. Failure to implement the necessary devolutionary measures and enter into co-management carries the real risk that local people will take matters into their own hands or, worse still, collaborate with illegal hunters from neighbouring countries. Inactivity will not simply result in the *status quo* being maintained. Since the 1970s, elephant populations have collapsed in an apparently inexorable process across Africa and it has occurred where the State has claimed ownership of elephants.

There is little risk that any management interventions could have an adverse effect on the status of elephant populations in Namibia. Populations are expanding and being augmented by migration from Botswana and Zimbabwe. Provided the effects are properly monitored, experiments in management will provide a learning experience.

Finance and Capacity

This management plan differs from other species management plans in that very little funding is required to implement it. The main costs lie in co-ordination and implementation of management activities that arise from co-management decisions. The potential income from elephant management is substantial and should more than cover these costs. Even if the full value of ivory and elephant skin is not achieved, the revenue from tourism and sport hunting will provide some 75% of the amounts required.

If elephant sport hunting were combined with reduction of elephant populations in the north-east, the expected revenue would be some **N$13 million** in the State protected areas (a total of 14,000km^2 including the Caprivi Forest Reserve) which would meet the present budget allocations for the north-east and would meet at least two-thirds of the budgets proposed under the MET/UNDP/GEF project. In the communal lands, the net

income/hectare (**N$8.7**) should more than offset the costs which elephant are presently causing through crop raiding and other damage. These figures do not include the net income of safari operators which would be about N$9.7/ha.

Transboundary Co-operation

Most of the management activities identified for potential co-operation and collaboration between Botswana and Namibia at the Kasane Workshop (2002) and Windhoek Workshop (2003) repeat themselves in this Management Plan.

The desirability of collaboration on elephant management among the countries participating in the KAZA TFCA was stated on the first page of this executive summary. A common approach to hunting quotas, problem animal control and population reductions would have the beneficial effect of not causing elephants to move from one country to another to escape different management regimes. This plan is structured so that the management of elephants on Namibian soil is not dependent on decisions by neighbouring countries: it is, first and foremost, a national plan. However, because it is based on adaptive management, decisions taken in co-management forums could be flexibly adjusted to accommodate collaborative management.

There are strong grounds for forming an alliance among Angola, Botswana, Namibia, Zambia and Zimbabwe specifically aimed at more effective performance in the CITES forum – based on the fundamental premise that all wildlife products should have value and legal trade is beneficial for conservation.

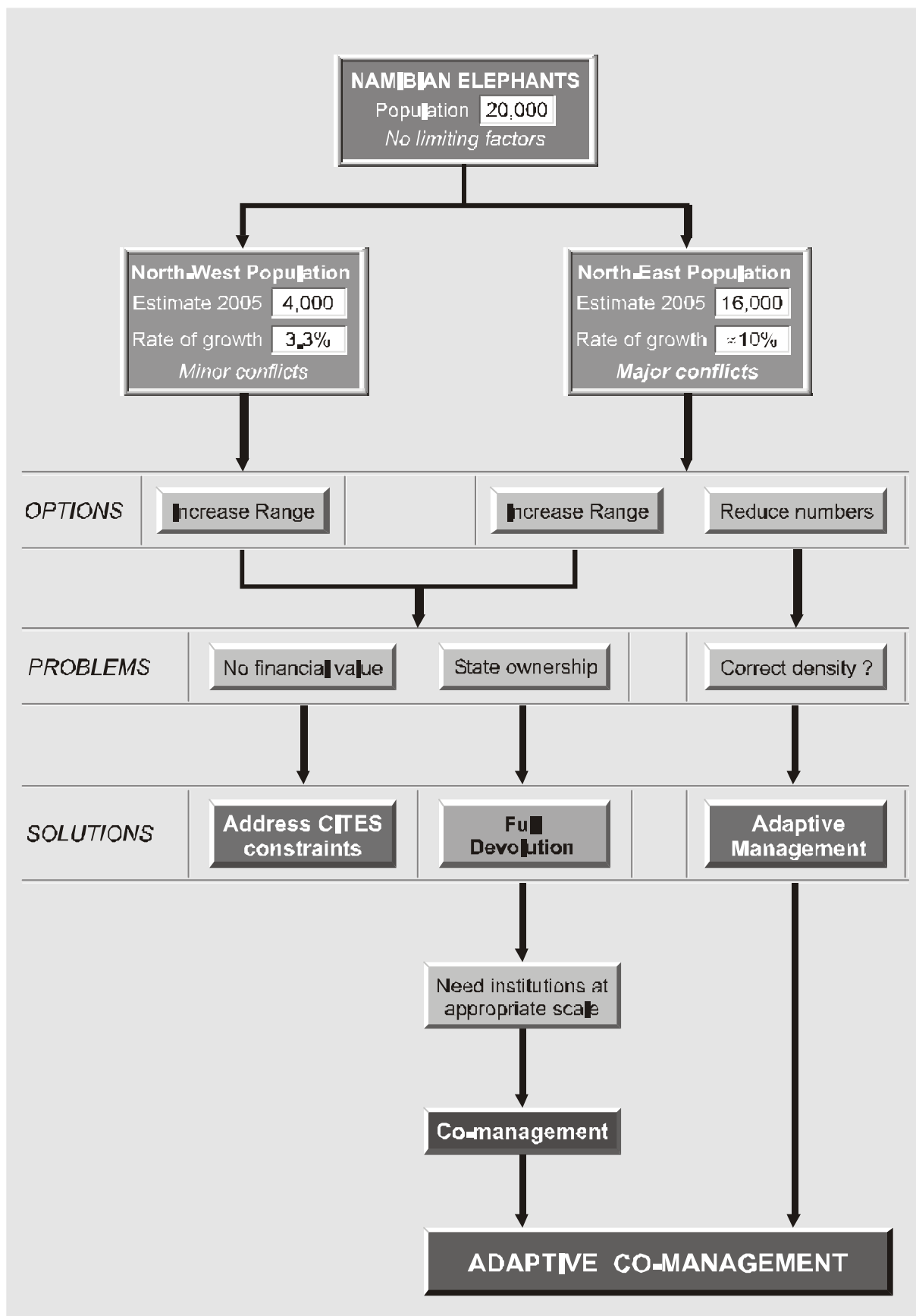_____

Fig. 1: Management of the Namibian Elephant Population — Options, Problems and Solutions

VISION

SOCIAL OBJECTIVE	ECOLOGICAL OBJECTIVE	ECONOMIC OBJECTIVE
1. Reduce conflict between elephants and people 2. Elephants benefit people	1. Increase elephant range 2. Conserve biodiversity	Achieve the full economic potential of elephants

STRATEGY

ACTIVITIES

Stage 1 — Devolve rights to manage elephants to primary stakeholders | Address veterinary control fences | Address CITES constraints on trade

Stage 2 — State and primary stakeholders form co-management institutions

Stage 3 — Implement co-management decisions using Adaptive Management — Year 2

Year 1

Stage 4 — Ecological Objective 2 achieved — Conservation of biodiversity — Year 3 Ongoing

Full product value

Stage 5 — Social Objective 2 achieved — Elephants benefitting people — Year 4 Ongoing

Stage 6 — Social Objective 1 achieved — Conflict reduced — Year 5 Ongoing

Stage 7 — Ecological Objective 1 achieved — Elephant range increased — Year 6 Ongoing

Stage 8 — Economic Objective achieved — Full value of elephants over maximum range — Year 10 Ongoing
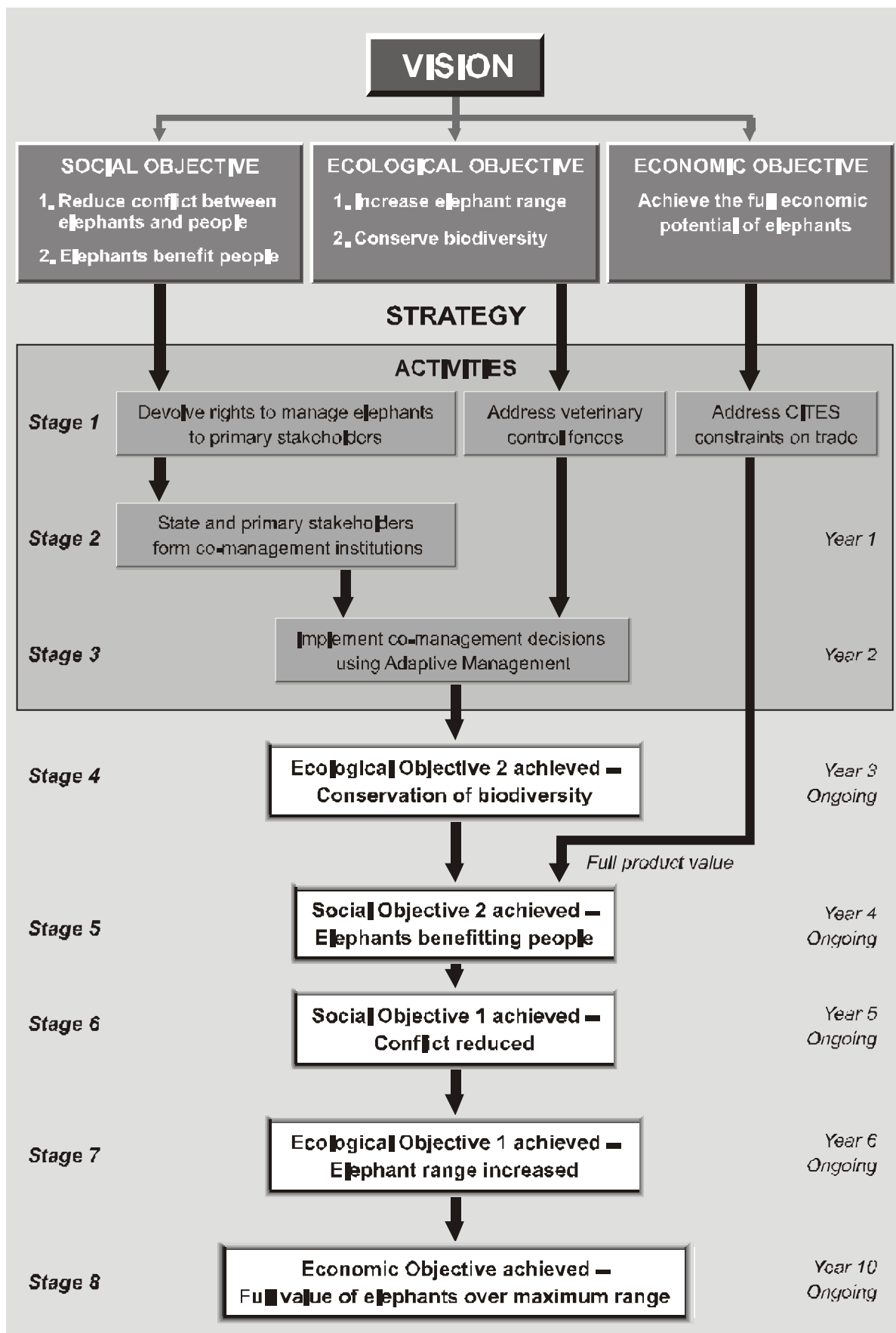
Fig. 2: Strategy for Management of the Namibian Elephant Population

INTRODUCTION & BACKGROUND

This Species Management Plan should be read in conjunction with the Background Study for Elephants prepared under the Transboundary Mammal Project of the Ministry of Environment and Tourism (MET) in April 2005.

Conservation Status and Significance

The taxonomy of Macdonald (2001) places the Savanna Elephant *Loxodonta africana* in the Family ELEPHANTIDAE, the only family in the Order PROBOSCIDEA (mammals with trunks) which is one of three Orders in the Superorder SUBUNGULATA (elephants, dugongs and hyraxes) which is part of the Infraclass EUTHERIA (placental mammals) in the Subclass THERIA (mammals bearing live young) in the Class MAMMALIA (mammals).

In the IUCN Red Data Book (Hilton-Taylor 2000), the species is classified as *Endangered*. This classification is based less on the actual numbers of elephant and more on the fact that the population is fragmented and has suffered recent catastrophic declines in some countries.

The African elephant was listed on Appendix I of CITES[1] at the 7th Meeting of the Conference of the Parties held in Lausanne in 1989. At the 10th CITES meeting in Harare in 1997 the elephant populations of Botswana, Namibia and Zimbabwe were transferred to Appendix II which, in theory, enables these countries to trade in ivory and elephant products. In practice, numerous obstacles have been placed in the way of trade – "*the Conference of the Parties has . . . adopted increasingly complex requirements for trade in elephant products that have all but ensured that such trade does not take place*" (MET 2004).

The distribution of elephants in southern Africa is shown in **Map 1**. It is emphasized that the elephant range shown on the map is no more than a 'snapshot' in time. The rapid expansions that are taking place in elephant populations in southern Africa, particularly in and around the Caprivi, will make any map outdated within a year. In 2002, the population in the whole of Africa was estimated at 560,904 elephants (African Elephant Database, AfrESG 2002).[2] More than half of this population is in southern Africa[3] and more than half of this is in Botswana (DG 2004). Projecting at normal population growth rates, the elephant population in southern Africa is likely to be around 350,000 to 400,000 animals in 2007. It is clear that elephants are not threatened in southern Africa and this raises the question whether they can be validly classified as threatened at the continental level.

The conservation status of elephants in Namibia is more than satisfactory – their numbers already exceed what many would consider desirable for the available habitats. Indeed, Namibia might want to avoid habitat changes of the sort that have happened in large parts of the elephant range in northern Botswana as a result of an overabundance of elephants (DG 2004, p7). In all other species management plans prepared thus far concerning ungulate species of the north-east, elephants have been identified as a possible threat to other species.

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[1]Convention on International Trade in Endangered Species of Wild Fauna and Flora
[2]"Definite" – 402,067; "Probable" – 59,024; "Possible" – 99,813
[3]"Definite" – 246,592; "Probable" – 23,722; "Possible" – 26,098; Total – 296,412

The economic contribution which elephant could make to the wildlife industry and to land use values in northern Namibia is very high, especially if the present elephant range can be consolidated and expanded southwards in the central area between the north-western and north-eastern populations. For non-hunting tourism, this contribution would come more from expanding the elephant range than from increasing numbers in the present range.

Under a high quality trophy hunting regime, elephants could bring in a net income of about US$120,000 for every 1,000 animals in the population. In the north-east of the country where elephant densities are reaching a level of 1/km^2, the net financial return should be of the order of US$1.20/ha (N$7.50/ha). When added to the present net returns from existing wildlife management without elephant hunting, this could result in a doubling of income. The present levels of exploitation of elephant for sport hunting on communal land in the Caprivi, eastern Kavango and Otjozondjupa regions (NNF 2004) are well below sustainable off-take levels and could be significantly increased for the benefit of local people.

In economic terms, the 'net value added' to land use values by the inclusion of sport hunting on commercial farms in the north of Namibia is, in all cases, more than double the value of the cash income (Barnes & de Jager 1995) and this relationship should hold true for the enhanced income obtained by adding elephants to the species mix.

Were the Ministry to combine elephant sport hunting with the reduction of elephant populations through culling in the State protected areas in the north-east of the country (a total of 14,000km^2 including the Caprivi Forest Reserve), the expected income would be some N$13 million which would meet the present costs of maintaining and managing these areas. If a similar management regime were practised by the conservancies in the north-east, the increase in income would also be substantial and should more than offset the costs which elephant are presently causing through crop raiding and other damage.

Elephants are classified as *Specially Protected Game* under Namibian law (Schedule 3, Nature Conservation Ordinance, Order No.4 of 1975). The original justification for such a listing may well have disappeared. However, designating the species as *Protected Game* (Schedule 4) or as *Huntable Game* (Schedule 5) or as a *Problem Animal* (in terms of Section 53(1)) would not introduce any greater flexibility in the management of the species as long as the provisions of section 37 (hunting of game to protect grazing, cultivated lands and gardens) expressly exclude elephants from being hunted either by private landholders (subsection 37(1)(a)(i)) or communal lands residents (subsection 37(1)(a)(ii)) in defence of their own livelihoods. To achieve the objectives of this Management Plan, several revisions to the legal provisions for elephants under Namibian legislation would be desirable.

Populations

Elephants occur across the entire north of Namibia (**Map 2**) with two main subpopulations in the north-east and the north-west. The subpopulations are not genetically isolated since they are weakly linked through the 'occasional' range in the central area which includes a small resident population of about 20 animals in the Mangetti.

The north-western range appears to be expanding at present. Elephants are being seen as far south as the Ugab River and in all of the river catchments which flow westwards to

the Atlantic Ocean in the north. As yet, the extreme north-western part of the potential range along the Kunene River has not been re-colonised although elephants were present in this area up until 1990.

Estimates of numbers are shown in the table below. In 2004 the total population was estimated at over 16,000 animals and, allowing for underestimates on aerial surveys, the true number in 2005 is likely to be closer to 20,000. The north-western population appears to be growing at about 3.3% per annum and there are movements of elephants in and out of Etosha National Park. The recent increases in the north-eastern population are well in excess of normal growth rates (which are less than 5% per annum) and must be attributed to migration from the northern Botswana population (about 150,000 elephants) and the north-western Zimbabwe population of about 50,000 elephants. The huge number of elephants south of the Caprivi presents Namibia with a management challenge.

Estimates of elephant numbers in Namibia

	NORTH-WEST		NORTH-EAST	
	Etosha National Park	Kunene and Erongo regions	Khaudum & Nyae Nyae	Caprivi East & West
Aerial surveys began in	1966	1968	1977	1978
Highest estimate	*2,800*	*800*	*4,815*	*8,726*
Year	*(1983)*	*(2004)*	*(2004)*	*(2004)*
2004 Estimates	2,057	800	4,815	8,726
Subpopulation Totals	**2,857**		**13,541**	
2005 Projection	2,656	1,033	5,658	10,268
Rounded to nearest hundred	2,700	1,000	5,700	10,200
Subpopulation Totals	**3,700**		**15,900**	
Total population projected for 2005	**20,000**		*rounded to nearest thousand*	

Notes:

The numbers given for 2004 are aerial survey estimates except for the Kunene and Erongo regions which are based on estimates by Loutit and Leggitt.

The 2005 projections for the North-west are based on a population growth rate of 3.3% and a correction factor of 25% for undercounting.

The 2005 projections for the North-east are based on population models (see *Background Study*) which include a correction factor of 25% for undercounting.

In addition to the numbers shown, an additional 76 elephants are on private land in northern Namibia.

Limiting Factors and Threats

At present no factor is preventing an increase in numbers of elephants in Namibia. Elephant populations might increase <u>faster</u> with the addition of more water points[4], with the removal of veterinary fences[5] or with less competition from cattle[6] but, even with these constraints, the information presented in the *Background Study* suggests that elephant are increasing at the maximum possible rate.

In both the north-western and north-eastern subpopulations, conflicts with humans are escalating due to the increase in elephant and human population numbers. In the extreme north-west, these conflicts are relatively minor because human populations are sparse and few crops are grown, although this may not be true for the Cuvelai area north of Etosha. In the north-east, crop damage incidents are a major problem.[7]

The benefits which communities are receiving from elephants on their land are small. The number of elephants hunted as trophies and problem animals is low and does not come close to compensating communities or individuals for their losses. Farmers are not free to defend their livelihoods from elephant depredations and the current arrangements for control of problem elephants are too tardy to be effective. O'Connell (1995) found an extremely hostile attitude towards wildlife among the Caprivi peoples and the inception of conservancy projects did little to ameliorate this attitude. With all conservancies being in a fledgling stage, there is a 'wait-and-see' attitude among their members. The recent rapid increase in the numbers of elephant in the Caprivi may be due to a temporary tolerance of elephants while conservancies are in their formative stage. The situation is finely balanced and it would require little in the way of disincentives for the entire edifice to collapse. A potential threat to elephants is the inception of a wave of illegal hunting by dissatisfied people.

The factors which should influence decision-taking and the options, difficulties and possible solutions to elephant management in Namibia are shown in a simplified diagram (**Fig.1**). In the north-west of Namibia elephant populations have considerable latitude for increasing their range and the situation may not require management interventions for many years. However, in the north-east, the escalating levels of conflict between humans and elephants suggest that the time for action has already been reached. Initially, the problem in the north-east appears intractable: the Caprivi, Khaudum and Nyae Nyae areas lie on the periphery of the largest elephant population in Africa. Management interventions carried out in isolation in Namibia will not affect the core elephant populations from whence the problems emanate.

Perhaps a shift in thinking is needed away from narrow preoccupations with biological diversity to a fuller consideration of the opportunities presented by the current situation. In the previous section, the exodus of elephants from Botswana and north-western Zimbabwe was portrayed as a challenge rather than a problem.

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[4]For example, in the multiple use zone of Bwabwata.

[5]For example, removal of the international boundary fence along the southern boundary of Bwabwata and along the eastern boundary of Khaudum and Nyae Nyae would greatly facilitate east-west linkages in the regional elephant range.

[6]In a study of the Caprivi Region, Schlettwein (*et al.* 1991) saw the greatest threat to large wild herbivores as the extreme grazing pressure exerted by 96,000 head of cattle – a number which the authors expected to rise to 260,000 by 2000.

[7]In 2003 there were 253 separate incidents involving elephants in the Caprivi and 985 recorded instances of crop damage.

The importance of creating conditions which allow wildlife to compete with domestic livestock as a form of land use is referred to in several places in the *Background Study* and it might be salutary to consider how cattle farmers would react to the present situation if the focus were on cattle and not elephants. If, within the midst of a group of cattle farms, one farmer produced an overabundance of cattle to the extent that the beasts moved onto adjacent properties and, if that farmer made no effort to recover his cattle and was not overly concerned about his neighbours making use of the plentiful resource, the normal human reaction would be to accept the bonanza and use it. It is proposed that exactly this attitude should be adopted by the Namibian authorities towards the elephants in the north-east. Namibia should take full advantage of the opportunity presented by the overflow of elephants from the large and thus far unmanaged elephant populations of Botswana and Zimbabwe. The justification is that elephants are causing significant hardships for people and threatening conservation objectives in the north-east.

Namibia's short-term problem is to accommodate the increase in elephants, which is currently happening. Elephants have a propensity to eat themselves (and other species) out of house and home no matter how great the range available to them – a process which culminates in population crashes. In the long term, population reductions may be necessary. In the north-west, the management requirement may simply be to increase the range available to elephants: in north-central and north-eastern Namibia not only does the range need to be increased but, in some areas, the population may need to be reduced (**Fig.1**).

Technically, there are no good reasons why more land in Namibia should not be made available to elephants. The highest valued land uses over most of this arid country (**Map 3**) are those based on management of natural resources (Brown 2004). Moreover, the full potential is far from being realized at present due to national and international policy constraints, which place wildlife at a competitive disadvantage with land use based on exotic species. Were subsidies to be removed from the domestic livestock industry and, were it possible for elephant to play their full economic role in land use systems, it could reasonably be expected that large additional areas of land would be converted to wildlife management where human densities are relatively low and where co-existence with elephants is possible, as elsewhere in Namibia – for example, in most of the northern Kavango, parts of the central northern regions and in eastern Caprivi. This would remove the short-term limiting factor of providing additional range for elephant.

The technical arguments for greater areas of Namibia to be put over to natural resource management will not, on their own, bring about the needed changes to remove this limiting factor for elephants. It will require a high level of political commitment and the correct suite of incentives to induce landholders (both communal and private) to convert to a land use based primarily on wildlife. The high- level political commitment is already in place. In a speech delivered on 3rd February 2004, His Excellency the Founding President, Dr Sam Nujoma, made the visionary statement that wildlife would be restored throughout the north of Namibia, that ownership of wildlife would be conferred on local peoples and that the economy would be transformed by diversification based on wildlife uses.

For elephants, two factors mitigate against realizing the President's vision. The first is that the full value of elephant commodities (ivory and elephant skin) cannot be realized

due to international trading constraints.[8] The second is that elephants in Namibia are effectively State property – which was clearly not the President's intent. These two major disincentives need to be addressed before the conditions for increasing elephant range will be achieved. The options for tackling the CITES constraints are discussed fully in section 2c of the *Background Study* and briefly under the *Strategy and Actions* in this plan. The devolutionary requirements for elephants are also dealt with under the *Strategy and Actions*. A threat to fulfilling the Vision lies in a possible perversion of the intent of policy during the course of putting it into practice (Corbett & Jones 2000).

Full devolution of rights over elephants to landholders (on both communal and private land) is a prerequisite for creating the correct suite of incentives for elephant populations to expand. It is a necessary but not a sufficient condition. As a result of the arid environment in Namibia, elephant have large home ranges and this has major portents for management, both within Namibia and across national boundaries. No single protected area is a self-contained range for elephants and, in the north-east, the national parks in Caprivi are small (e.g. Mahango, Mamili and Mudumu) and very much at the mercy of the land use surrounding them. The desirability of cooperation with conservancies and surrounding communal lands has been emphasized in all of the previous studies in this series.[9] A key difference between the institutions needed for elephant management in the Caprivi and those in the north-west is that they would have to include stakeholders who are not included in conservancies. Unlike the other species in Caprivi for which management plans have been prepared, elephant are not rare or endangered and, indeed, they are a threat to those species which are.

A process of 'scaling up' is necessary to match institutions with ecological imperatives (Murphree 2000). Large areas co-managed by the relevant landholders and occupiers will be necessary to provide viable ranges, to distribute the pressure of elephants on habitats and to allow population increase and expansion. The Vision Statement developed under the UNDP/GEF-assisted project in Namibia (UNDP 2005) provides for co-operation between stakeholders to achieve this far-sighted concept. Linkages would be established under a co-management system which would both secure and increase the available range for elephant (**Map 4**).

In the north-east, elephant population reduction may be necessary. However, there are no simple answers to the question of how many elephants need to be removed – either to conserve biological diversity or to reduce conflicts between humans and elephants. It would be a mistake to attempt to hold the elephant population of the north-east at some constant level (or, conversely, to attempt to maintain a constant harvest from it). Such a "Command-and-control" approach (Holling & Meffe 1996) is likely to have adverse effects on the resilience of ecosystems.

This all points towards a need for imaginative and innovative management. An acceptance is necessary that there are no scientific recipes which avoid all the pitfalls in what is a 'complex system'. The starting premise may be that the option of zero use is

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[8]Elephant are perhaps the only species where, if markets were working properly, the commodity value of an elephant bull is actually higher than the value which can be realized from trophy hunting.

[9]Martin (2004) stated that successful conservation of the wetland grazers was unlikely to be achieved without co-management institutions for the full extent of the floodplain habitats in the Caprivi.

not a reality – elephants will be harvested illegally and unsustainably if facile attempts are made to debar their use. The aim should be to avoid routine cropping or culling programmes which attempt to impose constancy on naturally fluctuating ecosystems and to introduce an element of randomness into the system. The challenge is to make it sustainable and this requires an adaptive management approach (Holling 1976).

Combining adaptive management with the arguments for co-management presents a classic situation where the principles of adaptive co-management in complex bio-economic systems (Ruitenbeek & Cartier 2001) need to be applied. The individuals who are most affected by elephants are those living in the north-east: together with the State authorities, they should decide how elephants should be managed.

Background and Rationale for the Management Plan

The African elephant has achieved huge prominence in global conservation issues in the past 20 years. Few other species are capable of arousing emotions, polarizing viewpoints and causing controversy to the extent that *Loxodonta africana* has done. In 1989, rightly or wrongly, the species was listed on Appendix I of CITES and legal trade in ivory was effectively banned. Because of the high profile of the species, every range country seeking credibility in the international conservation arena should have a management plan for elephant.

The southern African region holds more than half of the African elephant population and the largest concentrations of elephant are in a central zone extending across the continent between latitudes 15º-20º south of the equator. Within this zone, Botswana and north-western Zimbabwe hold some 200,000 elephants. The expansion of these populations into neighbouring countries is affecting biological diversity and human livelihoods. In recent years, divided opinions on the subject of elephant management have characterized debate in southern Africa and the situation is no less contentious than in the international arena. The topic is now in the political realm and demands for elephant management plans are coming from all stakeholders.

The 'elephant problem' is central in initiatives to create transboundary conservation areas in the region. The need for elephants to have access to far larger areas than those in which they are currently confined is recognized and, for many, TFCAs are seen as the solution to elephant population increases. Unfortunately, a lack of coherent land use planning in all of the participating countries[10] in the KAZA TFCA, coupled with a legacy of national boundaries which are an "outrage to geography and all common sense", (Fisch 1999) means that this TFCA will undergo a long and difficult birth. And shortly after parturition, the 'elephant problem' will rear its ugly head notwithstanding the additional range which is available. National management plans are needed to anticipate the reality that TFCAs will not solve the elephant problem.

Under the present Namibian environmental legislation, management plans are required for species which are rare or valuable and which share boundaries with neighbouring countries. Elephants are not rare but they are potentially valuable and, within multi-species wildlife systems, could provide a financial return which greatly exceeds that possible from alternative land uses. A management plan which treats elephants as the

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[10]Angola, Botswana, Namibia, Zambia and Zimbabwe.

valuable resource that they are could generate sufficient income to meet the conservation costs of the elephant range in Namibia.

This plan has no relationship to standard Government five-year budgeting plans – except insofar as the required operational expenditure for State Protected Areas needs to be maintained continuously above the minimum threshold needed for effective management and law enforcement. The achievement of a greater range for elephant and the capacity to carry greater numbers of elephant is subject to many factors being favourable – including success in conservancy development, a reversal of the present spread of unplanned settlement and land clearance, mitigation of the effects of veterinary fences and the creation of institutions with local stakeholders that allow co-management of elephant populations over substantial areas.

Plan Structure

In each of the preceding species management plans under the Transboundary Mammal Project, it has been found necessary to make minor adjustments to the *pro forma* layout that formed part of the terms of reference. Some additional small changes have been made in this plan – to suit the specific requirements for the species.

The style of the plan differs slightly from previous plans. Throughout the text, there is more narrative discussion and less of the conventional 'bullet point' approach. Recognizing that any decisions to manage elephant are potentially controversial, the plan gives due weight to the concepts and philosophy on which management should be based. The plan advocates that elephant management decisions are made in a co-management forum with other primary stakeholders and, because of this, it is impossible to predict in advance what those decisions will be or to spell them out in a concise sequence of required activities. The emphasis is more on predicting the outcomes of certain actions rather than advocating particular management interventions.

(1) The plan begins with a **VISION STATEMENT** which incorporates a **GOAL** and three objectives – a **SOCIAL OBJECTIVE**, an **ECOLOGICAL OBJECTIVE** and an **ECONOMIC OBJECTIVE.** The Vision builds on evolving Namibian policy.

(2) A set of **ACTIONS** needed to achieve the objectives follows and, taken together, these actions comprise the **STRATEGY**. The points are made that complex interactions exist among the objectives that are not amenable to 'linear programming' and an **ADAPTIVE MANAGEMENT** approach is needed for all interventions.

(3) The **RISKS AND ASSUMPTIONS** implicit in the plan are then detailed – the most severe risk being that attached to doing nothing.

(4) **FINANCE AND CAPACITY**: In previous plans detailed budgets have been prepared for implementation – based on the assumption that the plan might be submitted for donor funding. This plan is unique in that the income from elephants should more than meet all implementation costs and it is recommended that the plan is not submitted to donors. An estimate of typical income from elephant management is presented in **Appendix 1**.

(5) The key issues on which **TRANSBOUNDARY COOPERATION** is desirable are highlighted, and it is noted that the principles on which this management plan is based could be extrapolated to the larger scale of a trans-frontier conservation area.

MANAGEMENT PLAN

VISION, GOAL AND OBJECTIVES

This Vision Statement consists of a preambular section and an operative section in which the overall goal and objectives are stated. Following the Vision Statement, a sequence of actions is presented which, taken together, comprise a strategy to achieve the objectives.

This is the Vision Statement of the MET and not necessarily that of the other primary stakeholders in Namibia – who are those people in communal lands and on private land where elephants occur. For this reason some care has gone into the phrasing of the Vision Statement so that the State does not appear to speak on behalf of the other stakeholders with whom it hopes to enter into co-management arrangements. The overall goal makes it clear that the Ministry will be guided by the wishes of the other stakeholders.

If it were adopted, this Vision Statement could be seen as Government's policy for elephants. Several points need to be made: –

(1) Notwithstanding any sensitivity to other stakeholders, it is completely valid for Government to state its policy. The assumption is that the policy is already informed by the wishes of the stakeholders.

(2) Policy is a statement of Government's intent and, as such, it should be focused on the larger issues and not burdened with details.

(3) Policy precedes legislation. Laws are made to give effect to policy.

(4) Policy is essentially experimental and, at the outset, there should be an awareness and acceptance that it may need to be changed. Implementation of policy is 'adaptive management' at the highest level (Lee 1993).

VISION

RECOGNIZING that elephants are of global, regional and national conservation concern;

CO-OPERATING with neighbouring countries and the international community to achieve the security of the species and enhance its biological status;

PARTICIPATING fully in transboundary initiatives which, *inter alia*, will extend the range available to elephants;

REGARDING the elephant as a highly desirable species to be conserved as part of the biological diversity and natural wealth of Namibia and noting that there are unique adaptations among Namibian elephants to arid environments;

RECORDING the fact that Namibia has a secure and viable population of elephants which is expanding at the moment and becoming overabundant in some areas;

WILLING to continue to commit public funds to the promotion, protection and management of the species;

BEING AWARE that in recent historic times elephants were found throughout Namibia but that to return to this situation will require a high economic value to be attached to the species;

PROMOTING wildlife management as the optimum land use in the arid environment of Namibia and treating elephants as one of many valuable species in the diverse large mammal community occurring in Namibia;

NOTING the potential financial and economic contribution that elephants could make as part of wildlife-based land use were it not for national and international policy constraints;

DRAWING ATTENTION TO the high costs entailed in conserving the species that include the damage that elephants inflict on human livelihoods and the reduction in biological diversity that results from an overabundance of elephants;

EMPHASISING that a policy of total protection for elephant will result in their available range being reduced to State protected areas and a corresponding decrease in their numbers;

CONVINCED that a policy of sustainable use, as enshrined in the Namibian constitution, will result in the expansion of the range available to elephant and an increase in their numbers;

Accordingly, the Ministry has the following goal and objectives –

STRATEGY AND ACTIONS

Simple as the objectives are, they will not be achieved by 'linear programming' within each objective. To achieve the ecological objective of increasing elephant range requires certain actions to be taken in the social and economic categories. The social objectives of reducing conflict and achieving a flow of benefits require actions to be taken in the ecological and economic realms. The full economic objective will not be achieved until all of the other objectives are in place.

While all the actions and outcomes appear to be inextricably linked, it is possible to present them in a sequence which leads logically to the achievement of the objectives.

GOAL
Namibia wishes to carry the maximum number of elephants that is consistent with the conservation of biological diversity AND the wishes of those primary stakeholders who have elephants on their land

SOCIAL OBJECTIVE
1. **To reduce conflict between elephants and people**
2. **To create conditions under which elephants are a benefit to people**

ECOLOGICAL OBJECTIVE
1. **To increase the range available to elephant**
2. **To conserve biological diversity in State Protected Areas and promote the conservation of habitats outside State Protected Areas in the elephant range**

ECONOMIC OBJECTIVE
To enable the full economic potential of elephants to be realized according to the provisions for sustainable use in Namibia's Constitution

The actions, when taken together, comprise a strategy and this is outlined below as shown in **Fig.2**.

A feature of this management plan is just how few actions are needed to bring it to fruition. Success relies on a few administrative masterstrokes which will cost next to nothing – rather than on a long list of expensive management activities.

(1) **Devolution**

Devolution of authority for landholders, both communal and private, to manage elephants on their land is a prerequisite for the other stages in the management plan. Co-management arrangements cannot be entered into as long as the stakeholders around the table (other than the State) have no rights over the species. It will be impossible to create the conditions under which the elephant range can expand without the correct suite of incentives – which includes full empowerment at the outset. The State does not have the answers as to how many elephants there should be in all the parts of the range (and there may be no right or wrong answers) and it needs the other stakeholders to help to decide this.

Many planners and bureaucrats see devolution of authority as a step-by-step process where communities are granted powers incrementally as they demonstrate the ability to manage. This is a 'Catch 22' situation (Murphree 2000). Authority is a prerequisite for responsible management and should not be held out as the <u>reward</u> for it. In some cases, State authorities cannot see why the end goals of wildlife management require complete devolution. Devolution carries with it the responsibility for organization, management, control, self-sufficiency and, above all, for developing resourcefulness. These attributes cannot be imposed. They must be developed experimentally in the local setting and, without authority, such experiments are defective. The stimulus for the development sought within this management plan will arise not from the anticipation of future entitlement but from the imperative of immediate empowerment.

The MET may fear that complete devolution of authority for elephants could have wider ramifications – establishing precedents that would affect all other large mammal species in Namibia. This need not necessarily be the case. The devolution could be clearly labelled as 'experimental' and justified by the current prominence and urgency of elephant issues. In any case, the Ministry hopes that shortly after devolving these rights, it can enter into co-management arrangements in different parts of the elephant range – this will probably result in stronger controls on elephant exploitation than could be implemented by the State on its own.

In Zimbabwe during the 1970s and 1980s, wildlife authority was almost totally devolved to landholders except for Specially Protected Species (a legal category of wildlife where the State retains powers to control exploitation). Elephants in Namibia are in such a category. It is of interest that, in the years after devolution, all wildlife species increased in abundance except for Specially Protected Species. By limiting the rights of landholders to hunt, crop, breed, capture, translocate and sell these protected species, the incentives were not present to bring about their increase. Elephants are abundant in Namibia and there is no sound conservation reason why they should be classified as specially protected. Perhaps the only legal control that needs to be maintained is that of ensuring that all ivory is sold through the central Government outlet in order to satisfy CITES accountability requirements.

(2) Veterinary control fences

The influence of veterinary fences on the current elephant range, both in Namibia and in the region, is profound. There is a bottleneck in the vicinity of Mahango Core Area within Bwabwata National Park that affects the entire regional range for elephant across the central southern African region, (**Map 5**) caused by the veterinary fences on the southern boundary of Caprivi and along the international border between Botswana and Namibia. The compression of elephants in this narrow isthmus has undoubtedly been responsible for the woodland destruction in Mahango. This is a matter for the MET to pursue from the outset of the management plan.

The recent migration of elephant into Namibia indicates that these fences are less than effective. The boundary fence between Khaudum and Botswana is frequently breached over a large section (Beytell *pers. comm.*) and the fence on Caprivi's southern boundary is in a similar state (Booth *pers. comm.*). However, there should be little cause for elation over this: the fences undoubtedly impede movement of elephants up and down the Kavango River and act against the maintenance of spatial linkages between the subpopulations. There is a danger that the authorities in both countries will suddenly become conscious of the *status quo*, attempt to repair the fences and, at the same time, demand that elephants are killed as problem animals.

Cumming (2005) has called for the veterinary profession to re-examine its methods of disease control as the southern African region moves into transboundary wildlife management over very large areas. Methods of control that were developed in the 1960s and applied at national levels may no longer be appropriate at the international scale where collaborative efforts are being made between governments to move to the higher-valued land uses offered by wildlife tourism.

(3) Constraints on trade

CITES constraints on trade in ivory and elephant products are exerting a negative effect on Namibia's aspirations for conservation of elephant and, more generally, acting as a disincentive to the adoption of wildlife management as a primary form of land use.

The listing of the Namibian elephant population on Appendix II of CITES is accompanied by an annotation which makes trade in ivory and other elephant products very difficult. The achievement of full market prices for elephant commodities is needed to realize the ultimate objectives of this management plan. For this reason, the removal of the particular constraints affecting Namibia should be tackled with renewed vigour by the Government at an early stage in the inception of the management plan.

The options open to Namibia to achieve the removal of the current CITES annotation limiting its ability to trade are discussed in the *Background Study* and it may not be strategic to present them here. One of the options is to accept the *status quo*. The perspectives included in Namibia's submission to the 13th CITES meeting in Bangkok in 2004 to amend the annotation affecting Namibian elephants (MET 2004) are extremely powerful and provide the justification for rejecting this option. Namibia has reiterated its determination to oppose measures imposed externally that act detrimentally towards conservation, local people and national development.

It cannot be denied, however, that there are substantial values to be derived from elephants through tourism and international trophy hunting (which is not debarred under the Namibian annotation) even if they fall short of the ideal. The management plan is worth pursuing, even if the full value of elephant products cannot be achieved overnight and even if performance under the Economic Objective is lower than it should be.

(4) Co-management

Namibia continues to make huge progress in the development of conservancies on communal land. Namibia currently has 50 registered and about 20 emerging conservancies, with 220,620 people living in registered conservancies managing wildlife over an area of more than 118,704 km², including expanding elephant populations. The wildlife range on commercial farmland in the north of the country is increasing – particularly in areas where it is hoped that the elephant range can be expanded. These very positive developments are recognized in the Vision Statement of UNDP (2005) and are seen as a way to link protected areas across the country and to provide a continuous range for elephants across the north of Namibia.

It is important that the momentum continues: further evolution of policy is needed to allow new co-management institutions for larger areas to emerge. The present mosaic of parks, conservancies and commercial farms provides a sound and essential foundation for the 'scaling up' of institutions (Murphree 2000) and, as they stand, partnerships can be entered into among neighbours. But there is a difference between partnerships and full co-management institutions. The needs of elephant provide the vehicle for co-management – no tract of land in Namibia is large enough to be a self-contained management unit for elephant.

Ruitenbeek & Cartier (2001) would have it that a co-management institution cannot simply 'be imposed on a group of innocent bystanders'. It is something that should emerge naturally from a complex bio-economic system. The devolution of rights over elephants creates the conditions for emergence – it should stimulate the formation of institutions based sensibly on geographic areas. Here, too, there is scope for applying another principle – *no institution should be larger than the problem it is trying to solve* (Martin 1999b). Each new co-management institution should be related to the range of an elephant subpopulation and should include only those stakeholders on whose land elephants occur (which would include, in some areas, communal residents who are not organized into conservancies). The high-level institutional structure proposed for the State wildlife agency under the MET/UNDP/GEF project (UNDP 2005) is ideally suited to this from a geographical perspective. The new divisions, subdivisions and sections are well-matched to the elephant ranges that will require co-management institutions.

The State will be part of each co-management institution formed to manage elephants but its new role should be very different from a 'command-and-control' function. The operating point on the management continuum defined by Ruitenbeek & Cartier (2001) should be close to the *laissez faire* end of the spectrum.

At an early stage in the formation of the co-management institutions, a voting procedure may need to be established that could be based on the size of the landholding for which each stakeholder is the responsible authority within the elephant range. On this basis, the State might dominate decision-taking in the north-west: in eastern Caprivi, where Mudumu and Mamili national parks are relatively small, the communal land stakeholders should have the major say.

(5) Adaptive management

At this stage management interventions required in north-western Namibia are minimal: elephant densities are low and the population is in the process of re-colonizing its former range. Perhaps the only agenda for a co-management institution would be the allocation of trophy quotas.

In north-eastern Namibia, the migration of large numbers of elephant from Botswana, habitat modification in national parks and escalating levels of conflict between humans and elephants may require significant management interventions. The co-management institutions[11] in the north-east would need to address trophy hunting quotas, problem animal control (PAC) and population reductions.

Trophy hunting

In the absence of any other management (including PAC), the proportion of an elephant population that can be hunted for trophies is about 0.5%. These trophies would all be males over 30 years old. If the north-eastern population is about 16,000 animals, the maximum trophy quota would be about 80 animals of which 50 would come from the Caprivi and 30 from the Khaudum/Nyae Nyae area.

These might be the quotas set from 2007 onwards. Under adaptive management, the ages of the elephants killed should be monitored and, in succeeding years, the quotas should be adjusted upwards or downwards according to the criterion that there should be some animals among those killed that have reached an age of 40 years. If monitoring were based on tusk weights (which is considerably easier), there should be several tusks greater than 22 kg in the quota and the average tusk weight should not be much less than 19 kg.

Under a co-management system, it would not be necessary to allocate hunting quotas to particular conservancies or protected areas. The total income from all the trophies could be shared according to landholdings (or other agreed criteria) at the end of the year.

The sustainable off-take of trophy hunting quotas is affected by any other management interventions taking place at the same time (PAC and culling) and the effects are discussed below.

Problem animal control (PAC)

If PAC is restricted mostly to male elephants 15 years and older, the maximum sustainable off-take is about 1.5% of the total population. As the problem animal off-take is increased, the trophy hunting quota must be reduced to remain sustainable and, when the level of PAC reaches 1.5%, there are insufficient animals reaching an age of 30 years to allow sport hunting. The relationship is shown in the table below.

PAC off-take %	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4
Trophy off-take %	0.50	0.45	0.40	0.36	0.32	0.26	0.22	0.18	0.12	0.11	0.08	0.05	0.03	0.02	0.01

Percentage off-takes are of the total population

The present system for dealing with problem elephants is clearly unworkable, particularly in the Caprivi. Elephants identified as problem animals must first be offered to a hunting concessionaire. The professional hunter is not allowed to shoot after dark which means that on most occasions the offending animal will not be killed in the act of crop raiding. If the hunter is unsuccessful in selling the animal as a trophy to a hunting client, MET staff

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[11]There would probably be three such institutions in eastern Caprivi and Kavango.

may then destroy the animal subject to the current delegations of authority by the Minister.

Under a fully devolved co-management system, each stakeholder might be responsible for PAC in his/her landholding or authorized control officers would be present as needed in different parts of the area.[12] Being aware of the impact of PAC on trophy hunting, the co-management committee might prescribe guidelines to minimize the number of animals killed.[13]

Population reduction

Culling entails the removal of entire elephant herds with the aim of reducing population numbers or limiting the rate of population increase. By removing entire herds, the age structure of the female segment of the age pyramid remains unaltered and no selective pressures arise from the practice. The overall age structure of the population does become skewed in favour of males and this permits a higher percentage quota for trophy hunting, although it does not result in a greater number of male trophies over a period of years than would be obtained from a population which is not subjected to culling (because of population growth).

For a population growing at 4.6% per annum (a typical growth rate for savanna elephant), **an off-take of 3% of the total population will stabilise numbers**: a higher percentage off-take will reduce the population. This entails an off-take of about 30 animals for every 1,000 animals in the population. If culling is combined with trophy hunting, quotas can be raised to 1% of the population and an additional 10 males over the age of 30 years would also be removed annually.

If the sole consideration of the MET was to limit vegetation damage inside national parks, it might not seem necessary to confer with other stakeholders on any management decision to reduce elephant numbers in State protected areas. However, given the movements in and out of parks, a more sensible strategy is to manage the population both inside and outside parks with the other stakeholders for multiple objectives.

There are no simple prescriptions for the 'correct elephant densities' either to conserve biological diversity or reduce levels of human/elephant conflict. The worst mistake that could be made would be to attempt to hold the elephant population of the north-east at some constant level or to attempt to maintain a constant harvest from it – because this has adverse effects on ecosystem resilience. The rational approach is adaptive management (Holling 1976). Learning will only occur by exploiting the resource (Hilborn & Ludwig 1993) and monitoring progress towards the desired situation. By joining with

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[12]In the late 1960s and early 1970s a PAC system which was in place in Caprivi where Chiefs Mamili and Liswani III (Salambala) had their own hunters authorised to hunt problem animals and obtain meat for feasts. These hunters were armed with .458 and .375 rifles. A quota was issued to each chief, problem animals were reported and dealt with within 24 hours, the tusks from the problem animal were registered, sold on the chiefs' behalf and the funds were deposited into the chiefs' account for community development. The system worked well (B. Beytell, *pers. comm.*).

[13]If commodity markets for elephant products were functioning properly, there would be little financial advantage in selling an elephant as a sport hunting trophy – the same animal would earn as much killed as a problem animal.

other stakeholders in deciding the nature and extent of any management interventions, the MET will place itself in a strong political position both nationally and internationally. The implementation of any population reductions will not be difficult to defend since the decisions will have been taken democratically.

Cropping

Namibia has stated firmly in its submissions to CITES (MET 2004) that no elephant will be killed for the sole purpose of realizing its value in the ivory trade.

Throughout Africa, elephants have been killed by local peoples for both ivory and meat for centuries. One of the primary reasons that colonial powers sought territories in Africa was because of the natural wealth of ivory (Parker 2004). Ansell (1960, page 50) remarks on the damage to crops in the Luangwa Valley, Zambia, but notes that elephant were seen by local people as valuable animals because of the meat they provided.[14]

It would be as well for MET to enter any co-management forum with no preconceived moral position on elephant. Having accepted that the solutions to the current 'elephant problem' may lie in innovative management inspired by the values of local people, a *tabula rasa* is needed to accept with an open mind all options presented.

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The above actions comprise the strategy for elephant management.[15] Two of the actions are no more than enlightened administrative decisions to be taken within the Ministry. The veterinary fence issue requires the MET to confer with the Directorate of Veterinary Services in Namibia and carry its representations into the transboundary forum with Botswana. The ongoing struggle with CITES lies in the political and administrative realm. The adaptive management decisions affecting exploitation of the elephant population are not for prescription in this management plan: they will emanate from the enlarged forum of co-management institutions. They will take into account a wider range of social, ecological and economic factors than have previously characterized elephant management and, because of this, there is a real opportunity to advance knowledge on elephant management.

The objectives in the Vision Statement should be realized sequentially.

> **Ecological objective 2**, that of conserving biological diversity, should be the first to be realized since it is not dependent on achieving the full financial value for elephants. It requires only pro-active decisions from the co-management forums. It will, of course, result in costs which may have to be met from the fiscus in the first instance: however, as success is achieved in the CITES forum, the costs of ongoing population reductions can be met from the return from elephant products.

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[14]In the 1960s, every local person in the Luangwa Valley received a half-pound of meat weekly from elephant control.

[15]In the discussion of limiting factors the provision of artificial water, competition with cattle and the effects of veterinary fences were mentioned as additional factors influencing elephant populations. These are discussed more fully in the *Background Study* (pages 65-66) together with the effect on habitats of elephants and fire acting in combination. Rather than deal with these as stand-alone topics in this management plan, it is preferred to treat them as agenda items to be addressed by co-management institutions.

Social objective 2, that of elephants benefiting people, should be realized next. The full suite of benefits will only be realized when elephant commodities achieve their real market value: however, sufficient benefits may flow in the early stages from trophy hunting, PAC and population reductions to maintain the positive momentum needed to achieve the other objectives. An important factor enters the equation here. Once the stakeholders feel secure that they really are in control of elephant management, the demands for quick financial benefits are likely to lessen and they will begin to think more deeply about the very complex problems involved in managing elephants.

Social objective 1 - that of reducing conflicts between elephants and people, should follow. Here, too, the effects of devolution will be paramount. As long as the stakeholders see elephant management as a State responsibility, it pays them to make a huge fuss about all elephant incidents which affect their livelihoods. Following devolution, the responsibility for solving the problem rests squarely in their court. And, for the first time, they will have to grapple with multiple competing factors which affect their livelihoods. If all elephants are eliminated, crop raiding problems will be solved: however, the larger income from good wildlife husbandry will also be lost. It must be remarked that there is little possibility of eliminating elephants: dispersal from the large Botswana population will replenish stocks continuously.

Ecological objective 1 - that of increasing the elephant range in Namibia, will depend on a number of factors. The achievement of the previous objectives should create the incentives for a transformation in land use. The State can assist at the national level by removing perverse incentives which favour other less productive forms of land use and, in particular, by bringing the veterinary fences issue under scrutiny. As transboundary wildlife initiatives gain momentum, economic multiplier effects should speed up the process, tipping the scales in favour of wildlife management. The international struggle over the ivory trade is unlikely to be won in the first rounds of the contest and may require incremental demonstrations of success to convince sceptics that policies are working.

The Economic Objective - that of achieving the full value of elephants over the maximum potential range in Namibia, is also dependent on progress with the previous objectives.

If the elephant range can be extended as far south as shown in **Map 4**, about half of Namibia (400,000 km²) would contain elephants. If the full commodity values for elephant are finally achieved, under a sustainable use management regime involving elephant male trophy hunting and culling to prevent elephant population increase above a density of $1/km^2$, the net financial return per unit area could be as high as US$3/ha (**Appendix 1**). The net income would be about US$120 million. Using the multipliers implicit in Barnes & de Jager (1995) the 'net value added' in economic terms would be more than double this amount.

Impacts

The impact of achieving the highest valued of land use is likely to be considerable – Namibia could improve its economy by an order of magnitude. It will provide the revenue for effective State conservation, elevate the standard of living for landholders with elephants and create the incentives for more land to be put under wildlife. Ultimately, it could revolutionize land use practices throughout the region and pave the way for TFCAs.

Monitoring

Monitoring of a range of specific biological parameters is implicit under adaptive management. The detailed requirements for making sport hunting quotas sustainable and achieving the aims of any population reductions are detailed in the *Background Study*. The 'Event Book' system (NNF 2004) is already producing the needed information for conservancies on conflict between elephants and humans. The annual record of revenues and incomes earned from State protected areas, conservancies and other communal land will provide the information needed to assess progress towards achieving the economic objective.

RISKS AND ASSUMPTIONS

Given the escalating human-elephant conflict and the extreme modification of habitats in north-eastern Namibia, the greatest risk to Government's position is to do nothing. The architects of Botswana's elephant management plan (DG 2004) have recommended that Namibia does not take a passive approach on the issue (G.C. Craig, *pers. comm.*). Failure to implement the necessary devolutionary measures and enter into co-management carries the real risk that local people will take matters into their own hands or, worse still, collaborate with illegal hunters from neighbouring countries.

Inactivity will not simply result in the *status quo* being maintained. Since the 1970s, elephant populations have collapsed in an apparently inexorable process across Africa.[16] Invariably it has happened in countries where the State asserts that it owns all wildlife and attempts to regulate all wildlife use. Murphree (2000) describes this 'Big Government' syndrome as one where the State's "authoritative reach exceeds its implementational grasp". The most spectacular population crashes have occurred in countries that have banned all exploitation of elephants, yet corruptly continued to feed the ivory trade (Parker 2004). These same countries have also been in the vanguard of those proposing an ivory ban.

There is little risk that any management interventions could have an adverse effect on the status of elephant populations in Namibia. Populations are expanding and being augmented by migration from Botswana and Zimbabwe. Provided the effects are properly monitored, experiments in management will provide a learning experience.

Assumptions

(1) Adequate funding will be available to the Directorate of Parks and Wildlife Management (DPWM) through the fiscus to maintain its essential functions in State protected areas (see FINANCE AND CAPACITY).

(2) Present legislation which prevents the devolution of rights over elephant will be amended.

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[16]AfrESG (1998) and Martin (1986) document the decline of elephant populations in various countries since the 1970s. Among the more spectacular population crashes have been those in Kenya, Tanzania, Uganda and Zambia.

(3) MET is willing to enter into co-management of elephants with legitimate stakeholders.

(4) The devolution of rights over elephant and the establishment of co-management institutions will create the conditions for an expansion of the present elephant range beyond State protected areas, create linkages between State protected areas and improve the security of existing populations.

(5) Botswana and Zimbabwe will not take steps to limit their elephant populations. Whether or not they do will have little impact on this management plan as an institutional structure will have been set up to cope adaptively with changing situations.

(6) Namibia will be successful in convincing the Parties to CITES that the democratic policy it is pursuing carries the greatest long-term prospects for conservation and rehabilitation of elephant populations. If this assumption is not satisfied, it does not invalidate the management plan: it simply means that the transition to higher-valued land use systems based on wildlife and the expansion of the elephant range will take longer.

Risks

(1) If the assumptions are satisfied, the risk of an outbreak of illegal hunting of elephants among Namibian citizens is minimal. However, successful conservation of elephants in Namibia may attract illegal hunters from outside its borders – particularly from poorer countries whose local peoples are not benefiting from wildlife.

(2) There is a real risk that veterinary control measures, even though not directed at elephant, could continue to prejudice the objective of expanding the elephant range. Without expansion of the elephant range, the problems of conflict between humans and elephants and damage to wildlife habitats will require more intensive management. The solutions to this problem do not lie solely within Namibia's borders and this risk becomes an externality. The establishment of robust democratic co-management institutions will greatly strengthen the Ministry's position in tackling the problem and, even if the *status quo* of veterinary fences does not change, management solutions may emerge from within such institutions.

(3) If Namibia alienates some Parties to CITES through taking extreme measures to re-establish its sovereignty over elephants, there may be reprisals that affect other aspects of financial aid to Namibia. This will have to be handled in the political realm. Namibia's moral position is strong and it will be a pity if pragmatism has to override morals – particularly where it prejudices long-term prospects for conservation and rural development.

(4) If Namibia undertakes management interventions that involve culling or cropping from elephant populations, there will almost certainly be a regional and international outcry. From the experience that Namibia already has with the publicity surrounding elephants, it takes no stretch of the imagination to visualize the extremes to which the propaganda might go.

It is here that co-management is vital. If Namibia can present to the outside world a unified position supported by its citizenry, it should be able to weather the storm.

FINANCE AND CAPACITY

This management plan differs from all previous species management plans in that very little funding is required to implement it. The main costs will lie in co-ordination (liaison in setting up co-management institutions) and implementation of any management activities that arise from co-management decisions (problem animal control and population reductions). The potential income from elephant management is substantial and should more than cover these costs. The State or primary stakeholders may have to advance funds for certain activities to take place and it is strongly recommended that this is the financial mechanism used. Because of the controversial nature of elephant management, it would be wise not to compromise any decisions taken between the Ministry and primary stakeholders by seeking either international donor funding or local NGO funding to support implementation.

The current project to strengthen the system of national protected areas (UNDP 2005) should provide the necessary funding and capacity for MET to carry out its normal functions, including law enforcement. The close alignment between the UNDP project and the management plan for elephant bodes well for forming co-management institutions. Under the project, northern Namibia would be managed under two main divisions: the north-west (which includes Etosha National Park) and the north-east (which includes the Bwabwata, Mamili, Mudumu and Khaudum national parks and Waterberg Plateau Park).

The income from elephants would be unable to contribute much to Government budgets for the north-west. There is no sport hunting of elephants in the State protected areas and no management interventions are proposed. Outside the State protected areas, income earned from trophy hunting accrues to conservancies rather than to the State.

In the north-east, elephant could play a significant role in meeting conservation costs. The potential earnings from an elephant population managed for trophy hunting while keeping numbers constant are given in **Appendix 1**. The extent to which this revenue would contribute to park conservation costs is shown below.

	Caprivi	Khaudum & Mangetti
Protected areas with elephants (km^2)	9,956	4,142
Required conservation budget under UNDP (2005) – N$ million	13.9	4.8
Cost/hectare N$	13.91	11.59
Potential revenue from elephant management N$/ha	8.71	8.71
% contribution of elephants	63	75
Present conservation budgets (approx) – N$ million	9.9	3.4
Allocation/hectare N$	9.94	8.28
Potential revenue from elephant management N$/ha	8.71	8.71
% contribution of elephants	88	105

It would more-or-less meet the present budget allocations for the north-east and would meet at least two-thirds of the budgets proposed under UNDP (2005). Even if the full value of ivory and elephant skin is not achieved, the revenue from sport hunting will provide some 75% of the amounts given in the table.

Over and above the revenue which would accrue to State protected areas (N$8.7/ha), an additional N$9.7/ha would be earned by safari operators. This figure is dependent on the assumed proportion of gross income that safari operators would pay the landholder (MET or local community) for the 'rental' of the trophy hunting concession including trophy fees. If a rental higher than 25% can be secured, the primary stakeholders would achieve a larger part of the total net income (N$18.4 per hectare) from this elephant management regime.

Over and above the costs assumed in Appendix 1, additional costs could arise for such items as the annual aerial census of elephant populations, provision of artificial water and control of fire. However, in previous species management plans (Martin 2002, 2003, 2004) detailed budgets have been prepared for these items and it would be duplication to resubmit them here. Moreover, to put forward budgets for management activities which are the prerogative of co-management institutions yet to be established would be premature.

TRANSBOUNDARY COOPERATION

Whilst recognizing the larger goal of creating a major transboundary conservation area extending from the north of Namibia eastwards through Angola, Botswana, Zambia and Zimbabwe, the initial strategy guiding the Transboundary Mammal Project was to build incremental initiatives with Botswana based on individual rare or valuable mammal species of common interest to both countries. Given the extensive range of elephants and the high profile of elephant issues in the KAZA TFCA region, the time may have come for the subject to be discussed in a broader consultative forum.

Most of the management activities identified for potential cooperation and collaboration between Botswana and Namibia at the Kasane Workshop (2002) and Windhoek Workshop (2003) repeat themselves in this Management Plan.

(1)   Maintaining liaison between wildlife departments and communities managing wildlife on either side of the international border;

(2)   Maintaining linkages between species subpopulations;

(3)   Ensuring compatible forms of land use on either side of the international boundary;

(4)   Expanding the available range for the species – which includes dialogue on veterinary control fences;

(5)   Co-operating on law enforcement directed at illegal hunting;

(6)   Controlling fire;

(7)   Collaborating on aerial surveys to improve population estimates.

The issue of joint management of this species is a topic which has not arisen with the other species which have been the subject of transboundary dialogue. It would be highly desirable if a common management approach for elephants could be developed, in the first instance, between Namibia and Botswana but, after that, with the other countries sharing the elephant range.

So far, Botswana and Zimbabwe have not announced their intentions regarding elephant management. This plan is structured so that the management of elephants on Namibian soil is not dependent on decisions by neighbouring countries: It is, first and foremost, a national plan. However, if Namibia's neighbours expressed a wish to enter into large-scale joint management of elephants, there is nothing in the plan to preclude this. Indeed, Namibia would welcome the initiative. It is an extension of the co-management policy approach which Namibia will pursue at the national level.[17]

The corollary to this is that, if there is no agreement with neighbouring countries, it cannot reasonably be expected that Namibia will not undertake management interventions in the best interests of its local peoples and conservation imperatives. Namibia would, of course, keep its neighbours fully informed of its management decisions.

The management activities on which collaboration might occur are: –

(8)   Setting hunting quotas and monitoring the sustainability of hunting

Both Botswana and Namibia allow sport hunting of elephants and the trophies are derived from a shared population. This is a test case for developing workable transboundary institutions which, in the first instance, result in cooperation on quota setting and, ultimately, lead to income sharing.[18] Some of the problems which might arise in co-management are (a) the fact that Botswana allows citizen hunting of elephants at reduced charges; (b) the present Botswana elephant quota is not distributed among areas in proportion to elephant population numbers (DG 2004, page 13); and (c) the uncertainty that exists about the relationship between trophy quality and quota setting.

(9)   Problem animal control

With the escalating conflicts between humans and elephants in both countries, there are sound reasons to share experiences gained from PAC, including successful deterrents which do not involve killing elephants.

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[17]The issue may not be as simple as this. Namibia's co-management institutions would be based upon a far-reaching devolutionary policy. Co-management extending to neighbouring countries would need to be underpinned by the same principles for it to be entirely successful. The Utopian situation would be achieved when the TFCA was being managed jointly by local communities and their governments through a cascading structure of genuine co-management institutions.

[18]At the Kasane Workshop, the opportunity to develop such an institution involving Salambala Conservancy in Namibia and the Chobe Enclave community in Botswana was identified. These communities are directly opposite one another on the Chobe River and are almost certainly hunting from the same populations.

(10)   Population reductions and/or sustainable harvesting of elephants

Although it was decided in 1991 to limit the Botswana elephant population to 60,000 animals, no population reductions took place (DG 2004, page 4) with the result that the population is now in the vicinity of 150,000 animals. Most rural communities in northern Botswana feel that there are too many elephants and that the number should be reduced (DG 2004, page 10). However, the practicalities are daunting: it would require the removal of some 5,000 animals annually simply to prevent further increase.

From the perspective of those Botswana stakeholders who seek to reduce human/elephant conflict and prevent further habitat modification, Namibia's removal of a substantial number of elephants in the Caprivi Region would be unlikely to achieve the desired objective. More likely would be a reduction in elephant dispersal and migrations through Caprivi causing increased pressure on habitats in Botswana. There are obvious grounds for collaboration.

Were Botswana to pursue a policy of consumptive utilization of elephants, the sustainable off-takes would be very high. DG (2004, page 12) estimate that the removal of 5,000 animals annually would yield about 20 tonnes of ivory, 4,000 tonnes of meat (wet weight) and 325 tonnes of dried salted hide. The constraints imposed by CITES reduce the value of this resource and lead logically to another area where collaboration would be beneficial.

(11)   CITES constraints on trade in elephant products

At the time elephants were listed on Appendix I of CITES in 1989, a strong institution[19] was formed within the southern African region to contest the listing. At the Meeting of the Conference of the Parties in Kyoto in 1992, this alliance was able to introduce several resolutions which significantly affected the Treaty.[20] This institution was fundamentally altered in 1996 and, since then, has faded into obscurity. If the southern African countries still hold the fundamental viewpoint that all wildlife products should have value, there are strong grounds for resuscitating the alliance between states to perform more effectively in the CITES forum.

IMPLEMENTATION PROCESS & UPDATE PROCEDURES

Timing and Duration of Plan

Implementation of this plan should commence as soon as possible because of the rapidly changing situation of elephants in Namibia and the southern African region.

From the outset, an adaptive management monitoring programme should underpin the implementation of the Plan and test the underlying hypotheses regarding the response of elephant populations and habitats to various management interventions. The objectives, hypotheses and management activities in the plan should be modified as needed to take

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[19]SACIM – the Southern African Centre for Ivory Marketing, which included Botswana, Malawi, Namibia and Zimbabwe and which maintained liaison with Mozambique and South Africa.

[20]Among these resolutions was one that recognised that trade could be beneficial for wild species and another that altered the criteria for listing species on CITES Appendices.

into account externalities which may arise (and almost certainly <u>will</u> arise) during implementation.

The first draft of this Species Management Plan was completed in April 2005 and was reviewed during April-May 2005. Following comments and decisions from the Directorate of Parks and Wildlife Management and the Directorate of Scientific Services in the MET, a second draft was submitted to the Ministry by June 2005. Subject to any further revisions which might arise from inter-ministerial discussions or transboundary liaison with Botswana, a Final Plan should be ready for adoption before the end of 2007.

This should be followed by meetings between the MET and primary stakeholders to discuss implementation. Central to the plan are the devolutionary aspects and the establishment of co-management institutions. Notwithstanding any modifications made as and when necessary during implementation, there should be a mandatory review of the plan every two years – preferably synchronized with the results from elephant population surveys. If any changes are needed in the plan, the document should be modified, updated and re-approved.

Appendix 1: Income from Elephant Management

The potential income from sustainable use of an elephant population management has been analyzed using the population model of Martin (2000). The management regime entails culling to prevent population increase combined with trophy hunting of males. Assumptions and formulae used in the model are as follows –

(1) The management treatment is applied to a population of 1,000 animals in an area of 1,000 km^2 (i.e. at a density of 1/km^2). In the absence of any management this population would increase at a rate of 4.56% per annum. The percentage of the population to be culled is selected so that the population does not increase.

(2) Culling entails the off-take of complete elephant herds and includes males up to the age of 10 years. The probability of a male older than 10 years being present in a herd is set as: –

$$P_a = e^{-0.015(Age-10)}$$

(3) An off-take of 3% of the population is sufficient to stabilize numbers. This percentage may seem low when taken from a population which, in the absence of culling, increases at 4.6% per annum. The explanation lies entirely in the preponderance of females in the off-take.

(4) It is assumed that 75% of all elephant calves between the ages of 2 to 8 years will be captured rather than killed. These would be sold to zoos and to approved local and regional buyers wishing to domesticate elephant or begin new wild populations.

(5) The change in the age structure of the population caused by culling allows a greater percentage quota for trophy hunting of males. A quota of 1% of the population is sustainable.

(6) To calculate the values of ivory, skin and meat obtained from the culling operation, the following formulae were used for males and females of specific ages: –

Ivory   Weight of two tusks: –

$$I_{Age} = 1.88 (0.1 + 0.2 (Age - 2.5)^{1.2937}) \text{ kg}$$

$$I_{Age} = 1.88 (0.1 + 11 (1 - e^{-0.016(Age-2.5)^{1.2742}}) \text{ kg}$$

The multiplier for two tusks (*1.88*) is from Rodgers (*et al* 1978) and the formulae for the weight of one male and one female tusk are based on Pilgrim & Western (1986).

$$Price/kg = US\$ (50 + 110 . I_{Age}^{0.5})$$

Body weights

$$W_{Age} = 5,200 (1 - e^{0.006(Age+1.5)^{1.7}}) \text{ kg}$$

$$W_{Age} = 3,500 (1 - e^{0.00892(Age+1.5)^{1.7}}) \text{ kg}$$

Dressing out percentage = **33%** (wet weight); Price/kg wet meat = **US$1.00**

Skin weight (dry, both sexes)

$$S_{Age} = 0.373 W_{Age}^{0.67}$$ Price/kg dry skin = **US$5**

The table on the next page gives the results of the management programme averaged over 100 years. It is assumed that markets for all products are operating normally.

FINANCIAL VALUE OF ELEPHANT MANAGEMENT PROGRAMME

Assumed values *(all figures in US$)*

Area	1,000	km^2	Exchange rate 1US$ = N$	6.2
Elephant population	1,000	animals		

SPORT HUNTING

Trophy male quota	1.0	% of total population per year=	10	animals
Trophy fee US$	10,000	charged by operator		
Daily rate US$	1,000	charged by operator		
Minimum hunt days	14	Client charged for 14 days if elephant bull included in hunt		
Operating costs US$	200	per day (Safari operator's costs)		
Operator' rental	25	% of gross income (paid to landholder – MET or community)		
Weight of skin	100	kg dry skin/animal (assumes hunter takes 20% of skin)		
Body weight (adult male)	5,000	kg		

POPULATION REDUCTION

Culling quota	3.0	% of total population per year=	30	animals
Culling cost US$	300	per animal		
Calf capture US$	300	per animal (2-8 years old)		
Selling price for calves US$	1,000	per animal		
Capture success	75	% of animals 2-8 years old		
Price of skin US$	5	per kg (assumes markets operating)		
Dressing out percentage	33	% of body weight		

Meat value US$	1	per kg (wet weight)

Age-specific tusk weights, ivory prices, body weights and skin weights as per formulae on previous page

SPORT HUNTING

Safari Operator Gross income		**Safari Operator Net income**		**US$/ha**
Trophy fees	100,000		**155,750**	**1.56**
Daily rates	140,000	*N$*	*967,208*	*9.7*
Skin	5,000			
Subtotal	**245,000**			

Operating costs	
Operating costs	28,000
Rental	61,250
Subtotal	**89,250**

MET or communityNet income		**MET or communityNet income**		**US$/ha**
Rental	61,250		**77,750**	**0.78**
Meat	16,500	*N$*	*482,828*	*4.8*
Subtotal	**77,750**			

CULLING

MET or communityGross income		**MET or communityNet income**		**US$/ha**
Ivory	38,350		**62,444**	**0.62**
Calf sales	14,630	*N$*	*387,777*	*3.9*
Meat	12,696			

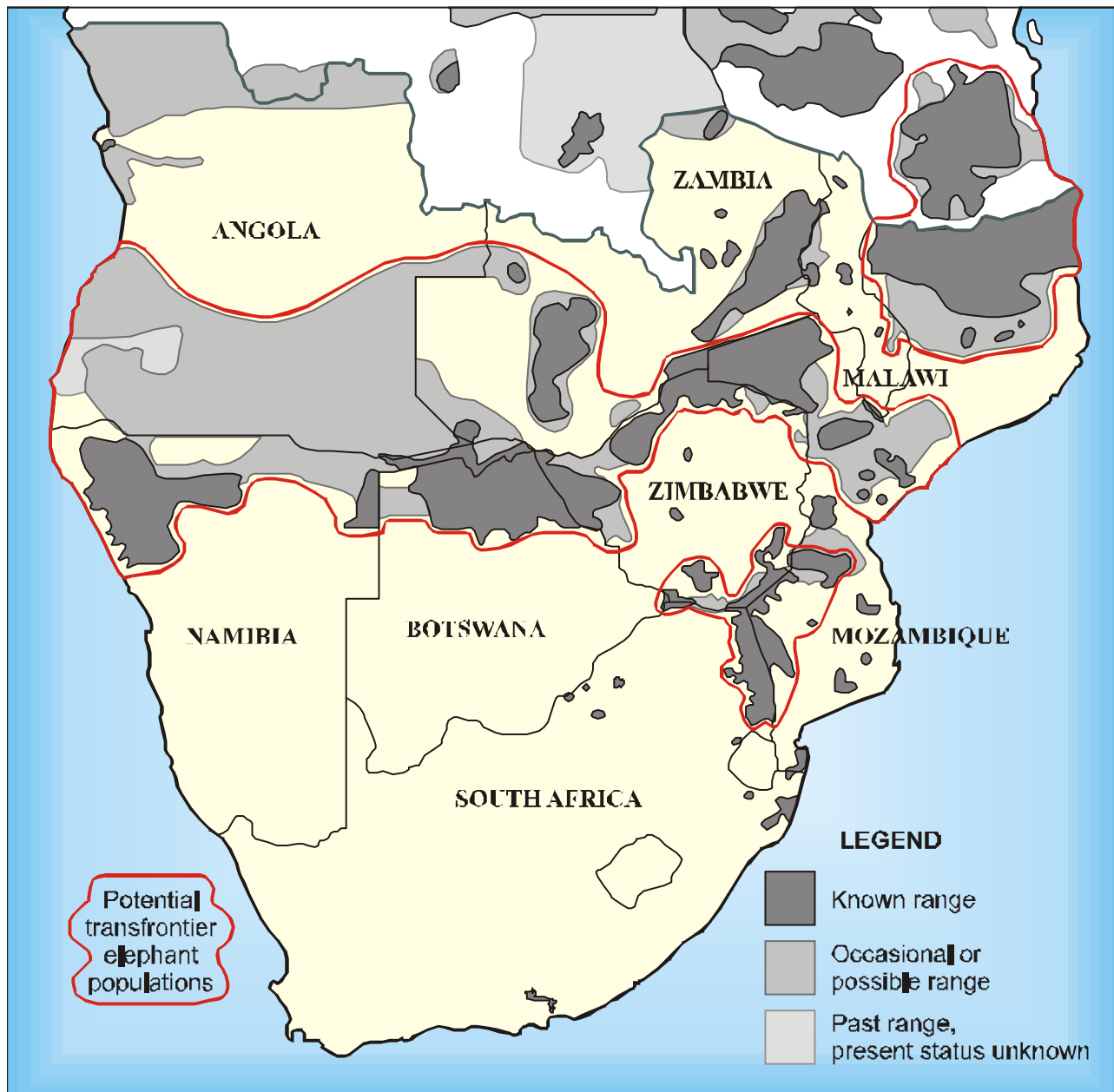|		MET or community income	Total net	US$/ha
Skin	5,768			
Subtotal	**71,444**		**140,194**	**1.40**
Operating costs		*N$*	*870,605*	*8.7*
Culling costs	**9,000**			
		OVERALL TOTAL NET INCOME	**295,944**	**2.96**
		N$	*1,837,812*	*18.4*

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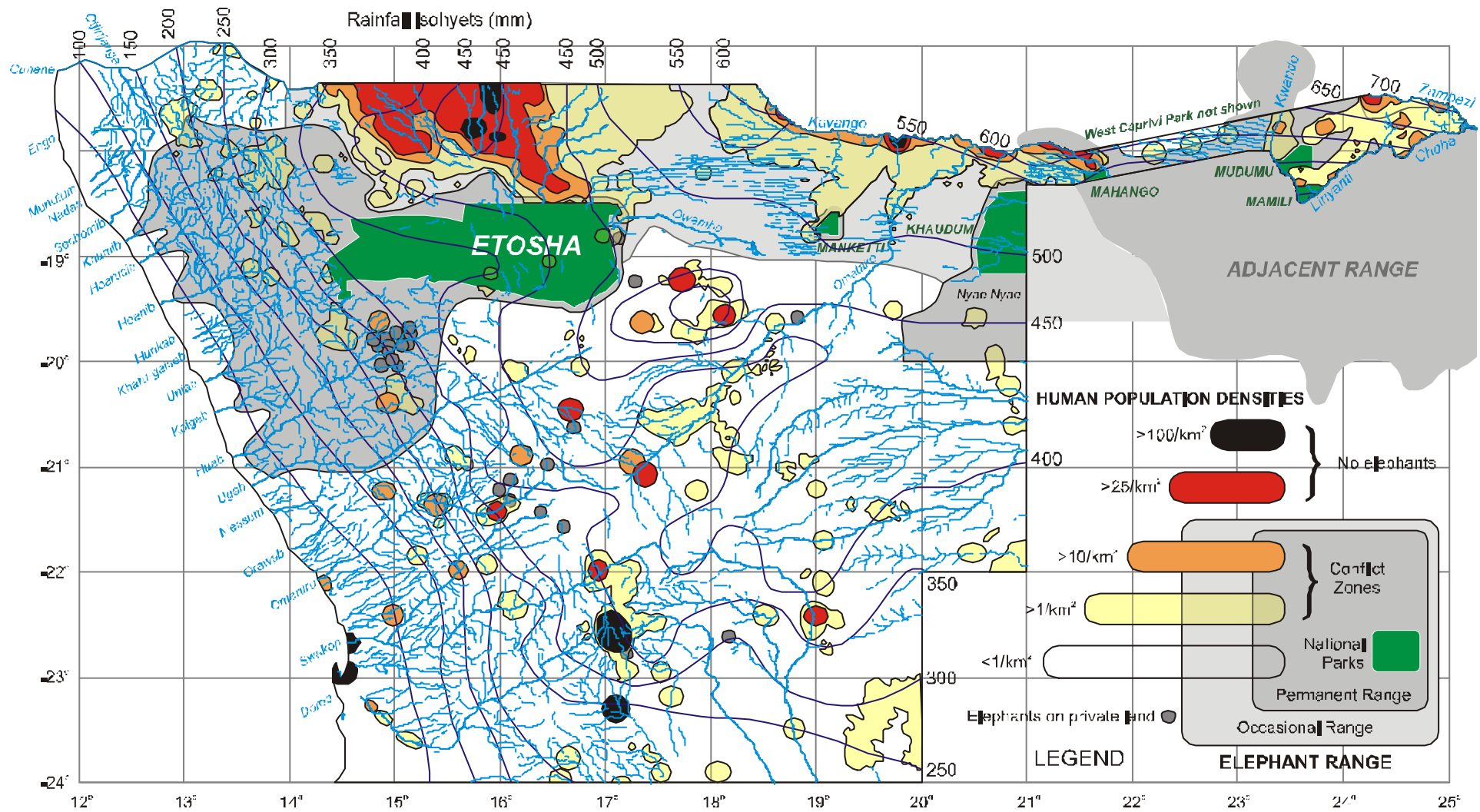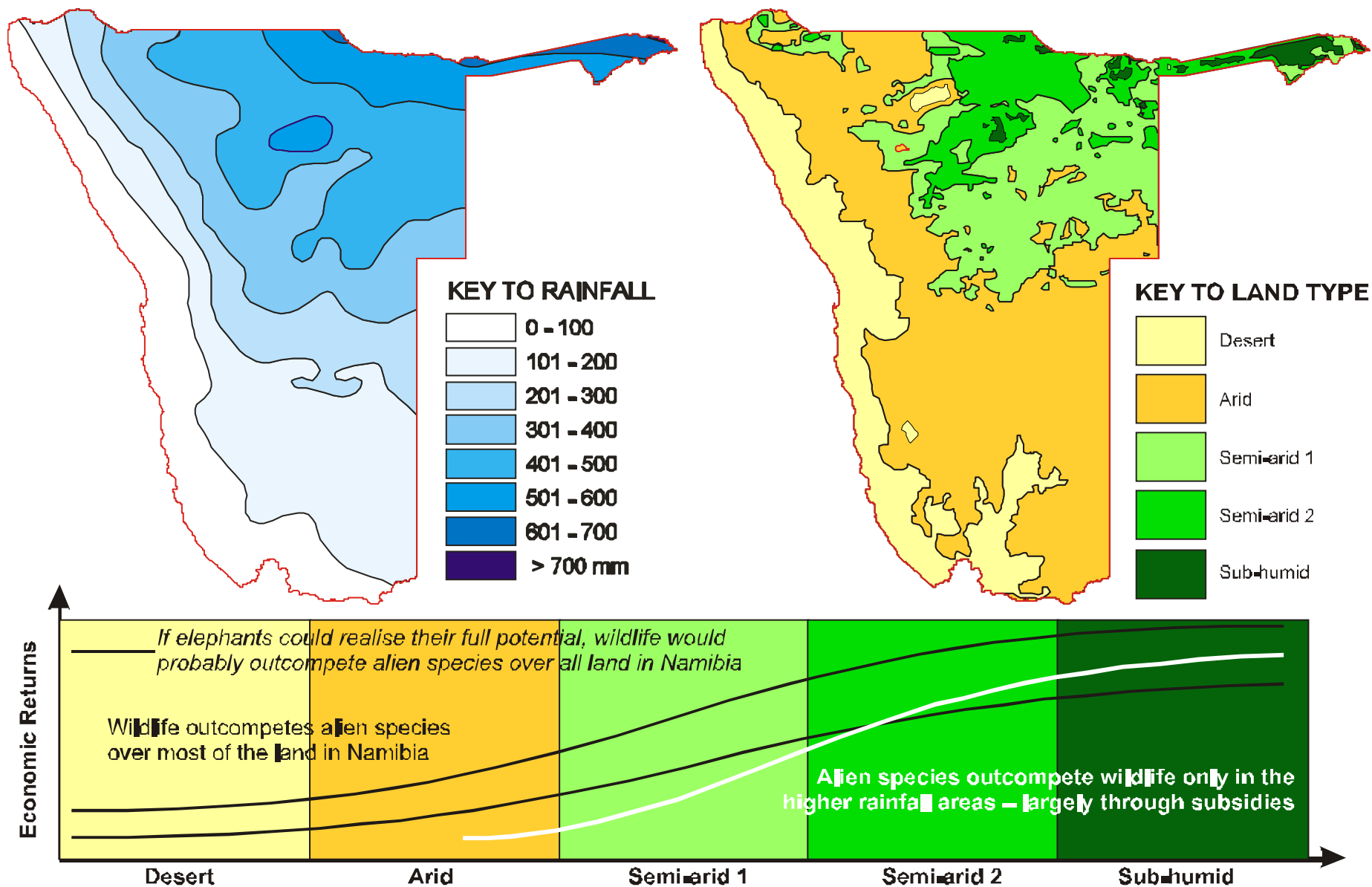
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Map 1: Elephant range in southern Africa
based on AfrESG (2002)

Legend:
- Known range
- Occasional or possible range
- Past range, present status unknown

Potential transfrontier elephant populations

Countries shown: ANGOLA, ZAMBIA, MALAWI, NAMIBIA, BOTSWANA, ZIMBABWE, MOZAMBIQUE, SOUTH AFRICA

Map 1: Elephant range in Namibia

KEY TO RAINFALL

- 0 – 100
- 101 – 200
- 201 – 300
- 301 – 400
- 401 – 500
- 501 – 600
- 601 – 700
- > 700 mm

KEY TO LAND TYPE

- Desert
- Arid
- Semi-arid 1
- Semi-arid 2
- Sub-humid

If elephants could realise their full potential, wildlife would probably outcompete alien species over all land in Namibia

Wildlife outcompetes alien species over most of the land in Namibia

Alien species outcompete wildlife only in the higher rainfall areas – largely through subsidies

Economic Returns

Desert | Arid | Semi-arid 1 | Semi-arid 2 | Sub-humid

Map 3: Land capability and economic returns from land use in Namibia

Map 4: The future range of elephants in Namibia ?

LEGEND

HUMAN POPULATION DENSITIES

Excluded from
future elephant range

>100/km²

>25/km²

State Protected Wildlife Areas

Communal Land Conservancies

Private land under wildlife

Other State Land

Concessions

Private Land

Communal Land

FUTURE
ELEPHANT
RANGE

Oshikango
Oshakati
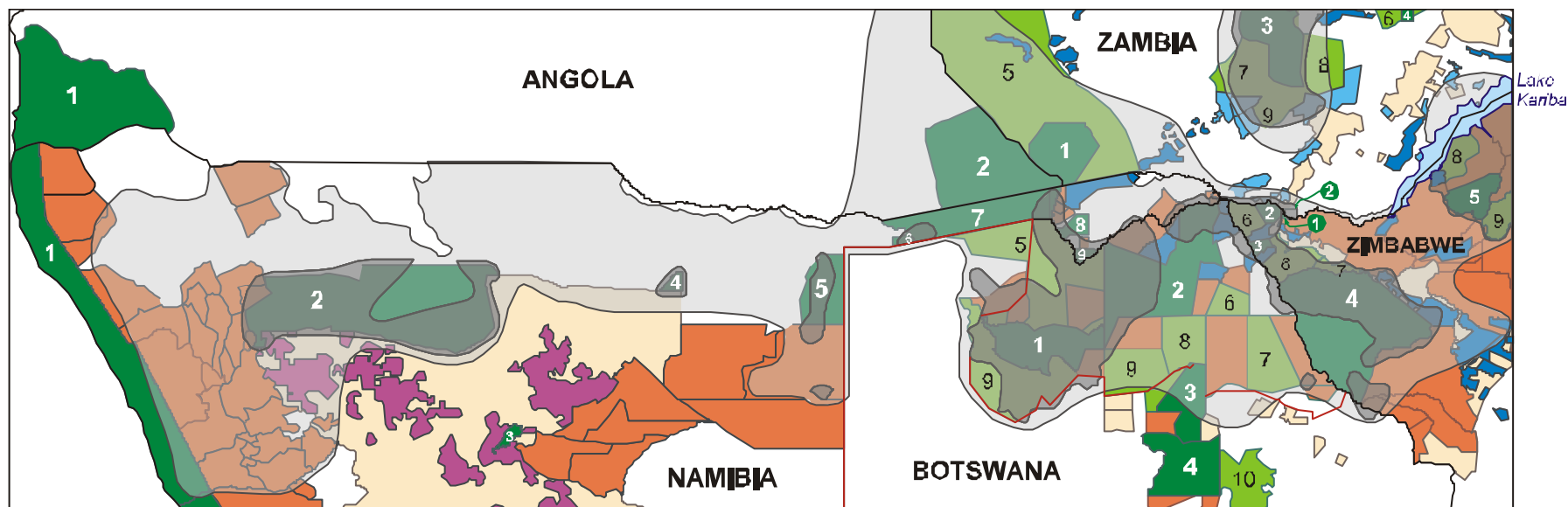Ondangwa
Runcu
Katima Mulilo

Tsumeb
Grootfontein

Otjiwarongo

Karibib

Okahandja
Gobabis

Swakopmund
WINDHOEK

Walvis Bay

Rehoboth

Cunene
Otjinjange
Engo
Munutum
Nadas
Seebomib
Khumib
Hoarusib
Hoanib
Hunkab
Khan-gaiseb
Uniab
Koigab
Huab
Ugab
Messum
Omaruru
Swakop
Kuiseb
Dorob

Kwando
Zambezi
Kavango
Chobe
Linyanti
Owambo
Omatako
Omuramba

LAND TENURE CATEGORIES

STATE PROTECTED WILDLIFE AREAS

ELEPHANT RANGE

	None	Total Range	High Density
Communal Land			
Private Land			
State Protected Wildlife Areas			
SAs (Zw), WMAs (Bw), GMAs (Za)			
CBNRM, Conservancies (Na)			
Private Land Conservancies (Na)			
Forest Reserves			
Local Forest Reserves (Zambia)			

ANGOLA
1 = Iona NP
2 = Luiana PR

NAMIBIA
National Parks
1 = Skeleton Coast NP
2 = Etosha NP
3 = Waterberg NP
4 = Mangetti GR
5 = Khaudum NP
6 = Mahango NP
7 = Caprivi GR
8 = Mudumu NP
9 = Mamili NP

BOTSWANA
National Parks
1 = Moremi GR
2 = Chobe NP
3 = Nxai Pan NP
4 = Makgadikgadi Pans

Wildlife Management Areas *with resident local communities*
5 = Kwando
6 = Nutiga
7 = Nata State Lands
8 = Ngami State Lands
9 = Okavango
10 = Boteti State Lands

ZIMBABWE
National Parks
1 = Victoria Falls NP
2 = Zambezi NP
3 = Kazuma Pan NP
4 = Hwange NP
5 = Chizarira NP
Safari Areas *(unsettled)*
6 = Matetsi
7 = Deka
8 = Chete
9 = Chirisa

ZAMBIA
National Parks
1 = Sioma Ngwezi NP
2 = Mosi-a-Tunya NP
3 = Kafue NP
4 = Lochinvar NP
GMAs *(ADMADE)*
5 = West Zambezi
6 = Kafue Flats
7 = Mulobezi
8 = Bill Springs
9 = Sichifula

National Boundaries

Veterinary Fence

Map 5: **The transboundary range of elephants in relation to the Namibian population**