ELEPHANTS IN SOUTHERN AFRICA: MANAGEMENT ISSUES AND OPTIONS

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EXECUTIVE SUMMARY

Elephant conservation in southern Africa has been remarkably successful over the last century. The region's elephant populations collapsed in the late 1880s through over-hunting, but their numbers have since increased more than 20-fold; from less than a few thousand to 250,000 – 300,000 today. The overall biomass of elephants in southern Africa is now higher than that of any other large mammal in the region. Human populations have also increased 20-fold over the last century resulting in a rapid expansion of human settlement and agriculture. Human and elephant population growth has led to compressed and fragmented elephant ranges, increasing human-elephant conflict and an escalating elephant overpopulation problem. Elephants are large generalist herbivores and the currently high elephant densities in protected areas may well be unprecedented in evolutionary and historical terms because the major predator of elephants, *Homo sapiens*, has been removed from these ecosystems.

This study, commissioned by the WWF Africa and Madagascar Programme, examined and reviewed management issues and options relating to the elephant overpopulation problem in southern Africa. The study covered six countries – Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. These countries were visited to obtain information on current numbers, distribution and trends in elephant populations, legal and policy frameworks governing the conservation and management of elephant, elephant management issues and problems, and the views of a wide range of stakeholders on elephant management issues and options.

Elephant numbers and trends

Botswana, with approximately 150,000 elephants, carries the largest elephant population in the world, followed by Zimbabwe with ~ 100,000 elephants. Half of the Zimbabwe elephant population lives in 22,000 km^2 in the north western region of the country, which is contiguous with Botswana. The combined population of about 250,000 elephant spills over into the Caprivi Strip in Namibia, into southwestern Zambia and southeastern Angola. This population is growing at about 5% per annum. The remaining four countries in the region each carry populations of between 15,000 and 20,000 elephants. These populations are also growing at rates of between 3% and 7% per annum. There is no clear evidence that population growth rates are declining. If current population growth rates are maintained, together with a hands-off approach to management, the population could increase to >500,000 elephant in southern Africa by 2020.

Both Zimbabwe and South Africa attempted to contain the eruption of elephant populations in protected areas from the mid-1960s through to the mid 1980s and South Africa continued culling until 1994. The Kruger National Park population was held below 8,000 elephant until 1995 when culling ceased – the population has since nearly doubled. In the mid-1980s Zimbabwe attempted to hold its elephant population at about 45,000 but culling effectively stopped in the late 1980s and the population has doubled since then. Although the Botswana 1991 elephant management plan stipulated that its elephant population would be held at 55,000 no action was taken and the number is now approaching 150,000. The Mozambican and Zambian populations both experienced heavy poaching during the 1970s and 1980s but are now beginning to recover. The main Namibian population in Etosha National Park and the northwest grew slowly, largely as a result of ongoing

mortality from anthrax. A recent influx of elephants from Botswana has, however, resulted in a rapid increase in elephants in the north east of the country and in the Caprivi Strip.

All of the countries in the region reported an increasing number of incidents of human-elephant conflict.

Management tools and options

Elephant management options can be divided into passive and active methods. **Passive methods** include (a) taking no action, (b) enlarging the range available to elephants, (c) fencing to contain or exclude elephants, (d) the use of repellents, and (e) manipulating water supplies. These methods are non-lethal and therefore favoured by many on ethical grounds. **Active methods** include (a) contraception, (b) translocation, (c) driving/disturbance, and (d) culling and cropping. The advantages and disadvantages of the various methods were examined. While attitudes and beliefs regarding the use of these alternative methods are polarized, most of the stakeholders consulted believed that active methods, including culling, would be required sooner or later to contain elephant population growth in their countries.

Passive methods: Taking **no action** is likely to result in the present southern African population exceeding 500,000 elephants by 2020[1]. An optimistic estimate of the area available for **range expansion** in the region indicates that this option might encompass a potential 392,000 km^2 and be able to accommodate up to about 75,000 elephant or 1/3rd of the expected increase over the next 12-15 years. Significant range expansion, if it is to occur, will have to include large areas of the communal lands of the region that are already settled by people. Elephant densities in excess of 0.2 elephant per km^2 are unlikely to be welcomed, let alone tolerated, in these Communal Lands. Such densities would in any event have to go hand in hand with realistic incentives to communal farmers to harbour elephants on their land. These benefits could be generated if farmers and rural communities were able to derive the full range of benefits from elephants, including, for example, trophy hunting and the sale of elephant products from animals harvested. Range expansion will thus require shifts in national, regional and international policy regarding the conservation and management of elephants outside of protected areas, as well policy changes relating to the sale of ivory and other elephant products. Such a strategy may also serve to assist in containing the ongoing elephant population eruption in the region (see below, under culling operations).

Fencing is used effectively to contain elephants within protected areas in South Africa and in some parts of Zimbabwe. Its use to exclude elephants from fields of crops or from particular areas in communal lands has been less successful, mainly because of the high maintenance costs involved.

Repellents, such as chilli peppers planted around fields and chilli-oil smeared on fencing have met with some success in reducing crop-raiding by elephants in some areas but do not provide a long-term solution to the problem of increasing elephant numbers.

Manipulating water supplies has only recently been used to manage elephant impacts on habitats in Kruger National Park where a large number of artificial water points have recently been closed. Clearly the technique can only be used where elephant distribution depends on artificial water supplies and where these can controlled.

[1] This estimate reflects a 5% per annum growth from the existing population of about 270,000 elephants. There is presently no evidence to suggest that growth rates of any populations in southern Africa are declining (Blanc et al, 2005) or that the upper asymptote to a logistic population growth model is likely to be realised soon.

Active methods: **Contraception** as a means of slowing elephant population growth is being developed in South Africa and two experimental immuno-contraception trials on small, enclosed, populations have been conducted. Some experiments are underway to investigate the possibility of sterilizing males. The results to date of immuno-contraception trials indicate that it is feasible, at least for small populations, and few side effects on elephant welfare and behaviour have been detected. Its main application is likely to be in containing population growth in the many small, largely unviable populations in South Africa. Its potential use in Kruger National Park and Addo Elephant National Park is still being debated. The method is expensive and is not seen as a useful approach by stakeholders elsewhere in the region; many of those consulted considered it "unnatural", if not morally wrong, to spend vast sums containing the productive growth of elephants that could be harvested to alleviate poverty.

Translocation of elephants into newly created protected areas has been successful in South Africa and Zimbabwe. Its use in alleviating overpopulation problems in large elephant populations would, however, be financially and logistically prohibitive, and areas that can accept large numbers of elephant no longer exist in the region. **Driving and disturbance** have been used in the region but their applicability is very limited.

Carefully targeted and professionally conducted **culling operations** are seen by a majority of those consulted as being the only viable option for effectively reducing elephant populations in the region. Many of those who opposed large scale government culling operations felt that cropping elephant to meet the needs of the rural poor was acceptable. The potential for containing a continuing elephant population eruption through peripheral harvesting and the creation of "source-sink" conditions in the region has not been seriously explored. Part of the strategy for managing elephant in Hwange National Park during the 1980s was to reduce the population to a level where a peripheral off-take of about 600 elephants per year in surrounding forest and communal lands could stabilize the population, and thus forestall further large-scale culling operations in the park.

Management capacity

The capacity to implement a wide range of elephant management options is high in South Africa but low elsewhere in the region. Operational budgets per unit area provide a reliable indicator of resource management capacity. In South Africa these are higher than US$1,400 per km^2, in Namibia they are approximately US $80 per km^2, while in Mozambique, Zambia and Zimbabwe they are US$10 or less per km^2. The discrepancies in trained manpower are equally great. In South Africa there are about 33 researchers per 10,000 km^2 of protected area but in the rest of the region it is about 3 per 10,000 km^2. Similar considerations apply to trained field staff engaged in protection of the resource.

National and regional policies

National policies and legal frameworks within the region all make provision for the conservation and sustainable use of elephant and for controlling the numbers of elephants where they may have adverse impacts on habitats and other components of biodiversity. The harvesting of elephants and sale of their products is also supported by local laws in all of countries visited. That elephants can be hunted and harvested to provide benefits to local communities is also fully supported by national and regional wildlife conservation and management policies. However, after the African elephant was listed on CITES Appendix I in 1989, decisions regarding elephant management in southern Africa were

strongly influenced by the international community; the resulting dearth of markets for ivory and hides greatly reduced funds available for elephant management particularly in Zimbabwe. This situation has not changed. A central issue is, "Whose value systems should prevail in decisions regarding the management of elephants in southern Africa?"

Human-Elephant conflict and the economic value of elephant

Conflict between humans and elephants were reported to be a major and escalating problem in all countries in southern Africa except South Africa where there are nevertheless problems on the boundary of Kruger National Park. Elephant and human populations have increased twenty-fold in southern African countries over the last century. In Zimbabwe, for example, the human population increased from c. 500,000 in 1900 to 12 million in 2000 while the elephant population increased from c. 4,000 to >90,000 during the same period. Most protected areas in the region are surrounded by traditional communal farming lands. The farmers are mostly subsistence farmers for whom cropping forms a vital component of household food security.

Elephants damage crops, water installations for livestock, and not infrequently kill people in rural areas. The problems are particularly acute on the boundaries of unfenced protected areas, which situation is common in southern Africa. Human-elephant conflicts also occur further afield where elephant live in traditional farming areas. In Botswana 60% of its large elephant population lives outside protected areas during the rainy season, the period of greatest threat to the fields of subsistence farmers. Some 80% of the potential elephant range in southern Africa is outside protected areas. In Zimbabwe nearly 10,000 elephants reside in Communal Lands. The root cause of the increasing conflict is exponential growth of both human and elephant populations. Moving people to make way for elephants is not an option. Attempts to mitigate crop and other damage caused by elephants have had a limited impact. Creating appropriate incentives and ways for rural subsistence farmers to live with elephants is an option that deserves to be more fully and realistically explored. More specifically there is, firstly, the need to devolve decision making about the conservation and management of elephants to those communities that live with elephants, and secondly, the there is need to increase the benefits derived from elephants (both live and dead) to local communities.

Elephants have the potential to generate major financial returns to communal farmers, to protected areas, and to other land under wildlife use, and by so doing to contribute to maintaining and extending wild areas in the region. Current estimates show that harvesting 5,000 elephant a year could generate US$ 40 million, a sum sufficient to finance the protected areas in the region at more than $200 per km^2. At present, protected areas in Mozambique, Zambia and Zimbabwe are operating on a fraction of this sum and at about $10 per km^2. The returns to communal farmers are potentially much higher than those from subsistence cropping and could create incentives to sustainably manage elephants on their land.

The current *laissez faire* approach to managing elephant overpopulations in the region has enormous opportunity costs that require full and critical scrutiny and analysis.

Elephant impacts on biodiversity

Elephants can and do greatly modify woodlands and habitat structure. However, the nature of the impact of increasing elephant densities on biodiversity remains a matter of controversy both

academically and amongst other stakeholders. The central question of trophic cascades following the removal of a top predator (i.e. humans) has not been given adequate attention in current research on elephant-ecosystem dynamics in protected areas. Recent archaeological evidence on the role of hominids in proboscidean extinctions indicates that in evolutionary and historical terms hominids have been a keystone predator of elephants and so will have shaped elephant habitat interactions.

The decision to conserve biodiversity is, in the first instance, a value judgment on the part of individuals and society. Confusion and controversy arise when the elements of biodiversity that are to be conserved are not precisely defined. This is an area that requires careful attention by conservation agencies in the framing of policy guidelines, management plans and the manner in which science is used to guide their decisions.

Solutions and priorities

The stated objectives of southern African conservation agencies are to conserve biodiversity and to ensure the sustainable use of natural resources for the benefit of present and future generations of their people. The major elephant conservation and management problems and issues identified and discussed in this report are, in essence, the following:

1. Elephant populations in southern Africa are growing exponentially and running out of space. (Too many elephants)
2. Elephants are spilling over into farming areas and eating people's crops, as well as killing several people each year. (Human-elephant conflict)
3. Because their ability to disperse is constrained, elephants are changing habitats within protected areas, but there is little agreement on whether such changes are "natural" or "unnatural," or good or bad for conservation or biodiversity in general. (Scientific controversy)
4. The world is divided into those who disapprove of killing elephant or interfering in what they consider to be natural processes and those who do not. (Differing value systems)

The elephant management issue is not a simple single-species conservation issue – it is embedded in a complex social-ecological system with important cross-scale effects and drivers. The ethical and value systems of major players with an interest in elephant conservation emerge as the overriding driver of resource management decisions and these are operating at an inter-continental scale. For this reason the overriding priority is to establish what the peoples of southern Africa think about the conservation and consumptive use of elephants.

> **Our first and major recommendation is to commission a professionally conducted opinion survey of values and attitudes of a full range of southern African ethnic groups and socio-economic classes to elephant conservation, sustainable use, and related issues.**

Once that information becomes available, southern African and other decision makers will have a firmer basis on which to consider the alternative options for managing the current overpopulation problem. They should then also be well placed to answer the following two central questions:

- Should rural communities and land owners in Africa have the right to use elephants and their products sustainably to better their lives and in so doing maintain wild land in the face of pressures from expanding agriculture or other land uses?

- Should national parks and protected area agencies have the right to maximize economic returns from elephants if such an approach helps to better conserve a full range of biodiversity within the protected areas for which they are responsible?

Our second major recommendation also concerns information that is required for informed policy and resource management decisions, namely, to conduct a thorough financial and economic analysis of:

- **Alternative management options,**
- **The opportunity costs to local communities, to protected areas, and to countries in southern Africa of alternative management options, and,**
- **The incentives and related policy changes that would be required to encourage communal farmers to carry elephants on their land.**

More directly, at national and local levels, the following are further important priorities for action and donor support:

- The gathering of sound data on numbers, distribution, conflict, impacts, etc., of elephants – lack of such information remains a major problem, even in South Africa.
- Some critical areas of research (e.g. historical numbers of elephants, impacts on biodiversity and the setting of acceptable limits to change) need to be fast tracked and receive appropriate support.
- Support for improved controls over ivory stocks and internal trade in ivory.
- Support for further implementation of elephant-human conflict mitigation strategies.
- Support for in-service training of mid-level managers (particularly on issues related to elephant management and control of ivory trade).
- Support for CBNRM particularly on institutional and governance issues so that conservation success can be maintained.
- Support for TFCA development and the establishment of corridors for elephant movement.
- Further investigation of methods of elephant birth control and their effects on social behaviour, and their use in managing smaller populations.

Concluding comment

A key finding of this study is that much better information is needed on the values and opinions of those conserving, managing and living with elephants, as well as on the social, economic, landuse and policy related dimensions of the elephant problem, to enable informed, equitable and sustainable decisions to be reached. The scientific debate about elephant impacts on biodiversity, currently a major preoccupation, is likely to continue indefinitely.

TABLE OF CONTENTS

ACRONYMS:

CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community based natural resource management
CBO	Community Based Organisation
CBD	Convention on Biodiversity
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DNAC	National Directorate of Protected Areas
DNFFB	National Directorate of Forestry and Wildlife
DWNP	Department of Wildlife and National Parks (Botswana)
FMD	Foot and mouth disease
GLTP	Great Limpopo National Park
GMA	Game Management Area
GOB	Government of Botswana
GOM	Government of Mozambique
IFAW	International Fund for Animal Welfare
KAZA	Kavango-Zambezi Transfrontier Conservation Area
KNP	Kruger National Park
LIRDP	Luangwa Rural Development Project
LNP	Limpopo National Park
MARD	Ministry of Agriculture and Rural Development (Mz)
MET	Ministry of Environment and Tourism
NAPHA	Namibia Professional Hunters Association
NGO	Non-Governmental Organisation
NP	National Park
NPWLMA	National Parks and Wildlife Management Authority (Zw)
SADC	Southern Africa Development Community
TASA	Tourism and Safari Operators Association
TFCA	Transfrontier Conservation Area
WESSA	The Wildlife and Environmental Society of South Africa
WWF	World Wide Fund for Nature
WWF-SARPO	WWF-Southern Africa Regional Programme Office
ZAWA	Zambia Wildlife Authority

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1. INTRODUCTION

Elephant conservation in four countries in southern Africa has been particularly successful, with populations recovering from a few thousand south of the Zambezi River in 1900 to more than 250,000 in 2005. Four countries, Botswana, Namibia, South Africa and Zimbabwe, did not experience the wave of elephant poaching that swept through East and Central Africa during the 1970s and 1980s. Angola, Malawi, Mozambique and Zambia were less fortunate. Their populations collapsed but over the last decade have begun to recover. The increasing elephant populations of southern Africa have shown little sign of stabilizing and south of the Zambezi they continue to grow at about 5% per annum as they have done over the last century. Their known range currently extends over an area of about 570,000 km^2 or about 9.5% of southern Africa (i.e. excluding the areas of "guessed" and "un-assessed possible range" of Blanc et al 2003. See also Fig. 1.1).

As elephant populations have grown so have human populations and the land under cultivation in the sub-region has similarly increased. The compression of increasing numbers of elephants into limited ranges has resulted in increasing pressure on habitats within protected areas and increasing conflicts with neighbouring peasant farmers. The resulting "elephant over-population problem" and potential options for managing it form the subject of this report.

We first outline the historical background to human-elephant interactions in the sub-region and present country reports for Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. We then provide a sub-regional overview of the present context for elephant management, before examining management tools and potential options to resolve the growing dilemma facing conservationists, the public, peasant farmers and wildlife management authorities in southern Africa.

2. HUMANS AND ELEPHANTS IN SOUTHERN AFRICA.

Hominids and elephants share a long evolutionary history in Africa. This was not the case in North America when Stone Age man invaded the New World ~ 11,000 years ago and rapidly hunted mammoths to extinction. A cascade of mammalian extinctions followed (Robinson et al 2005). In Africa, modern hominids (in the form of *Homo afarensis*) appeared on the scene about 1.8 million years ago as did the savanna elephant *Loxodonta africana*. The later appearance of *Homo sapiens* coincided with the extinction of other proboscidean species in Africa. Understanding the evolutionary linkages between humans, elephants and their habitats in southern Africa is necessary because both species are 'environmental engineers' and can have enormous impacts on their habitats. Placing their potential impacts in an evolutionary context is relevant to the present debate on managing elephants and their impacts on biodiversity and ecosystem processes in protected areas. It is also important because present-day human-elephant-habitat interactions almost certainly differ from those that existed when human populations were a fraction of their current levels and elephant range was not restricted.

Although we know little about early human-elephant-habitat interactions, two features are clear – firstly, once humans learned to use fire they possessed the means to manage landscapes in a way that no other animal was previously able to do. Secondly, hominids were also superb predators and once they developed stone tools and the use of spears and arrows, elephants would have featured among their prey, and the use of poison tipped arrows and spears will have added to their effectiveness

(Parker 2004). But the key question is: Did human predation contribute to limiting elephant numbers in African savannas? Surovell et al (2005), examined the distribution of archaeological sites that contain clear evidence of hominids killing proboscideans or scavenging their carcasses, and concluded that *Homo,* rather than climate change, was responsible for elephant and mammoth extinctions in Africa and Europe during the Pleistocene. The removal of top predators from ecosystems is known to have cascading impacts on biodiversity (Schmitz et al 2000). The potential for cascading losses of biodiversity in ecosystems where a large generalist herbivore, such as the elephant, is completely protected (i.e. has no predator) requires serious investigation – particularly since studies of elephant-environment interactions have so far ignored disease and predation.

Fig. 1.1 Map of southern Africa showing the overall distribution of elephant including Blanc et al's (2003) categories of "un-assessed possible range" and "other guesses". (Source R. B. Martin 2005, based on Blanc et al 2003)

In the more recent past it is clear from cave paintings that the San were hunting elephants a few thousand years ago. Archaeological and historical research reveals that ivory was traded for centuries from the east African coast. During the period 1546 to 1881 AD, annual exports from Isle de Moćambique (south of present day Nacala) amounted to *c*. 135 tonnes (Alpers 1975), suggesting a

sustainable harvest from a catchment of unknown size in south-eastern Africa. Worked ivory from archaeological sites in the Limpopo basin, particularly from Mapungubwe, reveal that ivory was being traded in this region a thousand years ago (Campbell 1990, Plug 2000). However, we have no good information on the size or density of elephant populations in southern Africa a thousand or even five hundred years ago. We do know, however, that elephant numbers and the centuries-old ivory trade in southern Africa had collapsed by 1890 due to over-hunting.

A century of successful elephant conservation

By 1900 there were less than c. 6,000 elephants south of the Zambezi River and it was feared that they would become extinct in southern Africa. In South Africa in 1900 there were a few elephants in the Tsitsikama Forest, about 150 in the Addo area near Port Elizabeth, some in Zululand in the Tembe area and none in Kruger National Park. The numbers in Botswana were probably less than a few hundred and similarly low numbers were left in the southern half of Mozambique and in Namibia. The number of elephants in Zimbabwe was almost certainly below 4,000 in 1900 (Cumming 1991). Today the number of elephant in southern Africa south of the Kunene-Zambezi Rivers exceeds 250,000 with the highest numbers occurring in Botswana (>125,000) and Zimbabwe (>100,000). The Zimbabwe population has grown to its present size despite a known mortality from hunting and culling of at least 60,000 animals during that period. In South Africa the re-entry of elephants to Kruger National Park and their subsequent dispersal through the park has been well documented. The population grew from initial estimates of 10 in 1905 and 25 in 1908 to 6,586 in 1967 and dispersed at a rate of 5-7 km a year to reach the northern area of Kruger by 1945. From 1967 to 1994 elephants were culled to keep the population below ~ 8000. By 2004 the population had grown to 12,000. The Addo elephant population grew from a nucleus of 11 animals in 1931 to 324 in 2000 (Whitehouse 2002). **By any reckoning the recovery of elephants in southern Africa over the last century represents an outstanding conservation success**.

What set of factors permitted the extraordinary recovery of elephant populations in the region? An essential precursor was the high level of protection afforded to the species by colonial governments across the region. In Zimbabwe during the 1920s, for example, the killing of a crop-raiding elephant required the permission of the Governor of the colony. Protection was further supported by an agreed Africa-wide ban introduced in 1906 on the export of tusks of cows and calves. Other contributing factors were a high reproductive rate and low calf mortality that resulted in population growth rates of about 5% per annum, with a doubling time of approximately 12-15 years. By the mid-1960s, elephant impacts on woodlands in several parks in Zimbabwe and in the Kruger National Park prompted park managers to start limiting population growth by culling herds of elephants[1]. The ongoing sale of ivory and hides covered the costs of the culling operations. In Zimbabwe the meat was recovered and made available to neighbouring communities. Animals recovered from control operations in the Communal Lands also provided a return to local communities.

Elsewhere in Africa elephants did not fare so well. By the mid-1980s the annual weight of ivory leaving the continent had risen to ~ 850 tons a year – the same level it had reached in 1880 before the ivory trade collapsed. The dramatic decline of elephants in East and Central Africa during the 1970s and early 1980s as a result of illegal hunting and uncontrolled export of ivory resulted in elephants

[1] Interestingly, in the case of Zimbabwe, it was a letter from a senior WWF official, following a visit to Hwange National Park in 1965 where he was alarmed at the level of elephant damage, to the Minister of Lands and Natural Resources, that prompted the start of culling in that country.

being listed on Appendix I in 1989 by the Convention on International Trade in Endangered Species (CITES). The listing effectively banned all international trade in elephants and elephant products and was to have major implications for the management of southern Africa's still well protected and burgeoning elephant populations. Despite policies and plans to curb the growth of elephant populations the two countries with the largest numbers of elephant, Botswana and Zimbabwe, did not follow through with their plans following the ivory ban. Botswana did not carry out its planned population reductions and Zimbabwe carried out a single small culling operation in 1991. South Africa stopped culling elephants in Kruger National Park in1994 but this was not a direct response to the ivory trade ban. Sport hunting of elephants was permitted under the CITES controls. Following the return of southern African elephant to Appendix II in 1997, ivory stockpiles have been sold in controlled 'one-off' auctions, but the value of elephant products has remained low and returns to wildlife agencies and rural communities from elephants have, as a result, been well below their potential. The combined result of elephant population growth, their presence in subsistence farming areas, and low returns from their products has exacerbated human-elephant conflicts in the sub-region.

At current rates of population growth elephant populations in the sub-region are likely to double in the next 12-15 years. A key question is whether the region should continue to pursue the *laissez faire* approach to elephant management that has existed for the last ten to 15 years, or whether it should actively manage elephant population numbers and distribution. Given that increasing human populations in the region are contributing to increasing deforestation and an expansion of land under mostly subsistence agriculture, the issue of the role of protected areas as refugia for the region's biodiversity assumes increasing importance. The twin processes of the expansion of human impacts outside protected areas and increasing elephant impacts within protected areas raises the all-important, but still contentious, issue of the extent to which increasing elephant numbers may adversely affect biodiversity of protected areas and hence their capacity to act as long-term refugia for biodiversity.

3. COUNTRY REPORTS

3.1 Introduction

This study was confined to six countries in southern Africa (Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe). Tanzania, from the perspective of elephant conservation is more closely linked with East Africa. Angola has very few elephants at present, as is the case in Swaziland. The information we sought to gather from each country (in the four days allotted per country to this component of the study) was as follows:

1) Number of elephant and their distribution (in and outside protected areas)
2) Trends in elephant population numbers and distribution - long term data if available.
3) Official projections of elephant numbers and resulting management plans / actions.
4) Is there a national elephant management plan/policy? Dates and main thrust of this.
5) For the following organisations or groups: What are the perceived elephant problems, if any? What management solutions are proposed? What views are held on alternative management options?
    a) Government – Department, Ministry, Parks Board
    b) Conservation NGOs
    c) Any local animal welfare/animal rights NGOs (e.g. SPCA)
    d) International animal welfare/animal rights NGOs with offices in the country
    e) Local government in districts with elephants
    f) Traditional Leaders
    g) Local communities and their representatives
    h) Tour operators and guides (Non-consumptive and consumptive – safari groups)
    i) Trade - ivory carvers, skin merchants
6) Opinions of the above groups on political/public reactions to the following elephant population management options:
    a) No control – let elephant populations continue to expand
    b) Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)
    c) Contraception to curb populations growth
    d) Translocation to new protected areas or areas of low population density
    e) Translocation to private land where they may later be hunted or culled (used sustainably)
7) What is the legal/policy framework within which elephant management can or does occur (e.g. laws governing the management of national parks and the extent to which conservation of woodlands or of selected aspects of biodiversity mandate or require government to take action where elephant impacts may conflict with broader conservation goals)?
8) Any pertinent recent reports or literature

3.2 BOTSWANA

"Botswana definitely has an elephant problem. It wants plenty of elephants to attract tourists but it must protect its farmers against the ever increasing pressure of elephant numbers. This is a complex issue…" (Quote from an article in the In-flight Magazine of Air Botswana, Peolwane, April 2005).

3.2.1 Number and Distribution of Elephant[1]

Botswana has the largest national elephant population in the world. These animals form part of a continuous population that stretches from Namibia through to Zimbabwe. Elephants are found in northern Botswana from the Makgadikgadi National Park northwards to the border with Namibia, and from the Zimbabwe border westwards to the Okavango Delta. There is a population of ~1,400 in the Tuli Block (Mashatu) in the east (J. Sellier, *pers. comm*.) The latest estimates of numbers by the Department of Wildlife and National Parks are summarised in Table 3.2.1.

It is thought that elephants were found in most of Botswana in the past and there may have been as many as 200,000 to 400,000 animals[2] at the end of the 18th Century (Campbell 1990). Their range shrank as the country became drier and uncontrolled commercial hunting for ivory reduced them to a remnant population restricted to the north of the country. In 1893 measures were put in place to control the hunting and the elephant population began to increase. The total number of elephants has doubled in size since 1987 (see Fig. 3.2.1), the number in the Okavango Delta has increased by a factor of three since 1987, while other species have remained more or less stable. The range has expanded south and west since the mid 1980s (Fig. 3.2.2a and b). In response to water availability the elephant range changes seasonally from about 85,000 km^2 in the wet season to about 63,000 km^2 in the dry season. Densities of elephants can reach over 10 per km^2 (for example along the Chobe River) during the dry season. Most of the elephant range is outside protected areas. Only about 23% of the total elephant population is found within national parks, reserves and forest areas in the wet season, increasing to about 32% in the dry season.

Table 3.2.1 Dry season elephant estimates for 2004 (source DWNP)

REGION	ESTIMATED NUMBER	RANGE	% of Total POPULATION	DENSITY/ km^2
Chobe NP	32,263	24,139 – 40,387	21.4	3.2
Moremi Game Reserve	9,143	4,026 – 14,261	6.1	2.4
Makgadikgadi –Nxai NP	810	25 – 1,932	0.5	0.1
CKGR	-	-	-	-
Khutse	-	-	-	-
Kalahari Transfrontier Park	-	-	-	-
Mashatu *	4,389	423 – 8,507	2.9	1.9
Zimbabwe border	14,330	7,417 – 21,243	9.5	1.5
Delta	27,917	20,328 – 35,506	18.5	1.6
Remaining areas of range	61,148	?	40.5	-
Total (including other areas)	151,000	130,995 – 171,004	100.0	0.32

* This estimate may too high – it is more likely to be approximately 1,400 elephants (J. Selier, *pers. comm.* 2005)

[1] This text is drawn mainly from DG Ecological Consulting (undated) with some more recent data added.
[2] There are good reasons to doubt that the populations were as high as these figures suggest.

Elephants move between northern Botswana and the Hwange National Park and neighbouring safari areas, into the Caprivi Region of Namibia and into Zambia. There is some movement between the Tuli Block in eastern Botswana, the game farms across the Limpopo River in South Africa and the Tuli Circle in Zimbabwe. For example, an elephant collared by Conservation International in Botswana near the Caprivi border moved through Caprivi and into southern Angola, and others collared near the Zimbabwe border moved into Hwange (Chase and Griffin 2005).

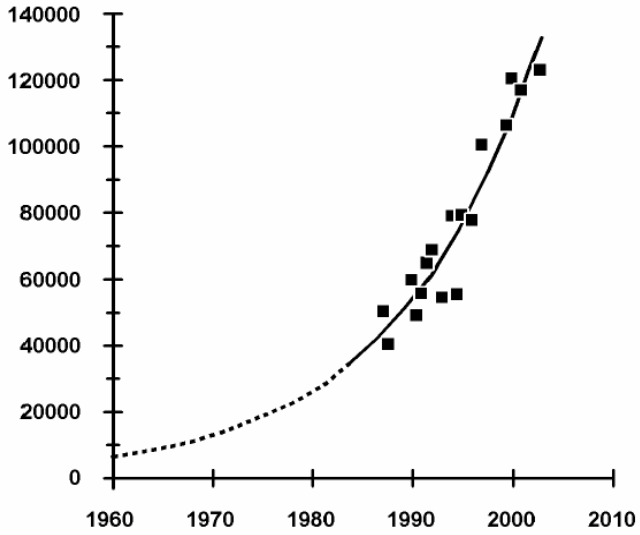
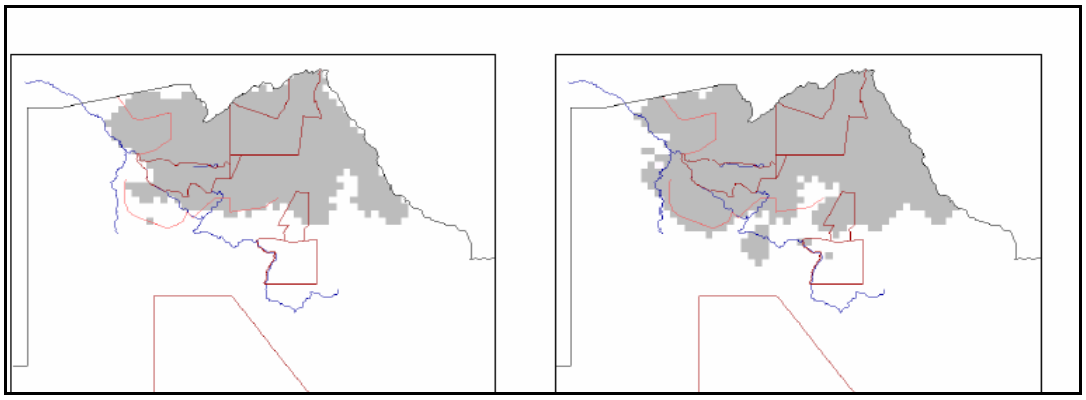


Fig. 3.2.1. **Trend in elephant populations in northern Bostwana from 1960 to 2004** (DWNP) survey data, Source: DG Consulting). The growth rate has been c. 5% per annum.



(a) (b)

Fig. 3.2.2 Distribution of elephants; (a) Before 1992, (b) After 1994

Illegal hunting of elephants is low and does not have an impact on population growth. **Table 3.2.2** provides data on incidents of illegal activity since 2000.

Table 3.2.2 Illegal hunting activities involving elephants (source: DG Consulting)

Illegal Activity	Number of cases
Illegal possession of ivory (55 tusks) 2000-2002	25
Illegally hunted elephants 2001	42
Illegally hunted elephants 2002	8

3.2.2 Policy and legal framework

The conservation of elephants and other wildlife is provided for in the Wildlife Conservation and National Parks Act (No. 28 of 1992). In terms of the Act, the elephant is classified as a "partially protected animal". This means that it is illegal to capture or hunt elephant outside national parks or game reserves without a permit issued by the Department of Wildlife & National Parks, or outside the set quota. Anyone caught hunting or capturing an elephant without a license is liable to a fine of P50,000 (approx. US$12 500) and to imprisonment for 10 years. However, an elephant that has damaged property or is threatening to damage property can be killed legally, but the incident has to be reported within seven days and the meat, tusks and other products become the property of the Government. Elephant are also specified as "dangerous animals" in the Act. It is not an offence to kill a dangerous animal in a national park or elsewhere in defense of human life or to prevent injury to a human.

Ivory is collected from all dead elephants and stored. At present there is a stockpile of 43.7 tonnes which has come from poached animals (18%), problem animal control (34%) or found ivory (49%). Botswana supports sustainable utilization of its wildlife including elephants and believes that the full potential of the resource should be utilized.

In 1991 DWNP developed a draft management plan for elephants and considered that no more than the 55,000 elephant estimated at the time could be sustained without habitat degradation. The elephant management plan of 1991 included the following objectives (DG Ecological Consulting undated):

- Manage elephants on a sustainable multiple use basis in accordance with the1986 Wildlife Conservation Policy and the 1990 Tourism Policy
- Maintain elephant populations at their 1990 level by removing annual increment
- Maintain elephant-occupied woodland in an acceptable state subject to climatic influence
- Reduce elephant populations if research and monitoring indicate unacceptable changes to elephant habitat
- Maintain biodiversity and essential life support systems in national parks and game reserves
- Reduce conflict between elephants and humans
- Support and undertake elephant population and elephant habitat research and monitoring programmes
- Seek amendment to then 1989 CITES resolution such that Botswana's elephants will revert to Appendix II.

DG Ecological Consulting (undated) suggests there was some success in achieving these objectives. Progress was made in sustainable multiple use management with the reintroduction of safari and citizen hunting, with low annual quotas; in 1997 Botswana and other southern African countries were

successful in their bid at the 10th CITES Conference of the Parties to have their elephants down-listed to Appendix II and some of the stockpiled ivory has been sold on a "one-off" auction. Habitat research and monitoring has been carried out and continued elephant population monitoring has successfully demonstrated the increase in populations. However elephant populations have not been kept at their 1990 level and woodlands within the elephant range were not maintained in an acceptable state (defined as the 1990 state). It is not possible to state whether biodiversity and essential life support systems have been maintained, because a baseline for this was not established. Conflict between elephants and humans continues at an unacceptable rate. The result is that elephant numbers have now reached a level at which reduction to the 1990 level would require extremely large numbers to be removed each year. For example, if 10,000 elephants could be removed each year it would take about 12 years to reduce the population to 60,000 from the 2002 level of around 120,000 (DG Ecological Consulting, undated).

The reasons for the non-achievement of some of the objectives of the management plan include a lack of in-house skills for implementing some of the activities required (e.g. culling), insufficient numbers of staff to carry out all the necessary monitoring and a lack of continuity because of staff turnover. With each delay in the implementation of the plan, population stabilisation became a larger and increasingly difficult objective to meet (DG Ecological Consulting undated).

The government has recently carried out a review of the 1991 management plan and has drafted a national policy for the conservation and management of elephants in Botswana (Government of Botswana undated)[1]. According to the policy the overall goal for elephant conservation and management in Botswana is to:

> "Conserve and optimise elephant populations while ensuring the maintenance of habitats and biodiversity, promoting the contribution of elephants to national development, and to the communities within their range, while at the same time minimising their negative impacts on rural livelihoods."

The following are the guiding principles to be applied in managing Botswana's elephants;

- Management shall be precautionary. If there is a possibility of a problem arising, and even though the system may be poorly understood, it is better to carry out a management activity than risk the consequences of a worsening problem.
- In selecting management options, the one that presents the least risk (minimum regret) will be selected.
- Management activities shall be process-based and adaptive, designed so that they can be continually adjusted in response to the results of previous activities.
- Only feasible, practical, economic and aesthetically acceptable management options shall be adopted.

Four primary objectives have been identified in the draft policy for managing elephants in Botswana:

1. Reduce human-elephant conflicts to acceptable levels;
2. Prevent, reduce or reverse unacceptable elephant-induced environmental changes;
3. Maximise the benefits from sustainable utilisation of elephants;

[1]/. The policy remains a draft and all references to it should acknowledge that it has not yet been ratified by the Botswana Government.

4. Protect elephants through law enforcement.

In addition to the four primary objectives, other supporting objectives include: (a) meeting international obligations on elephant conservation; (b) monitoring and management; improving public awareness of the management needs; and (c) research and monitoring to enable the Department of Wildlife and National Parks to manage elephants effectively. The draft national policy acknowledges that issues and options for elephant management are different for different areas in the country. Therefore different management strategies are required for different areas. Strategies recommended for different areas in Botswana are shown in **Fig. 3.2.3**

Elephants in the citizen hunting area in central district will be removed to create an "elephant free zone". In community leasehold areas the aim will be to maximize benefits. This will be achieved through a combination of safari hunting and non-consumptive tourism. In agricultural and in communal leasehold areas where human-elephant conflict is high, multiple protective measures will be put in place. In areas where elephant vegetation impacts reach unacceptable levels, the draft policy states that elephant population removal might become necessary. In Protected Areas, the emphasis will be on optimising tourism with elephants as a major attraction.

In international border areas, the approach will be to allow free movement of elephants back and forth as shared resources. The possible movement into Angola and Zambia through the Caprivi Strip will be investigated and confirmed. Where Transfrontier Conservation Areas (TFCAs) are established, Botswana will encourage the harmonisation of elephant conservation strategies by participating countries.

3.2.3 *Key issues and perceived elephant management problems*

A number of key issues and problems regarding elephant management in Botswana were identified by stakeholders interviewed (see section 3.2.7) and/or appear in the literature. As can be seen from the quote at the start of this report, the 'elephant issue' has become a national talking point which is discussed in articles aimed at the general public, and the issue is not confined to debates between wildlife managers and researchers.

Elephants and biodiversity conservation

The draft national policy for the conservation and management of elephants in Botswana takes the view that management of elephants is necessary because of the impacts of habitat modification (Government of Botswana, undated). According to the draft policy, studies since the 1960s have shown that elephants in Botswana have been and continue to be responsible for habitat modification. Elephants appear to have been responsible for, among other things, the decline in *Acacia* species in the Chobe River fringing forest. The draft policy states that all studies conducted in Botswana suggest that elephant have been responsible for causing changes in woodland composition and structure. Changes in woodland structure and composition can result in reduced species diversity or reduce the abundance of some species, or both. For example, the decline in bushbuck population over the past 20 years has been attributed to elephant impacts on their habitat. The draft policy document also notes that some studies have shown that elephant woodland destruction can lead to an increase in the abundance of gallinaceous fowls and other ungulates.

DG Ecological Consulting (undated) refers to research that shows that fire has also been important in the modification of some habitats. Elephants are said to play a synergistic role in worsening fire

damage, because debarked trees are more susceptible to fire damage and the opening out of tree canopies increases the amount of fuel at ground level.

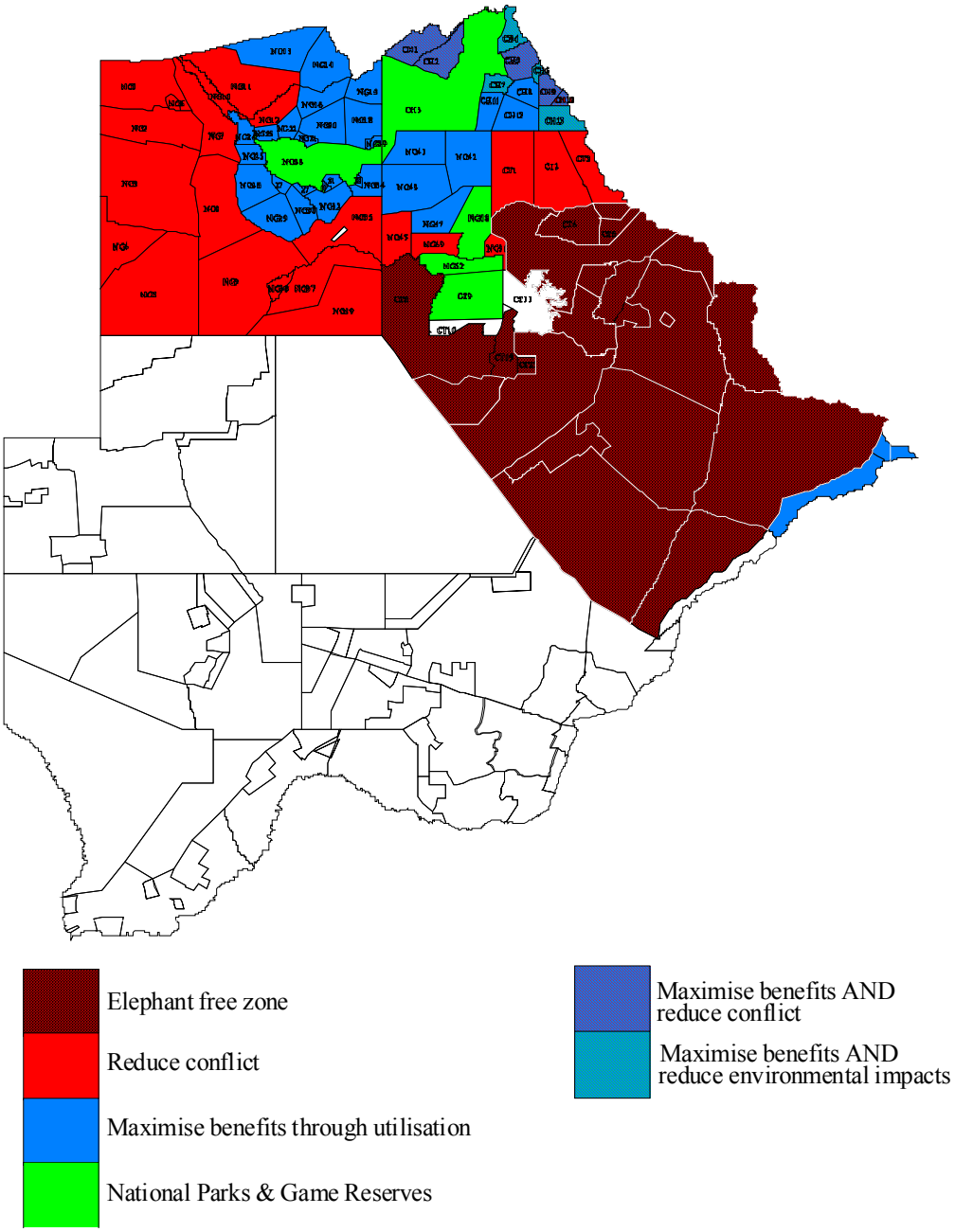


Figure 3.2.3. Elephant management strategies for different areas of Botswana (source: DWNP)

DG Ecological Consulting (undated) also points out that elephant-induced vegetation changes have usually been regarded as something to prevent or reverse, if possible, but not all researchers subscribe to this view. Skarpe et al (2004) have suggested that mopane woodlands in Botswana could support many more elephants than at present, but only by assuming that most of the woodland's productivity would be available to elephants and that the conversion of woodland to shrubland was not a concern. Others claim that the changes to riverine woodlands that have occurred are irreversible and remedial management would therefore be futile. M. Van der Walle (*pers. comm.*) suggests that there is

insufficient data to conclude that elephants are having a direct negative effect on biodiversity. He suggests that climatic and hydrological factors, as well as human activities such as logging in the past, along with fire, might contribute to the change in vegetation along the Chobe River. The loss of trees is opening up the environment and creating a more diverse habitat, which could be increase for biodiversity. He believes the key is to maintain the seasonal movement of elephants which will maintain a mosaic of habitats and that the wildlife areas (protected areas and surrounding wildlife management areas) are large enough in Botswana for this to be achieved.

Others point out that the issue is determined to a large extent by what management objectives are set for a particular area and ask whether the changes taking place along the Linyanti and Chobe River fronts is/are aesthetically desirable (D. Gibson, *pers. comm.*). The question boils down to whether a national park such as Chobe should be managed to favour one or two species or whether broader management objectives should be pursued. In this regard, Dr Cyril Taolo, Acting Assistant Director for Research in DWNP suggests that "Limits of Acceptable Change" need to be set for the vegetation in protected areas in order to guide management decisions. Further, surrounding human habitation and land uses such as crop farming within Botswana and in neighbouring countries do place limitations on the extent to which elephant range can continue to expand.

> "….. Ultimately it might be expected that affected habitats will become less able to support the elephants themselves - as numbers continue to increase without any apparent moderation of rate while habitats are deteriorating simultaneously - and there is a very real danger of a sudden population crash, as happened in the Tsavo ecosystem in Kenya. A mass die-off would have very serious aesthetic, ecological and economic consequences…" (DG Ecological Consulting undated: 7).

Human/elephant conflict

All those interviewed in Botswana agree that conflict between elephants and humans is a problem that needs to be addressed. DG Consulting (undated) found that conflicts between elephants and people were increasing as both human and elephant populations increase and expand. Crop raiding was the major cause of problems but elephants also damage fences and water supplies. People also complain that elephants destroy shade and fruit trees (Ptlagano, *pers. comm*.). Between Kasane and Kazangula along the Chobe and Zambezi River fronts, there is increasing settlement which bars access for elephants to the river and leads to conflict with local residents. Generally there are low human populations in the areas of highest elephant density but, where there is overlap, elephants can have high impacts. DWNP data shows the cost of damage at around US$12,500 a year. This amount represents cases reported to the department which are assessed for government compensation. Most reported incidents come from central district where elephant numbers are low and a few hundred people account for most of the incident reports. The data shows that 136 people, each with two or more separate reports, account for more than 45% of all reports over the past five years. However, not all incidents are reported and the DWNP data does not necessarily represent the full picture of damage being caused by elephants (Ptlagano, *pers. comm.*).

A survey carried out in a sample of affected villages showed that communities had a general perception that there were too many elephants and that the number should be reduced (DG Ecological Consulting undated). People felt that killing a significant amount of animals by shooting would be the most effective way to reduce numbers, provided it was done in a controlled and humane way. Two communities felt that killing was less acceptable because it might affect tourism negatively. There

appeared to be an appreciation of the need for management independent of a possible desire to generate income.

> "Despite the troubled relations between communities and elephants and the fact that they wish to see them reduced, community attitudes towards elephants are nevertheless positive overall. In all the discussions held the majority of people stated that they felt a sense of ownership of elephants as evidenced in their involvement in conservation through CBNRM. Some stated that elephants make their environment attractive and improve tourism. Others expressed the sentiment that they would not like elephants exterminated and want them conserved for future generations" (DG Ecological Consulting Undated: 11).

Additional costs linked to elephants

Aside from normal conservation management activities elephants are the cause of a number of additional costs to the government or citizens. Most of the costs are related to damage caused by elephants or the attempts to prevent damage. Farmers between Kasane and Kazangula, and in the Pandamatenga area near the border of Hwange National Park in Zimbabwe, need to invest in elephant proof fencing in addition to their usual farming inputs. The DWNP in Kasane employs a team to ensure the safety of residents moving between Kasane and Kazangula, as well as four teams to deal with elephant problems in the Chobe sub-district. DWNP officials noted that there are additional maintenance costs in the Chobe National Park as a result of elephant damage to water installations.

Elephant management as a political issue

Elephant management in Botswana has become a political issue at a number of levels. Politicians are under pressure from constituents to deal with 'the elephant problem' where there is a high incidence of human/elephant conflict. However, politicians are also concerned at the effect that international public opinion might have on the economy. They fear that not only tourism, but the diamond industry could be affected if elephants are culled. Some people interviewed suggested that this was one of the main reasons why Botswana had not reduced elephant numbers by culling according to the 1991 management plan. Further, highly influential individuals in government are known to be against culling and this is also believed to have contributed to the *de facto* strategy since 1991 of allowing numbers to continue to increase.

The CITES restrictions on trade in elephant products also raises elephant management to the political level in the international arena. Several people interviewed emphasised that any approach to elephant management has to recognise this reality and engage with it directly. To ignore the various political dimensions of elephant management will result in failure and a huge waste of resources. Some of those interviewed believe that with sufficient will and resources, the international public and media could be educated to understand the nature of the problem and realities of the issues involved.

Transboundary management of elephants

All of those interviewed emphasised the importance of cooperation between neighbouring countries in the management of elephants. There is sufficient evidence to show that the elephant population in northern Botswana is part of a larger population linked to Zimbabwe and Namibia and, to a lesser extent, Angola and Zambia. Cooperation is needed between all of these countries particularly if the approach of developing elephant movement corridors is followed (see 4.8 below) and if adequate measures are to be taken regarding the mitigation of human/elephant conflict. Dr Cyril Taolo, Acting

Assistant Director of Research in DWNP, emphasised the importance of harmonising regional conservation management objectives, particularly for elephant management.

3.2.4 *Stakeholders views on different management options*

1. No Control – let elephant populations continue to expand

Organisations such as the tourism company, Wilderness Safaris Southern Africa, and the NGOs, the Kalahari Conservation Society and Conservation International (CI), do not support killing elephants as control methods and believe means should be found (such as creating corridors for migration and human/elephant conflict mitigation) to enable populations to continue expanding. Some of those interviewed who did not see the ecological need to reduce numbers or were opposed to culling, were willing to support cropping of elephant in community areas (see 2 below). Their main justification for cropping is that the elephant population is large enough to withstand a considerable off-take without numbers being negatively impacted, and the economic gains would provide incentives for local communities to support conservation.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

There is divided opinion in Botswana over culling as a management option. According to Gibson, D (*pers. comm.*), if culling is done properly it can be quite humane and very quick, although culling from helicopters rather than on foot does cause stress. Some of those interviewed pointed out the huge costs of culling but others pointed out that if CITES restrictions on trade in elephant products were lifted, then the value of elephant products, including ivory, resulting from the cull could pay for the operation. Wildlife department officials suggested that culling would be difficult to carry out in northern Botswana because of the sheer numbers that would need to be removed. However, the department does not reject culling as an option and would consider this method in areas with more isolated populations. Officials acknowledge that culling would be likely to draw negative responses internationally and tourism could decline. Any culling operation would need to be accompanied by an extensive public relations campaign (J. Broekhuis, *pers. comm.*).

Some of those interviewed raised the issue of a potential crash of the elephant population due to habitat deterioration, perhaps combined with sustained periods of drought. Opponents of culling argue that tourists will object to killing elephants and will avoid Botswana. Others suggest that the sight of elephants dying of starvation would be just as unpalatable to tourists and questioned whether it would be more acceptable to allow elephants to die of starvation or for them to be killed by culling.

Botswana does not have the capacity to carry out a large cull and would need to outsource any proposed intervention to the private sector.

A number of people interviewed suggested that cropping of elephants in community areas would be a useful approach both to reducing numbers and for generating income for impoverished people who suffered problems from elephants. However, it was felt important to give considerable attention to educate the international public and media to accept the necessity for this approach. Without such a campaign, tourism could be negatively affected.

Some representatives of the tourism industry are opposed to all killing of elephants, while others oppose culling but are in favour of cropping. Wilderness Safaris, Kalahari Conservation Society and Conservation International are opposed to culling and cropping.

3. Contraception to curb population growth

Most of those interviewed felt that contraception was not a viable option as a management tool. They said this would be extremely difficult in a population of around 150,000 elephants if the aim was to reduce numbers. Local communities had felt that contraception was immoral (D. Gibson, *pers. comm*.).

4. Translocation to new protected areas or areas of low population density

Translocation was felt by most people interviewed to be an option for moving only small numbers of elephants due to the costs involved. It was unlikely that this option would have any impact on reducing overall numbers in Botswana, but it might assist in specific areas such as the Tuli Block where the local population was relatively low and there were conflicts with local communities. Some officials believe however, that lethal removal of elephants might be necessary in community areas close to Tuli.

5. Translocation to private land where elephants may later be hunted or culled (used sustainably)

There are only a few private farms in Botswana. Some are in the Tuli Block and have been converted to game ranches. However, elephant numbers are increasing there and causing problems to neighbouring communities. Translocation to these farms is not considered to be a useful option. Those private farms in Ghanzi district are considered to be too small for viable elephant populations and the habitat and availability of water is not optimal for permanent elephant populations.

6. Human/elephant conflict mitigation

All those interviewed agreed that it is a priority to find ways to mitigate human/elephant conflict. The draft national policy on elephant conservation and management (GOB undated) suggests different strategies for different parts of the country. It proposes maintaining an elephant-free zone in central district to remove all conflicts between farmers and elephants; in other areas considerable emphasis will be placed on generating benefits for local communities from elephants and finding ways to prevent damage to crops and infrastructure. As noted above (1 and 2), with some exceptions, most of those interviewed believe cropping of elephants to generate benefits in community areas is one of the most important ways of mitigating human-elephant conflict. A number of those interviewed also emphasised the need to find ways, such as the planting of chilli peppers, to keep elephants out of crop land.

7. Community-based natural resource management (CBNRM)

The issue of mitigation of human/elephant conflict is closely linked to community-based natural resource management (CBNRM) in Botswana. Local communities that meet certain criteria are able to gain a wildlife quota from the DWNP and enter into joint venture contracts with hunting and photographic safari companies. Significantly, most of those interviewed, including DWNP officials, researchers, representatives of the hunting industry and of photographic tourism companies agreed that in areas where CBNRM was operating, local communities were more tolerant of elephants (see also the quote from DG Ecological Consulting in 3.2 above). There is a good consensus that from a conservation perspective CBNRM in Botswana is successful. However, from a social and economic perspective, there are a number of problems that need addressing (Arntzen *et al* 2003). These include:

- Problems at the staffing and operational level. Few CBOs employ managers and most experience problems in effectively implementing their activities.

- A lack of accountability in decision-making.
- Benefit distribution: the fact that few CBOs distribute income at household level means that the most vulnerable groups often do not benefit.
- Sustainability: with the withdrawal of external support CBOs have tended to either under-perform or collapse.

Serious financial mismanagement has also been identified in many CBOs (Johnson *pers. comm*.). As a result of these short-comings government has been critical of CBNRM and has made moves in the past to remove the right of communities to keep the income from trophy hunting and photographic tourism. Given the conservation successes of CBNRM, and the implications of this for elephant management, it would seem more prudent to address some of the underlying problems rather than remove some of the key incentives for conservation that seem to be working. There was consensus among those interviewed that community benefit from conservation in general and elephants in particular was necessary. There is also consensus that two key issues need to be addressed. One is the need to strengthen good governance in CBOs and to help communities and their representative committees to develop processes that promote transparent decision-making. The other is to strengthen the management capacity of committees and/or to promote the employment of competent persons who can carry out the day to day management, while committee members provide the overall guidance and direction as representatives of the community. There was agreement among those interviewed that CBNRM is an important component in the complex issue of elephant management and should be strengthened.

8. The development of elephant movement corridors

There was consensus among those interviewed that developing elephant movement corridors could be a useful management option, although a number of stakeholders cautioned that the rate of elephant colonisation is slow and that this option on its own will not significantly reduce numbers. The movement of radio-collared elephants from Botswana through the Caprivi into southern Angola and from Botswana into the Sioma Ngwezi National Park in Zambia suggests that such re-colonisation could be possible (Chase undated). There are a number of barriers to creating corridors for elephant movement. These include the extensive minefields in south eastern Angola, the veterinary fence erected by Botswana along its border with Namibia between the Okavango River and an area 20 km short of the Kwando River, the presence of people living in and around the Sioma Ngwezi NP in Zambia and settlement along the Zambezi floodplains adjacent to the eastern floodplains of Caprivi. All of these issues need addressing if viable corridors are to be established. Chase (undated) suggests that urgent priority should be given to securing the Kwando/Linyanti corridor which elephants use to disperse from Botswana into Namibia, Angola and Zambia. He also suggests that the Namibia / Botswana border veterinary fence along the Caprivi Strip and the north/south buffalo fence from the Namibian border south towards the Okavango Delta are preventing elephant movement and leading to large aggregations of elephants along these fence lines. Others interviewed also emphasised the need to remove the Namibia/Botswana border/veterinary fence in order to allow greater freedom of movement for elephants.

9. Removal of CITES restrictions on trade

A number of those interviewed suggested that CITES restrictions on the trade in elephant products, including ivory, needed to be eased or lifted so that income can be generated from elephant. In particular, it is argued that cropping of elephants in community areas could potentially raise

significant income for rural development and act as an incentive for local people to tolerate elephants and adopt wildlife as form of land use. One of the main arguments for maintaining the restrictions on trade has been that ivory sales by southern African states would encourage poaching and illegal sales elsewhere in Africa. However, recent research by Stiles reviewed the available quantitative evidence on ivory trade, the restrictions on trade and elephant killing to evaluate the arguments of the ivory trade proponents and opponents. Stiles (2004: 9) concluded the following:

- Trade bans resulted generally in lower levels of ivory being traded and lower elephant poaching than prevailed prior to 1990.
- There is little evidence to support claims that the 1999 southern African ivory auctions stimulated ivory demand or elephant poaching.
- Levels of elephant poaching and illegal ivory trading in a country are more likely to be related to wildlife management practices, law enforcement and corruption than to choice of CITES appendix listings and consequent extent of trade restrictions.
- Elephant conservation and public welfare can be better served by legal ivory trade than by a trade ban, but until demand for ivory can be restrained and various monitoring and regulation measures are put into place it is premature for CITES to permit ivory sales.
- More elephant are being killed due to conflict with humans than by poachers looking for ivory.

In line with Stiles (2004) conclusions many in Botswana argued that southern African range states should continue to work to establish the conditions for well-regulated legal sales and to pressure CITES to allow sales to take place. Such a move would test the proposition that demand might outstrip legal supply thus leading to renewed poaching or to biologically unnecessary cropping (Stiles 2004) simply to make money. If the right law enforcement, ivory identification controls and community management approaches were in place, then poaching should be contained. Continuing to restrict trade until demand for ivory falls contains risks in the longer term. Without elephants becoming sufficiently valuable to landholders sooner rather than later, there is the strong possibility that current levels of tolerance will disappear and current conservation success will be converted to failure.

3.2.5 *Conclusions*

Analysis of the issues, problems and solutions provided by the stakeholders interviewed suggests that elephant management in Botswana, as with other countries in the region, requires a multifaceted approach that is flexible both temporally and spatially. Different approaches are required in different parts of the country and as the situation changes, strategies also need to change. Most of those interviewed essentially favour the development of a package of management approaches (noting that some NGOs and tourism companies are against the lethal removal of elephants). Such a package would include the following:

a) Investment in further research and implementation of human/elephant conflict mitigation
b) Investment in further research to understand the effects of elephants on vegetation and biodiversity in different areas of Botswana

c) Investment in monitoring elephant numbers, population trends and to understand elephant movements, particularly across international borders and between protected areas and community conserved areas

d) The use of culling as a management tool where necessary and where affordable and practical, based on a precautionary approach to conserving biodiversity (as per the approach in the draft national policy on elephant conservation and management)

e) The removal of external restrictions on the use of elephant products so that governments and local communities can realise the full value of elephants as a resource

f) The cropping of elephants in community areas adjacent to protected areas with high densities of elephant, both as a management tool and to generate a high level of benefit to local residents

g) The application of an adaptive management approach that ensures that management responds to monitoring and the provision of good data on population numbers and trends

h) The development of elephant movement corridors between protected areas and across international boundaries, particularly through the promotion of CBNRM the removal of the international border/veterinary fence between Botswana and the Bwabwata National Park in Namibia, the demining of the Luiana Partial Reserve in southern Angola and improved conservation in parts of Zambia (e.g. Sioma Ngwezi)

i) Strengthening and improving CBNRM in Botswana through capacity building of CBOs and promoting good governance

j) Investment in a highly focused and targeted public relations campaign to inform national decision-makers, international conservation organisations and the international general public and decision-makers of the issues concerning elephant management in southern Africa and the need to reduce elephant numbers through cropping or culling if necessary.

k) Capacity building within the wildlife department for elephant management.

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3.3 MOZAMBIQUE

3.3.1 *Number and distribution of elephant*

There have been very few surveys of wildlife in Mozambique and wildlife population numbers are based mainly on guesswork (Ministry of Agriculture and Rural Development (MARD) 1999, Table 3.3.1), with estimates drawn from a number of sources cited in the National Strategy for the Management of Elephants in Mozambique (April 1999). A major decline in elephant numbers from the 1960s has been attributed mainly to the direct and indirect effects of civil unrest and war (MARD 1999). No national survey has been carried out, but a limited number of surveys have been conducted for individual reserves and other areas. The data from these various surveys have not been collated and consolidated.

A survey by Gibson (1998) indicated around 9 000 elephants in the Niassa Game Reserve in the north of the country. A survey by Craig and Gibson (2002) in Niassa and surrounding hunting areas indicated that numbers had reached 13,061 by October 2002; an increase of 1,200 on a previous survey in 2000, and a growth rate of 5% per annum. Surveys conducted in the Maputo Special Reserve in the south indicated numbers of 250 in 1998, 300 in 1991 and 250 in 2004 (Matusse *pers. comm.*)[1]. Surveys carried out by WWF in Magoe District of Tete Province showed a considerable increase in elephants from 137 elephants in 1995 to 400 in 1999 and 1,264 in 2001 (Mackie and Chafota 1995, Davies 1999, Mackie 2001). A survey was carried out in January 2005 in the Gorongosa National Park although the results were not available at the time of writing but the number is likely to be in the region of 300 elephants. It is thought the overall population has remained fairly stable since the 1999 estimate of 18 000 with a possible increase of 0.7% a year (Matusse *pers. comm.*). However, it is possible that this is a considerable underestimate of the national total. For example, a WWF survey carried out in the Quirimbas National Park in November 2004 provided an estimate of 1,000 elephants compared to previous guesses of around 400 (H. Motta, *pers. comm.*).

Table 3.3.1. Elephant population estimates for Mozambique. Source of data: various studies cited by the Ministry of Agriculture and Rural Development (MARD) (1999).

Year	Estimated number of elephants
1900	120 000*
1974	50 000 – 65 000
1981	54 800
1986	15 000 - 27 000
1999	18 000

(* - an unlikely figure)

There are no accurate data for poaching levels and elephants killed because of conflict with humans. Estimates from wildlife officials in the different provinces indicated that around 121 elephants had been killed for problem animal control and 144 had been hunted illegally between 1996 and 1999 (MARD 1999).

Elephants in Mozambique appear to move seasonally between protected areas and neighbouring communal lands, in search of food and water. There are movements between the Maputo Special

[1] There is little recorded poaching activity in the park so officials believe the apparent decline in numbers from 2001-2004 was due to some elephants being unobserved in dense vegetation and others having moved temporarily to the neighbouring Tembe Elephant Reserve in South Africa (Mutusse *pers. comm.*)

Reserve and Tembe Elephant Park in South Africa. Movement between the Kruger National Park in South Africa and the newly proclaimed Limpopo National Park in Mozambique has been facilitated by the removal of about 20km of the international border fence. There are also movements of elephants between the Niassa Province and Tanzania and between Niassa and the neighbouring provinces of Cabo Delgado and Nampula (Osborn and Anstey 2002).

Although elephants are afforded protection within national parks and game reserves, all of Mozambique's protected areas have resident human populations. This inevitably leads to conflict and makes management of all wildlife more difficult. Poaching opportunities are facilitated and the availability of resources for elephants is reduced (MARD 1999). Local residents were forcibly evicted from protected areas declared by the Portuguese colonial authorities and many people returned to these areas after independence. The government's policy is not to make any forced evictions of people living within protected areas but to promote voluntary relocation. The government is committed to providing social infrastructure such as schools, clinics and housing and to ensuring that people are moved to areas sufficiently close to sacred sites within protected areas and where there is good soil and grazing (Matusse *pers. comm*.). This approach is being taken with the new Limpopo National Park adjoining the Kruger National park in South Africa and forming one of the main components of the Greater Limpopo Transfrontier Park that aims to link protected areas in South Africa, Mozambique and Zimbabwe.

3.3.2 *Policy and legal framework*

The conservation of wildlife in Mozambique is governed by the Forestry and Wildlife Act (10/99) and subsequent regulations (12/2002). Elephants may not be killed without the permission of the government. The maximum fine for illegally killing an elephant is 100 million mts. (US$5,000). The law provides that attempts must first be made to chase away problem elephants, but if this fails then the local district administrator has the authority to permit the destruction of an elephant. In 1990 Mozambique banned elephant hunting when CITES placed African elephants on Appendix 1. The ban has since been lifted and trophy hunting is allowed, within a CITES quota of 40 animals. The allocation of the quota is decided jointly by the two national government agencies responsible for wildlife, the Ministry of Tourism and the Ministry of Agriculture and Rural Development above[1]. In 2004 the United States Fish and Wildlife Department halted export of Mozambican ivory from trophy hunting to the US on the grounds that management strategies were inadequate. A National Strategy for the Management of Elephants in Mozambique was developed in 1999 and was approved recently by the MARD. The government hopes that this move will enable the US to once more allow imports of Mozambican ivory from trophy hunting.

Sustainable use of wildlife is an explicit policy of the government. The Forestry and Wildlife Act commits the government to "the protection, conservation and the rational and sustainable use of forest and fauna resources for the economic, social and ecological benefit of the present and future generations of Mozambicans" (GOM 1999).

The national strategy on Elephant management contains the following goal for conserving elephants in Mozambique (MARD 1999: 10):

[1] The Ministry of Tourism houses the National Directorate of Conservation Areas (DNAC) and the Ministry of Agriculture and Rural Development houses the National Directorate of Forestry and Wildlife (DNFFB) which has authority over wildlife outside protected areas.

> *To maintain and, where possible, increase numbers and range of elephant populations, promoting their contribution to national development and the communities with whom they share the land and ensuring the maintenance of habitats and biodiversity.*

The strategy envisages reaching a number of specific targets by 2010. The targets are: Elephant numbers increased by 20%; existing elephant range and number of populations maintained; management plans approved for all national parks, 75% of game reserves and 50% of hunting areas containing elephants; mechanisms in place whereby five or more communities within the elephant range will benefit directly from the presence of elephants and at least five new tourism related operations established.

The five main components of the strategy are (MARD 1999: 11):

> **Firstly**, mortality of elephants will be decreased by preventing illegal activity through improved law enforcement, by improving public attitudes and by control of utilisation within sustainable limits.
>
> **Secondly**, in order to increase the elephant range in Mozambique, range extensions will be incorporated into land use plans and protected areas (National Parks, Game Reserves etc.) will be secured. Enhanced tolerance of elephant on other land units will be achieved through economic incentives.
>
> **Thirdly**, elephant-oriented tourism will be enhanced through promotion and planned tourism development including systems of tourism concessions within elephant ranges. Non-consumptive eco-tourism, safari hunting, cropping and live sales will be encouraged as appropriate and in accordance with individual area management plans.
>
> **Fourthly**, in appropriate land-use designations, authority over wildlife will be transferred to acceptably constituted communal management bodies to enable local communities adjacent to state land and protected areas to benefit from elephant utilisation. Local employment opportunities will be generated through tourism.
>
> **Fifthly**, the environment and biodiversity throughout the elephant range will be inventoried and monitored. Elephant populations will be controlled, reduced or translocated where elephant-induced changes exceed agreed acceptable limits.

The main objectives for the management strategy are (MARD: 11-15):

1. The acquisition of adequate information for the National Directorate of Forestry and Wildlife to manage elephants effectively
2. The improvement of institutional and technical capacity through the provision of adequate resources based on sustainable funding mechanisms
3. A reduction in human-elephant conflicts to acceptable levels
4. Improved awareness by all levels of society of the value and benefits of elephants
5. The dissemination and explanation of the national elephant management strategy to relevant stakeholders and the development of elephant management plans for protected areas
6. Law enforcement capacity and procedures strengthened
7. Communication and coordination within and between stake holders and role-players improved.

The strategy further includes a number of implementation procedures and guidelines for management activities.

3.3.3 *Key issues and perceived elephant management problems*

A number of key issues and problems regarding elephant management in Mozambique were identified by stakeholders interviewed (see 3.3.7 below) and/or appear in the literature.

Human/elephant Conflict

Officials believe that the number of human/elephant conflicts is increasing and that this is also an indicator of increasing elephant numbers (Matusse *pers. comm*.). Elephants destroy crops, eat food being stored by villagers and have killed people. Government does not compensate villagers for crop damage. There is disturbance of elephants by people living inside protected areas. An assessment of human/elephant conflict in and around the Niassa Reserve (Osborn and Anstey 2002) found that such conflict was a significant problem not only in the reserve but in nine of the 15 districts of the Niassa Province (with an estimated elephant population of 13,000 elephants, with additional elephant outside the park). The assessment found that elephant/human conflict had become a political issue and figured prominently in district and provincial level official meetings. In Nipepe district it was estimated that 18 tonnes of maize had been lost in one year in fields around the district centre and this had contributed to riots in which residents attacked the administrative centre (Osborn and Anstey 2002).

Although human/elephant conflict is thought to be increasing, there is no national level data to show numbers of incidents, frequency of incidents, impacts on livelihoods, main areas where problems occur, etc.

Elephants and biodiversity conservation

There is no data available to suggest that elephants in Mozambique currently cause significant vegetation modification, or are a threat to other species as a result. Observations by individuals suggest there is increasing damage to trees in the Maputo Special Reserve and elephants are causing erosion to the dunes (Matusse *pers. comm*.). Officials say that damage by elephants to vegetation is at a small scale but could become a problem if elephant numbers increase considerably. Some officials favour a precautionary approach that would ensure that elephant numbers do not reach a stage where other species are threatened. They suggest that the elephant carrying capacity of protected areas should be established and that elephants should be managed according to this capacity. All those interviewed said it was important to begin monitoring elephant numbers and densities and the impact on vegetation by elephants so that problems could be identified before they became too difficult to deal with. It would be important for Mozambique to set some clear objectives regarding biodiversity conservation and habitat modification to guide its management decisions. In many cases a value judgement would have to be made which took into account the role of elephants in the wider economy and the perceptions of potentially hostile communities (Taylor *pers. comm*.).

Capacity and institutional issues

One of the main constraints to sound elephant management and control of ivory products in Mozambique is a lack of capacity. There is a small cadre of trained officials in government and there are very few rangers deployed in the field, inside or outside protected areas. Field staff lack transport and equipment. The government lacks the human and financial resources as well as the expertise to

adequately implement the national elephant management strategy. There is insufficient control of local legal sales of worked ivory, making it difficult to trace the source of the ivory. The lack of capacity results in a lack of good data on which to make management decisions and on which to base elephant quotas. The lack of good data makes it more difficult to deal with complaints from the rural public about elephants causing damage to crops and threatening people. There is a fear that politicians will simply react to the complaints and order the shooting of elephants without a clear indication of whether such action is the most appropriate. The lack of good data also weakens any case that Mozambique might make to CITES for increased hunting quotas or for the sale of its ivory stockpiles.

The lack of capacity within those agencies responsible for conservation is a result of the recent war and associated economic decline. The problems are exacerbated by the geography of Mozambique. Maputo is situated in a small corner of the south east of the country, close to 3 000 miles away from the northern extremities of the country. Many of the areas where elephants are found are extremely remote, not just in terms of distance from the capital but also because of poor transport and communications infrastructure. District and provincial authorities have extremely small budgets and are often unable to provide services to residents. These circumstances make it extremely difficult for government to administer the country, and for the conservation agencies to implement activities on the ground.

Wildlife management in general and elephant management in particular, are constrained by the split in conservation responsibilities between two government Ministries, the Ministry of Agriculture and Rural Development (wildlife outside protected areas) and the Ministry of Tourism (wildlife inside protected areas). Officials from both Ministries and others interviewed agree that this complicates management, is not an efficient use of the meagre resources available and results in territoriality. Once an elephant leaves a protected area, responsibility for its conservation and for dealing with any problems it might cause shifts from one Ministry to another. In practice, officials say that there is cooperation between rangers on the ground, simply because of the lack of resources, but management would be more efficient if responsibilities were not split.

Some of the suggestions made for dealing with these capacity issues are as follows:

- Promote cooperation and the development of partnerships between government, NGOs, local communities and the private sector
- Outsource activities where possible, with government providing an enabling policy and legislative framework and supervisory functions
- Promote targeted in-service training of field level staff and mid-management personnel
- Provide funds to fill the gaps in data and information, in order to promote informed decision-making
- Avoid unsustainable support such as the provision of equipment and infrastructure where there is the likelihood that government will not have the resources to maintain or replace it
- Shift funding from high-profile publicity friendly activities such as elephant translocation to more important current priorities such as training and data collection.

Elephant management as a political issue

A number of people interviewed said that human/elephant conflict was becoming a political issue that was raising concern at the highest levels of government. Politicians are coming under increasing pressure to do something about people being killed by elephants and crops being destroyed. The Mozambican President has visited areas heavily hit by elephant damage to crops and where people have been killed by elephants and has ordered that something must be done about 'the elephant problem'.

As with other countries within the region, Mozambique is subject to international conservation politics and the influence of international agencies that oppose culling. This situation is recognised in the national elephant management strategy which proposes that an awareness campaign be launched to make the international public more aware of the complexities of elephant management (MARD 1999).

Transboundary management of elephants

Mozambique has also been subject to pressure from regional and international organisations that favour transboundary approaches to conservation and is involved in the establishment of a number of Transfrontier Conservation Areas (TFCAs). The Greater Limpopo Transfrontier Park (GLTP) aims to link the Kruger National Park in South Africa, the Gonarezhou National Park in Zimbabwe and the newly proclaimed Limpopo National Park in Mozambique. Initial plans for the GLTP, promoted strongly by organisations such as the Peace Parks Foundation, appear to have been developed with little consideration for the presence of about 20 000 people in the area which has become the Limpopo National Park. As explained in point 3.3.1 above, the government does not intend to forcibly remove these people, but to offer appropriate compensation as an inducement for them to move. Some of those interviewed believe that many people are likely to insist on staying on their land and that this could become a major political issue. Mozambique does not have an official policy that deals with the issue of people living inside protected areas or with the relationship between protected areas and neighbouring residents. This will be given attention during the second phase of the World Bank funded TFCA Project which is due to start in 2005 (B. Soto *pers. comm*.).

All of those interviewed believe that it is in Mozambique's interests to engage with its neighbours to manage transboundary populations of elephants jointly. The development of TFCAs should facilitate such joint management. The main areas where joint management is required are the Maputo Special Reserve and the Tembe Elephant Park in South Africa, the GLTP, the Magoe Districts and Zombu Districts which border Zimbabwe and Zambia, and where the Niassa Reserve borders Tanzania.

3.3.4 *Stakeholder views on different management options*

1. No Control – let elephant populations continue to expand

No-one interviewed was in favour of letting elephant populations expand without some form of control. However, all emphasised the need for any control measures to be based on sound data.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

Culling of elephants is not a major issue in Mozambique at the moment as the current conservation aims are to increase the number of elephants. However, the national elephant management strategy and officials in the Ministry of Tourism and the Ministry Agriculture and Rural Development believe that culling is a management option that should be considered in order to protect habitats if elephant densities become too high. The national strategy recognises that this approach might not be

acceptable to some international organisations: "Animal rights groups and similar agencies often have unrealistic views that wild elephants should be preserved at all costs. Such groups should be shown that without incentives to conserve elephants, rural communities are likely to want the complete removal of animals that could threaten their livelihoods" (MARD 1999). The strategy recognises that there is a need to publicise nationally and internationally the extent of damage and the hardships caused by elephants. Culling as a management tool was also supported by all others interviewed. Some emphasised that it should be used only once other methods had failed. All those interviewed recognised that some elements of international opinion might be against culling and that this could negatively affect tourism. However, most felt that it was Mozambique's right to take the most appropriate decisions it felt necessary. It was important to explain to the world the nature of the problem and that most other management options were not adequate to deal the consequences of having densities of elephants that were too high.

3. Contraception to curb population growth

Few of those interviewed felt sufficiently informed about contraception to comment. Some suggested that it would be worth pursuing further research to see whether contraception would work. Most of those interviewed pointed out that it was likely to be an expensive operation to carry out in order to realistically reduce numbers if that became necessary.

4. Translocation to new protected areas or areas of low population density

Most of those interviewed felt that translocation was not really a management option that could be used to deal with an over-population of elephants. It was costly and large numbers of elephants could not be easily translocated. However, it was useful to translocate elephants to areas where the objective was to re-introduce elephants to an area, or build up a small population. It was reported that there were plans to move elephants from Botswana to the Limpopo National Park at the cost of several million US dollars. A number of those interviewed felt that there were better ways to spend such funds, such as in capacity building of government personnel (particularly training) and data gathering to support sound decision-making.

5. Translocation to private land where elephants may later be hunted or culled (used sustainably)

There are currently three game ranches on land leased by private individuals from the government. However, there does not seem to be a demand for elephants on these ranches. Further, these ranches are still undeveloped and the viability of introducing elephants needs to be assessed.

6. Human/elephant conflict mitigation

DNAC rangers carry out patrols when elephants begin to move out of protected areas at the same time as crops begin to mature. The aim is to scare away elephants that cause crop damage by firing over their heads. If there are persistent problems then permission is obtained for the destruction of the problem elephant.

In the Niassa Reserve the main technique used to minimise conflict has been the use of large-scale electric fencing around most of the main settlements. Osborn and Anstey (2002) found that the fences appeared to have had some success but were costly to maintain and difficult to expand to all conflict areas. Chilli peppers are now also being used in the area to keep elephants out of crop fields.

A number of people interviewed emphasised the need for a national land use policy and the implementation of provincial and district land use plans that can clearly demarcate areas for human

settlement and areas that should be left for conservation. Problems occurred for example when people left a village, set up a home and made fields in the bush where elephants moved through (Faloma *pers. comm*.). The national elephant management strategy (MARD 1999) also recognises the need for rational land use planning and suggests that zonation would determine where people have a right to settle, where they might expect to receive assistance in protecting their livelihoods against wild animals and where they might expect to benefit from the utilisation of wildlife.

The main government strategy for dealing with human/elephant conflict is to enable rural communities to benefit from elephants through tourism and other means to counteract the problems caused by these animals, and to enable communities to do more to manage conflict themselves (MARD 1999). In accordance with the national elephant management strategy the government is developing guidelines to deal with human-elephant conflict. This will be part of an overall human/wildlife conflict strategy. The strategy will provide analysis of the scale and scope of the problems and make recommendations for decision-making processes, capacity building, data collection, and policy and legal changes (DNFFB 2004?).

All of those interviewed agree that one of the most important priorities for elephant management in Mozambique is to collect data regarding the scale and scope of human/elephant conflict, so that a good understanding of what is happening can be developed.

8. Community-based natural resource management (CBNRM)

Elephants in Mozambique are not confined to protected areas and move through areas of human habitation. The importance for elephant conservation of positive attitudes towards elephants by local communities is fully recognised in Mozambique. The role of communities is emphasised strongly in the national elephant management strategy and was mentioned in most interviews. The strategy recognises that authority over wildlife needs to be devolved to communal management bodies and that economic benefits need to reach communities directly and not go to the central treasury. However, there are a number of constraints to the successful implementation of CBNRM in Mozambique (Jones 2004). Anstey (2001) suggests for example that despite the policy and legislative changes in Mozambique that have favoured CBNRM, there has been a lack of capacity to provide the legal mechanisms to promote community-based conservation. Compromises led to the watering down of the original policy intentions when legislation was drafted. A major constraint appears to be the reluctance of government to let go of real control over resources to communities. Nhantumbo *et al* (forthcoming) suggest that one factor affecting this has been the slow pace of wider democratic decentralisation and in particular the evolution of elected local government which despite legislation has not developed in rural areas. Furthermore, government is unwilling to forego income to communities. Government has approved measures that enable communities to receive 20% from forestry or hunting concessions, unless the community can strike a direct deal with the private sector. But communities do not have the skills and capacity to meet the requirements to do this.

Although legislation enables communities to gain group land rights through a certification system, according to Nhantumbo *et al* (2002), implementation of the new land laws has been slow and piecemeal, with most attention being given to private business concessions. Delimitation of community lands has only taken place with donor support despite a government budget available to support communities. As a result of an apparent reluctance by government to give up power and income, communities do not have strong rights over natural resources. This means that there is no compelling reason for the private sector to involve itself with communities when it can deal directly with government. The result is that communities do not receive significant income from wildlife and

this reduces the incentive for them to tolerate animals such as elephants. This problem is recognised by government officials working in CBNRM in Mozambique.

9. The development of elephant movement corridors

There are movements of elephants across Mozambique's borders between protected areas and across communal lands. These movements need to be better understood if viable corridors for movement can be established. Most of those interviewed believe that corridors could provide for genetic links between elephant populations, and for access to additional space for increasing populations. However, they cautioned that such approaches need to take into account socio-economic conditions and requirements as well. This implies the need for good land-use planning policies and programmes that can balance the needs of people and wildlife. Further, where such corridors might cross communal land, the full involvement of local people will be required. Elephants will need to generate benefits that are sufficiently compelling for landowners to tolerate them, or leave land unfarmed so that elephants can move through. The development of corridors cannot be undertaken without putting in place the right conditions for elephants as well as the right conditions for people to accept elephants (Taylor *pers. comm*.).

3.3.5 *Conclusions*

Analysis of the issues, problems and solutions provided by the stakeholders interviewed suggests that issues regarding elephant management in Mozambique differ in some important ways from those in other countries in the region. Major priorities are the development of human resources, management capacity, financial resources, infrastructure, coordination between stakeholders and the generation of good data on elephant numbers, densities, population trends, movements and human/elephant conflict. Further, CBNRM in Mozambique needs to be strengthened so that communities can acquire clearly defined rights over wildlife and forests and can gain full and direct benefits from sustainable utilisation of these resources. Mozambique has a national elephant management strategy which is in need of implementation. Once these issues have been addressed, Mozambique can give further attention to deciding which management options are best suited to its own needs. In doing this it will need to consider not only the conservation of elephants, but their place in the ecosystems they inhabit as well as socio-economic factors in extremely poor, remote and isolated rural communities. In the mean-time an adaptive management approach is required, basing decisions on existing data, but with a strong and very clear procedure for review and adaptation as new data emerges and capacity and resources increase. There are a number of private and NGO-led conservation activities taking place that are generating lessons, experiences and data related to elephant management. Government needs to be supported to collate these lessons and the information at national level, to support decision making and further policy development.

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3.3.7 *Persons consulted*

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3.4 NAMIBIA

3.4.1 *Elephant number and distribution*

Historically, elephants occurred at low densities throughout Namibia, though hunting and increasing pressure from humans reduced the range and brought the population to near extinction at the turn of the 20th Century. However, Namibia now has a population estimated at above 15,000 elephants distributed through the north of the country from the arid Skeleton Coast to the tropical savanna woodlands in the North-East. The latter area contains about 60% of Namibia's elephants and contributes a small part to a population of well over 200,000 shared between Botswana, Namibia, Zambia and Zimbabwe. There are considered to be two elephant populations in Namibia, one in the north-west (Etosha National Park and neighbouring Kunene Region) and one in the north-east (Tsumkwe District, Khaudom Game Reserve and the Caprivi). Table 3.4.1 shows the latest estimates for elephant in these areas. In Kunene region, in the North-West elephants are increasingly recolonising their former range, although growth rates are not high. Elephant numbers in Etosha have remained stable for a number of years, probably mainly due to anthrax (P. Lindeque, *pers. comm.*). In the north-east, increases are large and mainly due to immigration. Fig. 3.4.1 shows the clear upward trend in the overall population since 1984.

Table 3.4.1 Latest elephant population estimates for Namibia. (Source MET, undated)

Area	Year of previous estimate	2003 estimated elephant population	2004 estimated elephant population
Caprivi	2003	5740	8781
Khaudom	2002	1687	3099
Tsumkwe	2000	755	1028
Kunene Region	2000	663	800
Etosha National Park	2002	2417	2057
Total		**11262**	**15765**

Research shows that elephants in Namibia move considerable distances, both within the country and into neighbouring countries. Elephants from Etosha move out of the park northwards almost to the Angolan border, into the Kunene Region to the west, and about 30-50% of the Etosha elephant population spend 3-5 months a year outside the park (Martin 2005). An elephant collared recently in Khaudom Game Reserve has moved either around the corner of the border with Botswana or through Botswana almost to the Mahango Game Reserve on the Okavango River (P. Lindeque, *pers. comm*.). Radio-collared elephants in Caprivi have been tracked moving into Zambia (Rodwell 1995). An elephant collared recently in Botswana moved along the Kwando River through the Caprivi Strip into the Luiana Partial Reserve in southern Angola (Chase undated).

The levels of illegal killing of elephants in Namibia are low. However, incidents of human/elephant conflicts are steadily increasing, especially in the Caprivi, and some animals are killed illegally as a consequence of people protecting their livelihoods. Table 3.4.2 shows the number of cases of illegal killing of elephant since 1990.

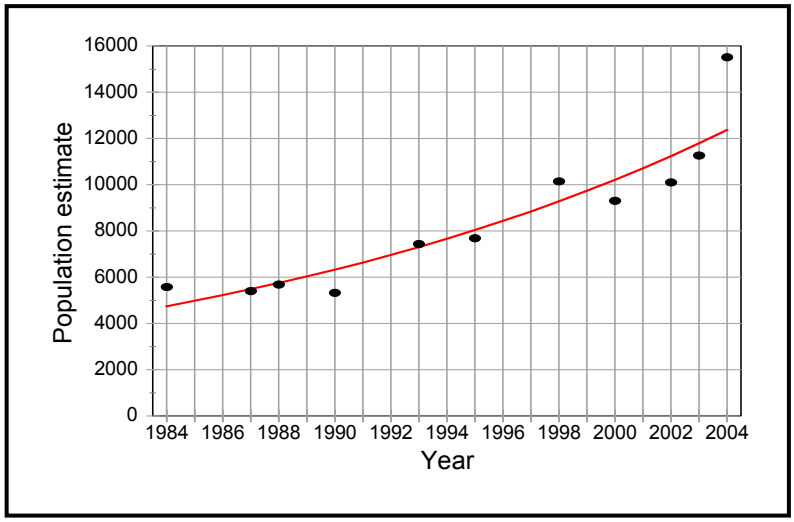

Fig. 3.4.1. Trends in elephant numbers since 1984. (Source: MET undated)

Table 3.4.2 Number of cases of illegal killing of elephant since 1990. (Source: MET undated)

Year	Number of cases	Year	Number of cases
1990	6	1997	4
1991	1	1998	4
1992	6	1999	12
1993	10	2000	2
1994	7	2001	2
1995	6	2002	5
1996	11	2003	7

3.4.2 *Policy and legal framework*

The conservation of wildlife in Namibia is governed by the Nature Conservation Ordinance (No. 4) of 1975. In terms of the Ordinance, elephants are categorised as Specially Protected, which means that an elephant may not be destroyed by any person without a permit from the Ministry of Environment and Tourism. The only exception is if an elephant threatens human life. The maximum penalty for illegally killing an elephant is N$200,000 (US$32,520 at current exchange rates) or 20 years imprisonment or both. Elephants may be hunted for trophy purposes according to trophy hunting quotas allocated by the Ministry. According to current Ministry policy, elephants that cause problems on farmland may be declared "problem animals" by the Permanent Secretary or Minister. The animal may then be shot by a ministry official or by a trophy hunter. Hunting, capture, transport, being in possession of and trade in raw ivory, live animals and other derivatives are subject to permits and conditions. Ivory and all other parts of an elephant are classified as 'Controlled Game Products' under Proclamation 42 of 1980.

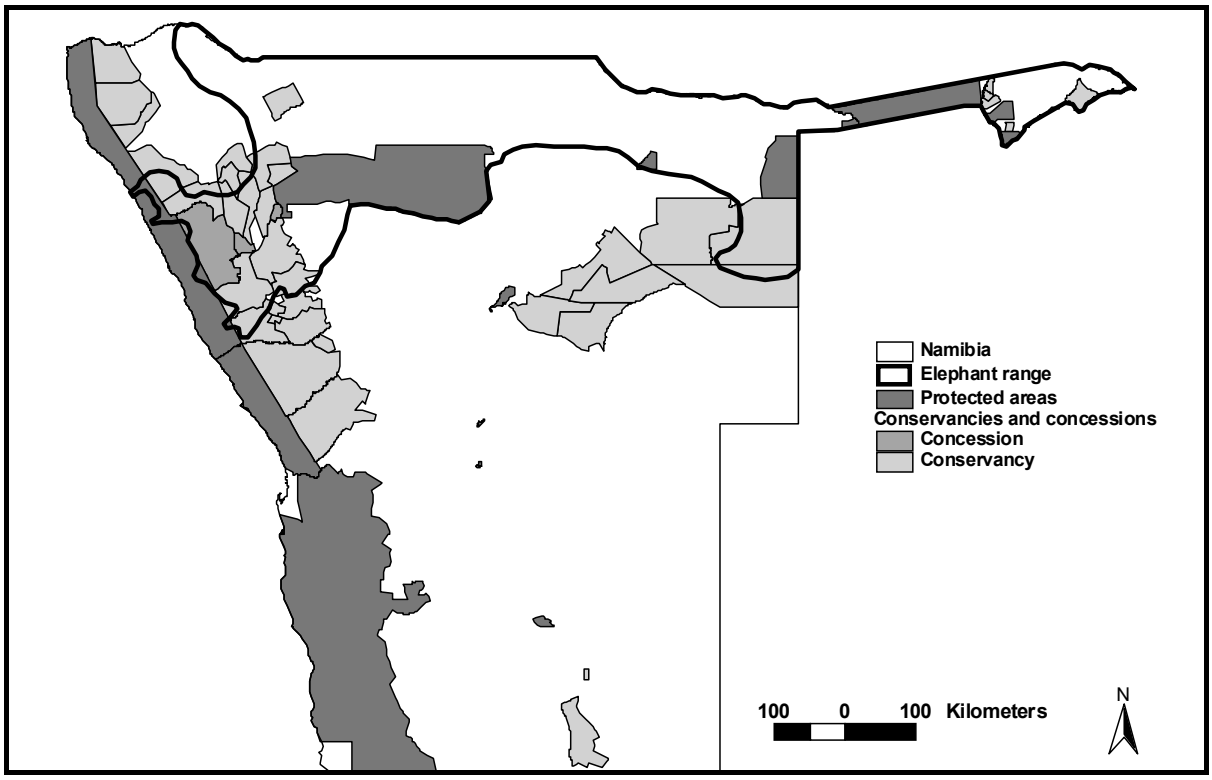

Fig. 3.4.2 Communal area conservancies falling within elephant range. (Source: MET undated)

The maximum penalty for contraventions relating to controlled game products is also N$200,000 and/or 20 years imprisonment. Any elephant tusk found is deemed by law to be the property of the state. Found ivory is stored under secure conditions along with confiscated ivory and is clearly stamped with an identity number.

Underlying Namibian policies on wildlife conservation is the principle of sustainable use and the MET works to create the highest valued use for all indigenous species and ecosystems. The MET views elephants as "potentially one of the most valuable wildlife species in Namibia" which "could play a major role in economic development and sustaining biodiversity as a primary land use" (MET undated: 4).

The conservation of biodiversity is entrenched in the Namibian constitution. As a result the MET considers elephant conservation in the broader context of the maintenance of biodiversity. MET acknowledges that "elephants have the potential to severely impact biodiversity, particularly where they are confined to specific areas at unnaturally high densities" (MET undated: 4). The MET perspective is that "one species alone cannot be given preference at the expense of many others" (MET undated: 4).

Other important policies and legislation relate to promoting conservation as a land-use outside protected areas. This approach has significance for securing and/or expanding land available for elephant range, particularly since many elephants move in and out of the Etosha National Park and the north-eastern protected areas. Under Namibian legislation, rural communities that form a common property management institution called a 'conservancy' are able to gain certain rights over wildlife from government. These rights include trophy hunting, the utilisation of certain species for own use, and live capture and sale.

There are currently 31 registered communal area conservancies in Namibia. Eighteen conservancies occur immediately adjacent to or in key corridors between national parks or game reserves. These conservancies increase land available for wildlife by nearly 50% beyond the existing protected area network (LIFE 2004). Elephants are present in conservancies in the north-west of Namibia, the north central regions and in the north east (Figure 3.4.2).

The MET is currently developing an elephant Management Plan for Namibia. A background study has been completed (Martin 2005) and a draft Species Management Plan has been submitted to the MET for approval (MET 2005). The main components of the proposed management plan are as follows:

> **GOAL:** Namibia wishes to carry the maximum number of elephants which 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
>
> **STRATEGY**
>
> 1) Devolution of authority for landholders, both communal and private, to manage elephants on their land
> 2) Representations on the location of veterinary control fences (particularly the border fence with Botswana east of the Okavango River)
> 3) The removal of CITES constraints affecting Namibia's ability to trade in ivory
> 4) Establish co-management institutions between the State and primary stakeholders
> 5) Apply adaptive management principles to the decisions of co-management institutions

This management plan is in the public domain, but still has to be approved by the Namibian Government[1]

3.4.3 *Key issues and perceived elephant management problems*

A number of key issues and problems regarding elephant management in Namibia were identified by stakeholders interviewed (see 3.4.7 below) and/or appear in the literature.

Human/elephant Conflict

[1] Ministry of Environment and Tourism. 2005. Elephant Management in Namibia. Information Document. Ministry of Environment and Tourism. Windhoek.

The increase of elephant numbers in Namibia and the expansion of elephant range also increases actual and potential conflict with humans. In north-eastern Namibia where there are the highest numbers of elephants and relatively high human densities, elephants provide a physical threat to people and destroy crops. In conservancies such as Kwando and Mayuni in Caprivi, conflict is exacerbated when settlements are placed across well-used elephant paths to and from the Kwando River (Beytell *pers. comm.*). In the more arid north-west elephants are also a physical threat. There is some damage to crops where these are grown under local irrigation from boreholes, and elephants damage small gardens at settlements. However, the main form of damage caused by elephants is to infrastructure for water provision and fences (on both communal and freehold land). Elephants damage wind mills and rip up pipes in search of clean water. Larger groups might drink up most of the contents of a small reservoir resulting in additional expenditure by people who have to pump more water for themselves and their livestock. Elephants sometimes kill cattle at water points.

O'Connell (1995) estimated that elephant damage to crops from 1995-2000 for the whole Kwando River frontage in Caprivi was about N$20 000 a year. Murphy *et al* (2004) estimated the average loss to households affected by elephant damage in the same area as N$1,172 in the Mayuni Conservancy and N$1,450 in the neighbouring Kwando Conservancy. These losses represent around 18% (Mayuni) and 22% (Kwando) of annual household income. The impacts of crop losses on households will vary according to the status of individual households. Elephant damage to the crops of poor small producers will have a higher impact than similar damage to the crops of a more wealthy family with larger crop lands. Some observers believe that the extent of crop damage by elephants is often exaggerated by villagers largely because they are frustrated because they feel powerless to take any action that will solve the problem (G. Owen-Smith *pers. comm.*)[1].

There is evidence to suggest that local communities in conservancies in Caprivi have become more tolerant of elephants than in past years (Bond *et al* 2003, Martin 2005). Elephants are also tolerated to a large extent in conservancies in north-west Namibia. However, data from the wildlife monitoring system in Caprivi conservancies shows that the number of incidents involving elephants and people and the number of incidents of crop damage is increasing (Martin 2005). But if increasing numbers of elephant continue to bring increased problems for residents, then tolerance for wildlife and aesthetic satisfaction at the return of wildlife could diminish, if benefits (financial and intangible) do not outweigh the costs (Jones 2003). Martin (2005) suggests that the benefits from wildlife (including trophy hunting of elephant) to conservancies in Caprivi are small and do not come close to compensating residents for losses caused by elephants. He concludes that "these communities will be evaluating whether a commitment to wildlife as a land use is worthwhile and, unless elephants contribute a great deal more to livelihoods, the present forbearance is likely to disappear" (Martin 2005: 38).

CBNRM approaches in Namibia therefore need to do more to ensure that sufficient benefit is reaching the people most affected by elephants (Brown *pers. comm*.). In some areas, such as the eastern flood plains of Caprivi, there is the potential within the existing policy and legal framework for generating income for conservancies through both photographic tourism and trophy hunting. MET officials (e.g. P. Lindeque *pers comm.,*B. Beytell *pers. comm.*) and others (e.g. C. Brown *pers. comm*.) have suggested that benefits to communities could be considerably increased through easing the restrictions on elephant hunting in the north-eastern communal areas so that harvesting of elephants could take

[1] In Namibia there are no compensation schemes for crop damage so any exaggeration of damage is likely to be political in motive rather than economic.

place on a sustainable basis. This would be of particular significance in earning income for communities if they could trade in ivory and processed skins (currently forbidden by CITES)[1].

Elephants and biodiversity conservation

As noted above, the MET has a mandate for biodiversity conservation and its current policy is that too many elephants can potentially be harmful to biodiversity, where high elephant numbers lead to high levels of vegetation change. Although there is little hard data, officials and trophy hunters familiar with the Caprivi believe there has been considerable modification of vegetation along the riverine strips of the Kwando River in the Bwabwata National Park and the Okavango River in Mahango Game Reserve. Bulls have been observed completely ring-barking trees in these areas. There is some data to suggest that as many as 24 tree species that have developed a specialised niche in riverine woodland have been lost along the Okavango River due to habitat change (Brown *pers. comm*.). In Caprivi, habitat modification by elephants is thought to be a threat to high value species such as roan and sable (Weaver *pers. comm.*) and elephant are believed to keep roan from drinking in the Khaudom Game Reserve (Beytell *pers. comm*.), one of the last remaining areas where roan are present in significant numbers. However, neither the extent of habitat change nor the full extent of biodiversity loss has been studied, nor has research determined the cause of the decline of certain species. Officials and NGO personnel agreed that such work, including a consolidation of existing field notes and data held by various individuals and organisations, would be valuable. The current policy of MET is to be precautionary in its approach and to ensure the continued presence of roan for example, rather than risk a local extinction.

Martin (2005) argues that elephant numbers in Namibia have already exceeded what many would consider desirable for available habitats and that elephants are increasing at a rate close to the maximum possible. "Namibia's short-term problem is to accommodate the increase in elephants which is happening at the moment. It is not the long-term problem. In the long-term 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 that culminates in population crashes. Some would argue that this is 'natural' and that no management is necessary. Such arguments tend to put elephant conservation in a vacuum and ignore the alternative options for accommodating elephants within larger sustainable development systems" (Martin 2005: 39).

Additional costs linked to elephants

A number of costs in addition to protected area management are incurred by the government, NGOs and donors funding conservation activities due to increasing elephant numbers. These include the need to maintain international boundary fences (e.g. between Botswana and Khaudom Game Reserve), veterinary fences (e.g. in Kunene Region), repairs to water installations inside and outside protected areas, the design and construction of elephant-proof installations (e.g. elephants have evaded every device so far tried in Khaudom), the provision of water points for elephants only (e.g. in Kunene Region so that elephants have access to clean water and do not compete aggressively with livestock).

[1] For a more detailed discussion of this management approach see point 4.6 below

Elephant management as a political issue

It is clear from the interviews and the literature that elephant management in Namibia is not simply a technical conservation issue, but is also political, in the sense that political will is required to further devolve rights over elephants and other wildlife to local communities in order to provide incentives for communities to adopt wildlife as a land use and tolerate elephants on their land. So far government has devolved only limited and conditional rights. Elephant management is also political in the sense that there are competing interests among government departments that have an impact on land allocation and land use, e.g. a band of livestock farms along and back from the western boundary of the Khaudom game reserve on land that forms an important wet season dispersal area for elephants. In Caprivi there have been plans in the past by the central government to use land that forms part of occasional or permanent elephant range for purposes such as irrigated agriculture and sugar cane plantations. Land-use planning based on the most appropriate uses of the land and its natural resources is required to form a foundation for local and national level political decisions concerning land allocation.

Elephant management is also political in the sense that strong opinions and the lobbying power of animal welfare groups in western countries against lethal removal of elephants for trophy hunting or as a management option influence the way that people think about elephants. MET officials and a number of NGOs in Namibia believe that as a result of such influence on CITES, southern African range states are prevented from raising the full value that could be obtained if elephants were treated as a sustainable resource.

Transboundary management of elephants

Most stakeholders interviewed emphasised the need for transboundary management of elephants, particularly because of the movement of elephants between Botswana, Zimbabwe, Namibia, Zambia and southern Angola. Elephants from the Chobe area of northern Botswana are moving across the Chobe river seasonally onto the eastern floodplains of Caprivi in Namibia in large numbers and are reported to be impacting on the small areas of woodland on the floodplains, although crop-damage is limited because they leave the area after the first rains (G. Owen-Smith *pers. comm.*). The elephants are also a physical threat to local inhabitants Bond *et al* (2003) suggest that a transboundary approach enabling elephants to move through the eastern floodplains to other areas including Zambia, is needed to relieve the pressure on eastern Caprivi floodplains. This is currently being supported by CI, which is funding research on human/elephant conflict on the eastern floodplains and is raising funds to remove land mines from the Luiana partial reserve in south- eastern Angola to enable elephant movement into the reserve (J. Hanks *pers. comm.*). MET is the Namibian coordinator for the Kavango-Zambezi (KAZA) Project which aims to establish a large transboundary conservation area including large areas of elephant range in the Okavango and Upper Zambezi basins, with the backing of the Governments of Angola, Namibia, Botswana, Zambia and Zimbabwe. It would link existing protected areas and community conserved areas, with the aim of improving biodiversity conservation while boosting local development through tourism. There is potential to use KAZA as a means to define wildlife zones and elephant corridors outside protected areas and develop joint strategies for elephant management within the project area (P. Lindeque *pers. comm.*).

3.4.4 *Stakeholder views on different management options*

We attempted to determine the opinion of various stakeholders on elephant management options (points 1 – 4 below). It is difficult to deal with these in isolation, partly because the problems require a multi-faceted strategy and partly because several stakeholders believe that a particular option might be appropriate in one set of circumstances, but not necessarily in others. Further, stakeholders added three additional management options to those initially listed (points 6 - 8 below).

The following sets out the views of those interviewed:

1. No Control – let elephant populations continue to expand

None of the MET officials and NGO personnel interviewed was in favour of a *laissez- faire* approach and neither were the chairpersons of the Namibian Professional Hunters' Association (NAPHA) and the Namibian Tourism and Safari Association (TASA). They all believe that action is needed to control elephant numbers on the grounds of perceived damage to vegetation by elephants in areas such as the Mahango Game Reserve, along the Kwando River, along the Chobe River frontage in Botswana and on the eastern floodplains of Caprivi. It is believed that the current and potential future extent of habitat modification is likely to lead to negative changes in the biodiversity of these areas. This might not be a problem if biodiversity was not also being negatively affected by human induced habitat change in areas neighbouring protected areas, e.g. human habitation has led to the removal of most of the riverine vegetation along the length of the Okavango River in Namibia, apart from small pockets on islands and in the Mahango Game Reserve. Yet there is considerable consensus that the riverine vegetation is also being removed by elephants in Mahango and it is argued that there is a need to manage elephants to protect this last remaining intact riparian forest and the broad spectrum of associated species. Another justification for intervention is the possibility that a *laissez faire* approach would lead to a large die off of elephants due to a reduction in the vegetation able to support a large population, exacerbated by years of drought. If such a situation were to occur, it would be unacceptable in the developing countries of the SADC region with high levels of rural poverty. It would be difficult to justify a waste of meat and other products to local residents and to national politicians.

Wilderness Safaris, a leading tourism company in Namibia, believes that nature should be allowed to take its course (Bell *pers. comm.*), and is opposed to control measures such as culling. Wilderness favours the expansion of protected areas and the opening up of corridors for elephants to move into new areas as the means of relieving pressure from high elephant numbers.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

The MET maintains culling as a management option when necessary and practical, and as a focused intervention over a short period of time to reduce elephant numbers. Culling took place in the Etosha National Park during 1983 and 1985 when, at the height of a severe drought, it was felt that elephant numbers were too high. At present, the MET does not believe culling to be a viable option in the main areas of concern (Khaudom/Tsumkwe, Mahango/Caprivi) because these are open systems linked to the large transboundary population that has northern Botswana as its "hub". As immigration appears to be an important factor causing the increase in numbers in these areas, culling is unlikely to lead to a reduction in numbers. There are also doubts about the Ministry's capacity to launch a culling operation of any size, although this could be outsourced to the private sector.

Senior Ministry officials and NGO personnel suggest it would be better to ease off the restrictions on use of elephants by local communities on communal land in the north east, where the continued utilisation of elephants over time through cropping could constrain population growth, encourage dispersal due to disturbance and provide local communities with incentives to tolerate elephants on their land. Community-conserved areas such as conservancies in Namibia and neighbouring Zambia and Angola could expand elephant range and provide corridors connecting protected areas. This would involve a relaxation of internal controls by the Namibian Government such as the devolution to conservancies of decision-making over how many elephants to harvest and how many problem animals to destroy. It would also require the removal of existing restrictions on trade in elephant products under CITES. Such an approach would be accompanied by the development of small-scale local industries for the drying and sale of elephant meat, the processing of skins etc. MET and NGO personnel believe that if local communities were able to realise the full range of potential benefits from elephants and other wildlife there would be sufficient incentive to view elephants as a sustainable resource that should be managed rather than eliminated.

There are clearly different views within the tourism industry in Namibia. Ms. Jean Liechtie, the Chair of TASA was not personally opposed to culling, but said there were those in the industry that would be. One of the companies opposed to culling is Wilderness Safaris which is also against trophy hunting. The company supports the development of TFCAs that expand protected areas, open up corridors between elephant populations and provide substantial benefits to local communities Wilderness Safaris believes the best way to generate such benefit is through photographic tourism. Tourists are willing to pay more to visit areas where there is no hunting because elephants are less disturbed and aggressive (Bell *pers comm*.). Wilderness is against culling and hunting on ethical grounds and on business grounds because many tourists will not visit areas where these occur (D. Van Smeerdijk, *pers. comm*.).

MET and NGO personnel emphasised the need for different approaches in different parts of the country. Thus in Kunene Region, where the population is low (approx. 800) and exists mainly on communal land and links to Etosha, management would support conservancy formation and operation, enhance benefits to local communities, and focus heavily on mitigating elephant/human conflict. Neither culling nor large scale cropping would be appropriate, although the small-scale trophy hunting could continue. The approach in Etosha would be more *laissez faire* due to the stability of the population.

Most of those interviewed emphasised that the northern Botswana population is the key to elephant issues in north-eastern Namibia. Some felt that there is a need to reduce this population but the logistical problems and costs of taking off around 6 000 elephants a year simply to maintain the current population would be too great. Others believe that if there was sufficient political will within southern Africa, the capacity could be found within the private sector to carry out culling , and that the operation could pay for itself. However, in order to carry out such an operation, there would be a need for a major public relations exercise to win over international opinion. There was a sense of frustration and indignation that influential animal rights organisations so far removed from the problem on the ground should be so influential in determining national approaches to elephant issues. A common view (as in Botswana) was, “if people in the West don’t want elephants killed, then they should provide sufficient money to fetch them in their thousands and take them elsewhere”.

3. Contraception to curb population growth

None of the MET or NGO personnel interviewed thought contraception was a viable option for dealing with the problems of elephant management. They felt it would be too difficult to locate and implant sexually mature females in sufficient numbers to have an impact on population numbers, particularly in northern Botswana. Further, contraception could have an effect on the social make up of elephant herds, leaving a disproportionate number of old cows with no offspring. One could not be sure what effect this might have on herd behaviour. A further negative consideration was the likely cost likely of carrying out contraception at the level required to reduce a population such as that in northern Botswana simply to maintain it at current numbers.

4. Translocation to new protected areas or areas of low population density

All interviewees felt translocation was a useful management tool, but most expressed the view that it was too expensive to be used to reduce numbers significantly, although it could be useful in re-introducing elephants where populations had declined due to extraneous factors such as the war in southern Angola.

5. Translocation to private land where elephants may later be hunted or culled (used sustainably)

None of the MET and NGO personnel object in principle to the translocation of elephants to private land where they might used sustainably, while pointing out that this will not significantly reduce elephant numbers, partly because of a lack of demand on private land in Namibia. Those private game ranches that have introduced elephants want to get rid of them because of damage to infrastructure such as fences, and it is difficult to translocate real family units to private farms (B. Beytell, *pers. comm*.). Most game ranch units in Namibia are too small to host elephant.

6. Human/elephant conflict mitigation

The mitigation of conflict between people and elephants was mentioned as an important strategy by all those interviewed. In Namibia, this goes hand in hand with CBNRM. MET and NGO personnel argue strongly that a number of mechanisms need to be used. Government should devolve to conservancies the decision-making over problem animals and the cropping of elephants in order to generate sufficient benefits to outweigh the cost of elephant damage to individuals. One possibility is to return to the system that operated in Caprivi in the past where each chief had a designated hunter who could shoot problem elephants. With sufficient communication between government and local residents and sufficient community participation in decision-making the problems on the ground can be resolved (G. Owen-Smith, *pers. comm.*). A positive attitude towards elephants by local communities is crucial because protected areas in Namibia are not large enough to contain elephant populations all year round and in Kunene most elephants are found outside protected areas on communal land.

There needs to be more research and implementation of successful mitigation measures. In the north-west, water installations have been protected against elephants by stone walls, and in some areas water points for elephants only have been constructed. Such approaches need to be linked to broader community management of wildlife in order to ensure that local people maintain protection measures and the alternative water points for elephants. In the north-east, experiments are taking place with the growing of alternative cash crops such as chilli peppers that can also be used to deter elephants from entering fields. The WWF-LIFE Project is promoting such experimentation as well as an approach known as “conservation farming”, which aims at reducing the extent of shifting cultivation by

promoting the cultivation of permanent fields through increased soil fertility, thus reducing the need to open up new land . In Caprivi, conservation farming could help to reduce the conversion of natural habitat to farmland and could lead to better land use planning, reducing the incidences of people settling or ploughing fields in elephant movement corridors.

6. Community-based natural resource management (CBNRM)

All those interviewed agree on the need for local communities to benefit from conservation as an incentive for residents to tolerate elephants and other wildlife on their land and in order to maintain sufficient habitat for wildlife outside protected areas. There is agreement that the low number of cases of illegal killing of elephant in Namibia, the increase in elephant numbers, the expansion of the range of elephants in Kunene Region and the increase in other wildlife species in the north-west are all partly attributable to the existing CBNRM programme in Namibia, which includes sustainable trophy hunting as a means of generating community revenue. However, there is consensus that much more needs to be done to increase the level of community benefit and control over decision-making. The issues regarding the need for a higher level of benefit and decision-making were discussed above. There is consensus that the Namibian government needs to make policy and legislative changes that promote greater devolution to conservancies and new wildlife legislation is expected to go some way to achieving this. However, there is also agreement on the continued need for support to conservancies to develop their wildlife management and institutional capacity to operate effectively. Experience has shown that it takes time for this capacity to be developed and for conservancies to develop sufficient institutional legitimacy among local residents (Jones 2004). One of the main areas of concern is that household and individual income and other benefits from CBNRM do not outweigh the costs brought about by investing time, effort and financial resources in wildlife management and by losses and damage caused by predators and herbivores such as elephant.

8. The development of elephant movement corridors

There was consensus among those interviewed that developing elephant movement corridors could be a useful management option, although a number of stakeholders cautioned that the rate of elephant colonisation is slow and that this option on its own will not significantly reduce numbers. The movement of radio-collared elephants from Botswana through the Caprivi into southern Angola and from Botswana into the Sioma Ngwezi NP in Zambia suggests that such re-colonisation could be possible (Chase undated). There are a number of barriers to creating corridors for elephant movement, including the extensive minefields in south eastern Angola, the veterinary fence erected by Botswana along its border with Namibia between the Okavango River and an area 20 km short of the Kwando River, the presence of people living in and around the Sioma Ngwezi NP in Zambia and the presence of people living along the Zambezi floodplains adjacent to the eastern floodplains of Caprivi. All of these issues need addressing if viable corridors are to be established.

3.4.5 *Conclusions*

Analysis of the issues, problems and solutions provided by the stakeholders interviewed suggests that elephant management in Namibia requires a multifaceted approach that is flexible both temporally and spatially. Different approaches are required in different parts of the country and as the situation changes, strategies also need to change. Most of those interviewed essentially favour the development of a package of management approaches that includes the following:

a) Investment in further research and implementation of human/elephant conflict mitigation approaches and devolution of decision-making over problem animals to the local level (MET regional offices and conservancies)

b) Investment in further research to understand the effects of elephants on vegetation and biodiversity

c) Investment in continued research to monitor elephant numbers, population trends and to understand elephant movements, particularly across international borders and between protected areas and community conserved areas

d) The use of culling as a management tool where necessary and where affordable and practical, based on a precautionary approach to conserving biodiversity

e) The removal of internal and external restrictions on the use of elephant products so that governments and local communities can realise the full value of elephants as a resource

f) The cropping of elephants in conservancies both as a management tool and to generate a high level of benefit to local residents

g) The application of an adaptive management approach that ensures that management responds to monitoring and the provision of good data on population numbers and trends

h) The development of elephant movement corridors between protected areas and across international boundaries, particularly through the promotion of CBNRM, the removal of the international border/veterinary fence between Botswana and the Bwabwata National Park in Namibia and the demining of the Luiana Partial Reserve in southern Angola.

i) Strengthening and improving the existing legislation on CBNRM through further devolution of rights over wildlife to conservancies, including local quota setting and cropping of elephants; increasing the benefits to local communities to a level where the benefits outweigh the costs for households and individuals

j) Investment in a highly focused and targeted public relations campaign to inform national decision-makers, international conservation organisations and the international general public and decision-makers of the issues concerning elephant management in southern Africa and the need to reduce elephant numbers through cropping or culling if necessary.

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3.4.7 *Persons consulted*

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Mr Ron Phillips, Small Business and Conservation Farming Advisor, WWF-LIFE Project

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Mr Danie Strauss, President, Namibian Professional Hunters' Association

Mr Chris Weaver, Chief of Party, WWF LIFE Project

3.5 SOUTH AFRICA

3.5.1 *Elephant numbers, distribution and trends*

By 1900 there were a few elephants in the Tsitsikama Forest near Knysna in the Cape, in the Tembe area of Zululand, about 130 in the Addo area near Port Elizabeth, and none in Kruger National Park (KNP). A herd of ten elephants reportedly entered the KNP in 1905 along the Olifants River and by 1908 the number had increased to 25. An attempt to eradicate the Addo population in 1919-1920 was not completely successful and by 1931 when the Addo Elephant Reserve was created eleven elephants remained to form the founder population (Whitehouse 2002). The herd has since increased to >340 animals.

The KNP elephant population had grown to 6,586 by 1967 when the decision to maintain the population at about 7,000 was taken and culling started. An annual cull kept the population between 6,800 and c. 8,700 animals from 1967 to 1994. Culling was suspended in 1995 and the population of c. 8,000 has since nearly doubled to 13,000 elephants at the last census in 2004.

During the period 1979 to 2001 more than 800 elephants were translocated to more than 58 small fenced reserves in South Africa with a mean founder size of 26 animals with a range of 2 to 227 (Garai et al 2004). The Madikwe Game Reserve was restocked with 227 elephants from the Gonarezhou NP in Zimbabwe in 1991 and the population has since grown to 424 animals.

Elephants from Botswana and Zimbabwe have moved into the newly established Mapungubwe National Park and the associated game reserves along the Limpopo River.

The total number of elephants in South Africa is now in the region of 20,000, distributed in more than 80, mostly small isolated populations. Nearly all of these populations are expanding and many are already facing problems of overpopulation.

Table 3.5.1. Summary of numbers and distribution of main elephant populations in South Africa.

Area	No. of Elephant	Year	Source
Kruger National park and adjacent areas	12,396	2004	Whyte, 2005
Addo Elephant National Park	340	2002	Whitehouse, 2002
Madikwe Game Reserve	424	2004	Makakgala, 2004
Pilanesburg	162	2004	Makakgala, 2004
Hluhluwe-iMfolosi	320-400	2004	Block, 2004
Tembe Elephant Park	180	2004	Block, 2004
Marakele	?		
Mapungubwe	?		

3.5.2 *Policy and legal framework*

The National Environmental Management Act of 1998 now provides the primary legislation governing the management of natural resources in South Africa. Within that framework the National Environmental Management: Protected Areas Act No. 57 of 2003 and the National Environmental Management: Biodiversity Act No. 31 of 2004, provide the new legal basis for elephant management in South Africa. The major innovative measures in the environmental legislation are provisions for formal public participation in the development of management plans for protected areas and the conservation of biodiversity. The legislation stipulates that management activities, such as culling or the use of contraception, require the development of a management plan involving public

participation and scrutiny and the approval of the responsible minister before it can be implemented. To this end the South African National Parks Board (SANParks) has recently held two public consultative meetings on the question of elephant management in South Africa. The Great Elephant Indaba was held at Berg-en-Dal in Kruger National Park in October 2004, and the second, a science meeting, was held near Pretoria in March 2005. Recommendations and plans for management of elephant under the new legislation are still in the process of being developed.

Some notable features of the new legislation in relation to the management of elephant and other natural resources in protected areas are its provisions for sustainable use of natural resources within all types of protected areas, its emphasis on benefits to local communities and their involvement in the planning process. These provisions are outlined here in some detail because it was clear that many in South Africa were unaware of the extent to which the emphasis in conservation legislation has changed from a narrow protectionist approach to embrace a wider, more inclusive and sustainable use philosophy in that country.

The preamble to the Protected Areas Act No. 57 of 2003 reads as follows:

> "To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith."

The objectives of the Act are:

(a) to provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas;

(b) to provide for co-operative governance in the declaration and management of protected areas;

(c) to effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;

(d) to provide for a representative network of protected areas on state land, private land and communal land;

(e) to promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas; and

(f) to promote participation of local communities in the management of protected areas, where appropriate

The preamble to the Biodiversity Act No. 31 of 2004 reads as follows:

> "To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith".

The objectives of the Act are:

(a) within the framework of the National Environmental Management Act, to provide for—

(i) the management and conservation of biological diversity within the Republic and of the components of such biological diversity;

(ii) the use of indigenous biological resources in a sustainable manner; and

(iii) the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;

(b) to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;

(c) to provide for co-operative governance in biodiversity management and conservation; and

(d) to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

Some relevant definitions under the Biodiversity Act are:

''biological diversity'' or **''biodiversity''** means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems;

''components'', in relation to biodiversity, includes species, ecological communities, genes, genomes, ecosystems, habitats and ecological processes;

''ecological community'' means an integrated group of species inhabiting a given area;

''ecosystem'' means a dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit;

''sustainable'', in relation to the use of a biological resource, means the use of such resource in a way and at a rate that—

(a) would not lead to its long-term decline;

(b) would not disrupt the ecological integrity of the ecosystem in which it occurs; and

(c) would ensure its continued use to meet the needs and aspirations of present

and future generations of people;

''this Act'' includes any subordinate legislation issued in terms of a provision of this Act;

''threatening process'' means a process which threatens, or may threaten—

(a) the survival, abundance or evolutionary development of an indigenous species or ecological community; or

(b) the ecological integrity of an ecosystem, and includes any process identified in terms of section 53 as a threatening process;

The following amendments to the Protected Areas Act, 57 of 2003 make clear provision for communities to use, on a sustainable basis, biological resources within a park and for protected area authorities to control species that may negatively impact on biodiversity within a park provided such actions fall within the approved plan for the area.

Amendment of section 50 of Act 57 of 2003

19. Section 50 of the principal Act is hereby amended-
(a) by the substitution for the heading to that section of the following heading:
"Commercial and community activities in national park, nature reserve and world heritage site";
(b) by the substitution for subsections (I), (2) and (3) of the following
"(1) The management authority of a national park, nature reserve and
world heritage site may, despite any regulation or by-law referred to in
section 49, but subject to the management plan of the park, reserve or subsections:
(a) carry out or allow-
(i) a commercial activity in the park, reserve or site; or
(ii) an activity in the park, reserve or site aimed at raising revenue;
(b) enter into a written agreement with a local community inside or

adjacent to the park, reserve or site to allow members of the community to use in a sustainable manner biological resources in the park, reserve or site; and
(c) set norms and standards for any activity allowed in terms of paragraph *(a)* or *(b)*.
(2) An activity allowed in terms of subsection (l)(a) or *(b)* may not negatively affect the survival of any species in or significantly disrupt the integrity of the ecological systems of the national park, nature reserve or world heritage site.
(3) The management authority of the national park, nature reserve or world heritage site must establish systems to monitor-
(a) the impact of activities allowed in terms of subsection *(l) (a)* or *(b)* on the park, reserve or site and its biodiversity; and

55. (1) South African National Parks must-
(a) manage the national parks and other protected areas assigned to it in terms of Chapter 4 and section 92 in accordance with this Act;
(b) protect, conserve and control those national parks and other protected areas, including their biological diversity; and
(c) on the Minister's request, advise the Minister on any matter conceming-
(i) the conservation and management of biodiversity; and
(ii) proposed national parks and additions to or exclusions
(d) on the Minister's request, act as the provisional managing authority of existing national parks; and protected areas under investigation in terms of this Act
(2) South African National Parks may in managing national parks-
(a) manage breeding and cultivation programmes, and reserve areas in a park as breeding places and nurseries;
(b) sell, exchange or donate any animal, plant or other organism occurring in a park, or purchase, exchange or otherwise acquire any indigenous species which it may consider desirable to re-introduce into a specific park;
(c) undertake and promote research;
(d) control, remove or eradicate any species or specimens of species which it considers undesirable to protect and conserve in a park or that may negatively impact on the biodiversity of the park;

The South African legal framework clearly makes provision for the sustainable use and control of elephants within protected areas – including national parks. In this respect it differs from neighbouring countries where consumptive use of natural resources in strict national parks generally follows the IUCN classification for such areas where "use" other than for scientific or management purposes is not permitted.

3.5.3 *Key issues and perceived elephant management problems*

All protected areas in South Africa are facing the problem of expanding elephant populations. Some populations, because of their age and sex structure, have been expanding at rates in excess of 10% per annum. The "overpopulation" issue is under scrutiny and generating considerable, often polarized, debate within South Africa and internationally. The central issues are those of elephant impacts on biodiversity and the ethical and moral questions surrounding the use of culling and contraception to control elephant numbers.

Human/elephant conflict (slash used earlier)

Because protected areas in South Africa are fenced, human/elephant conflict is not a major issue other than on the boundaries of Kruger National Park where elephants occasionally break fences and move into neighbouring communal areas where human densities exceed 100 people per km^2. Apart from the immediate disruption caused by the activities of crop-raiding elephants, broken fences allow other species, such as impala, to move out of the park and spread foot and mouth disease (FMD) to livestock (Bengis 2004, 2005). Because of its impacts on livestock and the marketing of livestock products, FMD outbreaks in areas surrounding KNP have major economic implications and the costs of subsequent measures to contain the spread of the disease are extremely high. Bengis (2005) has noted that the higher the density of elephants within the KNP, the higher the incidence of fence breaking.

Biodiversity conservation

As occurs elsewhere in Southern Africa high densities of elephant have resulted in habitat change and loss of trees and woodlands. Changes to vegetation and impacts on particular tree species have been studied but the potential consequential effects on species richness and other aspects of biodiversity have received remarkably little attention. The result is considerable controversy about elephant impacts on biodiversity, the conservation of which forms the central responsibility of protected areas. The problem is further compounded by a lack of clarity on precisely what is meant by "conserving biodiversity". The consequences of this vagueness are that the Minister can face court action for killing elephants without meeting the standards of reasonableness and rationality required by law (Bilchitz 2004). Equally, the Minister can face court action for failing to reduce elephant numbers as a precautionary measure to protect biodiversity (D. Daitz *pers. comm*. 2004).

The present "thresholds of potential concern" in the KNP elephant management plan are unlikely to be sufficiently precise and measurable to avoid continuing litigation in the courts on the matters of elephant management (Kay 2004).

Ethical and moral issues related to killing elephants

There is full range of strongly held views on the culling of elephants in official, scientific and public circles that range from the belief that there can be no ethical or moral justification for killing elephants to the view that they represent a valuable resource that should be used sustainably. The debate has been highly polarized.

Traditional and community leaders in areas surrounding KNP indicated that they do not object to culling elephants provided this is humanely and properly executed and all the products are recovered and used (Masuluke 2004, Sturgeon 2004). They see little point in the use of contraception to control economically productive populations, are concerned that it may harm the species (Masuluke 2004) and that it is an expensive option where the funds might be better spent on poverty alleviation (Mjadu 2004).

The Wildlife and Environment Society of South Africa – WESSA, the oldest conservation society in the country with a substantial, informed membership, considers that culling is the *only viable short-*

term option to reduce overpopulation and believes it would be dangerous to adopt a *laissez-faire* approach to the Kruger elephant problem. WESSA supports the consumptive use of natural resources provided it is done in a humane and ethical manner and is socially and economically justified. WESSA also holds that elephant management actions should be fully justified on sound scientific grounds (Kay 2004, Ferrar and Rossack 2005, Ferrar 2005). Essentially similar views are held by a range of other conservation related organisations in South Africa, including, the Elephant Management and Owners Association (EMOA Policy Document 2004), and the South African Hunters and Game Conservation Association (Thompson 2004).

Animal rights and welfare organisations, such as Justice for Animals and the International Fund for Animal Welfare – IFAW, do not condone the killing of elephants and advocate that other options, such as translocation, contraception and expansion of elephant range, should be used if population numbers do need to be controlled (Pickover and Smith 2004, Greenwood 2004, Bell 2005[1]). They do not believe there is sufficient evidence to show that elephants in KNP are adversely affecting biodiversity in the park, and consider that more research is needed to understand how elephants affect biodiversity.

Transboundary management of elephant

There are two elephant populations that lie on international borders and where transboundary management issues arise, KNP which now adjoins the Limpopo National Park (LNP) in Mozambique and communal land across the Limpopo River in Zimbabwe, and the Mapungubwe National Park that borders on Botswana and Zimbabwe. Parts of the fence between KNP and LNP have been lowered and elephants have been translocated into the LNP from Kruger. So far only limited dispersal from KNP in Mozambique has occurred. In the case of Mapungubwe there has been a rapid influx of elephants from Botswana, where elephant densities are very high, and possibly from Zimbabwe. The influx has raised concern about elephant impacts on woodlands in what is primarily a World Heritage Site and cultural park.

The spread of animal diseases is a key issue in the development of transfrontier conservation areas (Cumming 2004) and a potential stumbling block in the proposed use of elephant corridors and dispersal between countries to relieve pressures in overpopulated parks. The lowering of fences results in the movement of other species besides elephant. Bovine tuberculosis is prevalent in Kruger buffalo and is spreading north through the park. Zimbabwe is concerned that the disease will spread into the South East Lowveld and infect cattle, which so far appear to be clear of tuberculosis. Veterinary authorities will almost certainly want to erect fences to contain the spread of the disease. Likewise the spread of FMD from Zimbabwe into Botswana in the area of the Shashe Limpopo is a major concern to the Government of Botswana.

3.5.4 *Stakeholders views on different management options*

The Great Elephant Indaba and the science meeting convened by SANParks were both attended by Cumming (independently of this study) and the following draws largely on the views expressed by the wide spectrum of organisations and individuals who attended those meetings. The debate within South Africa has so far tended to centre almost entirely on Kruger National Park (KNP) and the management of that population.

[1] Jason Bell quoted in The Economist, 19th-25th March, 2005, "Mulling a cull", page 101.

1. No control, leave elephant populations to expand.

A non-interventionist or *laissez-faire* approach is strongly supported by animal rights and animal welfare groups on the grounds that killing elephants should never be countenanced. Some scientists argue, largely on theoretical grounds, that intervention is not necessary because expanding elephant populations will eventually reach carrying capacity and some measure of equilibrium with their food resources. In the specific case of KNP it was argued by both animal rights activists and some scientists that there was insufficient evidence to support the claim that increasing elephant populations had, or were having, adverse effects on the biodiversity of the park, i.e. no species losses had occurred. It was further argued that none of the "thresholds of potential concern" given in the park management plan, which signal when action needs to be taken in relation to elephant impacts on biodiversity, had been reached or surpassed.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

Culling to reduce elephant numbers has been proposed for two protected areas in South Africa, namely, KNP and Marakele NP, where elephants were re-introduced in the 1990s. The Addo Elephant National Park has accommodated increasing numbers of elephant by expanding the park. As indicated above, the 20 year culling programme in KNP stopped in 1995. A management plan to allow elephant numbers to increase in some parts of the park and to reduce them in others (by culling) while maintaining two botanical reserves with low numbers was developed between 1995 and 1999. After wide stakeholder involvement and support the management plan was submitted to the Minister of Environment and Tourism but was not endorsed.

Apart from the objections on ethical or moral grounds to culling, the key concerns that have been raised about the current management plan include the following:

- The management issue in question is not elephant numbers but elephant impacts and there may be better ways than culling to manage impacts, such as manipulating water supplies.
- The proposed 'experiment' will need to run for many years in order to provide meaningful results. The risk of it not being maintained and of thus failing to produce a result is also high. There are more efficient and quicker ways to gain a better understanding of elephant-biodiversity interactions (du Toit 2005)
- The evidence that elephants have, or are, adversely affecting biodiversity of the KNP is not convincing.

The proponents of culling argue that the woodlands and populations of trees have been, and continue to be, reduced in the park and that given the numbers of species of small mammals, birds, reptiles and amphibian that are known to depend on large trees there is good reason to reduce elephant densities and thus impacts on woodlands. The management plan and culling option is also considered to be adopting the precautionary principle and a strategy of minimum regret.

3. Contraception to curb population growth

A Preliminary trial in immuno-contraception using zona-pellucida proteins was started in Kruger National Park in 1996 using 41 elephant cows (Bertschinger et al 2004) and has since been followed up in several small game reserves within South Africa. The project in Makali has been running for long enough to provide data on the efficacy of the vaccine and possible effects on behaviour; ten cows had passed the 53-month inter-calving period without calving early, indicating 100% control

(Bertschinger et al 2004). No negative behavioural effects or anomalies had been observed during the initial phase of this project (Delsink et al 2004).

4. Translocation to new protected areas

There are no large protected areas that could absorb surplus elephants in South Africa

5. Translocation to private land

With the very rapid elephant restocking of small protected areas in South Africa over the last decade there are now very few areas into which elephant could be moved and most of the existing small populations are already facing problems of rapid population growth.

6. Expansion of elephant range and development of TFCAs and corridors

There is a high level of enthusiasm for the creation of corridors and the management of elephants across the region as a single large "meta-population" (Van Aarde 2004). This is seen as an ethical way out of the culling dilemma and also makes sense in terms of large scale conservation and tourism development in the sub-region. The practical issues involved are discussed later in this report.

3.5.5 *Elephant management capacity*

Within the region, South Africa stands out in having a very high level of technical capacity that can be drawn upon in the management of its elephant populations. The Kruger NP, for example, hosts more than 200 ongoing research projects on a wide range of ecological issues. Several universities within the country have ongoing research programs dealing with elephant ecology and behaviour. The research on elephant contraception is being led by the Faculty of Veterinary Sciences at the University of Pretoria. SANParks have the resources to fully monitor their elephant populations and carry out elephant management programmes.

3.5.6 *Conclusions*

South Africa has a single large elephant population of c.12,000 in KNP, several smaller populations of between 150 and 500 elephants, and more than 80 small populations – mostly in small private reserves. New legislation governing the management of protected areas and elephants requires management plans that are open to public scrutiny and debate before they can be adopted and implemented. There is, accordingly, intense and often highly polarised debate within South Africa on options for managing elephant overpopulations, particularly for KNP where the population was held at between 6,000 and 8,000 elephant from 1966 to 1994, when a moratorium was place on culling. The population has since nearly doubled.

Nearly all protected areas are facing, or will soon face, overpopulation problems. Options for translocation are now very limited and the debate is centred on the use of contraception or culling to curtail growth or reduce populations. The option of extending elephant range and opening corridors to areas of low elephant density has very limited application in South Africa but is a possibility in TFCAs being established for the Great Limpopo, the Sashe-Limpopo (Mapungubwe), and Ndumu. However, no management plans have been finalised and the Minister responsible is continuing to consult widely.

Because elephant in South Africa are generally held behind well-constructed fences, human/elephant conflict is not a major issue in the country.

The recently enacted legislation for protected areas is dealt with in some detail because it differs from that in other countries in the region, in that it makes provision for the sustainable use of natural resources within protected areas. This provision has a bearing on the attitudes and claims of communities bordering KNP who consider the sustainable harvesting of elephant to be a means of providing benefits to local people, while also meeting the biodiversity gaols of the park.

South Africa has the greatest capacity in the region for research, monitoring and management of elephant.

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3.5.7 *Persons consulted*

One of us (DC) attended both the Great Elephant Indaba in October 2004 and the Science Meeting held in March 2005 and this chapter draws on that experience where he was exposed to a wide range of opinion in South Africa. However, neither meeting was attended as part of this consultancy.

3.6 ZAMBIA

3.6.1 *Number and distribution of elephant*

The total number of elephant in Zambia was estimated to be about 20,000 in 2002 (Blanc et al 2003). These are distributed in four main population clusters (Fig. 1), namely the Luangwa Valley (14,000), Kafue (5,000), Lower Zambezi Valley (1,500) and Sioma-Ngwezi (1,000). Smaller, possibly isolated populations occur in West Lunga NP in the north west of the country, Nsumbu NP in the north east on Lake Tanganyika, and Kalindi-Kasanka, Insangoma and Luvishi-Manda south of Lake Bangweulu. The population is considered to be stable or increasing (W. Chansa of ZAWA *pers. comm.* 2005). Recent aerial censuses of parts of the elephant range in Zambia have been conducted by Dunham and Simwanza (2002), Dunham (2004), and Van Aarde and Guldemond (2004a, 2004b). Approximate distribution is shown in Fig. 1.1 (page 2).

Historically, Zambia's elephant population increased from a few thousand in 1900 to an estimated 12,000 in 1934 (Pitman 1934) and to 55,000 in Luangwa Valley alone in the early 1970s (Caughley and Goddard 1975). High levels of poaching during the 1970s and 1980s and continuing poaching after that reduced the populations to below 20,000. Recent surveys suggest an increase in numbers in the Kafue, Lower Zambezi and Sioma Ngwezi areas. Increases in elephant numbers in the Lower Zambezi and Sioma-Ngwezi areas are largely a result of immigration from densely populated areas in Botswana and Zimbabwe. The apparently low levels of population growth in Zambia over the last decade compared with Zimbabwe and Botswana suggest that illegal killing of elephant is still high.

The current elephant range in Zambia is estimated to cover 120,000 km^2 or nearly 16% of the country. A further 87,000 km^2 has been considered potential range for elephants but this number requires updating and confirmation (Blanc et al 2003). The total wildlife estate of Zambia covers an area of 224,073 km^2, or nearly 30% of the country. There is a potential for elephant numbers to expand in the Luangwa Valley, the Lower Zambezi Valley and in the south-west of the country. The Kafue National Park and surrounding Game Management Areas have historically carried very low densities of elephant and the potential for higher densities to be carried in that nutrient poor ecosystem will need further investigation.

3.6.2 Policy and legal framework

The Zambia Wildlife Authority (ZAWA) has recently produced a draft National Elephant Conservation Plan. The vision for elephants is

> "to effectively protect and secure viable populations of elephant in natural habitats that will contribute to the economic, social and spiritual wellbeing of the rural communities and the country as a whole, for present and future generations."

The primary goal of the Government of Zambia is:

> "to conserve elephants at population levels which promote conservation of biodiversity while providing for sustainable utilisation."

It is Government's policy to:

- Mitigate human-elephant conflicts
- Reduce poaching levels

- Provide adequate trained personnel
- Secure and allocate adequate financial resources
- Establish and maintain a comprehensive ivory management system
- Provide a favourable environment for the resumption of sustainable elephant hunting
- Strengthen and maintain coordination of elephant conservation in transfrontier areas
- Develop and implement public awareness campaigns

The two major acts that govern environmental and conservation activities in Zambia are the Environmental and Pollution Control Act and the Zambia Wildlife Authority Act.

3.6.3 Key issues and perceived elephant management problems.

A cross-section of stakeholders was consulted during a three-day visit to Lusaka in April, 2005. It was clear that elephant over-population was not an issue in Zambia, other than near Livingstone in the Mosi-oa-Tunya National Park where it is a serious problem, and the country wished to increase its elephant population to former levels. However, even at the current relatively low elephant population levels, the primary concern raised by all stakeholders was that of human/elephant conflict and the absence of benefits realized by rural communities carrying the costs of living with elephants. The key problems were crop raiding by elephants and the frequency of people being killed by elephants.

On the question of human/elephant conflict it is interesting to note that during the 1950s the control of crop-raiding and other problem elephants was an ongoing activity and was estimated to supply local inhabitants of the Luangwa Valley with an average of 250 gm of elephant meat per person per week (Ansell1960).

Zambia does not have a compensation scheme to cover damage to life or property by wildlife. Elephants have not been hunted since 1984, with the result that they have not generated financial returns to communities living within Game Management Areas or adjacent to National Parks. The only compensation realized has been the distribution of meat from animals occasionally killed during control measures.

3.6.4 Stakeholder views on different Management Options.

1. No control – let elephant populations expand

Zambia presently has good reason to want its elephant populations to expand. However, its policy and management plan make it clear that the country will retain the option to control elephant populations to maintain quality habitats and for the purposes of consumptive use.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

Prior to the collapse of Zambia elephant populations in the 1970s, the animals were regularly cropped as part of an ongoing elephant control programme and a major elephant cropping programme took place between 1965 and 1972 in the South Luangwa National Park. The cropping included hippo and its aim was primarily meat production.

There are presently no local overpopulation problems of a sufficiently serious nature to consider culling, and as indicated above, Zambia is keen for its elephant population to grow and the hunting of elephants, apart from those killed in defence of life or property has been banned since 1984.

However, twenty elephants have now been placed on quota for 2005. This is a CITES-approved trophy quota. The animals will be hunted on safari operations in GMAs. Half of the trophy fees will be retained by ZAWA and the remaining 50% will go to communities living in the areas from which the animals are hunted. The plans to resume trophy hunting after a 20-year ban have been opposed by some stakeholders in the wildlife and tourism industry.

3. Contraception to curb population growth

Contraception as a management tool in Zambia was considered to be irrelevant by all of those consulted. The country needed the elephant population to expand and the lack of technical expertise and costs were further reasons not to use the technique.

4. Translocation to new protected areas or to private land

Translocation, although an option was considered to be too expensive to be implemented in Zambia and there were no prime areas of elephant habitat into which elephant presently needed to be translocated. Translocation to private land is explicitly excluded by the new draft policy.

5. Expansion of elephant range and development of TFCAs and corridors

The greatest potential for increasing elephant range and numbers in Zambia lies within the GMAs which cover an area of 160,488 km^2. If half of this vast area has low human population densities (i.e. < 5 people per km^2) then the GMAs could probably hold a total of about 16,000 elephants at the conservative density of 0.2 per km^2. However, for this to happen, it is clear that the key issue of human-elephant conflict will need to be resolved to the satisfaction of those living in these areas. Several attempts are being made to help farmers reduce elephant damage to their crops and currently these mostly entail the use of chilli peppers and related repellents.

The most effective means of mitigating human/elephant conflict will lie in allowing those living within GMAs to reap the full potential financial benefits of living with elephants. This point was emphasized by many of those interviewed. The potential financial returns from the sustainable use of wildlife are considerable and elephants are, economically, a key species in the equation. As Martin (2005) has recently noted, the potential earnings from the consumptive use of elephant can yield as much as US$300 per km^2. At returns of $300 per km^2 communities living within GMAs would be able to sustainably manage the necessary infrastructure (fences and other deterrents to crop raiding) to protect their agricultural activities and ensure their security. The current revenue-sharing policy of 50% of trophy fee returns to the GMAs and 50% to ZAWA, and the retention of lease fees for safari concessions by ZAWA amounts to an exorbitant "tax" on wildlife as a land use option for communities living within GMAs.

The draft Wildlife Management Plan has specific policy guidelines for certain elephant management options and these are as follows:

- **Live Capture** "of elephants in Zambia will be confined to restocking under-stocked national parks and GMAs, export to zoos and for scientific purposes, for training in elephant-back ride safaris, state donations and other uses on a case by case basis".
- **Culling and cropping** "will be determined and guided by regular and consistent surveys of elephant populations to establish the population status. Such scientific recommendations will be done in the interest of maintaining quality habitat".

- **Game farming of elephants**. "The Government will not permit private wildlife estates to hold elephants, or own elephants except for those kept for elephant back ride safaris or in zoos with adequate facilities approved by ZAWA".
- **Elephant back rides and eco walks**. "Elephant back rides and eco walks will not be permitted in National Parks other than for Mosi oa Tunya National Park where the activity has already been initiated."

3.6.5 Elephant management capacity

The Zambian Wildlife Authority is severely constrained by lack of financial and human resources to manage the country's very large wildlife estate where National Parks comprise 7.9% of the country and Game Management Areas a further 21% of Zambia. The Luangwa North NP has been managed under a special project with assistance from the Frankfurt Zoological Society and Luangwa South NP has for many years been managed by the LIRDP project with support from NORAD. Contractual public-private sector partnerships have been, or are being, negotiated for the management of other NP in the country.

The result is that elephant populations in most part of the country are poorly protected and ZAWA does not presently have the capacity to regularly monitor the status of elephants in the country.

3.6.6 *Summary*

The current elephant population of Zambia is estimated to be about 20,000 compared with an estimate of 55,000 for the Luangwa Valley alone in the early 1970s and before a major wave of poaching reduced the country's elephant population. The elephant range covers about 120,000 or nearly 16% of the country and with current numbers there is not an overpopulation problem. However, some localized high elephant densities are a problem and human-elephant conflict is an important issue in many parts of the country.

Zambia lacks the resources and capacity to effectively monitor and manage its elephant population and low levels of poaching continue to be a matter of concern and are inhibiting full recovery of the elephant population. The elephant range can be expanded through the establishment of TFCAs, re-population of some GMAs and the creation of corridors.

The country wants its elephant population to expand and, although the question of culling does not arise, Zambia retains the option to cull if need be. All stakeholders consulted saw contraception as irrelevant as a management tool, and capture and translocation as being too expensive. Most stakeholders thought that the most effective way of resolving human-elephant conflicts was to allow those living with elephants to reap the full potential financial benefits from the sustainable use of elephants.

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3.6.8 *Persons consulted*:

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3.7 ZIMBABWE

3.7.1 *Elephant number and distribution*

The number of elephant in Zimbabwe has grown from < 4,000 in 1900 to 89,000 in 2001 when the most recent country-wide aerial census was completed (Cumming 1991, Dunham and Mackie 2002). If the rate of population growth of >5% experienced since the mid 1980s remains unchanged, the present population probably exceeds 100,000 elephants. The recovery and high growth rate over the last 100 years has been achieved despite a known off-take of more than 60,000 elephants and attempts to stabilize elephant populations through culling during the period 1965 to 1986 (Fig. 3.7.1).

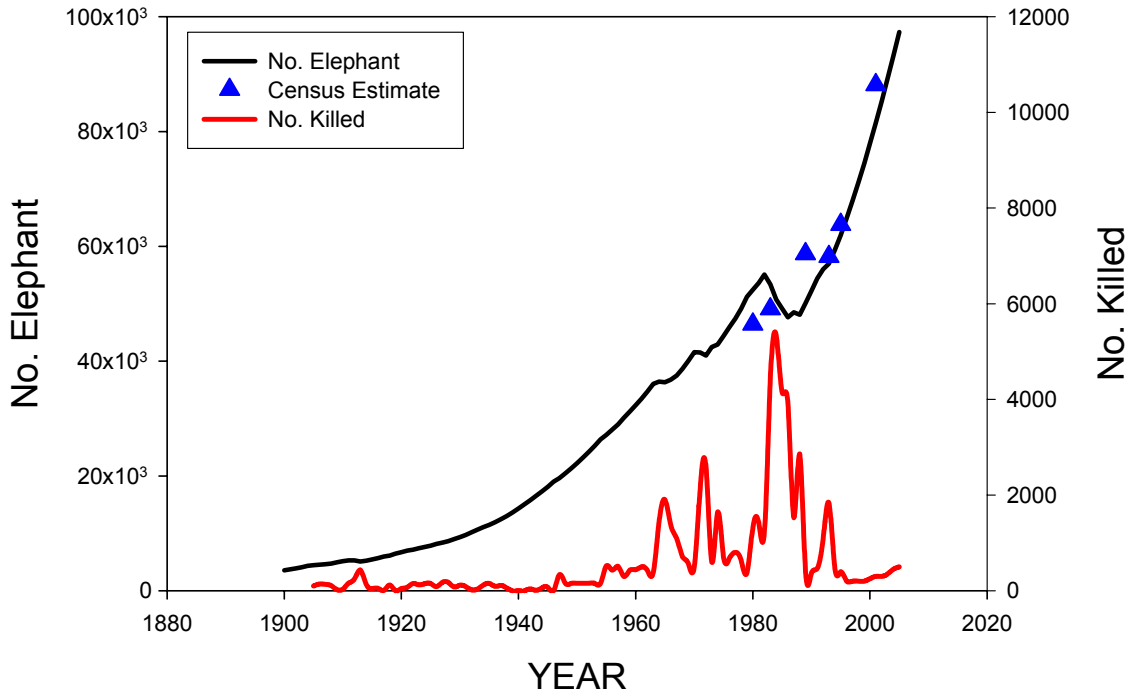

Fig. 3.7.1. Estimated number of elephant in Zimbabwe from 1900 to 2000. The census estimates shown are for those years in which the entire population of the country was surveyed. The numbers killed were derived from ivory exports (up to 1945) and hunting and culling records after 1945. (Source: Cumming and Slotow, 2003)

There are four large, separate elephant populations in Zimbabwe and several smaller, currently isolated, populations in conservancies. The largest population of 49,310 ± 12.3% is found in north-west Matabeleland in the Hwange-Matetsi complex that includes several Forest Areas and part of the Tsholotsho Communal Land in the south (Fig. 3.7.2). This population is contiguous with the Botswana elephant population of >125,000 elephants and is thus part of the largest single population of elephants in Africa. Elephants in the Zambezi Valley fall into the Sebungwe population (13,989 ± 15.2%) to the south of Lake Kariba and the Zambezi Valley population (19,297 ± 13.1%) occupying the parks and wildlife estate between Lake Kariba and Lake Cahora Bassa. The fourth largest population of 4,992 ± 32.8% elephants is centered on the Gonarezhou National Park in the south east of Zimbabwe. Smaller populations totaling about 1,000 elephants occur on conservancies in the south-east Lowveld, in the Shashe-Limpopo TFCA that is shared with Botswana and South Africa, and there is an isolated population of c.100 elephants in the Midlands.

There is presently no evidence to suggest that elephant population growth rates are declining in the country.

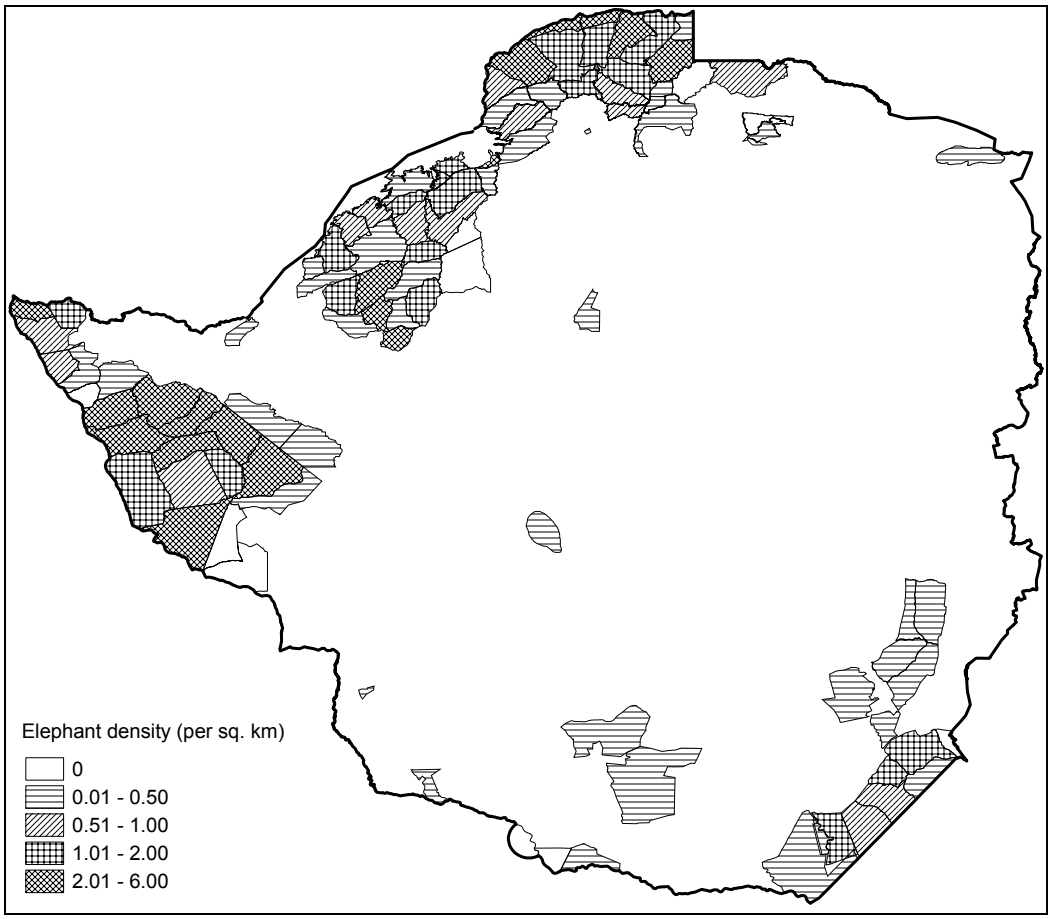

Fig. 3.7.2. Distribution and densities of elephant in Zimbabwe during the dry season of 2001. (Source: Dunham and Mackie 2002)

3.7.2 *Policy and legal framework*

Three legal instruments govern the management of wildlife and indigenous plants in Zimbabwe, namely the National Parks and Wild Life Act of 1975 as amended in 1999, the Forestry Act and the Environmental Management Act of 2004. The Parks & Wild Life Act makes provision for the establishment of six types of fully protected areas: National Parks, Safari Areas, Recreational Parks, Sanctuaries, Botanical Reserves and Botanical Gardens. The Forestry Act makes provision for the establishment of Forest Reserves covering areas of indigenous woodlands (mainly in the northwest adjoining parks & wildlife land), forests and plantations. The Parks & Wildlife Estate and the Forestry Reserves cover some 16% of Zimbabwe.

The Parks & Wildlife Act confers resource use rights and responsibilities (Appropriate Authority) on landowners and occupiers of the land which enables them to manage and derive full benefit from wildlife on their land. In the case of the Communal Lands, appropriate authority is vested in the Rural District Councils. For Forestry land it is vested in the Forestry Commission. The Parks & Wildlife

Act facilitated the rapid development of the wildlife industry in Zimbabwe and the concomitant expansion of land under wildlife to the extent that by the mid 1990s it covered >25% of the country. It also fostered the establishment of several private conservancies, the largest of which, the Savé Valley Conservancy, included 27 properties and covered 3,500 km^2.

An explicit "Policy and Plan for Elephant Management in Zimbabwe" was developed and adopted by the Ministry of Environment and Tourism in 1997 and, although not fully implemented, it is still in force. The document identified a number of issues associated with the conservation and management of elephant in Zimbabwe. Amongst these was the listing of all elephant populations on CITES Appendix I against the wishes of southern Africa, the high and increasing elephant numbers in Zimbabwe, their potential impacts on biodiversity and the problem of increasing human-elephant conflicts in the face of diminished returns, and hence conservation incentives, for rural communities. The ten point policy statement is as follows.

"The Government recognises that elephants comprise an important component of Zimbabwe's wildlife and cultural heritage, and wishes to conserve elephants at levels which promote the goals of biodiversity conservation while ensuring their sustainable use and their contribution to national development through the following:

1. Maintaining at least four demographically and genetically viable populations.
2. Maintaining numbers and densities below levels which will compromise biodiversity.
3. Maintaining or increasing elephant range at or above the 1996 level.
4. Maintaining continuity in research and monitoring necessary for the conservation and management of elephants.
5. Establishing sustainable funding programmes and building and maintaining necessary human resources (staffing levels and capacity) and strengthening elephant management capacity.
6. Strengthening partnerships and stakeholder programmes to facilitate the equitable distribution of the costs and benefits of elephant management and conservation.
7. Minimising human/elephant conflicts
8. Improving public awareness of elephant management and conservation issues and the value of elephants with activities targeted for domestic, regional and international audiences.
9. Ensuring effective trade control measures and enforcement.
10. Liaising with other elephant range states in the region."

The management plan reiterates the policy goal and is followed by ten objectives and associated management actions to give effect to the ten items of policy.

3.7.3 *Key issues and perceived elephant management problems*

Human/elephant conflict

Both human and elephant populations have increased twenty-fold in Zimbabwe over the last 100 years with the human population growing from c. 500,000 in 1900 to 12 million in 2000. Most protected areas are situated on the periphery of the country on land that was considered unsuitable for agriculture or was infested with tsetse fly. Most protected areas are bordered by communal lands into which growing elephant populations have increasingly dispersed to find food and, during the cropping season, to raid villagers' fields. Some 9 % of Zimbabwe's elephants presently occur outside of protected areas in the Communal Lands of the country. Conflicts arose as early as the 1940s when

elephant from Hwange National Park began to disperse into neighbouring areas. With the combination of expanding human populations and settlement, and expanding elephant populations, the rate at which elephants were destroyed around Hwange National Park increased at 15% pa during the 1950s and 1960s (Cumming 1981).

The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) was introduced in 1989 to enable rural communities to benefit from wildlife resources on their land and to meet some of the costs associated with living with wildlife. At least 60% of the revenue earned by the CAMPFIRE programme from trophy hunting is derived from elephant hunts (Bond 1999).

Table 3.7.1. **Number of elephants killed on problem animal control operations in Campfire areas of Zimbabwe during 2002-2004**. Ten people were killed by elephants during this period. (Source: C. Jonga, Campfire Association)

Year	No. Elephant killed
2002	101
2003	245
2004	233+

While steps have been taken to improve the ability of communal farmers to protect themselves and their crops from elephants using a variety of techniques, the underlying problem of increasing elephant populations in protected areas has not been addressed. As Osborne's (2002) work in the Sebungwe indicates, high elephant densities within protected areas can result in declines in woodland species and available food resulting in elephant moving into neighbouring communal lands to feed on both woodlands and cultivated crops (Table 3.7.1).

The currently depressed value of elephant products reduces the benefits that communal farmers can realize from their wildlife, thus shifting the balance of landuse values to agriculture and reducing rather than increasing elephant range in the country. A further concern is that, with increasing numbers of problem animals being shot by local scouts and villagers, combined with a depressed and declining economy, a shift into the illegal trade in ivory is but a small step (F. V. Osborne *pers. comm.* 2005). The upsurge in elephant poaching in Zambia in the 1970s was in part triggered by the dramatic fall in the value of the Kwacha combined with a fall in standards of living in the country (G. Kaweche *pers. comm.* 2005).

Biodiversity conservation

The policy and elephant management plan clearly states the country's intention to "conserve elephants at levels which promote goals of biodiversity conservation" while "maintaining numbers and densities below levels which will compromise biodiversity". The policy and management plan do not define "biodiversity" or limits of acceptable change. However, the following statements in the preamble indicate a primary concern about the loss of woodland habitats - "Elephants are capable of radically modifying habitats. Destruction of trees leading to unacceptable habitat change is accelerating." These sentiments are in keeping with earlier decisions to reduce elephant populations where the loss of woodland habitat was seen as a proxy for the loss of biodiversity.

A number of studies on elephant impacts on woodlands in several protected areas were conducted, or supported, by NPWLM from the late 1960s through to the 1980s. The results of this work, recently reviewed by Conybeare (2004), show the major impacts that elephants had on woodlands, particularly

miombo woodlands, in Zimbabwe's protected areas. Direct impacts on species richness of birds, ants and mantids were reported by Cumming et al (1997) who noted that 85% of *Brachystegia* woodlands within the parks and wildlife estate had been removed by elephants by 1994. These woodlands have not since recovered.

Current concerns regarding the increasing numbers of elephant and their impacts include:

- The continuing loss of woodland habitats in many parks and associated potential loss of plant and animal species.
- In Hwange NP, the possible reduction in numbers of other browsing ungulates (Valeix 2002), the domination of dry season water points by elephants, and the displacement of black rhino to less secure areas in the park.
- The selective removal of large trees and consequent impacts on raptor populations.

Ethical and moral issues related to killing elephants

A matter of concern in Zimbabwe in relation to the sustainable consumptive use of elephants is what is perceived as the imposition of foreign controls, based largely on North American and European ethical and moral values concerning sustainable use, on utilitarian conservation practices in Zimbabwe that have been demonstrably successful (Child 1995).

Zimbabwe has been at the forefront in international debates on the sustainable use of wildlife, including elephants. The Parks & Wildlife Act makes provision for the consumptive use of elephants on state, freehold and communal lands. The National Environmental Policy, flowing from the Environmental Management Act, lends support to this provision in the first two of several national environmental policy goals, namely,

1. Conserve biodiversity and maintain the natural resource base and basic environmental processes to enhance environmental sustainability.
2. Promote equitable access to and sustainable use of natural and cultural resources with an emphasis on satisfying basic needs, improving people's standard of living, enhancing food security, and reducing poverty.

The country's policy on sustainable use of wildlife both within protected areas (as in Safari Areas) and on other land resulted in the expansion of land under wildlife to more than 22% of the country by 1990 (Cumming 1991). During the 1990's elephant range within Zimbabwe was further extended with the creation of conservancies on private land and maintained in many communal lands under the CAMPFIRE programme.

Numbers of elephants in the country and census techniques

Several of the people consulted expressed concerns about the census techniques used and some simply did not believe the official estimates, particularly for Hwange National Park. One suggested that the figures had been inflated to justify culling, for which the primary motive was financial. There were calls for more research on the numbers of animals and their effects in protected areas. Concerns were expressed about the blanket nature of previous culls and it was suggested that if they were to be done they should be targeted at solving particular problems. Concerns were also voiced about the present capacity of the Parks & Wildlife Management Authority (PWMA) to carry out culling operations.

3.7.4 *Stakeholder views on different management options*

1. No control – let elephant populations expand

The majority of individuals/agencies consulted did not support a *laissez- faire* approach to managing elephants in Zimbabwe and most, even if they did not support lethal options, considered that some measure of control was necessary. Only one correspondent suggested that matters should be left to nature.

2. Culling to reduce or maintain fixed or varying numbers (i.e. periodic reductions)

The majority of those consulted considered culling to be the only realistic management option to deal with elephant overpopulation in Zimbabwe but with certain qualifications. These were (a) that culling should be a targeted rather than a blanket reduction exercise, (b) it should be carried out by thoroughly trained and competent teams, (c) it needed to be thoroughly justified on scientific or other grounds, and (d) all products should be recovered, and (e) it should benefit local communities and contribute to the alleviation of poverty. One respondent involved in photographic tourism considered culling to be the option of last resort.

Responses to questions about the likely impacts of culling on tourism were very varied and the following indicated the range of responses:

- Disturbance from hunting and culling is a reality and needs to be carefully and discreetly conducted if it is not to interfere with photographic tourism.
- Great sensitivity will be needed in communicating and executing any culling operations.
- The majority of foreign tourists are likely to be totally against culling and many would not visit Zimbabwe if culling resumed.
- Most people would be likely to accept culling if it was properly conducted and benefited local people and the economy.
- If culling is properly conducted tourists would not be aware it was happening.
- Whatever management option is taken, there are likely to be some unfavourable responses.

3. Contraception to curb population growth

There was general agreement that contraception may be a useful tool but given the size of the elephant populations in the country was unlikely to be a feasible option on account of the technology required, the high costs and the difficulty of applying it to large populations. The CAMPFIRE Association was of the view that contraception would be an expensive way in which to curtail the growth and production of natural resources that could be harvested for the benefit of local communities.

4. Translocation to new protected areas or to private land

Translocation was seen as a useful but expensive and limited option for dealing with overpopulation of elephants in Zimbabwe. The country does not have the space available to absorb excess elephants from overpopulated areas. Translocation to private land where elephants may later be hunted was not seen as problem by those interviewed.

5. Expansion of elephant range and development of TFCAs and corridors

One respondent suggested that the answer to elephant overpopulation problems lay in the development of mega-parks as suggested by Van Aarde (2004). Most of Zimbabwe's large protected areas lie on the country's boundaries and, apart from the Sebungwe to the south of Lake Kariba, its elephant populations are linked to those of neighbouring countries and dispersal should be a viable

option. However, the movement of elephants into Zambia from overpopulated areas in Zimbabwe has not been entirely welcomed. The movement of elephants across the Zambezi River in Zambia to the west of Livingstone has resulted in a marked increase in human-elephant conflict (F. V. Osborne *pers. comm.* 2005). The seasonal movement of elephant across the Zambezi into the Chiawa area in Zambia from the Hurungwe Safari Area to the east of Chirundu also results in increased and unwelcome human-elephant conflict (Chieftainess Chiawa *pers. comm.* 2005). The Hwange population is immediately adjacent to what is already the largest elephant population in the region and the Gonarezhou population can only be linked to the Kruger National Park and the Limpopo National park through already settled areas.

3.7.5 *Elephant management Capacity*

The national wildlife agency in Zimbabwe has been through a long period of restructuring and transition from the former Department of National Parks and Wildlife Management to the present National Parks and Wildlife Management Authority. As an Authority the agency is no longer funded by the national fiscus and is required to raise its own revenue primarily from tourism. With the drastic decline in tourist arrivals and the depressed economy the NPWMA has faced major cuts in its operating budget with the result that it is presently operating on about US $10 per km^2 compared with more than $200 per km^2 in the mid 19890s. The result is that capacity to monitor, manage and conduct research on elephants is currently low. There is an urgent need to conduct a country wide aerial census of the elephant population (the last national survey was carried out in 2001) and to train newly recruited scientific staff.

3.7.6 *Summary*

Zimbabwe has the 2nd highest population in the region, at approximately 100,000 elephant distributed in four mains populations. The number of elephant has recovered from about 4,000 in 1900 to more than 90,000 in 2001 despite vigorous attempts during the period 1966 to 1986 to keep the total population in the country to about 45,000.

A major concern in the country is the growing human-elephant conflict. About 9% of the elephant population occurs outside protected areas. The CAMPFIRE programme has mitigated human/elephant conflict in some areas and overall some 60% of CAMPFIRE revenues are derived from elephant.

The impact of high elephant densities on woodland habitats are another major concern. However, the 40,000 strong elephant population of Hwange National Park is now probably beyond the country's capacity to control and similar considerations are likely to apply to the other large populations in the Sebungwe and the middle Zambezi Valley. Stakeholders considered contraception a useful tool but thought that it was inappropriate and too expensive to use on large populations. In the view of the CAMPFIRE Association contraception was an unnecessarily expensive way to curtail population growth in a situation where excess animals could be harvested to provide benefits to local communities.

Research, monitoring and management capacity have been seriously curtailed over the last few years and there is an urgent need to census the country's elephant population – the last national census was conducted in 2001.

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3.7.8 *Persons Consulted*.

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4. ELEPHANT MANAGEMENT TOOLS

The options and tools for managing elephant populations can be divided into **passive** approaches that avoid any direct action on individual elephants and **active** approaches that entail direct action or intervention on animals. The main characteristics and pros and cons of these approaches are examined and discussed below and summarized in Table 4.1a and 4.1b

4.1 Passive management approaches

Passive management approaches include (a) taking no action, (b) enlarging or expanding the range available to elephants, (c) fencing to enclose or exclude elephants from selected areas, and (d) manipulating water supplies. These are all non-lethal and therefore favoured as an option for elephant management by many stakeholders on moral and ethical grounds. However, they are only non-lethal in the sense that no direct or immediate human-induced mortality is involved or apparent. High levels of stress and mortality are not ruled out in cases where no action may result in overpopulation and associated stress, starvation and mass die-offs. Nor is stress ruled out in other "non invasive" techniques of managing elephants.

(a) **Taking no action**.

Taking no action may be appropriate where elephant populations are self regulating and where there is no perceived overpopulation problem. Such conditions may occur in very large ranges (>100,000 km^2), in very arid areas, or in areas where there is a continuing peripheral harvest (whether legal or illegal) resulting in a source-sink situation. So far as we are aware such a situation does not presently exist in southern Africa. Most elephant populations in the region are growing but their ranges are confined either by fences or by surrounding landuse practices that preclude elephants, so that issues of "overpopulation" are likely to arise in the future if they have not already done so.

The "no action" option is frequently invoked in the face of uncertainty about the impacts of elephants on habitats and biodiversity, and uncertainty about the population level at which equilibrium between elephant and their food resources may be reached. It is also advocated as a sound conservation option on the grounds that "nature should be allowed to take its course" or "nature knows best". The "no action" option is widely advocated on moral and ethical grounds, often regardless of conditions on the ground. The potential costs, both environmental and social, of the "no action" option require more rigorous analysis and justification on social, economic and environmental grounds than they have received to date.

(b) **Enlarging elephant range**.

This option is applicable where land adjacent to an existing protected area can be made available to elephants either through government proclamation, land purchases or contractual agreements with neighbouring actual or potential wildlife areas. Constraints to elephant movement into these areas are removed and dispersal is expected to follow. Experience so far suggests that dispersal may be too slow to effectively reduce densities in the source area or to reduce pressure on habitats within an overpopulated source area. The delayed movement of elephant from Kruger NP into Limpopo National Park once fences were lowered is a case in point. A variant of this approach is the proposal to establish corridors between existing regional clusters of elephant populations and so establish a larger connected and interacting metapopulation across the region that may be self regulating. The major constraint to such an approach is human settlement and consequent human-elephant conflict in

the potential corridors between sub-populations. The rate of dispersal along and through corridors may also be too slow to relieve pressure on source populations. The hidden assumption that larger, more dispersed populations (often referred to as metapopulations) would stabilize at lower densities than are presently found in protected areas is without foundation.

(c) **Fencing.**

The use of elephant-proof fencing, although expensive, is a simple and secure way to contain elephants within particular areas or to exclude them from particular habitats or specific areas that require protection. It is an option that can be used to create botanical or other reserves within a protected area or to exclude elephants from crops in areas where elephants would otherwise be a problem (e.g. banana plantations on the shores of Lake Kariba). Although it is mostly applicable at small scales it is notable that almost the entire boundary of Kruger National Park was fenced until recently.

(d) **Manipulating water supplies**.

Many protected areas in the region have provided artificial water supplies in the form of pumped boreholes or dams to boost the numbers and distribution of large mammals. In Hwange National Park, for example, the dry season area available to elephants was increased from 20% to 70% of the park by the provision of artificial water (Cumming 1981a) and almost certainly contributed to the expansion of elephant populations within the park and thus their impact on woodlands. There is considerable potential to use water supplies to manipulate the spatial and temporal impacts of elephants on their habitats (Owen-Smith 1996) and Kruger National Park is presently reducing the number of artificial water points in the park (Gaylard et al, 2003).

4.2 Active management approaches

(a) **Contraception and sterilisation**

A reversible immuno-contraceptive technique has now been developed and successfully tested on small elephant populations in South Africa (Bertschinger et al 2004, Delsink et al 2004). The technique can be used to reduce or arrest population growth. It is not prohibitively expensive and can be used to manage small populations. Its applicability in managing large populations is under debate (Hutton 2004, Stout and Colenbrander 2004). Sterilisation of bulls (vasectomy and chemical) is also being explored. The full range of social and ecological impacts of using birth control to contain elephant population growth has still to be explored. Although moral and ethical concerns have been raised at the use of an invasive and "unnatural" technique the approach is nevertheless favoured by humane groups such IFAW (Greenwood 2004). Its use is not supported by rural communities surrounding Kruger NP who see it as an inappropriate curtailment of harvestable production that could provide material and economic benefits to the rural poor. Similar views are held elsewhere in the region and were expressed by community leaders or representatives we interviewed. Outside of South Africa it was not seen as a feasible option by most stakeholders.

(b) **Translocation**.

Large scale translocation became a potential option for reducing population numbers in some areas while at the same time establishing new populations with the development (by Clem Coetsee in 1991) of techniques to capture and move entire family groups. The technique was used successfully to move 200 elephant from the drought-stricken Gonarezhou NP in 1991 to Madikwe Game Reserve and to move a further 600 elephants to the nearby Save Valley Conservancy. The technique has since

been used by SANParks in South Africa to restock several smaller reserves. The major limitations on the technique are expense and the requirement for suitable terrain in which to capture animals, along with the impracticality of moving thousands of animals.

(c) **Driving.**

Elephant herds can be moved by driving them with ground crews and helicopters. The technique has, however, seldom been used and, because elephants will readily return to their original home ranges, it can only be used effectively when elephants are driven past a barrier, such as a fence, which prevents them returning. It was used in Zimbabwe in the 1960s to drive elephant out of tsetse control corridors.

(d) **Culling and cropping**.

Culling, as practiced in southern Africa, has involved the killing of entire family groups to minimise disturbance and facilitate the rapid recovery of meat, hides and tusks. In KNP elephants were immobilized using drug-loaded darts fired from a helicopter and followed up with lethal brain shots. Killed animals were then transported to a central abattoir. In Zimbabwe a light aircraft (usually a Super Cub) was used to locate a herd and guide a ground crew of three to five marksmen on to the herd. The pilot and members of the ground crew maintained radio contact throughout the operation. Using heavy calibre weapons and brain shots, the ground crew was able to kill herds of up to 50 animals in less than 2 minutes. Carcasses were then processed in the field and meat, hides, tusks and lower jaws were recovered. Culling of family units was also carried out in the Luangwa Valley in Zambia in the 1960s and early 1970s.

Culling is the only technique currently available to rapidly reduce large elephant populations. In the 1980s, culls of up to 5,000 animals were completed in three months during the winter in Hwange National Park.

Cropping selected animals from a population may be used to limit population growth in small populations but its use in large populations in protected areas is likely to be ineffective and result in a highly disturbed population. Ongoing cropping in peripheral areas may serve to contain population growth in some cases. Mimicking higher levels of predation by increasing mortality, humanely and in ways that are not associated with human presence, within selected age and sex classes does not appear to have been attempted in the region.

Controlled sport hunting has minimal effects on elephant population growth and is not a viable option for controlling elephant population growth. It can be used as means of mitigating human-elephant conflicts in ways that bring some relief to villagers and larger financial benefits to rural communities.

Culling as a means of reducing populations does have its limitations. The animals need to be killed during a cool time of the year when meat and hides can be recovered without spoiling. A competent and fully equipped team can probably handle up to 5,000 elephants during the 3-4 month winter season. Culling does result in disturbance and in a large national park more than one culling team operating in a single season may result in unacceptable levels of disturbance. These considerations suggest the two major populations in the region (Botswana and northwestern Zimbabwe) which form a contiguous population approaching 200,000 elephants, are now probably beyond control.

Table 4.1 (a) Summary of options for managing elephant populations (Passive methods)

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

Table 4.1 (b) Summary of options for managing elephant populations (Active methods)

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

4.3 Management Capacity

Annual expenditure per km^2 for protected areas provides a useful overall guide to conservation capacity and resources for a country. The general rule of thumb for southern Africa is that a minimum of US$200 per km^2 is required for effective management and conservation of protected areas (see also Smith et al 2003). The data available for five of the six countries covered in this report indicate great discrepancies across the region (Table 4.2).

Table 4.2 Expenditure per km^2 by wildlife agencies in Southern Africa

Country	Protected Area (km2)	Expenditure US$/km^2
Botswana	103,953	?
Mozambique	52,250	<10
Namibia	140,000	80
South Africa (SANParks)	40,000	1,400
South Africa (KZN)*	3,393	>3,000
Zambia	63,585	~10
Zimbabwe	49,000	~10

* Hluhlue/Imfolozi Complex and Drakensberg

An indication of expertise available in the region can be gauged from the number of scientists engaged in research and management in protected areas. In South Africa the figure is more than 30 scientists per 10,000 km^2, whereas in the rest of the region it is less than 3 per 10,000 km^2 of protected area (Cumming and Slotow 2003). In Kruger NP alone there are currently more than 200 ongoing registered research projects (H. Biggs *pers. comm*.). These figures and those for expenditure are, as might be expected, fairly closely related to national gross domestic product. Three out of the six countries' national parks and wildlife agencies have undergone major restructuring processes that have, in some cases (such as Zambia and Zimbabwe), been prolonged and disruptive. Mozambique has recently split the responsibilities for wildlife conservation between two ministries – one responsible for wildlife within protected areas, the other dealing with wildlife and forestry in the rest of the country. Both Mozambique and Zambia are exploring contractual arrangements with the private sector to manage some of their national parks (Child 2004).

Given the scarcity of human and financial resources to manage protected areas, the resources to deal specifically with elephant conservation outside of South Africa are clearly extremely limited.

4.4 Range Expansion

As we have indicated above, the current population of 250,000 elephants is likely to double in the next 12-15years. If current policies of non-interference in the growth of elephant populations continue, the question of where an additional 250,000 elephants can be accommodated needs some urgent answers and long term planning. There is now little prospect of creating new large national parks to absorb excess elephants in the region.

Private land

The only areas of private land which could absorb elephants are now located in South Africa and Namibia. In South Africa, areas for restocking elephant are very limited while in Namibia elephants have not yet been restocked on farms. The Zambian Government policy explicitly excludes the restocking of elephants on private land other than for tame animals used in elephant-back safaris. Land previously under free-hold tenure in Zimbabwe has mostly been acquired by the government for resettlement and the extent to which conservancies, on what is now leasehold land, will be allowed to operate and hold elephant has yet to be decided.

Communal land

In the absence of new protected areas and private land into which elephants can expand their range the only remaining option is expansion into settled game management areas such as in Zambia or into traditional or communal farming lands in southern Angola, Botswana, Mozambique, northern Namibia, Zambia and Zimbabwe. Given the already high and increasing levels of human-elephant conflict in communal lands it is clear that **significant elephant range expansion will only happen if it goes hand in hand with strong incentives to local people to conserve and manage elephants on their land**. The high potential value of elephants and elephant products makes this a feasible option, given appropriate changes in policy. The alternative of moving people off the land to make way for elephants (as is advocated in some quarters in order to create corridors) is unlikely to be politically acceptable or sustainable in the long term.

The following areas *may* provide potential for elephant range expansion but a detailed examination of the areas concerned, people's current land use patterns and livelihoods and their attitudes, will be required before any concrete steps can be taken.

a) **Angola**. The south-eastern corner of Angola has been mooted as a potential area into which the Chobe population can disperse. Little information is presently available on the extent to which this area is settled or suitable for elephants. Landmines along the border with Namibia contribute to the present constraints on elephant dispersal into southern Angola. The very large potential elephant range, covering much of southern Angola, that is depicted on elephant range maps is in need of careful checking and updating, particularly since very little of the area falls within nominal protected areas .

b) **Botswana**. Areas in Ngamiland in north-western Bostswana, between the Okavango Delta and the Khaudum NP in Namibia, could serve to expand the present very narrow corridor in the Caprivi Strip that links the Chobe and eastern Namibian elephant populations.

c) **Mozambique**. The elephant population in Niassa could potentially extend its range into neighbouring hunting areas and areas of low human density in Niassa and Cabo Delgado Provinces. Creation of a corridor for elephant movement between Niassa National Park and the Selous Game Reserve is being explored. The small elephant populations in Gorongosa NP and Marromeu Game Reserve have the potential to expand within those areas and to extend their distribution back into neighbouring Coutadas or hunting areas. The newly created Limpopo NP of 10,000 km^2 has the potential to absorb about 2,000 elephants from Kruger NP but so far dispersal has been slow. It should be noted that the park has 20,000 people living in it. A slow dispersal of about 2,000 elephants will contribute little to reducing elephant numbers in KNP. The greater part of the GLTFCA that is outside protected areas lies within Mozambique and roughly between the Limpopo NP in the south, Banhine NP and Zinave NP to the north, and Gonarezhou NP in Zimbabwe to the west. This area of approximately 36,000 km^2 is lightly settled, with very little infrastructure and could potentially carry a further 7,000 elephants at a density 0.2 elephants per km^2. However, the area is not currently shown as potential elephant range in the 2002 African Elephant Status Report (Blanc et al 2003). The key issue in Mozambique is that elephant-human conflict is already an issue and without clear benefits to villagers the expansion of elephant populations into these communal area ranges is unlikely.

d) **Namibia.** Martin (2005) has examined potential range expansion for elephants in Namibia in some detail. The key areas are those of Kunene in the northwest and the corridor between the main populations in Namibia and Botswana, where the boundary fence to the west of the Okavango needs to be removed.

e) **South Africa**. The Addo Elephant NP is being expanded and parts of the expanded park will accommodate the growing elephant population. Elephants have already extended their distribution into private game areas surrounding Kruger NP. Elephants have dispersed into the new Mapungubwe NP from Botswana and Zimbabwe and the park is already facing an over-population problem. The fence between KNP and the LNP has been lowered and movement of elephants out of Kruger has been slow. South Africa does not presently offer any significant potential for elephant range expansion.

f) **Zambia**. The Game Management Areas (GMAs) of Zambia, which are designated wildlife areas in which people are settled and able to farm, fall within the existing elephant range but carry very low elephant populations. There is the potential for elephants to disperse from national parks into these areas. The total GMA area in Zambia is 160,488 km^2. There is also the potential for elephant range to expand in the southwestern corner of Zambia surrounding the Sioma-Ngwezi NP.

g) **Zimbabwe**. The current potential for range expansion in Zimbabwe is limited to small areas in the south-east of the country. However, if plans to link the Great Limpopo TFCA and the Shashe-Limpopo TFCA into a wider wildlife/multispecies based land use system in the South East Lowveld come to fruition there is the possibility of establishing a more extended range for elephants in that part of the country. With more effective devolution of benefits from CBNRM there may be some potential for expansion of elephant range in the Zambezi Valley but the area is unlikely to exceed 3,000 - 5,000 km^2, or enough partially settled land to carry about 1,000 elephants.

Regional Potential

This brief examination of the potential for range expansion and corridor development in the region (excluding Angola) indicates that only the Communal Lands of the region offer significant opportunities for increasing elephant range in southern Africa. These areas are already settled so that only low overall densities (< 0.2 per km^2) of elephants are likely to be tolerated. An optimistic estimate of the total area in the region that could be available to elephants is about 390,000 km^2. It is mostly settled land so that acceptable densities are likely to be below 0.2 elephants per km^2. If these figures are approximately correct it means that **potential range expansion in southern Africa *may* be able to accommodate up to about 75,000 elephants, or one sixth of the 500,000 elephants the regional population can be expected to reach in the next 12 to 15 years.**

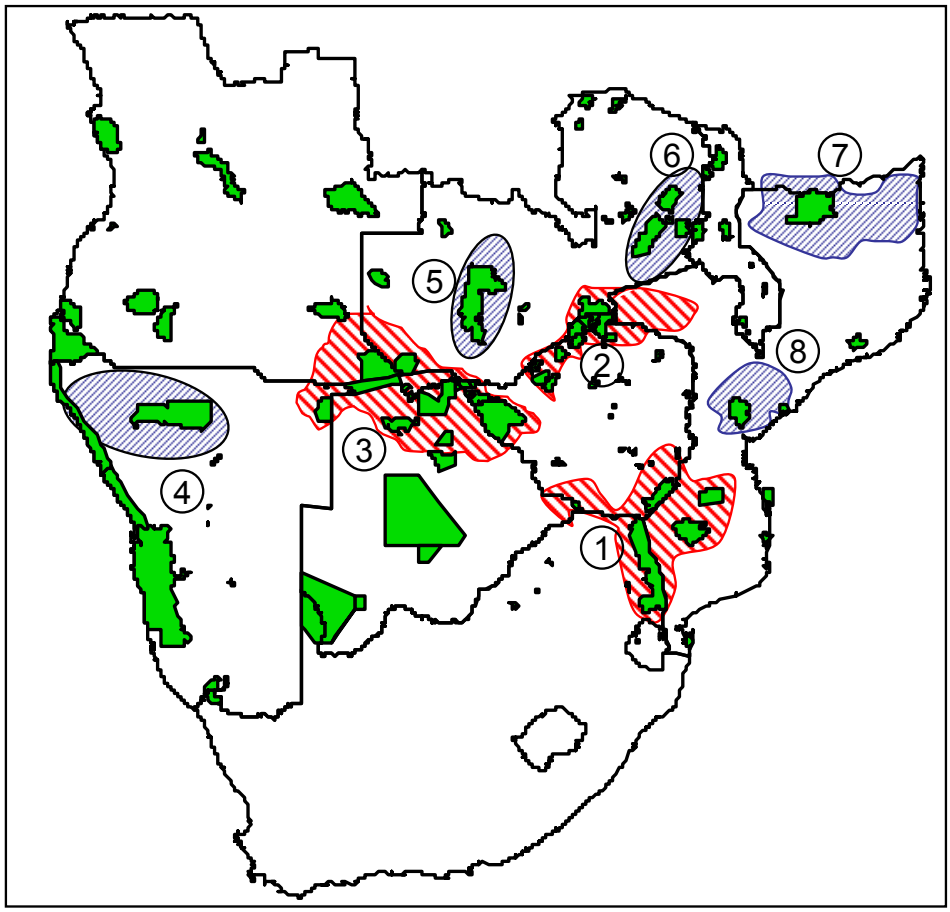

Fig. 4.1 Map of southern Africa showing protected areas (shaded) and surrounding areas (cross hatched) of existing and potential range expansion for elephants. The areas fall into two categories, (a) those areas where protected areas are presently considered to be over-populated (areas 1-3), and (b) those areas where there is not a perceived over-population problem (4-8). The approximate current elephant populations and areas involved are indicated in the table below (Table 4.3).

Table 4.3 Approximate current elephant ranges and numbers of elephants in the areas shown in Fig. 4.1, with a rough estimate of potential range into which elephant may expand and the numbers that could be absorbed. Note that most of the extended area would fall into already occupied communal land where overall densities above 0.2 elephants per km^2 are unlikely.

Area	Present elephant range (km^2)	No. of elephant	Potential added range (km^2)	Potential added no. of elephant
1. Great Limpopo TFCA	36,000	21,000	50,000	10,000
2Middle Zambezi	38,000	36,000	3,000	600
3. Kavango-Zambezi TFCA	130,000	200,00	140,000	28,000
4. Etosha – Kunene	61,000	3,000	57,000	6,000
5. Kafue NP and GMAs	12,000	3,000	35,000	8,000
6. Luangwa Valley	46,000	14,000	7,000	1,500
7. Niassa-Selous	45,000	14,000	70,000	14,000
8. Gorongosa – Marromeu	6,000	400	30,000	6,000
Totals	**374,000**	**277,400**	**392,000**	**72,600**

Considerable interest, and optimism, is currently focused on transfrontier national parks (TNPs) and transfrontier conservation areas (TFCAs) as solutions to the elephant over-population problem. The two largest potential TFCAs in the sub-region are the Great Limpopo TCFA and the Kavango-Zambezi (Kaza) TFCA (formerly known as the 4-Corners TFCA). The Great Limpopo TFCA, as indicated above, could probably accommodate an additional 9,000 elephants occupying the Limpopo NP and the area extending to Banhine and Zinave National Parks. The extent of the Kaza TFCA has yet to be delimited but it has the potential to include the elephant ranges in northern Botswana, northwestern Zimbabwe, the Caprivi Strip in Namibia, an additional 70,000 km^2 in southeastern Angola and possibly a further 40,000 km^2 in southwestern Zambia – i.e. a total elephant range of about 270,000 km^2 for the entire TFCA. The existing population in Botswana, northwestern Zimbabwe and the Caprivi has already reached about 200,000, resulting in a crude density for the entire area of about 0.75 elephant per km^2. If, as has happened in the past, concerns about elephant overpopulation surface at densities of < 0.5 elephant per km^2, the Kaza TFCA does not hold out much promise of a long term solution to the current elephant over-population problem, even if elephants do disperse rapidly over the entire area. While there is evidence of occasional movement from Botswana and the Caprivi into Angola and Zambia there is no clear evidence, as yet, of any large scale movement or dispersal.

4.6 Ethics and international responses.

Responses to questions about how people in Europe and North America might respond to culling in southern Africa were mixed and in part reflected people's own stance on the matter. Those who opposed culling were quite sure international tourists from abroad would respond negatively and that they would be appalled by any culling. Written responses from some experienced international tour operators suggested that tourist boycotts were unlikely if culling operations were discreetly and professionally carried out, and if the public had been sensitively informed about the rationale behind culling.

Several people who did not support large scale government culling operations (often on the grounds that they thought these were motivated only by financial gain) were not opposed to sustainable use of elephants where this contributed to rural livelihoods and poverty alleviation.

It is clear from the consultative meetings in South Africa, and the media responses to a suggestion in South Africa that they are "leaning towards culling in Kruger NP"[1] that animal rights and welfare groups will strongly resist any moves to cull elephants.

If southern Africa is to resume culling elephants as a means of limiting population growth or reducing densities in selected areas then there is a need for the region to be very clear about its ethical stance and beliefs. If the region does subscribe to a wider, more encompassing social and environmental ethic then it should claim the moral high ground through a clear enunciation of those beliefs and principles. Providing the execution of its elephant management programmes matches its ethical stance, the region would be in a strong position to convince a majority of sceptics that harvesting of elephants is an appropriate conservation and development action for southern Africa and its people. If elephant management programmes are hijacked by corrupt officials, politicians and businessmen (Cumming 1986) they will certainly not be accepted, and may do the cause of conservation irreparable damage.

[1] Hector Magome, quoted in the Economist, March 19-25th , 2005, page 101.

This is a complex subject and debate. A few days spent in each country by a consultant talking to a handful of people are not an adequate basis on which to plan action**. We suggest that a major priority is to gain a reliable measure of public opinion (values and beliefs) within southern Africa on the issues of culling and sustainable consumptive use of elephants. Such a survey needs to be carried out by a market research / opinion survey team of international repute which is able to conduct a carefully designed sample survey to cover the full range of ethnic and socio-economic groups in the region**. The cost of commissioning such a survey may be high, but it would be negligible in the context of the current opportunity costs the region carries and the transaction costs of the ongoing impasse in elephant management.

The main reason why such a survey is important is that will help clarify whether or not the values of those in southern Africa, concerning the management of elephant, correspond with those in Europe and North America and elsewhere in the world. If they differ then key question of whose values should prevail will need to be answered. We examine these issues further in Chapters 5 and 6.

5. ELEPHANT MANAGEMENT ISSUES AND CHALLENGES

The country surveys and consultations indicate that while priorities may vary from country to country the key issues are (a) the expansion of elephant numbers and range; (b) human/elephant conflicts, (c) actual or potential impacts of elephants on habitats and biodiversity, and (d) ethical questions about the manner in which elephants are managed. We examine and discuss each of these issues more fully in this chapter.

5.1 Expanding elephant populations

Despite concerns by some about the veracity of current elephant numbers and trends, it is widely agreed by nearly all stakeholders consulted that elephant numbers have increased and are increasing. The scientific evidence is unequivocal (Blanc et al 2003).

The two largest populations in the region, those of Botswana and Zimbabwe, which make up about 75% of the >250,000 elephants living in the six countries considered in this report, have been censused consistently over the last 20 years using standard well-tried methods. Similar considerations apply to the populations in Namibia and South Africa. The surveys in Mozambique and Zambia have been intermittent but the major populations have been censused with the same tried and tested techniques. These censuses have not been corrected for undercounting, a potential shortcoming of aerial census methods, which suggests that the true population figures are, if anything, likely to be higher than reported.

The measured rates of increase in population numbers based on repeated censuses have generally been c. 5% per annum, although a growth rate of 7% has recently been reported for Kruger NP and Martin (2005) has calculated a current growth rate of 6% for Hwange NP. Population growth rates in Namibia, excluding recent immigration from Botswana, have been in the region of 3% per annum (Martin 2005). Elephant population growth rates have in the past been confirmed by analysis of data collected from culls on age and sex structure of the populations concerned, and from an examination of reproductive organs, to provide data on age at first conception, age specific reproductive rates and calving intervals. More recently, population growth rates have been examined by analysing low level aerial photographs of herds to provide data on age and sex structures of populations (Ferreira and Van Aarde 2004, Van Aarde 2004).

Elephant range contracted markedly in the middle of the last century as agriculture expanded in the region (e.g. Hanks 1979, Cumming 1981a). Recent range expansion of elephants, other than through translocations into small fenced areas, has been less well documented and population growth has mostly occurred within existing areas. The consequence of rapidly expanding populations has been twofold – increasing densities and impacts within protected areas, and increasing dispersal into neighbouring farming areas, resulting in increased conflict with rural people whose populations and the area they occupy have also grown.

5.2 Elephants and biodiversity

The often very dramatic impacts of elephants on savanna woodlands have been well documented over the last 50 years. In a recent review of over 100 publications dealing with elephant impacts on broadleaved woodlands in south-central Africa, Conybeare's (2004) main findings were as follows:

"1. Elephants affect vegetation primarily through their feeding habits. Although catholic in their diet, they do select some species and avoid others. They eat grasses and woody plants but most grazing takes place during the wet season, hence they are thought not to have an important impact on grasses.

2. When browsing, elephants feed mostly between 1 and 2 m above ground, so shrubs are more affected than trees. However, shrubs are more resilient to damage, being able to replace lost biomass more quickly than trees. Elephant feeding results in biomass reduction or death of selected shrubs.

3. Elephants damage trees by pushing them over, breaking the main stem, removing branches and by debarking. Many damaged trees survive as coppice regrowth, but some are killed, either directly or from secondary causes such as woodborers. Tree damage may be greater when available shrub biomass is reduced by factors such as drought or fire.

4. The effect of elephants is to change the physiognomy of woodland, and wooded bushland in particular, by reducing the number of trees. They also change species composition with heavily used species declining in abundance or biomass and avoided species increasing. Tree species that have been severely impacted in the review area include *Acacia erioloba, A. nigrescens, A. tortilis, C. mopane, Adansonia digitata, Brachystegia boehmii, Commiphora ugogensis, Combretum collinum, Terminalia sericea, Sclerocarya birrea* and *Faidherbia albida*. Species that have been reported to have increased in abundance following elephant impacts include *Ochna pulchra, Lonchocarpus nelsii* and *Combretum mossambicense*.

5. As a result of tree breakage, there may be an increase in shrub density from coppiced trees, but shrub species composition will be changed and density may also ultimately be reduced. Tree regeneration is slowed or arrested by elephants and other browsers, and also by fire and frost.

6. Because of different species composition and levels of utilisation by elephants, some vegetation types, such as riverine woodland, miombo and mopane woodlands and *Baikiaea* woodland, are more affected than others. Utilisation of particular species may even vary geographically, perhaps affected by soil type and the array of other species available.

7. Impacts of elephants on vegetation are positively related to elephant density, but the rate and amount of vegetation change is affected by a number of factors, such as proximity to water, variation in annual rainfall, fire, frost and soil type. Changes to vegetation brought about by elephants result in greater susceptibility to the damaging effects of fire and frost.

8. At low to moderate densities the impact of elephants may increase habitat heterogeneity, particularly in a homogeneous environment. This may in turn lead to an increase in biodiversity. At high densities, the opposite probably occurs.

9. Even at low overall elephant density there will be areas of relatively high elephant concentration where impacts will be more severe. This non-uniform spatial distribution makes it difficult to quantify the relationship between elephant density and impacts on vegetation. Miombo woodland may be destroyed at elephant densities of 0.2-0.5 elephants per km². Even at an elephant density of 0.13 per km² there were areas of severe vegetation damage in the Kruger National Park.

10. Vegetation change caused by elephants affects other species of animals; arboreal birds are particularly vulnerable and there is evidence that gross vegetation change will also result in declines in numbers of most other browsers and possibly some grazers. Very high elephant numbers may also affect other species through competition for water.

11. Changes to woodland structure affect the herbaceous layer, but these changes and the effect of vegetation change on grazing animals have not been fully investigated.

12. When elephants recolonise an area from which they have been absent for some time, impacts are likely to be dramatic."

Woodlands can be felled within a few years by elephant (Thomson 1975, Cumming 1981b, Barnes 1983), but take decades to recover, if ever. Rangeland and savanna ecosystems can exist in one of several stable states and switches from one state to another can occur rapidly and unexpectedly once thresholds are reached (Westoby *et al* 1989, Scheffer and Carpenter 2003). A combination of elephant browsing and fire can cause rapid transitions to an alternative stable state, as Dublin *et al* (1990) demonstrated for *Acacia* woodlands in the Serengeti, and Starfield *et al* (1993) showed for miombo woodland. Transformed habitats may become caught in a "fire trap" (Bell 1981) which can then delay recovery indefinitely. In other words, elephant impacts on habitats within protected areas can be *irreversible* within a management and conservation time frame of 50-100 years. This observation raises issues of generational equity in the management of natural resources and the responsible custodianship of biodiversity.

Despite the evidence of marked elephant impacts on woodlands there is little agreement about their effects on biodiversity – largely because there has been surprisingly little research on this important question. Moolman and Cowling (1994) found a marked reduction in species richness of endemic flora of succulent thicket in the Eastern Cape as result of goat and elephant feeding. Cumming et al (1997) in a study of elephant impacts in *Brachystegia* woodlands in the Zambezi escarpment found significantly lower species diversity of tree, bird and ant species in impacted compared with intact woodlands.

Recent studies in the Chobe National Park (Skarpe *et al* 2004) concluded that, despite major changes in Chobe River alluvial habitat as a result of very high elephant densities, biodiversity was intact and that there was no ecological justification to reduce the numbers of elephant. Skarpe et al (2004) considered that elephant numbers had returned to pre-colonial levels and that the tall *Acacia erioloba* woodlands of 30-40 years ago were an artifact of the over-hunting of elephants in the late 19th Century and the decimation of other ungulates by rinderpest in 1895. The authors assumed that the present stand of *A. erioloba* was less than 100 years old. This species is, however, particularly long lived (Barnes *et al* 1997) and trees in the Chobe riparian fringe could have been as old as 300 years. The evidence for equivalent densities of elephants in Chobe area in the late 19th Century is also questionable because it is based on a human-elephant density relationship derived from colonial times when elephants were well protected. Ben Shahar (1993, 1996, 1998), working in the same area but mainly on mopane woodlands, considered that elephants and woodlands would reach a stable equilibrium and Herremans (1994) found no evidence of a decline in bird species diversity in the Chobe system. The Chobe system is within the Kalahari sand sea which is mostly comprised of deep sands and woody plants that have a high proportion of below-ground biomass. They are, as a result, likely to be more resilient to elephant browsing.

Indirect evidence of likely impacts of elephants on arboreal species can be deduced from the number of species that depend on large and small trees (i.e. height of > 3m). For Kruger NP the number of small mammal, bird, reptile and amphibian species that depend on trees is surprisingly high (Deacon 2005). Other than the work by Cumming *et al* (1997) little appears to have been done on the impacts of elephants on invertebrate species richness. Musgrave and Compton (1997) examined the effects of elephant browsing on phytophagus insects and found that there were fewer insects feeding on plants that had been browsed by elephants.

The potential effect of elephant over-population on other ungulates has also received remarkably little attention and the reports of impacts on particular species are mostly anecdotal. In Amboseli NP gerenuk, bushbuck and lesser kudu have disappeared as a result of woodland loss due to elephants,

and giraffe appear as occasional vagrants (Western and Maitumo 2004). Investigations of the effects of increasing elephant densities on other ungulates are taking place in Hwange National Park. Preliminary results from these studies (Valeix 2002) suggest that increasing elephant numbers may be negatively impacting several species of mesoherbivores. Observations of elephant depriving other ungulates of access to water-holes in Hwange NP are frequent but no quantitative data on these potential impacts appear to be available.

At a larger scale, Gillson and Lindsey (2003) argue that justification for culling elephants was based on an outmoded paradigm of attempting to maintain a "balance of nature" and that management should "promote the natural processes of habitat change to maintain biodiversity through time and space". They consider that there is no ecological justification for maintaining reduced or fixed numbers of elephant. In a related paper they argue, amongst other things, that attempts to limit elephant population abundance may negatively impact on other species (Gillson and Lindsay 2002). Both Gillson and Lindsay (2002, 2003) and Skarpe *et al* (2004) assume that the state of woodlands when most parks were established in the first half of the last century was an artifact of the collapse of elephant populations through over-hunting in the late 1800s. The implication is that Africa supported very high numbers of elephants in the past and that current high densities found in protected areas are merely a return to former natural conditions (hence "The return of the giants" as a title to a paper). These assumptions are based largely on Campbell's (1990) estimates of elephant numbers in Botswana in about 1800. Linked to this line of arguments is the belief (e.g. Ben Shahar 1996, Owen-Smith 2002) that elephant populations will grow until they reach a stable equilibrium with their food resources – a basic theoretical outcome of simple predator-prey or herbivore plant models. Recent modeling of elephants and mopane woodland interactions by Duffy *et al* (1999) indicates that stable limit cycles between elephants and their food resources are unlikely to develop. However, empirical and theoretical work on herbivore-plant interactions shows that, when there is more than one species of food plant involved, stability does not emerge (Schmitz *et al* 1997). There has been a strong tendency in the modeling of elephant-plant interactions to assume that all plants are the same and that stable limit cycles are possible (e.g. Caughley 1976). Much of the modeling has also treated plant populations as comprising individual plants of equivalent size, whereas "the abundance of both plant and herbivore populations should be expressed as biomass rather than numerical density" (Owen-Smith 2002).

An alternative hypothesis is that the presently high elephant densities observed in protected areas did not exist in the past and are an artifact of protection and the removal of human predation. There is a growing body of evidence (e.g. Surovell *et al* 2005) to suggest that *Homo* has been a more than effective predator of proboscideans for more than a million years, driving several species to extinction in Africa and Europe during the Pleistocene and more recently in North America about 10,000 year ago. The role of humans as "top predators" that regulated North American large herbivore populations in pre-Columbian times (Kay 2002), and earlier caused the rapid extinction of mammoths on that continent is well established, if not yet widely accepted (Haynes 2002, Kay and Simmons 2002). In the context of African conservation there is a continuing reluctance to acknowledge that members of the genus *Homo* were, and still are, superb predators. They have exerted a strong influence on ecosystem processes and their presence has been an integral part of the evolutionary history of this continent.

There is ample evidence that carnivores, particularly top predators, exert strong effects on the structure and dynamics of herbivore prey, which in turn influence plant species and plant community dynamics, i.e. result in "trophic cascades". That the removal of top predators from aquatic

ecosystems can result in trophic cascades is well established (Pace *et al* 1999). Trophic cascades also occur in terrestrial ecosystems but their occurrence in large mammal plant-herbivore systems has not been well studied (Schmitz *et al* 2000). The current major impacts of elephants on plant communities in protected areas may well be an example of a trophic cascade resulting from the removal of a top predator, namely *Homo*, from these ecosystems. This is clearly an avenue of research that requires further investigation.

A major factor contributing to the ongoing controversy surrounding the question of elephant impacts on biodiversity is the wide range of attributes and scales to which the term "biodiversity" is applied. As is noted below (Section 5.5), the decision to conserve "biodiversity" is a matter of choice on the part of individuals and society, and until there is agreement on what components of biodiversity are to be conserved in any particular area there is unlikely to be a resolution of the elephant-biodiversity issue.

5.3 Human/elephant conflicts and economics

There are two interrelated components to the human/elephant problem that merit attention and both revolve around who benefits from elephant conservation and who carries the costs. The question of who provides the resources to conserve and manage elephants (i.e. who pays?) is clearly part of the equation. The first component concerns the interaction between farmers and elephants and, for most of the region, this involves peasant subsistence farmers, and the management of elephant outside of protected areas. The second component involves national parks and the agencies responsible for managing elephants, both within and outside protected areas, and which require considerable resources to meet their national and international responsibilities.

Outside protected areas

In Botswana, Mozambique, Namibia, Zambia and Zimbabwe, a high proportion of elephant live outside of protected areas in land under traditional land tenure – usually referred to as communal land. In Botswana about 60% of the elephant population occurs outside protected areas particularly during the rainy season (Taylor 1999). In the other countries the proportion occurring outside protected areas varies between 10% and 40%, although in Mozambique people live and farm within protected areas. The African Elephant Specialist Group and its members have invested resources in gaining a better understanding of human/elephant conflict and in developing techniques that farmers can use to reduce the impacts of elephants on their livelihoods (e.g. Taylor 1999, Hoare 2001, Osborne and Parker 2002). However, as Barnes (2002) has so clearly pointed out, the root cause of increasing human/elephant conflicts is exponential growth of both human and elephant populations, and "treating the symptoms with aspirin" will not solve the problem.

In southern Africa it is our perception from discussions with stakeholders that the problem is escalating and reaching the stage where villagers are increasingly going to take matters into their own hands. The inherent dangers are the emergence of an increasingly illegal off-take of elephants with the high risk of an escalating illegal trade in ivory. Centralised command and control policies are unlikely to work in these circumstances – they have not worked in most of the continent.

There are two ways the problem may be resolved. One is to drastically reduce elephant populations. The other is, as Martin (2005b) has elaborated in a report to the Government of Namibia, to devolve the responsibilities for, and benefits from, conserving and managing elephants to rural communities.

If elephants are truly valuable, people will find ways to accommodate them within their livelihood strategies and the greater the returns from elephants the more likely they are to invest in conserving them. Much has already been done within southern Africa to provide rural communities with the necessary incentives to invest in conserving elephants and other wildlife. However, community conservation programmes in the region have not gone far enough in, (a) enabling communities to gain sufficient economic benefits, and (b) providing communities with sufficient decision-making authority over wildlife (Jones and Murphree 2004). Greater commitment by governments in the region to devolve authority, responsibility, and full benefits to local communities is crucial for elephant conservation outside protected areas. In several countries in the region, there is consensus that community-based programmes are contributing to elephant conservation, but these successes could be undermined by underlying and persistent institutional and governance problems. There is a need for governments and external support agencies to tackle these problems as a priority.

Within protected areas

National parks and related protected areas in southern Africa were first set aside in the early 1900s as reserves in which to protect "game." Their roles, responsibilities and public obligations have evolved over the last century to increasingly include such matters as the provision of tangible benefits to neighbours, balancing the demands of suitable amenities for a greater numbers of visitors, while maintaining wilderness experiences, becoming financially independent of the national fiscus, and acting as rural development hubs for an expanding tourism industry (Cumming 2004). Consumptive, economically viable, sustainable use of some resources (e.g. thatching grass, angling, trophy hunting, live-game sales, and, for a while, elephant products) from national parks has been practiced for decades.

Despite these changing roles of conservation areas, remarkably little attention and analysis has been devoted to the social and economic aspects of elephant conservation. There is little doubt that, economically, elephants are a keystone species.

Before the CITES meeting held in Nairobi in April 2000, Cumming (2000) suggested that $40,000,000 could be generated annually in southern Africa from a sustainable harvest of 5,000 elephant. This sum was sufficient to sustain 200,000 km^2 of protected area at a cost of $200 per km^2 – the rule of thumb for the minimum expenditure required to effectively manage a national park. A more recent calculation using data prepared by Resource Africa on the financial value of elephant products yielded an estimated annual return of $78,000,000 from a harvest of 5,000 elephant (Cumming *et al* 2005). On the assumption that the harvesting costs amount to 50% of the gross return, the profit that would be available for park management would still be in the region of $40 million a year. Martin (2005), in a comprehensive background document to the draft management plan for elephant in Namibia, has calculated a potential annual return of >$300 per km^2 from the sustainable use of elephant.

It is important to note that the control, cropping or culling of elephants also involves the harvesting of meat that is almost invariably made available to local communities. The protein produced can provide an important supplement to rural diets. A clear example was the meat produced for local consumption by elephant control operations in the Luangwa Valley during the 1950s when villagers received, on average, 250 gm of elephant meat a week (Ansell 1960).

Even if only half of the sums outlined above could be realized, the opportunity costs to conservation from the moratoria on the full use of elephant products are remarkable. The full significance of these

potential returns of \$200 - \$300 per km^2 per year from the sustainable use of elephants is in stark contrast to the current annual operating budgets of some wildlife agencies in the region (Mozambique, Zambia and Zimbabwe) which presently stand at, or less than, \$10 per km^2 (Table 4.2 page 62, Cumming 2004). A neglected component of the analysis is the value of elephants as a tourist attraction, including the level of elephant density at which that attraction is saturated, i.e. what is the threshold elephant density at which no further value is added in terms of elephants acting as a tourist attraction? Also, how sensitive are tourists to elephant impacts and is there a threshold beyond which tourists find the impacts on habitats unattractive? There were suggestions from some participants in the South African Elephant Indaba that many tourists do not enjoy visiting parks that look like "battle fields" which implies that the aesthetic implications of elephant impacts on habitats require attention.

5.4 Ethics, values and decisions

Attitudes and beliefs regarding the management of elephant tend to be highly polarized between those individuals, groups and societies which believe that elephants should not be killed under any circumstances, and those who view elephants as a valuable wild resource that can be harvested for the benefit of people and as an important component of a legitimate wildlife landuse option. There are, of course many people and organisations, and shades of opinion, that fall between these two ends of the spectrum of values related to elephant conservation and management.

The key issue is "Whose value systems should prevail in the management of elephants in southern Africa?" Objections to the sustainable use of elephants stem largely from developed countries in Europe and North America, and urban elites in Southern Africa and elsewhere. In most of these countries, animal rights organisations, humane societies and some conservation bodies are able to mobilize considerable resources to bring pressure to bear on politicians and the public to support their views. These pressures have recently extended to threats of tourism boycotts of countries that kill elephants.

The ethical framework that has developed around sustainable use of natural resources in southern Africa supports the humane treatment of animals but also includes the wider concerns of the environment in all its facets and the all-important social concerns of the rural poor.

Treatment of the philosophical arguments in support of a wider environmental and social ethic for conservation is beyond the scope of this report but can be found in the writings of Aldo Leopold, Holmes Rolston III, Baird Caldicott, Christopher Stone[1] and others. The following brief excerpt from Aldo Leopold's essay "*Thinking like a Mountain*"[2] is particularly relevant and also eloquently describes the cascading consequences of removing top predators.

> "We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes – something known only to her and to the mountain. I was young then and full of trigger itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die I sensed that neither the wolf nor the mountain agreed with such a view.
>
> * * * * *

[1] Christopher, D. Stone (1974) *Should trees have standing*? William Kaufman Inc. Los Altos, California.
[2] Aldo Leopold (1966) "*A Sand County Almanac: with essays on conservation from Round River*" Ballantyne Books.

> Since then I have lived to see state after state extirpate its wolves. I have walked the face of a newly wolfless mountain, and seen the south-facing slopes wrinkle with a maze of deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death. I have seen every edible tree defoliated to the height of a saddle-horn. Such a mountain looks as if someone had given God a new pruning shears, and forbidden Him all other exercise. In the end the starved bones of the hoped-for deer herd, dead of its own too-much, bleach with the bones of the dead sage, or moulder under the high-lined junipers.
>
> I now suspect that just as a deer herd lives in fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades.
>
> So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea."

From a southern African perspective two additional key questions arise in the ethical debate:

- Should rural communities and land owners in Africa have the right sustainably to use elephants and their products to better their lives and in so doing maintain wild land in the face of pressures from expanding agriculture or other land uses?[1]
- Should national parks and protected area agencies have the right to maximize economic returns from elephants in order to better conserve a full range of biodiversity within the protected areas for which they are responsible?

On the basis of our consultations and experience in rural development in the region, there is little doubt that the majority of southern Africans living in rural areas would respond that it is morally wrong to deny them the right to use their wildlife, including elephant, in both consumptive and non-consumptive ways. They would also fully support the view that national parks and protected areas, indeed all land under wildlife use, should be able to realize the full economic returns from elephants (and other wildlife) on that land – provided doing so does not compromise the accepted conservation objectives established for that land.

If elephants and wildlands are to be sustained in the face of burgeoning human populations and increasing rural poverty **the ethical issues raised here will have to be faced head on by governments and conservation agencies alike**.

Because the authorities responsible for managing elephants and protected areas find themselves in the position of being "damned if they do and damned if they don't"[2] control their elephant populations (Biggs 2005), there is an urgent need to develop a deeper understanding on the part of all stakeholders of the complexities of managing and conserving elephants and biodiversity in a southern African context. Biggs (2005) has recently outlined the "valuescape" pertaining to the choice of elephant management options. Park managers are required to balance a wide range of often conflicting values that may include:

[1] A related concern is that the agricultural and alternative land uses may not be sustainable – particularly in marginal lands where the wildlife based option may be both ecologically and economically superior.

[2] This point, expressed in these terms, emerged very clearly at the Great Elephant Indaba held in Kruger National Park in October 2004.

(a) environmental and biodiversity values such as wilderness and spiritual values, existence values of biodiversity and landscapes, utility values, and cultural values;

(b) sustainability values that may include concerns about park revenues and sustaining the financial viability of the park or park system;

(c) public service values and responsibilities in terms of providing facilities and amenities for visitors, benefits to neighbours and mitigating conflicts between wildlife and surrounding land uses.

The situation regarding values in relation to specific management options is equally complex (Table 5.1) and each management option may be in keeping with a particular value or value system, while violating other equally valid values or value systems.

Table 5.1 An outline of the value relations associated with some of the major elephant management options. (Source: Cumming *et al* 2005, based on Biggs 2005)

Tool/strategy	Examples of values supported	Examples of values violated
Laissez-faire	Wilderness Non-intervention No active killing necessary Experimental (Research?)	**Biodiversity** Material value Human safety/incurred damage Recreational & Tourism?
Contraception	Avoids killing. May limit 'environmental damage' and hence support biodiversity values Tourism Human safety	Biodiversity Social structure and behaviour (age-class/ reproductive/ psychological/ physiological parameters altered) Wilderness Co-operative governance (in some contexts) "Naturalness"
Culling/ cropping	Biodiversity/heterogeneity Naturalness of 'human predation' Sustainable utilisation Tourism Human safety Poverty alleviation	Involves killing Wilderness Tourism expectations (boycotts)

5.5 Science and values in management decisions

A key feature of the debate on the management of elephants has been the demand for a *scientific* justification for culling elephant. The arguments against culling, apart from those on purely ethical or moral grounds, are framed around the lack of scientific evidence or the current lack of scientific understanding of the interaction between elephants and biodiversity. These arguments are also used by animal welfare groups to justify their stance, e.g. Jason Bell of IFAW, 2005[1]. Equally, park officials frequently claim that the justification for culling is scientifically based.

At the heart of the question of whether or not population reductions in protected areas are justified is the problem of distinguishing between arguments based on values (i.e. value judgments) and scientifically or ecologically based arguments. The dichotomy is largely artificial because ultimately the reasons for adopting a particular management strategy, however well disguised as ecological imperatives and based in sound science, will be value judgments. The very act of deciding to protect

[1] Quoted in "Mulling a cull", The Economist, March 19th – 25th 2005, page 101

or maintain biological diversity as a conservation or management objective is in itself a choice based on valuing one objective above a range of alternative objectives. Science cannot usefully adjudicate between peoples' preferences or values. However, provided objectives are sufficiently precise, science can provide information on whether the objective is achievable, or is being achieved, and what the consequences may be of alternative choices.

The confusion between values and science is often compounded by vague and woolly management or conservation objectives. The current confused debate about whether or not elephants have a positive or negative impact on biodiversity provides a clear example.

Scientists conducting research on elephants have their own personal value systems and world views and these can also have a bearing on what research they do, their interpretation of research results and on their recommendations. Value free research is seldom possible and funding sources can also influence the nature of research and interpretation of results. Scientific paradigms also change and evolve and different schools of thought influence the interpretation of results and advice given to decision makers.

With particular reference to the question of culling to contain a population eruption, it is appropriate to quote a paragraph from Graeme Caughley's (1981) seminal paper on the issue:

> *"Is containment of an eruption necessary? That is a scientific question and I interpret the evidence available as implying that it is seldom or never necessary. Is containment of an eruption desirable? That is not a scientific question. I can boast no qualifications that would make my opinion any more valuable than those of my two immediate neighbors, a garage mechanic on the one side and an Air Vice-Marshall on the other."*

We can think of no case in which a purely scientific argument to contain a population eruption, of whatever species, is not ultimately based on values. If this observation is correct the logical conclusion is that ecological arguments can never be used to justify culling, or other means, to contain a population eruption.[1] They can, and should, be used to evaluate the risks that alternative courses of management might hold for reaching desired outcomes – such as the conservation of specific components of biological diversity, or clearly defined ecosystem states, that society or a landholder may value and desire. The argument that culling is, or is not, scientifically or ecologically justified is likewise inadmissible if, for example, the animals concerned are changing the environment in ways that a management agency or the public do not want.

An important implication of this discussion for conservation authorities within the region is that they need first to decide on clear conservation objectives for protected areas and land outside protected areas. The first question, following Caughley above, is to ask, what is *desirable*? Some conservation agencies in the region are beginning to use concepts such as "Acceptable Limits to Change" or "Thresholds of Potential Concern" (Biggs and Rogers 2003) to answer this question and to develop management approaches that enable change to fluctuate within these limits. A further implication is that setting desired outcomes will be part of a political process that must also take into account broader societal needs and be based on the values of that society if it is to be sustained.

[1] An indication of the extent to which science and values tend to be confused in the elephant management debate is when ecological arguments are found to be an acceptable basis for using contraception or translocation to control elephant population growth but are challenged when culling is proposed.

6. IN SEARCH OF SOLUTIONS AND PRIORITIES

The primary objectives of conservation for the region have been writ large in SADC protocols and national policies and legislation. They are reinforced by international agreements and treaties to which the countries of the sub-region are signatories. In summary, the objectives are to conserve biodiversity and to ensure the sustainable use of natural resources for the benefit of present and future generations. It is essential to appreciate that these objectives are societal choices and reflect local values. Most informed people in the region are agreed that the growing number of elephant is presenting a problem both within protected areas and outside of them. In this section we attempt to examine the problem in a manner that we hope will help to clarify the priority actions for elephant conservation and management that are required to meet the broad conservation and sustainable use objectives of the majority stakeholders in the region.

6.1 Identifying and bounding the problem

The first step in solving a problem is to define it. The major elephant conservation and management problems and issues identified and discussed in the previous chapters are, in essence, the following:

1. Elephant populations in southern Africa are growing exponentially and running out of space. (Too many elephants)
2. Elephants are spilling over into farming areas and eating peoples' crops, as well as killing several people each year. (Human/elephant conflict)
3. Because their ability to disperse is constrained, elephants are changing habitats within protected areas, but there is little agreement on whether such changes are "natural" or "unnatural", or good or bad for conservation or biodiversity in general. (Scientific controversy)
4. The world is divided into those who disapprove of killing elephant or interfering in what they consider to be natural processes and those who do not. (Differing value systems)

The first two problems are essentially natural resource management problems that potentially can be solved at local, national, and regional levels. The fourth is an issue of values, beliefs and ethics. It has international dimensions and has an overriding influence on the techniques and tools that can be used to solve elephant over-population problems. It also determines the benefits that landholders may derive from elephants and has a major influence on the third problem, the use and interpretation of results from research into the impacts of elephants on habitats and other species.

6.2 Complex systems and cross-scale effects.

The problems identified fall within the realm of "complex issues" and a first step in approaching the overall elephant management problem is to appreciate that we are dealing not with a simple, single species resource management issue, but with complex social-ecological systems operating at several scales. The dynamics of such systems are not simple or linear; they are characterized by largely unpredictable, non-linear responses and surprises (Holling 2001). They are also characterised by multiple scales and cross-scale influences. Traditional blueprint plans and "command and control"

approaches (Holling and Meffe 1996) are inappropriate for managing complex adaptive systems – more open, adaptive management and learning policies and approaches are required.

Resource management plans and actions generally require consideration of at least six sets of factors (or drivers) that may influence the outcome of most enterprises (Fig. 6.1). Each involves a cluster of different actors, value systems and goals and importantly, different criteria on which to judge to the success or otherwise of outcomes. These factors will also have to be dealt with at a variety of temporal and spatial scales. It is therefore important to recognize that elephant management issues are firmly embedded in complex social-ecological systems that can also be characterized as complex adaptive systems; systems in which both certainty and predictability are low. The technical components of the problem require more than normal, hypothetico – reductionist, science and the wider frameworks of post-normal science, resilience and scenario analysis are more promising and appropriate approaches (Kay *et al* 1999, Funtowicz and Ravetz 1993, 1994).

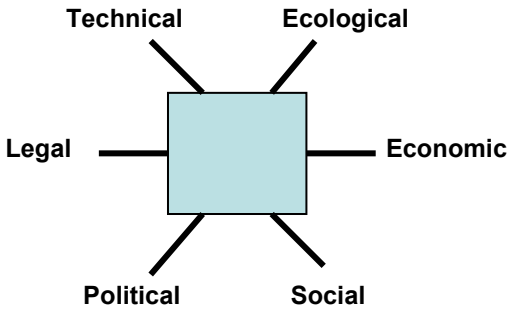

Fig. 6.1 Major components influencing, or impacting on natural resource management decisions and practice (from Cumming 1999)

Many of the legal, technical, ecological, and economic components and aspects of managing elephants have been dealt with in the previous sections of this report. But the political and social issues, particularly in relation to scale effects, have not been adequately considered.

The four problems listed above, namely, too many elephants, human-elephant conflict, scientific controversy, and differing values, have influences and impacts at differing scales in the larger social-ecological system that governs how elephants can be managed and conserved. We argue that **values and peoples' world-views are the dominant drivers of decisions on elephant conservation and management**, as indeed they are for most natural resource management. Because of the wide and often irreconcilable differences in beliefs that exist in relation to elephant management, this component has important cross-scale effects at international, national and local levels. It is for this reason that we place a high priority on actions to achieve a resolution in this difficult area.

At the international policy level, clear guidelines and support are provided for the sustainable use of natural resources, including elephants. Two international conventions to which most countries in southern Africa are a signatory have a bearing on the management of elephants, namely, the Convention on International Trade in Endangered Species (CITES) and the Convention on Biodiversity (CBD). CITES governs *international* trade in endangered species and their products. In 1989, in response to the collapse of East, West, and Central African elephant populations through

poaching, African elephants were listed on Appendix I, resulting in a ban on all international trade in elephants and elephant products. In 1997 the elephant populations of Botswana, Namibia, South Africa and Zimbabwe were returned to Appendix II, allowing trade in elephant products such as hides but limited one-off trade in ivory. In 2004 Namibia was granted permission to trade in traditionally carved ivory artifacts. Sustainable use of endangered species has been a recurrent bone of contention at the biennial conferences of the parties to the convention but sustainable use was accepted, in principle, at the 10th Conference of the Parties, held in Harare in 1997 when elephants were down-listed to Appendix II.

The Addis Ababa Principles and guidelines on the sustainable use of biodiversity were adopted at the 13 Conference of the Parties (Resolution Conf. 13.2) and provide an effective link between CITES and the CBD, the articles of which clearly support the sustainable use of wild natural resources as a means to achieving conservation and development. The Addis Ababa principles, fourteen in all, provide very appropriate and clear guidelines on sustainable use in relation to spatial and temporal scales of management, taking account of values derived from the use of biodiversity, the needs of indigenous communities and internalizing the costs of management and conservation – all of which apply to the elephant management issue (http://www.cites.org/eng/res/13/13-02.shtml).

The SADC Protocol on Wildlife Conservation and Management makes provision for harmonizing wildlife management policies and practices in the region. It clearly espouses regional support for sustainable use of wildlife resources, the development of transfrontier conservation areas, the associated development of common management practices and legal provisions, and the development of CBNRM programmes.

At a national level, as we have indicated in the country reports, all of the countries place equal emphasis on the conservation of biodiversity and habitats, sustainable use and community benefits from natural resources and, for those countries that have developed elephant management plans, this includes such benefits from elephants. These values are held at local landholder level. Policies, rules and guidelines for governance give rise to the laws and regulations that govern society. In an open society the policy and legal framework regulating resource use and management will ideally reflect the values and will of the majority of its citizens. If they fail to do so, then informal (often illegal) institutions will often govern resource use. And therein lies the considerable danger of imposing alien values at local levels. The point is well made by Smith *et al* (2003) in their examination of governance and the conservation of elephants and rhinos, where they present evidence that international trade bans may not serve the conservation of these species.

Value systems in society evolve and adapt. The responsibilities of protected areas have changed over the last century, with an increasing diversity of responsibilities and demands being placed on parks and park managers by society – including contributing to local rural and economic development (e.g. Child 2004, Cumming 2004). Rapid declines in elephant populations in West, Central, and East Africa over the last 25 years, coupled with increasing numbers in southern Africa and changing public opinion, have placed elephant management issues squarely in the public and political domain – nationally, regionally and internationally. It is for this reason that the question of whose values will, or should, prevail in the management of southern Africa's elephants assumes such importance. Our consultations and findings indicate that resolving this question is the first necessary step to developing an elephant conservation and management policy and strategy for southern Africa.

6.3 Proposed priorities

6.3.1 Policies and Values - international, regional and national

1. An opinion survey

An important first step in resolving the ongoing debate and associated political impasse in elephant management is to obtain reliable and up to date information on the values of a full cross section of those living in southern Africa. **We therefore recommend commissioning a professionally conducted opinion survey of values and attitudes of people in southern Africa to elephant conservation, sustainable use, and related issues.**

To date, the opinions of the majority of southern African peoples are simply being guessed at. The danger is that a vocal, well financed, minority outside of Africa may be wielding an undue influence on the process. While this may be an expensive project it will have enormous value in terms of informing the public within the region and internationally, and in providing sound guidance to policy at several levels. It is perhaps the most crucial aspect to be resolved in the elephant management debate and one that should not be delayed.

2. Economic analysis of alternative management options

This area of analysis is crucial to informed decisions on resource management and has been badly neglected. A critical analysis of the economic value of elephants and the opportunity costs of alternative elephant management strategies – including an environmental cost analysis of the effects of elephant deforestation and impacts on ecosystem goods and services, including biodiversity, is long overdue.

3. Policy, incentives and local resource management

Despite the great strides made in the development of CBNRM in the region there remain major policy related constraints to the effective development of natural resource management at the local level. Most of the region comprises land under communal tenure. The *de facto* resource managers are the mostly subsistence farmers of the region. It is they who make the day to day decisions about resources on their land based on their perceptions of the trade-offs between alternative land and resource uses – incentives in the form of tangible benefits from elephant conservation will therefore be an important issue. There is an urgent need to develop policy frameworks that will allow or foster the emergence of effective adaptive co-management systems in the region (Ruitenbeek and Cartier 2001, Martin 2005a, Murphree 2004).

An important component of policy development is opening the process to wider public debate and multidisciplinary participation within the countries of the region[1] and using "modern" techniques, such as scenario planning, to take the debate and basis for action and implementation forward. Associated with this is the need to develop an appropriate communications strategy for the region that is based on openness and honesty.

6.3.2 Management and research capacity in conservation agencies

Conservation agencies need to develop clear conservation objectives for parks and land outside protected areas and set outcomes that reflect societal needs and values. Once these objectives have been set, appropriate management tools can be identified to achieve these outcomes. Concepts such

[1] South Africa is already well advanced in this regard

as "Acceptable limits to Change" need to be used to set the parameters for when intervention might become necessary. The following also need attention

- Lack of sound data on numbers, distribution, conflict, impacts, etc, of elephants remains a major problem, even in South Africa.
- Landscape level analysis of human-elephant conflict to develop landuse planning and predictive mitigation (early warning) approaches to reduce human-elephant conflict.
- Some critical areas of research (e.g. historical numbers of elephants, impacts on biodiversity and the setting of acceptable limits to change) need to be fast-tracked and receive appropriate support.

Community-based conservation in the region needs to be strengthened so that communities have sufficient decision-making authority and receive sufficient income from elephants and other wildlife to provide them with the incentives and, more importantly, the resources to manage wildlife on their land. If communities can be sufficiently empowered through appropriate incentives they will very soon develop appropriate strategies to mitigate human/elephant conflicts.

6.3.3 External assistance

The following are identified as areas in which external donor assistance would be appropriate and which have emerged as needs in the country studies:

- Support for monitoring and data collection that can better inform decision-making
- Support for improved controls over ivory stockpiles and domestic ivory trade
- Support for further implementation of elephant mitigation strategies (chilli peppers etc.)
- Support for in-service training of mid-level managers (particularly on issues related to elephant management and control of ivory trade)
- Support for CBNRM, particularly on institutional and governance issues so that communities can be empowered to conserve wildlife and manage human/elephant conflicts in a manner that achieves a win-win outcome.
- Support for local, regional and national early-warning decision support systems to foresee and reduce human/elephant conflict.
- Support for TFCA development and the establishment of corridors for elephant movement.
- Support for further investigation of birth control methods and their biological, behavioural and ecological ramifications and their appropriateness for managing smaller populations.

The major priority, namely, a professionally conducted sample survey of southern African opinion and values related to elephant conservation and management would almost certainly need international donor support. And support will almost certainly be needed to secure much better information on the social, economic, landuse and policy related dimensions of the elephant problem to enable informed, defensible and sustainable decisions to be reached.

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8. APPENDIX – TERMS OF REFRENCE

Background
During the 1970s and 1980s, Africa's elephant population was substantially reduced by rampant poaching, driven by a thriving and unregulated international ivory trade. Up to 80% of herds were lost in some regions and the continental population fell to a total of perhaps less than 400,000. A ban on the international trade in ivory, combined with efforts to improve park management and anti-poaching, has seen an apparent reduction in poaching across many parts of the continent. Although elephant populations in west and central Africa remain unstable and threatened, populations in east Africa appear to be recovering. In southern Africa, many years of hard work and investment in wildlife management and protection has lead to improved and successful elephant conservation. As a result, many countries in the sub-region, in particular Botswana, Namibia, South Africa and Zimbabwe, report a steady increase in elephant numbers. Botswana and Zimbabwe hold the largest populations in the sub-region and some of the largest on the continent. This favourable situation has been acknowledged by CITES which, since 1997, has down-listed populations from four southern African states to Appendix II, allowing a controlled trade in ivory and other elephant products.

The increase in elephant numbers is, however, causing a dilemma for wildlife management authorities across southern Africa. As numbers grow, some parks have become over-populated with elephants. These large populations cause damage to their own habitat, reducing their food supply and threatening other protected species. Elephants increasingly leave protected areas to search for food and water, and often come into conflict with people as they enter fields to feed on crops. Human/elephant conflict is a growing problem, threatening the livelihoods of many rural communities.

The Republic of South Africa held a meeting (the Great Elephant Indaba) in October 2004 to investigate management options for its expanding elephant population. A suite of management actions was considered, including increasing the area available to elephants, translocation, culling, contraception, hunting, fencing, migration corridors and leaving the situation as it is. South African National Parks concluded that "all of these management interventions have their limitations". The new strategy will be finalized and submitted to the Minister of Environmental Affairs and Tourism in April 2005.

The management challenges facing South Africa also face the other countries in the sub-region. What is more, with many elephants crossing national boundaries, their management is increasingly becoming an international issue requiring transboundary co-operation. The Greater Limpopo Transfrontier Park (on the border of Mozambique, South Africa and Zimbabwe) and the KAZA or Four Corners Project (Botswana, Namibia, Zambia and Zimbabwe) represent some initiatives already underway to address sub-regional conservation.

Under the distinguished patronage of its President, HE Chief Emeka Anyaoku, WWF proposes to convene a Ministerial-level conference of the seven most affected southern African elephant range states: Angola, Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. (Note: Malawi and Swaziland are not included as they are not currently reporting problems with localized elephant over-population). The aim of the conference is to review the current situation of local elephant over-population and to search for common, sub-regional solutions to the problem. The meeting will be preceded by a working session of regional experts which will probably be linked to the next technical meeting of the African Wildlife Consultative Forum, AWCF (a consortium of the elephant range state wildlife directorates). This meeting will identify concrete recommendations for action that will help states conserve elephants, whilst safeguarding their habitat, their protected areas and the livelihoods of local people. Also taken into account will be the conclusions of recent elephant management conferences such as earlier AWCF meetings, the recent Elephant Indaba, and the South African Elephant Managers & Owners Association (EMOA) and NW Parks & Tourism Board symposium on elephant management. These results will feed into the on-going initiative by SADC

(the Southern African Development Community) to develop a sub-regional elephant management strategy to be adopted by member states.

Scope of Work
A consultant with expertise in African wildlife management will be employed to review elephant management issues across southern Africa and produce a report that will form the basis for discussions at the range states meeting. Assistance will be provided to the lead consultant through the employment of a second person.

The consultants will:

- hold preliminary discussions with WWF Africa & Madagascar Programme including the WWF Southern Africa Regional Programme Office (SARPO) personnel
- conduct a fact-finding mission to six of the range states concerned (Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe), visiting field sites as appropriate (Angola will not be visited but will be invited to the meetings)
- discuss elephant management issues with key stakeholders in each country including (but not limited to) government wildlife and parks authorities, conservation organizations (including local WWF offices and the IUCN/SSC African Elephant Specialist Group), local authorities and/or local communities living alongside elephants
- take into account recent meetings and initiatives dealing with the problem of elephant over-abundance
- review recent research and scientific literature pertaining to perceived elephant over-abundance and its impact on habitats, ecosystems and other species in southern Africa
- draft a report on elephant management issues relating to local over-population and outlining potential solutions and approaches
- assess actual and potential impacts of all possible management options, including culling, and how they may be perceived in countries outside southern Africa
- finalize the report based on feedback from WWF and its partners.
- attend the working session of regional experts prior to the Ministerial Conference.

The work will be carried out in close collaboration with the WWF offices in Mozambique, Namibia, South Africa, Zambia and Zimbabwe. WWF staff in these countries will accompany the consultant to meetings and site visits. The WWF offices will also provide assistance with logistics and in organising stakeholder meetings.

Schedule
The consultancy will run for 36 days from 10 March 2005 to 30 April 2005 (plus an additional 2 days at the experts meeting in May).

The outline schedule is:
- preliminary discussions with WWF Africa & Madagascar Programme (including SARPO) - 1 day
- fact-finding mission to six range states by the 2 consultants - 4 days in each of the 6 states = 24 days
- drafting of report - 6 days
- final edit and production of report - 3 days
- attendance at meeting - 2 days

Total consultancy = 36 days

Deliverables:

By 30 April 2005, produce a report which outlines elephant over-population management issues and potential solutions in the southern African range states of Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

The report will include the following sections:

- Background on elephant populations in the sub-region
- Current issues and challenges in elephant management, particularly as they relate to local over-population, including the abundance and distribution of other large mammals (especially black rhinoceros), avifauna, herpetofauna and invertebrates Chick – I don't recall any mention of rhino or herpetofauna
- Assessment of the practical capacity issues amongst the wildlife departments of the countries that would need to be addressed to enhance the management of elephants
- Actual and potential management tools for addressing local over-population
- Likely perceptions of actual and potential impacts of the management options in southern Africa and elsewhere
- Proposed priority actions to address the issues in the short- to long-term.
- Socio-economic implications of suggested actions
- The feasibility of elephant range expansion, including protection of this range and the space to do so, across the region.