

Towards a new elephant management policy for South Africa (1995 - 2008)

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LIST OF ACRONYMS

AfESG	IUCN African Elephant Specialist Group
BA	National Environment Management: Biodiversity Act (No. 10 of 2004)
CITES	Convention of International Trade in Endangered Species of Fauna and Flora
DEAT	Department of Environmental Affairs and Tourism
EMOA	Elephant Management and Owners Association
KNP	Kruger National Park
NEMA	National Environment Management Act (No. 107 of 1998)
NEM:PAA	National Environment Management: Protected Areas Act (No. 57 of 2003)
NEM:BA	National Environment Management: Biodiversity Act (No. 10 of 2004)
PAA	National Environmental Management: Protected Areas Act (No. 57 of 2003)
SAM	Strategic Adaptive Management
SANParks	South African National Parks
TPC	Threshold of Potential Concern
WESSA	Wildlife and Environment Society of South Africa

CHAPTER 1

INTRODUCTION

When the first National Parks were proclaimed in South Africa early in the 20th century only a handful of elephants remained within the country's borders, but ever since then our national elephant population has been growing. Today, South Africa is home to 17 840 elephants, making up 3.8 % of Africa's total population of 490 000. As early as the 1950s, concerns were expressed about the potential impacts of confined elephant populations on their habitats. The first management interventions in South Africa to limit these impacts followed in 1967, when elephants were culled in the Kruger National Park for the first time. When South Africa was accepted back into the international fold in the mid 1990s, SANParks' elephant management policies were questioned by international, and then local, animal rights groups. In response, SANParks agreed to suspend the practice of culling elephants and review both the purpose and methods of elephant management in its national parks. A thorough consultative policy review process sought the views, values, knowledge and experiences of a wide range of local, national and international stakeholders. Contributors have ranged from members of communities neighbouring national parks, to NGOs and international conservation organisations, animal rights and animal welfare groups, national conservation agencies from Namibia, Botswana, Zimbabwe and Mozambique, and a host of local and international scientists from a variety of disciplines and institutions.

The review emphasized that issues of elephant management are complex and controversial, involving not only data and expert opinion, but also values, ethics and emotions of stakeholders all over the world. Both research and debate about elephants and their management will go on for a long time, but the process of managing national parks must continue if SANParks is to meet its mandate to conserve biodiversity, and achieve its vision for a system of national parks that are the pride and joy of all South Africans. SANParks therefore developed new biodiversity management plans for all national parks in 2006 and 2007. The plans were based on full consultation with stakeholders and designed to meet the requirements of the National Protected Areas and Biodiversity Acts. Each plan sets out a desired state for the park's ecosystems and a strategy for achieving it. An important component of each plan is the large herbivore management policy. If a park supports elephants – as do Kruger, Addo Elephant, Mapungubwe and Marakele National Parks – then issues of elephant management were incorporated into this herbivore management plan. The Department of Environmental Affairs and Tourism (DEAT) has since published (February 2008) national Norms and Standards for elephant management which will have important implications for the implementation of elephant management in all private and public conservation areas.

At this juncture in the ongoing debate and policy development process it is fitting to reflect on the path we have travelled and the distance we have covered. What progress have we made in exploring and understanding the issues and interests at stake, and how has this influenced the way SANParks incorporates elephant management into its plans? This publication is a synthesis of the processes followed and outcomes achieved in South Africa over the last 12 years. Exposing this history to a wide audience presents an opportunity to place SANParks' current philosophy and approach to conservation management, with particular emphasis on elephants, on the table. We look forward to learning from any discussions, debate, research and new insights that emerge as a result. Our management can only be the better for it!

CHAPTER 2

THE CONTEXT OF THE “ELEPHANT DEBATE”

Understanding and predicting the dynamics of ecosystems and wildlife populations is the domain of ecology, botany, zoology – all of which are natural sciences that progress through scientific research and generate information to be analysed, interpreted and communicated by scientists. Why then did SANParks and later DEAT embark on a consultative process to gather stakeholder and societal inputs on the future management of South Africa’s elephants?

Decisions about the goals for which ecosystems are managed, their acceptability and that of the methods used to achieve them, cannot be determined by science or scientists alone. Decisions about environmental problems involve both knowledge and values, and it is not only scientists who have knowledge, and it is not only non-science stakeholders who are guided by their values. A participatory management philosophy recognises that “everybody has a piece of the wisdom” we need and that not only do stakeholders have a right to be involved in decisions which affect them, their involvement can lead to policies and decisions that are wiser, fairer, more efficient and more competent.

Elephant management requires specific attention in participatory conservation planning because:

- ***Elephants are ecosystem engineers:***
South Africa’s protected areas, our biodiversity and cultural heritage, are national and public assets of global importance. That elephants in confined spaces can markedly change ecosystem conditions is beyond dispute. In ecological circles organisms that have this sort of effect are known as ecosystem engineers and their potentially disproportionate influence on other species and ecological processes focuses the attention of scientists and managers alike.
- ***Elephants are important to people:***
Elephants are an iconic and charismatic species – entrenched in human history, culture and consciousness for thousands of years. Along with whales, dolphins, chimps, gorillas and other higher primates many view elephants as fellow sentient beings – highly intelligent animals with an awareness of self and others, and complex emotions that influence their social networks. Many people are willing to pay great sums of money for the opportunity to see these animals in the wild, or even for the assurance that wild elephant populations will continue to exist. Elephants are prominent in African culture and folklore, being associated with power and royalty, and many South Africans value elephants as part of their cultural heritage. But many, especially those in rural and poor African communities, also see elephants as an important, or potentially important, resource base for supplementing their incomes, and as a raider of crops that threatens life and livelihoods. Society should therefore contribute to determining the values expressed in the vision and management of specific national parks.
- ***Ethical considerations in elephant management:***
Decision-makers must take into account stakeholder views, not only about the goals of management, but also the ethics of the methods used and the manner in which they are applied. Stakeholders do not experience the costs and benefits of elephants, or their

management, equally. Though the impacts on local people are paramount, international reaction to chosen management strategies holds the potential for a cascade of national and local socioeconomic effects which should not be ignored.

- ***Conflicting objectives of the triple bottom line:***

The public aspect of the 'elephant debate' focuses mainly on management options – more specifically culling. However, the management of natural resources and protected areas, though focused on biodiversity conservation and ecological goals, has several, often conflicting, objectives to consider. These include the triple bottom line of sustainable development – social, economic and environmental – in addition to technical, political, legal, and not least of all ethical considerations. Such decision-making problems are complex and different stakeholder groups may have quite different perspectives on what falls within or without the context of elephant management decision-making. One of the purposes of public participation in policy processes is to generate a shared understanding among the diverse stakeholder groupings of what constitutes fair, informed and competent decision making.

In Figure 1 we present a mind map of the interacting aspects of the elephant management policy, its context, the stakeholders, their issues and concerns, suggested management options, and their potential implications. Fair decision making must be informed by all these factors. In untangling the various issues, conflicts and controversies the competent decision maker distinguishes between 'ends' and 'means' – in other words, the goals and methods of management. Stakeholders' interest in, and disagreement within, the debate concern both ends and means, along with information from a wide range of sources. Evaluation and selection of management options can only take place once the desired ends of management, and the ultimate values these serve, have been identified and agreed upon. Attempting to consider the merits of various management alternatives (the means to the end) before clarifying one's values and goals is a back-to-front and limiting decision-making approach. On the whole such an approach only serves to generate unnecessary misunderstanding and conflict¹.

The 'ends' in the elephant management debate concern desired and acceptable impacts on the one hand and levels of risk associated with growing elephant populations on the other. Potential impacts of concern include landscape or habitat change, loss of biodiversity, and increased incidents of fence-breaking leading to elephants and other animals leaving the park where they may spread disease or come into conflict with neighbouring communities. Though both national and international obligations dictate that biodiversity is of overriding concern as an 'end' or 'goal' of protected area management, all of these impacts must also be taken into account when assessing the risks of different management options.

In general management options are aimed at changing the size, density, structure or distribution of elephant populations and thereby the severity, extent or duration of any potential negative impacts. All the potential management options have pro's and con's, ethical concerns, financial and capacity constraints. Some management options have impacts only indirectly related to elephants or ecosystems in the form of the reactions they invoke from stakeholders. Others offer the potential for direct benefits to stakeholders through the use of by-products.

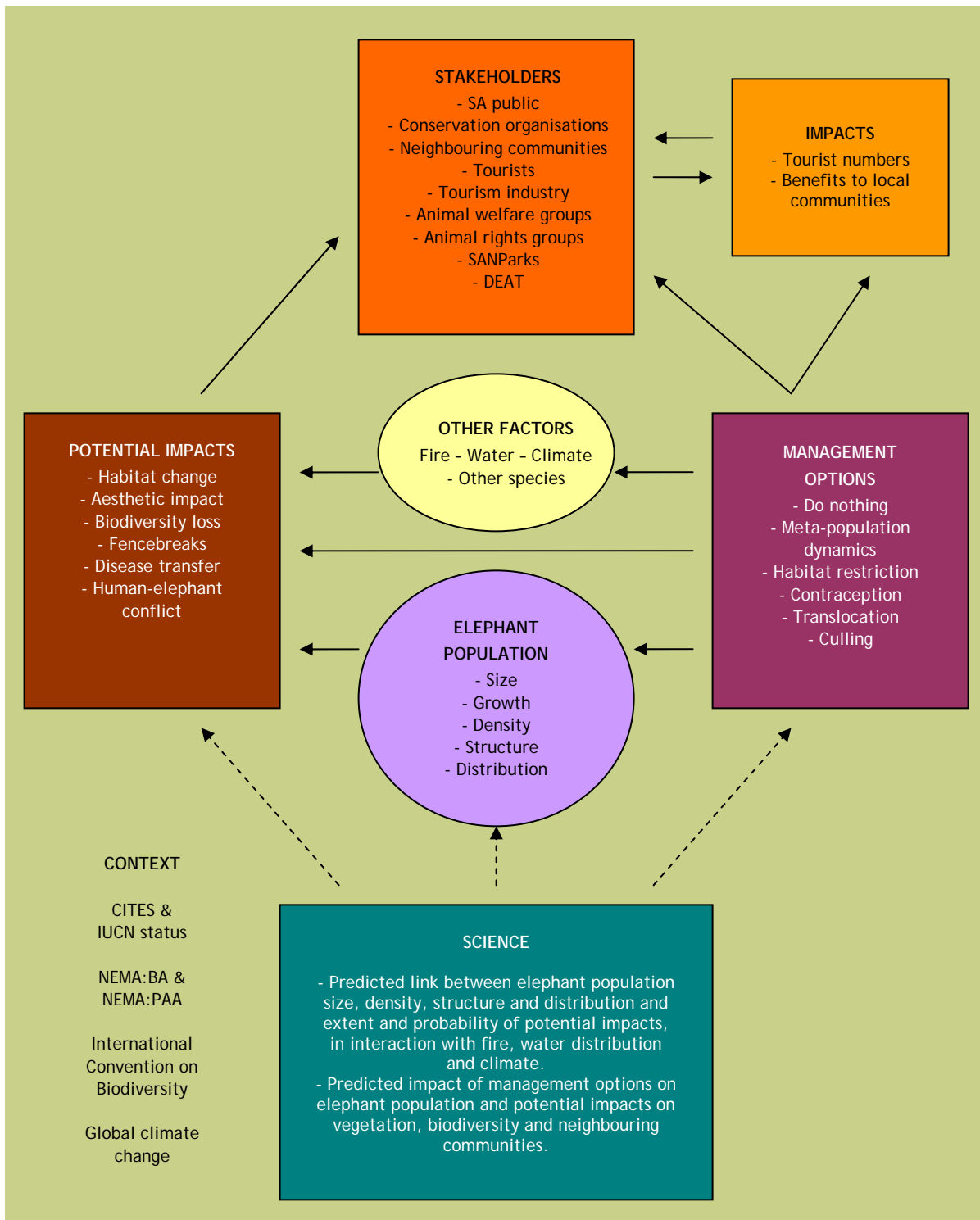


Figure 1: Mapping the issues affecting elephant management and policy

BOX: CITES and South Africa's elephant population

The fate of elephants has long been tied to their value as a source of ivory – Africa's 'white gold'. Humans have used and valued ivory since the Stone Age, but it was only with the emergence of professional ivory hunters in the late 18th century that this trade escalated to levels that swiftly depleted elephant populations across Africa. The drop in demand for ivory after the first world war, and the protection offered by legislation and the proclamation of protected areas, allowed elephant populations across Africa to stage a remarkable recovery². Then in the 1970s ivory prices soared, and in just a decade poachers were able to remove half of Africa's elephant population. Worst hit were the east African herds – in Kenya, Tanzania and Uganda. The dramatic decline in elephant numbers prompted drastic action from the Convention of International Trade in Endangered Species of Fauna and Flora (CITES). In 1989, CITES elected to ban the legal trade in ivory by moving elephants from Appendix II (permitting controlled commerce in wildlife products) to Appendix I (prohibiting all such trade among parties to the Convention). In recognition of the lower threat to southern African elephant populations, elephants in Botswana, Namibia and Zimbabwe were transferred back to CITES Appendix II in 1997 and South Africa's elephant population followed in 2000. These countries may apply to make limited, conditional, once-off sales of government ivory stockpiles to a CITES-approved importing nation. In 2002, CITES agreed to a once-off sale of 30 tons of South African ivory originating from Kruger National Park.

Who are the stakeholders?

Protected areas, wildlife and biodiversity are global assets – thus all humans, including future generations, have some stake in the outcome of the elephant management policy review process. Impacts are felt more closely by certain groupings by virtue of their specific interests or values, and by others because of the proximity of their lives and livelihoods to protected areas and tourism or, most directly of all, to individual elephants posing a risk to life and property. Different groups are subject to different potential impacts, costs and benefits as a result of growing elephant populations and the different management options.

Stakeholders in the debate can be grouped according to their chief interest in either 'ends' or 'means' or both. The chief interest of some groups is in management as an intervention to prevent impacts, whether on the aesthetics of landscapes, biodiversity, disease control or human-elephant conflict. Other stakeholders' main interest is in the methods that might be used to manage elephant populations. These concern the effects of different management interventions on elephant welfare, on tourism, the economy, and the potential for economic benefit from consumptive use.

Elephants and their management are therefore of interest to a very wide range of stakeholders in addition to the managers of conservation areas.

The main stakeholder groupings recognised are:

- Conservation organisations, both general and specific, e.g. birding or botanical societies
- Environmental justice groups
- Nature-based tourists

- Nature-based tourism industry
- Communities neighbouring the protected areas with elephant populations
- Animal welfare groups
- Animal rights groups
- Scientists, ecologists
- Government – provincial and national conservation agencies, SANParks, DEAT

There is a distinction between concerns for ‘animal welfare’ and ‘animal rights’. Animal welfare refers to the belief that humans have a moral responsibility to treat animals humanely, i.e. in a way that does not cause them to suffer unnecessarily. A stronger claim is that of ‘animal rights’, which proposes that animals effectively be given legal rights in order to protect their basic interests and prevent them from being exploited by humans.

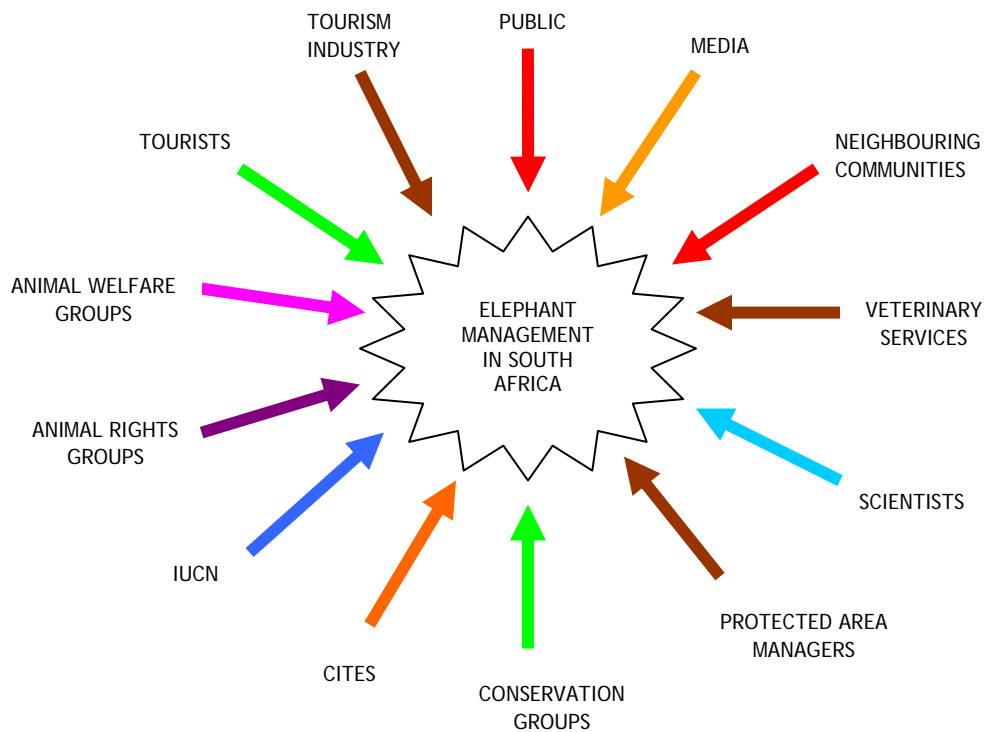


Figure 2: Chief role-players and stakeholders in the elephant management debate

The range of values influencing elephant management decisions

The range of ways in which elephants and other wildlife are valued by humans potentially gives rise to conflict when the expression of different values gives rise to incompatible actions or scenarios. Incompatible values and ethical frameworks give rise to moral dilemmas, which will persist unless one set of values becomes dominant.

Values attributed to elephants and the ecosystems they inhabit include:

- Aesthetic (appreciation through human senses)
- Bequest (leaving a legacy for future generations)
- Commercial (role in generating income)
- Cultural (importance as cultural symbols)
- Ecological (role in contributing to ecosystem structure, function and composition)
- Empathetic (satisfaction from being able to emotionally relate to other species)
- Existence (sense of wellbeing from the knowledge of a species' or ecosystem's existence)
- Historical (importance as a symbol of a past era)
- Recreational (enjoyment of a wildlife experience)
- Scientific (the advancement of knowledge and understanding)
- Subsistence (for non-commercial consumption)
- Wilderness values (experiencing an absence of human influence or intervention)

Science and uncertainty

Decisions about the acceptability of impacts and the appropriateness of management options must be informed by both descriptive and predictive knowledge. Scientists are both stakeholders in the debate and providers of knowledge that informs value-based decision-making in consultative processes in policy review. Science and scientists have played a significant part in the events of the last 12 years, and will continue to do so into the future.

In particular, science and scientists are required to clarify:

- The link between elephant population density, structure and distribution and their positive and negative effects on biodiversity.
- Which impacts on biodiversity are unacceptable to any given value system.
- The effectiveness of various management options in reducing or reversing negative impacts, and the likely consequences of these for both elephants and other species.

The issue of elephants and their interactions with their environment is complex and often leads to uncertainty in both our understanding and management decisions. These uncertainties can both fuel and paralyse the debate but they are inevitable and policy makers need to learn how to deal with them. Sometimes this uncertainty represents genuine gaps or contradictions in understanding but very often careful analysis by an interdisciplinary team will find rational explanations that the individual scientists could not. Unfortunately stakeholders, both scientists and others, sometimes use these uncertainties to create a perception of dissent. Amongst scientists this takes on the label of 'adversarial science' because failure to integrate findings from different studies or disciplines mostly serves to polarise scientists, stakeholders and the debate. A further problem is that other stakeholders, such as components of the media or particular lobby groups, use this apparent dissension to bolster their own ends without having to justify them. The challenge is to find consensus among all stakeholders to prevent costly deadlocks in decision making. This has happened many times during the policy review process. However, the consultative process pursued in search of a solution to the elephant management problem was able to establish at least sufficient consensus on issues to allow the forward movement we report in this publication.

A process to negotiate the elephant management policy problem

What kind of consultation, policy and decision-making process can be used to negotiate the complexity of the elephant management policy 'problem'? An effective consultative policy review approach rests on the following principles³:

- All views and perspectives count. Solutions are developed through discussions with all stakeholders.
- Science provides information. Science alone cannot provide the answers.
- Management must be adapted to the context of the problem, considering interrelated problems and externalities.
- Decision-making must be discursive and deliberative. Participants engage in open, honest and respectful discussion aimed at mutual learning and understanding others' perspectives. Avoid unproductive, yet common, tactics such as lobbying authorities about a particular point of view, polling opinions across stakeholder sectors without due recognition of proportional representation, and debating to win the argument rather than listening to understand it.
- Understand the past but build the future.

A DEAT communiqué explained in 2005 that the participatory policy process is not about million-signature petitions which attempt to dictate a decision to authorities, but reaching a sustainable African solution to an African problem through honest and constructive engagement and information-sharing.

CHAPTER 3

OVERVIEW OF THE POLICY PROCESS

Initiating policy review

Nearly 30 years of communicating the reasoning behind the first elephant management plan and the need for culling built general acceptance for KNP's elephant management policy over time, in a broad cross section of the South African public. However, the policy had always been controversial, especially beyond our borders. Towards the end of 1994 this controversy escalated when animal rights groups confronted SANParks about the ethics and morality of killing Kruger's elephants in the name of population control – a policy which they suggested also had no scientific foundation. SANParks responded to these criticisms by initiating a public debate on this issue. At the debate, held in Midrand on 4 May 1995, SANParks agreed to undertake a comprehensive review of its elephant management policies. SANParks imposed a moratorium on elephant culling in national parks to reduce conflict and draw a wide range of stakeholders into the review. A series of internal meetings, consultative workshops, public debates, stakeholder indabas and expert panels constituted the 'elephant management policy review process', undertaken at first by SANParks and in its later stages by DEAT.

Bounding the decision space - legislation, authorities, mandates and outputs

The policy review process that has unfolded over the next 12 years was not envisioned in its entirety in 1995, but became an evolutionary process which adapted to and followed both need and opportunity. The moratorium on culling occurred at a time of great political change in all aspects of government and governance in South Africa. In 1995, the responsibility for authorising park management actions, including elephant culling, was held by the National Parks Board, afforded to it by the National Parks Act (No. 57 of 1976). The passing of the National Environmental Management Act (NEMA) in 1998, and later its extensions, the Biodiversity and Protected Areas Acts, has recast and reassigned mandate and authority. In 1997 the National Parks Board became South African National Parks. SANParks now functions under the ambit of the National Environmental Management: Protected Areas Act (No. 57 of 2003). The core mandate of SANParks is the conservation of South Africa's biodiversity, landscapes and associated heritage assets, through its system of national parks.

NEMA, the Biodiversity and Protected Areas Acts are all framework Acts, which have been designed as enabling legislation – this allows for development of more specific policy through adaptive and consultative tools. The National Environmental Management: Biodiversity Act (No. 10 of 2004) authorises the Minister of Environmental Affairs and Tourism to issue norms and standards for the achievement of any of the objectives of the Act, including the management and conservation of biodiversity. Under the Protected Areas Act the Minister may also determine norms and standards for the performance by SANParks of its functions. SANParks is in turn required to advise the Minister at his request on any matter concerning biodiversity conservation and management.

Under the Protected Areas Act all parks must have management plans, developed in consultation with stakeholders, and approved by the Minister. Thus decisions about the management of specific elephant populations must ultimately take place at the level of individual parks. Elephant management plans form part of protected area management plans tailored to deliver desired states arrived at through stakeholder consultation. These plans are informed and constrained by national norms and standards published by the Minister. Protected area management plans must include a strategy of management options to achieve the desired state over time, a budgeted and resourced implementation plan, and a monitoring plan to measure progress and inform future policy review.

The overall policy planning and approval process for elephant management is shown in Figure 3, along with specific opportunities provided within the process for input and comment by the public, stakeholders and scientists.

The national Norms and Standards for Elephant Management and park management plans are all living documents subject to cyclic review. This allows for policies to be updated in response to new knowledge and technologies, and changing stakeholder needs, values and realities.

Under the new Acts, decisions about protected area and elephant management come with both process and outcome constraints. Governance is required to be cooperative and decision-making consultative. The decision-making process should be rational and reasonable, fair and inclusive (allowing all stakeholders equal opportunity to voice their concerns), informed (through scientific and other forms of knowledge) and transparent (providing access to information about both process and outcome).

Some of the values that conservation management decisions must uphold have already been set – these are laid out in the Constitution, Acts of Parliament, and in international agreements to which the SA government is a signatory, such as the International Convention on Biodiversity, CITES and RAMSAR. Both DEAT and SANParks have a priority mandate to conserve biodiversity – a regional, national and global asset which also has intergenerational value.

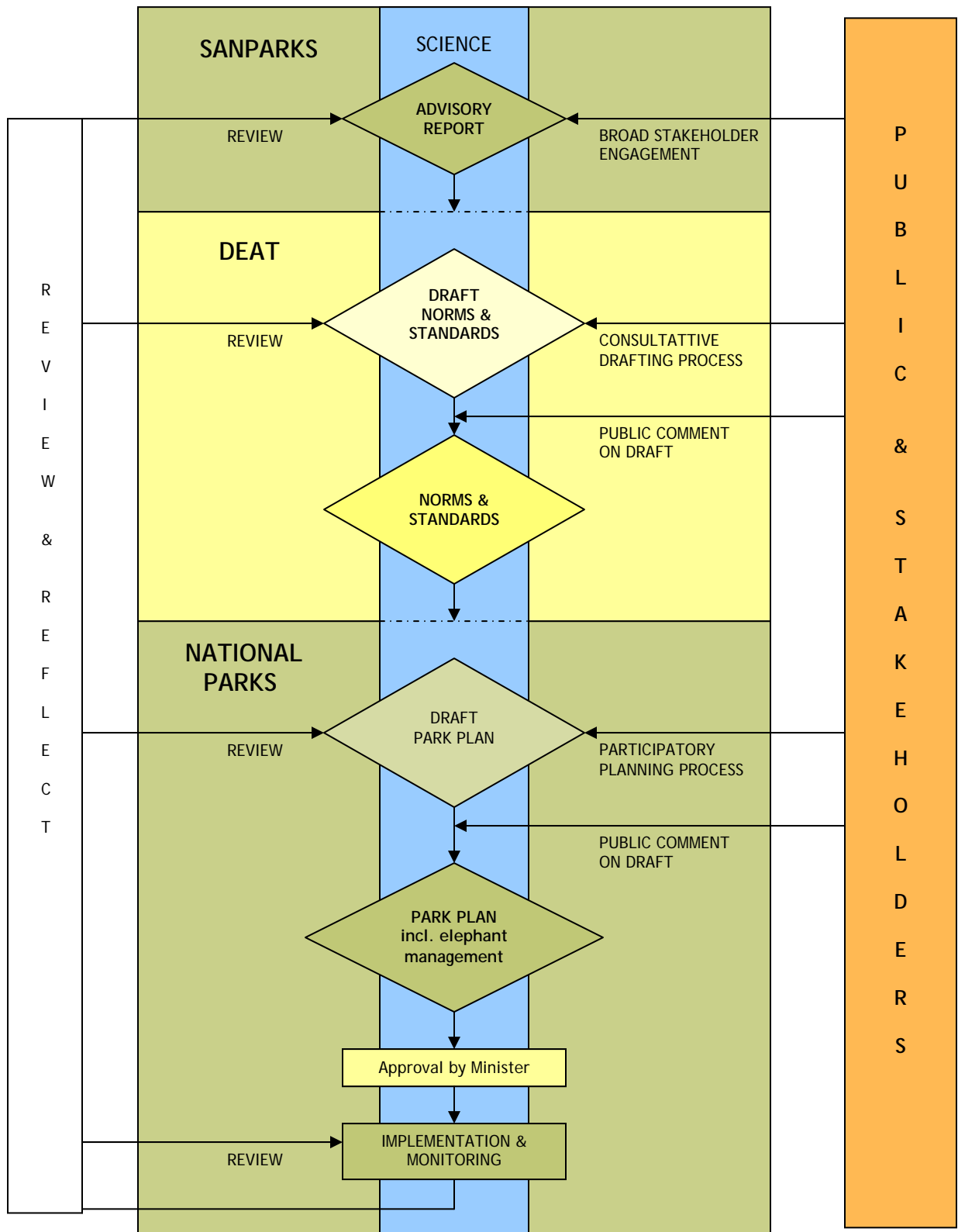


Figure 3: The elephant management policy drafting process

An overview of the policy review process: 1996 to 2008

As the idealised process of Figure 3 had not yet been mapped out by new legislation in 1995, the actual policy review process initiated by SANParks followed a slightly different path in its early stages. The majority of South Africa's elephant population is found in the KNP, the only national park where management has intervened in the past to limit elephant population growth. The debate and controversy about elephant management in South Africa has always centred on KNP. This time it was no different and, because KNP staff were already in the process of revising their management approach, attention first focussed on this individual protected area before expanding into a national initiative.

The process that followed can be divided into three distinct phases:

- PHASE 1: (1996 – 1999) KNP management planning process.
- PHASE 2: (2003 – 2005) SANParks indabas, concluding with SANParks' advisory report to the Minister of Environmental Affairs and Tourism in September 2005.
- PHASE 3: (2005 – 2008) Minister van Schalkwyk's forums and panels, culminating in the publication of National Norms and Standards for Elephant Management in February 2008.

All three phases have involved inputs from both scientists and stakeholders, the public and special interest groups, and have included a range of events, forums, media and opportunities for participation. A fourth phase will reach its conclusion in the approval and implementation of park management plans under the guidance of national norms and standards.

Documentation of the content of many of the most important events has been published elsewhere. This publication will focus on the purpose, participants and specific outcomes of the series of events during Phases 1 and 2 directed by SANParks. A synthesis of the potential impacts of growing elephant populations, and the options for managing elephants is followed by an account of Phase 3 – the Minister of Environmental Affairs and Tourism's consultation process and its outcomes.

TIMELINE: ELEPHANT MANAGEMENT POLICY REVIEW PROCESS

PHASE 1: KNP MANAGEMENT PLANNING PROCESS	
8 Feb 1996	Workshop with KNP scientists, AfESG
10 Feb 1996	Workshop with KNP scientists, AfESG, IFAW
30 Oct 1996	Internal KNP workshop
12 Nov 1996	Public debate, Midrand
11-13 Feb 1997	KNP TPC workshop
17 Mar 1997	Formulation of KNP elephant management policy
31 Oct 1998	Public meeting to present KNP elephant management zoning plan, Nelspruit
12 Mar 1999	SANParks Board approves KNP zoning plan

1999	KNP plan published in <i>Koedoe</i>
PHASE 2: SANPARKS BROADENS THE CONSULTATION PROCESS	
2000	CITES downlists SA elephant populations to Appendix II
2003	NEM: Protected Areas Act
2003–2004	Consultation with communities in Mozambique re Greater Limpopo Transfrontier Park
2004	NEM: Biodiversity Act
6 Aug 2004	WESSA's Great Elephant Debate, Nelspruit
17 Sept 2004	EMOA & North West Parks elephant symposium, Pilanesberg
19–21 Oct 2004	SANParks Great Elephant Indaba, Berg en Dal, KNP
15–17 Mar 2005	SANParks scientific workshop, Luiperdskloof
April 2005	Workshops with communities neighbouring KNP
25–27 May 2005	African range states consultation meeting held under auspices of SADC, Victoria Falls
18–20 July 2005	"Elephants Alive" convened by Care for the Wild International, Xwe African Wildlife, Justice for Animals at Wits University, Johannesburg
8 Sept 2005	SANParks advisory report on an Elephant Management Strategy submitted to Minister van Schalkwyk
13–15 Sept 2005	Elephant TPC workshop, Pretoria
PHASE 3: MINISTERIAL CONSULTATION AND DECISION-MAKING PROCESS	
Late 2005 – early 2006	Minister's international roadshow: UK, Holland, Switzerland, Italy, Germany, USA
28 Nov 2005	Minister hosts 17 local and international stakeholder groups, Cape Town
1 Dec 2005	7 environmental groups come out in support of SANParks proposal to manage elephant populations to protect biodiversity.
18 Jan 2006	Science Round Table 1, Cape Town
22 Aug 2006	Science Round Table 2, Cape Town
2 March 2007	DEAT publishes draft Norms and Standards for public review

CHAPTER 4

CHANGES IN ECOLOGY AND CONSERVATION: SCIENTIFIC CONTEXT FOR THE REVIEW PROCESS

The past: Managing elephants to protect the 'balance of nature'

The rampant exploitation of wildlife in the early colonial era, and changing philosophies of ecology and conservation management over the last century, have left their mark on South Africa's national parks and elephant populations. The following account offers both a historical and conceptual context for the ecological aspects of the elephant management debate.

The African Elephant (*Loxodonta africana*) once occurred or potentially occurred over most of South Africa (Figure 4), but what regional densities these populations may have attained can now only be guessed at. Ivory hunting and the expansion of human settlements and agricultural areas swiftly reduced elephant numbers and distribution. By 1900, elephants in South Africa were confined to remnant populations in the vicinity of Knysna, Addo, the Tembe area of Maputaland and possibly the Olifants Gorge in what is today the Kruger National Park (KNP)⁴. At the same time, populations of many other game species had been devastated by hunting and the rinderpest epidemic of the 1890s. Parks such as Kruger were proclaimed to try to protect what little game remained, and over time to replenish the area's once abundant wildlife resources.



Figure 4: Historical distribution of elephants in the area covered by the present South Africa, based on skeletal material, indigenous art and historical records (adapted from Ebedes et al., 1995⁴⁴). However, it is not known how much of this distribution represented resident elephants versus transient elephants (occasional visitors).

Prior to the 1930s, management was focused on the preservation of parks as natural areas and on restocking their game populations. The National Protected Areas Act of 1926 introduced a new consideration – tourists. A new set of stakeholders and interests was created, along with considerable potential for future income generation for parks. In the early years, management of animal populations was entirely *laissez faire* – the only management intervention being the protection provided from hunting. In KNP in the 1930s a slow shift began toward ‘management by intervention’ with efforts to counter the disruptive effects of fire and drought. The desire to preserve the KNP landscape, and particularly the woody vegetation, led early rangers to attempt to restrict fires. Efforts were also made to counteract the destabilizing effects on game numbers

of the lowveld's frequent and often severe droughts – boreholes were sunk, and weirs and dams built in seasonal and later perennial rivers.

By the 1960s management by intervention had intensified to ‘command and control’ – a term given to the prevailing worldwide approach to natural resource management at the time. This highly interventionist management style was aimed at maintaining the ‘balance of nature’. ‘Balance of nature’ thinking was central to ecology for much of the 20th century, and the notion of stable nature this portrayed was able to capture the imagination of a world beyond ecologists, a world which in large part continues to romanticise this condition today. Natural systems, in the absence of large-scale human interference, were believed to be internally regulated toward a stable or steady state. This was called a ‘climax’ or ‘equilibrium’ state and was recognised by the persistence of a characteristic type and structure of animal and plant communities over time. Though change was known to occur this was believed to be cyclic and predictable. Events termed ‘disturbances’, such as fires, floods or disease outbreaks, could reset the cycle – after which the system would recover along pre-determined paths toward its original, equilibrium, condition⁵. Pristine systems were predicted to be able to self-regulate toward this equilibrium but human-modified systems, such as fenced game parks, were proposed to require management aimed at maintaining the ‘balance’ or steady state. It was thought that this was best achieved by avoiding or controlling disturbances and the changes they brought about. In KNP this balance was thought to be represented by the type of vegetation observed around 1900, when the reserve was newly proclaimed.

By the 1950s and early 1960s sentiments were being expressed by biologists elsewhere in Africa that elephant populations should be controlled to prevent habitat change. The same concerns were voiced by biologists working in Kruger, who had noted a decline in large trees with increasing elephant densities. In November of 1965 a symposium convened by the National Parks Board, and attended by many South African biologists of the time, focused on the potential ‘overprotection’ of animal populations afforded by parks such as Kruger. One of the conference outcomes was the recommendation that the populations of seven species – elephant, buffalo, hippo, giraffe, wildebeest, zebra and impala – should be controlled by means of culling⁶. Various research outputs of the time were used to arrive at a recommended ‘carrying capacity’ and thus desired upper limit for Kruger’s elephant population. A figure of 7000 elephants or roughly one elephant per square mile was supported by estimates from elsewhere in Africa and observations of the population density at which elephants in their favoured habitat in KNP began to disperse to populate the rest of the park. Starting in 1968, the culling of various species completed the picture of KNP as a highly managed system operating around the maintenance of a stable ecosystem state⁷.

The culling of species other than elephant was eventually abandoned when it was realised that their populations followed predator-prey oscillations or wet and dry rainfall cycles. Elephant is the only species in KNP whose populations have not been shown to respond to short-term climatic cycles. Annual culling of elephant populations thus persisted through various review cycles of the KNP management plan. Between 1968 and 1995 this policy resulted in about 17000 elephants being removed from KNP, 2500 of which were live transfers to other conservation areas.

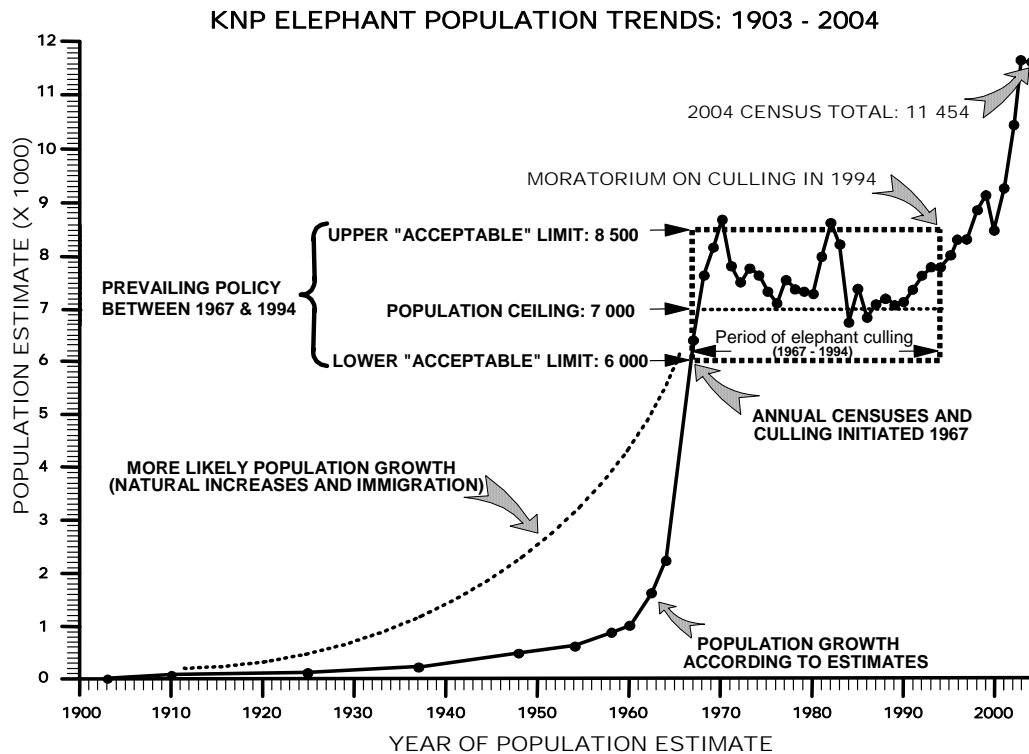


Figure 5: Growth of KNP's elephant population from 1900 to 2004

The present: Do we need to manage elephant impacts to protect the resilience of ever-changing ecosystems?

As management progressed in KNP and elsewhere, attempts to command and control ecosystems often had surprising and unwelcome consequences. Attempting to prevent fires, for example, merely led to a build up combustible material with fires eventually breaking out that were hotter and more damaging than those which had successfully been avoided. Rangers in KNP made this discovery early on and responded by introducing a programme of controlled burning to keep fuel loads down. As information from management accumulated, the details of management policies changed, though they still drew their underlying purpose and logic from equilibrium concepts.

At the same time the discipline of ecology was accumulating research findings that showed that in reality ecosystems are non-deterministic – their complexity, in the form of multiple feedback mechanisms, causes them to change in unpredictable ways and they are rarely stable or at equilibrium⁸. The apparent balance of nature was merely a snapshot that ecologists had taken of an ever-changing vista. Ecologists now realise that what they had documented in the past (and over the relatively short time period that the discipline of ecology had existed) was not the balance-of-nature but merely a small sample of what was really the **flux-of-nature**.

For example, in KNP we now realise that what managers of the past had aimed to preserve was not stable or in balance. The large stands of tall trees which left such an impression on early

visitors were established under conditions of very low herbivore numbers. This window of opportunity was created by the human impacts of hunting, particularly for ivory, and the introduction of rinderpest – an exotic disease. The vegetation at the time of KNP's establishment was thus not a reflection of the steady state of centuries, but a temporary condition which the spectacular recovery of herbivore populations since 1900 has now changed.

Over the long-term ecosystems can be seen to occur in a number of different forms. Most of the time these are simply a variation of the same fundamental state – e.g. a savanna with slightly different tree to grass ratios or dominant species. But ecosystems can also be driven to change more radically – e.g. a savanna may become a grassland or shrubland. If new feedbacks occur which act to keep the system in its altered state, this change could be irreversible. Previously, changes of these magnitudes were explained as an upsetting of the balance. Within the flux of nature paradigm ecologists now came up with the concept of '**resilience**'. Though ecosystems are constantly changing in response to various disturbances, drivers and external forces, and this overall change may be directional for a time, they seldom undergo a fundamental change in their basic character⁵. Resilience refers to this ability of ecosystems to absorb environmental stressors without undergoing an irreversible transformation in state.

Ecologists now believe that it is the existence of flux, variation and diversity that gives ecosystems their resilience in the face of extreme events. In other words, it is because they bend that they do not become brittle and break. Attempts to maintain the 'balance' by controlling or minimising fluctuations or extremes cause systems to become less resilient when faced with further stressors. The more we have tried to keep natural systems constant the more they have surprised us by changing.

Managing ecosystems under the flux of nature paradigm: resilience through diversity

The realisation of the flux of nature has required a fundamental rethink of the goals and methods of conservation and ecosystem management. Whereas previously managers attempted to dampen fluctuations in natural systems, the focus has now shifted to encouraging variation and variability, together referred to as '**heterogeneity**'. Heterogeneity implies the existence of patchiness in both space (different patches experience different environmental conditions and impacts) and time (individual patches experience changing conditions and impacts). Heterogeneity provides a diversity of patches in a mosaic – made up of different soil types, levels of mineral nutrients, water availability, heat, light and shade, hiding and nesting places, densities of herbivores, predators and disease. This patch mosaic provides habitats for many different organisms, and in this way contributes to maintaining biological diversity. **Biodiversity** is not simply the number of different species which occur in a particular area but includes variation at the level of genes, populations, species, communities and landscapes⁹. Three kinds of variation contribute to overall diversity: composition (what is there), structure (how it is distributed in space and time) and function (what it does and how it does it). For example, when considering the diversity of woody plants one can assess what species occur (composition), the number of trees in different size classes and where they are found (structure), and the role of different species and size classes in providing food, shelter, nutrient cycling, and erosion control (function).

Managing for heterogeneity and biodiversity requires a move away from simply monitoring and managing a list of species to the **explicit managing of ecosystems** by maintaining ecological

functions. Species are managed for their interactive roles in ecosystem functioning rather than their intrinsic value¹⁰.

A key aspect of managing ecosystems to maintain ecological functions is that of **scale** – or the distances over which ecological processes and cycles play out in both space and time. The heterogeneity of a landscape occurs not at one scale but several. These patches at different scales can be described as being nested within each other e.g. patches of reeds within a wetland that occurs alongside other wetland patches on a floodplain – itself a patch in a coastal plain. A hierarchy of patches and scales is thus formed. Processes within patches at one scale contribute to patterns formed at higher levels and constrain patterns occurring at lower levels.

Patches, and the mosaic they compose, are **dynamic** – patches are destroyed or shrink in some places and are created or expand in others and thus appear to shift over time. The path of a river on a floodplain changes and a wetland on one bank dries up while on the other a new wetland patch is created. A severe fire removes a patch of trees from a savanna and for a time a patch of grassland persists in its place. This at once elegantly simple and challengingly complex concept is the basis of '**hierarchical patch dynamics**'¹¹ – the current theoretical framework of choice for landscape ecologists.

The distribution of plants and movement of animals within landscapes both responds to and creates the pattern of heterogeneity at various scales. Understanding the role and impact of various species and populations requires insight into the scale at which they perceive patchiness and thus use and influence their environment. For example, animals which undertake annual migrations may contribute to patterns at a global scale; long-lived, giant tree species are caught up in cycles and patterns spanning centuries. In the past conservation management was directed at a geographical and time scale convenient or accessible to managers. In the future effective management will depend on consideration of the hierarchy of scales, and the insight and ability to respond to problems at the scale at which they are created.

Managing ecosystems toward a 'desired state' reflecting societal goals

If ecosystems are ever-changing, then the desired outcomes of ecosystem management cannot be determined by science or history, but are value judgements. In the past managers valued historic conditions that were considered to be 'pristine' or 'natural'. Today, we acknowledge that ecosystems are valued by society for the services they provide – whether these meet physical, emotional, aesthetic, cultural or spiritual needs or desires. Alternative ecosystem states or conditions provide varying types and levels of ecosystem services which are valued differently by different people. Thus in democratic societies the goals of ecosystem management must reflect societal values and not merely those of scientists or managers – though recognising that we need to maintain the ecological processes on which our survival, and those of future generations, depends. In addition, many democratic governments have committed to a collective international vision to conserve our planet's biodiversity.

Recognition of the flux of nature has therefore created a number of new imperatives for ecosystem management: to achieve ecosystem conditions which meet societal needs (and to establish through a fair and just process what these needs should be); to protect ecological functioning; and to maintain the resilience of ecosystems and society through promoting heterogeneity and biodiversity. The unavoidable flux-of-nature also means that achieving these imperatives is far from simple.

Heterogeneity and resilience: a new context for the elephant management debate

What is the relevance of new paradigms of ecology and conservation for the elephant management debate?

Firstly, abandonment of the balance of nature view means that fixed carrying capacities, such as one elephant per square mile or 7000 elephants for KNP, no longer have any relevance other than a historic one. The appearance and composition of KNP's vegetation as it was first described by rangers in the early 1900s is no more 'natural' than that which currently exists. Given the severely depleted populations of all herbivores as a result of human impacts at the time of this vegetation's establishment, it is now understood to be quite 'unnatural'. But which level of canopy cover or tree to grass ratio is more or less natural is no longer up for debate, as the only detail described for ecosystems that is truly natural is change. What is unnatural is to attempt to hold an ecosystem in a particular form – nor is it possible or wise to do so. We can however attempt to maintain certain qualities and functions of a landscape, through promoting diversity and resilience.

Elephants are known to be major drivers of ecosystem change – both the type of change which generates heterogeneity, maintains diversity and enables resilience – and also the type of change which can ultimately cause ecosystems to lose diversity and resilience and thus undergo a fundamental alteration of state. Of most concern are the large geographic scales at which the shifting mosaic of elephant impacts most likely operated in the past. Similarly large time scales are known to be involved in the regeneration of woodlands. Ecological processes operating at scales of this magnitude are less likely to be possible now than they were in the past, due to shrinking areas of natural vegetation and confined elephant populations. This raises the question of whether our protected areas are large or diverse enough to allow elephant impacts to continue unchecked.

Finally, the desirability of different levels and risks of elephant impact are relative to the context and desired state of a particular ecosystem. Societal values must be brought to bear in considering these risks and goals.

CHAPTER 5

POLICY REVIEW PHASE 1: RETHINKING THE PURPOSE AND PROCESS OF ECOSYSTEM AND ELEPHANT MANAGEMENT IN KNP (1996 - 1999)

Advances in academic ecology filtered through to theories of conservation management and finally to the practice of management itself. Though new insights based on the flux-of-nature provided answers as to why past conservation efforts have often failed, they also created many more questions and challenges for future conservation approaches. Acknowledging the complexity and uncertainty inherent in ecosystem functioning brought with it an uncomfortable question: how do we manage for resilience and diversity using our imperfect knowledge of ecosystems and our limited understanding of how and why they change?

The elephant debate threw into sharp focus some of the most serious challenges that managing for resilience and diversity presents:

- The need to manage ecosystems as an interactive whole, not as a set of species
- The need to be proactive not reactive
- The need to engage and consult stakeholders and the public, particularly about controversial and contested issues
- The need to manage despite uncertainty, and to fast track research by designing management that can lead to learning

The late 70s and early 80s had seen the emergence of an approach to natural resource management explicitly designed in recognition of the flux and complexity of natural systems. **Adaptive Resource Management**^{12,13} – learning by doing – offered a means of dealing with uncertainty by incorporating research into management actions. This was based on the principle that planned interventions in nature could be used to systematically test assumptions about ecosystem behaviour, and thereby enable managers to adapt and learn. A South African derived version of adaptive management, **Strategic Adaptive Management (SAM)**¹⁴, was first applied in KNP for river management and then became the model to rewrite KNP and eventually all SANParks management plans. SANParks' elephant policy review proceeded alongside the development of this more proactive management approach for KNP and other parks.

SAM is based on three principles:

- Strategic – goal-seeking and proactive. No change, impact, risk or management option can be evaluated without reference to a clearly defined ecosystem desired state.
- Participatory – engaging stakeholders to meet their needs and values.
- Adaptive – we must manage using an imperfect knowledge base and if we do this systematically, with foresight and reflection, we can learn by doing.

Both the process of SAM and stakeholder consultation by conservation agencies in South Africa were in their infancy in the early years of the elephant policy review process, and have been refined over time through their own learning-by-doing process.

The KNP management planning and elephant management policy process

Early 1996 saw the beginning of a series of meetings between KNP scientists, external scientists and stakeholder groups to develop a new elephant management policy for KNP, drawing on a broader KNP management planning process using SAM.

1996 resolutions, vision and planning principles

On 8 February 1996 the KNP scientists and managers held a workshop in Skukuza in conjunction with members of the IUCN African Elephant Specialist Group (AfESG). Two days later the same group met with delegates from both AfESG and the International Fund for Animal Welfare (IFAW). Following these meetings the rationale for reviewing the elephant management policy was established in an internal report¹⁵.

One of the criticisms expressed at the February 1996 meetings was that the mission statement and management objectives of the Kruger National Park were vague and did not facilitate clear interpretation. Research and Development and Operations staff of the KNP subsequently met on a weekly basis to derive, through a formal workshop process developed as part of SAM, specific objectives from the overall vision and operating principles.

The broader KNP visioning process that was taking place to define a desired state for KNP's ecosystems as part of SAM provided the following vision for KNP:

“To maintain biodiversity in all its natural facets and fluxes and to provide human benefits ... in a manner which detracts as little as possible from the wilderness qualities of the KNP.”

Operating principles for the process of achieving this vision were described as follows:

- “Biodiversity will be maintained by natural processes, and not manipulated deliberately by management intervention. Management intervention will, however, be justified if it is aimed at restoring biodiversity lost through past mismanagement or through human influences outside the KNP.
- Management intervention will be undertaken in such a way as to increase our knowledge of the system and of the consequences of the management actions.
- We recognize that we will never achieve complete predictability and will need to manage with incomplete information.”

On 30 October 1996 a range of possible management options was listed and debated at an internal KNP workshop held in Skukuza¹⁶. At this meeting a number of resolutions were developed:

- National Parks Board mandate is to conserve all elements of biodiversity. Elephants are not more important than any other component, although they are major ecosystem components.
- Wildlife populations do not remain static through time and space, and consequently elephant populations should not be maintained at a stable unvarying ceiling. Fluctuation in numbers and density should be introduced to simulate ecosystem processes and enhance biodiversity.
- In contrast with all other known animal species elephant do not respond to short-term climatic cycles so that, in recognition of the negative impact unimpeded population growth would have on other wildlife in an unnaturally limited “conservation island”, some form of population control would be necessary.

- There is evidence of severe impact by elephant at current densities in certain areas of the park.

There was consensus that the consequences of unrestricted elephant population growth resulting in an ultimate self-induced population crash are not acceptable.

These resolutions were presented to the public as part of a debate at Midrand on 12 November 1996. A discussion document circulated prior to the meeting included the intention to test hypotheses about the impact of water provision on elephant distribution and population growth, as well as the draft vision statement and operating principles for KNP. In keeping with these principles the intention to reduce the number of artificial water points in KNP was explained. It was acknowledged that the public had already expressed reservations about the removal of water points.

Formal presentations were also made by various stakeholder groupings – including representatives of communities neighbouring KNP, tourism, environmental and conservation NGOs. Few comments were voiced by participants in response to the National Parks Board's proposals, either in the discussion document or the resolutions. This was interpreted as a mandate to proceed with the detail of the new policy proposal.

Development of a new elephant management plan for KNP

In February 1997, the National Parks Board hosted a three day workshop, attended by a number of local and international scientists, to discuss the maintenance of biodiversity in the KNP. Discussion focused on the development of means for the determination of 'Thresholds of Potential Concern'. The concept of TPCs had been developed as part of SAM – to describe the desired range of variation in ecosystem conditions contributing to the desired state. TPCs were designed as red flags marking the limits of acceptable change – at which managers would be prompted to assess, based on the cause of the change, whether management intervention is necessary.

On 17 March 1997, at a meeting of National Parks Board staff in Skukuza, the resolutions and principles developed and agreed on in the preceding events were used to formulate a new policy recommendation for elephant management in KNP. In October 1998 this policy was published on the internet for public comment. In addition on 31 October the plan was presented at a public meeting in Nelspruit, where almost unanimous public support was given, the only objection being from animal rights group Falcon, who advocated waiting until the then relatively new technique of contraception could be used in place of lethal population control. As there was no guarantee of this, and acknowledging the support of the majority of the people and organisations represented, the Board of the now SANParks approved the new KNP elephant management policy on 12 March 1999. The policy and the rationale behind it were then published in the journal *Koedoe*⁶.

The basis of this plan was as follows:

- To introduce controlled fluctuations in elephant population density to create or maintain heterogeneity and conserve biodiversity.
- To manage elephant populations according to measured impacts on biodiversity rather than on absolute numbers; to use a decision support system based on TPCs.
- To create of zones of high and low impact (Figure 6): to allow the elephant population to increase in high density zones and to progressively reduce the population in low density

zones. In addition to create two botanical reserves where the presence of elephant will be allowed but at a controlled level.

- To define zones that roughly conform to the known boundaries of elephant clans.
- To close artificial water points in order to restrict elephants' dry season foraging ranges and create refuges for upland tree species.

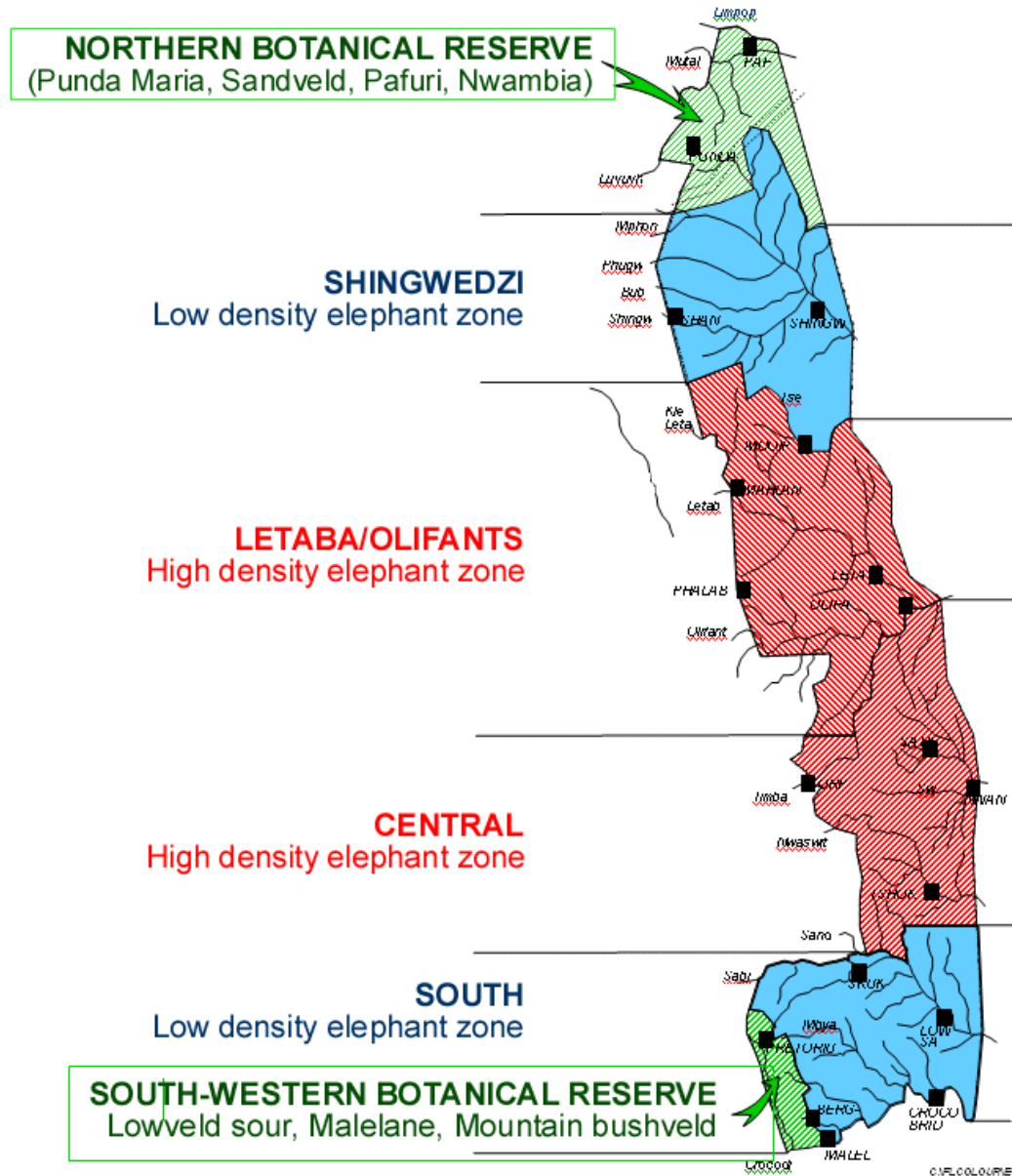


Figure 6: 1999 proposed elephant management zones for KNP

CHAPTER 6

POLICY REVIEW PHASE 2A: BROADENING THE SANPARKS CONSULTATION PROCESS (2003 - 2005)

Though the principles underlying the 1999 KNP elephant management plan were approved by the appropriate authorities at the time, it did not attract the political will necessary for it to progress toward an implementation stage. In the period immediately following the plan's approval by SANParks' Board, South Africa entered a process of making a representation to CITES for the downlisting of its elephant population. Later, SANParks and DEAT were involved in hosting two major international events – the 2002 Johannesburg World Summit and the Vth World Parks Congress in 2003. KNP's elephant population grew at close to the lowest rates on record after culling was stopped in 1995. But from 2000 onward this growth rate accelerated, and by 2004 the annual increase in the population was approaching the maximum possible at 7%. The expansion of available elephant habitat through the development of the Greater Limpopo Transfrontier Park offered an opportunity for a reduction in population through migration or translocation. However, communities in Mozambique, particularly those living along the Shingwedzi River, expressed concern about human-elephant conflict, and Mozambique decided against promoting a rapid increase in the elephant population of Limpopo National Park¹⁷.

Midst growing concern about the size and growth of KNP's elephant population, the debate about elephant management was revived. New leadership of both the Ministry of Environmental Affairs and Tourism and SANParks in 2004 provided the impetus for formal resumption of the policy review process. NEMA, the Protected Areas and Biodiversity Acts laid out options for a policy development and approval process, priorities and imperatives for action, and criteria for public and stakeholder involvement. Under the new legislation the ultimate purpose of the SANParks consultation process was now to produce a report advising the Minister on an elephant management strategy. This new phase of the review sought to engage stakeholders more directly and focused upfront on integration of stakeholder views, values and concerns, and not merely on gauging their reaction to SANParks' proposals.

The Great Elephant Indaba

On 19 October 2004, SANParks officially reopened the public debate about elephant management in South Africa with a three day meeting of over 200 stakeholders in Berg en Dal, KNP. The opportunity to participate in this event was advertised on the internet and in the media. Invitations were also extended to all nature conservation agencies, non-governmental conservation organisations, academic institutions, provincial and national conservation bodies, and interested nature conservation stakeholders in SA and neighbouring countries.

The workshop was structured as a series of presentations, by delegates from across the stakeholder spectrum, on various aspects and views within the debate. This was followed by

breakaway sessions involving separate focus group discussions. The feedback from these smaller groups was then the basis for further discussion within the group as a whole.

The five presentation and discussion sessions focussed on the following topics:

- The conservation, status and future of elephants in protected areas in southern Africa (including opportunities for range expansion and the linking of protected areas to create megaparks).
- Ethics and values (including the animal rights and animal welfare perspective on elephant management options, and legal and procedural basis of the decision-making and approval process).
- Potential impacts of elephant on biodiversity, neighbouring communities and other stakeholders.
- Social impact of protected area management and opportunities for bringing greater benefits to neighbouring communities (including presentations by community representatives from areas around KNP and Addo Elephant National Park).
- Management options and methodologies.

In addition, presentations were made on the status of elephant management in neighbouring countries (by representatives from Namibia, Botswana, Mozambique, Zimbabwe) and by the IUCN African Elephant Specialist Group which presented an overview of current challenges in the conservation and management of Africa's elephants.

The theme of the indaba was expressed as "finding an African solution to an African problem". Participants were asked to avoid reducing the event to a debate about culling, and to give due consideration to all aspects of the decision – including financial limitations, logistics, availability of resources, international and local biodiversity management responsibilities, and the interests of affected parties.

The proceedings of the Indaba have been published¹⁸. Details of the issues raised and views expressed will form part of the synthesis chapter which follows. Some of the diverging views expressed can be summarised as follows:

- Elephant population growth will slow down because of food shortages before any biodiversity is lost.
- A precautionary approach is required to limit the risk of biodiversity loss.
- A single species cannot be favoured at the expense of biodiversity.
- Death by starvation due to habitat degradation could cause suffering worse or equivalent to that of culling.
- Increased fencebreaking by elephant carries the risk of disease transfer to livestock, particularly foot and mouth disease, which could cause huge economic loss for the whole country.
- Communities neighbouring parks experience costs from elephants and other animals which leave parks and should also share in the benefits of parks.
- Contraception is wasteful in that it involves spending resources in order to effectively forgo the potential to benefit from the renewable resource that culled elephants provide.
- Contraception may impact negatively on the social wellbeing of elephants.
- Culling is ethically unacceptable in all circumstances.
- Culling is acceptable as a last resort.
- Tourists will avoid parks where culling takes place.
- Tourists have not avoided parks on account of culling in the past.
- Fire, climate and other herbivores all affect the survival and number of large trees in savannas.

- Impacts of elephants and other factors can only be considered relative to the desired state of a particular park.
- The preservation of vegetation established in the absence of elephants is an unrealistic and unsustainable desired state.

Events organised by stakeholders

Three other large stakeholder events took place within Phase 2 of the policy review process that were not organised by government but by various stakeholder groups themselves.

SANParks Great Elephant Indaba was preceded by a similar event organised by the Wildlife and Environment Society of South Africa (WESSA) entitled the 'Great Elephant Debate'. On 6 August 2004 WESSA Lowveld hosted an open debate on what they termed "the issue of apparent overpopulation" of elephant in KNP¹⁹. A broad range of speakers was invited, including scientists, vets and community representatives. The debate was attended by over 200 people from all over the country, including national newspaper and television journalists. Issues discussed ranged from potential impacts on neighbouring communities, tree recruitment, biodiversity and potential management options such as range extension, contraception and habitat management. Though SANParks did not make a presentation, the CEO and a team of officials was present and answered questions raised by the speakers and from the floor.

Another major South African stakeholder grouping, the Elephant Managers and Owners Association (EMOA), in collaboration with the provincial agency North West Parks, hosted an elephant symposium at Pilanesberg on 17 September 2004.

Care for the Wild International, Xwe African Wildlife and Justice for Animals convened a workshop in Johannesburg (18-20 July 2005) entitled 'Elephants Alive'. The workshop focused on demonstrating the inappropriateness of culling and the suitability of various non-lethal management options. The workshop involved animal rights groups, scientists, conservationists and legal experts.

Science indaba at Luiperdskloof: 'Elephant and Biodiversity'

A point strongly emphasised at both the WESSA debate and the SANParks Indaba was the need for a process of clarifying the 'evidence'. Concern was expressed that scientists appeared to hold opposing opinions about some of the most fundamental aspects of the debate, which confused the other stakeholders and delayed decision making.

SANParks therefore hosted more than 50 scientists, from a range of disciplines, in a three day workshop in March 2005 to discuss and synthesise current understanding of the role of elephants in ecosystems and of the potential options for their management²⁰. The objectives of this meeting were:

- To develop a framework expressing current thinking on the role of elephant in savanna ecosystems, placing elephants and their activities in the context of all other components, processes and scales.

- To develop a complementary framework for the management of elephant in national Protected Areas under current legislation.
- To relate current SANParks policies to this framework.

Prior to the workshop written submissions were solicited from participants, and any other scientist who felt the need to contribute, in an effort to collate as much knowledge from as wide a range of sources as possible. A group of international University students undertaking field studies in KNP also conducted a very detailed literature survey. Over 300 pages of submissions were then available for the participating scientists to use in their 3 days of deliberations²¹.

Topics discussed included:

- The role of science and scientists in decision making
- Elephant demography
- Elephants and vegetation
- Fire and water distribution as contingencies in elephant/vegetation interactions
- Elephants and biodiversity
- Possible responses to the Elephant “Problem”
- Lines of reasoning around the KNP elephant management plan
- Contraception
- Elephant TPCs in KNP
- A SANParks proposal for a way ahead in Kruger
- Tentative elephant management plans for other national parks: Addo Elephant, Marakele and Mapungubwe National Parks
- An elephant management plan as a learning tool in Adaptive Management
- Ideas for new TPCs in Kruger

Discussions were vigorous, at times heated, but within three days a remarkable consensus emerged on the most important issues, some of which were:

- There is no doubt that elephants have a major impact on their habitat, but there is much uncertainty as to the circumstances under which this impact “matters” in terms of biodiversity conservation.
- Decisions on whether the impact “matters” are highly specific with regard to context and situation, and have to be (a) based on the underlying values determining the desired state of the system and (b) guided as far as possible by a predictive understanding of the relationship between elephant impacts and the desired state. Given the well developed planning framework of the KNP, the KNP elephant management plan is potentially defensible. However it did not receive unqualified support at the workshop for the following interrelated reasons:
 - o No TPCs have yet been exceeded, nor are there clear predictions as to when they may be exceeded. Justification for the plan therefore currently rests entirely on the precautionary principle. SANParks should be reluctant to invoke this principle because it can be used to justify almost any action.
 - o Some of the elephant-related TPCs, which are critical guides to implementation of the elephant management plan, have not been subject to wide scientific scrutiny and do not appear to be well founded in a predictive understanding of the relationship between elephant impacts and the biodiversity objectives.
- The “treatments” of elephant populations proposed in the high and low impact zones of the 1999 KNP elephant management plan do not clearly relate to the biodiversity objectives, and could be regarded as being arbitrary.

An important outcome of the workshop was the agreement to establish a scientific reference group to re-examine and agree on all elephant-related Thresholds of Potential Concern (TPCs) that had been set within the management plan of the KNP and to model them to establish the likelihood of their being exceeded. The timing and nature of interventions to shape elephant impacts in KNP would be advised by the reference group.

The Elephant Management Reference Group met for three days in September 2005 to critically assess the KNP's elephant-related TPCs and determine a way forward for potential revision and refinement of the KNP decision support system into the future. The TPCs were adapted in response to this critique and circulated to workshop participants and a wider audience for scrutiny. The TPCs were again adjusted in response and integrated into a new KNP management plan.

Consultation with communities neighbouring KNP

On 31 March, 1 and 5 of April 2005, workshops were held in the Northern, Central and Southern regions of the KNP with representatives of the communities neighbouring KNP¹⁷. This focused in particular on the 1999 KNP elephant management plan and preliminary zoning proposal for areas of high and low elephant density. One of the objectives of the workshops was to invite suggestions for potential benefits to communities from KNP and particularly elephant management activities. 150, 190 and 129 community members attended the Shingwedzi, Phalaborwa and Berg en Dal workshops respectively, which were also attended by SANParks staff from KNP's Conservation Services, and People and Conservation. Stakeholder groups in attendance included traditional leaders, trusts, Community Property Associations, local forums and local government.

Strong support was expressed for potential reduction of human-elephant conflict in the areas neighbouring low elephant density zones, and for culling as a management option. Should culling need to take place there was agreement that a wide variety of benefits should and could be offered to communities, both directly from consumptive use of culled animals, and indirectly through training and employment in the processing of by-products for KNP. Suggestions were also made about the issue of Damage Causing Animals and the revision of policies governing their control to better protect and benefit communities.

Communities from the central region (predominantly communities neighbouring areas zoned for high elephant impact) expressed two diverging viewpoints: firstly, that the zones should be realigned so that low elephant impact zones extended from north to south in order to create a buffer between communities and elephants; alternatively, that communities could benefit from high elephant numbers, provided adequate safeguards were put in place, and that a mechanism to realise benefits from Damage Causing Animals was created.

Southern African elephant range state meeting

Consultation between southern African elephant range states took place at the African Wildlife Consultative Forum hosted by the Zimbabwe NPWLM at Victoria Falls in May 2005¹⁷. The

primary purpose of the workshop was to reach agreement on a framework for a regional elephant conservation and management strategy. There was recognition of:

- The need to accept culling as one of the management options, but that this should be decided within a framework of clear objectives set for specific areas, including a definitive description of the desired state in terms of specified ecological and socio-economic thresholds or targets.
- The need to apply management measures in accordance with the principle of adaptive management, in the spirit of learning by doing.

SANParks recommendations to the Minister of Environmental Affairs and Tourism

Based on all the events and inputs of the preceding 10 years of engaging both stakeholders and scientists, SANParks submitted a report on an Elephant Management Strategy to the Minister of Environmental Affairs and Forestry on 8 September 2005¹⁷. This recommended that:

- Elephant population management is necessary as a precaution to prevent possible loss of biodiversity.
- In order to maintain biodiversity in national parks, elephant populations must be controlled in some areas and left to fluctuate naturally in other zones of the parks;
- Culling should be approved as one of a range of available management options, along with translocation, contraception and the development of migration corridors.
- Translocation, contraception and use of migration corridors should be applied as medium to long term management options.
- Guidelines (so-called 'Norms and Standards') should be developed to help parks decide when population control is needed, and what measures are best for that specific location;
- Population control measures (such as capture, translocation, contraception or culling) must be overseen by an animal ethics committee; and
- Where culling is necessary, animal products should be utilised to the benefit of local communities.

CHAPTER 7

POLICY REVIEW PHASE 2B:

AN INTEGRATED UNDERSTANDING OF GROWING ELEPHANT POPULATIONS AND THEIR MANAGEMENT EMERGES

In the events and discussions held from 1996 to 2005 stakeholders, managers and scientists raised concerns about the potential impacts of growing elephant population in South Africa's national parks. Four main concerns were expressed:

- The impacts of animals which leave parks through fencebreaks by elephant
- Human-elephant conflict in the areas neighbouring parks.
- Changing appearance of landscapes
- Impacts on the structural, functional and compositional biodiversity of ecosystems within parks.

The full content and context of these concerns is synthesised below. As the causal mechanisms for the last two concerns are linked these will be discussed together.

Fence breaks and their consequences

Though in South Africa elephants are mostly confined within 'hard' boundaries, these do not always serve to keep them within protected areas. On KNP's western boundary fencebreaking by elephants peaks in February and March – the marula season – as they seek out these trees and their favoured fruit beyond the borders of the park. Elephants also leave the park in the dry season in search of water and bulls in musth will travel large distances in search of oestrous cows. KNP researchers have reported a strong correlation between areas and periods of high elephant population densities and the number of fence breaks. The cost of fence breaks is counted not only in the expense of maintenance but in the potential for other species to leave the park – predators which escape may kill livestock, and there is a risk of buffalo, kudu, wildebeest and warthog spreading livestock diseases such as theileriosis, brucellosis, bovine tuberculosis and foot and mouth disease. Foot and mouth disease is of the greatest economic concern. Though control measures are in place, such as risk zonation, and regular inspection and vaccination of livestock within the buffer zone, four outbreaks of foot and mouth have occurred in the area to the west of KNP since 2000, all of which were associated with fence breaks which allowed buffalo to come into contact with cattle¹⁷. Should there be an outbreak of foot and mouth disease outside the control zone, South Africa would lose its foot and mouth free status for international trade in animal products, a scenario with serious economic implications for the entire country.

There are a number of factors which contribute to breaches of the fence on the western boundary of KNP or which make it easier for elephant to do so. In an attempt to contain elephant more successfully, KNP have installed electric fences but these are interfered with by illegal immigrants entering South Africa via KNP, or by locals who enter the park to poach, or to harvest wood, thatching grass, honey or medicinal plants. Theft of solar panels and batteries provide

further obstacles to the maintenance of an effective boundary. It is then easy for elephants to walk over the fence, often ripping up large sections as they move along.

Human-elephant conflict

Even without the problems of fence-breaking by people or elephants, the western boundary of KNP is crossed by a multitude of streams and drainage lines, making it impossible to have a continuous and consistent fence system. Elephants which are able to leave the park through, over or around the fence, then find themselves as unwelcome guests on the lands of neighbouring communities. Here they often cause damage to crops, water installations and dwellings. Though crop losses in these areas are attributed to many animals which are more frequent visitors than elephants – such as rodents, bush pigs, monkeys and baboons – the effect of a single elephant on a single occasion can be devastating. Elephant raids occur most often just before harvest, and can destroy an entire crop in one night. Elephants are also a threat to human life and are difficult to chase away²². The social cost of human-elephant conflict rises as children stay home from school and adults spend their nights in their fields to guard crops. Household chores such as collecting water and firewood are disrupted, and daytime productivity is affected by nights spent without sleep.

Confusion over the jurisdiction of provincial versus KNP authorities with regard to animals found outside the park, the slow response by authorities, and a lack of capacity for dealing with human-elephant conflict exacerbates the problem and the community's sense of helplessness. All these factors potentially contribute to the cost of human-elephant conflict in fostering negative attitudes among communities toward parks and conservation.

Elephants, biodiversity and landscape change

The greatest controversy within the scientific aspect of the debate, since the flux of nature paradigm gained precedence, has been the potential impact of elephants on biodiversity.

The scale of elephant's role and impact within ecosystems is relative to their great size, strength and mobility. An adult male consumes about 180kg of food a day²³ and needs to drink approximately every 48 hours. In the wet season, elephants are mostly grazers – feeding on the highly palatable grass species which resurge after the first spring rains. In winter, when the savanna grasses die back, elephants switch to browsing, eating leaves and branches, stripping bark and occasionally even taking roots of trees. Elephants are selective feeders at the plant species level – therefore different impacts are observed for different tree species found within the same area. Elephants fell or uproot trees, sometimes feeding on branch tips or roots, but on other occasions walk away without feeding – suggesting that some tree pushing may be a male social display unrelated to feeding. Elephants may travel great distances in search of food, but are limited in their movements by their need for water – the greatest impacts on vegetation are therefore usually observed in areas close to water.

The scale and extent of elephant influence has led to them being referred to as **keystone species** and **system engineers** of savanna ecosystems. Elephants serve a number of important ecological functions: creation of paths and clearings, configuration of riverbeds, formation of waterholes, seed dispersal, germination facilitation, litter production, nutrient dispersal, nutrient cycling, and

preventing bush encroachment in grasslands²⁴. The absence of elephant from landscapes in which they used to occur can thus cause a loss or change in ecological function, structure and diversity.

Disturbances, such as those created by elephant feeding activities, help to enhance **heterogeneity** and thus generate conditions for a variety of species to coexist. However, if disturbance is too frequent or too extensive, it is likely that progressive landscape change will occur over time and ultimately lead to a loss of heterogeneity and diversity.

The main influences of elephant on vegetation become visible as a **change in plant species composition** (loss or gain of species or a combination) and a **change in vegetation structure**, usually manifest as a reduction in tall trees and/or a change in the tree/grass ratio. It is mostly the potential impacts of elephant on the abundance of woody plants, and particularly big trees, which has led to concerns about growing elephant populations in South Africa's national parks. In KNP, fixed point photographs and fence line contrasts have been used to demonstrate the influence of elephant on vegetation. Photographs taken at the same points since the late 1970s show taller trees steadily diminishing in abundance. Of the 60 sites monitored 49 sites experienced a net decrease in the abundance of tall trees (greater than 5 metres). Tall trees are a component of both structural and functional diversity – vultures and other birds require sufficiently large trees for nesting and tall trees are essential habitat for 40% of bird, 15% of small mammals, 6% of amphibians, and 5% of reptile species in KNP. A large number of insect species also inhabit tall tree canopies⁹.

The loss of trees also has implications for the **aesthetic qualities** of the savanna landscape²⁵. Large trees such as marula (*Sclerocarya caffra*), baobab (*Adansonia digitata*), knobthorn (*Acacia nigresens*) and kiaat (*Pterocarpus angolensis*) form part of the 'sense of place' attributed to the lowveld landscape by tourists and locals alike. Should the rate of loss of mature trees not be matched by the establishment of seedlings in the same or other patches over time, there could be a complete **conversion of savanna to shrubland or open grassland**, a deteriorating habitat for many other species, and ultimately also for elephant. Diminishing food resources will eventually lead to a decrease in the population growth rate of elephant. Should this happen suddenly, such as through a devastating drought, it could lead to a **population crash** for elephants and other browsers.

Changes of this nature have been reported for other parks in Africa which have decided not to intervene in growing elephant populations. Often brought into the debate as examples of 'ecological disasters' are **Chobe** National Park in Botswana, **Amboseli** and **Tsavo** East National Park in Kenya, **Hwange** in Zimbabwe, and the **Rwindi Plain** in DRC. Local changes have been dramatic – at Rwindi and Tsavo dense thickets and woodland were transformed to open grassland and 7000 elephant subsequently starved to death at Tsavo in a drought that spanned two years. Elephant impacts have resulted in almost complete removal of the mature riparian forest at Chobe, and at Amboseli species such as lesser kudu, bushbuck, and gerenuks are no longer found in the park, with giraffe now only recorded as occasional vagrants¹⁸. Some have used these examples to suggest that allowing elephant population growth to take its natural course is choosing the inevitable scenario of reducing our national parks to 'elephants and dust'.

Others argue that the changes brought about in these parks have been exaggerated, being severe but extremely localised in their extent. At Chobe and Hwange woodlands were transformed into shrublands in areas close to water but the plant species that were affected are widely distributed. At Tsavo riparian woodlands have regenerated following the die-off of elephants²⁵. It is also not considered appropriate to extrapolate from experiences in parks with very different soils, climate

and vegetation in order to predict outcomes for South Africa's landscapes and elephant populations.

One aspect which is comparable is that observed changes in vegetation over the last few decades need to be viewed in the context of centuries of ecosystem change. Severe human impacts of the previous two centuries have left a legacy in the vegetation which established at the time. The vegetation, particularly big trees, recorded historically in KNP and in Chobe's riparian forest, was able to establish due to the absence of elephants together with low densities of other herbivores as a result of ivory and other hunting and the introduction by European settlers of rinderpest. The phenomenon of '**megaherbivore release**' – which results in changes to ecosystems due to the absence of elephants – is used to argue that the changes observed with increasing elephant densities are merely a return to a situation that existed prior to elephant removal.

With increasing populations of elephants and other browsers a decline in canopy cover over time is to be expected, and is evidenced in KNP by the loss of woody vegetation which has persisted through almost three decades of elephant population control. Changes in ecosystem attributes over time are also a reflection of the flux of nature. Though the low levels of herbivory experienced toward the end of the 19th century were due to a catastrophe of human origins, establishment during episodic windows of opportunity seems to be a general feature of woodlands subject to wide variability in rainfall, fire frequency and herbivory²⁵.

Unacceptable and irreversible ecosystem change

But if change is natural and expected, why is so much concern expressed by scientists and stakeholders about potential landscape change in KNP and other national parks?

It is generally accepted that past elephant impacts on vegetation in Africa must have been variable and patchy. Parts of the landscape would experience periods of high impact leading to reduced woodland and more grassland. Elephant would then move on to other areas providing opportunity for woodland 'recovery'. The African landscape would then consist of a mosaic of patches of different stages of elephant impact and vegetation 'recovery'. A general principle is that the reduction of woodland (to shrubs and/or grassland) by elephant occurs much faster than recovery in their absence²⁰.

There is now concern that the **shifting mosaic of high and low elephant impacts** has been homogenised by providing permanent water throughout parks and by preventing the migrations that allowed vegetation the time and opportunity to regenerate. Whether changes (to shrub thicket or grassland) have adverse ecological consequences depends not on their local severity but on their extent²⁵. Sustaining the mosaic and the biodiversity it holds requires a range of elephant impacts to be maintained across space and time. At low elephant densities, disturbance-sensitive species thrive, at high density, disturbance-tolerant species thrive. But in parks where populations are confined or find no need to migrate in search of water, elephant densities remain at high levels all the time creating ever-expanding patches of highly impacted vegetation, which could spread to cover a large fraction of the available area. The likelihood of this occurring is relative to the size of a park, but more importantly to the existence of **refuges**²⁵ – areas that provide protection from the impacts of both elephants and other factors which limit regeneration.

The risk of permanent loss of species is now much higher than ever before, due to diminishing habitat for rare species as a result of human development, which is soon to be compounded by the

effects of climate change. The risk and **acceptability of change** needs to be assessed relative to human values and perceptions. Both the definition of biodiversity loss and the **reversibility** of ecosystem changes are relative to human needs and timeframes. For example, it may be decided that biodiversity loss is not of concern if species lost are abundant elsewhere. Similarly, whether changes are termed irreversible depends on one's time frame – ecosystem processes, particularly those involved in woodland dynamics, extend well beyond the timeframe of most relevance to individual humans, and in many cases can span several human lifetimes.

Predicting the outcome of interacting variables: fire, climate, elephants and other herbivores

Predicting what kind of impacts are likely, and when and whether a particular elephant population size or distribution poses a threat to biodiversity or other values, is subject to various sources of uncertainty.

There is general agreement that high densities of elephant can lead to short-term modification or loss of savanna woodland. However, in the long term several scenarios are thought to be possible. Species could become locally extinct, constituting irreversible change that could also result in elephant deaths on a large scale. Alternatively, elephant populations could be self-regulating, with decreasing food availability resulting in declining fertility and increased mortality, and causing any elephant induced changes to be short term and cyclical²⁶.

The effects of previous management interventions on the age structure of elephant populations could determine whether they will be able to avoid a catastrophic crash by timely density-dependent reproductive responses. Any relatively young population will show eruptive growth²⁷ and is likely to overshoot its key resource, causing a crash and elephant deaths by starvation.

Driving variables in savannas include nutrients, moisture, fire and herbivory – not only by megaherbivores but by insects, rodents and antelope. It is believed that most of the important changes in savannas are event-driven. In particular it is the co-occurrence of two or more events which is able to bring about a fundamental shift in ecosystem state. Disturbances which occur together have an effect which is far more severe than the simple addition of their individual impacts – a factor which is an important source of complexity and uncertainty in ecosystem management.

Fire, for example, is an important factor in the mortality of tall trees. Though bark stripping by elephant or other animals such as porcupine does not kill trees, trees subject to this type of damage are more likely to die in fires. Elephant impacts in general may also increase the frequency of tree-damaging fires as the amount of grass fuel increases in more open woodland²⁸. It is thought that fire in conjunction with elephant impacts may have resulted in the loss of large trees in KNP between 1960 and 1989²⁹. There are also interactions with rainfall – trees damaged by elephants are more likely to die during drought than wet years. Debarking of trees may also make them more susceptible to damage by wood-boring insects.

But some of the negative impacts attributed to elephants could also occur in their absence. Though it is elephants that kill large trees, it is smaller animals such as bushbuck, impala and rodents that eat seeds and seedlings and prevent the recruitment of young trees. The problem which could lead to a conversion of savanna to shrubland or grassland is not only the loss of big trees but the combination of this with a lack of recruitment from smaller size classes to replace

them. Other agents, such as fire and browsers – particularly impala – play a role in delaying or preventing the establishment of large trees²⁵.

The issue of regeneration is then key, but again a number of uncertainties arise: Processes governing regeneration include the actions of elephants, browsers, fire and climate variability and predicting whether regeneration will occur requires reliable specification of how these factors interact within specific ecosystem contexts. Elephants prefer some species over others and their influences are played out through the complex interaction of plant attributes (e.g. mode of reproduction, ability to sprout), plant community processes (e.g. plant succession, competition between plant species) and ecosystem drivers (fire, drought, other herbivores). The outcome of these interactions can manifest differently in vegetation at different scales, and with different management histories. It is therefore often difficult, in specific situations, to separate elephant effects on vegetation from other disturbance drivers such as fire, drought and other herbivores⁹.

Predicting the outcome of management scenarios for elephants and other factors is thus difficult. Reversing effects brought about by elephants may involve factors other than elephants. For example, though elephants were largely responsible for removing large tracts of riparian forest in Chobe, evidence suggests that it is currently impala that are preventing regeneration of *Acacia*¹⁸. Interventions to control elephants therefore do not carry the assurance of reversing the changes that they brought about.

What then are the management options?

Though there is some disagreement as to the extent, acceptability and likelihood of potential negative impacts of growing elephant populations, the most heated aspect of the debate has continued to be the ethical acceptability, appropriateness and effectiveness of various management options.

All participants agree that there is a limited range of management options for reducing the potential negative impacts of elephants on landscapes and biodiversity – should management be necessary. These are:

- Do nothing – with or without additional information collection
- Expand elephant habitat
 - o Increase the size of parks
 - o Create corridors linking parks and thus create metapopulations
- Habitat restriction within parks
 - o Close water points permanently or cyclically
 - o Fence vulnerable vegetation to exclude elephant
- Reduce birth rate by contraception.
- Translocation of elephants to establish new populations or enhance existing populations in new conservation areas.
- Increase mortality to reduce population growth rate and/or size
 - o Introduce biological control through predators and disease
 - o Allow hunting and fail to control poaching
 - o Culling (blanket or selective) control in the form of predators or diseases

This first priority of management is to address ecological and biodiversity goals. However there are also economic (options to protect local livelihoods and ensure disease control) and social

(options to protect and benefit communities) objectives to consider. There are also many issues that must be taken into account when weighing up the different options²⁰:

- *Environmental issues:*
 - o Consequences for compositional, structural and functional biodiversity.
 - o Long term effects on elephant: social structure, behaviour, health/welfare, genetic diversity, population dynamics.
- *Social issues:*
 - o Need to consider affected communities, local stakeholders, potential for provision of benefits where possible.
- *Economic issues:*
 - o Impact of chosen strategy on local and national livelihoods and revenue generation, e.g. potential intended and unintended effects on tourism.
- *Political issues:*
 - o Implications for the rest of SADC, transfrontier parks and international trade
 - o The need to take into account the potential influence of lobby groups.
- *Ethical issues:*
 - o These relate to both the choice of management option and the principles governing its implementation. Ethical dimensions include impacts on elephants, other species, biodiversity and victims of human-elephant conflict.
- *Legal issues:*
 - o Compliance with international conventions and national legislation.
- *Feasibility:*
 - o Is it possible to meet the technical, physical, legal, financial, logistic and infrastructure requirements for implementation?
- *Institutional and park image:*
 - o Impact on branding, media, tourism and donor funding.

Do nothing (laissez faire)

One option for managing elephant populations is to not manage them. Known as a *laissez faire* policy this allows for natural population fluctuations, and has been adopted by countries such as Kenya in recent decades. It has also been the policy implemented by default for South Africa's national parks since 1995.

Rationale:

- Elephant population growth rate will decrease in response to decreasing resource availability before irreversible or unacceptable habitat change results.

Advantages:

- Avoid an immediate decision and thus the potential negative reactions resulting from more active management approaches.

Concerns:

- Risk of loss of biodiversity if no natural limitation of populations occurs. There has been no evidence of density-dependent or independent regulation of population growth in KNP since the moratorium on culling.
- Potential negative reaction of tourists to changing landscapes.

Ethical concerns:

- Participants at the indaba expressed the concern that population die-offs resulting from habitat degradation and starvation may be more traumatic for elephants than culling.

Habitat expansion: metapopulation dynamics within megaparks

The development of transfrontier parks is expanding the size and connectedness of southern Africa's protected areas and elephant ranges. Metapopulation dynamics is a population management option which is more than just range expansion but explicitly addresses how elephants use of space and resources affects their dispersal behaviour and population dynamics.

Rationale:

- Restoration of natural migration and dispersal processes by linking protected areas and removing factors such as fencing, water holes and human settlements will enable elephant populations to limit their own density more effectively³⁰. The megaparks so created will need to encompass or link areas where elephant populations tend to increase (sources) and areas where their numbers decrease (sinks), thus creating a metapopulation. When elephants are able to move freely between these areas it allows 'surplus' animals to be soaked up by the sinks. Restoration of meta-population dynamics can best be achieved through the development of a network of mega-parks across ecological gradients. One of the most important gradients is water availability. Without year-round water supplies elephants tend to move between distinct wet and dry season ranges – this seasonal migration gives relief to vegetation from the impacts of high elephant densities.

Advantages:

- Ethically acceptable from an animal welfare and animal rights perspective.
- Compatible with a minimum interference conservation ethic as it mimics natural processes to limit populations.
- Provides opportunity for habitat regeneration if elephants leave for long periods.
- Increases the range of elephants.

Limitations to implementation:

- Establishing corridors between parks will require relocation of human settlements.
- Potential for human-elephant conflict in the vicinity of corridors.

Questions about effectiveness:

- Success in limiting populations and impacts depends on a number of assumptions about elephant movements and habitat preferences. It remains to be seen whether elephants will use corridors and move into new areas.

Habitat restriction within parks: closing water points

It is believed that in KNP the 'water for game' programme has increased the dry season range of elephants. Removal of water points began in KNP in 1996 and is still in progress.

Rationale:

- Removing many of the artificial water sources located in areas away from rivers will limit elephant foraging range in the dry season and could limit the extent of impacts on susceptible tree species that grow primarily in upland areas. In addition an increase in calf mortality will decrease population growth rates.

Limitations to effectiveness:

- KNP is still well supplied with natural water sources - perennial rivers and pools in seasonal streams provide fairly widespread water. Two thirds of artificial water sources have already been removed and removing the rest will not restrict elephants' dry season range by a great deal.

Limitations to implementation:

- Visitor expectations regarding game viewing at water holes are a factor that constrains removal of all water points. Tourist experience will be negatively affected by crowding at remaining waterholes in the future.

Create artificial refuges for vegetation through fencing

Rationale:

- Rare and endangered vegetation at high risk from elephant activities is protected from any impacts of elephants by fencing. This is already successfully used in Addo Elephant National Park where certain endemic plant species are now only found in areas from which elephants and rhino have been excluded. Fencing to create botanical reserves is also used in Tembe Elephant Park and Phinda Resource Reserve.

Limitations to implementation:

- Expense of installing and maintaining fences, therefore most appropriate for small areas of highly threatened endemic vegetation.

Concerns:

- Detracts from wilderness qualities of park.
- Potential loss of ecological benefits from presence of elephants and other wildlife.

Contraception

Manipulating fertility in elephants was not even an option prior to the 1990s and elephant contraception in wild populations is still a developing technology. Two methods of elephant contraception have now been tested in South Africa – steroids and immunocontraception.

Steroids:

Contraception occurs by means of hormonal control through the surgical insertion of oestradiol (oestrogen) implants. Trials were undertaken in KNP from 1996 to 1998 by a team of researchers from the Institute for Zoo and Wildlife Research in Berlin, but were ultimately abandoned due to the technique's adverse effects on sexual behaviour³¹. As the cows are kept in a state of chronic "false oestrus" this incorrectly signals to the bulls that they are sexually receptive – bulls are thus continuously attracted to the cows and attempt to mate, causing ongoing disruption to the herd.

Immunocontraception:

A more promising technique involves immunising cows with a foreign protein (porcine zona pellucida). This leads to the production of antibodies which hinder fertilisation. Two field trials were conducted in KNP from 1995 to 2000, with success rates of 60% and 80%. A trial began in Makalali Private Game Reserve in 2000, which has thus far demonstrated that in the short-term the method is effective in preventing pregnancies, reversible, harmless (no adverse health effects have been observed) and safe during pregnancy and with no negative effects on calf raising³². No

behavioural side effects have been noted other than increased heat incidence, and there has been no change in the social status of the treated cows. A new one-shot vaccine has been developed that is effective for 12 months. The vaccine is delivered by darting and there is thus no need to immobilise the cows.

Rationale:

- Limiting elephant reproduction by preventing conception will prevent population from increasing and could even reduce the population over the long term.

Advantages:

- Economically viable, could attract international sponsorship.
- Vaccine locally manufactured.

Limitations to effectiveness:

Incapable of reducing population size in the short term.

Limitations to implementation:

- Costs in long-term could be prohibitive for large populations. Cows need to be darted repeatedly; expenses include helicopter flights, veterinary expertise.

Concerns:

- There is currently insufficient historical data on the method's effectiveness, reversibility, and long-term impacts on health and social behaviour of cows.
- Preventing births will destabilise the age structure of breeding herds.
- There will be a loss of genetic diversity over time.
- There could be impacts on the social behaviour and wellbeing of the cows and herds.
- There are health concerns for cows over the long-term; uterine fibroids are common in unmated female elephants in zoos.
- In captive elephants sterility has been shown to occur with repeated use.
- Ethical concerns due to the level of interference in natural processes and elephants' natural lives, particularly the right to reproduce.

Allied concerns:

- Some view contraception as wasteful – in that it involves spending resources to effectively forgo the potential to derive useful products from a renewable resource (that could be yielded from lethal methods of population control).

Translocation

Translocation has been practiced in KNP alongside culling since 1978 and has continued since the moratorium on culling. Initially only juveniles orphaned by culls were relocated but the absence of socialisation by the matriarch-dominated herd and large bulls resulted in problems with delinquent behaviour – young bulls are now only introduced to areas where older bulls are already present. From 1993, techniques and equipment were developed for the capture of entire herds as well as large bulls, and elephants are now only relocated in family groups.

Rationale:

- Translocation reduces local elephant densities by removing elephants from an area of high density to establish new populations or increase existing populations in new elephant conservation areas.

Advantages:

- Increases the range of elephants.

Limitations to implementation:

- Highly specialised and thus expensive procedure, requiring heavy duty cranes, trucks and containers, well-trained capture and transfer teams, and veterinary expertise and supervision.
- As a result of translocation in the past most areas in southern Africa which can accommodate elephants now have them. There is now very limited land available which can accommodate relocated elephant, thus not considered to be a large-scale or sustainable solution for reducing large elephant populations.

Concerns:

- Capture and transfer process, and removal from familiar social and physical environment, is stressful for elephants.
- Potential for human-elephant conflict in new areas.

Increase mortality by introducing biological control

This is currently not an option under consideration, as elephants have few predators other than man, and are attacked by few diseases.

Increase mortality by allowing hunting or failing to control poaching

This is currently not an option under consideration, as both methods are in conflict with the current conservation values of SANParks.

Increase mortality by culling

Culling has the longest history of all the elephant management interventions proposed, but this history is coloured by controversy and protest. Culling has been used extensively in the past, not only in KNP but elsewhere in eastern and southern Africa. However, the only countries that have practiced culling in recent decades are in southern Africa – Zimbabwe, Namibia and South Africa. In KNP, the technique and principles of the practice have evolved over time in response to ethical concerns and improved knowledge and technology. In recognition of elephant's strong social bonds the practice of culling adults and capturing calves was abandoned in favour of herding off and then culling entire family groups. Darting elephants with Scoline, which resulted in death through paralysis, was suspended in 1990 as it is now considered inhumane. From 1990 to 1995 culling was conducted by means of a brain shot delivered from a helicopter.

Rationale:

- In the past in KNP and elsewhere the rationale behind culling was to remove 'surplus' animals and thus keep the population within the ceiling proposed to limit the impact on vegetation. A blanket culling approach aimed only to reduce the size and not alter the structure or local density of the population, though from 1985 onward the location of the entire annual cull was rotated through four regions of KNP in an attempt to introduce a form of population fluctuation. The concept of a fixed carrying capacity has since been abandoned. However, culling was proposed as a management option by the 1999 KNP plan and the SANParks report to the Minister, though within the context of a desire to

create a range of elephant impacts within a particular park, not to maintain the static population of the past. At the current high population densities across the park culling is now being proposed as a means to achieving areas of low elephant density and thus to create refuges for vegetation to recover from elephant impact.

Advantages:

- Only option which is currently available to reduce the population in the short term.
- Sale of by-products can finance costs of management.
- Potential for economic benefits to local communities from consumptive use and employment in the processing of by-products.
- Due to its long history of use in KNP the capacity and skill already exists for effective implementation.

Concerns:

- Ethical concerns for animal welfare and animal rights.
- Potentially traumatic for entire populations, as elephants in cull areas may be able to signal their distress to other elephants over large distances using infrasound.
- Removal of entire family groups removes older females from the population over time causing a loss of cultural information and disruption of social networks.
- Suggestions by some stakeholders that affected elephants may suffer a form of social trauma affecting both physiology and behaviour, and analogous to post-traumatic stress disorders of modern human society.

Allied concerns:

- Threat of tourism boycott and prolonged legal action by animal rights groups.
- Impact on image of SANParks and South Africa, leading to avoidance of national parks and other local destinations by international tourists.
- Concerns about consumptive use creating dependencies and expectations amongst neighbouring communities which will limit the choice of future management options for parks.

Questions about effectiveness in reducing impacts:

- Culling at 'economic' carrying capacity (e.g. the previous KNP target of 7000 elephants) may keep elephant populations at a density at which food remains abundant and is thus able to support a maximal growth rate. This sustains the need for a high level of management intervention making culling a self-perpetuating practice.
- Over time a blanket (non-selective) culling programme reduces the average age of the population creating an unstable age structure which, if released from culling, enters an eruptive population growth phase which is likely to overshoot the resource.
- Culling may not achieve the goal of reducing impacts on vegetation if population movements in response to a cull result in higher densities in cull blocks. It has been suggested that in KNP culling stimulated local population growth rates, probably through intrapopulation migratory patterns.
- Stress and trauma suffered by surviving elephants could have behavioural effects, such as aggression, which increase impacts.
- Blanket culling does not target the cause of undesirable impacts on vegetation – if these are largely due to one segment of the elephant population (bulls) in certain parts of the park (areas remote from natural water sources) at a particular time of the year (dry season).

Addressing human-elephant conflict and improving community perceptions of conservation

Management options should, to an extent, be considered separately for the goal of reducing human-elephant conflict versus that of reducing negative environmental impacts. Though it is assumed that any management options which succeed in reducing elephant population densities in areas close to human settlements will also reduce the incidence of elephants breaking fences and straying from parks onto agricultural land, there are also a number of options unrelated to elephant population density which are available to reduce human-elephant conflict and the resultant poor perceptions of conservation by neighbouring communities:

- Improving, maintaining and patrolling barriers between elephants and people such as electric fencing, sisal barriers, trenches and the use of chemical repellents and deterrents (for example chillies are highly unpalatable to elephants and provide a powerful deterrent when burnt), disturbance shooting, firecrackers and traditional methods.
- Employing guards from within the community.
- Finding ways to address the problems of people tampering with fences in order to access the park.
- Land use planning to create buffer zones between cultivated land and protected areas.
- Improving communities' and authorities' capacity for dealing with human-elephant conflict.
- Creating ways for communities, who bear the costs of potentially dangerous and destructive wildlife neighbours, to benefit from their proximity to protected areas, and from Damage Causing Animals which are found on their land. This includes the option of consumptive use should culling be implemented as a management option. Some stakeholders have pointed out that the issue of improving benefits for communities neighbouring protected areas like KNP can also be considered independently of the elephant management question and the controversial subject of consumptive use.

Ethical concerns

A range of ethical frameworks have been applied to the elephant management debate and particularly the issue of culling. Different ethical frameworks derive from different values and assertions about the moral standing of elephants and thus the constraints that humans should impose on their behaviour toward elephant, and the appropriate rights that should be accorded to individual elephants relative to human interests and the interests of ecosystems as a whole.

Ethical positions about elephant management options range from the assertion that elephants have the right to life and the right to reproduce, to concerns about the effects of the stress or trauma of contraception, culling or translocation on both affected and unaffected animals, particularly given elephants' strong social bonds, to simply applying a principle that culling should be carried out in as humane a way as possible, both for the elephants killed and those left behind. Some stakeholders have expressed the view that culling is unethical and inhumane and should never be used; others that culling is acceptable only as a last resort and to prevent irreversible biodiversity loss.

Though other methods are not without ethical concerns, culling has received the most attention in this regard – it has been suggested that the ethical implications of other management options requires further analysis.

Context-specific management decisions

The appropriateness of a particular management option is relative to the goals and context of a park. It is likely that different management options will be appropriate for short-term versus long-term management goals and that combinations of options will be used. The most important aspects of context which influence the goals and thus methods of elephant management are:

- Desired State of a specific park – what vital attributes stakeholders agree are most important to maintain.
- Soils, vegetation, climate, regeneration strategies of woody plant species.
- Management history – culling, fire management, water supply.
- Size, shape, heterogeneity of protected area.
- Existence of rare and endemic vegetation types or species.
- Social, political and economic context.

Adaptive management

There is still much that is uncertain about elephants and their impacts on their habitat. Any and all management interventions are an opportunity to reduce this uncertainty and learn by doing.

Scientific uncertainties will remain until the longer term consequences of high elephant densities have actually been observed. Delays will occur in the reproductive responses of elephant populations to increasing densities and reduced resource supply and the duration of these delays is difficult to predict. Similarly, recruitment of trees in savannas may only occur at intervals of a decade or longer, and will be affected by rainfall, fire frequency, seed predation and browsing of seedlings²⁵.

For decision-making in conditions of uncertainty it is considered appropriate to invoke the precautionary principle. But precaution could be applied to the elephant debate in two contrasting ways:

- To reduce the risk of biodiversity loss, elephant numbers can be kept generally low.
- To avoid killing elephants and the risks and concerns this entails, action can be delayed until it has been observed that losses to biodiversity do actually occur before population stabilisation through resource limitation takes place.

A third alternative is to apply both options, thus ultimately establishing the consequences of each option and reducing uncertainty by determining where the thresholds of system response and recovery from elephant impacts lie. This will involve allowing changes to progress toward extremes in selected places, through an adaptive management approach²⁵.

Designing suitable adaptive systems is a means to enable the policy and decision-making process to avoid the paralysis resulting from differences in scientific opinion.

Finally, planning of management interventions must consider actions and outcomes at a range of ecological (and ultimately also social and economic) scales. Actions applied at one spatial scale could have unexpected and unwanted consequences at smaller or larger scales. Similarly, actions designed to meet short-term goals could ultimately prevent long-term objectives for the same or other spatial scales from being met.

CHAPTER 8

POLICY REVIEW PHASE 3: MINISTERIAL CONSULTATION AND DECISION-MAKING (2005 - 2008)

With the delivery of the SANParks advisory report in September 2005, the policy development and decision-making process became the responsibility and concern of the Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk.

Following the prescriptions of the Biodiversity Act, the Minister consulted with provincial authorities who emphasised³³:

- That all provinces, parks, and elephant ranges face similar challenges and that there is a pressing need for sustainable solutions to be found.
- The need for National Norms and Standards to define a flexible basket of management options including culling, contraception, translocation, conservation corridors, and reinforced and upgraded fences.
- The importance of creating such a national framework to empower the Minister and MECs to ultimately approve elephant management plans for individual parks.

A presentation on the elephant management policy challenge was made to Cabinet, who instructed Minister van Schalkwyk to draft and publish Norms and Standards, based on the recommended range of management options, for public comment. It was decided that the finalised Norms and Standards would then inform the drafting of location-specific elephant management plans for all national, provincial and private parks. Each plan would also require thorough consultation with all local stakeholders – thus effectively creating a two phase consultation and decision making process.

In various media statements the Minister expressed his intention that decisions about elephant management will be based on scientific research, ethical and social considerations, indigenous knowledge, and environmental and tourism impacts, at the same time recognising our global responsibility to act in the best interests of sustainable conservation.

In one of the first actions to follow The Minister and SANParks undertook an ‘international roadshow’ to present the content of the report to delegations in Europe and the USA and to gather their inputs. The Department of Foreign Affairs, SATourism, and the International Marketing Council of South Africa also took part in the programme which visited delegations in the UK, Holland, Switzerland, Italy, Germany and the USA.

When strong negative reaction arose to the SANParks report by some groups opposed to culling, SANParks was requested to step back from the subsequent policy development process to allow the Minister to conduct an independent consultative process, particularly with dissatisfied groups.

The Marula Tree Talks: NGOs meet the Minister

On 28 November 2005 Minister van Schalkwyk hosted 17 local and international stakeholder groups at a meeting at Kirstenbosch, Cape Town. This included many of the groups opposed to culling, as well as leading conservation NGOs. Following these talks 7 of the organisations present – Birdlife SA, Botanical Society of SA, Elephant Management and Owners Association, Endangered Wildlife Trust, WESSA, Wilderness Foundation and WWF-SA – came out in support of SANParks proposal to manage elephant populations as a precautionary measure to protect biodiversity. In this they stated their agreement that in the absence of any other feasible alternative culling is currently the most viable short-term management option, though long term solutions must also be pursued³⁴.

Science Round Table I

Scientists present at the Marula Tree Talks had suggested to the Minister that further expert discussion regarding the necessity of intervention in South Africa's elephant populations should take place. In addition, other participants in the ministerial consultation process had again raised the concern that there was little consensus about the elephant management 'problem' or an appropriate 'solution'. This led the Minister to appoint an issue manager who assembled a panel of experts to discuss the need and urgency for intervention in South Africa's elephant populations. The panel – termed the Elephant Science Round Table – met on 18 January 2006 in Cape Town, and was asked to demonstrate the scientific evidence in support of or against a number of propositions such as:

- Are there too many elephants?
- Are they causing damage to biodiversity?
- Is action needed to reduce populations?
- Which management options are most appropriate?

The panel comprised ten leading elephant scientists:

- PROFESSOR NORMAN OWEN-SMITH - Research Professor in African Ecology at the University of the Witwatersrand.
- PROFESSOR RUDI VAN AARDE - Professor of Zoology and Director of the Conservation Research Unit in the Faculty of Natural & Agricultural Science, University of Pretoria.
- PROFESSOR GRAHAM KERLEY - Director, Terrestrial Ecology Research Unit, Department of Zoology, Nelson Mandela Metropolitan University.
- DR HECTOR MAGOME - Head of Research, South African National Parks
- DR IAN WHYTE - Research Manager: Large Herbivores, South African National Parks.
- DR DAVID CUMMING - Tropical Resource Ecology Programme, University of Zimbabwe.
- BRUCE PAGE - Lecturer in Ecology in the School of Conservation and Biological Sciences, University of KwaZulu-Natal.
- PROFESSOR ROB SLOTOW – Professor, School of Conservation and Biological Sciences, University of KwaZulu-Natal.
- DR BOB SCHOLES - Systems Ecologist, Council for Scientific and Industrial Research.
- DR BRIAN HUNTLEY (CHAIR) – Director, South African National Biodiversity Institute.

The panel concluded that there was no compelling evidence to suggest the need for immediate, large-scale reduction of elephant numbers in the Kruger National Park, but that in some protected areas, some intervention might be necessary to manage elephant density, distribution and population structure³⁵.

The need for ongoing research was emphasised and the panel proposed that a representative science advisory panel should be established to design and fund an accelerated elephant research programme.

Science Round Table II

The first round table was not able to cover all areas of concern, and on 22 August 2006 the issue manager brought three new members to a second Round Table:

- DR HOLLY DUBLIN - Chair, Species Survival Commission, IUCN - The World Conservation Union.
- DR IAIN DOUGLAS HAMILTON - Chief Executive of Save the Elephants
- PROFESSOR KEVIN ROGERS - Professor of Ecology at the University of the Witwatersrand and facilitator of the Luiperdskloof Science Workshop.

Participants were requested to consider the following questions:

- What scientific interventions are required for the implementation of an adaptive management research programme in the near future?
- How would a multi-stakeholder research programme be set up and administered?
- How would it work in practice?
- How much will it cost - and over what time period should it operate?
- Who should monitor the process and how would what was learnt be absorbed into elephant management policy and practice?

On conclusion of their meeting, the panel issued a “statement of scientific consensus” as follows³⁵:

1. **African elephants are an important component of South Africa’s biological diversity, both as a species in their own right, and as agents of change in the ecosystem.** Due to this role, the absence of elephants from ecosystems that evolved under their influence is potentially deleterious, as is their overabundance. Elephant impacts need to be managed as components of the ecosystem.
2. **The management of elephant influence on ecosystems takes place within the context of human society and its objectives.** Social, environmental, economic and political values, must be brought to bear on decision making.
3. **Decisions on managing elephants are dependent on stated land use objectives, the techniques by which this can be practically achieved being situation-specific.** Influencing factors are the size of the area involved; conservation value of the elephant population; biodiversity, social and economic values of the area. A single, uniform set of rules for elephant management is not desirable, but a differentiated and evolving best practice guideline for various circumstances is achievable.
4. **Elephants in confined populations can, in the absence of interventions, cause changes to the composition, structure and functioning of ecosystems in which they occur.** These changes may be unacceptable. It is possible that sustained high elephant

impact will cause the local extinction of sensitive species in the affected areas, and if those constitute the major populations for the species, could lead to their endangerment or extinction.

5. **Excluding extinctions, elephant-induced changes to the ecosystem are potentially reversible.** The time period for which elephant influences are apparent may exceed a human generation (30 years), for example if it requires the regrowth of large trees or the regeneration of lost soil.
6. **Elephants have a high level of social organisation and consciousness.** Behavioural consequences or objectives of management intervention should be well considered. Their management therefore requires particularly high ethical standards. Science can contribute an understanding of behaviour and measures of stress to the formulation of these standards.
7. **The state of knowledge regarding some important aspects of elephant management requires further research.** In particular, the likely trajectory of elephant numbers, the relationship between elephant density and a range of ecological consequences in various ecosystems, and the viability under various circumstances of elephant density control using contraception and habitat manipulation need further research. An active adaptive management approach, including a targeted research programme, is indicated as a strategy for combining timely action with learning.

Minister Van Schalkwyk thanked the panel for their statement of consensus and invited the scientists to develop a comprehensive proposal for a long-term research programme. It was agreed that this would be undertaken under the leadership of South African National Biodiversity Institute (SANBI).

National Norms and Standards for Elephant Management in South Africa

In March 2007, based on the preceding policy review and Round Table processes, the Minister of Environmental Affairs and Tourism published draft Norms and Standards for elephant management in South Africa³⁶. The 30 day response period required by legislation was extended to 60 days to allow more time for stakeholders to comment. Some 80 submissions were received, some up to 50 pages in length. The Norms and Standards were revised in accordance with these responses and published in February 2008³⁷.

The national Norms and Standards are intended to ensure that:

- Elephants are managed in the Republic in a way that:
 - o ensures the long term survival of elephants within the ecosystem in which they occur or may occur in future;
 - o promotes broader biodiversity and socio-economic goals and are ecologically, socially, politically and economically sustainable;
 - o does not disrupt the ecological integrity of the ecosystems in which elephants occur;
 - o enables the achievement of specific management objectives of protected areas, registered game farms, private or communal land; and
 - o is ethical and humane and recognising their sentient nature, highly organised social structure and ability to communicate,
- The management of elephants is regulated in a way that-

- is uniform across the Republic; and
- takes into account the Republic's international obligations in terms of international agreements on biodiversity management binding on the Republic; and
- The management of elephants is regulated in accordance with national policies on biodiversity management and sustainable development.

The Norms and Standards allow, with certain provisos, for consideration of the following management options should they be considered necessary to achieve the objectives of a particular park:

To manage the size, composition or rate of growth of a wild elephant population:

- Contraception
- Range manipulation (management of water or food supply, controlled use of fire, fencing, creation of corridors of movement between different areas; or range expansion)
- Translocation
- Culling

To manage the distribution of a wild elephant population within the boundaries of the area:

- Contraception
- Range manipulation (management of water or food supply, controlled use of fire, fencing, creation of corridors of movement between different areas; or range expansion)
- Translocation

CHAPTER 9

ONGOING DEVELOPMENT OF ELEPHANT MANAGEMENT PLANS FOR SOUTH AFRICAN NATIONAL PARKS

SANParks has explicitly chosen an adaptive management approach to managing ecosystems within South Africa's national parks. Elephant management is but one component of a broader ecosystem management process that focuses on maintaining ecological processes, flux and diversity. A locally derived form of Adaptive Management termed Strategic Adaptive Management (SAM)³⁸ has been developed through an interactive 'action research' process with national and provincial conservation agencies. The various locations and management challenges that SAM has been applied to, not least of all the last 12 years of ecosystem management planning in KNP, have refined and improved its component principles and processes, and exposed a wide range of people to its concepts. SAM has also been accepted by DEAT as the basis for management of all National Protected Areas³⁹.

The Strategic Adaptive Management cycle

The SAM cycle (Figure 7) begins with the definition of a desired future state based on stakeholder values and incorporating the inputs of science, management and society. A broad vision for the long-term future of a Park is gradually broken down into achievable ecological outcomes. This state must reflect the flux of nature by maintaining or restoring natural variation and patchiness, and in so doing, conserve biodiversity. Potential impacts of elephants are considered in the management process as one set of factors that can help or hinder the achievement of this desired state.

Management actions are considered and evaluated on the basis of their ability to achieve the desired state, their potential to generate learning, and the acceptability of their consequences to stakeholders. A management plan is designed to include both implementation of interventions and ongoing monitoring of ecosystem response to management and natural events. The results of monitoring are used to evaluate the success of management actions. A process of careful review and reflection strives to incorporate the learning from previous management actions and outcomes into the next round of management planning. This can also involve changes to the objectives representing the desired state.

It is now recognised that to conserve biodiversity we cannot aim to achieve specific and unchanging ecosystem conditions, but rather to maintain natural variation and processes. But some changes may be undesirable if they form part of a long-term trend moving the ecosystem away from the desired state. Over time this trend may become irreversible. Within the SAM process the desired outcomes of management are therefore expressed as limits of acceptable change termed Thresholds of Potential Concern (TPCs) – the upper and lower levels along a continuum of change in selected indicators. TPCs act as 'red flags' to alert managers to changes in ecosystem properties that may be cause for concern. If TPCs are exceeded it is likely that the desired state will not be maintained or will not be able to be achieved into the future. When a TPC is breached – or modelling predicts that it will be breached – it prompts managers to

investigate the cause, and then to decide on this basis whether management action is needed to moderate this change (Figure 8). TPCs are set based on the best available knowledge and expert opinion at the time, which is used to develop hypotheses of acceptable change in ecosystem structure, function and composition. As hypotheses TPCs are open to challenge – the management and monitoring process, as well as independent research, will over time enable us to update the knowledge on which TPCs are based.

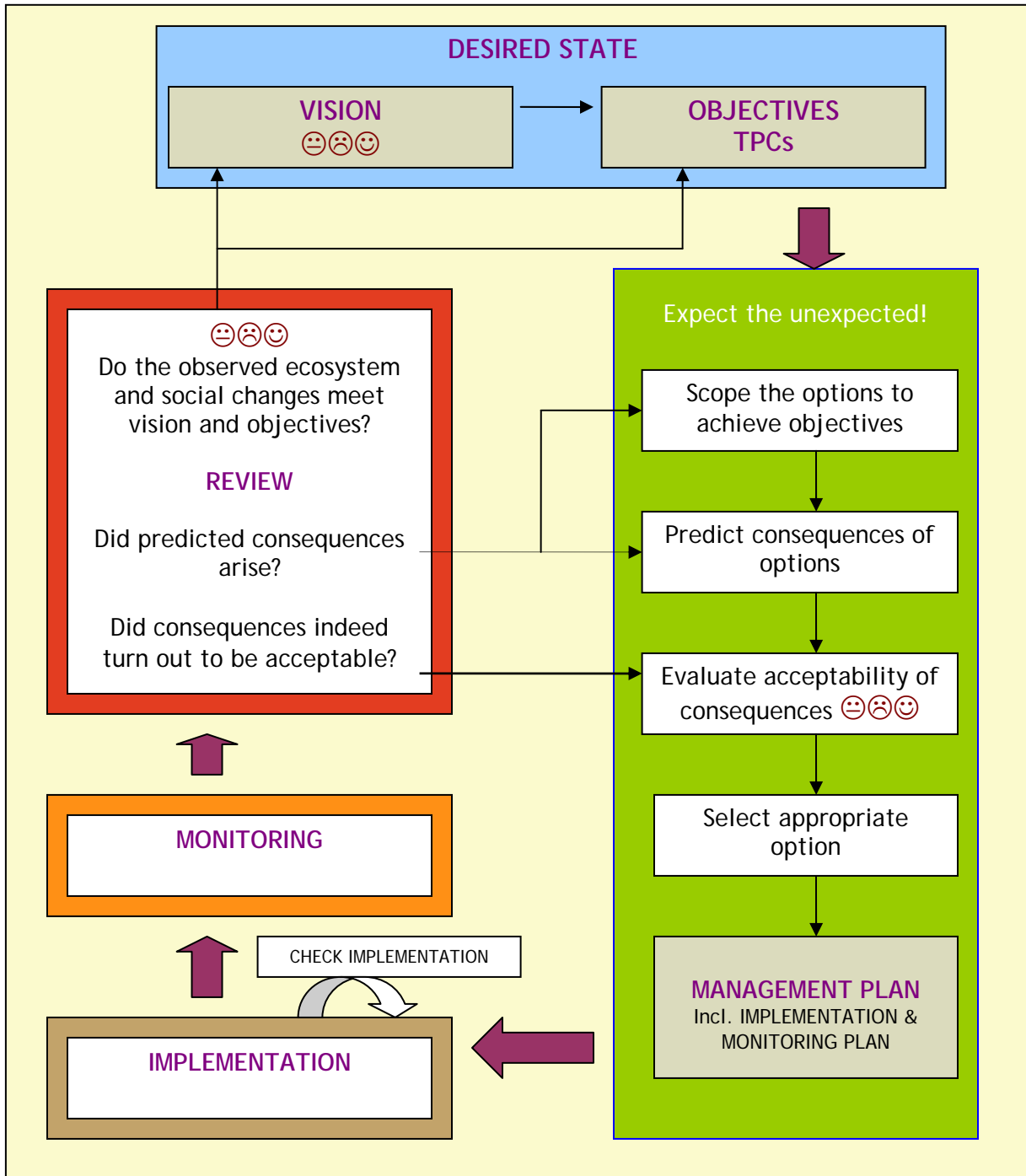


Figure 7: The Strategic Adaptive Management (SAM) process

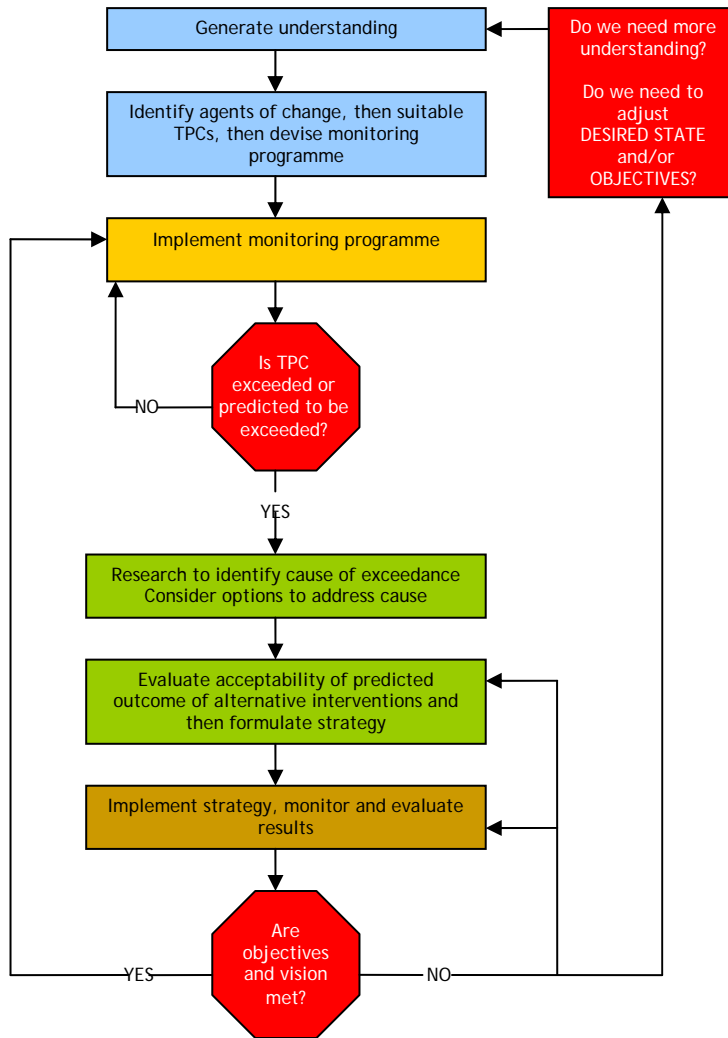


Figure 8: A management decision support system based on TPCs

A long-term research programme for elephant management in South Africa

Successful Strategic Adaptive Management is dependent on a reliable flow of new knowledge that can be integrated into decision making and future planning. A valuable outcome of the policy review was a wide commitment to more cooperative and collaborative research efforts

amongst southern Africa’s elephant scientists and ecologists. At the final Elephant Science Round Table Minister van Schalkwyk agreed to fund a long-term research programme to support this commitment. The intention is not to replace existing research but to enhance it by achieving greater coordination and synergy. An integrative approach is needed to develop a national strategy for reducing key risks and uncertainties of various elephant management strategies. The programme will be based on an active adaptive management policy and rests on four pillars⁴⁰:

- Periodically-repeated **scientific assessment** to transfer knowledge between the science, and policy domains;
- **Modelling** to attain reliable predictions of complex systems;
- New **investigations** from planned and unplanned experiments, including **social, political and economic research**;
- The **building of capacity** in decision-makers, managers and researchers, as well as in institutions and technology.

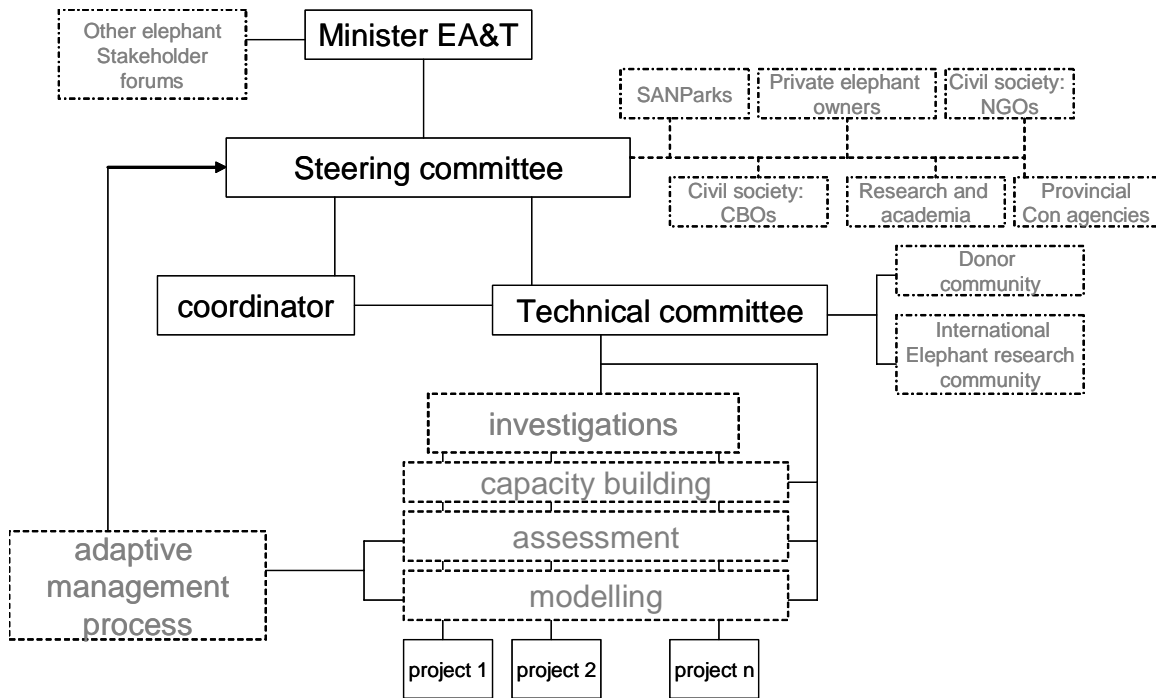


Figure 9: A proposed long-term research programme for elephant management in South Africa

The foundations of the programme have already been laid. The “Assessment of Elephant Management in South Africa” began in 2007 and was published in February 2008⁴¹. The purpose of the assessment was to:

- Document what is known, unknown and disputed about elephant-ecosystem-human interactions in South Africa.
- Synthesise and communicate the above information to facilitate decision-making and the reaching of social consensus about elephant management.

The assessment did not generate new primary knowledge but used expert judgment to add value to, and evaluate, the state of existing knowledge. It was conducted to the same exacting standards as the international Millennium Ecosystem Assessment. The final report was vetted by a Guiding Committee, open to public scrutiny before finalization, and reviewed by a wide range of experts. The Assessment does not constitute policy on any level but is intended to inform policy and management decision-making processes.

A modelling network, the second pillar of the research programme, has also been established to stimulate and support the development, testing and application of predictive models of elephant-ecosystem interactions in South Africa. The modelling will not only guide management, but test TPCs, generate questions for investigation, and synthesise data to reveal the degree of certainty, or uncertainty, that we have about particular outcomes. An 'elephant modelling workshop' was held at Skukuza in January 2007 and followed by a meeting of interested parties at the Kruger Network Meeting in April 2007. The approach is currently to encourage multiple modelling groups to focus on a small set of common questions, within a defined location and time period, using shared databases for driving and testing the models.

The next steps in the research programme are to: (1) initiate new research, particularly in the neglected fields of social, economic and political issues that play a role in elephant management and (2) integrate the new advances into adaptive decision making processes, not only in Kruger but across the country.

At the Luiperdskloof meeting of scientists there was some concern that the zoning of Kruger into elephant management zones (Figure 7) was not sufficiently based on scientific knowledge. A new zoning map was designed to reflect the protection of areas with specific biodiversity elements, by incorporating the potential impact of all ecosystem drivers including fire, elephants and other herbivores.

The selection of zones was based on several data sources:

- The South African National Biodiversity Institute (SANBI) map⁴² that includes the conservation status, environmental descriptors, special features and economic value of vegetation in South Africa. The IUCN Red List Categories and Criteria⁴³ were also used to provide an objective framework for the classification of vegetation types according to their extinction risk.
- The distribution and density patterns of elephants defined from 20 years of annual censuses were used to demarcate areas subjected to consistently high elephant densities in winter.
- A Landscape Sensitivity Index was developed for each of KNP's thirty-five landscapes.
- The distribution of rare and endangered plant species of which 90 are IUCN red-listed and 93 are rare in the KNP.
- The distribution of rare vertebrate species, for which detail is limited, was mapped on a broad scale which was used as a layer in the final analysis.
- Identification of human-elephant conflict/benefit zones and areas of limited access as dictated by wilderness areas.

The final product of the zonation exercise (Figure 11) has been circulated to scientists and has been accepted by the Conservation Services Management Committee of SANParks for inclusion in the KNP management plan.

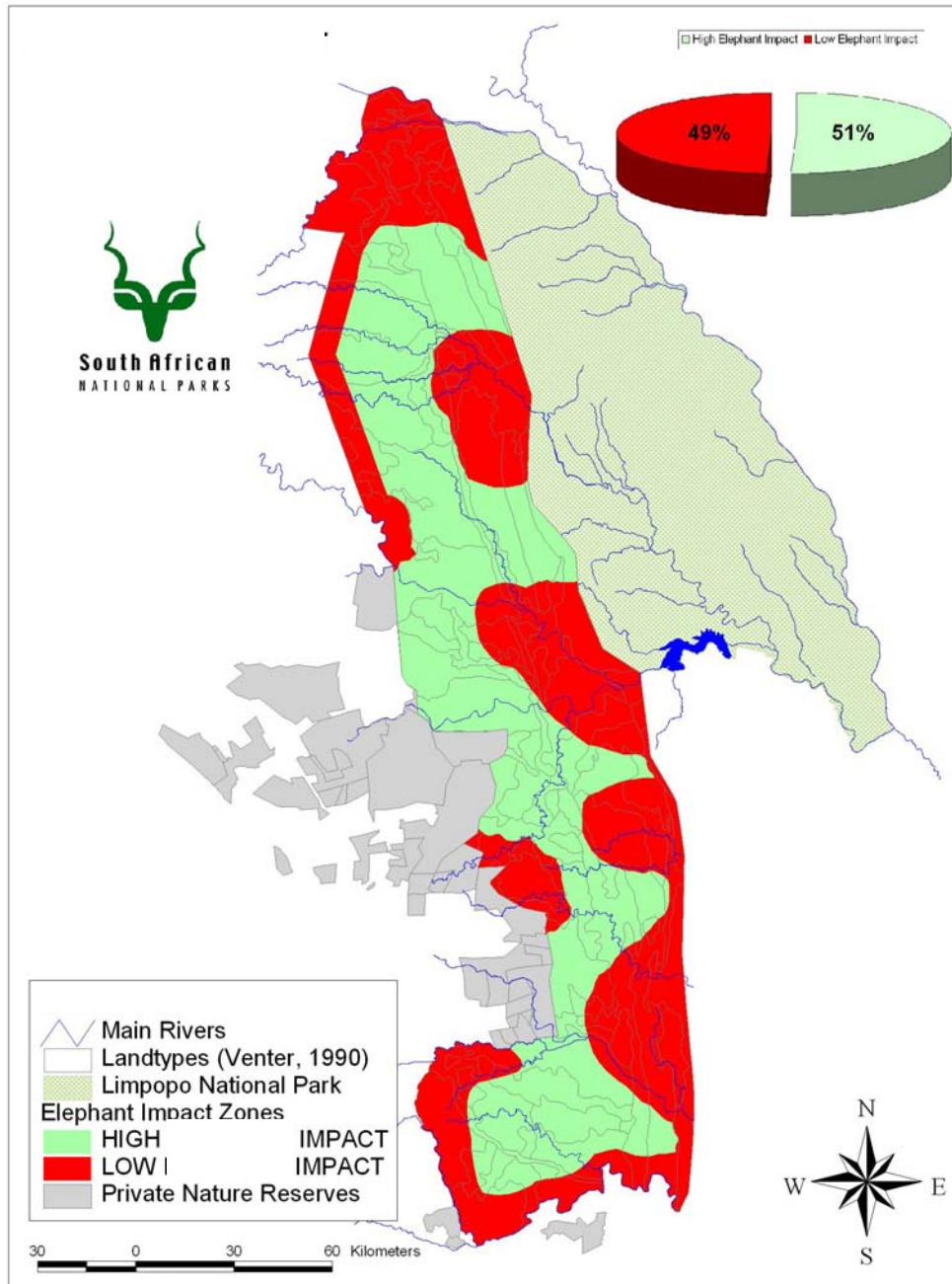


Figure 10: Proposed biodiversity impact zones for KNP

EPILOGUE

The overall policy review process followed over the past 12 years has increased awareness of the context and issues of the elephant management debate amongst all stakeholders. There is also a better understanding of the different points of view and what they represent.

The long-term research programme to support elephant management in South Africa will address important unanswered questions about elephants in ecosystems and their population dynamics. The “Assessment of South African Elephant Management” has used a synthesis of available knowledge, concerns and ideas to generate a list of priority themes for future research, which will be supported by the Minister.

The Norms and Standards announced in February 2008, together with the Assessment, clearly state that SANParks should manage elephants to induce spatial and temporal variation in the intensity with which elephants use landscapes. Thus management will focus on spatial distribution of animals and their impacts, rather than on animal numbers *per se*. The adaptive management principles to which SANParks adheres, and the organisation’s core values, will be brought to bear on developing and monitoring for Thresholds of Potential Concern. These are in turn designed to reflect mechanisms for, and the spatial distribution of, the impacts of animals, including elephant, on national park landscapes and the biodiversity they support.

When thresholds are exceeded or are predicted to be exceeded, management options will focus on spatially and temporally altering the distribution of key resources (*e.g.* water), the scale of resource availability (*e.g.* removing fences), and the access to resources, particularly those impacted by elephants (*e.g.* enclosure fences to keep elephants out of sensitive areas). Further options may include consideration of non-lethal induction of spatial and temporal variation in elephant numbers to modulate the intensity with which elephants use a landscape (*e.g.* contraception in small parks), and lethal induction of spatial and temporal variation in elephant impacts through reducing numbers (*e.g.* culling) when other methods are considered to be inappropriate or ineffective to achieve the park’s objectives.

SANParks envisage that a combination of management approaches and options will achieve the integrated ecosystem objectives supporting each national park’s desired state by focusing on restoring, or mimicking, spatial and temporal variation in how elephants, as one component of the suite of megaherbivores, use and modify landscapes. Approval, through the national Norms and Standards, for the full toolbox of management interventions means that SANParks will be able to draw on the most appropriate management interventions for prevailing circumstances. However, the choice of management tool to be used will not be indiscriminate. Even a decision to cull is one that will be made prudently in the face of managing towards a jointly agreed-upon desired state for a park through managing risks. This is guided by the provisions of the Park Management Plans which have in themselves incorporated extensive public input in their development.

Very importantly, SANParks will continue using Strategic Adaptive Management as a learning approach that generates shared understanding and informed, legitimate decision-making for policy-makers, managers and stakeholders who engage this complex, dynamic and changing social-ecological challenge.

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