



REPORT ON THE ELEPHANT MANAGEMENT STRATEGY

**Report to the Minister: Environmental Affairs and Tourism on
Developing Elephant Management Plans for National Parks with
Recommendations on the process to be followed**

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ACCRONYMS & ABBREVIATIONS

Addo	Addo Elephant National Park
Biodiversity Act	National Environmental Management: Biodiversity Act No. 10 of 2004
CBD	Convention on Biological Diversity
CE	Chief Executive
CITES	Convention on Trade in Endangered Species of Fauna and Flora
CSD	Conservation Services Division
DCAs	Damage Causing Animals
DEAT	Department of Environmental Affairs and Tourism
DWAF	Department of Water Affairs and Forestry
ED:CSD	Executive Director: Conservation Services
EXCO	Executive Management of SANParks
GLTP	Greater Limpopo Transfrontier Park
Indaba	Great Elephant Indaba
IUCN	World Conservation Union
KNP	Kruger National Park
Minister	Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk
Marakele	Marakele National Park
MINMEC	Minister and Members of Executive Council Committee
MINTEC	Ministerial Technical Committee
MNP	Mapungubwe National Park
PAs	Protected Areas
PAA	Protected Areas Act, 57 of 2003
P&C	People & Conservation Division
PPF	Peace Parks Foundation
Protected Areas Act	National Environmental Management: Protected Areas Act No 57 of 2003
SANParks	South African National Parks
TPCs	Thresholds of Potential Concern
V-STEEP	Values-Social, Technological, Environmental, Economic, Political
V th WPC	V th World Parks Congress
Working Group 1	Technical group consisting of representatives of provincial and national protected area agencies, reporting to MINTEC

EXECUTIVE SUMMARY

1. This document
 - a. Gives a brief review of values and scientific information relevant to the question of elephant management.
 - b. Reports on the stakeholder consultation process currently being conducted by SANParks on the elephant management strategy,
 - c. Gives an outline of a proposed elephant management approach for SA national parks under the management of SANParks - a process which is not yet complete and which will continue as part of the development of protected area management plans for those parks with elephants.
 - d. Puts forward guidelines for consideration in drafting norms and standards for the management of elephants in protected areas.

2. The Biodiversity and Protected Areas Acts identify the conservation and sustainable use of biodiversity as values that must be maintained in South Africa's protected areas. Although the Protected Areas Act has not yet come fully into effect, SANParks is aligning its planning and policies to accord with the requirements of this new Act.

3. The scientific evidence shows that the interrelationships between elephants and other species of large herbivores and biodiversity are complex, and the outcome will vary depending on the characteristics of the protected area in question.

4. There is reason to expect that, in large unbounded systems, which are minimally impacted by surrounding human development, population management of elephant and other large herbivore populations may be unnecessary. However in smaller protected areas, surrounded by transformed land, biodiversity is very likely to be degraded if population management is not practiced.

5. Natural systems, whether small or large, are inherently complex and outcomes are difficult to predict. Scientific certainty regarding biodiversity losses will very seldom be attained until the losses have actually occurred. Biodiversity losses are likely to be increasingly irreversible with the increasing transformation of surrounding land and isolation of protected areas.

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6. In certain situations, for example the western boundary of the KNP, elephants at high densities tend to disperse, breaking fences and invading cultivations or allowing other species such as buffalo to leave the park. Buffalo carry economically important diseases such as foot and mouth and bovine tuberculosis, which infect livestock and have a negative economic impact. Outbreaks of foot and mouth disease to the west of the Kruger National Park have increased in recent years, the current one having so far incurred approximately R93 million in direct costs to the state. Even at great expense (a fence of the most effective design would cost in the region of R37 million) it is not possible to maintain an elephant proof barrier on the western boundary of the KNP.

 7. A consultation process with relevant stakeholders revealed that stakeholders have a range of opinions on elephant management options, at least some of which are conflicting and irreconcilable.
 - a. Groups promoting animal welfare or animal rights oppose population management by lethal means, advocating non-lethal means such as contraception.

 - b. Groups in favour of sustainable use, and also a number of local community representatives oppose contraception on the ground of cost and the fact that it “wastes” the economic benefits that can be derived from animal products.

 - c. Communities on the western boundary of the KNP currently experience occasional elephant-related impacts, and are acutely aware and apprehensive of the possibility of increased impacts if the elephant population remains uncontrolled.

 - d. Government conservation agencies indicated a need to consider a solution that is practical and economically viable as they are faced with more challenges than just the management of elephants.

 8. The precautionary principle, as formulated in Principle 15 of the 1992 Rio Declaration on Environment and Development, is central to conservation decision-making in the face of uncertainty. This states that: *“In order to protect the environment the Precautionary Approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”*
 - a. The Precautionary Principle has been called into question because it is subject to various interpretations. SANParks advocates the interpretation of Cooney (2004),

whereby the Precautionary Principle is regarded as an approach to decision-making which requires (i) consultation with stakeholders to identify competing interests and values, (ii) science-based risk assessment of the consequences of decisions in terms of the range of stakeholder interests, and (iii) identification of the burden of proof.

- b. Assigning the burden of proof is one of the most important ways in which the precautionary principle is given operational effect. This entails analysis of any proposed activity in terms of its implications and risks for the various interested and affected parties.
- c. Where does the burden of proof lie in decision making on population management? It is not reasonable to place the burden on conservation agencies to provide 'proof' that population management is necessary to prevent loss of biodiversity. Because of the inherent uncertainty noted in point 5¹, this attitude to the burden of proof will be to the detriment of biodiversity conservation. It needs to be accepted as legitimate to apply population management as a precautionary measure to avert risks to biodiversity and/or community livelihoods. It would also be unjustified to apply the Precautionary Principle without mechanisms for learning from the experience; hence it should be applied as part of an adaptive management system.
9. The principle of sustainable use of biodiversity with tangible benefits for neighbouring communities is established in the Biodiversity and Protected Areas Acts, in recommendations of the 2003 Vth World Parks Congress, and in the Addis Ababa Principles and Guidelines on the Use of Biological Diversity. To give effect to this we advocate that - given that a decision has been taken to control a population in a national park to avert risks to biodiversity or to the livelihoods of neighbours - it be accepted as legitimate to apply lethal rather than non-lethal population management in situations where economic benefits for stakeholders, amongst other considerations, can be derived from this course of action.
10. As indicated in 3 above², it is not possible to generalize regarding the risks to biodiversity conservation posed by elephants the question needs to be considered in the context of particular PAs. The values and interests of stakeholders, as well as the risks to those interests, are also specific to particular PAs. It is therefore necessary to consider the

¹ Natural systems, whether small or large, are inherently complex and outcomes are difficult to predict. Scientific certainty regarding biodiversity losses will very seldom be attained until the losses have actually occurred. Biodiversity losses are likely to be increasingly irreversible with the increasing transformation of surrounding land and isolation of protected areas.

² The scientific evidence shows that the interrelationships between elephants and other species of large herbivores and biodiversity are complex, and the outcome will vary depending on the characteristics of the protected area in question.

question of population management at the level of individual PAs in consultation with stakeholders in line with approved Norms and Standards. This is appropriately done in the course of revising protected area management plans as required by the Protected Areas Act.

11. It is recommended that application of lethal means, specifically culling, be approved as part and parcel of a range of options for the management of elephant populations. The implementation of culling should be informed by the application of adaptive management principles, while also not excluding the application of and learning from other viable management options.
12. It is recommended that other management tools such as translocation, contraception and migration corridors be applied as medium to long-term management interventions.
13. It is recommended that draft norms and standards for the management of elephants in South African PAs be compiled under the leadership of the Department of Environmental Affairs and Tourism and that points 8(b) to 9 and 11 above be considered for inclusion in these norms and standards. It is suggested that other national and provincial protected area agencies be consulted in the development of these norms and standards.
14. There are biodiversity concerns with regard to the management of elephants in the Kruger, Mapungubwe, Marakele and Addo Elephant National Parks and in the case of Kruger there is a grave risk of economic impacts resulting from disease spread. There is broad consensus that decisive action is required. It is therefore recommended that a decision on the use of culling as a legitimate option for management of elephants, and the approval of norms and standards should not be delayed beyond March 2006.

INTRODUCTION

This document has three purposes:

1. To report on the stakeholder consultation process followed so far by SANParks on the issue of elephant management in national parks and;
2. Based on SANParks' findings in the stakeholder consultation process, to put forward certain guiding principles and a decision-making framework for consideration as norms and standards for the management of elephants in South African PAs.
3. To put forward a proposed elephant management approach as informed by the current available knowledge.

Provision for norms and standards is made in terms of Chapter 1 Section 9 of the National Environmental Management: Biodiversity Act and Chapter 2 Section 11 of the National Environmental Management: Protected Areas Act. Given the divergence of stakeholder viewpoints and societal values surrounding the issue of control of mammal populations in protected areas, SANParks is of the view that national norms and standards would be of value in setting out guiding principles.

Decision-making on environmental/conservation problems should be informed by science but cannot be determined purely by science. It needs a broad societal response that incorporates the full range of value systems and social, technical, economic, environmental and political understanding. It is therefore appropriate to briefly outline some relevant values that are already established in national legislation, in international conventions, to which South Africa is a signatory, as well as in IUCN recommendations and resolutions. Thereafter, the underlying scientific considerations have been given.

The first step in drafting a strategy for elephant management in national parks has been the stakeholder consultation.

STAKEHOLDER VIEWPOINTS

Appendix 4 lists the major consultative meetings on the question of elephant population management that SANParks has held since 1994.

1. THE GREAT ELEPHANT INDABA

The most recent multi-stakeholder meeting was the Great Elephant Indaba held in October 2004. The proceedings have been published (SANParks 2005), and divergence of viewpoints expressed are given below. The names in parentheses refer to addresses delivered at the Indaba in which the relevant viewpoints were expressed.

1.1 Ethical and value considerations:

- i. Concern that avoidance of elephant population management may lead to loss of biodiversity (H. Ebedes³, R Thomson⁴, R. van Aarde⁵)
- ii. Concern that the moral principles that underpin human rights should be extended to animals, that culling is unethical and inhumane and should never be used (M. Pickover⁶, S Smit⁷),
- iii. That contraception and other non-lethal control methods should always be preferred as being more humane than culling (M. Pickover, S Smit, N. Greenwood⁸, A. Antonites⁹).
- iv. Concern that population die-offs resulting from habitat degradation and starvation may be more traumatic for the animals than culling (H Ebedes, J Sturgeon¹⁰).
- v. Concern that contraception may impact on the social well-being of elephants and may not achieve objectives (R van Aarde, M Masuluke¹¹).
- vi. Concern about spending resources using contraception, thereby wasting useful products that could be yielded by lethal population management (M Mjadu¹², R Thomson).

1.2 Concerns Regarding Economic and Livelihood Costs:

- vii. Evidence from Chobe National Park that although elephants contributed to the removal of large tracts of riparian forest, it is currently smaller herbivores, e.g. impala that are

³ Hym Ebedes, Livestock and Animal Welfare Association

⁴ Ron Thomson, SA Hunters and Game Conservation Association

⁵ Prof Rudi van Aarde, Department of Zoology and Entomology, University of Pretoria

⁶ Michelle Pickover, Justice for Animals

⁷ Steve Smit, Justice for Animals

⁸ Neil Greenwood, International Fund for Animal Welfare (IFAW)

⁹ Prof Alex Antonites, Department of Philosophy, University of Pretoria

¹⁰ Julian Sturgeon, Resource Africa

¹¹ Michael Masuku, Community Representative for communities surrounding Kruger National Park

¹² Mzwandile Mjadu, Community Representative for communities around Addo Elephant National Park

responsible for preventing Acacia regeneration. This raises the risk that in some situations resources spent on elephant population management could be wasted (J du Toit¹³).

- viii. Concerns regarding the economic costs of increasing elephant numbers on local communities (M Masuluke, R Bengis¹⁴, P Lindeque, L. Rutina, C Jonga).
- ix. Concern that decision-making on elephant management ignores the concerns and impacts on communities surrounding national parks with elephants (M Masuluke)
- x. Plea that economic opportunities for communities should be created by maximizing benefits associated with elephant products or hunting opportunities (M Masuluke, R Thomson, P Lindeque¹⁵, L Rutina¹⁶, C Jonga¹⁷).
- xi. Concern regarding the disease risk associated with elephant breakouts, for example the economic impact of foot and mouth and bovine TB in the areas adjoining the KNP, and the costs of fence maintenance (R Bengis).
- xii. Concern that international outrage about elephant culling may seriously affect tourism (M Pickover, S Smit, H. Bertschinger¹⁸).

1.3 Summary of Feedback from the Working Groups:

Participants were divided into five working groups and tasked with formulating a short term and a medium term vision for elephant management in South Africa and the conclusions of each group are recorded in SANParks (2005). Specifically with regard to the situation in the KNP, three of the five groups reached consensus on elephant culling as being necessary and desirable to attain their proposed visions, whereas members of two groups could not reach agreement on an appropriate management approach.

¹³ Prof Johan du Toit, Mammal Research Institute, University of Pretoria

¹⁴ Dr Roy Bengis, Directorate of Animal Health in the Kruger National Park, Department of Agriculture

¹⁵ Dr Pauline Lindeque, Ministry of Environment and Tourism, Namibia

¹⁶ Dr Lucas Rutina, Department of Wildlife and National Parks, Botswana

¹⁷ Charles Jonga, Representative from Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)

¹⁸ Prof Henk Berchinger, University of Pretoria

2. CONSULTATION WITH COMMUNITIES NEXT TO THE KNP

2.1 Views and Opinions on the 1994/5 Proposed KNP Elephant Management Plan:

On 31 March, 1 and 5 of April 2005, community workshops were held in the Northern, Central and Southern regions of the KNP with the aim of bringing the proposal for Elephant Management in the KNP to communities for their comment and input. Communities were also asked to comment on potential options for the roll-out of benefits to their communities, should the plan be approved. Concerns, comments and suggestions were:

- Delegates from the Northern Region commented that when elephant numbers needed to be reduced in national parks, culling should be the management option of choice as it potentially holds the most benefit for communities.
- Delegates from all three regions in the KNP supported culling as the most practical option to manage elephants in the park.
- Delegates in the areas bordering zones of low elephant impact accepted the proposed zoning plan as they are confident that the impact of elephants on communities will be reduced by managing their numbers in these areas.
- Delegates from the Central Region (predominantly communities bordering proposed areas of high elephant impact) were divided in their comment on the proposed Elephant Management Plan. Although there was general acceptance of culling as the most practical option, the suggested zoning system was hotly debated and two points of view emerged:
 - a) that the proposed high elephant impact zones would not reduce the impact of elephants on the community and that the zones should be realigned to have low elephant impact zones from north to south in the areas adjacent to communities to act as a buffer and limit damage and impact on communities.
 - b) others felt that communities adjacent to high elephant impact zones could benefit from having high elephant concentrations, provided adequate measures are put in place for communities to safeguard themselves and the situation with regard to Damage Causing Animals (DCAs) is resolved so that communities can realise benefits.
- Other delegates felt there should be tight security along fences bordering communities adjacent to high elephant impact zones and that an increased number of rangers should be

recruited to protect villages. These Rangers should be recruited from the local villages themselves as they would have a vested interest in doing the job well.

- Yet a third group felt that the fence should be strengthened and electrified and that barriers should be constructed across the rivers to keep the elephants out of the communities.
- It was also observed by delegates from the Central District that the proposed plan was a good one because while it allowed for culling and for communities to benefit, the zones of high elephant impact would please those who favoured uncontrolled elephant numbers.

2.2 Benefits for communities:

- The community should stand to benefit from the culling process in as many ways as possible and this could include:
 - outsourcing of various functions associated with the processing of the carcasses
 - community canning plants or butcheries
 - processing, marketing and selling of bi-products
 - tusks and tusk carving.
 - bones and bone carving
 - elephant hair products
 - employment of community members to be involved in all aspects of the culling process
 - training and skills transfer to communities
- Sourcing labour from communities for the implementation of elephant management activities was seen as being very important and could be a real benefit to communities.
- Delegates from the Central District made the point that communities expected real benefits from culling. The notion of meat over the fence is viewed as much too simplistic.
- Repeated calls were made for negotiations to ensure that DCAs become the property of the community so that real benefits can be realised.
- A suggestion was made that licences should be granted to communities to enable subsistence and trophy hunting of animals on communal land.
- Communities in the South recognised that there is a ban on international trade in ivory. They would however like to see a register kept, of elephants shot in communal areas, to ensure that communities will benefit from the sale of the ivory, in the event of the ban being lifted.
- Any money accrued as a result of benefits should be paid into a trust account and mechanisms put in place to ensure that communities benefit.

- The abattoir at Skukuza should be reinstated to produce meat, biltong and canned goods and the option of additional processing plants investigated in communities.
- Another group felt that it was not realistic to have these facilities in the communities as communities would not have the resources or skills to market the products effectively.
- The counter argument was that the training and skills development to run all aspects of the business should be an integral part of the project.
- The stomach contents of culled elephants should be made available to traditional healers and the remains used to manufacture compost.

3. CONSULTATION WITH THE SCIENTIFIC COMMUNITY

Appendix 3 summarizes the outcome of a three-day consultative workshop with the scientific community, and includes relevant information on the state of scientific knowledge. In preparation for this workshop a group of researchers undertaking field studies in the KNP conducted a detailed literature survey of the issues to be dealt with during the workshop. Many other researchers also made independent submissions on particular topics within their expertise. Over 300 pages of submissions were available for the participating scientists to use in the workshop.

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) currently set in the management plan of the KNP and to model them to establish the likelihood of their being exceeded. TPCs, established previously for the KNP in consultation with external scientists (Appendix 4), are defined as upper and lower levels along a continuum of change in a selected environmental indicator which, when reached, prompts an assessment of the causes which led to such an extent of change, and may result in management action to moderate such causes.

4. CONSULTATION BETWEEN SOUTHERN AFRICAN ELEPHANT RANGE STATES

The elephant range states of southern Africa met recently at the African Wildlife Consultative Forum hosted by the Zimbabwe NPWLMA. The primary purpose of the workshop was to reach agreement amongst the range states on a framework for 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 & 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.

A preliminary report on the outcomes of this Forum is attached as Appendix 5.

PROPOSED ELEPHANT MANAGEMENT APPROACH

1. RELEVANT VALUES SET IN LEGISLATION, INTERNATIONAL CONVENTIONS, AND GUIDELINES

Chapter 3 Section 17 of the National Environmental Management: Protected Areas Act No. 57 of 2003 lists the purposes of protected areas, which include, among others:

- preservation of the ecological integrity of PA's;
- conservation of biodiversity;
- protection of South Africa's threatened or rare species;
- provision for the sustainable use of natural and biological resources;
- management of the interrelationship between natural environmental biodiversity, human settlement and economic development.

The Protected Areas Act takes guidance from the international Convention on Biological Diversity (CBD), to which South Africa is a signatory, in defining biodiversity as:

".. the variability from among all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes the diversity within species, between species and ecosystems."

The Protected Areas Act thus identifies the conservation and sustainable use of biodiversity as central objectives of managing PA's. SANParks' biodiversity conservation values, which have been developed in sympathy with the above, are included in Appendix 1.

It is recognized (for example Recommendation 3.094 of the 3rd IUCN World Conservation Congress, Bangkok 2004) that where natural dispersal of large herbivores is constrained their populations may pose a threat to an area's biodiversity, and it may be necessary for agencies responsible for managing ecosystems to control those populations. This is particularly so in South Africa, where most protected areas are fenced and surrounded by areas that have been transformed to a greater or lesser extent by human development. Because of their propensity to alter their habitats elephants and other large mammalian herbivores often give cause for concern in this regard. Elephants are potentially difficult to confine within protected areas, and if they leave the area they are likely to pose a threat to the lives and property of neighbours.

It is further recognized that the control of large mammal populations is a source of concern to many people. Because of their charismatic nature the mega herbivores, especially elephants, tend to attract particular concern. Thus, the control of large mammal populations in protected areas is often a source of controversy, with widely divergent views among government, conservationists, neighbouring communities and animal welfare/rights groups. Policy guidelines are needed to provide a framework for decision-making by agencies responsible for protected areas.

Both the Protected Areas Act and the Vth World Parks Congress (WPC), hosted by South Africa in 2003, urge protected areas to provide a sustainable flow of benefits to local communities. Recommendation 5.20 of the Vth WPC calls on protected area agencies to mitigate human-wildlife conflicts. WPC Recommendation 5.29 urges that protected areas should strive to contribute to poverty reduction at the local level, and at the very minimum must not contribute to exacerbating poverty.

In accordance with the principle of sustainable use, SANParks is permitted in terms of the Protected Areas Act to use natural resources to generate revenue for use in developing and managing national parks. Conferences of the Parties to CITES (COP11, COP12, and COP13) have allowed South Africa to trade internationally in elephant hides and goods made from elephant leather, and to sell accumulated ivory in a once-off sale to an approved trading partner.

The fourteen Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity, adopted at the 7th Conference of the Parties to the CBD, are also of relevance, in particular:

- Principle 11. Users of biodiversity components should seek to minimize waste and adverse environmental impacts and optimize benefits from uses.
- Principle 12. The needs of indigenous and local communities who live with and who are affected by the use and conservation of biological diversity, along with their contributions to its conservation and sustainable use, should be reflected in the equitable distribution of benefits from those resources.

The draft National Biodiversity Strategy and Action Plan, drawn up by DEAT in consultation with stakeholders, sets the following objectives:

- Management plans for species and processes posing a threat to biodiversity must be developed and threatening processes need to be managed and controlled, to minimize the impact on biodiversity.
- Biodiversity management (including conservation, access, use and rehabilitation) must be integrated with poverty alleviation strategies and local economic development.
- Human development and well-being should be enhanced through sustainable utilization of biological resources and equitable sharing of benefits derived from biodiversity use.

2. OUTLINE OF SCIENTIFIC CONSIDERATIONS

2.1 Past and present scientific paradigms influencing management:

In all South African national parks with elephants, the populations are increasing at near maximal rates and currently show no signs of being limited by either density dependent or density independent factors. Populations cannot continue to grow indefinitely. Eventually food resources become limited bringing the growth rate to zero. Food and other environmental resources may be depressed at this level causing a decline in the carrying capacity and hence population size.

In the field of livestock production it is standard practice to set carrying capacities or stocking rates at levels which are compatible with maintaining the animal population in a productive state over the long term. The economic concept of carrying capacity tended to influence wildlife managers in southern Africa, where it became customary to set stocking rates for wild herbivores. Thus, before 1994 the 'elephant carrying capacity' in the KNP was set at around 7 500.

While the agricultural (economic) concept of carrying capacity might be appropriate for certain game farming situations, where the objective is animal production, it is not appropriate when the objective is to conserve biodiversity. As explained in more detail below, the maintenance of biodiversity is best achieved by permitting – or if appropriate actually encouraging - variation in time and space, rather than attempting to manage for stability. This realization led to a change in thinking, or “paradigm shift”, in the scientific literature from the so-called equilibrium paradigm to the non-equilibrium paradigm (e.g. Mentis et al. 1989, Westoby et al. 1989).

In the revision of the Management Plan for the KNP of 1995-96, the maintenance of biodiversity was set as the main objective (Whyte et al. 1999) and the notion of a constant carrying capacity

of 7500 elephants was abandoned as being incompatible with this objective. The new elephant management plan aimed at promoting spatial and temporal heterogeneity by applying elephant population management within specific zones in the park (Whyte et al. 1999, Whyte et al. 2003). Other management interventions applied in the KNP with the aim of promoting heterogeneity are listed in Appendix 2.

On the basis of the shift from equilibrium to non-equilibrium paradigms, Gillson and Lindsay (2003) question the rationale for the control of elephant populations in southern African countries as put forward in the context of CITES, which they believe to have been based on the equilibrium paradigm. They state that population management is “nearly always avoidable except perhaps in the rare cases of very small enclosed reserves.”

As noted above, the managers of the KNP abandoned the equilibrium paradigm in favour of the non-equilibrium paradigm a decade ago, but nevertheless believe population management of elephants to be necessary (Whyte et al. 1999). The critical question is: how big must a protected area be before managers can safely avoid population management? The question of spatial scale is critical and this is examined in the light of current knowledge in the following section.

2.2 Current scientific understanding of the impact of elephants on biodiversity:

Because of their large size and high food intake elephants can change both the species composition and the structure of the vegetation. There are examples from the scientific literature, which show that habitat changes brought about by elephants can create conditions, which favour certain species of plants and animals. Equally there are examples of species being negatively affected as a result of the impact of elephants (see for example Whyte et al. 1999, 2003; Western and Gichohi 1989; Cumming et al. 1997; Cumming and Jones 2005). Given the present state on knowledge it is clearly not possible to generalize regarding the impact of elephants on biodiversity, in some protected areas it may be unnecessary to manage the elephant population to maintain biodiversity; in others a *laissez faire* approach may lead to degradation.

Given the lack of knowledge and the inherent complexity of natural systems, it is difficult to predict in advance whether degradation of biodiversity will occur in a particular park. However, as indicated above, spatial scale appears to be one of the critical factors, with degradation of biodiversity being highly likely, if not inevitable, in small confined areas.

For illustrative purposes we present the situation in Addo Elephant National Park, which is well-documented and useful to explain the underlying principles. In AENP elephant numbers have increased steadily since the proclamation of the park in the 1930s. It has never been considered necessary to control this population because it has been possible by land acquisition to enlarge the size of the park, especially in recent years. As elephant numbers have increased they have opened up the dense woody thickets, thereby bringing about a steady rise in the numbers of kudu, a species which favours open woodland, and a progressive decline in Cape grysbok and bushpig, which require dense cover (Knight and Hall-Martin 1994).

There is evidence that the abundance of a number of plant species, including endemic geophytes and succulent shrubs, and mistletoe species, has been significantly reduced by elephants (Midgley and Joubert 1991; Moolman and Cowling 1994; Johnson 1998; Johnson et al. 1999; Lombard et al. 2001). This was demonstrated by comparison of the vegetation within the so-called Botanical Reserves - which is enclosed by fences that keep out elephant and black rhino but allow smaller herbivores to enter – with surrounding areas that are accessible to all large herbivores in the park (Midgley and Joubert 1991; Moolman and Cowling 1994, Johnson 1998). Significantly from the point of view of conservation, the plant species that were heavily impacted by indigenous elephants in the park were also severely reduced by livestock grazing on privately owned land surrounding the park – unprotected land. Those species that are particularly vulnerable to elephants comprise the bulk of the regionally endemic, Red Data Book and rare species associated with succulent thicket, and AENP is the only national park which contains this thicket (Lombard et al. 2001).

At the broad landscape level, the key to maintaining biodiversity over the long term, as indicated earlier, lies in spatial and temporal variability. In a heterogeneous habitat, composed of a mosaic of different patches, some of the patches will be heavily impacted by elephants and others will be avoided. The pattern of impacts will also change over time, for example after subjecting certain patches to heavy use the elephants may move away, allowing them to recover. Such a 'shifting mosaic' would be compatible with the maintenance of biodiversity (see e.g. Whyte et al. 1999). In terms of the AENP example, patches heavily utilized by elephants would be good for kudu, and other species favouring open vegetation. Grysbok and bushpig would disappear from these localities, but this would not matter so long as sufficient dense habitat patches, avoided or lightly impacted by elephants, remained available for them, and also for the endemic geophytes and succulent shrubs.

In a landscape of large size there is likely to be sufficient diversity in terms of topography, soils, vegetation and microclimate to ensure the full range of habitat conditions necessary to maintain

the biodiversity characteristic of the area. However, human development has destroyed natural habitat over vast areas, isolating and fragmenting the remaining patches. More so in South Africa than in neighbouring African countries, protected areas are increasingly becoming islands in a sea of modified land.

The important question is, how do elephants and other large herbivores adapt to the islands that constitute today's protected areas? Enclosed protected areas differ from open ecosystems in two important respects: dispersal is restricted and predation is often absent. Artificially confined populations often reach densities much higher than those in situations where dispersal is possible (Owen-Smith 1983). This is frequently, but not inevitably, followed by depletion of food resources and a crash of the herbivore population. The absence of predation is also likely to result in inflated population densities. In the case of elephants there is evidence that man has been a key predator since prehistoric times (Kay 2002, Surovell et al. 2005). The trade in ivory from the Limpopo valley, dating from as long ago as AD900, is well-documented.

How may atypically high large herbivore populations impact upon biodiversity? The example of AENP illustrates the risk of species losses. The high population densities that a mega-herbivore species may reach under confined island-like conditions in effect constitutes a perturbation that may bring about the extinction of some of the rarer species in the protected area.

In terms of the examples given above from AENP, the grysbok, bushpig, mistletoes and endemic geophytes and succulents can be regarded as 'impact sensitive species' that are vulnerable in the face of persistent and accumulative elephant impacts.

It has been argued (e.g. Gillson and Lindsay 2003) that localized high impacts of elephants, even to the point of causing extinctions of other species in the system, is a natural phenomenon and should not be a matter of concern. However, this ignores the ever-increasing loss of biodiversity caused by habitat transformation by humans. The vulnerability of endemic plant species to both the elephants and other large herbivores in AENP and to livestock on the surrounding farms is a good illustration of this. Habitat loss is making it increasingly important for protected areas to maintain their complement of species as far as may be possible. This means that simply leaving nature to take its course would not be a sensible management option, indeed leaving a confined system to "take its course" would be unnatural. Active management intervention is therefore called for.

The likelihood of biodiversity losses in the island situation may seem to imply that management should intervene to stabilize elephant populations, or at least to dampen fluctuations. However,

as pointed out above, localized high densities of elephants need to be encouraged in order to maintain biodiversity. Maintaining elephant populations at an equilibrium level may in fact prevent heterogeneity of impacts in space and time, thereby losing biodiversity. It is for this reason that SANParks decided in 1995 to abandon its previous policy of keeping the elephant population of the KNP at around 7 500.

In the context of the KNP, SANParks believes that the best approach to maintaining biodiversity is to identify certain specific zones in the national park within which elephant numbers will be reduced (Whyte et al. 1999). Outside these zones elephant numbers should be left to fluctuate naturally. It is intended by this means to encourage the full range of elephant impacts necessary to maintain biodiversity. If elephant populations are left entirely alone and allowed to reach high levels then the entire park may eventually be subject to heavy impact, with no refuge for impact-sensitive species. The population management zones serve firstly as a 'safety valve', to simulate the effects of dispersal and/or predation, and secondly as a guaranteed refuge for impact sensitive species. The rationale for population management within specified zones is analysed by Owen-Smith (1983).

2.3 Conclusion on the role of science:

Although science should inform conservation decision-making, the decisions are ultimately based on value systems. The divergence of views on elephant management arises primarily from completely different values held by different stakeholders. Scientific information cannot resolve these value differences. It is up to decision-makers to set the value systems that should be upheld in national protected areas.

Ecology is unlikely to become a predictive science (Cooney 2004). Uncertainty arises partly because of our limited understanding of ecosystem functioning. However even given near perfect understanding, uncertainty will remain because ecosystems are so complex and dynamic that outcomes will remain difficult to predict. A good analogy is the weather; despite good scientific understanding of weather patterns we remain unable to predict it with certainty. Consequently dealing with uncertainty from an imperfect knowledge base is central to effective conservation decision-making and management.

It is appropriate to point out the unreasonableness of demanding 'proof' that elephants will have a deleterious impact in a given protected area. Firstly 'deleterious' is a value judgement, and rational decisions and some measure of consensus can only be reached in relation to clearly stated and accepted values and associated management objectives. Secondly experimental

proof of negative impacts will only be at hand once the impacts have occurred, which is undesirable as they are likely to be difficult to reverse or irreversible.

3. DESCRIPTION OF METHODOLOGY AND OPTIONS FOR CONTROL

The following options for managing elephant, not all practical or desirable, were identified at a consultative workshop on elephant management with the scientific community (Appendix 3).

2. Do nothing (*laissez faire*), with or without additional information collection.
3. Expand elephant habitat by:
 - a. increasing the size of national parks;
 - b. providing corridors for dispersal to elephant “sinks” (e.g. hunting zones);
 - c. removing barriers to dispersal (fences) that currently surround national parks.
4. Restrict elephant habitat within parks by closing water points permanently or cyclically thereby increasing mortality of juvenile elephants by forcing them to travel longer distances between sources of water and foraging areas.
5. Introduce biological control in the form of predators or diseases.
6. Protect sensitive areas by excluding elephant from them as is the case in AENP.
7. Increase mortality to reduce population growth rate and/or size. The main options are:
 - a. culling (full culling or selective),
 - b. allowing hunting and
 - c. failing to control poaching.
8. Reduce birth rate by contraception to effect, in the long term, a reduction in population growth rate or size.
9. Translocation of elephants from an over populated, to a less populated, area.

4. SUMMARY OF RISKS AND BENEFITS TO STAKEHOLDERS

The SANParks consultation process showed that the values held by stakeholders on the issue of lethal population management are highly divergent, varying from total opposition to active support on a variety of grounds, including sustainable resource use, averting population crashes through starvation, or risks to biodiversity. The stakeholder interests are not easily reconcilable, it is inevitable that whatever management option is chosen, one or more value

systems will be transgressed, and the consequence is likely to be a feeling of alienation or even outrage on the part of those whose values have been transgressed.

Regarding economic and livelihood risks two main concerns were voiced in the consultation process:

- (i) the risks posed by dispersing elephants to neighbours and
- (ii) the possibility of declining tourism as a result of either outrage over elephant culling or degradation of parks through excessive elephant impacts.

Fence breaks are currently fairly frequent on the western border of the KNP. As the elephant population increases breaking will increase as the animals disperse in response to habitat degradation. As made clear by community representatives participating in the Indaba and during the community consultation process, the risks posed by elephants are a reality; incidents of damage to property are not uncommon, and a few lives have been lost. Both SANParks and provincial conservation authorities frequently need to shoot damage causing elephants in the areas outside the park.

Bengis (2005) outlined the disease concerns associated with the elephant issue on the western boundary of the KNP. Fence breaks by elephants allow other species to leave the park, including buffalo, which carry economically important diseases (with adverse economic impact) such as foot and mouth, bovine tuberculosis, theileriosis or brucellosis. The available evidence strongly suggests that the disease problem to the west of the KNP is associated with the expanding elephant population in the KNP. From 1983 to 2000 there were no outbreaks of foot and mouth disease in this region, since 2000 there have been four (2000, 2001, 2003 and 2004), all of which have been associated with fence breaks which allowed buffalo to come into contact with cattle. The case of the 2000 outbreak was brought about by the floods in the year 2000 which swept away fences. In the other three cases the evidence points to elephants as the cause of the fence breaks. Recent estimates indicate that over 90% of fence breaks are caused by elephants (R Bengis, personal communication¹⁹). The last outbreak of foot and mouth disease in the Letaba District west of Phalaborwa resulted in approximately R93 million in direct costs to the state. If the outbreak goes beyond the control zone South Africa may lose its zonation status resulting in a prohibition of export of all animal products (red and white meat, hides, bone meal, dairy products, etc) - a massive economic loss for the country (estimates not available).

¹⁹ Dr Roy Bengis, State Veterinarian, Directorate of Animal Health, Department of Agriculture, Skukuza)

The western boundary fence of the KNP extends over 300 km and is crossed by numerous rivers, streams and drainage lines, which are subject to annual flooding. In the experience of SANParks the fence design most effective in keeping in elephants is the so-called Armstrong fence that has been used since the early years of AENP. To construct an Armstrong fence along the western boundary of the KNP would cost in the region of R37 million, a figure which is currently completely beyond the means of SANParks with all its competing priorities. Such a fence could not be extended over rivers or streams. Thus, even at enormous cost, there is no question of maintaining an elephant proof fence on the western boundary of the KNP.

Recently local community members have been employed by SANParks, using poverty relief funds, to assist with fence maintenance and the reporting of fence breaks. This is of great value in creating employment and increasing the amount of information on the rate and causes of fence breaks. Although the participation of community members in fence maintenance reduces the risk by shortening the reaction time to a fence break, it is not a complete solution in that it cannot eliminate fence breaks.

The human-wildlife-livestock disease interface in this region is a very complex problem with considerable risk to both the state and community livelihoods. Consultation with communities showed widespread awareness, concern and apprehensiveness on this issue. Elephants are only one part of this complex problem but it is likely that the elephant population in the KNP will increasingly exacerbate the risks if it is allowed to continue expanding. Population management within the KNP as a means of alleviating risks to neighbours is preferable to the reactive approach of dealing with animals only once they have left the park and caused damage or brought about the spread of disease.

The possible risks for tourism were voiced by a small number of participants in the consultation process. Some predicted that outrage over lethal population management would harm tourism. Others felt that extensive habitat transformation by elephants, in particular the loss of tall trees, could be perceived as degradation and have a negative effect on tourism. These viewpoints are speculative; there is no clear evidence to indicate either way what the impact on tourism may be. Certainly there was no tourism boycott of the KNP during the period when elephant culling was conducted.

A number of stakeholders, in particular representatives of local communities, advocated the realization of economic returns from elephant products. There is significant potential for returns; Cumming and Jones (2005) estimate that the sustainable use of elephant products can potentially contribute US\$ 200-300 per square km per year towards the costs of managing protected areas.

5. KEY PRINCIPLES UNDERLYING DECISION-MAKING UNDER CONDITIONS OF UNCERTAINTY:

5.1 The Precautionary Approach:

Protected areas with elephants and other large herbivores constitute highly complex systems, set within even more complex systems of human land use patterns, influenced by a great diversity of economic, cultural, ethical and social interests and viewpoints. As a result of this complexity, the impact of elephants - whether on biodiversity or on stakeholder interests - will seldom be fully predictable in advance. It is always necessary to make decisions on the basis of incomplete information, in situations where the likelihood of different outcomes and risks are difficult to establish and in which preparedness to tolerate risks will vary between stakeholders depending on their value systems.

The Precautionary Principle is relevant to situations where decision making is required in the face of uncertainty. This Principle is incorporated into the CBD, numerous other international conventions e.g. CITES, the Cartagena Protocol on Biosafety, and the national legislation of many countries, including South Africa's National Environmental Management Act. There are various formulations of the Precautionary Principle the most widely cited being Principle 15 of the Rio Declaration on Environment and Development (1992):

"In order to protect the environment the Precautionary Approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

The Precautionary Principle is subject to confusion, and has to some extent come into disrepute, because it is susceptible to interpretation in a multitude of ways. However, a recent analysis by Cooney (2004) provides a rational basis for invoking the Precautionary Principle. Cooney advocates that the Principle be applied as an approach to decision making that entails:

1. A consultative, democratic approach to establish interests and values held by stakeholders, identification of possible conflicts of interest and competing objectives.
2. Identifying the options available in decision-making to achieve objectives
3. Conducting a science-based risk assessment to determine risks that the available options pose for the various stakeholder interests and values, focusing on the question of who bears the costs, especially the livelihood and economic costs

4. Analysis, in terms of the above, of where the 'burden of proof' lies, and what may constitute an appropriate decision.

The 'precautionary approach', applied in this way, does not necessarily result in a precautionary decision, but rather a decision based on consultation and recognition of competing interests and objectives (Cooney 2004).

Assigning the burden of proof is one of the most important ways in which the precautionary principle is given operational effect. Proponents of potentially harmful activities may need to demonstrate that such activities are safe and acceptable, rather than those opposing the activities required to argue that they are harmful (Cooney 2004).

Where does the burden of proof lie in the question of population management of elephants? It is often assumed, especially by those who oppose lethal population management on ethical grounds, that it is incumbent on conservation agencies to 'prove' negative impacts on biodiversity before applying control measures. As noted, ultimate proof only comes once biodiversity is lost. Hence insistence on assigning the burden of proof to those tasked with averting risks to biodiversity effectively renders their task impossible. Given the value placed on the maintenance of biodiversity in South Africa's new legislation, and the potential for economic returns for both communities and parks, it has to be accepted in principle that it is legitimate to apply population management as a precaution. We strongly advocate that the norms and standards for large mammal population management should make this clear.

In many situations in Namibia, Botswana, Zimbabwe and numerous other African countries elephants pose a threat to community livelihoods (SANParks 2005, Parker 2004). In South Africa this is true for the western boundary of the KNP. In such cases it is highly likely that if nothing is done about elephant populations, either neighbouring communities will incur substantial costs or else heavy demands will be made on the fiscus to maintain elephant proof barriers. This will increase animosity between the communities and conservation authorities. The appropriate precautionary decision should protect those at risk. In these cases there appears to be a good case for assigning the burden of proof to those who are against elephant population management rather than those who support its adoption.

However, it would clearly be contrary to the spirit of Cooney's (2004) interpretation of the Precautionary Principle to invoke it to apply population management as a matter of course wherever elephants may be found. There is evidence (for example Du Toit 2005) that in certain large ecosystems, remote from human development, it may be possible to reconcile unmanaged elephant populations with both biodiversity and human interests over the long term.

Thus the question of whether or not population management should be applied is context and situation specific, and needs to be addressed on the level of individual protected areas. A framework is required that allows decision-making to be made in accordance with the principles listed above for the application of the precautionary approach, namely consultation, identification of values and objectives, risk assessment, burden of proof. This is dealt with in the following section.

5.2 Adaptive Management:

Adaptive management is designed to produce information about the system being managed. This approach aims at achieving explicit objectives and outcomes, and emphasises “*learning by doing*” through careful monitoring of outcomes and continual refinement of the management approach as knowledge increases. SANParks advocates the application of the Precautionary Principle, as interpreted by Cooney (2004), within a framework of adaptive management.

RECOMMENDATIONS FOR THE MINISTER

1. It is recommended that Norms and Standards for the management of elephants be drafted and approved by the Minister of Environmental Affairs and Tourism as is provided for under the Protected Areas Act 57 of 2003 section 11:

(1) The Minister may prescribe-

- (a) norms and standards for the achievement of any of the objectives of this Act...*
- (b) indicators to measure compliance with those norms and standards*

As well as in the Biodiversity Act 10 of 2004 section 9:

(1) The Minister may, by notice in the Gazette-

- (a) issue norms and standards for the achievement of any of the objectives of this Act, including for the-*
 - i. Management and conservation of South Africa's biological diversity and its components.*
 - ii. Restriction of activities, which impact on biodiversity and its components.*

2. It is recommended that the norms and standards be used as guidelines for the development of individual PA Management Plans as provided for under the Protected Areas Act 57 of 2003, section 39:

(2) The management authority assigned in terms of section 38 (1) or (2) must, within 12 months of assignment, submit a management plan to the Minister or the MEC for approval.

(3) When preparing a management plan for a protected area, the management authority concerned must, consult with municipalities, other organs of state, local communities and other affected parties, which have an interest in the area.

It is suggested that other national and provincial protected area agencies be consulted in the development of these norms and standards.

3. It is recommended that the Minister of Environmental Affairs and Tourism approves the usage of culling as a means of reducing elephant populations in protected areas as is provided for under the Protected Areas Act 57 of 2003, section 55:

(1) *South African National Parks must –*

(b) protect, conserve and control those national parks and other protected areas, including their biological diversity; and

(c) On the Minister's request, advice the Minister on any matter concerning

(i) the conservation and management of biodiversity

(2) *South African National Parks must –*

(d) may control, remove or eradicate any species or specimens of species which it considers undesirable to protect and conserve in a park or that may negatively impact on the biodiversity of the park

It is suggested that the approval of culling shall be read within the provisions of the Precautionary Principle²⁰ in conjunction with Adaptive Management provisions²¹ and shall be incorporated into Protected Area Management Plans.

4. It is recommended that the Minister of Environmental Affairs and Tourism approves the usage of other management tools such as translocation, contraception and migration corridors as medium to long term management interventions.

1. DRAFTING OF NORMS AND STANDARDS

1.1 General Guidelines for the Management of Elephants in Publicly Owned Protected Areas in South Africa:

It is recommended that the norms and standards should include the following standpoints:

1. Population management of elephants is recognized as a legitimate management option to avert risks to biodiversity. In accordance with the Precautionary Principle, scientific certainty is not a requirement to apply population management. However, decisions on population management must be made in accordance with the procedures and conditions set out below.

²⁰ Page 26: "In order to protect the environment the Precautionary Approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." - Principle 15 of the Rio Declaration on Environment and Development (1992)

²¹ Page 27: This approach aims at achieving explicit objectives and outcomes, and emphasises "learning by doing" through careful monitoring of outcomes and continual refinement of the management approach as knowledge increases. SANParks advocates the application of the Precautionary Principle, as interpreted by Cooney (2004), within a framework of adaptive management.

2. In accordance with the principle of sustainable use established in the Biodiversity and Protected Areas Acts, and given that a decision has been taken to control a population in a national park to avert risks to biodiversity or to the livelihoods of neighbours, it is legitimate to apply lethal methods in preference to non-lethal methods in circumstances where economic benefits can be derived from animal products, provided that
 - a. Decisions on lethal population management are made in accordance with the procedures and conditions set out below.
 - b. The disposal, sale, use or distribution of animal products is in accordance with any applicable regulations or controls (for example international trade in elephant products needs to be in accord with CITES conditions and regulations).
 - c. Population management should be applied as an adaptive management approach as outlined above

It should be noted that in terms of point 2 above, the use of animal products from a national park for economic gain would only be considered if population management was deemed to be desirable to maintain biodiversity or to reduce risks to neighbours. In other words, economic gain would not be the primary consideration in making the decision. However, this may not apply to all categories of protected areas; in certain categories it may be accepted as legitimate to cull animals to generate economic benefits irrespective of considerations of risks to biodiversity or impacts on neighbours. For example in the area to the north of the KNP, managed by agreement with the Makuleke people – a contractual national park - it has been accepted that the community may conduct hunting of elephants and other species to generate income if they so wish.

2. DRAFTING OF PARK MANAGEMENT PLANS

2.1 Procedures and conditions governing decision-making on population management:

1. Decisions on whether population management may be necessary in a particular protected area must be made in consultation with interested and affected parties. In terms of the Protected Areas Act, national park management plans are subject to approval by the Minister²².

²² PAA section 39 (2) and (3):

(2) *The management authority assigned in terms of section 38 must, within 12 months of assignment, submit a management plan to the Minister or the MEC for approval.*

2. All feasible cost effective options for population management must be considered.
3. Interested and affected parties should have an opportunity to express their views on the different options, and to express their tolerance for any possible risks as far as it may be possible to assess them, as provided in the PAA section 39 (3).
4. In the case of population management aimed at averting risks to biodiversity it is necessary to formulate clear biodiversity objectives including a definitive description of the desired state of the PA in terms of specified ecological thresholds or targets. This is not a precondition in cases where population management is needed to avert risks of livelihood or economic costs.
5. Where the management measure(s) require handling or manipulation of animals (for example culling, capture and translocation, contraception) the methodology involved should be evaluated by an appropriately constituted animal ethics committee.

To further elaborate on point 5, it is common practice among organizations that conduct work on animals to submit issues for consideration by an animal ethics committee. The purpose of the committee is to ensure that the highest ethical standards are maintained. Appropriate decisions on methodology require insight into the technical characteristics of the different methods, whether they involve the use of lethal drug doses, firearms, chemical immobilization and translocation, or contraception. Thus ethics committees include members who are veterinarians and experts on research using experimental animals. The role of ethics committees is not to replace stakeholder consultation as a condition for decision making, but rather to provide an independent judgment informed by specialist expertise.

3. DECISION-MAKING: CONDITIONS FOR IMPLEMENTATION OF DECISIONS

As has been indicated in the 'Introduction', it is suggested that provincial and national government departments be consulted in the drafting of the proposed norms and standards through the channels of Working Group 1, MINTEC and MINMEC. They are then to be published for a 30-day public comment period as mandated by the Biodiversity and Protected Areas Acts.

The requirements for consultation and evaluation set out above are closely in accordance with the requirements for preparing management plans for PA's in the PAA. Thus decisions on elephant population management should be made in line with approved norms and standards and as part of the management planning process, giving effect to the need to place this in the

(3) When preparing a management plan for a protected area, the management authority concerned must, consult with municipalities, other organs of state, local communities and other affected parties which have an interest in the area

context of park-specific values, objectives and stakeholder interests. The PAA provides that national PA management plans are subject to approval by the Minister of Environmental Affairs and Tourism.

Owing to the urgency of this matter in some regions SANParks recommends January 2006 as the deadline for publication of the norms and standards for public comment.

CONCLUSION

1. The norms and standards for the management of elephants in protected areas, once approved by the Minister and published, will provide general guidelines for national protected areas.
2. Park-specific population management plans will be drafted in accordance with the approved norms and standards. The population management plans will be part of park management plans to be approved by the Minister in accordance with the provisions of the PAA.
3. Conservation agencies will be responsible for implementing population management plans within the provisions of the norms and standards and approved management plans.
4. The use of culling in the short to medium term shall be considered in the context of adaptive management and shall be applied on the basis of the specific needs of each PA.
5. Other management tools such as translocation, contraception and migration corridors to be applied as medium to long term management interventions.

Signature: _____

Date: _____

Dr David Mabunda

Chief Executive: South African National Parks

Signature: _____

Date: _____

Prof. Willem van Riet

Chairperson of Conservation Committee: Board of South African National Parks

Signature: _____

Date: _____

Ms Cheryl Carolus

Chairperson: Board of South African National Parks

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APPENDIX 1:

SANParks BIODIVERSITY VALUES

- We adopt a **complex systems view** of the world while striving to ensure the **natural functioning** and **long term persistence** of the **ecosystems** under our care.
 - ⇒ Biodiversity informs and constrains all aspects of SANParks operations.
 - ⇒ We ensure continuous learning by practising an adaptive approach to biodiversity research, monitoring and management.
 - ⇒ We are responsive to the impact of other (V-STEEP) systems on the biodiversity system.
 - ⇒ We are concerned, and responsible, for the implications of our biodiversity management decisions/actions, within and without a park/SANParks, for other (V-STEEP) systems at local, regional and global levels.

- We aim at **persistent** achievement of **biodiversity representivity** and **complementarity** to promote **resilience** and ensure **ecosystem integrity**.
 - ⇒ We treat all biodiversity elements (all species, ecosystems, processes, structural components, etc.) with equity.
 - ⇒ We manage in a bio-regional context to promote connectivity across all landscape elements.
 - ⇒ We ensure representivity while accounting for uniqueness.
 - ⇒ The acquisition and restoration of land is guided by these values and principles.

- We can **intervene in ecosystems responsibly and sustainably**, but we focus management on **complementing natural processes** under a "**minimum interference**" philosophy.
 - ⇒ Where anthropogenic influences warrant, interference, even severe interference, is acceptable for achieving our biodiversity custodianship mandate.
 - ⇒ A laissez-faire approach may be used but it will be a conscious and informed choice.
 - ⇒ Biodiversity forms the basis of the ecosystem services that sustain the benefits that humans derive from conservation.
 - ⇒ Beneficiation of biodiversity assets/ecosystem services for human use and enjoyment is fully cognisant of the associated conversion natural capital and the potential for insidious impoverishment of genetic diversity and ecosystem integrity.

- ⇒ We effectively measure our performance in biodiversity management.
- We accept with humility the **mandate of custodianship** of biodiversity **for future generations** while recognising that both natural and social systems change over time.
 - ⇒ We strive for continuous, and co-operative, improvement of public perception of our rationale for conservation practice and beneficiation of biodiversity/ecosystem services.
 - ⇒ Biodiversity understanding and management must reflect the social imperatives (e.g. transformation, equity, efficiency, empowerment, growth) of an emerging African democracy.

APPENDIX 2:

Major Management Interventions Relevant To Elephant Management In The Kruger National Park Since The Cessation Of Culling In 1994

1. Since the year 2000 the number of man made water points available to wildlife has been reduced from 283 to less than 150. The rationale behind this was that excessively widespread provision of water in the past had homogenized the impact of large herbivores in the park, thus working against the principle that landscape heterogeneity is necessary to maintain biodiversity. The relevance of this to elephants is that they are water dependent, and mortality, especially among calves, is likely to increase if they are forced to move long distances between water points and feeding areas. Hence the removal of water points has been advocated as a means of slowing down population growth. The abundance of natural water in the KNP makes it doubtful that the removal of man made water points will have a major effect on the elephant population.
2. From the mid 1990s the rotational block burning policy was abandoned for other fire policies because it tended to homogenize vegetation structure, working against the maintenance of landscape heterogeneity. The current policy of mosaic patch burning is intended to promote diversity through structural heterogeneity.
3. In September 2003 twenty-five elephants, three family groups and four adult males, were translocated to the Mozambique side of the Great Limpopo Transfrontier Park (GLTP). It was believed in some quarters that the GLTP offered prospects of reducing the problem of excessive elephant numbers in the KNP. However, tracking by radio telemetry showed that all the translocated elephants returned to the KNP. Mozambique decided against promoting a rapid increase in elephant numbers on their side of the GLTP because of concerns raised by communities living along the Shingwedzi River. After the removal of sections of the fence along the international boundary small numbers of elephants began moving into Mozambique, but this is not sufficient to offer a solution to the problem.

APPENDIX 3:

Outcomes of the Science Workshop: 15-17 March 2005

ELEPHANT AND BIODIVERSITY AN EXECUTIVE SYNTHESIS OF CURRENT UNDERSTANDING OF THE ROLE AND MANAGEMENT OF ELEPHANT IN SAVANNA ECOSYSTEMS

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Introduction

The SANParks mission and new Protected Areas and Biodiversity Acts mandate biodiversity custodianship in National Protected Areas and the need for co-operation with stakeholders in decision-making. In October 2004 SANParks held The Great Elephant Indaba in which it consulted with over 200 stakeholders covering a very wide spectrum of interests. It was felt that scientific issues of the debate were not dealt with in sufficient depth at the Indaba and that the scientific community should be engaged separately. This document represents an executive summary of a workshop in which some 50 scientists, from a range of biophysical disciplines, discussed and synthesised current understanding of the role of elephants in ecosystems, and of their management.

Ecosystems are complex, dynamic systems that change in uncertain ways and our understanding of ecosystem functioning is limited. Dealing with uncertainty from an imperfect knowledge base is central to effective decision-making and management. Environmental/conservation problems need a broad societal response that incorporates social, technical, economic, environmental and political understanding and value systems, each of which provides its own level of uncertainty. An uncertain knowledge base and a lot to learn are, however, not valid reasons for deferring decisions. The time frame of many problem issues is shorter than that for learning “enough” about them. The process of Adaptive Management, also called “learning-by-doing”, has been developed to deal with these problems in conservation and natural resource management.

Elephant population dynamics

In all South African National Parks, elephant populations are increasing at or near maximal rates and currently show no signs of being limited by either density dependent or density independent factors. Populations cannot continue to grow indefinitely. Eventually food

resources become limited bringing the growth rate to zero, at which time the population is said to have reached ecological carrying capacity. Environmental resources may be depressed at this level causing a decline in the carrying capacity and hence population size.

Water distribution can become a factor regulating elephant populations if water points are far enough apart that individuals, especially calves, cannot balance their food and drinking water requirements during times of drought. Elephant need to drink at least every 2-3 days and this limits their foraging range to about 15km from water. The provision of artificial watering points in National Parks has essentially eliminated water as a population regulation mechanism.

Past conservation policies have largely interpreted “ecological carrying capacity” as “stocking rate” (an agricultural interpretation) for a particular species, or species mix. Unfortunately, the figures used to define carrying capacity for elephants in National Parks have largely been guesstimates and have not been tested scientifically, or by adaptive management. Carrying capacity is a difficult number to pin down in wild populations subject to variable environments. Elephant populations in savanna regions elsewhere have attained regional densities of up to 3 animals per km², meaning that KNP’s population could reach as high as 50-60 000 elephants.

The main concern in National Parks is that vegetation will be severely altered by the time an elephant population reaches ecological carrying capacity, with a resultant highly deleterious effect on biodiversity in general.

Vegetation

The main influences of elephant on vegetation are ultimately expressed as: (1) A change in plant species composition (loss or gain of species or a combination) (2) A change in vegetation structure, usually manifest as a reduction in tall trees and/or change in the tree/grass ratio. Not all changes are negative. 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 herbivores.

There is general acceptance 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 absence.

It is generally agreed that no South African National Park is large enough to naturally accommodate such spatially and temporally patchy fluctuations in elephant and vegetation.

Biodiversity

Biodiversity composition (e.g. number of species), structure (e.g. height of trees) and function (e.g. nutrient cycling) are expressed across the range from genes to ecosystems and landscapes. Past conservation research concentrated on individual wildlife species while management focussed on manipulating their populations by culling, fire, water provision, reintroductions and translocation. Understanding of biodiversity and its conservation remain largely untested in African savannas.

Ecologists recognise that elephants are important agents of positive and negative biodiversity change in ecosystems. The list of positive consequences of elephant activities for biodiversity is extensive but it has been little studied. Broadly speaking these positive consequences seem to outweigh the negative consequences at “low” densities of elephant. What these low densities represent will differ from region to region and vegetation type to vegetation type. They have not been quantified and will be considerably lower than ecological carry capacity.

There is ample evidence that high levels of elephant activity can, and has, had deleterious effects on biodiversity, at least in some patch types of our National Parks, and that increased elephant impacts will eventually have a deleterious effect on biodiversity in general.

Elephants prefer to feed near water and this concentrates the influence of their activities around water points, especially during the dry season and droughts. The number and distribution of water points, and hence the area of elephant influence (piosphere), in the landscape can have important implications for the distribution of elephant impacts. As water points become closer together and elephant numbers/impacts grow, piospheres will begin to overlap thereby homogenising the landscape. At greater and more variable distances between water points, disturbance variability and landscape heterogeneity are enhanced.

Not all components of biodiversity found in ecosystems without elephant can continue to exist under the disturbance regime provided by elephant. Some will be lost, some will be reduced but others will be increased. The issue, therefore, is do these effects matter to the conservation effort at this stage, and if not, when will they matter?

New biodiversity legislation presents some conflict with the past focus on carrying capacity because it concerned only large mammals and how much food they needed. It did not take any biodiversity, aesthetical, or other values of the ecosystem into account. The numbers of animals at which changes in biodiversity, or aesthetic appearance of a landscape, occurs will be much lower than that for the ecological (food availability) carrying capacity. The “biodiversity carrying capacity” of a park has yet to be quantified but it would not represent a single number or duration of impact. It would have to consider spatiotemporal scales and flux in numbers, impact and recovery periods.

Management options

Six options for managing elephant, although not all practical or desirable, exist:

(1) Do nothing (Laissez faire). (2) Expand conserved elephant habitat. (3) Restrict elephant habitat within parks by excluding elephant or closing water points. (4) Increase mortality by culling, hunting, biological control through disease management, or failing to control poaching (5) Reduce birth rate by contraception. (6) Translocate elephants to less populated areas.

There are many issues that must be taken into account when weighing up the different options.

(1) **Costs/Benefits** in short and long term. (2) **Feasibility**: Technical, Physical, Legal, Logistical (3) **Ethics**: Does it fit with SANParks values. (4) **Social, Political** and **Legal** considerations. (5) **Environmental/Biodiversity Consequences** (6) **Institutional and park image**

Elephant Management in Kruger

Past management in the KNP (and AENP) invoked the ecological carrying capacity “rule”. Managers strived to keep the elephant population growth rate at zero with 0.35 elephant per square km. Currently the KNP elephant population is growing at approximately 7% pa. This means that doubling time is about 10 years and that there will be about 20 000 and 30 000 elephants in 8 and 14 years time respectively. Different landscapes of KNP and AENP are differentially used by elephant and “carrying capacity” by any definition will differ with landscape vegetation and type. It is therefore difficult to know how close the KNP ceiling of 7000 elephant was to any of the carrying capacity measures, and this is probably a moot point under the current biodiversity mandate.

The current elephant management plan was developed in 1997 by an eminent body of scientists. After considering many different options it was accepted as a workable plan directed at adaptive biodiversity management. The plan is not about culling but about managing elephant numbers, through a range of possible interventions, to achieve explicit adaptive

management and biodiversity goals. Contraception is not one of the options as it does not fit the KNP objectives or value system.

Although no conservation targets (Thresholds of probable concern) have been exceeded in the KNP + 90% of scientists at the meeting believed they will be if elephant numbers continue to rise. About 60% of scientists accepted that the precautionary principle could be invoked to cull elephants to reduce population size because other options would not solve the problem. The precautionary principle is, however, largely a value judgement suitable for data poor situations and current ecological knowledge and modelling expertise could improve decisions.

The KNP objectives, values and adaptive management process were endorsed as an innovative and detailed planning framework against which to convincingly examine the management plan and thereby lessen dependence on the Precautionary Principle. SANParks proposed that a credible reference group, that will give wide approval, should, within the current year:

1. Re-examine and agree on all elephant-related TPCs against all appropriate values.
2. Model these to explore whether exceeding the TCPs can be confirmed
3. If this study confirms that TPCs will be exceeded, refine current planned interventions and learning processes for implementation of an elephant management plan.

Elephant Management in other National Parks

Addo Elephant National Park is experiencing an expanding elephant population. The loss of rare endemic plants of the "valley bushveld" is a concern. A proposal to prototype contraception as a management tool is being developed.

Four different contraceptive methods have been considered by SANParks for controlling elephant population growth but only two have been tested in elephants per se. Many concerns regarding unwanted physiological and ecological side effects of using contraceptives have been raised. Any experiment or management action where the dynamics of a free-range population is manipulated using contraception, must include detailed studies of the potential physiological and pathological responses in contracepted individuals. All individuals and family units must be known and their behavioural responses tracked over several years of booster contraceptive application. Most importantly the experiment must also clearly have mechanisms in place to examine and monitor the biodiversity consequences of the population response as these are the prime target of conservation efforts.

The lack of clear biodiversity objectives and associated elephant management plans for Addo, Marakele and Mapungubwe National Parks did not permit an effective analysis of their proposals.

Concluding statement

In accepting the SANParks proposal to re-examine all elephant related TPCs for the KNP, the workshop agreed to a credible process to further develop and scrutinise the KNP elephant management plan before finalising decisions. The proposal provides a way of taking “bite sized” steps on the way toward consensus on elephant management within a biodiversity context. The proposed learning process, steered by a “credible reference group”, satisfied the scientists at the workshop.

The workshop recognised the preliminary nature of proposals for management of elephants in the other parks. These proposals need to be formally placed within a biodiversity management context, with well-considered objectives that meet SANParks' mission and biodiversity value system.

APPENDIX 4:

Consultative Meetings/Events on the Management of Elephants Held With Various Stakeholders by SANParks Since 1995

1. 4 May 1995. Public debate in Midrand, SANParks gives an undertaking to suspend elephant culling and to review its policy on the management of elephants in the KNP.
2. 8 February 1996. Workshop in Skukuza in conjunction with the African Elephant Specialist Group, rationale for reviewing the elephant management policy established in an internal report.
3. 30 October 1996. Workshop in Skukuza, decided on the principle that elephants should not be maintained at a stable unvarying population ceiling, but rather that fluctuation in numbers and density should be introduced to simulate ecosystem processes and enhance biodiversity (thus adopting the heterogeneity paradigm in favour of the equilibrium paradigm). The decision was made on a management framework, which promoted controlled fluctuations of elephants.
4. The resolutions of point 3 were presented to the public during a debate at Midrand on 12 November 1996. Few comments were voiced by participants.
5. 11-13 February 1997. Workshop on the maintenance of biodiversity in the KNP, attended by local and international scientists. The workshop developed the concept of Thresholds of Potential Concern (TPCs) defined as upper and lower levels along a continuum of change in a selected environmental indicator which, when reached, prompts an assessment of the causes which led to such an extent of change, and may result in management action to moderate such causes.
6. 31 October 1998. New elephant management policy presented on the Internet for public scrutiny, and also presented at a public meeting convened in Nelspruit. Almost unanimous public support was given at this meeting, the only objection being from an animal rights group who advocated waiting until the then relatively new technique of contraception could be used in place of lethal population management.
7. 1999. The new elephant policy published in *Koedoe* (Whyte et al. 1996. *Koedoe* 42: 111-132).

8. 2003-2004. Consultation with communities in Mozambique on the development of the Great Limpopo Transfrontier Park. Communities express concern about elephant-human conflict. Mozambique decides against promoting a fast increase in the elephant population in the LNP owing to sensitive negotiations with communities living along the Shingwedzi River.

9. 19-21 October 2004. Ten years pass since the moratorium of culling of elephants in KNP, and increasing elephant impacts in KNP and in other parks with elephants causes SANParks to reopen the public debate. The Great Elephant Indaba at Berg-en-Dal in the KNP is attended by a wide variety of stakeholders.

10. February 2005. Proceedings of the Great Elephant Indaba printed and made available to participants.

11. 15-17 March 2005. SANParks hosts scientific workshop entitled "*Elephant and Biodiversity: A Synthesis of Current Understanding of the Role and Management of Elephant in Savanna Ecosystems*". Appendix 3 gives the outcomes of this workshop.

12. April 2005. Extensive consultation with communities adjoining the KNP shows support for culling of elephants and the use of elephant products to provide economic benefits. Communities living adjacent to parts of KNP zoned for high elephant densities express concern about impacts on neighbours.

APPENDIX 5:

Preliminary outline of the conclusions of the African Wildlife Consultative Forum 25-27 May, Victoria Falls.

From 24-27 May the African Wildlife Consultative Forum met at Victoria Falls, Zimbabwe. The forum, facilitated by IUCN and others, comprises mainly southern African elephant range state members, of whom South Africa, Zimbabwe, Mozambique, Zambia, Malawi, Botswana & Namibia were present - at the senior departmental level (mostly heads or directors of research or management of wildlife & environmental departments/agencies). The meeting focused mainly on development of common standpoints in support of each other's initiatives in elephant management, in some cases in the context of transboundary conservation agreements. A report commissioned by WWF was prepared for the meeting, and the workshop proceedings and a draft "Southern African regional strategy for the conservation and management of elephant" will become available soon for member states to present to their ministers in preparation for eventual higher-level ratification. In the meantime his brief report below summarises some of the main recommendations.

Elephant numbers are rising almost universally in the region as a result of very successful conservation efforts over the last 100 years. Human-elephant conflict understandably parallels this rise. Elephants are important modifiers of habitat and of the fate of other animal species in negative and sometimes positive ways relative to resource and park objectives. There is a sense of urgency around an overabundance problem in three main zones in the region, one of which includes South Africa, particularly regarding the use of one of the essential tools in the 'management toolbox', namely culling. The full range of tools in the toolbox (except poaching) should be available for range states to use according to their needs and according to agreed-on trans-boundary arrangements. Indeed several tools (such as translocation, contraception, manipulation of surface water, fencing, or laissez-faire) are already in use, but the key bottleneck is the reluctance to use culling as a key ancillary tool. This tool would effectively complement the others and enable population management over parts of the elephant range, often in combination with lucrative sustainable use options and benefits to communities and conservation agencies. In fact, much conservation action can also be funded from these proceeds. Countries are looking for leadership, in the form of one country being bold enough to now break this impasse; at this meeting there appeared to be complete solidarity in terms of in-principle support. Inaction is seen as dearly costing all countries in terms of learning opportunities, the belief being that we will simply not learn fast enough to achieve biodiversity mandates if we do not act more decisively, and set that action up in a way in which we can best learn. There is acceptance of the complexity of the situation, and of the fact that science can

only act to inform, the ultimate decisions depending mainly on value judgements. The South African case study (presented there) appeared to assist in that the principles of our experience e.g. the Protected Areas Act, seemed generalisable:

- clear objectives need to be set for any area, including a definitive description of the desired state in terms of specified ecological & socio-economic thresholds or targets. There was recognition that while science advises, the ultimate decisions are driven by values e.g. the way society wishes to maintain woodlands in parks is a value decision; consequences and risks of which science can help inform.
- Because the system is clearly a complex one, properly constructed adaptive management offers by far the best chance of success, necessitating monitoring and ongoing learning as key issues.
- Recognition of changes over time and patchiness over space offer the highest resilience i.e. best chance of meeting objectives overall. The planned KNP policy was helpful, and promoted discussion on possible setting up of broader source-sink arrangements in larger regions in the subcontinent. For instance, in some areas it appears it would be expedient to leave populations unrestrained (source), but in surrounding ones (sinks) to utilize elephant moving out of the source.

Furthermore, harmonisation of policies between countries and land-uses was deemed crucial, as were properly standardised elephant counts in the whole sub-region. Institutional arrangements and assertive appropriate advocacy were the final crucial components discussed.