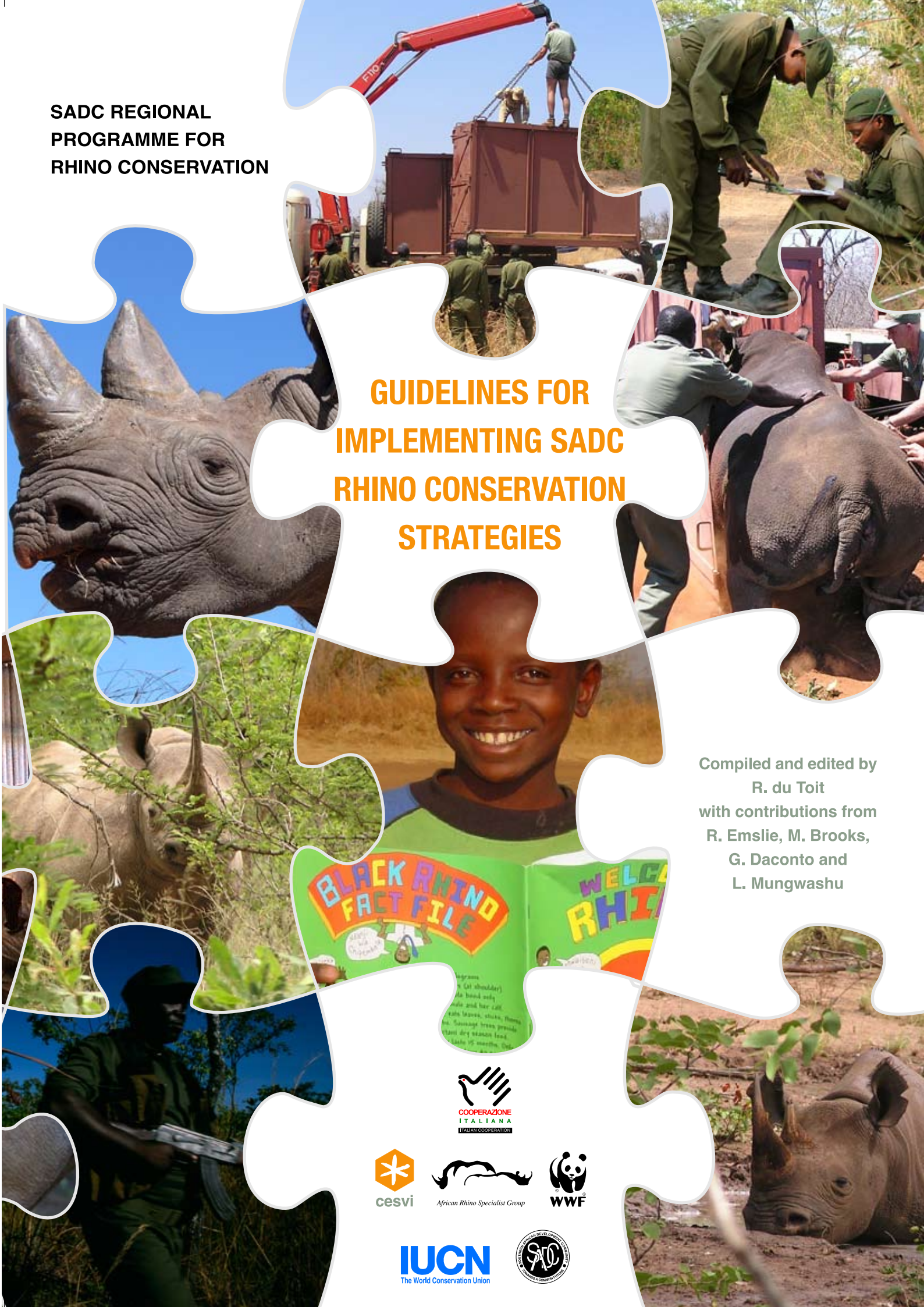
SADC REGIONAL PROGRAMME FOR RHINO CONSERVATION

GUIDELINES FOR IMPLEMENTING SADC RHINO CONSERVATION STRATEGIES



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COOPERAZIONE ITALIANA
ITALIAN COOPERATION

cesvi

African Rhino Specialist Group

WWF

IUCN
The World Conservation Union

SADC

GUIDELINES FOR IMPLEMENTING SADC RHINO CONSERVATION STRATEGIES

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SADC RPRC

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The Programme is contracted to CESVI and implemented through a regional consortium which comprises:
-The Secretariat of the Southern Africa Development Community (SADC)
-IUCN-ROSA (The World Conservation Union - Regional Office for Southern Africa)
-The IUCN African Rhino Specialist Group
-WWF-SARPO (World Wide Fund for Nature - Southern Africa Regional Programme Office)
-CESVI (Cooperazione e Sviluppo)

The Programme goal is to contribute to the maintenance of viable and well distributed metapopulations of Southern African rhino taxa as flagship species for biodiversity conservation within the SADC region.

The Programme objective is to implement a pragmatic regional rhino strategy within the SADC region following the acquisition of sound information on, firstly, the constraints and opportunities for rhino conservation within each range state and secondly, the constraints and opportunities for rhino metapopulation management at the regional level.

Programme website www.rhino-sadc.org

Foreword

The SADC undertaking that has brought this manual to completion has been promoted and wholeheartedly supported by the Italian Government from its inception in 1999. The first question that comes to mind when considering such a steady and proactive commitment is: what are the linkages between the management of rhinoceros and the fundamental objectives of the Italian overseas development cooperation? The answer can be readily provided by considering the linkages between the fight against human poverty and the conservation of biological diversity. This is a development binomial which vividly stands out in Sub-Saharan Africa, as a priority region for Italian cooperation.

The region battles with enormous challenges to uplift people from poverty and to produce options for tangible, far-reaching and sustainable development. The rural poor are at the forefront of the damage caused by unsustainable use of resources. This situation makes it imperative, but also very difficult, to preserve future resource use options by conserving biodiversity and maintaining the resilience of the natural ecosystems.

Southern Africa is endowed with exceptional natural landscapes both within and outside of protected areas, containing a rich diversity of species. Experience shows that tangible economic benefits can be derived from tourism and sustainable use of biodiversity resources. At a higher level, the overall resilience of agro-ecological systems, supporting millions of rural African people, relies on the judicious use and management of land and resources.

For flagship species such as rhinos, decades of extraordinary conservation efforts in southern Africa have yielded victories and failures. These efforts have often enjoyed great international support. They have also demonstrated how the conservation of species like rhinos can become a means to achieve much wider goals of rational land management and sustainable resource use. Conversely, where we have sadly witnessed the ravaging effects of poaching on endangered species such as rhinos, it has been obvious that poverty has been the main driving force behind this poaching.

On the one hand, these experiences convincingly support the contention that rhino conservation can help to fight poverty by sustaining the sound use of land, protected areas and landscapes, and by strengthening the institutions and skills required to


M. James

achieve these goals. On the other hand, it is clear that rhinos will be conserved only insofar as rural people can be uplifted from poverty in ways that give conservation a tangible economic meaning to them.

It is with these challenges in mind, that the Italian Cooperation supported the SADC Regional Programme for Rhino Conservation over a number of years, as part of its agenda to support biodiversity conservation and sustainable development in southern Africa. We gladly welcomed the addition of this new challenge to our established partnership with the Southern Africa Development Community, and through it, with ten countries: Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The delivery of this programme was entrusted to the SADC Secretariat along with a consortium of competent organizations: CESVI (as the lead contractor), IUCN, WWF and the African Rhino Specialist Group of IUCN.

After about five years of hard work, the Programme delivered important results, including a considerable range of experiences, methodologies, pilot initiatives, augmented skills and know-how at several levels. One of the primary endeavours was to promote devolution of rhino conservation from a technical level dominated by conservation practitioners within a few southern African countries, to becoming a reality for the region as a whole. We believe that the foundation for this more holistic approach is now in place.

The SADC Regional Strategy for Rhino Conservation for 2005-2010, developed with the support of the programme, embodies a new level in the battle to conserve wildlife species in southern Africa. This battle is increasingly meshed with: intergovernmental cooperation at political and technical levels among the countries of the region; the application of sound science and sophisticated technology; the development of the tourism and the wildlife industries in a socially inclusive way; the execution of complex field operations to exchange animals required for metapopulation management; the strengthening of critical institutions such as park management agencies; the establishment of collaborative partnerships among a large number of stakeholders in each country; and the formulation of strategic policies at national level together with the monitoring of their execution.

The manual to guide the implementation of the SADC rhino strategy has been conceived to present in a succinct form the accumulated know-how required to deliver this strategy. An effort of this nature is clearly not only the fruit of the work by the SADC Programme or by the authors identified in the publication. The manual has indeed benefited from the collaboration, inputs, expertise and experience accumulated by a large number of individuals and institutions in the region. It is targeted to an audience of rhino conservation practitioners who will be directly involved in conserving rhinos in the field or in devising policies, programmes and strategies. But while it primarily informs rhino conservation practitioners, we are confident that it will be also be useful to a wider range of relevant professionals in academia, conservation and development organizations, and in the wildlife and tourism industry.

Plenipotentiary Minister Giuseppe Deodato
Director General
Directorate General for Development Cooperation
Italian Ministry of Foreign Affairs


WWF/ N. Anderson

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ACRONYMS

AfRSG	African Rhino Specialist Group (within the Species Survival Commission of IUCN)
CESVI	Cooperazione e Sviluppo (Italian NGO)
CITES	Convention on International Trade in Endangered Species
CITES CoP	CITES Conference of Parties
DRC	Democratic Republic of the Congo
ECC	Ecological carrying capacity
GPS	Global Positioning System (for satellite-based navigation)
GR	Game Reserve
HF	High Frequency (radio frequency)
ICI	Inter-calving interval (period between births by a rhino female)
ID Code/Number	A unique code/number used in the context of rhino identity records
IECWG	Interpol Environmental Crime Working Group
IPZ	Intensive (Rhino) Protection Zone
IUCN- ROSA	International Union for Conservation of Nature Regional Office for Southern Africa
MPCC	Maximum productivity carrying capacity (assumed to be about 75% of ECC)
NP	National Park
RCA	Rhino Conservation Area
RESG	Rhino and Elephant Security Group (under SADC RPRC)
RMG	Rhino Management Group (under SADC RPRC)
RRG	Rhino Recovery Group (under SADC RPRC)
SADC FANR	Southern African Development Community – Directorate of Food, Agriculture and Natural Resources
SADC RPRC	Southern African Development Community – Regional Programme for Rhino Conservation
SSC	Species Survival Commission of IUCN
TRAFFIC	Trade Records Analysis on Flora and Fauna in Commerce
VHF	Very High Frequency (radio frequency)
WWF-SARPO	World Wide Fund for Nature Southern Africa Regional Programme Office

INTRODUCTION

INTRODUCTION

For effective rhino conservation within the SADC region, a strategic approach is required in which a range of different aspects of conservation work are attended to in an integrated way.

A SADC regional rhino strategy has been developed for implementation over the period 2005-2010. The strategy was reviewed and endorsed by SADC rhino range states representatives as follows:

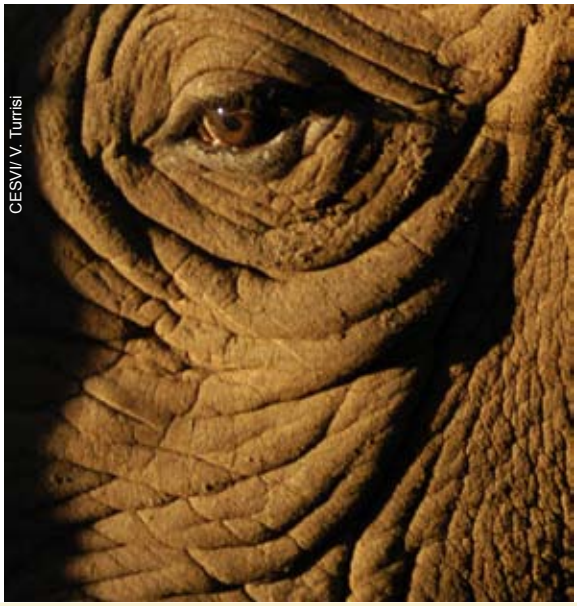
- in draft form, at a meeting of the SADC rhino range states representatives at Kilaguni, Kenya, in September 2004;
- in final form, at a meeting of the SADC rhino range states representatives at Midrand, South Africa, in March 2005.

This manual is a set of principles and guidelines that will facilitate implementation of the SADC regional rhino conservation strategy (2005-2010) as well as sub-regional or national strategies. From experience over the past decade in developing national rhino conservation strategies, some common themes can be identified within these strategies and are elaborated within this manual.

The manual is not a comprehensive guide to every aspect of rhino management but instead deals with strategic planning for rhino metapopulation management.

Numerous relevant reports have been produced by the SADC Regional Rhino Programme for Rhino Conservation (RPRC) and are referred to in this manual; they can be accessed on the SADC RPRC website (www.rhino-sadc.org)

STRATEGIC PLANNING FOR RHINO CONSERVATION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SUMMARY OF GUIDELINES FOR: STRATEGIC PLANNING FOR RHINO CONSERVATION

R. du Toit, M. Brooks and R. Emslie

National and regional strategies for rhino conservation should not make rhinos seem like museum specimens or like dinosaurs or that are close to natural extinction. Instead, rhinos must be presented as robust species that can play a very positive role in sustainable wildlife industries, to the economic benefit of rural people.

It can easily be shown that efforts to protect rhinos will, at the same time, create protection for a range of other species. For this reason rhinos should be referred to as “flagship species”.

Regional efforts to achieve a wider distribution of rhino populations, and to make rhinos more economically relevant to rural people, can and should be linked to SADC’s objectives for the coordinated development of southern Africa.

Cross-border cooperation is often required for effective conservation of rhinos. The spread of rhino populations will therefore be proof of constructive diplomacy within the region. This is another reason to suggest that rhinos are “flagship species” for SADC.

There are three recognized subspecies of black rhinos in the SADC region, and two white rhino subspecies. Breeding between the different subspecies should be avoided.

For the long-term evolution of each subspecies, regional “metapopulations” of 2,000-5,000 animals will be required. The term “metapopulation” means that there is some mixing of rhinos between different populations of the same subspecies (but not between populations of different subspecies). This need for exchanges of rhinos is another reason why regional collaboration between range states must be maintained.

Apart from the obvious need to maximize the growth rates of rhino populations to build up numbers of rhinos, healthy growth rates (at least 5% per year) are essential for maintaining genetic diversity.

The range of objectives in rhino conservation, ranging from economic objectives to biodiversity objectives, can only be achieved through strong technical coordination, for which a number of interlinked structures have been developed within the region.

At the national level, coordination structures are also needed and a typical way of building the national structure has emerged from the experience of various range states.

The means to achieve rhino coordination must be expressed through a national rhino strategy, which also has typical components.

Annual action plans must be developed to implement the strategy through the clear, time-scheduled assignment of responsibilities and resources for the various aspects of rhino conservation.

2.1 Setting strategic goals for rhino conservation: what are we trying to achieve?

2.1.1 Broad goals for conservation and development

A common perception, perpetuated in media reports, is that rhinos are "living dinosaurs". However, this perception is far from the truth. Both species of African rhinos have evolved over a time-scale that is not greatly different to that of human evolution, and are well adapted to a range of habitats including very arid ones. They are also more compatible with some agricultural land-use systems than is generally appreciated. This potential compatibility arises because:

- rhinos are hardy animals that do not carry significant livestock diseases (such as foot-and-mouth disease);
- they do not normally damage crops or harass livestock to the same extent as elephants, predators, etc.;
- they tend to remain within well-defined home ranges with regular movement patterns around which land-use activities such as cattle ranching could be planned;
- they have low requirements for water or other supplementation and, in the case of black rhinos, do not compete with livestock for grazing resources.

Therefore, of the "big five" wildlife species within Africa, rhinos have the greatest potential to fit into mixed land-use systems where adequately sized areas of suitable habitats can be retained. Unfortunately, incompatibility arises because of humans impacting on rhinos through poaching and poor land-use planning, not because the rhinos are invariably problematic for all forms of agriculture or rural development.

Where wildlife-based land-use systems are established, rhinos act as true "flagship species" because:

- they require large areas and significant protection measures that help to conserve a wide range of biodiversity;
- the conservation of these rare and charismatic animals attracts donor as well as state support, with the latter being stimulated by the national prestige of a rhino conservation project;
- the rhinos are a major attraction for ecotourists and (where markets are established) have a high value in live sales, thus generating revenue for wildlife operations.

These factors suggest that, when initiating a rhino re-introduction project, a government should give careful consideration to the siting of the project in order to maximize overall conservation opportunities (seeking spatial overlap with "hotspots" of biodiversity) and also to boost top-priority development initiatives such the establishment of certain tourism facilities, creation of transfrontier conservation areas, etc. (see Section 5.7). The extent to which these broader objectives can be promoted would, however, be conditional upon habitat suitability for rhinos, security and the size of the proposed re-introduction area.

Examples of the extent to which rhinos add value to wildlife operations have been researched within the SADC Regional Programme for Rhino Conservation. This study (Spenceley and Barnes, 2005) highlighted the following examples.

- Between 2000 and 2005, live sales of rhinos from the Hluhluwe-iMfolozi Park in South Africa generated the equivalent of 60% of the park's conservation budget.
- Surveys of tourists in this park, as well as in private reserves in South Africa and Namibia, indicate that 7-14% of total wildlife viewing value can be ascribed to rhinos.
- In Zimbabwe's south-eastern Lowveld and in Namibia's arid Kunene region, rhino conservation programmes have been major catalysts in the formation of commercial and communal conservancies.

White rhino safari hunting in South Africa, and to a lesser extent in Namibia, has for many years generated significant income for conservation. In future, as rhino populations recover, safari hunting could become a very significant form of income-generation from black rhinos as well as white rhinos. For instance, Spenceley and Barnes (2005) estimate that with carefully regulated safari hunting in the Torra Conservancy of Namibia, black rhinos could sustainably contribute

US$0.43 per hectare to the annual community income from this communal conservancy which is too arid to support agricultural options.

However, rhinos are expensive species to restock and to look after, and on their own these animals will not attract tourists. There have to be additional drawcards for each reserve to gain a tourism reputation, and it may take some time before earnings from tourism can compensate for the costs of re-introducing, managing and protecting the rhinos. There may be a risk that the illegal value of their horns could stimulate poaching networks that might then increase poaching pressures on other species. Any failure in re-introducing rhinos (whether because of poaching, inadequate biological management, poor choice of release areas, or other factors) would create a poor international perception of a country's conservation efforts. Hence, to ensure that the gains from rhino conservation do in fact outweigh the costs, strategic planning is required along the lines that are advocated in this manual.

2.1.2 Relevance to SADC development priorities

The Protocol on Wildlife Conservation and Law Enforcement in the Southern African Development Community notes that:

- *Article 21 (F) of the SADC Treaty designates natural resources and environment as an area of co-operation for Member States;*
- *conservation and sustainable use of wildlife in the Region contribute to sustainable economic development and the conservation of biological diversity; and,*
- *the viability of wildlife resources in the Region requires collective and co-operative action by all Member States.*

Article 3 (Principles) of the Protocol on Wildlife Conservation and Law Enforcement in the Southern African Development Community commits State Parties to: *co-operate with other Member States to manage shared wildlife resources as well as any transfrontier effects of activities within their jurisdiction or control.*

Similar commitments to regional co-operation in the conservation of wildlife species are expressed in the SADC Regional Indicative Strategic Development Plan (RISDP), which in Paragraph 3.4.8.1 of Chapter 3 notes that current policies focus on the conservation of regional ecosystems and landscapes, endangered, endemic and cross-border migratory species; management of water catchments and aquatic ecosystems; and prevention of extinction of indigenous plant and animal species, especially those distributed across national boundaries.

These and other SADC formal commitments provide a very clear rationale for continuing with a SADC regional programme for rhino conservation, and to strive for development-orientated outcomes as well as conservation outcomes from this programme.

Rhinos are particularly appropriate as "flagships" for regional cooperation in resource management because the decline of many of the sub-continent's rhino populations was due to cross-border poaching and illegal trading networks that extended through several countries. Showing a reversal of this trend, through regional cooperation in law-enforcement, sharing of rhino management expertise, and sharing of rhinos through metapopulation management, would be a very graphic demonstration of SADC's effectiveness.

Implementation of rhino conservation projects with a development orientation is in accordance with one of the ten principles that were expressed in the "Agenda for Action" that was drafted at the World Parks Congress in Durban in 2003. This principle states that: *The African people's extreme dependence on biodiversity and natural resources will not be sustainable unless protected areas are linked with mainstream local, national, and regional development priorities. Lessons from integrated conservation and development programmes have shown that both conservation and development can only be integrated if projects are conceived within a similar framework. Perhaps more than anywhere else in the world, biodiversity conservation must be integrated into the livelihoods of local people and their economies.*

From these perspectives, there is a clear rationale for ensuring that any national or regional goals for rhino conservation refer to the interdependency between human welfare and sustainable management of wildlife resources, within which the "flagship" role of rhinos is highlighted.

2.1.3 Rhino metapopulation management goals

National and regional rhino conservation strategies set goals in terms of conservation biology (genetic and demographic considerations) as well as in terms of the broader conservation and development issues that are outlined above. This section of the manual deals with goal-setting for rhino metapopulation management while Section 4 shows how the relevant management principles can be put into practice.

First, it is important to clarify what is meant by a "metapopulation". This term is often used loosely or incorrectly. A metapopulation is not simply a set of separate rhino breeding groups within a region. Instead, it is defined by the fact that there is interchange of genetic material between sub-populations, i.e. breeding animals (or, potentially, their semen, ova or embryos) are exchanged between geographically separated groups so that they amount to a single population in genetic terms.

The reason for maintaining a metapopulation is to avoid losing genetic diversity that is essential for the long-term evolutionary potential of rhino species, which means the ability to adapt to changing environments. Loss of genetic diversity can arise through two main processes that affect small populations: inbreeding and genetic drift. Inbreeding is a well-known genetic problem that does not warrant elaboration. Genetic drift is a less obvious problem which arises from the fact each birth constitutes a sample of the genetic composition of the previous generation. If there are few births, therefore few samples, it is likely that the random sampling process will result in an incomplete transfer of the overall genetic diversity of the parent generation. Some of the diversity is left behind with the previous generation, and is thus lost.

Another process, outbreeding depression, might arise if rhinos from distant populations are mixed so that local genetic adaptations become obliterated or diluted by the genetic inflow from a population that has been evolving in a somewhat different environment. Outbreeding depression is avoided by managing rhinos within several conservation units or "subspecies", hence there is no continental metapopulation for all black rhinos or for all white rhinos, only regional metapopulations of each species.

Drawing a line of spatial separation between subspecies is mainly a matter of common sense rather than taxonomic precision. Studies of black rhino DNA from across the continent (Brown and Houlden, 2000; Harley et al., 2005) indicate that the genetic variation is discernible (and sufficient to suggest that subspecies designations are valid) when comparing DNA from geographically distant populations, but is only gradual between each of the intermediate populations. Subspecies differentiation is therefore like trying to separate grey scales rather than black and white (this is known as "clinal variation").

The IUCN/SSC African Rhino Specialist Group has defined four nominal "subspecies" or conservation units for the black rhino that are geographically and ecologically separated as follows:

- west Africa (Cameroon), being *Diceros bicornis longipes;*
- east Africa (Kenya and northern Tanzania), being *Diceros bicornis michaeli;*
- south-western Africa (Namibia and the arid areas of South Africa, i.e. mean annual rainfall <400mm), being *Diceros bicornis bicornis;*
- south-central Africa (southern Tanzania, Zimbabwe, Zambia, Malawi, Mozambique and the less arid areas of South Africa, i.e. mean annual rainfall >400mm), being *Diceros bicornis minor.*

For white rhinos, the situation is simpler because there are only two defined "subspecies" of which one (the northern white rhino, in the Democratic Republic of the Congo) is virtually extinct.

Some countries that are re-establishing rhino populations, such as Botswana, are on the indistinct boundary between two black rhino conservation units. In these situations, careful consideration must be given within the national rhino strategy to the question of whether to restock with both "sub-species", or only one. Restocking with two "sub-species" will entail extra costs and management problems involved in maintaining two separate populations or metapopulations within the same country. However, there may be reasons related to the supply and cost of the founder animals that might suggest the need to source the animals from both rhino conservation units (but not to inter-breed them).

The number of animals that is sufficient, within a population or metapopulation, to avoid loss of genetic diversity through inbreeding and genetic drift cannot be precisely determined on the basis of current knowledge of the reproductive behaviour and population dynamics of rhinos. A previously-stated guideline was that each panmictic population (i.e. one in which there are no barriers or distribution gaps to prevent breeding between any animals), or each metapopulation (i.e. one in which barriers or gaps are overcome by deliberate translocations), needs to contain at least 2,000 animals to maintain long-term evolutionary potential for each "subspecies". However, recent research (Lande, 1998; Reed et al., 2003) suggests that the "minimum viable population" may need to be significantly higher than this, at over 5,000 animals.

In view of the problem of genetic drift, rhino conservation strategies often specify a target growth rate for a population or metapopulation, sufficient to ensure that rhinos do not get stuck in a "genetic bottleneck". This is generally specified as being at least 5% per annum, which requires an average inter-calving interval (in a population with normal age and sex structure) of three years or less per breeding-age female. At this rate, a population would double in 14 years.

In summary, typical goals relating to conservation biology within rhino conservation strategies are:

- developing a metapopulation of over 2,000 (ideally 5,000) animals of each rhino subspecies that exists, or is known to have occurred in the past, in that region;
- preventing loss of genetic diversity; and,
- maintaining a population growth rate of at least 5% per annum.

2.2 Achieving coordination

2.2.1 Continental and regional coordination mechanisms

Each country and population requires its own tailor-made strategy and programmes to meet the unique challenges it faces in funding, implementing and ensuring long-term sustainability of rhino conservation efforts. Unfortunately, many of the African rhino range states lack sufficient rhino expertise to develop and maintain rhino programmes on their own. A number of mechanisms and structures have been developed over the years not only to address this problem, but also to ensure that broad species survival objectives are set, effective rhino conservation strategies and action plans are compiled, appropriate techniques are developed and made available, and expertise is shared so that effective rhino conservation programmes can be implemented. This requires coordination and commitment at the continental and regional levels so as to provide support and direction for the range states that are responsible for implementation.

The continental strategic framework is provided by the IUCN Species Survival Commission's African Rhino Specialist Group (AfRSG), and is documented in the *"Status Survey and Conservation Action Plan: African Rhino"* (Emslie and Brooks, 1999). This document provides the continental goals and guidelines for the successful conservation of African rhinos, concentrating on surveys, monitoring, field protection and law enforcement, criminal justice, community involvement, sustainable use, applied research, and national plans. Other aspects covered are: the conservation status and historical distribution of the rhino, range state reports, threats, the international and regional framework for African rhino conservation (updated within this manual), and captive breeding. The continental plan should be used as reference material, as should the proceedings of the biennial AfRSG meetings as these contain valuable sections on strategic issues, techniques, rhino status and conservation support programmes.

The major structures or mechanisms operating at the continental and regional levels are as follows.

2.2.1.1 IUCN SSC African Rhino Specialist Group (AfRSG)

This was reconstituted in 1991, with a continental scope, following a period during which it was amalgamated with the African Elephant Specialist Group. As one of more than 100 specialist groups within IUCN's Species Survival Commission, the mission of the AfRSG is: *"To promote the long-term conservation and maintenance of viable populations of the six subspecies of Africa's rhinos in the wild".*

The AfRSG comprises a Chairman, a partially-funded Scientific Officer, representatives of most African rhino range states and a variety of rhino experts who operate as a network to address both strategic (e.g. government rhino policy) and implementation challenges for rhino conservation, ensuring that the best scientific knowledge is used as the basis for decision-making and field conservation programmes. To achieve this, meetings attended by the 30-40 members are held every two years, and in addition individuals or groups of members are assigned to contribute to important international, regional and national initiatives where their expertise is required. The value of the face-to-face nature of the exchanges helps establish a sense of belonging to a serious and relevant professional peer group, which strengthens the confidence and influence of government rhino conservation managers in particular. The AfRSG Chairman or individual members may be approached by any range state wishing technical support or advice. Further details of the AfRSG's role are provided by Emslie and Brooks (1999).

2.2.1.2 SADC's regional structures for rhino conservation

SADC Regional Programme for Rhino Conservation (SADC RPRC). This programme was initiated in 1999 with funding from the Italian Ministry of Foreign Affairs – Directorate General for Development Cooperation – and has thus far been implemented through a consortium comprising SADC FANR, WWF-SARPO, IUCN SSC AfRSG, CESVI (an Italian NGO) and IUCN-ROSA. Consortium partners may change over time according to shifting institutional interactions and funding commitments. The programme has provided expertise, specialised logistical support, training and catalytic funding for projects of a regional nature or importance.

The scope of the programme has been limited to rhino subspecies shared by more than one SADC country (i.e. situations of relevance to regional metapopulation management), and hence has been restricted to the southern white rhino *Ceratotherium simum simum* and two black rhino subspecies *Diceros bicornis bicornis* and *D.b. minor.* The Democratic Republic of the Congo (DRC) has not been included in the programme since the relic northern white rhino population *(Ceratotherium simum cottoni)* of the DRC is not managed within any metapopulation. The other range states within the SADC RPRC include 95% of Africa's rhinos.

The SADC RPRC has helped to bridge the gap between the high-level umbrella strategy provided by the AfRSG, and programme implementation by the range states, by providing technical and financial support for a variety of projects. After the initial phase of funding by the Italian Government (to the end of 2005), the SADC RPRC continues with a focus on promoting and implementing a regional strategy for rhino conservation that is orientated towards SADC development policies. This can be achieved, despite a lower level of funding, by networking existing rhino conservation projects within the region and by maintaining collaboration between rhino management authorities and key NGOs under SADC auspices, thereby giving regional political momentum to initiatives such as re-introduction projects.

SADC Rhino Management Group (RMG). This was established in 1989 on a bilateral basis between South Africa and Nambia, later incorporating Swaziland and Zimbabwe, and thereafter being subsumed within the overall SADC RPRC. The common factor between these countries, which together contain 94% of Africa's rhinos, is the relatively sophisticated nature of the monitoring and management programmes undertaken, so they face common challenges and benefit from jointly developed solutions. The RMG comprises a chairman, representatives of each state conservation agency, a representative of the South African private owners, a number of elected independent rhino experts and the chairman of the Rhino Recovery Group (see below). The group's main activities are: ensuring that effective conservation objectives and programmes are in place, developing appropriate techniques (e.g. monitoring, re-introductions), debating key issues (e.g. auction sales, trophy hunting of black rhinos) and evaluating the performance of all individual populations and also by subspecies. This latter activity involves regular but confidential status reporting on all populations, with periodic reviews providing recommendations for improved monitoring and management based on population performance. This approach has been catalytic in encouraging improved biological management of the population in the region. The RMG therefore provides a focused evaluation of black

rhino management (excluding security) that is not provided by the higher level AfRSG or SADC RPRC programmes.

SADC Rhino Recovery Group (RRG). This regional subgroup of the SADC RPRC was established in 2001 to place particular emphasis on the management needs of 1% of Africa's rhinos that are in the minor range states and where there is considerable scope for re-introduction projects and population expansion (Zambia, Botswana, Malawi, Mozambique, Tanzania, Angola). The RRG's aim is: *"To coordinate and facilitate the application of regional resources in establishing re-introduced rhino populations and managing remnant rhino populations, and ensuring their future viability"*. Activities are focused on developing national policies, strategies and plans, promoting rhino surveys and area evaluations, sourcing rhinos for reintroduction, facilitating access to funds, sharing expertise and capacity-building. The RRG comprises representatives of each range state (one of which will act as chairman and one as vice-chairman for a period of two years each), the AfRSG Chairman, the RMG Chairman and a representative from the SADC RPRC consortium.

SADC Rhino and Elephant Security Group (RESG). This grew out of a Security Sub-committee of the RMG. It was formed in 1989 and met regularly till 1998 when it became dormant. With support from the SADC RPRC, the group was re-launched in 2001 with new, more focused terms of reference. More recently the group has also come under the SADC RPRC framework. The overall objectives of the RESG are to develop guidelines, strategies and databases for the effective and efficient protection of African rhino and elephant populations, to assist the various conservation agencies, communities and private landowners to minimise rhino and elephant poaching and the illegal trade in rhino horn and ivory, and to provide advice, training and coordination. The group also promotes procedures for effective investigation and prosecution of rhino and elephant crimes. Membership comprises representatives (usually wildlife investigators or managers) of rhino conservation management agencies, specialist police units, including the Interpol Environmental Crimes Working Group (IECWG), and co-opted specialist technical members as required (e.g. from TRAFFIC, AfRSG, etc). To save on costs and increase sharing of information, RESG meetings have, since the group's re-launch, been held back-to-back with regional IECWG meetings.

2.2.2 National coordination and planning mechanisms

A number of mechanisms are necessary for rhino conservation programmes to be effectively directed and coordinated within the range states, and these are all present in those countries with the most successful rhino programmes. In some countries the situation is complicated by the fact that there is more than one formal conservation agency. In such cases, the various agencies should endeavour to manage their rhinos in accordance with national and indeed regional goals and should not operate only according to their own organisational level strategies and plans.

2.2.2.1 National Coordination Committees

These committees should be responsible for driving, coordinating and advising on all rhino conservation activities within each country. As each country varies according to the extent to which powers have been delegated to lower levels by the relevant Minister, and because the rhino programmes themselves will vary significantly in extent and complexity, there is no single model of rhino committees that will suit all countries. The model presented here is something of a hybrid based on the use of committees by Kenya and Namibia in 2004.

Rhino Executive Committee. This committee sanctions all policy and strategy decisions concerning rhino conservation in the country, although it may need to refer to higher authority (e.g. Minister or Parks Board) for ultimate approvals. It receives and endorses policy proposals (including revisions of national rhino strategies) and annual work plans, provided by a lower level committee. Typically, it comprises the head of the Rhino Management Authority (the accounting officer), senior conservation and research staff and the national rhino coordinator. This committee normally meets twice a year.

Rhino Management Committee. This committee drafts (generally on an annual basis) and oversees the implementation of the national rhino plan, in accordance with policies expressed within the overall national rhino strategy, and makes the necessary

recommendations to the Rhino Executive Committee. It typically comprises the national rhino coordinator, rhino sanctuary/IPZ wardens, rhino management and security experts and representatives of private landowners or custodianship populations. Such a committee tends to meet two to four times per year. Typical terms of reference of the committee are as follows.

- Draft national rhino strategy (policy) and annual work plans and submit to the Rhino Executive Committee for approval.
- Review the management, including security, of all rhino populations.
- Determine rhino numbers and the performance of all populations and present as an Annual Status Report.
- Recommend on rhino removals, reintroductions and sourcing of rhinos.
- Secure funding for rhino programmes.
- Debate key issues and draft national positions on them.
- Convene meetings and workshops with stakeholders.

2.2.2.2 National Rhino Coordinator

Each country should have a person who acts as the focal point on rhino conservation matters, whether this is a full-time National Rhino Coordinator or an individual who represents the range state and provides some internal coordination as part of a larger portfolio. The duties of the Coordinator would be as follows (Brett, 2002).

Planning and operations:

- oversee revision and implementation of National Rhino Strategy (policy);
- oversee production and implementation of periodic action plans (considering not only management interventions such as captures and translocations, but also monitoring programmes, training and capacity-building, and research projects such as habitat studies);
- convene and provide secretariat for meetings (Rhino Executive Committee, Rhino Management Committee, external stakeholders, etc.), dealing with agenda notifications, minutes and follow-up.

Status reporting and information:

- compile and circulate reports (recording population status and performance, survey and monitoring programmes, site selection and inspections for rhino translocations, rhino horn stockpile data, training and performance of staff);
- maintain rhino population database;
- monitor expenditure on rhino conservation projects (expenditure against budgets; reporting to donors).

Coordination and liaison with stakeholders:

- within Rhino Management Authority (providing link from field to headquarters on rhino priorities);
- between Rhino Management Authority and stakeholders (coordinating and monitoring rhino custodians/owners; maintaining liaison with and between donors; information-sharing with international rhino specialists and other national rhino coordinators).

Representation and funding:

- identify and prioritize funding needs;
- draft and present funding proposals;
- obtain official endorsement of priority projects and proposals;
- advise RMA on international matters through coordination committees;
- represent the country on regional and continental bodies (IUCN/SSC AfRSG, SADC RRG/RMG, RESG, etc.).

A key consideration is the continuity of the National Rhino Coordinator/country representative function as the expertise and credibility of the individual is critically important to the effective functioning of this role within the country and externally at the regional and continental levels. It takes time for the National Rhino Coordinator to develop this expertise and credibility, therefore wildlife departments should make every effort to view this as a long-term role for an individual, and wherever possible should ensure that the capacity of one or more other staff members is developed such that there is always an individual with advanced expertise to take over should that be necessary. The National Rhino Coordinator should represent the country's rhino conservation programme at all relevant regional and international

fora to ensure a rapid development of rhino expertise and the efficient incorporation of lessons learnt into the national programme.

2.2.2.3 National Rhino Strategy

A major range state, such as South Africa, will have evolved rhino conservation principles over time, within broader legal and institutional arrangements and programmes that are well established. Minor range states, particularly those undertaking re-introduction programmes, will not necessarily have an adequately comprehensive policy framework in place to guide their rhino conservation efforts. In such situations, it is desirable for the relevant ministry to formally express a national statement of intent to conserve rhinos (in accordance with goals discussed in Section 2.1) along with a commitment to set up the appropriate legal and institutional frameworks required to achieve this. These statements could either be expressed within a National Rhino Strategy, or in a high-level policy document.

The National Rhino Strategy provides the policy framework and direction for the rhino conservation programme, ensuring that priority actions are identified and, wherever possible, international best practice for rhino conservation is applied. This document, which should be drafted by the Rhino Management Committee and approved at the highest possible level within government, needs to be revised at regular intervals (about every 5 years) to ensure that it remains up-to-date and relevant to both the national and park levels to guide decision-making. This strategic document is critically important not only to ensure a coordinated, focused direction for the rhino programme, but also to provide credibility for any international funding applications (or applications for rhinos) that may be made.

The key issues that need to be considered and incorporated in the strategy (pertaining to the vision, objectives, and international "best practice" principles) are summarised in Section 2.1 of this manual. Most national strategies have a long-term Vision, indicating the desired situation to be achieved in future. The strategies then invariably include much more precise and measurable shorter-term targets or Conservation Objectives to cover the period of the lifespan of each strategy (usually 5 years). A strategy will usually go on to identify Actions needed to meet these objectives, as well as verifiable Indicators of Success. These need not be exhaustive, but usually will include those "best practice" approaches or actions that experience has indicated as needing to be implemented for the programme to be successful.

The following key objectives are common to many of the national and continental strategies.

Security and protection: to minimise illegal activity and losses of rhinos through appropriate management action, improved legislation and sentences, cooperative intelligence, detection, effective investigation and prosecution, law enforcement and community support.

Biological management: to manage rhinos (and possibly also their habitats and other competing species) to achieve sustained rhino metapopulation growth of at least 5 % per annum; and where possible to promote longer term genetic viability by minimising loss of heterozygosity, limiting inbreeding and minimising genetic drift (i.e. to manage populations to achieve demographic and genetic goals).

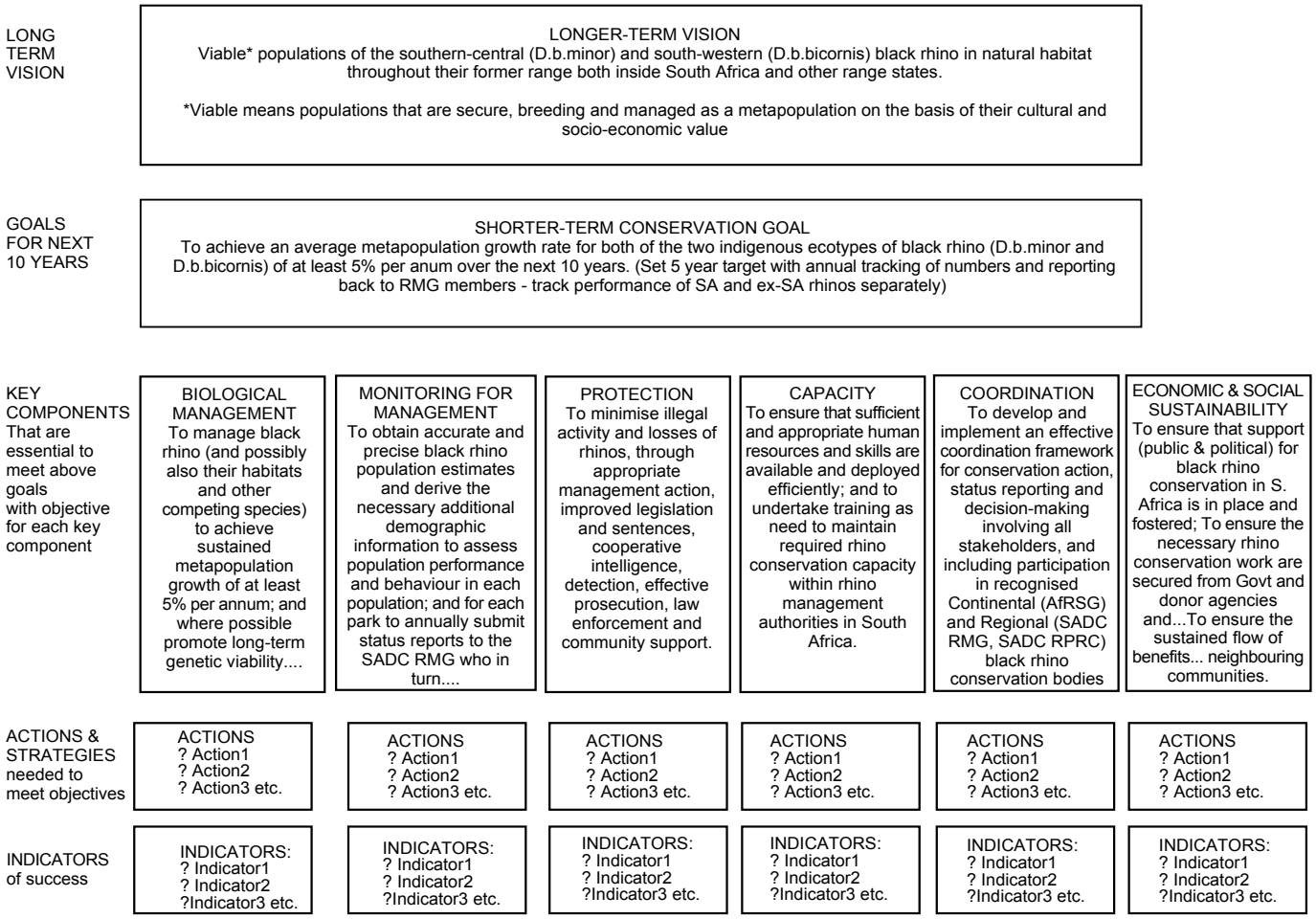
Monitoring: to maintain accurate population estimates and demographic measures of performance for populations, and where possible to synthesise these data at a metapopulation level. This will aid future biological management and provide quantitative measures against which progress towards meeting conservation objectives can be assessed, as well as providing lessons to help improve future rhino management.

Coordination: to develop and implement an effective coordination framework for conservation action, status reporting and decision-making involving all stakeholders, and including participation in recognised continental and regional conservation bodies.

Capacity: to ensure that sufficient and appropriate human resources and skills are available and deployed efficiently, and to undertake training as needed to maintain required rhino conservation capacity within rhino management agencies.

Economic and social sustainability: to ensure that support (political and public) for rhino conservation is in place and fostered, that the necessary financial budgets and manpower to undertake rhino conservation work are secured from government, donor agencies and through the sustainable use of black rhinos (provided that in the latter case acceptable standards of animal welfare are practised); to ensure that the sustained flow of benefits from the conservation of rhinos contributes to the social and economic development of neighbouring communities.

Figure 1: Example of national rhino strategy log-frame.



An advantage of this structured approach is that it is possible to graphically show the structure of a plan and its key features on a single poster diagram. The example given above is from the revised South African black rhino plan.

2.2.2.4 Annual action planning

Work plans with approved budgets that put into effect the highest priority elements of the National Rhino Strategy are essential to drive implementation of the rhino conservation programme. These should include specific time frames and responsibilities, and should be drawn up with all the staff that will ultimately be held responsible for implementation to ensure ownership and accountability.

Work plans that outline the major programme-level activities will need to be drawn up by the Rhino Management Committee and approved by the Executive Management Committee (see Section 2.2.2.1).

Activities that cannot be adequately funded by the Management Authority should be considered for external donor support. These should be "packaged" as discrete projects, stressing their importance to both national and international rhino goals and include clear end-products or deliverables that are measurable and relevant to improved rhino conservation status. The major rhino conservation support and funding agencies include the WWF African Rhino Programme, the SADC Regional Programme for Rhino Conservation, the US Fish and Wildlife Service's Rhino and Tiger Conservation Fund, the International Rhino Foundation, the Frankfurt Zoological Society, Save the Rhino International and periodic fund raising campaigns such as the EAZA 2006 Rhino Campaign (European zoos). The IUCN SSC African Rhino Specialist Group is often requested by funding agencies to evaluate projects and rate them for importance. This is done using defined criteria that have been developed by the AfRSG to identify projects of continental priority and importance to subspecies survival, and those at a subsidiary level of national importance.

2.2.2.5 Definitions of terms used within plans for rhino conservation

To avoid confusion and differing standards for rhino conservation within the region, it is important that rhino management authorities are consistent in their use of terminology that is applied to the various rhino conservation situations. Some key terms (modified from Leader-Williams et al., 1997) are as follows.

- **Rhino Conservation (Protection) Area.** A medium to large area (state, private or communal) in which rhinos are able to range over the whole area, which may be fenced or unfenced, and in which staff are deployed at moderate to high density throughout the area, with an emphasis on rhino protection.
- **Intensive Protection Zone (IPZ).** An unfenced section of a larger conservation area, with this sub-section having a significantly higher staff density (at least one man per 20 km^2) than the rest of the area, specifically to protect rhinos.
- **Rhino Sanctuary.** A relatively small area (state, private or communal) within which rhinos are deliberately confined by perimeter fencing or other barriers, and within which manpower densities are high (as in an unfenced IPZ).
- **Rhino Conservancy.** A relatively large area, fenced or unfenced, of private and/or communal land (possibly combined also with state land) in which rhinos are managed by stakeholder groups rather than by a single state agency or private agency.


ZS-RSC

MAXIMIZING THE INCENTIVES FOR RHINO METAPOPULATION MANAGEMENT

SUMMARY OF GUIDELINES FOR: MAXIMIZING THE INCENTIVES FOR RHINO METAPOPULATION MANAGEMENT

R. du Toit and R. Emslie

There is a range of potential ways in which rhinos can contribute to economic development and biodiversity conservation, depending upon local circumstances and policies. Consumptive use of rhinos (particularly through safari hunting) is a legitimate option in some circumstances.

Wildlife-based enterprises that incorporate rhinos can take place under different tenure systems ranging from state ownership of rhinos to private ownership. Custodianship schemes, at the interface between the state and the private or communal sectors, have often been successful in helping to spread the burden of rhino protection from under-resourced state agencies.

There are pros and cons to the different ways in which rhinos can be conserved and utilised, and the selection of the most sustainable option in an area will require careful consideration of the incentives and capacities that apply to the stakeholders in that particular situation.

Similar reviews of incentives and capacities will apply to case-by-case consideration of options for a range state to help with the restocking of another range state. Outright donations of rhinos from one range state to another must generally be encouraged, but sometimes more businesslike deals may have to be developed.

International donors must be encouraged to support incentives-based approaches to rhino conservation (i.e. rewarding community enterprises or private enterprises that produce more rhinos).

3.1 Utilisation options

Rhinos can be sustainably used in a number of ways – both consumptive and non-consumptive – as follows.

- Live sales (primarily by auction but can be by agreed fixed price). Options also exist for rhinos to be leased for a period; necessary insurances would have to be taken out in such cases.
- Use of rhinos in ecotourism ventures. A southern African wildlife operation that includes rhinos will be regarded by tourists as a more prestigious one than parks without rhinos, even if the rhinos are not easily seen. White rhinos are generally more easily seen by tourists than black rhinos, but in some situations black rhinos come to drink at night at waterholes at tourist camps (e.g. Etosha NP and Addo Elephant NP) and if these waterholes are illuminated with floodlights they become a significant attraction for tourists.
- Limited sport hunting of white rhinos. Currently less than 0.5% of southern white rhinos are hunted each year, mainly in South Africa, and most are surplus males. Numbers hunted are governed by economics and demand rather than quotas. Since sport hunting of white rhinos was initiated on a significant but controlled basis in South Africa in 1968, numbers in the wild have increased from 1,800 to 13,500 by the end of 2005. The fact that numbers in the wild have increased by 650% since sport hunting started clearly indicates that offtake levels have been sustainable.
- Limited sport hunting of surplus black rhinos. The 2004 CITES Conference of the Parties approved an annual hunting quota of five surplus black rhinos for South Africa and the same quota for Namibia, in recognition of the "surplus male problem" (Emslie, 2004). This level of offtake represents less than 0.5% of the population and should therefore be sustainable. It should be noted that the animals to be hunted should be surplus males in breeding populations not just any male black rhino. Criteria used for defining "surplus" males should be specified and monitoring should be in place to confirm compliance with these criteria. It is crucial that the conditions that are specified for sport hunting of rhinos (e.g. "overstocking") do not create perverse incentives for rhino owners or custodians to deliberately manage rhinos in ways that tend towards these situations. Leader-Williams et al. (2005) suggest some guiding principles for ensuring optimum conservation outcomes from safari hunting of black rhinos.
- The internal sale of biltong and meat from hunted rhinos (in South Africa, but also potentially in other range states). For CITES reasons this meat is not exported.
- Legal trade in rhino horn and other rhino products such as hides is currently banned under CITES, and would require a quota to be approved with a two-thirds majority at a future CITES Conference of the Parties to become a reality. This is unlikely to happen in the foreseeable future.

Examples of the extent to which rhinos add value to wildlife operations have been researched within the SADC Regional Programme for Rhino Conservation (Spenceley and Barnes, 2005)

3.2 Private ownership of rhinos

Pros of private ownership.

- The sale of rhinos to the private sector can generate substantial funds for state conservation bodies whose budgets may be declining in real terms. For example sales of surplus white and black rhinos in Hluhluwe-iMfolozi Park have for years contributed substantially towards Ezemvelo-KZN Wildlife budgets.
- State-run rhino areas in a country may already be fully stocked with rhino and sales to the private sector can stimulate the necessary increase in range available to rhinos to enable rapid population increases to continue.
- By commercialising rhino conservation, rhinos have been given an economic value which can be used by resource economists

to argue about the economic importance of conservation as a form of land-use. This value can also be referred to in court cases to stress the seriousness of rhino crimes and to motivate for the imposition of stiff deterrent sentences.

- Budgets for many privately-run conservation operations may be significantly higher (per hectare) than in state-run parks, facilitating high-class protection, monitoring and management.
- Private sector involvement can wholly, or in collaboration with the state, fund and assist with the translocation and re-establishment of rhinos in a country.

Cons of private ownership

- Depending upon the nature of contracts entered into, the state will have much less influence over how rhinos are managed when under the ownership of the private sector, rather than being managed on a custodianship basis (see Section 3.3).
- Some private owners may not be interested in participating in regional rhino conservation initiatives.
- Making a profit may be the primary consideration rather than doing what is best for rhino conservation. However, breeding rhinos as rapidly as possible will often achieve both financial and conservation objectives.
- Control of private horn stockpiles has been poor in some cases.
- Rhinos may end up being sold to the highest bidder, not necessarily to the reserve or park with the best potential for future population growth, and sometimes to the detriment of genetic diversity.

3.3 Custodianship schemes

A custodianship scheme refers to a situation where rhinos are allocated to a wildlife operation (which may be a private one, a communal one or even one that is under the control of another wildlife management authority in a different province or state) without transferring ownership of the rhinos to that operation. The question of future rights, such as ownership of progeny, is dealt within in different ways according to national legislation and policies; in some situations (e.g. in KwazZulu-Natal), a state or provincial rhino management authority might agree to share the progeny of rhinos that are allocated to private sector or communal custodians. In countries where legislation permits private ownership of rhinos, the private owners may sometimes have reason to allocate some of their rhinos according to a custodianship arrangement (for instance, if sale prices are poor or if an owner chooses a deal that shares progeny while retaining a claim on the founder animals). Partial custodianship is another option. In this model the state or private owner may retain ownership only for a defined period (e.g. 20 years), after which the founder rhinos become the property of the custodian. The sharing of progeny could, however, continue.

Pros of custodianship schemes (from the perspective of a state or provincial management authority)

- Rhino range can be increased at no additional cost to the state.
- Rhino populations can grow rapidly after being re-established on custodianship properties or communal land with space to expand.
- By letting private land owners and/or communities bear most of the costs of protecting and monitoring custodianship rhinos, state conservation agencies are able to concentrate their (sometimes limited) resources in their own rhino parks.
- Unlike sales to the highest bidder the state can decide to allocate surplus rhinos to areas with optimum rhino conservation potential (rather than to those that merely have the most money).
- Budgets for many privately-run conservation operations may be significantly higher than in state-run parks, facilitating high-class protection, monitoring and management.
- Private sector involvement can wholly, or in collaboration with the state, fund and assist with the translocation and re-establishment of rhinos in a country.
- If the state agency specifies minimum carrying capacities for areas to receive substantial founder groups of rhino on a custodianship basis, this can act as a catalyst for neighbouring landholders to take

down fences and cooperate to create larger, more viable conservation areas for rhino re-introductions. This process, catalysed by rhinos as the "flagship species", can create significant opportunities for other aspects of biodiversity conservation and can induce economies of scale in wildlife management.

Cons of custodianship schemes

- Under a straight custodianship scheme, landowners have all the expenses but have a more limited range of utilisation options than if they owned the rhinos.
- Custodianship properties in some countries may not have a large carrying capacity necessitating many small rhino populations fragmented over different properties. This fragmented situation requires expensive and active hands-on management, to prevent inbreeding and overstocking, which a conservation agency may struggle to afford.
- If there are many different and smaller custodianship populations in a country, this may place an additional administrative management burden on a state conservation agency.
- Custodians sometimes argue against necessary rhino management actions such as destocking or dehorning (in the face of a poaching threat) thus creating friction within the national rhino conservation programme. Therefore, the custodianship agreements need to be formally concluded between the parties at the outset of each restocking project and should be very clear about who has ultimate management control.
- Potentially reduced revenues for those state or provincial conservation agencies that are allowed to retain revenues from business activities (as founder animals not sold).

3.4 Conservancy options

Private land owners, or communities on communal land, have formed a number of conservancies. Ideally this has involved the consolidation of a number of smaller areas into one big area (with any internal fencing between properties being taken down). Rhinos have been the catalyst to help develop large conservancies in Zimbabwe (e.g. Save Valley), South Africa (e.g. Munyawana) and Namibia (e.g. in the Kunene region).

By cooperating and creating a bigger potential area for rhinos, conservancies may then become eligible to receive black rhinos to manage on behalf of the state (when previously their component areas may have each individually not been big enough to qualify to receive even a small breeding group of rhinos). Donor support can be allocated in ways that exert maximum leverage for the creation of these larger areas, in place of smaller, fenced-off units. The way in which this leverage was exerted during the formation of the large Lowveld conservancies of Zimbabwe is explained by du Toit (1998).

In a straight conservancy arrangement, the landowner has the opportunity to obtain rhinos without having to buy them. Depending on the prevailing land-use, this may or may not have an ecotourism benefit. More recently, in KwaZulu-Natal, a modified form of custodianship arrangement has been developed whereby the founder rhinos remain the property of the state conservation agency that supplied them, for an extended period, but the offspring are shared with the landowner. In this way the state becomes the "owner" of more rhinos and private landowners have an incentive, based on the potential sale of some of the progeny, to breed the rhinos up rapidly.

3.5 Contractual park arrangements (for expansion of rhino range)

Contractual parks can be a win-win option for the state (to increase the size of its national parks), and the private sector or communities (to become part of a larger conservation area). Following negotiations and the signing of a contract between the state conservation authority and the other parties, additional areas can be contractually incorporated into existing national parks (e.g. the Greater Kruger National Park and Greater Addo Elephant National Park). The contract will specify future management practices, requirements and responsibilities (security, monitoring, allowable tourism, sustainable use practices, etc.) on the private/community land, which will then acquire official park status. This mechanism can therefore create additional rhino conservation areas with the highest possible protection under law.

3.6 Opportunities for the private sector to invest in concessions (long-term) on state land

State conservation agencies are ideally placed to offer low-cost or mid-market ecotourism in their parks. Local taxpayers then have the opportunity to visit the parks whose conservation they are partly funding. However, state agencies typically require upper income tourism in some parks (or portions of parks) in order to generate additional revenue for operating costs and to maximize employment.

Regional experience indicates that the state conservation sector is usually not suitably qualified or able to offer upmarket ecotourism of a sufficient standard. Private sector tourism is often more service-orientated than that provided by state conservation agencies. State agencies tend to under-invest in maintenance of tourist facilities. In some countries other issues, such as salaries for state employees being stipulated at higher levels than prevail at equivalent levels in the private sector, may reduce the potential of state-run tourism operations to generate a profit. Developing high-end camps and bush lodges is capital intensive and state conservation bodies may not wish to take a business risk or to incur loan obligations for such developments. In such cases conservation agencies may instead wish to grant concessions to the private sector to build and operate such developments in state national parks and game reserves. Care needs to be taken to ensure that state conservation agencies get sufficient remuneration from such deals while still maintaining investment incentives for the private sector.

One approach, which has been proven in Madikwe Game Reserve, North West Province, South Africa, is to offer exclusive tourist concessions for specific areas of the park which are leased to the company for a specified period. Other parts of the park are accessible by all operators. The selected company then takes on all the risks and costs of building a lodge in its concession area, paying an agreed percentage of turnover (per person per night) to the conservation authority. The conservation agency in turn manages the park and controls entrance of visitors to the park. This arrangement is likely to lead to the flow of much greater funds to the state conservation agency than if that agency had arranged to get a percentage of the profits (which accountants may have reduced to a low level). Once the lease period expires (40 years), then under the contract the lodge itself becomes the property of the conservation agency who can then lease it back to the company as part of any new lease contract.

Thus park authorities are able to use their wildlife assets to generate additional passive income which can help fund the conservation activities in parks without having to spend any money or take on any risks associated with expensive capital developments. The wildlife authority can also set down building and behaviour standards which have to be adhered to by the company concerned. The advantage of having high-end lodges is that fewer people visit an area creating less impact, waste, etc.; but at the same time creating more service jobs per visitor, and more profit for the conservation agency than lower-end accommodation. This limited lease approach is now also being used in the Greater Addo Elephant Park with ownership of some developments transferring to SANParks in only 20 years.

In other areas some existing tourism facilities have been privatised and are now run by private concessionaires (e.g. the restaurants and shops at Skukuza, Kruger National Park, or security at park entrances) This has resulted in an improvement in standards. In some countries the running of specific parks and reserves may be given out entirely to the private sector.

In terms of rhino conservation, the significance of these private/state joint ventures arises from the potential for the tourist operation to interest its clients in rhino viewing, to thereby generate greater revenues to the benefit of the rhinos and the park as a whole, to assist in rhino monitoring (often linked with walking safaris) and even to invest in rhinos for re-introduction projects. The latter opportunity is well demonstrated in terms of the lease arrangements for the Mombo concession, in Botswana, by Okavango Wilderness Safaris who included support for rhino restocking in their bid for the concession. Such opportunities will depend upon long-term leases (10-15 years) being allocated in order that the operator can derive an adequate return from investment in rhino restocking.

3.7 Possible import incentives for the private sector

Import duties can act as a disincentive for the private sector to import rhinos into a country and governments should therefore consider waiving customs duties in an attempt to facilitate the re-establishment of rhino populations in their country. Provided the basic wildlife laws of a SADC country allow for ownership of wildlife (or at least usufruct and trading rights) by the private sector, the extent to which private owners or custodians can utilize or trade rhinos might be varied by the state management authority to take account of the direct investment that was made in importing rhinos. If, for instance, customs duty was waived then the importer might be subjected to a greater degree of control by the state on the use (particularly consumptive use) of the rhinos and their progeny, compared to the situation where the importer paid full duty and should therefore be allowed to manage the rhinos, as private assets, in a less restrictive way.

3.8 CITES and "Primarily Commercial Purposes"

Any importation of rhinos, particularly by a private sector operation, requires careful consideration of CITES restrictions, especially Article III.3 of the CITES Convention. This article states that CITES import permits for Appendix II and especially Appendix I animals may not be given by the importing country if the animals are imported for "primarily commercial purposes". However, the definition of "primarily commercial purposes" is supposed to be based on the intended use of the animals (i.e. the principal purpose of the proposed importation), not on the nature of the transaction (i.e. whether or not the proposed importer is a private entity, or whether or not the animals involved in the transaction were purchased from the supplier). The importer would need to show that it intends to undertake well-managed breeding of the rhinos as the principal reason for the importation. Low intensity, non-consumptive tourism (provided this does not develop into the type of intrusive commercial activity that could compromise the breeding programme) can be considered to be a secondary rather than a primary reason for the importation.

The interpretations that may be made of the CITES regulations are complex and potentially contentious, so it would be necessary prior to any importation of rhinos (especially black rhinos) to seek clarification on this matter from the CITES Secretariat, in accordance with the specific circumstances of the intended importation.

An example of a contentious black rhino importation was the acquisition by the Malilangwe Trust of 28 black rhinos in 1998. These were purchased by the Trust from Ezemvelo-KZN Wildlife for importation to the Trust's property in Zimbabwe. The CITES conditions pertaining to this importation held it up for a long time but the importation eventually went ahead because the Trust clearly committed the rhinos to the Zimbabwean black rhino metapopulation, to be managed strictly in accordance with the national rhino strategy for Zimbabwe. The rhinos were sourced from overstocked populations (such as Ithala GR) that had been performing poorly prior to the translocations. The released animals bred rapidly once released onto Malilangwe and as result after a few years there were significantly more black rhinos than there would have been had this deal not gone through. The buying of the rhinos also generated much needed additional revenue for Ezemvelo-KZN-Wildlife. Clearly this was a win-win scenario for conservation, despite the initial controversy about whether the "primarily commercial purpose" restriction imposed under CITES should or should not be automatically applied to a private sector importation.

At the last CITES CoP, Swaziland asked for and obtained an annotated downlisting of its southern white rhino from Appendix I to Appendix II. The reason for this application was to facilitate sales of surplus rhinos to the main market in neighbouring South Africa. While the Swaziland rhinos remained on Appendix I, because of the "primarily commercial purpose" definition, South Africa was not able to issue the necessary CITES import permits even though the country supported the translocations on conservation grounds.

Some SADC countries and most notably Namibia have attempted (unsuccessfully so far) to moderate this CITES restriction because these countries feel that commercial activities can often be highly advantageous for endangered species conservation,

under enlightened management policies that ensure the appropriate checks and balances for these activities. Further concerted effort needs to be made by SADC rhino range states to agree upon a common position on this issue (along with similar issues related to sustainable commercial use of rhinos) in order to present a logical and united regional position at fora such as CITES CoPs.

3.9 Incentives for rhino breeding within the communal or small-scale commercial farming sector

The ecotourism values of rhinos within community-based ecotourism projects are amply demonstrated in Namibia, have been documented in SADC RPRC reports by Spenceley and Barnes (2005) and Hearn et al. (2004), and are discussed in Section 2.1.1.

For the reasons stated in Section 2.1.1, rhinos of both species are potentially far more compatible with enlightened approaches to low-input land-uses (even in some agricultural areas that include subsistence or small-scale farmers) than is generally appreciated. Since the unplanned settlement of many wildlife ranches during the "fast-track" land reform programme in Zimbabwe, a significant number of black rhinos have survived (although sometimes seriously injured by snares) in patches of thicket between recently cleared fields, and amongst cattle herds. The rhinos show a remarkable ability to adapt to these circumstances, provided they are left with sufficient areas of thicket and access to water, while the communities learn how to avoid dangerous encounters with them. Thus co-existence would undoubtedly be possible provided the rhinos are not poached or snared.

However, the protection of the rhinos by communities can only be assured if there is some economic benefit that arises from the ongoing presence of these animals. This is a very different situation to those Namibian communal conservancies that have well-established tourism operations, based not only on wildlife such as rhinos but also on the wilderness character and scenic attraction of the Namibian desert and semi-desert. In many other communal farming areas of Africa, with typically higher human population densities, lower wildlife densities and less scenic landscapes, ecotourism is not viable. SADC countries, along with international donor organisations, need to pay concerted attention to production incentives that encourage communities to allow rhinos to survive in these marginal areas and to tangibly contribute to the local livelihoods.

One possible incentive scheme could involve a well-publicized, transparent and closely-monitored system of direct payments for rhinos that are bred within these areas. That breeding effort will not involve significant management costs for the communities (since the rhinos "look after themselves" providing poaching is kept in check), so the payments need not be anywhere near the scale of auction prices for rhinos that prevail in South Africa and could instead be on a scale that is closer to the livestock sale values that are derived by typical subsistence farmers in remote rural areas. This would effectively turn rhinos into a form of minimally-managed livestock, with the management inputs coming from the state agencies or conservation NGOs in the form of monitoring programmes and periodic capture-and-translocation exercises. Considering the global importance of rhinos as endangered species, and considering also the fact that community participation clearly reduces poaching pressures that otherwise require high financial outlays, this production-incentives approach holds promise of cost-effectiveness in terms of the allocation of international conservation funding.

Sometimes the production incentives could come not only from donor funds, but also from sales of the rhinos (sale profits accruing to a well-regulated fund), and sometimes the donor agencies could achieve twin objectives by purchasing the rhinos from a community scheme as a preferential source, in order to restock donor-supported initiatives such as Transfrontier Conservation Areas. The SADC RPRC catalyzed a community scheme of this nature in Save Valley Conservancy, Zimbabwe (du Toit, 2005).

Where communities have land claims within National Parks (such as the Makuleke community adjacent to Kruger NP and the Chitsa community that has invaded Gonarezhou NP), Public- Private/Community Partnerships are appropriate mechanisms to create shareholdings for these communities while retaining the biodiversity conservation role of the contested areas, as outlined in the context of rhino conservation

by du Toit and Mungwashu (2005). In these situations, the rhino production-incentives scheme could also be applicable.

Other options to provide direct incentives to communities for rhino production could be:

- harvesting of horn (through dehorning programmes, which could potentially generate income from darting "safaris") and the sale of this horn through regulated markets;
- hunting safaris that generate trophy fees from surplus bulls.

Both these potential options are controversial with the first one most unlikely to gain international acceptability in the foreseeable future. However, economic analyses of these options, in the context of rural livelihoods, are certainly worth pursuing in order to ensure that the international debate is better informed and that the potential value of rhinos as "animals for Africa" is more clearly appreciated. Relevant community attitudes were revealed during a community stakeholders' workshop that was held under the auspices of the SADC RPRC at Palmwag, Namibia, in March 2004 (Hearn *et al.*, 2004).

3.10 Incentives for allocating rhinos to re-introduction projects

The allocation of rhinos by one SADC range state (allocating state), or by an individual rhino management agency within that state, to another (recipient state or agency) can be according to several options:

- as an outright donation;
- on the basis of payment being made for the rhinos at some agreed live-sale price;
- on the basis of an barter arrangement whereby the recipient state exchanges a certain number of animals of another species for a certain number of rhinos, or the recipient state reciprocates in some other way such as the provision of services;
- on the basis of a "rhino investment" scenario.

The rhino investment scenario is potentially a "win-win" option for both recipient and allocating states, and stimulates long-term regional collaboration in the management of rhinos, but it may be the most complicated of the four main options and therefore requires further explanation. The intention in outlining this option is not to suggest that it is necessarily preferable to other options. Indeed, outright donation of the founder stock will always be the simplest arrangement. However, rhino management agencies are answerable to stakeholders within their countries and may have to justify the allocation of rhinos to another country as being more businesslike than a mere gesture of goodwill. In such situations, the rhino investment concept would demonstrate that there can be some return to the allocating country, albeit over the long-term, resulting from the growth of the rhino population in the recipient country.

Under a "rhino investment" scenario the allocating state will retain a right to receive rhinos back from the recipient state in future. This is merely a right for the allocating state to repossess a certain number of these rhinos at some future stage, and there are not necessarily any obligations imposed upon either country regarding capture and translocation costs. These costs will have to be resolved according to relevant funding circumstances that pertain at that future stage.

Rhinos are biological assets that should be invested, sometimes for maximum security and sometimes for maximum growth, just like financial capital. A prudent investment strategy should spread the assets into a range of situations (a "balanced investment portfolio").

The rhino investment option can be seen as two things:

- for the recipient state, it is a way to source founder stock so that a viable rhino population can be created within that country;
- for the allocating state, it is a way of spreading that country's investment in rhino breeding options to include external investment, hence providing a form of insurance against catastrophic loss of rhinos within that country, and potentially generating revenue.

The allocating state and the recipient state would basically share the growth rate in the rhinos that are allocated, similar to sharing the financial interest rate on a bank savings account. A balance must be found between the need for the allocating country to achieve a return on this biological investment, and for the recipient country to achieve population growth. For a new rhino population within the recipient country, a growth rate of 5% per annum can be considered to be a reasonable target that will maintain demographic and genetic viability. In fact, growth rates of 8-10% per annum are feasible in well-managed situations, with adequate habitats. Any population increment above 5% per annum could accrue to the allocating country. Thus, if 8% growth rate is being achieved, then the allocating country could have a reclaim of progeny equivalent to 3% per annum.

The period over which the allocating country should receive a return in investment can be finite rather than continuing in perpetuity. A "double your money" deal might, for example, be mutually agreed to be fair, whereby the allocating country can claim progeny until such time as the total number of rhinos that are reclaimed equals twice the number that were originally invested.

Example

Allocating country provides 5 rhinos to a recipient country.

The increase in rhino numbers over time at different population growth rates would be:

YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
At 5%	5	5	6	6	6	6	7	7	7	8	8	9	9	9	10	10	11	11	12	13	13
At 8%	5	5	6	6	7	7	8	9	9	10	11	12	13	14	15	16	17	19	20	22	23

Thus, with 8% annual growth rate, the allocating state could reclaim 10 rhinos (double the investment) in 21 years, leaving 13 rhinos (which is the number that would have resulted from a baseline growth rate of 5% per annum). Alternatively, some rhinos could be reclaimed earlier (e.g. 5 rhinos after 15 years, see example below) in which case it would take a few years longer for the population to yield the next surplus of 5 rhinos.

YEAR	**15**	**15**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
At 5%	10	10	10	10	11	11	12	13	13	14	15	16	16
At 8%	15	-5	10	11	12	13	14	15	16	17	19	20	22

The allocating country may prefer a quicker, more regular return, e.g. 1 rhino every 5 years. This scenario may be particularly attractive if sale options are feasible within the recipient country so that this biological "interest rate" can be converted into a financial return.

In practice, founder populations of at least 20 rhinos will be established to meet guidelines for genetic and demographic viability so the subsequent population sizes will be much higher than is indicated in the example above. Therefore the offtakes to yield returns to the various allocating states can be regulated to avoid major fluctuations in the rhino population, and to make any capture and translocation operations as cost-effective as possible.

If the annual growth rate is not above 5% then the allocating country will obviously not achieve a direct return on investment (although if the animals were sourced from poorly performing populations, overall growth in rhino numbers may still be higher than would have occurred if no translocation had taken place). This risk means that:

- the allocating country needs to assess the investment option (habitat, security, management, etc.) very thoroughly before allocating rhinos;
- the allocating country might wish to retain some say in the management of the new population (e.g. be represented on a rhino management committee, to guide major decisions);
- the allocating country should be willing to assist with professional services and other forms of ongoing collaboration to maximize the rate of return on the investment of rhinos;
- the allocating country may want to retain the right to reclaim its founder stock under certain conditions such as sub-optimal performance over a period.

The allocating country may choose not to reclaim its share of the progeny but may instead want these animals to be allocated to another external breeding project, perhaps in another country. At any stage the arrangement might, through mutual consent, be converted partly or in full to one of the other arrangements (donation, purchase agreement or exchange for other assets or services). If the investment is made in a country where live sales of rhinos are permissible, then the allocating country may wish to convert its share of the population growth into a financial return by selling these rhinos within the recipient country (subject to CITES considerations).

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ENSURING OPTIMAL BIOLOGICAL MANAGEMENT

SUMMARY OF GUIDELINES FOR: ENSURING OPTIMAL BIOLOGICAL MANAGEMENT

R. Emslie and R. du Toit

It is not sufficient only to protect rhinos in order to conserve them. The animals also need appropriate biological management, by which we mean measures to prevent overstocking, to prevent inbreeding and to meet other animal husbandry needs.

The rationale for biological management can be explained in terms of a ball game such as football. A game is won not only by a team defending against its opponents (i.e. protecting rhinos from poaching) but also by scoring goals (i.e. breeding more rhinos through sensible biological management). A rhino that is not born because of poor biological management is as much of a loss as a rhino that is slaughtered because of inadequate antipoaching efforts.

Sometimes the needs for rhino protection (which are easiest to achieve in small, highly-defended sanctuaries) conflict with the needs for maximizing the potential for population expansion. Holistic decision-making is required to balance the rewards in biological management of rhinos (i.e. encouraging population growth by spreading rhinos to new areas) against the risks (i.e. exposing the rhinos to poaching in less secure areas).

Quite small reductions in annual rates of rhino population growth (e.g. from 5% to 3%) can make a big difference to the number of rhinos that are present in a population in future. The situation is equivalent to interest rates on a bank account.

We use the concept of carrying capacity (which is not a precise and easily measurable level) to help us in achieving optimum biological management. To maintain maximum population growth rate, a rhino population has to be managed at a density that is significantly below the absolute (ecological) carrying capacity.

Estimating the capacity of an area's habitats to support rhinos requires the involvement of ecologists who have specific experience in this subject.

Because carrying capacity estimates are only approximate, adaptive management is required. This means that the managers of a rhino population have to be ready to react quickly to any indications of reduced breeding success, rather than assuming that theoretical estimates of carrying capacity are correct and therefore delaying biological management. Various indicators of rhino breeding performance have been developed and must be monitored in each population.

Even better than waiting for indicators of reduced breeding performance to trigger biological management, it is possible to implement a logical approach of harvesting rhinos steadily from an established population to keep it well below the area's carrying capacity. This approach maximizes the overall growth rate of the region's rhino populations (i.e. metapopulation growth).

There are significant financial costs, and some mortality risks, associated with rhino translocations. However, these are invariably outweighed by the benefits provided the translocation is undertaken with competent personnel and appropriate equipment, and provided the recipient area is adequately secure, understocked and comprised of suitable habitats.

There is rarely any justification for captive or semi-captive rhino breeding programmes within Africa, where free-ranging populations can be maintained more cost-effectively and with greater breeding success.

Professional monitoring of rhino populations is fundamental for their biological management as well as their security.

Rhino populations should generally be monitored using techniques that are based on the individual identification of some or all of the rhinos in each population. These techniques are only possible if the rhinos have identity markings (ear-notches), and also require population registers (databases) and specially trained field staff to undertake the identifications with a high degree of reliability.

Identity records of rhinos can be used either to simply keep account of all animals in a population (if all the rhinos are identifiable), or can be used as input data for statistical techniques to estimate the size of a population within which a proportion of the rhinos are identifiable.

Modern technology, especially radiotracking, has an increasing role to play in rhino monitoring but traditional bushcraft skills (spoor tracking, etc.) are still more important and this expertise must therefore be nurtured within rhino conservation agencies.

For large rhino populations in arid or semi-arid areas, regular aerial surveys based on specially-designed "block counts" can yield reliable indications of population trends.

Standardized reporting systems are required for the various rhino populations in order that demographic information can be subjected to regular professional review. This enables a direct comparison of the breeding performance that is achieved in the different areas, allows the overall metapopulation status to be confirmed, and assists in the identification of common rhino management issues that require national or regional attention.

4.1 Reproductive biology of black rhinos

Oestrus cycles have a mean of 35 days in the female black rhino, but true oestrus only occurs for one or two days during each cycle (Bertschinger,1994). Cycling can occur year-round, but conception is influenced by female nutritional status. Several populations have shown conception peaks at times of the year that correspond to improved rainfall conditions, and thus nutritional status of the female, in the months preceding conception (Adcock, 2000, 2003). The timing of these peaks varies across Africa with the seasonality (winter versus summer) of the annual rainfall pattern.

Black rhinos have a 15.4 month gestation period (Bertschinger, 1994) and the interval between calves can vary widely, depending on the age of the female and the nutritional conditions in the habitat. Under good habitat conditions and at densities below carrying capacity most females can produce several consecutive calves at 2 to 2.5 year intervals. Where conditions are less favourable, the average inter-calving interval exceeds 3.5 years. In many such cases a calf may be conceived but is lost as the pregnancy nears full term, or shortly after birth. Old females (28 years plus) may have difficulty regaining body condition after weaning each calf, and tend to have longer intervals between calves.

Mortality rates within the first year of life range from 8-14% on average in South Africa and Namibia. Mortality in sub-adults averages 2-4%, less than 2% in young and prime age adults (Adcock, 2003), and probably 4% or more in older rhinos. Male rhinos have a higher mortality rate than females, and fighting is the most common cause of their deaths. Most females die of old age.

More male calves are born than female calves, but male mortality rate is higher leading on average (although not always) to adult sex ratios that are biased towards females. Because of male territoriality limiting male numbers in all but the largest fenced areas, adult sex ratios tends to average 1.3 to 1.5 females per male in many populations. Larger populations have sex ratios of 1.1 to 1.2 females per male on average.

4.2 Reproductive biology of white rhinos

White rhinos are gregarious animals found in groups of up to 18 animals. Their reproductive behaviour involves stimulation from group interactions; breeding is therefore constrained if the species cannot form and maintain free-ranging groups, unlike black rhinos that do not require protracted social interactions in order to breed.

The oestrus cycle of a female white rhino is approximately 30 days in the wild, but may be longer

in zoos (Owen-Smith, 1998). Cycling is year-round though bi-annual conception peaks have been noted. Body condition influences the rate of conception, with animals in poorer condition showing poorer reproductive performance. The gestation period is 16 months. Weaning occurs at about 12 months but the calf will stay with its mother for a further 12 to 24 months. Once the calf separates from its mother, it will temporarily join other groups and will eventually form a stable bond with one group. Age of sexual maturity in cows is similar to black rhinos, with first parturition at 6.5 years and older in wild white rhinos followed by subsequent calving at intervals of 2 to 6 years depending on nutrition and health of the cows.

White rhino bulls are territorial and serious fighting between bulls can occur. Subordinate bulls will be tolerated by territorial bulls if they are submissive. Calves are at risk of being killed by territorial bulls.

4.3 What is meant by biological management and why is it crucial?

Biological management is about managing rhino populations at a metapopulation rather than at an individual population level, to achieve demographic and genetic goals at an organisational, country, regional or subspecies level. In the case of black rhinos, conservationists seek to manage the animals (and sometimes also their habitats and other competing species) to achieve sustained metapopulation growth of at least 5% per annum; and where possible to promote longer term genetic viability (limiting inbreeding and minimising genetic drift).

This 5% target is for the underlying (intrinsic) population growth, by which is meant the growth of a population after allowing for removals and introductions and man-induced deaths such as poaching. It therefore provides a more valid measure of the reproductive performance of a population than simple growth in numbers. This figure represents an achievable minimum target well below the estimated intrinsic maximum rate of increase of a population with typical age/sex structure, which would be around 9% annually; managers should certainly be striving to achieve growth rates of 6.5% plus. Rhino areas stocked well below habitat carrying capacity, and having female-biased sex ratios and low mortality rates, can sometimes achieve average population growth rates as high as 10-15% per year.

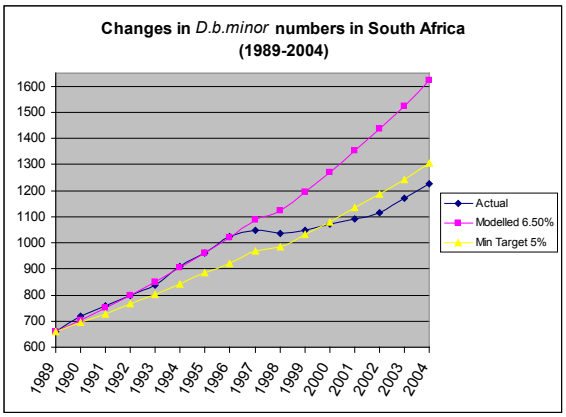
In populations approaching ecological carrying capacity (ECC), overall mortality can exceed 4% annually (involving mainly infants and sub-adults), while the females' average age at first calving and average inter-calving interval tend to increase. Average growth rates (referred to as "population performance") obviously decline as a result. Black rhino populations that have been allowed to approach or exceed estimated longer-term ECC (normally following a period of conservative low removals) have consistently exhibited a slowing of, and then a decline in, their growth rates to below 5% per annum as the available browse per rhino diminishes.

With the compounding effects from reduced reproduction in several populations, declines in metapopulation growth rates can quickly result in hundreds fewer black rhino in a metapopulation in a few years time. The example of the changing performance of the South African *D.b.minor* metapopulation over the period 1989-2004 (Figure 2) illustrates this. Estimated numbers of *D.b.minor* in South Africa grew rapidly from 1989-1996 at around 6.5% per year. However, due to conservative removals in some major donor populations, densities in some areas were allowed to approach or exceed estimated ecological carrying capacity. Numbers of competitive browsers have also increased substantially in some areas. Underlying performance in some populations became negative with the overall metapopulation performance being maintained only by rapid growth in other re-established populations. During the period 1996-2001, performance declined well below the minimum target levels (averaging only 2.0% per year). Over the last three years, the annual growth rate has improved to an estimated 4.2%, but is still below the target level of 5%.

Translating these percentages into rhino numbers, and comparing those numbers with the population sizes that should have been attained at a 5% annual growth rate, it becomes apparent that after being 101 rhinos above the target population size in 1996, it only took four years for numbers to start falling below the intended population size, and by 2004 the metapopulation was about 78 below target. If the earlier 6.5% metapopulation growth rate had

been maintained through more aggressive biological management, then there would have been an estimated 397 more *D.b.minor* in 2004.

Figure 2: Changes in the estimated numbers of *D.b.minor* in South Africa from 1989-2004
Compared to modelled growth rates of 6.5% and 5% (allowing for removals/introductions from/to South Africa). Source: SADC RMG data (Adcock, 2005).



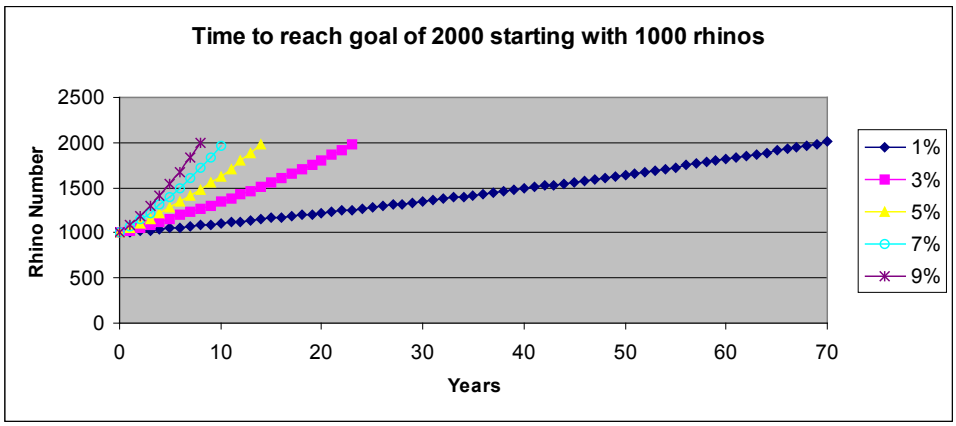
The fact that small differences in underlying growth rates can have a huge impact, over a few years, on rhino metapopulation sizes is illustrated further by Figure 3.

impacts. In the South African example, the loss to the metapopulation due to sub-optimum biological management far exceeded poaching losses which, however, invariably attract greater attention.

Managing rhino populations represents a form of investment management where one is seeking to get as many of the separate component populations (individual investments) in a metapopulation (portfolio) to increase at a rapid rate (generate good yields), so the overall metapopulation size (overall value of the investment portfolio) grows at a rapid rate. The underlying rhino population growth rate is therefore equivalent to the interest rate (percentage yield) on an investment. Just as in managing an equity (share/stock) portfolio, it is unlikely that every single rhino investment will perform well, but overall we should be striving to ensure that as many as possible of the rhino investments (populations), and hence overall rhino numbers in the metapopulation, continue to grow at a rapid rate.

Extending this analogy further, it is desirable to diversify and spread the investment risk by "putting eggs in different baskets". This can be done by harvesting rhinos at a significant rate from established rhino populations in order to establish various new populations, ideally under a variety of management models.

Figure 3: The time it would take for a metapopulation of 1,000 rhinos to reach a target of 2,000 given different annual growth rates of 1% (70 years), 3% (23 years), 5% (14 years), 7% (10 years) and 9% (8 years). After 25 years the net increase in rhino numbers at 1% would only be +282 compared with +7,263 at 9%.



The number of rhinos that are not born or which die prematurely due to overstocking must be regarded as seriously as poaching losses in terms of demographic

As an additional analogy, we can regard the biological management component in a rhino conservation strategy as being equivalent to attacking and scoring tries and goals in rugby and football. Without a strong defence (good anti-poaching and law enforcement) a football team will never win tournaments. Rhino protection and law enforcement therefore remains a critical component of any successful rhino conservation strategy. However, even the best defence will concede goals or tries from time to time. Similarly, the odd rhinos may sometimes be poached from well-run parks, but if numbers are breeding up rapidly (scoring goals) the impact of this poaching will be minimised. Just as the end result in a football or rugby match is simply the number of goals/points scored minus the number conceded, the number of rhinos in future will equal the net gain or loss due to reproductive growth rates of a population on the one hand (which can be enhanced/reduced by good/poor biological management) and mortality levels on the other hand (influenced by poaching levels and the quality of biological management).

It should, however, be appreciated that biological management is not just a simple case of managing rhino numbers. Social factors following removals in donor populations may have short-term negative effects. The age and sex structure of the donor population should be considered when choosing animals to remove. For example, the selective removal of young female rhinos over a long period may potentially skew the age (and sex) structure of a donor population, reducing its future performance. The build-up of populations of competing browsers or grazers, of other species, may also have a significant impact on rhino performance in some well-established populations. A reduction in densities of competitors may therefore improve rhino performance.

4.4 Concepts of "carrying capacity" and its estimation

The term "ecological carrying capacity" (ECC) refers to the number of a species that a defined area holds at a given time in a situation where the amount of available food/water resources is such that the numbers being born into a population are being cancelled out by the numbers dying; hence the population size remains fairly constant.

When a population of rhinos has been established in a new area with suitable habitat it is likely that if given sufficient protection, the population will continue to grow rapidly for a period. However, at some stage after densities increase, the amount of quality rhino food available per rhino will decrease to the extent that females take longer to put on sufficient condition to conceive and carry calves. This will result in inter-calving intervals lengthening, age at first calving increasing, and neonatal survival rates declining. Increased competition for food may also result in increased adult mortalities from fighting. Rhinos are believed to have a ramp-shaped production curve; at lower densities, population performance will largely be independent of density but density-dependent declines start becoming apparent once densities exceed about 75% of ECC and a graph of population growth then takes a downward turn towards zero.

The term "maximum productivity carrying capacity" (MPCC) refers to the maximum density of animals that a defined area can carry yet still be able to reproduce at the maximum rate possible.

In reality, there is no such thing as a fixed ECC or a fixed MPCCC because these capacities fluctuate in response to variables such as:

- variation in weather (droughts or frost events) from year to year;
- habitat dynamics (vegetation succession and growth);
- alien plant infestations;
- the impact of fire (can be positive or negative);
- browsing/grazing impacts on the habitats.

These complicating factors mean that carrying capacity estimation is neither straightforward nor precise. ECC estimates are at best approximate figures, estimated as the probable average for a period of a few years. Despite these limitations the concepts of ECC and MPCC are still useful management tools and are used to help decide on harvesting levels and to assess whether or not potential new areas are large enough for rhino introductions. Practically, accurate estimation of ECC in large unfenced areas is less important than for smaller fenced areas. Reasonable estimation of ECC for the latter becomes increasingly important in countries where there is a wider range

of ECC's and where reserve sizes tend to be limited, such as in South Africa or Kenya.

All approaches to the estimation of black rhino carrying capacity require some ecological expertise (species identification, ability to assess relative amounts of available browse, soil nutrient status, etc.) and the person(s) doing an assessment should have knowledge of rhino densities and habitats in relevant ecosystems. Rangeland ecologists who do not have specific experience in rhino feeding ecology generally tend to over-estimate ECC and this can therefore create significant management problems or unrealistic expectations.

An approach towards the systematic, statistical estimation of carrying capacity of some black rhino habitats was initiated by the RMG and has been elaborated and investigated as a SADC RPRC task (Adcock, 2001, 2005; Dunham and du Toit, 2003). This quantitative approach requires ecological expertise and fieldwork effort to determine factors such as the soil nutrient status of an area, the amount and quality of palatable black rhino browse up to 2m above ground, the proportional contribution of the different habitats in the area, average annual rainfall and rainfall distribution through the year as well as the minimum July temperature. As a fundamental component of the model for estimating black rhino EEC, the methodology for quantifying available browse in specific habitats (Adcock, 2004) has been evaluated during a SADC RPRC trial (Adcock, 2005) and is being used as a habitat monitoring tool in some areas where resources permit the detailed fieldwork that is required.

In many situations when re-introduction sites have to be evaluated or rhino management needs have to be determined, the most pragmatic approach will be to get these areas assessed on a less quantitative basis, by ecologists who have knowledge of rhino densities in relevant ecosystems. If the carrying capacity can be estimated, with some confidence, in a "ballpark" range of 1 rhino per 5 km², 10 km², 15 km², 20 km², etc., then this estimation will suffice for most planning purposes in larger areas, especially since a process of adaptive management will be required to take account of changing habitat conditions. However, some form of vegetation monitoring/assessment may still be required, especially in fenced sanctuaries, as build-ups in densities of other competing species (impala, nyala, elephant and giraffe) or other factors (vegetation succession, impacts of fires, alien plant invasions) can substantially alter rhino ECC's (positively or negatively) over time.

Less work has been done on estimating white rhino ECC's, although estimates can also be made by experienced ecologists based on comparative densities in similar habitats.

As rhinos are long-lived, taking years to grow to their full size, and are relatively slow-breeders, they may overshoot carrying capacity before signs of density-dependent reductions in performance are recorded. Thus it is inadvisable to wait for signs of reduced performance (increased inter-calving intervals, increased neonatal and adult mortality rates) before taking action. The ideal is to pro-actively start removing rhinos before population performance starts to suffer, as is discussed further below.

4.5 Recommended harvesting-for-growth strategies

Following realization of the decline in breeding performance in a number of conservatively harvested populations in South Africa, increased attention has recently been given to improving biological management, and the issue was tackled as a specific task of the SADC RPRC (Emslie, 2001). This review of relevant scientific principles and of case studies of rhino breeding situations led to management recommendations that were endorsed by the AfRSG and SADC RMG.

The fundamental recommendation is that established black rhino populations that are reaching relatively high densities (in terms of the estimated ECC) should be managed productively and pro-actively by either keeping rhino numbers at or below 75% of ECC; or preferably, in larger populations, by annually translocating a set percentage (5-8%) of the population once densities exceed 50% of ECC. With set-percentage harvesting, the population should adjust its density and eventually stabilise at a level that can sustain that level of harvest. Thus if one removes 5% annually the population's density should adjust to the point that the regeneration rate of the

population is 5% (although numbers remain stable as this reproduction is cancelled out by removing 5% of the animals). The corollary is that if one removes less than 5%, the population performance will in due course decline to below the target 5% level.

Advantages of set-percentage harvesting, compared with the strategy of harvesting to a level that maintains a population at an estimated level of 75% of ECC, are that the latter approach:

- is less influenced by the accuracy of ECC estimates;
- will automatically result in densities adjusting in response to fluctuations in ECC;
- yields more predictable and more constant annual removals each year, hence facilitating the planning for translocations and other forms of management.

For black rhinos, removals should be spread throughout an area rather than being concentrated in one section. However for the better-dispersing white rhinos, concentrating removals creates a low-density sink area into which surplus animals can move. This in turn simulates the natural regulatory process of dispersal, which is often prevented by a reserve fence.

Combining these harvesting concepts with the concept of spreading rhino "investments" (Section 4.3), it is apparent that surplus rhinos should be routinely translocated to: a.) reduce the densities of the more heavily stocked populations in an attempt to increase or maintain breeding performance; and b.) create new populations or to enhance existing re-established populations with good potential for growth.

Translocation is therefore a key facet of rhino biological management. In some countries the sale of surplus animals can help cover some of the costs of rhino conservation, management and monitoring. However, re-established populations can take some years to become established and to achieve optimum breeding rates, particularly if they have few founders. Hence offtakes have to be planned with due consideration as to whether the population is sufficiently well-established to yield "surplus" rhinos (and if so, how many) and which particular animals should be removed to maximize genetic variability of the rhino population in the source area as well as in the recipient area (see Section 4.9).

4.6 Social carrying capacity of males

The number of adult male black rhinos that a smaller fenced area can hold is limited by social factors. The log of average adult male black rhino home range size in an area has been found to be inversely proportional to the log of the black rhino carrying capacity of an area, even though individual rhino home range sizes vary greatly (Adcock, 2001). Thus in areas of low rhino carrying capacity, such as 0.01 rhino per km^2, (or 1 rhino per 100 km^2), the ranges of adult males average around 380 km^2. Areas that can carry 10 times more rhino (0.1 rhino per 10 km^2) tend to have ranges averaging 44 km^2; while areas that can carry 1 rhino per km^2 tend to have ranges averaging around 5 km^2. If an area is stocked with more adult males then it is likely that some may be killed by fighting. The fighting risks are particularly severe if bulls are brought in some time after other males have become established within the area.

In some populations chance demographics can result in a male bias. If not managed, these surplus males may end up not only killing each other but also killing breeding females, or injuring females to the extent that they lose condition and therefore breed poorly. Surplus males also use up valuable food resources that could be used more productively by breeding females. Options to deal with surplus males are limited. Setting up male-only populations in areas that are too small to hold a viable breeding population may be one option, but the way that this is done will need professional advice to avoid excessive intra-species fighting. At the 2004 CITES Conference of the Parties in Bangkok, a quota for limited sport hunting of five surplus black rhino males every year in South Africa, and the same quota for Nambia, were approved.

4.7 Costs of a "fortress mentality" that restricts rhino breeding

Many black rhino populations are today conserved in small fenced rhino sanctuaries or larger fenced rhino conservation areas (RCA's).

Fenced sanctuaries and rhino conservation areas (RCA's) have a number of advantages.

- Fencing reduces the potential area that rhinos may range over and hence allows law enforcement manpower and effort to be concentrated where the rhinos are. Without a fence, rhinos may move further out in different directions, with the result that the area which field rangers need to patrol can greatly increase, reducing the effective manpower density, and sometimes necessitating the use of skilled trackers. Supposing one has a circular reserve of 300 km^2 (park diameter of 19.5 km), protected by 30 field rangers. If the area is fenced, then the effective manpower density protecting the rhino would be 1/10 km^2. However, supposing the area is unfenced and some rhinos at the edge of the reserve were to move up to 10 km further out from the edge of the initial 300 km^2 area, this would increase the area available to rhinos to 1,228 km^2, but would effectively reduce the manpower density to only 1 man per 41 km^2.
- Fencing helps minimise conflict with neighbouring communities by keeping wild animals within conservation areas.
- In most sanctuaries or RCA's, the fencelines are checked every day and boundary road tracks are also checked for signs of spoor. Experience has shown that this has often provided a valuable early warning of illegal entry into rhino areas, allowing rapid deployment of rangers and specialised anti-poaching units.

However, fenced sanctuaries and RCA's also have some major disadvantages.

- Fenced areas can foster a "fortress-mentality" in managers, in which they focus on the ease of preventing poaching (a defensive game, as discussed in Section 4.3) rather than giving equal importance to achieving high reproductive rates (scoring goals). Without sound biological management of rhinos and other species in the enclosed sanctuary, and without an acceptance of some risks that are entailed in spreading rhinos to new areas (see Section 4.8), the managers of small fenced areas will inevitably get to a stage of sub-optimal reproductive performance of the rhinos once densities approach or exceed ecological carrying capacity.
- Fencing prevents dispersal of subadult white rhinos, in particular, as the natural mechanism for regulating population density of this species (black rhinos tend to disperse less readily than white rhinos do, but fencing is nonetheless problematic in this regard for this species as well). Even if biological management of an unfenced area is paralysed with indecision on the part of the authorities, or lack of resources to undertake translocations, some rhinos can still move out into new areas and the impacts of density build-ups are likely to be less severe than they would be in fenced sanctuaries.
- Because the distributions of other mammalian herbivores (e.g. nyala antelope) are also constrained by the fencing, and because some fence-breaking herbivores such as elephants may deliberately concentrate in a sanctuary to take advantage of water supplies and security, the densities of these species may exceed ecological carrying capacity with potentially disastrous impacts for both rhinos and the habitat. For example, in Ngulia rhino sanctuary in Tsavo West NP (Kenya), the build-up of elephants in the sanctuary and the failure to remove some or all of them has negatively affected the carrying capacity of the sanctuary for black rhinos (Brett and Adcock, 2002) and density-dependent reductions in rhino performance are apparent.
- The fencing entails significant expenditure for construction and maintenance, detracting from the operational budget for the area and also requiring a commitment of manpower and administrative effort that could be spent on other aspects of rhino conservation.

- Fencing can create a false sense of security; whereas the fences can be made cost-effective for the containment of rhinos, making them human-proof is not achievable without major expenditure (notwithstanding options for modern fence electrification systems).

4.8 Translocation risks versus potential gains

Rhino managers are often overly cautious about undertaking rhino translocations, particularly in situations where national or provincial rhino numbers are low and/or where poaching losses have been high, or where custodians or other stakeholders are opposing the removal of rhinos from an area in which they have a vested interest. Experience has shown that field managers faced with reduced performance in a population that is close to estimated ECC can become more hesitant to remove more animals, at the very time when removals should increase to return the population to productivity.

Certainly, it is important not to destabilize a re-introduced population by harvesting rhinos from it before it has reached a stage of definite genetic and demographic viability (assuming that there is potential for it to do so in that area). It is also important not to spread the available resources (manpower, expertise, equipment, etc.) too thinly by starting up new re-introduction projects before existing ones are adequately consolidated. However, it is equally important to translocate rhinos from the area if there are strong reasons to do so (e.g. overstocking, poaching losses, poor sex ratios) because the risks of mortality during the translocation are almost always justified in demographic terms. It is also important to avoid delaying translocations until the physical condition of the animals has declined significantly, because by that stage the animals will be more susceptible to translocation mortality risks; and in some cases habitat changes may have reduced the longer term potential for an area to hold rhinos.

Assuming that a competent team is undertaking the capture and translocation, the translocation mortality rates can be expected to vary from about 2%, as has been experienced in Zimbabwe in recent years, to about 5% as experienced in South Africa and Namibia (Adcock, 2005). The losses of rhinos at those rates can soon be fully compensated for by the improved rhino population growth rates in new area. If, for instance, there is the option of moving 20 rhinos from a donor population that is maintaining a sub-optimum growth rate (e.g. 2% per annum) because of overstocking, to a recipient area where they can maintain a moderate growth rate (e.g. 5% per annum), and being subject to a 10% translocation mortality rate (i.e. twice what might be expected from regional experience), then the following scenarios are possible.

- If 20 rhinos are moved, with 2 deaths during the translocation, there would be 18 remaining in the new population which (at a 5% annual growth rate) would increase over 10 years to 29.
- If the 20 rhinos are not moved, they would increase at 2% per annum over 10 years, to only 24.

A move of rhinos under these conditions would probably also allow the growth rate in the source area to improve due to the alleviation of density-dependent constraints, resulting in even more rhinos in the metapopulation. Conversely, leaving the rhinos would probably result in the growth rate decreasing below 2% as these constraints worsen.

4.9 Which specific rhinos should be translocated?

In most situations, it will be apparent that the most suitable female candidates for translocation will be those that are:

- unrelated (as far as is known) to others that would make up the founder group at a re-introduction site, in order to maximize genetic diversity;
- not with young, dependent calves at foot (for the above reason and also because young calves are more prone to translocation mortality risks, although under careful management those risks can be reduced to acceptable levels);
- capable of breeding (as far as is known);
- in fair physical condition, and not of

advanced age, so that they can withstand the stresses of translocation and release in an unfamiliar area.

Prime female candidates for translocation are young cows that are close to attaining the age of first conception or which are in the first trimester of their first pregnancy. Not only are such animals most likely to fit all the criteria above, but if the objective of the exercise is to reduce population size and growth rate in an overstocked source area, then the removal of females in this age class will have the greatest effect. However, care needs to be taken to avoid skewing the age structure of a donor population towards older animals by continuous selective removal of young females over a longer period.

For bulls, the situation is more complicated. The following questions arise.

- Genetically, is it better to remove sub-dominant bulls, or dominant bulls that have already contributed genetically to the next generation of the population within the source area?
- Behaviourally and demographically, would removing dominant bulls stimulate an undue level of intra-species fighting within the donor population as their potential replacements struggle for dominance?

The issue of genetic contributions will depend upon site-specific issues and in particular upon the overall size of the donor population, and whether or not any of the dominant males are founders within that population (see Section 5.1 for definition of "founder"). If the donor population is well-established (50 or more animals, with several generations) then it will be least disruptive to that population to harvest "subsidiary" or subadult males. This age class is the one in which natural dispersion is most likely to occur. If, however, it is clear that some males are heavily monopolizing breeding within a smaller donor population (at an extreme, breeding with their daughters) then consideration should be paid to moving them out, especially if they are being added to an area that includes founders from at least two different populations so there is minimal chance of them being related to other rhinos in the new population.

4.10 Captive or semi-captive breeding

In keeping with the strategic approach of "putting eggs in different baskets", it is desirable that a certain number of rhinos of each subspecies are maintained within *ex situ* (i.e. outside the region) captive breeding programmes. However, those programmes must be regionally or internationally coordinated ones that ensure metapopulation management amongst a number of zoos (such as the North American Species Survival Programme). Linkages with these international programmes and their member zoos can and should result in a flow of conservation funding and other support back to the areas from which rhinos are sourced.

There is very little rationale for captive or semi-captive rhino breeding programmes within the SADC region *(in situ)*, because the following problems arise.

- The browse of black rhinos is difficult if not impossible to replicate in artificial diets and captive black rhinos commonly develop various diet-related heath problems. It is believed that many of these problems are related to iron-overloading which occurs because of the dietary imbalances. Some captive breeding facilities in the region have run into these dietary problems despite attempts to include natural browse in the diets of their black rhinos; for instance, a rhino that died after some years in captivity at the Chipangali Wildlife Orphanage in Zimbabwe had the highest level of iron overloading that has ever been detected in the liver of a rhino.
- White rhinos do not breed readily in zoo conditions because of the importance of group behavioural stimulation in this species (see Section 4.2).
- The cost-effectiveness of captive breeding programmes is very low. Rhino population gains from these programmes are extremely poor compared to those from programmes that conserve free-ranging rhinos; although births are achieved, mortality rates are high, and expenditure per surviving rhino is many times what is typically spent on each rhino in non-captive conservation project.

- Captive programmes can divert funding and public attention from non-captive rhino conservation projects, to the detriment not only of those free-ranging rhinos but also of biodiversity conservation in general.

Semi-captive (or semi-wild) black rhino breeding projects (e.g. at Imire in Zimbabwe) have performed better than totally captive breeding projects, mainly because of the greater scope for natural browsing. The rate of breeding can be speeded up by separating calves from their mothers and hand-rearing them, so the mothers breed again with a shorter inter-calving interval than would occur if the calves were left with them. However, the overall cost-effectiveness of these projects remains low, especially once the costs and complications of rehabilitating the offspring into wild populations are taken into account.

It is sometimes argued that keeping some rhinos in captive or semi-captive facilities is important for community awareness and conservation education, especially for urban populations. However, these needs can be met with rhinos that are not important for breeding programmes (e.g. surplus males, or females that are known from monitoring records to be poor breeders or totally barren, or rhinos with debilitating and permanent injuries such as severe snare wounds).

4.11 Monitoring of rhinos

4.11.1 Why monitor rhinos?

The foremost reason for monitoring is to "audit" rhino populations and to check that none of their members, being valuable biological assets, are missing because of illegal offtakes or other demographic impacts. The knowledge that a rhino population is being kept under close demographic surveillance, so that any poaching will be detected, serves to deter would-be poachers including corrupt elements within that area's protection/management force. The need to be able to undertake "auditing" fully justifies the costs and (relatively small) risks of immobilizing rhinos in order to cut ear notches as identification features.

A second major reason for rhino monitoring is because the adaptive management that is required to maximize metapopulation growth rates for rhinos is not possible without reasonably accurate annual population estimates, measures of demographic performance, and information on mortality patterns, behaviour and translocations.

The sharing and synthesis of this information at a national and regional level (for example, the routine annual black rhino status reporting and periodic analysis of data within the SADC RMG) serves to provide:

- measures of progress towards meeting metapopulation goals (in the form of underlying metapopulation growth rates, and the consequent estimates of how long it will take to reach target metapopulation sizes);
- estimates of population sizes and densities which can be used to derive recommended offtake levels (either using set-percentage harvesting or by keeping numbers at or below 75% of estimated ECC);
- data on the comparative performance of the different populations in a metapopulation, which encourages each park manager to put that park's rhino population performance into context, and to consider how that population can help contribute to attain metapopulation goals;
- additional insights into factors affecting rhino population performance;
- an effective way to share lessons learned from both experience in the field and the results of research;
- a consolidated record of movements of rhinos within and in and out of a metapopulation.

4.11.2 Monitoring rhinos through individual identification

For all but very large areas (>2,500 km^2) and for very large populations (>500), rhino populations can and should be monitored using techniques that are based on the individual identification of some or all of the rhinos in each population.

Ideally, the rhino monitoring staff should regularly identify each and every rhino in a population. This is achievable in areas that are staffed by specialised rhino monitors, such as several Zimbabwean conservancies of 400-3,000 km², and exceeding 100 rhinos in some of these, with a confirmation sighting of each rhino every six months at least, and a ratio of approximately one monitor to 20 rhinos. In habitats with higher rhino densities, greater confusion can arise but the logistical demands in deploying monitors are reduced. Examples of such areas where populations have been reliably monitored through recognition of all (or virtually all) rhinos are Pilanesberg NP, Sam Knott/Andries Vosloo area of Great Fish River Reserve and many custodianship populations.

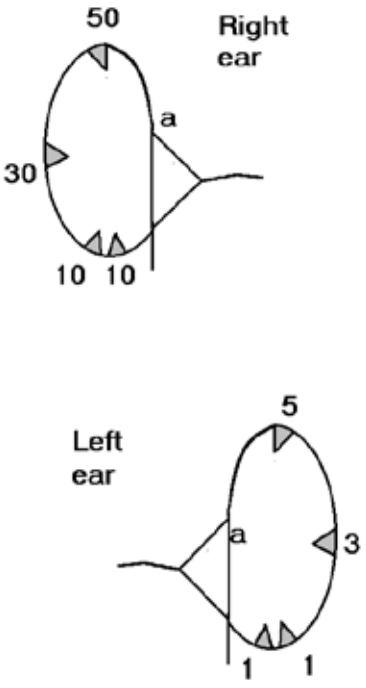
However, not all areas have dedicated rhino monitors or expert trackers and rhino monitoring may be carried out by field rangers as part of their general patrol work. In large , long-established populations a sizeable fraction of the population may not have easily distinguishable and easy-to-record features (ear notches and ear tears), and all patrol teams may not have digital cameras. In such cases all observers are not able to reliably identify all animals seen all of the time. Provided some animals have easy-to-record features (and can reliably be identified by ***all*** observers ***always***), and provided there are sufficient rhino sightings, it is still possible to accurately estimate population sizes with confidence levels using sighting/re-sighting (mark/recapture) statistical methods.

Once rhinos are individually identifiable, their details can be maintained in population databases which assist greatly in ensuring that information can be derived to meet the needs outlined in Section 4.11.1. Rhinos are identified as individuals primarily through natural ear tears and/or through the application of artificial ear notches.

A rhino ear can be demarcated into sectors within which combinations of notches can be cut (using both ears) so as to create a coding system for a large number of rhino identification (ID) numbers. Ear notch numbering systems differ from country to country and organisation to organisation. Some countries allocate specific numbers nationally, whereas others may simply be concerned that no two rhinos in the same population have the same ear-notches and if so will need to check when notched animals are being moved to another population to see if additional new notches are required to maintain a unique ID in the rhino's new area. Rhinos that do not have recorded ear patterns or other known features by which they are identifiable are known as "clean" animals.

Figure 4: Rhino earnotching system used in Zimbabwe, as an example.

By cutting notches that add up to the required ID number, any number up to 99 can be obtained. Punching a hole (about 10mm diameter) in the centre of the right ear would add 100, and a similar hole in the left ear would add 200, so a total of 598 ID numbers are achieved. Males and females, and black and white rhinos, are numbered in different series, so 1,196 animals of each species can be uniquely numbered. Cutting notches between the position marked "a" and the tip of the ear is not recommended as this notch is difficult to see when a rhino is facing the observer.



The aim is for every individual rhino to be given a unique identifier (ID) for life to enable population performance data to be derived (e.g. inter-calving intervals for each cow). The names and/or ID numbers of individual rhinos should not be changed, and ID numbers should not be re-used once an animal dies. In this way sightings of individual animals, database records, and sample collections, are less likely to become confused.

Quality control of sighting records is of paramount importance, because for monitoring information to be of any use it must be accurate. Those running field monitoring programmes must regularly check on the quality and reliability of the data being provided. Recognising and accrediting reliable observers assists with the quality control process. The use of compact digital cameras with 8-10x optical zoom capabilities has made it much easier for rhino monitors and other staff to reliably record sightings of rhinos. The submission of clear photographs showing identity features can be the basis on which to pay incentives to rhino monitors.

To ensure that rhino identifications are as reliable as possible and that sightings data are compiled in a systematic and comparable way, the AfRSG has developed a rhino ID training course ("toolbox") which was revised with part-funding from the SADC RPRC (Adcock and Emslie, 2004). A number of training courses of field rangers using these course materials have been run within the SADC RPRC (e.g. Kamwi and Ngarira, 2004, Loutit et al., 2005).

However, it is important to note that successful completion of the training course does not necessarily qualify a trainee as a fully competent rhino monitor. The trainee, after the course, should certainly be able to record the key details (earnotches, sex, age class, etc.) of a rhino that is located in the field, but the course cannot ensure that the trainee will be able to locate the rhino in the first place; the tracking and bushcraft skills that are required to track and approach a wild rhino are beyond the training scope of this kind of short course. The recognition and retention of informally-acquired tracking and bushcraft skills within rhino management agencies is a key issue that is discussed in Section 7.1.

A system of monitoring black rhinos through flashlight photography at waterholes has been developed in Etosha National Park, Namibia (Cilliers, 1989) and would be applicable in other semi-arid areas that have a defined set of waterpoints rather than rivers or large waterbodies that the rhinos can drink at.

Footprint recognition systems, using tracings or photographs of rhino spoor, can be useful in certain situations but depend upon specialized training (and sometimes equipment and analytical software) and the various techniques have not yet proven to be cost-effective and practical for the regular monitoring of typical rhino populations. They may, however, have an application in deriving periodic mark-recapture population estimates (see Section 4.11.5).

4.11.3 Population master files and computerized databases

The monitoring of each population should allow the development of an accurate and up-to-date master file for that population, containing details of ear features (notches and tears) as well as other potential identifying features such as horn shapes and configurations, scars, broken tails, etc. It is recommended that separate files are kept for males and females as well as for records of animals which have died or been translocated to another reserve (i.e. those no longer present in the population). Where possible up-to-date photos and/or drawings should be used to record the details of features used to individually identify that animal.

When dealing with populations of 20 or more rhinos it is recommended that data be stored and managed using a computerized database. This database will contain key information and dates for individual rhinos (dates of births, calving records, details of ear-notching, mortalities, translocations) as well as all their sightings records. Ideally the database program should be able to interrogate the data and produce reports and answers to frequently asked questions. The SADC RPRC has developed a customized rhino database known as WILDb which is in use in several areas (Springett and Marshall, 2003)

4.11.4 Monitoring rhinos through radiotracking

The obvious potential of modern radiotracking technology to facilitate rhino monitoring has led to considerable experimentation (e.g. du Toit, 1996; du Toit and Mackie, 2001; Hofmeyr, 1998). Initially the focus of this experimentation was on neck collars as the means of attachment of the transmitters. However, two problems have been experienced with neck collars.

- The neck shape of rhinos pushes collars forward against the soft skin of the ear bases. Pressure lesions can develop in this region of the neck. No lesions of this type are known to have led to a rhino's death or to serious

long-term injuries but nonetheless it became apparent that alternative attachment options should be investigated, while still considering certain "animal-friendly" collar designs as an option.

- Through their wallowing habitats and movement through thickets, rhinos (especially bulls) tend to tear, abrade and rub off neck collars leading to greater rate of shedding of these collars than is typical in other species. Nonetheless, some collars have remained on lesion-free rhinos for long periods (e.g. 19 months).

The current trend of rhino radiotracking technology is towards the embedding of small transmitters in the horns of rhinos (Shrader and Beauchamp, 2001). Holes are drilled into the horn (generally the front one, but preferably the rear if it is long enough) into which the transmitter and its aerial are inserted and embedded within dental acrylic. These transmitters give typical ranges of 5-10 km for ground tracking and 10-25 km for aerial tracking, and generally transmit for 12-18 months (maximum about 24 months) before the horn growth and general wear result in their destruction (this period being considerably less than the potential battery life). A problem of "frequency drift" (i.e. the transmitters continuing to transmit, but not on their original frequencies) has often been experienced and requires further attention to resolve; some makes of receiver are considerably more useful than others in accommodating this problem.

The transmitters can include mortality sensors that change the frequency of the signal after a pre-determined period of immobility.

The costs of implanting transmitters are not normally justified except in certain situations when the technology is clearly cost-effective, such as:

- situations of active poaching activity;
- situations where post-release monitoring of translocated rhinos is required, particularly in large areas where it is difficult to monitor the rhinos through other means until they settle down into home ranges;
- situations where there is insufficient monitoring capacity to ensure regular sightings through spoor tracking and recognition of identity features (however, if radiotracking is relied upon in such situations, care must be taken not to develop over-reliance and complacency on the part of the monitors who may tend towards vehicle use and cursory confirmation of signals rather than visual checks).

Transponders are often confused with radio transmitters but are a different technology, being based on the activation of an implanted microchip by an external device (equivalent to a bar-code reader). These microchips are very useful for short-range confirmation of the identities of rhinos or horns, and should be routinely embedded when rhinos are immobilized for whatever reason, but do not have sufficient ranges for the monitoring of free-range rhinos. Hopefully, this technology will improve to the point that it does assist with longer-range monitoring, but immediate developments in this field will probably be linked to cellphone systems and will therefore depend upon cellphone reception being achieved within the rhino area.

4.11.5 Mark-recapture population estimation

Provided:

- rhino sightings have been collected throughout a reserve over a period of time, and
- equal attention has been paid to monitoring both identifiable and "clean" rhinos, and
- there are enough sightings of adults and independent sub-adult rhinos (ideally with the number of sightings being at least double the estimated total number of rhinos in these age classes),

then the RHINO Bayesian Mark-Recapture software package (which was extensively revised and re-written as Version 2.0, primarily with funding from the SADC RPRC) can be used to analyse the sighting: resighting records in order to produce accurate population estimates with confidence levels (Emslie, 2004).

RHINO is designed for use in populations where not all animals are individually identifiable (i.e. where a significant number of rhinos are "clean") and where

monitoring data are collected primarily by anti-poaching patrols and other staff on an ongoing ad-hoc basis, rather than by specialised teams of rhino monitors. Additional knowledge that might be derived (about known deaths, introductions and removals in a population and where known calves have become independent of their mothers) is incorporated into the estimation process, which deals with some violations of classical mark-recapture assumptions. Population estimates with confidence levels can be produced at both a whole park and sub-park area level. The software can also help users assess the likely cost: benefit ratio in expending greater effort on collecting more sightings data and/or ear-notching more rhinos in order to improve the precision of the population estimate.

For some less intensively monitored populations, sightings data will not be accumulated on the regular basis that is required to run the RHINO program. In these situations, provided a significant proportion of the population has ear notches or other recordable distinguishing features, then periodic discrete surveys ("audits") of a rhino population can be used to generate population estimates, using other (and sometimes more basic) methods of mark-recapture population estimation. Such estimates may have a lower degree of accuracy and precision than those that would be derived through the more continuous monitoring that is entailed for the RHINO program, but will nonetheless be useful. This use of periodic ground surveys may be relevant where there are insufficient rangers trained in rhino identifications to accumulate sufficient, reliable sightings data and specialist rhino monitors have to be brought in from other areas to conduct the surveys.

In Hluhluwe-iMfolozi Park, while ground-based rhino ID monitoring and RHINO population estimation are used to estimate black rhino numbers, there are simply too many white rhinos (around 1,900) for such methods to be used to estimate white rhino numbers as well. As a result, ground-based "distance sampling" is undertaken along cut-line transects (or from points in the wilderness area of the park) and is used to produce white rhino population estimates with confidence levels. However, this approach requires a large number of rhino sightings and has limited applicability elsewhere in the region.

4.11.6 Aerial surveys of rhinos

In very large rhino parks such as Etosha NP and Kruger NP it may not be logistically feasible to monitor rhino numbers using ID-based methods. Aerial surveys are a more practical option for these areas. However, standard aerial transect counting yields estimates of rhino population sizes that are well below the actual population sizes, and are highly variable, because of the difficulty of counting the rhinos in their typical habitats. This is particularly true for black rhinos despite their large body size, because these animals are often solitary, are widely dispersed, live in dense thickets, are camouflaged by dust or mud and are immobile during the middle hours of the day.

Instead of flying transects (straight lines) over a large area, a more effective way to count rhinos is to search small blocks (each of 10-25 km^2) within the area, using a small aircraft that can fly very slowly and turn tightly. By circling thickets, watercourses, etc., the pilot can ensure that these likely rhino refuges are thoroughly searched and rhinos are disturbed within them, making them more visible. Each block count constitutes a sample of rhino density and makes it possible to calculate the area's overall rhino density within confidence limits, and with far greater accuracy than a transect survey because the undercounting bias is minimized.

In Kruger NP, white rhino numbers are estimated using aerial counts with distance sampling, allocating the rhinos that are seen to different distance bands from the aircraft and deriving a visibility correction factor for the counts by comparing the numbers that are seen in the closest band to the decreasing numbers seen in the further bands. Although an undercounting bias is still inevitable (because the factors outlined at the beginning of this section still apply), repeated surveys of this type can gradually built a fairly reliable indication of the population trend.

Photography during helicopter surveys has been successfully used to monitor both black and white rhinos in some parks although this is expensive.

4.11.7 Standardized reporting and demographic analyses

Annual reporting on the status of individual rhino populations using a standardised format, and evaluation of the results obtained collectively from one or more country, are fundamental means of meeting the requirements for monitoring and adaptive management as outlined in Section 4.11.1.

Status reporting needs to be coordinated centrally within a country, ideally by the National Rhino Coordinator (and in the case of the SADC RMG by the Chair), with responsibility for ensuring that appropriate status reports are solicited and received from each target rhino population. The coordinator also needs to ensure that the reports are analysed, ideally every two years, to determine population performance and to provide management recommendations. Subsequent evaluations will draw on the results of previous years to provide more robust estimates of population performance and longer-term trends. A specialist consultant may be selected for this purpose. This standardised interpretation allows for a range of populations under different management regimes to be objectively compared and unbiased recommendations to be made, within a confidential report (e.g. Adcock, 2005) that is returned to each of the agencies that contributed information on these populations.

Ideally a regional approach should be taken where a number of countries cooperate by submitting status reports to a single focal person or organisation for analysis. This allows for a broader evaluation of performance and improved opportunities for identifying problem areas and finding solutions. This approach, as taken by the SADC Rhino Management Group (RMG), has involved reports from South Africa and Namibia, and more recently from Zimbabwe. Priority in RMG reporting has so far been given to the two black rhino subspecies within the region, but the reporting could be extended to the southern white rhino if considered necessary.

The individual park status reports used in the SADC RMG region include the following sections.

- Population estimation.
- Sex and age structure.
- Female breeding performance.
- Mortalities.
- Introductions.
- Translocations.
- Behaviour.
- Security.
- Neighbour programmes.
- Research.
- Reports and publications.
- General.

Different status report formats are used for:

- state protected areas where each individual rhino is known (usually very small populations);
- state areas where this is not possible (large populations);
- private landowners.

This is because the type of information collected will vary according to the intensity and type of monitoring, but the use of standardised criteria allows for objective comparison.

4.11.8 Population performance indicators

A number of key indicators are used to determine population performance and to understand the underlying factors involved in populations performing below or above the internationally-accepted minimum annual underlying growth rate of 5 % for rhinos. Due to variable calving rates from year to year (in part a function of birth lags) population estimates are normally analysed over longer periods of three or preferably five years when estimating overall growth rates. The following demographic indicators have emerged from regional reviews.

Overall annual population growth rates

- >7.5% indicates good to excellent performance
- 5-7.5% indicates moderate to good performance
- 2.5-4.9% indicates poor to moderate performance
- <2.5% indicates poor to very poor performance (population may even be declining).

The calculation of growth rates must exclude translocations in or out. Managers of any populations performing at or below the minimum target level of 5% will need to look closely at the various performance indicators (as given below) for their populations to try to understand the reasons for their poor performance.

In small populations, percentage growth rates are less meaningful as a change in population size of just one rhino may have a big influence on the estimated growth rate. Underlying growth rates are not independent of sex ratio and for populations with a greater proportion of females growth rates should be higher. There are methods for correcting growth rate estimates for differences in sex ratio, and it is often important to do so in order to achieve a more objective assessment of underlying performance in response to habitat and other environmental and population density factors. Being equivalent to compound interest rather than simple interest, the annual population growth rate that is calculated for a population over a period of several years needs to be based on the correct formula, which it often is not (leading to inflated estimates).

Observed inter-calving intervals (ICI)

The average period between giving birth provides one of the best indicators of population performance. This measure is also largely independent of sex ratio. The measure is determined by observing the calving frequency of known females and averaging these values.

- >3.5 years for ICI indicates poor to very poor fecundity.
- 3.1-3.5 years for ICI indicates moderately poor to poor fecundity.
- 2.5-3.0 years for ICI indicates good to moderate fecundity.
- <2.5 years for ICI indicates good to excellent fecundity.

In some cases the actual inter-calving interval may be overestimated if a calf has been born and died and this was not detected; the indicator must be based on surviving calves.

Average percentage of adult females calving per year

This is a similar measure of performance to ICI. The main difference between average observed ICI and the percentage of females with calves under one year is that the latter measure includes those females that have not calved.

- < 29 % with calves under one year indicates poor to very poor fecundity.
- 29-33 % with calves under one year indicates poor to moderately poor fecundity.
- 33-40 % with calves under one year indicates moderate to good fecundity.
- >40% with calves under one year indicates good to excellent fecundity.

A value of 50 % is approximately equivalent to an inter-calving interval of 2 years, 33 % to 3 years and 25 % to 4 years. The average percentage of females calving per year should exceed 33%. A similar measure is to add up the number of calves born over a period and express this as a ratio compared to the number of adult female years for the same period. This value can then be converted to give an estimate of the percentage of adult females with calves born per year.

Average age at first calving

This is another useful indicator of breeding performance which can be used where the rhinos are individually known and frequently sighted. Females in rapidly growing populations may have their first calves as young as 6.5 years but in populations with poor performance age at first calving may lengthen to over 7.5 years.

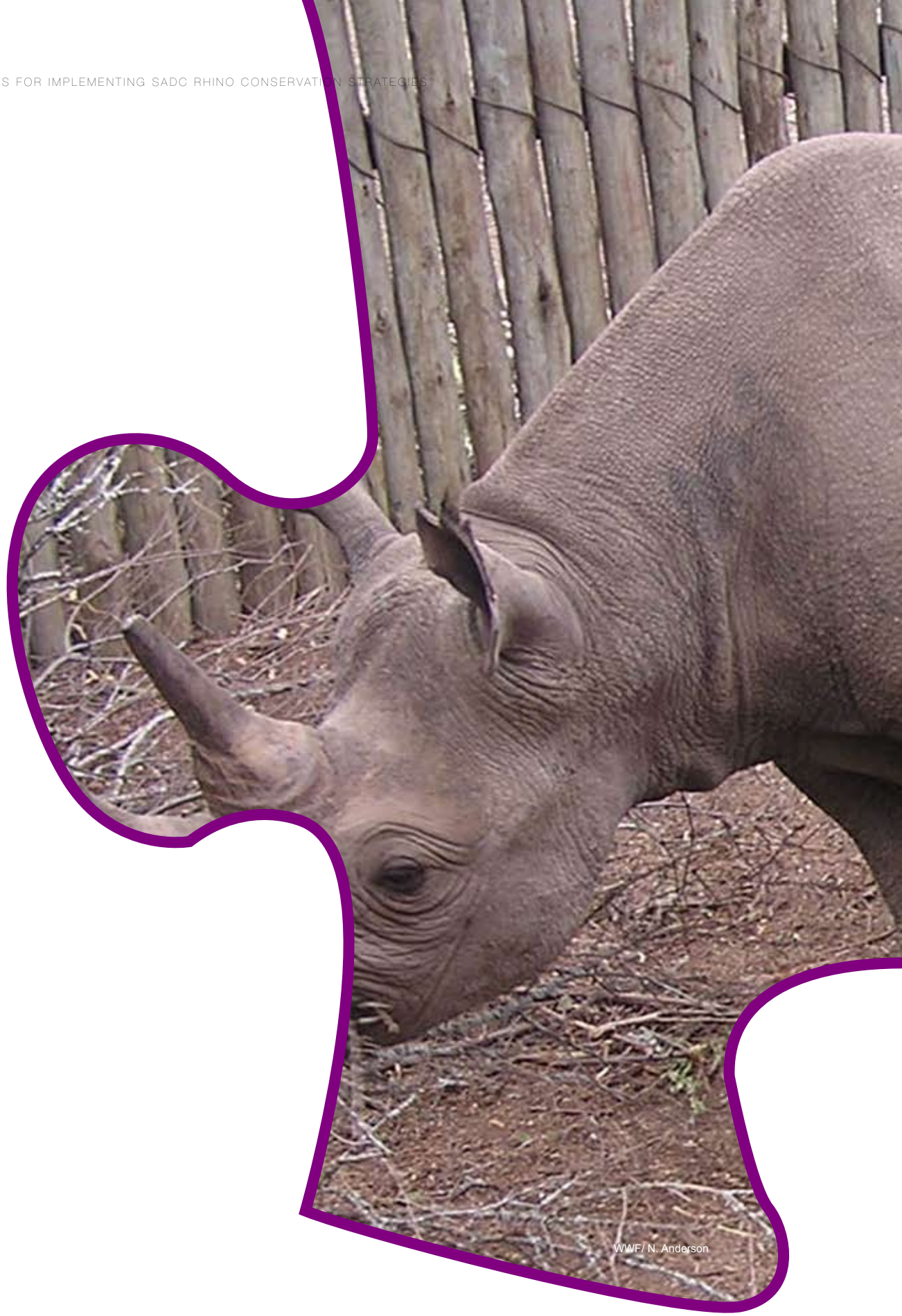
Annual mortality rates

Very intensive monitoring is required to detect mortalities; in reality it is often very difficult to detect all calf mortalities, especially in large populations. However, the average annual mortality rate measured over a number of years is a good indicator, with 4% or less per year being considered as desirably low.

Early carcass detection and detailed post-mortems are essential if the causes of deaths are to be determined. Ideally based on a long-term data set, these records can provide very valuable insight into the causes of under-performance. Analysis of data from the RMG status reports over the period 1989-1998 indicated that man-induced deaths comprised 38% of the total (of which poaching accounted for 26%, and capture and translocation 11%); while of the natural mortalities, the major causes were reported to be fighting (26%), accidents (8%) and interactions with other species such as elephants (6%). The extent of mortalities due to poaching, inter-specific aggression and poor condition related to habitat conditions are particularly important to establish.

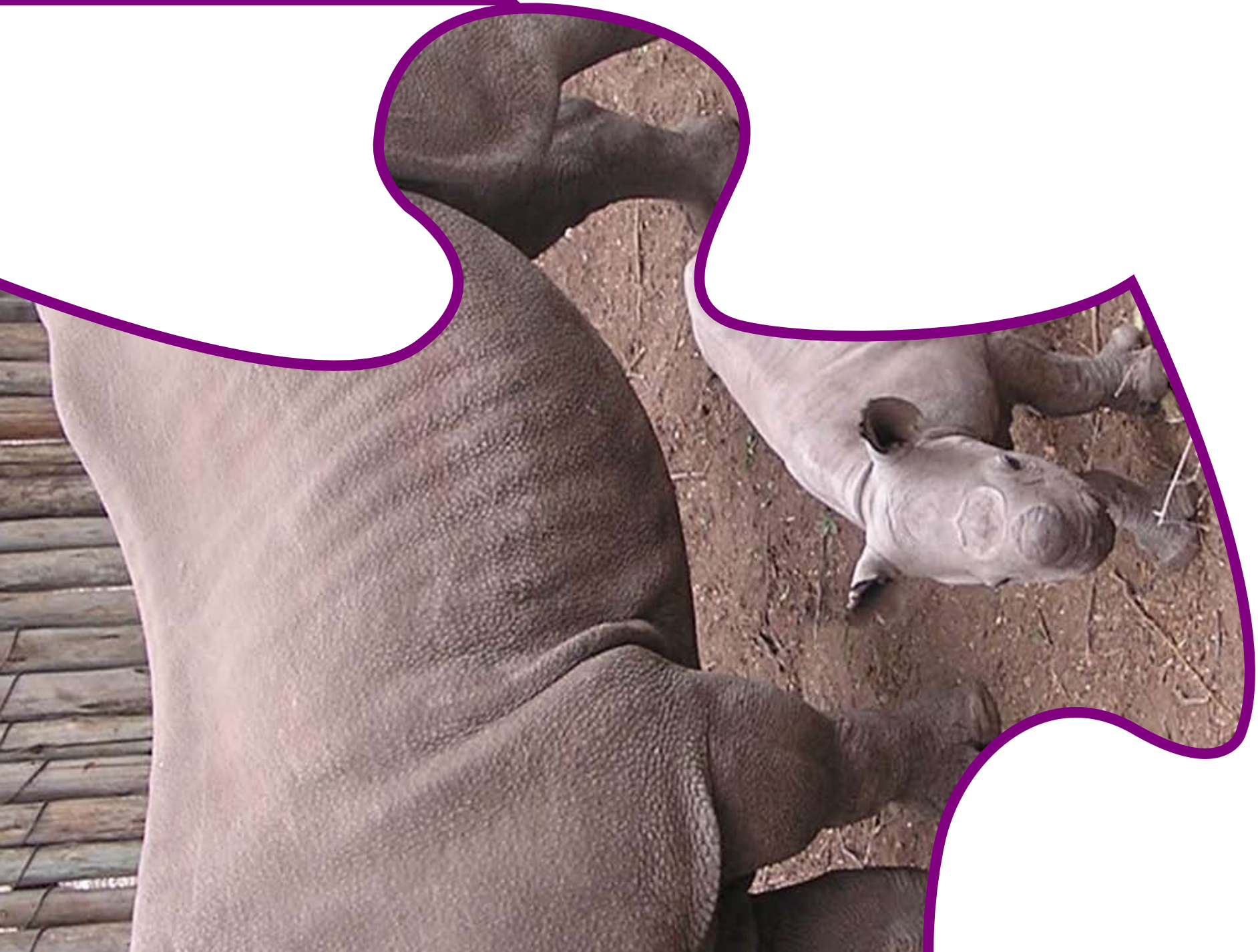
Nutritional problems are often the underlying cause of deaths that are ascribed to other factors; for instance “fighting” may be given as the cause of death when a rhino that is malnourished is injured by another and dies of injuries that would not be life-threatening to a rhino that is in good condition. This means that

a significant number of the mortalities ascribed to other natural causes in the RMG reports (and also some of the translocation mortalities) are likely to be associated with problems such as overstocking and habitat constraints. National Rhino Coordinators should be very careful to consider possible nutritional factors when dealing with rhino mortality reports.



WWF/ N. Anderson

RE-INTRODUCING RHINOS: BIOLOGICAL AND MANAGEMENT CONSIDERATIONS



SUMMARY OF GUIDELINES FOR: BIOLOGICAL AND MANAGEMENT CONSIDERATIONS IN RE-INTRODUCING RHINOS

R. du Toit

Ideally, each rhino re-introduction project will involve at least 20 rhinos, that are unrelated and all able to breed, being introduced into an area that has sufficient carrying capacity to allow rapid population growth to at least 100 animals.

The re-introduced rhinos should be of a subspecies that historically occurred at the re-introduction site.

In typical habitats within the SADC region (i.e. those lying between the more arid and the more humid rhino habitats within the region), the area required to introduce 20 black rhinos and to allow some room for growth is likely to be of the order of 300-400 km^2, while at least double this area will be required to enable population growth to over 100 rhinos. Thus wildlife authorities need to consider projects of this spatial scale when planning black rhino re-introductions.

The translocation of rhinos from one part of the region to another has to be done in accordance with the veterinary regulations of the relevant countries, but disease risks are usually low.

Behavioural factors have to be considered. In particular, fighting risks arise if rhinos are re-introduced to an area through a series of annual translocations; there is less fighting if the animals are all introduced in the same year.

The selection of re-introduction sites, although primarily based on issues of security and biological management, should take into account the opportunities for rhinos to contribute to strategic tourism development and to act as “flagships” for the conservation of other species.

5.1 What do we mean by "viability" of re-introduced rhino populations?

Since the priority rhino management issue for a number of the SADC member states is to re-introduce rhinos, and since these countries lack much of the technical expertise that is available within the larger range states, a specific section of this manual must be devoted to setting out guidelines for the re-establishment of free-ranging rhino populations within SADC range states. These guidelines apply at the stage of initial planning and do not incorporate the finer details of translocation and release procedures. The general species re-introduction guidelines of the IUCN Re-Introduction Specialist Group (see Annex 1A) are also applicable. Consideration must be paid not only to factors that pertain to the re-introduction of rhinos but also to those that pertain to the *in situ* consolidation of survivors of populations that have not yet been totally extirpated but which cannot constitute viable breeding groups without management interventions.

The long-term viability (sustainability) of such efforts at rhino re-introduction or consolidation will of course depend not only upon biological/ecological factors, which are outlined in this section, but also on economic and socio-political factors (including security) which tend to be more variable from one SADC state to another.

When considering "viability", there are subjective interpretations of this term. Even if some definition of viability can be agreed upon, it will often be the case that a phased programme of re-introduction or consolidation of a population is intended, so initially this will not constitute a "viable" breeding programme but should have a reasonable expectation of becoming so within a reasonable period. However, what is a "reasonable" prognosis of success? And what is a "reasonable" time horizon by which to have met some criteria of viability? Although there are no definitive answers for these questions, some general understanding can be gained by reviewing demographic and genetic management principles that apply to rhino conservation.

5.2 Genetic factors pertaining to rhino re-introductions

There can be little disagreement that a long-term aim of rhino breeding programmes must be to maintain the potential of these species to adapt to natural selection pressures (i.e. to evolve further). Conservation biologists cannot yet be precise about the population size and composition that would be required to limit the rate of genetic loss through inbreeding, genetic drift, etc. to a specified level. However, the "conventional wisdom" on rhino genetic management is as follows.

- Each population should be established with 20 or more effective founders. By "effective founders" it is meant that these animals will as far, as is known, be unrelated and will be capable of breeding (so if a population is started with five bulls and five cows each of which has a calf, then the maximum founder size is not 15 but only 10 because the cows and calves are directly related).
- Ideally, each new population will be established in an area with a carrying capacity of not less than 100 rhinos. This is often not possible; if it cannot be achieved then the less desirable alternative is to maintain at least one such population within a national or regional metapopulation. By "metapopulation" it is meant that two or more geographically separated populations will exist and rhinos will be translocated between these populations so that managed gene flow is achieved.
- There should be periodic exchange of effective breeders between populations of the same subspecies; i.e. at least one male or one female, capable of breeding, should be brought into each population every 10-15 years in order to compensate for inbreeding, genetic drift, etc.
- Rapid rates of population growth must be maintained, particularly in the smaller populations.

The founder animals should of course be of a "subspecies" that occurred within the area prior to extinction or is the same as any surviving rhinos in that area. There may be a risk in deriving founders

from a small source population that itself has had a limited founder base and has stagnated through poor breeding; this "sub-sampling" of the gene pool could bottleneck the genetic diversity of the new population from the outset. This is not likely to be a significant risk as yet in southern Africa because various populations that are most likely to be the sources of founders for new breeding programmes have been shown to still retain a high degree of genetic variability (Harley et al., 2005). In principle, it is desirable to draw the founders from more than one source population, of the same subspecies.

5.3 Demographic factors pertaining to rhino re-introductions

The demographic objective of maintaining the maximum possible rate of population growth overlaps with the genetic factors outlined above; rapidly expanding populations will pass on more genetic diversity from one generation to the next than will populations with stagnant growth rates. An annual population growth rate of 5% is regarded as a minimum target for rhino populations (Section 4.11.8), although well-managed introduction programmes can double this rate. Because recently established populations (or remnant populations) are small, caution is required when assessing their growth rates because even a single birth can constitute a large percentage increase in population size and is not necessarily proof of adequate breeding success. A small population may well have a very impressive birth rate in one year but no calves born over the next couple of years, since calving by a few females can become synchronized either by chance or because of the way in which the population was established.

As noted in Section 4.11.8, a common mistake is to calculate growth rates as being equivalent to a simple interest rate rather than a compound interest rate, thereby giving an exaggerated impression of the growth rate when compared to the 5% per annum benchmark. Even if this mathematical pitfall is avoided, the difficulties in deriving a meaningful growth rate for small, recently established populations require that other indicators of breeding performance must also be considered. The average inter-calving interval of the adult females can be checked for conformity with the benchmarks outlined in Section 4.11.8. However, neither of these indicators will necessarily be applicable in the early stages of population establishment; for instance, the breeding potential of the females within a re-introduction area may be initially suppressed if they are held in pens without opportunities to mate over prolonged periods during the release process, or if they have problems settling-in after their release.

These monitoring complications point to the fact that since rhinos are relatively slowly-breeding animals, their management during a re-introduction programme must be proactive (potential breeding constraints must be avoided, through careful planning, before they arise), rather than reactive (simply responding to problems once they become apparent). Unless breeding is limited by poaching or by insufficient founders, the major constraint will be the quality and extent of suitable habitat. Hence, a professional habitat assessment (see Section 4.4) is essential.

Once the carrying capacity of the re-introduction site has been estimated, this estimate can be used to determine whether the area is sufficiently large to meet the demographic targets of the programme. If the area is sufficient for the 100+ rhinos that would optimally meet the genetic management guidelines, and if 20+ founders of a reasonable sex ratio are available, then demographic issues are unlikely to require further consideration during the planning phase. If the area is too small for 100+ rhinos, then as outlined above it is necessary to ensure that the new population can be managed as a satellite breeding group within a metapopulation, with definite opportunities for exchange of animals. These opportunities must be clear from the outset not only in terms of the legal or diplomatic issues that will influence the exchange of rhinos, but also in terms of the funding, expertise and equipment that will be required to achieve these exchanges.

Rhino management authorities may sometimes compromise on the basic genetic and demographic principles in recognition of other factors. For instance, in South Africa groups of five or six black rhinos are sometimes auctioned to private buyers. This is justified on the basis that although it does not constitute recommended genetic management of the auctioned rhinos, it does bring in significant

funding which is then allocated to the protection and management of key rhino populations that remain the reservoirs of genetic diversity. Such situations are beyond the scope of these guidelines; for re-introductions to SADC countries such as Botswana, Zambia and Mozambique it should be feasible to follow "best practice" rather than compromising. Although the full complement of founder animals may not be introduced all at one time because of funding or other constraints, there should be a clear plan to introduce the additional founders (up to the target of 20+) in due course and the habitats/area should be sufficient to absorb these additions.

When re-introductions are undertaken by the private sector (commercial agencies or conservation NGOs) or as a joint venture between a state agency and the private sector (e.g. a custodianship scheme), there may be particular pressures to introduce rhinos in less than ideal numbers. In such cases the relevant wildlife management authorities need to consider whether the constraints to larger founder groups are truly insurmountable or whether some leverage can be applied to create a better situation. For instance, if the constraint is the size of the property to which the rhinos are being introduced, the wildlife management authorities should look for any opportunities to provide pressures or incentives (possibly assisted by donor agencies) to have this land incorporated into a larger wildlife complex such as a conservancy, without internal fencing. Zimbabwe's experience in creating large conservancies in its south-eastern Lowveld region is relevant (du Toit, 1992).

A guideline of the IUCN Re-Introduction Specialist Group (Annex 2) is that any re-introduction project should not diminish the viability of the source population (whether wild or captive). However, this will not be applicable in situations where fragmented "outlier" populations are being consolidated into a more viable one.

The sex ratio of the founder group should be as close to parity as possible. Having more females would increase the rate of breeding but a reduction in the number of males may reduce the genetic base of the re-introduced population, and may cause a problem of excess/surplus males in the donor population.

5.4 Ecological factors pertaining to rhino re-introductions

In order to meet the fundamental requirements of an adequate area of suitable habitat for a wild rhino population, professional input will be required to conduct an assessment of carrying capacity well before any translocation plans are finalized. Two levels of carrying capacity must be considered (see Section 4.4). Ecological carrying capacity (ECC) is the upper limit, at which population growth will be checked by a shortage of food or other density-dependent constraints. Maximum productivity carrying capacity (MPCC, also known as economic carrying capacity or the level of maximum sustained yield) is a lower density (assumed to be about 75% of ECC) at which population growth is optimised.

The carrying capacity of habitats for both species of rhinos varies greatly through the SADC region. For instance, black rhino ECCs vary from 1 rhino per 100 km² for parts of arid Kunene, Namibia, up to 1 rhino per 2 km² for valley bushveld habitats of Addo NP, South Africa.

As an initial and very rough planning guide for black rhino introductions, a stocking rate of one adult rhino per 10 km² is broadly applicable as MPCC over much of the former range of this species in south-central Africa, where Colophospermum, Acacia and Combretum are typical tree genera. However, this stocking rate would be too high in dystrophic (low soil nutrient) areas, such as extensive miombo woodlands on Basement Complex geology, and in arid areas such as most of Namibia.

Using this benchmark density of one adult rhino per 10 km², it will be apparent that to introduce the recommended minimum of 20 founders an area of at least 200 km² will be required, while to maintain the optimum population size of 100+ an area of 1,000 km² or more will be necessary.

It may be that much higher densities of black rhinos were historically recorded in the re-introduction area or in similar habitats elsewhere. However, it would not be prudent to use this type of historical or comparative information as the only basis for determining the area that is initially required for the release of the founder animals. Allowance must be

made for the fact that the foraging efficiency of rhinos may be reduced until they become familiar with the area, and their initially unstable social structure will create greater problems of "social carrying capacity" (see below) than will be the case with a naturally expanding, indigenous population. Experience has shown that vegetation changes can cause rhino ECCs to change dramatically (up or down) over time, therefore past densities may no longer adequately reflect current ECCs.

It must be emphasised that a stocking rate of 1 adult black rhino per 10 km² (as MPCC) is certainly not always applicable within SADC range states. The use of this figure in these guidelines is merely to indicate the approximate order of magnitude of the area that will be required within the range of likely SADC re-introduction sites (e.g. in Mozambique and Zambia) for a straightforward re-introduction programme.

When deciding whether a proposed rhino re-introduction area is large enough, allowance must be made for population expansion in order to avoid having to translocate rhinos out, or to extend perimeter fencing, etc., soon after the first calves are born. SADC range states that are re-introducing rhinos are unlikely, in the initial stages, to have ready access to the expertise, equipment and funding that would be required to maintain an intensive regime of translocations. Neither is it likely that additional release areas will be immediately available with the requisite levels of security, infrastructure, etc., into which to move rhinos from the initial release area if it becomes overstocked.

The SADC RMG has recommended that a new area should be stocked at no more than half MPCC (to allow time for growth before the population needs to be harvested from, as well as providing a safety margin should ECC have been seriously over-estimated. At the benchmark MPCC density of 1 black rhino per 10 km² , at least 400 km² would be therefore be required to introduce the recommended minimum of 20 founders and allow space for some growth. At that benchmark MPCC, an area of 1,000 km² or more will be necessary to achieve the target population size of 100+ black rhinos. The officials within SADC wildlife management agencies who are considering rhino re-introduction programmes are strongly urged to plan at this spatial scale, rather than at any smaller scale that would preclude at least 20 founders, ideally expanding to 100+. The alternative and far more problematic scenario, of moving founders in dribs and drabs into smaller areas, is discussed later.

With regard to white rhinos, carrying capacities of different habitats within southern Africa are even more variable than those for black rhinos, hence it is not appropriate to refer to a benchmark density for this species for general planning purposes. White rhino densities range down from a maximum of 2 white rhinos per km² in Hluhluwe-iMfolozi, South Africa; most populations in the SADC region have much lower densities of around 1 white rhino per 5 to 10 km².

Apart from suitable habitat, the other obvious ecological requirement that has to be assessed prior to the selection of a re-introduction area is the reliability and distribution of surface water supplies. Abundant and uniformly distributed drinking sites seem an obvious attribute, but on the other hand advantage can sometimes be gained from a smaller number of water points, because of the way that they can provide a natural check against the excessive dispersion of rhinos from an unfenced release area.

5.5 Disease factors pertaining to rhino re-introductions

Inherent disease risks within the re-introduction area itself are most unlikely to arise to the extent that they would constitute a significant constraint to rhino re-introductions. However, an area that shows repeated outbreaks of anthrax is undesirable. The prevalence of trypanosomiasis in tsetse-infested areas would be a complicating factor for rhino re-introductions but should not necessarily preclude the translocation of rhinos; a careful re-introduction schedule is feasible, provided that close veterinary surveillance is ensured (Mihok et al., 1992; Dunham, 2005). The possibility of any environmental toxins or poisonous plants being present in the re-introduction area requires consideration, but is unlikely to be a "killer factor" that will preclude an area from receiving rhinos.

Where "outlier" rhinos are being consolidated within a reserve, disease risks will be of minimal importance in the planning. But if rhinos are being imported from other areas then there is a definite possibility that they

may transmit diseases within the re-introduction area. The likelihood of such problems is low but nonetheless warrants a professional disease risk assessment, with particular consideration of tick-borne diseases and tuberculosis.

Tick-borne theileria or babesia parasites may flare up and kill black rhinos, especially if the rhinos are nutritionally stressed (e.g. during droughts) or are suffering from injuries or other diseases. Hence, it may be important to prophylactically treat rhinos that are being moved from areas where these blood parasites are known to have caused veterinary problems. Rhinos are the natural hosts of a number of ixodid tick species, some of which are the vectors of diseases (e.g. heartwater) affecting domestic livestock and some wildlife species (Duncan, 1989). It is therefore a prudent measure (and one that is stipulated by the veterinary authorities in most countries) to de-tick rhinos by applying topical acaracides before they arrive in the re-introduction area.

A more insidious disease risk arises with rhinos that have been raised in zoos, or held in captivity for long periods, and are brought back to wildlife areas for release (Osofsky et al., 2001). Black rhinos in captivity are particularly susceptible to a range of infectious agents, including fungal pneumonias. One explanation that is strongly suggested for this is that diet-related iron overloading develops progressively in zoo rhinos and suppresses the animals' immune systems (Osofsky et al., 2001). Veterinary authorities in southern Africa are very cautious about the transmission of bovine tuberculosis from infected areas in South Africa but tend to regard rhinos as a low-risk species in this regard; rhinos from zoos should be viewed more critically as potential carriers of this and other infectious diseases.

5.6 Behavioural factors pertaining to rhino re-introductions

Rhinos have more complex social systems than is generally realized. Translocations will inevitably disturb these systems and will tend to increase the risk of intraspecies fighting. Some problems are unavoidable, such as the jostling for optimum home ranges and social dominance among bulls when they are first released. Nonetheless, when a high frequency of injuries or deaths ensues from fighting amongst translocated rhinos, this problem should not merely be accepted as "normal" for rhinos – the possibility of underlying management problems must be considered.

It is desirable to bring all 20 or more founders in to a new area in a single year, rather than phasing the introductions over several years, because otherwise bulls that have come in first will establish home ranges and social dominance, and will fight with the bulls that are brought in afterwards. If it is not possible to achieve a single phase of introductions, then the rhinos may have to be released in different parts of the reserve (if it is large enough). This will spread the effort that is required for their protection over a larger area. Alternatively, the rhinos could be released into a series of adjacent, fenced compartments and the fences can be removed once the rhinos have established their home ranges. However, this requirement for fencing is expensive and any kind of extra management such as this can give rise to unexpected complications, so is best avoided if at all possible.

The social effects of translocations within donor populations also need to be considered.

5.7 Summary of strategic planning issues pertaining to rhino re-introductions

To help achieve strategic goals as outlined in Section 2.1, and to maximize the chances of success for each re-introduction project, the following strategic planning issues should be considered when planning and locating this type of project.

- Distance to other rhino populations (relevant to the logistical constraints of metapopulation management).
- The distribution of other important biodiversity features or hotspots (so that a concentration of effort on rhino conservation can coincide with the conservation of other key elements of the nation's biodiversity).
- The national priorities for tourism development and general improvement of parks (so that providing the habitats and security situation are conducive, rhinos are put first into areas where they can boost the tourism attractions, and can generate tourism revenues that will help to pay for their conservation).

- Plans for Transfrontier Conservation Areas that could, for instance, boost the restocking of a minor range state through cross-border assistance in rhino allocations, technical and logistical support from a major range state.
- Allocations of wildlife areas for development by the private sector (where the awarding of long-term concessions could stimulate Public-Private Partnerships and commercial investments that facilitate the restocking, monitoring, management and protection of rhinos).
- Whether there are any area-specific, long-term commitments from donor organisations for support programmes.
- Plans for community-based conservation projects that could, in due course, be boosted by the addition of rhinos.

ENSURING SECURITY OF RHINO POPULATIONS

CESVI/ V. Turrisi

SUMMARY OF GUIDELINES FOR: ENSURING SECURITY OF RHINO POPULATIONS

R. du Toit, L. Mungwashu and R. Emslie

The establishment of anti-poaching systems should be based on the concept of maximizing the risk for poachers whilst also minimizing their potential rewards from killing rhinos.

Maximizing the risk to poachers is achieved by maintaining intelligence networks and by ensuring effective field surveillance of rhino populations, with this surveillance including civilian elements such as tourist operators, researchers and unarmed rhino monitors who may be engaged by NGOs. These varied eyes and ears must be coordinated to ensure the earliest possible detection of poaching incursions, to be followed by swift and aggressive reaction by anti-poaching units.

Minimizing the returns to poachers involves measures such as dehorning rhinos, translocating some of them elsewhere when poaching becomes prevalent, increasing legal penalties, influencing communities to deplore poaching, disrupting horn trading networks, etc.

The fundamental aim of anti-poaching is to reduce the motivation for poachers to enter a rhino area in the first place, through the ongoing demonstration of high risks and low rewards. It is not necessarily a sign of anti-poaching success that the protection units have a high rate of encounters with poachers and win all or most of those encounters; once diverse groups of poachers have started frequent incursions, the situation deteriorates into a “poaching war” and the rate at which rhinos are lost can soon become unsustainable.

Manpower densities for effective anti-poaching within an area that contains rhinos are unlikely to be less than one man (suitably trained, equipped and motivated) per 20 km^2, and in many cases this density may have to be increased to one man per 10 km^2.

Of all the items of equipment that are required by anti-poaching staff, reliable handheld radios are amongst the most important because effective communications will reduce the time between a poaching incursion being detected by someone, and a reaction being achieved. Thus the poachers will inflict less damage on the rhino population.

Recording and analysis of field patrol effort, and the outcomes from this effort, are essential in order to reliably monitor trends in poaching activity, over different areas and over different time periods.

Incentive systems for anti-poaching staff, and informer and reward systems within all sectors of the local community and staff, are important for the protection of rhinos. However, these systems need to be implemented with considerable care as poorly administered incentive and intelligence systems can become worse than none at all.

All possible information must be derived from each rhino poaching incident, using appropriate methods of scene-of-crime analysis. This evidence must be carefully recorded and/or preserved in accordance with the legal steps required to present the evidence in court. Expert witnesses should be used whenever possible to reinforce the case for prosecution.

Investigating agencies should follow established procedures to share their information with sister agencies who have valid needs for such intelligence. Specific databases have been designed to facilitate this.

The rhino management authorities within every range state should undertake regular assessments of the amount of rhino horn that is likely to be derived from various sources (natural mortalities, dehornings, etc.). The anticipated accumulation of horn into official stockpiles from these sources should be compared with actual accumulation rates in order to detect leakages of horn to the illegal sector. The horn stockpiles must be maintained in accordance with CITES regulations and must be regularly audited.

6.1 Reducing incentives for rhino poaching

Two fundamental points pertain to commercial rhino poaching:

- dealing with poaching through a military response to the detection of carcasses, poachers' tracks, gunshots, etc., is insufficient in itself because by the time this stage of reaction is reached, the rhino population will have sustained losses, which are likely to continue as poachers gain local knowledge and slip in and out through an overstretched security screen;
- to be proactive rather than reactive, the emphasis of anti-poaching must be placed on reducing the motivation for would-be poachers to make any incursions into a rhino refuge in the first place; this requires a comprehensive strategy to ensure that disincentives (risks) for poaching outweigh incentives (rewards).

Some options for tackling the poaching problem holistically, in terms of the reward/risk equation, are as follows.

Increasing risk to poachers

- Allocate more manpower to field protection, using staff members who are adequately trained and authorized to respond aggressively to poaching incursions. The question of adequate authorization is a vexing one for private sector operations; the official law-enforcement agencies need to do all they can to empower private rhino guards (e.g. by training and attesting them as militia) while ensuring that their use of force remains in conformity with the laws of the country.
- Allocate manpower to rhino monitoring, with an emphasis on the deployment of men who are proficient in the tracking and identification of rhinos but who do not necessarily have to be heavily armed and to participate in confrontations with poachers. These rhino monitors may be employed by conservation NGOs as an auxiliary force to operate in state-protected as well as private or communal areas (provided they are security-cleared and have reasonable conditions of service so that they are not tempted to poach or to collaborate with poachers). By putting these men in the field, the chances of rapid detection of poaching activity are maximized.
- Allocate more anti-poaching resources (equipment, fuel, etc.) to field protection. There is little value to be derived from extra manpower unless these men have adequate housing, transportation and patrol gear. Some NGOs have flexibility to assist with "shopping lists" (ad hoc needs) when poaching flares up in state-protected areas, but donors are generally reluctant to commit to long-term support arrangements that create dependency.
- Develop intelligence networks, backed up by a reward system for information on poaching activities (see below).

Decreasing the reward for poachers

- Reduce rhino densities by translocating some rhinos to other, more secure areas (if available).
- Dehorn rhinos (see below).
- Induce community attitudes that favour rhino conservation and ostracize poachers.
- Disrupt horn trading networks, which are often associated with smuggling of other commodities, so that poachers have less access to reliable outlets for horn.
- Work to ensure effective prosecution and conviction of rhino poachers and horn traders, and the handing down of deterrent sentences rather than lenient ones.
- Induce community attitudes that favour rhino conservation and ostracize poachers.

6.2 Manpower levels

Experience in Zimbabwean parks (which have generally been intermediate in terms of funding between the relatively well-funded parks of South Africa and parks elsewhere in the SADC region) suggests that the number of rangers that is required to patrol these parks is approximately equal to the square root of the area (in km^2) of that park (R.B. Martin, pers. comm.). Thus a park of 400 km^2 would require about 20 men on active duty, whereas a park of 4,000 km^2 would require 63 men in the field.

However, the manpower needs for rhino protection will tend to be greater than this: the minimum manpower density that should be in place for rhino protection is one active, trained and adequately equipped scout per 20 km², and this would have to be increased to one man per 10 km² where poaching pressures are high and where there is a risk of "hit-and-run" poaching incursions into a small, accessible rhino reserves. In the larger parks with rhinos, the manpower density of one man per 20 km² need not be maintained throughout the area but only in the sections that contain rhino concentrations ("Intensive Protection Zones").

Each man would be expected to spend at least 15 days per month on patrol or undertaking other rhino protection duties in the field, rather than in the park's bases.

In larger reserves, it is highly desirable that the basic field force is complemented by a reaction unit of a well-trained, highly-motivated individuals with rapid deployment capabilities. It is also recommended that a specific rhino monitoring unit is established using rangers or auxiliary staff with particular tracking, bushcraft, radiotracking and other rhino monitoring skills and experience. These men, some of whom may be engaged by NGOs or tourist operators, need not necessarily be armed to deal with poachers, although they may need some weapons to protect themselves against dangerous wildlife. A ratio of one of these monitors per 20-25 rhinos should be adequate to maintain up-to-date rhino identification files as discussed in Section 4.11.2. This rhino monitoring unit would have a focus on signs of poaching activity within the areas of rhino concentration while the rest of the IPZ or park staff would operate more generally. However, even if a rhino monitoring unit is present, the other men who patrol the park should be trained in basic rhino monitoring (recording earnotches, etc.).

Park administration should include a system to monitor law enforcement effort (days spent on patrol, relative patrol effort for different zones of the park, detection of illegal activities and sightings of rhinos in relation to patrol effort, etc.). The principles that underlie the design and implementation of such a system for rhino conservation are described by du Toit (1989) and a SADC RPRC software program has been designed to assist in the capture and analysis of relevant patrol data within a customized database (Purchase, 2004). New technological developments include miniaturized GPS engines and data-loggers, making it possible to produce small, robust and cheap devices to automatically record patrol routes and to fix locations of key events or sightings in a format that readily inputs to the law-enforcement database for a park. A customized device of this type is under development within the SADC RPRC.

6.3 Equipment, training and motivation required for protection of rhinos

Radio communications are of fundamental importance to rhino protection and necessitate the establishment of a radio system (using repeater stations if necessary) that enables communication on VHF handheld radios ("small means") throughout the park, or at least throughout the IPZ. Having a communications system comprised only of HF base station radios ("big means") is insufficient because the rapid detection of, and reaction, to poaching incursions can only be achieved if patrols or rhino monitors immediately communicate their information. In addition, patrols in areas of dangerous wildlife and other natural hazards need to be able to summon help in the event of an accident. It is highly desirable to have several channels for the VHF radio system, maintaining at least one secure channel but also including a general-use channel that enables communications between the anti-poaching staff, tourist operators and other personnel who have legitimate business in the area and can act as "eyes and ears" and provide logistical support if necessary.

The weapon that is most commonly used to kill rhinos is the AK47, and can be expected to be used by poachers in fire-fights, so anti-poaching units must be equipped with equivalent automatic or semi-automatic assault rifles. Men that are not authorized or trained to engage in fire-fights (such as rhino monitors or non-government staff) can be equipped with shotguns for basic self-defence with the advantage that these weapons cannot be used to kill rhinos, therefore any inclination towards internal poaching is reduced.

Apart from radios and firearms, basic patrol equipment and materials (back-packs, water bottles, binoculars, spare radio batteries, notebooks, maps, GPS devices, rations, etc.) are required for effective anti-poaching and must be consistently supplied. However, care

must be taken with the use of GPS devices because experience in some areas has shown that excessive reliance can be placed on these devices for "getting from point A to point B", with inadequate bushcraft and a failure to observe the terrain, wildlife, water points, potential poachers' routes, etc.

Field patrol staff must be adequately trained (in weaponry, drill, anti-poaching tactics, etc.) and disciplined under a fair Code of Conduct. They should also be rewarded for good performance through an equally fair incentives system. However, two major considerations apply to an incentives system:

- the system should not be initiated unless it is sustainable because if it lapses after being started, due to lack of funding or other reasons, this will demoralize and antagonize the field staff (hence donor-supported incentives systems must be viewed with caution);
- the system should be strictly applied according to clear rules, with objective means of verification of effort or performance, and it should be accessible to all personnel who perform the same duties in the face of the same risks.

6.4 Considerations for private and communal sector operations

Anti-poaching personnel operating on private land should, to the fullest extent possible under national legislation, be indemnified against any legal claim arising out of actions taken by them in pursuit of rhino poachers. In some countries, it is possible for anti-poaching personnel from private reserves to be attested into the national police force or parks service as auxiliary members. This gives them the powers of arrest and the necessary indemnification.

The employment of community game guards for monitoring rhinos and undertaking law enforcement should be encouraged wherever the land tenure system makes this approach relevant. The national wildlife agencies should participate in the training of the game guards and should occasionally provide their own personnel to carry out joint patrols with the game guards. As with anti-poaching personnel on private land, community game guards have to be legally indemnified to the fullest extent possible in order to operate effectively, but in giving these men greater powers care must be taken not to undermine any traditional hierarchies or disciplinary processes that might be effective in community-based rhino conservation.

6.5 Informer and reward systems

The use of intelligence ensures optimum utilisation of ground patrol staff in that deployments are done in those areas where illegal activities are most likely to occur. A highly effective intelligence gathering system can reduce the number of anti-poaching patrol staff required in wildlife conservation agency. This can only happen where people who provide information about wildlife crimes are motivated by being justly rewarded and their identity is not compromised; compromising the identity of an informer can obviously lead to retribution by those whom the informer will have informed upon.

Staff members who are involved in anti-poaching intelligence have to be trained on how to infiltrate poaching gangs and how to recruit and handle informers. An informer must have only one handler so as maintain the informer's confidence that he or she is being dealt with in a confidential way. The organisation must have a documented reward system, which stipulates the various categories of information and the corresponding rewards and these have to be reviewed on a regular basis to ensure they remain attractive to the informer lest the informer turns 'double agent' and starts passing information on patrol deployments, etc., to the poachers. The categories of information will depend on the amount of effort and risk entailed in procuring that information.

An informer reward system, because of its confidentiality, can create significant accounting problems that will need careful consideration within the wildlife agency in order to balance the needs of the system against the risks of corruption. Some state agencies (or NGOs) have sufficient flexibility in their accounting systems to be able to provide funds that do not have to be accounted for by investigations staff when paying undercover informants. Other state agencies or NGOs do not have this flexibility and can only support a more transparent, accountable

arrangement in which defined rewards are paid to witnesses in court cases that lead to successful prosecutions of poachers. This less flexible system is, nonetheless, very effective if it is well-publicized.

This effectiveness arises from the fact that if there is general knowledge that informants will be paid big rewards for facilitating convictions, a potential rhino poacher will become aware of this and will therefore see a greater risk of being informed on and caught if he gets involved in poaching. Therefore he will be less inclined to take the risk of shooting rhinos. A clear example of this type of well-publicized reward system constituting a significant disincentive for rhino poaching comes from the Lowveld conservancies in Zimbabwe, where rhino poaching in the early 1990s stopped once a reward system was coupled with a dehorning programme.

6.6 Entrapment versus enticement in apprehending dealers in rhino horn

Entrapment arises in a situation where a law enforcement officer is aware that there is someone who has rhino horn and is looking for a buyer, but the officer may not know where the rhino horn is being kept so getting a search warrant to simply search for the horn and make an arrest may not be possible. The only option may be to find someone who poses as a buyer and arranges a date and venue for the transaction to take place so that the horn seller can be arrested during the transaction. Most wildlife laws in the SADC region make possession of rhino horn without a permit a crime, so the burden of proof is placed on the person who has the horn in his or her possession to show that such possession is lawful.

A somewhat different entrapment situation may arise when a person approaches an employee of a conservation agency and offers to buy horn illegally from the employee. In order to set up a trap, the conservation agency could supply a horn so that the employee can pose as a corrupt member of staff, going along with the offer of an illegal transaction. The significant difference between this situation and the one outlined above is that now the State must prove deliberate unlawful intention on the part of the accused. Therefore, the State has to show that the accused made a concerted effort to buy the horn (such as repeated approaches to the witness), and to strengthen the State's case the witness must show that he/she tried to dissuade the accused from pursuing the transaction. Courts tend to treat these situations with circumspection based on the possibility that the suspect may have been deliberately enticed into engaging in the unlawful activity. Thus, the courts may refuse to prosecute or if they do agree to prosecute, the penalties meted out may be relatively low.

6.7 Acquiring information and evidence through crime investigations

The use of appropriate scene-of-crime techniques can play an important role in:

- maximizing the chance of identifying and apprehending criminals; and,
- ensuring that the evidence collected at a scene of crime is admissible in court, in order to maximize the chance of achieving an appropriate conviction.

Because of the importance of these issues in rhino protection, the SADC RPRC has arranged specialist scene-of-crime training courses in several SADC rhino range states. Follow-up training will be required in future in some range states, hence the SADC RESG has recommended that the existing scene-of-crime course should be modified to have greater emphasis on training-of-trainers, thus maintaining training capacity into the future. It is strongly recommended that in addition to specialised police units and wildlife investigators, senior field managers in charge of rhino areas are also trained in scene-of-crime techniques. It would then be more likely that someone who is appropriately trained can attend to the crime scene relatively quickly, thus maximizing the gathering of useful evidence which is rapidly lost.

The procedures that need to be followed are mainly standard ones for any outdoor crime scene, generally involving shooting. Thus, patrol staff must be made aware of the crucial need to preserve evidence (avoiding disturbance or degradation of the site by humans, wildlife, the weather, etc.), while those who investigate this evidence must record all possible details (through systematic note-taking, sketches, photographs, sample collection, etc.) and must

maintain the chain of evidence right through until a court case to ensure that evidence and exhibits will be admissible in court. To increase the likelihood of evidence being found, these basic techniques must be enhanced by making the relevant personnel aware of aspects that have particular significance in rhino-related crimes. Examples of rhino-specific aspects are:

- an understanding of how poachers are likely to find, stalk and shoot rhinos will aid in finding poachers' spoor and bases, locating spent cartridges for ballistics investigation, finding witnesses to interrogate, etc.;
- knowledge of the typical decomposition rate of a rhino carcass will assist in determining the likely date, month or year of a rhino's death;
- being aware that the decomposition process causes bullet heads to be gradually buried in the soil humus under a rhino's remains will make it more likely that the investigator will dig for this evidence;
- insight into the typical daily movement patterns of rhinos, and their likely interactions with other rhinos depending upon their age and sex, may lead to the discovery of other rhino carcasses, or may enable the investigator to back-track from the site of a rhino's death to another site where the rhino was initially wounded.

The above examples emphasize the fact that the follow-up to rhino poaching requires some special skills and experience. Hence, it should not be assumed that the policemen, soldiers, militia or other such security personnel of a range state can routinely take care of the follow-up, without further training or without the involvement of suitably experienced colleagues.

6.8 Interacting with courts that deal with rhino crimes

In some countries, wildlife investigators working for conservation agencies can provide significant assistance to prosecutors during preparation for a case involving rhino crime, and they may also be able accompany them in court and give them further advice and information as is needed during the case. The use of specialised wildlife prosecutors, if available, will also help to ensure convictions.

Even if a conviction is secured, a lenient sentence may be imposed unless expert evidence is presented to convince the court that maximum penalties should be applied to those who are found guilty of rhino crimes. Obviously, if someone convicted of a serious rhino crime gets off with a paltry fine which is lower than the value of the animals poached and/or the estimated black market value of horn received by the poacher, this will not act as a deterrent to future poaching.

In some SADC countries, after conviction and prior to sentencing the prosecution can call upon an expert witness when arguing in aggravation of sentence. This witness can stress the rarity, plight and value of rhinos, the consequent seriousness of the crimes, the country's responsibility to conserve the species according to a number of international conventions, as well as the need for effective deterrent sentences. The seriousness of rhino crimes can be further highlighted by quoting the live sale and other economic use values of rhinos, explaining their contribution to the creation of employment and foreign currency in the tourism industry, and outlining the costs to the country of protecting rhinos (in human and financial terms). The fact that much of the illegal profit from rhino crimes is made by foreign nationals in consuming states should also be stressed. The use of a representative from an international organisation (such as the AfRSG Scientific Officer), or the country's national rhino coordinator, to present such information in a technical way can assist in lending credibility to these arguments.

The difference between rhino crimes (of greed) and subsistence poaching by poor people (crimes of need) should be made clear during the prosecution and presentation of evidence in aggravation. Nonetheless, in cases when rhinos are snared by people claiming to be attempting to trap other animals, the magistrates need to appreciate that these cases cannot be regarded with any leniency because the risk to rhinos in those particular areas makes indiscriminate snaring an even more serious offence than usual.

When dealing with potentially controversial rhino cases, such as those involving entrapment, it may be advisable for the prosecution to seek high-level legal advice. For example in one case, the local Swazi prosecutor benefited from advice from the KwaZulu-Natal Attorney General who was an expert in the law regarding entrapment cases.

6.9 Law enforcement databases and sharing of information

The cross-border nature of horn smuggling, and also of poaching in many situations, requires that different national or provincial law enforcement agencies cooperate and share intelligence. Various wildlife agencies keep crime registers into which they record all wildlife crime offences. As the records are maintained manually, often in bound books, it is difficult to share this information with other interested sister agencies. This often results in some criminals with known previous rhino crime cases being treated as first offenders and therefore getting away with lenient sentences. Also, leads in an investigation by one agency can become blocked by lack of relevant information from another.

With partial SADC RPRC funding, a law enforcement database initially developed in KwaZulu-Natal has been enhanced and has been made available throughout the SADC region. This database allows users to store and link information about investigations, court cases, incidents, suspects, convicted criminals, suspected front businesses, vehicles, weapons, species, photographs, documents, etc. A number of customised reports and graphs can also be produced. A central (national or HQ) version of the database is available as well as a satellite version (for individual parks or sections within parks). Data can be sent from satellite versions to the central version. The software and training videos are available from the SADC RPRC.

There are currently two formal bodies actively involved in facilitating intelligence networks: the Interpol Environmental Crime Working Group (IECWG), which is an arm of Interpol Southern Africa Regional Office, and the SADC Rhino and Elephant Security Group (RESG).These two groups hold their meetings back to back, as this is cost-effective and also maximizes the sharing of information between the groups.

6.10 Dehorning programmes

At the height of rhino poaching, dehorning of rhinos has been carried out by several range states. Namibia pioneered this process, in 1989, and dehorned a large number of vulnerable rhinos until poaching abated in the mid 1990s. In November 1991, Zimbabwe conducted an experimental dehorning exercise for 59 white rhinos in Hwange National Parks and followed-up with a national rhino dehorning programme, commencing in June 1992 and involving over 400 dehornings. Similarly, wildlife authorities in Swaziland dehorned all remaining white rhinos around the same time. From these various dehorning programmes, the following salient points become evident.

- Dehorning entails an acceptably low risk of mortality during the drug immobilization and dehorning procedure. For black rhinos, the mortality risk has been under 1%.
- Although allegations were made that dehorned rhinos were at greater risk from fighting with rhinos that still had horns, along with allegations that a few dehorned cows were unable to protect their calves from predators, no convincing evidence was produced to back these assertions.
- The horns re-grow normally, at a rate of approximately 6 cm/year for front horns, and 3 cm/year for rear horns; after 3-4 years, the horns look normal again.
- The immobilizations are expensive (usually at least US$500 per rhino) but often provide opportunities to concurrently earnotch, or radiocollar, or translocate rhinos.
- Tourists tend to accept dehorning as the demonstration of effort to protect the species, rather than regarding dehorned rhinos as alarmingly disfigured.

The fact that a large number of rhinos were poached in Hwange NP (Zimbabwe) more than a year after dehorning operations had started has been cited as evidence that dehorning does not stop rhino poaching. However, during late 1992 and early 1993, anti-poaching efforts in the park were virtually halted due to budget cuts. At this stage, over 40% of the estimated Hwange population of 200 black and white rhinos had never been dehorned, or had substantial horn regrowth. Thus in a situation of minimal risk, it was still worthwhile for poachers to continue operating in Hwange NP despite a reduced reward (in terms of a somewhat lower yield of horn). In addition, it can be postulated that poachers harvested horn stubs from dehorned rhinos while they had the opportunity to do so, but subsequently experienced market resistance to these unnatural horns when they attempted to trade them. This possibility, coupled with the increasing

protection that was achieved within Sinamatella IPZ, may well have tipped the balance towards inadequate reward to poachers in relation to the growing risk that they faced of being detected. The dehorning programme collected about 400 kg of rhino horn in Hwange NP alone, that would have otherwise have entered into, and helped maintain, the illegal trading network.

Partial or complete dehorning is recommended to reduce the risks of traumatic horn loss during rhino translocation (agitated rhinos can accidentally knock their horns off in crates or in pens, leaving bleeding horn bases). Dehorning will also reduce the risks of injuries if rhinos fight each other while they attempt to establish their dominance in new areas. However, dehorning under these circumstances has to be weighed against the need for inserting horn transmitters in translocated rhinos.

6.11 Management of rhino horns

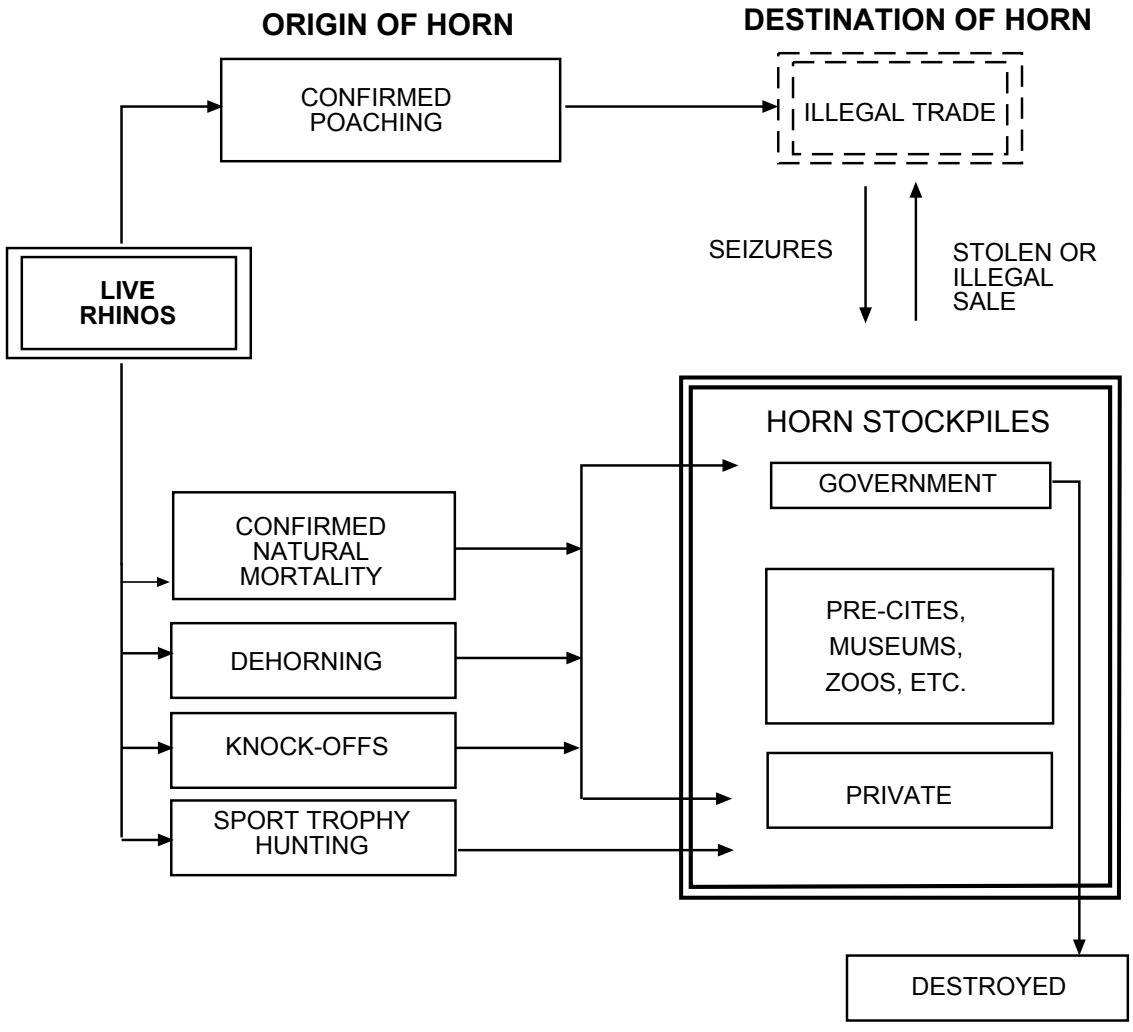
6.11.1 Sources and stocks of rhino horn

This issue has been reviewed, as a SADC RPRC exercise, by Milledge (2002) who produced the following diagrammatic representation and whose report can be consulted for greater detail.

Sources of rhino horn are:

- natural mortality through old age, territorial fights, etc.;
- planned dehorning exercises;
- seizures from poachers and other illegal activities

Figure 5: Simplistic view of rhino horn movement.



Sources of rhino horn, for accumulation by the national rhino management agencies, are:

- natural mortality through old age, territorial fights, etc.;
- planned dehorning exercises;
- seizures from poachers and other illegal activities;
- accidental, traumatic loss of horns (particularly breakages during fighting or translocation);
- sport trophy hunting.

Stocks of rhino horn (apart from the horns carried by live rhinos) are:

- government stockpiles;
- private stocks (being horns from privately owned rhinos, or horns obtained before rhinos were listed on CITES appendices and which can therefore be held legally by private owners provided they are registered);
- illegal stocks (being horns in sale, in transit, being stored for future sales, or not intended for trade but which may nonetheless be illegal if they have not been registered (where this is required by national legislation).

The proportion of horn within these different stocks will vary greatly from country to country, depending upon the size and ownership of the rhino populations, management systems, poaching levels, etc. Each rhino management authority should develop a flow chart, based on the circumstances that apply to the rhino population(s) under its management, to predict the likely annual yield of rhino horn from natural or legal sources and to verify if the horns are in fact being accumulated at approximately this rate, or if there is a significant deficit arising because of poaching or theft from horn stocks. The issue of carcass detection rates would need consideration here, in terms of the patrol effort that is (or should be) achieved in each area that contains free-ranging rhinos.

Figure 6: Sources of illegal horn and some modes of intervention (from Milledge, 2002)

The total quantity of horn in recorded stockpiles within Africa (around 15 tonnes) is believed to be approximately equal to the total quantity outside Africa, of which a significant proportion is in depleting stockpiles in Asia. With this accumulation of stockpiled horns within Africa, it is feasible that the illegal supply of horn from these stockpiles (through theft or national corruption) could exceed the amount of horn that could be derived through poaching. This situation arises not only because most remaining rhino populations are protected better than they were in the 1970s and 1980s, but also because the government and private stockpiles have been building up. Thus improved security and monitoring of SADC horn stocks is essential.

At the eleventh Conference of the Parties to CITES in April 2000, Parties adopted CITES Resolution Conf. 9.14 (Rev.) *"Conservation of and trade in African and Asian rhinoceroses"*. Whilst acknowledging the many successes and advances in rhino conservation worldwide, it recognised the need for continued efforts and specific interventions. This Resolution, the only one of its kind specific to rhinos, clearly recognises the need for appropriate monitoring and counter measures to minimise the risk of horn stockpiles entering illegal trade. It urges *"all Parties that have stocks of rhinoceros horn to identify, mark, register and secure all such stocks"*. Further, horn stocks are one of several details that should be submitted by all Parties in a biannual report to the CITES Secretariat six months before every Conference of the Parties to CITES. Amongst other issues, the Resolution also urges *"all Parties to adopt and implement comprehensive legislation and enforcement controls, including internal trade restrictions and penalties, aimed at reducing illegal trade in rhinoceros parts and derivatives" and "that law enforcement cooperation between and among States be increased in order to curtail illegal trade in rhinoceros horn"*.

Existing deficiencies in horn stockpile management would have to be addressed by any SADC countries that wish to pursue options for legal horn trade, under CITES, in future. South Africa, with the largest national rhino populations and with the largest involvement of the private sector, is inclined to consider trade options but would require significantly improved stockpile management within the private sector before any of these options would be feasible.

6.11.2 Securing legal horn stocks

The horns from trophy hunting are exported (and recorded) under CITES controls. Horns from the other natural or legal sources should of course be securely held. Once rhino horns from any of these sources have been received they should immediately be measured, weighed, allocated a unique serial number, marked and recorded in a rhino register. The register must be a bound book with numbered pages to minimise the chances of the records being tempered with. A duly completed and signed-for issue voucher must accompany the movement of horn from one office to the other. All horn must ultimately be stored in one national or provincial store rather than at various offices. Each horn at the national/provincial store must be marked with a unique national number as prescribed by CITES requirements (the country's two-letter ISO code, the last digits of the year of recovery of the horn, and a serial number) as well as the weight of the horn in kilograms. Where funds permit, in addition to the other markings the horns should be micro-chipped with passive transponders (of a type approved by the SADC RESG) and a transponder database should be maintained.

Rhino horn is susceptible to attack by weevils and other pests so it is important that new stock is thoroughly disinfected to avoid contamination of the horn already in stock. The storerooms should be fumigated on a regular basis to ensure that any weevils that infest the storeroom are destroyed before causing significant damage.

Entry into the storeroom should be restricted to a few authorised people, ideally only two. Access into the storeroom by any other people besides those who work in the rhino storeroom must be authorised by senior management of the conservation agency and a record of such authorised entry and purpose thereof must be kept. The storeroom building must be constructed of robust material and should be fitted with a metal door with a combination locking mechanism. A 24-hour guard of armed personnel must be maintained. Adequate lighting must be provided at night to ensure that any movement is easily detected. It is strongly recommended that the storeroom building be fitted with an alarm system.

Further details on how rhino horn should be marked and stored are specified in CITES Resolution Conf. 9.14 (Rev.).

Guidelines on the use of a customized, computerized database for horn stockpile management are provided in a SADC RPRC report (Milledge, 2003).

WWF/ N. Anderson

RETAINING AND ENHANCING HUMAN RESOURCES FOR RHINO CONSERVATION

SUMMARY OF GUIDELINES FOR: RETAINING AND ENHANCING HUMAN RESOURCES FOR RHINO CONSERVATION

R. du Toit and G. Daconto

Effective rhino conservation depends on a wide range of expertise, from modern skills such as those of a veterinarian to informally acquired skills such as those of a tracker. The informally acquired skills must not be overlooked as wildlife management authorities establish their grades of manpower and recruit staff members into these grades.

The management authority in a range state that is in the process of re-establishing its national rhino population will not initially possess the full range of required expertise within its ranks. This gives additional reason to maintain linkages with other management agencies, via a regional rhino network, in order to draw on regional expertise when the needs arise.

Because the range of expertise that is required for rhino conservation is broad, and because institutionalized training opportunities in the region are limited in their scope and in their availability, capacity-building is best achieved through in-service training. Senior conservation managers should undertake needs assessments for capacity-building within their staff, and then find suitably experienced individuals within their agencies, or within other national or regional institutions, to undertake the in-service training.

A considerable body of information as well as training tools have been developed by the SADC Regional Programme for Rhino Conservation and can be used to help identify and to meet some of the needs for in-service training.

7.1 The need for varied expertise for holistic rhino conservation

Effective rhino conservation involves a blend of "high-tech" inputs and informally-acquired "low-tech" skills of bushcraft and tracking. It must be remembered that poachers are typically from rural backgrounds and their poaching technology is limited to firearms (and possibly also cellphones, in the more developed parts of the SADC region). Therefore, getting to grips with these poachers will require that the protection effort includes a number of men who are equally proficient in bushcraft and hunting skills, and can anticipate the "low-tech" tactics of the poachers in relation to the area's terrain, habitats, water distribution, rhino distribution, etc.

The same skills are required for aspects of rhino management. The most cost-effective way to capture rhinos within a large area is to deploy a tracker unit that locates the rhinos or at least their fresh spoor, then uses radio communications to summon a surveillance aircraft and to direct it above the rhinos, which the aircraft orbits while calling in and directing a helicopter and veterinarian to dart them. The aircraft then guides a specialized four-wheel-drive vehicle to each immobilized rhino, and the capture process is completed through the crating of the rhinos and the transport of the crates out of the area on the truck (or, alternatively, a large helicopter carries each rhino out of the area in a net). Thus, a large range of different skills are exhibited on a rhino capture operation (tracking, radio procedure, piloting of fixed-wing aircraft and helicopter, veterinary inputs, rough-terrain driving, etc.), with the first step in the process entailing basic bushcraft. As noted in Section 4.11.2, staff can be trained in rhino ID techniques, but finding specific rhinos through tracking and interpretation of other field observations involves skills and experience that cannot generally be imparted through formal training courses.

There has been a tendency on the part of wildlife management authorities in the SADC region to go through drastic restructuring exercises, which include retrenchments, re-grading of staff and the implementation of new staff selection criteria. These processes invariably down-grade or exclude men with informal skills in favour of those with formal educational qualifications or training certificates. National rhino conservation strategies must therefore recognize this actual or potential loss of key expertise for rhino conservation, and include measures to retain, and give due professional credit to, men with significant field experience.

One of the foremost advantages to be gained from the SADC Regional Programme for Rhino Conservation is the sharing of regional expertise within the varied disciplines that are needed for holistic rhino conservation projects. It will not be cost-effective or practical for every range state to try to build expertise in all disciples. For instance, the wildlife management authority within a minor range state is unlikely to be able to employ a full-time veterinarian with specific experience in rhino management, and can instead benefit from veterinary expertise from another range state, mobilized via the regional programme when significant needs such as rhino capture operations arise.

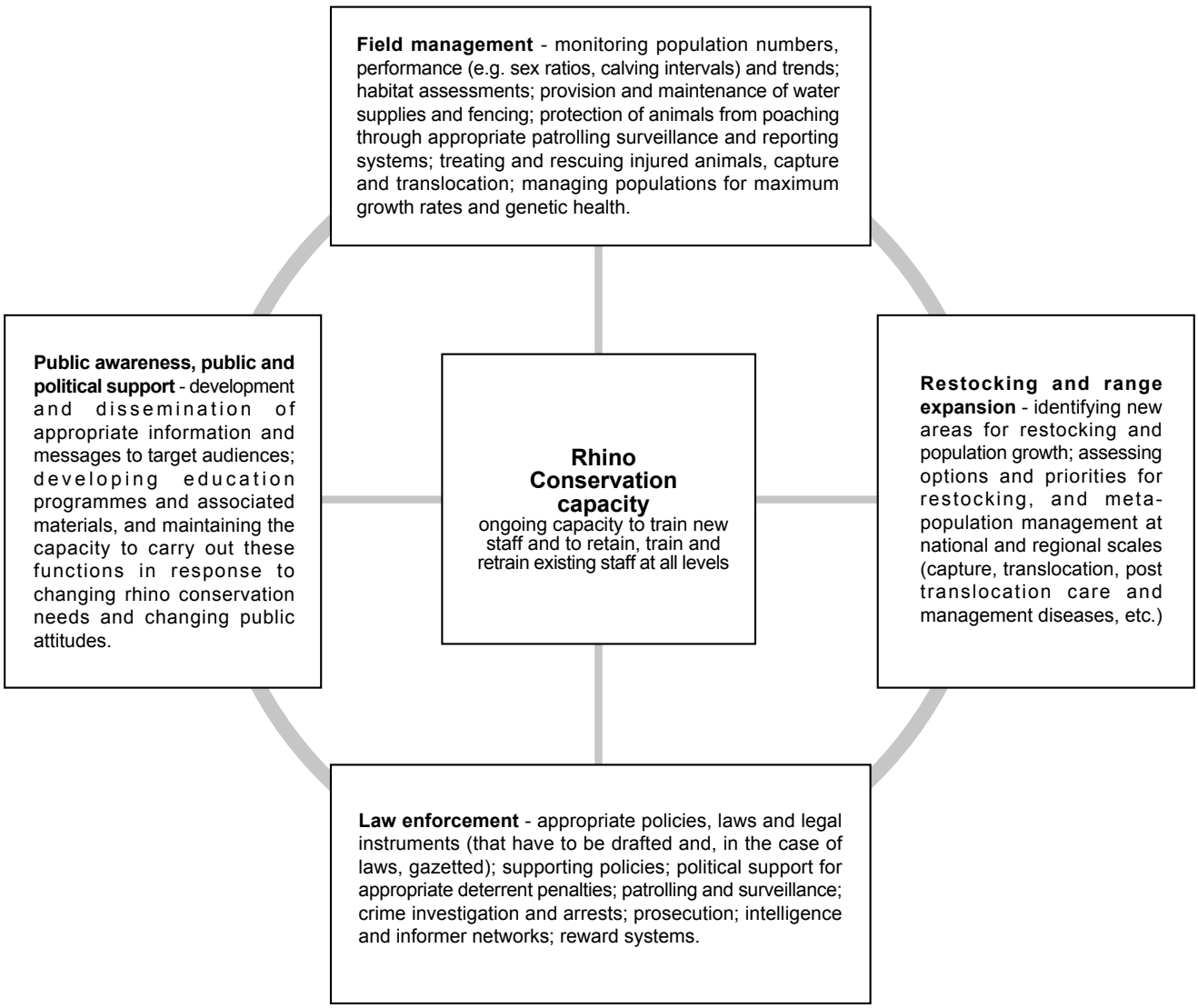
7.2 Training needs and opportunities within the SADC region

An assessment of regional training needs and opportunities, relevant to rhino conservation, was undertaken within the SADC RPRC (Cumming, 2005). Within this assessment, four main areas were identified as requiring capacity-building within the region:

- field management of populations;
- restocking and range expansion;
- law enforcement and protection;
- public awareness and political support.

These four broad categories encompass a wide range of specific activities or discrete areas of expertise requiring capacity-building, diagrammatically illustrated below.

Figure 7: Aspects of capacity-building in rhino conservation



Results of a questionnaire survey that was undertaken among 14 protected areas during the SADC RPRC review of capacity-building needs (Cumming, 2005) indicate that a very high proportion (40-80%) of existing field staff involved in rhino conservation are in need of training. The great majority of these are rangers or field scouts. Only about 20% of the staff employed were considered, by their seniors who participated in the survey, to be sufficiently experienced or skilled to train new recruits or inexperienced staff in one or more skills or activities. Table 1 presents the overall likelihood of availability of in-house training expertise for key skill areas, extrapolated from the results of the survey. Some protected areas have staff that could train at national and regional levels but their availability to take on wider responsibilities is limited by the work demands on these personnel within the areas that they are employed.

Table 1: Likely availability of in-house training expertise among protected areas staff to conduct local (L) on site training, training at national level (N), and training within the region (R).

(●●●high, ●●moderate, ● low likelihood).

Area of Training Skills/Expertise	Likelihood of in-house availability of training capabilities		
	L	N	R
1. Field Management			
1.1 Rhino monitoring	●●●	●●	●
1.2 Tracking	●●●	●●	●
1.3 Population performance	●	●	●
1.4 Habitat assessment	●●	●	●
1.5 Water and fencing	●●	●●	●
1.6 Capture and translocation	●	●	●
1.7 Surveys and population estimates	●●	●	●
1.8 Monitoring database use	●	●	●
2. Re-introduction & range expansion			
2.1 Assessing areas for restocking	●●	●●	●
2.2 Metapopulation management	●	●	●
2.3 Rhino conservation strategies	●	●	●
3. Law enforcement			
3.1 Legislation and polices	●●	●●	●
3.2 Lobbying political support	●●	●	●
3.3 Patrolling strategies and tactics	●●●	●●	●
3.4 Scene-of-crime investigations	●●●	●●	●
3.5 Prosecution	●●	●	●
3.6 Intelligence systems	●	●	●
3.7 Managing reward systems	●	●	●
3.8 Rhino horn stocks and databases	●●	●	●
4. Public Awareness			
4.1 Developing awareness material	●	●●	●
4.2 Dissemination of messages	●●	●●	●
4.3 Developing education programmes	●	●	●
5. In-service training (IST)			
5.1 Developing IST programs	●	●	●

The most appropriate people to provide training and transfer of experience, in the various technical and management skills required in rhino conservation, are experienced practitioners engaged directly in rhino conservation in the field. These practitioners range from highly capable, but often illiterate, trackers to trained scientists with years of field experience in rhino conservation. Not all of them will have the time or the aptitude to engage in mentoring staff or running training courses. However, they represent a very important pool of expertise (which is often overlooked) that can assist in the development of training materials and can advise on training and capacity-building matters. This is particularly relevant to those essential skill areas where local knowledge and informal qualifications and experience can be critical factors (e.g. monitoring and tracking, as well as local public outreach and awareness). Therefore, the development and facilitation of in-service training programmes offers the best prospects for sustainable capacity building for rhino conservation in the region.

Additional training capacities and opportunities in southern Africa can be found in specialist NGOs, associated with relevant conservation initiatives. These NGOs can be enlisted by Government conservation agencies to support and develop effective in-service training programmes. Wildlife training colleges and universities also provide additional resources and opportunities. Table 2 summarises the potential key advantages and disadvantages of these sources of training capacities.

Table 2: Sources of training capacities for rhino conservation skills
(elaborated from Cumming, 2005)

	Potential Advantages	Potential Disadvantages
In-service training	• Cost-effective. • Most suitable to skills areas benefiting from local knowledge and experience. • Amenable to train-the-trainers programmes. • Government agencies can partner NGOs in training programmes.	• Unavailability of training capacities in key skill areas. • Staff with technical skills might not have training skills or time. • Lack of formalised in-service training programmes and schedules in most agencies. • Lack of formal professional qualifications and uniform standards of competence.
Specialist NGOs	• Availability of specialist expertise and training capacity, including some training “toolboxes”. • Flexible; can complement and support in-service training programmes.	• Dependent on external/donor funding. • Work on project basis, sometimes with limited continuity and sustainability.
Wildlife training colleges	• Availability of training expertise. • Availability of formal qualification systems. • Can provide modular courses to support in-service training programmes.	• Expertise and curricula might not be relevant to actual needs. • Unevenness in accreditation systems. • Often under-funded. • Offer limited opportunities for hands-on training.
Universities	• Availability of training capacity in foundation areas (graduate/post-graduate). • Availability of formal qualification systems. • Best suited to long-term development of scientific and technical capacity through research grants for young cadres.	• Lack of specialised curricula and courses.

The SADC RPRC published a Knowledge Base on CD ROM in 2006. It contains over 60 technical reports and documents on state-of-the art methodologies and experiences in rhino conservation in southern Africa. It also contains dedicated software and manuals, developed or co-funded by SADC RPRC, for techniques and systems ranging from estimation of rhino population numbers and analysis of demographic performance, to management of databases (for law enforcement/intelligence, analysis of patrol effort, rhino horn stock pile records, rhino horn seizure records, and rhino monitoring at area and national level, etc.). The reports and software can also be accessed on the SADC RPRC website (www.rhino-sadc.org). This body of information is therefore available as input to capacity-building programmes, both academic and practical, for rhino conservation in the region. Cumming (2005) provides a summary and assessment of these various outputs of the SADC RPRC, in the context of capacity-building.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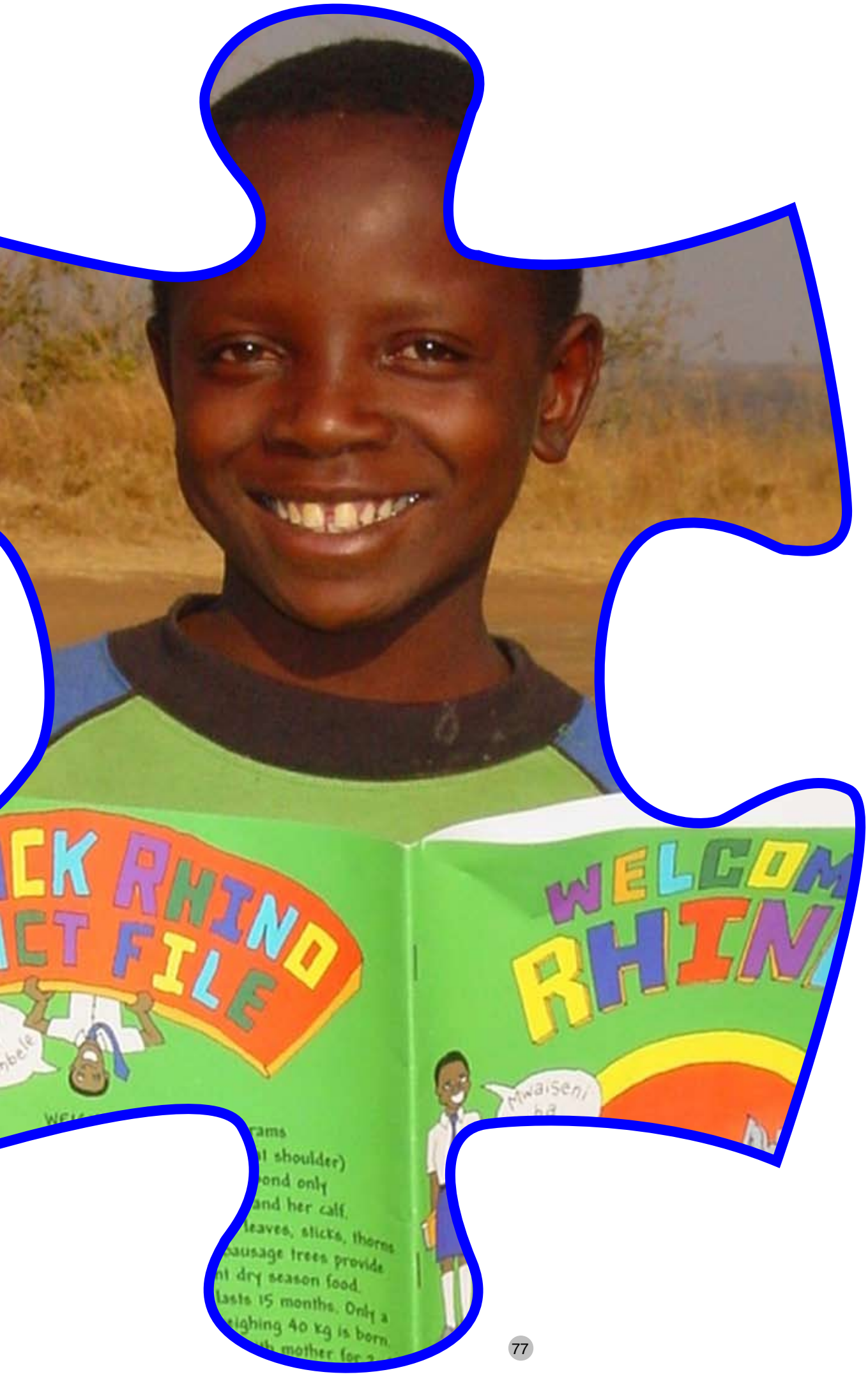
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SUMMARY OF GUIDELINES FOR: DEVELOPING AWARENESS OF RHINO CONSERVATION ISSUES

G. Daconto and R. du Toit

Local communities often have limited or negative perspectives on rhino conservation which need to be improved through awareness programmes, as an essential part of pro-active measures to prevent poaching and, in some cases, to maintain space for rhinos. School awareness programmes near rhino areas can be very effective in imparting better understanding of, and sympathy towards, the conservation needs of the species.

For the general public, a special effort needs to be made within each national rhino conservation strategy to overcome misunderstandings, which often encourage poaching. Misunderstandings that are typically perpetuated by the media are that rhino horn is far more valuable than it actually is within Africa, and that it is used as an aphrodisiac.

Tackling these misunderstandings, and developing national prestige in the conservation of rhinos as “flagship species”, requires careful awareness campaigns that are directed towards specific audiences and which take account of local sensitivities. Media materials that are produced elsewhere will not necessarily achieve the desired effect within a range state.

The national rhino conservation strategy should tackle specific needs to sensitize officials who play roles that are directly or indirectly influential in rhino conservation. Such officials include senior policy-makers, land-use planners, and members of the judiciary. Also, international development and funding agencies need to be made aware of the risk that their large-scale programmes (which are often agriculturally orientated) may unnecessarily foreclose options for species such as rhinos to enhance rural development through compatible, wildlife-based operations.

8.1 Why public awareness is important for rhino conservation

As explained in Section 2.1.1, the rationale for rhino conservation goes beyond mere environmental or ethical considerations. Rhinos can become tangible economic assets and their conservation can become a catalyst for rational and sustainable use of large areas and their natural resources. At the same time, rhino conservation often requires complex technical and societal choices which bring into focus not only the core tenets of biodiversity conservation, but also issues of land use, the structure of the wildlife and tourism industry, the cooperation amongst a wide section of national stakeholders (government, local authorities, communal farmers, private land owners, technical experts, etc.) and, increasingly, international cooperation.

Invariably, public perceptions strongly influence these choices. Rhino conservation managers therefore need to be increasingly responsive to and able to influence the wider attitudinal context within which they operate. Awareness and communication activities can pursue a range of goals and targets: long term behavioural and attitude change, knowledge dissemination, augmenting public dialogue and participation in choices at local and policy levels, development of skills, etc. A similar wide range of means to deliver communication and awareness messages exists (Table 3).

Table 3: Types of environmental education activities (after Foster-Turley, 1996**)**

Setting	Means of delivery	Rationale and implications
Formal	Formal education system and school curricula, teachers' training and extra-curricular activities.	Long-term behaviour change and awareness-raising.
Non-formal	Organised groups like youth groups and clubs, extension systems, churches and other community associations.	Can link to area-based conservation and development programmes. Can be delivered through government extension or park outreach services. Amenable to train-the-trainers design.
Informal	News media, community theatre, internet.	Influence general public perceptions. Need specific target identification.

8.2 Developing awareness at a local community level through formal and non-formal systems

The development of proactive rather than purely reactive measures to protect rhinos from poaching activities depends heavily upon community attitudes towards their conservation. Communities surrounding wildlife areas generally have limited access to educational resources, so opportunities for them to educate themselves on conservation issues are minimal to non-existent. Providing these communities with relevant information, in an appropriate and accessible form, is a powerful conservation tool.

School children, who make up a large proportion of rural communities, are particularly open to new ideas and different ways of looking at their environment and so make a good target audience for the rhino conservation message. Targeting school children in effect targets all households as it is rare to find a rural home without a school-age child. Children take home the lessons they learn at school and can stimulate interest in the broader community. The implementation of an awareness programme in schools shows support and recognition for the education efforts already being made within the community, so the personnel involved in rhino conservation are seen as being helpful to the community rather than merely having an unpopular policing role.

The materials provided need to be made durable, practical and as relevant as possible to the target audience bearing in mind that teachers will be more likely to use these materials consistently if they fit the school curriculum. Imaginative design of the materials can make them useful for teaching several subjects, thereby reinforcing rhino conservation messages. For instance, rhino population growth rates can be explained in a way that is relevant to arithmetic classes, and rhino myths and legends can be present in a way that is relevant to English comprehension. A pictorial style, using photos for realism and cartoons for amusement, will help make the materials engaging to young and non-English reading students. A set of rhino awareness materials (known as "The Rhino Cards") was developed under the SADC RPRC for use in primary schools (Anderson, 2003), and a more advanced booklet was also developed for secondary schools (Anderson, 2004).

Schemes for creating an economic stake for communities in rhino conservation (see Section 3.9) constitute obvious platforms to raise awareness, with opportunities for community meetings, hand-over ceremonies, and visits by VIPs to promote these schemes. Even where a direct economic linkage is not established, projects to re-stock rhinos should not be hidden from local communities but should instead be fully explained to them. For instance, in the first phase of the black re-introduction project in North Luangwa (Zambia) local traditional leaders were brought to see the rhinos in their pens before release, and were invited to give names to them. If stray rhinos have to be captured in farming areas adjacent to rhino reserves, the capture operations will usually attract local residents. These gatherings provide opportunities to inform the people of the reasons for the operations, the facts of dehorning, horn transmitter implantation, rewards for information on poachers, etc.

8.3. Rhinos and the media

Rhinos have always attracted considerable media and public attention, especially in developed countries where media systems are pervasive. Media attention to charismatic, endangered species such as rhinos has certainly helped to shape international perceptions of conservation issues. However, the products of the international media are sometimes based on perceptions and value systems which may not be directly relevant to the local context of conservation efforts and to the critical choices that stakeholders need to face in their immediate circumstances. Thus there is a risk that some of these products (films, articles, books, etc.) will aggravate local sensitivities and misinform, rather than enlighten, stakeholders on pertinent issues. Stereotypic or clichéd media interpretations include the frequent exaggeration of the value of rhino horn (which can be high in pharmacies of the Far East, when dispensed in minute quantities in traditional medicines, but does not have even a tenth of this value within trading networks in Africa).

Thus, when developing public awareness programmes of relevance to rhino conservation within the SADC region, crucial requirements are:

- to identify the specific target audience(s);

- to carefully sift through the large body of existing media products to find those rhino-related materials that are accurate and appropriate to the target audience(s), rather than unquestioningly using what is readily available;
- if necessary, to produce new materials that have relevance and impacts within the local audience(s). The SADC RPRC took a step towards this objective by producing a TV documentary entitled "Rhinos for Africa", which is available in VHS and DVD formats for non-formal awareness activities.

8.4. Raising awareness within special target groups

Metapopulation management strategies, the design, negotiation and implementation of regional collaboration and rhino exchange programmes, and the promotion of a conducive policy framework within which to harmonize conservation and land-use increasingly bring national and international dimensions to the forefront of rhino conservation. These processes require the involvement of a wide cross-section of key stakeholders in government and public service. Therefore, rhino conservation managers should pay special attention to raising awareness of the policy dimensions of rhino conservation amongst these critical audiences. Special target groups include the following.

- **Policy makers and senior personnel in key ministries (environment, agriculture, land, etc.).** Since this group sets the agenda in the crucial policy areas of biodiversity conservation, land-use, rural development, and tourism, a specific effort needs to be made by the rhino conservation community and by rhino management authorities to inform these politicians and senior officials of some of the strategic issues that are outlined in this manual. For this audience, rhino issues should not be presented within a narrow conservation context, but should rather be discussed in the wider context of resource use and development implications. The presentation of the key messages to this group might be via SADC fora and sub-regional groupings, national rhino conservation conferences and targeted media products.
- **Development and aid agencies.** The fact that rhinos can act as "flagship species" for conservation programmes and for wildlife-based rural development may be overlooked by agencies that are funding large rural programmes in the SADC region. The Italian Ministry of Foreign Affairs showed, in funding the first phase of the SADC RPRC, that rhino conservation can be logically incorporated in development support programmes. A development programme, such as one designed to impose veterinary disease controls (notably for foot-and-mouth disease) or one to expand conventional agriculture, may unnecessarily foreclose options for rhino conservation so those options have to be communicated to the programme's designers and promoters. Sometimes a development or aid programme may be neutral for rhinos but, with better understanding of how that programme should be designed or implemented, can become strongly positive for rhinos with no greater effort or expenditure. For instance, educational aid programmes can incorporate rhino awareness materials such as those that were designed within the SADC RPRC to facilitate the teaching of school curricula. Thus it will often be appropriate for the regional rhino conservation community to make special efforts to liaise with the representatives and consultants within development/aid programmes, even if those individuals and their agencies are not directly involved in wildlife issues.
- **Prosecutors and magistrates.** Lenient sentences for rhino poachers undermine the effectiveness of conservation and law enforcement agencies (Section 6.8). Since the leniency sometimes arises from lack of appreciation of damage caused by poachers, magistrates and public prosecutors should be targeted in awareness-raising campaigns, such as workshops and specific communication products, focussing on the rationale (including economic factors) and goals of rhino conservation.

REFERENCES

NOTE: numerous relevant reports have been produced by the SADC Regional Rhino Programme for Rhino Conservation (RPRC) and are referenced below; they can be accessed on the SADC RPRC website (www.rhino-sadc.org)

Adcock, K. (compiler) (2000). Status and management of black rhino in South Africa and Namibia from January 1997 to December 1998. Rhino Management Group Report (confidential).

Adcock, K. (2001). User guide to the Rhino Management Group Black Rhino Carrying Capacity Model Version 1. SADC Regional Programme for Rhino Conservation Report (Task 4.2-2.1).

Adcock, K (compiler) (2003). Status and management of black rhino in South Africa and Namibia from January 1999 to December 2001. Rhino Management Group Report (confidential).

Adcock K. (2004). Visual assessment of black rhino browse availability V2.1 (Manual) SADC Regional Programme for Rhino Conservation Report (Task 4.2-2.3).

Adcock K. (2005). Report on the field testing of inter-observer variability in the application of the standardised browse availability assessment method used in black rhino carrying capacity estimation, with reviewers' comments from O'Connor T., Kirkman K.P. and Page B.R. SADC Regional Programme for Rhino Conservation Report (Task 4.2-2.4).

Adcock K. (2005). Status and management of black rhino in Namibia, South Africa and Zimbabwe: January 2002 – December 2004. RMG/SADC Regional Programme for Rhino Conservation (Task 2.4-2.2) and People and Park Support Report (confidential).

Adcock, K and R.H. Emslie (compilers) (2004). Monitoring African rhino: trainer's and trainee's manuals. Part of IUCN SSC AfRSG's 5th Edition of "Sandwith's" training course for field rangers. IUCN SSC AfRSG/US Fish and Wildlife Service Rhino and Tiger Conservation Fund/SADC Regional Programme for Regional Rhino Conservation Reports.

Anderson N. (2003). Creating awareness of rhino conservation in rural primary schools in Zimbabwe: report and education materials. SADC Regional Programme for Rhino Conservation Report (Task 5.1-1.2).

Anderson N. (2004). Community outreach in rhino conservation via awareness programme in rural secondary schools. SADC Regional Programme for Rhino Conservation Report (Task 5.1-2.2).

Bertschinger H.J. (1994). Reproduction in black and white rhino. Pages 155-161 in: Penzhorn B.L. and Kriek N.P.J. (Eds). Proceedings of a Symposium on Rhino as Game Ranch Animals. South African Veterinary Association, Wildlife Group, Onderstepoort.

Brett R. (2002). Presentation on: Coordination of rhino conservation in RRG countries. SADC Rhino Recovery Group Meeting, Maun, 24-25 May 2002.

Brett R.A. and Adcock K. (2002). Assessment of options and areas for the expansion of the black rhino population at Ngulia rhino sanctuary, Tsavo West NP, Kenya African Wildlife Foundation Report.

Brown S.M. and Houlden B.A. (2000). Conservation genetics of the black rhinoceros (Diceros bicornis). Conservation Genetics, Vol. 1:365-370.

Cilliers A. (1989). Monitoring methods and techniques for censusing black rhinos Diceros bicornis bicornis in Etosha National Park. Koedoe, Vol. 32 (No. 2):49-60.

Cumming D.H.M. (2005). Sustainability assessment of capacity building tasks of the SADC Regional Programme for Rhino Conservation. SADC Regional Programme for Rhino Conservation Report (Task 6.1-3.1).

Duncan I.M. (1989). The use of Flumethrin Pour-on for de-ticking black rhinoceros (Diceros bicornis) prior to translocation in Zimbabwe. Journal of the South African Veterinary Association, Vol. 60:195-197.

Dunham K.M. (2005). The re-introduction of rhinos to Gonarezhou National Park, Zimbabwe: a feasibility study – biological aspects and IUCN reintroduction guidelines. SADC Regional Programme for Rhino Conservation Report (Task 3.1-12.1).

Dunham K.M. and du Toit R. (2003). A review of the RMG black rhino carrying capacity model Version 1.0. SADC Regional Programme for Rhino Conservation Report (Task 4.2-2.2).

du Toit R. (1989). Suggested patrol reporting system for Operation Stronghold. Annex 1 in: Purchase D.N.A. (2004). Patrol effort rhino monitoring and law-enforcement database/GIS: users' manual. SADC Regional Programme for Rhino Conservation Report (Task 4.1-1.4).

du Toit R. (1992). Large-scale wildlife conservancies in Zimbabwe: opportunities for commercial conservation on endangered species. Pages 295-300 in: van Hoven W, Ebedes H. and Conroy A. (Eds). Wildlife Ranching: A Celebration of Diversity. South African Game Organization, Pretoria.

du Toit R. (1996). Modern technology for rhino management. Pachyderm, No. 22:18-24.

du Toit R. (1998). Case study of policies that support sustainable development in Africa: the Save Valley Conservancy, Zimbabwe. Paper presented at Scandinavian Seminar College workshop, Harare, September 1998. On web site: http://www.cdr.dk/sscafrica/dtoit-zi.htm

du Toit R. (2005). Implementation of "rhino endowment model" for community participation in rhino conservation, Save Valley Conservancy, Zimbabwe. SADC Regional Programme for Rhino Conservation Report (Task 5.3-1).

du Toit R. and Mackie C. (2001). Radiotracking coordination. SADC Regional Programme for Rhino Conservation Report (Tasks 6.1-1.1 and 6.1-1.2).

du Toit R. and Mungwashu L. (2005). The re-introduction of rhinos to Gonarezhou National Park, Zimbabwe: a feasibility study – institutional, management and security issues. SADC Regional Programme for Rhino Conservation Report (Task 3.1-12.1).

Emslie R.H., compiler (2001). Proceedings of a SADC Rhino Management Group workshop on biological management to meet continental and national black rhino conservation goals. SADC Regional Programme for Rhino Conservation Report (Task 2.4-1.1).

Emslie R.H. (2004). Black rhino hunting quotas approved for Namibia and South Africa at CITES Conference of the Parties 13. Pachyderm, No. 37: 92-97.

Emslie R. H. (2004). RHINO 2.0 population estimation software: user guide. SADC Regional Programme for Rhino Conservation Report (Task 6.1-2.1).

Emslie R.H, Amin R and Davey K (2004) RHINO 2.0 User's Guide. Ecoscot Consultancy Services/SADC Regional Programme for Rhino Conservation Manual (Task 6.1-2.1).

Emslie R.H. and Brooks M. (1999). African Rhino: Status Survey and Conservation Action Plan. IUCN/SSC African Rhino Specialist Group. IUCN, Gland.

Foster-Turley P. (1996). Making biodiversity conservation happen: the role of environmental education and communication. Discussion Paper of the GreenCOM Environmental Education and Communication Project. U.S. Agency for International Development [URL: http://www.greencom.org/greencom/pdf/discussion papers/biodiv4.pdf]

Harley E.H., Baumgarten I., Cunningham. J. and O'Ryan C. (2005). Genetic variation and population structure in remnant populations of black rhinoceros, Diceros bicornis, in Africa. Molecular Ecology, Vol. 14: 2981-2990.

Hearn M., Kruger B. and Brett R. (2004). Stakeholder workshop on biological management for the black rhino in north-west Namibia. SADC Regional Programme for Rhino Conservation Report (Task 5.3-1.2).

Hofmeyr M. (1998). Comparison of four different radio transmitter attachments on black rhino in Madikwe Game Reserve. Pachyderm, No. 26:14-24.

Kamwi J. and Ngarira I. (2004). Instructor training in rhino monitoring techniques IV: Training by local instructors. SADC Regional Programme for Rhino Conservation Report (Task 4.1-1.4).

Lande R. (1998). Anthropogenic, ecological and genetic factors in extinction. Chapter 2 in: Mace G., Balmford A. and Ginsberg J.R (Eds). Conservation in a Changing World. Cambridge University Press.

Leader-Williams N., Milledge S., Adcock K., Brooks M., Conway A., Knight M., Mainka S., Martin E.B. and Teferi T. (2005). Trophy hunting of black rhino Diceros bicornis: Proposals to ensure its future sustainability. Journal of International Wildlife Law and Policy, Vol. 8:1-11.

Leader-Williams N., Brett R., Brooks M., Craig I., du Toit R.F., Emslie R.H., Knight M.H., Stanley-Price M.R. and Stockil C. (1997). A scheme for differentiating and defining the current situations under which live rhinos are conserved. Pachyderm, No. 23: 24-28.

Loutit R., Emslie R. and du Preez P. (2005). Capacity building in rhino monitoring in Namibia: Phase 1. Additional report summarizing main lessons of wider applicability relating to training of staff in rhino ID monitoring techniques. SADC Regional Programme for Rhino Conservation Report (Task 4.1- 3.2).

Milledge S. (2002). Improving security and management of rhino horn stocks in SADC rhino range states. SADC Regional Programme for Rhino Conservation Report (Task 3.1- 1.1).

Milledge S. (2003). TRAFFIC Wildlife Stockpile Register Database (WSRD), Version 1.0: Instruction manual. SADC Regional Programme for Rhino Conservation Report (Task 3.1- 1.2).

Mihok S., Munyoki E., Brett R.A., Jonyo J.F., Rottcher D., Majiwa P., Kang'ethe E., Kaburia H. and Zweygarth E. (1992). Trypanasomiasis and the conservation of black rhinoceros (Diceros bicornis) at the Ngulia Rhino Sanctuary, Tsavo West National Park, Kenya. African Journal of Ecology, Vol. 30:103-115.

Osofsky S.A., Paglia D.A., Radcliffe R.A., Miller R.E., Emslie R.H., Foose T.J., du Toit R. and Atkinson M. (2001). First, do no harm: a precautionary recommendation regarding the movement of black rhinos from overseas zoos back to Africa. Pachyderm, No. 30:17-23.

Owen-Smith R.N. (1998). Megaherbivores: The Influence of Very Large Body Size on Ecology. Cambridge University Press.

Purchase D.N.A. (2004). Patrol effort rhino monitoring and law-enforcement database/GIS: users' manual. SADC Regional Programme for Rhino Conservation Report (Task 4.1-1.4).

Reed D.H., O'Grady J.J., Brook B.W., Ballou J.D. and Frankham R. (2003). Estimates of minimum viable population sizes for vertebrates and factors influencing these estimates. Biological Conservation, Vol.113:23-34

Shrader A.M. and Beauchamp B. (2001). A new method for implanting radio transmitters in the horns of black and white rhinoceros. Pachyderm, No. 30: 81-86.

Spenceley A. and Barnes J. (2005). Economic analysis of rhino conservation in a land-use context within the SADC region, Phase II. SADC Regional Programme for Rhino Conservation Report (Task 6.3 -1.2).

Springett C. and Marshall W. (2003). WILDb site database: reference manual. SADC Regional Programme for Rhino Conservation Report (Task 2.2-2.1).

ANNEX 1

SADC REGIONAL RHINO CONSERVATION STRATEGY, 2005-2010

GOAL

Southern African rhinos maintained as flagship species for biodiversity conservation and wildlife-based economic development, within viable and well distributed populations.

OBJECTIVE (for five-year time horizon)

By 2010, regional populations of each subspecies increased by 25% above their levels in 2005 and showing significantly wider distribution within the region as well as significantly greater economic relevance to the people of the region.

GUIDING PRINCIPLES

SADC commitments and instruments

The implementation of the strategy must be guided by, and must reinforce, SADC policies and initiatives with particular reference to the following:

SADC Treaty and Declaration (Chapter 3, Article 5);
SADC Protocol on Wildlife Conservation and Law Enforcement (and the Implementation Plan for this Protocol);
the SADC Regional Indicative Strategic Development Plan (RISDP).

The regional strategy for rhino conservation should not stand alone; it should serve as precursor to, and ideally be integrated with, other such strategies that involve regional collaboration in the protection and sustainable use of key species and ecosystems.

Sustainable use

Within the SADC region, rhinos are respected as charismatic and ecologically important elements of global biodiversity, justifying the attachment of high moral importance to their conservation. In addition, the legitimate commercial value of rhinos must be maximized within the region. This can be achieved through their sustainable use, both non-consumptively (through ecotourism) and consumptively (through trade in live animals and limited safari hunting).

Any new or contentious initiatives involving consumptive use or trade in rhinos or their products should be sensitive to the views of the various rhino management authorities and key stakeholders within the region. The SADC Regional Programme for Rhino Conservation (SADC RPRC) is a framework within which intraregional debate on any such policy issues can be facilitated and condensed into regional perspectives.

All sustainable-use approaches for rhinos must clearly demonstrate that they are to the advantage of the species and of biodiversity in general, and are also to the advantage of the communities and local institutions that are actively conserving rhinos. This requires transparency in the derivation and management of financial profits from economic activities that involve rhinos. Strong control mechanisms must be established to prevent over-exploitation or illegitimate activities.

Sustainable use options exist within the private sector and the public sector, as well as within community-based resource management programmes. Stakeholders from this full spectrum have to be given roles in rhino conservation, with the allocation of rights and benefits from sustainable use being directly related to the conservation responsibilities, costs and achievements that pertain to each group of stakeholders.

International support

Opportunities for commercial wildlife ventures do not exist, to an extent sufficient to meet all rhino conservation costs, within the full range of rhino conservation situations within the region. Therefore, international support for rhino conservation remains crucial. While retaining their right to make

management decisions that reflect their national aspirations as well as the regional policy consensus, the SADC range states recognize the fact that rhinos are global assets.

The balance between local and international rights and responsibilities in rhino conservation must be reflected in businesslike arrangements for international support. In particular, the SADC Regional Programme for Rhino Conservation must explore innovative, incentives-based funding mechanisms that will encourage local stakeholders to participate in rhino breeding projects.

Principles of conservation biology

Notwithstanding the need to ensure a return of economic benefits to the people who conserve rhinos, biological management considerations must be paramount in decisions that pertain to rhino re-distributions, utilisation options, etc.

The following subspecies are recognized in different ranges within the SADC region (unless further reputable research indicates otherwise) and should not be interbred:

Black rhinos: *Diceros bicornis bicornis* (south-western, or "desert" subspecies), *Diceros bicornis minor* (south-central subspecies), *Diceros bicornis michaeli* (eastern subspecies).

White rhinos: *Ceratotherium simum simum* (southern subspecies), *Ceratotherium simum cottoni* (northern subspecies).

These subspecies should not be redistributed beyond their natural, historical ranges unless compelling conservation reasons to do so are demonstrated.

Each species will need to be managed as a metapopulation, i.e. with some deliberate management to exchange rhinos between the various sub-populations as required to avoid loss of genetic diversity (through inbreeding and genetic drift) and to avoid small-population demographic problems (skewed age/sex ratios, etc.).

Every introduction process should follow "best practice" as recommended by the IUCN African Rhino Specialist Group.

- New breeding groups should be established with at least 20 founders in each (i.e. animals that are, as far as is known, unrelated and capable of breeding).
- Areas for rhino breeding should, whenever possible, be selected on the basis of their potential to support populations of over 100 rhinos in each area.
- Where this is not possible, realistic plans must be considered in advance of restocking, and implemented thereafter, to prevent inbreeding and overstocking, through translocations and exchanges of rhinos.
- For each subspecies, regional metapopulation sizes of over 2,000 animals are ultimately intended and the various sub-populations must be managed as elements of these regional metapopulations (i.e. breeding animals should periodically be exchanged between the sub-populations in order to ensure gene flow within the regional metapopulation of each subspecies).
- A population growth rate of at least 5% per annum will be expected for each population, failing which the reasons for inadequate breeding must be professionally investigated. If this professional assessment identifies feasible measures to overcome breeding constraints, such as translocating rhinos elsewhere, then such measures should be firmly implemented in the interests of the species.
- The population growth rate will inevitably fall as a population approaches the ecological carrying capacity of the area that it occupies. Therefore the objective of increasing rhino numbers at the maximum growth rate can only be achieved through pro-active management that keeps the population density consistently below ecological carrying capacity.
- Captive or semi-captive breeding of rhinos has nowhere achieved the reproductive rate of well-managed wild populations. Because this approach has not proven to be cost-effective, it should not be given precedence over any opportunities for free-range breeding within the region that could be developed with the same breeding stock and resources.

OUTPUTS AND ACTIVITIES

Output 1: Mechanisms maintained and enhanced for regional collaboration in rhino conservation.

Activity 1.1: Streamlining regional coordination mechanisms within the SADC Regional Programme for Rhino Conservation, under the auspices of the SADC Directorate for Food, Agriculture and Natural Resources (FANR).

This entails the facilitation (by SADC FANR, by rhino management authorities in each range state, by donors and by other stakeholders) of the functioning of the SADC RPRC coordination office, of the Rhino Management Group (encompassing the major range states), of the Rhino Recovery Group (made up of the minor range states), of the Rhino and Elephant Security Group and of any other relevant regional groupings or initiatives. The SADC RPRC coordination office must act as an "honest broker", if so requested, in any bilateral arrangements between range states (e.g. involving the allocation of rhinos from one state to another).

Activity 1.2: Advising on and facilitating national coordination mechanisms.

Each range state requires a clear policy framework integrated with a national rhino strategy (generally with a five-year period of implementation, outlining the key policies, goal and intended outputs of the national rhino conservation effort), and annual rhino action plans (allocating stakeholder roles, responsibilities and resources to agreed rhino management activities within a defined time frame). These policies and plans will need to be reviewed by stakeholder committees under the overall supervision of each national rhino management authority. In some situations, there may be more than one rhino management authority (e.g. South Africa), or the strategies may involve more than one range state (e.g. the Rhino Management Group). Thus some variation of coordination mechanisms will be necessitated by the different circumstances within the region. The SADC RPRC must be geared to provide technical support, as required, via the various coordination mechanisms.

To maintain continuity and technical capacity, the appointment of national rhino co-ordinators (also known as focal points or range states representatives) should be on a consistent basis. The SADC RPRC can provide guidelines for their roles.

Activity 1.3: Networking existing and new rhino conservation projects.

A variety of rhino conservation projects are underway within the region, or will be initiated before 2010, in a number of sites and with a number of support agencies and stakeholders. Synergy must be created between these projects by sharing their expertise and other resources, and by spreading innovations and experiences between them. Some projects or programmes constitute "centres of excellence" for certain skills or approaches and the SADC RPRC can facilitate the transfer of these abilities to other sites.

Activity 1.4: Linking the Regional Programme for Rhino Conservation with other regional conservation and development initiatives.

The establishment of Transfrontier Conservation Areas (TFCAs) within the SADC region provides some specific sites for bilateral or trilateral cooperation between countries. This cooperation can be highly conducive to rhino conservation (e.g. where one of the countries is in a position to facilitate a rhino re-introduction project within an adjoining park in another country) and the rhinos can in turn enhance a TFCA, as tourism assets.

The SADC RPRC is a model than can be promoted for other regions, notably East Africa.

Output 2: Innovative approaches to rhino conservation identified and encouraged within the region.

A particular emphasis must be placed on maximizing the relevance of rhinos (as flagship species that thrive in semi-arid habitats) to economic development in agro-ecological settings that are more conducive to wildlife production than to other forms of livelihood.

Activity 2.1: Identifying and encouraging opportunities for commercial and community-based wildlife production systems that sustainably integrate rhinos, to the economic benefit of the stakeholders in those systems.

Rhino conservation under poaching pressure has conventionally involved a sanctuary approach (preserving small populations in fortressed, state-managed enclaves with high dependency on donor funds). However, the diversity of commercial and community-based approaches to wildlife production

that has arisen in southern Africa creates the challenge and the opportunity to integrate rhinos more widely and more sustainably within these production systems.

Assessment of the current and potential economic value of rhinos within these varied production systems is a complicated issue that requires ongoing investigation.

Custodianship schemes, whereby rhinos are allocated to private operations in order to spread the economic burden of their conservation without transferring any ownership rights, have proven successful in parts of the region. The constraints and opportunities that are inherent in these private custodianship schemes must be demonstrated for consideration elsewhere in the region. Community-based custodianship schemes are also appropriate in some areas but require further socio-economic analysis, elaboration of relevant policy, capacity-building, development of appropriate management structures, and incentives-based funding (Activity 2.2).

Since rhinos require large areas, production systems into which they can be integrated will be of a spatial scale that will often necessitate broad land-use planning and advocacy of biosphere reserves, conservancies, etc.

Activity 2.2: Identifying and encouraging innovative mechanisms for the transfer of international support to rhino conservation (and to biodiversity conservation in general) according to criteria and conditions that induce local stakeholders to maximize rhino population growth.

Internationally, there has been growing interest in incentives-driven conservation approaches involving local stakeholders, instead of using international conservation funds merely for direct species management interventions or for supporting government conservation agencies. The opportunities for commercial and community-based schemes for rhino management (Activity 2.1) must be reinforced by external funding support, but along businesslike lines rather than as unleveraged grants.

Activity 2.3: Promoting co-management arrangements that constitute "win-win" partnerships between different stakeholders in rhino conservation.

As rhino "intensive protection zones", sanctuaries and rhino re-introduction projects are developed in state-protected areas, the substantial support that is required from international NGOs and other partners must be meshed with the control mechanisms and manpower of the official wildlife management agency for each area. Supporting agencies are not always willing to merely hand over funds, equipment, etc., without being granted opportunity to play some ongoing role in the management of the project. On the other hand, an official wildlife management agency does not wish to see its functions taken over or excessively diluted by an external agency. Some regional examples of projects that have achieved the appropriate balance can be identified and considered as models for other projects, albeit requiring local adaptation.

Custodianship arrangements that constitute joint ventures between state agencies and landholders in rhino breeding are relevant to Activity 2.1. In addition, joint ventures between established commercial operators and inexperienced or under-resourced land occupiers can also be important for rhino conservation. With several land reform programmes underway in the region, involving some major rhino breeding areas, the SADC RPRC must be a source of advice on appropriate mechanisms for co-management of rhinos and other wildlife resources. Such mechanisms may also become relevant in state areas that include substantial human populations (notably wildlife reserves in Mozambique and Angola).

Output 3: Biological management of rhinos facilitated at a regional level.

Limitations of capacity within the SADC RPRC preclude the involvement of this programme in all aspects and in all sites of rhino conservation within the SADC region. Thus an emphasis must be placed on activities that have significant regional dimensions, such as allocations of rhinos from one range state to another, and the sharing of relevant expertise, equipment and information within the region.

Activity 3.1: Supporting viable projects for rhino re-introduction or for the consolidation of relict populations.

The SADC RPRC must continue to facilitate rhino re-introduction or consolidation projects by providing technical support to plan and implement such projects and by helping to broker agreements under which rhinos can be allocated.

Activity 3.2: Mobilizing key elements of technical support for rhino monitoring and management.

Some highly specialized requirements for rhino conservation expertise and equipment arise and cannot always be met at a national level, especially in range states that have just begun to initiate rhino population recovery projects. These requirements range from informally acquired rhino tracking and bushcraft skills, to "high-tech" skills (such as veterinary inputs, experience in radiotelemetry devices, piloting of aircraft used in low-level rhino surveillance, database management, design of rhino surveys, habitat assessments, etc). The SADC RPRC must act as a coordinating mechanism to identify and mobilize the required expertise on an intraregional basis, within the financial constraints of the programme.

Activity 3.3: Facilitating standardized reporting on the status of rhino populations and ensuring professional review of such information, to guide management decisions.

The gathering and analysis of demographic data and other information relevant to rhino management is a specialized activity, especially for the larger populations. Without appropriate indicators of population performance, validly compared between different areas, it will be impossible to implement the adaptive management that is necessary to attain the objective of this strategy. Adequate confidentiality must be ensured for rhino population data.

Output 4: Capacity for rhino conservation retained and enhanced.

Activity 4.1: Promoting the roles of individuals who have informally-acquired bushcraft skills (including tracking abilities) for rhino conservation.

Professional rhino conservation involves a harmonization of varied expertise ranging from "low-tech" to "high-tech". Some forms of expertise (notably bushcraft skills) are commonly overlooked during staff recruitment in preference to formal schooling and other experience. To undertake Activity 3.2, the SADC RPRC will need to build up a network of individuals who can provide this bushcraft expertise in the context of rhino management. Such individuals will require additional experience in relevant modern methods (e.g. radiotracking, patrol reporting, use of GPS devices, capture of rhinos) that must be integrated with their existing skills. This network must be available not only to provide inputs to field operations (Activity 3.2) but to also undertake training and mentoring of relevant field personnel.

Activity 4.2: Networking professionals in spheres of rhino conservation (in addition to biological management).

The central thrust of sound biological management gives rise to requirements for the mobilization of relevant regional expertise as envisaged under Activity 3.2. In addition to those forms of expertise, the holistic SADC RPRC regional strategy for rhino conservation requires professional inputs to activities as diverse as community awareness programmes and law-enforcement intelligence. Some of these inputs can be provided by the NGOs that are associated with the SADC RPRC, or by the programme's subsidiary groups (Rhino Management Group and Rhino and Elephant Security Group). Other inputs must be derived from "centres of excellence" in the form of existing projects within the region that have developed areas of speciality in rhino conservation.

Activity 4.3: Maintaining, updating, expanding and disseminating the range of tools for rhino conservation that have been developed within the SADC RPRC.

During the pre-2005 phase of the SADC RPRC, a range of technological tools (software and hardware) was developed and a number of manuals were written for these tools, as well as for other aspects of rhino monitoring and protection. To maximize the relevance of these tools and training materials within regional rhino conservation, they have to be kept updated and available for rhino managers who require them. While updating and refinements will be required, such activities should not be allowed to become never-

ending reasons to delay the cost-effective delivery of functional tools. Tools that have not proven to be cost-effective, practical and in significant demand by rhino managers will not receive ongoing support from the SADC RPRC. Wherever possible, proven tools and materials must be mainstreamed within staff training curricula or integrated within the less formal field training that is envisaged within Activity 4.1.

Output 5: Awareness of rhino conservation increased within the region.

Activity 5.1: Promoting awareness of rhino conservation at a local community level.
For communities living with or adjacent to rhino populations, community awareness can be tackled particularly effectively via schools programmes, especially at primary schools where the largest (and most impressionable) sector of the population can be accessed. In community-based schemes, local employment must be maximized within the structures that are established for monitoring, protecting and managing the rhinos.

Activity 5.2: Undertaking awareness programmes at national and regional level.
The principles of this regional rhino strategy must be articulated to a broad audience, particularly at a political level, through judicious use of the media and through presentations at relevant meetings, conferences, etc.

DEVELOPMENT OF THIS STRATEGY

This strategy was developed within the SADC Regional Programme for Rhino Conservation, and was reviewed and endorsed by SADC rhino range states representatives as follows:

- in draft form, at a meeting of the SADC rhino range states representatives at Kilaguni, Kenya, in September 2004;
- in final form, at a meeting of the SADC rhino range states representatives at Midrand, South Africa, in March 2005.

ANNEX 2

IUCN/SSC Guidelines for Re-Introductions (abbreviated)
Prepared by the SSC Re-introduction Specialist Group
Approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995

INTRODUCTION

These policy guidelines have been drafted by the Re-introduction Specialist Group of the IUCN's Species Survival Commission, in response to the increasing occurrence of re-introduction projects worldwide, and consequently, to the growing need for specific policy guidelines to help ensure that the re-introductions achieve their intended conservation benefit, and do not cause adverse side-effects of greater impact.
These guidelines are intended to act as a guide for procedures useful to re-introduction programmes and do not represent an inflexible code of conduct. Many of the points are more relevant to re-introductions using captive-bred individuals than to translocations of wild species. Others are especially relevant to globally endangered species with limited numbers of founders. Each re-introduction proposal should be rigorously reviewed on its individual merits. It should be noted that re-introduction is always a very lengthy, complex and expensive process.

Re-introductions or translocations of species for short-term, sporting or commercial purposes - where there is no intention to establish a viable population - are a different issue and beyond the scope of these guidelines. These include fishing and hunting activities.

The priority has been to develop guidelines that are of direct, practical assistance to those planning, approving or carrying out re-introductions. The primary audience of these guidelines is, therefore, the practitioners (usually managers or scientists), rather than decision makers in governments. Guidelines directed towards the latter group would inevitably have to go into greater depth on legal and policy issues.

DEFINITION OF TERMS

"Re-introduction": an attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct ("Re-establishment" is a synonym, but implies that the re-introduction has been successful).

"Translocation": deliberate and mediated movement of wild individuals or populations from one part of their range to another.

"Re-inforcement/Supplementation": addition of individuals to an existing population of conspecifics.

"Conservation/Benign Introductions": an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and ecogeographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range.

AIMS AND OBJECTIVES OF RE-INTRODUCTION

a. Aims: The principle aim of any re-introduction should be to establish a viable, free-ranging population in the wild, of a species, subspecies or race, which has become globally or locally extinct, or extirpated, in the wild. It should be re-introduced within the species' former natural habitat and range and should require minimal long-term management.

b. Objectives: The objectives of a re-introduction may include: to enhance the long-term survival of a species; to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem; to maintain and/or restore natural biodiversity; to provide long-term economic benefits to the local and/or national economy; to promote conservation awareness; or a combination of these.

MULTIDISCIPLINARY APPROACH

A re-introduction requires a multidisciplinary approach involving a team of persons drawn from a variety of backgrounds. As well as government personnel, they may include persons from governmental natural resource management agencies; non-governmental organisations; funding bodies; universities; veterinary institutions; zoos (and private animal breeders) and/or

botanic gardens, with a full range of suitable expertise. Team leaders should be responsible for coordination between the various bodies and provision should be made for publicity and public education about the project.

PRE-PROJECT ACTIVITIES

a. BIOLOGICAL

(i) Feasibility study and background research

- An assessment should be made of the taxonomic status of individuals to be reintroduced. They should preferably be of the same subspecies or race as those which were extirpated, unless adequate numbers are not available. An investigation of historical information about the loss and fate of individuals from the re-introduction area, as well as molecular genetic studies, should be undertaken in case of doubt as to individuals' taxonomic status. A study of genetic variation within and between populations of this and related taxa can also be helpful. Special care is needed when the population has long been extinct.
- Detailed studies should be made of the status and biology of wild populations (if they exist) to determine the species' critical needs. For animals, this would include descriptions of habitat preferences, intraspecific variation and adaptations to local ecological conditions, social behaviour, group composition, home range size, shelter and food requirements, foraging and feeding behaviour, predators and diseases. For migratory species, studies should include the potential migratory areas. For plants, it would include biotic and abiotic habitat requirements, dispersal mechanisms, reproductive biology, symbiotic relationships (e.g. with mycorrhizae, pollinators), insect pests and diseases. Overall, a firm knowledge of the natural history of the species in question is crucial to the entire re-introduction scheme.
- The species, if any, that has filled the void created by the loss of the species concerned, should be determined; an understanding of the effect the re-introduced species will have on the ecosystem is important for ascertaining the success of the re-introduced population.
- The build-up of the released population should be modelled under various sets of conditions, in order to specify the optimal number and composition of individuals to be released per year and the numbers of years necessary to promote establishment of a viable population.
- A Population and Habitat Viability Analysis will aid in identifying significant environmental and population variables and assessing their potential interactions, which would guide long-term population management.

(ii) Previous Re-introductions

- Thorough research into previous re-introductions of the same or similar species and wide-ranging contacts with persons having relevant expertise should be conducted prior to and while developing re-introduction protocol.

(iii) Choice of release site and type

- Site should be within the historic range of the species. For an initial re-inforcement there should be few remnant wild individuals. For a re-introduction, there should be no remnant population to prevent disease spread, social disruption and introduction of alien genes. In some circumstances, a re-introduction or re-inforcement may have to be made into an area which is fenced or otherwise delimited, but it should be within the species' former natural habitat and range.
- A conservation/ benign introduction should be undertaken only as a last resort when no opportunities for re-introduction into the original site or range exist and only when a significant contribution to the conservation of the species will result.
- The re-introduction area should have assured, long-term protection (whether formal or otherwise).

(iv) Evaluation of re-introduction site

- Availability of suitable habitat: re-introductions should only take place where the habitat and landscape requirements of the species are satisfied, and likely to be sustained for the foreseeable future. The possibility of natural

habitat change since extirpation must be considered. Likewise, a change in the legal/ political or cultural environment since species extirpation needs to be ascertained and evaluated as a possible constraint. The area should have sufficient carrying capacity to sustain growth of the re-introduced population and support a viable (self-sustaining) population in the long run.

- Identification and elimination, or reduction to a sufficient level, of previous causes of decline: could include disease; over-hunting; over-collection; pollution; poisoning; competition with or predation by introduced species; habitat loss; adverse effects of earlier research or management programmes; competition with domestic livestock, which may be seasonal. Where the release site has undergone substantial degradation caused by human activity, a habitat restoration programme should be initiated before the reintroduction is carried out.

(v) Availability of suitable release stock

- It is desirable that source animals come from wild populations. If there is a choice of wild populations to supply founder stock for translocation, the source population should ideally be closely related genetically to the original native stock and show similar ecological characteristics (morphology, physiology, behaviour, habitat preference) to the original sub-population.
- Removal of individuals for re-introduction must not endanger the captive stock population or the wild source population. Stock must be guaranteed available on a regular and predictable basis, meeting specifications of the project protocol.
- Individuals should only be removed from a wild population after the effects of translocation on the donor population have been assessed, and after it is guaranteed that these effects will not be negative.
- If captive or artificially propagated stock is to be used, it must be from a population which has been soundly managed both demographically and genetically, according to the principles of contemporary conservation biology.
- Re-introductions should not be carried out merely because captive stocks exist, nor solely as a means of disposing of surplus stock.
- Prospective release stock, including stock that is a gift between governments, must be subjected to a thorough veterinary screening process before shipment from original source. Any animals found to be infected or which test positive for non-endemic or contagious pathogens with a potential impact on population levels, must be removed from the consignment, and the uninfected, negative remainder must be placed in strict quarantine for a suitable period before retest. If clear after retesting, the animals may be placed for shipment.
- Since infection with serious disease can be acquired during shipment, especially if this is intercontinental, great care must be taken to minimize this risk.
- Stock must meet all health regulations prescribed by the veterinary authorities of the recipient country and adequate provisions must be made for quarantine if necessary.

(vi) Release of captive stock

- Most species of mammal and birds rely heavily on individual experience and learning as juveniles for their survival; they should be given the opportunity to acquire the necessary information to enable survival in the wild, through training in their captive environment; a captive bred individual's probability of survival should approximate that of a wild counterpart.
- Care should be taken to ensure that potentially dangerous captive bred animals (such as large carnivores or primates) are not so confident in the presence of humans that they might be a danger to local inhabitants and/or their livestock.

b. SOCIO-ECONOMIC AND LEGAL REQUIREMENTS

- Re-introductions are generally long-term projects that require the commitment of longterm financial and political support.
- Socio-economic studies should be made to assess impacts, costs and benefits of the reintroduction programme to local human populations.

- A thorough assessment of attitudes of local people to the proposed project is necessary to ensure long term protection of the re-introduced population, especially if the cause of species' decline was due to human factors (e.g. over-hunting, over-collection, loss or alteration of habitat). The programme should be fully understood, accepted and supported by local communities.
- Where the security of the re-introduced population is at risk from human activities, measures should be taken to minimise these in the re-introduction area. If these measures are inadequate, the re-introduction should be abandoned or alternative release areas sought.
- The policy of the country to re-introductions and to the species concerned should be assessed. This might include checking existing provincial, national and international legislation and regulations, and provision of new measures and required permits as necessary.
- Re-introduction must take place with the full permission and involvement of all relevant government agencies of the recipient or host country. This is particularly important in reintroductions in border areas, or involving more than one state or when a re-introduced population can expand into other states, provinces or territories.
- If the species poses potential risk to life or property, these risks should be minimised and adequate provision made for compensation where necessary; where all other solutions fail, removal or destruction of the released individual should be considered. In the case of migratory/ mobile species, provisions should be made for crossing of international/state boundaries.

PLANNING, PREPARATION AND RELEASE STAGES

- Approval of relevant government agencies and land owners, and coordination with national and international conservation organizations.
- Construction of a multidisciplinary team with access to expert technical advice for all phases of the programme.
- Identification of short- and long-term success indicators and prediction of programme duration, in context of agreed aims and objectives.
- Securing adequate funding for all programme phases.
- Design of pre- and post- release monitoring programme so that each re-introduction is a carefully designed experiment, with the capability to test methodology with scientifically collected data. Monitoring the health of individuals, as well as the survival, is important; intervention may be necessary if the situation proves unforeseeably unfavourable.
- Appropriate health and genetic screening of release stock, including stock that is a gift between governments. Health screening of closely related species in the re-introduction area.
- If release stock is wild-caught, care must be taken to ensure that: a) the stock is free from infectious or contagious pathogens and parasites before shipment and b) the stock will not be exposed to vectors of disease agents which may be present at the release site (and absent at the source site) and to which it may have no acquired immunity.
- If vaccination prior to release, against local endemic or epidemic diseases of wild stock or domestic livestock at the release site, is deemed appropriate, this must be carried out during the "Preparation Stage" so as to allow sufficient time for the development of the required immunity.
- Appropriate veterinary or horticultural measures as required to ensure health of released stock throughout the programme. This is to include adequate quarantine arrangements, especially where founder stock travels far or crosses international boundaries to the release site.
- Development of transport plans for delivery of stock to the country and site of reintroduction, with special emphasis on ways to minimize stress on the individuals during transport.
- Determination of release strategy (acclimatization of release stock to release area; behavioural training - including hunting and feeding; group composition, number, release patterns and techniques; timing).
- Establishment of policies on interventions (see below).
- Development of conservation education for long-term support; professional training of

individuals involved in the long-term programme; public relations through the mass media and in local community; involvement where possible of local people in the programme.

- The welfare of animals for release is of paramount concern through all these stages.

POST-RELEASE ACTIVITIES

- Post release monitoring is required of all (or sample of) individuals. This most vital aspect may be by direct (e.g. tagging, telemetry) or indirect (e.g. spoor, informants) methods as suitable.
- Demographic, ecological and behavioural studies of released stock must be undertaken.
- Study of processes of long-term adaptation by individuals and the population.
- Collection and investigation of mortalities.
- Interventions (e.g. supplemental feeding; veterinary aid; horticultural aid) when necessary.
- Decisions for revision, rescheduling, or discontinuation of programme where necessary.
- Habitat protection or restoration to continue where necessary.
- Continuing public relations activities, including education and mass media coverage.
- Evaluation of cost-effectiveness and success of re- introduction techniques.
- Regular publications in scientific and popular literature.