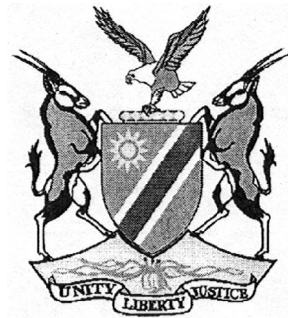


DRAFT



Ministry of Environment and Tourism
Republic of Namibia

SPECIES MANAGEMENT PLAN

Roan antelope

Hippotragus equinus

Sable antelope

Hippotragus niger niger

Tsessebe

Damaliscus lunatus lunatus

May 2003

DRAFT

SPECIES MANAGEMENT PLAN

Roan antelope **Sable antelope** **Tsessebe**
Hippotragus equinus *Hippotragus niger niger* *Damaliscus lunatus lunatus*

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GLOSSARY AND DEFINITION OF TERMS

Acronyms

DPW	- Directorate of Parks and Wildlife
DSS	- Directorate of Scientific Services
DWNP	- Department of Wildlife and National Parks, Botswana
MET	- Ministry of Environment and Tourism
NNF	- Namibia Nature Foundation
WWF LIFE	- World Wide Fund for Nature: Living In a Finite Environment programme

Definition of Terms

Background Study: This refers to the *Species Report for Roan, Sable and Tsessebe* prepared under the **Transboundary Mammal Project** of the Ministry of Environment and Tourism (Martin 2003).

Buffalo Management Plan: This refers to the *Species Management Plan for Southern Savanna Buffalo* prepared under the **Transboundary Mammal Project** of the Ministry of Environment and Tourism (Martin 2002b)

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

Population, Subpopulation and Metapopulation: In this report, a population is any viable breeding group of a species; a subpopulation is one of a number of breeding groups which, when considered with other subpopulations, makes up a metapopulation. In a metapopulation there are usually two or more subpopulations which, in the normal course of events, are not in breeding contact with each other.

The “Project”: A number of situations have occurred in the Plan, particularly in the development of budgets, where it has been necessary to refer to the expected process of implementation of the Plan. Although no formal project proposal has yet been developed for this purpose, the term “project’ is used to refer to the activities which would follow adoption of the Plan.

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

ACKNOWLEDGMENTS

People from Namibia who contributed their time and valuable experience towards preparation of the Plan include Ben Beytell (Director, DPW), Pauline Lindeque (Director, DSS), Peter Erb (DSS), Chris Brown (Namibia Nature Foundation), Chris Weaver (WWF LIFE programme), Barbara Paterson (Transboundary Mammal Project of the Ministry of Environment and Tourism), John Mendelsohn (Directorate of Environmental Affairs) and a large number of others.

EXECUTIVE SUMMARY

Roan, sable and tsessebe were relatively abundant and widely distributed in north-eastern Namibia at the turn of the century. None of these species occurred naturally in areas where the mean rainfall was lower than 400mm. Today, the population levels of all three species are a matter for concern: at best, the number of roan in Namibia is about 800, sable 1,200 and tsessebe 350. More than half of the animals in each of these species populations are on commercial farms and, of these, more than half are in areas with a mean annual rainfall below 400mm – which does not bode well for their long term survival. In the areas which should contain substantial, viable populations all three species, the numbers are low and the populations are dispersed in small isolated groups.

Various explanations can be put forward for the parlous state of roan, sable and tsessebe in areas where they should occur. As with buffalo (see *Buffalo Management Plan*), their abundance is largely controlled by rainfall and this has been below average since the mid-1980s. However, a more subtle effect of rainfall appears to operate on these species – their numbers correlate with the cumulative deficits and surpluses above and below the mean rainfall, particularly towards the margins of the range of rainfall which are acceptable to the species. These cumulated deficits and surpluses produce long term variations in habitats, rendering them unfavourable for roan, sable and tsessebe for extended periods.

If the hypothesis is correct, little can be done for populations of roan, sable and tsessebe in marginal areas when the cumulative rainfall is in a deficit mode. However, when rainfall conditions are favourable, it is essential that other limiting factors are not operating to depress populations. A list of potentially limiting factors is given in **Fig.1** immediately after this summary and, of these, the effects of illegal hunting, an overabundance of elephants and uncontrolled fires are seen as the most serious.

In order to restore roan, sable and tsessebe populations, this Management Plan advocates an aggressive STRATEGY of establishing new populations of all three species in suitable areas on an opportunistic basis, provided certain criteria are satisfied (**Fig.2**). For these new populations and for existing populations which are located in the right areas, the Plan then addresses the MANAGEMENT measures needed to overcome potentially limiting factors and give the populations the maximum probability of increasing (**Fig.3**).

There is a potentially suitable range of at least 50,000km² available for roan, sable and tsessebe in the north-east of Namibia. At very modest densities, the numbers of all three species in this range should be in the tens of thousands and, were this the case, it would be of major economic significance for the tourism industry. The high value of the species in the international safari hunting could result in the net income from wildlife-based land use being raised to some US\$29 million annually. The contribution of roan, sable and tsessebe to the potential earnings under non-hunting tourism in certain parts of the range could be even higher. The costs of achieving this and the potential returns to the various stakeholders are summarised in **Fig.4**.

Roan, sable and tsessebe populations are capable of growth rates well in excess of 10% when conditions are favourable and this augurs well for investment in developing their populations. Long before the populations reach their carrying capacities, their contribution to the wildlife economy would be substantial and the benefits would be realised jointly by the State, conservancies and commercial farms. The potential revenue for the State would be sufficient to meet the full budgetary requirements of the Directorate of Parks and Wildlife in north-eastern Namibia.

To achieve the vision for this Plan, there are certain over-arching requirements. Success in implementation relies on being decisive and seizing opportunities when they are presented. Undue bureaucratic delays in decision-taking will defeat the objectives.

- It is essential that adequate authority is devolved the Directorate of Parks and Wildlife to be able to respond to the imperatives of the Plan without constant referral to higher authorities. In turn, it will be expected that, given this authority, DPW will make full use of it.
- A similar devolution of authority is needed for those landholders (private and communal) on whose land it is hoped to establish successful roan, sable and tsessebe populations. To generate the impetus which will result in effective management institutions being formed requires the alignment of authority, responsibility and incentives.
- As with the *Buffalo Management Plan*, there is a need for ongoing dialogue with land use planning authorities and government veterinarians to secure the desired range for roan, sable and tsessebe. Veterinary control fencing and *ad hoc* patterns of settlement are fragmenting and reducing the available range. A key aspect of this dialogue must be aimed at raising awareness of the land use issues and economic values at stake.
- Collaboration with the Botswana wildlife authorities is a key component of this Plan. Linkages need to be maintained with the larger Botswana roan, sable and tsessebe populations and, with innovative projects in the vicinity of the international boundary, the potential exists for both Botswana and Namibia to bring about rapid improvements in these species populations.

Some of the management measures demanded by this species management plan are designed exclusively to benefit roan, sable and tsessebe (particularly those involving translocation). However, most of the required actions will benefit all wildlife species in north-eastern Namibia.

HIERARCHY OF FACTORS LIMITING POPULATIONS

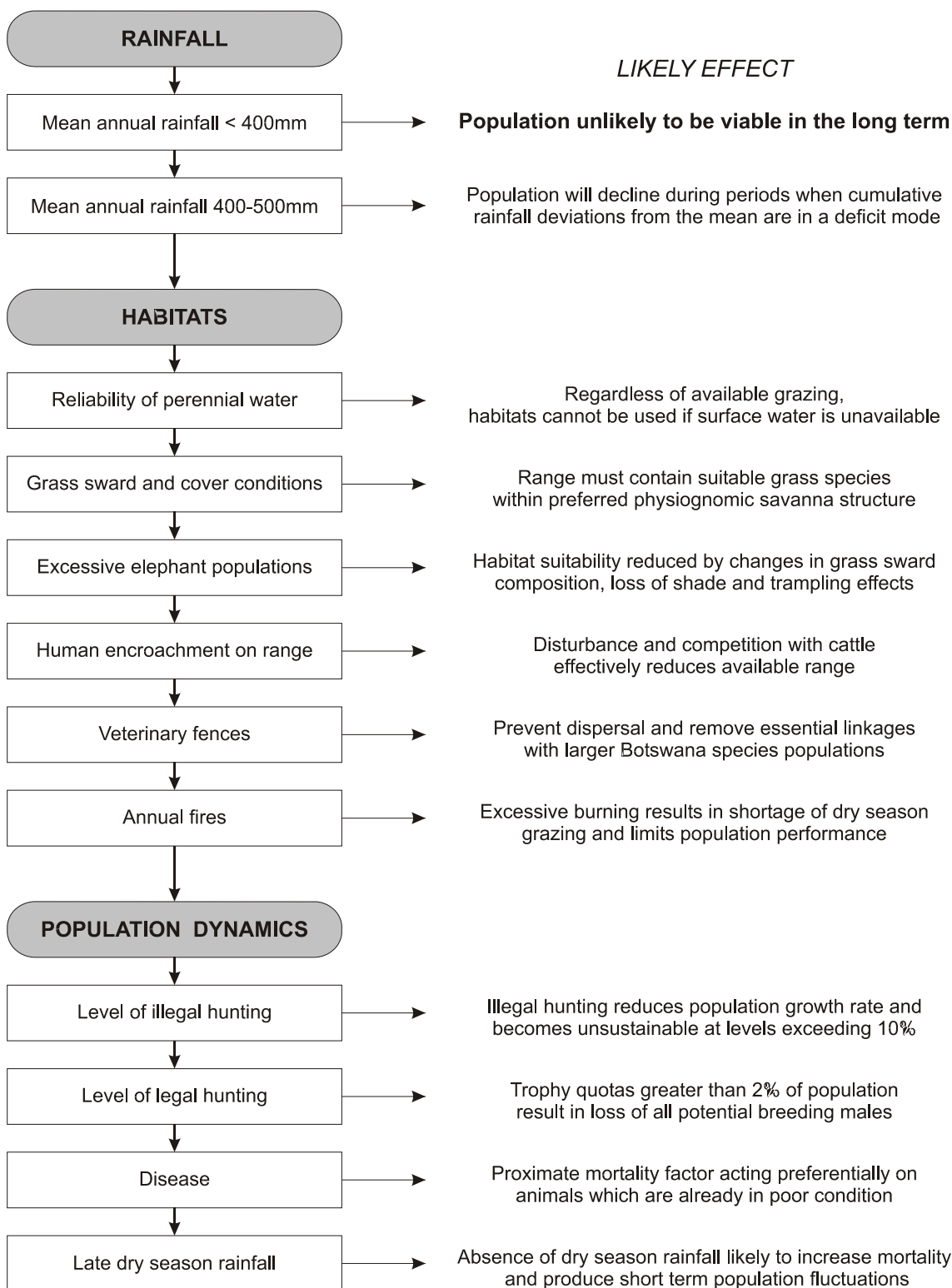


Figure 2: Limiting Factors Affecting Roan, Sable and Tsessebe Populations

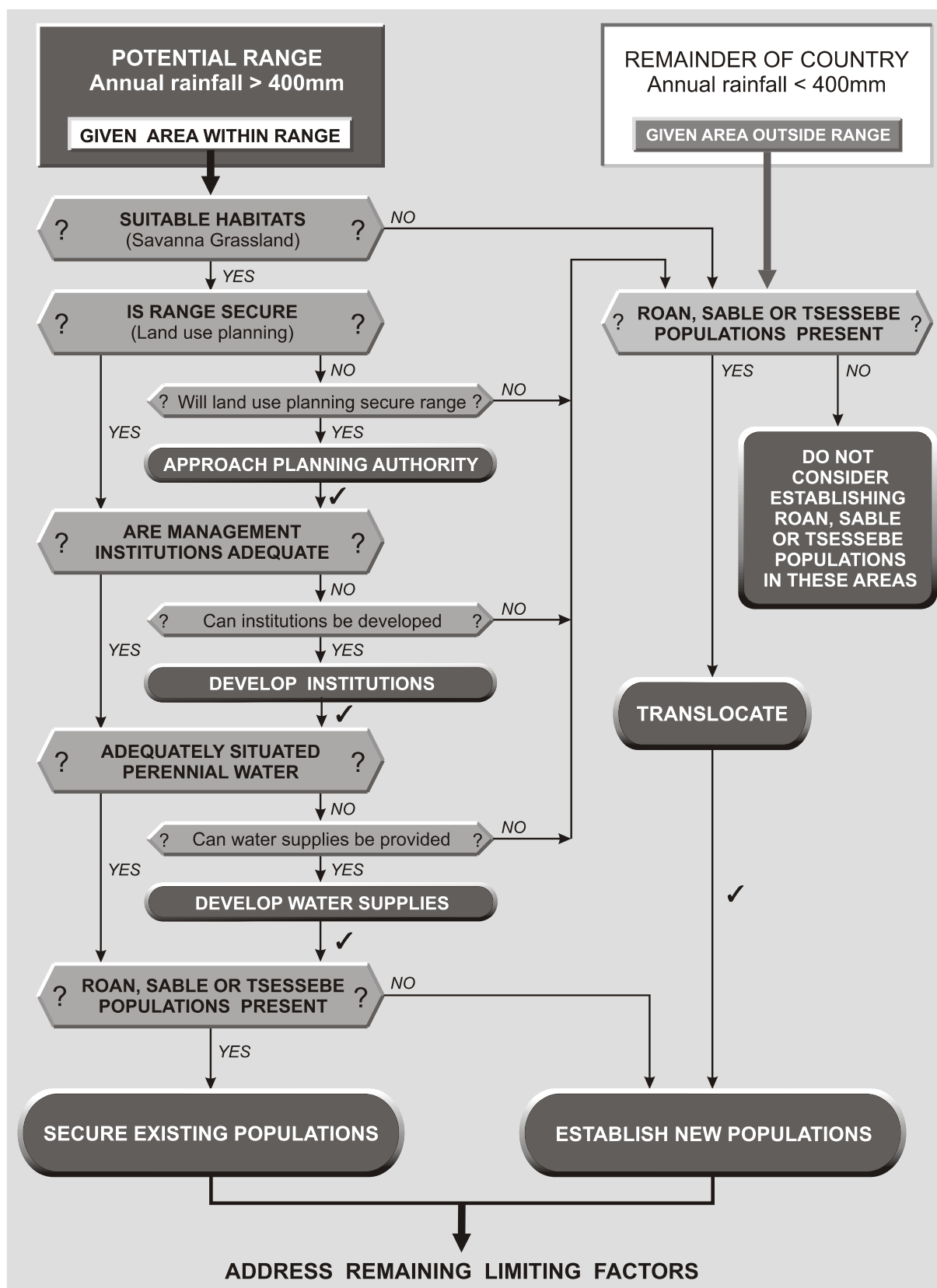


Figure 3: Strategy for Establishing Roan, Sable and Tsessebe Populations

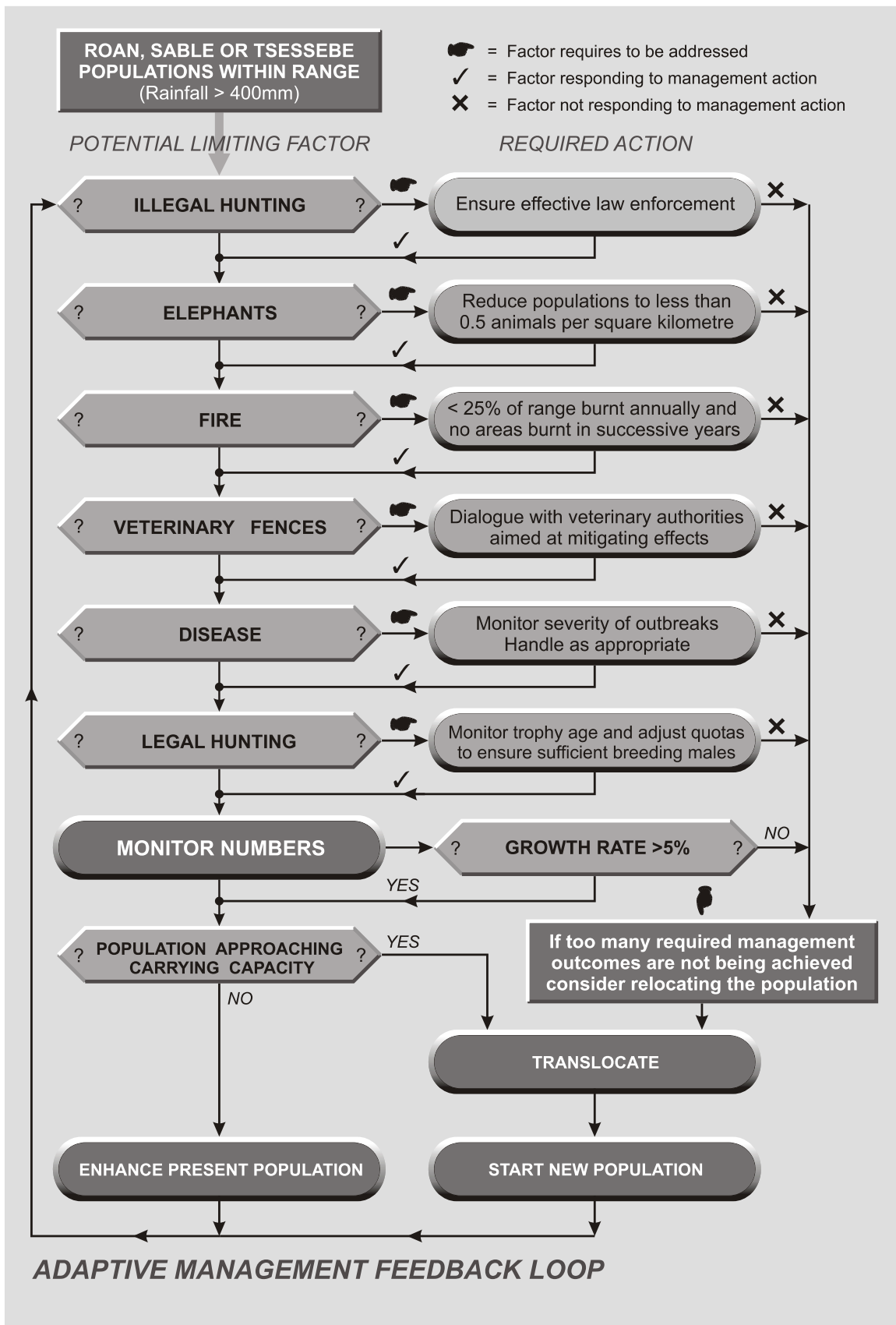


Figure 4: Management of Roan, Sable and Tsessebe Populations

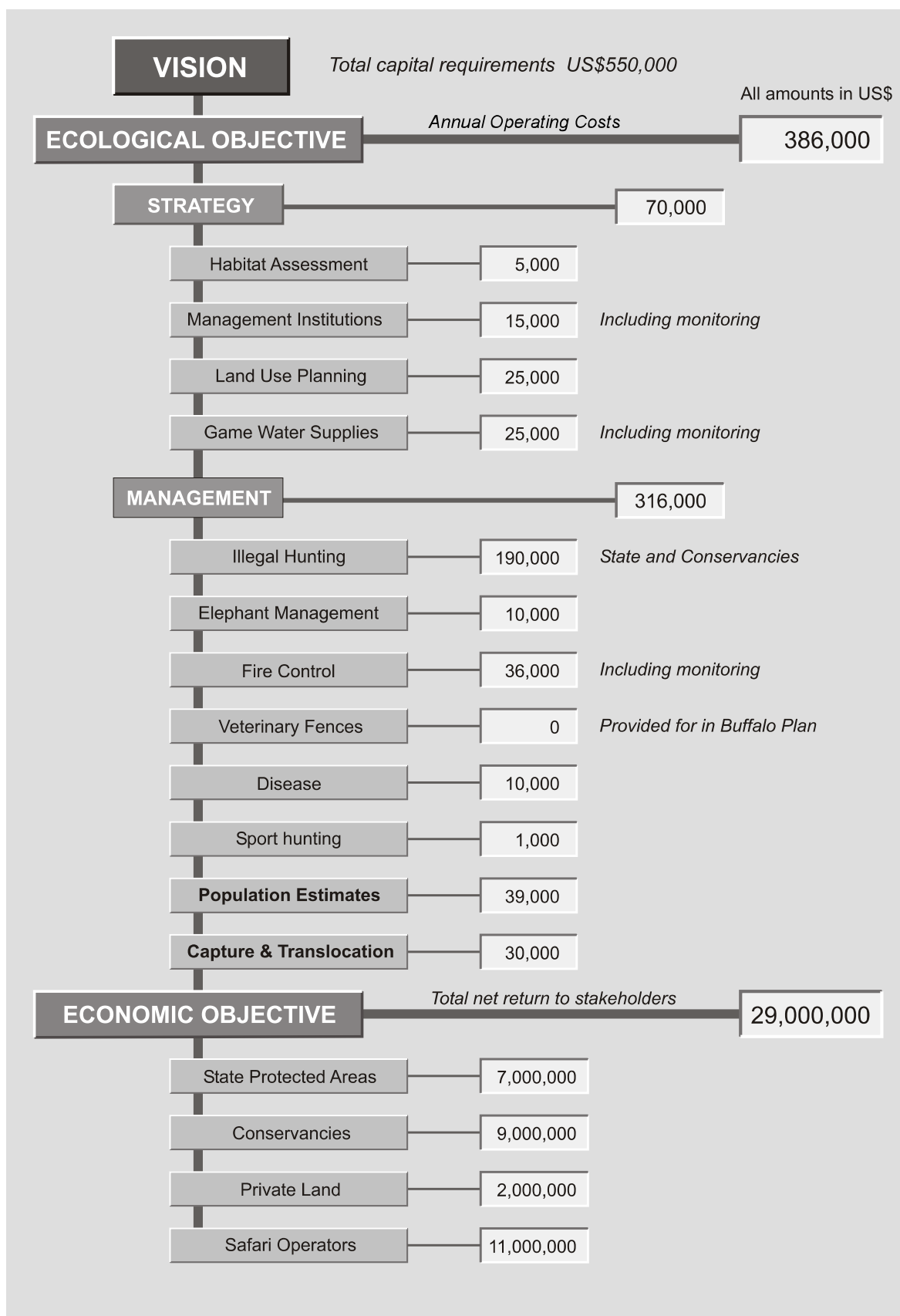


Figure 5: Summary of Financial Requirements for the Management Plan

INTRODUCTION & BACKGROUND

This **Species Management Plan** should be read in conjunction with the **Species Report for Roan, Sable and Tsessebe** prepared under the **Transboundary Mammal Project** of the Ministry of Environment and Tourism in March 2003.

Conservation Status and Significance

This management plan covers the following three species in the Subfamily HIPPOTRAGINAE (The Grazing Antelopes) of the Family BOVIDAE in the mammalian Order ARTIODACTYLA (Macdonald 2001) –

- Roan antelope – *Hippotragus equinus* (Desmarest 1804)
- Sable antelope – *Hippotragus niger* (Harris 1838), subspecies *H.n. niger*
- Tsessebe – *Damaliscus lunatus* (Burchell 1824), subspecies *D.l. lunatus*

The subfamily HIPPOTRAGINAE embraces three Tribes. Roan and sable are in the HIPPOTRAGINI Tribe and the tsessebe is in the ALCELAPHINI tribe. The third tribe, REDUNCINI, includes wetland antelope species such as the waterbuck, lechwe and reedbuck.

In the IUCN Red Data Book (Hilton-Taylor 2000), all three species are classified as Lower Risk (Conservation Dependent): they are not threatened at the global, continental or regional level. All three species are of conservation concern at the national level in Namibia because, within their ‘natural range’,¹ their numbers are low (far lower than in the recent past), they appear to be declining and many of the subpopulations making up the national metapopulation are isolated from one another. However, because the areas in which roan, sable and tsessebe are found ‘naturally’ in north-eastern Namibia are spatially linked to larger populations in Botswana, they would not qualify independently for any category of threat based on population numbers.

In any situation where the numbers of a species are lower than we might wish them to be, it is as well to have a perspective of how much greater they might be. Firstly, most of Namibia is outside the limit of the rainfall range in which the three species are found ‘naturally’ (**Map 1**). Secondly, roan, sable and tsessebe seldom, if ever, are the dominant species in large mammal communities in African savannas. Even under optimum conditions in those areas where the species occurred historically in Namibia, it is unlikely that any one of the them will ever make up as much as a tenth of the total biomass of wild animals (Coe, Cumming and Phillipson 1976). Nevertheless, surveys of the historic range of the three species in recent years indicate that all populations have decreased to a fraction of their former numbers and that there is justification for conservation effort to focus on them.

If roan, sable and tsessebe were to disappear from their former range in north-eastern Namibia where the rainfall conditions are favourable, this would be a loss of biological diversity and a failure of wildlife management. **Their persistence in viable numbers can be seen as an indicator of ecosystem health.**

1. Although numbers have increased spectacularly on commercial farms in Namibia, most of these farms are located outside the range where the species formerly occurred in the country.

Several factors threaten ecosystems in north-eastern Namibia including the uncontrolled spread of human settlement, an overabundance of cattle and veterinary control fences – all of which are acting in concert to fragment the available range and to sever links with the larger Botswana populations of roan, sable and tsessebe. One the greatest of the threats for these species is the burgeoning elephant population which is likely to modify their habitats unacceptably.

Substantial populations of roan, sable and tsessebe are likely to have a significant effect on wildlife tourism, both for game-viewing and for sport hunting. The effect is likely to be more pronounced in the Caprivi or Khaudum than in (say) Etosha, which is already a guaranteed tourist destination. A corollary to the possible enhancement which large numbers of these species might bring to tourism is the negative impression which their disappearance from their former range would give. For knowledgeable tourists visiting the Caprivi or Khaudum, the absence of roan, sable and tsessebe is likely to be noted unfavourably.

Roan, sable and tsessebe are all highly prized hunting trophies and an analysis has been done of the potential economic contribution that their inclusion in international sport hunting quotas might make. Gross income almost doubles when reasonable quotas of these species are part of the available hunting (see *Background Study*). A similar recent study (Martin 2002a) showed that an increase in the numbers of buffalo could double the returns from land use in the Caprivi. Enhancing roan, sable and tsessebe populations would further increase land use values. As existing wildlife uses are financially and economically more profitable than subsistence agriculture and cattle husbandry, the potential rôle of these species in a land use context is very significant.

To achieve the aims of this management plan requires a coordinated effort within Namibia and with its neighbour, Botswana. As with the Species Management Plan for Buffalo (Martin 2002b), many of the larger factors determining the status of the roan, sable and tsessebe populations will only be addressed through dialogue with the veterinary departments in Namibia and Botswana and with land use planning authorities in north-eastern Namibia. The maintenance of spatial links with the Botswana roan, sable and tsessebe populations and the successful development of conservancies are the key to increasing numbers and avoiding population fragmentation.

Populations

Formal surveys to count roan, sable and tsessebe date back to 1970 in some parts of Namibia and, since 1980, most parts of the species' range have been surveyed at least once in every 3 years. Because of a lack of consistency in the survey methods used, the data do not permit a detailed evaluation of population trends. Estimates for the three species (from the *Background Study*) are shown in the table below, together with the highest estimates obtained in the past 20 years.

	ROAN	SABLE	TSESSEBE
State Protected Areas	300	400	175
Communal Lands	100	0	0
2003 Subtotal	400	400	175
<i>Highest estimate Year</i>	<i>843 (1984)</i>	<i>1,200 (1994)</i>	<i>206 (1994)</i>
Commercial Farms	400	800	175
2003 TOTAL	800	1200	350

The location of the present roan, sable and tsessebe populations is shown on **Maps 2, 3 & 4**. Although substantial populations of these species have been built up on private land in the main body of the country, it would be a mistake to regard these as secure because of their permanent vulnerability to rainfall regimes.

Limiting Factors and Threats

Rainfall is the primary limiting factor for roan, sable and tsessebe populations. The species' early range in Namibia lay well above the 400mm rainfall isohyet (Map 1) and historical records do not show any of the species occurring in areas with a lower rainfall.

A more subtle rainfall influence may be affecting all three species in areas where the mean annual rainfall is less than 500mm per year. Dunham and Robertson (2001) demonstrated that the cumulative surpluses and deficits above and below the mean rainfall correlate closely with the performance of tsessebe populations in Kruger National Park. The data from Namibia suggest that this effect may also be influencing roan and sable.

The long term surplus or deficit in rainfall could be the main determinant of the vegetation structure, particularly of grasslands, in any given locality. A prolonged drying out process would affect water tables and the catenas in vegetation from river banks to the upper reaches of catchments. Species such as tsessebe would find their preferred habitats shrinking to narrow bands close to rivers. Sable and roan would be affected by changes in species composition in grass swards and shifts between perennial and annual grasses.

Dunham and Robertson (2001) and Erb (1993) also found a strong correlation between adult and juvenile mortality and the rainfall in the late dry season. Rainfall in late dry season appears to be critical, affecting the animals' condition, survival rate, late stage of pregnancy and early stage of lactation.

The limiting factors for roan, sable and tsessebe can be arranged in a hierarchy –

- (1) Many of the areas where it is being attempted to conserve roan, sable and tsessebe lie below the lower rainfall limit which the subcontinental data indicates are acceptable for the species.
- (2) In the areas where the rainfall is marginal (300-500mm of annual rainfall), the performance of all three species appears linked to the long term cumulative rainfall surpluses and deficits.
- (3) A surplus in the accumulated rainfall need not necessarily produce a linear increase in population growth rates – it should rather be seen as the removal of a primary limiting factor.
- (4) When it occurs, **a deficit in the accumulated rainfall is likely to be the primary limiting factor** for roan, sable and tsessebe populations. All management efforts directed at secondary factors are unlikely to surmount this fundamentally negative effect.
- (5) Given that the rainfall regime is favourable (i.e. in a period of accumulated surplus), management efforts directed at a number of other potentially limiting factors may enhance population growth – e.g. **illegal hunting, fire**, provision of **artificial water** in specific areas.
- (6) Roan, sable and tsessebe are specialist feeders with habitat requirements which, despite much research, may not yet be fully understood. In those parts of southern Africa where elephant populations have been allowed to increase unchecked, the major structural changes in habitats have not been favourable for roan, sable and tsessebe. **The negative influence of large numbers of elephants on the habitats required by the three species is likely to be the most severe limiting factor after rainfall.**
- (7) Roan, sable and tsessebe may be susceptible to various **diseases** of which anthrax is likely to be the most serious (Pienaar 1961). Together, predation and disease tend to be secondary factors acting on undernourished animals.
- (8) **Veterinary fences are an important limiting factor** in their influence on movements of roan, sable and tsessebe between Botswana and Namibia. Many populations are becoming isolated as a result of the placement of fences.²
- (9) Within the Caprivi and to the west of Khaudum Game Reserve **the ad hoc location and spread of human communities and their cattle** is resulting in loss of wildlife range and direct competition for grazing resources. Unplanned human settlement may be more than a ‘limiting factor’ – it is a direct threat to the long term survival of the species.

These limiting factors are summarised in **Fig.1** on page (v). The most important implication of the *Background Study* is that the major management emphasis must lie in conserving roan, sable and tsessebe in the areas which are favourable to their long term survival, i.e. where mean annual rainfall is above 400mm.

2. e.g. Mahango, Khaudum and Nyae Nyae.

Background and Rationale for the Management Plan

Under the present Namibian environmental legislation, management plans are required for species which are rare or valuable and which share boundaries with neighbouring countries. Roan, sable and tsessebe are rare (within their 'natural' range) and valuable. In the Caprivi, the net income from land under a sport hunting regime with buffalo, roan, sable and tsessebe at carrying capacity approaches US\$10/hectare which greatly exceeds the returns from alternative land uses.

The costs of restoring wild species populations which are in low numbers can be extremely high and the history of conservation is littered with examples of funds which have been spent but failed to achieve their objective. The aim of this management plan is to provide a sharp focus on measures likely to enhance roan, sable and tsessebe populations and, conversely, to emphasize areas in which it is not worth wasting conservation funds.

This management plan is dynamic and its implementation is dependent on a proactive approach which seizes opportunities when they are presented. Because of the dependency of roan, sable and tsessebe populations on rainfall, there will be long periods during which, despite the best management performance, little can be done to increase species numbers. The plan relies on a combination of maintaining and enhancing existing species populations and establishing new populations when conditions are favourable.

The plan has no relationship to standard government five-year budgeting plans – except insofar as the required operational expenditure for State Protected Areas needs to be maintained continuously above the minimum threshold needed for effective management and law enforcement. Funds also need to be available at short notice in order to take advantage of opportunities when presented. The achievement of greater numbers and new populations over the available range is subject to many factors being favourable – including success in conservancy development, a reversal of the present spread of unplanned settlement and land clearance, mitigation of the effects of veterinary fences and management of elephant.

Plan Structure

As with the Species Management Plan for Buffalo, the management plan for roan, sable and tsessebe requires a process-based structure. Experience gained from the buffalo plan indicates that several improvements can be made which will shorten the document and avoid repetition of points. The modified structure is described below –

(1) The plan begins with a **VISION** statement which incorporates two objectives – an **ECOLOGICAL OBJECTIVE** and an **ECONOMIC OBJECTIVE**.³ The Vision is hopefully consistent with Namibian policy and legislation and the Species Management Plan should have public and political support.

(2) To realise the **VISION**, the **ECOLOGICAL OBJECTIVE** needs to be addressed first.

An examination of the factors which limit roan, sable and tsessebe populations (**Fig.1**) suggest that these fall into two types – those which are debarring constraints and those which have variable effects on species populations. **Debarring constraints** are such that a species population will not be viable in the long term and therefore the population should either be moved or, if there is no population in the first place, there should be no attempt to establish one. The other type of limiting factor is likely to impair a species population's performance rather than result in its extinction. However, if the severity of this type of limiting factor is extreme it might cause extinction, particularly if it is acting in concert with other factors tending to depress the population – in other words, it becomes a debarring constraint.

(3) The first step in tackling the Ecological Objective is to develop a decision-making framework to address the debarring constraints – in other words, a **STRATEGY**. The Strategy is based on potential areas for roan, sable and tsessebe populations and considers each debarring constraint which might affect the long term viability of a species population (**Fig.2**, page vi). Depending on whether the constraints can be removed, the decisions which follow are either to secure an existing population or to use the animals to start a new population elsewhere.

(4) Having decided positively on any roan, sable and tsessebe population, the next stage is to address the other limiting factors which may affect its performance – the **MANAGEMENT** of the population (**Fig.3**, page vii). This part of the plan has been structured as an adaptive management exercise in keeping with a process-based system.

(5) The **ECONOMIC OBJECTIVE** will start to be realised once progress is being made with the Ecological Objective.

In a process-based approach, the constraints are addressed serially. The decisions required under the strategy precede any management activities and include addressing social and institutional requirements. The order in which the limiting factors are presented in the Strategy and the Management sections could be subject to change depending on the severity of the particular factors in the area concerned. The budgetary requirements for implementing the plan are necessarily notional because of the dynamic and contingent nature of the plan.

3. The concept of a **GOAL** for the plan has been avoided since it implies some fixed endpoint to be achieved. This plan is seen as ongoing and aimed at continuous enhancement of roan, sable and tsessebe populations.

MANAGEMENT PLAN

VISION AND OBJECTIVES

AWARE that **Roan, Sable and Tsessebe** antelope once occurred widely in the north-east of Namibia;

REGARDING these antelope as highly desirable species to be conserved as part of the biological diversity of the large wild mammal community of Namibia;

NOTING the valuable economic contribution which these species can make as a component of wildlife-based land use in the semi-arid lands of Namibia;

NOTING also that present populations of these species are in low numbers and occur sporadically and discontinuously across their former range;

Accordingly, the **OBJECTIVES** of this Management Plan are –

ECOLOGICAL OBJECTIVE

To increase ROAN, SABLE and TSESSEBE antelope numbers in those areas which are ecologically suitable for the species both by enhancing existing populations and by establishing new populations.

ECONOMIC OBJECTIVE

To realise the full potential of ROAN, SABLE and TSESSEBE as components of wildlife-based land use for the benefit of rural landholders and the State, in keeping with the provisions for sustainable use in Namibia's Constitution.

1. Ecological Objective

1.1. Strategy

The Strategy for achieving the Ecological Objective is shown in **Fig.2** on page (vi). The elements of the Strategy are as follows –

- (1) **Potential Range:** Namibia can be divided into two regions separated by the 400mm rainfall isohyet (**Maps 2, 3 & 4**). It is argued in the *Background Study* that only those areas enjoying more than 400mm average annual rainfall will support viable populations of roan, sable and tsessebe in the long term. The State should be willing to establish new roan, sable and tsessebe populations within this region regardless of the land tenure category (State land, communal land or commercial farm – **Map 5**), provided the area satisfies the preconditions which follow.

- (2) Unsuitable Areas: Existing roan, sable and tsessebe populations in areas where the average annual rainfall is less than 400mm should be considered for relocation to areas above the 400mm rainfall isohyet.

This is feasible in State Protected Areas and is unlikely to provoke an adverse public reaction. However, such a decision is likely to produce an outcry from private landholders who have roan, sable and tsessebe on their land – of which there are a significant number below the 400mm rainfall isohyet (**Maps 2, 3, 4**). As these landholders have invested considerable amounts in establishing groups of these species, their adverse reaction may be justifiable. It is recommended that the Ministry of Environment and Tourism adopt the following policy towards roan, sable and tsessebe on private land which lies below the 400mm rainfall isohyet –

- (i) Government will not contribute founder animals to establish any new populations in areas with less than 400mm average annual rainfall. The State will discourage landholders in such areas from purchasing the animals from other sources but will not necessarily withhold permits.
 - (ii) Government will not provide free support (veterinary or other support) to landholders with groups of these species.
 - (iii) In the event that animals of these species are found to be in poor condition due to drought or habitat depletion, the State may intervene on animal welfare grounds to relocate animals to more favourable situations.
- (3) Habitats: The area should contain habitats suitable for roan, sable and tsessebe. All three species are amenable to a range of savanna woodland types⁴ and this is unlikely to be a debarring constraint over most of the available range.

In the event that habitats are not suitable, the area in question should be treated as if it were in the region with less than 400mm rainfall. If any roan, sable and tsessebe happen to be in the area they should be translocated.

- (4) Land Use: The area should not be heavily settled or contain large numbers of domestic livestock. It is unlikely that populations of roan, sable and tsessebe can be established in areas where human densities exceed 10 persons/km² (**Map 6**).

Situations exist in the Caprivi where, to maintain linkages, it would be highly desirable to establish or secure roan, sable and tsessebe populations in certain communal lands but *ad hoc* settlement is proving to be a debarring constraint. In such cases, dialogue with land use planning authorities might result in the objective being achieved.

If the desired range cannot be secured, it should be discounted as a potential area for establishing roan, sable and tsessebe populations and any animals of these species within it should be translocated.

4. Suitable habitats for roan, sable and tsessebe are described on pages 7-11 of the *Background Study*.

- (5) Management Institutions: If the above conditions are favourable, the next question is whether adequate institutions are in place to protect and manage populations of roan, sable and tsessebe (this would pertain both to communal lands and commercial farms). If such institutions can be developed (e.g. conservancies), the condition will be satisfied: if not, any roan, sable or tsessebe in the area should be translocated.

It is recommended that, in developing roan, sable and tsessebe populations on communal lands or commercial farms, the animals are not treated as belonging to the State and that the landholders are not treated as ‘custodians’ of State assets. A greater likelihood of success will come from a full devolution of authority for the species to the landholders.

The possibility of joint management institutions between the State and conservancies should be considered in areas where conservancies border on to national parks. This could result in larger ranges for roan, sable and tsessebe to the mutual benefit of all parties.

- (6) Permanent Water: Roan, sable and tsessebe are restricted in their movements by availability of permanent drinking water. Unless there is adequate perennial water spatially situated so that the species can make full use of the available habitats, the area should be disregarded as being viable unless such water supplies can be provided.

It is unlikely that roan, sable or tsessebe will be present in areas without suitable water supplies but the situation could arise where animals have been recently displaced from their regular drinking places by an influx of people and domestic livestock. In such cases, the animals should be translocated to new areas where they have a greater likelihood of surviving.

A network of permanent game watering points needs to be developed in the Caprivi Game Reserve. These water supplies should be positioned evenly across the Caprivi Strip to enable animals not only to get access to additional grazing but also to traverse the distance between the core wildlife areas at each end of the Strip. Water points may also be needed in the Caprivi Forest Reserve.

- (7) Selected Areas: The above steps (1)-(6) should have identified areas suitable for maintaining existing roan, sable and tsessebe populations or for establishing new populations.

It is stressed that the STRATEGY should remain dynamic and should not be seen as a ‘once-off’ static decision-taking framework. It is possible that some areas initially identified as suitable for roan, sable and tsessebe may prove to be unsuitable in practice: equally, conditions may change in areas which had earlier been rejected as unsuitable and the decision should be revisited (this could apply particularly where new conservancies are developed). Although no feedback loops are shown in **Fig.2**, the exercise should be seen as an adaptive management process where the outcome of establishing or maintaining populations provides the learning experience for improving each new stage in decision-taking.

The next stage in the Management Plan is to address the remaining limiting factors which could prevent the species populations from realising their full potential. A schematic outline of these factors is shown in **Fig.3** on page (vii).

1.2. Management

This process applies specifically to areas which were identified under the STRATEGY as having no debarring constraints for the establishment of roan, sable and tsessebe populations. The section follows the layout of potentially limiting factors shown in **Fig.3**. It is reiterated that the factor which may have the greatest influence on the performance of roan, sable and tsessebe populations is a cumulative rainfall deficit – a factor which is not amenable to human control. The discussion which follows applies to those factors which may enhance roan, sable and tsessebe populations when the rainfall regime is in a cumulative surplus mode and it includes consideration of the required management actions and monitoring.

- (1) **Illegal hunting:** Under normal rainfall conditions, roan, sable and tsessebe populations can be expected to increase at more than 10% per annum and, accordingly, the populations can sustain illegal offtakes of about 10% annually before their effective growth rate becomes zero (*Background study*, page 59). If illegal hunting can be limited to about 2-3% per annum, populations will maintain growth rates of about 10% and be able to sustain reasonable sport hunting quotas.

The manpower and budgetary requirements for effective law enforcement are dealt with in **Annex 1** (page 28). Law enforcement effort and illegal activity needs to be monitored to ensure that the objective for illegal hunting is being achieved (*Background Study*, Appendix 5).

- (2) **Elephants:** The large elephant population in the Caprivi and northern Botswana (over 100,000 animals) may be responsible for fundamental structural changes to the habitats of roan, sable and tsessebe. The loss of large trees, removal of shade and trampling effects are likely to alter the grass sward in a manner which is not favourable for these species.

As recommended in the *Management Plan for Buffalo*, intervention in the balance between elephants and other species may be best tackled through an adaptive management research experiment. In a defined area where elephants, buffalo, roan, sable and tsessebe are present and their numbers are known, the elephant population would be reduced significantly. At the same time there should be a scientific ‘control’ area where there is no intervention and the effect of the management in the first area can be compared with that in the control area. The numbers of elephant removed should be large enough to be able to detect any differences (as an initial target, elephant densities should be reduced to less than 0.5 animals/km² – a level which has been shown elsewhere as necessary in order to retain more than half of the mature tree canopy cover), the duration of the experiment should be long enough to enable the species to respond to the treatment, and the monitoring of numbers should be accurate enough to detect the changes.

There have been no population reductions of elephant either in northern Botswana or the Caprivi as part of ecosystem management in recent times (if ever). Any decision to reduce elephant populations, even if it is limited and experimental, will require **public and political support** and **transboundary cooperation** with Botswana.

- (3) **Fire:** At present more than 50% of the Caprivi is burnt each year (Mendelsohn and Roberts 1997) and it can be expected that a similar situation prevails in much of the remaining potential range for roan, sable and tsessebe. This significantly reduces the carrying capacity for grazing species. While tsessebe are attracted to burnt areas, neither roan nor sable show preferences for them. It would be a considerable step forward if the incidence of fire could be limited to an annually burnt area of less than 25% of the range and if the same areas were not burnt each year.

To limit the ravages of fire, a network of firebreaks and adequate manpower and equipment for controlling fires is required. Satellite imagery can be used for detailed fire mapping (Mendelsohn & Roberts 1997, p 24-25) although this monitoring technique is expensive if the progressive incidence of fires over the dry season is to be mapped. A single image of the final result of fires by the end of November each year may be adequate.

Coordination and collaboration with neighbouring communities and **transboundary co-operation** with Botswana are needed to achieve this objective fully.

- (4) **Veterinary fences:** The influence of veterinary fences on the well-being of roan, sable and tsessebe populations is less critical than for buffalo. Nevertheless, the fences along the international boundary between Namibia and Botswana undoubtedly impede movement of the three species and disrupt spatial linkages between the subpopulations (**Map 6**). The effects are likely to be most severe in the vicinity of Khaudum, Nyae Nyae, Mahango and the Caprivi Game Park.

Discussions are needed with the veterinary authorities in Namibia and Botswana with the aim of mitigating the effects of present veterinary control fences and avoiding the future development of any fences which will further fragment the wildlife range.

- (5) **Disease:** Roan, sable and tsessebe may be susceptible to various diseases of which anthrax is likely to be the most serious. However, there is no evidence in the literature that disease has ever been a significant limiting factor for these species and, if it were, there is little in the way of management measures available to mitigate the effects. Together, predation and disease tend to be secondary mortality factors acting on undernourished animals. Disease may differentially affect juveniles but the resultant mortality is likely to cause population fluctuations rather than any long term alterations to basic population growth rates.

The primary measure needed to protect roan, sable and tsessebe from livestock diseases is the avoidance of contact. This poses problems in north-eastern Namibia because land use allocations are in a state of flux and, as yet, veterinary fencing to contain cattle is not in place in certain key areas. There are obvious concerns on the part of the wildlife authorities that implementation of fencing could result in further reductions in the available range.

Every opportunity to monitor the incidence of disease and occurrence of parasites in roan, sable and tsessebe should be taken, without employing unnecessarily intrusive methods. In the course of implementing this management plan, numerous animals are likely to be translocated and, while the animals are in close confinement, blood samples can be taken and animals can be inspected for parasites.

- (6) Legal hunting: Roan, sable and tsessebe populations all respond similarly to the offtake of sport hunting trophies. The annual recruitment to the part of the age pyramid from which males are hunted is very low – the proportion of males recruited annually to the 8 year-old age group is about 2% of the population. Thus, in order to retain sufficient prime breeding males, **sport hunting quotas for roan, sable and tsessebe should never exceed 2%**.

Population estimates derived from aerial surveys are unlikely to provide the accuracy needed to set a 2% quota. The key parameter to be monitored is the age of trophies taken from the population.⁵ If a criterion is set that there should always be a sufficient number of prime breeding males, then the requirement is that amongst the trophies (regardless of the selectivity of the hunting regime), there should be a representative number of males in the age classes above 7 years old. As soon as the cohort of hunted animals is missing all of the age classes older than 7 years of age, this is a robust indicator that the population is being overhunted and the quota should be reduced. An initial quota might be set by the crude method of applying 2% to the population estimate but, thereafter, that quota should be adjusted upwards or downwards by the ‘hard data’ which comes from measuring trophies (as opposed to the ‘soft data’ of population estimates).

- (7) Population numbers: Progress towards realising the ECOLOGICAL OBJECTIVE of this management plan relies on a knowledge of the trends in roan, sable and tsessebe population numbers. If considerable effort is to be put into increasing numbers of these species, then it would be desirable to measure the effects of this investment. The limitations of present aerial survey methods when applied to estimating roan, sable and tsessebe populations are discussed in the *Background Report* (page 24): however, there appears to be little in the way of alternatives which will produce superior results.

Population estimates would be greatly improved in the areas where roan, sable and tsessebe populations are being established if annual surveys using the standard methodology of Craig (2000) were done at a fairly high sampling intensity (10-20%) using the same strata on every survey and, where possible, the same observers. **It is recommended that Botswana and Namibia collaborate on annual air surveys to achieve this** (*Background Study*, page 65).

In addition to annual aerial surveys, there is sufficient justification to merit experimenting with alternative methods, including the development of local community monitoring systems and the method of inference from monitoring the age of hunting trophies (*Background Study*, page 62).

The monitoring of roan, sable and tsessebe population trends has a significance for decision-taking under this Management Plan. It is recommended that **any population of roan, sable and tsessebe which is not increasing at a growth rate greater than 5%** (i.e. the population is effectively stationary),⁶ **should be translocated in its entirety to an area where conditions are more favourable for its increase.**

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5. Methods of ageing roan, sable and tsessebe from their dentition or horns are given by Grobler (1979,1980); Joubert (1976); Child *et al* (1972); Huntley (1973).
6. In making this assessment, the current status of the cumulative rainfall deviations above and below the annual mean rainfall needs to be taken into account. If the rainfall regime is in a deficit mode it is unlikely that populations will increase and the best that can be hoped for is that they can be maintained with minimum loss until the rainfall regime enters a surplus mode.

- (8) Population performance: If any single limiting factor or a combination of factors is exerting an influence which is keeping a particular population of roan, sable or tsessebe depressed and management actions are not ameliorating the situation, a decision as to whether to relocate the population should be taken.

One criterion on which to base such a decision is simply the population growth rate, as stated in the previous subsection. However, there may be qualitative factors to be taken into account which cannot be specified with rigid criteria in this Plan and which will rely on the judgement of senior officials in the Ministry of Environment and Tourism.

- (9) Populations at Carrying Capacity: In the event that any existing roan, sable or tsessebe population is approaching carrying capacity, the opportunity should be seized to use animals from the population to begin a new population in another suitable locality.

It is difficult to provide general criteria for what might constitute carrying capacity for these species and the situation is likely to be area-specific. By definition, a population is approaching carrying capacity when its rate of population increase is beginning to slow down. It is recommended that this criterion is treated fairly liberally so that whenever there is a local abundance of any of the three species, whether or not there is data to suggest the population growth rate is decreasing, the opportunity should be taken to begin another population.

- (10) Adaptive Management: To increase the numbers of roan, sable and tsessebe in Namibia, the Management Plan relies on an aggressive process of monitoring the performance of existing populations and starting new populations whenever opportunities are presented.

An annual review process should be built into the Management Plan whereby a committee (which may include persons outside government) examines the monitoring data objectively at the end of each year and recommends management decisions to the Ministry for the following year.

2. Economic Objective

The economic objective was stated on page 7. This objective should be progressively achieved as the ecological objective is met. There is no particular end-point for the objective – the greater the numbers of roan, sable and tsessebe in Namibia, the greater will be the economic benefits which can be derived from the species through hunting and non-hunting tourism.

Expected Results

The economic objective implies some notional concept of the financial value which roan, sable and tsessebe could bring to land use if their numbers were close to carrying capacity. It is difficult to attribute some marginal increment to the increase in non-hunting tourism which might result from substantial populations of these species and it will not be attempted here. Suffice it to say that in areas where tourism is presently low in the north-east of Namibia an abundance of these species would be likely to make a significant difference. This is particularly so because their presence would indicate that ecosystems were in prime condition and, given this, it is very likely that most of the other large wild mammal species would also be plentiful. Thus, an effort to build up roan, sable and tsessebe numbers would indirectly result in benefits for a range of species and a multiplier effect for tourism.

It is possible to assess the contribution which these species might make to sport hunting and an exercise was carried in the *Background Study* (Appendix 4) which estimated that if the present densities of roan and tsessebe could be increased to 1/km² and the density of sable increased to 2/km², this would result in –

- a five-fold increase in the numbers of international hunter-days;
- a doubling of the gross income from about US\$5/ha to US\$10/ha; and
- an increase of some 20% in net earnings from the land.

– with all other variables remaining as they are at present.

Assuming that present densities of roan and tsessebe in the given area are around 0.1/km² and the density of sable is about 0.2/km², it would take about 25 years with population growth rates of 10% per annum to reach the required densities. Any immigration from Botswana would shorten this time.

The net returns do not show the full economic value of this improvement. It would result in a large number of jobs being created and a substantial increase in the economic activities supporting the hunting industry. The figures represent a substantial improvement in wildlife-based land-use values – which are already higher than those possible from livestock husbandry.

The implications of the income which could be derived from land in Namibia lying above the 400mm rainfall isohyet are explored in the table on the following page. The present areas within this region on which roan, sable and tsessebe populations exist are taken from Table 7 in the *Background Study*. It has been assumed that, under this Management Plan, more land with new populations of roan, sable and tsessebe could be added to the existing areas of communal land and

commercial farms (column titled 'FUTURE'). At an assumed net income per hectare of US\$3.50 to the landholder for land managed under the described sport hunting regime and US\$2.20 earned by safari operators, the net financial value is some US\$28.5 million.

Potential Earnings from Sport Hunting on Land with Roan, Sable and Tsessebe Populations

AREA	PRESENT ----- square kilometres -----	FUTURE	TOTAL	NET EARNINGS @ US\$3.5/ha
State Land	20,000	0	20,000	7,000,000
Communal Land	10,000	15,000	25,000	8,750,000
Private Land	1,000	4,000	5,000	1,750,000
TOTALS	31,000	19,000	50,000	17,500,000
				Safari operators' net income @ US\$ 2.2/ha . . . 11,000,000
			TOTAL NET EARNINGS	28,500,000

Management Activities

Given that the ecological objective is being achieved and roan, sable and tsessebe populations are increasing at the expected rate towards carrying capacity, the actions needed to maximise the income for the primary stakeholders are as follows –

- (1) Sustainable hunting quotas need to be set in the manner described on page 12.
- (2) All safari hunting concessions should be sold to maximum advantage. The best system for those on State land is one of public auction because it is difficult for any corrupt practices to affect the competitive outcome and prices are usually far higher than those obtained through a tender system. Tenders are the next best option but, unless the system for award of tenders is transparent, corruption is frequently encountered.
- (3) In some areas where conservancies or commercial farms abut onto State Protected Areas there may be a need to set quotas for the entire range as opposed to individual areas. This requires institutions to be developed between the State and its neighbours which will enable the overall proceeds from hunting to be shared when the hunting is taking place from a common population.
- (4) There is a transboundary aspect to this same problem. In several instances it is clear that hunting trophies are coming from a population shared between Botswana and Namibia. This is a test case for developing workable transboundary institutions which, in the first instance, result in cooperation on quota setting and, ultimately, lead to income sharing.⁷

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

Impacts

The impact of achieving the highest valued land use is likely to be considerable. It will provide the revenue for effective State conservation, elevate the standard of living for landholders with roan, sable and tsessebe in north-eastern Namibia and create the incentives for more land to be put under wildlife. Ultimately, it could revolutionise land use planning and pave the way for transfrontier conservation areas.

Monitoring

The annual record of revenues and incomes earned from safari hunting in State Protected Areas, conservancies and commercial farms will provide the information needed to assess the overall progress towards achieving the economic objective. It will be necessary to separate out from the data the portion of the income which is attributable to roan, sable and tsessebe.

RISKS AND ASSUMPTIONS

Being based on adaptive management, this plan is not unduly susceptible to the requirement “to get things right first time”. Underpinning the plan is a proactive strategy of establishing new roan, sable and tsessebe populations in suitable areas on an opportunistic basis. If some of the newly established populations (or existing populations) do not thrive, the plan contains the flexibility to be able to recover from the situation by moving the animals to new areas before they decline drastically. In a worst-case scenario, some of the newly established populations will go extinct. This is not a measure of failure of the Plan – ultimately, the establishment of any new population which was not in place at the inception of the Plan must be seen as a conservation success.

Possibly the greatest threat to the objectives of the Plan lies in potential bureaucratic inertia. This Plan requires “fast footwork” and rapid decision-taking. It requires opportunities to be seized when they present themselves. It will not tolerate lengthy delays. There is a tendency in dealing with species which are perceived as ‘rare or endangered’ to hesitate before making commitments. Situations will arise where monitoring data are not available to assist decision-taking but this should not be used as an excuse for inactivity. In this Plan, the correct way to apply the Precautionary Principle is “when in doubt, do something” – for example, if animals are needed to begin a new population and there is uncertainty as to whether the population from which it is desired to take the founder group has reached carrying capacity, the better question to ask is whether it will affect the viability of the target population to remove a founder group from it (subparagraph (9) on page 13).

This section has been written so that no issue appears both as a risk and as an assumption. The assumptions are potential risks if they are not true – but they are also risks which are unlikely to materialise.

Assumptions

- (1) The highest valued uses for semi-arid savannas are those obtained by managing land under wildlife and that the additional values conferred by viable populations of roan, sable and tsessebe are significant enough to warrant a substantial investment and conservation effort.

The analysis carried out in the *Background Study* supports this assumption. A large amount of land which has for most of the twentieth century been managed under domestic livestock in southern Africa is now being converted to wildlife management because of the higher returns possible.

- (2) Adequate funding will be available to the Directorate of Parks and Wildlife through the fiscus to maintain its essential functions in State Protected Areas and to undertake those specific management activities which would enhance roan, sable and tsessebe populations.

In the event that such funding is not available through government there are alternative solutions – including donor funding and/or partnerships with conservancies and the private sector. **The key point is that roan, sable and tsessebe are a bankable asset:** an injection of funds which will result in these species achieving their full potential in the part of Namibia which is suitable for them will produce known returns from land which more than justify the investment.

(3) MET and its supporting agencies will be successful in establishing conservancies and influencing land use planning in the potential range for roan, sable and tsessebe in a manner which makes new areas available for establishing populations of these species and improves the security of existing populations.

(4) The 'state-of-the-art' in capturing and translocating roan, sable and tsessebe has reached the stage where mortalities are low enough not to prejudice operations.

Until a few years ago, capture mortality for these species, particularly roan, was unacceptably high. However, a number of major translocations have been carried out recently with negligible losses.

(5) The Ministry will devolve sufficient authority to the Directorate of Parks and Wildlife to be able to react timeously to the imperatives of the plan without disruptive delays which could prevent objectives being realised.

Risks

(1) That the vicissitudes of rainfall could result in long periods of cumulative deficits which prejudice the performance of existing and newly established populations of roan, sable and tsessebe.

This risk is an externality over which wildlife authorities have no control. However, the contingency exists in the Plan to relocate animals to more favourable geographic localities in such situations.

(2) That insufficient authority may be devolved to landholders (both conservancies and commercial farms) to provide the incentives necessary for effective management of roan, sable and tsessebe.

As long as these species are held under any form of 'custodianship' on behalf of the state, the necessary alignment of authority, responsibility and incentives which are essential for effective management institutions will be missing.

(3) That instability in present land tenure systems may prejudice roan, sable and tsessebe populations, particularly on private land.

Elsewhere in the southern African region, thousands of wild animals worth millions of dollars have been eliminated in the course of radical land reform programmes.

(4) That, despite best efforts, illegal hunting pressures originating from within and outside Namibia may not be contained.

Within Namibia, illegal hunting by people who are outside of any conservancy structure is a potential threat in the identified range for roan, sable and tsessebe. The possibility of incursions into Namibia from Angola and Zambia is not negligible and it is difficult to provide for effective law enforcement along the entire border of the Caprivi.

- (5) That political pressures from major private sector investors in wildlife may result in compromises in the strict criteria of this Plan for the areas which are suitable for the establishment of roan, sable and tsessebe populations.

There is already a major investment in roan, sable and tsessebe groups in areas which, in the assessment of the *Background Study* to this plan, may not be viable for the species in the long term.

- (6) That an outbreak of any disease for which buffalo are a carrier amongst cattle either in Namibia or in Botswana will result in the application of more stringent veterinary controls which further depress roan, sable and tsessebe populations.
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FINANCE AND CAPACITY

A detailed budget for the operating and capital costs associated with this plan has been developed in **ANNEX 1** and a summary of the budget figures relating to each management requirement is shown in **Fig.4** on page (viii).

The key points arising from this budget are –

- (1) Much of the funding is of a contingency nature necessitated by the adaptive management approach to the plan. It is unlikely that all of the operating costs will be taken up in every given year but failure to provide for them could result in lost opportunities to establish viable roan, sable and tsessebe populations.
- (2) The budget contains a contribution to the operating and capital costs required for effective performance of the Directorate of Parks and Wildlife in the potential range of roan, sable and tsessebe in north eastern Namibia –
 - The objectives of the Species Management Plan will not be realised if State Protected Areas are underfunded; and
 - The revenues from State Protected Areas managed under sport hunting with established roan, sable and tsessebe populations are capable of funding the entire annual operating costs for these areas. Even greater revenues may be earned from non-hunting tourism when these areas are established tourist destinations.

However, to include the entire set of Parks' costs as part of the Species Management Plan produces an extremely unbalanced budget. It is the prerogative of the State to re-invest the revenues earned from roan, sable and tsessebe in its running costs and capital costs.

- (3) The project is very viable. Because of the high growth rates possible from roan, sable and tsessebe populations (10-20% when rainfall is favourable), the entire set of capital costs and the initial deficits in running costs could be borrowed from a bank at a high rate of interest and the loan would be acquitted within a few years of inception of the plan – well before the species populations had reached one-half of carrying capacity.
- (4) The required manpower for effective protection of the State Protected Areas from illegal hunting in each of the protected areas is given in ANNEX 1 and the operating cost budget includes a full provision of all equipment needed for effective performance. The budget also includes a provision for training Conservancies in law enforcement and monitoring.
- (5) Considerable emphasis is placed on monitoring in the financial provisions of the plan. This includes the central task of estimating numbers of roan, sable and tsessebe, habitat assessment including the effects of elephants on habitats, monitoring of land use in the potential range for roan, sable and tsessebe, monitoring of the effects of establishing wildlife water supplies, monitoring illegal hunting, fire mapping and setting of sustainable sport hunting quotas.

TRANS-BOUNDARY COOPERATION

An examination of the list of management activities in **Fig.4** shows that most of the areas identified for potential co-operation and collaboration between Botswana and Namibia at the Kasane Workshop repeat themselves in this Management Plan –

- (1) Maintaining linkages between species subpopulations;
- (2) Ensuring compatible forms of land use on either side of the international boundary;
- (3) Expanding the available range for populations of roan, sable and tsessebe;
- (4) Mitigating veterinary disease control measures for wildlife viability;
- (5) Co-operating on law enforcement directed at illegal hunting;
- (6) Managing the interaction between roan, sable and tsessebe and other species – particularly elephants;
- (7) Controlling fire;
- (8) Collaborating on air surveys to improve roan, sable and tsessebe population estimates;
- (9) Collaborating in setting hunting quotas and monitoring the sustainability of hunting;
- (10) Maintaining liaison between wildlife departments and communities managing wildlife on either side of the international border.

The Transboundary Mammal Project provides the scope for certain imaginative local projects. Along the international boundary separating Botswana and Namibia are a number of suitable areas involving both State Protected areas and local communities in which new populations of roan, sable and tsessebe could be established – possibly using founder stock from areas further inland in northern Botswana. One method of achieving rapid growth from small groups of roan, sable and tsessebe may be to locate them in interim holding paddocks of 10-50km² where the effects of predation, habitat modification by elephants and competition with other grazing species are minimised – which would enable these starting cohorts to increase rapidly. The paddocks might be situated straddling the international boundary thus providing a genuine foundation for transboundary co-operation in initiating a ‘seed-bank’ for rare species production which will be used to populate larger areas.

IMPLEMENTATION PROCESS & UPDATE PROCEDURES

Timing and Duration of Plan

Implementation of this plan should commence as soon as possible and remain in operation indefinitely or until the abundance of roan, sable and tsessebe is such that there is no further need for State intervention in the promulgation of the species.

From the outset, an adaptive management monitoring programme should underpin the implementation of the Plan and test the underlying hypotheses regarding roan, sable and tsessebe population growth rates and carrying capacities. The objectives, hypotheses and management activities in the plan should be modified as needed to take into account externalities which may arise (and almost certainly will arise) during implementation.

The first draft of the Species Management Plan was completed in May 2003.

Review of the draft plan should take place during June-July 2003 and, following comments and decisions from the Directorate of Parks and Wildlife and the Directorate of Scientific Services in the Ministry of Environment and Tourism, a second draft should be prepared for submission to the Ministry in August 2003. Subject to any further revisions which might arise from inter-ministerial discussions or transboundary liaison with Botswana, a Final Plan should be ready for adoption before the end of the year.

This should be followed by a meeting between the Ministry of Environment and Tourism and supporting agencies to discuss implementation and, in particular, the approach to funding.

Central to the success of the Plan is the establishment of a Review Committee (para (10), page 13) which will take decisions on an ongoing basis using available monitoring information, for each stage of implementation. Notwithstanding any modifications made as and when necessary during implementation, there should be a mandatory review of the plan every two years – preferably synchronised with the results from air surveys provided for in the schedule of activities. In the course of such reviews, if any major changes are needed in the plan, the document should be modified, updated and re-approved.

ANNEX 1 BUDGET

Costs are developed below following the structure of the Management Plan. A significant part of the budget is in the nature of contingency funding, since it is not possible to prescribe exactly which aspects of the management interventions will require funding in any particular case. However, it would defeat the achievement of the objectives if funds had to be sought on each occasion that a management intervention became necessary. It is assumed that the budget would devolve upon the Ministry of Environment and Tourism, mainly for the activities of the Directorate of Parks and Wildlife but also for the Directorate of Scientific Services. Any portion of this budget could be taken up by another government department or by an NGO, if it is considered that the particular management activity might best be carried out by a supporting agency. All costs are in United States dollars.

1. ECOLOGICAL OBJECTIVE

1.1 Strategy

(1) Habitat Assessment

Habitats will require on-site inspections whenever the possibility of establishing a new roan, sable or tsessebe population arises. Habitats of existing populations may also need assessment from time to time, particularly where elephants have modified habitats to the extent that they may have become unsuitable for roan, sable and tsessebe. A small annual budget is provided to cover the operating costs of a scientific officer to visit areas, purchase air photographs and prepare reports.

Recurrent expenditure US\$5,000

(2) Land Use Planning

A small budget is needed for liaison, coordination and collaboration with land use planning authorities in the potential range for roan, sable and tsessebe. The amount provided is to cover costs of travel, holding meetings, undertaking site visits and map preparation.

Recurrent expenditure US\$10,000

Associated with the land use planning component is an ongoing requirement to monitor the available range for roan, sable and tsessebe, the extent of human settlement and land cleared for agriculture. This can be done with the acquisition of 4 satellite images annually at an approximate cost of US\$750 each. A further provision for data capture and mapping entailing one person's time for 3 weeks/year (US\$2,000) has been added.

Recurrent expenditure US\$5,000

Should it arise out of the planning process that there is a need for relocation of existing settlements, compensation for affected families or development of new infrastructure to facilitate land reorganisation, it would be as well to have a capital provision available to meet such costs. The amount provided is notional.

Capital provision US\$200,000

(3) Management Institutions

This provision is to assist with the development of conservancies in the potential range for roan, sable and tsessebe. Significant funding is available in Namibia for the development of conservancies but the requirements of this Management Plan may not coincide exactly with the established work schedules of the agencies presently assisting communities to develop conservancies. This funding is intended to be catalytic and to enable a rapid focus to be brought onto the establishment of any particular conservancy where it coincides with the aims of the Management Plan.

Recurrent expenditure US\$25,000

(4) Water Supplies

A provision was made in the *Buffalo Management Plan* for the development of 5 game water supplies in the Caprivi Strip and, as these would contribute to the needs of roan, sable and tsessebe populations, the provision is not duplicated. A provision is made for 5 additional water points elsewhere in the roan, sable and tsessebe range.

Capital costs of drilling (or re-drilling) 5 boreholes, purchase of 5 solar panels and pumps, and construction of drinking pans @ US\$30,000 per installation –

Capital provision US\$150,000

Annual maintenance costs on 5 solar-driven pumps including transport and spares.

Recurrent expenditure US\$15,000

Monitoring the use of the water points by roan, sable and tsessebe and other species may be best done by a specific research project carried out over 5 years. The project should contain provisions for radio-tracking equipment, transport, a contribution towards air surveys and a research stipend.

Recurrent expenditure (annual) US\$10,000

1.2 Management(1) Illegal hunting

The required manpower and budgets for the State Protected Areas in the potential range for roan, sable and tsessebe were developed in the *Background Study* (page 57). In the table on the next page, the protected areas in the Caprivi have been grouped together with Khaudum to form a single management unit for the purposes of calculating operating costs – the costs are considerably reduced if these areas are treated as a single unit. The Waterberg Plateau Park and Mangetti Game Camp are evaluated separately. The eastern end of Etosha National Park, which falls within the potential range for roan, sable and tsessebe, has been omitted from this table because it is assumed that adequate operating budgets for the whole of Etosha are in place. The operating costs for the Kwando Triangle are assumed to be included in the budget for the Caprivi Game Park.

**Required Budgets for State Protected Conservation Areas
in the Potential Range for Roan, Sable and Tsessebe**

STATE CONSERVATION AREAS	Total Area km ²	Required Number of Guards	Required Annual Operating Budgets US\$	Cumulative Cost - US\$
<i>----- Managed as individual areas -----</i>				
CAPRIVI MANAGEMENT UNIT				
Popa Game Reserve	20	5	122,000	122,000
Mahango Game Park	200	15	177,000	299,000
Mamili National Park	280	17	193,000	492,000
Mudumu National Park	1,000	32	300,000	792,000
State Forest	1,496	39	359,000	1,151,000
Caprivi Game Park	5,500	75	727,000	1,878,000
Khaudum National Park	3,841	62	586,000	2,464,000
Managed as a Single Area . . .	12,337	112	1,244,000	1,244,000
WATERBERG PLATEAU PARK	403	21	216,000	1,460,000
MANGETTI GAME CAMP	480	22	228,000	1,688,000
TOTALS . . .	13,220	155	1,688,000	
10% Contribution to Annual Operating Costs . . .			168,800	

It seems reasonable that a portion of the operating costs for State Protected Areas should be debited against the roan, sable and tsessebe 'project', since the objectives of the Species Management Plan demand a high level of law enforcement. The contribution has been arbitrarily set at 10%.

There is a capital component associated with this budget which provides for staff housing, office facilities etc. The required capital for developing a park of 12,000km² is about US\$8 million. Assuming that most of the required infrastructure is in place but that the roan, sable and tsessebe project will result in some additional requirements (e.g. extra housing, holding bomas, loading ramps), an arbitrary allocation of US\$100,000 has been made.

Recurrent expenditure (rounded) US\$170,000

Capital provision *US\$100,000*

A significant proportion of the potential range for roan, sable and tsessebe lies within conservancies and, if the Plan is successful in its objectives, additional conservancies are likely to be created. A provision is made to assist Conservancies with training in combatting illegal hunting and development of monitoring systems for illegal activity.

Recurrent expenditure US\$20,000

(2) Elephants

In the Management Plan, it proposed that a research experiment is carried out in a limited locality where the effects of elephant on roan, sable and tsessebe habitats are reduced by removing elephants. The outcome would be compared with a 'control' area where there is no elephant management. A similar proposal was made in the *Buffalo Management Plan* and it may be possible to combine the two experiments. This project proposal would require detailed development and the provision here is of a contingency nature on the assumption that, over and above the provision made for buffalo, a similar amount would be needed to cater for the additional aspects of roan, sable and tsessebe.

Recurrent expenditure (annual) US\$10,000

(3) Fire control

Detailed provisions were made in the *Buffalo Management Plan* for improved fire control and fire monitoring in the Caprivi. Making the same provision to cater for fire control in the remainder of the potential range for roan, sable and tsessebe –

Maintenance of 500km of firebreaks using a grader capable of clearing 2km/hour at an operating cost of US\$100/hour US\$25,000

Casual labour for fire-fighting, transport and firebeaters US\$10,000

Recurrent expenditure US\$35,000

Monitoring the annual incidence of fire can be done using the same satellite images acquired for land use monitoring. A provision is needed for data capture and reporting which entails one person's time for one week/year (US\$1,000)

Recurrent expenditure US\$1,000

Initial preparation of 500km firebreaks using a bulldozer capable of clearing 1km/hour at an operating cost of US\$200/hour

Capital provision US\$100,000

(4) Veterinary Fences

A significant provision for liaison, coordination and collaboration both with the Namibian Directorate of Veterinary Services and the Botswana Department of Animal Health and Production was made in the *Buffalo Management Plan* and no additional provisions are required in this Plan.

(5) Disease

A provision is included for routine veterinary checks in the course of translocations and in the unlikely event that an outbreak of disease (e.g. Anthrax) necessitates veterinary measures to treat roan, sable and tsessebe.

Recurrent expenditure US\$10,000

(6) Monitoring Sport Hunting

A small provision is needed to ensure that monitoring of trophy ages is incorporated into all sport hunting operations. This work should entail about 1 week per year of a research officer’s time, including travel, data collection and writing up the results.

Recurrent expenditure US\$1,000

(7) Monitoring Population Numbers

There is an overall requirement for monitoring numbers of roan, sable and tsessebe wherever populations have been established. It is not worth employing air survey methods for small groups which have been newly established on commercial farms or conservancies – for these, the better technique will be direct counts in the course of intensive field work by the landholders.

The areas which require a standard sample transect air survey are about half of the Caprivi (10,000km²), Khaudum (4,000km²) and Nyae Nyae Conservancy (9,000km²) – rounding this up to provide for new areas suggests that a total of about 25,000km² should be surveyed annually.

At a sampling intensity of 20%, 5,000km² would require to be surveyed and, at a cost of US\$7.75/km² actually surveyed, the total cost would be US\$38,750. The cost includes the analysis of data and reporting.

Recurrent expenditure (rounded) US\$39,000

Provisions were made in the *Buffalo Management Plan* for air surveys every two years in the Caprivi and a significant part of this cost could be combined with that provision. The cost could be further reduced by using the funds to extend the Botswana Wildlife Department’s annual dry season survey into the above areas, subject to their agreement.

(8) Capture and Translocation

There is a component of translocation both within the STRATEGY and the MANAGEMENT part of this Plan. For budget purposes, both provisions have been combined and placed in the management section.

It is difficult to predict the numbers of roan, sable and tsessebe which may be captured and translocated annually under this Plan. Moreover, costs cannot be standardised because they will vary with the size of groups and the distances to be transported. Nevertheless, this is the cornerstone of the Management Plan and adequate funds to move animals are a pre-requisite for its success. A notional provision has been made which would be adequate to move 3 groups of 10 animals a distance of 100km.

Recurrent expenditure US\$30,000

The full set of costs for the Management plan is tabulated below.

Budget Requirements for the Roan, Sable and Tsessebe Species Management Plan

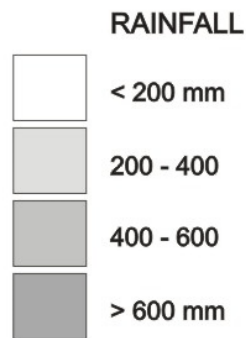
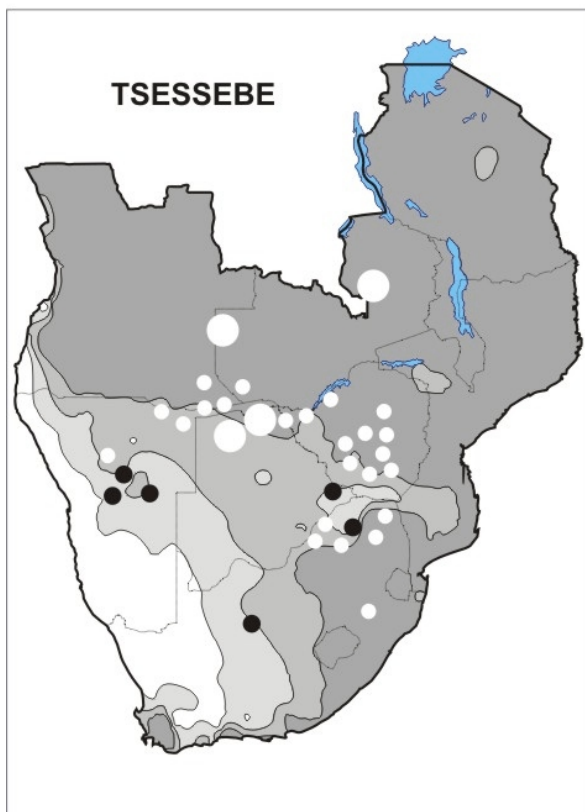
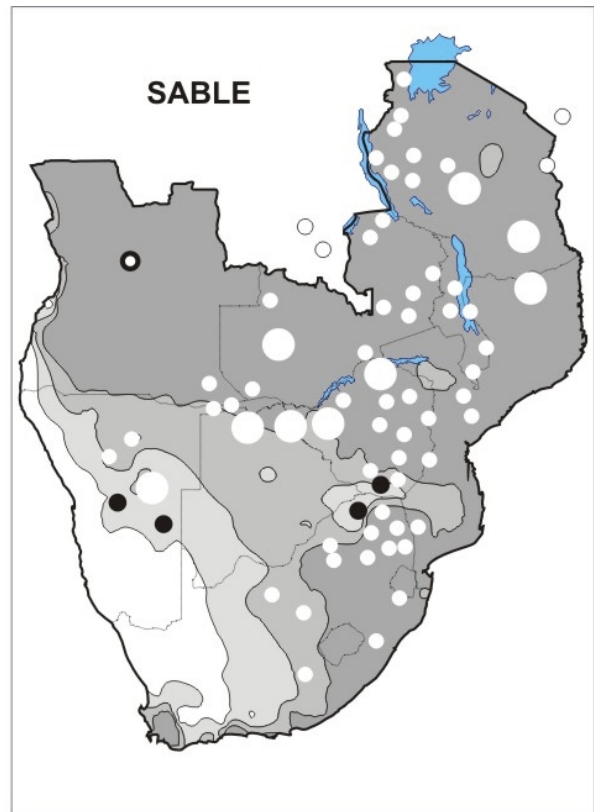
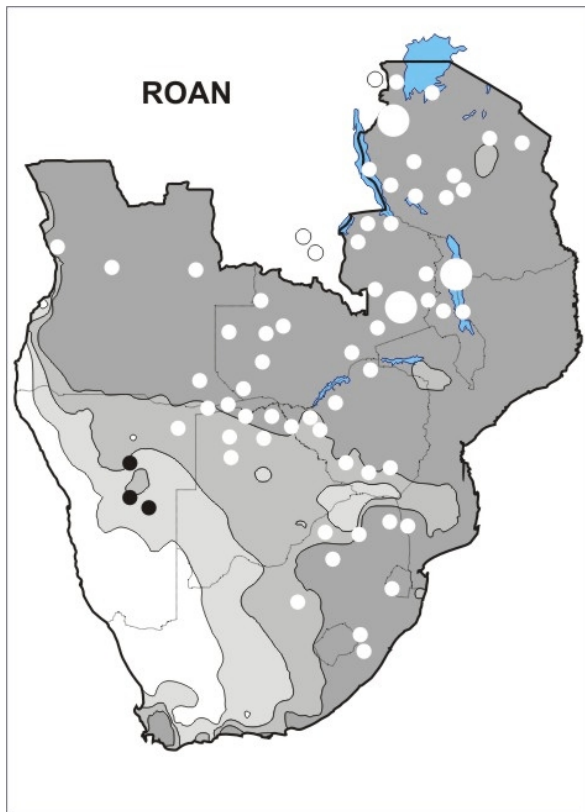
ECOLOGICAL OBJECTIVE	Operating Costs	Capital Costs
STRATEGY		
(1) Habitat assessment	5,000	
(2) Land use planning	10,000	200,000
Monitoring	5,000	
(3) Management institutions	25,000	
(4) Water supplies	15,000	150,000
Monitoring	10,000	
MANAGEMENT		
(1) Illegal hunting - State protected areas - 10% contribution	170,000	100,000
Illegal hunting - Conservancies	20,000	
(2) Elephant management	10,000	
(3) Fire control	35,000	100,000
Monitoring	1,000	
(4) Veterinary fences	0	
(5) Disease	10,000	
(6) Monitoring sport hunting	1,000	
(7) Monitoring population numbers (air surveys)	39,000	
(8) Capture and translocation	30,000	
TOTALS US\$	386,000	550,000

PROJECT VIABILITY

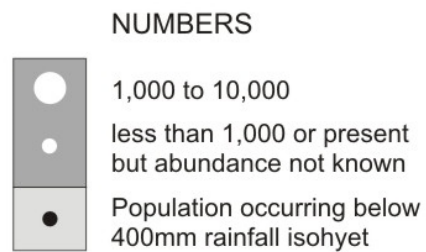
It appears unnecessary to carry out any financial or economic rate of return exercise on this Management Plan given the above costs and the projected incomes shown in the table on page 15 (Economic Objective). Under full development of a sport hunting regime (which is not necessarily the highest possible return from land), the projected revenue from State land under wildlife management with roan, sable and tsessebe populations is expected to be around US\$7 million annually. Conservancies would earn around US\$9 million if their total area amounts to 25,000km² some 25 years from now. The above costs would be more than balanced by income within a few years of inception of the Management Plan provided there was a modicum of progress towards the ecological objective.

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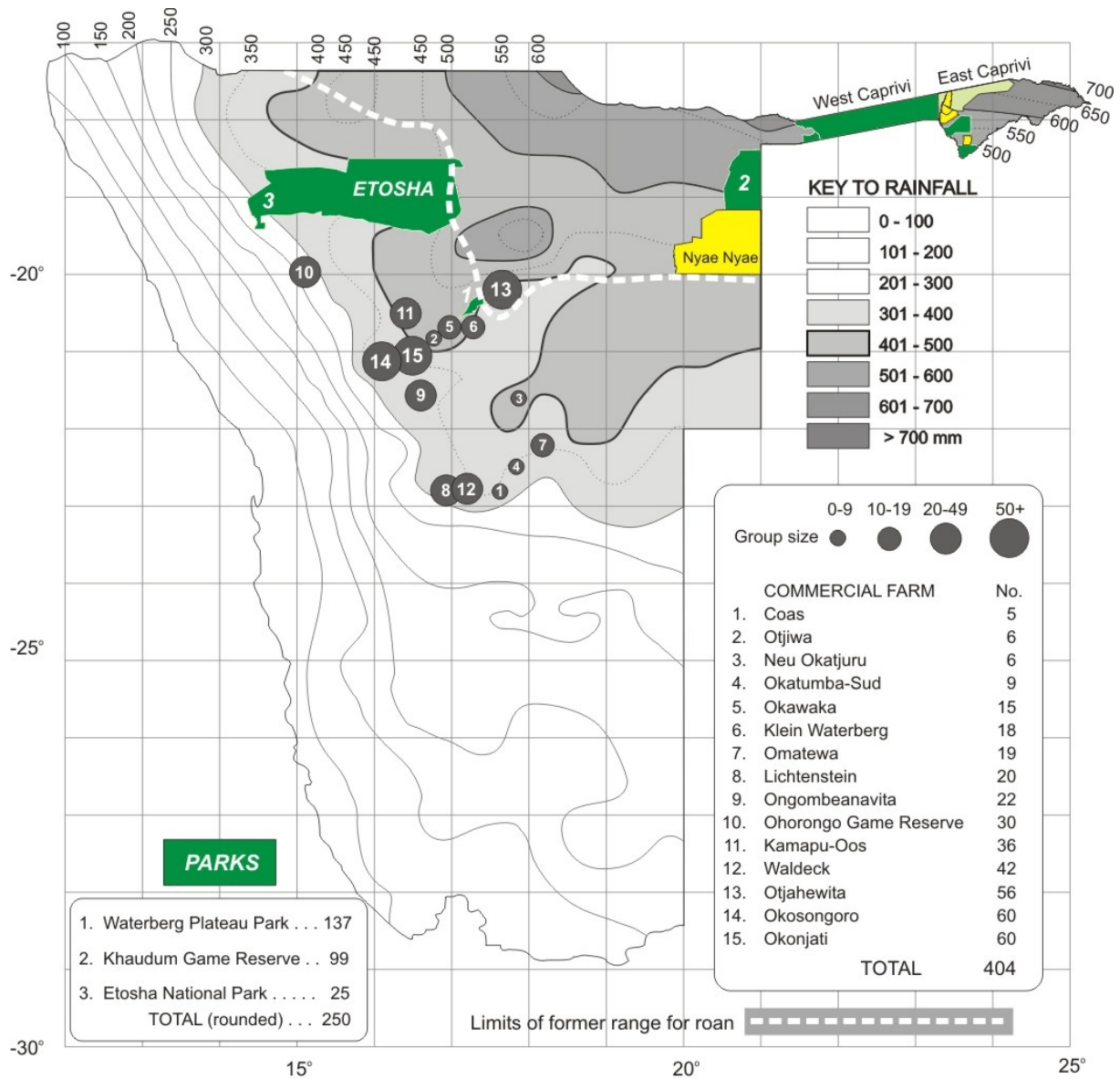


Rainfall data from Cumming (1999, Map 2.4)



Population data from ASG (1998)

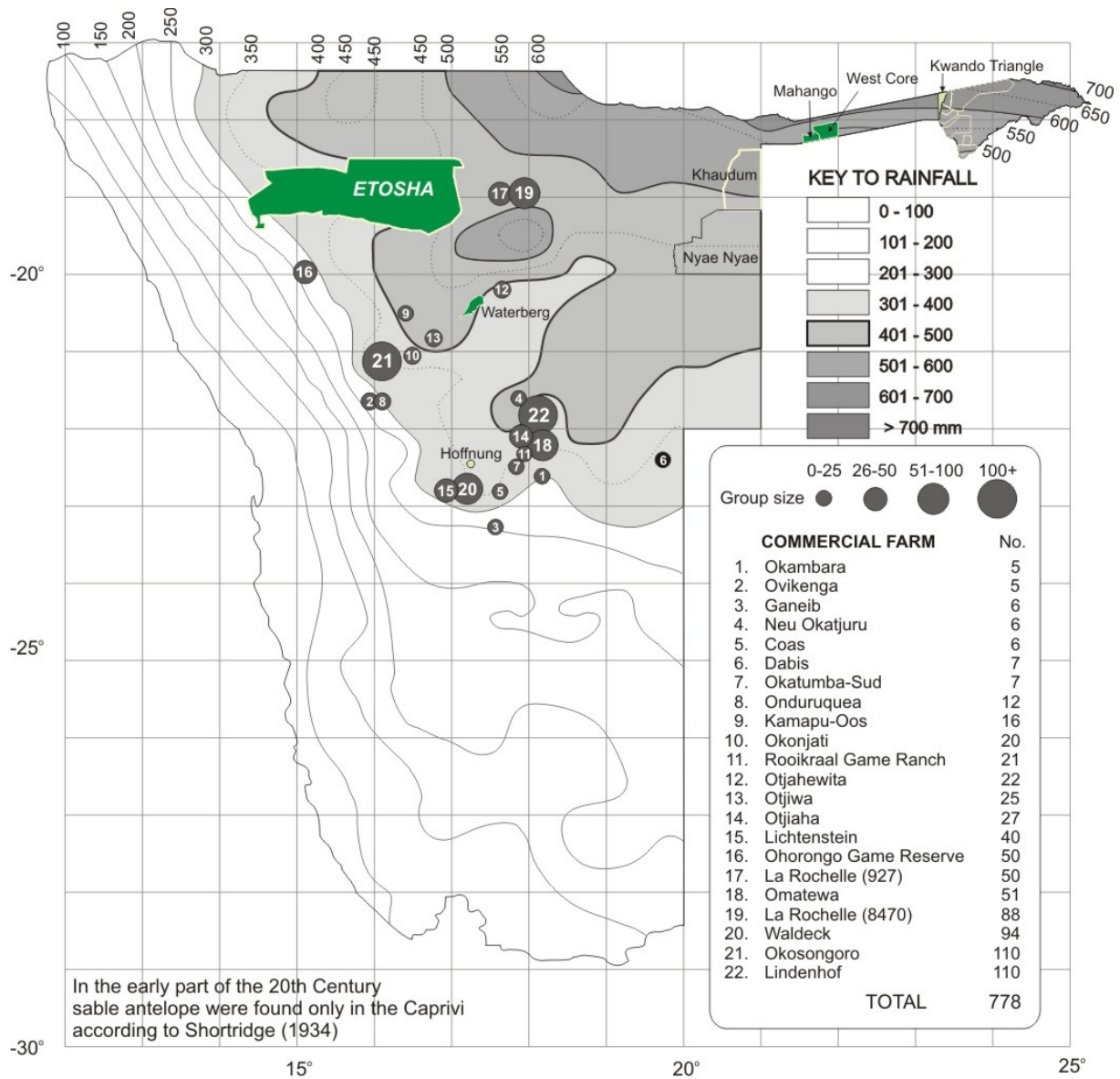
Map 1: Distribution of Roan, Sable and Tsessebe in Southern Africa in Relation to Rainfall



SUMMARY TABLE (rounded numbers)

COMMERCIAL FARMS	400
STATE PROTECTED AREAS (excluding Caprivi)	250
CONSERVANCIES (Nyae Nyae)	100
WEST CAPRIVI (including Mahango and Kwando Triangle)	25
EAST CAPRIVI (including Mudumu, Forest Reserve and Conservancies)	25
TOTAL	800

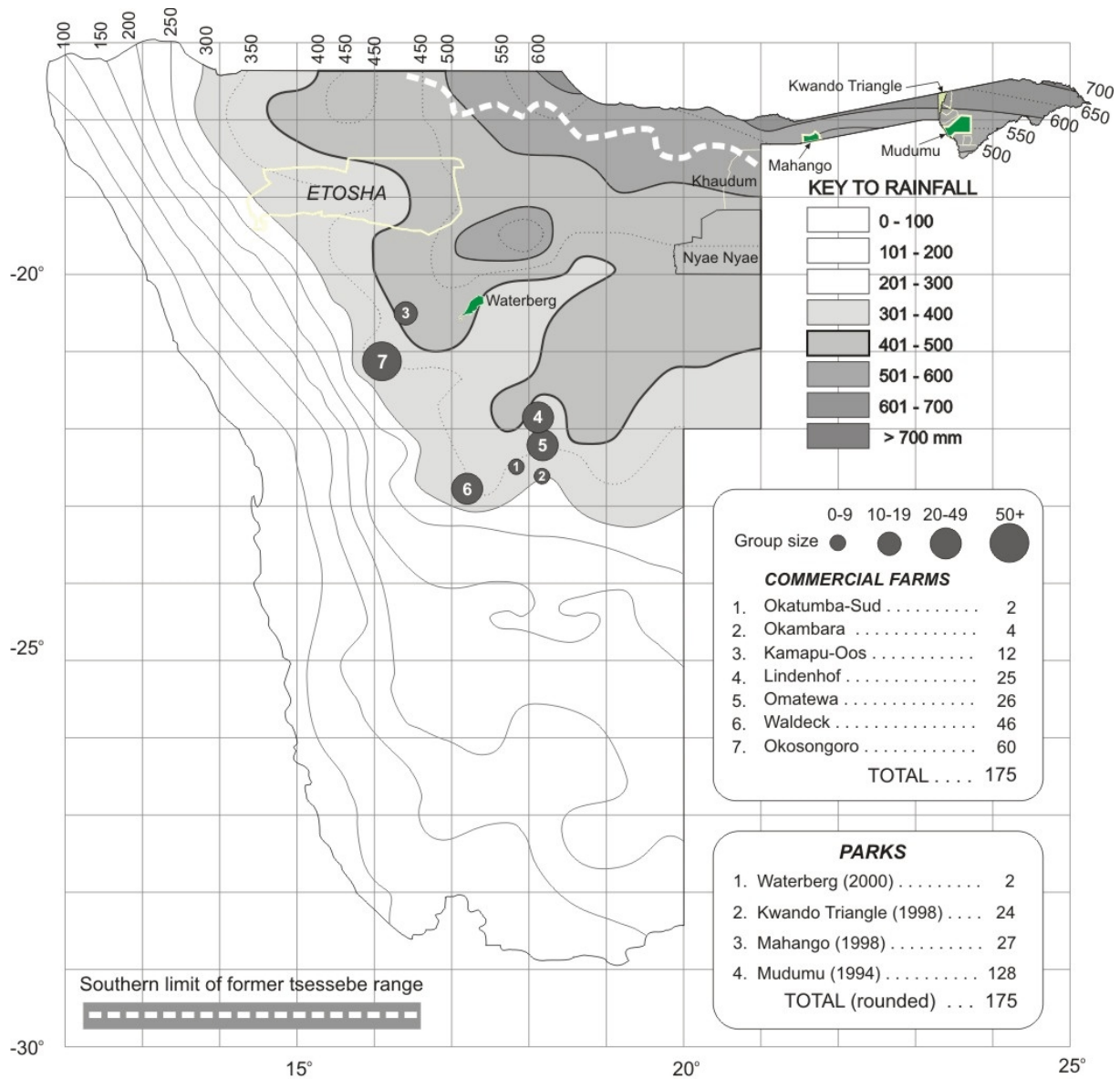
Map 2: Distribution of Roan Antelope in Namibia in relation to Rainfall



SUMMARY TABLE (rounded numbers)

COMMERCIAL FARMS	.....	800
STATE PROTECTED AREAS		
Hoffnung Part II	.....	1
Western Core (1998)	.....	21
Kwando Triangle (1998)	.....	70
Etosha National Park (2003)	.....	78
Waterberg Plateau Park (2000)	.....	119
Mahango Game Reserve (2000)	.....	130
TOTAL	.....	419
TOTAL	.....	1,200

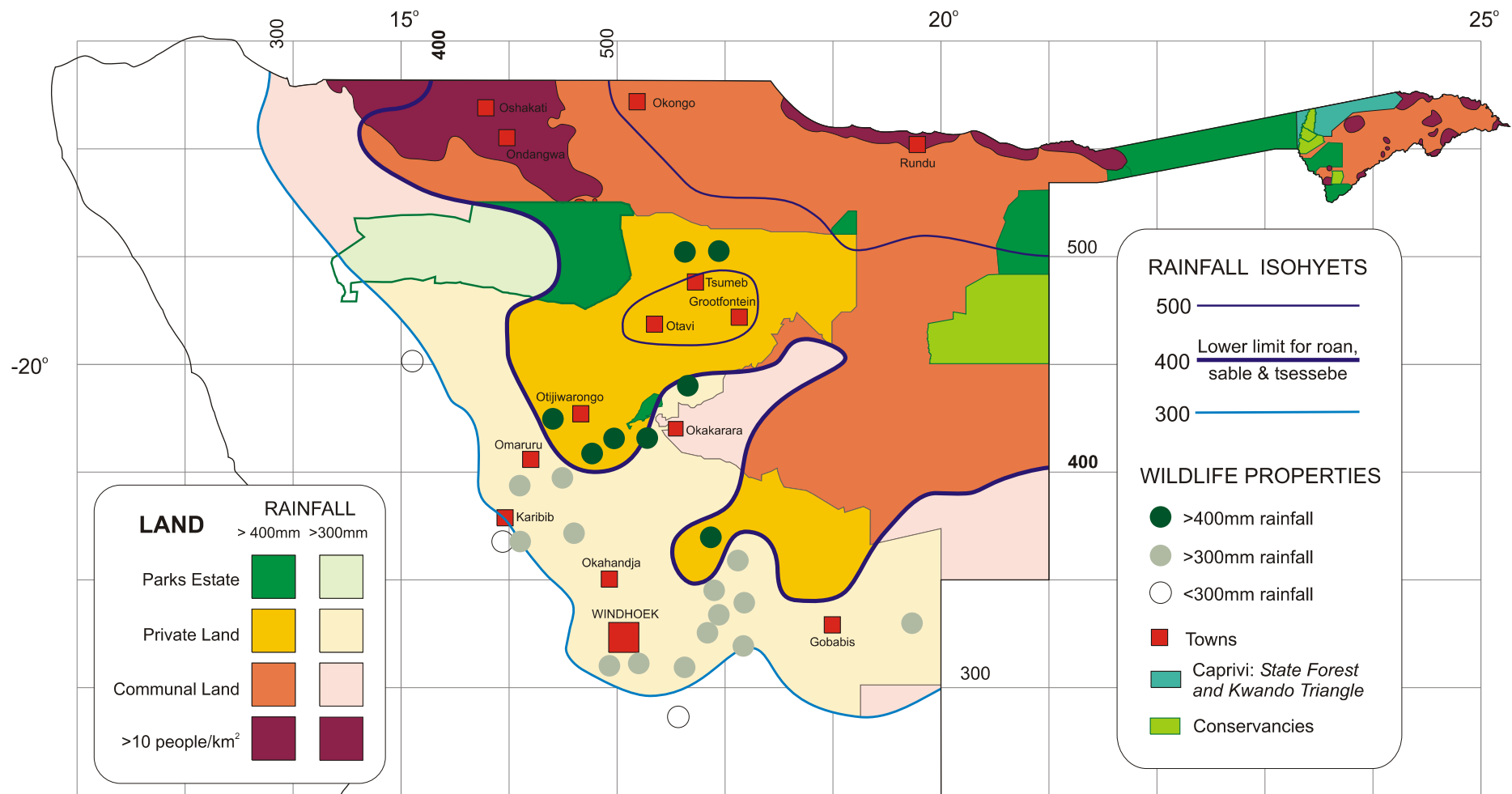
Map 3: Distribution of Sable Antelope in Namibia in relation to Rainfall



SUMMARY TABLE (rounded numbers)

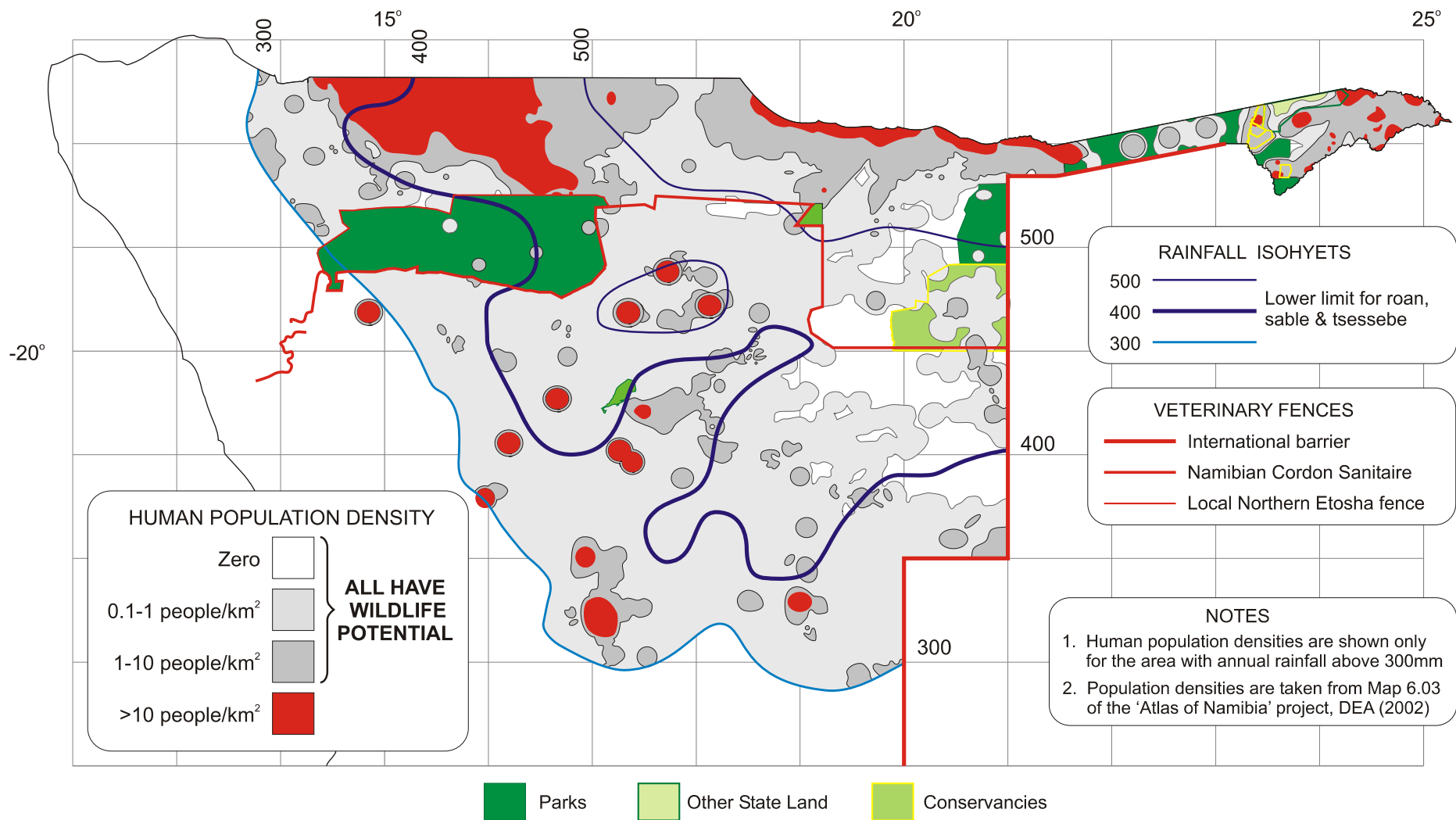
COMMERCIAL FARMS	175
STATE PROTECTED AREAS	175
TOTAL	350

Map 4: Distribution of Tsessebe in Namibia in relation to Rainfall



Land tenure categories are taken from Map 5.21 of the 'Atlas of Namibia' project, DEA (2002)

Map 5: Land Tenure in Namibia above the 400mm Rainfall Isohyet



Map 6: The potential Range for Roan, Sable and Tsessebe in Namibia showing Rainfall, Human Population Densities and Veterinary Fences