Consumptive wildlife utilization as a land-use form in Namibia

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by

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Declaration

Hereby I, Karl Peter Erb, declare that this study project is my own original work and that all sources have been accurately reported and acknowledged, and that this document has not previously in its entirety or in part been submitted at any university in order to obtain an academic qualification.

K.P.Erb Date

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Opsomming

Hierdie studie som die konsumptiewe wildlewe industrie in Namibië op in terme van van beide beskikbaarheid, huidige verbruik en monetêre waarde van hierdie hulpbron. Gebaseer op hierdie data is ’n kontantvloei model opgestel om vooruitskouings te simuleer, met betrekking op aanbevelings en gevolgtrekkings.

Hoofstuk een gee ’n oorsig van die Namibiese ekonomie met spesiale verwysing na die vee- en wildboerdery. Daar word uitgewys dat die gesamentlike kommersiële veekudde oor die afgelope aantal jare kleiner geword het, terwyl die opbrengs stabiel gebly het deurdat better bestuurspraktyke toegepas is. Die literatuurstudie het gewys dat in suider-Afrika, wildlewe-boerdery ’n lewensvatbare alternatief kan wees vir veeboerdery, veral in die droër streke wat ’n hoër reënval speling toon.

Gebaseer op die verspreiding en digtheid van die meer algemene wild, gee hoofstuk drie ’n oorsig van die beskikbaarheid van hierdie hulpbronne. Trofeejag, wat die belangrikste inkomstesektor is, word bespreek, sowel as die lewende verkoop, uitvoer en nagoes (skiet van diere gedurende die nag vir vleisproduksie) van wild, asook die wildlvleis produksie. Met betrekking tot die ekonomiese uitsette, word ’n vergelyking gemaak tussen die wildlewe en kommersiële veeboerdery industrie.

Hoofstuk vier dek die finansiële modelering en ekonomiese aspekte van die wildlewe industrie in Namibië. ’n Rekenaar “spreadsheet“-gebaseerde, deterministiese model is ontwikkel om die kontantvloei van verskeie opsies van wildlewe boerdery te verken. Voorbeelde sluit in die gebruik van verskillende spesie samestellings, die besit van grond met verskillende drakrag vermoëns, asook die aanbiedinge van verskeie dienste.

Hoofstuk vyf bespreek die beleid en wetgewing met betrekking tot die wildlewe industrie. Onderwerpe soos eiendomsreg en eksklusiewe benuttingsregte, industrie verteenwoordiging en die stigting van “smart“ vennootskappe met primêre hulpbron verbruikers, word aangespreek. Aanbevelings word aan die Ministerie van Omgewing en Toerisme gemaak.

Hoofstuk ses behels ’n sintese van die voorafgaande vier hoofstukke.

Abstract

This study summarizes data for the consumptive wildlife industry in Namibia, both in terms of resource availability and current utilization and monetary value. Based on these data a spreadsheet-based cash-flow model is developed to simulate scenarios and to explore what constitutes the critical parameter. Based on this data synthesis and modelling, recommendations are made and conclusions drawn.

Chapter one gives an overview of Namibia's economy, with special reference to the livestock and wildlife industry. The fact that the commercial livestock herd has been shrinking over the years is pointed out, as well as the stable output achieved through better management practices. The literature research has shown that wildlife ranching could be a viable alternative to livestock farming as practised in southern Africa, especially in the more arid areas with higher rainfall variability.

Chapter two outlines the resource availability, based on the distribution and densities of the more common species. The occurrence of the rarer species is touched on. The point is made that it is very difficult to accurately count wildlife over large areas and that, as elsewhere, Namibia's wildlife at a regional scale is underestimated.

Chapter three documents the consumptive use of wildlife. Trophy hunting, the most important segment in terms of national income, is discussed together with the live sale of game, live export of game, venison production and night culling. A comparison is made between the economic outputs of the wildlife industry versus that of the commercial cattle industry.

Chapter four covers financial modelling and the economics of the wildlife industry in Namibia. A spread-sheet based deterministic model is developed to explore the

cash-flow implications of various game ranching options, such as using different species mixes, owning land of different carrying capacities and offering different services.

Chapter five addresses policy and legislative issues in relation to the wildlife industry. Topics such as property rights and exclusive utilization rights, industry representation and the forming of smart partnerships with primary resource users are covered. Broad recommendations are made to the Ministry of Environment and Tourism.

Chapter six is used for a concluding synthesis of the previous four chapters.

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CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

Three broad land-use forms are found in Namibia, viz. commercial, freehold farmland (44% of the area), communal farmland (42%) and formal conservation areas (14%) on state land (Adams and Devitt 1999). Namibia's human population of 1.8 million has been growing by 2.6% per annum between 1991 and 2001 (National Planning Commission 2002). 31% of the population lives in urban centres, with large areas in Namibia having a population density of below one person per square kilometre (see Figure 1.1).

Namibia had a GDP of US$ 3.5 billion in 2000 and an annual average GDP growth rate of 4.1% over the preceding ten years. The per capita GDP growth over the same period averaged only 1.5%. A per capita GDP of N$ 12774, makes Namibia a lower-middle income country, but with a very skewed distribution of income (Gini index 0.8). 35% of the population is unemployed (World Bank 2000).

In 2000 agriculture contributed N$ 1.3 billion to a gross domestic product of N$ 23.8 billion; this equals 5.6%. Primary industries contributed 23.5%, secondary industries 14.6%, tertiary industries 50.9% and taxes on products and import duties 11%. Within the agricultural sector, the commercial livestock sector dominates with N$ 1024 million as measured by output in 2000 (Ministry of Agriculture, Water and Rural Development 2001).

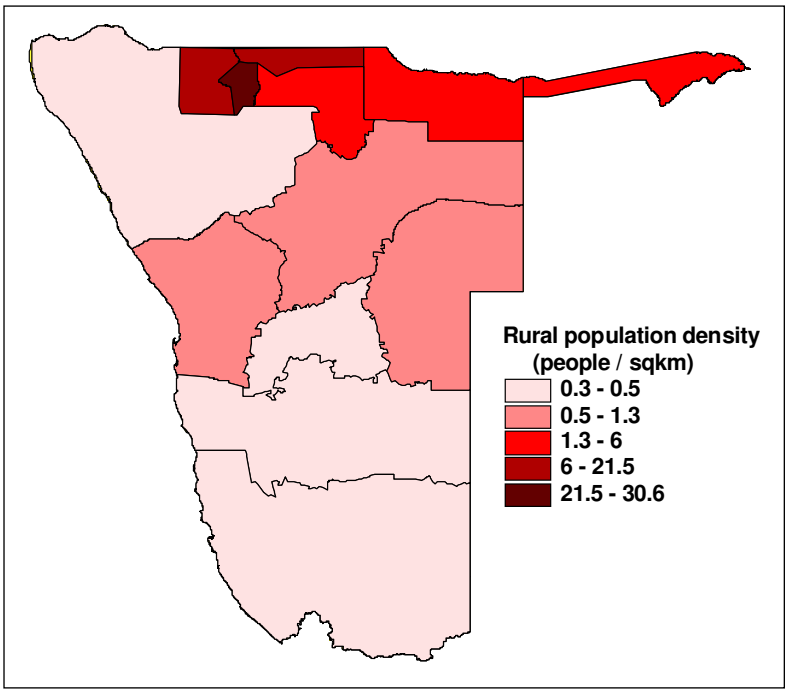


Figure 1.1: Rural population density based on data in the "2001 Population and Housing Census" preliminary report
Source: National Planning Commission, 2002.

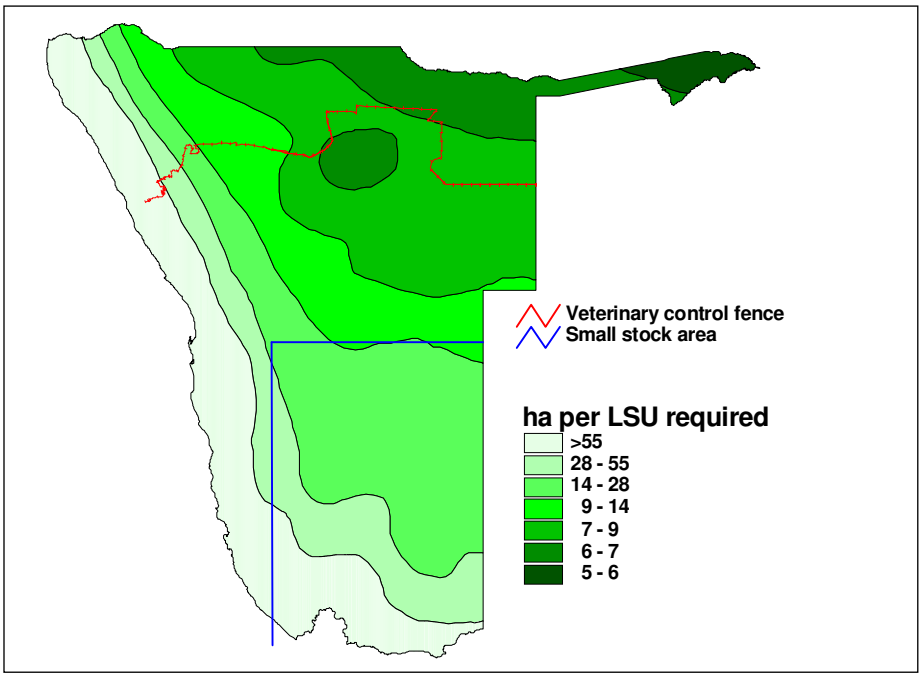


Figure 1.2: Broad livestock carrying capacity categories.
Note: The rectangular line indicates the small stock farming area in southern Namibia and the line in the north indicates the veterinary control fence.
Source: After Sweet, 1998.

Namibia today still has a large and stable population of wildlife, both within protected areas and on farming land. Due to the extensive nature of the farming activities game was able to survive in large parts of the country up until the late 1960s when an interest in game farming started to develop and landowners were given conditional utilization rights over the game on their land. Since then game numbers have increased on the free hold land, due to good management of existing stocks and the re-introduction of new populations of game. Farmers gradually started to supplement their livestock farming with game and some have even switched over completely to game farming only. While some people have a game farm as a hobby, the majority of Namibian farmers are dependent on their land in order to make a living from it.

Conservancies have been formed, on both commercial and communal land, with the aim to better manage their common wildlife resource. This process is encouraged by MET through making it easier for conservancies to obtain quotas and possible exemptions from certain permit restrictions in future. Currently there are 25 commercial conservancies with a total of 1008 farms and covering a combined area of 43 250 km^2 or 24% of commercial large-stock farmland (see Figure 1.3). Hunting farms not included in conservancies add another 8.7% to this area covered by the conservancies. 95% by area of all conservancy farms lie within the large-stock farming area.

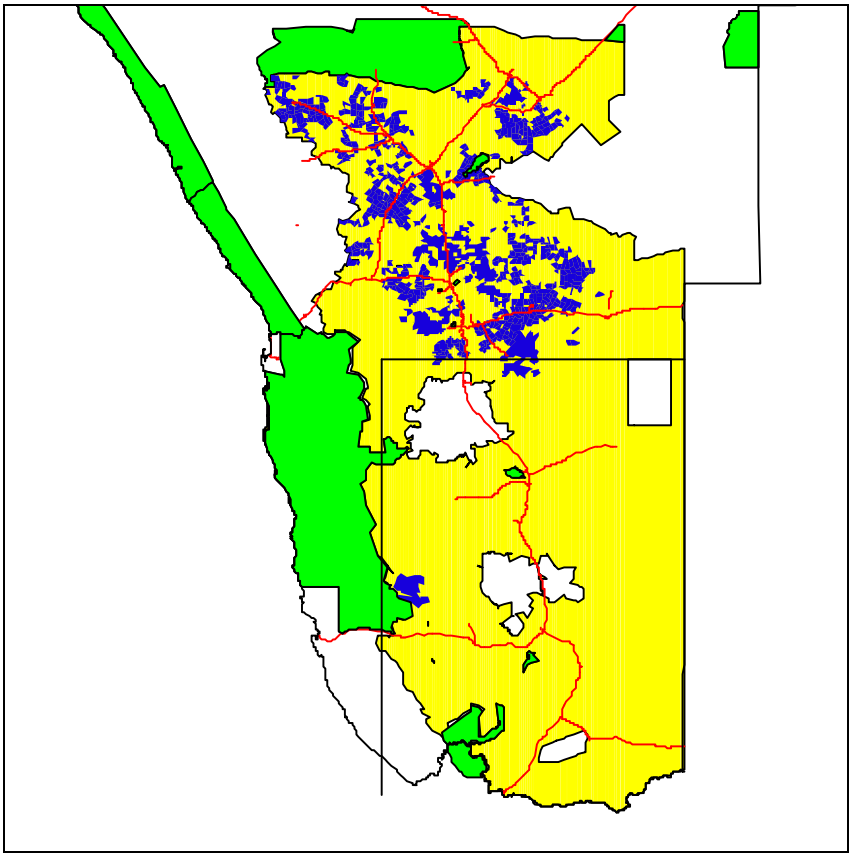


Figure 1.3: The commercial conservancies on the commercial farmland and conservation areas

Note: The commercial conservancies are indicated in blue, the commercial farmland in yellow and conservation areas in green.
Source: Based on Permit Office data, 2002.

Cattle are raised for beef production in predominantly northern Namibia, while small stock (sheep and goats) are raised in southern Namibia. By the end of 2001 Namibia had a cattle population of 2 504 948 and 4 295 715 sheep and goats (Meat Board, 2002). Of these 845 656 cattle and 2 578 378 small stock occurred on the commercial farmland. Cattle numbers have been gradually decreasing on commercial farmland from 2.5 million in the late 1950s to 845 656 by the end of 2001, while maintaining the production of slaughter animals at between 200 000 and 400 000 animals per year over the last fifty years. The relatively steady output, despite the decline in cattle numbers can to a large extent be attributed to better herd

management and thus a faster turnover of the cattle (Lange *et al,* 1997). The decline in the cattle numbers is attributed to better management of the cattle and the grazing, while some farmers have also completely switched from livestock to game farming within the last two decades. Fences erected by farmers over the decades and especially the mesh wire (jackal-proof) fences in the small stock farming area (see Figure 1.2) in southern Namibia obviously had an influence on game movements. These jackal-proof fences are considered game proof for non-jumping wildlife and each farm has to be fenced in this way around its boundary in the small stock area by legislation.

Since the early 1990s some farmers, especially in southern Namibia, have started to farm with domesticated ostrich under intensive conditions. Today there are some 50000 domesticated ostrich, mainly in the Mariental / Maltahöhe area (Meat Board, 2002).

Wildlife utilization is an important land-use form in Namibia and especially in the semi-arid, north-western part of the country. Here, for example, registered hunting farms take up approximately 20% of the commercial farmland. Not only is trophy hunting important, but so also is the live sale of breeding stock and normal wildlife based tourism. On many farms wildlife is utilised in addition to livestock as a form of diversification.

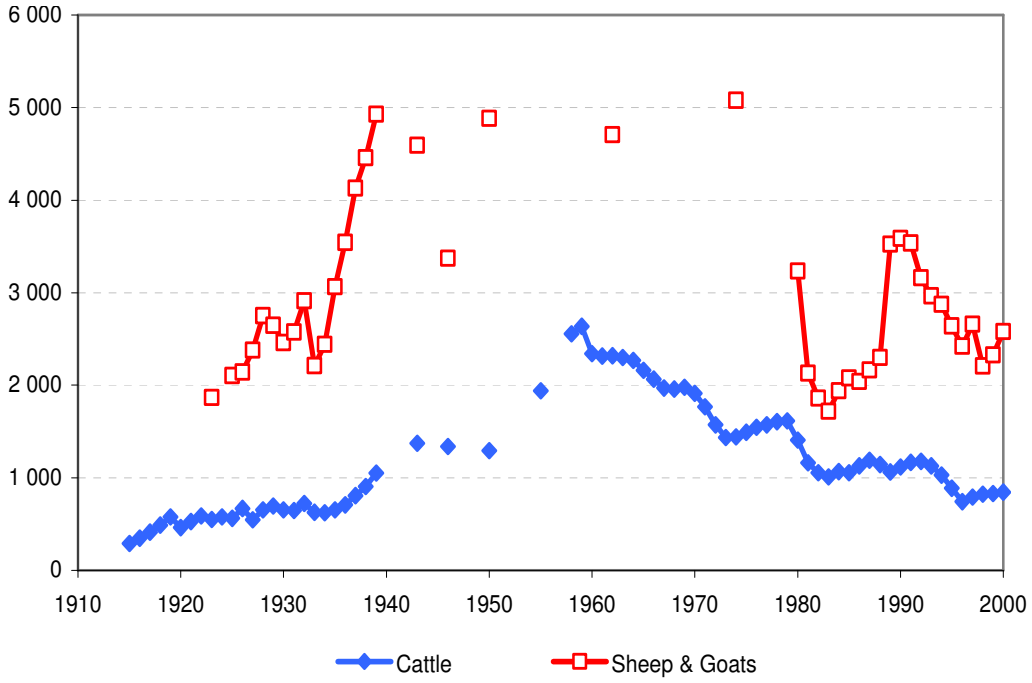


Figure 1.4: The size of the commercial cattle herd and small stock (sheep & goats) flock in thousands from 1915 to 2000
Note: Data not available for all years.
Source: Based on Rawlinson, 1994; Meat Board, 2002.

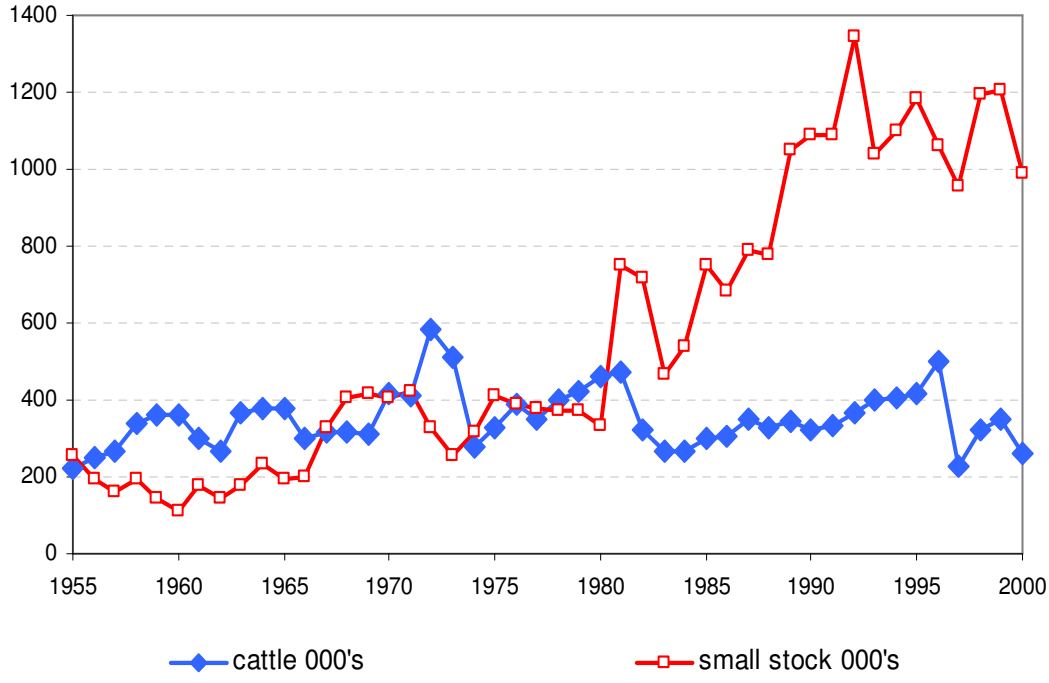


Figure 1.5: Production of cattle and small stock for sale from 1955 to 2000 in thousands in Namibia
Source: Based on data from Rawlinson, 1994; Meat Board, 2002.

Although much is known about the actual wildlife management, little has been reported about the micro-economics or about the financial implications of using wildlife; nor is its contribution to the national economy well documented or routinely monitored.

Namibia is, as most countries within the sub-region, busy with land-reform and investigating alternative land-use forms. The free hold farms cover 36 million hectares, 57 per cent of the agriculturally utilisable area. This area was made up of 6292 pieces of registered land, with 97% of these owned by individuals. Only 181 of these farms belonged to black farmers in April 1991 (Adams and Devitt, 1999). Approximately 42300 Namibians work on these free hold farms as farm labourers, with a further 38125 living as unpaid family workers in the communal areas (Werner, 2002).

Land reform and its implications are important to consider in an analysis of the wildlife industry in Namibia as the majority of farms, that the government considers that should be bought as they belong to absentee foreign owners, are also used as game farms. To date, most farms bought for re-settlement have been used for extensive livestock farming. In many instances game from within game fenced areas on such farms was re-located prior to the sale, in order to reduce the price that had to be paid for the land by government. The implications of land reform and efficient sustainable use of the natural resources are thus issues that need to be addressed.

Although Namibia's population is becoming more and more urbanized in percentage terms, as is happening in all developing countries, the absolute number of people living in rural areas is still growing (see Figure 1.6), thus putting more pressure on the land.

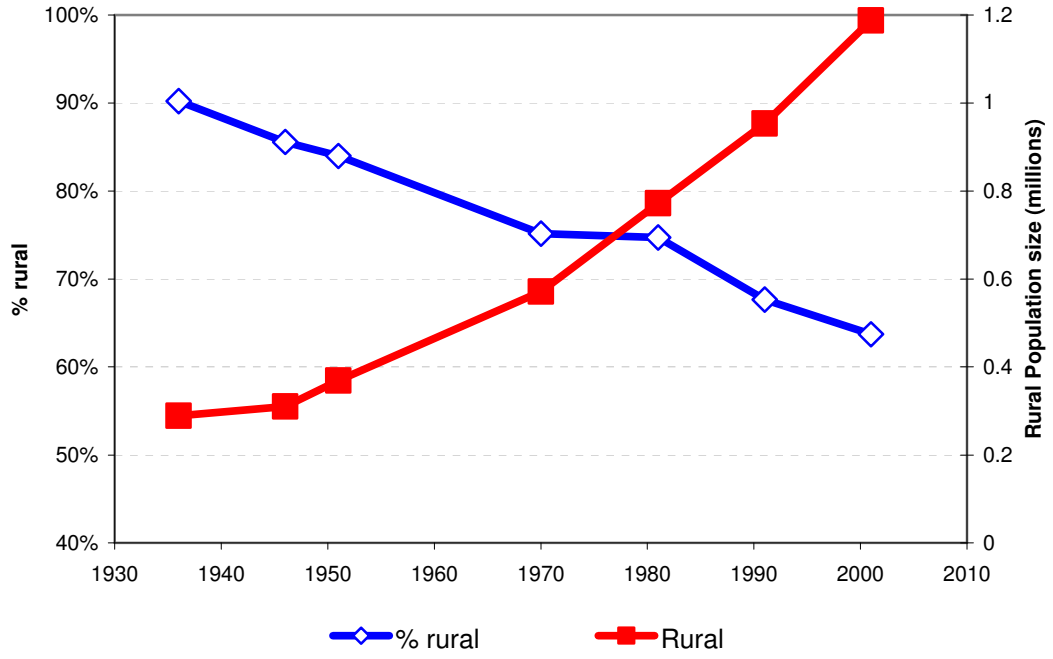


Figure 1.6: The decline in the importance of the rural population is depicted, but also that the rural population is still growing in absolute numbers
Source: Based on data from the Atlas Project, 2001.

1.2 RESEARCH PROBLEM AND OBJECTIVES

The Directorate Scientific Services within the Ministry of Environment and Tourism, and more specifically the Sub-Division Wildlife Utilisation and Permit Control administers wildlife quotas within the country pertaining to trophy hunting, live sale and any other form of consumptive use, and registers the role players within the industry on an annual basis.

Although much data is routinely collected as part of the quota allocations and registration of wildlife users, the format of this data does not allow easy monitoring of trends on a regional or national basis. At the moment there are few linkages

between the data. The data are also not collected in such a manner as to easily determine trends within the industry.

It is therefore crucial to streamline the data collection process (computerising the data) to turn it into knowledge based on the consumptive wildlife industry. A main objective of this study is to determine the economic carrying capacity of wildlife in the different broad regions and potential economic productivity. This topic is currently of special interest, because of the land tax being introduced, with one of the aims being that land is used to its "full economic potential". What then is the “full economic potential” of the land in different regions and how should the realization of this potential be accessed for land tax purposes from a wildlife management point-of-view? Though recognizing that wildlife in the broad sense includes plants and invertebrates as, for example, defined in the new proposed Namibian Parks and Wildlife Act, this study concentrates on the traditional game species, the mammalian herbivores traditionally hunted by man both for their meat and trophies. That wildlife other than these game species can make a considerable contribution to the economy of local areas is clear from, for example, the work done on mopane worm, the larvae of the Mopane Emperor moth, *Imbrasia belina*, in Botswana, where the harvest in a good year is estimated to be worth US$ 3.3 million and to provide employment to 10000 people (Knell, 2002). Similarly, collecting the tubers of the Devil’s Claw, *Harpogophytum procumbencens*, provides a cash income to many rural Namibians, with some 600 tons of dried tuber being currently exported per year.

The outputs of the current project will focus on the financial and economic side of the wildlife industry on commercial farmland. To this end, the intention is to

- document the wildlife resource base on farms representative for the different broad ecological regions within Namibia;
- describe outputs of the industry both in terms of quantity and financial and economic income generated;
- provide a cash flow model to explore financial implications of various wildlife utilization options for the different regions as land-use options; and
- identify policy constraints and opportunities.

1.3 MOTIVATION FOR THIS STUDY

Although the Permit Office has been in operation for more than 30 years, to date no in-depth study of the wildlife industry has been undertaken based on this primary data. As pointed out by Bakkes (1992) the same lack of financial and economical data relating to the wildlife industry is experienced for Namibia as was the case in South Africa. This makes strategic planning both from within the industry and from government side difficult, if not impossible. As part of this study available data will be synthesized and this should fill some of the gaps identified. The knowledge thus gained can furthermore be used to formulate future data requirements and make an input in wildlife management legislation as well as provide some guidance for the current land reform and land tax initiatives currently taking place in Namibia.

This study will concentrate on commercial farmland because of data availability. Land-use options in this sector are topical with land reform taking place here and

there is tremendous knowledge relating to wildlife management held by individual farmers for this land ownership category.

1.4 RESEARCH METHOLOGY

This is primarily a desk analysis of available raw data within the Ministry of Environment and Tourism's Directorate Scientific Services. Data collected and stored within the Permit Office in raw form provide the backbone of this study. Input was sought from game farmers and other experts in the field on particular issues such as validating current input costs.

The carrying capacity model (Figure 1.2) as developed by Sweet (1999) for Namibia is used as a basis for assessing potential wildlife population densities and dividing the country into some meaningful broad categories in the absence of any other recognised broad subdivisions of the country that bear a relationship to game distributions and densities. With a given carrying capacity it is possible to predict sustainable off-take levels based on published values (ABSA, 2002) and thus production per unit area.

The overview of the current use of the wildlife in Chapter 3 is based on an analysis of permit applications for proposed wildlife utilisation and report-backs from farmers, trophy hunters and game dealers.

Trophy prices and the daily rates the hunter has to pay are published in web pages by several Namibian game farmers. A survey of these web pages will be undertaken compared to the NAPHA price list.

The data from chapters 3 and 4 will then be used in chapter 5 and applied in the financial and economic models.

The raw data used for the bulk of Chapters 3 and 4 come from the files in the permit office. A file with all the farm inspection data, wildlife utilization permits (licences) issued and report backs made by the farmer are kept for each land unit belonging to an individual in a separate file. Game dealers have to report back on their captures, translocations and exports through a register that is submitted annually, before the annual re-registration of the game dealers. Again data pertaining to a particular dealer are kept together. Similarly the professional hunters have to submit a summary detailing all the animals hunted, the farm hunted on and trophy measurements. The data have been computerized in a Microsoft® Access® database. The database was developed in order to make the whole data storage and retrieval more efficient and to allow for the synthesis and cross-checking of the data. This part of the larger project is still evolving. General wildlife utilisation data since 1997 have already been entered into this database. All data are, as far as possible, being geo-referenced for spatial analysis in ArcView® G.I.S. All data relating to a particular farm are for example geo-referenced to that farm. A digital farm map, developed originally for the Ministry of Agriculture and Rural Water Development, is used and has been updated with Ministry information.

Dealers in wildlife products, taxidermists, souvenir manufacturers and skin dealers, have to also submit a copy annually of their registers. Registration details have all been computerized.

All data pertaining to a particular farm or enterprise are dealt with confidentially by the Permit Office and thus only summarised data for a region or information without identifiers as to a particular farm or enterprise are used in this report.

1.5 LITERATURE STUDY / THEORETICAL FRAMEWORK

Research on financial/economic aspects of the wildlife industry in Namibia has been conducted by Ashley and Barnes (1996), Barnes (1998) and Barnes and de Jager (1995). On the use of wildlife as an alternative/complementary land-use form has been published by, for example, Knemeyer (1985) and Maier (1985, 1988). Craig (1998) has reported on large-scale aerial censuses to estimate wildlife populations, Kolberg (1998) by estimating these based on questionnaire surveys. National wildlife questionnaire surveys were conducted in 1955, 1960, 1972, 1982, 1992 and 1997 on wildlife distribution and use (van der Spuy, 1962; Joubert and Mostert, 1975; Joubert et al., 1984; and Kolberg, 1998).

Maier (1985) presents a fairly detailed picture of the wildlife industry in Namibia in the early 1980s. Price analyses are presented for the different utilization options.

The LIFE programme commissioned a study into the export opportunities for Namibian venison to Europe during 1994. Financial models for different farming enterprises involving venison production are presented as well as a detailed SWOT analysis (LIFE Programme, 1994).

Du Plessis (1991) gives an overview of the Namibian wildlife industry's organization around Namibia's independence in 1990, based on Ministry reports and interviews

held with role players. Bakkes (1992) gives a detailed overview of the financial aspects affecting the South African game farming industry in 1990 and reaches *inter alia* the following conclusions:

- That although the game industry started initially as a hobby or from a desire to conserve wildlife, it had to develop into an financially viable industry.
- A lack of research into the financial and economical aspects regarding the industry.
- The game industry, like any other sub-sector, can maintain its place in the agricultural sector.
- That every game farm enterprise is unique, as determined by *inter alia* its vegetation types, geographic situation and proximity to other tourist attractions, and should be treated as such. Trying to apply standard models across this range of diverse situations, would not work.
- Sound financial management is required as in any other business, but is made more difficult through the unique factors having an affect on agriculture.

More recently Falkena (2000) and ABSA (2002, 2003) give a good review of the financial aspects involved in wildlife management in southern Africa. The authors in the ABSA (2002) study, for example, note that the game industry has been expanding at a rate of about 25% per annum during the last decade in South Africa. This rate of expansion is in contrast to earlier cautioning that the industry would probably not carry on expanding as rapidly as during the 1980s (Bakkes 1992). In

South Africa the majority of the about 6000 annual hunting clients that come annually, originate from the USA, followed by South America, Germany and Spain. The claim made that some 85% of all trophy exports from Africa come from South Africa, is clearly exaggerated, considering that Namibia hosts more than 3 000 clients annually and Zimbabwe had been an important trophy hunting destiny until recently. Countries such as Botswana, Zambia and Tanzania and lately Mozambique also participate in the trophy hunting industry within the SADC region (TRAFFIC Sport hunting workshop, 2001; ULG Northumbrian Ltd, 2001).

The question as to whether wildlife or cattle are more profitable from a financial and economic point of view has been extensively researched in Zimbabwe through the Multispecies Animal Production Systems Project in the early 1990s (Jansen, 1989; Jansen et.al.; 1992a, 1992b; Bond, 1993; Kreuter and Workman, 1992, 1994). Primary findings of this project were that although wildlife was a major land-use form, it represented a way of diversification in the moister regions and did not replace crop production in these regions. In the drier regions wildlife was a real alternative to cattle, because of better financial returns. In semi-arid rangelands domestic livestock output and thus productivity and financial viability are directly dependent on the levels of primary production. Lower rainfall is coupled to higher variability of precipitation between years. As wildlife production focuses on low off-take activities such as trophy hunting or non-consumptive activities such as tourism, the financial viability is less affected by this variability in annual rainfall and thus primary production (Bond, 1993). These early results were replicated in the late 1990s in, for example, the Savé Valley conservancy (du Toit, 1998). As Namibia receives considerably less rainfall, these factors should play an even bigger role in Namibia. As pointed out by

Jansen *et al* (1992), the relative advantage of one form of range utilization over another is dependent on who the farmer is (i.e. level of management and experience), what he does in his cattle and wildlife enterprise (i.e. production system used and marketing options available) and how such a farmer is likely to be affected by government policies.

1.6 LAYOUT OF THE STUDY

The foundation for this study is produced in Chapter 2, with an inventory of the wildlife resource, and in Chapter 3 with an overview of current uses of the wildlife and prices obtained for these wildlife products. The inventory in Chapter 2 is both qualitative as far as species distributions are concerned and quantitative in trying to link actual animal densities to calculated carrying capacities. In Chapter 4 a cash flow model is constructed to explore the financial viability of different game farming options. In Chapter 5 policies in relation to the wildlife industry are examined and broad recommendations, based on this study, are made to the Ministry of Environment and Tourism. The study will be rounded off with a discussion of recommendations based on this overall analysis as well as the implications of policy decisions on the wildlife industry. Tools such as the Agricultural Policy Analysis (PAM) as described by Jansen 1989 and Sellen (2002) or the Comparative Advantage Analysis (Salinger 2002) are used.

CHAPTER 2

RESOURCE AVAILABILITY

2.1 INTRODUCTION

The aim of this chapter is to highlight the resource availability in terms of game distribution and relative density for the more common species and those particularly important to the wildlife industry. A comprehensive survey of all game species is simply beyond the scope of this work. Nevertheless, game density estimates and thus also national game population sizes are discussed in considerable detail as these figures are important to indicate the sustainable use potential of these more important species. The chapter is rounded off with a review of where in Namibia the wildlife industry is located and potential conflict with other land-use options is examined.

Wildlife distributions for especially the game species have been well documented during the last 100 years by various authors, being hunters and explorers, colonial administrators and more recently conservation scientists. Early reviews are given by, for example, Fischer (1914) and Shortridge (1934). Gaerdes (1968, 1969a, 1969b, 1969c) reviewed the distribution of game in the mid-1960s, especially on farmland. Joubert and Mostert (1975) published findings of a questionnaire survey undertaken in 1972, while a similar unpublished report is available for a survey undertaken in 1982 (Joubert *et al,* 1984). From the early records a good picture of distributions are obtained, but population estimates for larger areas are unreliable as data were collected opportunistically and not in a planned systematic way with a certain degree of accuracy and precision as a goal. Interpretation of these findings is difficult as

methods for obtaining these estimates are poorly documented. Even today obtaining reliable population estimates remains a challenge to the wildlife manager.

2.2 METHODS

Current wildlife distribution is documented based on aerial survey data and records on the occurrence of game on individual farms. These data are compared to the data presented by Joubert and Mostert (1975) and Joubert *et al.* (1984).

Wildlife densities are computed, based again on aerial survey data and estimates obtained from farm inspections. Farm inspections are conducted by ministry field staff, who visit individual farms in order to ascertain *inter alia* the abundance of the game based on sightings and spoor observations. During a farm inspection a ministry official visits identified farms for a certain purpose, such as registering farming units as hunting farms or resource inspections of especially communal game, and completes a questionnaire in conjunction with the farmer, with one section dealing specifically with game estimates. The farmer is given a chance to present his population estimates, the actual number of game seen during the inspection is recorded and the official makes an estimate. The quality of these reports varies greatly, depending on the staff involved and their experience of working in a particular region of the country, as well as the amount of time spent on a particular property. A subjective decision had to made that leaned more towards the farmer's estimate or that of an official depending on the above considerations. Game count data were entered into an Access® database for analysis and spatial analysis was done with ArcView®.

The methodology followed during the aerial surveys is generally a sample count whereby 5-20% of the census area is covered by a transect of about 250m on either side of the aircraft. Jolly's method for unequal block sizes is used to compute the game estimates. The 1998 census referred to was conducted by the MET and covered essentially northern Namibia with a 5% sampling intensity (Craig, 1999). The raw data for this census were available for further analysis in database format.

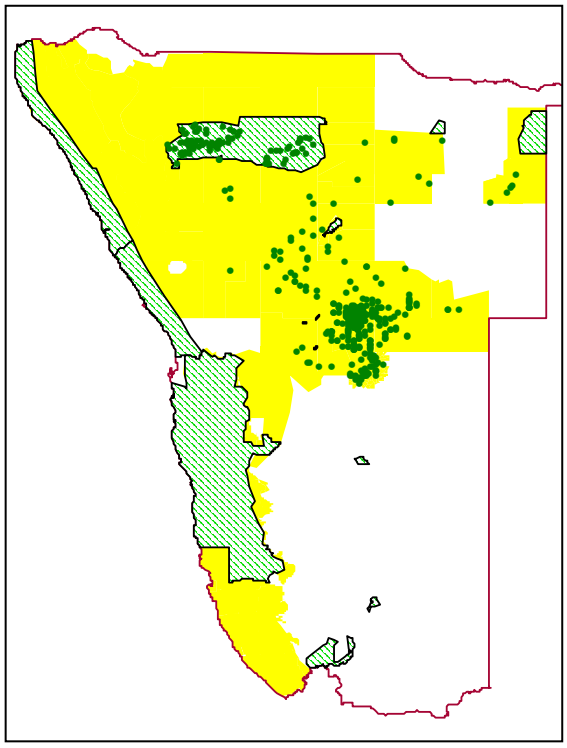
Related to the farm inspection is a questionnaire survey, whereby information is requested from the farmer without a MET official being present to try to verify the answer given. Data for the 1997 survey, to which access to the raw data in a database was obtained, are presented and compared to previous surveys.

Data from special research projects represent another source for population estimates, but difficult to integrate into the larger picture. Its value lies, however, in the fact that these data can be used to verify population estimates obtained by different methods.

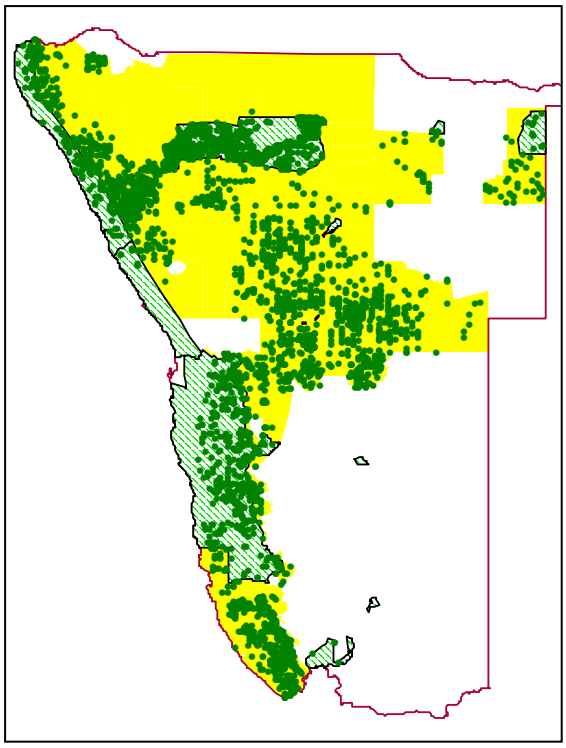
2.3 RESULTS

2.3.1 Distribution

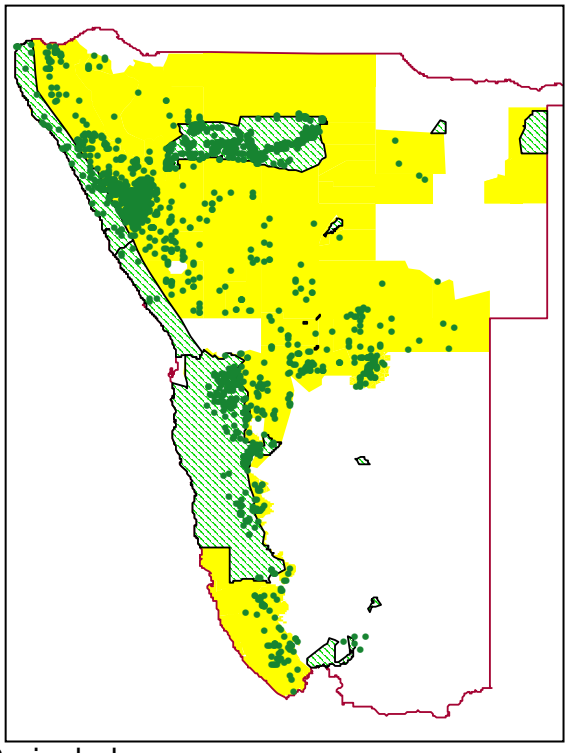
The huntable game species (kudu, oryx, and springbok) and hartebeest are distributed widely throughout the commercial farming area, as depicted in Figure 2.1, which summarizes sightings data from various aerial censuses with different coverage (Appendix 2) conducted by the Ministry between 1995 and 2001. Table 2.1 indicates that, apart from springbok, they occur in viable numbers on at least 80% of the hunting farms. Springbok are less widely distributed in northern Namibia, where



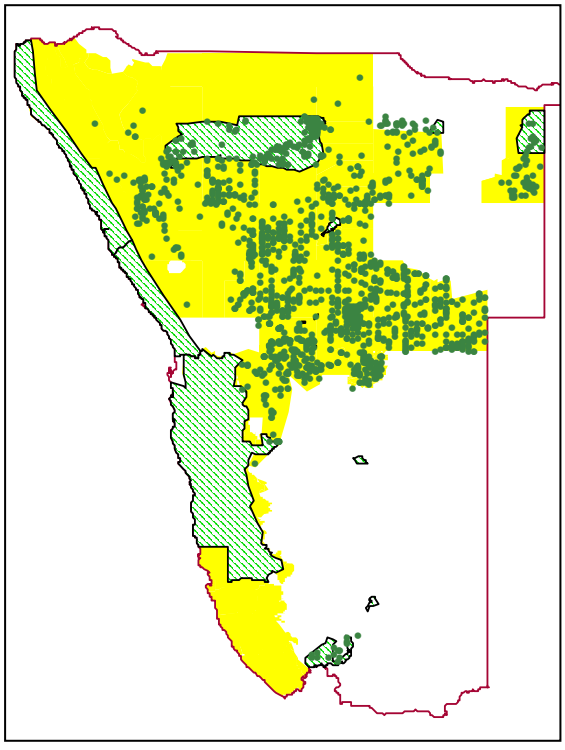
Hartebeest



Oryx



Springbok



Kudu

Figure 2.1: Distribution of hartebeest, oryx, springbok and kudu based on sightings during aerial surveys.

Note: The area surveyed is indicated in yellow, the conservation areas are indicated in green. No density index can be derived from these maps as they are derived from overlaying different census animal sightings. Censuses with very different coverage have been used for this purpose.

Source: Based on Ministry raw data, 2002.

the hunting farms are concentrated. The distribution of the rarer species, such as Burchell's zebra and waterbuck, is very heterogeneous and localised.

These rarer animals became extinct previously and have been re-introduced by only certain farmers and are normally kept in game fenced areas.

Table 2.1: The occurrence of the different species, expressed as a percentage occurrence on a) 512 individual hunting farms and b) based on game counts on 190 different management units with all species included.

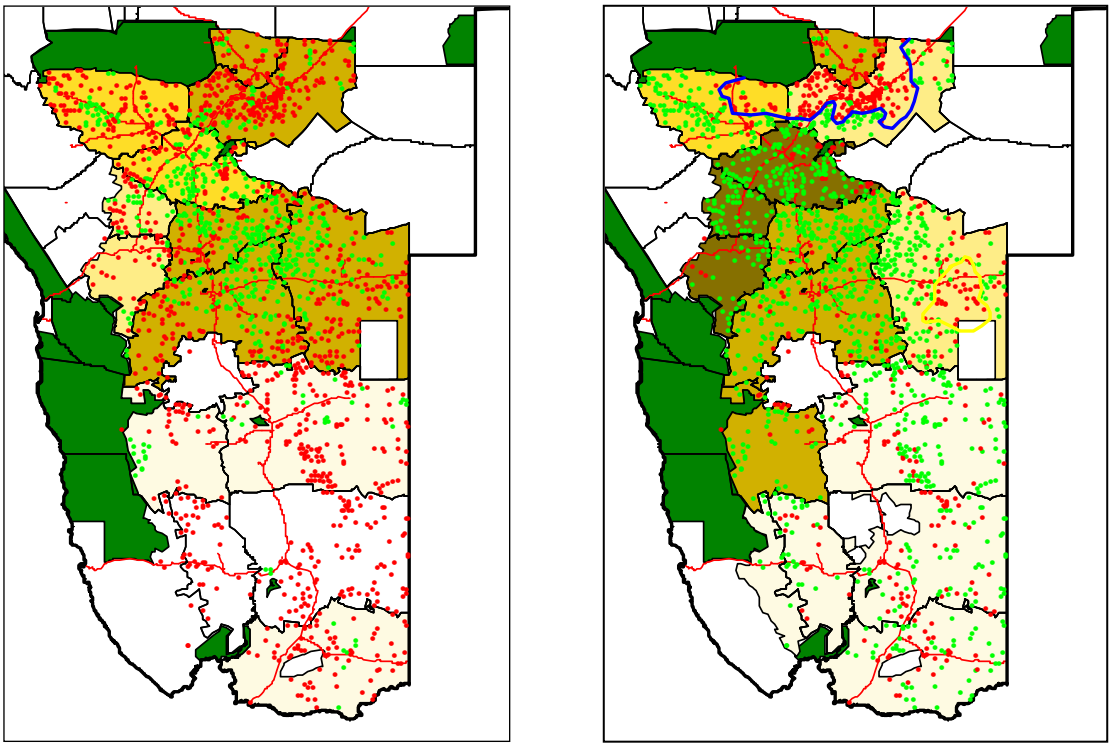
Species	a) registered trophy species on 512 farms	b) based on 190 complete game counts
Kudu	93.9%	93.2%
Oryx	89.5%	94.2%
Warthog	76.6%	81.6%
Springbok	53.7%	73.7%
Hartebeest	52.9%	58.9%
Steenbok	52.0%	85.3%
Eland	31.4%	43.7%
Duiker	28.9%	72.1%
Hartmann's zebra	27.5%	43.7%
Blesbok [1]	23.6%	37.9%
Blue wildebeest	20.5%	31.1%
Burchell's zebra	16.0%	28.4%
Black wildebeest	14.6%	26.8%
Ostrich	14.5%	46.3%
Common Impala	14.3%	28.9%
Waterbuck	7.8%	18.9%
Giraffe	5.7%	31.1%
Sable	2.1%	7.9%
Klipspringer	2.0%	32.1%
Black-faced Impala	1.8%	5.3%
Roan	1.6%	5.8%
Tsessebe	1.0%	2.6%
Dik-Dik	0.8%	20.5%
Lechwe	0.6%	4.7%
Nyala	0.4%	4.2%
White rhino	0.0%	3.2%
Black rhino	0.0%	1.6%

Note: 1. Exotic species are highlighted
Source: Based on Ministry raw data, 2002.

Game fenced areas can be registered in order to be able to export game from these - a total of 225 camps with a total area of 1 342 306 ha have been registered for jumping game and 65 camps covering 272 275 ha for non-jumping game.

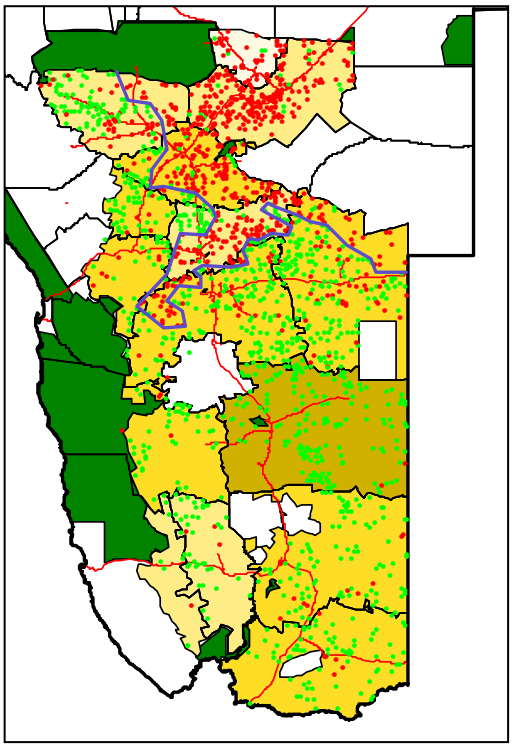
Table 2.1 gives a summary of the species registered as trophy animals on 512 hunting farms compared to 190 complete game counts during farm inspections. The huntable game species occur roughly in equal proportions on the farms, while springbok, for example, are favoured by more farms from the south being included in the game counts as opposed to the number of registered hunting farms in the south. The game counts data set also shows a higher abundance for traditionally less important trophy species such as giraffe, ostrich and klipspringer.

Although the average number of species on the 22 farms in the magisterial districts in the small stock area are similar to those of the 441 farms in the more northern large stock farming area, the maximum number of species in any one district is only about half of that of the farms in the north. Furthermore although 48% of the commercial farming area lies in the southern half of Namibia, only 5% of the hunting farms are situated there (see Table 2.2).

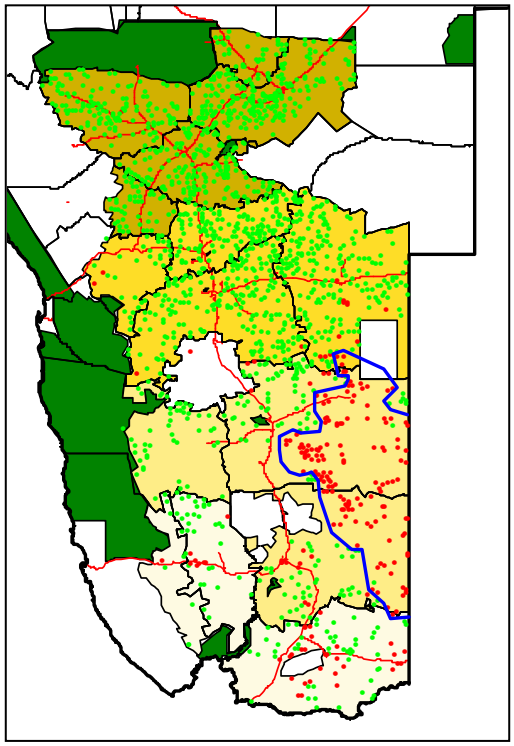


Hartebeest

Oryx



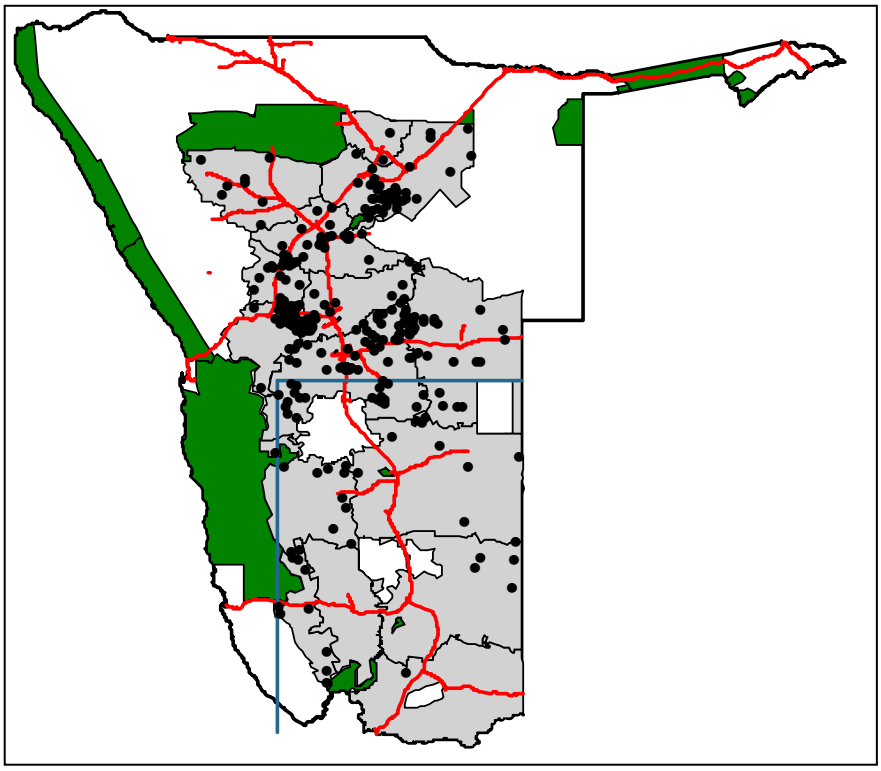
Springbok



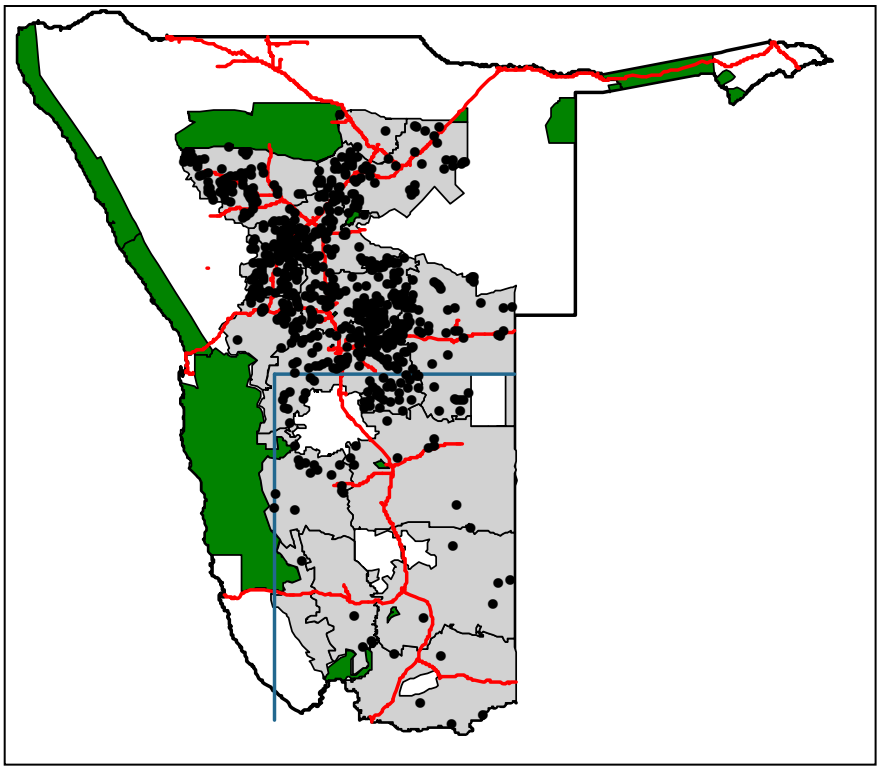
Kudu

Figure 2.2: Distribution and density maps for four species.

Note: Green dots indicate presence and red absence on a farm based on the 1997 questionnaire data. Green indicates conservation areas. The darker the background shading (shades of brown) for the farmland, the higher is the game density averaged over a district. Source: Based on Ministry raw data, 2002.



A)



B)

Figure 2.3: A) The 240 farms with game counts; and B) the 512 registered hunting farms used in the analysis

Note: The black dots represent the farms in relation to the commercial farmland (grey) and the conservation areas (green). Major roads are indicated as red lines. The blue line demarcates the small stock area in the southeast of the country.

Source: Based on Ministry raw data, 2002.

Table 2.2: Registered hunting farms per magisterial district for northern and southern Namibia

District[1]	Units	Average number of species	Maximum number of species
Gobabis	49	8.0	19
Grootfontein	44	6.3	17
Kamanjab	2	9.5	12
Karibib	20	5.5	14
Okahandja	67	6.0	18
Omaruru	49	6.4	20
Otavi	8	6.5	10
Otjiwarongo	73	5.8	19
Outjo	55	5.6	18
Tsumeb	5	9.2	19
Windhoek	122	6.9	18
Subtotal / average	494[2]	6.9	16.7
Bethanie	2	6.0	8
Karasburg	2	6.0	8
Keetmanshoop	4	3.8	4
Leonardville	1	7.0	7
Maltahöhe	12	4.8	11
Mariental	7	5.6	12
Subtotal / average	28	5.5	8.3

Notes:1. Bethanie to Mariental lie in the small stock area in southern Namibia
2. Ten farming units straddle a magisterial boundary; thus a total of 512 farms instead of 522.

Source: Permit Office raw data, August 2002

For 190 farm management units an estimate was obtained for all species (game and livestock); for a further 50 farms an estimate for only some species was obtained (in most cases the game only).

2.3.2 Densities and population sizes

Density data, based mainly on farm inspection data, were obtained for 240 farms for the different species of game (see Table 2.2). 153 of these 240 game counts took place between 1996 and 2002, as well as being located within the 1998 aerial census blocks, and have been used to compare their combined population estimates to those of the aerial census in Table 2.3. The 1997 questionnaire raw data were

analysed in order to derive a density estimate per farm, based on the farmers' estimates as returned. Density estimates were derived for 1041 farms with their spread throughout the country indicated in Figure 2.3. As both datasets have spatial reference data associated, these could be imported into the ArcView® G.I.S. and spatially manipulated. Farms were allocated to the different carrying capacity categories and aerial census blocks. Density data for the 240 farms have been summarised in Table 2.4 and are graphically compared to the densities as derived for the 1041 questionnaire farms in Figure 2.4.

Densities derived from the 1998 northern Namibia aerial census are compared with the questionnaire derived density estimate in Figure 2.5. Only census blocks for which there were at least ten farms with questionnaire-derived data were included in the analysis. For oryx, springbok and hartebeest, which are predominantly grazers and prefer open habitat, there is a reasonable relationship between the density estimated by the farmers and that derived from the aerial census. For kudu, a browser and animal associated with thickets, there is a weak inverse relationship, i.e. as the kudu habitat improves by getting denser, fewer kudu are spotted from the air. From this data comparison it can be estimated that on average the aerial census derived density estimate is 55% for hartebeest, 37% for oryx and 15% for springbok and kudu compared to the farmers' estimate. The comparison is influenced by the representativeness of the averaged density estimates derived from the farms for a counting block.

Table 2.3: Game estimates obtained according to source or method

Farm inspection	241
Farmers estimate	110
Conservancy count	39
Game Dealer census	27
MET aerial census	12
total	429

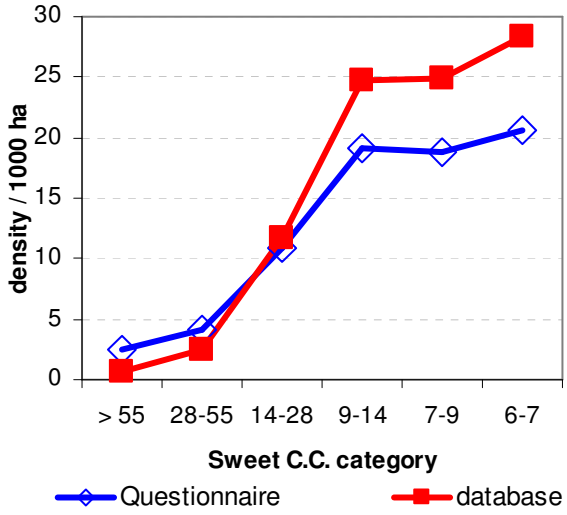
Source: Ministry raw data, 2002

Table 2.4: Observed average game densities for the different carrying capacity categories as defined by Sweet (1998)

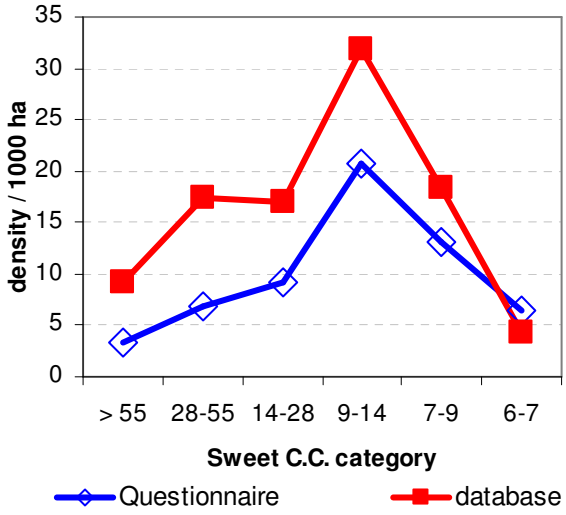
Carrying Capacity category	Springbok	Kudu	Oryx	Hartmann's zebra	Hartebeest
> 55	5.6	0[1]	7.5	2.7	0
28-55	8.1	2.4	17.4	4.6	3.1
14-28	44.4	11.8	14.3	14.6	3.7
9-14	22.8	24	32.7	5.9	21.4
7-9	22.9	24.8	18.4	5	10.4
6-7	0	28.3	4	11	7.6
farms	152	222	220	95	134

Note: 1. A 0 indicates that no animals of this species where recorded in this category in the sample of farms

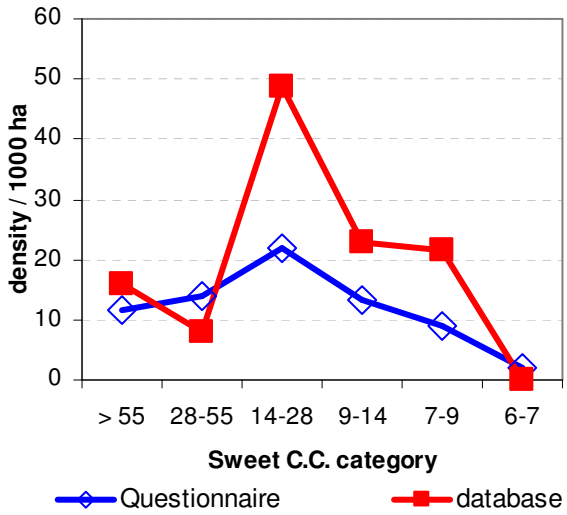
Source: Based on Ministry raw data, 2002



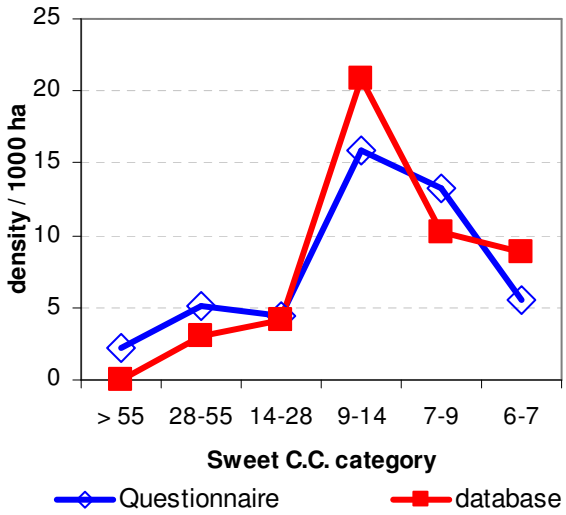
Kudu



Oryx

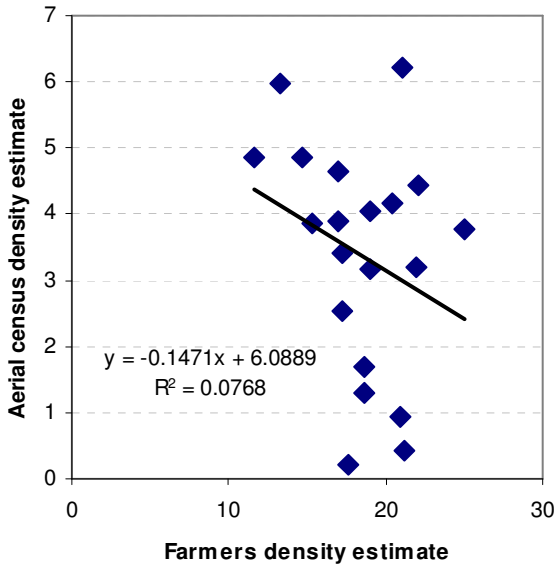


Springbok

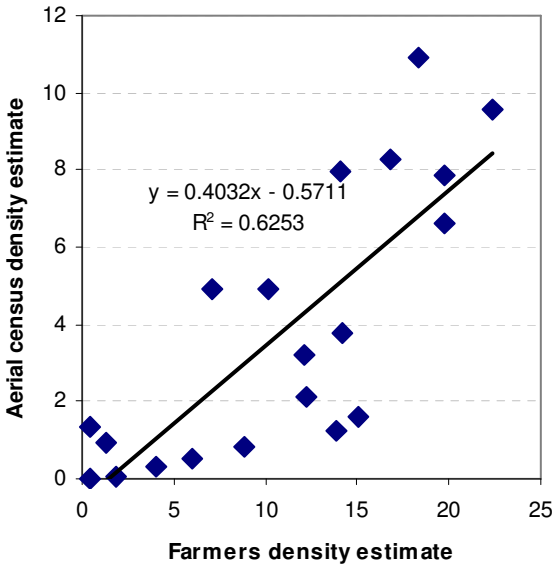


Hartebeest

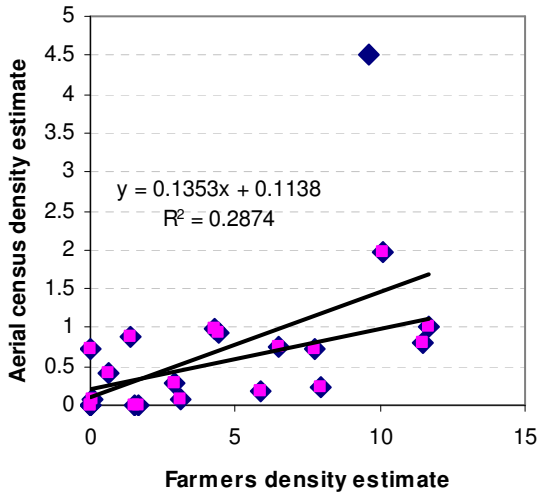
Figure 2.4: The average density estimates derived per carrying capacity category from the 1041 questionnaire farms and 240 farms in the game counts database.
Source: Based on Ministry raw data, 2002



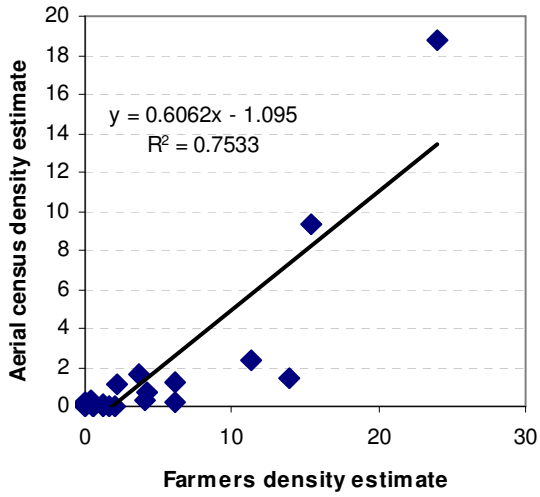
Kudu



Oryx



Springbok



Hartebeest

Figure 2.5: A comparison of the farmers density estimate with that derived from the aerial census.

Note: The comparison is per census block with a least density estimate for 10 farms included. The graph for springbok shows a trend-line fitted to all data and one for the points excluding the one outlier.
Source: Based on ministry raw data, 2002

Table 2.5: Game population estimates for the commercial farm land in Namibia based on aerial census data and summed estimates from individual farms

Species	database for 153 farms 1996-2002	Aerial census 1998	database/aerial census
area covered, km²	13 450	172 146	7.8%
Elephant	14	0	
Ostrich	1 385	43 053	3.2%
Cattle	21 573	579 573	3.7%
Oryx	34 346	65 266	52.6%
Hartebeest	15 928	30 256	52.6%
Kudu	34 520	54 734	63.1%
Roan	380	511	74.4%
Black wildebeest	3 727	4 970	75.0%
Hartmann's zebra	6 105	8 097	75.4%
Burchell's zebra	3 212	3 611	89.0%
Blue wildebeest	7 573	8 275	91.5%
Eland	11 175	8 604	129.9%
Springbok	16 953	11 834	143.3%
Giraffe	2 179	1 461	149.1%
Waterbuck	2 942	1 622	181.4%
Sable	631	249	253.4%
Blesbok	2 658	495	537.0%
Impala	5 094	206	2472.8%

Source: Based on Ministry raw data, 2002

All animals in Table 2.5 below Blue wildebeest are estimated to occur on these 153 farms in higher numbers than indicated by the aerial census figures for the whole northern Namibia commercial farming area. Eland and giraffe certainly have a wider distribution than that covered by the sampled farms. Table 2.5 also indicates the continuum from domestic animals such as cattle which are easy to spot from an aircraft and are equally distributed at relatively high density and thus can be counted to give an accurate and precise population estimate; to species such as impala which

are very difficult to spot or the rare antelope such as roan or sable, which are highly localized and thus difficult to estimate accurately based on aerial census data.

Table 2.6 has been included in order to provide an indication of the degree to which the animals counted during farm inspections are confined to that farm and could not have been counted on neighbouring farms again during other farm inspections. For example, eland moving in large herds over several farms, are often overestimated for a region.

Table 2.6: Percentage of different game species in a sample of 240 farms contained by different types of fence

Animals estimated to be on 240 individual farms in total		game fenced	open (stock proof only)	jackal proof fenced	mixed fences	In game proof camps/farms
Springbok	54 935	26 603	5 622	15 378	7 152	76.4%
Oryx	52 364	24 726	14 594	7 858	5 186	62.2%
Kudu	41 389	19 101	13 480	875	7 933	46.1%
Hartebeest	18 923	10 493	4 865	150	2 874	55.5%
Eland	12 802	9 682	600	79	2 441	75.6%

Source: Based on Ministry raw data, 2003

2.3.3 Spatial distribution of the industry

The distribution of registered hunting farms is used as one indicator of where the industry is concentrated. It needs, however, to be pointed out that this indicator is valid only for northern Namibia, because of the lack of registered hunting farms in southern Namibia. In Table 2.7 it can be seen that nearly half of all hunting farms are situated in the relatively dry 14-28 ha per LSU category, the area corresponding roughly to the Windhoek, Omaruru and Karibib districts.

For southern Namibia the map in Figure 3.1, indicating where the large springbok herds and the night-culling are concentrated, gives an idea of the distribution of the consumptive wildlife industry.

Table 2.7: Distribution of hunting farms in relation to the carrying capacity categories as defined by Sweet (1998)

Sweet CC category	Hunting Farms	% farms	% Commercial land
> 55	6	1%	8%
28-55	6	1%	15%
14-28	114	25%	39%
9-14	221	48%	20%
7-9	95	20%	15%
6-7	23	5%	4%
Total	465		

Source: Based on Ministry raw data, 2003.

2.4 ANALYSIS

It is clear from the data presented that Namibia is fortunate in still having large populations of wildlife and natural habitat. It is also recognised that antelope populations, especially the rarer species, have increased since 1967, when farmers were granted conditional commercial utilization rights over game on their land that had so far been government property with non-commercial utilization rights for the land-owner. The re-introduction of game gathered momentum in the mid-1980s as the value of these species on the open market increased. From 1985 to 1989 the Ministry made roan antelope in groups of ten available to 11 farmers at a subsidized price of N$ 1500 per animal. In 1994 21 roan were sold on a MET game auction for N$ 26714 per head, while in 2000 three roan were sold for N$ 120000 per head. If it

is assumed that N$ 1500 in 1985 represented half the market value, prices have been increasing by an average of 28.5% per annum over the 15 years. Prices for sable antelope increased similarly at 25%. Price developments will be explained further in Chapter 4. Farmers had earned relatively large revenues from the sale of culled animals (see Chapter 4), after the exceptionally good rainfall years in the mid-1970s boosted their farm income and thus the financial value of game to the farmer.

This trend is also reflected in the importation of game; while during 1978 permits were issued for the import of 186 animals from South Africa, this figure reached 6134 animals in 1986. Although these figures reflect permit applications and not actual imports they give an idea of the demand for game for re-stocking purposes. It is probable that around a 1000 animals were imported per year throughout the 1980s. In 1990, for example, 929 head of game were actually imported, based on report backs from the farmers. Joubert (et al. 1984) reported that in 1982 there were a minimum of 160 waterbuck, 895 common impala, 2060 blesbok and 149 Black wildebeest already on farms as determined by the questionnaire. Species that had been imported in large numbers include Common impala, blesbuck, Black- and Blue wildebeest and springbok. Other species imported in lower numbers but of higher financial value, are waterbuck, nyala, tsessebe and sable antelope.

Livestock numbers on commercial farmland have been decreasing since the 1950s. Cattle numbers reached their peak in the 1950s and have been declining since then, for a number of reasons as discussed by Lange et al (1997). This decline in the livestock stocking rate made space for the wildlife to increase. Other factors that contributed to the increase of wildlife on commercial farmland are the reduction of large predators (lion and hyaena), as well as the provision of open water at livestock

drinking troughs and dams. That game numbers were not able to match the observed de-stocking of livestock can be ascribed to range degradation and subsequent bush encroachment; the latter especially applies to large parts of northern Namibia. The bush encroachment in northern Namibia and the resultant loss in carrying capacity for especially grazers, has been described by Bester (1999).

A further argument is based on the observed increase in game numbers by comparing data from the 1960 farm questionnaire (van der Spuy, 1961, as quoted in Gaerdes 1968, 1969a, 1969b, 1969c) with the 1972 and subsequent game counts. Figures for oryx and hartebeest, two grazers, showed the biggest increase from estimates made prior to 1967 to those afterwards, with the observed increase for kudu being lower. In 1967 farmers obtained utilization rights and ownership over huntable game and it could be argued that farmers became more tolerant of grazing game and did not see it as much as a competitor for grazing as before 1967. It seems reasonable to expect that, prior to 1967, farmers limited competition from grazers such as oryx and springbok by keeping these species at lower levels compared to their potential densities, than the kudu as a browser. Grazing wildlife had thus a higher potential to increase than the more tolerated browsing species.

The bulk of the national wildlife population is found on commercial farm land; this being especially true for the antelope (see Table 2.8). The “Big Five” species, in contrast, are concentrated in the conservation areas and in the communal areas. This makes the hunting concession areas in the communal areas attractive.

Hunting farms are concentrated in the relatively dry western areas in northern Namibia. Bush encroachment might play a role here, in that most farms in the higher

rainfall areas have a too dense bush stratum, making trophy hunting difficult because of the restricted visibility and access.

While it is difficult to arrive at a satisfactory population estimate for the wildlife species on a particular farm, this task is even more challenging for a region within the country or the country as a whole, because of the great variation between individual farms as regards game density. In Table 2.5 an attempt is made to illustrate that the aerial census based population estimates are underestimating true population size if judged against the summed totals for individual management units. The table gives the aerial census derived population estimate for Namibia for various species, and compares this to the population estimate for these species based on the 240 management units.

Aerial census undercounting bias has been reported by, for example, Erb (1993), who presents data to show that the estimated undercounting for roan antelope in the Waterberg Plateau Park varies on average between 52% of roan counted in March/April, at the end of the rainy season, to 71% in July/August and to 86% in October, at the end of the dry season, for helicopter counts. Visibility as affected by tree leaf cover is one factor. An analysis of game counting data for Etosha has shown that early in the morning, when shadows are long, more springbok are counted per unit counting time than later in the day. Kudu again are counted most easily during mid-morning when they move to the water points and into the open (Erb 1995.) Similar observations have been made during aerial counts of grey kangaroos (Hill *et al.* 1985), viz., that visibility of these animals from the aircraft varies with time of day. Undercounting biases have been reported by several authors; see, for example, Pollock and Kendall (1987); van Hensbergen *et al.* (1996); Redfern *et al.*

(2002); and Melton (1978). Similarly, data in Mader (2001) indicate that during an aerial census approximately 20% of the kudu, 40% of oryx and 80% of hartebeest are counted, compared to estimates made by the ground count based line transect method. These data are for the relatively open Seeis conservancy and standard Namibian aerial census techniques. These estimates of the sightability of kudu, oryx and hartebeest compare well with data calculated when comparing aerial census based density estimates to farmer questionnaire based ones in Figure 2.5

Table 2.8: Estimated population sizes for selected game species on commercial farmland, communal land and in protected areas

	Commercial farmland	Communal land	Protected areas	Total estimated population size	% of game population contributed by a species
Springbok	129 334	25 990	10 117	165 441	30.2
Oryx	81 966	18 975	7 945	108 886	19.9
Ostrich	71 363	10 465	3 625	85 453	15.6
Kudu	65 534	1 333	1 540	68 407	12.5
Hartebeest	31 126	18	528	31 672	5.8
Hartmann's zebra	10 387	6 413	3 847	20 647	3.8
Warthog	15 615	226	229	16 070	2.9
Blue wildebeest	8 275	204	3 857	12 336	2.3
Burchell's zebra	3 861	0	8 460	12 321	2.3
Eland	9 304	162	1 512	10 978	2.0
Elephant	0	1 219	8 939	10 158	1.9
Giraffe	1 461	595	1 919	3 975	0.7
Roan	511	0	381	892	0.2
Buffalo	0	33	626	659	0.1
Sable	249	0	316	565	0.1
Total	428 986	65 633	53 841	548 460	100
%	78.2	12.0	9.8	100	

Source: Based on Ministry raw data (2002) and adapted from Craig (1999).

A challenge would certainly be to derive a more accurate estimate of the national game populations and thereby be able to set objective national quotas, which could then be broken down into regional off-take limits. Such an exercise could alleviate fears that the game populations on the commercial area, as a whole, are over-utilised. While over-utilization certainly does take place on individual farms for short term financial gain, the vast majority of farmers utilise the game on their property in a sustainable fashion.

Table 2.9: Questionnaire returns and game population size estimates

	1972	**1982**	**1992**	**1997**
% return	61%	51%	30%	23%
Springbok	141 072	115 782	166 192	79 850
Gemsbok	40 630	64 500	93 400	62 755
Kudu	110 400	103 550	116 800	76 072
Warthog	52 720	73 750	70 420	42 474

extrapolated population sizes	**1972**	**1982**	**1992**	**1997**
Springbok	231 266	227 024	553 973	354 889
Gemsbok	66 607	126 471	311 333	278 911
Kudu	180 984	203 039	389 333	338 098
Warthog	86 426	144 608	234 733	188 773

Note: In the top half of the table the actual summed population estimates are given together with the % returns. In the bottom half the population estimates have been extrapolated over all farms.
Source: Based on Ministry raw data (2002), Joubert and Mostert (1975) and Joubert et al (1984).

Population fluctuations, as related to droughts, disease and other environmental factors, can severely affect a steady and predictable supply of game products. The rabies epidemic affecting the kudu population in the early 1980s reduced their numbers in northern Namibia (see Table 2.10). This table shows the average estimated kudu population per farm prior to the outbreak of the rabies in early 1977 and again afterwards. The population estimates for the Okahandja district are

somewhat anomalous, but otherwise the table shows that the kudu population decreased significantly in the Windhoek, Omaruru, Karibib and Outjo districts into which the rabies epidemic had spread by 1982. The northern districts of Tsumeb and Grootfontein had not yet been affected, while the districts in southern Namibia, with their much lower kudu density, remained unaffected by the disease and here the kudu population increased.

Table 2.10: Reported number of kudu per farm prior to the rabies outbreak and afterwards

	Kudu per farm		1982 as % of 1972
	1972	1982	kudu numbers
Bethanie	15.1	24.6	162%
Karasburg	4.7	5.0	105%
Keetmanshoop	6.3	12.9	204%
Maltahöhe	17.0	23.8	140%
Mariental	3.9	3.4	87%
Gobabis	23.8	37.9	159%
Grootfontein	35.9	56.4	157%
Karibib	58.1	33.8	58%
Okahandja	70.6	71.6	101%
Omaruru	104.9	58.1	55%
Otjiwarongo	73.0	49.7	68%
Outjo	62.7	56.0	89%
Tsumeb	50.3	104.1	207%
Windhoek	58.7	32.9	56%

Source: Based on questionnaire data in Joubert *et al.* (1984).

Drought conditions in southern Namibia affect the availability of springbok for especially night culling operations (this aspect will be covered in the next chapter).

Namibia's aridity allows for little dry land agriculture, large parts of the country can thus only be used for extensive livestock ranching to be which game ranching can be complimentary. The areas important for crop production around the towns of Otavi,

Grootfonetin and Tsumeb are not important from a wildlife point of view; only 5% of the registered hunting farms are located here (Table 2.7).

2.5 CONCLUSION

From the analysis in this chapter it is clear that although the huntable game species are widely distributed, their densities vary greatly from farm to farm, making it difficult to estimate populations on a regional basis through sampling techniques. This difficulty is even more pronounced for the rarer game species occurring on only few farms.

The point is made that game populations have been underestimated in past questionnaire surveys as well as aerial censuses. These low population estimates do not necessarily reflect population trends or give an indication of true population sizes and thus sustainable utilization levels.

An alternative approach, especially for the rarer species, might entail the use of summed totals from individual farms collected during routine farm inspections, based on permit application data and from farm management plan data. These data are collected, but need to be effectively summarized and correlated with other relevant data. An effort should be made to determine game/livestock population trends over time from a sample of farms monitored in relation to general farming conditions and producer prices.

CHAPTER 3

OUTPUTS OF THE CONSUMPTIVE WILDLIFE INDUSTRY

3.1 INTRODUCTION

In this chapter the different wildlife products are examined in terms of financial value to the farmer and their contribution to the national economy. Whilst recognizing that the value of a resource could be broken-up into different components, such as use values and non-use values; and use values further into direct use values, indirect use values and option values, this chapter focuses on the direct use values; those that can be relatively easy measured in monetary terms. Particular attention will be paid to trophies, live game and venison production. Other recognized segments of the industry entail biltong or sport hunting, selling of venison by the farmer and utilization of game for own consumption on the farm. Fluctuations in supply and its dependency on environmental factors are addressed.

Statistics on various game products produced in the country have been routinely collected since the 1970s. With changing legislation and fluctuations in particular sectors of this industry, the quality of the data collected varies. Equally, the Permit Office has gone through various stages, differentiated by staff capabilities and the availability and application of information technology, which has influenced the data quality.

3.2 DATA COLLECTING

Data on consumptive wildlife utilization, which are regulated through the permit (license) system in Namibia, were extracted and summarized from Permit Office data stored in individual farm paper files and from data in the different electronic

databases. All permit applications and report-backs, as well as inspection reports, are kept in the farm files. The quality and usefulness of these individual files vary greatly depending largely on how active the particular farmer is in the wildlife industry and his own inclination towards data recording and sharing this information with the ministry. Files were found for farmers with a near complete record of permits issued and report-backs given. These files were used to construct models to estimate a minimum sustainable off-take for particular game species on individual farms over a period of up to 25 years. Similarly, annual returns from various wildlife product dealers were used to get an understanding of their activities. The trophy hunting returns for 2000 were entered into a database for detailed analysis down to the individual clients and their hunting activities. Trophy hunting data for the other years, from 1994 to 2001, were only entered into the database summarized per currently active professional hunter and year with regard to the number of clients per country and animals per species hunted.

A survey of web page advertisements by 37 individual game farms with price lists for 2001/2002 was undertaken as part of this study. As these price lists are quoted in US$, € or DM, an average exchange rate for 2001 was used of N$ 1 being equal to 0.1177 US$, 0.2545 DM and 0.1313 € (Bank of Namibia, 2002b).

Data were extracted from various Ministry annual reports, especially where such data related to Permit Office statistics.

Interviews were held with managers of some of the larger skin/ trophy/ game dealers, as well as farmers, in order to gain a better insight into the industry.

Prices for live game that the farmer would receive from a game dealer, who would have to do the capturing, vary significantly depending on the game population sizes

from which the animals need to be captured, numbers and species packages offered etc. For this analysis, in order to arrive at a global figure that would indicate turnover at farm level, 50% of the auction prices obtained was used as a general figure for the common species and 75% for the rare species such as sable and roan antelope and white rhino (Reuter, 2002).

Prices for biltong hunting are based on the rule of thumb that a springbok is worth N$ 350, an oryx between N$ 800 and N$ 1000, a kudu cow N$ 1000 and a kudu bull N$ 1500. Camping charges are estimated at an average of N$ 150 per day. It is assumed that, on average, four animals are hunted per day per hunting party.

Prices for raw skins bought from farmers were obtained from a large buyer and exporter of these skins in Windhoek (Snyman, 2002), while the number of skins entering the market are calculated based on the annual report-backs from the skin dealers.

3.3 RESULTS AND FINDINGS

3.3.1 Trophy hunting

The trend in the number of trophies taken per year is given in Table 3.1 for the huntable game species. The huntable game species contributed 59% of animals hunted and 49% of the trophy fees during the year 2000.

The country of origin for the trophy hunters is indicated in Table 3.2, where it can be seen that the majority of clients are from Germany and Austria. A total of 3240 trophy hunters visited Namibia during 2000, based on the annual returns by the

professional hunters. This number includes only hunters that shot at least one animal; unsuccessful hunters have not been included in this figure.

Table 3.1: Number of animals of huntable game species and hartebeest trophy hunted per year from 1994-2001.

Species	1994	1995	1996	1997	1998	1999	2000	2001	2002
Hartebeest	718	905	1068	1270	1210	1525	1507	1727	1654
Kudu	1005	1296	1586	1758	2099	2238	2186	2584	2648
Oryx	1369	1832	2134	2603	2634	2945	3288	3338	3380
Springbok	689	720	891	1362	1407	1707	1996	2187	2216
Warthog	1122	1429	1697	1523	1838	2020	1898	2169	2597
All species[1]	6456	8164	9667	11435	12685	14434	15735	17141	18167
% increase		26.5	18.4	18.3	10.9	13.8	9.0	8.9	6.0

Note: 1. “All species” refers to all species hunted as trophy animals.
Source: Based on Permit Office data, July 2003

As 6408 individual trophy hunting permits were issued, only approximately 50% seemed to have been actually used. Of these 3240 trophy hunters, 101 had two permits and seven had three. Thus a report-back was received on 52% of the permits issued and it is not possible to say how many of the remaining hunters for whom a permit was issued actually attempted a hunt or never came to Namibia. By counting the number of permits individual professional hunters reported back on, it appears that the majority of clients hunt with only one professional hunter, while 236 used two and 14 used three different ones. Clients, however, apply to hunt with up to seven different professional hunters, with 28.4% of clients in 2001 applying to hunt with more than one professional hunter.

Based on records for 3102 hunts in 2000, the average hunt lasted a minimum of 4.7 days, based on the difference between the dates for the first and last successful hunt as indicated on the trophy returns. All hunts lasting longer than 32 days (n=33) have been excluded. Of course the 4.7 days are an absolute minimum figure for the shorter hunts and the true duration for which a hunter stays on a particular farm

should be longer, considering that not all hunters would shoot an animal on the first and last day of their stay. Similarly, for the longer hunts the duration on a farm might include visits to, for example, game reserves or other sight-seeing trips away from the farm. American hunters (n=378) stayed for an average of 6 days and shot 4.8 animals, while German and Austrian hunters (n=1849) on average stayed for 4.4 days and shot 3.6 animals during 2000.

Table 3.2: Hunting clients visiting Namibia per country of origin and year.

Country Name	1994	1995	1996	1997	1998	1999	2000	2001	2002
Germany	1093	1234	1490	1769	1829	2027	2208	2213	1900
Austria	203	244	349	432	401	468	481	500	516
USA	73	60	140	178	249	339	497	590	649
France	47	46	140	167	177	239	203	351	361
Hungary	4	30	42	33	105	120	160	201	168
Denmark	17	29	46	96	64	94	118	149	165
Spain	20	19	27	51	59	60	75	77	101
Italy	17	26	33	40	53	74	65	58	83
Switzerland	33	33	47	36	48	60	65	70	51
Czechoslovakia	9	12	17	39	52	82	61	70	84
South Africa	18	19	8	43	35	32	64	67	75
Poland		18	17	29	26	53	47	73	57
Slovenia	7		22	36	34	43	62	33	79
Sweden	3	9	18	18	30	22	42	57	81
Portugal	3	3	3	8	17	26	38	53	84
United Kingdom	5	9	12	13	26	26	31	43	60
Belgium	8	9	7	30	23	40	35	32	39
Namibia		2	6	1	14	29	25	25	20
Argentina		4	4	10	16	13	33	20	7
Subtotal	1560	1806	2428	3029	3258	3847	4310	4682	4580
From elsewhere[1]	358	432	264	266	105	183	145	182	235
Grand total	1918	2238	2692	3295	3363	4030	4455	4864	4815
% growth		16.7%	20.3%	22.4%	2.1%	19.8%	10.5%	9.2%	-1.0%

Note: 1. “from elsewhere” includes clients for whom no country of origin was specified. The countries with more than a 100 clients between 1994 and 2002, are listed individually.

Source: Based on annual by the professional hunters to the Permit Office data July 2003

Table 3.3: Daily tariffs and trophy fees as determined from a survey of price lists on the internet, prices (in N$) for 2001.

Daily tariffs	Min	Average	Max	N[1]
1 x 1 (Plains game)[2]	865	1 740	3 400	37
2 x 1 (Plains game)	692	1 438	2 805	35
Leopard Hunts	2 933	2 933	2 933	2
Non - Hunters/ Rest days	380	698	1 934	37
Species				
Kudu	3 804	5 537	10 200	37
Gemsbok	2 421	3 436	5 415	37
Red Hartebeest	2 628	3 578	5 415	34
Blue Wildebeest	3 804	6 609	8 122	30
Black Wildebeest	5 187	7 665	9 282	23
Zebra Burchell's	2 386	4 915	7 348	22
Zebra Hartmann's	3 078	4 676	7 650	29
Springbok	1 573	2 467	3 655	34
Blesbok	2 465	3 159	5 100	26
Impala Common	2 075	3 500	5 100	18
Impala Black-Faced	10 028	13 243	17 000	6
Eland	6 916	9 538	13 600	29
Eland Livingstone's	12 750	12 750	12 750	1
Giraffe	5 014	11 494	25 500	16
Ostrich	1 950	3 278	5 100	13
Warthog	1 275	2 329	3 481	37
Duiker	1 064	1 742	2 550	27
Steenbok	1 064	1 675	2 550	34
Dik-Dik	1 141	6 859	12 750	10
Leopard	13 832	17 937	27 073	22
Cheetah	7 800	15 368	25 500	25
Hyaena Spotted	4 250	4 250	4 250	1
Lion		No prices		0
Baboon		No prices		21
Jackal	0	287	850	23
Caracal	380	1 856	3 868	20
African Wildcat	0	596	1 700	4
Serval	3 868	3 868	3 868	1
Klipspringer	1 936	4 272	6 916	11
Roan	48 750	54 975	61 200	2
Sable	40 950	51 075	61 200	2
Nyala				
Tsessebe	11 310	11 310	11 310	1
Waterbuck	8 645	12 139	15 725	14
species	4	14	23	37
3+1-day, kudu,oryx & warthog	11 100	17 200	29 200	37

Note: 1. N refers to the number of professional hunter that advertised a species or service
2. Refers to whether one or two clients hunt simultaneously per professional hunter

Source: Based on own survey of web-based price lists, 2002.

Daily tariffs on guest farms for the non-hunting tourist averaged N$ 350 (per person sharing) in a sample of 121 such establishments in 2002 (Where to stay, 2002). For 69 such establishments, for which prices were available for both 2001 and 2002, an average price increase of 9% between the two years was recorded. By comparison, hunters were charged an average of N$ 1740 for hunting alone with a professional hunter or N$ 1438 when hunting together with another client (see Table 3.3). Non-hunting companions had to pay on average N$ 698 per day on a hunting farm. No data could be found on the percentage of hunting clients hunting alone with a professional hunter or together with another client. NAPHA estimates that about 44% hunt on a 1:1 basis, whereas the other 56% hunt with two clients to a professional hunter (Halenke, 2002).

A package consisting of one kudu, oryx and warthog, hunted over three days with an additional rest day, would cost between N$ 11 100 and N$ 29 200, with an average of N$ 17 200 on all 37 different farms offering this combinations (see Table 3.3).

Table 3.4: Average number of clients recorded per active professional hunter category per year.

Category	1994	1995	1996	1997	1998	1999	2000	2001	2002
Hunting Guide	6.3	5.0	5.3	4.8	4.5	5.5	5.3	4.5	4.4
Master Hunting Guide	12.1	10.6	10.4	11.1	9.2	10.7	11.3	11.9	10.5
Professional	14.3	13.9	14.9	15.4	15.7	15.7	15.1	14.6	15.8

Source: Based on Permit Office data, July 2003.

The number of clients per hunting guide or professional hunter over the period 1994 to 2001 is summarized in Table 3.4.

3.3.2 Production of trophy animals per unit area

The number of trophy animals hunted per unit area shows a significant fluctuation between farming units depending on whether the farmer used game farming as primary source of income or only in addition to cattle. These large variations in the off-take of trophy animals per unit area were also observed when farms were grouped together by carrying capacity. Because no clear pattern could be detected this aspect was not further investigated here.

Table 3.5: Summary data for game auctions hold during 2000 to 2002 in Namibia

	All auctions 2000		All auctions 2001		All auctions 2002	
	number sold	avg. price	number sold	avg. price	number sold	avg. price
Springbok	50	1 116	389	1 161	509	1 003
Ostrich			40	1 600	53	1 333
Blesbok	76	1 087	145	1 305	268	1 630
Common impala	53	1 350	120	1 542	294	1 746
Kudu			74	1 619	80	1 887
Oryx	12	2 400	143	1 909	295	1 511
Hartebeest	28	2 286	160	2 259	246	2 400
Blue wildebeest	26	4 077	168	2 449	222	2 223
Black wildebeest	43	4 349	152	3 960	257	4 102
Eland	41	4 561	129	4 670	225	4 574
Burchell's zebra	8	3 200	109	2 996	152	4 234
Hartmann's zebra	7	4 800	57	3 592	120	4 748
Waterbuck	35	7 879	120	8 781	216	10 331
Black-faced impala			59	7 530	20	9 000
Giraffe	9	9 444	40	9 775	63	10 427
Elephant			4	18 000	0	
Bushbuck			0		10	11 000
Nyala			0		13	12 692
Tsessebe			10	14 125	12	16 250
Sable	7	68 000	23	72 826	29	74 483
Roan	3	120 000	8	103 750	12	107 875
White rhino	2	165 000	4	125 000	3	173 333
Animals sold	400		1 954		3 122	
Number of auctions[1]	1		3		5	
Turnover (N$)		2 635 950		8 898 400		14 294 680

Note: 1. These are the number of individual game auctions held during a particular year.

Source: Based on own data collected at these game auctions, 2002.

3.3.3 Live game sales

Live game is sold primarily through three channels in Namibia, viz. game auctions, direct transactions between game dealers and farmers within the country, and game dealers exporting game to South Africa.

Table 3.6: A summary of the market segments for live game in Namibia.

	Sold by game dealers within Namibia directly		Sold on game auctions in Namibia		Animals exported by game dealers		Total animals
Springbok	787	24.0%	389	11.9%	2102	64.1%	3278
Ostrich	27	40.3%	40	59.7%		0.0%	67
Blesbok	35	19.4%	145	80.6%		0.0%	180
Common impala	17	12.4%	120	87.6%		0.0%	137
Kudu	174	41.6%	74	17.7%	170	40.7%	418
Oryx	1321	31.9%	143	3.5%	2673	64.6%	4137
Oryx colour variants	16	100.0%		0.0%		0.0%	16
Hartebeest	823	67.3%	160	13.1%	239	19.6%	1222
Blue wildebeest	377	62.3%	168	27.8%	60	9.9%	605
Black wildebeest	95	38.5%	152	61.5%		0.0%	247
Eland	428	55.1%	129	16.6%	220	28.3%	777
Burchell's zebra	291	67.7%	109	25.3%	30	7.0%	430
Hartmann's zebra	140	71.1%	57	28.9%		0.0%	197
Waterbuck	127	51.4%	120	48.6%		0.0%	247
Black-faced impala	36	37.9%	59	62.1%		0.0%	95
Giraffe	67	26.7%	40	15.9%	144	57.4%	251
Elephant	1	20.0%	4	80.0%		0.0%	5
Bushbuck	0		0				0
Nyala	0		0				0
Tsessebe	12	54.5%	10	45.5%		0.0%	22
Sable	8	25.8%	23	74.2%		0.0%	31
Roan	2	20.0%	8	80.0%		0.0%	10
White rhino	0	0.0%	2	50.0%	2	50.0%	4
Black rhino	0		0				0
Total	4784		1952		5640		

Note: Indicated is the number of animals sold in 2001 on the three different markets as well as the % animals of a species sold per market.
Source: Based on Permit Office raw data, 2002.

Included in the category, direct sale of game from dealers to farmer, is the game sold between farmers, which is captured by a game dealer and transported to a different farm, as well as game sold by a dealer from his own stock. In 2001 there were 24

game dealers registered in Namibia, with the majority being restricted to the capture of certain species only, or to only capturing game for sale from their own farms.

The large majority (96.1% in 2002) of all live game exported is destined for South Africa, with small numbers being exported to Angola, Botswana and overseas. Oryx, springbok and hartebeest constitute over 80% of all animals exported (see Table 3.6 and Table 3.7). As from 2001 roan antelope, Hartmann's zebra or Black-faced impala, all being Namibian endemics, could no longer be exported under adapted ministry regulations.

Table 3.7: Number of animals exported over the last three years

	Exports		
Species	**2000**	**2001**	**2002**
Oryx	2321	2673	2425
Springbok	2525	2102	1400
Hartebeest	381	239	745
Eland	323	220	216
Kudu	215	170	185
Giraffe	129	144	68
Blue wildebeest	201	60	100
Burchell's zebra	73	30	61
Black wildebeest	48		
Ostrich			40
Cheetah		10	
Roan	8		
Common Impala		3	
White rhino		2	
Total	6224	5653	5240

Source: Based on Permit Office raw data, 2002.

3.3.4 Venison production based on trophy hunting and small scale harvesting

Prices obtained for venison sold as an entire carcass to the butcher increased from N$ 3 per kg in 1991 to N$ 8.5 per kg in 2001 for kudu, oryx, hartebeest and springbok. Zebra and warthog meat sells for about half the price obtained for the

other species. While individual farmers might sell up to an average of 9.3 t of venison from a 12 000 ha farm per year over a 10 year period, no reliable data are available on how much venison is produced by the industry as a whole and sold to individual small butcheries. Two different butcheries received 230 and 235 carcasses respectively during 2001, comprising 24% hartebeest, 36% oryx and 31% kudu. Species sold to butcheries vary by district in their relative importance, due to their distribution and density patterns. Fifty-three butcheries were registered in 2002 to buy unprocessed venison from farmers. Typical carcass weights as delivered to the butcheries for different species are given in Table 3.8 as reported by five individual farmers over a number of years. A sample of 10 farmers delivered a minimum of 350 kg venison per 1000 ha farmland from trophy hunting and on "Shoot & sell" permits to butcheries in 2002.

Table 3.8: Carcass weights for various animals on five different farms shot on "Shoot and sell" permits

	Okahandja area		Outjo area		Omaruru area		Otjiwarongo area	
	number	kg/animal	number	kg/animal	number	kg/animal	number	kg/animal
eland	11	201.2						
Hartmann's zebra	4	98.4						
Common impala	12	33.9						
kudu	45	92.5	98	125.5	31	75.7	27	145.7
oryx	158	73.1	143	95.8	116	100.4	90	94.2
springbok	21	17.4						
warthog	17	27.9						
Hartebeest			17	65.4			21	72.7

Note: Individual farmers did not utilize all species, thus values are reported only for certain species. 2 farms are represented in the Otjiwarongo area sample.
Source: Based on report-backs by these farmers to the Permit Office, 2002.

3.3.5 Night culling

During 2001 one night culling team harvested 1813 springbok out of an allocated quota of 2100 animals, involving seven farms. The other registered night culling team was inactive due to logistical problems. The springbok weighed an average of 18.4 kg (n=1162) with the range of average weights between farms being 18.0-18.9 kg. Similarly, the average weight for 5242 night-culled springbok in 34 different operations from 1976-1990, was 18.6 kg, with a range of 15.97 to 22 kg. An average

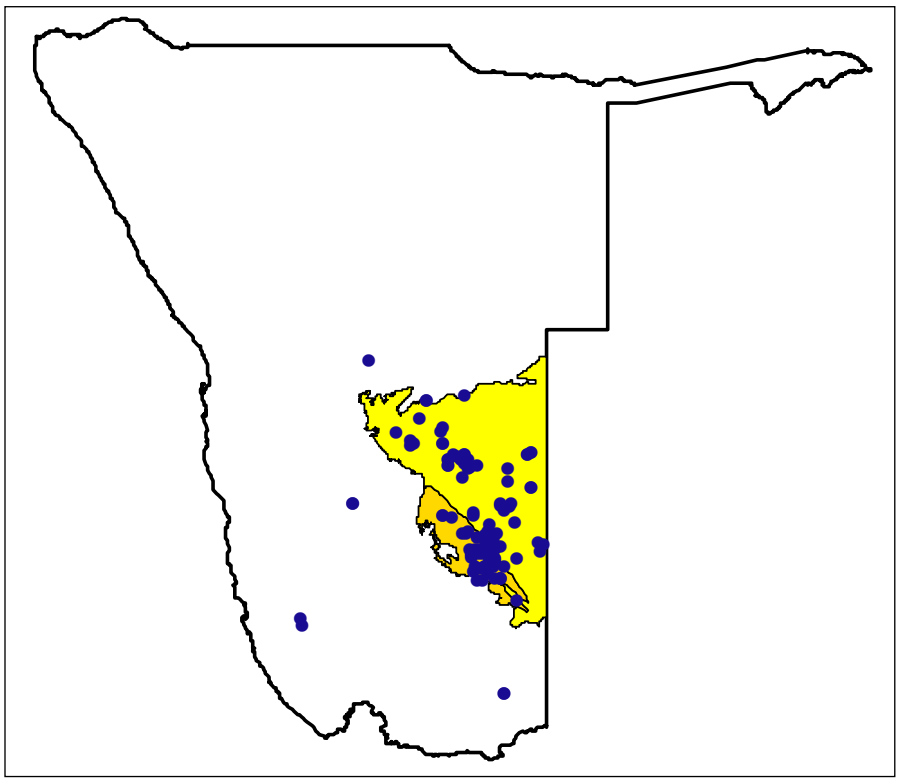


Figure 3.1: Localities (blue dots) of where larger groups of springbok (500+) occur and farmers have applied successfully to night cull.

Note: Indicated are the southern Kalahari sand landscape (yellow/larger area) and the Weissrand Plateau (light brown).

Source: Based on Permit Office raw data, 2003; and Namibian Atlas Project (2002).

of above 20 kg carcass weight for a culling operation was, however, only obtained with less than 50 springbok involved and thus a selection for heavier animals having taken place.

Thirty permits for a total of 8 800 springbok to be night culled were issued during 2001. In 2002 68 permits were issued for 19 904 springbok to be night culled, with farmers wanting to cull on average 293 animals, or 34% of their respective populations.

3.3.6 Production of harvestable game per unit area

In order to get an idea of sustainable harvests the following summarised data are represented. These figures should be considered to be the minimum harvests, as they are based on only the larger off-takes, i.e. night culling and live capture. Shooting for own use or trophy hunting is not included. Data are for farms, which are used predominantly for livestock production, with game farming being a secondary activity.

Springbok – Eleven farms were included in this analysis stretching over an average time span of 20 years per farm. Farms are situated in south-eastern Namibia with an average size of 12 340 ha. Average springbok density was 66 animals per 1000 ha and on average 6.5 (range 4.1 – 9.6) springbok were harvested per year per 1000 ha or 10.3% (range 5.6 – 16.6%) of the average population size. On five of these farms with recent complete game/livestock counts, springbok contributed on average 27.8% of the LSU. In each case there was also livestock on the farms in addition to the game.

Hartmann's zebra – Twelve farms from the Khomas Hochland area, situated west of Windhoek, were included in this analysis. Farms have an average size of 15 037 ha and on average the analysis covered a time span of 16 years per farm. The average density for the Hartmann's zebra was 16.1 (range 4.8 – 31.6) per 1000 ha, with 0.7 zebra (range 0.1 – 2.1) being used per year per 1000 ha, or 4.4% of the average population.

3.3.7 Other wildlife products -Skins and horns

Skins and horns are bought from farmers by dealers serving certain regions within the country. During 2001 at least 18 such dealers were active. These dealers then sell their accumulated skins to the big exporters in Windhoek. The operation for one particular dealer is summarised in Table 3.9. This dealer bought 1102 kudu skins in 458 separate transactions directly from farmers. His operation is considered typical for this kind of enterprise.

Table 3.9: Skins bought by one dealer in the Gobabis district (Dealer register summary 1 April 2001 to 31 March 2002) at farm level

Species	Sum	Average	transactions
Blesbok	1	1	1
Hartebeest	4	4	1
Kudu	1102	2.4	458
Oryx	212	2.7	80
Springbok	327	4.2	77

Source: Based on dealer report-back to Permit Office, 2002.

There is a market for skins from kudu, oryx and springbok, as well as well skins from zebra and carnivores. Kudu skins are primarily exported to Greece for the production of horse riding boots. Oryx skins are used for the manufacture of protective clothing

at blast furnaces in Hong Kong and also used as decoration on furniture. 20-25% of springbok skins are used for decorative purposes. Average prices obtained at farm level are reported to be about N$ 60 per kudu skin, N$ 24 per oryx skin and N$ 15-20 per prime springbok skin. Second-grade springbok skins fetch N$ 10-15 and 3rd grade skins N$ 1. Eland skins are sold as dry skins for leather production at about N$ 95 each. About 300-400 jackal skins enter the fur trade at N$ 7-15 apiece. In addition, about 150 caracal and 70 genet skins are sold (Snyman, 2002).

Table 3.10: Skins traded at national level based on data for 2001, between farmer and skin dealer.

Skins	Springbok	26 856
	Kudu	19 518
	Oryx	10 060
	Blesbok	239
	Hartebeest	1 346
	Blue wildebeest	192
	Eland	454
	Hartmann's zebra	485
	Burchell's zebra	138
	Caracal	88
	Jackal	348
	Ostrich	155
	Genet	12
	African wildcat	111
	Leopard	18
	Cheetah	48
	Lion	9
	Warthog	4
Horns (pairs of)	Eland	12
	Springbok	7 225
	Kudu	6 774
	Hartebeest	11
	Oryx	2 119
	Warthog tusks (kg)	1 307

Source: Based on report-backs from dealers to Permit Office, 2002.

Between 6000 and 8000 pairs of kudu horns are sold annually, mainly to Israel for musical horns and to Hong Kong. Similarly 2100 pairs of Oryx horns are sold, as well

as 7250 springbok horns (Table 3.10). Each month about a ton of various horns is sold to the bone meal factory at Gobabis for the production of hoof meal. In 2002 a tanned Hartmann's zebra skin was retailing for N$ 3 700 in Windhoek (based on 4 different transactions and six skins), while at farm level it was sold for N$ 1 200.

The so-called skin dealers buy skins at the individual farms and act as middlemen between the farmer and the larger skin dealers/exporters in town. Transactions for a particular dealer, considered typical, are summarised in Table 3.9. These individual skin dealers typically serve a region within the country, trying to optimize the travelling costs versus the skins they buy.

3.4 ECONOMIC OUTPUT

The economic output for the wildlife industry is summarised in Table 3.11, with an estimate of what individual activities contribute at national level, how much is earned

Table 3.11: Approximate contributions by the various sub-sectors to the national economy during 2001.

Sub-sector	N$ in millions	% foreign exchange	Animals involved
Trophy hunting	117.7	100	17 700
Live capture	21.9	50	12 389
"Shoot & sell" venison	8.4		16 930
Trophy animal venison	8.6	25	n/a
Biltong hunting	9.4	60	13 400
Skins & Horns	3.0	80	n/a
Night culling	0.3	80	1 813
Total	**169.3**		**62 232**

Note: Amounts reflect income at farm level only, data for 2001. For explanation see Appendix 4.
Source: Based on data summarised from the Permit Office (see Appendix 4).

in foreign exchange and the approximate number of animals involved. As mentioned before, some figures are based on accurate data from report backs, as in the case of trophy hunting, while the figure for own use is based on extrapolated questionnaire data.

In these calculations only direct outputs of the wildlife industry were used. The trophy industry is probably indirectly responsible for a considerable amount of income from non-consumptive tourism, i.e. hunters that visit game parks while in the country before or after hunting.

3.5 ANALYSIS

In general it was difficult to extract reliable data for the different segments of the wildlife industry. For instance, venison sales directly to retail butcheries are very difficult to extract from the individual registers, with more than 250 farmers selling to 280 butcheries. The hand written registers are simply not set up in a way that can deal efficiently with large numbers. Biltong hunting is another segment that is very poorly monitored and little is known about its financial and economic contributions.

3.5.1 Trophy hunting

Trophy hunting started in Namibia in 1959 and the industry's early history is described by Joubert (1983 et al). In 1980 the gross contribution earned at the farm level from trophy hunting was N$ 4.4 million; this amount increased steadily to N$ 118 million 20 years later, representing 18% growth per annum in nominal terms. Inflation averaged 11.5% over this period (Bank of Namibia, various reports). The

income generated from the sale of trophies and accommodation of hunting clients generates approximately 75% of the direct wildlife industry income.

The duration of the average hunt was estimated to be a minimum of 4.7 days, based on the first and last day of a successful hunt. By comparison NAPHA estimates that

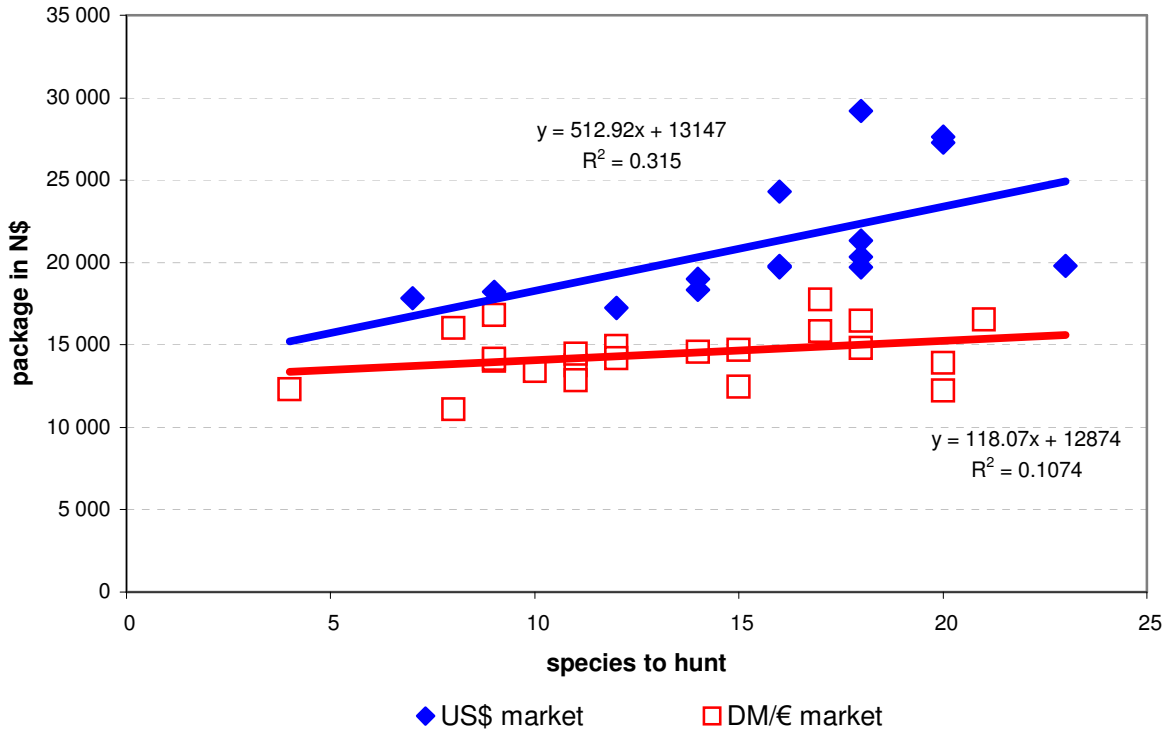


Figure 3.2: The relationship between the price for a hunting package and the number of species present on the particular farm.

Source: Based on own analysis of web-based price lists, 2002.

the average trophy hunter stays for seven days on a farm (Halenke 2002) and Buss (2002) estimates the duration of a hunt to be 7.1 days (based on personal interviews with seven hunting operations in the Okahandja area). The duration of the hunt is not significantly related to the number of animals shot. Advertised hunts denoted in euro seem to be discerning with regard to the number of species on the property that could be hunted, whereas American hunters seem willing to pay more to hunt on a

farm with a wider variety of species (Figure 3.2). It is, however, difficult to determine whether the higher species diversity is the primary factor or whether species diversity is also related to for how long a game farm is already in operation and its success as a commercial service provider. The issue of whether game farmers are selling a commodity (a trophy differentiated by price) or an experience – the hunt (where quality of experience differentiates and determines price) - will be addressed in the next chapter.

3.5.2 Live game sales

The live game industry in Namibia, as in South Africa, has shown good growth. One auction was held in 2000, while five were held in 2002 with 3122 animals being sold. Similarly, in South Africa, 8292 animals were sold at nine auctions for R 9 million in 1991, while in 2000, 17702 animals were sold for R 62.9 million at 48 auctions (Chardonnet et al., 2002).

3.5.3 Venison production and night culling

Night culling is very dependent on a series of good rainfall years (as can be seen in Figure 3.3), during which time populations increased rapidly and can be harvested at a rate sufficiently high to justify night culling. In order to satisfy health and veterinary regulations a large 20 ton cool truck needs to be filled with 500 springbok carcasses during a maximum of two nights, before the truck departs for delivery to South Africa (Joubert *et al.,* 1983). Equally important is a suitable terrain - sandy and open vegetation - on the farm in order to be able to drive off-road without too much difficulty and the terrain must be relatively open to facilitate spotting the prey and

shooting of the animals. These requirements exclude a large number of farms from profitable night culling (see Figure 3.1). It is also clear from the data that there is a large potential surplus of animals that are not utilised because of limited markets for venison produced on a seasonal basis, and fluctuating quantities. In 2001, for example, only 21% of the springbok for which permits had been issued were utilised and similarly only 23% of the permit holders actually had night culling take place on their land as planned.

In 1981 farmers earned an average of N$ 1.90/kg for springbok and N$ 1.40/kg for oryx and kudu from night culled animals (Maier, 1985). By 1994 the price for springbok had increased to N$ 6.20 / kg or N$115 per animal and the exporter could expect to make a profit of N$ 8.55 per springbok exported to Europe (LIFE Programme, 1994).

Venison production from trophy animals and small scale “shoot & sell” produces only approximately 10% of the meat produced by a well run beef operation in the Okahandja area, where farmers manage to produce 7-8kg of beef per ha (Coetzee, 1999). Nevertheless, the conservancies could potentially produce 3500 t of venison, worth N$ 44 at farm level, from 47 250 animals utilized for their meat. These 47 250 animals equal 15% of the approximate stock of kudu, oryx, hartebeest, springbok and warthog. It is clear that at present the extent of the venison market is severely underestimated, because the market is diffuse and probably also because of deliberate underreporting by the producer of what is actually sold.

3.5.4 Production of harvestable game per unit area

In the same way that the number of live animals was extrapolated based on the 1997 questionnaire data, the number of animals reported utilised during a year was extrapolated in Table 3.12.

By comparison with Table 3.12, 1254 springbok, 1584 kudu, 2339 oryx and 1156 hartebeest were reported trophy hunted during the year, as determined from the individual report-backs by the professional hunters (see Table 3.1). These figures might indicate that the extrapolated figures are too high, if populations sizes are just adjusted for the percentage of area covered by the returns.

Table 3.12: Summary of utilization figures for game as determined by the 1997 questionnaire and the extrapolated data

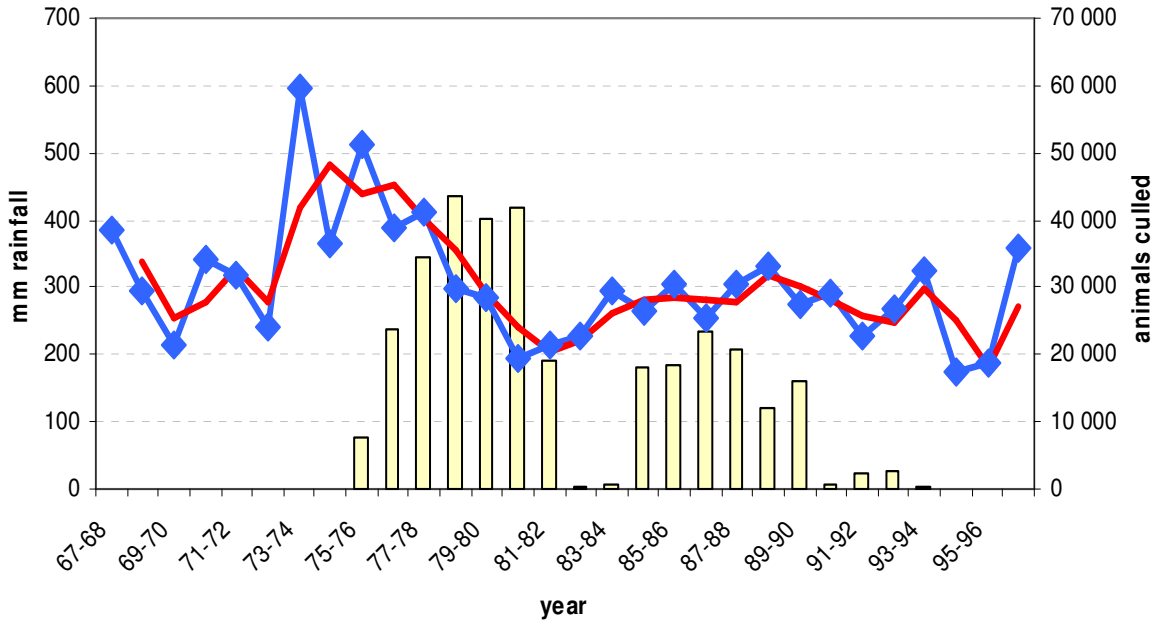
Original totals	Own use/ rations	Gifts/ Donations	Shoot & Sell	Night culling	Trophy hunted	Live capture	Biltong hunting	Total
Springbok	3324	1034	1749	733	748	294	1421	9303
Kudu	3701	443	710	0	865	8	724	6451
Oryx	3124	464	1063	3	1312	631	644	7241
Hartebeest	446	39	121	0	654	345	3	1608
Extrapolated totals								
Springbok	14 452	4 496	7 604	3 187	3 252	1 278	6 178	40 448
Kudu	16 091	1 926	3 087	0	3 761	35	3 148	28 048
Oryx	13 583	2 017	4 622	13	5 704	2 743	2 800	31 483
Hartebeest	1 939	170	526	0	2 843	1 500	13	6 991

Source: Based on the 1997 questionnaire raw data, 2002.

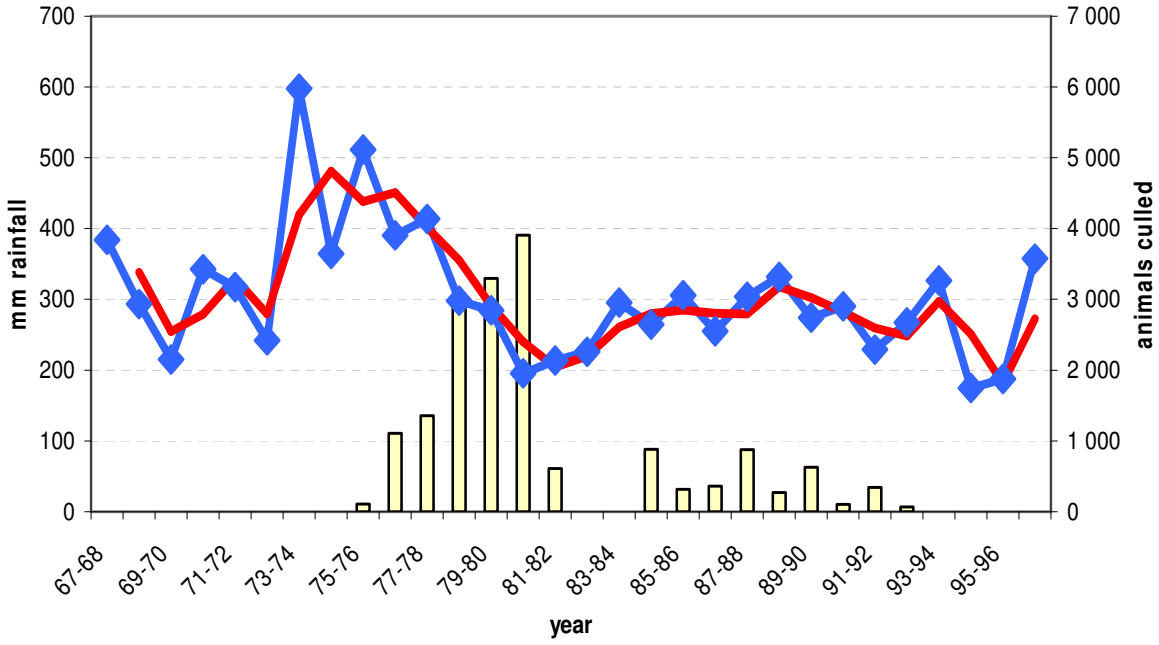
Table 3.13: Reported average utilization levels for game in northern and southern Namibia based on the 1997 questionnaire data.

	% use of population		**use per 1000 ha**	
	North	South	North	South
Kudu	8%	12%	1.03	0.18
Oryx	11%	11%	1.15	0.20
Hartebeest	6%	4%	0.21	0.02
Springbok	4%	16%	0.28	1.75

Note: Utilization figures are applicable for the year 1997.



Springbok



Oryx

Figure 3.3: Animals night culled between 1977 and 1995

Notes: The rainfall is indicated in blue and a two-year running average in red. The bars indicate the number of animals culled per year.
Source: Ministry annual reports; average rainfall data from 1997 Questionnaire survey; Joubert et al., 1984.

Table 3.13 indicates the percentage of animals that were utilized on average in southern versus northern Namibia per farm in 1997. While 5 to 10 times more kudu, oryx or hartebeest were utilized in northern Namibia per unit area, significantly more springbok, both in terms of percentage of population and per unit area, were harvested in southern Namibia. These figures reflect the habitat suitability for these species across their distribution range. Southern Namibia is the favoured springbok habitat, coupled with the near extermination of predators that could be a threat to sheep or springbok. Most parts of northern Namibia are too bush encroached to be good springbok habitat and here the density of springbok in the 14-28 ha carrying capacity category is then only 5.9 springbok per 1000 ha compared to 22.6 springbok in central or southern Namibia (based on the 1997 questionnaire data).

3.6 CONCLUSION

The N$ 120 million earned from trophy hunting compares favourably to the output at farm level of N$ 449.4 million from the cattle industry or N$ 291.6 million from sheep and goats (Ministry of Agriculture, Water and Rural Development, 2001). While the output of the cattle industry was 17.5 times bigger than the trophy hunting output in 1993, this figure has decreased to 3.7 times in 2000 (see Figure 3.4).

The wildlife industry grew from an estimated N$ 25.3 million contribution in 1993 to N$ 154 million in 2000, representing real growth of 20.7% per annum. The industry, which is largely dependent on the trophy hunting sector, with inputs in Namibian dollar and hard currency denominated earnings in US$ or euro, was favoured by the average annual depreciation of the local currency against these foreign currencies of 11.6% between 1993 and 2000. The figures in Table 3.1 and Table 3.2 for the

number of animals hunted and the number of hunting clients coming to Namibia show similar increases over the last couple of years.

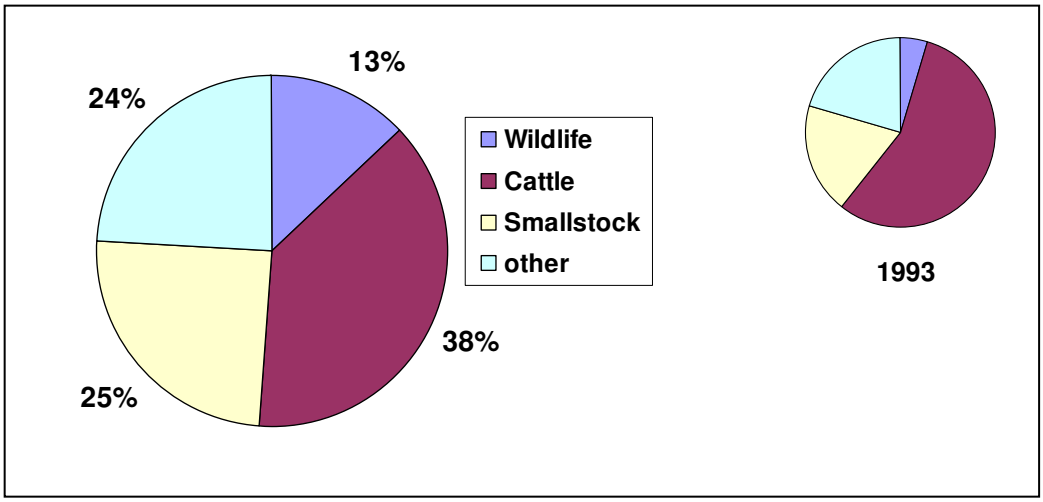


Figure 3.4: The contribution of the wildlife industry compared to the commercial livestock sector in 2000 and 1993.
Source: Based on data in this chapter and the 1993 Ministry annual report.

CHAPTER 4

FINANCIAL MODELLING AND ECONOMIC CONSIDERATIONS

4.1 INTRODUCTION

Having provided an overview of the resource availability in Chapter 2 and a quantification of the outputs of the wildlife industry in Chapter 3, this information can now be used as building blocks in the formulation of financial and economic modelling. Game farming today has evolved into a business for many land-owners and thus requires sound financial management just like any other business. Equally important are economic considerations for the decision maker in the public service when formulating policy with regard to this important and growing industry. The scope of this report clearly limits the investigation to exploratory modelling and does not aim to present detailed or comprehensive models, especially regarding input costs.

In this chapter the factors of production (natural resources, labour, capital and entrepreneurship) are brought together with production costs and outputs. The issue of land value is examined, having recognised that the farm price in fact represents a combination of land value, the game and the infrastructure on the farm (see Table 4.7). Land value, in relation to the environmental risks a farming operation is exposed to, is examined.

Recognizing the traditional approach to valuing biological resources according to direct values, which again includes consumptive and productive use values, versus

indirect values, comprised of non-consumptive use value, option value and existence value, Chardonnent *et al.* (2002) propose a pragmatic approach in classifying these values. According to these authors financial profitability, economic yield and environmental sustainability are often dominant values for high-level decision makers, as well as for grassroots-level individuals dealing directly with the wildlife. They propose the following classification:

- The economic importance of wildlife
- The nutritional value of wildlife
- The ecological role of wildlife
- The socio-cultural significance of wildlife.

While these four value categories are considered positive, wildlife can also be associated with negative values. It is furthermore recognized by these authors that while the current value of the wildlife is important in itself, the greatest value of biodiversity may lie in opportunities this diversity offers to humankind to adapt to global change.

This chapter only deals with the economic value of the wildlife and more specifically only the consumptive use portion. The entire range of wildlife activities produces revenues and brings added value, which contributes to the gross national product (GNP). This added value at national level is considered to be the wildlife GNP, which may be compared to, for example, the agricultural GNP (Chardonnet *et al.,* 2002). The respective shares of the official and informal sectors within the wildlife GNP can vary considerably. In the Côte d'Ivoire, for example, the informal sector reaches 99.5% of the wildlife GNP, while in Zimbabwe the official sector contributes 94.7% of

the estimated GNP (Chardonnet *et al.,* 2002). As noted by Ashley and Barnes (2002), estimating the economic value of the different wildlife uses is like putting together a jigsaw, where some pieces might be missing or roughly hewn. It is nevertheless the intention to give a fair estimate of the different economic values, especially of the official sector, and provide a basis for further work.

4.2 METHOD OF ANALYSIS

Prices for farmland have been obtained from the Namibian Atlas Project (2002) database (see Figure 4.1), that summarizes data pertaining to farm sale transactions between 1990 and 2000. The following outliers were excluded by the authors: farms smaller than 1000 ha; where the total price exceeded N$ 10 million; where the price/ha was less than 5 N$ (23 records); and where the price/ha exceeded 1000 N$ (11 records). 1045 records remained with complete data.

Prices for farmland are part of the aggregate farm price, which includes the value of the improvements on the land, as well as game and any livestock. Similarly, the farm price is expressed in N$/ha and not in N$ per unit area required to sustain a LSU. In order to try to derive a land price, farm prices for three different size categories and the five carrying capacity categories were averaged and, through a linear regression, the “fixed cost” of the house on the farm was determined, as opposed to the “variable price” for the land value together with fences and game (Figure 4.3).

A risk assessment pertaining to farming activities from the Namibian Atlas Project (2002) is shown in Figure 4.2.

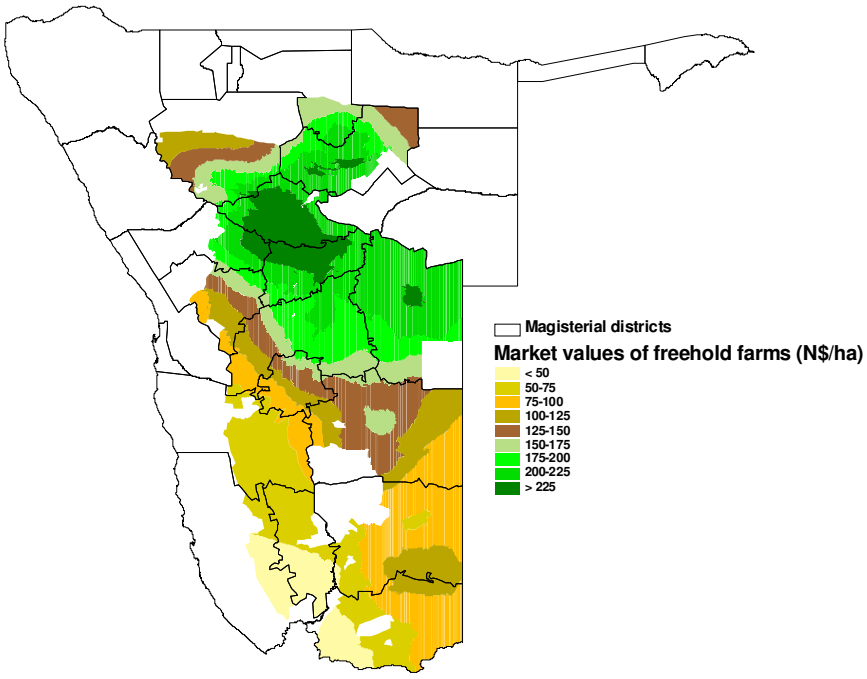


Figure 4.1: The prices obtained for commercial farmland.
Source: Based on data from the National Atlas Project (2002).

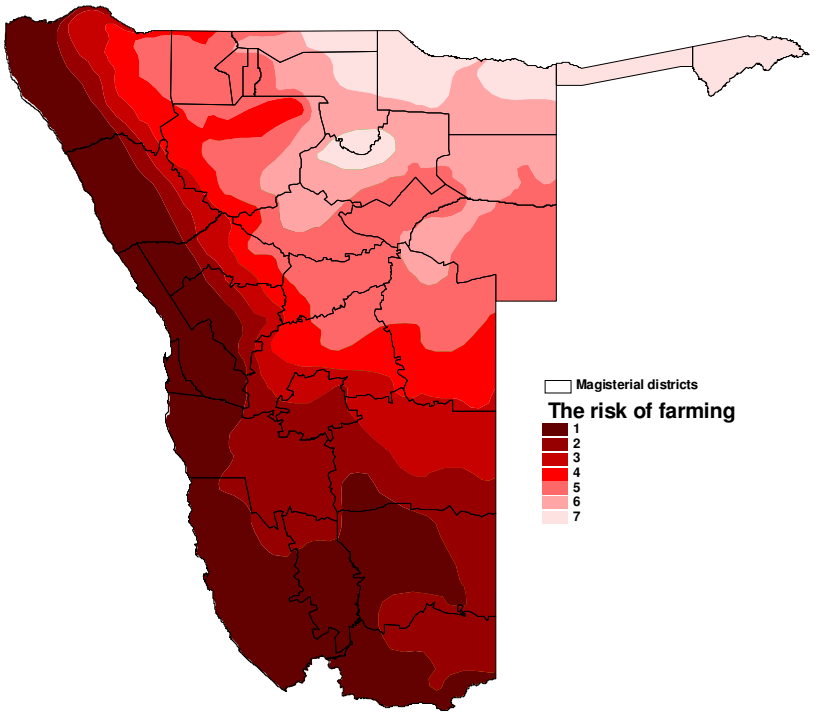


Figure 4.2: The risk of farming in different regions of Namibia.
Note: The risk estimation of farming in Namibia in different areas is based on a synthesis of information on average rainfall, variation in rainfall, average plant production and variation in plant production. Category 1 equals high risk and category 7 low risk.
Source: Based on data from the Namibian Atlas Project (2002).

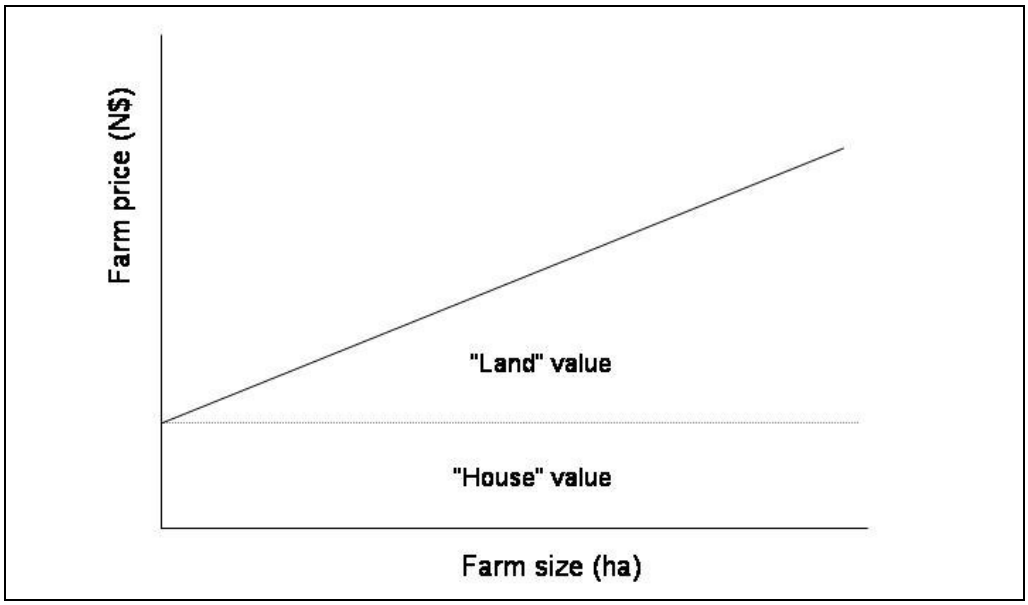


Figure 4.3: Schematic representation of splitting the farm price into a fixed (house) price and variable (land, game and dispersed infra-structure) price component.
Source: Own concept

A spreadsheet based model was developed in order to explore cash flow implications of different management options, as well as different game farm settings and associated variations in size and differences in species assemblages.

The model is schematically depicted in Figure 4.4. The farm component allows the user to specify farm size as well as carrying capacity. Equally the price for the land, game and buildings is determined. Labour costs as well as running costs can be input. Values are adjusted on a yearly basis through a specified inflation rate figure.

The environment component aims to represent annual fluctuations in the carrying capacity of the land as influenced by the rainfall. The game population grow faster when the current stocking rate is low in comparison to the carrying capacity, and vice versa. The range between which the growth rates fluctuate can be set. Rainfall

fluctuates randomly between set limits to display the observed rainfall variability in the real world.

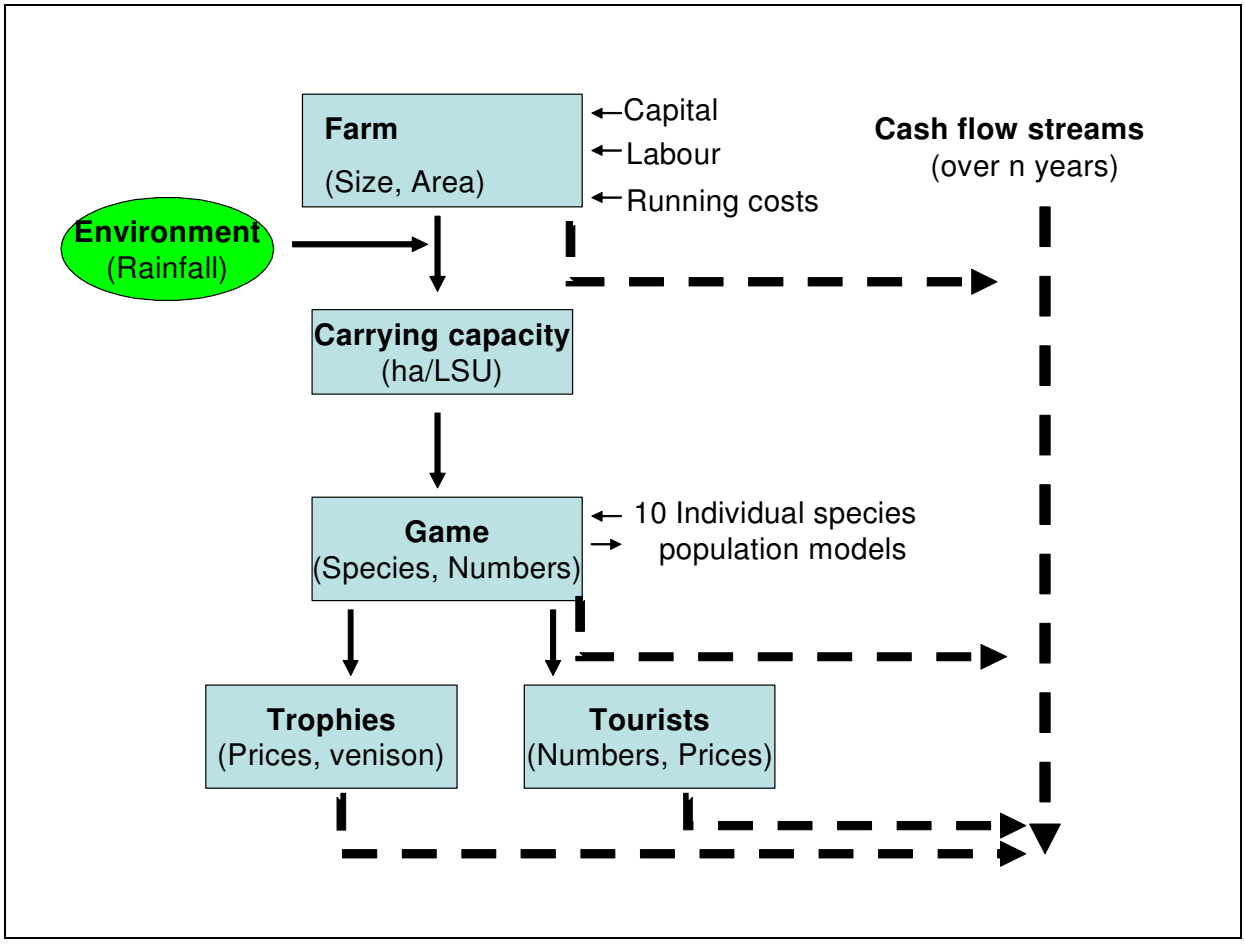


Figure 4.4: Schematic representation of the spreadsheet based cash flow model
Source: Own concept.

Ten species of game were selected and a population model constructed for each. The models allow initial population sizes to be selected as well as the year in which the population will be established. Trophy and live capture harvesting rates can be set. Prices as well as costs are input for each species based on values determined

in earlier chapters. Similarly, the stocking rates are based on data presented earlier. Cash flows are determined for each species on an annual basis.

The trophy hunting and tourist components allow for the setting of expected trophy hunting packages sold, as well as for the number of tourists that should visit the farm. Again, cash flows are determined for the different components.

The Net Present Value (NPV) of the investment, as well as the Internal Rate of Return (IRR), is determined over a specified number of years. Provision has been made for selling the enterprise at the end of the investment period.

All calculations are based on setting the enterprise up and exclude for simplicity, any detailed cost analysis or interest payments as well as tax payments. Provision has been made for the depreciation of the local currency against foreign currency in which output prices (trophies, daily tariffs and accommodation) are quoted.

Input values used in the model are based on Chapters 2 and 3, and more general values such as a figure for wages or maintenance expenses are based on data from the ABSA (2002) study.

4.3 RESULTS AND FINDINGS

4.3.1 The price of farmland

Prices for farmland are based on 1138 transactions recorded between 1991 and 2000 and presented in the Namibian Atlas Project (2002) in database format. These data are summarized in Table 4.1 according to the carrying capacity categories (Sweet, 1998) of these farms.

Table 4.1: Prices obtained for farmland in Namibia in 1991-2000.

CC category (ha / LSU)	Average price (N$/ha)[1]	Farms sold (1991-2000)
> 55	51.20	73
28 - 55	67.09	127
14 - 28	124.54	462
9 - 14	186.38	237
7 - 9	187.36	239
Total		**1138**

Note: 1. Prices have been adjusted to the year 2000 based on the CPI.
Source: Based on raw data from the Namibian Atlas Project, 2002.

In Table 4.2 the raw data have been transformed into a price per unit area required to sustain a LSU. For this purpose the mid-point in the range of ha per LSU required was multiplied by the price per ha. For the first category (> 55) the price per ha was multiplied by 55 ha. Farms were furthermore grouped into three total carrying capacity classes following the ABSA (2002) study for comparative purposes.

Table 4.2: Prices (N$) per unit land required to sustain one LSU at economic carrying capacity across the five carrying capacity categories and for units with different total LSU carrying capacities.

CC category	<250 LSU's	n[1]	250 – 500 LSU's	n	500 – 1000 LSU's	n
1	3 185	55	1 647	15	2 374	2
2	3 180	93	1 273	23	1 047	1
3	3 104	262	1 988	130	1 493	24
4	2 998	46	1 963	124	1 341	45
5	2 251	12	1 819	80	1 271	123

Note: 1. Refers to number of transactions recorded
Source: Based on raw data from the Namibian Atlas Project, 2002.

Prices given in Table 4.3 represent land, game and dispersed infra-structure value per unit area required to sustain a LSU. Excluding carrying capacity categories 1 and 3 an increase in the price is observed. The higher prices observed in carrying

capacity categories 1 and 3 could possibly be the result of higher prices paid for farms with higher tourism potential or already well developed game farms.

Table 4.3: Calculated break-down of farm prices into a fixed value (house) and variable value (land) and the value of the land required to sustain a LSU

C.C. category	Fixed value (N$)	Variable value (N$/ha)	N$/LSU requirement
1	206 581	15.5	850.0[1]
2	274 500	13.5	552.6
3	322 330	44.6	936.1
4	471 778	52.7	580.0
5	320 082	103.6	828.7

Note: 1. Based on the values of <250 and 250 – 500 LSU per farm only. In this category there are only two transactions for the large farm category
Source: Own calculations as described in this chapter.

4.3.2 The simple revenue model

In order to develop an understanding of the profitability of keeping different species compositions on a game farm, a simple calculation was made based on the price for which an average population of a particular species could be established, the percentage of trophy animals that could be hunted, as well as surplus produced to harvested as live game or as venison. Trophy prices and venison prices are based on the preceding chapters (also see Appendix 2). The basic recruitment rates used represent rates considered optimum for a particular species and were adjusted by the model based on the stocking rates in relation to carrying capacity.

Results for this analysis are summarized in Table 4.4.

Table 4.4: Summary of game LSU equivalents, auction prices, return on capital invested and income potential per LSU not considering discounting of cash flows

	Animals / LSU	Auction price	Gross revenue return on capital	Gross revenue / LSU/ year
Kudu	1.85	1 600	49.5%	879
Sable	1.67	80 000	22.9%	18 337
Springbok	6.67	1 000	36.9%	1 475
White rhino	0.36	150 000	14.5%	4 703
Roan	1.56	120 000	21.1%	23 728
Blue wildebeest	2.00	2 200	45.8%	1 210
Hartebeest	2.70	2 000	30.4%	986
Oryx	1.79	1 900	53.1%	1 083
Eland	0.93	4 600	35.4%	910
Cattle	1.10	4 000	31.2%	824
Waterbuck	2.00	8 000	31.6%	3 030

Source: Animals/LSU values based on ABSA (2002).

4.3.3 The cash flow model – interpretation of results

The model was set up for a 10 000 ha farm typical of northern Namibia with a carrying capacity of 12 ha/LSU. The farm price was stipulated to be N$ 335/ha, made up as follows: actual land N$ 80/ha, game N$155/ha and the house/lodge N$ 100/ha. Capital items (vehicles) were taken as N$ 500 000, initially and a third of this amount in replacement costs every fourth year. Variable costs included wages at N$ 250 000 per annum and other costs at N$ 36 450. Fixed costs, for example advertising, were set at N$ 50 000 per year. Game stock figures are presented in Table 4.5, with “game density required” referring to the density of animals/1000ha the model will work towards. “Year starting population” refers to the year in which the population was established with the “initial population”.

Table 4.5: Summary of game figures used in the cash flow model

	Kudu	Sable	Springbok	White rhino	Roan	Blue wildebeest	Hartebeest	Oryx	Eland	Waterbuck
Game density required	25	10	50	1.5	10	20	25	30	20	10
Year starting population	0	1	0	0	2	1	0	0	1	1
Initial population	200	20	400	6	20	50	250	300	50	20
Optimum growth rate (%)	18.0	20.0	35.0	7.5	22.0	20.0	20.0	20.0	20.0	20.0
% trophy animals	5.0	2.0	7.5	1.0	2.0	5.0	5.0	10.0	7.5	7.0
Group size required for live capture	10	5	50	2	5	10	10	20	10	5

Source: Optimum growth rates based on ABSA (2002), other figures based on own experience.

Table 4.6 shows the financial values used in the model. The cash flow streams for the individual animals consider the buying price of the animals, trophy prices and live sales but not daily trophy hunting fees and income generated from venison sales. As will be shown later, venison sales made a relatively low contribution towards income and should thus not have a marked effect on the calculated NPVs or IRRs. Daily trophy hunting fees were not calculated per animal as they are inter-related, depending on the availability of packages of different species.

Cash flows were simulated over 30 years. Unless otherwise stated, the inflation rate was set at 10% and the cost of capital at 17%.

Tourist fees were varied between N$ 350 (country average; see Chapter 3) to N$ 750, depending on the availability of the big/rarer species. Without roan or sable a tariff of N$ 350 was taken and 100 tourist bed nights per year were assumed. With

a minimum of either 20 sable or roan antelope the tariff was increased to N$ 500 and with at least 5 white rhino present to N$ 750. Similarly tourist bed nights increased to 350 and 450 per year with the two categories of big game present respectively. The bed nights would translate into an occupancy rate of 4.6 and 20.5% with an availability of six beds in three chalets for the game viewing tourists.

Table 4.6: Financial data used for game and results obtained

	Kudu	Sable	Springbok	White rhino	Roan	Blue wildebeest	Hartebeest	Oryx	Eland	Waterbuck
Trophy price (N$ '000's)	5.5	50	2.5	300	50	6.5	3.5	3.5	9.5	12
Auction price/animal (N$ '000's)	1.6	75.0	1.2	120.0	92.0	2.4	2.2	1.9	4.6	8.8
Live selling price (N$ '000's)	0.8	65.0	0.6	100.0	80.0	1.2	1.1	0.9	2.8	6.0
Net Present Value (N$ million)	0.322	-0.372	0.629	-0.349	-0.331	0.080	0.186	0.464	0.120	0.017
Internal Rate of Return	28.3%	10.3%	34.3%	8.3%	10.7%	16.4%	19.3%	29.4%	16.1%	12.8%

Source: Prices based on data in previous chapters.

Trophy hunting daily fees were based on two packages, viz.

- a package including one big game species and four plains animals hunted over a period of seven days; and
- a five day hunt for five animals of plains game.

The fee for the first package was set at N$ 4000 and that for the second at N$ 1500, with non-hunters within the group paying N$ 2000 and N$ 700 respectively. It was assumed that non-hunters would constitute 50% of the hunters. The percentage of packages actually sold could be varied, as could be the amount of venison sold from the trophy animals.

Each scenario was repeated for 20 runs, to evaluate the effect of the simulated rainfall and its effect on carrying capacity.

In the typical scenario the income generated from the sale of game contributed 56% of all income on average per year; daily fees and game viewing tourists 19% and 22.5% respectively; and the sale of venison 2%, while the overall NPV was N$ 0.594 million with an IRR of 17.8%. If no provision was made for tourism the IRR dropped to 15.7%. If big game (sable, roan and white rhino) were excluded, the IRR increased slightly to 18.4%. If the no big game option was further explored by allowing more common species earlier on to make up for the extra available grazing, the IRR remained at 18.4%, while allowing the common species to naturally reach higher densities later showed no difference with the IRR remaining at 18.4%. Only selling trophies to other professional hunters at the trophy fee, and not leading the clients oneself, had a similar effect to not having any tourists by lowering the IRR to 16.2%. Increasing the value of the lodge from the initial value of N$ 1 million to N$ 4 million lowered the IRR again by about 2.5 percentage points to 15.5% in a linear relationship between value used and calculated return. Decreasing the stocking rate from 12 ha/LSU to 15 or 18 ha/LSU reduced profitability to 16.8 % and 15.8% respectively. Calculations showed that cash flows became positive after year

3 and initial requirement was N$ 6.272 million of which N$ 3.345 million was required to purchase the farm.

The local currency was set to depreciate at 10% per annum against foreign currencies. With no depreciation, profitability would fall significantly to 12.7%, a decline of five percentage points.

4.4 ANALYSIS

4.4.1 The price of farmland

Interesting is the fairly similar land prices calculated, if the price is expressed in N$ per area required to sustain a LSU on an economic basis (see Table 4.2), across the different carrying capacity categories. This price similarity indicates that the land price is closely linked to its value in producing livestock.

Table 4.7: Distribution of average asset values on typical game ranches in South Africa.

	Ecological region				
	Grassland	Lowveld	Bushveld	Kalahari	Karoo
Land and fencing %	53 - 31	88 - 71	60 - 47	56 - 36	54 - 41
Game stock %	28 - 45	7 - 23	33 - 43	30 - 42	29 - 31
Other assets %	19 - 24	4 - 6	7 - 10	13 - 22	17 - 28
Total assets (R million)	2.6 - 19.3	18.4 - 97.3	9.2 - 51.3	3.9 - 20.8	3.0 - 16.4

Note: Indicated are values representative for the range of a small (150 LSU) to a large (1000 LSU) farm.
Source: ABSA (2002)

There appears to be a weak relationship between the land price expressed in this way and the associated risks of farming in the drier parts of Namibia with a much greater variability in rainfall on a yearly basis. As the farm price data do not indicate the contribution of the individual components (land, infrastructure, game), it is difficult to analyse the price data in more detail. The data for South Africa show much bigger price fluctuations, if expressed in Rand per land required per LSU, depending on its eco-tourism potential (see Table 4.8). These prices compared to those for Namibia in Table 4.3, are five-to six fold higher for the Grasslands, Kalahari and Karoo areas.

Table 4.8: The land only price per ha, the carrying capacities and the price per unit area required to sustain a LSU

	Grasslands	Lowveld	Bushveld	Kalahari	Karoo
R/ha	952.2	3867.3	1074.5	147.5	74.1
ha/LSU	5.7	17.1	21.4	42.8	78.5
R/area required per LSU	5 427	66 131	22 995	6 313	5 817

Source: Based on data from ABSA (2002).

4.4.2 The simple revenue model

This model indicates a relatively high return on the investment made on the more common antelope versus the rarer species such as roan and sable. Similarly, if the revenue is expressed per livestock unit, the income generated by the rarer species is predicted to be much higher per LSU or per unit area of land available. This model is clearly an oversimplification, as it does not make provision for the potentially higher income stream if some of the more attractive rare species are present, allowing for higher tourism and hunting fees. As already shown in Chapter three, in Figure 3.2, there appears to be weak relationship between the prices quoted for a hunting

package and the number of species that can be hunted. The DM / € prices show no increase as species diversity increases, but the US$ denominated prices do.

4.4.3 The cash flow model

A model is by definition always a simplification of the real systems it tries to simulate. The challenge is therefore to include the aspects that really drive the system in a particular direction and to omit the detail that makes the model complex, but adds little value in trying to understand the broad workings of the real system. A component that was deemed to be important, but was nevertheless excluded as it is still poorly understood and would have added a lot more complexity, is one showing the relationship between rainfall, the vegetation response and the interaction of carrying capacity and stocking rate in relation to the previous two parameters. In view of the risk of vegetation degradation leading to bush encroachment and desertification this is an important factor with potentially severe financial implications.

Although the input parameters were kept simple, they are realistic. As an exploratory model, the crucial components can be identified for a particular situation and the applicable input parameters refined.

As with any export orientated business, the strong influence the depreciation of the local currency against that of the overseas currency has on profitability needs to be emphasized.

4.4.4 General price data trends

In Table 4.9 a comparison is made between a calculated utilization option price, based on the argument that a game farmer would require the equivalent browse (bush) that 48 goats would consume to produce one kudu trophy bull and that one could sell 30% of the goats for a certain amount; the so-called utilization option price. It is further based on the assumption that 16 kudu are required to produce this one trophy male. For oryx and hartebeest, being grazers, cattle equivalents are used. The data for 1983 were taken from Maier (1985) and the same assumptions were used for the 2000 comparison. From this comparison it is clear that trophy prices became much more favourable in 2000 especially for the two browsers, kudu and springbok, when compared to the calculated utilization option price.

Table 4.9 indicates furthermore that trophy prices increased by an average of between 18.5% and 21.7% for the four species between 1983 and 2000 in N$ terms and by 6.5% to 9.3% in US$ terms over the same time period. Between 1980 and 2000 the N$ depreciated by an average 10.4% per annum against the US$ and inflation in Namibia averaged 11.5% per annum (Bank of Namibia, various; Officer, 2002).

Table 4.9: Price comparison between a calculated utilization option price and the actual trophy price in 1983 and 2000

	1983		2000	
	trophy price[1]	Utilisation option price	trophy price[1]	Utilisation option price
Kudu	290	570	6 404	3528
Springbok	129	331	3 610	1617
Oryx	251	455	4 492	3180
Hartebeest	253	542	4 621	4770

Note: 1. Includes trophy fee and daily fee for one day
Source: Maier (1985); own calculations.

A comparison between game auction prices in Namibia and South Africa is made in Table 4.10. Interesting is the very low price quoted for springbok; yet Namibia exported in excess of 2500 live springbok in the year 2000. Thus, while auction prices give an indication of the value of live game, buyers are interested in certain strains or animals from a particular area and will pay accordingly higher prices.

Table 4.10: Comparison of Namibian and South African game auction prices, 2000.

	Namibian auction prices for 2000	South African auction prices for 2000
Kudu	1 600	2 100
Sable	68 000	53 500
Springbok	1 100	380
White rhino	165 000	180 000
Roan	120 000	86 400
Blue wildebeest	2 500	2 300
Hartebeest	2 300	2 960
Oryx	2 000	3 300
Eland	4 600	4 700
Waterbuck	8 000	4 800

Source: South African data from ABSA, 2002; Namibian data own data, 2002.

4.5 CONCLUSION

The price analysis for farmland sold in Namibia over the last decade seems to indicate that the land price is determined by the potential of the land, as indexed by its carrying capacity, to be used for livestock production. Little provision seems to be made for the higher risk associated with farming in the drier parts of Namibia with more erratic rainfall. In South Africa, by contrast, land in the Lowveld and Bushveld is significantly more expensive, based on its tourism potential, and is not priced purely according to its agricultural value.

The cash-flow model produced realistic values in terms of animals that could be utilized and expected profit when compared against published values. The depreciation of the N$ against the US$ and the Euro, currencies in which trophies and trophy hunting related services are priced, contributed significantly towards profitability. Trophy hunting was the dominant income generator in this model.

Calculation of the utilization option price as compared to the trophy price in both 1983 and 2000, clearly indicates that trophy hunting has become a more competitive land-use option then what it had been in 1983. In 1983 the trophy prices for the four species analysed were below the calculated utilization option prices, while in 2000 three of the four trophy prices were higher, by a factor of two, than the utilization option prices.

CHAPTER 5

POLICY AND LEGISLATIVE ISSUES IN RELATION TO THE WILDLIFE INDUSTRY

5.1 INTRODUCTION

Namibia is endowed with a substantial environmental wealth in the form of abundant wildlife, endemic species and a variety of different habitats. As pointed out by Ashley and Barnes (1996) there is growing evidence and realisation that this environmental wealth can make a substantial contribution to sustainable development in the country. These authors are furthermore of the opinion that wildlife on commercial farmland, which had already grown significantly over the past 20 years (as measured by its contribution to the national economy), has the potential to effectively double again during the coming 10 to 20 years. The net economic contribution of wildlife utilization on farms was estimated to be N$ 52 million in 1994.

It was recognized by Ashley and Barnes that, while commercial farmers were able to benefit through appropriate property rights and utilization rights over wildlife, access to capital etc, farmers were diversifying into profitable wildlife based enterprises. In contrast, in the communal areas the same conditions did not exist and the potential for improvement was so much larger.

The wildlife sector has gained in importance not only in Namibia, but also in South Africa (Palmer and Ainslie, 2003; Eloff, 2003), Botswana (ULG Northumbrian Ltd, 2001) and Zimbabwe during the last decade. The economic growth in the sector has been driven largely by the private sector as is evident by the growing number of trophy hunters visiting privately run game ranches, the increasing turn-over at game

auctions especially in South Africa, and the registration of professional hunters and hunting farms in, for example, Namibia. The production of venison has shown a steady increase in South Africa from 10 000 metric tons in 1992 to 16 000 metric tons in 2000 (Palmer and Ainslie, 2003); yet its overall contribution to meat production is only 1.2%. The production of venison will not challenge the importance of beef or mutton in the short term, but should nevertheless be seen as a viable and expanding form of diversification, especially in the drier parts of the sub-region. As a land-use form it has benefits for conservation. It can be argued that in an ever increasingly modified environment, the remaining natural landscapes will gain in value as they become scarcer.

The purpose of this chapter is to round off this report by briefly addressing the topics of property rights and exclusive utilization rights; industry regulation and representation and thirdly the policy formulation process.

5.1.1 Property rights and exclusive utilization rights

As mentioned previously, until 1967 the game on the commercial farmland had very little financial value for the land owner. The owner could utilize game throughout the year for his own use. In the hunting season, family or friends could hunt on his land with a valid licence; revenue from the sale of such licences was deposited in the central Department of Revenue. No legal provision had been made for trophy hunting at that stage. According to Joubert *et al* (1983) the single most important factor contributing to the healthy game industry in Namibia in the early 1980s (and still today) was the legislation passed in 1967, which gave "…the owner or occupier of a farm full ownership of all game, other than specially protected and protected

game, while such game is lawfully upon such farm and while such farm is enclosed with a sufficient fence." In effect this ownership of game is restricted to the four huntable species, namely kudu, oryx, springbok and warthog, and the alien species imported from elsewhere in the sub-region.

Dales (1992) makes the point that "The sad list of animal species that have been extinguished by man's predation results purely from the fact that property rights in these animals did not exist, perhaps because they could not have been enforced if they had been established, but in any event because they did not exist. If animals are sought after they are valuable, and if they are owned those who seek them will have to pay their owners for the right to kill or capture them. Owners will charge a high enough price for the right to kill their animals that some stock of animals will always remain; you don't have to be an economist to know that it doesn't pay to kill the goose that lays the golden egg. No domestic animal has ever been threatened with extinction simply because domestic animals are owned."

The challenge for the policy makers is thus to define ownership rights over natural resources and devolve the responsibility and authority over these resources to the lowest level possible. An appreciation of the incentives that sustainable utilisation bring, needs to be fostered at ground level. Policy makers equally need to be aware that sustainable utilization is only practised if certain minimum requirements of the people are met. A community in danger of starving now cannot worry about sustainable utilisation and its long-term benefits. Equally, people without some level of certainty over the future utilization rights for a particular resource, will tend to maximise their short-term benefits at the detriment of potential, but uncertain, longer-term benefits. Buss (2002) has been able to demonstrate through a model that it

makes financial sense for a farmer to overstock his land if the discount rate is high (15%), whereas with a low discount rate (5%) this incentive is removed.

5.1.2 Industry regulation and representation

The industry in Namibia is regulated through, for example, the Ministry of Environment and Tourism through the Ordinance (4 of 1975). The Ordinance and the associated regulations make provision for testing the skills of professional hunters and then registering them, as well as for the registration of hunting farms with suitable game species populations.

The Ministry is currently in the final stages of drafting a new Parks and Wildlife Bill. The objectives of this new legislation are to

- give effect to Article 95 (l) of the Namibian Constitution by establishing a legal framework to provide for and promote the conservation of wildlife and wildlife habitats, and the mutually beneficial co-existence of humans with wildlife, within and as part of the natural environment of Namibia, and the sustainable use of wildlife and wildlife habitats;

- give effect to Namibia's obligations under the 1973 Convention on International Trade in Endangered Species of wild fauna and flora and the 1992 Convention on Biological Diversity, and other international treaties and instruments concerned with biological diversity and the protection of fauna, flora and the natural environment in Namibia;

- repeal the Nature Conservation Ordinance, 1975; and

- provide for matters incidental to the above objectives.

The underlying principles of this new proposed Parks and Wildlife Bill are that biological diversity must be maintained. Thus

- essential ecological processes and life support systems must be maintained, and where necessary, rehabilitated;
- sustainable utilization of wild populations should be promoted, but without having a detrimental impact on biodiversity, ecosystem integrity or ecological processes;
- access to the benefits from wildlife production and utilization should be equitable; and
- authority over wildlife should be devolved to the lowest level possible.

The Namibia Tourism Board grades accommodation facilities on these farms, while the transport of live game or wildlife products is subject to veterinary regulations, as well as Ministry of Environment and Tourism export/import permissions. The Ministry clearly has a lead role to play in the whole wildlife sector through its legislative and policy functions governing broad conservation and through its control over the Namibia Tourism Board.

The Ministry of Agriculture, Water and Rural Development, as well as the Ministry of Lands and Resettlement have a direct influence on the wildlife industry through broad

agricultural policies and the land reform process, land tax and land-use practices in general.

The trophy hunting industry is represented through the Namibia Professional Hunters Association (NAPHA) with a long and active track record. Conservancies are represented at national level through the Conservancies Association of Namibia (CANAM). Apart from these two representative bodies there are some smaller ones such as the Wildlife Translocation Association of Namibia (WTAN) or the Game Sanctuary Association for game farmers breeding rare species.

5.1.3 The policy formulation process

In considering the effect of policy, one needs to make a distinction between two perspectives, viz. those policy aspects that effect private incentives (those aspects that shape the behaviour of the individual through, for example, profit motives) and, secondly, the social incentives (those that effect the nation and typically influence economic growth and equity). As policies can have a distinct influence on the private versus social incentives, these differences can provide valuable insights into how policy can influence economic growth. A simple analytical tool, the Policy Analysis Matrix (PAM), is one way to document the comparative advantage and profitability of commodity systems (Sellen, 2002).

The Comparative Advantage Analysis is another approach to elucidate policy effect by examining economic, as opposed to financial, profitability of an activity (Jansen,

1989; Salinger, 2002). Government policy makers are some of the people using the comparative advantage analysis to

- evaluate whether a commodity or activity being undertaken represents an efficient use of the country scarce input factors, such as land, labour, capital and foreign exchange;
- determine how to allocate investment or program resources across competing activities within the industry; and
- establish whether the country's incentives environment encourages or discourages efficient agricultural activities.

The incentives under consideration encompassing all relevant marco- (monetary, fiscal, exchange rate, trade and investment policies), meso- and microeconomic policies.

5.1.4 Broad recommendations to the Ministry of Environment and Tourism

Recommendations are made against the following background: Realizing that broad strategic intent for the Ministry, within the bigger picture of government, is in part determined through the four major objectives of the Government's National Development Plan (NDP II), namely, poverty alleviation, employment creation, economic growth and the reduction of inequalities (NEPRU, August 1996).

5.1.5 Forming a smart partnership with primary resource users

The policy maker has a limited range wherein economic and financial incentives can be amplified or further reduced in order to achieve sustainable resource utilization and yet remain internationally competitive. In order to be able to detect these opportunities for policy intervention, a good understanding of the market forces at play is required. This understanding needs to be in real time and not retrospective in order to maximise its effectiveness. Good and timely monitoring data, combined with resource and economic modelling, as well as direct and frequent interaction with the industry role players will help achieve this goal.

In a country as sparsely populated as Namibia, but yet with a large and diverse natural resource base there are limits to what can be achieved through restrictive legislation and the difficulties associated with trying to enforce these. Restrictions are especially difficult to control at the primary producer level or the individual farm level. As the products become beneficiated and are handled by fewer role players, control becomes easier. As an example it is easier to deal with one skin dealer than with the 198 individual farmers this dealer interacts with during a year.

Considering that the carrying capacity for livestock has been severely reduced in central and northern Namibia by as much as 20% to 90% in certain areas (see, *inter alia* Bester, 1999), there appears to be considerable scope for a natural resource monitoring and policy developing unit at national level, with an holistic approach and mandate, to improve the sustainable utilization of the country's natural resource base. It is, however, difficult to anticipate how much of this perceived potential can actually be realised considering market imperfections, organizational constraints and resistance to change by the different stakeholders. The merging of the terrestrial

natural resource research and monitoring agencies/components within the Ministry of Agriculture, Water and Rural Development (MWRD) and the Ministry of Environment and Tourism (MET) might have several benefits. For example, currently there is an overlap between the National Botanical Research Institute within the MWRD and the Directorate Forestry within the MET; yet these organizations are within two different Ministries. Pasture and wildlife management is a mandate of both the MWRD and MET, depending on whether one looks at the function from an agricultural point of view or a sustainable resource point of view.

Namibia's extensive livestock industry depends on a primary natural resource - suitable natural grazing. The tourism industry is largely wildlife based. Whether it is game viewing in natural landscapes or trophy hunting, it is based on natural resources which will come under increased pressure from a larger human population striving for a higher living standard on the one hand and climate change and its effects on the other hand. Climate change predictions for the sub-region forecast an even drier climate, with negative implications for primary resource production.

Just as with the commercial cattle herd it appears that through better management of the wildlife – quicker turn-over, lower stocks, less pressure on the land, better recruitment rates – stocks could be reduced significantly, yet the output kept stable. Several conservancies report overall utilization rates of about 5% of their stock; yet their populations are at near ecological carrying capacity.

The Ministry should aim to change its image with the broad public from a "we know best" regulating body to an empowerment partner, making economic growth based on efficient utilization of the natural resource base. This trend was started by the 1967 change in legislation, but is now lacking behind economic reality. Wildlife

farming has shown this tremendous growth because is a viable and financially attractive form of diversification. No resource user, with secure utilization rights, will knowingly destroy this basis for being in the business. While inefficient use might be due to a lack of appropriate know-how or lack of capital, this is not done on purpose if economic incentives are also effective. The Ministry largely has control over making appropriate information available. Exclusive utilization rights could be ensured through vesting the rights to utilize game species moving between farms with conservancies, which are large enough to encompass these game populations during there movements.

Government's new drive for economic empowerment needs to be fought on all fronts that promise success. UNCTAD predicts tourism as the industry most likely to attract foreign direct investment into Africa during 2000-2003 (Breytenbach, 2001). Namibia, with its good infra-structure, low human population density, spectacular landscapes and wildlife, should be able to develop its already important tourism industry further, thereby creating jobs in rural areas. Areas suited for high-quality wildlife-based tourism should be seen as a shrinking resource on a global scale, yet demand for it will increase. If approached correctly this could be an import and sustainable growth industry for arid Namibia.

Although farms managed for their wildlife do not seem to have a significantly larger labour force (Buss 2002), arguably these should benefit from working in a service industry with a demand for better skilled personnel than as a pure extensive livestock farming enterprise. Viable diversification should not only benefit the farmer, but his employees and the national economy in general by generating a more stable income. As with the livestock industry, there are several associated and supportive industries

connected to the wildlife industry, from travel agents, accommodation establishments through to taxidermists and hunting equipment dealers.

In relation to land reform the Ministry can play an important role through the promotion of sustainable wildlife use by the new owners or lessees of commercial farmland. This can be achieved through making relevant information available to these new farmers in an appropriate way, such as farm visits or talks at farmer meetings. A real contribution, but limited in scope, could be made through extending the custodianship scheme currently very successfully implemented for Black rhino to other commercially important species. Commercial conservancies could, for example, be stocked with certain species as an incentive to really become inclusive management units, with a large potential for skills transfers between the established farmers to their new neighbours. Give additional benefits to those conservancies that really take the concept a step further and become inclusive from a previously advantaged/disadvantaged point of view.

The lack of capital needs to be addressed through appropriate Government policy. While land reform is a serious national challenge that needs to be resolved quickly, it is maybe not addressed with enough vision. The current strategy seems to solely concentrate on the immediate wish to satisfy the land hunger of the have-nots, but makes no implicit provision for smart partnerships between the land hungry and those with the required capital to develop such land to its full potential. To people living on the poverty line sustainable utilization is an unaffordable luxury in their daily struggle to survive. To expect resettled citizens to utilize the land wisely and to its full potential has to remain an un-achievable wish, unless substantial capital is made available, together with technical know-how. Despite substantial agricultural

subsidies and an extension service focussing primarily on the commercial sector prior to independence, many farms are just too marginal for conventional livestock farming to ensure viability as a unit.

With regard to land-use the Ministry should, together with the partner Ministries promote wildlife as a viable and appropriate land-use form through land-use zoning, policies and legislation. Research needs to be focussed on identified problems affecting the industry by the Ministry's own staff or by directing outside research effort at these identified challenges. The efforts of the Economics Unit within the Directorate Environmental Affairs are commendable and should be supported. A close link between economic reality and environmental goals needs to be established and maintained. Wildlife-use in relation to the newly implemented land tax is an issue that needs to be closely monitored to ensure that game farming is a recognized farming activity with similar benefits to the nation as derived from other practised farming activities.

Regarding biodiversity conservation, the Ministry needs to find a compromise between safeguarding the individual's right to practice wildlife management without undue interference, while at the same time promoting co-operation between neighbours in managing a resource collectively that is not restricted to individual farms. This collective approach to managing a spatially contiguous renewable resource will become increasingly important in order to not jeopardize the species' long-term survival, through breaking the population up into small groups in individually managed game-proof camps. Smaller areas require more intensive management, smaller isolated groups (through the game fences) are more prone to become locally extinct, there is a risk of losing genetic diversity by having small

founder populations and by only having small populations as determined by the limited amount of habitat per game camp.

Similarly, the Ministry is in the process of developing a policy on the introduction of alien wildlife, trying to limit the introduction of new species as far as possible. Alien species could become invasive; crossbreed with indigenous species as well compete with the local species for grazing and suitable habitat in general. For example Blue wildebeest and Black wildebeest, the latter naturally occurring only in South African highveld, produce fertile offspring.

5.2 CONCLUSIONS

Over the last three decades the wildlife industry has grown on commercial farmland as a result of empowering legislation and policies. This legislation was build around the concept of ensuring exclusive utilization rights and thus favouring individuals with entrepreneurial drive. However, these policies also had shortcomings, especially with regard to effective wildlife management. The policies, for example, encouraged the fencing off of individual farms to limit game movements. This resulted in small breeding groups, limiting exchange of genetic material and requiring intensive management. With the erratic rainfall in Namibia and high spatial variability, fenced in game populations have to be continually reduced in size or given additional fodder, or during good rainfall periods are below the carrying capacity. Self-regulation by the system, through migration, has been limited by the fences. Although it can be argued that fencing was initially required in order to build up game populations on selected farms, adopting game farming early, this paradigm now seems obsolete.

The benefits that conservancies have through the co-operative management of larger areas (10 fold to 20 fold) have been demonstrated in, for example, Zimbabwe (du Toit, 1998; De Alessi, 2000). In Namibia conservancies on communal land are recognized in the wildlife legislation, but not so on commercial land. The benefits of the conservancies for conservation and better resource utilization need to be promoted through enabling legislation. Using the commercial conservancies to encourage new previously disadvantaged farmers to become part of the game farming community should be investigated and possibly encouraged through suitable incentives. Game farming needs to be promoted as an efficient form of diversification, with clear benefits to the country's economy.

CHAPTER 6

SUMMARY AND CONCLUSIONS

6.1 SUMMARY OF RESEARCH RESULTS

The consumptive wildlife industry in Namibia is presented as a snapshot in time. Resource availability is discussed, how the resource is utilized and the benefits that can be derived there from. Utilization options are further explored through exploratory modelling. Recommendations are made, after having discussed such topics as land reform, property and exclusive utilization rights, as well as the policy formulation process.

In Chapter 2 the resource availability, based on the distribution and densities of the more common species, is presented through the use of maps. It is shown that the common species - kudu, oryx, springbok and hartebeest - are widely distributed with densities that allow for sustainable utilization on many farms. The occurrence of the rarer species is touched on, by analysing their occurrence on registered hunting farms, as well as a sample of game farms.. The point is made that it is very difficult to accurately count wildlife over large areas and that, as elsewhere, Namibia's wildlife at a regional scale is underestimated. The degree to which individual species are undercounted depends on their cryptic behaviour and group structure, as well as habitat preferences.

Chapter 3 documents the consumptive use of wildlife. Trophy hunting, the most important segment in terms of national income, is discussed, together with the live sale of game, live export of game, venison production and night culling. The number of animals utilized within the different sub-sectors is documented, where possible

giving an indication of the utilization at national level for the commercial sector. Information on price data is summarised and presented. An attempt is made to derive a figure for the income derived from wildlife for the commercial farming sector overall. A comparison is made between the economic outputs of the wildlife industry and that of the commercial cattle industry.

Chapter 4 covers financial modelling and the economics of the wildlife industry in Namibia. In order to be able to model different game farming scenarios, the land price in Namibia is discussed. From this analysis it appears as if the land value is still largely determined by its potential to sustain livestock production. The price for land across the different carrying capacity categories, is very similar if expressed in N$ per land unit size required to sustain a livestock unit using an economic carrying capacity. A spread-sheet based deterministic model is developed to explore the cash-flow implications of various game ranching options, such as using different species mixes, owning land of different carrying capacities and offering different services. Realistic species off-take rates are achieved with the simulations and the profit expectations based on the model are consist with values in the literature. The trophy hunting industry, being essentially an export industry, has benefited during the past years from the declining strength of the N$ against the US$ and Euro, in which currencies trophies and related services are priced. The internal rate of return based on the investment in different species is compared. In general the more common species offer a much better rate of return then the rarer species; the latter might, however, be important in differentiating between individual game farming enterprises and thus important as a competitive factor.

Chapter 5 addresses policy and legislative issues in relation to the wildlife industry. Topics such as property rights and exclusive utilization rights, industry representation and the forming of smart partnerships with primary resource users are covered. Property rights over wildlife are ill-defined and in fact are restricted to the four huntable species and alien wildlife imported from elsewhere in the subregion. However, valuable species such as roan antelope and Hartmann's zebra are, in terms of the legislation, State owned and the landowner has conditional utilization rights. Broad recommendations are made to the Ministry of Environment and Tourism about certain wildlife management issues.

6.2 CONCLUSIONS

This study has shown that wildlife is again widely distributed throughout Namibia being perceived as an asset on many farms, as an result of enabling legislation passed in the mid-1960s allowing farmers to profit from the wildlife on their land. Policies and legislation to date have put considerable emphasis on the principle of demonstrable exclusive utilization rights, which now seems to hinder further development within the industry through for example the formation of effective conservancies and thereby the management of larger areas as a unit and with it larger gene pools within the game populations and overall a more stable grazing resource availability.

Wildlife is today widely utilised with several important projects, be they trophies, the production of venison or breeding stock. For many land owners wildlife presents an attractive form of diversification, while relatively few have switched completely to wildlife. The trophy hunting industry has shown steady growth over the past three decades. In the last decade real growth measured in income generated at farm level

averaged 17.7%. Based on a declining rate of increase in clients coming to Namibia, it can be expected that the saturation point under the current circumstances has been reached, that competition between farms will increase and with it the demand for differentiation. The current demand to import ever more rare species is probably an indication of this need for differentiation. By understanding the industry and its drivers, there is an opportunity for the policy maker to guide this need for differentiation in a way that is compatible with broad conservation goals as well as industry requirements.

Tools such as databases on the industry linked to geographical information systems are some of the tools required to get an insight into this complex industry. Exploratory modelling is further aiding the decision maker about the predicted outcome of new policies, designed to influence the industry in certain ways. Equally important is strong industry representation to allow for constructive dialogue and the formation of smart partnerships between the different role players.

Without doubt the wildlife-based tourism, of which consumptive utilization is part, in southern Africa can play an ever more important role in bringing development and jobs to the rural areas of the sub-region, thereby alleviating future pressure on the urban areas already under strain to accommodate the influx of people from the rural areas. In order to achieve this goal, practical strategies need to be developed by government policy makers in partnership with the role players from the private sector. Bold new actions need to be taken. Old paradigms need to be questioned. The potential for considerable further growth is there; it now needs to be wisely tapped for the benefit of all.

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Appendix 1 - Acronyms and definitions

LIFE	Living in a finite environment, World Wildlife Fund programme in Namibia
LSU	Livestock unit, the equivalent in terms of feed requirements of a 450 kg bull
MET	Ministry of Environment and Tourism, Namibia
NAPHA	Namibian Professional Hunters Association
GDP	Gross Domestic Product

Huntable game	Kudu, oryx, springbok and warthog, species the land owner might hunt himself for own consumption without a permit

Appendix 2 – Aerial census data used in Chapter 2

Year	Census	Broad area covered
1995	Elesmap census	The Caprivi, Kavango, Etosha and western Kunene
1998	Northern Namibia census	The Caprivi, Kavango, Etosha and western Kunene plus the commercial farmland down to Windhoek and Gobabis
1997	Southern Namib	The Namib-Naukluft Park, Diamond area 1 and adjacent farms
1998	Huns Mountains	The state land and some surrounding farms
1999	Dordabis Conservancy	The conservancy farms
2000	Southern Namib	The Namib-Naukluft Park, Diamond area 1 and adjacent farms
1999 2000	Seeis Seeis	The conservancy farms The conservancy farms
2000	Northern Namibia	The Caprivi, Kavango, Etosha and western Kunene
2001	Khomas Hochland/ Naukluft mountains zebra	Farms in the Khomas Hochland and the mountainous portion of the Naukluft

Appendix 3 – Revenue generating potential for different game species

The following assumptions were used for the simple revenue model:

Capital invested in game equals 60% of herd value (population x auction price)

Live game income as % of auction prices rare=70%, common=50%

Table 1 The revenue generating potential calculations for selected species

	Population	LSU	Price	Growth rate	Trophies	Venison	Live game	Total
Kudu	100	1.85	1 600	20.0%	5.0%	12.5%	2.5%	20.0%
weight					160	100		
meat price					10.00	10.00		
trophy/live					5 000		800	
approximate animals					5	13	3	
income					33 000	12 500	2 000	47 500
capital			96 000					
return on capital								**49.5%**
income / LSU							N$	879
Sable	50	1.67	80 000	20.0%	5.0%	0.0%	15.0%	20.0%
weight					160	100		
meat price					10.00	10.00		
trophy/live					50 000		56 000	
approximate animals					3	0	8	
income					129 000	0	420 000	549 000
capital			2 400 000					
return on capital								**22.9%**
income / LSU							N$	18 337
Springbok	250	6.67	1 000	40.0%	4.0%	0.0%	26.0%	30.0%
weight					20	20		
meat price					14.00	14.00		
trophy/live					2 000		500	
approximate animals					10	0	65	
income					22 800	0	32 500	55 300
capital			150 000					
return on capital								**36.9%**
income / LSU							N$	1 475

Table 1 contd.

	Population	LSU	Price	Growth rate	Trophies	Venison	Live game	Total
White rhino	25	0.36	150 000	7.5%	2.5%	0.0%	5.0%	7.5%
weight					2500	2000		
meat price					5.00	5.00		
trophy/live					300 000		105 000	
approximate animals					1	0	1	
income					195 313	0	131 250	326 563
capital			2 250 000					
return on capital								**14.5%**
income / LSU							N$	4 703
Roan	100	1.56	120 000	20.0%	5.0%	0.0%	15.0%	20.0%
weight					220	160		
meat price					10.00	10.00		
trophy/live					50 000		84 000	
approximate animals					5	0	15	
income					261 000	0	1 260 000	1 521 000
capital			7 200 000					
return on capital								**21.1%**
income / LSU							N$	23 728
Blue wildebeest	200	2	2 200	25.0%	5.0%	5.0%	15.0%	25.0%
weight					120	100		
meat price					10.00	10.00		
trophy/live					6 600		1 100	
approximate animals					10	10	30	
income					78 000	10 000	33 000	121 000
capital			264 000					
return on capital								**45.8%**
income / LSU							N$	1 210
Hartebeest	150	2.7	2 000	20.0%	5.0%	0.0%	15.0%	20.0%
weight					80	70		
meat price					10.00	10.00		
trophy/live					3 500		1 000	
approximate animals					8	0	23	
income					32 250	0	22 500	54 750
capital			180 000					
return on capital								**30.4%**
income / LSU							N$	986

Table 1 contd.

	Population	LSU	Price	Growth rate	Trophies	Venison	Live game	Total
Oryx	250	1.79	1 900	25.0%	10.0%	5.0%	10.0%	25.0%
weight					120	100		
meat price					10.00	10.00		
trophy/live					3 400		950	
approximate animals					25	13	25	
income					115 000	12 500	23 750	151 250
capital			285 000					
return on capital								**53.1%**
income / LSU							N$	1 083
Eland	100	0.93	4 600	22.0%	5.0%	2.0%	15.0%	22.0%
weight					250	165		
meat price					10.00	10.00		
trophy/live					9 500		2 300	
approximate animals					5	2	15	
income					60 000	3 300	34 500	97 800
capital			276 000					
return on capital								**35.4%**
income / LSU							N$	910
Waterbuck	100	2	8 000	20.0%	5.0%	0.0%	15.0%	20.0%
weight					150	120		
meat price					10.00	10.00		
trophy/live					12 000		5 600	
approximate animals					5	0	15	
income					67 500	0	84 000	151 500
capital			480 000					
return on capital								**31.6%**
income / LSU							N$	3 030
Cattle	100	1.1	4 000	20.0%	0.0%	20.0%	0.0%	20.0%
weight					0	234		
meat price						16.00		
trophy/live							0	
approximate animals					0	20	0	
income					0	74 880	0	74 880
capital			240 000					
return on capital								**31.2%**
income / LSU							N$	824

Appendix 4 – Calculations for sub-sector contributions to national economy

Trophy hunting

The trophy price lists from NAPHA were used as a basis in determining trophy value per animal. These price lists have a US$ and DM/€ price for hunting farms, guest farms or safari operations indicated. It was assumed that hunters from Western Europe would pay in DM/€ and everybody else a US$ based tariff. 50% of all clients were assumed to visit hunting farms, 35% guest farms and 15% safari operations. The web-based prices compare well with the NAPHA prices for 2001 (see Figure 1), except for waterbuck and giraffe.

In relation to the daily tariff it was assumed that 60% of clients would hunt one on one with the professional and the remaining 40% would hunt as a pair with the PH. The number of non-hunters was taken as 50% of all hunting clients, i.e. for every two hunter's one accompanying person. On average, clients were assumed to be hunting for seven days.

Table 1: The calculated trophy and daily fees calculated for 1996 to 2002

	in '000 N$							
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	Average
Trophy fees	20 213	23 476	30 509	39 576	44 900	67 155	93 792	
Daily tariffs	16 284	19 285	26 301	34 721	35 126	50 537	70 985	
Subtotal	36 497	42 762	56 809	74 297	80 026	117 693	164 777	
1996 constant prices	36 497	38 977	48 575	58 071	56 763	75 717	94 018	
real growth %		6.8%	24.6%	19.5%	-2.3%	33.4%	24.2%	17.7%

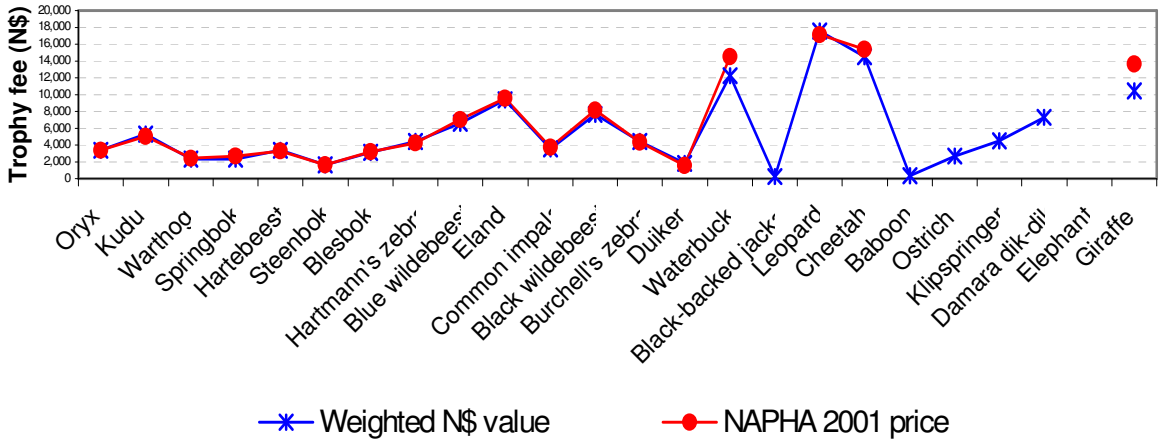

Figure 1: A comparison between the trophy prices based on the NAPHA price lists against those from the web.

Live capture

Based on the animal numbers in Table 3.6 in Chapter 3 and the assumption that the farmer would on average receive 75% of the auction selling price, the following monetary values were derived: Live sales from the game dealer directly to the farmer N$ 10.038 million; exports N$ 6.568 million, and from auctions N$ 5.339 million. From auctions it was assumed that the farmer would receive on average only 60% of the auction price for his game on the veld. Together the three values give a turnover of N$ 21.945 million at farm level.

Venison

The carcass weights for the commonly hunted trophy animals (91% of all animals) were summed and multiplied by average prices paid by the butcheries.

For the “Shoot and sell” venison it was assumed that 30% of the skins sold from kudu, oryx and springbok, originated from animals from which the meat was sold. Considering that the other 70% of animals have not been included in the calculations, assumptions about numbers and prices seem conservative.

Biltong hunting

Depending on whether the animals hunted are based on the 1997 questionnaire survey or the biltong hunting permits for 2001, two different estimates of the number of animals involved are obtained (see Table 2). For the analysis based on the permit applications, a 75% success rate was assumed. Although the animal numbers differ between the two approaches, the calculated total value is fairly similar with an average of N$ 9.406 million.

Table 2: The estimated number of animals hunted for "biltong" and the prices used for the calculations

1997 Questionnaire

	Price	Animals	Value (N$)
Springbok	350	7 500	2 625 000
Kudu female	1 000	2 325	2 325 000
Kudu male	1 500	775	1 162 500
Oryx	900	2 800	2 520 000
		13 400	8 632 500
4 animals per day	150		502 500
			9 135 000

2001 Permit applications

	Price	Animals	Value (N$)
Springbok	350	16 130	5 645 500
Kudu female	1 000	475	475 000
Kudu male	1 500	475	712 500
Oryx	900	2 350	2 115 000
		19 430	8 948 000
4 animals per day	150		728 625
			9 676 625
	average		**9 405 813**

Skins and Horns

The number of skins (Table 3.10 in Chapter 3) was multiplied by the appropriate price per skin, as mentioned in the text, and an amount of N$ 3.0 million was obtained. Included in this amount are N$ 328 000, the estimated worth of the horns sold.

Night culling

The 1813 springbok reportedly night culled during 2001, with an average carcass weight of 18.4 kg, were assumed to be worth N$ 7.5 per kg at farm level. Their combined value would then be N$ 0.3 million.

General comment

Several of the values used are crude estimates of the numbers involved and the average prices obtained. However the values making up the larger contributions seem to be based on good estimates, i.e. the trophy hunting and live game segments.

Appendix 5 – List of hunting farms for which web-based price lists were used

	Hunting farm name	Prices for	Currency used
1	Astra	2001	€
2	Dorka/Achalm	2002	€
3	Elandsbult	2002	US$
4	Erindi	2002	€
5	Etendero	2001	€
6	Garib	2001	US$
7	Gras	2001	US$
8	Halseton	2001	DM
9	Hamakari	2001	DM
10	Huttenhain	2002	€
11	Kamanjab	2002	US$
12	Khan River	2002	€
13	Khomas	2001	US$
14	Kuwinamab	2002	US$
15	Matemba	2002	€
16	Moringa	2001	€
17	Mount Etjo	2001	US$
18	Okahua	2001	€
19	Okatjuru	2001	US$
20	Okondura-Nord	2002	€
21	Omatako	2001	US$
22	Omongongua	2002	€
23	Ongue	2001	DM
24	Onguma	2001	US$
25	Otjandaue	2001	US$
26	Otjiruse	2001	€
27	Otjozonjti	2002	€
28	Ozondjache	2002	US$
29	Panorama	2001	€
30	Robyn	2001	€
31	Rooikraal	2001	US$
32	Sachsenheim	2002	€
33	Saturn	2001	DM
34	Schonfeld	2001	US$
35	Okawaka	2001	US$
36	Steinhausen	2001	€
37	Waldeck	2001	DM