

CHANGING LAND USE TRENDS IN THE THICKET BIOME: PASTORALISM TO GAME FARMING

N. Smith & S.L. Wilson

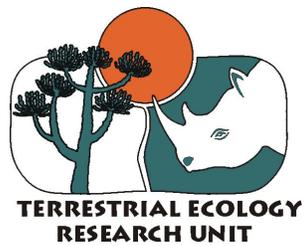


**Terrestrial Ecology Research Unit
University of Port Elizabeth
Port Elizabeth 6031**

**Report No. 38
September 2002**

CHANGING LAND USE TRENDS IN THE THICKET BIOME: PASTORALISM TO GAME FARMING

Nadia Smith & Sharon Wilson



Terrestrial Ecology Research Unit
University of Port Elizabeth
Port Elizabeth 6031

Report No. 38
September 2002



This study was undertaken as part of the Subtropical Thicket Ecosystem Planning Project, funded by the Global Environment Facility through the World Bank.

ABSTRACT

A shift from pastoralism to game farming has been identified in South Africa since the 1980s. In some cases it has been the objective of private landowners to diversify their operations by running game-based ventures in tandem with stock-farming activities. In other cases, private landowners have removed all stock and replaced it with game. Quantitative data on private land use trends are limited, and this study aimed to determine the spatial extent and distribution of privately owned game farms, as well as conservancies, in the STEP project planning domain. The results have shown that the post-1996 period has experienced an unprecedented increase in game based operations. Currently, 2.5% of the 116 500 km² study area has converted entirely from stock to game farming. A total of 41 game species was recorded on the 63 game farms surveyed. Most farmers expressed a positive attitude towards game farming and are trying to implement conservation measures. However, many of them have been stock farmers their whole lives and therefore their approach to game farming might be skewed towards principles applied in stock farming. The present study found that the main activity, for which game is utilised, on both game farms and conservancies, is hunting and this includes both recreational and trophy hunting. The foreign ecotourist and the hunting market have been strong driving forces behind the introduction of extra-limital species in this region. Farmers were of the opinion that the satisfaction of both tourists and hunters was based on the diversity of species rather than on their ecology and biogeography.

TABLE OF CONTENTS

1. INTRODUCTION 1

2. METHODS: BOUNDARY AND META DATA ACQUISITION 2

 2.1. Desktop and Field Data 3

 2.2. Digital data..... 4

 - *Spatial data*..... 4

 - *Attribute data* 4

3. GEOGRAPHY OF GAME FARMS AND CONSERVANCIES..... 5

 3.1. Surface area covered 5

 3.2. Spatial distribution 6

4. RATE OF LAND USE CHANGE 9

5. GAME SPECIES 12

6. UTILISATION..... 17

7. CONCLUSION 18

8. ACKNOWLEDGEMENTS 19

9. REFERENCES..... 20

10. APPENDIX 1: List of sourced people..... 21

11. APPENDIX 2: Game farm and conservancy names. 23

12. TERRESTRIAL ECOLOGY RESEARCH UNIT (TERU) REPORT SERIES i

1. INTRODUCTION

The shift in land use from pastoralism to game farming has been identified since the 1980s as a fast growing trend in South Africa (Grossman, Holden & Collinson 1999). More recently, the introduction and commercial use of wildlife, particularly antelope, on private land has increased by up to 25% per annum (Jolliffe 2001) both in terms of area and income generated from game. During 2000, a peak was reached in the Eastern Cape when it was recorded that an additional 48% of private landowners had entered the commercial game industry (Jolliffe 2001a). It is in this light that Stroleny-Ford (1990, as cited by van der Waal & Dekker 2000) identified game ranching as one of the fastest (economically as well as spatially) growing sectors in the agricultural industry in South Africa today.

In some cases it has been the objective of private landowners to diversify their operations by running game-based ventures in tandem with stock-farming activities. In other cases, private landowners have removed all stock and replaced it with game.

This change in land use trends has drawn the attention of scientists worldwide, and specifically with reference to desertification of rangelands. Following the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro 1992, desertification has been identified as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities” (Earth Summit 1992). Desertification currently affects about one sixth of the world’s population and 70% of all drylands, which amounts to 3.6 billion hectares (Earth Summit 1992). Widespread poverty is one of the key impacts of desertification (Earth Summit 1992).

In response to the key issues identified at this meeting, the UNCED preparatory Committee has developed an action plan for the 1990s and into the 21st century, commonly known as Agenda 21. The latter is a collection of global programs formulated around achieving the goal of international sustainable development. In one of Agenda 21’s programs, “Managing fragile ecosystems”, it has been recognised that in trying to combat desertification both national governments and the international community should aim at improving the knowledge base. They should in addition support the monitoring of systems prone to desertification, including the economic and social aspects of such ecosystems.

In South Africa, the thicket vegetation of the Eastern Cape has been recognised as particularly vulnerable to degradation, due mainly to years of overgrazing (Kerley *et al.* 1995). Less than 5% of this vegetation type occurs in formal conservation areas, and the remainder is currently under threat from various activities that include; overgrazing by domestic stock, bushclearing for agriculture and urban development, coastal resort development and invasion by alien vegetation. The Suptropical

Thicket Ecosystem Planning (STEP) project was initiated to undertake a detailed spatial analysis of the various thicket types, and to assess the extent of their transformation and the threats facing them. The ultimate aim of the STEP project is the development and use of a strategic and flexible conservation plan for the protection of globally important biodiversity within the Thicket Biome. Central to attaining these conservation goals is an understanding of current land use trends within the Thicket Biome.

In addressing such issues as identified in Agenda 21, a shift in focus from public to private land has been prevalent. This follows the reasoning that public land, such as national protected areas, only partially contributes to achieving realistic targets for the conservation and sustainable development of thicket ecosystems. Kerley *et al.* (1995) identified multi-game species operations as a land use option for thicket that could be ecologically and economically more sustainable than traditional livestock farming. Management of private land could contribute significantly to conservation and sustainable development, and to avoiding desertification.

The change in land use from pastoralism to game farming on private land in the Eastern Cape has been widely acknowledged (e.g. Van Rooyen 1998, Fourie 2000, Knott-Craig 2000, Potgieter 2001). However, quantitative data on private land use trends are limited. In order to address this lack of information, the current project, a subcomponent of STEP, was initiated with the overall goal of determining the spatial extent and distribution of privately owned game farms in the STEP project planning domain. This domain extends from the Groot-Gouritz river system in the west to the Kei River in the east, and to the Great Escarpment in the hinterland in the vicinity of Graaff-Reinet. This spatial information will be integrated with other spatial layers in the systematic conservation planning component of the STEP Project, the conceptual and methodological basis of which is described by Pressey & Cowling (2001).

2. METHODS: BOUNDARY AND META DATA ACQUISITION

The project was conducted from August 2001 to January 2002. The term 'game farm', in the current colloquial sense, is used to describe private land from which domestic stock have been removed and replaced with game. Such game farms are characterised by a lack of internal fences and the presence of game-proof boundary fencing. Private land, on which combined game and stock farming is practised, is referred to as a 'mixed farm'. In this report the term 'game' refers to both indigenous and extra-limital species of ungulates, large carnivores and the African elephant. Extra-limital species are those that occur outside their natural range. Genetic variants and hybrids were included where possible, and are grouped with the extra-limital species in all analyses.

The main objective of the study was to compile a map showing the distribution of privately owned game farms in the STEP project planning domain. However, during the course of the study it became possible to extend the analyses to provide additional information on the trend in land use change from stock to game farming. This included, firstly, the compilation of a map showing the locations of conservancies in this area. A conservancy is a group of neighbouring mixed farms that, under auspices of the provincial conservation authority, is managed according to a single management plan and has a strong conservation ethic. Secondly, personal contact with landowners made it possible to discuss their concerns and motivations, around the issue of changing from stock to game. The ensuing discussion forms an informal synthesis of the opinions and attitudes of farmers regarding the apparent boom in the game industry currently taking place in the Thicket Biome.

2.1. Desktop and Field Data

At the outset, a list of game farms in the STEP project domain was compiled from tourist brochures, telephone directories, and advertisements. In applying this method, 'commercial' game farms, i.e. properties advertised to local or national tourists and hunters, were highlighted. To supplement this list, private organisations, provincial government departments and farmers' associations were asked for references to landowners who had changed entirely to game farming, but had not advertised commercially (see Appendix 1 for a complete list of persons and organisations contacted).

The list was expanded during the course of the project, by inviting landowners' responses in a number of ways. Firstly, a questionnaire survey was compiled and printed in the Eastern Cape Game Management Association's (ECGMA) newsletter, which was posted to its approximate 800 members. Thirty-four questionnaires (< 5 %) were completed and returned. Secondly, presentations (introducing the project and giving its objectives) were made at the ECGMA's annual workshop in Grahamstown (September 2001) and the Annual General Meeting in Port Alfred (October 2001). Membership lists of private organisations (e.g. the ECGMA and East Cape Game Traders) were inaccessible due to a confidentiality agreement between them and their members. Personal communication was thus a primary means of acquiring information. It is emphasised that the aim of these surveys was not to record all existing farming practices but, rather, to identify game farms or game farmers. The poor response to the questionnaires should therefore not be interpreted as a lack of interest on the part of landowners. In total, 204 private landowners were personally consulted, of which 63 confirmed their status as "game farmers".

Provincial nature conservation departments have lists of properties to which they have issued Certificates of Adequate Enclosures (CAE), and these have been used by previous researchers as a basis for measuring the extent of game farming practices (e.g. van der Waal & Dekker 2000). However, it is important to note that in issuing such certificates, nature conservation officers do not

distinguish between “game farming” and “mixed farming”, but rather whether the property or paddock is adequately enclosed or not. As previously mentioned, a clear distinction between game and mixed farming was applied in this study, and as a result, CAE lists were only considered as a secondary information source.

Once game farms had been identified, farm boundary information was obtained by consulting with provincial nature conservation departments, as well as with game farmers personally. In each case, farm boundaries were marked on 1:250 000 topo-cadastral maps. In some cases farmers were familiar with their property details, and could provide their cadastral codes telephonically.

Data gathering efforts were concentrated in the Eastern Cape section of the project planning domain, owing to the fact that data sources in this region were not as centralised and complete as those found in the Western Cape section. Due to time constraints, results for conservancies cover only those located in the Eastern Cape section of the project domain.

2.2. Digital data

Two digital data sets resulted from the survey; namely, spatial data and attribute data for the categories ‘game farms’ and ‘conservancies’.

- *Spatial data*

Spatial data layers delineating boundaries of game farms and conservancies were acquired by asking farmers to mark off cadastral units comprising their properties onto 1:250 000 hardcopy maps. This information was transferred to an ArcView 3.2 shapefile from the Surveyor General’s cadastral layer (allcas4.shp). An additional field in the attribute table of allcads4.shp was created, and named “gfname” (= game farm name) or “cname” (= conservancy name). The cadastral units highlighted on the hardcopy maps were selected onscreen and assigned names in the “gfname” or “cname” fields that corresponded to the individual game farms or conservancies in question. Where farmers indicated fenced boundaries that were inconsistent with cadastral boundaries, the entire cadastral unit was selected instead of subdivided sections using the lines that they drew. This was necessary for ease of analysis and for compatibility with other data layers incorporated in the STEP project. The resultant digital layers are thus the closest approximation of the boundary lines, drawn on the hard copy maps, in cadastral units. In this manner, two polygon data layers delineating spatial boundaries for both game farms and conservancies (co-ordinate system: geographic) were created, and formed the base-maps to which all attribute data were linked.

- *Attribute data*

Attribute data were collected in addition to geographic data derived for each game farm and conservancy. They comprised the name of the game farm; the name and contact details of the owner (or manager); the year when land use changed from stock to game farming; a list of large game species

on the property; types of game utilisation on farms. The game farm (or conservancy) name has been used as the unique identifier, linking attribute data with geometric data. The area for each game farm and conservancy was calculated with the view in ArcView 3.2 temporarily projected to Albers Equal Area (Datum: Clark 1880).

3. GEOGRAPHY OF GAME FARMS AND CONSERVANCIES

3.1. Surface area covered

The STEP planning domain covers an area of roughly 11.65 million ha (116 500 km²), spanning 57 magisterial districts (Sims-Castley 2002). The 63 game farms recorded for this study comprise an area of 285 968 ha in total (Table 1), which means that 2.5 % of the total project planning domain has converted entirely from stock farming to game farming. It is emphasised that these figures do not include the numerous mixed farming (i.e. stock plus game) practices that existed at the time of the study. This made it difficult to compare the results with those of other studies (e.g. van der Waal & Dekker 2000), which have included mixed farms in their definition and analysis of “game farms”.

The average game farm size is 4 496 ha, with a median of 2 506 ha. However, the mode is skewed since 46 (72%) of the game farms are smaller than the mean (Figure 1), while 18 (23%) are larger than 7000 ha. Therefore, 26 % (76187 ha) of the total area comprised of game farms can be considered medium to small (or less than the mean) and 74% (211 581 ha) large (or greater than the mean). The mean size of conservancies, which comprised a total of 6 % of the Easter Cape section of the project planning domain, is **57 755 ha**.

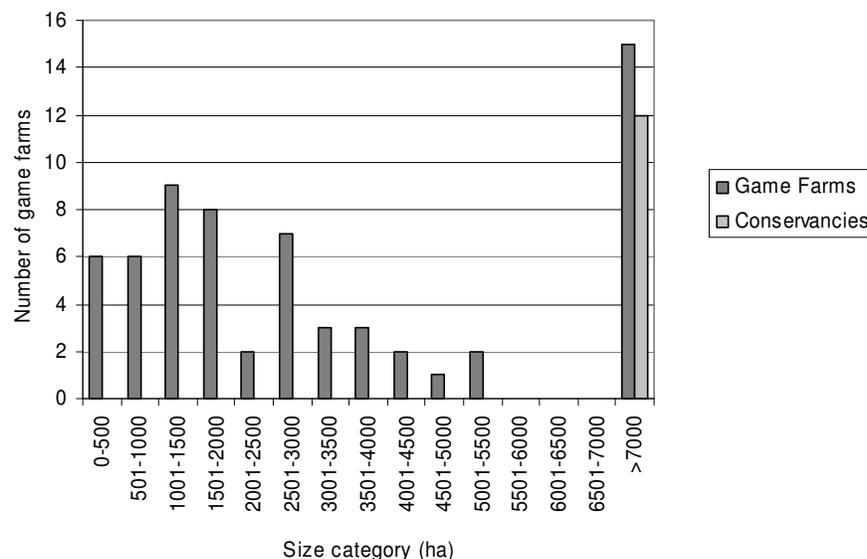


Figure 1: Number of game farms and conservancies according to size classes

3.2. Spatial distribution

Most of the game farms identified by this study are concentrated in the south and central regions of the Eastern Cape (Figure 2). The sparse distribution of game farms in the Eastern Cape districts of Peddie, Mdantsane, Zwelitsha, Cofimvaba, Cacadu, Xalanga, Tsomo, Nqamakwe and Idutyawa can be attributed to the former political dispensation of South Africa, as these districts are all within the borders of the former homeland areas of Transkei and Ciskei. The area west of Steytlerville and Hankey is also seemingly less attractive for game ranching (Figure 2). Conservancies are concentrated in the northern section of the project domain (Figure 3).

Table 1: Location and size of game farms and conservancies in the study area.

Province	District	Number of Units		Total Area (ha)	
		Game Farms	Conservancies	Game Farms	Conservancies
Eastern Cape	Adelaide	1	2	1550	168151
	Albany	14	1	98590	21303
	Alexandria	1	0	1769	0
	Bathurst	3	0	9945	0
	Bedford	1	1	1258	85734
	Cathcart	1	0	1170	0
	Craddock	1	0	11027	0
	Fort Beaufort	1	1	10727	38055
	Graaff-Reinet	5	3	61863	190688
	Hankey	0	0	0	0
	Humansdorp	1	0	920	0
	Jansenville	0	1	0	49083
	Kirkwood	5	0	8628	0
	Komga	1	0	186	0
	Pearston	1	0	3081	0
	Peddie	2	0	8695	0
	Port Elizabeth	2	0	234	0
	Queenstown	1	0	3537	0
	Somerset East	3	1	29603	33430
	Sterkstroom	3	0	5007	0
Steytlerville	4	1	9515	35552	
Tarkastad	0	1	0	71070	
Uitenhage	3	0	4581	0	
Willowmore	3	0	7568	0	
	SUBTOTAL	58	12	279454	258627
Western Cape	Knysna	1	0	497	0
	Oudtshoorn	1	0	843	0
	Mossel Bay	2	0	1593	0
	Prince Albert	1	0	1761	0
	Uniondale	1	0	1821	0
		SUBTOTAL	6	0	6515
	TOTAL	63	12	285968	693066

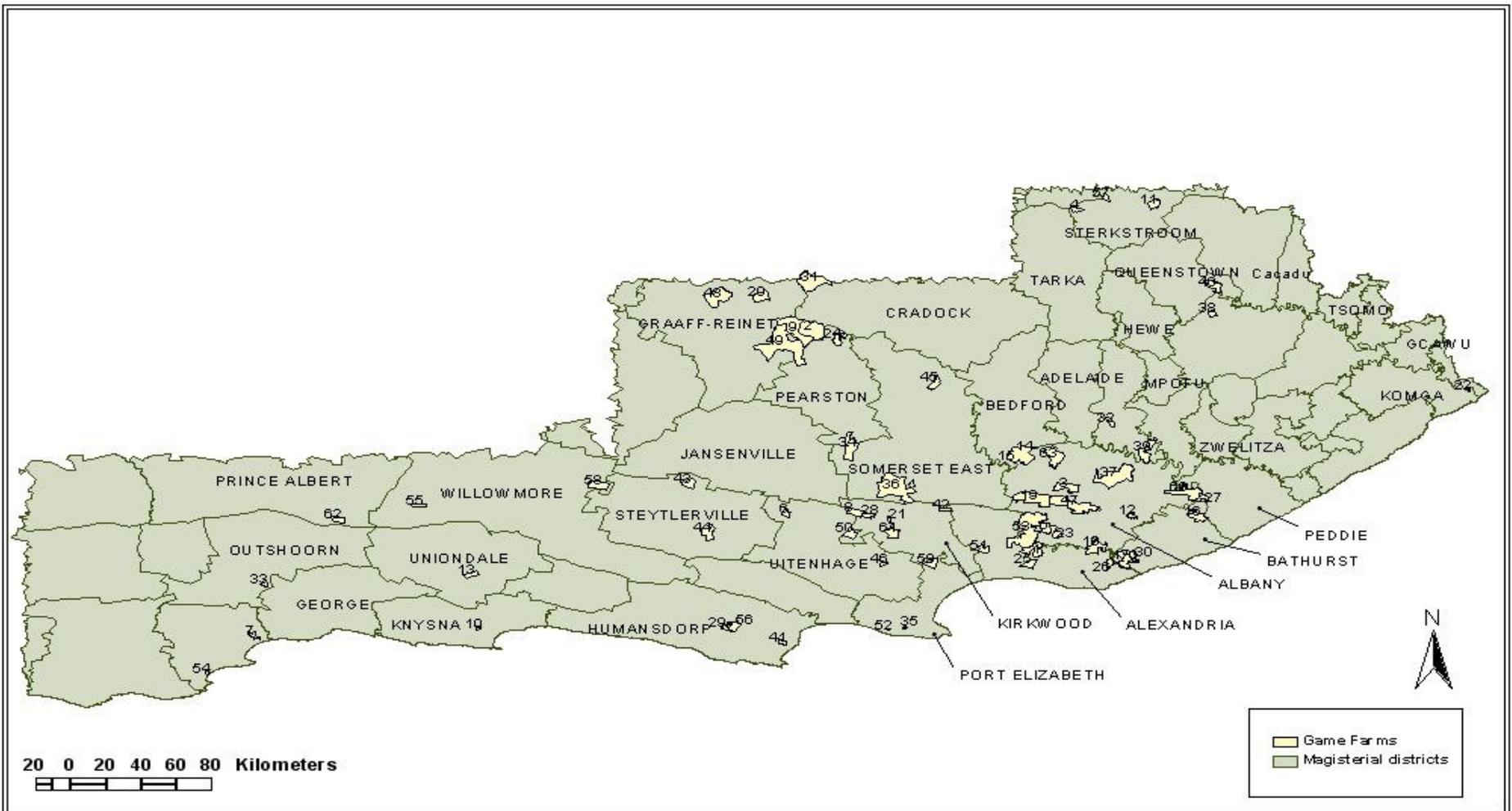


Figure 2: Distribution of game farm in the STEP project domain. (Names corresponding to the numbers are listed in Appendix 2)

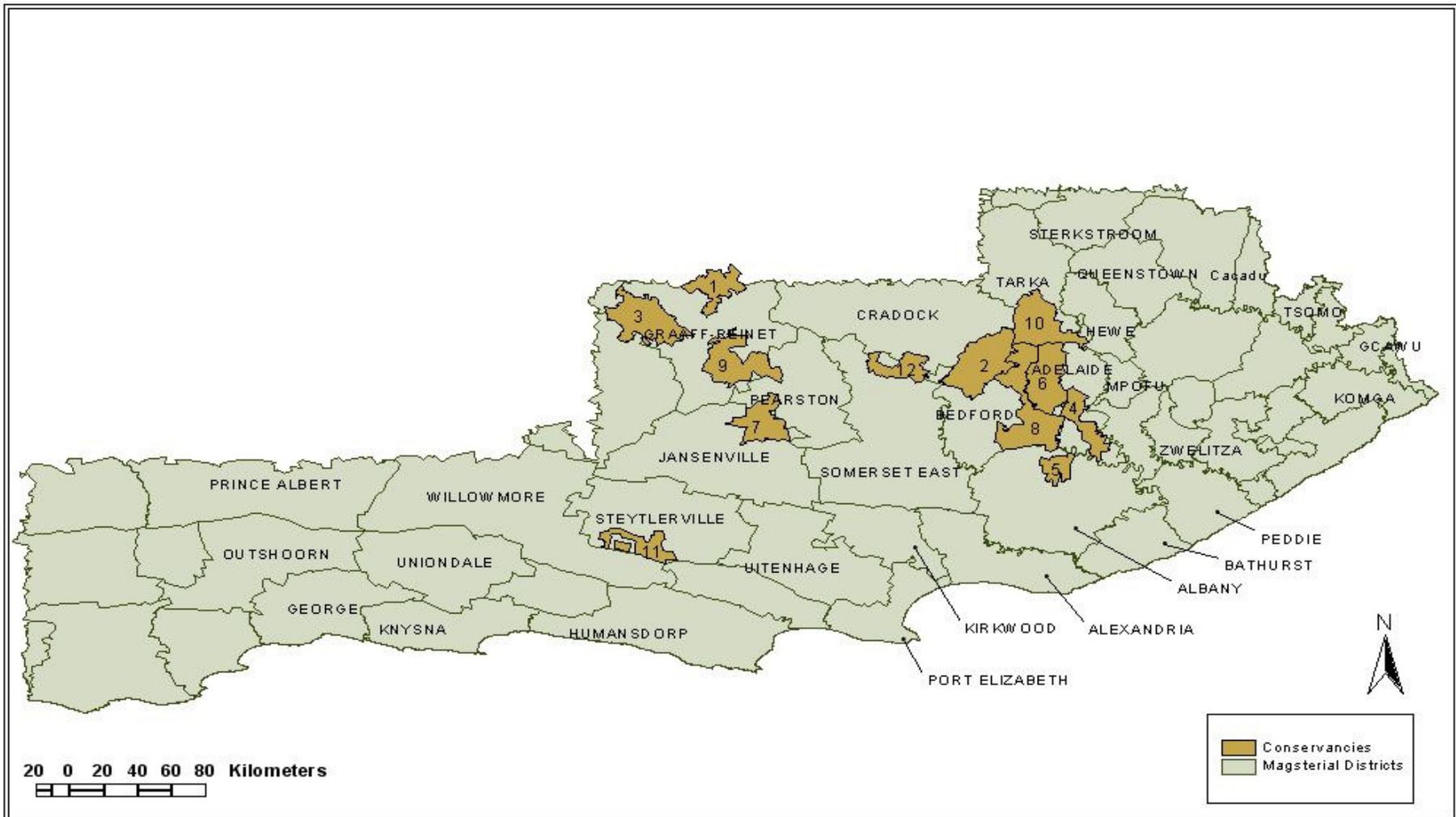


Figure 3: Distribution of conservancies in the STEP project domain. (Names corresponding to the numbers are listed in Appendix 2)

4. RATE OF LAND USE CHANGE

The results presented in this section represent a summary of the landowners' perspectives with regards the current trend in land use change from pastoralism to game farming. Land use changes first started to occur in the 1970s (Figure 4), and were characterised by two basic trends that included either the landowners themselves changing from being stock farmers to game farmers, or investors purchasing stock farms and financing their conversion to game farms. In the latter case, the actual landowners tended to be absent from the property during the survey and managers, who were resident on the property, were consulted.

Apart from landowners who have switched entirely to game farming, it was ascertained through personal communication with both game and mixed farmers, that existing stock farmers in the Eastern Cape have increasingly been utilising game on their farms (referred to as "mixed farmers" in this report). This trend is also evident from the rampant increase in the number of game-fenced properties in the Eastern Cape (*pers obs*). Generally, mixed farmers have not (re)introduced game species onto their properties but have rather actively started to manage natural and indigenous game populations occurring on their properties. In some cases, this has involved the establishment of conservancies, administered by the provincial conservation department. Provincial legislation allows conservancy members to hunt game, occurring within the boundaries of their conservancy, throughout the year. It is, in other words, in the interest of all landowners involved in a conservancy to utilise the various game species in a sustainable manner. As a rule, conservancy members are not allowed to game proof fence their individual properties.

Some mixed farmers (who do not belong to conservancies) have fenced off sections of their farms with high game proof fences, thereby retaining their game populations on their properties. This is done on the basis that in certain cases neighbouring landowners have applied or allowed unethical hunting practices, resulting in local game populations decreasing to very low levels. By game fencing their properties, landowners can manage their game populations and prevent the movement of game to neighbouring farms. Game fencing has also allowed landowners to "supplement the low indigenous game species diversity" on their properties by introducing extra-limital species.

Utilising game (including the preparation of game products) has provided an important secondary income to most mixed farmers. However, the switch from stock to game has been limited due to number of constraints. A seminal aspect is the massive capital required to establish a game farm. Most farmers are reluctant or unable to take such a large financial risk. Instead, they attempt to minimise risk by "maintaining mixed practices as a means of financial security". However, it has been

made clear that if stock farmers had the financial backing, “70% of them would immediately switch over to game farming”.

Another reason given in support of mixed farming is the strong seasonality of the hunting industry and by implication the seasonality of income generated from game farming. Farmers also argued that by mixing both game and stock they could keep tick populations low. Furthermore, years of experience with stock farming outweighed farmers’ considerations for game farming. The latter is still considered a novel concept and practice, and its current “boom” has given rise to much scepticism and cynicism. Some stock farmers have compared the booming game industry to the ostrich farming boom of the late 1800s and they expect the game farming industry to undergo a similar life cycle, i.e. a “boom’ followed by a “bust”. They contend that game farming practices will in the near future revert to stock farming.

Despite the concerns expressed above, a limited but continuous change in land use from pastoralism to game farming has been evident over the last 30 years or so (Figure 4). Confirming this trend, Halse (1983) argued that the beginning of “serious” game marketing and renewed conservation interest in the 1970s followed the introduction of a stock reduction scheme (resulting from the prolonged drought

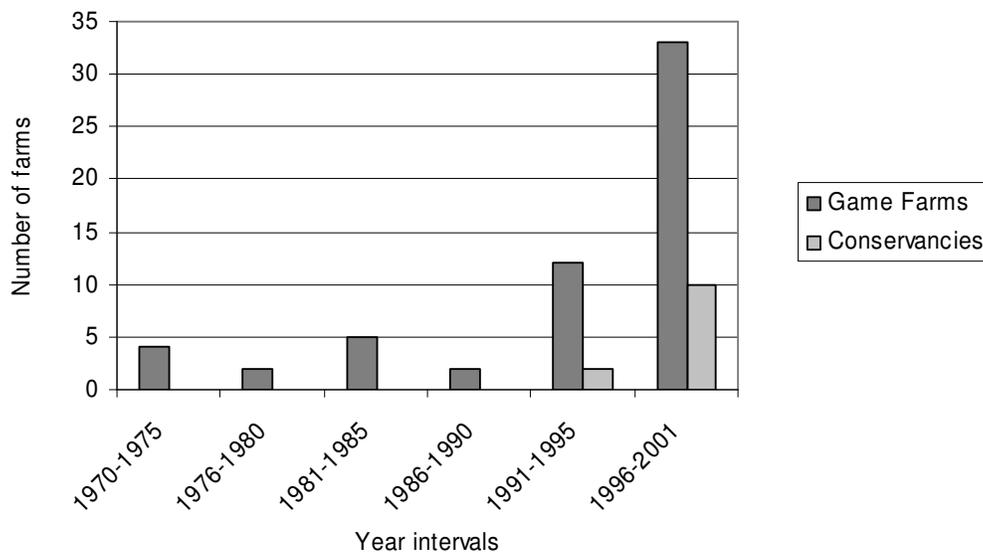


Figure 4: Rate of land use change from stock farming to game farming since 1970. The establishment of conservancies has been included.

of the 1960s), low cattle prices and a boom in mohair prices. He concluded that this trend was mainly the result of an “altered attitude” to the utilisation of game, accompanied by a realisation that game has an “intrinsic value” and in many areas of marginal land can compete with domestic stock. Grossman

(1991), however, speculates that it is disenchantment with livestock farming, rather than a belief in the inherent superiority of game farming as a form of landuse, which is encouraging the change in landuse currently being observed in South Africa.

The present study has shown, however, that the post-1996 period has experienced an unprecedented boom in game based operations, through the establishment of both game farms and conservancies (Figure 4). Interviews with landowners indicate that this trend is still continuing.

The impetus behind the growing game industry can be attributed to a number of socio-political, economic and ecological motivations. These motivations were expressed mainly as concerns by landowners or managers. For example:

- 1) Recently changed labour legislation stipulates increased wages for workers on farms. This has made landowners regard game farming as an alternative to stock farming, as it is considered to be potentially less labour intensive than traditional stock farming;
- 2) Increased stock theft, especially of small domestic stock, has rendered stock farming economically less viable;
- 3) “Vermin”, jackal and rooikat (caracal) allegedly “overflow” from adjacent game farms or statutory reserves and this has resulted in increased stock losses. However, by following the general trends amongst neighbours and converting to game farming, landowners have managed to maintain profitable farming practices;
- 4) Decades of overgrazing have lead to rangeland degradation and thereby reduced livestock production. By (re)introducing (indigenous) game species, that are better adapted to their natural environment, periodic droughts could be survived both economically and demographically;
- 5) Further to the previous point, game is considered to contribute, in the long term, to veld restoration (rather than degradation);
- 6) There is good potential for foreign exchange earnings from trophy hunting and tourism.

A conservation official from the (now defunct) Western District Council, has listed in a series of articles on the game industry in the “Karoo Advertiser”, additional aspects worth mentioning here Jolliffe (2001). He observed that the de-regulation of the agricultural sector by the World Trade Organisation, as well as the agricultural sector’s loss of political leverage in parliament, have played an important role in promoting the switch from stock farming to game farming.

Economic incentives are the predominant factors causing many farmers to switch from pastoralism to game farming. Conservation of game by landowners may, therefore, be strongly attributed to the high economic value that has been attached to game and game products in recent years. Ecological reasons

(land degradation and soil erosion) might have initially caused farmers to consider reducing their stock in favour of game, but economic incentives have driven them to consider game farming as a viable alternative land use option.

5. GAME SPECIES

A total of 41 species (Table 2, Figure 5) was recorded on the 63 game farms surveyed. The high diversity that was recorded is, however, not maintained on any one farm. Rather, 11 to 15 species occurred on a third (21) of the game farms, with only five game farmers maintaining more than 20 species (Figure 6).

Table 2: Evaluation of the number and percentage of extra-limital and indigenous species occurring on both game farms and conservancies

Species Status	Game Farms	Conservancies
Extra-limital (EL)	13 (32%)	11 (32%)
Indigenous (I)	28 (68%)	23 (68%)
Total number of species listed	41	34

The overall species diversity was lower (a total of 34 species) on conservancies (Table 2, Figure 7), but the same median diversity (11 to 15 species) was recorded as for game farms.

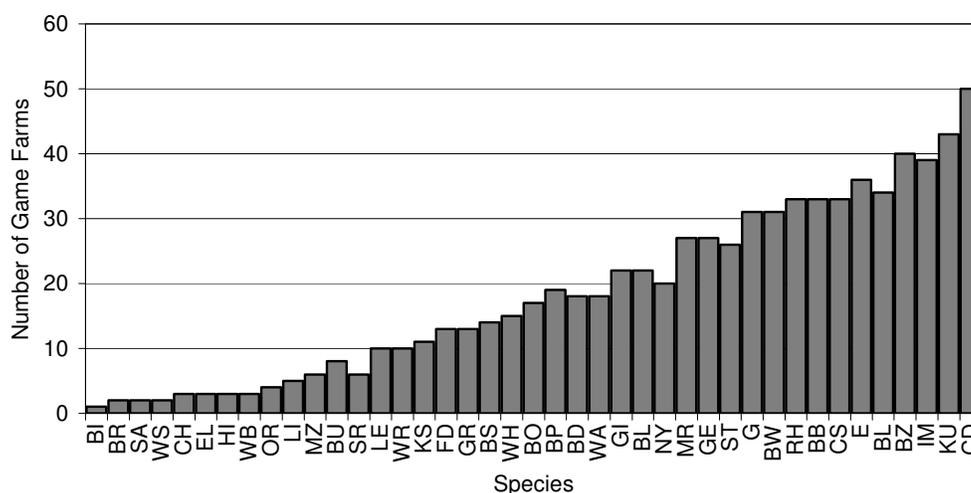


Figure 5: The distribution of species on game farms. Refer to Table 3 for species codes.

Species diversity was lower on conservancies than on game farms, which was largely due to the landowners still concentrating on stock farming. Most mixed farmers on conservancies

were of the same opinion that income generated from game amounts to a mere 5% of their total income. The species not recorded on conservancies were Black Impala, Black Rhinoceros, Cheetah, Elephant, Hippopotamus, Lion, Sable and the Southern Reedbuck. Of these only the Black Impala, Sable and Southern Reedbuck were extra-limital (Table 3).

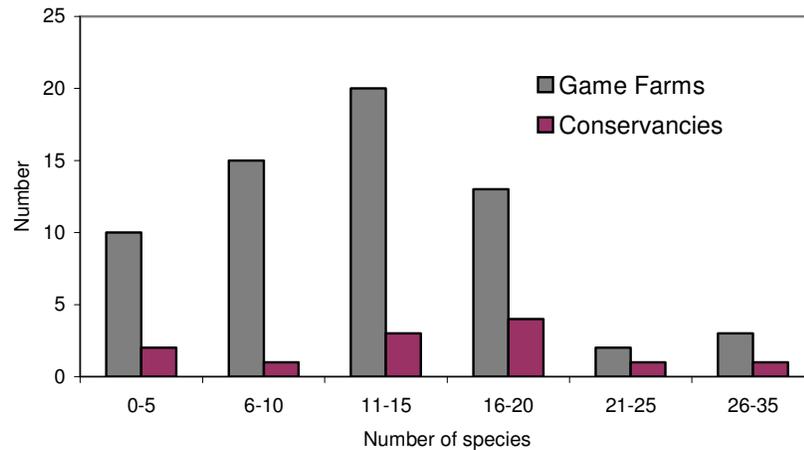


Figure 6: The number of game species occurring on game farms and conservancies.

Species abbreviations and status (indigenous or extra-limital) are listed in Table 3. The gradient from least to most common species recorded on game farms and conservancies, respectively, is illustrated in Figures 5 and 7. In both categories (game farms and conservancies), indigenous game comprised 68% of the total number of species listed (Tables 2 and 3). Due to the extent of the study area, some of the species listed as extra-limital may not be extra-limital across the entire planning domain. For example, black wildebeest may be indigenous to some of the more northern properties within the planning domain but not to the others. This requires further analysis.

Of the thirteen extra-limital species recorded on game farms (Table 2), three are genetic variants of indigenous species, and include the black springbok, white springbok and white blesbok (Table 3). The black impala, however, is a genetic variant of an extra-limital species and was thus primarily classed as extra-limital species for all analyses. Eighty-nine percent of the game farms surveyed, carried extra-limital species. This total included the genetic variants, which were recorded on 25 % of the properties. Genetic variants were not stocked independently of other extra-limital species on any of the properties.

Table 3: List of indigenous and extra-limital (including genetic variants) game species (n=41) encountered, with scientific names and abbreviations. Species are listed in taxonomic order.

Species Common Names	Scientific Names	Abbreviation
Elephant	<i>Loxodonta africana</i>	EL
Mountain Zebra	<i>Equus zebra</i>	MZ
Burchell's Zebra	<i>Equus burchellii</i>	BZ
Black Rhino	<i>Diceros bicornis</i>	BR
Hippopotamus	<i>Hippopotamus amphibius</i>	HI
Bushpig	<i>Potamochoerus porcus</i>	BP
Warthog	<i>Phacochoerus aethiopicus</i>	WH
Black Wildebeest	<i>Connochaetes gnou</i>	BLW
Red Hartebeest	<i>Alcelaphus buselaphus</i>	RH
Bontebok	<i>Damaliscus dorcas</i>	BO
Blesbok	<i>Damaliscus dorcas phillipsi</i>	BL
Blue Duiker	<i>Philantomba monticola</i>	BD
Common Duiker	<i>Sylvicapra grimmia</i>	CD
Common Springbok	<i>Antidorcas marsupialis</i>	CS
Klipspringer	<i>Oreotragus oreotragus</i>	KS
Oribi	<i>Ourebia ourebi</i>	OR
Steenbok	<i>Raphicerus campestris</i>	ST
Grysbok	<i>Raphicerus melanotis</i>	G
Grey Rhebok	<i>Pelea Capreolus</i>	GR
Gemsbok	<i>Oryx gazella</i>	GE
Buffalo	<i>Syncerus caffer</i>	BU
Kudu	<i>Tragelaphus strepsiceros</i>	KU
Bushbuck	<i>Tragelaphus scriptus</i>	BB
Eland	<i>Taurotragus oryx</i>	E
Southern Reedbuck	<i>Redunca arundinum</i>	SR
Mountain Reedbuck	<i>Redunca fulvorufula</i>	MR
Cheetah	<i>Acinonyx jubatus</i>	CH
Lion	<i>Panthera leo</i>	LI
Extra-limital species		
White Rhino	<i>Ceratotherium simum</i>	WR
Giraffe	<i>Giraffa camelopardalis</i>	GI
Blue Wildebeest	<i>Connochaetes taurinus</i>	BW
Impala	<i>Aepyceros melampus</i>	IM
Black Impala (also a Genetic Variant)	<i>Aepyceros melampus petersi</i>	BI
Sable	<i>Hippotragus niger</i>	SA
Nyala	<i>Tragelaphus angasii</i>	NY
Waterbuck	<i>Kobus ellipsiprymnus</i>	WA
Lechwe	<i>Kobus leche</i>	LE
Fallow deer	<i>Dama dama</i>	FD
Genetic Variants		
White Blesbok	<i>Damaliscus dorcas phillipsi</i>	WB
Black Springbok	<i>Antidorcas marsupialis</i>	BS
White Springbok	<i>Antidorcas marsupialis</i>	WS

Of the 34 species recorded on the twelve conservancies surveyed, eleven were extra-limital and include the three genetic variants, black springbok, white springbok and white blesbok. Extra-limital species were recorded on 83 % of the conservancies surveyed. This total includes the genetic variants,

which were recorded on 58 % of the properties. One property carried black springbok, but had no other extra-limital species.

Game farming has been described as a potential ecologically sustainable form of land use (e.g. Kerley *et al.* 1995), however, the introduction of extra-limital species may threaten this state (Castley *et al.* 2002). Limited guidelines exist for game ranching in conjunction with stock farming, let alone for the practice of farming with both indigenous and extra-limital game species.

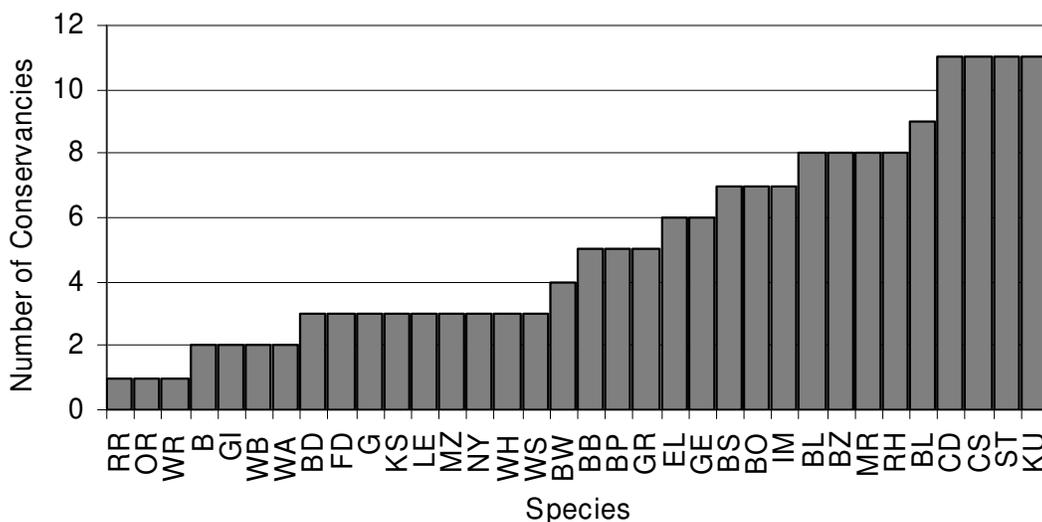


Figure 7: Distribution of species on conservancies. Refer to Table 3 for species codes.

The introduction of extra-limital species has a strong origin in the foreign ecotourist and hunting market. In order to guarantee tourists satisfaction, farmers have found it necessary to game-proof fence their farms with the purpose of introducing “hunting” or “tourist” species, whether indigenous or extra-limital. The introduction of extra-limital species has been vital to this industry as the “low indigenous diversity” has been described by local game farmers as “unsatisfactory to overseas visitors”, be they ecotourists or hunters. Kudu and bushbuck, both indigenous to thicket vegetation, are among the most desired hunting species in the Eastern Cape. Promotion of these animals as hunting species may promote ecologically sound farming practices, without the introduction of extra-limital species.

The high expectations from ecotourists and hunters concerning their need to see/hunt a diversity of game species may well lead to ‘unacceptable’ ecotourism. Clearly, these expectations may be driving the diversity of game species (both indigenous and extra-limital) observed in the STEP project domain. Tisdell (2001), in assimilating Ceballos-Lascurian’s definition of ecotourism, describes

‘unacceptable’ ecotourism as the exploitative use of nature for tourism. He listed recommendations that should be placed on tourism to make it acceptable, one of which is the necessity for environmental education. Relative to concerns expressed in this report, it could involve the development of programmes educating ecotourists about the different bioregions of South Africa, each of which supports a unique community of indigenous game species.

Over and above the motivations mentioned for game introductions, farmers have had to take into account the genetic conservation of species and have noted that the active management of a population’s gene pool, especially on small fenced farms, is a growing concern. Jooste (2001), in discussing ecologically sustainable game practices, warned against the dangers of allowing certain species to hybridise by keeping such species in the same fenced area. This warning, however, has not always been heeded. At the time of the survey, 15 game farmers (23%) had both Blue- and Black Wildebeest on their property, and eight game farmers (12.5%) both Blesbok and Bontebok. This has raised concern in the conservation and scientific communities as both pairs of species have the ability to hybridise. Thus, the stocking of genetic variants within closed (fenced) populations may have negative implications for the genetic conservation of the species.

Most farmers expressed a positive attitude towards game farming and are trying to implement conservation measures. However, many of them have been stock farmers their whole lives and therefore their approach to game farming might inadvertently be skewed towards principles applied in stock farming. In these cases, and especially where farmers have small properties, cooperation between neighbours should be a vital consideration for the ethical and sustainable farming of game.

Grossman *et al.* (1999) assessed the difference in veld management on a game ranch as opposed to that on a nature reserve, and concluded that on game farms “production-related considerations will dictate management, whereas in nature conservation, prevailing paradigms such as the maintenance of biotic diversity and natural ecological processes, will take precedence”. In support of this argument, this study established that economic incentives, rather than ecological incentives, dictated game management. However, many private landowners have started to notice the visible improvement in veld condition since their game introductions, and this is serving as a motivation to promote veld restoration.

Game farming has strong roots in both conservation and agriculture, but Bothma (1990) argued that actually neither of these apply and it “occupies a central position between them”, with principles and issues unique to itself. Game farming should, consequently, be developed and marketed as such in order to assure sustainable land use practices.

6. UTILISATION

In the mid 1980s only 14% of South African game ranchers derived income solely from game, while 73% of them let friends and family hunt game free of charge and, surprisingly, 38% derived no income at all from their game (Benson 1989, in Bothma 1990). With respect to the hunting industry, only 40 % of game ranchers derived income from professional hunting practices and only 10 % of them charged market related fees (Benson 1989, in Bothma 1990). These statistics are starkly contrasted by recent findings, as outlined below.

The Eastern Cape has been recognised as the most preferred destination for overseas hunters. For example, during the period 1 November 1999 to 31 October 2000, a total of 1002 professional hunters hunted a total of 7915 animals (Sims-Castley 2002). During the 2000/2001 season, this number increased to 8943 animals, generating funds in excess of R44 million. The present study found that the main activity, for which game is utilised, on both game farms and conservancies, is hunting (Figure 7) and this includes both recreational and trophy hunting. It is the latter which has proved especially successful in attracting foreign interest. Els (1994) stated that by introducing trophy hunting on game farms, the value of the harvesting of game increased by 14%. In order to maximise income derived from game, most properties combined hunting with both the processing of meat and live game sales.

On 20 of the 63 game farms ecotourism activities are combined with that of hunting (Figure 8). Despite the fact that ecotourism and hunting are mutually exclusive (on a single property at the same time), such a combination of hunting and ecotourism is made possible due to the strong seasonality of the former. Ecotourism activities therefore take precedence during the closed hunting season on these properties. Although twelve of the game farms ran only non-consumptive ecotourism activities, this was not the case for any of the conservancies. None of the conservancies ran ecotourism activities in the absence of hunting (Figure 8), and three of the 12 conservancies combined hunting with ecotourism activities.

Attention has been drawn to the development of the ecotourism sector in South Africa. It is, potentially, the area of the economy in which environmental sustainability and job creation could be combined most effectively, especially in less developed regions (Weaver 1998). This is supported by figures stipulating that, already, 50 % of foreign tourists to South Africa visited game reserve attractions while in the country, whilst according to the 1996 South African Tourism Domestic Survey, 2% of domestic holidaymakers' main destination has been a game reserve or national park (Thornton and Feinstein 2000). This equates to around 61000 domestic game reserve holiday trips per year.

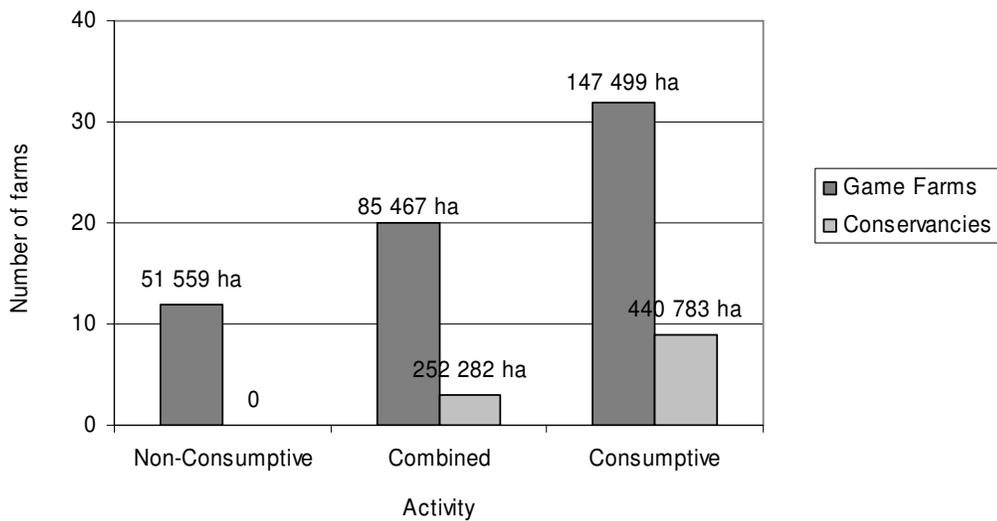


Figure 8: Game-related activities on both game farms and conservancies. “Non-consumptive” means all activities not related to the removal of animals off a property, e.g. ecotourism, while “consumptive” includes such activities as hunting and live game sales. The area figures presented reflect the total area of farms on which such activities are practised.

A recent financial report indicated how a private ecotourism initiative in the Eastern Cape has turned a stock farming operation into a successful ecotourism venture that employs about 240 people and generates an income of about R35-million a year, which equates to a gross annual income of over R1900/ha (Sims-Castley 2002). Although the former may be an extreme example, other indications are that changes in land use from stock- to game-farming enterprises have enabled landowners to quadruple their annual income per hectare (Sims-Castley 2002).

7. CONCLUSION

It has been recognised that traditional (national and provincial) protected areas can only partially contribute to realistic targets for biodiversity conservation. The management of private land, on the other hand, can significantly contribute to these targets, as farming with game has the potential to be more ecologically and economically sustainable than farming with livestock. Knight (1999) identified the “private sector” as a vital focus point in current efforts towards restoring the planet’s health. He raised the suggestion that the recognition of ways to use private lands, whilst simultaneously conserving their natural heritage, should be of primary concern.

Clearly the switch in land use from stock farming to game farming within the STEP planning domain is a reality that is currently largely market driven. Stock farmers are diversifying their options in order to stay on the land; with the result that game-based industries are expanding at a rapid rate. Overall this is a positive trend because if properly managed the game-based industries have the potential to be far more ecologically sustainable than stock farming (see Grossman 1991). Current indications are that this industry is still spatially expanding, which has important implications for both social and

economic development in the Eastern Cape. The contents of this report confirm the suggestions made in previous studies, namely that on private land, game farming is potentially sustainable, in ecological, economic and social terms. However, further research into the possible economic and social impacts of game farming, as well as the ecological implications of grazing and browsing capacity estimates, are needed in order to emphasise and develop this potential.

8. ACKNOWLEDGEMENTS

This project was funded through the conservation planning component of the Subtropical Thicket Ecosystem Planning (STEP) Project. Sincere thanks are extended to Profs G.I.H. Kerley and R.M. Cowling, and Dr. A.F. Boshoff, for their encouragement and ongoing assistance. Thanks also go to Joki le Roux and Allette Ollermans of the ECGMA for information and assistance. The help and direction obtained from provincial nature conservation officials played a fundamental part in the design of this project. It is not practical to mention the numerous people who provided the necessary information and assistance during this study, but sincere gratitude is extended to all who contributed.

9. REFERENCES

- BUYS, D & J. PAUW 1991. Survey of the abundance and distribution of game in the Eastern Cape. *Pelea* 10: 133-140.
- CASTLEY, J.G., BOSHOFF, A.F. & KERLEY, G.I.H. 2001. Compromising South Africa's natural biodiversity – inappropriate herbivore introductions. *South African Journal of Science*. 97: 344-348.
- FOURIE, B. 2000. Jaggeleenthede in die Oos-Kaap. *Landbou Weekblad*. 4 Augustus.
- GLAZEWSKI, J. 2000. Environmental law in South Africa. Butterworths, Durban.
- GROSSMAN, D. 1991. Game ranching – a lucrative, easy option ? *Pelea*. 10: 111-114.
- GROSSMAN, D., HOLDEN, P.L. & R.F.H. COLLINSON 1999. Veld management on the game ranch. In: *Veld management in South Africa*. N. Tainton (Ed.) University of Natal Press, Pietermaritzburg. Pp 261-279.
- JOLLIFFE, D. 2001. Is game ranching/farming an alternative or additional form of land use (part 1-4). *Karoo Advertiser*. Jan 2001.
- JOOSTE, C. 2001. Eko-benadering werk vir wildplaasbestuur. *Landbou Weekblad* 26 January.
- KERLEY, G.I.H., KNIGHT, M.H. & M. DE KOCK 1995. Desertification of subtropical thicket in the Eastern Cape, South Africa: are there alternatives? *Environmental Monitoring Assessment* 37: 211-230.
- KNIGHT, R.L. 1999. Private lands: the neglected geography. *Conservation Biology* 13(2): 223-224.
- KNOTT-CRAIG, A. 2000. Graaff-Reinet is a throbbing, pulsating, dynamic economy. *The Graaff-Reinet Advertiser*. 16 March.
- MILTON, S.J. and DEAN, R.J. 1995. South Africa's arid and semiarid rangelands: why are they changing and can they be restored? *Environmental Monitoring and Assessment*. 37: 245-264.
- PRESSEY, R.L. & COWLING, R.M. 2001. Systematic conservation planning for the Subtropical Thicket Ecosystem Planning project: a conceptual and methodological basis. *Terrestrial Ecology Research Unit*. Report No. 32. 57 pp.
- POTGIETER, L. 2001. Baie wild – min jagters. *Landbou Weekblad*. 5 Januarie.
- TISDELL, C. 2001. *Tourism economics, the environment and development: analysis and policy*. Edward Elgar Publishing Ltd. Cheltenham, UK.
- VAN DER WAAL, C. & B. DEKKER 2000. Game ranching in the Northern Province of South Africa. *South African Journal of Wildlife Research* 30(4): 151-156.
- VAN ROOYEN, C. 1998. Wild by beeste kan wenspan vorm. *Landbou Weekblad*. 23 Januarie.
- SIMS-CASTLEY, R. 2002. A Preliminary review of gross financial incomes generated by industries dependent on thicket vegetation. *Terrestrial Ecology Research Unit*. Report No. 37: 19pp.
- UNITED NATIONS. 1992. The global partnership for environmental and development: a guide to Agenda 21. United Nations Conference on Environment and Development, Genève.
- HALSE, A.R.D. 1983. A look at game farming in the Eastern Cape. *Pelea*. 2: 85-89.
- DU P. BOTHMA, J. 1990. Game ranching – an agricultural enterprise? *Pelea*. 9: 97- 102.
- WEAVER, D.B. 1998. *Ecotourism in the less developed world*. CAB International, Oxon.

10. APPENDIX 1: List of sourced people

NAME	TYPE OF CONTACT	AREA OF INTEREST
PRIVATE		
Botha, George	Chairman of Somerset East Farmers Ass.	Somerset East
Coetzee, Ken	Environmental Consultant	George
Cohen, Mike	Consultant	Port Elizabeth and wider Eastern Cape
Cole, Nicholas	"Lombard, Wolf & Cole" consultants	Knysna / George
de Vos, Wouter	Suidkaap Jagters	Stormsriver
Dryer, Johan	Game farm manager	Albany
Frost, Philip	Knows Kirkwood area well	Kirkwood, Uitenhage
Greeff, Pieter	Saasveld	Western Cape
Jone Philipson, Cecil	Chairman of Conservation Committee	Bathurst & Grahamstown (GHT)
Jordaan, Tollie	Stock Farmer and Outfitter	Somerset East - "Grootvlakte"
Kirkman, J.D.	Knows area well	Steytlerville
Lombard, Mandy	"Lombard, Wolf & Cole" consultants	Knysna / George
Mills, Paul	Rep	Salem to Humansdorp
Ollemans, Louis & Alette	East Cape Game Traders	Greater Eastern Cape
Palmer, Tony	Agricultural Research Institute	Grassland Society, GHT
Peacock, Cathy & John	Taxidermist	Humansdorp
Pienaar, Jan	Sales agent for East Cape Game Traders	Port Alfred
Pietersen	Deputy president of Agri EC	Humansdorp
Ross, Noel & Janet	Winterberg conservancy	Bedford - Tarkastad
Stretton, Robby	Outfitter	Tarkastad
van der Walt, Albert	"Somerset Budget" newspaper	
van der Westhuizen, Gert	Extensive knowledge on wider area	Fort Beaufort
Vlok, Jan	Consultant	Oudtshoorn
Wolf, Trevor	"Lombard, Wolf & Cole" consultants	Knysna / George
EAST CAPE GAME MANAGEMENT ASSOCIATION (ECGMA)		
Debbie	Office	
le Roux, Jokl		
Thompson, P.J.	Chairman	
Joubert, S.J. (Dr.)	Vice chairman	
Lombard, Theo	ECGMA Hunting Club	
TECHNIKON, PORT ELIZABETH		
Rudder, Letitia	Lecturer	Dept. Marketing
van Niekerk, Pieter	Postgraduate student	Economics of game farming
PROVINCIAL CONSERVATION AGENCIES		
Basson, Braam		Graaff Reinet
Sonuka		Graaff Reinet
Hahndiek, Quintis		Grahamstown
Manyakayaka, Sityebe		Grahamstown
de Jong, Tim		Queenstown
Youthed, Jenny		Queenstown
Ferreira, Gerrie		Humansdorp
Swanevelder, Hennie		Humansdorp
Eksteen, Mike		Port Elizabeth
Southwood, Alan		Port Elizabeth
Kapp, Jan		Port Elizabeth
Hannon, Rick		East London
Fryer, Mike		East London
Marshall, Tony		George
Sharples, Justine		George

Oelofse, Johan		George
Crazette		Oudtshoorn
de Villiers, Riki	Scientific Services	Jonkershoek
Pienaar, Jaap	Special investigations	
FARMER'S ASSOCIATIONS		
Schenk, Raymond		Bathurst
Dickson, Glyn		Coombs
Tyson, Bryan		Salum
Potgieter, Christo		Alexandria
Biggs, Trevor		Committees
Joubert, Gideon		Glen Connor
Nel, Schalk		Kleinpoort
Ehlers, H.		Kirkwood
Pietersen, G.		Winterhoek
Lovemore, R.		Nanagga
Lombard, Kobus		Paddafontein
Kritzinger, W.		Zuurberg

11. APPENDIX 2: Game farm and conservancy names.

NUMBERS LISTED IN TABLE ARE INDEX NUMBERS FOR THE VARIOUS FARMS AS DISPLAYED IN FIGURES 2 AND 3.

GAME FARM NAME	NUMBER	GAME FARM NAME	NUMBER
Amakhala Game Reserve	1	Rockdale Game Ranch	47
Sante Sana Game Reserve	2	Rupert	48
Aylesbury Nature Reserve	3	Samara Private Game Reserve	49
Bamboeshoek Game Farm	4	Schuilpatdop	50
Bayeti Game Reserve	5	Schotia Safaris	51
Blaawbosch	6	Seaview Game Park	52
Botlierskop Game Farm	7	Shamwari Private Game Reserve	53
Brakkefontein	8	Springerbaai Ecocoastal Estate	54
Buchanon	9	Sunnyside Game Farm	55
Buffalo Hills Game Reserve	10	Thaba Manzi	56
Carnarvon Estates	11	Thorn Bush Ranch	57
Coleridge Game Reserve	12	Timbili Game Reserve	58
De Hoop Game Farm	13	Tregathlyn	59
Doorn Boom Game Farm	14	Trumpeter's Drift	60
East Cape Game Traders	15	Voetpadskloof	61
Elephant Park	16	Vrolykheid	62
Emlanjeni Private Game Reserve	17	Woodlands Game Reserve	63
Fourie Safaris	18		
Frontier Safaris	19		
Glen Harry Game Reserve	20	CONSERVANCY NAME	NUMBER
Goodhope	21	Amandelhoogte	1
Great Kei Game Reserve	22	Baviaansriver	2
Hillside Safaris	23	Camdeboo	3
Hoeksfontien	24	Kat River	4
Hopewell Game Reserve	25	Noboya	5
Hunters Lodge	26	Post Retief	6
Hunts Hoek Safaris	27	Shambala	7
Inthaba Lodge	28	Smaldeel	8
Jumanji	29	Tantjiesberg	9
Kariega Park	30	Winterberg	10
Karoo Safaris	31	Winterhoek	11
Kingsdale	32	Witmoskloof	12
Klein Doorn Rivier Game Farm	33		
Koedoeskop Game Ranch	34		
Kragga Kamma Game Park	35		
Kuzuko Game Reserve	36		
Kwandwe Private Game Reserve	37		
Lalapa Bush Camp	38		
Lanka Safaris	39		
Lausanne	40		
Lombardi Game Farm	41		
Meisieskraal	42		
Minnawill Game Farm	43		
Monteaux Game Ranch	44		
Oudekraal	45		
Paardekop	46		

12. TERRESTRIAL ECOLOGY RESEARCH UNIT (TERU) REPORT SERIES

*Contract report (confidential)

- Geach, B.** 1995. Socio-economic and environmental aspects of land use in the Sundays River Valley: pastoralism vs conservation/ecotourism. *TERU Report 1*: 57 pp.
- Haschick, S.L. & Kerley, G.I.H.** 1995. Land use and proposed conservation of Valley Bushveld to the north-east of the Swartkops River. *TERU Report 2*: 18 pp.
- Kerley, G.I.H.** 1995. The terrestrial vertebrate fauna of Rein's Nature Reserve: inventories and management recommendations. *TERU Report 3*: 19 pp.*
- Kerley, G.I.H.** 1995. The mammals of Van der Kemp's Kloof. *TERU Report 4*: 6 pp.*
- Simelane, T.S.** 1996. A preliminary survey of the traditional natural resources in the Addo Elephant National Park. *TERU Report 5*: 12 pp.
- Vial, C.** 1996. Levels of expectation, requirements and satisfaction of visitors viewing wildlife at Addo Elephant National Park, South Africa. *TERU Report 6*: 22 pp.
- Kerley, G.I.H. & Watson, J.J.** 1996. Quail as a renewable resource in the Eastern Cape. *TERU Report 7*: 13 pp.
- Boshoff, A.F.** 1996. Roberts' Birds of Southern Africa : the "Millennium Edition", a synthesis of opinions on options for a seventh edition. *TERU Report 8*: 37 pp.*
- Boshoff, A.F.** 1997. A survey of the birds of the farm " New Bradford" and surrounding areas, with notes on the medium to large mammal fauna. *TERU Report 9*: 25 pp.*
- Boshoff, A.F. & Kerley, G.I.H.** 1997. Towards a conservation policy for the Eastern Cape: the function and management of protected areas. *TERU Report 10*: 8 pp.
- Boshoff, A.F. & Kerley, G.I.H.** 1997. A habitat suitability assessment for the introduction of elephant to the Sante Sana Game Reserve, Graaff-Reinet district. *TERU Report 11*: 15 pp.*
- Kerley, G.I.H. & Boshoff, A.F.** 1997. A habitat suitability assessment for the introduction of black rhinoceros to the Sante Sana Game Reserve, Graaff-Reinet district. *TERU Report 12*: 16 pp.*
- Boshoff, A.F. & Kerley, G.I.H.** 1997. Apieskloof Wildlife Area : Habitats, species and land use options. *TERU Report 13*: 17 pp.*
- Kerley, G.I.H. & Boshoff, A.F.** 1997. A habitat suitability assessment for the introduction of African buffalo to the Sante Sana Game Reserve, Graaff-Reinet district. *TERU Report 14*: 16 pp.*
- Kerley, G.I.H. & Boshoff, A.F.** 1997. Proceedings of a strategic planning workshop for Sante Sana Game Reserve. *TERU Report 15*: 20 pp.*
- Henley, S.** 1997. On the proposed reintroduction of serval (*Felis serval*) into the Great Fish River Reserve, Eastern Cape. *TERU Report 16*: 9 pp.
- Kerley, G.I.H. & Boshoff, A.F.** 1997. A proposal for a Greater Addo National Park: a regional and national conservation and development opportunity. *TERU Report 17*: 62 pp.
- Boshoff, A.F. & Kerley, G.I.H.** 1997. Comparison of alternative Eskom 400kv transmission line routes from Wolwefontein to Grassridge: potential effects on birds and mammals. *TERU Report 18*: 14 pp.*
- Boshoff, A.F. & Kerley, G.I.H.** 1997. Breeding and production options for a founder herd of African buffalo in the Apieskloof Wildlife Area. *TERU Report 19*: 16 pp.*
- Boshoff, A.F.** 1998. The predicted impacts of a proposed regional waste-water disposal scheme on the avifauna of the upper Blesbokspruit wetland (including the Ramsar site), Gauteng Province. *TERU Report 20*: 16 pp.*
- Boshoff, A.F., Kerley, G.I.H. & Geach, B.** 1998. A biophysical survey, ecotourism development feasibility study and site assessment for Tamboekiesvlei, Mpofo District, Eastern Cape Province. *TERU Report 21*: 64 pp.*
- Boshoff, A.F.** 1998. The Airports Company South Africa-Endangered Wildlife Trust strategic partnership: a project plan for a birdstrike hazard reduction programme. *TERU Report 22*: 48 pp.*
- Boshoff, A.F.** 1998. The predicted ecological impact of the termination of the water supply to the Rondebult Bird Sanctuary, Germiston District, Gauteng Province. *TERU Report 23*: 7 pp.*
- Boshoff, A.F. & Sigwela, A.** 1998. The predicted impacts of the construction and operation of the proposed Coega harbour on the birds of the Coega Estuary and Jahleel Island. *TERU Report 24*: 11 pp.*
- Boshoff, A.F. & Kerley, G.I.H.** (eds). 1999. Proceedings of a Greater Addo National Park Stakeholders Workshop: University of Port Elizabeth, 22-23 February 1999. *TERU Report 25*: 58 pp.
- Boshoff, A.F. & Kerley, G.I.H.** 1999. Conservation planning in the Cape Floristic Region: Distribution, conservation status and spatial population requirements of the medium- to large-sized mammals. *TERU Report 26*: 141 pp.*

- Boshoff, A.F., Cowling, R.M. & Kerley, G.I.H.** 2000. The Baviaanskloof Conservation Area: A conservation and tourism development priority. *TERU Report 27*: 35 pp.
- Henley, S.** 2000. The Baviaanskloof Conservation Area: Opportunities for the conservation of Cape mountain zebra and leopard. *TERU Report 28*: 14 pp.*
- Cowling, R.M. & Heijnis, C.E.** 2000. An assessment of the conservation value of potential World Heritage Sites in the Cape Floral Kingdom. *TERU Report 29*: 48 pp.
- Boshoff, A.F.** 2000. The potential impacts of a proposed Eskom powerline, between Poseidon and Grassridge sub-stations, on the terrestrial fauna (excluding the avifauna). *TERU Report 30*: 31 pp.*
- Boshoff, A.F.** 2000. The suitability of the Keurbooms River Mouth as a possible site for the construction of a small boat harbour at Plettenberg Bay. *TERU Report 31*: 8 pp.*
- Pressey, R.L. & Cowling, R.M.** 2001. Systematic conservation planning for the Subtropical Thicket Ecosystem Planning (STEP) Project: a conceptual and methodological basis. *TERU Report 32*: 57 pp.*
- Boshoff, A.F., Kerley, G.I.H., Cowling, R.M. & Wilson, S.L.** 2001. Conservation planning in the Greater Addo National Park: The potential distributions, and estimated spatial requirements and population sizes, of the medium- to large-sized mammals. *TERU Report 33*: 87 pp.*
- Boshoff, A.F., Kerley, G.I.H., Cowling, R.M. & Wilson, S.L.** 2001. Conservation planning in the Greater Addo National Park: A review of the species-, population- and spatially-driven processes involving the medium- to large-sized mammals. *TERU Report 34*: 13 pp.*
- Kerley, G.I.H., Wilson, S.L. & Massey, A.** 2002. Elephant conservation and management in the Eastern Cape. Workshop Proceedings. *TERU Report 35*: 88 pp.
- Cowling, R.M. & Kerley, G.I.H.** 2002. Subtropical Thicket Ecosystem Planning (STEP) project: Identity, spatial components, and estimation of irreplaceability of processes required, to sustain biodiversity. *TERU Report 36*: 17 pp.
- Sims-Castley, R.** 2002. A preliminary review of gross financial incomes generated by industries dependent on thicket vegetation. *TERU Report 37*: 20 pp.