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The role of land claim facilities in the
conservation of Oribi in South Africa

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“Reconnecting people and nature”

INDEX

ABSTRACT	7
INTRODUCTION	9
1. LITERATURE REVIEW ON ORIBI.....	13
1.1. Taxonomy and morphology	13
1.2. Distribution	14
1.3. Phylogenetic and Phylogeography	15
1.4. Population viability assessment	17
1.5. Habitat and Nutritional Requirements	20
1.6. Conservation	22
1.4.1. IUCN Classification	22
1.4.2. Oribi Working Group.....	24
2. ANALYSIS AND DISCUSSION OF THREATS.....	25
2.1. Habitat destruction – loss and fragmentation.....	25
2.2. Lack of awareness by landowners on the value of the species	26
2.3. Lack of understanding of the value of grassland.....	27
2.4. Lack of incentives to landowners.....	28
2.5. Overexploitation – Illegal Hunting and commercial trade.....	29
3. THE WIDER CONTEXT OF SOUTH AFRICAN LAND REFORM.....	31
3.1. Land reform and biodiversity conservation in South Africa: towards joint management	32
4. CASE STUDY: HIGHOVER LAND CLAIM	34
4.1. Highover after the land claiming.....	36
4.2. Objectives of Conservation Guardians in the mentoring of Highover.....	37
4.3. Highover action plan strategies.....	38
CONCLUSIONS.....	41
Bibliography	43

ABSTRACT

The majority of biodiversity in South Africa sits in the hands of private owners, which have the task to manage and protect it. Due to the complex political and social situation, this is not always possible and achievable and most of the times the consequence is a bad habitat management, causing damage to species. In this dissertation the case of the antelope specie Oribi (*Ourebia ourebi*), which is considered the most threatened antelope species in South Africa will be analysed. Distribution, population dynamics, genetics and threats are going to be investigated, using the species as a flagship to draw attention on grassland ecosystems importance. Through the case study of Highover Land Claim, the social and political situation of the country will be highlighted, driving the attention towards the fact that conservation is not only about biology and single species, but about whole habitats and about the involvement and active participation of people and institutions. The only effective solution to protect Oribi and threatened species, eventually, is through biodiversity-value education and through application of circular sustainable economies involving the totality of the stakeholders for the purpose of entire ecosystems protection.

INTRODUCTION

Life on Earth is undergoing its sixth major extinction crisis (Child et al., 2017), an anthropogenically driven event that is comparable to prehistoric mass extinctions (Isaac et al., 2007). We must understand the risk of each species becoming extinct to prioritise conservation efforts and allocate scarce resources effectively (Child et al., 2017). Worldwide attention and finances are, unfortunately, insufficient to protect most of the world's threatened biodiversity, therefore preference is given to the most charismatic species. Global conservation priority-setting focuses on an animal-centric vision, using terms such as 'umbrella' or 'keystone' species, or species having a significant economic, scientific or cultural value (Isaac et al., 2007). The attention of the media is withdrawn from small realities in which there's an urgency, and there's still a possibility for conservation to make a difference. Most of the times we forget that extinctions occur regionally before globally (Child et al., 2017).

South Africa has been ranked the third most biologically diverse country on Earth based on an index of species diversity and endemism and is one of the 12 megadiverse countries which collectively contain more than two-thirds of global biodiversity (Child et al., 2017). Its wide range of bioclimatic, oceanographic, geological and topographical settings create high ecosystem diversity and endemism across terrestrial, freshwater and marine ecosystems (Department of forestry, fisheries and the environment, 2022). South Africa's diversity and richness are not limited to biodiversity, and exceptional geological and climatic variety, but include numerous cultures and eleven officially recognised languages (Department of forestry, fisheries and the environment, 2022). Conserving the nation's living heritage, biodiversity and natural capital would mean protecting an important portion of the global heritage.

In this dissertation, contradictions and conflicts in the conservation environment will be discussed, taking as a model the threatened antelope *Oribi* in the South African context.

The oribi (*Ourebia ourebi*) is the most threatened antelope species in South Africa (Patel, 2015). Oribi are small, highly specialized antelopes, totally reliant on grassland ecosystems for their survival (Coverdale et al., 2006). Only the subspecies *Ourebia ourebi ourebi* is recognised in South Africa, but considering the regional differences in body size and colouration, 11 Oribi subspecies have been suggested in the whole African

continent (Shrader et al., 2016), with a 12th subspecies considered extinct having previously occurred in a restricted range on the lower slopes of Mount Kenya (*O. o. Kenyae*) (Phukuntsi et al., 2022). However, this classification is not internationally officially recognised, because in the *IUCN Red List* only the global population is considered, and the conservational status of *Oribi* and its taxonomic diversity is not receiving the correct attention. Efforts have been made by South Africa to deem the correct conservational status of *Oribi*. In fact, in the *Red list of Mammals of South Africa, Swaziland and Lesotho* of 2016, *Oribi* status has been raised from *least concern* to *endangered* (Child et al., 2017). The *Oribi Working Group*, composed of enumerated experts, is working to develop and actively implement a conservation strategy to ensure the long-term survival of the species and reverse the negative trend of the *Oribi* population in the country, while managing the threats faced by *Oribi* (Coverdale et al., 2006). Habitat loss, population fragmentation, land mismanagement, illegal hunting, poor law enforcement and poor knowledge and awareness are just some of the threats faced by *Oribi*. Social and political problems, corruption, conflicts of interests give their contribution to the challenges already faced by conservationists. The key turning point is to understand that conservation in South Africa is intrinsically connected to the Nation's turbulent past, especially regarding land ownership rights, that still today is the main driver of the observed inequality, and disorder present at all levels of the society (Kepe et al., 2010). Biodiversity rich areas are often in the hands of private landowners that have no idea on how to manage such places for the benefits of both conservation and sustainable development of the land. Moreover, poor rural communities land rights are in conflicts with biodiversity conservation goals, and this just results in delaying the process of solving land-claim issues and hindering any kind of sustainable economic development, as well as preventing the realization of conservation initiatives. Co-management as a strategy for achieving Land Reform objectives whilst preserving biodiversity is still far from being successful and needs concrete solutions to be implemented (Kepe et al., 2010).

The case study on *Highover* Land Claim is described as a representative of the other several (thousands) land claims in South Africa, in which the conservation of *Oribi*, but on a larger scale, of the biodiversity in general, is hampered by a series of constraints. Considered a biodiversity rich area and possessing the right habitat for *Oribi*, *Highover*

and surroundings would be the perfect place to implement a conservation strategy for this species. However, the current owners, the institutions and the neighbouring rural community are not aware of the value of the land they inhabit, and have no interest in supporting conservation initiatives, unless they receive an economic benefit in return. With the help of the conservation agency that is mentoring the reserve today, an action plan for the area has been developed, with the direct involvement of the community in the area, having as ultimate goal the realization of conservation objectives, such as Oribi and Blue Swallow protection, and the development of a circular and sustainable economy model in the area.

1. LITERATURE REVIEW ON ORIBI

1.1. Taxonomy and morphology

Oribi is the largest and the more gazelle-like of its tribe *Neotragini* (Estes, 1991), that comprises up of the klipspringer, the steenbok and the dik-dik (Reilly, 1989). At the same time Oribi is the Africa's smallest grazing ungulate, and the largest of the dwarf antelopes in the family Bovidae (Tekalign et al., 2015).

The current taxonomic description of Oribi is the following (Groves 1993):

Order:	Artiodactyla
Family:	Bovidae
Sub-family:	Antilopinae
Tribe:	Neotragini
Genus:	Ourebia
Species:	Ourebia ourebi (Zimmerman, 1783)

Morphologically Oribi appear like small (12-14 kg) antelopes, with males having an average shoulder height of 580 mm and a weight of 14 kg. Sexual dimorphism is evident in that males are slightly smaller and lighter than females (2 kg heavier). Rams are also distinguished by straight horns of an average of 110 mm length with ridges at their bases (Phukuntsi, sanbi.org). The coloration is geographically variable, but generally upper body parts vary from bright rufous to fulvous colour, in contrast with the white underparts, rump patch, chin and line over the eyes (Estes, 1991). The coat is smooth and silky, longer along the back and with a distinctive wavy appearance. The tail is short, bushy, and generally dark in its upper part. Oribi has large ears, narrow and covered on the posterior side with short rufous hair and anteriorly and within, with long white hairs. Black spots are present beneath each ear (Coverdale et al., 2006).



Figure 1: Oribi male

Hairless patch of skin is visible below the ears and small hair tufts are visible on the knees (Reilly, 1989). Distinctive identification features comprise also white facial marks, such as those around the nostrils and the sickle-like marking above the eyes (Phukuntsi, sanbi.org).

1.2. Distribution

The historical distribution of the species through Africa is discontinuous in better-watered area of Northern and Southern Savanna.

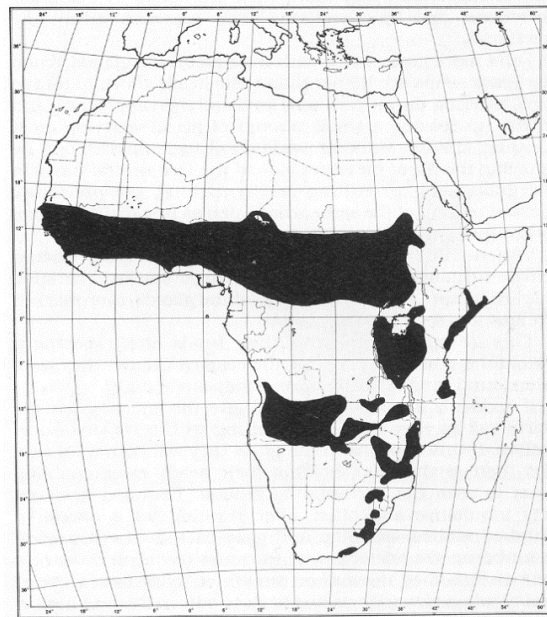


Figure 2: Distribution (shaded areas) of oribi *Ourebia ourebi* in the world to show the coincidence with the savannas and grasslands of Africa (Reilly, 1989)

In South Africa the current range of the species is probably similar to its historical one, occurring extensively in the provinces of Mpumalanga, Eastern Cape and Kwa-Zulu-Natal. Few subpopulations are present in southern and north-eastern Free State and southern Limpopo. There is one subpopulation on a protected land in North West Province and another in the Vredefort Dome Granite grasslands (Shrader et al., 2016). Oribi minorities also occur in some regions of Swaziland. In addition, they can marginally occur in Lesotho, since habitat is connected with the largest of the subpopulations found in the Maloti-Drakensberg Transfrontier Park (Shrader et al., 2016).

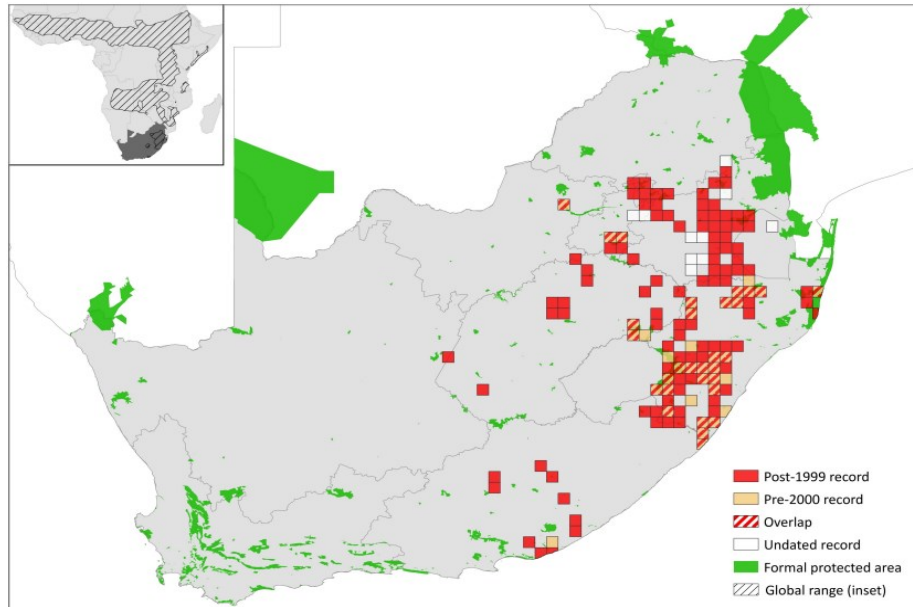


Figure 3: Distribution records for Oribi in the state of South Africa (Shrader et al., 2016)

1.3. Phylogenetic and Phylogeography¹

The taxonomic description of the proposed Oribi subspecies is still under study (Coverdale et al., 2006). Even though species delineation is crucial for the implementation of appropriate and targeted conservation management practices, the current Oribi taxonomy is mainly based on morphological variations in body size and colouration across African continent (Phukuntsi et al., 2022). East African animals appear larger and darker compared to the Western, Northern and Southern conspecifics (Coverdale et al., 2006), but the validity of these subspecies requires further molecular genetic investigations. Species or subspecies delimitation is challenging and requires a multidisciplinary approach that uses morphological, genetic, and ecological data (Phukuntsi et al., 2022).

To date, only two published studies have analysed the genetic diversity in the South African oribi antelope “*O. o. ourebi*” (Phukuntsi et al., 2022). *Van Vuuren* in 2017

¹ *Phylogenetics* and *phylogeography* aim to understand the diversification patterns of organisms and their shared biogeographic histories by analyzing molecular and morphological characters using computational technology. *Phylogenetic* is the study of the evolutionary history and relationships among or within groups of organisms. *Phylogeography* is the study of the link between geography and intraspecific genetic diversity (lsa.umich.edu).

performed a phylogenetic analysis investigating the genetic relationship between *O. o. ourebi*, the geographically closest oribi subspecies *O. o. hasata* (from Zimbabwe) and the sister species steenbuck (*Raphicerus campestris*) as an outgroup (Van Vuuren et al., 2017). One nuclear and two mitochondrial DNA regions were used as targets to infer conclusions on phylogenetic relationships. After DNA extraction, PCR amplifications and DNA sequencing, inter- and intra-specific sequence distance for the different targets was calculated (see *Jansen van Vuuren, Rushworth & Montgelard 2017, Phylogeography of oribi antelope in South Africa: evolutionary versus anthropogenic panmixia, African Zoology*, for materials and methods). Conclusions were drawn from genetic distance calculated for the mitochondrial *cytochrome b* gene region: the two oribi subspecies resulted to be too divergent for being considered conspecific entities. Sequence divergence separating *O. o. ourebi* from *O. o. hasata* turned out to be around 13%, while resulting in around 12% separating *O. o. ourebi* and steenbuck (Van Vuuren et al., 2017). At the same time the highest sequence divergence in the selected targets within *O. o. ourebi* across its distribution range in South Africa resulted in less than 2% (Van Vuuren et al., 2017).

In the other genetic study, conducted by *Dalton et al.* in 2020, analysing three forensic cases for molecular identification of species, genetic divergence for cytochrome b (cyt b) gene region within *O. o. ourebi* was assessed at 2,7%.

The genetic results emerged from these two researches highlight that relationships among and within oribi subspecies should be further investigated, but a precautionary treatment of the South African subspecies as a distinct lineage with its own unique evolutionary trajectory is valid (Phukuntsi et al., 2022). Even though the taxonomy of the species has not been officially reassessed yet, findings establish that *O. o. ourebi* must be considered as a single taxonomic unit (be that at species or subspecies level), genetically different from the rest of African conspecifics (Phukuntsi, sanbi.org). This is therefore the appropriate unit for conservation management and can confidently be referred to as an *Evolutionary Significant Unit (ESU)* (Van Vuuren et al., 2017). This is already an important clarification, but it would be worth to go into depth, since species may consist of populations representing by themselves evolutionary significant units and requiring specific conservation efforts (Phukuntsi et al., 2022). Oribi in South Africa show a high genetic diversity, but no phylogeographic structure has been reported,

therefore suggestions of small-scale geographic relevant genetic difference inside the country is still unfounded (Shrader et al., 2016). In other words, currently there's no evidence for geographical structure underlying the observed genetic diversity within the South African population and no genetically distinct populations can be identified (Coverdale et al., 2006).

To date, all Oribi in South Africa are assumed to belong to a single *panmictic*² healthy population (Shrader et al., 2016). The most accredited hypothesis is that oribi population was once spatially united, and then, due to the heterogeneous landscape linked to habitat fragmentation, the variable climate across the (sub)continent and possibly the human-mediated translocations, geographic isolation has occurred and is considered now the main driver of the recorded genetic diversity and structure (Van Vuurer et al., 2017). Adequate genetic diversity in South African oribi population is therefore considered to be representative of a healthy structure, fundamental to enable the species to adapt in a rapidly changing environment impacted by anthropogenic-induced stressors and climate change (Phukuntsi et al., 2022).

South African specimens (*O. o. ourebi*) as a single population, will be the element of analysis of this dissertation, because being proved that they possess a distinct ancestry from the rest of the African Populations, they require concrete efforts for the conservation of their unique traits (Phukuntsi, sanbi.org).

1.4. Population viability assessment

In South Africa, the majority of oribi antelope (*O. o. ourebi*) occur on private rangelands as broadly distributed and highly-fragmented populations. For this reason, to properly manage this species, conservation organizations rely on citizen science-led conservation initiatives, whereby landowners voluntarily provide data on oribi population demographics and potential threats (Patel, 2021). Since 2001 the *Oribi Working Group* (see chapter 1.6.) has been distributing surveys to private landowners and protected areas, in which information on age, sex, population trends, perceived threats and property details were asked. Initially surveys were conducted biennially, but since 2010 they have been conducted annually. Thanks to these counts, nowadays OWG is able to maintain a database containing standardized data on Oribi population in South Africa

² *Panmixia* means random mating. In a panmictic population all individuals are potential partners.

(Patel, 2015). However, there are some major concerns, including the lack of expert validation, the poor accuracy of the data collected and the lack of participation and consistency from many sites, which can be explained by the frequent distrust between private landowners and conservation organisations, the little knowledge about oribi and their habitat requirements and the quality of the project design (surveys). All this has as result a difficulty in obtaining long-term monitoring data from oribi sites; as a consequence, it is hard to accurately assess population trends and almost impossible to determine if any changes in conservation management have influences on oribi demographics (Patel, 2021). Although population trends data will always be highly influenced by the number of returned surveys and by the quality of the records, estimations done with the possessed data, are the only available results. Population estimations are therefore to be considered dependent on landowners' knowledge and attitudes towards oribi management and oribi conservation efforts (Louw, 2019).

Data suggest that 75% of oribi population is found on private owned lands across South Africa, with 45% of the population in the province of Kwa-Zulu-Natal (Louw et al., 2021), in which the private sites are 74%. Overall, to date, no subpopulation is likely to harbour more than 250 mature individuals. The total minimum count for 2013-2015 is 3,098 specimens, of which 60/70% is assumed to be mature population structure distributed in at least 231 subpopulations in the country (Shrader et al., 2016).

Information on the population trends are approximative, due to the way census have been performed, anyway, a general decline emerge from all the analysis (Shrader et al., 2016).

Province	Type	No of reserves/properties (2009, 2014)	Count total (2013-2015)
Eastern Cape	Formally protected + private	83	1,155
Free State	Formally protected	2	11
Free State	Private	5	143
Gauteng	Formally protected	1	13
KwaZulu-Natal	Formally protected	26	848
KwaZulu-Natal	Private	74	581
Limpopo	Formally protected	1	8
Mpumalanga	Formally protected	3	63
Mpumalanga	Private	35	274
North West	Formally protected	1	2
Total	All	231	3,098

Table 1: Summary of minimum population size estimates for Oribi (*Ourebia ourebi ourebi*) based on provincial game counts and survey returns from private landowners (OWG data) (Shrader et al., 2016).

For the purpose of this study, only the data of oribi population in KZN will be taken into consideration, since a majority of the population is found there (Patel, 2015).

The first official demographic assessments was made in 1981, year when one of the first random postal surveys was submitted to 86 properties through Kwa Zulu Natal, to try to determine Oribi population numbers. From this small sample it emerged that Oribi had gone extinct from 38% of the surveyed farms in living memory (since 1930). A follow-up survey was conducted in 1998 by *Ezemvelo KZN Wildlife*³ to assess the status of Oribi on the same 86 properties involved in the 1981 survey. This survey gave even more alarming results: oribi had declined (reaching less than 5 individuals), or gone extinct, in 58% of the farms since 1981. It also emerged that it was mainly populations of less than 10 individuals that had gone extinct (Marchant, 2000). These results, showing a significant downward trend in oribi numbers on private lands, suggested that oribi could be one of South Africa's most threatened antelope species. Alerted by this situation, conservationists recognised the urgency to intervene to reverse oribi trends, that's when the creation of the Oribi Working Group occurred (Coverdale et al., 2006).

A very complete study by *Tamanna Patel* in 2015, then, analyses population oscillations in KZN over the 13-year period in which the surveys had been regularly conducted by Oribi Working Group.

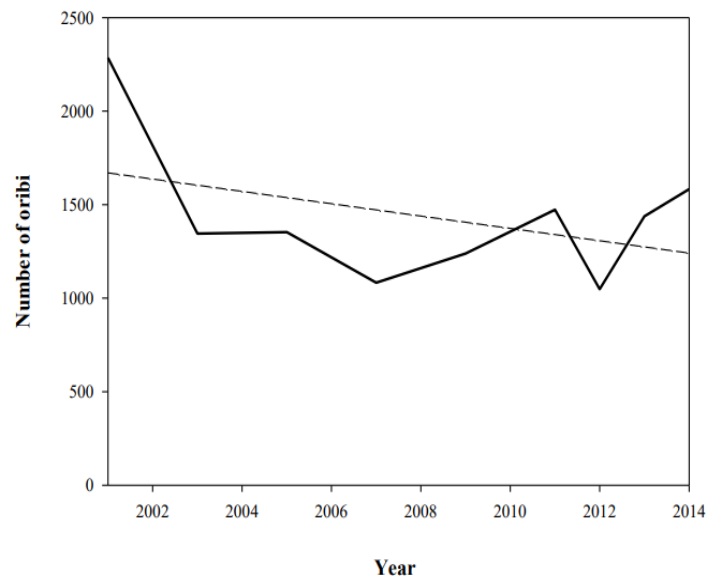


Figure 4: Oribi population trend across KwaZulu-Natal from 2001 to 2014 for both private and protected areas (N=589 sites) (Patel, 2015).

³ *Ezemvelo KZN Wildlife* is the provincial agency mandated to carry out biodiversity conservation and associated activities in the province of KwaZulu-Natal in the Republic of South Africa

She highlights that one of the key challenges facing the conservation of oribi is the fact that their population dynamics in South Africa are poorly understood (Patel 2015), but analysing them goes beyond the scope of this study. What is relevant, instead, is that between 2001 and 2014 oribi numbers have declined in 46% of the 589 analysed properties, remaining stable in 17% of the properties (Patel, 2015).

Even though the results of this study suggest that oribi numbers have increased between the years 2012 and 2014, this apparent raise was due to improvement in survey effort and improved counting methods, and not an actual increase in oribi numbers. From the analysis performed, it also emerged that the key factors driving the population dynamics of oribi were initial population size and the availability of suitable habitat (Patel 2015). Dog hunting and poaching were also considered, but turned out to be non-significant, most probably because due to their illegal nature, it is difficult to obtain accurate measurements of its effect on oribi populations (Patel, 2015).

1.5. Habitat and Nutritional Requirements

Oribi inhabit floodplains and other open or wooded grasslands, from about sea level to about 2.200 msl (Mpumalanga Province) (Shrader et al., 2016). Generally, they avoid bushland and woodlands (Estes, 1991), reaching their highest density on floodplains and moist tropical grasslands, especially in association with larger grazers (Shrader et al., 2016). Oribi tend to avoid lowland areas, preferring ridge terraces and avoiding flat land or very steep slopes (Coverdale et al., 2006). They are highly specialised species, requiring short grass areas for feeding, as well as longer grass areas mainly for resting, cover from weather and predators and the concealment of the young, which are left to “lie-out” for at least six weeks after birth (Everett et al., 1991).

For what regards nutritional preferences, oribi are strong selective feeders, not only for short green grasses, but also for certain species of grass and for certain parts of those grasses (Patel, 2015). Oribi is the only dwarf antelope preferring grazing over browsing (Phukuntsi, sanbi.org) and its almost exclusively preference for grasses and the minimal presence of forbs, legumes and tree foliage in the diet, confirms its strong dependence on grassland habitat (Coverdale et al., 2006). Digestibility of grasses is generally less than forbs and shrubs, that’s why grasses usually are more suitable to large herbivores that have low nutrient requirements per unit body weight. It’s curious how Oribi, instead

of feeding on high energy content forbs or shrubs, have adapted to eat the leaves of grasses, which are nutritionally superior to stems, and by favouring only the short grasses, which are also nutritionally superior to mid and tall grasses (Holechek, 1984). Ultimately, this means that the growth form of plants is important in terms of oribi selective feeding and this, in turn, has implications for land management (Coverdale et al., 2006). Oribi, in fact, show a strong preference for grasslands that had been recently burned or mowed, which can easily be explained by the fact that: firstly, if grasses are not defoliated, each year the green growth becomes less accessible to grazers, in that green tufts increase in size, shading out the other growing fresh tufts. Secondly, veld species composition changes and the amount of unpalatable grasses increases to the detriment of palatable grasses. At the same time, oribi benefit from burnt veld because the crude protein, phosphate and calcium content of burnt grass in the growing season is three times higher than that of unburnt grass. Moreover, the crude fibre content (less digestible part) increases with time since burning (Holechek, 1984). Another important aspect is that in the dry winter months, food quantity and quality is at its lowest and there is a marked decline in the crude protein content of grass species, corresponding to an increase in the crude fibre content of grasses. Digestibility and nutritional value of the food is, therefore, very low and often results in a loss of condition of the oribi during winter (Coverdale et al., 2006), which have to feed more selectively in order to satisfy their need for nutritious food (Holechek, 1984). Especially in this season Oribi can also use artificially managed or altered habitat such as hayfields and grasslands used by cattle (Shrader et al., 2016), but their presence on pastures and in croplands is more likely a result of reduced or degraded natural habitat, rather than a preference for these areas (Louw et al., 2021).



Figure 5: Themeda triandra (red grass), a grass species considered to be one of the most valuable veld grasses and an indicator of good quality veld. One of the preferred grass species by Oribi in Kwa Zulu Natal (Coverdale et al., 2006).

Therefore, if an area has to be managed specifically to favour oribi population, especially in winter when their conditions are harsher, some management recommendations have to be followed. It is essential the provision of mowed grassland either in the form of natural or cultivated hayfields, burnt areas in the form of firebreaks or autumn-burnt veld to ensure high quality food all year round⁴ (Everett et al., 1991).

1.6. Conservation

1.4.1. IUCN Classification

The Red List of *IUCN* (International Union for the Conservation of Nature) is known to be a worldwide system used for classifying species at high risk of global extinction with the aim of providing the most up-to-date indication of the health of the world's biodiversity to guide critical conservation actions (iucn.org).

If we look at the global population across the African continent, oribi is classified as a *least concern* species, this means that it is not a focus-species in conservation, considered still plentiful in the wild (IUCN, 2012). According to the official IUCN website, even though various subspecies of *Ourebia ourebi* have been described, most of these just reflect individual variation and have little or no validity. Across Africa, the total population is estimated at *ca.* 750,000 individuals, 50% of which are in protected areas and stable in many of them, while populations outside protected areas are gradually declining. Anyway, they consider that the species' overall conservation status should remain satisfactory as long as it continues to exist in healthy, stable populations in a large number of protected areas and hunting zones (iucn.org). However, according to the latest findings explained in chapter 1.3., the justification provided by IUCN is not satisfactory, since it has been proved that South African individuals are genetically distinct from the rest of the African oribi (Van Vuuren et al., 2017): there's an urgency to preserve its distinctiveness among the others.

Since IUCN only accepts global-level assessment for species (iucn.org), in 2002 numerous South African conservationists were invited to collect relevant data on species in the country within their areas of expertise. Information on distribution, habitat,

⁴ The season of the burns affects the subsequent structure of the vegetation, moderating plant survival and reproduction. Fire has played a major role in the development and maintenance of grassland communities in the montane regions of South Africa (Everett et al., 1991).

population status and trends, breeding and feeding were inserted in a datasheet and evaluated and compared for each species. Following the *Guidelines for application of IUCN red list criteria at regional and national level*, then, the species' extinction risk in the country has been assessed, followed by the publication of the *Red Data Book of the Mammals of South Africa* in 2004. A total of 295 terrestrial and marine species and subspecies of mammals were reviewed, with the aim of developing a baseline dataset for each; in this way future updates of these assessment will have provided a means of determining trends, measuring conservation success or failures and identifying areas of biodiversity conservation concern (Child et al., 2017).

In the updated version of the *Red List of Mammals of South Africa, Lesotho and Swaziland* of 2016, *Oribi* is not classified as *least concern* anymore, but as *endangered* complying with criteria *C2a(ii)*. This means that it is facing a high risk of extinction in the wild, meeting any of the requirements for being considered in the threatened category *endangered*.

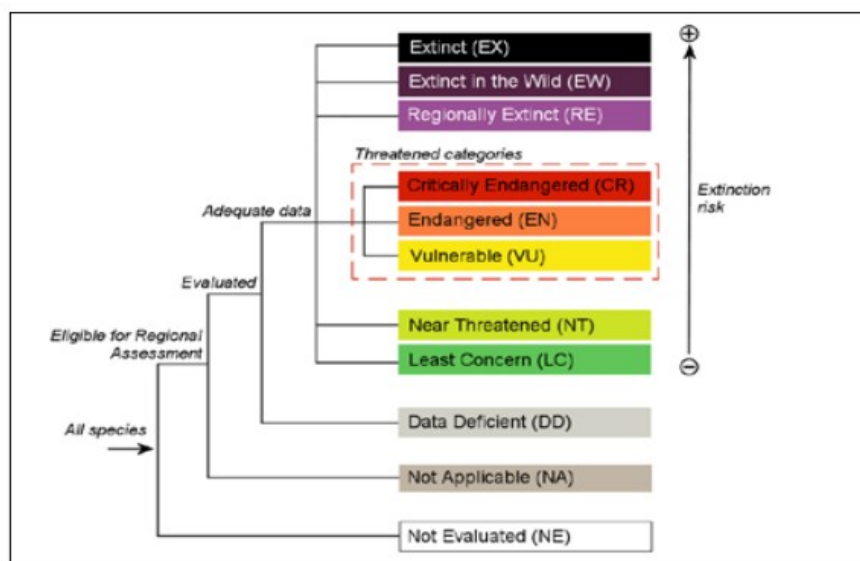


Figure 6: Structure of the categories used at the regional level (IUCN, 2012)

Criteria C2a(ii), instead, stays for:

- C: Population size estimated to number fewer than 10,000 mature individuals
- 2: continuing decline, observed, projected, or inferred, in numbers of mature individuals
- a(ii): population structure in the form of all mature individuals in one subpopulation

1.4.2. Oribi Working Group

In the context of Oribi conservation, it is worth to mention Oribi Working Group as a referent institution for what regards oribi protection in South Africa. The OWG was formed in 2000, due to the alarming results emerged from the first surveys conducted on oribi demographics. The group consisted of enumerated experts from different organizations that had in common the understanding of the threatened condition of oribi and a commitment towards the species safeguard. In November 2002 a smaller committee, consisting of members of Ezemvelo KZN Wildlife, Department of forestry, University of KZN and private landowner and other partners, was created (Patel, 2015), becoming a working group of the *Endangered Wildlife Trust* (the south African's most reputable NGO's) (Coverdale et al., 2006).

The mission of OWG is to promote the long-term survival of the species in its natural grassland habitat, by initiating and coordinating conservation programmes to sustain existing populations and reduce threats to them (Patel, 2015). For this reason, during 2005 OWG developed a very detailed *Oribi Conservation Plan*, giving important guidelines for Oribi conservation and management, and outlining projects, policies and strategies for facing threats, while proposing concrete solutions to be implemented by the various stakeholders involved. The main issues influencing the Oribi conservation regarded:

- Habitat loss, directly related to anthropogenic activities and land management, in terms of quality and quantity
- Lack of awareness amongst various stakeholders regarding the value of the species and the value of their grassland habitat, followed by a general lack of concern and interest with regards to the plight of oribi conservation
- Lack of incentives for landowners to conserve oribi and its habitat
- Overexploitation, connected to illegal hunting
- Poor law enforcement, not considering wildlife crimes a priority
- Illegal capture and movement of oribi or misinformed translocations, which could cause an irreversible genetic contamination
- Laws and policy on wildlife and environment are not fully aligned and sometimes contradictory, also due to the fact that too many official bodies deal with environmental issues

- The unpreparedness of the current political land redistribution process and consequent failure of both conservation and land rights objectives
- Lack of capacity among the conservation personnel and lack of communication between the different provinces, landowners and institutional departments, resulting in lack of coordination and cooperative management
- Poor knowledge on oribi demographics, genetics, habitat requirements in terms of minimum size, predation effects, translocation success, inter and intra-specific competition, captive breeding, pathologies etc...

2. ANALYSIS AND DISCUSSION OF THREATS

The problem statements mentioned by the Oribi Working Group in the conservation plan will be unpacked and analysed in linked macro-categories, in a solution-proposal approach.

2.1. Habitat destruction – loss and fragmentation

The main cause of Oribi decline is the loss of grassland habitat (Patel, 2015) on which they strongly depend. Poor habitat availability is not only due to bad veld management and incorrect burning regimes of the remaining existing grasslands fragments. In a more substantial way grasslands are lost due to commercial forestry activities (afforestation), intensive commercial farming, agricultural practices, cropping or pastures, and their degradation due to overstocking, poor fire management, erosion and mining (Coverdale et al., 2006). There is also an emergence of unresolved land claims and changes in ownership, which may reduce potential suitable habitat via changes in land use and/or degradation through a lack of active management (Shrader et al., 2016).

Landowners in general do not perceive habitat loss to be a threat to oribi and this is a cause for concern because it means they are unlikely to take measures to re-establish or actively manage grasslands (Louw et al., 2021).

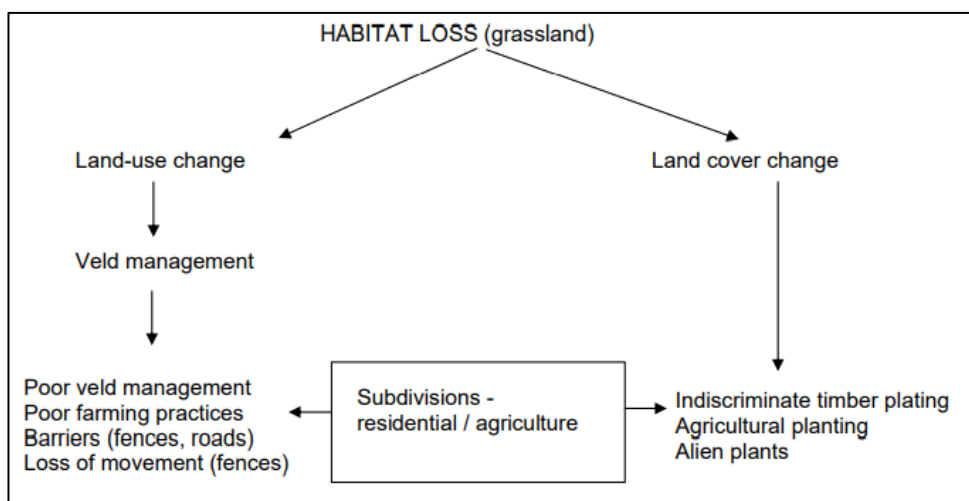


Figure 7: habitat and habitat management issues affecting oribi (Coverdale et al., 2006)

2.2.Lack of awareness by landowners on the value of the species

Understanding landowners' attitudes, perceptions, and limitations is essential to conserving wildlife on private lands, especially when these species are not adequately protected on public lands (Louw et al., 2021).

It is certain that private lands play a crucial role in the conservation of biodiversity, but the challenges to achieve conservation in those places are many. First of all many private landowners choose not to participate in conservation activities, engaging in more economically beneficial activities such as forestry and agriculture (Louw, 2019). Lack of trust in government and conservation organisations is another deterrent, since landowners are afraid of losing rights over the decisions on their lands and resources, owing to interferences by government and NGOs (Louw, 2019).

Between 2017 and 2018 Adrienne Joy Louw et al. conducted interviews with landowners investigating their willingness to manage and protect oribi in their properties. Fifty interviews were submitted to farmers who currently or previously had oribi on their property, as well as those whose properties possessed suitable oribi habitat (Louw et al. 2021). Most respondents stated that they were willing to protected oribi on their properties, but there was no general consensus as to why they wanted to do so. Majority of them was motivated by a general love for wildlife and a belief that conservation is part of their cultural heritage and important for future, others were feeling empathy toward the endangered status of Oribi, and someone just thought it was the right thing to do having a moral obligation and a social responsibility (Louw, 2019). Three respondents also noted that the oribi is a financially valuable species, which can

be sold to landowners in South Africa for ZAR 25 000– 34 000 (~USD 1730–2350) per individual (if the appropriate permits are obtained) (Louw et al., 2021).

Regarding their perceptions to threats to Oribi, owners perceived the hunting with dogs (mainly taxi hunts) as the major problem. High number of responses indicated predation as a threat, especially by jackals, but no data on the severity of the threat were provided, also because this factor is strongly dependent on the predator population dynamics (Louw et al., 2021). Unfortunately, a very low percentage considered habitat loss to be the biggest cause of oribi decline, on the contrary, arguing that Oribi benefit from agriculture utilizing improved pasture for grazing and hiding in sugarcane and corn crops (Louw et al., 2021). Very few possessed a clear understanding of Oribi habitat requirements and management, however, some respondents (14%) were removing timber plantations and encroaching bush and protecting wetlands and remnant *Themeda* grasslands on their farms, actively returning their farms to grasslands (Louw et al., 2021).

2.3. Lack of understanding of the value of grassland

Another conclusion that can be drawn from the landowners survey's results is that there's a general lack of understanding and appreciation of the value of grassland, which is hindering conservation progress (Shrader et al., 2016). Grassland ecosystems are currently the most important and yet the most underrated and highly degraded ecosystems in South Africa (Coverdale et al., 2006).

In general, the current global network of protected areas is not sufficient to ensure that biodiversity is effectively conserved (Louw, 2019), and South African grassland is an example of that, with only 2% being formally conserved and more than 80% already irreversibly transformed (Coverdale et al., 2006).

Due to its grassland dependence for survival, the Oribi acts as a flagship species for the conservation of these important ecosystems. Addressing the threats faced by Oribi in the grasslands of the eastern part of South Africa, would have considerable benefits for conserving not only the remaining grassland areas, but also their associated biodiversity components (Coverdale et al., 2006).

2.4. Lack of incentives to landowners

A lack of incentives to landowners has been listed as one of the reasons hampering conservation practices in private lands. In reality it would be more correct to say that incentives exist, and what is lacking is their correct implementation and the landowner's motivation, as well as personnel operational capacity (Wright et al., 2018).

An important project called *Biodiversity Stewardship Programme* has been created by Ezemvelo KZN Wildlife and NGOs partners to assist landowners in the protection of their biodiversity. Landowners can choose between four levels of engagement, depending on their needs. Of course, the higher the category they choose, the higher the limitations put on their land use and resources, but at the same time, the higher the incentives they receive in terms of benefits and support by Ezemvelo KZN (EKZNW, 2020). Despite the success gained, unfortunately challenges exist, most notably limited available financial and capable human resources involved in the programme (Wright et al., 2020). Moreover, afraid of the restrictions that could be placed on the use of their land, often landowners are reluctant to participate in this programme (Louw et al., 2019).

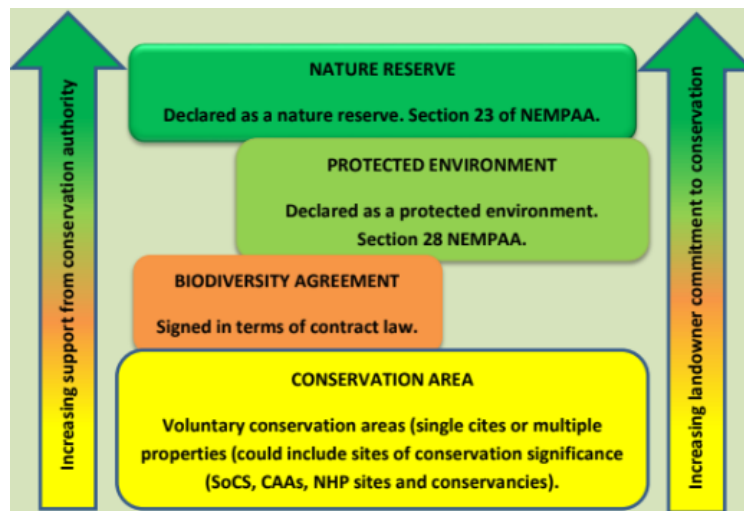


Figure 8: Stewardship options available to landowners (all of them are voluntary) (EKZN, 2020).

Specifically designed for Oribi, then, there's the *Oribi Custodianship Programme*, created to give incentive-based recognition for landowners contributing to oribi conservation in various forms. To be considered an Oribi custodian, landowners have to comply with a series of criteria, which include: willingness to adapt agricultural practices to allow oribi to flourish, monitoring the population status of oribi annually on their properties, thus maintaining a good working relationship with the Oribi Working

Group, implement sustainable grassland management practices etc... This programme is very strict, in that the Oribi Working Group Committee will review awards of oribi custodianship on an annual basis (oribi.co.za).

2.5. Overexploitation – Illegal Hunting and commercial trade

The hunting of game has occurred historically within African cultures for centuries at apparently sustainable levels. However, the bushmeat trade in Africa has developed over recent years from purely subsistence hunting into a lucrative commercial industry (Grey-Ross et al., 2010). Antelopes make up a significant proportion of demand and supply in African bushmeat markets (36%–95% across Africa) and trophy hunting, suggesting that antelopes may be the most hunted species (Dalton et al., 2022). Motivations for hunting vary from subsistence to income generation, sports and recreation, but can be broadly classified into legal and illegal (Dalton et al., 2022).

South African landowners perceive poaching to be the greatest threat for oribi (Louw et al., 2021), having drastically reduced oribi numbers (Grey-Ross et al., 2010), resulting in the local extinction of different subpopulation on private owned lands (Louw et al., 2021). Most illegal hunting occurs in the form of dog hunting by local community members and taxi hunting, particularly with domestic dogs (*Canis lupus familiaris*)⁵ (Louw et al., 2021).

- Rural hunting

It is true that most rural households are strongly dependent on bushmeat as source of proteins, but the threat for wildlife is represented by the increased bushmeat consumption directly related to human population growth and poverty. It is important to highlight also that in many cultures wildlife has an invaluable social and cultural significance, thus sometimes rural communities hunt even if they have alternative source of livelihood (Grey-Ross et al., 2010). Local communities argue that they are justified in hunting with dogs on private farmlands and in protected areas because they were deprived of their traditional hunting rights and access to resources by the colonial and

⁵ Many of the methods used by illegal hunters, i.e. dogs and snares, are extremely unselective with respect to what species they target (Grey-Ross et al., 2010), thus many other species are jeopardized by these illegal activities.

apartheid governments (Louw et al., 2021). Local communities also claim that they hunt smaller wildlife because they have no access to refrigeration, rather than larger, charismatic wildlife. Oribi may therefore not be the intentional target, but due to their predator-response, causing them to run short distances and then lying down and remaining still when threatened (Louw et al., 2021), they're highly susceptible to this kind of hunt. Hunting by local communities is thus motivated by subsistence needs, social and cultural tradition, and the concept of *ukujola*, a Zulu term for locally legitimate stealing of a resource based on historical claim to it (Louw et al., 2021).

- Taxi hunting

Taxi hunts are organized hunting events, typically organized by criminal syndicates (even if sometimes facilitated by community members) for people who do not reside in the local area. Taxi hunts involve multiple participants and packs of dogs (often greyhounds) arriving at farms in the early morning dark hours, in minibus taxis. Participants place bets on the outcome of the hunt, with particular focus on oribi kills (Louw et al., 2021). Dogs are then released onto farms to hunt without farmers' knowledge or permission illegally and indiscriminately, mauling other livestock and game in the process (Grey-Ross, 2006). Although traditional hunting with paid permits is allowed in South Africa, both taxi hunting and hunting of oribi with dogs by local communities are prohibited by the *Threatened or Protected Species (TOPS) Regulations*⁶, because oribi are endangered.

Taxi hunting also contravenes the *Animals Protection Act* of South Africa, the main animal welfare legislation in South Africa, which stipulates that 'Any person who liberates any animal in such manner or place as to expose it to immediate attack or danger of attack by other animals, or incites any animals to attack any other animal shall be guilty of an offence and liable on conviction to a fine' (Louw et al., 2021).

Biologists consider taxi hunts to be more destructive to the oribi population than dog hunting by local communities for food and subsistence purposes (Shrader et al., 2016).

⁶ This regulation was put in place for Government to regulate the specie numbers of certain species in the hunting industry.

Question with answers	%		%
If yes, how often do you hunt?		Do you have any suggestions that would reduce the amount of illegal hunting and conserve wild animals?	
No answer/don't hunt	16	Don't care	2
Daily	10	Don't know	13
Weekly	51	Arrest/prosecute illegal hunters	27
Monthly	3	Need permit system	10
A few times a year	4	Animals should be kept in reserves	8
Winter	5	Better security on farms	10
Variable	10	Education	2
If yes, why do you hunt?		Warning must be issued, then prosecution for those caught	8
Meat	42	Nothing must be done	6
Fun	15	Other	13
Skins	1		
Gambling/sport	18		
Meat/sport	8		
Meat/skins	8		
Skins/sport	1		
Meat/Fun	6		

Table 2: Results of the interviews conducted by Grey-Ross et al. with residents of rural settlements near commercial farms with conservancy areas in KZN that did hunt, showing their perceptions of illegal hunting (n = 92).

Illegal hunting is one of the topics that deserve a broader attention for what it represents at social level. Firstly, as illegal hunting is predominantly conducted by rural communities, the practice exacerbates social and political tensions between individuals. This can be explained by the fact that the only way for the farmer to intervene, once the hunt has started, is by shooting the dogs, and this often results in violence and harassment episodes towards landowners and their families from part of the poachers (Louw et al., 2021). Therefore it is not difficult to understand why landowners perceive poaching as the strongest threat for oribi: because it is a symbol of much larger political and social conflicts in South Africa, including conflicts over land reform and property rights, which have their roots in the period of colonialism and, in the more recent, apartheid ages (Louw et al., 2021).

3. THE WIDER CONTEXT OF SOUTH AFRICAN LAND REFORM

South Africa has gone through decades of apartheid and segregation, in which state policies reached back to the very beginning of European settlement by colonial powers in the 17th century (Institute for Poverty, Land and Agrarian Studies, 2016). The country faced three and a half centuries of racially based land dispossession, which resulted in a massively unequal distribution of land, laying the foundations of contemporary rural poverty and directly contributing to the wider structural problems of unequal power and wealth in the South African society. By 1990s South Africa was a profoundly divided

society characterised by a deep poverty of most of its people, high levels of inequality (in relation to race, but also gender and class), social disorder, endemic violence and severe political tensions, resulting from over 40 years of apartheid - policy of segregation (Institute for Poverty, Land and Agrarian Studies, 2016).

With the famous elections of 1994, the post-apartheid government, with *Nelson Mandela* as president (1994-1999), implemented an ambitious programme of *Land Reform*, allowing people to re-claim the land they were forcefully removed from. The key objective of the reform was to create security of land tenure for all, and thus to provide a basis for land-based economic development (Kepe et al., 2010). It was a programme for rural development, aiming at generating large-scale employment, increasing rural incomes and avoiding overcrowding (Institute for Poverty, Land and Agrarian Studies, 2016).

A number of important debates on aspects of land reform would be worth mentioning, but will not be discussed here due to limitations of space (See *advisory panel for land reform and agriculture* for more details). However, it is important to underline that this ambitious project, to date, has not achieved the expected results yet. Namely, many land reform projects, especially in the rural areas (which account for the 90% of all people claiming lands (Kepe et al., 2010)), have been unsuccessful because of inadequate and inappropriate post-settlement support and are in 'distress', and thus in need of further injections of funds (Institute for Poverty, Land and Agrarian Studies, 2016). Land reform is a politically controversial issue, that difficultly combine right-based restitutions, economic development and environmental policies. Uncertainties, chaos and corruption reign around issues of land ownership and administration, including informal privatization by powerful elite and corrupted authorities (Kepe et al., 2010).

3.1. Land reform and biodiversity conservation in South Africa: towards joint management

Forced removals and resource dispossession among black people, was also sometimes linked to the establishment of protected areas in South Africa (first created in the late 19th century, in response to declining numbers of wildlife). These areas, actually, often serviced the recreational needs of whites, with racially discriminatory restrictions being placed on their use, such as hunting and fishing bans for natives. The scientific rationale

behind the establishment of protected areas was often obscured, and this created an extremely negative perception towards conservation and its adherents, destined to perpetuate through time (Kepe et al., 2010). After the Land Reform Programme in 1994, land claims affected much of these land set aside for conservation in the country (Qwatekana and Mazibuko, 2020), and the divergent goals of the land and conservation sectors resulted in conflicts from the start, leading to delays in the process of resolving land issue and failure of conservation objectives (Kepe et al., 2010). Protected areas today are still perceived as playgrounds for a privileged elite, holding very little relevance for the majority of South Africa's people. Considering that the efficacy of protected areas is dependent upon the extent to which such areas are socially, economically and ecologically integrated into the surrounding region (Kepe et al., 2010), the support and the participations of South Africans, especially local communities, is fundamental to achieve conservation and development. Even though the country has made impressive scientific achievements, due to the mistrust and, in part, to the poor knowledge, today it is challenging to reconcile people's resources with biodiversity preservation. Strategies need to be implemented to resolve this dilemma, starting from alternative land uses, ecotourism and broader inclusive conservational strategies (Kepe et al., 2010).

The *White Paper on the conservation and sustainable use of South Africa's Biodiversity*, first adopted by government in 1997, represent the first step towards an inclusive conservation approach, in which integration and cooperation are the keys to combine land rights, biodiversity conservation and economic development driven by a sustainable use of resources through the development of the biodiversity economy⁷ (Department of forestry, fisheries and the environment, 2022).

Co-management may be the most logical approach to involve both claimers, conservational organizations and neighbouring communities in the administration and protection of biodiversity relevant areas (Qwatekana and Mazibuko, 2020), to achieve both economic advancement and biodiversity preservation, but in practice this has revealed numerous challenges. Starting from divergent agendas of different actors, the

⁷ Biodiversity economy includes: 1. The bioprospecting economy, involving the mass cultivation of indigenous plants for the purpose of further processing and packaging for commercialization. 2. The wildlife economy, including game ranching, eco-tourism, wildlife products and the practice of legal trophy hunting.

unequal power relations between parties involved and, last but not least, the extreme poverty and lack of capacity and knowledge of local communities (Kepe et al., 2010). Here's where the conservation agencies are frequently being required to take on the dual role of being promoters both of biodiversity conservation and rural development (Kepe et al., 2010), in a context in which any concrete and applicable programme of support from government is lacking.

4. CASE STUDY: HIGHOVER LAND CLAIM

Highover Wildlife Sanctuary is a 3000 hectares land claim situated on the riverbanks of the river Mkomazi, close to the town of Richmond in Kwa Zulu Natal midlands. The land claim of Highover also comprehends the protected area of the *Soada Forest nature reserve*, and it is situated close to the other land claim known as *Hela Hela adventure centre*.

The whole area of rich biodiversity, which exceeds 5000 hectares (EKZNW shapefiles), includes a number of habitats, ranging from savannah to mist-belt forests, mist-belt grasslands and valley thicket. A conspicuous variety of animals could once be found there: warthog, wildebeest, zebra, blesbok, impala, kudu, nyala, bushbuck, eland, springbok, mountain reedbuck and especially the threatened oribi, as well as the blue swallow, blue duiker african rock python and samango monkey (sa-venues.com). For this reason it has to be considered a critical biodiversity area.

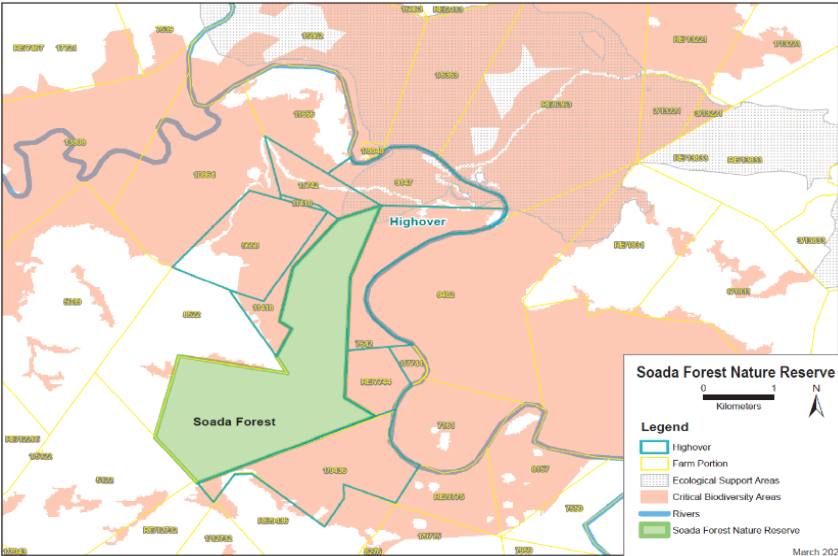


Figure 9: Map of Highover Land claim, Soada nature reserve and surrounding biodiversity critical areas.

The property of Highover, together with Hela Hela, was previously owned and managed by *Dave and Margaret Edwards* up until the land claim was established and the land was transferred into the name of the new landowner: *Dlamini Nhlanhleni William*.



Figure 10: Aerial picture of Highover venues by the river



Figure 11: Signs on the Highover entrance gate (original picture, 2022)

During that time the reserve thrived both from a natural point of view and from an economic perspective. Their key source of income was generated from the eco-tourism sector: still present today are well equipped lodges, that host tourists in search of eco-adventure experiences characterized by animal sightings, activities by the river and long hiking trails. Even though the facility is not operative to date, on the web it is still very good rated in the most popular booking companies. Highover was also awarded the title of *Oribi and Blue Swallow Custodian*, showing its commitment towards the protection of these species.

During a brief interview with Dave and Margaret Edwards, information on Oribi was provided at the time they were managing the reserve. They said that even if they had never participated in the Oribi Working Group survey's for oribi counts, animals were regularly counted all year round during routine game counts. The counts of oribi fluctuated between 3 and 5 animals and in their opinion it was hardly a sustainable group. According to their assessments, poaching may have been a problem, but the Oribi were not a target of the poachers in that area. Numbers were more likely to have been affected by caracal (of which there were numerous). They also believed that the area was not large enough and adequate for the group to grow, also because the rams were very aggressive towards each other. Thus, in their opinion, the land quality and quantity was the main cause of the oribi suffering, and a different land management practice would

have been necessary for the species to thrive (Edwards D. and M., personal communication, 2022).

Despite this input from the Edwards, we do know that the extended wilderness area of Hela Hela comprising up Highover and Soada Forest Nature Reserve exceeds 5000 hectares (Ezemvelo Wildlife Shapefiles), and we recognise that the oribi metapopulation resides across the various properties owned by different groups (Vogt A. G., Conservation Guardians, personal communication).

4.1. Highover after the land claiming

Conservation Guardians, is an NGO that works extensively on land claim spaces, and who recently concluded a 4 year sustainability study on another Land Claim (*Shongweni Nature Reserve*). Today the agency is mentoring Highover Land Claim, assisting the new owner in the management of its land and in the creation of a sustainable economy aimed at developing the claim and at achieving biodiversity protection.

To start, through the study of *Government Land Claim diagnostic reports* and its personal experience, the CEO of the agency, Vogt A. Gregory, highlights the following constraints in running Highover case study:

1. Basically non-existent mentoring of land claim beneficiaries with a difficulty to get these new owners to understand the fundamental value propositions that reside within the biodiversity economy.
2. Poor inter-departmental communication between different government departments, like the *Department of Rural Development and Land Reform (DRDLR)* and the *National Department of Environment*.
3. A general poor understanding of how the biodiversity economy works by the DRDLR has led to a focus on agricultural activities on these land claim spaces, rather than a focus on how to develop a sustainable biodiversity economy to generate incomes. Basically, there's also a lack of capacity of the institutional personnel.
4. Generally, the rural beneficiaries of these land claims have a very low education level, making it difficult for the mentors to teach sustainability within the biodiversity economy and, more significantly, how to derive an economic return from species like the Oribi and Blue Swallow.

Specifically, this lack of training, teaching and education of the land claimants of sustainability principles within the biodiversity economy, together with the lack of support from governmental institutions, has led to a general decline in maintenance of Highover infrastructure (accommodation, water systems, electricity supply, fencing, roads and alien species management), causing the collapse of the sustainability model and the current owners struggling to survive financially.

4.2. Objectives of Conservation Guardians in the mentoring of Highover

1. Get the area proclaimed as a natural reserve

The stewardship programme implemented by the department of environment is designed to incentivise land-owners to protect natural spaces, starting from the assumption that local people are interested in conservation when there are perceived benefits from it (Qwatekana and Mazibuko, 2020). To date, only the Soada Forest Nature Reserve is protected, but the mission of CG is to incorporate this reserve with Highover Wildlife Sanctuary, the neighbouring land claim of Hela Hela Adventure Centre, together with the large agricultural conglomerates performing timber agriculture in the surroundings, to form a conservancy with an overall biodiversity management strategy. Applying for the Biodiversity Stewardship Programme would mean not only perceiving benefits from the protected area in terms of incentives and support by EKZNW, but also making these reserves desirable eco-tourism destinations if operated and marketed in accordance with the principles, marking the start for a sustainable economic development.

Specifically for oribi, if the different properties adjoin one another, the single management strategy would generate benefit for the species also in terms of the creation of corridors for the movement of individuals between the different properties.

2. Achieve the co-management of the reserve thanks to the cooperation of the claimer and the involvement of the neighbouring community

Ascertained that the efficacy of protected areas is dependent upon the extent to which such areas are socially, economically and ecologically integrated into the surrounding region (Kepe et al., 2010), Conservation Guardians' role at Highover is to act as a catalyst between all the key stakeholders, namely: land claim owners, other land-owners, local government and different departments, conservation agencies and the local community. This is not an easy task, considering that frictions are often present between

the different role-players. Jealousy and exclusion are perceived from local communities towards land claims beneficiaries, especially when accepted practices like the grazing of livestock, rural hunting practices and the collection of flora species for traditional medicine are prohibited because these landowners put limitations on the use of their resources. Moreover, communication between different departments is lacking: cooperation is needed to ensure that grants, funds and training resources can be allocated to these initiatives.

Conservation Guardians is therefore being asked to design land use models that incorporate circular economies within the biodiversity economy of the area to enable sustainable functioning of the system in harmony with the cultural challenges that need to be integrated to ensure that biodiversity conservation principles can prevail.

3. Education of people to the value of the biodiversity and the possibility to generate incomes from the biodiversity economy

Conservation Guardians strongly believes in education as a tool to achieve an integrated conservation, since people must get to know the value ecosystem services and of biodiversity to be willing to protect nature. Moreover, they need to understand how to sustainably take advantage of natural resource for their benefit and look for alternative sources of livelihoods other than hunt when it is not permitted. Innovative strategies for blending conservation and cultural and traditional practices must be implemented using the possibilities offered by the biodiversity economy.

4.3. Highover action plan strategies

Highover has already qualified, through an extensive study, for protected status proclamation. The area qualifies for a stewardship and now all that is required is for the landowner to sign the commitment and work with the conservation agency, Conservation Guardians towards defining a land use model, which is a critical starting point. This process includes designing the circular economies ensuring the sustainability and viability of the project, not compromising the key biodiversity significance of the area, but rather promoting the unique habitat and the species that reside within this space.

Designing the proposed circular economies requires a short-term, medium term and long-term plan:

- Short term strategies:

1. Reviving the eco-tourism income generators that were in existence previously and now have collapsed due to lack of skills and training by current operators, these include:

- restoring and securing the accommodation
- establishing conferencing services
- fixing and clearing the hiking trails.
- building bird watching hides
- instituting a white water rafting centre with qualified instructors

- Medium term strategies:

1. Promoting agricultural crops that do not compromise the biodiversity conservation efforts. These crops will be situated away from sensitive biodiversity.
2. Training the owners to capitalise on income generators like aquaculture, hemp growing and wildlife venison harvesting.
3. Community initiatives that include training community individuals to participate in the projects being developed. Through a human resource model, community members will be trained to carry out different roles, also giving them opportunity to attend professional training courses. Example of required employers are: general maintenance workers, housekeepers, people involved in the wildlife management such as field rangers, people involved in the eco-tourism and hospitality sector such as tour guides.

- Long term Goals:

1. Enhancing the Blue Swallow program including birdwatching experiences into the eco-tourism income generators
2. Enhancing Oribo conservation initiatives that will include the breeding of Oribo and a shared responsibility between the various land owners
3. Encourage partnerships between the Johannesburg Zoo and Highover with regard to the breeding of Oribo

CONCLUSIONS

*“Conservation is primarily not about biology
but about people and the choices they make”*

- Balmford

Oribi in South Africa is endangered, and it is unique. Further studies on genetic, population dynamics, ethology, pathology and related disciplines are essential, since targeted conservation management efforts are imperative to halt population declines (Phukuntsi et al., 2022). Research has a vitally important role in the field of biodiversity conservation, but biology alone cannot provide all the answers. In the great majority of situations much more is needed: the key to increase the future contribution of biologists to on-the-ground conservation interventions lies in working much more closely with experts from other disciplines, especially the social sciences (Balmford et al., 2006). The unfortunate myth that protected areas are isolated islands of biodiversity (Kepe et al., 2010) must be shattered and a profound revolution must occur in people’s mind to change their approach towards the natural world.

Oribi is an indicator species, meaning that its presence reflects the health of the ecosystem in which it resides. It has been brought here as a flagship species, as an indicator to highlight the value of the grassland ecosystem as a whole, calling for an urgency to shift from an animal-centric vision, towards a vision that incorporates entire ecosystem as priorities in conservation. In an ideal world, if the ecosystem is preserved and managed in the correct way, the oribi would thrive easily and, together with the it, all the other species inhabiting the same ecosystem would benefit from this situation. Unfortunately, the reality is totally different, since conservation includes many disciplines other than the natural ones. Highover, thus, plays the role of the representative of a need to fuse natural, social and economic sciences to put conservation plans into practice (Blamford et al., 2006). In this instance the success in preserving the Oribi and its ecosystem resides in a successful land use model being adopted and implemented by the land-owners of the area, in a deep comprehension of the biodiversity economy discipline from the part of institutions, and in a strong involvement of the local communities. Co-management turns out to be the most effective solution, involving the

totality of the stakeholders, to achieve economic development and biodiversity conservation at the same time.

The role of conservationists, thus, today has shifted from a merely earth natural resources manager, to that of an educator and economist. They have to teach not only the value of biodiversity, but also the principles and importance of biodiversity sustainable economy, leading people to acquire a profound respect for nature and its components. Landowners need to understand how to generate incomes from the natural and wildlife sector, without impacting the ecosystem, while rural populations need to understand the value of their land and of the Oribi as a species to the sustainability model. Only after a deep understanding and appreciation of their natural heritage, everybody will ensure that habitats are secure, and with them, also the protected plants and grass species and unique ecosystem the species resides within.

A sentence pronounced by *Baba Dioum* at the General Assembly of the IUCN in 1968 represents the importance of education in the South African context, in which the preservation of biodiversity is in the hands of private citizens whose decisions are imperative to turn the tide of ecosystems and species degradation.

“In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught”.

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