

THE DISTRIBUTION, STATUS AND CONSERVATION MANAGEMENT OF INDIGENOUS MAMMALS IN TRANSKEI COASTAL FORESTS

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Abstract

Transkei is a unique and diverse biophysical environment with approximately 100 000 ha of several types of indigenous forest, of which 70 000 ha are demarcated and protected by the Department of Water Affairs and Forestry. Very little research has been done in the region to document the distribution and density of indigenous fauna. The aim of this study was to determine patterns of distribution of selected species of indigenous mammals in the forests of the Transkei. Null hypotheses were: firstly, that the presence of indigenous mammals was unrelated to the patch size of forests; secondly, that the presence of selected mammals was unrelated to the utilisation intensity within forests and thirdly, that presence of indigenous mammals was unrelated to surrounding land-use.

The probable historical occurrence and distribution of indigenous mammals were determined by examination of literature and by obtaining verbal accounts from local people. The actual present distribution of mammals was determined by census techniques within Transkei forest sites representing all forest types and over a range of patch sizes with differing legal status. Emphasis was placed on determining the presence / absence of blue duiker, bushbuck and bushpig in each forest site. Physical and biological parameters and utilisation practices and their intensities were also recorded for each site.

Preliminary results from coastal forests indicate that indigenous mammals are present but some species are confined to larger patches of demarcated forest. It appears that blue duiker, bushbuck and bushpig have been eliminated from many smaller forest patches and some unprotected forests. Observations and verbal records suggest that habitat destruction and uncontrolled hunting are leading to the decline of mammals in forests throughout the coastal region. Conservation measures are urgently needed to halt this decline.

1. Introduction

The area referred to as Transkei is a former homeland which has been incorporated into the Eastern Cape. It stretches approximately 250km along the coast from the Great Kei River in the South to the Mtamvuna River in the North at the boundary with KwaZulu-Natal. It has been estimated that Transkei has 100 000ha of indigenous forest comprising a significant proportion of that remaining in South Africa (Cooper & Swart, 1992). Of these forests, 70 000ha are demarcated, surveyed, marked off with beacons and gazetted as State Land under control of the Department of Water Affairs and Forestry (DWAF). Most of the smaller forest patches among the more than 1 300 indigenous forests of Transkei have not been surveyed or proclaimed and are termed Headman's forests. They are under the control of the local tribal authority.

Forest conservation in Transkei began in the 19th Century with Paramount Chief Sarili protecting Dwesa and Manubi along the coast until his conquest by the British in 1878. The colonial era of forest conservation started with the appointment of Henkel in 1888 as the first Forest Conservator (Cooper & Swart, 1992). Several botanical surveys have since been undertaken.

Cooper and Swart (1992) classified the indigenous forests of Transkei as Afromontane and Indian Ocean Coast Belt Forests. Afromontane Forests occur along the Drakensberg mountains and are very similar to the Mist Belt Mixed Podocarpus Forest type of the Natal Midlands. The Indian Ocean Coast Belt Forests are sub-divided into six subtypes: Pondoland Coast Forests, South Coast Forests, Dune Forests, Swamp Forests, Coast Scarp Forests and Mangrove communities. As well as the forests of Transkei, Low and Rebelo (1996) have classified a variety of grassland and thicket vegetation types in the region. Both the forests and grasslands of Transkei are diverse and those of the Natal/Pondoland sandstone regions along the Wild Coast contain a rich endemic element (van Wyk, 1992).

In spite of the surveys undertaken in the indigenous forests, the mammalian presence and absence can only be deduced from a compilation of sparse historical records (Table 1). The past political situation, perceived dangers due to lawlessness, inaccessibility and the remoteness of the forests resulted in few biologists venturing into the area and the fauna remain largely undocumented. Skead (1987) refers to a general scarcity of useful information towards which even the records of the Southern Natal region could not contribute. The historical records of mammals of the Transkei are therefore largely speculative and have resulted in considerable doubt and debate.

Table 1. Historical and proposed present status of mammalian species indigenous to Transkei. Records were taken from Skead (1987) and Shackleton (1989)

SPECIES	HISTORICAL	PROPOSED PRESENT	PRESENT (INTRODUCED)
Vervet monkey (<i>Cercopithecus aethiops</i>)	X	X	
Samango monkey (<i>Cercopithecus mitis</i>)	X	X	
Chacma baboon (<i>Papio ursinus</i>)	X	X	
Scrub hare (<i>Lepus saxatilis</i>)	X	X	
Porcupine (<i>Hystrix africaeaustralis</i>)	X	X	
Wild dog (<i>Lycaon pictus</i>)	X		
Black-backed jackal (<i>Canis mesomelas</i>)	X	X	
Striped polecat (<i>Ictonyx striatus</i>)	X	X	
Spotted-neck otter (<i>Lutra maculicollis</i>)	?	X	
Clawless otter (<i>Aonyx capensis</i>)	X	X	
Large-spotted genet (<i>Genetta tigrina</i>)	X	X	
Water mongoose (<i>Atilax paludinosus</i>)	X	X	
Aardwolf (<i>Proteles cristatus</i>)	?	?	
Spotted hyena (<i>Crocuta crocuta</i>)	X		
Brown hyena (<i>Hyaena brunnea</i>)	X	?	
Leopard (<i>Panthera pardus</i>)	X	X	
Lion (<i>Panthera leo</i>)	X		
Caracal (<i>Felis caracal</i>)	X	X	
Serval (<i>Felis serval</i>)	X	X	
African wildcat (<i>Felis lybica</i>)	X	X	
Aardvark (<i>Orycteropus afer</i>)	X	X	
Elephant (<i>Loxodonta africana</i>)	X		
Rock dassie (<i>Procavia capensis</i>)	X	X	
Black rhinoceros (<i>Diceros bicornis</i>)	?		
White rhinoceros (<i>Ceratotherium simum</i>)	?		X
Burchell's zebra (<i>Equus burchelli</i>)	?		X
Bushpig (<i>Potamochoerus porcus</i>)	X	X	
Warthog (<i>Phacochoerus aethiopicus</i>)	?		
Hippopotamus (<i>Hippopotamus amphibius</i>)	X		
Oribi (<i>Ourebia ourebi</i>)	X	X	
Cape grysbok (<i>Raphicerus melanotis</i>)	?	?	
Grey rhebok (<i>Pelea capreolus</i>)	X	X	
Klipspringer (<i>Oreotragus oreotragus</i>)	X	X	
Blue duiker (<i>Philantomba monticola</i>)	X	X	
Grey duiker (<i>Sylvicapra grimmia</i>)	X	X	
Blesbok (<i>Damaliscus dorcas phillipsi</i>)	?		X
Common reedbuck (<i>Redunca arundinum</i>)	X	X	
Mountain reedbuck (<i>Redunca fulvorufula</i>)	X	X	
Springbok (<i>Antidorcas marsupialis</i>)	?		X
Blue wildebeest (<i>Connochaetes taurinus</i>)	?		X
Black wildebeest (<i>Connochaetes gnou</i>)	?		X
Red hartebeest (<i>Alcelephus buselaphus</i>)	?		X
Bushbuck (<i>Tragelaphus scriptus</i>)	X	X	
Kudu (<i>Tragelaphus strepsiceros</i>)	?		X
Eland (<i>Taurotragus oryx</i>)	X		X
Buffalo (<i>Syncerus caffer</i>)	X		X

Low and Rebelo (1996) suggest that forest conservation has two facets: the maintenance of components and critical processes in the forests (which requires the conservation of the large mammals and birds which disperse seeds and maintain gap processes to allow succession within the forests) and the maintenance of gene flow (which requires allowing seed dispersers and pollinators to move along the corridors between forest patches). Thus the protection of isolated stands of forests may be insufficient for their conservation. Sustainable use of forests may require that their fauna be effectively conserved.

The main objectives of this study were to determine patterns of distribution of selected species of indigenous mammals in the forests of Transkei. Emphasis was placed on blue duiker (*Philantomba monticola*), bushbuck (*Tragelaphus scriptus*) and bushpig (*Potamochoerus porcus*) because these are some of the larger forest specialists and are known to be specifically targeted by hunters. Physical and

biological parameters and utilisation practices and their intensities were recorded for each forest surveyed to determine the effects of biogeographic and disturbance factors on mammalian abundance and diversity. The ultimate goal was to provide information for management purposes.

Null hypotheses were: firstly, that the presence of indigenous mammals was unrelated to the patch size of forests; secondly, that the presence of selected mammals was unrelated to the utilisation intensity within forests and thirdly, that presence of indigenous mammals was unrelated to surrounding land use.

2. Materials and methods

2.1 Study site

A grid of quarter-degree squares was overlaid on a map of the Transkei region. Within each grid square representatives of all types of forests, as classified by Cooper and Swart (1992), were selected as study sites. Since sites were first selected to determine maximum potential distribution of mammals, relatively pristine areas of each forest type, such as demarcated State Forest, were chosen. More heavily utilised sites within similar vegetation types were then selected for comparison and to enable identification of potential causes of reduction in mammalian populations. Forests of varying sizes and management types were chosen so that DWAF forests could be compared with Headman's forests. Additional areas of interest were included. Approximately 10% of Transkei's indigenous forests will ultimately be surveyed.

For the purposes of this paper 26 forests were surveyed along the Wild Coast. Representatives of Dune Forests and South Coast Forests were surveyed between the Great Kei River and Manubi Forest; South Coast Forest and Mangroves were surveyed at Cwebbe Nature Reserve and Dune Forest, Pondoland Coast Forest and Mangroves were surveyed from the Umzimvubu River to the Msikaba River.

2.2 Species sightings

Personal observations of species were recorded, as well as sightings made by Nature Conservators, Field Rangers, Foresters and Forest Guards. Because forest mammals are often cryptic species, more indirect methods of surveying also had to be used. Spoor, dung and other sign identification were used to determine the presence of mammals in the forests.

A questionnaire was used to obtain verbal records of the diversity and abundance of medium and large mammals from local people living near the study sites. A list was compiled of mammals (antelope, primates, carnivores, etc.) expected to be present in Transkei forests according to distributions in reference literature (Smithers, 1983; Skead, 1987). One or two local people in each area, usually adult men, were asked if each species was present and if so in what abundance, on a five-point scale from none to many. They were also asked whether numbers of each species were increasing or decreasing and whether each species was hunted or not.

2.3 Sampling protocol

Once a forest was located it was entered along a path or river course along which signs of mammals were sought. Measures of utilisation were recorded to correlate with presence or absence of each species. Emphasis was placed on bushbuck, blue duiker and bushpig but all other mammal observations were recorded. Time spent in a forest was recorded and the length of time taken before finding sign (sighting, sounds, dung, footprints, diggings, paths, feeding), as well as the amount of sign, gave a rough indication of density of a mammal species within a forest patch. Mammals were regarded as present if sign was found. Forest patches were surveyed for a standard effort per unit area of one hour per 100-hectare forest patch, with a minimum of half an hour for any patch. If signs of blue duiker, bushbuck or bushpig were not recorded within this time, the species was regarded as absent. Verbal records from local people were recorded for comparison and verification.

3. Results

3.1 Pondoland Coast Forest

Thirteen Pondoland Coast Forests were surveyed. Evidence of blue duiker was found in seven forests while signs of bushbuck and bushpig were found at six sites (Table 2). The five forests smaller than 50ha (including the two Headman's forests surveyed) showed no sign of these species.

Table 2: Survey results from Pondoland Coast Forest

Name	Size (ha)*	Status	Nearest patch*	Surrounding land use	Principal utilisation**	Blue duiker [◇]	Bush buck	Bush pig	Other
Libadani	4	Headman	1 km	Grassland, settlements	Chopping, grazing	N	N	N	V
Bumbane	225	State	Adjacent	Indigenous forest	Curios, chopping	Y	Y	V	V
Umkozi (Ngcambeni)	200	State	Adjacent	Indigenous forest	Hunting	Y	Y	Y	Y
Umzimpunzi	607	State	Adjacent	Indigenous forest	Minimal	V	Y	Y	Y
Hili	871	State	Adjacent	Indigenous forest	Minimal	Y	Y	Y	Y
Lotana (Ingo)	759	State	2 km	Indigenous forest	Minimal	Y	Y	Y	Y
Mzwane	50	State	2 km	Plantation	Grazing	Y	Y	Y	V
Poko	62	State	Adjacent	Indigenous forest, grassland	Cottages, minimal	Y	Y	Y	V
Isizilo	293	State	22 km	Plantation	Chopping, paths	Y	Y	V	Y
Ntlobolweni	2	Headman	1 km	Crops, grassland	Chopping	N	N	N	-
Mpondokazi	27	State	2 km	Settlements	Crop planting	N	N	N	Y
Ntafufu	8	State	3 km	Crops	Crops, clear-felling	N	N	N	-
Cobane	4	State	2 km	Grassland, settlements	Clear-felled	N	N	N	-

* Size and distances to the nearest patch are approximations.

** Only the principal utilisation practices are noted here; other types were observed.

◇ Presence (Y) and absence (N) were recorded as described in text. V indicates verbal records of presence obtained but this was not confirmed by signs of spoor.

Other mammals for which there was positive evidence were African wildcat (*Felis lybica*), black-backed jackal (*Canis mesomelas*), caracal (*Felis caracal*), Cape clawless otter (*Aonyx capensis*), large spotted genet (*Genetta tigrina*), porcupine (*Hystrix africaeaustralis*), vervet monkey (*Cercopithecus aethiops*) and water mongoose (*Atilax paludinosus*).

In addition, verbal records from local people included aardvark (*Orycteropus afer*), chacma baboon (*Papio ursinus*), common reedbuck (*Redunca arundinum*), grey duiker (*Sylvicapra grimmia*), rock hyrax (*Procavia capensis*), rock rabbit (*Pronolagus crassicaudatus*), tree hyrax (*Dendrohyrax arboreus*), Samango monkey (*Cercopithecus mitis*), scrub hare (*Lepus saxatilis*), serval (*Felis serval*), striped polecat (*Ictonyx striatus*), large grey mongoose (*Herpestes ichneumon*), white-tailed mongoose (*Ichneumia albicauda*), slender mongoose (*Galerella sanguinea*), and leopard (*Panthera pardus*).

Some verbal accounts indicated that all these species were hunted where they occurred. Signs of hunting were observed in six of the larger forests. Gunshots were heard by day and night during the week. Weekends were reportedly more popular for hunting. A local from one village, who admitted to subsistence hunting, claimed to be scared of poachers who came from outside his community. These recreational or commercial poachers apparently informed locals beforehand to stay away from forests during periods when they would hunt with firearms (shotguns, rifles and automatic weapons) and dogs.

Shotgun cartridges were found in two forests. Dogs or their spoor were found in 12 forests. Subsistence poachers were seen openly carrying a dead blue duiker ewe on a weekday at Ngcambeni (Eastern Ntsubane State Forest). They had a dog and snares with them. Although they knew they were not supposed to be hunting in the forest they showed little concern about the possibility of being caught. No snares were found set along forest paths during the surveys in the Pondoland Coast Forests. Another forest use which was evident was the clearing of trees for planting crops, which was observed at three of the sites surveyed. Forest Guards complained of receiving no support when reporting transgressions. One Forest Guard claimed to have reported illegal squatting and clearing of declared State Forest to three different supervisors, none of whom ever subsequently visited the sites.

Commercial exploitation of *Millettia grandis* was observed at Bumbane Forest in the Ntsubane complex. Mature *M. grandis* were felled and worked onsite to produce walking sticks for the curio trade. Bark stripping was evident in nine of the forests, but this was mostly discriminate use with no ring-barking.

Wood collection (dead and live) was noticeable in 11 forests. Dead wood collection was less noticeable in forests where exotic plantations provided a buffer area.

Alien vegetation was found in 11 forests, mainly on fringes and in disturbed areas. Grazing by cattle and other domestic stock occurred in all 13 forests. Ten forests had well-used footpaths and/or roads traversing through. Illegal holiday cottages and local homesteads were present in two of the State Forests.

3.2 Dune Forests

Six forests were surveyed, four of which showed signs of blue duiker, three had signs of bushbuck and two contained signs of bushpig (Table 3). The two Headman's forests that were smaller than 10ha, isolated and surrounded by grassland, had no sign of any antelope species. Besides blue duiker, bushbuck and bushpig, the following mammal signs were also present in Dune Forests: water mongoose, Cape clawless otter, large spotted genet, aardvark, vervet monkey and scrub hare. Additional verbal records were obtained of porcupine, black-backed jackal, African wildcat, striped polecat, large grey mongoose, white-tailed mongoose, slender mongoose, tree hyrax, rock hyrax and grey duiker, plus one isolated verbal record of honey badger.

Table 3: Survey results from Dune Forests

Name	Size (ha)*	Status	Nearest patch*	Surrounding land use	Principal utilisation**	Blue duiker [◇]	Bush buck	Bush pig	Other
Kilroe	2	Headman	5 km	Grassland	Cottage	N	N	N	Y
Little Goss	5	Headman	5 km	Grassland	Chopping, paths	N	N	N	Y
Lotana (Lojazo)	215	State	Adjacent	Indigenous forest	Cottages, hunting	Y	Y	V	V
Nxaxo	200	State	3 km	Grassland	Chopping, hunting	Y	Y	Y	Y
Nhlaboya (Gqunqe)	100	State	Adjacent	Grassland	Chopping, hunting	Y	Y	Y	Y
Cebe (Stony Point)	50	State	Adjacent	Grassland	Chopping, paths	Y	N	N	Y

* Size and distances to the nearest patch are approximations.

** Only the principal utilisation practices are noted here; other types were observed.

◇ Presence (Y) and absence (N) were recorded as described in text. V indicates verbal records of presence obtained but this was not confirmed by signs of spoor.

The Dune Forests at Black Sands, Lotana State Forest, were severely impacted upon by illegal holiday cottages allegedly built by affluent people with homes outside of Transkei. Other disturbances included grazing, which occurred in every forest, dead and live wood collection from all forests, bark stripping for medicinal use from every forest, hunting in the two larger dune forests of Nxaxo and Qqunqe, dogs, roads and paths in all forests, refuse in four forests, alien vegetation in five of the forests and fire on the edges of five of the forests. *Vepris lanceolata* from Nxaxo forest had been used for making curios. Forest guards in some areas had been threatened and intimidated to such an extent that they vacated the huts in the area.

3.3 South Coast Forests

Blue duiker occurred in all five surveyed South Coast Forests including a small patch less than 50ha in size in Kentani (Table 4). Bushbuck and bushpig sign was found in four forests. Other mammals noted were vervet monkey, grey duiker, large spotted genet, porcupine, water mongoose and Cape clawless otter. Additional verbal records were obtained of samango monkey, baboon, scrub hare, African wildcat, large grey mongoose, white-tailed mongoose, aardvark, tree hyrax and rock hyrax.

Table 4: Survey results from South Coast Forests

Name	Size (ha)*	Status	Nearest patch*	Surrounding land use	Principal utilisation**	Blue duiker [◇]	Bush buck	Bush pig	Other
Cwebe	1 800	State	Adjacent	Grassland, settlement	Chopping	V	Y	Y	Y
Manubi	762	State	Adjacent	Plantation, indigenous forest	Chopping	Y	Y	Y	Y
Kentani	50	State	5 km	Plantation, settlement	Hive robbing	Y	Y	Y	Y
Mabulala	1 100	State	Adjacent	Plantation	Minimal	Y	Y	V	Y
Mlindi	200	Headman	Adjacent	Grassland, indigenous forest	Minimal	Y	V	Y	Y

* Size and distances to the nearest patch are approximations.

** Only the principal utilisation practices are noted here; other types were observed.

◇ Presence (Y) and absence (N) were recorded as described in text. V indicates verbal records of presence obtained but this was not confirmed by signs of spoor.

The South Coast Forests appeared to be less disturbed than the Pondoland Coast Forests and Dune Forests. Disturbances in South Coast Forests included grazing in all the surveyed sites; dogs at three sites; wood collection (live and dead) at all forests; curio-making from three forests; medicinal product collection from all forests; hunting in four forests; roads or footpaths at all sites; and alien vegetation infestation at two sites. There were noticeably less aliens in forests with exotic plantations adjacent to them. There was no evidence of large fires affecting South Coast Forests but deliberate burning of individual *Sideroxylon inerme* in order to rob hives was recorded in three forests.

3.4 Mangroves

Mangroves at Ntafufu and Mbashe Rivers were surveyed. Bushbuck spoor was found at Ntafufu while blue duiker, bushbuck and bushpig spoor were present in the Mbashe mangroves (Table 5). In addition, grey duiker, Cape clawless otter, water mongoose and Burchell's zebra (*Equus burchelli*) had walked in the Mbashe mangroves. In spite of some live-wood chopping and small amounts of refuse, the mangroves were in good condition.

Table 5: Survey results from South Cape Forests

Name	Size (ha)*	Status	Nearest patch	Surrounding land use	Principal utilisation	Blue duiker	Bush buck	Bush pig	Other
Ntafufu	10 ha	State	Adjacent	Grassland, indigenous forest	Chopping	Verbal	Yes	Verbal	Yes
Mbashe	3 ha	State	Adjacent	Indigenous forest	Chopping	Yes	Yes	Yes	Yes

* Sizes are approximations.

4. Discussion

This study has provided preliminary information indicating that a high diversity of indigenous mammals remains in Transkei forests, but that mammalian populations are threatened by human activities. Methodological limitations included the short amount of time spent in forest patches due to the large number of forests, their inaccessibility and the security hazards present in the region. There were too few signs of mammals in the forests to allow the determination of densities of bushbuck, blue duiker and bushpig using methods such as line transects (Sutherland, 1996) or drive counts as used by Bowland (1990) to count red duiker and blue duiker in KwaZulu-Natal reserves. The amount of spoor or sign found in a forest and the length of time taken to find spoor or sign provided only a rough estimate of density and status.

Presence/absence data could reliably be collected using methods that included species sightings (Walker, 1986); pellet counts (Von Gadow, 1978); volume of dung (Welch, 1982); and observations of tracks, diggings, runways, feeding and other signs (Odendaal *et al.*, 1980). Verbal accounts were also recorded, and although they may not have been entirely reliable, almost all local people reported decreases in the populations of species of interest. Personal observations further suggested that there was uncontrolled exploitation of forest resources and numbers of mammals were dwindling rapidly.

Despite all the disturbances in the forests there was still a high diversity of mammals present. Bushbuck, blue duiker and bushpig occurred in all the forest types surveyed. They were, however, absent from most forests smaller than 50ha and from all isolated forest patches smaller than 10ha. Small forest patches, irrespective of whether they were State Forests or Headman's Forests, were generally heavily exploited and showed very few signs of any mammals at all. A noticeable exception was Kentani State Forest, which was less than 50ha in size and situated close to heavily populated settlements. The fact that it still had bushbuck, blue duiker and bushpig within it may be attributed to the exotic timber plantations and woodlots established around it. The results suggest that we can reject the null hypothesis that forest patch size does not affect the incidence of indigenous mammals. Fragmentation and small patch size appear to reduce mammalian incidence.

Hunting appeared to be confined mainly to the large forests, possibly because there was still a reasonable chance of success in those forests. All mammals were allegedly hunted, not only antelope. There was more evidence of hunting with the aid of dogs and firearms than by means of snares, perhaps because there were more firearms in circulation than was the case in earlier times. The use of snares would also create a threat to goats and other domestic stock, which were prevalent in most coastal areas. There also appeared to be no need for poachers to operate secretly by using snares because Foresters and Forest Guards were powerless to respond to lawlessness in the forests. Their firearms were withdrawn in 1998 and they were allegedly intimidated, not only by local communities from which they often originated, but also by syndicates of recreational and possibly commercial poachers.

All indigenous forests surveyed showed utilisation to varying degrees. Heavily utilised forests had fewer signs of bushbuck, blue duiker and bushpig. Forests with adjacent exotic timber plantations, such as Manubi and Kentani, generally showed less disturbance and contained more signs of mammals. We can thus tentatively reject the null hypothesis that mammalian incidence is unrelated to utilisation intensity. However, since utilisation intensity was highest in the smallest patches, it is difficult to determine from these preliminary results whether utilisation or patch size was most responsible for the lack of mammals.

Furthermore, it is not possible to determine whether or not effects of utilisation on mammalian populations occur through indirect influences on the degradation of habitat. We speculate rather that in small patches past hunting (a form of direct utilisation) had already caused the extinction of most of the large mammals. Utilisation intensity, rather than type of utilisation, would thus correspond more closely with a reduction in the incidence of hunted mammals.

Utilisation appeared to be occurring at such high intensities because management of indigenous forests was inadequate. Foresters had jurisdiction over large areas but did not have resources such as vehicles to manage them. Many foresters knew very little about the indigenous forests under their control and less still about the fauna within these areas. They had been trained in the management of exotic timber plantations, not in issues related to conservation forestry. Some had tried to prevent illegal exploitation of natural resources within the indigenous forests but they complained of receiving no support when reporting transgressions to their supervisors and the authorities. Intimidation and threats had led to Forest Guards being chased from some outposts. There was therefore no managing authority present in many of the forests.

Those indigenous forest patches which were surrounded only by settlements, crops, pastures and grasslands showed very few signs of mammals and no indication of bushbuck, blue duiker and bushpig. Indigenous forest patches surveyed that were linked or close to other indigenous forests or timber plantations showed signs of bushbuck, blue duiker or bushpig. This was particularly noticeable in South Coast forests. We can thus reject the hypothesis that the presence of indigenous mammals is unrelated to surrounding land use. The historical practice in Transkei of planting woodlots near indigenous forests for their protection may have benefited forest fauna as well as flora.

Our results to date suggest that the incidence patterns of blue duiker and bushbuck are similar in Transkei coastal forests, but that bushpig are less widely distributed. It is not clear whether this restricted distribution is because of more particular biological requirements of this species (such as water or food), a larger home range territory or behavioural characteristics. Bushpig can be a major crop pest (White, 2000), and local people may attempt to kill marauding animals, or to chase them from inhabited areas deeper into the forest.

Further elucidation of the factors affecting the incidence of indigenous mammals awaits collection of the complete dataset and analysis of information using a species incidence function model, such as that of Hanski (1994). This approach has been successfully used to explain the impacts of forest patch characteristics on selected mammalian species in KwaZulu-Natal (Lawes, Mealin & Piper, 2000).

5. Conclusion and recommendations

A variety of mammal species were present in Pondoland Coast Forests, South Coast Forests, Dune Forests and Mangroves along the Wild Coast. Blue duiker, bushbuck and bushpig were, however, difficult to find and were absent from small forest patches. It appeared that their habitat was being heavily exploited even where it had been proclaimed as State Forest. The utilisation pressures, particularly noticeable in Headman's forests and smaller forest patches, did not appear to be sustainable. Hunting seldom occurred in the smaller patches any more, but was confined to the large forests where blue duiker, bushbuck and bushpig still existed. Foresters and Forest Guards were not properly trained, equipped or supported to enable them to control hunting or other utilisation.

The presence of exotic plantations around forest patches appeared to increase the incidence of the selected forest species and to reduce utilisation of forest. There were also signs of these species where indigenous forest patches were interlinked to create corridors. Where surrounding land-use was restricted to grassland, crops or settlements, however, there were no signs of blue duiker, bushbuck or bushpig.

The uncontrolled exploitation of the Wild Coast Forests has resulted in the complete destruction of some patches. The future of the remaining forests and mammals within them depends upon the political will to protect them. Forests that are important because of their rich biodiversity require a higher status of protection and need to be managed by an organisation that is capable of providing enough trained personnel with adequate resources and support. The forests require comprehensive management plans that should be drafted with the involvement of foresters, conservationists, biologists and local communities. Research and monitoring of forests and their utilisation will be crucial to provide input into the management plan and the possibilities of sustainable utilisation of natural resources.

The importance of the involvement of local people cannot be overemphasised. Environmental education for communities is essential as is the provision of employment opportunities in the fields of conservation, ecotourism and related industries. The negative impacts of commercial forestry need to be considered, but the social and environmental benefits of strategically placed woodlots cannot be ignored. Community Foresters can play an important part in training local people to manage woodlots.

To ensure the efficient management of the indigenous forests and sustainable resource utilisation, legislation will need to be enforced. It is unrealistic to expect field staff, who are often isolated and subject to intimidation, to confront and arrest heavily armed poaching syndicates. Organised commercial exploitation of forest products is out of control and is threatening the future of the indigenous forests of the Wild Coast. A well-trained law enforcement unit needs to be established to assist in curbing the lawlessness that prevails in the Transkei forests.

Unless these management recommendations are implemented, blue duiker, bushbuck, bushpig and other mammal species could be eliminated from the forests along the Wild Coast. The protection status currently awarded to the forests may therefore be insufficient to ensure their long-term conservation.

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