NATAL DRAKENSBERG PARK
SOUTH AFRICA

Information sheet for the site designated to the
List of Wetlands of International Importance
in terms of the
Convention on Wetlands of International Importance
especially as Waterfowl Habitat

South African Wetlands Conservation Programme
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RAMSAR DATA

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5. NAME OF WETLAND Natal Drakensberg Park

6. DATE OF RAMSAR DESIGNATION 21/01/1996

7. GEOGRAPHICAL CO-ORDINATES

The Natal Drakensberg is crescent-shaped, and stretches from latitude 20º 05' to 9º 55' south, and longitude 29º 45' to 29º 44' east.

8. GENERAL LOCATION

The area is located in eastern KwaZulu-Natal, along the border between the Province of KwaZulu-Natal, South Africa and the Kingdom of Lesotho.

9. AREA Approximately 242 813 ha (see Appendix 1).

10. WETLAND TYPE

The area is characterised by an abundance of high altitude mountain wetlands. These include high altitude tarns, springs, bogs, marshes and streams. These may be broadly classified as permanent rivers and streams, including waterfalls, permanent and seasonal marshes and ponds, with emergent vegetation waterlogged for at least most of the growing season, peatlands, freshwater springs, seasonally flooded meadows and sedge marshes.

The wetlands are further described by Dely, Kotze, Quinn, and Mander (1995) based on the topographic position and water regime of each wetland. In order to account for the range of topographic positions occupied by the wetlands of the Park, they describe the wetlands with reference to the terrain and landform classification system employed in WETLAND-USE (Kotze et al. 1994). The water regimes of the wetlands are described indirectly using soil morphology criteria. According to Dely et al. (1995), the Drakensberg wetlands have therefore been classified as depression settings, midslope and valleyhead slope settings, valleybottom and channel settings, footslope settings and cliff/scree sites. These are described as follows:

i. Depression settings
Depression settings occur on terraces or in valleybottoms, but tend to be more common and conspicuous on ridgetops, even on fairly narrow ridges. Wetlands in such settings are described as endorheic because they are inward draining and do not have an outlet.

Ridgetop depressions with open water are commonly referred to as tarns (Killick 1961). Tarns are fairly widespread in the lower Sub-alpine zone but are very infrequent in the Montane zone and in the entire Northern Drakensberg. Excluding very small depressions (those <0.1 ha) there are probably not more than a few hundred tarns in the Drakensberg. The highest concentrations of tarns occurs in the southern Drakensberg (e.g. 'The Lake District' in Cobham), where flat-topped ridges are far more prevalent than in the central and northern Drakensberg. This range in water regimes results in depressions supporting a range of vegetation types. Permanently wet areas support open water with submerged or floating aquatic plants or support emergent plants (notably, Eleocharis dregeana). In the less wet depressions and on the margins of the wetter depressions, temporarily wet grassland is supported.

ii. Midslope and valleyhead slope settings
Valleyhead wetlands can be flat and relatively large (>1 ha). However, most wetlands in valleyhead positions are sloped. Sloped valleyhead wetlands are functionally similar to sloped midslope wetlands in that both are: (1) generally characterised by the discharge and/or throughflow of groundwater; (2) usually situated high in the catchment; (3) do not have stream channels within or entering them; and (4) are usually small (<1 ha). They also support similar vegetation types, mostly sedge/grass meadow. However, they differ in that valleyhead wetlands are drained by a stream channel (i.e. they occur at the 'eye' of the stream) but slope settings are not.

iii. Valleybottom and channel settings
Stream channels are common in the Drakensberg but their character is such that riparian wetlands are seldom very extensive. Most stream channels have steep gradients, with the result that the velocity of stream currents is high and not conducive to the establishment of emergent and aquatic plants (Killick 1961). In addition, streambeds are often characterized by boulders, sometimes in several tiers, further limiting the establishment of wetland vegetation. In young valleys, the valleybottom is very narrow, and steep well drained slopes often extend all the way to the channel banks, confining any riparian wetland areas that occur to the immediate stream banks. The stream banks themselves are usually well drained, further limiting the extent of riparian wetlands. Thus, wetlands associated with young valleys are discontinuous and usually narrow.

Valleys with third order streams and greater tend to have wider valleybottoms than those associated with low order streams. Although these valleys are more gently sloped, they generally do not support extensive wetland areas in the Drakensberg because the channel bed usually lies well below the general valleybottom surface and the water table is seldom shallow enough for wetland conditions to develop, other than in less elevated areas (e.g. 'backmarsh' areas).

'Backmarsh' areas supporting wetlands usually occur where tributary streams which are not deeply incised into the valleybottom flat areas, flow across the valleybottom of the main stream. This allows

for diffuse flow across the wetland area to occur readily. It is presumed, therefore, that such tributary streams have an important role in maintaining the wetness of the 'backmarsh' wetlands. Both herbaceous vegetation types, such as Merxmuellera meadow, and woody vegetation types, such as Leucosidea sericea scrub, are supported in valleybottom areas. The degree of wetness of valleybottom flat areas varies, resulting in these areas supporting a range of wetland vegetation types. The most commonly occurring wetland type in the wettest of these areas is Carex acutiformis marsh, while Merxmuellera meadow and Miscanthus capensis meadow occur in less wet situations.

Almost all of the large wetlands of the KwaZulu-Natal midlands (e.g. Ntabamhlope vlei and Mgeni vlei) occur in unchannelled valleybottoms, which are areas that have very gentle slopes and where channelled flow becomes diffuse. This landform is almost completely absent from the Natal Drakensberg, presumably due to the steep gradients of most Drakensberg streams. There are some Drakensberg wetlands (e.g. those occurring on the Highmoor plateau) which have very gentle gradients, but these tend to have stream channels which, although shallow, reduce the extent of diffuse flow.

iv. Footslope settings
Hill profiles are often stepped, especially in the southern Drakensberg. This effect is caused by the lithology of the parent rock; erosion of which gives rise to steep slopes interrupted at intervals by gently sloped terraces/footslopes running along the hill contour (Klug et al. 1991). Depending on the situation, these footslopes may either have very shallow soils (<10 cm deep), with patches of the underlying sheetrock exposed or, alternatively, they may have deep soils (usually >80 cm). Wetlands occurring on footslopes with shallow soils appear to occur predominantly in situations where groundwater moving downslope is forced to the surface, or very close to the surface, by the impervious sheetrock.

Most wetlands occurring on footslopes with deep soil are associated with tributary streams which flow down the side of the main valley and over the footslope, becoming more diffuse due to the considerably reduced gradient. As is the case with many valleybottom flat/'backmarsh' wetlands, the tributary streams are presumed to be important in maintaining these wetlands. The vegetation types supported by terraces with shallow soils are distinctly different from those on terraces with deep soils and tend to be much shorter and have many more succulent plants, especially of the genus Crassula.

v. Cliff/scree sites
Very small waterlogged (temporarily to permanently) sites (<10 m2 in size and often only a few centimetres in diameter) occur on cliffs, scree slopes, below overhangs and adjacent to waterfalls. Because of their scale, these areas are generally not considered in wetland inventories. Nevertheless, they support a wide range of species, some of which are specially adapted to such sites.

11. ALTITUDE Maximum 3 377 m, minimum 1 300 m

12. OVERVIEW OF SITE

The Drakensberg, which forms part of the eastern escarpment of southern Africa, is an extremely rugged area that includes three altitudinal zones: the Montane zone (1280 - 1830 m); the Sub-Alpine zone (1830 - 2865 m) and the Alpine Zone (2865 - 3500 m) (Killick, 1978).

The Drakensberg catchments consist of an inter-connected system of wetlands, ranging from open water bodies such as mountain tarns, a variety of marshes, to an intricate network of stream and river courses. These wetlands are present throughout the altitudinal gradient of the mountains, from the Afro-alpine to the Afromontane Belts. The networks of interconnected wetland systems are distributed in a complex mosaic, occupying a variety of positions in the landscape, ranging from small hanging wetlands, high on valley sides, down to the extensive watercourses.

13. PHYSICAL FEATURES

The Drakensberg Mountain Range forms part of the outer rim of the Great Escarpment of the interior plateau of southern Africa, and stretches from the Stormberg Mountains of the southern Cape to the eastern part of the Northern Province. The Natal Drakensberg component of the greater range lies

along the boundary between KwaZulu-Natal and Lesotho, and extends northwards along the boundary between the Free State and KwaZulu-Natal.

Geology and Geomorphology
The Drakensberg consists of two parallel escarpments stepping up from the lowlands to the Lesotho plateau. This comprises four rock formations of the Stormberg Series, underlain in turn by the Upper Beaufort Beds of the Beaufort Series. The lower escarpment, or "Little Berg" as it is commonly known, is capped by prominent Clarens Sandstone cliffs. Underlying this formation are three formations of sedimentary rocks. Above the Clarens Sandstone lies stratified basaltic lavas, with a vertical thickness of nearly 1 400 m. The cliffs of the main escarpment are dark coloured, bare and form spectacular sheer cliff faces locally, some of which are almost 500 m in height.

Origins
The rivers of the Drakensberg, although numerous, drain into only three catchments namely, the Tugela, the Mkomazi and the Mzimkulu. The Tugela is the biggest river in KwaZulu-Natal and the second biggest in South Africa, while the other two are the second and third biggest rivers in KwaZulu-Natal. All the rivers in the Drakensberg Park fall into the same category in any given classification namely, the Drakensberg Mountain Region (Harrison, 1959).

Hydrology
The water yield of the Park is of high importance to much of KwaZulu-Natal. The Park occupies c. 2460 km2 out of a total of c. 3038 km2 in the whole Drakensberg catchment area. The estimated water runoff for the Park is 7000 m3/ha/year. Thus the MAR of the Park is some 1722 X 106 m3/year. Although only 7,3 % of the three major rivers' catchment lies in the Park some 25 % of their MAR is derived from this area (Bainbridge, 1982).

Soil type and chemistry
The channel substrate at high altitudes (generally > 1850 m) consists of basalt bedrock and boulders while at lower altitudes, sandstone bedrock and boulders dominate. In the lowest parts of the park, sand and silt substrates become evident as occurs in the Stillerus section of the Mooi River. Although mineral soils are more common, some of the wetland areas, particularly those on south-facing slopes and at higher altitudes, have organic soils (which tend to have a minerotrophic water supply).

Water quality
Water temperatures range from freezing point at higher altitudes to as high as 27ºC at low altitudes. Dissolved oxygen is usually at saturation level and the Total Dissolved Solids (T.D.S.) value is usually < 100 ppm. The pH remains around neutral but a range from 6,5 to 8,2 has been recorded. Suspended solid loads are generally low although higher levels may be temporarily induced by storms. There is little primary productivity in the rivers, especially at higher altitudes, and food chains depend on allochtonous litter. This litter may consist of grassy material or of woody plant material but the most important contributory species, at lower altitudes (< 2000 m) at least, is Leucosidea sericea. This small tree sheds leaves throughout the year and it has been shown that invertebrate population densities in the river are proportional to bank cover by this species. The invertebrate populations are dominated by insects with Ephemeroptera (e.g. Afronurus harrisoni) and Trichoptera (e.g. Hydropsychidae) being generally predominant. Population densities of more than 2000 individuals/m2 have been recorded where L. sericea stands are particularly dense. Only one crustacean, the crab Potamonautes depressus, occurs in the park.

Depth, fluctuations and permanence
Under normal rainfall conditions, all the main rivers and their tributaries are perennial where they leave the Park and most may be classified as the Lower Stony Run Zone at that point. The larger streams are perennial right from their Source Zones and Mountain Torrent Zones while the smaller ones are seasonal at high altitudes. The winter (dry) season flows are largely dependent on either the extent of development of a snow pack or on the localised presence of wetlands. Stream flows can fluctuate widely in the short time periods after storms. Generally these events, which may be very localised, occur in the summer months. The water regimes represented in the wetlands range from permanently to temporarily waterlogged.

Tidal variations

N/A.

Climate
The mean annual rainfall ranges from about 1 100 mm to over 2 000 mm. Precipitation is in the form of rainfall, mist and snow, with most snowfalls occurring in the winter and spring, between May and October. There are approximately eight snowfalls per year, but the contribution to total precipitation is small. Mist may account for as much as a quarter of the total precipitation. About 80 % of the annual rainfall occurs from October to March, leading to a summer moisture surplus and a winter moisture deficit. The rainfall is of convection and orographic types. Summer rainstorms, particularly convection storms, are commonly of high intensity.

14. ECOLOGICAL FEATURES

Two of the seven floristic regions recognised by Werger (1978) in his phytosociological study of Africa south of four degrees south, are represented in the Drakensberg Park. These are the Afro-alpine and Afromontane Regions described in detail by Killick (1978) and White (1978) respectively. The vegetation of the Drakensberg Park falls into three of the 70 South African Veld Types described by Acocks (1975), viz. Themeda - Festuca Alpine Veld (no. 58), Highland Sourveld (no. 44a), and a very small area of Southern Tall Grassveld (no. 65). Most of the area is covered by grasslands, with wooded areas being confined mainly to lower altitudes and moist aspect slopes. Topography is varied, from extremely exposed basalt escarpments to more sheltered sandstone formations, and from undulating hill slopes to river valleys. Although the topography does not, in general, favour the development of large wetlands, an extremely wide range of wetland communities are represented due to the range of physical conditions under which the wetlands have developed.

Vegetation types characterising wetlands in the Natal Drakensberg Park

The topography of the Drakensberg does not, in general, favour the development of large wetlands. However, a wide range of wetland vegetation types and wetland dependent species (Appendix 4) are represented in the Natal Drakensberg Park due to the range of physical conditions under which the wetlands developed. On the basis of a study to compile an inventory and classification of the wetlands in the Natal drakensberg Park, Dely et al. (1995) describe 11 wetland vegetation types which characterise the wetlands of the Park. These are outlined in Table 1, together with the dominant and other characteristic species.

Table 1. The eleven vegetation types characterising wetlands in the Natal Drakensberg Park

VEGETATION TYPES	**DOMINANT SPECIES**	**OTHER CHARACTERISTIC SPECIES**
Leucosidea scrub[1]	*Leucosidea sericea*	*Miscanthus capensis*
Mixed scrub[3]	*Cliffortia linearifolia*	*Erica evansii, Myrsine africana*
Miscanthus capensis meadow[3]	*Miscanthus capensis*	*Acalypha spp., Senecio spp., Helichrysum spp., Gunnera*
Merxmuellera spp. meadow[3]	*Merxmuellera macowanii, M. drakensbergensis*	*Afrotysonia glochidiata, Geranium pulchrum, Ranunculus baurii,*
Sheetrock dwarf wetland	*Rhodohypoxis spp., Crassula spp., Tulbaghia spp., Aristida junciformis*	*Styppeiochloa gynoglossa, Bulbostylis humilis*
Sedge/grass meadow	*Festuca caprina, Andropogon appendiculatus, Eragrostis planiculmis, Rhynchospora brownii, Schoenoxiphium spp., Scleria spp.*	*Fuirena pubescens, Bulbostylis schoenoides, Dierama pauciflorum, Xyris capensis, Aristida junciformis, Melasma scabrum, Geranium spp., Urginea macrocentra.*
Kniphofia caulescens marsh	*Kniphofia caulescens*	*Scirpus ficinioides, Eriocaulon dregei*

Mixed sedge marsh	*Carex cognata, Juncus oxycarpus, Juncus exsertus, Eriocaulon dregei, Pycreus cooperi*	*Juncus dregeanus, Denekia capensis, Cyrtanthus breviflorus*
Carex acutiformis marsh	*Carex acutiformis*	*Gunnera perpensa*
Isolepis marsh	*Isolepis fluitans*	*Isolepis costata*
Eleocharis dregeana marsh	*Eloecharis dregeana*	*Isolepis fluitans*
Open water	*Crassula natans, Limosella maior*	*Ilysanthes bolusii*

Although the wetlands of the Drakensberg support predominantly herbaceous vegetation types, some wetland areas support woody vegetation types. These are restricted to steam channels and associated bottomland areas. The woody vegetation types (*Leucosidea sericea* scrub and Mixed scrub), while being associated with riparian areas, are not confined to wetlands. This applies particularly to *Leucosidea sericea* scrub, which occurs predominantly in mesic non-wetland areas, but may be found occasionally on wetland soils. Mixed scrub is characterized by species associated with riparian wetlands (e.g. *Cliffortia linearifolia*) and thus is more confined to wetlands per se. Regular burning of the Drakensberg favours the maintenance of herbaceous vegetation over woody vegetation.

Of the herbaceous vegetation types, *Miscanthus capensis* meadow typically occurs in the Montane zone in temporarily to seasonally wet areas in valleybottom and terrace settings with deep mineral soils. In the Alpine and Sub-alpine zones, such areas tend to be dominated by *Merxmuellera* spp. The wetland areas with very shallow soils which are maintained by groundwater discharge over sheetrock terraces, are characterized by *Rhodohypoxis* spp. and *Crassula* spp. The occurrence of particular species varies depending on such factors as altitude and water regime.

Sedge/grass meadow areas, characterized by species such as *Festuca caprina,* usually occur in temporarily to seasonally wet areas surrounding marshes and on elevated hummocks within the marshes, as well as on slopes. The dominant species vary according to landform setting and altitude. For example, in the Montane and lower Subalpine zone, *Scleria welwitschii* and *Rhynchospora brownii* may predominate, while in the Alpine zone, *Scirpus ficinioides* is usually one of the predominant species in Sedge/grass meadow areas. *Kniphofia caulescens* is usually the dominant and most conspicuous species on wetter seepage slopes in the Alpine zone.

Marshes, which tend to be in permanently waterlogged areas on very gentle slopes or in depressions, are characterized by various vegetation types dominated by Cyperaceae and, to a lesser extent, Juncaceae. *Carex* marsh, dominated by *Carex acutiformis*, occurs predominantly in 'backmarsh' areas. Mixed sedge marsh is characterized by various sedges (e.g. *Carex cognata* and *Pycreus cooperi* and rushes (e.g. *Juncus oxycarpus*). *Isolepis* marsh, dominated by *Isolepis fluitans*, and *Eleocharis* marsh, dominated by *Eleocharis dregeana*, often occur in association with a mixed sedge marsh. Standing open water areas, which are generally restricted to tarns, are characterized by aquatic species such as *Crassula natans* and *Ilysanthes bolusii*.

The occurrence of the eleven vegetation types is summarized below in relation to the typical water regime, altitudinal zone and topographic setting in which they were found (Table 2).

Table 2. Drakensberg wetland vegetation types, summarized according to water regimes, altitudinal zones and topographic settings

WETLAND VEGETATION TYPES	**Water regime**	**ALTITUDINAL ZONES**		
		Montane	**Sub-alpine**	**Alpine**
Leucosidea scrub*	Non, Se	V,C		
Mixed scrub*	Se, Non	V,C	V,C	V,C
Miscanthus capensis	Se, Non	Fd,V,S,C		

meadow/grassland*				
Merxmuellera spp. meadow/grassland*	Se, Non		C,Fd,S,V	D,C,S,V
Sedge/grass meadow	Se	S,D,V	S,D,V	S,D,V
Sheetrock dwarf wetland	Se	Fs,D	Fs,D	Fs,D
Kniphofia caulescens marsh	Se, Perm			S
Mixed sedge marsh	Perm, Se	V,D,C,S	V,D,C,S	V,D,C,S
Carex acutiformis marsh	Perm	V,D,C,Fd	V,D,C,Fd	
Isolepis marsh	Perm	V,D,C,Fd	V,D,C,Fd	V,D,C,Fd
Eleocharis dregeana marsh	Perm, Se	D,V	D,V	
Open water	Perm, Se	D,V,Fd	D,V	D,V

Legend

TOPOGRAPHIC SETTINGS
D= Ridgetop depressions and flats
Fd= Footslopes with deep soils
Fs= Footslopes with shallow soils
S= Midslopes and valleyhead slopes
C= Valleybottom channel and banks
V= Valleybottom 'backmarsh' and flat areas

WATER REGIMES
Se= Temporarily to seasonally waterlogged
Perm= Semi-permanently to permanently waterlogged
Non= Also occurs in non-wetland areas

Those topographic settings which are most characteristic of particular vegetation types are underlined.
* These vegetation types are also found outside of the wetland.

Based on the relationship between altitude, topographic setting and water regimes of the wetlands of the Natal Drakensberg Park, Dely et al. (1995) proposed a classification scheme (Figure 4) which attempts to combine the descriptions of wetland vegetation types and the physical parameters of the wetland sites. The wetlands of the Natal Drakensberg Park are therefore classified as follows:

Topographic	**Alt. zone**	**Water regime**	**Vegetation type**
Ridgetop depressions	Alpine/sub-alpine/ montane	-temporary	-Grass/sedge meadow
			-*Eleocharis marsh*, Mixed sedge marsh
		-permanent	-Open water
Midslope & valleyhead slopes	-Montane	-temporary	-*Miscanthus capensis* meadow, *Merxmuellera* spp. meadow*
			-Grass/sedge meadow
		-permanent	- Mixed marsh
	-Sub-alpine	-temporary	- *Merxmuellera* spp. meadow
			- Grass/sedge meadow
		-permanent	- Mixed marsh
	-Alpine	-temporary	- *Merxmuellera* spp. meadow
			- Grass/sedge meadow
			-*Kniphofia caulescens* meadow
		-permanent	- Mixed marsh
Footslopes with deep soils	-Montane	-temporary	-*Miscanthus capensis* meadow, *Merxmuellera* spp. meadow*
			- Grass/sedge meadow
		-permanent	-All marsh types
	-Sub-alpine/alpine	-temporary	- *Merxmuellera* spp. meadow
			- Grass/sedge meadow
		-permanent	-Mixed marsh/*Isolepis* marsh
Footslopes with shallow soils	Montane/sub-alpine/alpine	temporary/permanent	Sheetrock dwarf wetland
Valley-bottom 'backmarsh' and flats	-Montane	-temporary	-*Miscanthus capensis* meadow, *Merxmuellera* spp. meadow*
			- Grass/sedge meadow

		-permanent	-Mixed marsh, *Carex acutiformis marsh*, *Isolepis* marsh
	-Sub-alpine	-temporary	-*Merxmuellera* spp. meadow* - Grass/sedge meadow
		-permanent	-Mixed marsh, *Carex acutiformis marsh*
	-Alpine	-temporary	-*Merxmuellera* spp. meadow* - Grass/sedge meadow
		-permanent	- Mixed marsh
Valley-bottom channel and flats	-Montane	-temporary	-*Leucosidia* scrub, mixed scrub -*Miscanthus capensis* meadow, *Merxmuellera* spp. meadow* - Grass/sedge meadow
		-permanent	- Mixed marsh
	-Sub-alpine	-temporary	-*Leucosidia* scrub, mixed scrub -*Merxmuellera* spp. meadow* - Grass/sedge meadow
		-permanent	-Mixed marsh
	-Alpine	-temporary	- Mixed scrub -*Merxmuellera* spp. meadow* - Grass/sedge meadow
		-permanent	- Mixed marsh

Figure 1. A hierarchical classification of the Natal Drakensberg wetlands based on topographic setting, altitudinal zone and vegetation type
*= confined mainly to the Southern Drakensberg

15. LAND TENURE

a.Ramsar site: State owned land
b.Surrounding area: In Lesotho, most of the area is communal land. In South Africa, the surrounding area comprises both privately owned commercial farms and communal land.

Legal status
Most of the area has been declared a wilderness area, nature or game reserve, or provincial park. Small areas of demarcated and undemarcated state forest land also occur.

16. CONSERVATION MEASURES TAKEN

The primary reason for the establishment of the Natal Drakensberg Park was to ensure the maintenance and production of quality water for the countries needs. As a result of the conservation efforts, crystal clear water flows out of the Park in substantial volumes. The South African Department of Water Affairs and Forestry have implemented a water scheme to pump water out of KwaZulu-Natal to the densely populated and highly industrialised Gauteng Province in the interior of the country.

The outstanding landscape that comprises the Park attracts thousands of visitors annually both from South Africa and overseas. Visitors greatly appreciate the ability to walk and climb and overnight in remote wilderness areas. Substantial upgrading and maintenance of paths and roads has taken place and is an ongoing challenge for field managers.

The eland populations have increased over the years from about 100 in 1904 to over 2000 to date. Eradication programmes of alien species have also taken place with and particular successes have been made with regard to eliminating infestations of wattle and pine. These endeavours are ongoing and will continue for many years to come. The potential to succeed with this programme is however limited by budget allocations. Considerable success has been achieved through the consultation with neighbouring communities who now have a much clearer understanding of environmental awareness and the need and benefit of conservation areas.

Fire is a common natural disturbance in these mountain grasslands. Historically, lightning which occurs during summer thunderstorms in this region was, and in many cases still is, the major cause of fires in this region. However, there is evidence to suggest that the earlier traditional occupants of the "little berg", and more recently, the plateau areas, introduced fire in order to improve grazing for livestock and encourage game into the area for hunting. Nowadays, burning in the Park is managed. Areas are burnt biannually and seasonal variability has been introduced (i.e. Autumn, winter and spring) in order to try and maintain the biotic diversity of the area. Considerable research over many years has been carried out in the Cathedral Peak area in order to study the effects of fire on the grasslands.

Legally proclaimed wilderness areas (held under the provisions of the Forest Act No 122 of 1984) total 130 000 hectares. These areas are set aside for visitors and staff who travel through by foot or horse back. Motorised transport is not permitted except in exceptional circumstances. Visitors to the wilderness make use of caves, campsites and mountain huts to overnight. Hutted visitor camps are located at the following locations: Royal Natal (Tendele), Injasuti, Giants Castle, Kamsberg and Loteni. Public camping sites are scattered throughout the Park. Visitors to the Park are able to participate in many activities which include hiking, backpacking, wilderness trails, horse rides, paragliding and mountain climbing. Attractions include outstanding examples of rock art in caves and overhangs, clear mountain streams, a magnificent landscape, herds of game, wild flowers and indigenous trees, grasslands and interesting bird species.

Management category
Wilderness area
Nature or game reserve
Demarcated and undemarcated state forest land

Management Plan
A Natal Parks Board management plans exist for the following stations:
* Royal Natal National Park and Rugged Glen
* Giants Castle
* Kamsberg
* Loteni

Draft Forestry management plans exist for:
* Cathedral Peak
* Monks Cowl
* Highmoor
* Mkhomazi
* Cobham
* Garden Castle

A joint management plan exists for the Mont-Aux-Sources Plateau. This was drawn up by officers from Natal Parks Board, KwaZulu Department of Nature Conservation and the previous Qwa Qwa conservation authority.

17. CONSERVATION MEASURES PROPOSED BUT NOT YET IMPLEMENTED

Management plans for the remaining areas are being drafted.

18. LAND USE

a.Ramsar site
Nature conservation and outdoor recreation including walking, hiking, climbing, camping, wilderness experiences and horse riding.

b.Surroundings
Various activities are currently taking place in the area surrounding the Park. These include commercial and subsistence farming, as well as various recreation activities. Many private

accommodation facilities like chalets, lodges, hotels and camp sites have been developed to cater for the tourist market.

Consumptive resource utilization

Table 3. Wildlife resource harvesting by neighbouring communities 1994/1995.

Species Utilized	Quantities (tons)	Returns (Rand)
Festuca costata	25.70	9 880
Thatch	79.20	31 680
Firewood	25 076.00	125 380
Ncema	10.00	50
Reeds	0.07	-
Acacia delbata	2.00	-
Other Grasses	9.46	1 201

The controls on utilization of resources is the responsibility of the officer-in-charge of every station. Control is exercised through entry and movement within the protected area and the use of neighbour cards and/or "thatch" cards. Harvested resources are inspected and/or controlled before they are allowed out of the protected area.

Table 4. Drakensberg total budget : 1995/96

	Natal Parks Board funded	State funded	TOTAL
Salaries & Running Costs	4,881,027.00	14,181,371.00	19,062,398.00
Capital Expenditure		576,500.00	576,500.00
GRAND TOTAL	4,881,027.00	14,757,871.00	19,638,898.00

19. POSSIBLE CHANGES IN LAND USE AND PROPOSED DEVELOPMENT PROJECTS

a. Ramsar site
None envisaged.

b.Surroundings and catchment
Uncontrolled agriculture, overgrazing of communal land and afforestation with exotic tree species. Neighbouring communities often view the Park as an unutilized grassland which should be made available for ever increasing numbers of domestic livestock for grazing. Land claims and a land invasion have taken place. The communities have been encouraged to work legally through the Land Claims Court and not to invade conservation areas. In a few places communities dispute the boundary between the Park and communal land. Forums have been set up to resolve these disputes.

20. DISTURBANCES AND THREATS

A preliminary assessment of the status of the wetlands in the Natal Drakensberg Park was carried out by Dely et al. (1995), based on the following factors:

i. level of erosion;
ii. disruption of the hydrological regime; and
iii. invasion by alien plant species.

The wetlands of the Park have been subjected to very low levels of soil disturbance caused by erosion. Erosion of the wetlands surveyed by Dely et al. (1995) was found to be extremely low, with erosional degradation (in the form of rill and gully erosion) not being recorded in the wetlands surveyed. This

may be partly attributed to the low level of use of the wetlands in the Park. The low level of erosion and the absence of any artificially constructed drainage channels suggests that the hydrological regimes of wetlands in the study area have not been significantly disrupted. Except for a few wetlands with low levels of alien plant infestation, almost all of the described wetlands were found to be free of alien plants.

21. HYDROLOGICAL AND BIOPHYSICAL VALUES

The three largest rivers in KwaZulu-Natal rise in the Drakensberg. The mountains occupy less than 7 % of the surface area of KwaZulu-Natal, but yield approximately 25 % of the total stream flow. The Drakensberg exerts good control over high rainfall inputs. Drainage density (the length of stream channel per unit area) is very high and slopes are very steep resulting in high runoff/rainfall ratios (0,45 to 0,5). Mean annual runoff is estimated at 600 mm.

22. SOCIAL AND CULTURAL VALUES

The Drakensberg is renowned for the quantity, quality and variety of rock art painted by now extinct Bushman. Many parts are also declared wilderness areas.

23. NOTEWORTHY FAUNA

A number of animals listed in the South African Red Data Books are partly or totally dependent on the wetlands of the Natal Drakensberg Park. These are listed in Appendix 2.

24. NOTEWORTHY FLORA

A large numbers of South African Red Data Book and endemic plants are associated with the wetlands of the Natal Drakensberg Park. These are listed in Appendix 3.

25. SCIENTIFIC RESEARCH AND FACILITIES

The Natal Parks Board encourages scientific research in the area. There is one research station, run by the Council for Scientific and Industrial Research (C.S.I.R.), in the Park at the Cathedral Peak State Forest. In other areas accommodation is made available to researchers with projects registered with the Natal Parks Board. A list of current research projects is given in Appendix 5.

26. CONSERVATION EDUCATION

There is an education centre, run by the Department of Education and Training, at the Cathedral Peak State Forest, catering for groups of schoolchildren on a short-term basis. There are several information centres at other stations and one full-time Information Officer based at Giant's Castle Game Reserve. There is also a vulture feeding station with a hide at Giant's Castle.

27. RECREATION AND TOURISM

The Natal Parks Board provides accommodation in 10 centres. The accommodation at these centres totals 1 757 beds per night, or 641 305 bed units per annum. This includes:

94 units, providing 450 beds in hutted camps;
3 mountain huts providing 150 beds; and
9 caravan/camping areas accommodating 1 157 people.

28. MANAGEMENT AUTHORITY

Natal Parks Board

29. JURISDICTION

State jurisdiction, in the form of the Forest Act, No. 122 of 1984 and the KwaZulu-Natal Ordinance, No. 15 of 1974, are applicable to the forestry reserves and conservation areas respectively.

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31. REASONS FOR INCLUSION IN THE LIST OF WETLANDS OF INTERNATIONAL IMPORTANCE

Criterion 1 (a) . A particularly good representative example of a natural or near-natural wetland characteristic of the appropriate biogeographical region.

Motivation: The Park protects over 70 % of the Drakensberg biogeographical region, and contains representative sample ecosystems of the entire variety of ecosystems. Extensive wetlands of various types occur within the rare Afro-alpine and Afromontane Belts. Associated with the wetlands of both floristic regions are the endemic and Red Data plant and animal species listed in Appendices 2 and 3. It is of significance that the World Conservation Strategy listed the Drakensberg as a priority biogeographical region for the establishment of protected areas. The establishment of the Park was a significant step to achieve this objective.

Criterion 1 (c). A particularly good representative example of a wetland which plays a substantial hydrological, biological or ecological role in the natural functioning of a major river basin or coastal system especially where it is located in a trans-border position.

Motivation: The Drakensberg is regarded as the most important mountain catchment in South Africa because of the high water yield and good quality water which flows from it. The three largest rivers in KwaZulu-Natal have their origins here and support rural, agricultural, urban and industrial users down-stream. Water is transferred to the highly industrialised and populated Gauteng Province in the interior of the country. The value of water produced has been estimated at over R 150 million p.a. The high altitude wetlands play a vital role in regulating flow and in maintaining the highest water quality standards. In addition, negotiations are underway regarding collaboration with Lesotho to develop a protected area adjacent to the Natal Drakensberg Park in Lesotho. This will result in the formation of a transborder park.

Criterion 1 (d). It is an example of a specific type of wetland, rare or unusual in the appropriate biogeographic region.

Motivation: The Park thus contains the most significant wetland systems of the Drakensberg mountain range. The high altitude wetlands of the type occurring in the Drakensberg occur only in a few localities in the Eastern Cape, and nowhere else in southern Africa.

General criteria based on plants and animals

Criterion 2 (a). Supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species.

Motivation: At least 1 mammal, 3 bird, 1 reptile and 5 amphibian species which are partly or totally dependent on the wetlands of the Natal Drakensberg Park are listed in South African Red Data Books. These include the serval Felis serval, Black stork Ciconia nigra, Wattled crane Grus carunculata, Striped flufftail Sarothrura affinis, Grass owl Tyto capensis, Nile monitor Veranus niloticus, Drakensberg toad Bufo gariepensis nubicolus, Lesotho river frog Rana dracomontana, Water rana Rana vertebralis, Drakensberg stream frog Strongylopus hymenopus and the Dwarf dainty frog Cacosternum namum parvum respectively.

Criterion 2 (b). It is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna.

Motivation: The Park is of great significance for the maintenance and permanent protection of the genectic and ecological diversity in the Drakensberg Biogeographical Region.

Criterion 2 (c). It is of special value as the habitat of plants or animals at a critical stage of their biological cycles.

Motivation: The Park, because of its relatively large size includes a unique assemblage of complex ecosystems and habitats characterized by an extraordinarily high species richness, most of which are dependent on specific habitats.

Criterion 2 (d). It is of special value for one or more endemic plant or animal species or communities.

Motivation: The wetlands of the Natal Drakensberg Park support at least 36 endemic plant species from 12 families. These are listed in Appendix 3.

Conservation importance

The Drakensberg is the most important high altitude watershed in southern Africa, in terms of water yield. It forms the catchment area for the three largest rivers in KwaZulu-Natal (the Tugela, Mkhomazi and the Mzimkulu Rivers), which are of major significance for the socio-economic well being of both Gauteng and KwaZulu-Natal. In particular, the Tugela-Vaal Scheme, which exports water from KwaZulu-Natal to Gauteng, is dependent on the water from this mountain catchment area.

The wetlands of the Drakensberg play a key hydrological role in the mountain catchments and are of particular significance for the maintenance of regular streamflow patterns, and the production of high quality water. Within KwaZulu-Natal numerous farming communities, villages, and a number of large towns, are directly dependent on the above rivers for their water supplies. The inter-connected system of wetlands in the catchments range from open water bodies such as mountain tarns and marshes to an intricate network of stream and river courses. These wetlands are present throughout the altitudinal gradient of the mountains, from the Afro-alpine to the Afromontane Belts and are distributed in a complex mosaic, occupying a variety of positions in the landscape, ranging from small hanging wetlands, high on valley sides, down to the extensive watercourses.

Two of the seven floristic regions of southern Africa, the Afro-alpine and Afromontane Regions, are represented in the Drakensberg Mountains. These two are amongst the least extensive (and therefore most rare) of the seven floristic regions. The only Afro-alpine vegetation in southern Africa is shared between Lesotho, the Eastern Cape and KwaZulu-Natal. The Afro-alpine Belt contains extensive wetlands, which, by virtue of their extremely limited distribution on the Sub-continent, are considered rare. Although these wetlands have been little studied, it is known that an extensive list of endemic and Red Data faunal and floral species are associated with them. The most extensive and best conserved Afro-alpine wetlands in the country are conserved in the Park. Also present are the most important Montane Belt wetlands in KwaZulu-Natal. The Belt is somewhat more widespread than the Afro-alpine Belt, but the Park contains the most extensive and some of the best conserved Montane wetlands both in KwaZulu-Natal and South Africa. Almost the entire wetland system is in a pristine or near-

pristine state, since a large proportion of the Drakensberg Park has conserved since the turn of the century.

32. OUTLINE MAP OF SITE

APPENDIX 1

COMPONENT PROTECTED AREAS OF THE DRAKENSBERG PARK

PROTECTED AREA	AREA (ha)
Cathedral Peak State Forest	32 246
Monk's Cowl State Forest	20 379
Highmoor State Forest	28 151
Mkhomazi State Forest	49 156
Cobham State Forest	30 498
Garden Castle State Forest	30 766
Royal Natal National Park	8 094
Giant's Castle Game Reserve	34 638
Loteni Nature Reserve	3 984
Vergelegen Nature Reserve	1 159
Rugged Glen Nature Reserve	762
Kamberg Nature Reserve	2 980
TOTAL	242 813

APPENDIX 2

LISTS OF THE ENDEMIC AND RED DATA ANIMAL SPECIES PARTLY OR TOTALLY DEPENDENT ON THE WETLANDS OF THE DRAKENSBERG PARK.

SPECIES		**RED DATA STATUS**
1. MAMMALS		
Felis serval	Serval	T
2. BIRDS		
Ciconia nigra	Black Stork	I
Grus carunculata	Wattled crane	EG
Sarothrura affinis	Striped flufftail	R
Tyto capensis	Grass owl	I
3. REPTILES		
Varanus niloticus	Nile minotor leguaan	V
4. AMPHIBIANS		
Bufo gariepensis nubicolus	Drakensberg toad	V
Rana dracomontana	Lesotho river frog	V
Rana vertebralis	Water Rana	R
Strongylopus hymenopus	Drakensberg stream frog	V
Cacosternum namum parvum	Dwarf dainty frog	V

KEY:
ED = Endemic
EG = Endangered
T = Threatened
I = Indeterminate
R = Rare
V = Vulnerable

APPENDIX 3

RED DATA AND ENDEMIC PLANTS PARTLY OR TOTALLY DEPENDENT ON WETLANDS OF THE DRAKENSBERG PARK

SPECIES	RED DATA STATUS
APONOGETACEAE	
Aponogeton ranunculiflorus	ED,V
POACEAE	
Helictotrichon galpinii	ED
Agrostis subulifolia	ED
LILIACEAE	
Wurmbea burtii	ED
Wurmbea pusilla	ED
HYPOXIDACEAE	
Rhodohypoxis deflexa	ED
Rhodohypoxis incompta	ED
Rhodohypoxis rubella	ED
Saniella verna	ED
IRIDACEAE	
Romulea campanuloides	ED
Romulea luteoflora	ED
Moraea alticola	ED
Hesperantha crocopsis	ED
Hesperantha schelpeana	ED
ORCHIDACEAE	
Schizochilus zeyheriq	I
BRASSICACEAE	
Heliophila alpina	ED
Lepidium basuticum	ED
CRASSULACEAE	
Crassula peploides	ED
Crassula sp. nov.	ED
GERANIACEAE	
Geranium multisectum	ED
Geranium pulchrum	ED
APIACEAE	
Alepidea pusilla	ED
GENTIANACEAE	
Sebaea marlothi	ED
Sebaea thodeana	ED
LOBELIACEAE	
Lobelia galpinii	ED
ASTERACEAE	
Felicia uliginosa	ED
Gnaphalium limicola	ED
Helichrysum bellum	ED
Helichrysum ephelos	ED
Helichrysum flavum	ED
Helichrysum palustre	ED
Cotula paludosa	ED
Senecio cryptolanatus	ED
Senecio parentalis	ED
Senecio qathlambanus	ED
Senecio telnateius	ED
LEGUMINASAE	
Indigofera evansii	ED

KEY:
ED = Endemic I = Indeterminate
EG = Endangered R = Rare
T = Threatened V = Vulnerable

APPENDIX 4

WETLAND PLANT SPECIES IDENTIFIED IN THE NATAL DRAKENSBERG PARK

AIZOACEAE
Psammotropha obtusa Adamson

ALLIACEAE
Tulbaghia sp. L.

AMARYLLIDACEAE
Cyrtanthus breviflorus Harv.

APONOGETONACEAE
Aponogeton junceus Lehm. ex Schlechtd.

ARACEAE
Zantedeschia aethiopica (L.) Spreng.

ASPHODELACEAE
Kniphofia caulescens Bak.
Kniphofia linearifolia Bak.

ASPIDIACEAE
Dryopteris inaequalis (Schlechtd.) Kuntze

ASTERACEAE (Compositae)
Artemisia afra Jacq. ex Willd.
Berkheya multijuga (DC.) Rössl.
Conyza pinnata (L. f.) Kuntze
Denekia capensis Thunb.
Helichrysum aureonitens Sch. Bip.
Helichrysum cooperi Harv.
Helichrysum epapposum H. Bol.
Helichrysum mundtii Harv.
Senecio cathcartensis O. Hoffm.
Senecio erubescens Ait.
Senecio hygrophilus R.A. Dyer & C.A. Sm.
Senecio polyodon DC. var. polyodon
Senecio tysonii MacOwan

BORAGINACEAE
Afrotysonia glochidiata (R. Mill) R. Mill

CAMPANULACEAE
Wahlenbergia spp. Schrad. ex Roth

COMMELINACEAE
Commelina africana L.

CRASSULACEAE
Crassula dependens H. Bol.
Crassula natans Thunb.

CYATHEACEAE
Cyathea dregei Kuntze

CYPERACEAE
Ascolepis capensis (Kunth) Ridley
Carpha filifolia Reid & Arnold
Pycreus cooperi C.B. Cl.
Pycreus mundii Nees
Mariscus congestus (Vahl) C.B. Cl.
Kyllinga pauciflora Ridley
Fuirena pubescens (Poir.) Kunth
Eleocharis dregeana Steud.
Fimbristylis dichotoma (L.) Vahl
Bulbostylis humilis Kunth
Bulbostylis scleropus C.B. Cl.
Bulbostylis oritrephes (Ridley) C.B. Cl.
Bulbostylis schoenoides (Kunth) C.B. Cl.
Scirpus falsus C.B. Cl.
Scirpus ficinioides Kunth
Schoenoplectus corymbosus (Roth. ex Roem. & Schult.) J. Raynal var. brachyceras (A. Rich.) K. Lye
Isolepis costata (Boeck.) A. Rich.
Isolepis fluitans (L.) R. Br.
Rhynchospora brownii Roem. & Schult.
Scleria dregeana Kunth
Scleria welwitschii (Ridley) C.B. Cl.
Schoenoxiphium bracteosum Kukkonen
Schoenoxiphium rufum Nees
Carex acutiformis Ehrh.
Carex cognata Kunth var. drakensbergensis (C.B. Cl.) Kuekenth.
Carex austro-africana (Kuekenth.) Raymond
Carex zuluensis C.B. Cl.

DIPSACACEAE
Scabiosa columbaria L.

ERICACEAE
Erica alopecurus Harv.
Erica evansii N.E. Br.

ERIOCAULACEAE
Eriocaulon dregei Hochst.

EUPHORBIACEAE
Acalypha wilmsii Pax ex Prain & Hutch.
Euphorbia epicyparissias E. Mey.

GENTIANACEAE
Chironia krebsii Griseb.
Sebaea spp. Soland. ex R. Br.

GERANIACEAE
Geranium pulchrum N.E. Br.
Geranium spp. L.

HALORAGACEAE
Gunnera perpensa L.

HYACINTHACEAE
Galtonia regalis Hilliard & Burtt
Ledebouria cooperi (Hook. f.) Jessop
Urginea macrocentra Bak.

HYDROCHARITACAE
Lagarosiphon major (Ridley) Moss ex Wager
Lagarosiphon muscoides Harv.

HYPOXIDACEAE
Hypoxis filiformis Bak.
Hypoxis ludwigii Bak.
Rhodohypoxis baurii (Bak.) Nel

IRIDACEAE
Aristea montana Bak.
Dierama pauciflorum N.E. Br.
Gladiolus papilio Hook. f.
Hesperantha baurii Bak.
Moraea alticola Goldbl.
Moraea dracomontana Goldbl.

JUNCACEAE
Juncus dregeanus Kunth
Juncus effusus L.
Juncus exsertus Buchen.
Juncus oxycarpus E. Mey. ex Kunth
Juncus tenuis Willd.

LAMIACEAE
Mentha aquatica L.
Plectranthus grallatus Briq.

LEGUMINOSAE Fabaceae
Argyrolobium tuberosum Eckl. & Zeyh.
Trifolium burchellianum Ser. subsp. burchellianum

MYRSINACEAE
Myrsine africana L.

ONAGRACEAE
Epilobium salignum Hausskn.

POACEAE (Gramineae)
Agrostis barbuligera Stapf var. barbuligera
Agrostis lachnantha Nees
Andropogon appendiculatus Nees
Andropogon distachyos L.
Aristida junciformis Trin. & Rupr.
Aristida monticola Henr.
Arundinella nepalensis Trin.
Cymbopogon validus (Stapf) Stapf ex Burtt Davy
Digitaria setifolia Stapf
Diheteropogon filifolius (Nees) Clayton
Eragrostis capensis (Thunb.) Trin.
Eragrostis curvula (Schrad.) Nees
Eragrostis planiculmis Nees
Eragrostis racemosa (Thunb.) Steud.
Eulalia villosa (Thunb.) Nees
Festuca caprina Nees
Festuca costata Nees
Fingerhuthia sesleriiformis Nees
Harpochloa falx (L. f.) Kuntze
Helictotrichon turgidulum (Stapf) Schweick.

Hyparrhenia dregeana (Nees) Stapf
Koeleria capensis (Steud.) Nees
Merxmuellera drakensbergensis (Schweick.) Conert
Merxmuellera macowanii (Stapf) Conert
Merxmuellera stereophylla (J.G. Anders.) Conert
Miscanthus capensis (Nees) Anderss.
Panicum aequinerve Nees
Panicum ecklonii Nees
Paspalum dilatatum Poir.
Pennisetum sphacelatum (Nees) Dur. & Schinz.
Pennisetum thunbergii Kunth
Pentaschistis setifolia (Thunb.) McClean
Pentaschistis tysonii Stapf
Phragmites australis (Cav.) Steud.
Poa binata Nees
Setaria nigrirostris (Nees) Dur. & Schinz.
Setaria obscura De Wit
Setaria sphacelata (Schumach.) Moss
Sporobolus centrifugus (Trin.) Nees
Stiburus alopecuroides (Hack.) Stapf
Stiburus conrathii Hack.
Styppeiochloa gynoglossa (Goossens) De Winter
Thamnocalamus tessellatus (Nees) Soderstrom & Ellis

POLYGONACEAE
Polygonum spp. L.
Rumex spp. L.

RANUNCULACEAE
Anemone fanninii Harv. ex Mast.
Ranunculus baurii Macowan
Ranunculus multifidus Forssk.

ROSACEAE
Cliffortia linearifolia Eckl. & Zeyh.
Leucosidea sericea Eckl. & Zeyh.

SCROPHULARIACEAE
Halleria lucida L.
Ilysanthes bolusii Hiern
Limosella inflata Hilliard & Burtt
Limosella longiflora Kuntze
Limosella maior Diels
Melasma scabrum Berg.
Phygelius aequalis Harv. ex Hiern

TYPHACEAE
Typha capensis (Rohrb.) N. E. Br.

UMBELLIFERAE
Alepidea spp. De La Roche
Peucedanum thodei Arnold

XYRIDACEAE
Xyris capensis Thunb.
Xyris gerrardii N.E. Br.

Note: this list is based on the identification of plants encountered in January/February 1994 during the field component of a pilot project to compile an inventory and classify the wetlands in the Park. It is by

no means a complete list, with certain taxa such as Orchidaceae being under-represented and ferns and mosses being largely not accounted for.

APPENDIX 5

CURRENT RESEARCH PROJECTS

1. Description and gradients in soil and plant moisture status and evapotranspiration from montane grasslands in the Cathedral Peak catchments.

2. Determining the effects of management treatments on water quality, sediment yield and nutrient balance in afforested and grassland catchments in KwaZulu-Natal.

3. Studies on seedling establishment of grasses in the Drakensberg with reference to the colonisation of disturbed areas.

4. Long-term responses of Themeda triandra grassland to the fire regime at Cathedral Peak: replicated plot trials.

5. The development and testing of water balance models in a grassland catchment in the summer rainfall area of South Africa.

6. Development of spectral biomass models for mapping and monitoring montane grassland resources.

7. The impact of insects on Protea caffra, P. dracomontana and P. roupelliae along altitudinal and burning gradients.

8. A description of stormflow characteristics and the response of streamflow components to catchment treatments.

9. The developmental behaviour ecology of infant baboons.

10. An investigation into aspects of cave sandstone weathering in the Drakensberg, with special emphasis on the preservation of Bushman art.

11. The feasibility of using Themeda triandra Forsk. and other indigenous species to revegetate disturbed sites in the Drakensberg

Projects already completed in the Drakensberg Park (including Royal Natal, Cathedral Peak, Giant's Castle, Kamsberg, Vergelegen)

REGISTRATION NUMBER	TITLE	DURATION	
		STARTED	COMPLETED
DR/004/06	Southern Drakensberg fish survey	01-12-87	31-03-95
DR/005/06	The petrology, geochemistry and stratigraphy of the Karoo sequence basaltic rocks in the vicinity of Sani Pass, KwaZulu-Natal.	01-06-88	31-12-94
DR/006/05	The development behavioural ecology of infant baboons.	30-03-91	31-12-94
DR/007/10	An alien plant control programme for the Drakensberg Park	01-12-91	31-03-95
DR/008/11	An investigation into aspects of cave sandstone weathering, with emphasis on the preservation of Bushman art	01-04-90	31-12-94
DR/009/05	Basaltic and pyroclastic volcanism in the vicinity of mSimude Pass, southern Drakensberg.	01-08-91	31-12-94
DR/010/05	Habitat, prey and area requirements of otters in the Drakensberg.	01-02-93	31-12-95
DR/011/09	Cultural perception of the Drakensberg as a wilderness area.	17-06-92	31-12-94

DR/012/10	The suitability of the robust Zululand race of Themeda triandra for rehabilitating disturbed soil in the Drakensberg.	01-06-93	31-05-94
DR/013/06	A pilot project to compile an inventory and classification of wetlands in the Drakensberg.	01-04-93	1-10-94
DR/014/10	Footpath erosion in the Drakensberg: Assessment and implications.	01-05-93	31-12-94
DR/015/06	Basaltic and pyroclastic volcanism in the vicinity of mSimude Pass, southern Drakensberg.	01-07-93	31-03-95
DR/016/06	An evaluation of the periglacial morphology in the Drakensberg-Lesotho mountains and associated environmental implications.	01-04-93	31-03-95
DR/017/05	Habitat use and resource use by the water mongoose in the Drakensberg Park: Co-existence with otters.	01-01-94	31-12-95
GC/010/03	Weathering of rock paintings, Main Cave, Giant's Castle.	01-08-92	31-12-94
GC/011/05	The effect of group size on adult social relationships in mountain baboons Papio cynocephalus ursinus.	01-05-94	30-06-95
GC/012/06	Terracette and asymmetric valley formation in the Drakensberg Park.	01 -08-94	31-01-96
NA/047/06	Characteristics of South African peats and peatlands.	01-08-92	31-12-94
NA/064/09	Nature conservation and eco-tourism: Opinions of rural communities living next to three protected areas in KwaZulu-Natal.	01-02-94	30-05-94
NA/065/09	The KwaZulu-Natal Region: Development of a programme for integrating communities into the economic, political and social structures of resource management bodies.	01-03-94	28-02-95
RN/005/10.	Footpath erosion and sediment yield related to different path surfaces and in response to varying path gradients	01-12-92	31-07-95
DR/001/03	Monitoring population size and distribution of eland in the southern Drakensberg.	01-04-78	01-03-90
DR/002/05	Ecology of eland using farmland in KwaZulu-Natal.	01-01-86	01-06-88
DR/003/02.	A study of eland on farmland in the KwaZulu-Natal Drakensberg	01-01-86	21-08-86
EX/002/06	Status of klipspringer in the Drakensberg Game reserves.	01-01-74	28-03-80
EX/003/05	A study of the beared vulture Gyptaetus barbatus in Southern Africa.	01-02-80	17-06-92
EX/013/01	Management of trout in the KwaZulu-Natal Drakensberg rivers and streams.	01-06-81	01-03-86
GC/001/02	The influence of jackals on antelope populations in the Drakensberg.	01-01-78	01-04-82
GC/002/01	The influence of fire on mammal ecology in the Drakensberg	01-01-78	05-02-82
GC/003/05	The behavioural ecology of chacma baboons at high altitude versus low altitude sites.	01-08-82	01-09-90
GC/005/02	The use of horses in Natal Parks Board reserves in the Drakensberg: evaluation and rationalisation.	01-05-84	01-02-87
GC/006/05	Foraging ecology of grassland avian predators in Giant's Game Reserve.	01-10-83	01-04-84

GC/007/05	Feeding ecology and nestling development of the red-breasted sparrowhawk in Giant's Castle Game Reserve.	01-10-83	01-06-84
GC/008/03	Monitoring abundance of large herbivores in Giant's Castle Game Reserve.	01-05-85	01-05-90
GC/009/05	Life history indices of Falco and Accipiter spp: A comparative study of temperate and sub-tropical populations.	01-01-83	01-03-87
KB/001/03	Monitoring species composition of grasslands in Kamberg Nature Reserve.	01-01-83	01-03-87
KB/002/11	Hydrological and environmental factors associated with soil pipes in the Kamberg area.	01-12-80	03-06-86
NA/012/03	Monitoring rainfall pH in Natal Parks Board reserves and resorts.	01-07-85	28-07-95
NA/017/06	Cetonid beetles in KwaZulu-Natal.	01-12-87	04-02-93
NA/019/05	Diet, home-range and movement patterns of serval in KwaZulu-Natal.	01-04-88	18-10-91
NA/037/06	Small-mammal survey of priority Natal Parks Board reserves.	16-01-91	08-10-93
RN/001/11	The effects of moisture and fire on the composition and dynamics of Podocarpus forests.	29-07-83	13-12-83
RN/002/01	The effects of burning on the population structure of Protea caffra in the Royal Natal National Park.	01-08-83	12-12-83
RN/004/10	Monitoring the impact of seasonal burning in the Drakensburg - a baseline survey.	01-03-89	28-02-91
RN/006/06	Multiple slope failure in Royal Natal.	01-09-93	31-03-94

LIST OF BIOLOGICAL MONITORING PROGRAMMES BEING CARRIED OUT IN THE DRAKENSBERG PARK

Giant's Castle
1. Monitoring abundance of large herbivores in Giant's Castle (Thomson).

Highmoor
2. Monitoring population sizes of large herbivores in Highmoor (Thomson).

Royal Natal
3. Monitoring the impact of seasonal burning on species composition of selected grasslands and on large herbivores in Royal Natal (Thomson).
4. Monitoring population sizes of large herbivores in Royal Natal (Thomson).
5. Protea nubigena monitoring at Royal Natal (Scott-Shaw).

General
6. Monitoring the distribution and numbers of eland in the southern Drakensberg (Thomson).