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## Review articles

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### An overview of conservation in South Africa and future perspectives

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Pienaar, U. de V. 1991. An overview of conservation in South Africa and future perspectives. *Koedoe* 34(1): 73-80. Pretoria. ISSN 0075-6458.

Key words: conservation, terrestrial biomes, management categories, environment.

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In South Africa the protection of the environment has come a long way. On 14 April 1654 the first conservation measure was issued at the Cape of Good Hope settlement. Born of desperation and a lurking threat of famine, it stated: "Two meals instead of three. Only half a penguin per person per day." Although the first protective legislation was laid down in 1657, five years after Van Riebeeck's settling in the Cape, the concern of the authorities was apparent in that these early laws prohibited the shooting of certain species of birds and game and the felling of yellow wood trees, except for the making of planks.

To the early settler, the vast unspoiled wilderness of the interior of South Africa, with its teeming herds of antelope and other wildlife must have presented a spectacular landscape. The natural resources of the country would have seemed limitless.

By the time the first formal conservation area (the Pongola Nature Reserve) was proclaimed by President Paul Kruger on 13 June 1894, however, much of this landscape and its animal inhabitants had been degraded and destroyed. The end of the eighteenth and nineteenth centuries saw the demise, in South Africa, of three taxa of large mammals — the blue buck *Hippotragus leucophaeus* (Pallas, 1766), the true quagga *Equus quagga* Boddaert, 1785 and the Cape lion *Panthera leo*

*capensis* J.B. Fischer 1830.

The first official nature reserves in South Africa were indeed the result of a conscious reaction to the early settlers' progressive extermination of the area's large mammal populations. Despite their faults and location, these early nature reserves and South Africa's first national park, the Kruger National Park, which was established on 31 May 1926 by an act of Parliament, were the key to creating a wider interest in wild species, ecosystems and landscapes. They undoubtedly contributed to the upsurge of interest in environmental conservation during the 1960s and 1970s, when many western nations felt the negative impacts of industrialisation on the quality of life.

Of the total land area comprising South Africa (excluding the TBVC states — Republics of Transkei, Bophuthastwana, Venda and Ciskei — but including the national self-governing states) of 1 221 068 km<sup>2</sup>, a total of 67 962 km<sup>2</sup> have been set aside over the years in 428 state owned conservation areas, which comprise 6,03% of the total land area. These state owned conservation areas include 17 national parks, with a total land area of 31 680 km<sup>2</sup> (of which the Kruger National Park alone comprises 19 485 km<sup>2</sup>) or 2,81 % of the total South African land area; 130 Cape provincial nature reserves comprising 20 003 km<sup>2</sup>; 50

Transvaal provincial nature reserves comprising 2 245 km<sup>2</sup>; 79 Natal parks and nature reserves comprising 5 860 km<sup>2</sup>; 14 Orange Free State provincial nature reserves comprising 1 583 km<sup>2</sup> and 138 other conservation areas comprising 6 705 km<sup>2</sup> controlled by various government departments and regional bureaus. Only five (less than 1 %) of these 482 state-owned reserves are larger than 100 000 ha, but they account for 46 % of the total reserved area. More than 60 % are smaller than 5 000 ha, and account for only seven percent of the total reserved area.

Most of these reserves were established during the last 25 years, following a period in which the rate of proclamation was relatively slow. Paradoxically, it was during the earlier slow period, that more than 3 million ha were acquired through the proclamation by the Minister of Lands in the Union of South Africa's Cabinet Minister Piet Grobler, of the Kruger and Kalahari Gemsbok national parks (amongst others) during 1926-1931. It is encouraging to note that the increase in the rate of acquisition of both the number and area of publicly-owned reserves has continued unabated in recent years, as predicted by Greyling & Huntley (1984).

In addition to this relatively impressive list of state-controlled conservation areas, another 33 205 km<sup>2</sup>, comprising a total of some 1 010 areas in South Africa, has been set aside for conservation or multiple use wildlife areas by private individuals or agencies in private nature reserves, conservancies or national heritage sites.

This brings the total area presently under some form of conservation in South Africa to 101 167 km<sup>2</sup> or 8,98 % of the total land area of the country. This approximates the 10 % goal set for conservation in modern, conservation-minded countries by the IUCN, but falls short of the total areas under conservation achieved by some other African countries e.g. the 11,16 % of Kenya and the more

than 17,00 % of Botswana.

Today, the guardianship of South Africa's unique wildlife heritage rests in various bodies and tiers of government. Since the pioneer days, a plethora of legislation, dealing not only with the fauna and flora, but also with almost every other aspect of the South African environment, has also been passed. Owing to this concern, South Africa's environment today is still one of the world's richest and most diverse, almost unsurpassed in its beauty and splendour. The physiographic diversity of the region's plant and animal species is still remarkable despite the negative inroads of modern man's technological activities and the progressive exploitation of its bounty by the European settlers and indigenous peoples.

Although relatively small, covering less than 4 % of Africa and less than 0,8 % of the total land area of the world, South Africa contains some 20 300 species of vascular plants, or about eight per cent of the world's vascular flora (including a third of its succulent plants). The fynbos biome (including the Cape Floral Kingdom) alone, in the southwestern coastal strip of South Africa, has some 7 300 vascular plant species.

There are indications that the insect fauna of the fynbos biome, and perhaps other invertebrate groups as well, is also extraordinarily rich in species. However, the taxonomic and geographic data bases for most of South Africa's invertebrate groups are still relatively poorly developed. Among the vertebrates, South Africa's amphibian, reptilian, avian and mammalian terrestrial faunas account for approximately two, six, seven and six percent, respectively, of the world's total species of these groups (Siegfried 1989). The relative richness of the South African indigenous terrestrial flora and fauna, and their high level of endemism, is brought out more strikingly in a comparison involving numbers of species per unit area (1 000 km<sup>2</sup>). Here we find, for in-

stance, 16 species of vascular plants, 0,23 species of reptiles and 0,47 species of birds per 1 000 km<sup>2</sup> compared to 1,69 species of plants, 0,04 species of reptiles and 0,06 species of breeding birds for the world as a whole (Siegfried 1989). The survival of a significant number of this species diversity (species richness) is, however, seriously threatened in South Africa today; for instance, at least some 1000 species of vascular plants alone are threatened with extinction (Hall 1987).

Until very recently, no attempt has ever been made to assess comprehensively the extent to which the conservation area or nature-reserve system in South Africa actually includes a true representation of the indigenous floras and faunas. Many of the reserves have been in existence for more than 50 years, and it seems strange that it was only attempted for the first time as recently as 1989 to rectify this long-standing neglect (Siegfried 1989).

Siegfried (1989) found that most of the total of 430 odd official (state-owned) nature reserves in South Africa were concentrated in a relatively narrow band of land between the major inland plateau and the marine coast, stretching from the north-east along the eastern and southern escarpments to the south-western part of the subcontinent.

Five major, terrestrial biomes are represented in southern Africa: fynbos, forest, karoo, grassland and savanna. The karoo biome is sometimes subdivided into the Nama-karoo and the succulent karoo and the savanna biome into moist savanna and arid savanna (Huntley 1984). In accordance with the relative paucity of nature reserves in the central, and major part of South Africa, the karoo and grassland biomes are represented poorly in the reserve system of the country. This pattern differs very little from that presented by Greyling & Huntley (1984) who concluded that the neglect with regard to the establishment of reserves in the Karoo and

grassland had not changed much since its first reporting by Edwards (1974), who made a strong recommendation for a better balance of nature reserves in South Africa.

Coincidentally, the most critically threatened South African vegetation systems were identified by Huntley & Ellis (1984) as highveld grassland (with only 0,19 % conserved), the winter-rainfall Karoo (only 0,06 % conserved) and lowland fynbos (1,38 % conserved). This unsatisfactory situation regarding the conservation status of the two biomes in question as well as the poor representation in the South African reserve system of a considerable number of Acocks' major veld types (Acocks 1975), is due for significant improvement by the proclamation of the new, large, contractual national park of some 168 000 ha in the northern Richtersveld. Also the consolidation and enlargement of some of the country's existing national parks and nature reserves, including the new Vaalbos National Park near Barkly West, the Tankwa Karoo National Park, the Kransberg National Park near Thabazimbi, the Suurberg National Park near Addo, and a new substantial coastal fynbos national park in the Southern Cape will partly rectify this discrepancy.

According to Siegfried (1989), the fynbos biome comprises 5,58 % of South Africa's total land area, while it is represented as 24,24 % of the total South African reserved area. Similarly, the forest biome represents 0,24 % of the total land area while it comprises 3,29 % of the total reserved land area. In contrast, the karoo biome, grassland biome and savanna biome respectively comprise 33,71 %, 27 % and 33,31% of the total land area while they respectively represent 4,85 %, 9,57 % and 58,05 % of the total reserved area. From these figures, the species-rich and generally heterogeneous fynbos biome, including the endemic Cape Floral Kingdom, appears to be adequately conserved, with about 30 % of the biome's total area included in 133 nature reserves.

This is misleading, however, since most of the reserved area is covered by mountain fynbos vegetation in the Cape's mountain catchment reserves. Coastal fynbos and other lowland vegetation types are represented in only about 10 % of the reserves and account for about 3 % of the reserved area of this important biome. Here, particularly, the biome's coastal renosterveld is critically endangered (Jarman 1986). According to existing data, some 20 300 species of vascular plants, 110 fresh water fishes, 84 amphibians, 286 reptiles, 600 birds and 227 mammals have indigenous breeding populations in South Africa. However, complete or partial check-lists of species, for one or more of the taxa considered here, have been published for about 15 % of the 428 state-owned nature reserves in South Africa. This paucity of species lists for conservation areas of our region is remarkable, given that some have been in existence for more than 50 years, that preservation of species was an important factor in motivating for the acquisition of many of the reserves, and that it is, ostensibly, a primary objective in their management and recurrent funding. Nevertheless, an assessment by Siegfried (1989) of the limited information presently available in published reports shows that 74 % of South Africa's vascular plants, 80 % of fresh water fishes, 92 % of amphibian, 92 % of reptilian, 97 % of avian and 93 % of mammalian species are represented in conservation areas. Moreover, some 50 % of the animal species occur in more than 10 reserves, and differences are small between the relatively high proportions of animal species represented in conservation areas in relation to the occurrence of the species in particular biomes. This is a somewhat unexpected and satisfactory result, given that it is based on lists of species from fewer than a quarter of the conservation areas in South Africa. The relatively poor representation of karoo biome amphibians and reptiles should, however, be noted.

The revelation that such an extraordinarily

high proportion of South Africa's terrestrial vertebrate fauna, and possibly 74 % of its vascular plant species, are represented by breeding populations in the region's conservation areas is remarkable, considering that the nature reserve system accounts for only about 6 % of the regions' total area, and that it developed without any preconceived design for maximizing the preservation of biological diversity. This is no cause for complacency from the various conservation agencies in South Africa, however. Large gaps still exist in our nature reserve system, particularly in the representation of the recognised veld types. Of the 70 veld types described by Acocks (1975), only five have more than 10 % of their area within conservation areas. Three of these types are arid savanna communities within the Kruger National Park; the other two are mountain fynbos communities falling within the mountain catchment reserves of the south-west and southern Cape. No fewer than 47 veld types have less than one percent of their area conserved, and, until recently, 13 veld types were not represented at all in South Africa's conservation system. However, two of these are now included in the new Vaalbos National Park near Barkly West, i.e. "Kalahari Thornveld invaded by Karoo" and "Pan turf veld invaded by Karoo".

If a common principal goal of the nature conservation agencies in South Africa is the long-term conservation of a maximum amount of biological diversity in nature reserves, it is not yet too late for devising and implementing the long overdue and innovative national strategic conservation plan for realizing this objective. In this plan, the present nature reserve system should not be regarded as sacrosanct. If and where necessary, parts of or even whole reserves which are at present mere duplicates of others, or lacking intrinsic conservation qualities, should be de-proclaimed.

The land thus sacrificed could be sold or exchanged in order to obtain new areas

needed for conserving plant and animal associations that are under-represented in the current system, to develop new groupings of reserves; and to provide links or corridors (other than river drainages) between reserves to facilitate exchanges of floral and faunal elements. At the same time, the classification of the South African conservation system should be rationalized, and associated management standards developed. According to Scott *et al.* (1987), the success of efforts to retain biological diversity will be judged in future on the number of surviving species, and not on whether the Californian condor, *Gymnogyps californicus*, for example, or some other currently endangered spectacular animal, is saved from extinction in the next decade or so. Scott *et al.* (1987) advocates focusing on the protection of species-rich areas as offering the most efficient and cost-effective way to retain maximal biological diversity in the minimal area.

Perhaps the time is also now ripe to reconsider whether South Africa can afford the present highly fragmented and uncoordinated administration and management of its conservation estate by both governmental and non-governmental agencies. The consolidation of manpower, expertise and funds in a single, or, at most, two umbrella statutory organizations dealing with and coordinating conservation actions at all levels in South Africa can only bring a timely end to parochialism and benefit the long term conservation goals of the country.

Attitudes to conservation and protected areas did, in fact, enter an era of change in the 1960s and 1970s, with classic texts such as Rachel Carson's *Silent Spring* and Paul Ehrlich's *The Population Bomb* introducing new perceptions to our view of the world.

The publication in 1980 of the World Conservation Strategy (WCS) by the IUCN introduced a new era in the history of nature conservation, possibly as significant as the

proclamation in 1872 of the world's first national park at Yellowstone in the U.S.A. The importance of the World Conservation Strategy is that it brought into focus new dimensions in conservation, expressed most clearly in its three main goals or objectives:

- to maintain essential ecological processes and life support systems
- to preserve genetic diversity
- to ensure the sustained utilization of species and ecosystems (i.e. wildlife resources), including marine populations such as seals.

These goals differed in many ways from the traditional emphasis on protecting large, often spectacular, species of mammals within rigorously policed national parks, where tourist revenue was often believed to be the only tangible benefit derived from the exercise.

Modern definitions of environmental conservation almost invariably now contain, either explicitly or implicitly, a requirement for regulations that should facilitate enhancement of humanity's welfare and quality of life through the so-called rational use of both natural and cultural resources. Stripped of all fancy verbiage, environmental conservation is now regarded as something that is done by man for the benefit of man.

Miller (1983) listed alternative categories for the management and development of natural and cultural resources to achieve primary conservation objectives. These include, *inter alia*:

- maintaining sample ecosystems in the natural state; maintaining ecological diversity and environmental regulation;
- conserving genetic resources; providing education, research and environmental monitoring;
- protecting water catchments; controlling erosion, sedimentation, and protecting downstream investments;
- providing hunting, fishing and animal products (in this context it is worth noting, from a recent letter received from the president of Safari Club

International in the USA, that for hunting purposes North American hunters today regard South Africa as the country of choice);

- providing recreation and tourism services and optimizing the income therefrom;
- producing timber and forage on a sustained yield basis;
- saving energy and promoting the phasing in of alternative energy sources other than fossil fuels;
- curbing and reversing all forms of pollution and encroachment by invasive plants and animals;
- stimulating rational use of marginal lands and rural development; and
- protecting sites and objects of cultural value; protecting scenic landscapes and green areas and maintaining open options and management flexibility.

This list can also form the basis or blueprint for a national environmental plan and policy that will guide the new South Africa's people and their environment to the 21st century.

The South African Council for the Environment (Botha 1989a, b) has recently produced a draft document for a national environmental policy, which addresses the problem of arresting and reversing current resource and environmental deterioration, while at the same time promoting approaches to attaining a better quality of life for all South Africans. The policy follows the WCS in identifying the following broad goals:

- preservation of genetic diversity
- integration of planning for conservation and economic and other development
- retention of options for future use
- investigating causes as well as symptoms of environmental deterioration
- development of environmental knowledge (data bases) and a predictive capacity for future application
- development of procedures for integrated environmental management
- and, most importantly, the education and active participation by the public in environmental matters. No effort to conserve or manage the envi-

ronment wisely will succeed without an effective and continuous environmental education strategy aimed at all sectors and levels of education and training.

Specific environmental concerns to be addressed in the short term include the following:

- ensuring that the national conservation plan for South Africa is completed and put into practice. This will facilitate the filling of the gaps in the chain of conservation areas in South Africa, particularly in the coastal fynbos, karoo, highveld grassland and Eastern Cape lowland forest regions. At the same time, an attempt should be made to consolidate and enlarge existing conservation areas of consequence into viable ecological units
- ensuring that existing national parks and reserves are entrenched, through proper legislation, against population pressures for more land, over-utilization of water resources, mining or prospecting claims, all forms of pollution and encroachment by invasive plants and animals
- ensuring that South Africa's marine resources are utilized on a sustained yield basis, but are protected against over-utilization by local and foreign exploiters of the resource. This will provide the necessary safeguard for the survival of the marine avifauna and mammals also dependent on the resource
- ensuring that South Africa's conservation areas are utilized for the material and spiritual well-being of all its peoples as well as by the growing numbers of overseas tourists, but within the constraints of conservation precepts. Multiple land-use strategies must be considered in those areas lending themselves thereto, such as buffer zones around the periphery of primary conservation areas, which may be used as controlled hunting areas for the local and foreign hunting fraternity, or for satisfying certain basic conservation needs of our rural, Third World population segment
- ensuring that by equitable access to resources, and through a process of negotiation and debate, First World conservation concepts, philosophies and management strategies are accepted and supported by members of the relatively less affluent third world and numerically dominant segment of our population, who have their own inherent, but not necessarily conflicting, cultural

approaches towards conservation

- ensuring that effective measures are instituted to prevent large scale, organized poaching by manipulated poacher bands armed with automatic weapons or poison, of rare and endangered species such as black rhinoceros or of animal or plant products such as ivory and 'muti' (traditional medicine), for which a continuous demand on the black market exists both locally and in the Middle or Far East. Such measures include strict protection in well-policed, smaller reserves, higher penalties for poaching transgressions and more effective legislation
- ensuring *ex situ* protection and breeding of species threatened with extinction, both in South Africa and the rest of Africa, by well-controlled programmes, in institutions such as the national botanic gardens, the national zoological gardens, the De Wildt rare animal breeding centre and fresh water fish breeding centres such as those at Jonkershoek, Lydenburg, Marble Hall and Grahamstown
- ensuring that marine mammals, such as whales and the bottle nosed and Indo-Pacific humpback dolphins, receive adequate *in situ* protection, and that they are not, for instance, killed in shark nets along the Natal coast or in floating gill nets used by certain foreign commercial fishing fleets. Similarly, marine turtles should receive sustained protection in all their known breeding sites along our eastern shoreline
- ensuring sufficient fuel wood resources in rural areas until alternative energy sources such as solar-heated stoves can be provided
- ensuring the arrest and reversal of the deterioration of natural veld and of erosion, and by instituting such measures, such as a form of land tax, ensuring that poorly managed farmland is acquired by more competent farmers who will promote the rehabilitation of degraded farmland through improved land management practices
- ensuring the arrest of all forms of environmental pollution and wastage of resources by implementing strict and legally enforceable environmental standards, which carry heavy penalties if they are breached by polluters of whatever origin
- ensuring that a free-market economy is not interpreted as a licence for a "freebooting" economy, which would plunder resources or damage the environment and its life-supporting processes indiscriminately. This applies particularly to the world's common resources or 'commons', such as the oceans, the Arctic and Antarctic, the ever-

green forests, the atmosphere, the soil, and even to national and 'international' conservation areas (Hardin 1968). Here the government, through all-important environmental legislation, should play its role in leading society to accept that a free-market system is indeed an ally in a healthy environment if it is properly disciplined.

Unfortunately, the success or failure in years to come of all these environmental and conservation goals will not be determined primarily by environmentalists, but rather by socio-economic, demographic and political issues and the success by which they are addressed. No conservation strategy has any hope of long-term success in a country plagued by persistent political unrest, violence, anarchy and unimpeded population growth.

It must be recognized, therefore, that effective environmental management requires both popular and political will to bring it to fruition. Popular response to a national environmental policy and strategy will be dependent on the equitable access to resources and on reduced poverty, overpopulation and hunger. Political implementation will require both social and economic stability. The attainment of environmental goals is therefore inextricably related to the emergence of a commonly accepted, new and just political and social dispensation in South Africa.

The most deadly threat to South Africa's economy, as well as to its environment, lies in its present uncontrolled and burgeoning population growth. On the other hand, the only sure means to stem this all-destructive juggernaut lies in sustained economic growth over a protracted period, raised standards of living, improved quality of education and the promoting of goodwill amongst all races. This, again, can only be successfully achieved in a climate of political stability and negotiation.

The ultimate success of the government's present moves towards political reform and reconciliation and further socio-economic

and political developments, during the next decade will determine whether we enter the 21st century as one of the world's leading nations on the economic and conservation fronts, or whether we will drop into the abyss of Third World poverty, strife, environmental degradation and despair.

There will, inevitably, be trade-offs, compromises and sacrifices in the process, but there is still time to achieve the so-called 'high road', to social, economic and environmental health and prosperity for a new South Africa. It is a deservedly rich heritage. We need only all apply our hearts and minds to it!

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Paper delivered at the *International Symposium on Wildlife Management — A Veterinary Perspective*, held at the Faculty of Veterinary Science, University of Pretoria, 13 July - 26 July 1990.