CHAPTER 3: THE WATERBERG BIOSPHERE RESERVE

3.1 LOCATION AND SIZE OF THE BIOSPHERE RESERVE

The proposed area lies between latitude 27° 30'S and 28° 40'S and longitude 23° 10'E and 24° 40'E . The Waterberg Biosphere Reserve embraces an area from the Marakele National Park, up to the north eastern side of the mountain range to include twenty-six rural villages in the Bakenberg area which forms part of the Mokgalakwena Municipality.

The size of the biosphere reserve is 417 406 hectares of which the core areas are 121 249 hectares, the buffer zone is 146 157 hectares and the transition zone ± 150 000 hectares. Map 5 refers to the location of the Waterberg Biosphere Reserve.

Figure 3: (a) Gateway to the Waterberg Biosphere Reserve towards Vaalwater depicting the Seven Sisters of the plain.

Figure 3: (b) Gateway to the Waterberg Biosphere Reserve on the road from Mokopane towards Marken, linking the rural Bakenberg area with the vast wildlife areas to the east.

3.2 CRITERIA FOR DESIGNATION AS A BIOSPHERE RESERVE

A Statutory Framework for the World Network of Biosphere Reserves has been formulated with the objective of enhancing the effectiveness of individual biosphere reserves and strengthening common understanding, communication and co-operation at regional and international levels. The Statutory Framework is further intended to contribute to the widespread recognition of biosphere reserves and to encourage and promote good working examples of conservation. Rather than forming islands in a world increasingly affected by severe human impacts, they can become theatres for reconciling people and nature. In short, biosphere reserves are much more than just protected areas (UNESCO, 1996).

Article 4 of the Statutory Framework of the Seville Strategy presents seven general criteria for an area to be qualified for designation as a biosphere reserve. Information pertaining to the Waterberg Biosphere Reserve area was used and applied accordingly.

3.2.1 Criterium1: The area should encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention

a) Topography

The most noticeable topographic feature of the biosphere reserve is the Waterberg Mountain range. The elevation of the range above sea level within the Waterberg Biosphere Reserve area varies between 807,7 meters (lowest point) in Wonderkop Nature Reserve (De Klerk and Loubser, 1989) and 2 100 meters (highest) in Marakele National Park (Van Staden, 2002). The mountainous area of the Waterberg forms a large plateau with steep escarpments to the south and east. The mountain range has predominantly sandstone hills and mountains. The area receives between 650 and 900 mm of rain annually (Van Rooyen and Bredenkamp, 1996). It is characterized by numerous streams and small rivers, rock-pools, deep and large pools in the stream and river beds, fountains, marshes, and other features associated with the high rainfall on the rocky areas of the mountains. The bare and beautiful sandstone cliffs so typical of the Waterberg mountains and other adjacent hills or koppies can be described as a major characterizing feature of the biosphere reserve as well.

b) Vegetation

The World Network of Biosphere Reserve Map classifies the vegetation of the area as savanna. The Waterberg Biosphere Reserve represents a considerable area of the savanna biome of Southern Africa. Although the conservation status of savanna is in principle good, less than 5% of the biome is formally protected (Rutherford and Westfall, 1986). Savanna vegetation types are inadequately conserved within formally proclaimed nature reserves.

According to Acocks (1988), there are five different veld types represented in the biosphere reserve, of which the most common are Sour Bushveld (veld type 20) and Mixed Bushveld (veld type 18), typical savanna vegetation types. To the north there is also a small component of Acock's veld type 14 (Arid Sweet Bushveld). A number of

smaller areas to the south and centrally on the highest parts of the Waterberg are covered by one of the most threatened veld types in the Limpopo Province, namely veld type 8 (North-Eastern Mountain Sourveld). In the extreme south veld type 19 (Sourish Mixed Bushveld) occurs to a limited extent. The clear gradient in the vegetation, from sour in the south and on high elevations, to sweet in the north on lower elevations, is linked to the variation in annual precipitation as determined by elevation and latitude (more moist to the south, drier to the north).

The Waterberg has the largest portion of the Sour Bushveld veld type, which characterizes mountainous savanna areas. A large diversity of habitat types can be found in the Waterberg plateau, valleys, cliffs, and slopes (Henning, 2002). Deep sandy soils alternated by shallow and rocky soils occur on the flats and plateau, while in the valleys the vegetation changes from riparian vegetation (amongst others riparian woodlands and near-forests, reed beds and marshes/vleis) to the predominantly thornveld on the loamy alluvial valley floors. The grassveld is particularly rich floristically, while the woody component is divers. Apart from the termitaria patches on the slopes, where near-forests develop, there is a great wealth of forbs and bushy plants, including stragglers of the southern (fynbos) flora. The savanna biome is home to a wide variety of large herbivores, which, together with fire, play a decisive role in ecosystem processes, and the maintenance of plant species diversity (Henning, 2002).

The Mixed Bushveld veld type is found at lower elevations than the Sour Bushveld, and occurs as a maze of variations and transitions. They vary from rather dense short savanna to tall, sparser savanna, and generally provide better grazing to the large herbivores than the Sour Bushveld.

According to another South African veld type classification, that of Low and Rebelo (1996), the Waterberg Biosphere Reserve is mostly covered by veld type 12, Waterberg Moist Mountain Bushveld (equivalent to Acock's veld type 20). In 1996, about 28% of this veld type had been transformed by human activities, while 8.55% had been conserved. The rest of the Waterberg Biosphere Reserve consists of veld types 17,

Sweet Bushveld (equivalent to Acock's veld type 14) (28% transformed, 2.34% conserved) and veld type 18, Mixed Bushveld (60% transformed, 3.05 conserved).

Different phytosociological studies have contributed to a knowledge of the vegetation of the Waterberg . However, neither a vegetation map, nor an in depth synthesis of the vegetation of the Waterberg region has been done (Henning, 2002). A more detailed overview classification and description of the Waterberg vegetation was thus undertaken by Henning (2002). Aspects of vegetation science such as diversity and diversity indices, apart from vegetation classification, will undeniably provide important guidelines to tourism planning and management in sensitive areas. The application of these principles will further emphasize the important role of vegetation science in the planning and development of tourism in the Waterberg region (Henning, 2002).

c) River systems and wetlands

The following four main drainage rivers exist within the area, namely the Lephalala, Mokolo, Matlabas, and the Mogalakwena. These rivers, together with numerous smaller rivers and streams, constitute a major water catchment area for the Limpopo basin (the border between South Africa, Botswana and Zimbabwe). The National Water Act (South Africa, 1998c) requires that a "reserve" be set for each and every river and wetland in the country. The White Paper on a National Water Policy (South Africa, Department of Water Affairs and Forestry, 1997) recognizes the importance of natural ecosystems with the water cycle and as such, provide a legal mandate to protect these ecosystems in a pre-defined ecological management class. To date no reserve has been proclaimed for any system occurring in the Mokgalawena Catchment area. It is, therefore, of vital importance that the status of the streams and wetlands within this part of the Waterberg Biosphere Reserve be protected (Angliss, 1996).

When looking at the larger Waterberg District and the concept of promoting the biosphere reserve model as an important bioregional plan (Bridgewater and Cresswell, 1998), strongly advocates the integration of the Nylsvley floodplain (of which a part was been proclaimed as a Ramsar site in 1998) in the future zonation pattern of the Waterberg Biosphere Reserve (Limpopo Province, Department of Finance, Economic

Affairs and Tourism, 2001).

The Nyl River floodplain stretches for 67 km between Middelfontein (east of Modimole) and Moordrift (south of Mookgopong) in the Limpopo Province. It is up to 6 km wide in places and has been described as the largest inland floodplain in South Africa (Noble and Hemens, 1978). The seven attributes, which drain into the Nyl River, are situated in the foothills of the Waterberg Mountains while the Nyl River floodplain occupies almost one third of the catchment area of the Nyl River system, which converges into the Mokgalakwena River to finally form part of the larger Limpopo River basin (Frost, 1987). Currently only 4% of the floodplain area is under official protection, namely the pat that falls within the Nylsvley Nature Reserve.

Wetlands play an important hydrological and ecological role, because they performing a number of functions, such as water storage, stream flow regulation, flood attenuation, water purification, nutrient assimilation, sediment accretion, and the provision of habitat for a wide variety of plant and animal species (Begg, 1986). The inclusion of the Nyl River floodplain into the zonation of the Waterberg Biosphere Reserve will thus certainly add to the reserve's conservation status.

d) Geology

The main mass of the Waterberg consists of sedimentary rock, and is bounded by escarpments on the north, east and south with the central portion forming the Palala Plateau. These sediments are entirely detritus and consist of sandstones, mudstones, shales, conglomerates, and lenses of grits (Truswell, 1977; SACS, 1980). However, the Waterberg Group of Sandstone is almost entirely limited to the Waterberg Biosphere Reserve.

The Bushveld Igneous Complex, the bedrock of the Waterberg mountains, was formed 1,954 ± 30 million years ago while the Waterberg System or Super Group was formed some 1 790 million years ago following an extensive period of levelling due to the erosion of the Bushveld Igneous Complex (Truswell, 1977; SACS, 1980).

E) Soil

Due to the domination of quartzitic sandstone, the nature of the soil is predominantly sandy. Sandy soils are very leached due to the relatively high rainfall and are, therefore, mostly of a distrophic nature. As a result of the predominantly hilly and mountainous nature of the terrain, a large portion of the soils are very shallow and rocky (Low and Rebello, 1996), and can therefore be classified according to the South African soil classification system of McVicar *et al.* (1977) as being of the Glenrosa and Mispah soil forms. Dominant soils found on the flat areas such as the plateau and lower lying plains are of the Clovelly and Avalon forms. Although these soil forms are also found in the valleys and drainage lines, other soil forms with a higher clay and nutrient content and generally with a better developed structure are more common. The following soil forms frequently occur in theses landscapes: Hutton, Dundee, Oakleaf, Katspruit, Westleigh, Champagne, Cartref, Inanda, Kranskop, Magwa, Griffin, Longlands, and Fernwood (Land Type Survey Staff, 1988).

f) Human interventions

The current human communities in the Waterberg Biosphere Reserve consist mainly of white farmers and black rural, mainly Pedi speaking people. The town Vaalwater has a small, mixed ethnic population.

The Waterberg has a long history of human occupation and has been inhabited by a succession of people over hundreds of thousands of years. If we include the remains of the early Hominids, its history spans more than a million years. Excavations at the Olieboompoort Shelter in the north-western part of the Waterberg have yielded tools which display a large degree of specialisation and skill in stoneworking, and are representative of the Middle Stone Age (Woodhouse, 1987). The people of the Late Stone Age included the San (Bushmen), who were indigenous hunter gatherers, as well as Khoikhoi herders who came from Eastern Africa with their sheep, cattle and goats, and preferred the wetter coastal areas. Some material remains of the Khoikhoi may be found on the inland plateau (Palala), since they may even have passed through the Waterberg, where paintings of fat-tailed sheep occur. Within the last two thousand years, however, the San were displaced when the first Iron Age people moved into the

area (Van der Ryst,1996). These people owned cattle and practised subsistence farming on the deep red soils which surface along the river valleys.

It was at this time that the Agro Pastoralists from the lowlands moved into the Waterberg. Auckema (1991) is of the opinion that this move was prompted by the spread of tsetse fly into the lowveld areas where these early farmers had lived for centuries.
Their farming were successful and their cattle herds increased on the sweetveld. This caused overgrazing and resulted in encroachment by pioneer thorn bush, a suitable habitat for tsetse flies. According to Auckema (1991), the Waterberg Plateau was also inhabited by another group, who were Nguni speaking and who selected hilltop sites for settlement. These settlements may have been built by the ancestors of the Northern Transvaal Ndebele, who now live further east. Boersema (1996) states that these Northern Ndebele people have lived in the Mokopane (Potgietersrus) area since approximately 1750. Also of Northern Ndebele origin are the Langa of Mapela and Bakenberg. These facts concerning human history are important for the current study because Khosi Langa of Bakenberg is currently the traditional representative of the rural communities which are involved in the Waterberg Biosphere Reserve (Boersema, 1996).

The remote and inaccessible Waterberg was one of the last regions in the geographical area formerly known as the Transvaal to be permanently occupied by white farmers (Van der Ryst, 1996). Although the first Voortrekker farmers moved into the Waterberg during the 1850s, the region has been increasingly occupied on a regular basis only since the early part of the twentieth century (Van der Ryst, 1996).

The Waterberg area was predominantly used for seasonal game hunting or cattle pasturage. According to historical sources and local oral tradition hunter-gatherers had been living in the region until after the turn of the century. Hunter-gatherers have consequently been in contact with black and white farmers in the Waterberg till recently. According to Van der Ryst (1996), archaeological evidence for social and economic change at the Later Stone Age sites has been linked to the above mentioned

contact period. Given our knowledge of the human occupation of the Waterberg, it nevertheless appears to have been unoccupied for many thousands of years, an aspect that will continue to intrigue archaeologists. Part of the complexity and fascination of the Waterberg history, nevertheless, lies in the interaction of the culturally diverse groups who have been living here during the last couple of centuries (Van der Ryst, 1996).

g) Current human activities

Human interventions are part and parcel of the history of the Waterberg area. A considerable area of land has been altered by human activities, of which commercial and subsistence crop cultivation is the most important human activity in this regard. In the past commercial dryland cultivation was extensively applied to the land, but because of its erratic rainfall and the nutrient poor soils of the area this practice has decreased considerably. A fair number of old abandoned fields in varying degrees of recovery thus still exist. Currently, however, commercial irrigated cultivation, especially alongside the river courses in the Waterberg, is the most extensive ongoing land use practice and account for positive alterations to the vegetation. To a lesser, but still considerable extent, is the effect of subsistence crop farming, as well as overgrazing by cattle or game with resulting vegetation changes. The growing tourism and hunting industry also influences current human activities. Map 3 thus indicates the distribution of exemption farms in the area. In addition, the infrastructure, like roads and lodges is constantly changed that the influx of tourists to the region could cause concern if not probably managed (UNEP/CBD, 2002).

The current influence of infrastructure in the Waterberg Biosphere Reserve, for instance the development of towns, villages and roads with their associated impact, is not as extensive as the other land uses e.g. mining and irrigation, which impact is both drastic and irreversible. There is also a clear indication that the impact of overgrazing is more severe around the villages (as Figure 4 illustrates), while erosion, both sheet and donga, occurs mainly around these rural human settlements (De Klerk, 2001).

Figure 4: Overgrazing in and around villages in Bakenberg zoned as part of the transition zone of the Waterberg Biosphere Reserve

Mining activities do not currently occur within the Waterberg Biosphere Reserve area, but mainly on the periphery of the zoned biosphere reserve area as illustrated in Map 4. They must, however, be considered as important interventions that should be managed and zoned accordingly. These mining activities do have an influence on certain tourism activities as well as on the water resource utilization within the biosphere reserve area.

The mining activities within the Mokgakawena Municipality, that partially forms part of the Waterberg Biosphere Reserve area, also have a direct influence on the rural communities since a resettlement of villages takes place when the mines need to expand. This has a direct social and environment impact on the Waterberg Biosphere Reserve that will need management in future while the long term effect of such

resettlements could influence the land use zonation plans of the municipalities and the biosphere reserve itself.

3.2.2 Criterium 2: Be of significance for biological diversity conservation

Taking the general information provided under Criterium 1 into account, the following features could be identified as being significant features within the Waterberg Biosphere Reserve.

a) Sandstone features

The sandstone, shale and conglomerate rocks of the range are rather unique to this area. The occurrence of the geological formation that underlies the area, namely the Waterberg Group of Sandstone, is almost entirely limited to the Waterberg Biosphere Reserve.

Foto: Department of Finance, Economic Affairs and Tourism

Figure 5: Sandstone features at Masebe Nature Reserve, unique to the Waterberg

b) Species

Of significance for the development of tourism and game farming are the reintroduction of a number of game species as depicted in the rock paintings in the Waterberg. According to Van der Ryst (1996) these include Eland (*Taurotragus oryx*), Elephant (*Loxodonta africana*), Kudu (*Tragelaphus stresiceros*), Giraffe (*Giraffa*

cameleopardalis), Reedbuck (*Redunca* sp), carnivores, and reptiles.

The following information was compiled from species lists available from the Provincial Nature Reserves within the Waterberg Biosphere Reserve and the lists received from Marakele National Park. At least eighteen threatened or scarce species of plants, eleven bird species, four reptile species, four species of fish, one butterfly species, and eighteen mammals occur in the Waterberg Biosphere Reserve. This list probably does not reflect all the endemic and scarce species within the biosphere reserve. A detailed list of the above mentioned species has not yet been compiled for the Waterberg.

The numerous wetlands, streams and rivers that exist within the Waterberg Biosphere Reserve's boundaries form part of a very important conservation priority not only in the Limpopo Province, but also in the Republic of South Africa, namely the ***aquatic systems.*** When considering the Nyl floodplain as part of a newly proposed zonation of the Waterberg Biosphere Reserve, the biodiversity is exceptional. The Nyl floodplain is rich, not only in bird numbers, but in diversity as well. According to Duthie and Tarborton (2000) 104 different species of waterbirds have been recorded on the floodplain. Eighty-seven of the 94 waterbird species known to breed in southern Africa have occurred on the Nyl floodplain at one time or another, a feature that no other South African wetland can claim. In addition, it however supports a large number of waterbirds classified as Red Data Species in South Africa. More than three-quarters of the 23 currently listed waterbird species occur here. Eight of them breed on the floodplain while a few of these are not known to breed anywhere else in South Africa (Duthie and Tarborton, 2000). In addition, the Nylsvley Nature Reserve serves as a refuge for seventy seven mammal, fifty eight reptile and twenty eight amphibian species. Up to sixteen species of fish have been recorded in the Nyl River system (Duthie and Tarborton, 2000) . The endangered Roan antelope (*Hippotragus equinux*) and rare Tsessebe (*Damaliscus lunatus*) too occur in this reserve.

c) Veldtypes

The Waterberg Moist Mountain Bushveld (Low and Rebelo, 1996) which is synonymous to Acocks's (1988) Sour Bushveld is largely limited to the Waterberg mountains, with the Waterberg Biosphere Reserve including the majority of this veld type. Bredenkamp and van Rooyen (1996) also indicate the economic uses in this veld type as game and cattle farming as well as ecotourism.

Phytosociological studies contributing to the vegetation knowledge of the Waterberg Moist Mountain Bushveld (Coetzee *et al1.,*1977; Westfall *et al.,*1985) and the recent study of Henning (2002) stress the importance in conserving this veldtype, not only through the legal proclamation of establishing protected areas but also through proper planning and management in relation to its utilization e.g. tourism. This, therefore, reinforces the fact that the Waterberg Biosphere Reserve has a significant conservation role to play in this regard. Map 8 indicates the veldtypes which occur in the Waterberg Biosphere Reserve area according to Acocks (1988).

d) Unique land use practices

The fact that the land use has changed over the last 21 years (Walker,1998) from crop and irrigation practices to cattle and game farming indicates a natural tendency to utilize the natural resources of the Waterberg optimally. The dry seasons also contributed to these changes. The vast open spaces currently under conservation/game farming/ecotourism are, nevertheless, significant in themselves since one does not easily find natural areas of this size in other parts of South Africa. As already mentioned in Chapter 2, the Waterberg has the lowest human population density in the Province mainly due to the large farming community. The majority of villages are found to the north-eastern side of the Waterberg Biosphere Reserve as indicated on Maps 4 and 6. Under the dispensation of the previous government, this north-eastern area was formally part of the Lebowa homeland and its inhabitants have been mainly cattle and subsistence farmers who are still practising the same land uses. The only difference today is the expansion of villages. It must, however, be noted that the lack of water in the area hampers large developments. The influx of people would rather settle close to the town of Mokopane. It must, however, be noted that the villagers within the zoned

Waterberg Biosphere Reserve area are still conducting dry land cultivation in the traditional way cultivating family plots, a feature that makes the area unique. Within the Waterberg Biosphere Reserve framework these traditional systems are thus extremely useful for conserving ancient breeds of livestock, and old land races of crops, which are invaluable gene pools for modern agriculture (UNESCO, 1995)

e) Rock Art

Numerous paintings of people in trance positions, dance scenes of men and women, men with hunting equipment, a large variety of antelope and other animals, imaginary rain animals, handprints, and geometric designs form part of the contents of the rock art of the Waterberg (Van der Ryst , 1996). In conversations with landowners while conducting the fieldwork for this study, it became evident that the Waterberg is rapidly emerging as a rock art area. Almost all the landowners indicated that there is some form of rock art or archaeological artefacts on their properties. Many, if not most of these are still undiscovered and have certainly not been described. Of special significance is the area along the steep gorges of the Lephalala River as described by Woodhouse (1987) and the rock shelter at Masebe Nature Reserve, which represents one of the larger Stone Age shelters yet identified in the Waterberg (Boeyens *et al.*, 1996).

Two traditions of Rock Art occur in the Waterberg. First the more "naturalised" form of art, which includes skilled depictions of animals and people and is attributed to the San and is closely linked to Shamanism. Second, the more geometric, schematic art tradition, which includes the so-called "late white" paintings, and finger painting is found. This tradition is associated with negroid farmers who painted for different reasons. The San people further possessed powers of healing, rainmaking and control of animal movements, all of which we find depicted in San Art (Van der Ryst, 1996).

3.2.3 Criterium 3: Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale.

At an operational level sustainable development has four interlinked dimensions namely economic, environmental, social, and cultural. (UNESCO, 2002). However, sustainable

development can have a working sense only when these four dimensions of development are of equal importance and strength. No one country or region has reached an acceptable dynamic balance of the four legs. In the late 1970s and early 1980s, the conservation role had been kept prominent in the designation of the vast majority of biosphere reserves (Batisse, 1986) with the environmental dimension as referred to above as the main focus. However, in November 1995, the UNESCO General Conference approved the Seville Strategy for Biosphere Reserves and adopted the Statutory Framework of the World Network, which define the principles, the criteria and the designation procedure for biosphere reserves (UNESCO,1996). With these documents the philosophy and concepts underpinning biosphere reserves have continued to spread into the broader international context, so that protected areas are being considered as integral to socio-economic development.

Biosphere reserves are increasingly regarded as practical examples of where the conservation and development roles are integrated (UNESCO, 2001).

All too often conservation programmes focus on areas that are too small to meet the habitat requirements of all species. In addition, conservation and resource management goals are often too narrowly formulated to make either economic or biological sense. However, biosphere reserves provide frameworks for practising biodiversity conservation and resource management on a larger scale.

The Waterberg Biosphere Reserve represents the savanna biome that extends into the Limpopo Province's and South Africa's neighbouring countries namely Botswana, Zimbabwe and Namibia (Low and Rebelo, 1996). The two ecosystem types, namely Tropical Dry or Deciduous Forest and Tropical Grasslands and Savanna, as indicated on the map of the World network of Biosphere reserves, are found in this eco-region which flows over into Zimbabwe, Botswana and Mozambique. As such, the Waterberg Biosphere Reserve would be an ideal pilot site that represents the savanna biome on a regional scale.

Since tourism is one of the fastest growing industries in the world (World Tourism Organization, 2002), the Limpopo Province capitalized on this tendency, by identifying tourism as one of the economic pillars that need to be developed as a priority. The two transborder initiatives, namely the Mapungubwe and Greater Limpopo, are currently engaged in unlocking the Province's tourism potential as well as those of its neighbouring countries. The Waterberg Biosphere Reserve has thus been identified as one of the provincial building blocks of the Golden Horseshoe that links with the two transborder initiatives.

The Waterberg Biosphere Reserve is therefore positioned in a way that provides an opportunity to demonstrate sustainable development on a regional scale. This aspect will be discussed in more detail in Chapter 4.

3.2.4 Criterium 4: Have an appropriate size to serve the three functions of biosphere reserves

In combining the three functions of biosphere reserves, these reserves should strive to be sites of excellence for exploring and demonstrating approaches to conservation and sustainable development, as referred to in Article 3 of the Statutory Framework (UNESCO, 1996; UNESCO, 2000). To accomplish this goal a biosphere reserve must have an appropriate size to serve the three functions.

The Waterberg Biosphere Reserve is currently ± 414 571 hectares in size, of which the five core areas are 114 571 hectares, the buffer zone 150 000 hectares and the transition also ± 150 000 hectares.

It must, however, be clearly stated that the Waterberg Biosphere Reserve's boundary was identified according to a participation process with all the relevant stakeholders at the time when the nomination form was completed. During the negotiation process it

was agreed that the Waterberg Biosphere Reserve's boundary must not be seen as cast in stone but that the zonation pattern would be re-investigated in future.

Two additional core areas within the Waterberg District that need to be incorporated into the new zonation pattern of the Waterberg Biosphere Reserve are Nylsvley Nature Reserve and the Makapan Caves. Other provincial Nature Reserves also to be included are D'Nyala Nature Reserve and Doorndraai Dam Nature Reserve. This will have a direct influence on the size and zonation pattern of the Waterberg Biosphere Reserve in future.

3.2.5 Criterium 5: It should include the three functions of a biosphere reserve through appropriate zonation, recognizing:

a) a legally constituted core area or areas devoted to long term protection, according to the conservation objectives of the biosphere reserves, and of sufficient size to meet these objectives;

b) a buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place;

c) an outer transition area where sustainable resource management practices are promoted and developed;

In many parts of the world, natural ecosystems have been largely converted or transformed into agricultural systems of various kinds, or have been replaced by cities, towns, industrial complexes, and other man made infrastructures. This process has in particular been noticeable in those parts of the world that have long been inhabited by high densities of human populations, and is in a process that has accelerated over the last few centuries (UNESCO, 2002). In South Africa, and in particular in the Limpopo Province, the position is the same. However, the land changes as a result of agricultural practices and densely populated rural areas as a result of mainly previous land policies that were set to develop the homeland system, is still felt. The lack of proper land use zonation legislation further contributes to the current mismanagement of the natural

resource base. This will be discussed in Chapter 5 as an important factor that needs to be considered in biosphere reserve planning.

Appropriate land use zonation principles are currently of the utmost importance as the implications of a poorly defined, implemented and regulated planning framework will result in uncontrolled development (Wilson, 1997). With the provincial Economic Development Strategy in place as a tool to combat poverty, economic development is encouraged in all sectors (Limpopo Province, Department of Finance, Economic Affairs and Tourism, 1999a). This strategy is driven by the need for job opportunities and access to services. Within the Waterberg Municipality, in which the Waterberg Biosphere Reserve is located, all three economic pillars namely Agriculture, Mining and Tourism are competing for space. More ever, municipalities are at present forced to develop and implement an Integrated Development Plan (South Africa, 2000). It is thus within this planning framework that the zonation criteria for the development of the biosphere reserve concept will play a major role.

a) Zonation of the core areas.

The core areas within the Waterberg Biosphere Reserve were identified according to their legal status, their long term role as protected areas and according to the participatory approach of the stakeholders. The last point refers to the fact that other protected areas just outside the Waterberg Biosphere Reserve, e.g. D'Nyala Nature Reserve, Doorndraai Nature Reserve and Nylsvley Nature Reserve, have not yet been zoned as core areas due to the fact that the negotiations with the private landowners surrounding these reserves have not yet been conducted.

There are currently five core areas in the Waterberg Biosphere Reserve, of which only one, Marakele, is proclaimed a National Park, Wonderkop and Mokolo Dam are proclaimed provincial nature reserves, and Masebe is proclaimed a communal owned nature reserve. Moepel is not proclaimed and is earmarked for a community owned nature reserve with specific reference to ecotourism development. Map 6 indicates the current zonation pattern of the Waterberg Biosphere Reserve with its distinct core areas.

Core area 1: MARAKELE NATIONAL PARK

Marakele National Park is situated in the south-western corner of the Limpopo Province and is bounded by longitudes 27E 30' and 27E 45' E and latitudes 24E 15' and 24E 30'S. Marakele is one of seventeen National Parks in South Africa, currently covering an area of ± 68 000 ha in the south-western part of the Limpopo Province. It has been managed as a National Park since 1988, but was officially proclaimed a National Park on 11 February 1994 (South Africa, Department of Environmental Affairs and Tourism, 1994). Marakele consists of some of the most rugged mountain scenery in this country and is situated mainly in the Waterberg Moist Mountain Bushveld in the savanna biome which is synonymous to Acocks (1988) Sour Bushveld, which was listed by Edwards (1983) as one of the 52 of South African veld types extremely lacking in conservation (Van Staden, 2002). The Sour Bushveld covers 18 306 km, occurring in mountainous areas in the Limpopo Province (Low and Rebelo, 1996). This park aims at conserving components of pristine natural ecosystems, reintroducing rare and endangered species that previously occurred in the area and making the park more accessible to tourists. Bordering Marakele is the Welgevonden Private Game Reserve, currently consisting of 33 000ha. This Big Five reserve is zoned as part of the buffer zone.

Core area 2: MOKOLO DAM NATURE RESERVE

The Mokolo Dam is situated in the north-western part of the Waterberg Biosphere Reserve, approximately 70 kilometers north-west of the town Vaalwater. The dam is characterized by densely wooded mountains which mainly comprise of sandstone and surrounding cliffs. This Nature Reserve plays an important role in providing outdoor recreation, including both land and water orientated activities. Mokolo Dam was proclaimed as a provincial nature reserve in 1993 and covers an area of 4 600 hectares which includes the dam surface area of 914 hectares (Limpopo Province, Department of Finance, Economic Affairs and Tourism, 1994). The current objectives for the Nature Reserve are to conserve the biodiversity of the area and develop the area as a tourist destination.

Core area 3: WONDERKOP NATURE RESERVE

The Wonderkop Nature Reserve is situated in the north-western part of the Waterberg District, about 130 km north of the town Mokopane. Low rainfall and high summer temperatures are characteristics of the area. The vegetation can broadly be described as Sweet Bushveld (Acocks, 1988) although certain areas of the Reserve are somewhat sour, especially where sandy soils occur. The Reserve also adjoins the Glen Alpine Dam, which forms 11 km of the eastern boundary of Wonderkop Nature Reserve which was proclaimed as a provincial nature reserve in June 1994 with an area size of 16 100ha (Limpopo Province, Department of Environmental Affairs and Tourism, 1994). The objectives of this reserve are to conserve the biodiversity of the area, specifically the conservation of the Roan antelope and to promote the sustainable utilization of natural resources from which the direct surrounding communities can benefit (Limpopo Province, Department of Environmental Affairs and Tourism, 1994). This is the only core area without a buffer zone contiguous to it but and therefore has a major challenge of including the surrounding rural villages in its objectives and future developments.

Core area 4: MASEBE NATURE RESERVE

The Masebe Nature Reserve forms part of the north-eastern side of the Waterberg escarpment. Geological formations comprise of sandstone and conglomerate into which water erosion had carved the valleys and interesting forms as seen today. The veldtype is Sour Bushveld (Acocks, 1988) on the high elevations and Sourish Mixed Bushveld (Acocks, 1988) on the low-lying areas. Streams of water flow freely down the mountain to form beautiful waterfalls in the rainy season. Due to the topography of the area, there is a rich variety of habitat types that can accommodate a variety of game and bird species. The inaccessiveness of the area kept it in a pristine state so that well- conserved rock paintings and other archaeological sites still exist at Masebe Nature Reserve (refer to point 3.2.2.). The land incorporated into Masebe Nature Reserve is communal land of which government has always been the legitimate owners with the right to utilization. These farms were previously utilized as grazing for the community's cattle. In 1984, negotiations with the affected communities and the traditional authority of Bakenberg resulted in a tribal resolution which granted the authorities of the then Lebowa Nature Conservation the right to develop and proclaim the area as a nature reserve. All affected communities and authorities are satisfied with this land use option and the continued

cooperation of the affected communities is dependent upon the economical, sustainable and responsible utilization of the Reserve's natural resource potential. The seven villages that donated their land for the establishment of Masebe are structured into an association that will be the legal authority responsible for the Reserve in partnership with the relevant government authority. Masebe is 4 541,85 hectares in size and aims at conserving its natural biodiversity and features with the emphasis on economic benefits through tourism development to the communities involved. The reintroduction of game species, especially White Rhinoceros, is currently under investigation.

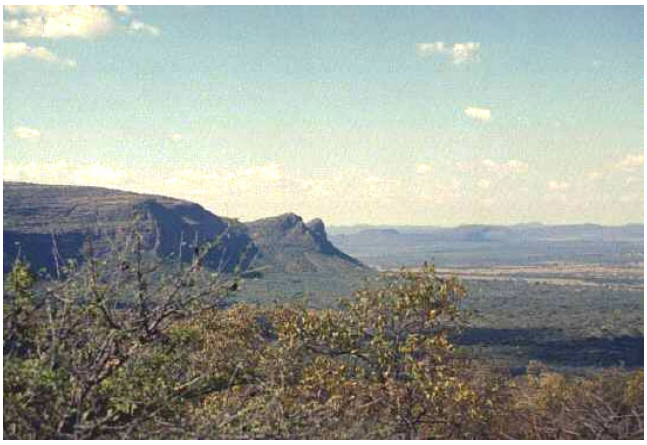
Core area 5: THE MOEPEL FARMS

The Moepel farms are situated 75 km north-west of Mokopane and 20 km south- east of Marken. The farms form part of the Waterberg mountain and extend onto the plains below the escarpment while the area is mostly inaccessible for any kind of vehicles due to its topography. The Moepel farms are currently state owned land put aside for conservation purposes but have not yet formally protected. However, there now exists an opportunity to proclaim this area as a communal nature reserve that is described as a new type of protected area in the proposed Limpopo Province Environmental Management Bill (Limpopo Province, Department of Finance, Economic Affairs and Tourism, 2002). This may be regarded as an advantage as the local community can get involved in its development from the initial stages. These farms could previously not be developed into a nature reserve or park due to a lack of funds. Involved provincial departments and local municipalities, however, have recently prioritized it to develop the area as a "Big Five Reserve" owned by the surrounding communities (De Klerk, 2002). The Moepel farms are 28 330 hectares in size and adjacent to Masebe Nature Reserve. To link these two reserves to be managed as a single unit has great potential.

Apart from conserving the rich biodiversity that occurs in this mountainous reserve the main objective is water conservation which is of extreme importance due to the fact that the rural villages in the plains below the escarpment have an extremely serious water shortage due to drought and incorrect land use practices. Very remote and distinct wilderness areas are zoned within these farms. Because little information is currently available regarding all the biological components, it would be an ideal site for research

and monitoring programmes that could be launched with the involvement of the adjacent communities. Conversations with a number of local villagers revealed the existence of undiscovered archeological sites in these mountains. As such, the Moepel farms constitute a very important core conservation area within the Waterberg Biosphere Reserve.

Masebe Nature Reserve



Moepel farms

Mokolo Dam Nature Reserve

Wonderkop Nature Reserve

Marakele National Park

Figure 6: Features found on the core areas of the Waterberg Biosphere Reserve

b) A buffer zone or zones.

The buffer zone has been clearly identified as areas adjacent to or nearby the core areas. It is, therefore, not necessary for all the land surrounding the core areas to be zoned as a buffer (UNESCO, 1996). The land use activities should rather be taken as criteria that depict activities compatible with the conservation objectives of the core areas.

The buffer zone is owned by 28 private landowners whose land constitute the Waterberg Nature Conservancy. This explains why the boundaries of the buffer zones were drawn alongside private farm boundaries and not vague concentric rings. The importance of zoning the properties of members of the Waterberg Nature Conservancy as the buffer zone in the Waterberg Biosphere Reserve was that:

aa) It was easier to talk to a collective group of people about the biosphere reserve concept than to start a process of negotiation with individual landowners. This would have taken even longer than an already time consuming process.

bb) The Waterberg Nature Conservancy had already identified a common vision for the area they live and work in. They are further bound by a constitution to ensure that they fulfil certain objectives. Common ground was therefore found that greatly assisted the initial stages of establishing the biosphere reserve.

cc) Criterium 7 of the Statutory Framework (UNESCO, 1996) refers to mechanisms that need to be in place to manage human use and activities in the buffer zone or zones. The Waterberg Nature Conservancy, representing the private landowners involved, seemed to be an authority that could be responsible for managing the buffer area.

dd) The landowners that are members of the Waterberg Nature Conservancy further endorsed the biosphere reserve initiative and are committed to implement the criteria set down by UNESCO's MaB program.

The Waterberg Conservancy initiative started in 1982 (Walker, 1998). The Conservancy currently has 30 members (of which 28 are private landowners) who control more than 146 157 hectares while the following large private game farms form an integral part of the Conservancy: Lapalala Wilderness, Touchstone Game Ranch, Kwalata Wilderness,

Keta Private Nature Reserve and Welgevonden Private Nature Reserve. Table 2 refers to different landowners and the sizes of their farms.

Apart from tourism and hunting, mixed farming practices such as cattle and game farming, are found on some of the buffer zone farms. Other activities within the buffer zone include a number of extensive environmental education programmes currently conducted by the Wilderness Trust of Southern Africa (Walker, 1998). A more detailed discussion in regard to the tourism activities within the core areas and buffer zone will be presented in Chapter 4.

A portion of the communal land in the Bakenberg area has also been zoned as a buffer zone strip specifically as an area where ecotourism activities could be developed to enhance the economic potential within the adjacent transitional zone that includes 26 rural villages. The main activity currently practiced in the Bakenberg buffer zone is cattle grazing while a portion of this buffer zone is mountainous and difficult to access.

c) An outer transition area

The Seville Strategy (UNESCO, 2002), gave increased emphasis to the transition area since this is the area where the key issues on environment and development of a given region are to be addressed. The transition area is by definition not delimited in space, but rather to be changed in size according to the problems that may arise over time. In addition, is a zone where sustainable resource management practices are promoted and developed.

The main activities that are currently taking place within the transition zone are:

aa) Game and cattle farming. Not all the game farms in the area form part of the Waterberg Nature Conservancy. They are therefore not part of the buffer zone but constitute the transition zone. Overgrazing is one of the problems within the zone, especially in the area that includes the rural areas of Bakenberg (De Klerk, 2001).

bb) Various small and low impact tourism activities are found within the buffer and transitional zones. Figure 9 (Chapter 4) indicates the type of tourism activities within the buffer zone. These kinds of activities are also dominant in the transitional

zone area. However, in the transitional zone and on the periphery of the current boundary of the Waterberg Biosphere Reserve larger tourism operations such as holiday resorts, hotels and large operations providing conference facilities are found. Steyn (2002) refers to this as a mass tourism node.

cc) Hunting, especially trophy hunting, is regarded as a major attraction due to the fact that the majority of the operators cater for overseas hunters. Based on the survey conducted by Kessel Fenstein (2001), the Limpopo Province captured 30% of the total hunting days sold in South Africa. Map 3 that refers to the amount of exemption farms in the Province clearly indicates that the Waterberg region has the majority of exemption farms recorded. The data assimilated for this study from surveys of the departments involved, indicates that it is estimated that the Waterberg region currently has 1240 exemption farms, excluding farms where hunting takes place but did not request an exemption permit from the department. Hunting, therefore, does not only take place on exemption farms. In the year 2001, 899 hunting permits were issued in the Waterberg region of which 39 permits were issued for Leopard hunts, a major contributor to the trophy hunting industry. When considering the above information, it is clear that within the transition and buffer zones of the Waterberg Biosphere Reserve, game farming linked with tourism activities and hunting, remains the major type of land use.

dd) Irrigation farms. The most important field crop commodities are tobacco, cotton, sunflower, sorghum, and maize of which the tobacco industry is an important industry within the transition zone and contributes significantly to the local economy. The majority of these farms border the Mokolo River and extends over ± 1750 hectares (Limpopo Province, Department of Finance, Economic Affairs and Tourism , 2001c). However, within the Waterberg Biosphere Reserve with its commitment to sustainable development, the major water extraction from the Mokolo River by this industry needs to be monitored closely since this could have an effect on the future sustainability of the tobacco industry as well as on the Mokolo River system.

ee) The following human settlements form part of the Waterberg Biosphere Reserve:

The town Vaalwater and 26 rural villages within the Bakenberg area of the Mokgalakwena Municipality. A large number of these rural villages are situated on the plains below the escarpment as clearly demonstrated in Maps 6 and 7. Issues that need to be taken into account within these areas are:

- The Bakenberg area has a relatively high population density in comparison to the other areas within the biosphere reserve.
- The area has a relatively low level of economic activities.
- It has inadequate water resources and water supply systems.
- It contains poorly developed rural energy supply systems and is thus a concomitant to the exploitation of local woody vegetation to supply local energy needs.
- The area has a lack of local employment opportunities.
- It has inadequately developed infrastructure and services.

3.2.6 Criterium 6: Organizational arrangements should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and carrying out of the functions of a biosphere reserve

The Waterberg Biosphere Reserve committee was formalized after a participatory process had started towards the end of 1996. This initial phase of participation had taken almost two years until it was decided that role players who contributed land to the initiative, the tourism industry and the then four transitional local government structures would be part of the steering committee (Limpopo Province, Department of Finance, Economic Affairs and Tourism, 1999b). All the other relevant role players, for instance the different government departments, would form part of the technical committees that are also represented on the steering committee. The aim was to finalise the nomination form to UNESCO for registration first, before concentrating on specific project or programme implementation. To ensure active participation and decision making, the steering committee was kept as small as possible.

An area as big as the Waterberg Biosphere Reserve involves various stakeholders. To ensure that the people within the biosphere reserve should take ownership of the project was a challenge in itself. The only aspect that will still change, will be the number of people participating in the initiative as the biosphere reserve grows in size. Experience within the Waterberg Biosphere Reserve initiative over a period of five years has indicated that as people start to understand the concept and its benefits, they become more positive to get involved. Munro (1995) indicates that people support what they believe to be valuable. People are usually most positive and active in their support if the values that they perceive accrue to themselves. The values may be concrete and easy to quantify, such as the provision of employment or other income; tangible but less easy to put into monetary terms, such as opportunities for recreation; and quite intangible and un-quantifiable, such as wilderness experience.

The involvement of all the relevant stakeholders at all times is therefore of the utmost importance for the long-term survival of the Waterberg Biosphere Reserve. Due to the uniqueness of each biosphere reserve the stakeholder composition will differ from one reserve to the other since the biosphere reserve concept allows a flexible approach to a biosphere reserves' structural arrangements.

Within the Kogelberg Biosphere Reserve and the Waterberg Biosphere Reserve a representative management committee of stakeholders including the landowners, local authorities, government departments, statutory boards and local communities is in place. Non governmental organisations (NGO's) that are active within the Waterberg area also form part of the management committee while the mining sector plays an important role in the committee as well. Although mining is not a prominent land use within the Waterberg Biosphere Reserve area, it is of major importance in developments on the periphery of the biosphere reserve, which have direct and indirect effects.

It is at this stage envisaged that the management committee will register a non-profit legal entity to assist in management and fundraising. Other biosphere reserve initiatives

in the country, for instance the West Coast and Kogelberg Biosphere Reserves, have been managed with good results through a Section 21 company.

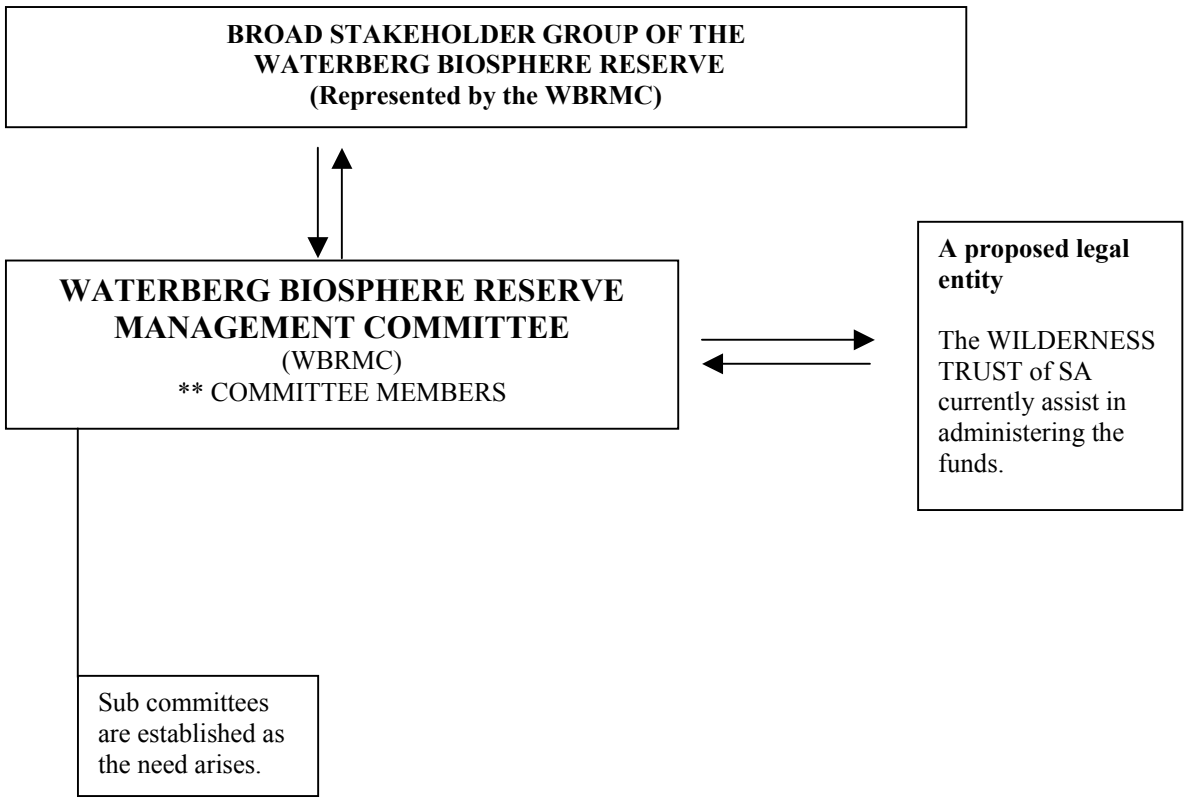


Figure 7: Current structural arrangement of the Waterberg Biosphere Reserve

** COMMITTEE MEMBERS

Members of the Management Committee are elected at stakeholder representative level while each of the following stakeholder groups is asked to appoint a representative to the Management Committee. This appointment must be confirmed in writing.

- National Parks Board
- Provincial Parks and Tourism Board

- Provincial Department responsible for Environmental Affairs
- Provincial Department responsible for Tourism.
- Provincial Department responsible for Agriculture
- Provincial Department responsible for Education
- Portfolio committee in Provincial Legislature responsible for Environment and Tourism
- Waterberg District Municipality
- The six local Municipalities within the Waterberg District
- Bushveld Regional Tourism Forum
- The Waterberg Nature Conservancy
- Transvaal Agricultural Union
- Agric SA
- Game Breeders Association
- Tribal Authorities
- Bakenberg Community
- Mining sector
- Business sector
- NGOs
- Other relevant private sector representation
- Representative of the Development Finance Institutions (DFIs)

Note: The Waterberg Biosphere Reserve Constitution states that there must always be a balance between government, community and private representation on the Waterberg Management Committee (Limpopo, Department of Finance, Economic Affairs and Tourism, 2002a).

3.2.7 Criterium 7: Other provisions a biosphere reserve should have in place:

a) Mechanisms to manage human use and activities in the buffer zone or zones.

b) A management plan or policy for developing the area as a biosphere reserve.

c) A designated authority or mechanism to implement this policy or plan.

d) Programmes for research, monitoring, education, and training.

a) Mechanisms to manage human use and activities in the buffer zone or zones.

The only direct form of regulating use and activities in the buffer zone is through the implementation of existing legislation. Administrative mechanisms to manage human use and activities in the buffer zone are, therefore, mainly built into the structure and function of the Waterberg Biosphere Reserve Management Committee. All the government roleplayers who are involved in any of legislation implementation are represented on the committee where issues pertaining to human activities are identified and dealt with. There is no legislation that currently guide any development or activity within a biosphere reserve. However, in the new proposed National Protected Area Bill, biosphere reserves and all issues pertaining to the concept will be addressed. In Chapter 5 this study will broadly investigate the legislative aspects to be considered when dealing with biosphere reserves. The local and district municipalities involved will be the most prominent roleplayers with appropriate legislative powers to deal with development, activities and land use changes or influences. The Municipal Systems Act (South Africa, 2000) will guide an Integrated Development Plan (IDP) that needs to be drafted for each municipality against which developments or activities will be evaluated.

The Waterberg Biosphere Reserve, however, endeavours to let all members and roleplayers involved endorse the objectives and principles of the biosphere reserve as contained in the constitution. These objectives are founded on the Seville Strategy and Statutory Framework for Biosphere Reserves as approved by UNESCO (UNESCO, 1996). The Waterberg Biosphere Reserve further took the initiative to look at a zonation mechanism that could be used as a self-regulatory mechanism to encourage landowners to become part of the Waterberg Biosphere Reserve out of their own free will since it will provide the landowners with certain incentives that will rate his/her property. A gold rating will mean that the landowner conforms to all the criteria set for this status within the Waterberg Biosphere Reserve. There are four levels before reaching gold status, starting with an entry level (Baber, 2002). This mechanism has only recently been finalized and it is hoped that with appropriate funding the implementation thereof could start as soon as possible. This kind of initiatives will hopefully enable the biosphere reserve concept to encourage its participants to be self regulators and watchdogs over their own natural resources. Chapter 6 will further discuss legislative issues for dealing with biosphere reserves in the future.

b) A management plan or policy for developing the area as a biosphere reserve.

The Waterberg Biosphere Reserve does not yet have a detailed management plan. With the recent changes in local government and its associated legal framework the Waterberg Biosphere Reserve Management Committee suggested to look at all the local government requirements as set out in the Integrated Development Plan (IDP) for the Waterberg District, before detailing a management plan for the Waterberg Biosphere Reserve. It is, therefore, imperative for any biosphere reserve initiative at this stage to be involved with the IDP process of the municipalities to ensure that the biosphere reserve principles and zonation are incorporated. If not done, it could mean that the Waterberg Biosphere Reserve at a later stage does not comply with the MaB programme as a result of conflicting interests. The integration of the Waterberg Biosphere Reserve's plans into the IDP of the municipalities is, therefore, crucial for the future existence of this biosphere reserve.

c) A designated authority or mechanism to implement this policy or plan

This point was discussed in detail under Criterium 6.

d) Programmes for research, monitoring, education, and training

Ongoing environmental education and training programmes are conducted from the Wilderness School at Lapalala to assist in communicating the biosphere reserve concept to the local communities. This is of vital importance as the majority of the learners in the Bakenberg area have never even seen an elephant or undisturbed wilderness area. They are also not familiar with the tourism and game industry, but ironically, the area adjacent to their village is thriving economically because of this wildlife industry. A bridge between the known and unknown, poor and rich and cultural diversity was built in the Waterberg Biosphere Reserve through this programme. Representatives from both parties are now sitting around the same table planning their future as partners in the Waterberg Biosphere Reserve.

Various monitoring programmes, are currently conducted especially in the core zones throughout the year. These include veld monitoring, scarce species monitoring, aquatic system monitoring as well as monitoring utilization of firewood and grass. However, conservation and resource management programmes within the larger Waterberg Biosphere Reserve have not yet reach a satisfactory level. Major programmes could be initiated with regard to erosion control, bush encroachment and proper ecological management, especially within the core and buffer areas. The only large conservation project with a positive impact within the Waterberg Biosphere Reserve area up to date has been was the Work for Water Project (Walker, 2002) conducted under the Department of Water Affairs and Forestry to eradicate alien vegetation in river and wetland systems on which R2,4 mil was spent in 2001 while 360 job opportunities were provided. Various individual conservation projects that are undertaken on private land, need to be coordinated and assisted where possible.

Within the framework of monitoring and research it was decided to establish a coordinating office at Melkrivier's Cultural and Rhino Museum established by Clive Walker in 1997 (Wilderness Trust of Southern Africa, 1997). The cultural museum is linked to a Natural History Museum and a Rhinoceros Museum, devoted to the world's five species of

Rhinoceros. In addition, it is planned to establish the Waterberg Ecological Institute, which will have its headquarters at Melkrivier for all researchers conducting research in the Waterberg Biosphere Reserve. There they will be engaged in the compilation of all research material conducted within the Waterberg mountains while simultaneously encourage private landowners in developing ecological research programs for the sustainable development of their reserves. This will enable the Waterberg Biosphere Reserve to have a permanent office from where all the administration could be handled.