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In situ conservation in Namibia: the role of national parks and nature reserves

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Introduction

Conservation areas are important for *in situ* conservation of plant genetic resources. Approximately 12 % of Namibia is protected by legislation for the conservation of natural resources. This excludes the other state-owned land such as the Diamond area No 1 which is being protected by at least temporary legislation. When all the game farms are included, more than 20 % of the country's natural heritage is at this stage relatively secure.

The IUCN standard of protecting at least 10 % of a country surface is exceeded in Namibia. One of the aims of the Ministry of Wildlife, Conservation and Tourism, is to protect at least one part of each of the main vegetation types in Namibia. Of the 13 vegetation types identified in Namibia (Giess, 1971), only 8 have conservation areas situated in them, and some of these areas are representative of less than 5 % of the vegetation type they are situated in. Each vegetation type also has numerous variations in terms of abiotic and biotic diversity. Often the really sensitive variations are not protected. It is therefore important to realized that even though more than 10 % of the country is protected, a lot of areas rich in well adapted plant and animal life are potentially under threat of genetic degradation.

55 % of the country is classified as extremely arid to arid (0-300 mm of rainfall per annum). 16 % is classified as true desert environment. The remaining semi-arid to subhumid areas are therefore mostly providing food for the people of Namibia. These areas are often under severe pressure of being over-utilized. Extensive agriculture further erodes these areas of potentially important native forage species. *Ex situ* and *in vitro* conservation should therefore probably concentrate firstly on the communal and commercial lands of Namibia. These areas are most likely to have genetic erosion occurring there than in the established conservation areas of Namibia. Some exceptions to this do occur.

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This paper gives an overview of the conservation areas present in Namibia. Each unit will be discussed in terms of position, size, main plant communities, its representativeness in protecting the main vegetation type in which it is situated, some unique features, specific problems and areas in and around these reserves that need more urgent attention to prevent genetic erosion.

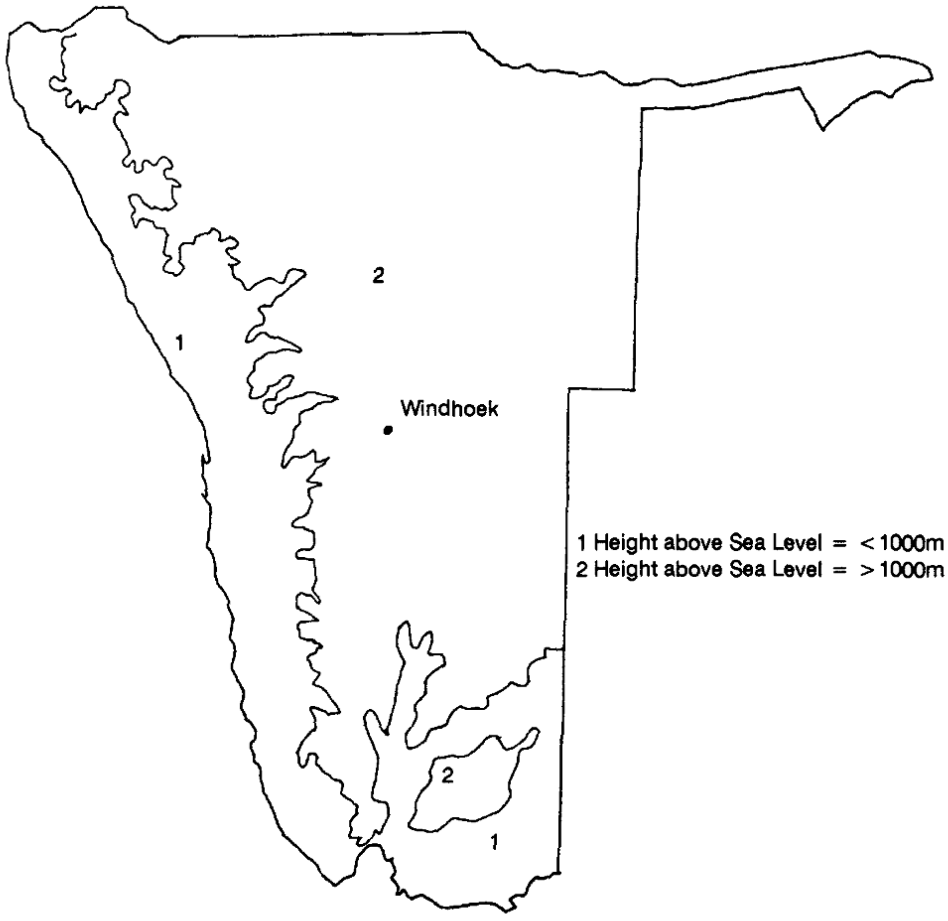

Figure 1: Topography map of Namibia

Etosha National Park

Etosha is approximately 22 270 km^2. Seven main plant communities occur in Etosha (Etosha Pan and surrounding plains, Karstveld and Mopane tree veld, NE Sandveld = Dry woodlands, Shrub mopane veld and the Kaokoveld). Etosha is situated in four main vegetation types (Fig. 3). It accounts for a very good representation of the saline

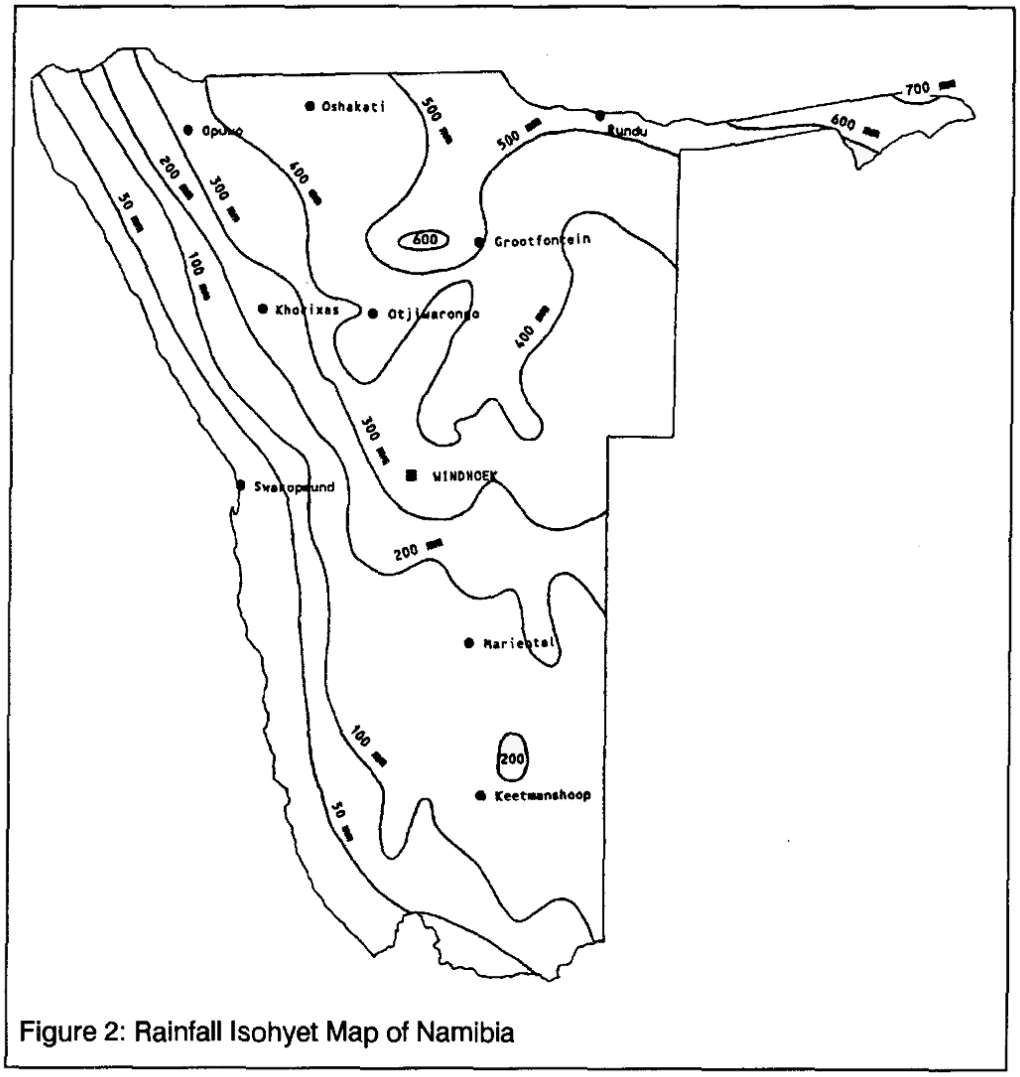

Figure 2: Rainfall Isohyet Map of Namibia

desert (unit 5) and the mopane savanna (unit 7). The dry woodlands (unit 14) and mountain savanna (unit 8) are poorly represented, as well as the escarpment vegetation of Kaokoveld, which is very varying and diverse.

Forage grasses are an important component of most of the savannas.

The park is mostly situated in a semi-arid rainfall zone, and the rainfall is unpredictable and erratic and mostly below the long-term average. Parts are therefore nearly constantly under rainfall and temperature-induced stress. The plains grasses are very acceptable to grazers and well adapted to grazing pressures and rainfall variations. Plants with a high affinity for saline soils are well represented in and around the Etosha Pan *(Suaeda/Zygophyllum/Sporobolus)*.These plants can provide an important source of genetic diversity that are well adapted to saline grassland and desert environments.

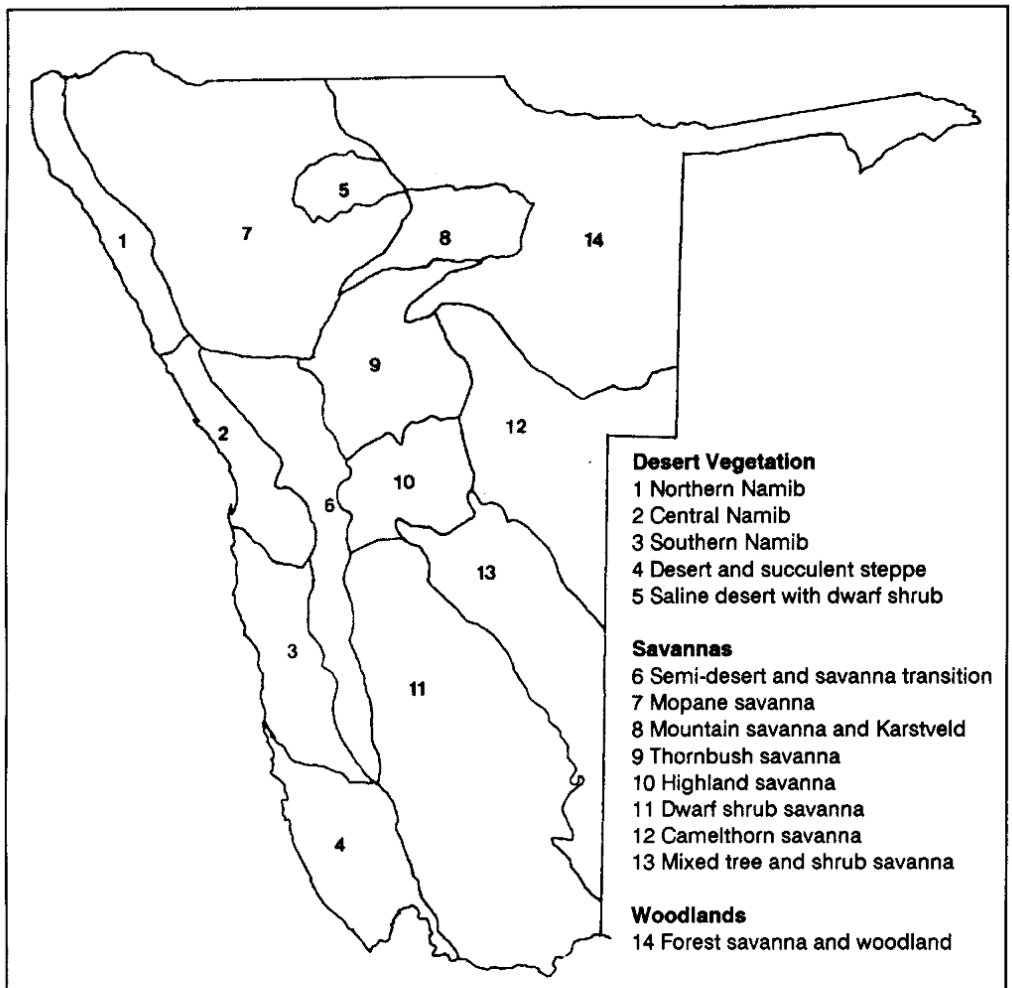

Figure 3: Vegetation Map of Namibia, after Giess, 1971.

The Andoni plains/Owambo grasslands are poorly represented in Etosha. The area outside the park was previously an impotant forage source for migratory plains animals of Etosha. The vegetation is well adapted to more saline soils and periodic flooding. These areas in southern Owambo do not have protective status and are close to the highest concentration of people in Namibia. Ever-increasing human pressure for more land is already starting to have an influence on these grasslands. Genetic erosion of its natural resources can be expected soon.

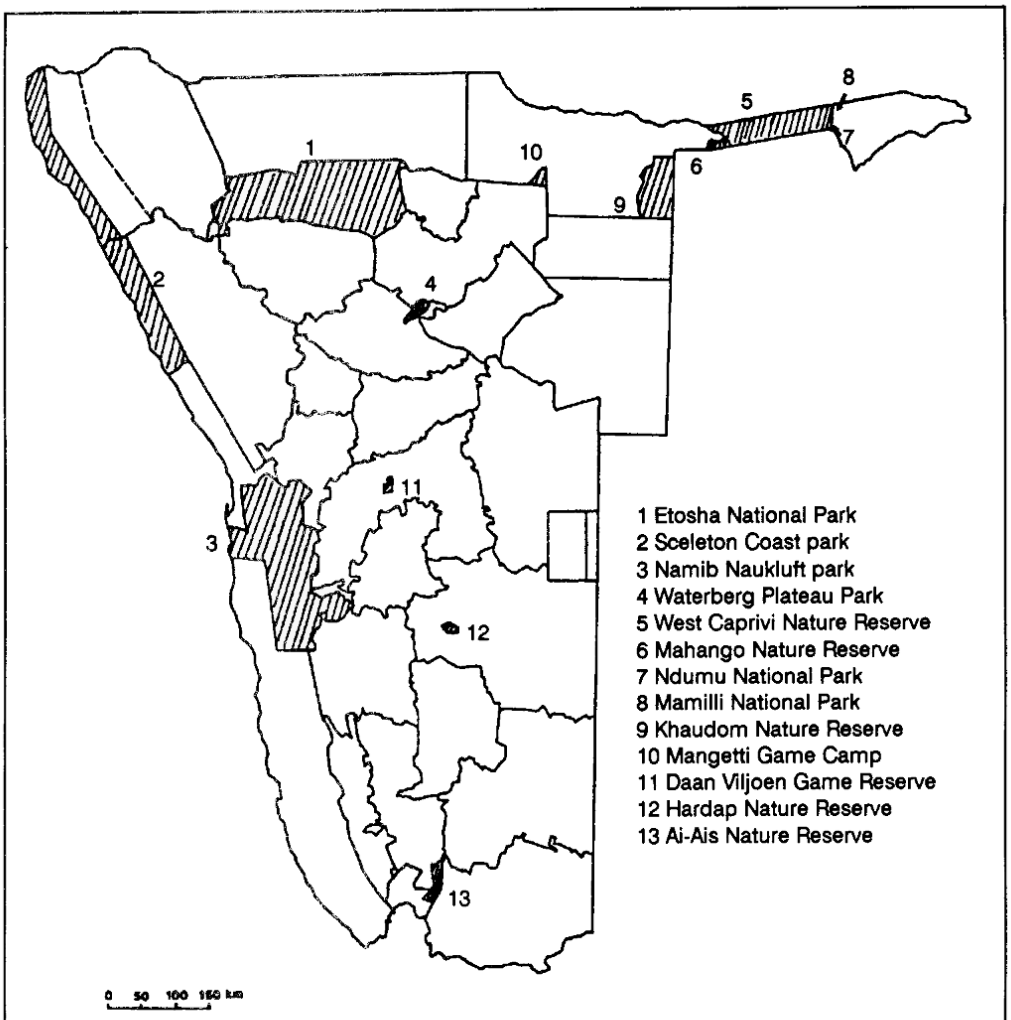

Figure 4: National Parks and Nature Reserves

The Namib Naukluft Park

This true desert park occupies nearly the same size as the Etosha National Park. Four main plant communities occur in the park (gravel plains, the dune sea, the eastern semi-desert and escarpment vegetation and the Kuiseb River). The park is a good representation of the central and southern namib vegetation (unit 2 and 3) as well as of the Kuiseb river, but poorly represents the semi-desert escarpment region (unit 6) in the east.

The park has numerous examples of endemic fauna and flora of the region. It is an important source of highly adapted and specialized forage species. Diamond area 1 and 2 needs more formal and permanent legislative protection. The Inselbergs and Kuiseb river are very sensitive to increasing human-induced stresses, such as small

stock farming and water extraction out of the river. Even this enormous area is not big enough to sustain highly mobile and adapted game species like gemsbok.

The Mahango, Ndumu and Mamili Nature Reserves

These three areas occupy in total a size of approximately 60 000 ha in the north-east of the country. Four dominant plant communities are found (river, floodplain, riverine forest and dry woodlands). These areas are situated in the Dry woodlands and forest savanna vegetation type (unit 14), but are more representative of this unit's riverine vegetation. It therefore poorly represents the dry forest types, and also poorly protects the riverine vegetation. The latter is extremely over-utilized along the rest of the Kavango river. This utilization is less pronounced along the Kwando river, but the situation can change drastically in a short period of time.

Unique features are the dense and diverse riverine woodlands, as well as the highly productive floodplain vegetation. The floodplain vegetation is used elsewhere by the people of the area for providing grazing to their cattle, it provides building material and is used in the manufacturing of curios. Forage species adaptable to periodic flooding and containing high yields of edible seeds may be important species to preserve.

Conflicts between huge numbers of elephants and other wild animals are forcing especially elephants to concentrate more in the few small protected areas, with devastating effects on species density and structural variation of the vegetation. This conflict is seen as the most urgent conservation problem in Namibia at this moment, especially since it is expected to increase in magnitude in the near future with more people being resettled in the surrounding areas.

Khaudom Nature Reserve

The area is approximately 4 500 km^2 in size. The park is a good representation of the Dry Woodland vegetation (unit 14). A few omarambas occur. The vegetation is relatively diverse, with hard and soft wood forest as well as forage species well adapted to deep Kalahari sands in a semi-arid region. Well established and specialized phanerogamic plants with underground storage organs are common. They possess a large genetic potential in terms of providing food that may be used by humans on a commercial scale once domesticated.

West Caprivi Nature Reserve

The area is approximaterly 5 300 km^2 in size. It consists mainly of dry woodlands with numerous omarambas and oshonas. It is a good representation of this part of unit 14.

The area is waterless, except for rainwater during the rainy season that accumulates in the omarambas and oshonas. Its status as a nature reserve is unsure, since people are already being resettled in the area. Like the Mahango Nature Reserve, this region is an important concentration area for elephants moving periodically through the area. Conflicts with people will force these animals to concentrate in the conservation areas, the effects there-of have already been discussed.

Daan Viljoen Game Park

This small game reserve (39 km^2) is situated in the Highland Savanna (unit 10). It is relatively well protected, but because of its small size, cannot be taken as a long-term secure area for the vegetation occurring in this bigger vegetation type. Grasses are important in the herbaceous stratum, and are well adapted to steep slopes, varying aspects and cool climate of the winter months.

Skeleton Coast Park

The size of this unique desert is 15 800 km^2. Three main vegetation units are found (old seabed-gravel plains, dunes and dry river courses). The Skeleton Coast Park is a good representation of the Northern Namibia desert. Various unique vegetation features are associated with each of the main plant communities. The dry river courses are life veins in this desert environment and contain a higher diversity of species than found in the adjacent desert. Some species are well adapted to obtaining moisture from fog. The area is highly sensitive to various types of disturbances, especially the coastline (lichen fields) and the dry river courses (desert elephants, rhino's and giraffe utilizing *Faidherbia albida*, etc.). A proposed harbour at Möwe Bay will be disastrous for the region as a whole.

Mangetti Game Camp

The size is 40 000 ha. The area is part of the Dry Woodland of unit 14. Some omarambas occur, with open savanna vegetation. The area is a poor example of the variation in the dry woodlands, but combined with the Khaudom Nature Reserve,

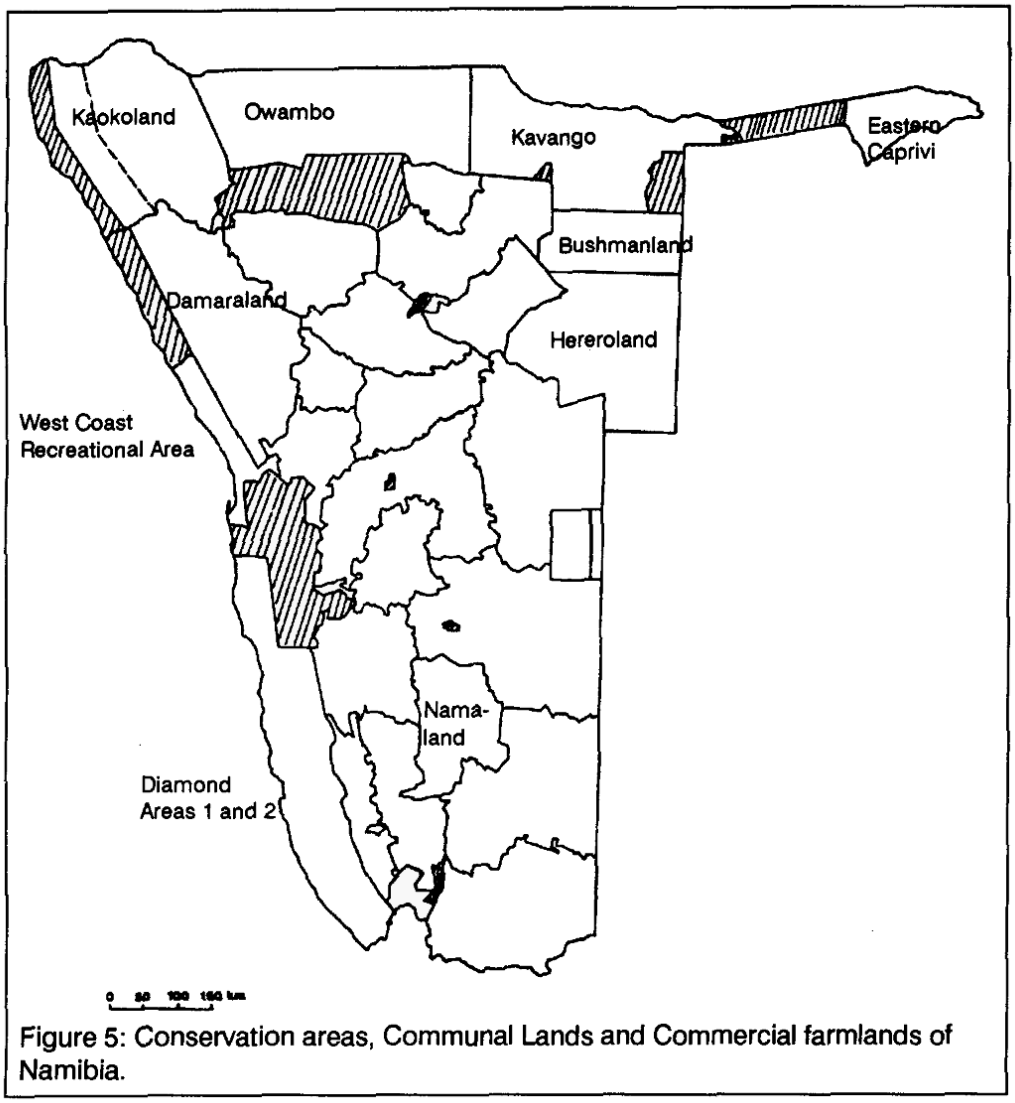

Figure 5: Conservation areas, Communal Lands and Commercial farmlands of Namibia.

makes it an important area to conserve. The conservation status of the area is still in the balance. The vegetation experiences frequent fires.

Hardap Nature Reserve

The size is 25 000 ha. It is located in the Dwarf Shrub savanna (unit 11). Because of the small size, it is not a good representation of vegetation variations in this unit. The man-made lake in this arid environment gives the park special significance. Numerous dwarf shrub species that are important browse species for sheep and goats are present.

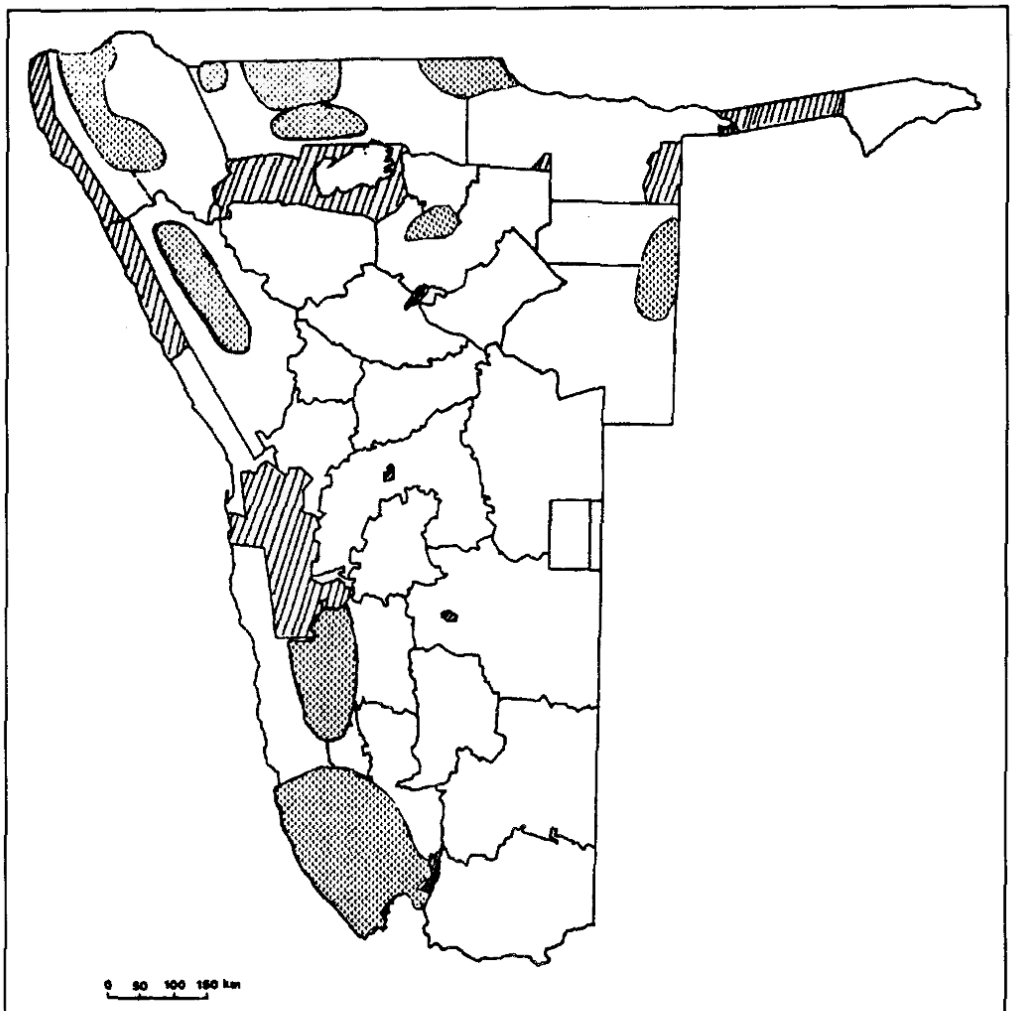

Figure 6: Conservation areas and other areas of unique species diversity.

Waterberg Plateau Park

The size is 40 500 ha. Three main plant communities are present (rocky communities of the Wilderness area, middle plateau dry woodlands and fountain communities). The area is part of the Dry Woodlands, but the vegetation combinations and abiotic factors makes the area unique in Namibia. It is well protected and relatively well managed. The rocky and fountain communities are unique and have a higher species diversity than the deep sands of the central plateau area. The park is an important source of potentially usable plant genetic diversity.

Ai-Ais Nature Reserve

The size is approximately 60 000 ha. The area is located in the Dwart Shrub savanna. Although not really representative of the bigger vegetation type, it is important to protect the unique Fish River Canyons with highly varying plant growth forms and beautiful scenery. More of the mountains to the west need protection because of the occurrence of endemic species of the region that are not protected elsewhere.

Reference

GIESS, W. 1971. A preliminary vegetation map of SWA. *Dinteria* 4:4-13.
