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TH!NK NAMIBIA
Sustainable Forest Management

FACT SHEET ON:

Vegetation in Namibian Forests

The purpose of this fact sheet is to describe the vegetation types, composition, and structure in Namibian forests.

INTRODUCTION

Although Namibia is the most arid country south of the Sahara, it does not consist only of deserts. Rainfall increases strongly from west to east, and from south to north, which influences the distribution, structure, and type of vegetation in the country. Vegetation in Namibia is therefore variable across the country, mainly comprising savanna across the interior, desert in the western and southern parts, and woodland or forest in the north-central and north-eastern parts of the country. Namibia's forests are an important resource for the country, although their precise extent is not known.

According to the FAO's definition of forests Namibia has an estimated total forest coverage of 8.4%. This is however based on outdated data, highlighting the urgent need for a fresh assessment based on the FAO's forest definition.

Photo 1: A typical view of the forests in north-eastern Namibia

The greater part of the country, estimated at about 66% of the land area, is covered by shrub and bush savanna, classified as "other wooded land" by the FAO definition.

A forest is ***"land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10% or trees able to reach these in situ"*** (FAO, 2020).

Other wooded land is defined as ***"the canopy cover of trees in between 5 and 10%, trees should be higher than 5 meters or able to reach 5 meters in situ"*** or ***"the canopy of trees is less than 5%, but the combined cover of shrubs, bushes and trees is more than 10%, includes areas of shrubs and bushes where no trees are present"*** (FAO, 2020).

The second definition of "other wooded land" fits most of the vegetation in Namibia, especially in the central parts, which are highly encroached by indigenous invader bushes such as Black thorn *(Acacia mellifera)* and Sickle bush *(Dichrostachys cinerea)*.

Regardless of the technical definitions, Namibia's forest resources are important on social, economic and ecological levels, serving various purposes and offering a wide variety of ecosystem services.

VEGETATION TYPES AND COMPOSITION IN NAMIBIA

The description of vegetation is an important requirement in ensuring proper management of plant resources. The most comprehensive description of the country's vegetation types was done by Giess in 1971, and has proven to be quite accurate. The map divided the country into 14 different vegetation zones. While it remains the most widely used vegetation map for the country, a project is under way to refine the map and provide more detailed descriptions of the vegetation types.

Mountain Savanna and Karstveld

Occurs in central Namibia, within the Otjozondjupa and Oshikoto Regions. There are variable habitats such as mountains, ridges, and sandvelf patches which host various species such as:

Common kirkia *(Kirkia acuminata)*

Bird plum *(Berchemia discolor)*

Violet tree *(Securidaca longepedunculata)*

Wild olive *(Olea europea africana)*

Tambuti *(Spirostachys africana)*

Figs *(Ficus cordata, sycomorus and thoningii)*

Forest Savanna and Woodland

Extends from the north-eastern part of the country in the Zambezi Region to the eastern part of Owamboland, and further down to the Waterberg Plateau. Characterised by various tree and shrub species, including:

Zambezi teak *(Baikiaea plurijuga)*

Kiaat *(Pterocarpus angolensis)*

Wild syringa *(Burkea africana)*

Mangetti *(Schinziophyton rautanenii)*

Rosewood *(Guibourtia coleosperma)*

Monkey oranges *(Strychnos cocculoides and pungens)*

Leadwood *(Combretum species)*

Resin bushes *(Grewia species)*

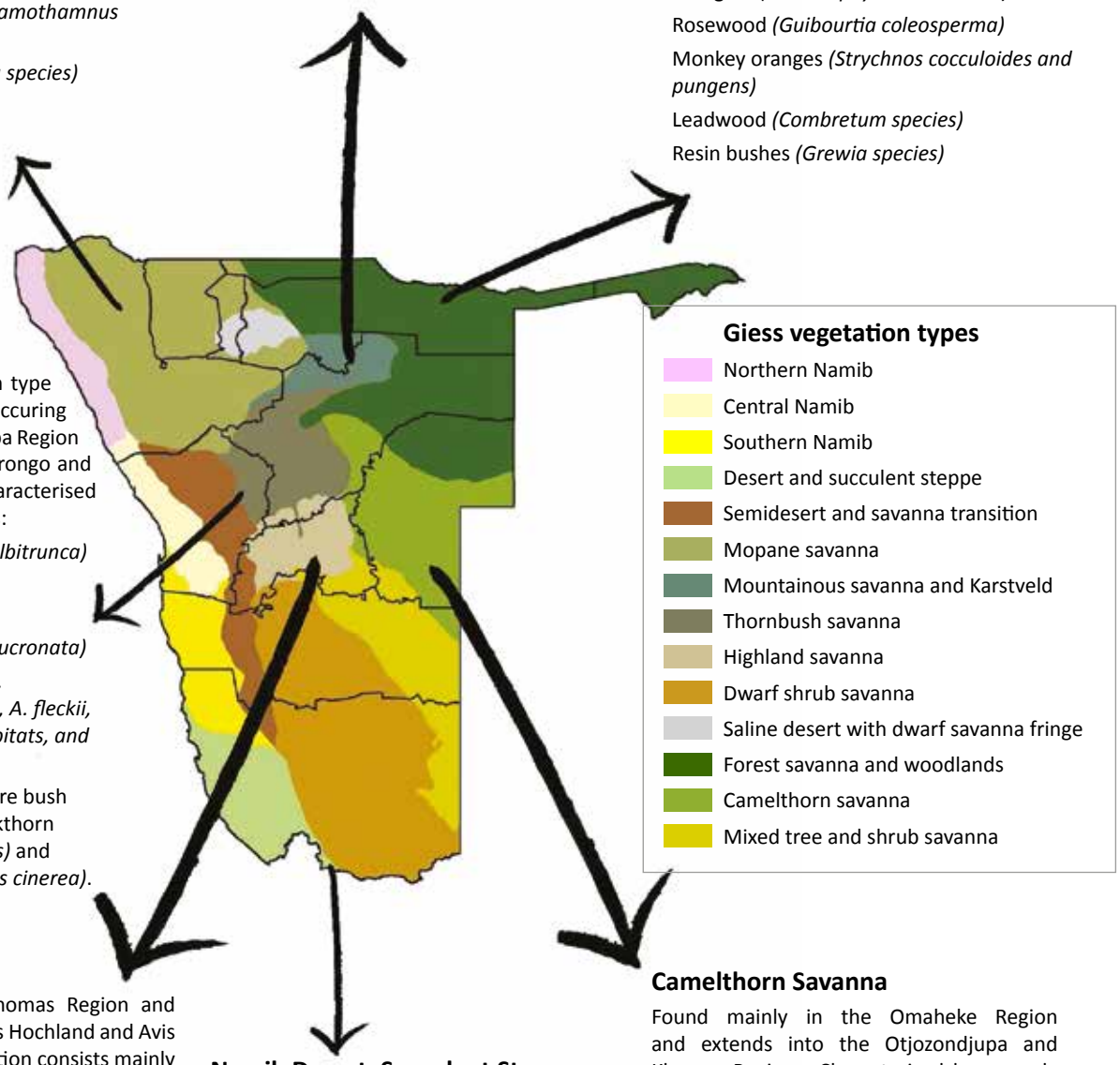
Mopane Savanna

Occurs in the Kunene Region and extends into the Omusati, Oshana and Oshikoto Regions. It is characterised by woody species such as:

Mopane *(Colophospermum mopane)*

Herero sesame bush *(Sesamothamnus guerichii)*

Corkwoods *(Commiphora species)*



Thornbush Savanna

The dominant vegetation type in central Namibia, occuring mostly in the Otjozondjupa Region and extending into the Erongo and Khomas Regions. It is characterised by woody species such as:

Shepherd's tree *(Boscia albitrunca)*

Kudu bush *(Combretum apiculatum)*

Buffalo thorn *(Ziziphus mucronata)*

Various Acacia species *(A. hebeclada, A. erubescens, A. fleckii, A. erioloba in riverine habitats, and many more)*

Large areas of this zone are bush enchroached by the Blackthorn *(Acacia mellifera detinens)* and Sickle bush *(Dichrostachys cinerea)*.

Highland Savanna

Found mainly in the Khomas Region and influenced by the Khomas Hochland and Avis mountain ranges. Vegetation consists mainly of species like:

Kudu bush *(Combretum apiculatum)*

Wild pear *(Dombeya rotundifolia)*

Namibian resin tree *(Ozoroa crassinervia)*

Bitter karee *(Searsia marlothii)*

Common guarri *(Euclea undulata)*

Wild olive *(Olea europea africana)*

Namib Desert, Succulent Steppe and Dwarf Shrub Savanna

Found along the western and southern parts of the country. Characterised by several endemic and near endemic species. A few woody species that occur in some of the areas include:

Wild tamarisk *(Tamarix usneoides)*

Wild ebony *(Euclea pseudebenus)*

Trumpet thorn *(Catophractes alexandrii)*

Green-hair tree *(Parkinsonia africana)*

Most of the species in the desert zones are herbacious and succulent plants, adapted to the dry habitats.

Camelthorn Savanna

Found mainly in the Omaheke Region and extends into the Otjozondjupa and Khomas Regions. Characterised by sparsely distributed trees with species such as:

Camelthorn *(Acacia erioloba)*

Candle pod *(Acacia hebeclada)*

Silver leaf *(Terminalia sericea)*

Buffalo thorn *(Ziziphus mucronata)*

Figure 2: The vegetation map of Namibia (Giess, 1971)

Forest composition refers to the plant species found in a forest. The composition of most forests in northern and north-eastern Namibia is fairly uniform with 9 species making up 90% of the biomass. Three of these, namely Kiaat *(Pterocarpus angolensis)*, Zambezi teak *(Baikiaea plurijuga)* and Mopane *(Guibourtia coleosperma)* are harvested for their high-quality timber.

In addition to the vegetation types described by Giess, dense riparian forests are found alongside the perennial rivers such as the Zambezi, the Kwando, the Orange, and the Kunene. The riparian forests are much more diverse than the other forest types in Namibia. The tree layer is characterised by species such as the Knob thorn *(Acacia nigrescens)*, Worm-cure albizia *(Albizia versicolor)*, Jackal berry *(Diospyros mespiliformis)*, Ana tree *(Faidherbia albida)*, African mangosteen *(Garcinia livingstonei)*, Sausage tree *(Kigelia africana)*, Apple leaf *(Philenoptera violaceae)*, Water berry *(Syzygium cordatum)*, and Water pear *(Syzygium guineense)*.

FOREST STRUCTURE

Forest structure refers to the physical attributes of the forest, such as canopy height, the height of the shrub layer, tree density, the proportion of large versus small trees, standing biomass, and more. These features are influenced by factors such as terrain, soil and rainfall, and can be modified by factors such as grazing, fire, and other human factors like land clearing. The structure of mature forests in north-eastern Namibia is characterised by sparsely distributed trees with low canopy height, a sparse shrub layer and well-developed grass layer.

The local tree species are generally slow-growing and regeneration is poor, often as a result of natural or anthropogenic factors. Some species such as Kiaat *(Pterocarpus angolensis)* go through growth stages, where they die back to below ground level and only resprout when conditions are favourable for their growth. The dying back usually happens as a result of frequent fires. Low seedling numbers have been recorded for species such as Mangetti *(Schinziophyton rautanenii)* and Kiaat *(Pterocarpus angolensis)*.

Table 1: Summary of average structural measurements for vegetation in north-eastern Namibia (De Cauwer et al., 2018)

Vegetation structure in the northeastern woodlands	
Average stem DBH (cm)	29.9
Maximum DBH (cm)	52.8
Average tree height (m)	12.0
Basal area (m2/ha)	5.6
Leaf size/ type	Broad leaf

DBH = Diameter at Breast Height

THREATS TO VEGETATION TYPES

Local vegetation is threatened by various natural and anthropogenic factors. Most threats are generic, but some are specific to certain species or habitats.

Table 4: The major threats to vegetation in Namibia

Threats to vegetation in Namibia	
Frequent fire occurrence in the late dry season	A major threat to vegetation in the north-east, it impacts regeneration, reduces the quality of timber stems, and influences the general vegetation structure.
Overharvesting of timber	A major threat in the north-east considering the increased demand for timber. Other resources, such as Devil's claw, are also overharvested.
Drought and erratic rainfall	Long drought periods, such as occurred over large portions of Namibia from 2013 to 2020, have a major impact on vegetation across the country.
Illegal plant trade	A threat in the southern part of Namibia. Succulents are illegally harvested and sold on the black market because of their unique appeal.
Alien invasive species	A threat along most of the ephemeral and perennial rivers of the country, with species such as Wild tobacco, Datura species, Mexican poppy, and Prosopis causing invasions. The central and northern parts of the country are invaded mostly by Prickly pear *(Opuntia species)*.
Grazing and browsing pressure	A threat in many parts of the country, browsers target tree seedlings and other small plants, stunting their growth or killing them.
Climate change	Namibia's dry climate is vulnerable to the impacts of climate change, which is projected to increase the unpredictability of rainy seasons. This major threat to the vegetation of the country is predicted to reduce the range of deciduous broad-leaved species.
Habitat destruction and fragmentation	A problem for riparian forests, mainly due to land clearing for agricultural purposes.

ADDRESSING THE THREATS TO VEGETATION

The threats to vegetation can be reduced through some of the following approaches:

- Quantifying the resources through inventories and identifying all possible threats, followed by development of species management plans, as all species and habitats are different.
- Developing and implementing, for different vegetation types, relevant fire management plans that cover season, frequency, and intensity of burning.
- Ensuring the removal of alien invasive species in areas with such infestations.
- Tightening control measures around resource utilisation and enforcing regulations on harvesting of forest resources. Further, ensuring that law enforcement personnel are aware of the types of resources they need to regulate.
- Developing control methods for grazing, such as rotational grazing of livestock, and ensuring that livestock and wildlife numbers are within the carrying capacity of the area.
- Conducting research to explore plant growth thresholds in response to changing climatic conditions, and using these to grow climate adapted plants, especially the ones with high ecosystem values.

Despite the aridity of the country, there is a wide variety of plant species in different vegetation zones. Although these are threatened by several factors, there is potential for the forestry sector to advance and become more beneficial to local communitities by ensuring good management and use of forest resources.

GLOSSARY

Anthropogenic:
Processes, impacts, or outcomes that result from human activities.

Carrying capacity:
The average population size of a species within a certain habitat that can be sustained by the resources of that habitat.

In Situ:
In the wild or original place of occurrence.

Endemic species:
Any species that occurs only within a certain geographical area.

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