



**THINK NAMIBIA**  
Sustainable Forest  
Management

## FACT SHEET ON:

# Afforestation and Reforestation

*The purpose of this fact sheet is to share information on Namibia's forests, why afforestation and reforestation are important in Namibia, and how you can do your own afforestation project, no matter how small.*

## INTRODUCTION

Most forests in Namibia are the so-called dry forests – open forests with few trees and shrubs, and often a lot of grass. Because of Namibia's predominantly dry climate, dense tropical forests are rare in the country. They are usually found in comparatively small areas along riverbanks or in remote locations in the Northern regions.

The most forested regions of Namibia are in the Zambezi and the two Kavango Regions. The Zambezi Region receives between 600 and 700 mm of annual rainfall and has an average of 87 trees per hectare. In the Kavango East and West Regions, where the bulk of the forests are situated on deep Kalahari sands, and where average rainfall is about 500 to 600 mm, estimates are at 125 trees per hectare. Only nine tree species make up approximately 90% of the biomass of forests in Kavango and they are mainly canopy species (trees that can reach heights of 8 to 15 m). Three of the canopy species are harvested for their high-quality timber. The most commonly used timber species in Namibia is Kiaat or Dolf (*Pterocarpus angolensis*), also named Mukwa, Umbila, or Muninga.

The main reason for deforestation in Namibia is the clearing of land for agricultural purposes. Another reason is the frequency of wildfires in the late dry season; these are much hotter fires than those in the early dry season, and can affect large trees. The harvesting of timber rarely amounts to deforestation in Namibia but can cause forest degradation.

## WHAT IS AFFORESTATION AND REFORESTATION?

Afforestation and reforestation both have a common goal, which is to plant enough trees in an area to call it a forest. The FAO defines a forest as "land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha".

But there is a slight difference in that afforestation is the planting of trees where there have never been trees before, while reforestation is the planting of new trees in areas where most trees have been felled.

## WHY IS AFFORESTATION IMPORTANT?

The forest areas of Namibia are on the decline. With population growth requiring more agricultural land and timber for construction, and uncontrolled commercial exploitation of species for export such as Zambezi Teak (*Baikiaea plurijuga*), Rosewood (*Guibourtia coleosperma*), and Kiaat (*Pterocarpus angolensis*), the remaining forests are in severe danger. Additionally, climate change is an increasing concern in Namibia, as well as the rest of the world, with a drier and warmer climate affecting forest health and on the other hand increasing the importance of maintaining forests as carbon sinks.

## WHAT ARE THE ADVANTAGES OF AFFORESTATION?

(AND IN SOME CASES FOR REFORESTATION AS WELL)

- It delivers a constant supply of forest products, providing the community with fodder, fruits, firewood, and other valuable resources necessary for humans. 71% of Namibia's rural communities are dependent on non-timber forest products (NTFPs) for their diverse livelihoods.
- It prevents soil erosion because trees act as wind barriers, thereby weakening the force of the wind and reducing its impact and ability to carry large soil particles. Tree roots also hold the soil together tightly, making sure that the soil stays in place during flooding.
- Trees help to improve soil health; fallen leaf litter creates new organic matter in the soil, an important element of new topsoil creation. Additionally, the shade created by trees helps to moderate soil temperatures.
- It stabilises the climate since trees reduce the greenhouse effect, limiting warmer temperatures, as they are the world's only natural air conditioners. Forests provide multiple water and climate-related services including precipitation recycling, cooling, water purification, infiltration, and groundwater recharge.
- It has the potential of mitigating global warming and climate change. Trees help reverse the greenhouse effect through the process of photosynthesis as they act as carbon sinks. In other words, establishing new forests creates new carbon dioxide holding areas.
- It contributes to the preservation of wildlife. When forests diminish, the wildlife also diminishes. Afforestation helps to ensure that there are enough forests for wildlife to thrive in. Those animals pushed from their natural habitats by human activities can relocate to the new forests. For this reason, afforestation can aid in protecting wild animals.
- They are the first step towards healing the drylands and protecting them from desertification and drought. Deforestation and the resultant desertification adversely affect the productivity of the land, human and livestock health, and economic activities such as ecotourism.
- Forests serve as natural sponges, collecting and filtering rainfall and releasing it slowly into streams and rivers, and are the most effective land cover for maintenance of water quality.

# IDENTIFICATION OF SITES SUITABLE FOR AFFORESTATION

The life cycle of trees is very long; it may take more than a hundred years to replace a large tree once harvested. It is therefore very important that the right location is used, which is why the process of afforestation begins with site selection. Several environmental factors of the site will determine forest suitability, including climate, soil, vegetation, and human activity. These factors will also determine what species of tree should be planted and what planting method should be used.

## Site investigation

The more information you have available about the site conditions, the better are the chances of selecting the tree and shrub species best suited to the area. Make notes of the following during your site investigation:

- **Climate:** Temperature, rainfall, relative humidity, and wind. The following website is very helpful in collecting the data [www.climate-data.org](http://www.climate-data.org)
- **Soil:** Determine the soil type. Below is an easy Jar Test method to use.

- ① Use straight edged, clear jar
- ② Fill jar 1/3 full of soil to be tested
- ③ Fill remainder of the jar with clean water, but leave some space at the top
- ④ Shake until all solids are suspended in water
- ⑤ Place on shelf and wait 24 hrs
- ⑥ If cloudy, then wait another 24 hrs
- ⑦ After 48 hrs. layers should appear: Sand on bottom, silt in middle, clay on top
- ⑧ Measure layers in proportion to each other
- ⑨ Use chart to determine soil type based on proportions of sand, silt, clay in layers

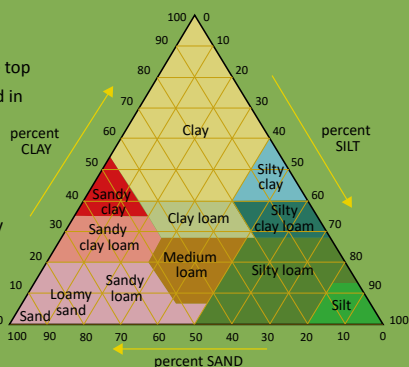


Figure 1: Determine soil type using Jar test (<http://greengardensgroup.com/how-site-evaluation-whats-my-soil-type>)

- **Topography:** Soil fertility is higher in low lying areas than on ridges.
- **Water table levels:** A knowledge of the depth and variation of the water table levels in the area can be valuable information. If you or a neighboring farm has a borehole, it should give you a good indication of the water table.
- **Other biotic factors:** Past history and present land use (Do domestic livestock graze on the area? This would increase difficulty in establishing new trees and shrubs.)

## Selecting the afforestation site

Often the choice of the planting site is limited to lands which are not suited for agriculture or livestock production.

Once the area has been chosen, the boundaries should be marked with boundary posts, especially so that cattle herders know to keep livestock clear. When there is a danger of trespassing and damage by grazing or browsing animals, a boundary fence should be established. Fencing is costly and therefore should only be erected when other means of protection will not be effective. A boundary fence could also be constructed from felled branches, like a kraal. Another option is to use a tree protector to protect the young trees from browsing mammals. Once a forest plantation is well established and the trees are sufficiently tall, the fences can be removed and re-used at another planting site.



Photo 1: Sausage tree (*Kingelia africana*) in woodland of northern Namibia (Roburq, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons)

## Selection of species

When the best possible information has been collected on the characteristics of the site to be planted, the next step is the selection of the tree or shrub species to plant. The aim is to choose species that are suited to the site, will remain healthy, will produce acceptable growth and yield, and will meet the objectives of the plantation (whether it be fuelwood production, food, etc.).

One has to evaluate local factors which can be important in determining the selection, for example soil and slope.

### INDIGENEOUS TREES THAT CAN BE USED FOR REFORESTATION IN NORTHERN NAMIBIA:

- MARULA (*Sclerocarya birrea*)
- AFRICAN ROSEWOOD (*Guibourtia coleosperma*)
- SAUSAGE TREE (*Kingelia africana*)
- ZAMBEZI TEAK (*Baikiaea plurijuga*)
- JACKALBERRY (*Diospyros mespiliformis*)
- OMUFIMBA (*Dialium engleranum*)
- MONKEY THORN (*Acacia galpinii*)
- VARIABLE COMBRETUM (*Combretum collinum*)

### INDIGENEOUS TREES THAT CAN BE USED FOR REFORESTATION IN AREAS WITH LOWER RAINFALL:

- CAMELTHORN (*Acacia erioloba*)
- RINGWOOD TREE (*Maerua schinzii*)
- WILD OLIVE (*Olea europea*)
- WILD EBONY (*Euclea pseudobenus*)
- AFRICAN WATTLE (*Peltophorum africanum*)
- JACKET PLUM (*Pappea capensis*)

# HOW TO DO AFFORESTATION/ REFORESTATION

Preparation of the planting site should be done in advance to ensure that planting can proceed without delay when the seedlings arrive.

Important objectives to bear in mind while doing the site preparation:



Remove the competing vegetation near where the trees will be planted.



Create conditions that will enable the soil to catch and absorb as much rainfall as possible. Surface runoff should be reduced to increase the moisture in the soil. For example, make sure the soil remains covered further away from the trees.



Provide good rooting conditions for the planting, including a sufficient volume of rootable soil. Hardpans must be eliminated.



Create conditions where danger from fire and pests, like small mammals and rodents, is minimised.



Photo 2: Tree protector (Credit: W. Hager/Shutterstock.com)

Once site preparation is done, planting can start. Most often, this is done with pre-grown seedlings. Plants can be bought at a nursery or you can grow them yourself from seeds you collect. If you collect seeds, you should collect them from healthy individuals that are genetically superior; for example, a fruit tree with big and very nice tasting fruits, or a timber tree with a very straight and long stem. Seed pretreatment can improve germination; for example, soaking *Strychnos cocculoides* seed (Monkey orange) in water overnight increases the germination rate. The germination rate of *Dialium englerianum* (Kalahari podberry) can increase by 68% with nicking and soaking in water.

Studies have shown that tree regeneration by direct seeding is a promising method for enriching the natural dry woodlands of Namibia. Seeds need to be covered by soil to ensure both good germination and the survival rate of seedlings.

## Further practical advice for planting:



Seedling protection against small mammals is essential when planting seedlings pre-grown in a nursery.



Time for planting or seeding generally coincides with the rainy season, usually when the soil is wet to a specified depth (approximately 20 cm). Otherwise continuous watering is needed during the first months after seeding.

There are several modern tree growing boxes on the market that makes tree planting easier and survival rates better, especially when it comes to planting in the dry season. As an example have a look at [www.groasis.com](http://www.groasis.com)

## CONCLUSION

Deforestation and land degradation in Namibia are leading to the loss of ecosystems, goods, and services for livelihoods and further economic development.

Afforestation can be a positive effort in curbing the over-use and destruction of natural forests. If it is done with proper planning and at relevant sites, and with the hardy indigenous species of Namibia, it can become a commercially and socio-economically viable solution for many human needs without harming the balance of nature.

Although planting of pre-grown seedlings is the most common method used for afforestation and reforestation, direct seeding of woody species is a promising propagation method if the seeds are covered by soil.

## GLOSSARY

### **Afforestation:**

The process of planting large numbers of trees on land which has few or no trees on it.

### **Biotic:**

A living component of an ecosystem; for example organisms, such as plants and animals.

### **Carbon sink:**

A forest, ocean, or other natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere.

### **Climate change:**

The global phenomenon of climate transformation characterised by the changes in the usual climate of the planet that are especially caused by human activities.

### **Community forestry:**

Any situation which intimately involves local people in a forestry activity.

### **Deforestation:**

The action of clearing a wide area of trees.

### **Dry forest:**

A type of forest characterised by relatively sparse distributions of drought-resistant species growing in scrub woodland or savanna.

### **Hardpan:**

A hardened layer, typically of clay, occurring in or below the soil and impairing drainage and plant growth.

### **Nicking:**

The process of opening the seed coat, or seed “jacket”, prior to planting seeds.

### **Reforestation:**

The natural or intentional restocking of existing forests and woodlands.

### **Topography:**

The arrangement of the natural and artificial physical features of an area.

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