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Indigenous Tree Planting Manual

PELUM ASSOCIATION
SWAZILAND

Supporting ecological land use management in Swaziland

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CHAPTER 1: INTRODUCTION

1.1 Why plant indigenous Trees

The 2030 Sustainable Development Goal 15 is set to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.” The national forest policy encourages forest rehabilitation throughout the country. Tree planting is an important activity and calls for the involvement of citizens, particularly rural people, who, in turn, require additional tree planting techniques.

When native plants are propagated, they help local wildlife live and thrive. Animals like birds and butterflies have looked to native plants for millennia for food and shelter. When there are not enough native trees around, these populations can quickly decline. That’s why native trees are important—they help support our local ecosystems. Ecologically, trees perform many functions that help people and animals such as absorbing airborne pollutants, reducing soil erosion and providing food and shelter for many forms of wildlife as well as people. Anthropogenic activities such as urbanisation and over harvesting for medicinal and fire fuel wood has reduced tree densities and threatened some species.

The National Biodiversity Strategy Action Plan (NBSAP 2) has targets of retaining native genetic pools. Nationwide, the government of Eswatini (especially the department of forestry), NGOs, companies and individuals have realised the importance of reintroducing indigenous tree species into the environment and have undertaken several tree-planting activities. This training manual is aimed at providing a standard guideline for planting indigenous trees. Here are some reasons you should plant indigenous trees in your community or area:

- Climate change mitigation
- Reintroducing threatened species
- Create awareness on importance of biodiversity
- Helps to re-establish the original eco-system of the region

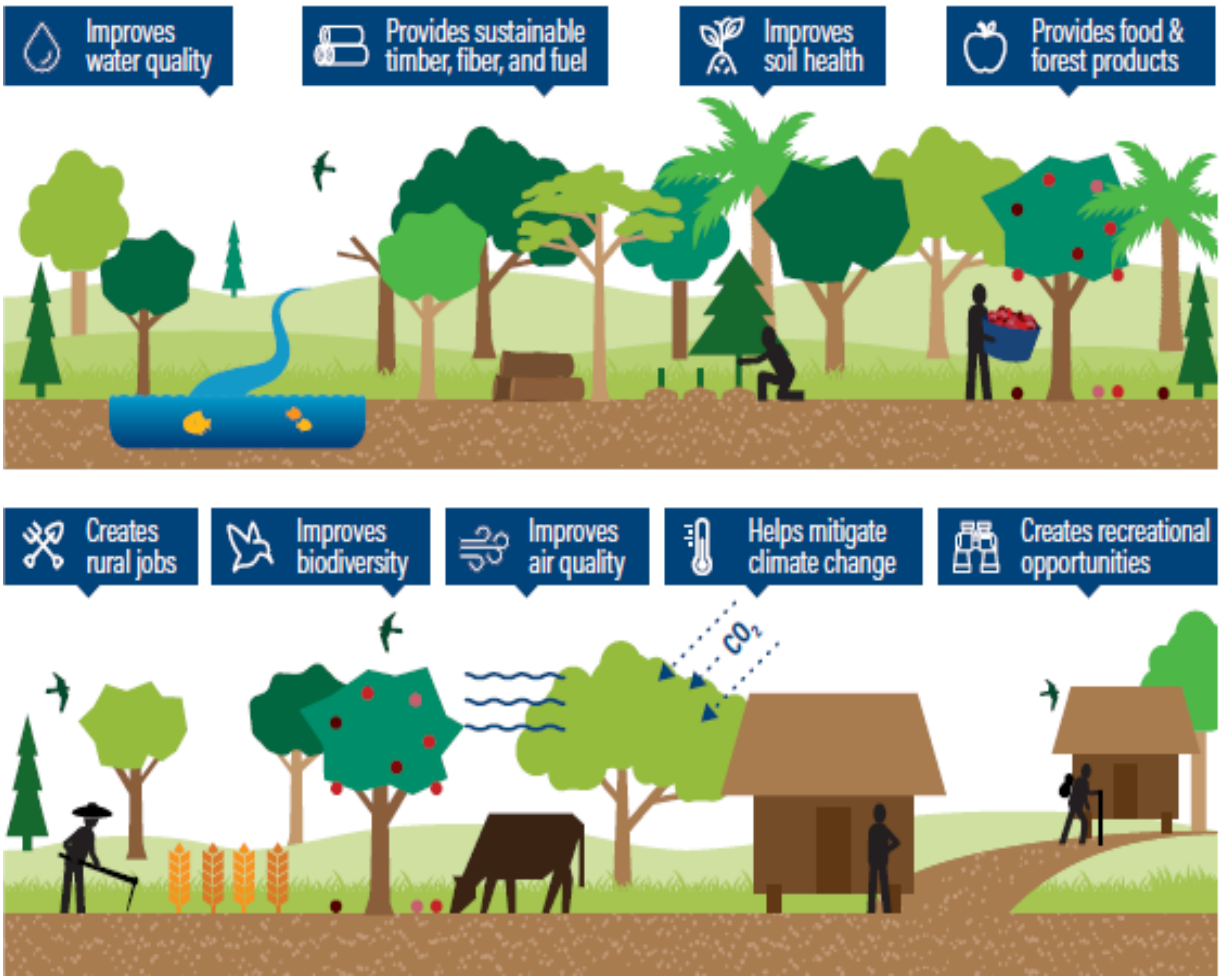


Figure 1: The importance of indigenous trees in the environment

1.2 Advantages of Tree Planting

Native tree species have properties such as maintaining water sources (Syzigium spp), upgrading soil quality, prevention of soil erosion, improving climate, supplying construction timber and wood energy, providing shelter for livestock, and furthermore, for social advantages, cultural and traditional conservation and for beautifying the landscape.

CHAPTER 2: PLANNING FARMERS' TREE PLANTING

2.1 Forest Land Situation Analysis

An Ecologist and the communities that want to plant trees shall discuss and determine the requirements and problems of local forest communities such as their utilisation, possible forest rehabilitation opportunities, determine quantities based on the amount of available land for planting trees and profile the tree species growing in the forest community.

Figure 2: Flora assessment at planning stage

During the planning session, members of communities interested in tree planting can discuss the following issues:

- ✓ Identify areas for reforestation and determine their advantages.
- ✓ Select appropriate tree species according to the situation, capacity and requirements of environment.
- ✓ Specific evaluation of the number of seedlings that can be planted.
- ✓ Ways to successfully achieve reforestation plans.

2.2 Species Selection

The first step in preparing for your tree planting exercise is to conduct species selection. It is important to choose plants which are characteristic of your site,

therefore it is a prerequisite to check what naturally grows there. Trees adapted to the planting site are more likely to survive and thrive in that environment. Use the following criteria to select tree species according to climatic zones in the country.

1. **The local ecology:** Is natural regeneration already taking place? If so, this may be preferable for wildlife. Copy nature by planting trees already successful on or near the site. Meaning that, for a rural site, choose species that exist in the forest community.
2. **Physical Environment:** The aspect (or direction the slope of the land faces) plays an important role in site conditions. North or east aspects are cooler, moister, and shadier than south or west aspects. Certain tree species tolerate more shade than others, while others require full sun for growth.
3. **Annual precipitation and occurrence:** Annual precipitation amounts and their distribution are important. In the case of wet sites, there is a need to plan on using wet site species. The same hold true for a dry site, where species adapted to drought have a much greater chance for survival.
4. **Insect and disease problems:** Tree vigour and species diversity are effective deterrents to most insect and disease problems.
5. **Desired Function of the Trees:** The intended use of the tree planting is a very important consideration. If you plant a windbreak, you want different species than if planning a reforestation project or a high-value hardwood plantation.

Table 1: Native Tree Species ecological adaptation in Eswatini

Tree Species	Preferred Climatic Zone	Suitable locations
1. Acacia xanthophloea (uMkhanyakudze)	Lowveld	Along rivers, swamps and pans (e.g. along Usuthu River at KaNgcamphalala Chiefdom)
2. Afzelia quazensis (Umkholikholi)	Bushveld and woodland	On sandy soils, on deep sand, in sand forest and woodland (e.g. below the Lebombo mountains)
3. Albizia adianthifolia (Sivangatane)	Moist bushveld and woodland	In forest, wooded grassland and forest margins (e.g. Jilobi forest)
4. Aloe arborescens (Imbovane)	Highveld	Rocky slopes and cliffs (e.g. Lushikishini)
5. Aloe marlothii (Inhlaba)	Highveld and Middleveld	Rocky hills (e.g. Dlangeni and Ntondozi)
6. Antidesma venosum (Umhlala-mahululu)	Lowveld and Lebombo mountains	Forest margins and wooded grassland (e.g. Mambane and Mvembili)
7. Berchemia zeyheri (Umneyi)	Lowveld and Middleveld	On river banks, in open bushveld and on rocky ridges (e.g. Sithobelweni)

8. Bauhinia galpinii (Lusololo)	Middleveld and Lebombo mountains	On river banks, in open bushveld and on rocky ridges (e.g. Sithobelweni)
9. Bolusanthus speciosus (Umhhohlo)	Middleveld and Lowveld	Clay soils in the bushveld (e.g. Sigwe, KaKholwane)
10. Breonadia salicina (Umhlume)	Middleveld and Lowveld	Riverine forest and along watercourses (e.g. along Mlumati River)
11. Bridelia micrantha (Umnwangase)	Lowveld Sourveld	Along rivers and streams (e.g. Mahhoshe)
12. Cussonia spp. (Umsenge)	Occurring in all climatic zones of the country	In a wide variety of habitats: bushveld, rocky outcrops, hillsides, forest and forest margins (e.g. Bulembu, Herefords, Sinceni, Hlathikhulu, etc.)
13. Dais cotinifolia (Intfocwane)	Middleveld	Along rivers, at forest margins and in riverine thickets (e.g. Velezizweni)
14. Dombeya rotundifolia (Nhliziyo)	Middleveld, Lowveld and Lebombo mountains	Wide variety of veld types. Rocky hillsides and grassland (e.g. Maphungwane, Velezizweni, Meleti, etc)
15. Encephalartos spp. or Cycads (Gebeleweni)	Highveld, Lowveld and Lebombo mountains	In a wide range of locations which include sheltered valleys, rocky slopes, cliffs, rocky grassland, mountain peaks (e.g. Lebombo mountains, Nkomati valley, etc.)
16. Ekebergia capensis (Umnyamatsi)v	Wet Middleveld and Highveld	Afromontane, riverine forest and on well-drained soils with high rainfall (e.g. Mkhitsini, Mvembili, etc.)
17. Englerophytum magalismontanum (Umnumbela)	Wet Middleveld and Highveld	In forest, on rocky oucrops and ridges in grassland and in interior of forests (e.g.Malanti, Mdzimba mountains)
18. Erythrophleum lasianthum (Umkhanku, Umhlahle)	Lowveld	Sand forest (e.g. Mambane, Gamula)
19. Faurea macnaughtonii (Sisefo or Sicalaba)	Highveld	Afromontane forest (e.g. Bhunya)
20. Gardenia volkensii (Umvalasangweni)	Middleveld and Lowveld	Sandy soils and rocky hills (e.g.) Mafutseni, Kakholwane)
21. Halleria lucida (Umbinta)	Highveld and Wet Middleveld	In forest and forest margins, rock outcrops (e.g. Dlangeni)
22. Harpephylum caffrum (Umgwenya)	Middleveld and along the escarpment (Lebombo mountain)	Forest and forest margins (Jilobi forest)
23. Kigelia africana (Umvongotsi)	Lowveld	Along watercourses or in rocky hilly areas (e.g. Madlangempisi)
24. Lannea discolour (Siganganyane)	Middleveld	On rocky, wooded hillsides, riverine thickets and in dry, open bushveld (e.g.Mvembili)
25. Olea capensis subsp. macrocarpa (Umncume)	Wet Middleveld	In forest and Afromontane forest (e.g. Mdumezulu)
26. Ozoroa engleri (Imfuce lemhlophe)	Lowveld	On sandy or rocky soils in open bushveld (e.g. Egamula in the Lubombo region)
27. Pachypodium saundersii (Ligubaguba)	Lowveld and Lebombo mountain)	Among rocks in dry, low-lying bushveld and wooded rocky ridges (e.g. Mhlumeni and areas near Big-Bend)
28. Podocarpus latifolius (Umsontsi)	Wet Middleveld	Afromontane forest and bush clumps on rocky outcrops (e.g. Elangeni, LaMgabhi, etc.)
29. Prunus africana (Undumezulu)	Wet Middleveld and the Mist belt	In Afromontane forest and on forest margins (e.g. KaPhunga and Mahhoshe)
30. Pterocarpus angolensis (Umvangati)	Lowveld and Middleveld	Well-drained soils in grassland and open bushveld (e.g. Maguga area, Nyakatfo, etc)

31. Schotia brachypetala (Vovovo or Sihlazi)	Lowveld and Dry Middleveld	Bushveld and along river banks (e.g. Mafutseni)
32. Sclerocarya birrea (Umganu)	Lowveld and Middleveld	In open bushveld, on rocky outcrops and in riverine forest (e.g. Mvembili, KaKholwane, etc.)
33. Strychnos madagascariensis (Umkhwakhwa)	Middleveld and Lowveld	In open bushveld, on rocky outcrops and in riverine forest (e.g. Mvembili, KaKholwane, etc.)
34. Strychnos spinose (Umhlala)	Middleveld and Lowveld	Sandy or rocky areas and on river banks (e.g. Mayiwane, Mvembili, Velezizweni)
35. Syzygium cordatum (Umcozi)	Highveld and Middleveld	Along streams and rivers in mountain grassland, riverine forest or bushveld (e.g. Kutsimuleni, Pine Valley in Mbabane, etc.)
36. Syzygium guineese (Umcozi, Umdoniwamanzi)	Middleveld	In open hilly bushveld or tall riverine vegetation (e.g. Zombodze, Shewula mountain slopes)
37. Trichilia emetica (Umkhuhlu)	Middleveld and Lowveld	On alluvial soils along rivers and in Bushveld (e.g. Mvembili)
38. Warburgia salutaris (Sibhaha)	Middleveld	On rocky hillsides and in dry thickets, in wet forests (e.g. Bulunga hills, KaPhunga)

CHAPTER 3: SITE PREPARATION

3.1 Planting Guide

Site preparation is the process that facilitates readiness for planting of seedlings and for the control of any present challenges that would inhibit seedling establishment. The planting site can be prepared by removing weeds, manually using a digging spade/shovel.

a) Skim any grass or weeds

Remove the top soil of the planting site using a spade. Put top soil in a different heap to the lower soils dug from the planting hole.

b) Prepare the planting hole

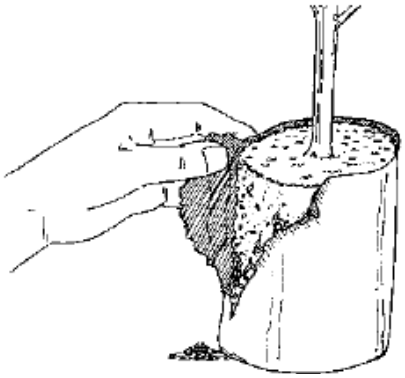
The hole should be larger than the plant container at least 3-4 times. Once the hole is large enough, loosen the soil on the sides and in the bottom of the hole, to allow the plant's roots to penetrate the soil more easily. The hole should be deep enough so

that the collar (base of the stem where the roots start) is lightly below ground level (1cm) on most sites, and slightly above (1-2cm) on wet or saturated sites.

Separate sub soil from top soil for use when planting and hole dimensions should be as follows:

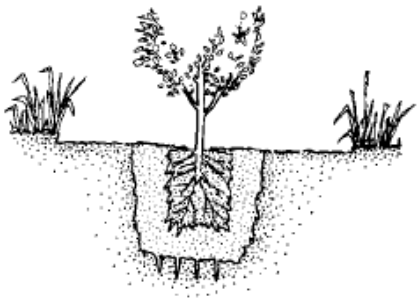
- ✓ Small trees - 25cm x 25cm x 25cm
- ✓ Medium trees - 45cm x 45cm x 45cm
- ✓ Large trees - 50cm x 50cm x 45cm

c) Plant removal from pot/bag



Remove plastic bag or root trainer and make sure roots retain as much as possible growth medium around them. Gently tease root bound plants to avoid slow growth and establishment.

d) Place plant in the hole



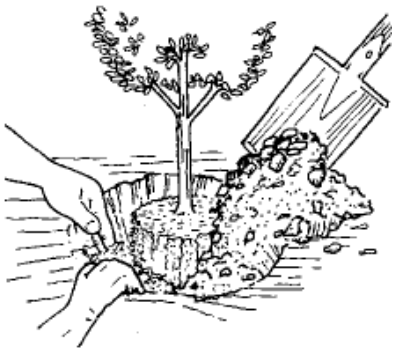
Make sure the stem is the correct depth in relation to the adjacent soil surface. Apply bio-fertiliser or animal manure and the topsoil before placing the plant in the hole. Mix the bio-fertiliser with the loose soil in the bottom of the hole. Quantities of bio-fertiliser/ kraal manure:

- ✓ ***Small trees:*** 1kg/half spade full/2 handfuls
- ✓ ***Medium trees:*** 1kg/half spade full/2 handfuls
- ✓ ***Large trees:*** 1kg/half spade full/2 handfuls

Apply stock absorber: Absorber is beneficial in tree planting especially in areas where water is a scarce commodity. It helps to increase the survival rate and healthy growth of trees through continuous availability of water and nutrient in the root zone.

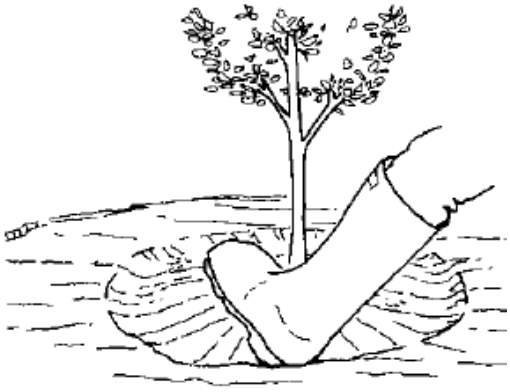
- ✓ Each plant requires 5g stock absorber
- ✓ 150g solution made from 50 litres of water
- ✓ 2.5kg required for 500 trees.
- ✓ Stir water solution for 3-5 min then pour 1 litre.in the planting hole

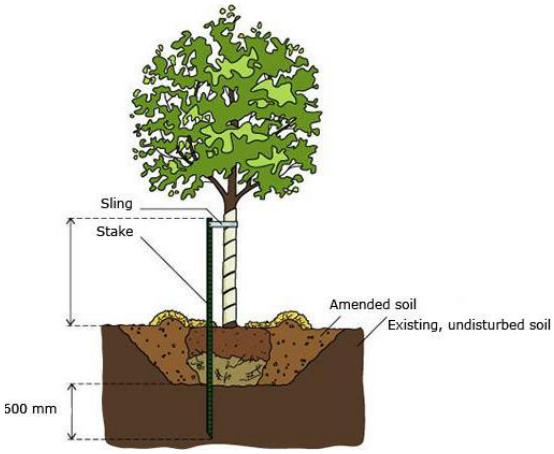
e) Gradually add soil into the hole



Firm soil around the roots, firming each layer with your hands to minimise roots damage. Sides of the hole must be loosened to avoid j-rooting and the seedling must be placed up-right to avoid bending of the root system.

Firm the soil well after the hole is filled using a boot heel, to create a slight depression to catch any rain or water run-off.





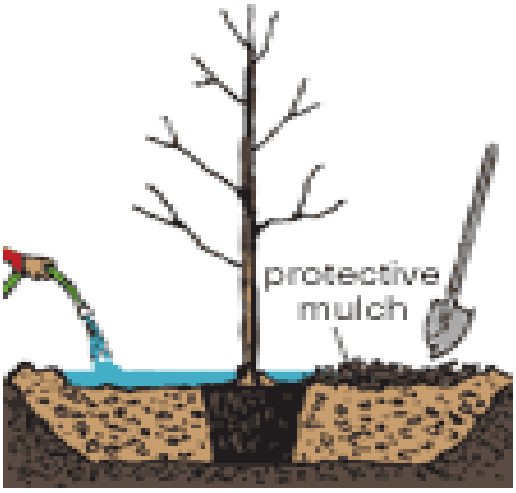
f) Inserting a stake

Seedlings with heights above 1 m require stakes to support them upright and prevent trees from bending when livestock pass by to avoid them from breaking. Don't use wire to secure the stake, because it can cut into the tree trunk. The stakes should be placed outside of the root ball. Plan to remove stakes

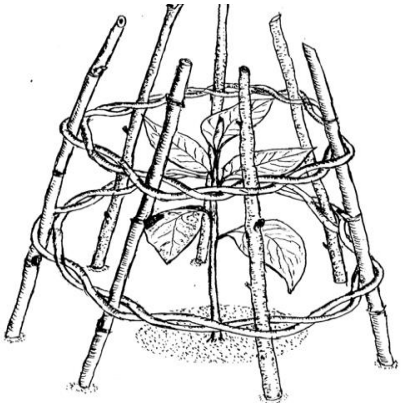
as soon as the tree can support itself, in 6 to 12 months.

g) Watering & Mulching

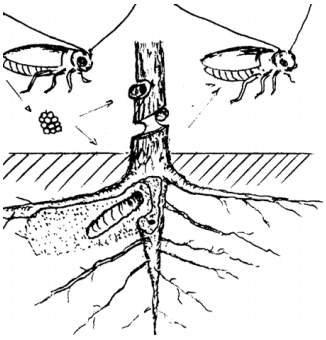
Create a water-holding basin around the hole and give the tree a good watering. After the water has soaked in, spread protective mulch about 5cm deep in the water holding basin but not touching the base of the tree and not touching the trunk. The mulch will help the soil around the tree to retain water more efficiently.



h) Protection from animals

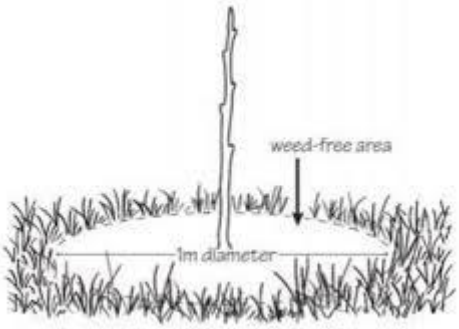


Try to use locally available materials that are biodegradable such as small poles, bamboo, etc to make protective frames for the seedlings



i) Protection from pests

Umsutane, garlic, ash, and other bio-pesticides can control pests in newly planted trees.



j) Weeding

Clearing grasses around newly planted trees is important for minimising competition for water and nutrients between tree roots and other vegetation such as grass and weeds.

- ✓ Clear vegetation in 1 m radius.
- ✓ Mulch to suppress weeds.

CHAPTER 4: CONCLUSION REMARKS

4.1 Notes for Experts

If you are restoring an isolated site, which is away from existing natural areas and potential seed sources, or has been significantly degraded through stock trampling and wind damage, the planting of under-storey species may be required. This additional planting can be particularly important on the edges, where light gaps encourage weed growth and strong winds can have adverse effects.

4.2 Plant Species Re-introductions

Restoration planting using a broad selection of the recommended plants in this manual should eventually attract and provide habitat for a range of common forest birds, particularly if the site is near existing bush. Forest birds need year-round food supplies and low predator numbers during nesting. Reptiles and invertebrates also thrive in forest fragments with low pest numbers and plenty of moist soil, rotting logs, and thick leaf litter. This provides habitat immediately, which would otherwise take many years to develop.

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