

**MINISTRY OF ENVIROMENT AND TOURISM
DIRECTORATE OF FORESTRY**

VERSION 1

**FOREST MANAGEMENT PLAN FOR THE INOMBUWALEKA
COMMUNITY FOREST**

E. Amadhila, A. Aushona

Eenhana, March 2003

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Executive summary

1. Introduction

The Inombuwaleka community forest was identified with the assistance of the Oukwanyama Traditional Authority in January 1998. The Oukwanyama Traditional Authority selected this area as a community grazing area and as such the forest vegetation will be maintained and not used as a settlement area. Inombuwaleka community falls under the jurisdiction of the Oukwanyama Traditional Authority. This is in line with the Forest bill of 1998.

Inombuwaleka Community Forest belongs to the people living in and around the Community Forest area. There are seven villages namely; Oshihepo, ;Ekolola, ; Ohandiba, 67; Oheti, ; Eengonyo, 89; Omutwewondjamba, and Okwayoufuko, homesteads. In each village there is an average of persons per homestead.

The management period is from November 2002 to September 2012. The management plan will have a relatively short planning horizon (10 years) so that the community will be able to better respond to any changes. The Forest Management Committee for the Community Forest will monitor the progress.

The following institutions are engaged in different activities in and around the Inombuwaleka community forest: Ministry of Local Government and Housing, through the Councilor for Eenhana Constituency for facilitation role in the general development of the area. Ministry of Agriculture, Water and Rural Development, provides extension services to the Inombuwaleka community. Ministry of Women and Children Affairs, through the Ondangwa Community Development center, supports community projects such as kindergarten within the community forest area.

The participatory resource assessment was conducted in the Inombuwaleka community forest area in April 2001. In July 2002, forest inventory of 719 ha out of 8100 ha carried out at Inombuwaleka Community Forest.

The Directorate of Forestry will assist with technical advice toward the implementation of the management plan.

The overall management objective of Inombuwaleka community forest is to conserve the forest, so that people continue to derive products and services.

2. Ownership and the management of the area

Inombuwaleka Community Forest belongs to the people living in and around the Community Forest area. There are three villages namely; Oshihepo, ;Ekolola, ; Ohandiba, 67; Oheti, ; Eengonyo, 89; Omutwewondjamba, and Okwayoufuko, homesteads. In each village there is an average of persons per homestead.

The Forest Management Committee consists of 12 members composed of 5 women and seven men; chairperson and deputy, secretary and deputy, treasurer and deputy, 6 advisors. There are sub-committee in each of the three villages to take care of other projects that are undertaken within the community forest such as selling of firewood and carving.

3. General description of the area

3.1 Location

Inombuwaleka Community Forest is located 17°27'55"S and 16°20'35"E, 4 km north of Eenhana Town, in the Ondobe and Omundaungilo constituencies, Eenhana district in Ohangwena Region (see figure 1).

Figure 1. Map showing the location of Inombuwaleka Community Forest

3.2 Physiography (geology, climate, soils)

3.2.1 Geology

Geologically the area is covered by unconsolidated Kalahari sand. The area is generally a very gently undulating plain, with slightly elevated dunes (uplands) and depressions (valleys). The larger area is characterized by a dense oshana network originating in the Encoco highlands in Angola, shallow clay pans and small pools (ondombe). The oshanas, clay pans and ondombe usually start filling with rainwater in December, and the oshanas usually are completely dry by July-August. The deepest parts of the oshana channel have compact, saline soils, and are usually without vegetation, but the banks are often lined with trees (Mendelsohn et al., 2002).

3.2.1 Soil

The Oshaampula Community Forest is generally a slightly elevated terrace with an oshana to its west to northwest, and a number of clay pans and oondombe. Deep Kalahari sands dominates the area. The soils in the scattered clay pans, interdune valleys and fossil drainage channels with clay sands and therefore favoured for crop production. The oshanas, clay pans and oondombe usually start filling with rainwater in December, and the oshanas usually are completely dry by July-August. The alluvial soils, especially the side slopes of the elevated terraces, support large fruit trees, and provide a relatively high potential for rain-fed agriculture. The cultivated fields and homesteads are commonly found in the lower part of the uplands above the compact valley soils.

3.2.2 Rainfall

An average rainfall is about 390 mm per annum [see figure 2). North central Namibia has two seasons: the dry season lasting from May to October; and 'rainy' season with occasional rainfall between November and April.

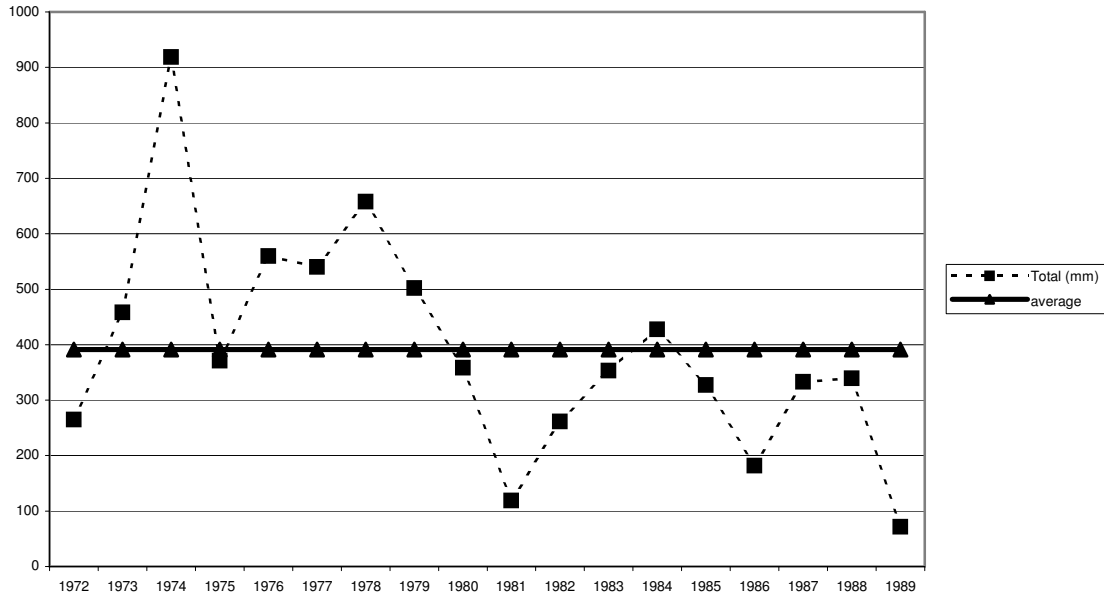


Figure 2. Total annual rainfall for Ondangwa (Source: Namibia Meteorological Service, 2003)

The average rainfall sitting around 400 mm per year. After 1990 the total annual rainfall is below the average (See fig.2).

3.2.3 Temperature

The monthly mean temperature at Ondangwa ranges from 26°C in November to 16°C in July. The coolest period is July to August with night temperatures as low as 7°C and day temperatures as high as 27°C or more. Frosts is rare. The hottest period is from October to December, and maximum day temperature may reach 40°C. Evaporation is very high throughout the year but is extreme during the months of the first rains.

4. Forest resources

4.1 Inventory results

Only a brief summary of inventory results are given here.

4.2 Trees

The inventory covered only 719 ha of the total area. A number of 18 species were identified during inventory with a total number of 218 stems ha⁻¹. The most frequent species is *Combretum collinum* with 104 stems ha⁻¹, *Terminalia sericea* with 50 and *Dichrostachys cinerea (setulosa)* with 13 stems ha⁻¹, and *Burkea africana* 8 stems ha⁻¹. There are three species of which only one specimen could be recorded during inventory i.e. *Baphia massaiensis*, *Commiphora angolensis* and *Lonchocarpus nelsii*.

4.2.1 Live trees

Table 1. Diameter distribution of stems by species, total nr of trees

Species	Number of stems in total area, 1000s						Total
	5-15	15-25	25-35	35-45	45-55	55-65	
<i>Acacia ataxacantha</i>	1						1
<i>Acacia erioloba</i>		1					1
<i>Acacia fleckii</i>	1	1					2
<i>Baikiaea plurijuga</i>	14	4	1	1			20
<i>Baphia massaiensis</i>	2						2
<i>Bauhia petersiana</i>	1						1
<i>Boscia albitrunca</i>	1						1
<i>Burkea africana</i>	8	6	4	1			19
<i>Combretum collinum</i>	31	8	1				40
<i>Combretum psidioides</i>	5						5
<i>Combretum zeyheri</i>	7	1					8
<i>Croton gratissimus</i>	1						1
<i>Dicrostachys cinerea</i>	9	1					10
<i>Erythrophleum africanum</i>	9	4	1				14
<i>Ochna pulchra</i>	18	1					19
<i>Pterocarpus angolensis</i>							2
<i>Terminalia sericea</i>	27	5					32
Total	136	33	9	4	1		183

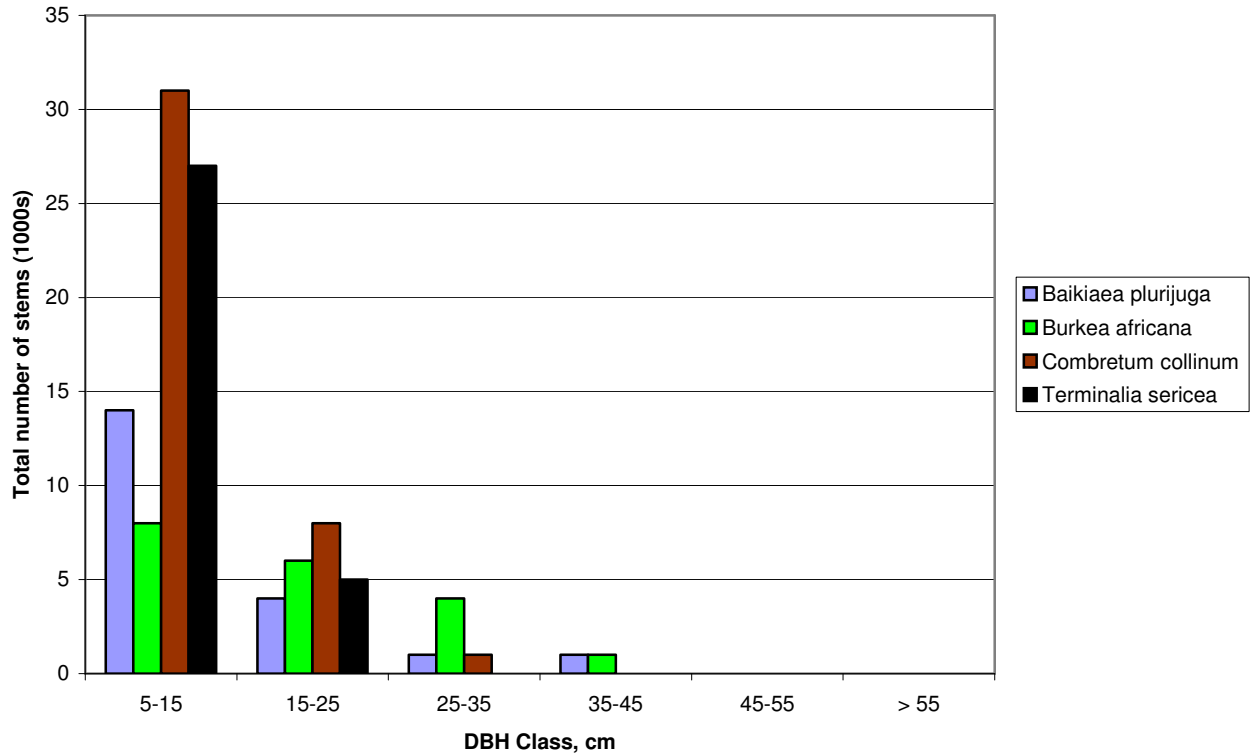


Figure 3. Diameter distribution of stems of the four most frequent tree species

The diameter distribution of the four most frequent species has been illustrated in figure 3. The diameter distribution of combretum is good, however there is a big number of small trees. About 80% of all combretum stems are less than 15 cm at breast height. This gives a potential for harvesting some poles without risking the future of the forest. The distribution of terminalia is not good, even though it has more smaller trees than bigger ones. The distribution of dicrostachys and burkea have less stems than the former two tree species. The possibilities of utilization of trees in the Oshaampula Community Forest are mainly related to *Combretum collinum* and *Terminalia sericea*.

The volume of all tree species is 21 m³ per ha. *Combretum collinum* has got the highest volume of 7.3 m³ per ha. The next highest volume are with burkea and terminalia, 5.6 and 3.1 m³ per ha respectively. The total area volume is 148,000 m³.

4.2.2 Dead trees

The total number of dead trees for all species found in the inventory area were 55 trees per ha and a total of 39,643 trees in the whole area. The most frequent dead trees found are *Terminalia sericea* and *Combretum collinum*. The total dead tree volume is 3,720 m³. About 10% of the dead wood can be harvested annually, for a planning cycle of 10 years. This is equivalent to 3900 dead trees be harvested annually.

4.2.3 Regeneration of trees and shrub layer

A total of 981 tree saplings per hectare were found in Oshaampula inventory area. The regeneration of the common big trees like *Combretum collinum* and *Terminalia sericea* is very good. 7 shrub species were recorded in the inventory area. *Grewia retinervis* (79 shrubs per ha), *Mundulea sericea* (24 shrubs per ha), *Ozoroa schinzii* (24 shrubs per ha), *Rhus tenuinervis* (10 shrubs per ha) and *Vangueria infausta* (5 shrubs per ha).

5. Wildlife

The community has objectives to maintain bio-diversity in the area. However, the Oshaampula Community Forest has only few wildlife and birds. The most common animals are striped pole cat, jackal, yellow mongoose, steenbok, common duiker, ground squirrel, and suricate as well as birds such as red billed francolin, red-crested korhaanor and black-billed korhaan. Due to the fact that the area is very small about 1070 ha surrounded by a large area, whatever is done in the community forest area will not necessarily affect wildlife so much in the area. Therefore, it is proposed that only following management strategies be applied to enhance wildlife resources; installation of water points inside the forest, exclusion of illegal hunting and control of grazing inside the forest.

6. Current utilization of forest resources

According to the Oshaampula Community members, people living in the three villages (Oshaampula, Omahiya and Egolo) are not extracting woody resources from the proposed community forest area. There are 142 households in all three villages adjacent to the Oshaampula Community Forests. The use of fuel wood comes from dead wood and branches. According to the interviews conducted with the community, an average of about 104 poles per households are needed to renovate a house. Every fourth year a house is renovated, which translates into 36 houses. A conservative estimate is made that 2 poles can be obtained from a tree. This implies that about 3,700 poles (1850 trees) are used for renovation annually. Which is below the sustained yields of 6,500 poles (3270 trees) predicted in Geldenhuys (2002). This sustained yield prediction was done on all tree species with significant number of stems. Hence, the number of poles will reduce if only preferred species for the community utilization is considered.

The utilization of fuelwood varies from season to season, and the quantity used is determined by the composition of wood. During summer one headload is used per day per household. Whereas, during winter each household uses two headloads of firewood per day. One headload consists of 17-20 sticks (Geldenhuys et al., 2002). Preferably local communities use, *Terminalia prunoides*, *Dichrostachys cinerea*, and *Combretum collinum* for fuelwood.

A normal family (seven members) consumes one bundle of average 10.5 kg per day of fuel wood (Angula, 2000). This translates in 3800 kg per household per annum (142 households). Their annual consumption is 540 tones of fuel wood. The inventory results

have given about 55 dead trees per hectare and a total of 39,643 dead trees in the inventory area (Kanime, 2002). It is difficult to predict sustained yield for fuel wood because annual deadwood biomass is difficult to determine accurately. Hence, it is cautiously proposed that 10% of total dead trees being harvested for fuel wood annual for the planning cycle of 10 years. This will result in 3900 dead trees being harvested for fuel wood annually.

The information on the quantities of non-woody forest products utilize by the communities is very patchy, though the communities use the resources year round. Therefore, no prediction was made on sustain yields for these products. However, fruits are normally collected for own consumption and income generation. Some of the fruit are used to make dry gin (Ombike). A variety of species are used such as *Vangueria infausta*, *Ziziphus mucronata*, *Grewia flavescens* and many others (Geldenhuys et al., 2002).

Moreover, thatching grass is found mostly at water pans inside the forest area. The thatching grass is readily harvested from June onwards. The availability of thatch grass depends on the rainfall received.

It is increasingly an important issue to define the community forest area. Generally, community members do not utilize resources from the smaller core area (inventoried area). However, they are using resources from the larger area as whole. According Geldenhuys (2002), communities collect forest resources (woody and non-woody) about one kilometer radius around them. Which means in most cases that it is outside the smaller core area. Thus, it is easy to sustainably manage this smaller core area than the larger area as whole. Therefore, it is very important that the DoF staff and Forest Management Committee will come together and address this issue, so that the larger area as whole will be managed sustainably.

7. Forest management objectives

In order to make a feasible plan for resource utilization, objectives for the management was defined. It was clear from the Oshaampula community that they aimed at developing a forest management plan that considers both wood and non-wood products and services. Therefore, the following specific objectives were set with consideration of desired benefits from the forest;

1. To sustainably manage and use forest for grazing of livestock.
2. To conserve trees and plants for medicinal purposes.
3. To protect the forest resources against the wild fires.
4. To maintain the biological diversity in the Forests.
5. To generate an income to the community by selling wood and non-wood products.

8. Sustained yield estimates for woody forest resources

The calculation is based on the growth of the trees and the movement of stems from

smaller diameter classes into bigger diameter classes. The main assumption in the calculation is that the diameter distribution during the ten years period of implementation of the plan will remain constant. This implies that the structure of forest could remain the same in the future too. A mortality rate of 10 % has been used in the calculation. In practice, a portion of these dead trees can be harvested too. However, in the following calculation this has not been taken into account.

According to the inventory report, there are three tree species, *Combretum collinum*, *Terminalia sericea* and *Burkea Africana*, which can be utilized for renovation of homesteads (according to the by-laws no new homesteads could be constructed) and firewood. The sustained yield of these three species are indicated below.

Table 2. Calculation of allowable cut of *Combretum collinum*

Diameter class	# of stems/ha	# of stems/ha after 10 years	Total # of trees in area	Annual allowable cut
15-25	18	28	7248	725
25-35	2	5	1927	193
Total				918

The table 2 shows allowable harvesting of *Combretum collinum*. Estimates indicated that for *Combretum collinum* 900 stems per year, could be harvested in both diameter class 15-25cm and 25-35cm. There are few trees in the diameter class above 35 cm, therefore harvesting should concentrate more on the smaller diameter class to maintain a diversity of age classes.

Table 3. Calculation of allowable cut of *Terminalia sericea*

Diameter class	# of stems/ha	# of stems/ha after 10 years	Total # of trees in area	Annual allowable cut
5-15	44	46	1754	175
15-25	7	13	4285	429
Total				604

The calculation in table 3 results in annual harvesting of *Terminalia sericea* of 600 trees per year in both dbh class.

Table 4. Calculation of allowable cut of *Burkea Africana*

Diameter class	2002 # of stems/ha	2012 # of stems/ha after 10 years	Total # of trees in area	Annual allowable cut
5-15	2	16	10210	1021
35-45	2	2.3	244	24
Total				1045

Table 4 shows that the allowable cut for *Burkea africana* is 1045 stems per year for both diameter classes. There is potential to harvest 2500 stems per annum. The estimate for current use in the area is about 1,800 stems per year.

9. Management Approach

9.1 Grazing

Grazing is based on the availability of grass. Cattle for the community are grazed in the forest throughout the year. Outsiders have to ask permission from the headman to graze livestock in the forest from July to November. Normally the cattle herders are not allowed to set up cattle posts but live with other village members.

9.2 Firewood extraction

The community has realized a potential to sell firewood, due to the abundance of dead wood in the forest. They intend to collect dead wood from the forest and sell, when ever markets are available. Village based committees were established to coordinate the collection and selling of firewood. However this venture is well in progress, the communities are facing problems of transport and the availability of markets. Firewood collection for sale should be managed to ensure sustainable production. If this include live trees in rehabilitating areas of bush encroachment, it should be done in a manner that will sustain a regular supply over time. This will require that the potential areas for firewood collection (areas with *D. cinerea* and possibly *A. ataxacantha*) be zoned for management as firewood production areas. The available area and the density of the plants would determine the harvesting rate and cycle.

9.3 Woodcarvings

The community are embarking on wood carving project. This is a well established income generating activity for the Oshaampula community. Some of the products include wooden spoons, pestles, mortars, cases planks and many more. Annually they take part in the Ongwediva Annual Trade Fair to sell their products. Dead wood from *Pterocarpus angolensis*, *Burkea africana*, *Acacia erioloba* and *Ochna pulchra* are used.

9.4 Tree planting/regeneration

Tree planting is done through live fencing and woodlots. The planting of seedlings is done during the early part of the rain season to enable the seedlings to become established before the end of the rainy season. The protection of planted trees should be rendered to avoid browsing animals and small rodents to devour seedlings. The most desired species for planting are *Acacia nilotica*, *Acacia erioloba*, *Opuntia*, *Dichrostachys cinerea* and *Combretum africana*. Homestead tree planting will be given priority before planting will be carried out in the community forest.

9.5 Silvicultural practices

The forest management committee wants to closed-off some areas in the forest which some species such as *Terminalia sericea* and *Burkea africana* are coppicing. With this they want to encourage growth of these trees into mature trees from where poles and timber will be extracted for own use and sales. Also, they would like to apply selective harvesting for poles in the forest.

9.6 Fire management

The community's by-laws prohibits setting fires in the forest. The by-laws make provision for punishing anyone found culprit for lighting fires in the forest. Also, all community members are appealed to participate in fires extinguishing whenever necessary. However, all mechanisms such as construction of cut lines and fire management committees establishment are considered thoroughly. These will be implemented as soon as the DoF staff rendered their logistical and technical advice to the community.

10. Expected revenue

The average price for a bundle which weighs 20 kg is N\$5.00. Annually it is estimated that 54000 kg of fuel wood (10% of own consumption) is harvested only for sales. This translates into 2700 bundles being harvested by all households annually. This will result in the total annual revenue of N\$13,500.00. Whether selling of the poles is financially feasible, depends on the cost of labour required for collecting firewood and transporting it to the markets. These costs calculation has not been included here.

11. Harvesting plan

In order to propose harvesting in Inombuwaleka community forest, community needs to regulate yields throughout the forest area. The size of the area proposed for harvesting is 770 hectares. There is only one visible cutlines which goes through the community forest. Hence, it is difficult to divide the forest into blocks. Therefore, it is proposed that the forest committee members should see to it that the community members selectively cut, a given annual amount of poles in a radius of 1-2 kilometers form the homesteads. The aim is to keep the annual harvesting yield at a reasonably constant level.

12. Selection of trees

In practice, the selection of trees will differ according to diameter class and species. Some rule of thumb are given below to assist with the selection of trees.

Combretum collinum

- No combretum trees with dbh less than 15 cm and greater than 35 cm should be cut (table 2).
- All sizes between 15 and 35 cm should be selectively harvested.

- The distance of 100 m should be kept between trees in diameter class 15-25 cm.
- Similarly, distance of 200 m should be kept between trees in diameter class 25-35 cm.

Burkea africana

- No combretum trees with dbh less than 5 cm and greater than 45 cm should be cut (table 4).
- All sizes between 5 and 45 cm should be selectively harvested.
- The distance of 90 m should be kept between trees in diameter class 5-15 cm.
- Similarly, distance of 560 m should be kept between trees in diameter class 35-45 cm.

Terminalia sericea

- No combretum trees with dbh less than 5 cm and greater than 25 cm should be cut (table 3).
- All sizes between 5 and 25 cm should be selectively harvested.
- The distance of 210 m should be kept between trees in diameter class 5-15 cm.
- Similarly, distance of 130 m should be kept between trees in diameter class 15-25 cm.

13. Implementation of management plan

During the two days discussion held with the communities from seven villages namely Oshihepo, Ekolola, Ohandiba, Oheti, Eengonyo, Omutwewondjamba, and Okwayoufuko (17-18 March 2003) the community discussed on who will have the responsibility to implement of the management plan and when. After the discussion the community agreed on the following points:

- The entire Executive members and committee should have the responsibility for implementation of the management plan.
- According to the community members the management plan will be implemented by March 2004, if is ready.
- Forest Management Committee (FMC) feels that there is a need for the staff from DoF to help the community of Inombuwaleka, whenever is required.
- Activities of harvesting of firewood and poles in the community forest should be monitored by members of FMC and assisted by the DoF staff at least to direct the community.
- DoF staff should train members of the FMCs in all technical aspects which is needed to carry out effective management of forest resources.
- The DoF staff should make sure that the FMCs and the community who are responsible for the implementation of the management plan are well-equipped with all necessary skills which will ensure running smoothly.

14. Collaboration

Inombuwaleka Community Forest Management Committee needs technical advice as well as other services from the Eenhana District Office (EDO). They will require assistance in preparation of annual implementation plan until harvested products are marketed. However, the committee emphasized that DoF staff will only play advisory and supervisory role. The committee will be entirely responsible for the actual implementation of activities on the ground.

15. Monitoring

All resource use from the community forest should be monitored closely. Each potential user must apply for the use of specific resources for specific products through the FMC. The amount allocated should be recorded as part of the permit system. The amounts harvested should be also be recorded by the user and information provided to the Forest Management Committee. The areas where the resources have been harvested should be indicated by zones. Also, monitoring would be carried out on any changes in the forest (illegal harvesting, damages by fires, wildfires, pests, etc.). This should be done by FMCs when patrolling the community forests.

Reference

Annexes

Table 5. Proposed management prescriptions

	Activities					
	Firewood collection	Tree planting	Grazing	Income generating projects	Fire management	Fruit harvesting
Months						
January	Harvesting Searching for market Selling Administering finance	Nursery establishment Pot filling and sowing, transplanting, watering,	Grazing	Ploughing and sowing of Mahangu field Carving		
February	Same as above	Watering	Same as above	Carving Weeding		
March	Same as above	Watering	Same as above	Carving Weeding		
April	Same as above	Watering	Same as above	Carving		
May	Same as above	Seed collection Selling	Same as above	Carving		Harvesting and selling
June	Same as above	Watering	Same as above	Carving Harvesting of mahangu, Basket making		Harvesting and selling
July	Same as above	Watering	Same as above	Carving, threshing and winnowing, selling of Mahangu	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling	Harvesting and selling
August	Same as above	Watering	Same as above	Carving, selling of mahangu, Stove making	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling Identify areas for clearing cut lines Training Formulation of FMU, Construction	Harvesting and selling

					of cut lines, patrolling	
September	Same as above	Watering	Same as above	Carving, selling mahangu, stove making	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling	Harvesting and selling
October	Same as above	Watering Planting in homestead, live fencing	Same as above	Carving, selling	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling	Harvesting and selling
November	Same as above	Watering	Same as above	Carving, selling	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling	Harvesting and selling
December	Same as above	Watering	Same as above	Carving, selling	Identify areas for clearing cut lines Training Formulation of FMU, Construction of cut lines, patrolling	Harvesting and selling