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Use and Sustainability of Miombo Woodlands under Community Management in Zimbabwe

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ABSTRACT

The use and sustainability of miombo woodlands under community management was studied in north eastern Zimbabwe using Participatory Rural Appraisal (PRA) methods. The study especially focussed on benefits obtained from miombo woodlands, their seasonal variability and long-term changes of woodland resources in the Mangwende communal area so as to assess the sustainability of communal management of forest land in the study area.

Like farmers everywhere in Southern Africa, people in the study region are largely dependent on resources found on communal and state owned lands. In the study area, communal woodlands were found to provide a large variety of benefits for local people, especially important during dry seasons, e.g. poles, fibre and thatching grasses, firewood, fodder and traditional medicines. Despite the rich variety of products, the availability of woodland resources has dramatically diminished during the last 30 years. This trend, which is expected to continue, has forced people to use manufactured substitutes, e.g. for medicinal, nutritional and heating purposes. Most of the few forested areas left in the region are heavily degraded, but still continuously under over-utilisation.

Based on the collected data, it was evident that community management has not helped the environment to survive the increased land use pressure brought about by a growing population in the study area. It is, however, too simplistic to assume that community management has directly caused environmental degradation. In the case of forest cover loss, for example, population pressure has probably been a bigger reason for deforestation than failures in land management.

Key words: traditional institutions, community management, woodland resources, Zimbabwe.

INTRODUCTION

A. MIOMBO WOODLANDS

Most of Africa's population live in savannas. Of the savannas in the southern hemisphere, by far the most common are miombo woodlands (Campbell et al. 1996). Miombo woodlands are distinguished from other African savannas, woodlands and forest formations by the dominance of tree species in the family *Fabaceae*, subfamily *Caesalpinioideae*, particularly in the genera *Brachystegia*, *Julbenardia* and *Isoberlinia*. The diversity of canopy tree species in miombo woodlands is low, although the overall species richness of the flora is high (Frost 1996).

Miombo woodlands are primary source of energy, in the form of firewood and charcoal, and a crucial source of essential subsistence goods (Gauslaa 1989, Dewees 1994; Morris 1995). It has been estimated that in 1990, 40 million people inhabited areas covered by, or formerly covered by, miombo woodlands, with an additional 15 million urban dwellers relying on miombo wood or charcoal as a source of energy in Africa (Campbell et al. 1996). Apart from the recognition of local significance, there has been little consideration given to the importance of miombo woodland to global interests, e.g. biodiversity conservation, atmospheric chemistry and global climate change (Campbell and Byron 1996).

Campbell and Byron (1996) describe that while there are many case studies on the use and diversity of miombo products in Southern Africa, a household perspective of resource use is extremely limited. They recommend further studies on household economics and the role that miombo products have in livelihood systems, with emphasis on how and why this role varies in space and time. Stimulating commercialisation of forest products, focussing on fruit trees and household forestry activities also has an important role in further studies (Remme et al. 1997). The focus of this study was set on the household utilisation and sustainability of miombo woodlands under community land management in Zimbabwe.

B. WOODLAND MANAGEMENT

The majority of people in Southern Africa live on customary or communal land and depend on resources found on these lands (Misana et al. 1996). In Zimbabwe, 42% of the total land area is designated as communal area and it is estimated to support about 70% of the population (Mukwekwerere 1996). In these areas, most wood has been removed in the course of a long history of human settlements. While the areas allocated to Africans became overcrowded, severely deforested and degraded, much of the land under European occupancy, excluding that where tobacco was cultivated, reverted to forest (Vail 1977).

Traditionally, woodlands in communal areas were subjected to common property management, where a clearly defined group had user rights on resources and land. Traditional leaders were responsible for enforcing rules regarding access regulations and punishment (Mukwekwerere 1996). Murphree (1993) describes communities as traditional institutions, comprising individual actors who collectively made decisions on the use and management of resources. After European occupancy, the belief systems associated with traditional institutions were attacked on two fronts, from the perspectives of modern science and agriculture, and from the Christian perspective (Sithole 1996).

Murphree (1993) states that expecting traditional institutions to be effective in the contemporary situation is not entirely realistic. Due to the gradual erosion of customary control, the communal woodlands are now more or less subject to open

access whereby individuals pursue their own interests without regarding future needs from the forests or woodlands. The open access is also spilling into state-controlled forests, particularly where the communal areas border state forests, parks and game reserves (Mukwekwerere 1996). This view however, may be too pessimistic and simplified, because, in many cases, strong differences in institutional arrangements even between neighbouring villages can be found. Campbell et al. (1996), for example, describes one village in which the traditional structures are strong and effective, comprising a sub-chief, village leader, advisors and resource monitors, while in the neighbouring village decision making is split between traditional and modern systems, with no effective systems of local control.

The changes that are taking place in people's behaviour and attitude towards traditional forestry rules are explained by changing values. Young people in particular defy traditional rules as part of modernization 'simanjemanje' or 'chirungu', the modern and European way of life (Mukamuri 1995). Important changes have taken place also in forest land allocation during the last 15 years, most notably in the higher levels of, in particular, eucalyptus planting and their commercialisation (Remme et al. 1997). This quick change in forest management has not occured without difficulties. Shumba et al. (1996), for example, state that Rural Afforestation Programmes which focussed on the establishment of fast-growing eucalyptus woodlots for producing fuelwood and poles during the early 1980s did not adequately consider the social benefits obtained from forests, such as rural communities' interests in tree growing with species that provide multiple products.

At present, an official tenure system in Zimbabwe discourages people for planting fruit trees because they are, including those fruit trees growing on fields, accessible to anyone. Under the communal tenure system farmers only own the crops in their fields, not the trees; trees and their fruit remain under public domain (Mukamuri 1995). The studies have shown, that rural communities prefer planting trees on privately owned land than on the communally owned grazing areas and that fruit trees, especially exotics, are more popular than non-fruit trees (Shumba et al. 1996). People prefer exotic species not because they are replacements for indigenous fruit trees, but because they have characteristics that people favour. Much of the drive for planting exotic fruit trees relates to commercialisation and the potential income that can be derived from such planting (Brigham 1994).

C. THE SOCIO-ECONOMIC AND ENVIRONMENTAL IMPORTANCE OF MIOMBO WOODLANDS AND STUDY AIMS

Throughout the miombo woodlands, the supply of many products and services is essential for the well-being of rural communities, some products acting as subsidies to agriculture, with others providing materials for basic needs. The products derived

from woodlands include poles and construction products, timber, materials for tool handles and household utensils, foods, medicines, leaf litter, grass and browse. Trees and woodlands are also important for the spiritual and cultural life of local residents throughout the miombo zone (Mukamuri 1989; Sorensen 1993).

In addition, woodlands have an important environmental role in controlling soil erosion, providing shade, modifying hydrological cycles and maintaining soil fertility (Clarke et al. 1996). Miombo woodlands also provide watershed protection to areas prone to erosion by heavy seasonal rains. Rapid regrowth of trees in miombo woodlands, which is supported by the well-developed root stocks, is environmentally important after bush fires and shifting cultivation (Gauslaa 1989).

One of the few attempts to estimate the total value of woodlands has been made in Zimbabwe: Campbell et al. (1991) estimated that tree products and services had an imputed gross value of about US$320 per household per year. Another study, which used the Contingent Valuation Methodology (CVM), implied an annual income flow from miombo woodlands equal to about US$100 per household per year, applying a 20% discount rate (Lynam et al. 1994; Clarke et al. 1996).

The aim of the study was to examine the use and sustainability of miombo woodlands under community management in north-eastern Zimbabwe. More specifically, the aims were to study what are the household benefits obtained from miombo woodlands, what is their seasonal variability, and what are the long-term changes in the availability of woodland resources in the Mangwende communal area. An additional aim was to study the importance of traditional institutions in the management of woodland resources.

1. Community Woodland Management In Zimbabwe

1.1 The study area

The case study area is located in the Murewa and Mutoko districts in the northeast Zimbabwe in the Mashonaland-East province (Figure 1)**.** The Murewa district is centred on 17' 35' south and 31' 45 east. The Mukarakate area in the Mangwende communal area lies in the south eastern part of the Murewa district. The study villages are located in the resettlement area in the South western part of the Mutoko district. In the Murewa district, the mean annual temperature varies between 18 and 23 centigrade, and the mean annual rainfall between 890 and 930 millimetres (Brinn 1987). Much of the study area lies between 900 and 1400 metres above sea level. Soils in the study area are characterised by granitic rocks of Basement Complex with scattered and localized intrusions of dolorite (Stagman 1978). Sandy nutrient-poor soils of granitic origin are most widespread in the study area, land being mainly used for dryland cropping of maize and to a lesser extent groundnuts and sunflowers (Mandondo and Jackson 1996).

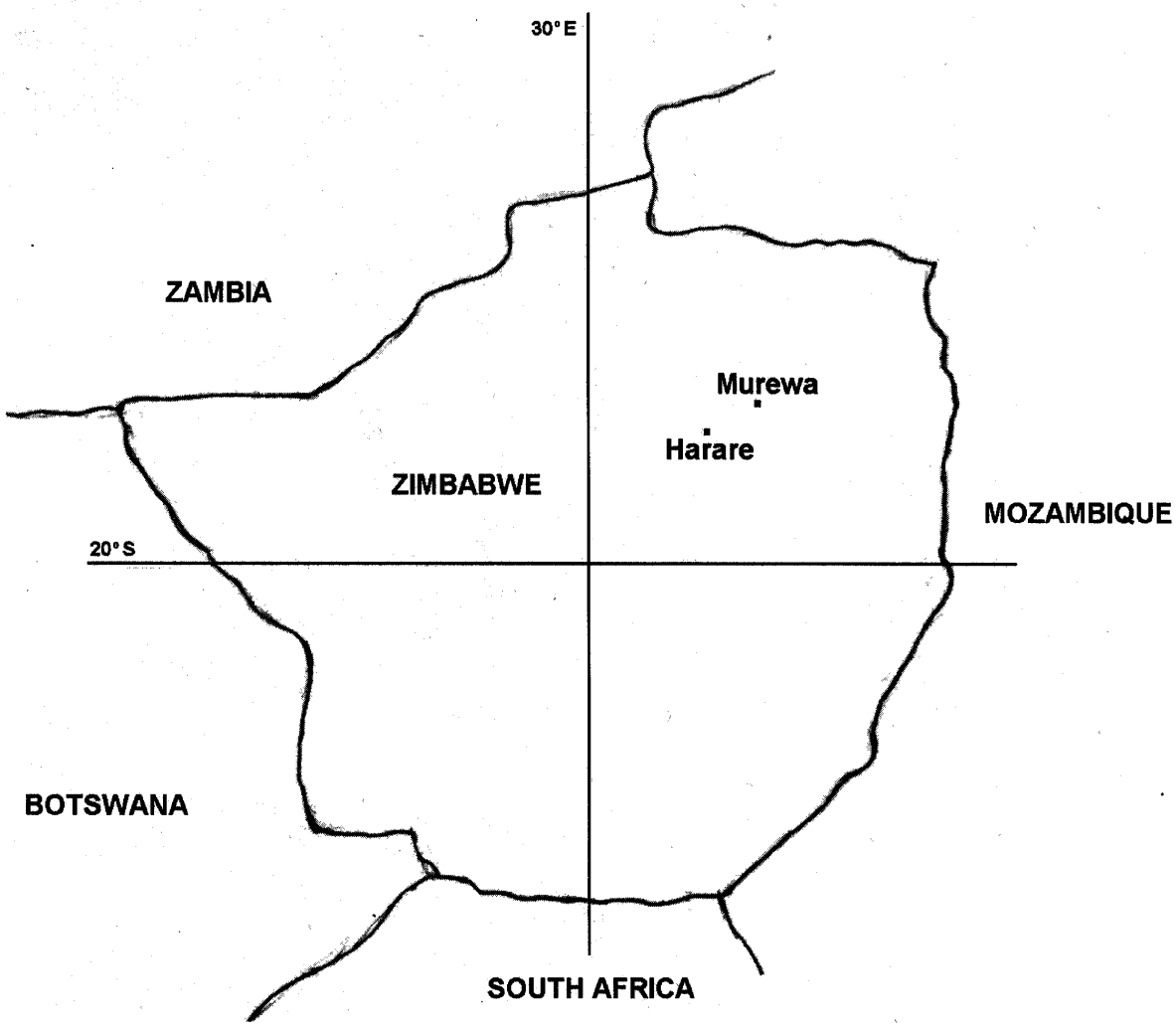


Figure 1. The location of the study area.

Much of the original vegetation, which falls under Brachystegia-Julbenardia woodland on granite (Timberlake et al. 1993), has been cleared, and the soil has been prepared for cultivation. On sites with steep and rocky terrain, the original vegetation type is more prevailing (Brinn 1987). For example, 87% of the total land area in Natural Region II is classified as heavily deforested, where woodland cover is less than 15% of the total land area. In Natural Regions III and IV the percentage is 25 (Mandondo 1993).

In 1982, the Mangwende communal area had a population of nearly 110 000 in approximately 21 000 households giving an average household size of 5.1 persons and a population density of 53.4 per km^2 (Mandondo 1993). In 1993, the Mukarakate area had a population of about 30 000 in approximately 6 000

households giving an average household size of 5.0 persons and a population density of 88.1 per km^2. The Mukarakate area had nearly 17 000 ha of arable land and 15 000 ha of grazing area. The average size for cultivators were 2.7 ha of arable land and 2.3 ha of grazing area (Table 1 and Table 2).

Table 1. Population in the Mukarakate area 1993-1994.

Ward	Total population	No. of cultivators	No. of villages
17	9352	1788	15
18	7563	1076	13
19	4318	1024	10
20	5193	964	10
21	5020	1468	14
Total	31446	6320	62

Source: Interview of Mr. Mutambara, supervisor of Agritex in the Mukarakate area, Dombwe B.C. 9.12.1998.

Table 2. Gross area, arable land and grazing area in the Mukarakate area in 1993-1994.

Ward	Gross area (ha)	Arable land (ha)	Grazing area (ha)
17	10096	4578	5356
18	6597	3197	3193
19	6284	4011	2001
20	4933	2563	1850
21	7789	4461	2273
Total	35699	16721	14775

Source: Interview of Mr. Mutambara, supervisor of Agritex in the Mukarakate area, Dombwe B.C. 9.12.1998

1.2. STATE INSTITUTIONS AND TRADITIONAL LEADERS

According to Mukamuri (1995), in communal areas there are at least three different management strategies in forestry derived from different sources and sponsored by different authorities. The first is based on traditional rules, which are set and enforced by the traditional leaders and usually backed by religious beliefs. The second, based on state rules, are enacted by Parliament and often supported by policy agencies of the state. The third type of management is based on private ownership of tree resources, which includes ownership of planted trees (exotic and indigenous), as well as trees in homesteads and on relatives' graves.

Traditional leadership is based on Chiefs' (*mambo* or *ishe* in shona), Headmen's (*sadhundu* or *muchinda*) and Kraal Heads' (*sabhuku*) net. The Mangwende communal area in the Murewa district have traditionally had six Headmen who control as many areas: the Muchinjike, Chitowa, Zihute, Musami, Chamachinda and Mukarakate areas. The Headmen are all under Chief Mangwende. Each village is led by a Kraal Head who is under his headman (Figure 2).

At the same time as there are traditional institutions there are modern state rules. The state control system includ 28 wards in the whole communal area and 5 in Mukarakate. In Mukarakate ward 20, for example, there are 11 villages and 1729 households. All these villages have their own village development committees. The committee have representatives in ward development committee. The mixture of traditional and modern state institutions has caused conflicts between traditional leaders and committees. However, according to Mukamuri (1995), post holders can occupy both traditional and modern roles: for example, a person can be both a chief (traditional role) and a ward councillor (state function).

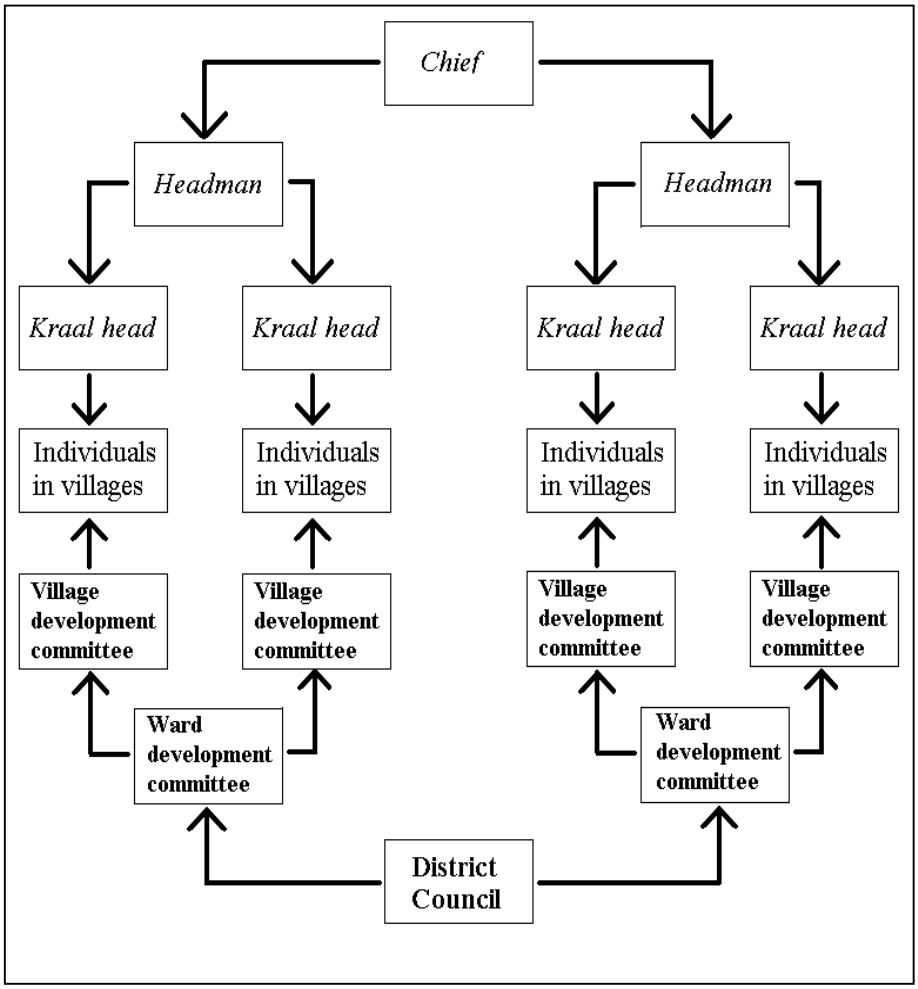


Figure 2. *Traditional leaders* and **state institutions** in local and district levels in rural Zimbabwe.

1.3. COMMON PROPERTY MANAGEMENT

The Mangwende communal area has been under communal farming from the turn of the 20th century. Although the area has quite high agro-ecological status and good soil growth potential, the high population growth rate has increased pressure to increase agricultural production. The harvests have been primarily increased through converting lands from communal grazing to other agricultural purposes. One consequence of the increased food demand has been that, at present, the Mangwande communal area is heavily deforested, and even small woodland areas are difficult to find. Remaining non-agricultural areas are often rocky and bushy and unsuitable for agriculture. Even in these areas trees are often cut down before they reach five metres in height. Only fruit trees are not cut down as it would be against old customary practices. People in the Mukarakate area have to collect or

buy most of the goods normally derived from their woodlands from outside, from the nearest resettlement area or commercial farms (Figure 3).

The Mukarakate area gained better constructed roads and electricity after independence in 1980. After that, westernisation and modernization have rapidly proceeded, as people have bought more cars and had more leisure time than earlier. In this situation, customary woodland management practices have diminished in many areas. Villages which still have strong Kraal Heads (*sabhuku*), however, have maintained their traditions, e.g., their woodland management practices, more strongly than villages with no strong attachment to the traditional institutions. In Chikurunhe village, for example, there is a powerful Kraal Head, who controls the use of wood resources by giving permission to villagers to cut trees. If trees are cut down without permission, the Kraal Head can discuss with Chief Mangwende, who can order a fine as high as 500 Zimbabwean dollars for the thieves (at the time of the study US$1=Z$16). The traditional control over wood resources is obviously one reason that trees are still left, for example, on Mukuwa mountain.

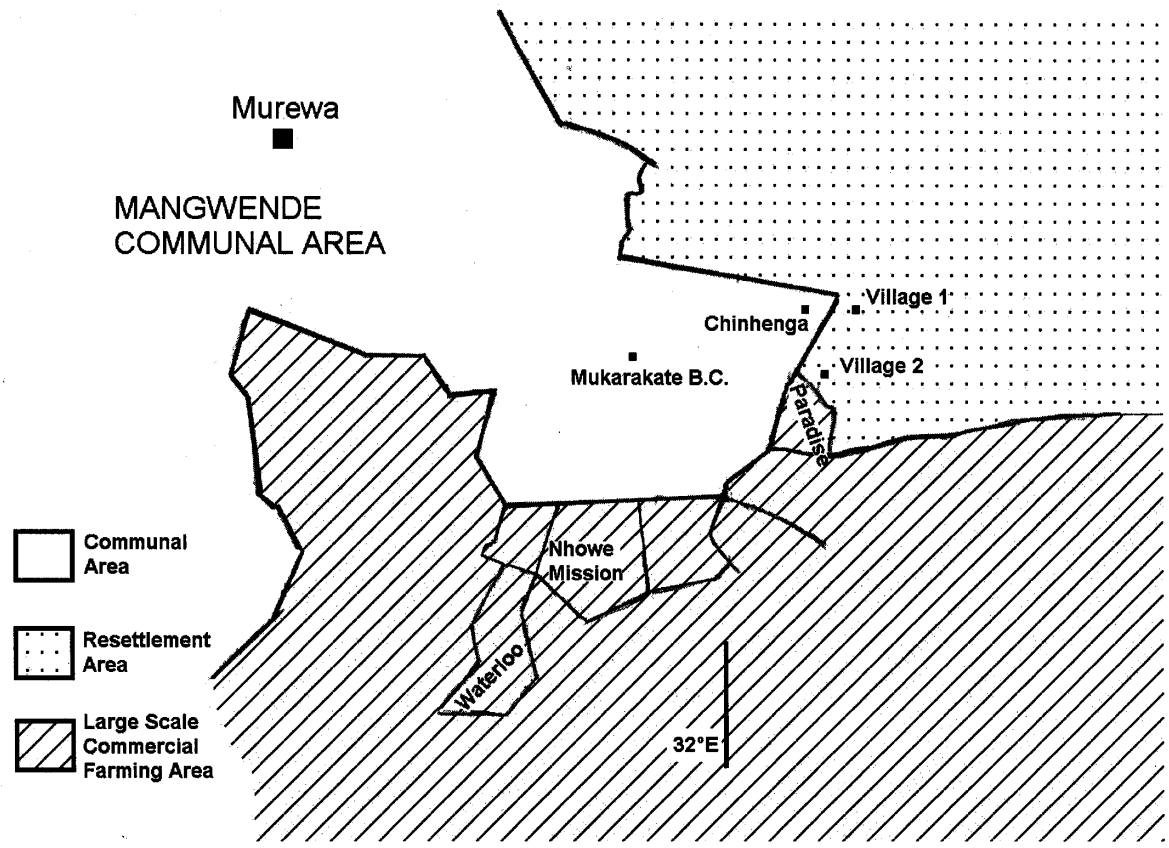


Figure 3. Land tenure systems in the study area.

Although traditional control over wood resources still exists in some areas the leaders do not have the legal power to create and enforce rules on natural resources management. Legally, this power rests with the Rural District Councils, who may make decisions (such as granting timber concessions, making bylaws or developing land-use plans) without consulting the chief or taking into account customary resource management rules and practices (Maphala 1994). In 1982, the Communal Land Act removed the power of the chiefs to control land, and allowed land-use plans made by the councils to override any customary land claims (Musvoto 1994).

2. The Use and Sustainability of Miombo Woodlands in Mukarakate

2.1. Study approach

In this study, the use and sustainability of miombo woodland in Mukarakate in the Mangwende communal area in northeast Zimbabwe was studied using PRA-methods. The study examined, in particular, what benefits can be obtained from miombo woodlands, and what the seasonal and long-term changes in the availability of miombo woodland resources are.

In the applied PRA-approach, before any attempt for close relations with the villagers was attempted, their everyday life was studied by familiarising us with them through discussions during transect walks from the communal grazing area to woodlands and further to the borders of the villages. During these walks, indigenous tree species were listed (Table 3), and benefits obtained from woodlands discussed. Based on the prepared list, indigenous and exotic species were ranked by the villagers including both men and women. As it became obvious that the villagers' opinions on the utility of tree species vary greatly according to what purposes they use the trees, a group of villagers was selected and they were asked to do the ranking (Table 4).

Table 3. Indigenous tree species on Mangwende communal land collected in transect walks in January and February 1998. Very important uses of the species are written in bold.

Scientific name	Local name	Usage purposes
1 Brachystegia spiciformic	*Musasa*	poles, firewood, shade
2 Brachystegia boehmii	*Mupfuti*	firewood, poles, **fibre**
3 Parinari curatellifolia	*Muhacha*	fruit (**sacred tree**)
4 Pericopsis angolensis	*Muwanga*	**poles**, firewood
5 Julbenardia globiflora	*Munhondo*	firewood
6 Lannea discolor	*Mushamba*	firewood, poles, shade, **fruit**
7 Syzygium cordatum	*Mukute*	firewood, fruit (water tree)
8 Sectia brachypetala	*Mutondochuru*	poles, firewood, shade (grave tree)
9 Acacia karroo	*Mubayamhondoro*	poles, firewood
10 Ochna schweinfurthiana	*Mubaramhosva*	**poles**
11 Terminalia sericea	*Mususu*	firewood, poles, shade, fencing
12 Piliostigma thonningii	*Mutukutu*	**fodder**, poles, firewood, fencing
13 Pterocarpus angolensis	*Mubvamaropa*	furniture, firewood, poles
14 Combretum apiculatum	*Mugodo*	poles, shade, fencing
15 Ficus capensis	*Mukuyu*	firewood
16 Erythrina abyssinica	*Mutiti*	firewood, poles
17 Garcinia buchananii	*Mutunduru*	poles, firewood, shade
18 Strychnos cocculioides	*Mutamba*	fruits, firewood
19 Swartzia madagascariensis	*Mucherekese*	firewood, poles
20 Uapaca kirkiana	*Muzhanje*	**fruit**, firewood
21 Annona senegalensis	*Muroro*	fruit
22 Flacourtia indica	*Munhunguru*	fruit, firewood
23 Azanza garckeana	*Mutohwe*	**fruit**, firewood
24 Dichrostachys cinerea	*Mupangara*	**fencing**
25 Euphorbia tirucalli	*Kanyanganya*	**fencing**
26 Agave americana	*Mafibre*	fencing, **fibre**
27 Ziziphus mucronata	*Muchecheni*	firewood, fencing
28 Bauhinia petersiana	*Munando*	firewood
29 Vangueriopsism lanciflora	*Mutufu*	fruit
30 Kigelia africana	*Mumwe*	firewood (sausage tree)
31 Commiphora marlothii	*Chiwirowiro*	fencing
32 Ximenia caffra	*Munhengeni*	fruit
33 Ficus burkei	*Mutsamvi*	fruit
34 Vitex payos	*Mutsubvu*	fruit (chocolate berry)

Villagers were also asked to draw resource maps, like in the exercise of the Gwaai Working Group (1997), where the village area with its surroundings was indicated with respect to various resources available. The villagers drew first the boundaries of their village on the paper and marked different land uses on it. Physical features such as wells, pools, schools, roads, woodlots and homesteads were also marked on the map. The mapping exercise was first carried out with young villagers, after which the map was checked and completed by the older men in the village. After long discussions and a short walk in the communal grazing area some changes were made to the map, which is presented in final form in its Figure 4.

2.2. BENEFITS OBTAINED FROM MIOMBO WOODLANDS IN MANGWENDE COMMUNAL AREA

As Mangwende communal lands in the study area are heavily deforested, there are many goods and services that cannot be derived from miombo woodlands anymore. The supply of construction material and poles, for example, has become so degraded that sometimes people have to travel for hours to buy eucalyptus timber from private woodlots. The lack of indigenous tree species for poles has been severe for a long time, and has been one reason that *Eucalyptus camaldulensis* was actually ranked second-best pole material after *Pericopsis angolensis* (‘muwanga’) (Table 4).

The firewood supply from the communal area was found to be very limited also. Actually, it was noticed that because villagers cannot find enough firewood from the communal area in Mukarakate, they have to walk to the state owned forests in the nearest resettlement area where they collect firewood free of charge. The price of firewood, Z$30 per cont when bought from local business centres, can be considered very high which also indicates that firewood is severely short in supply in the study area.

Rope fibre and thatching grasses used, e.g., for housing, are perhaps even harder to find than firewood or poles from the communal land. The most important indigenous species for rope fibre is *Brachystegia boehmii* (mupfuti) which can be found in bushlands and small woodlands in Mukarakate, specifically in mountains. One cultivated species, *Agave americana* (‘mafibre’) is also important for fibre. In the communal area, picking thatching grass or rope fibre is possible only in a few wooded areas. The price of thatching grasses was found to be $ 70 per cont when bought from private farms or from the surrounding resettlement areas. Grasses were sold by communal farmers who usually pick it from the state owned forest resettlement areas.

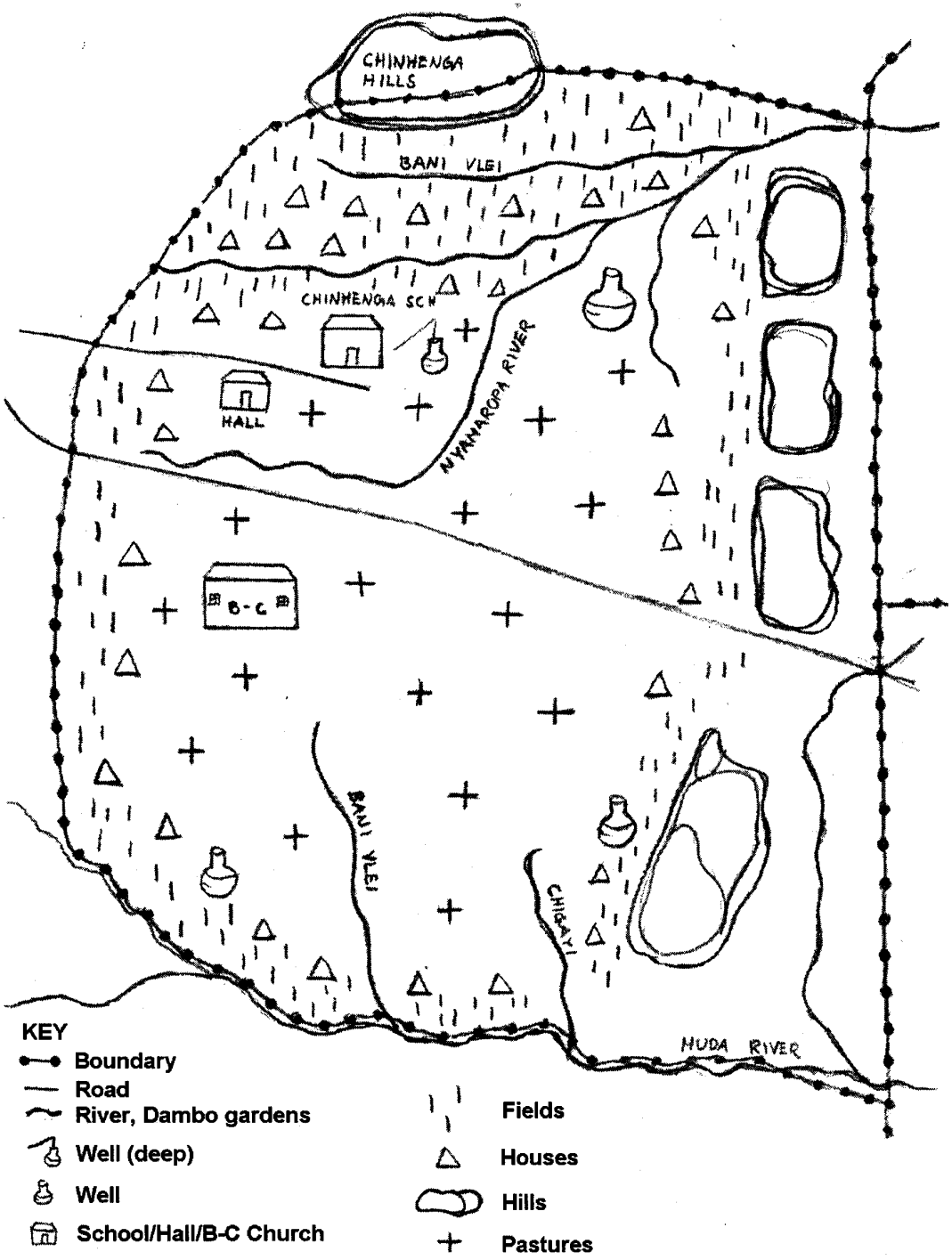


Figure 4. Resource map of the Mataranyika and Kusangaya villages.

In Mukarakate some tree species like *Dichrostachys cinerea* (‘mupangara’), *Euphorbia tirucalli* (‘kanyanganya’) and *Agave americana* (‘mafibre’) are commonly used for livestock fencing. They are important for subsistence farmers

who cannot afford to pay for modern iron fences or to use eucalyptus poles for fencing.

In every village, a large *Parinari curatellifolia* ('muhacha') tree, which has spiritual value, is grown. Villagers commonly cook beer under the muhacha tree and conduct ceremonies there because they believe that the souls of their ancestors live under the tree. Traditionally, also fruit trees are also highly valued in Mukarakate. In ranking the most important fruit tree species, there are three indigenous species in the top-five list, after the exotic species of mango and guava (Table 4).

Table 4. The most important tree species and their use..

Poles	
Scientific name	**Local name**
1. Pericopsis angolensis	*Muwanga*
2. Eucalyptus camaldulensis	*Gums*
3. Sectia brachypetala	*Mutondochuru*
4. Lannea discolor	*Mushamba*
5. Erythrina abyssinica	*Mutiti*
Firewood	
Scientific name	**Local name**
1. Brachystegia spiciformic	*Musasa*
2. Eucalyptus camaldulensis	*Gums*
3. Pericopsis angolensis	*Muwanga*
4. Brachystegia boehmii	*Mupfuti*
5. Garcinia buchananii	Mutunduru
Fruit	
Scientific name	**Local name**
1. Mangifera indica	*Mango*
2. Psidium guajava	*Guava*
3. Azanza garckeana	*Mutohwe*
4. Uapaca kirkiana	*Muzhanje*
5. Parinari curatellifolia	*Muhacha*
Multiple-use	
Scientific name	**Local name**
1. Parinari curatellifolia	*Muhacha*
2. Brachystegia spiciformic	*Musasa*
3. Eucalyptus camaldulensis	*Gums*
4. Uapaca kirkiana	*Muzhanje*
5. Pericopsis angolensis	*Muwanga*

Source: Interviews of local people in Mukarakate.

Edible insects and mushrooms have an important seasonal role for rural peoples' diet in some parts of the miombo region, but in Mukarakate they are less important because of an existing small woodland area from where they could be obtained. In practise, grasshoppers are the only edible insects available throughout the year, but those have little importance. Two mushrooms ('tsvuketsvuke' and 'luhve') are also used for nutrition. *Piliostigma thonningii* ('mutukutu') is the most important tree species for fodder.

In most parts of the study area, game meat does not have a high importance. Only hyenas are hunted, not for meat but in order to protect the villagers' chickens and goats. Near resettlement areas and other remaining woodlands or bushlands, some animals ('nchembwe', 'mhere', 'nyungu', 'horwe' and other birds, and rabbits) are hunted, though their importance for villagers is minor. Natural honey can be collected from wooded areas. Because of deforestation, honey cannot be collected in Mukarakate. Despite continued forest depletion, traditional medicines have an important role for the villagers' healthcare in Mukarakate. Because the villagers are not willing to directly discuss natural medicines with a foreign researcher, medicinal resources were not explored more specifically.

2.3. SEASONAL VARIABILITY

Seasonal variability of forest products was studied by constructing seasonal calendars for various species and commodities. In this study, the seasonal calendars were specifically constructed to study the variability of use patterns over time, while resource flow diagrams were drawn to indicate the range and flow of products from specific sources (Gwaii Working Group 1997).

When preparing seasonal calendars, resources that were extracted from woodlands accessible to villages in Mukarakate area were explored through discussions with villagers. The names of extracted resources were written on paper that was placed against each month of the year. A group of men in Mukarakate was asked to indicate the times and relative quantities of each resource they extracted, by scoring. At first, the group discussed firewood and told us that each household needs firewood, about three conts per month in winter and in the rainy season but only one cont per month during other periods. After familiarisation with the measurement unit, the group was asked to compare times and relative quantities of all other resources to one cont of firewood (Table 5). This was assessed more reasonably and was easier for the group to score all resources rather than, for example, scoring 100 for various resources replacing berries or stones on bare ground, like often done in PRA applications.

A fruit availability calendar (Table 6) was constructed in a similar manner to the product extraction calendar. After listing the most important fruit trees, the same group was asked to give three points for the month when fruits were most available

and two or one points when they were less available. Discussion of fruit availability took about one hour. The group wanted to add some more species to the list like *Vitex payos* ('mutsubvu'), which was not originally listed. After the construction of the calendar the group was asked to describe the picking and selling of indigenous and exotic fruits in the area.

The group estimated that in the rainy season and winter, households need three conts of firewood per month, which is many times more than at any other time of the year. Winter, mainly August and September, is also the best time for building houses, which was perhaps the reason why three conts of poles were used in August and two conts in September, and only one or half conts in the other months for repairing fences. Rope fibre and thatching grass are also needed for building houses. Mushrooms are picked in the rainy season in January and February. Medicines are needed in winter and the rainy season when flu and other diseases are common among the villagers. The importance of grazing in communal grazing areas is highest in the rainy season when coats and cattle are herding and calving. In the dry winter season, fodder is used to feed cattle.

Table 5. Product extraction calendar scored by men from Mukarakate, showing products derived from the Mangwende communal area and the Mutoko resettlement area (for firewood and poles the amounts equal conts per month, for other products the amounts equal relative weights).

Product	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Firewood	3	3	1	1	1	3	3	3	1	1	1	1
Poles	½	½	½	½	½	1	1	3	2	2	1	½
Fibre							1	3	2			
Thatching grass							1	3	2			
Mush-rooms	3	3										
Medicine	3	3				3	3	2				
Grazing	3	3	3	3	1	1	1	1	1	1	1	3
Fodder					1	2	3	2	2			

During winter, four nutritionally important indigenous fruits can be picked in the Mangwende communal area. The fruits of three indigenous tree species growing in the communal grazing area are sold. In practise, this means that the picking of fruit is allowed for everybody in the village but not for outsiders. *Uapaca kirkiana* ('muzhanje') is mainly picked from small mountains like Chiguri and the area near St.Peter's school. The fruit is sold at Z$1.50 per packet, and one packet including

15-20 pieces of fruit. *Azanza garckeana* (‘mutohwe’) is common in the communal grazing area in Mukarakate where many villagers sell it at Z$0.50 per piece. *Vitex payos* (‘mutsubvu’) is also common in the Mukarakate area. It is sold on private farms or business centres nearby. One packet of ‘mutsubvu’ includes 30-35 pieces of fruit and is sold at Z$1.50 per packet.

Almost all households in the Mukarakate area grow mango and guava trees. These two most important exotic fruits are picked during the rainy season. Because of its high yield, guava is rather cheap in the area. One packet (more than 100 pieces of fruit) costs only Z$10, whereas a packet of mango is Z$30. Mango is easy to plant by seeds, this being one reason for its popularity in the communal area. Lemon and orange are also popular for the same reason. In some villages, up to 90 % of the households have lemon trees, and 70 % orange trees. Lemons and oranges are ready for picking by the late rainy season or right after it. Lemon is sold at Z$15 per packet and orange Z$1 per piece. Peach is sold in the early rainy season at Z$0.15 per piece. Avocado and paw-paw are the only exotic fruits picked in winter. They are not yet common in the area and rarely sold.

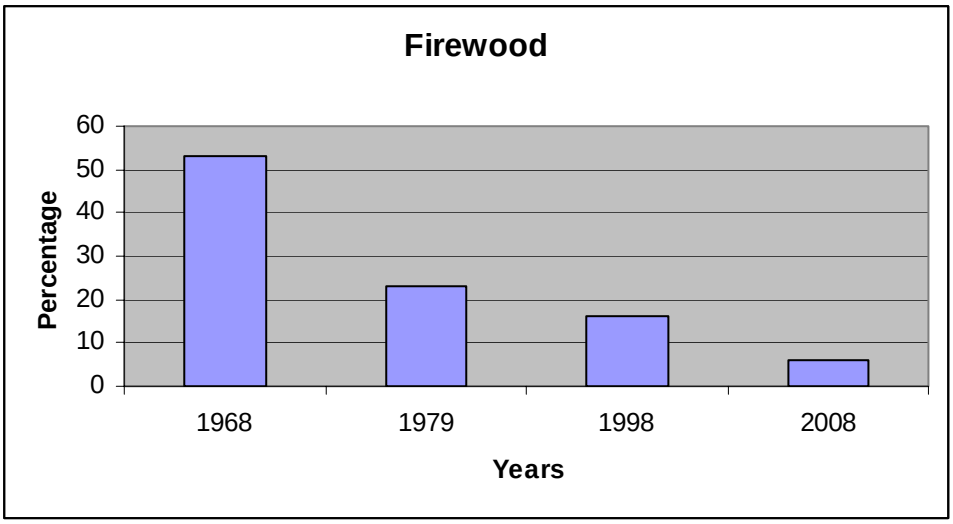
2.4. Long-term changes

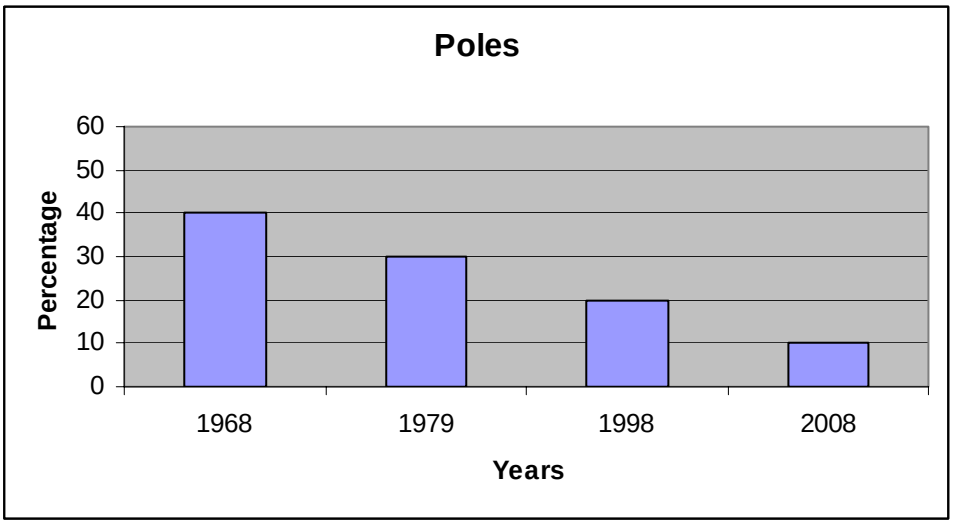
In using PRA techniques to ascertain local peoples’ views on the sustainability of woodland resources, it was considered necessary to select only the most important resources for the study. Due to the fact that people in Mukarakate are dependent on firewood and poles collected from the woodland these were included in the resource list, which also included indigenous fruit and medicines. The explored time period in the calendar was set at 40 years starting from 1968, followed by the year before independence (1979), the present (1998) and the future (2008). The group, which mainly consisted of young and middle-aged men, scored the relative abundance of each resources across the mentioned years.

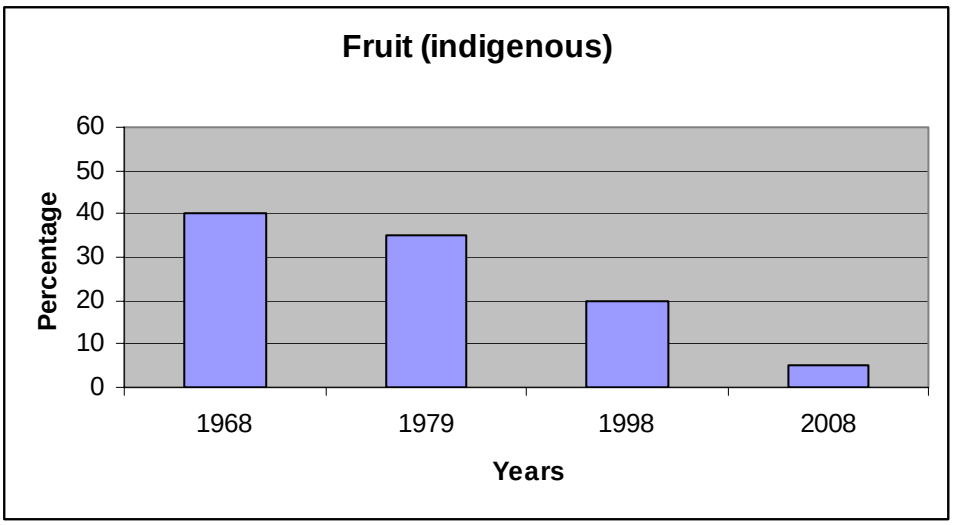
Based on the replies, there have been great changes in the availability of all woodland resources in the area during the last 30 years. In the future, villagers expect even more dramatic changes. Firewood resources, in particular, have decreased in the communal area and people have been forced to use more firewood from the nearest resettlement area. The same trend that was common for wood and fruit, can be seen also in the availability of traditional medicines, which is rapidly decreasing (Figure 5).

Table 6. Fruit availability calendar scored by men from Mukarakate, showing the different fruit derived from the Mangwende communal area and the Mutoko resettlement area (the amounts mean relative weights given for different products).

Fruit name	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Uapaca kirkiana (muzhanje)											3	2
Azanza garckeana (mutohwe)						2	3	2				
Vitex payos (mutsubvu)				2	3	2						
Strychnos cocculioides (mutamba)					3	2						
Syzygium cordatum (mukute)	2	3	2									
Annona senegalensis (mururo)	2	3										
Flaucourtia indica (munhunguru)			3	2								
Vangueriopsism lanciflora (mutufu)			3	2								
Ximenia caffra (munhengeni)	3											2
Parinari curatellifolia (muhacha)						3	3					
Psidium guajava (guava)	2	3	2	2								
Mangifera indica (mango)	3	3	2									
Citrus limoni (lemon)		2	2	2	2							
Prunus persica (peach)											2	3
Citrus sinensis (orange)			1	3	2							
Persea americana (avocado)						3	2					
Carica papaya (paw-paw)						3	2					


Firewood
Percentage
60
50
40
30
20
10
0
1968
1979
1998
2008
Years


Poles
Percentage
60
50
40
30
20
10
0
1968
1979
1998
2008
Years


Fruit (indigenous)
Percentage
60
50
40
30
20
10
0
1968
1979
1998
2008
Years

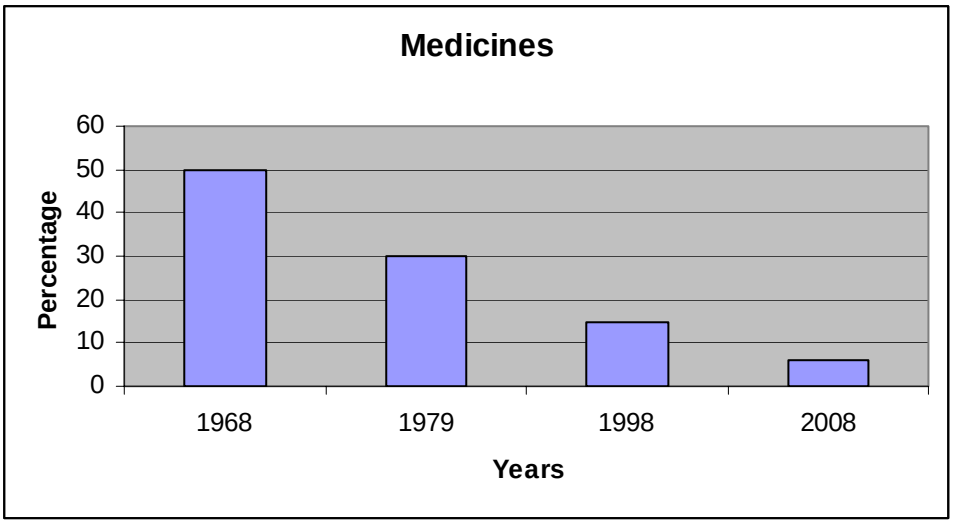


Figure 5. Availability of woodland resources over different time periods as perceived by men from the Mangwende communal area**.** The scoring was done by using 40 stones (numbers mean the percentage of stones).

3. Discussion And Conclusions

Any signs of conflicts between state institutions and traditional rules in management of forests could not be heard during the interviews and exercises. If the conflicts really existed people were not willing to speak about them. In fact, only a few examples were found where traditional rules or customary practices were still in use.

In ranking, *Parinari curatellifolia*, which was a so called sacred tree in every village in the area, was ranked as the most important tree species (Table 4). However, it only has limited concrete values for example in providing fruits. This means that the traditional importance of tree species is sometimes valued over their practical use.

In the conducted mapping exercise, boundaries were marked according to the old boundaries between the areas of Kraal Heads (Figure 4). During the exercise, nobody mentioned the boundaries of state institutions (e.g. wards). It can, therefore, be questioned if state institutions have any meaning for villagers. Mapping also showed that wells, rivers and hills, which are important in customary practices, had a very high importance for people in general, as they were very carefully drawn into the maps.

The indigenous tree species list, which was collected during the transect walks, had a total of 34 different species (Table 3). Most of them had more than one purpose. Some of the species were already rare because there were only a few forested areas left in the study area. These small woodland areas were often on hills. All other areas except settlement or cultivated areas were used for communal grazing (see Figure 4, for example). Only a few trees were found in communal

grazing areas, the main number of them being fruit trees that are not cut down for firewood, unlike almost all other tree species. As the farmers had a continuous demand for arable or grazing land (Table 1 and Table 2), pressure on communal grazing areas was high. As cattle was often grazing everywhere outside the fenced cultivated land at least part of the year, destroying at the same small trees and seedlings, communal grazing can be considered as one reason for deforestation in the study area.

It seems evident that the forest reserves in the communal area can no longer provide all the needed goods and materials for villagers. The situation is worse in winter, when large amounts of poles, fibre and thatching grasses are needed for building, firewood and fodder (Table 5). Villagers stated that the availability of woodland resources has dramatically decreased during the last 30 years (Figure 5). The availability of poles and firewood has, in particular, continuously decreased. There is also a lack of thatching grass and rope fibre, which can be collected only in a few forest reserves in the communal area. The villagers, who live near the resettlement area (see Figure 3), can utilise woodland resources from there. For other villagers there is not many other choices than to use manufactured goods (which are too expensive for most of them) or to try to collect or buy the most essential products like thatching grasses, fibre and firewood from private farms. To help alleviate the lack of poles and firewood the planting of *Eucalyptus* is one alternative. This planting has become more and more important in the last ten years and the *Eucalyptus* species has already been ranked to as the second most important species for poles and firewood (Table 4).

Based on the fruit availability calendar (Table 6) only four of the ten most important indigenous varieties of fruit were picked in winter. On the other hand, only two exotic species of fruit, namely avocado and paw-paw, which had only little significance for people, were picked in winter. The importance of the four indigenous fruit trees can be very high in times when green food is scarce. These fruit trees grow on the community grazing area and villagers from any community can freely use them. At the same time, as the amount of indigenous fruit trees in the study area is decreasing, people are planting exotic fruit trees, especially mango and guava. They were already ranked as the most important fruit tree species in the area.

Compared with the study done in South-Zimbabwe (Gwaii Working Group 1997), the product extraction calendar (Table 5) of this study indicated that firewood extraction is less concentrated on winter time in our study area than in South-Zimbabwe. In addition, the Gwaii Working Group (1997) study indicated that medicines are mainly used in April (35%) and September (50%) in South-Zimbabwe, whereas in the Mukarakate district the medicine use was more sharply divided into the rainy season and winter months. The main reason for this is the climate. The study area in South-Zimbabwe lies in Natural Region IV and Mukarakate in Natural region II, where the annual rainfall is approximately 400-650 mm and 930 per annum, respectively. An additional reason for the difference

can be that the extraction calendar in South-Zimbabwe was scored by women but the extraction calendar in Mukarakate was scored by men.

The data of this study was collected from the Mukarakate area, which is one of the six areas under six headmen in the Mangwende communal area in North-Eastern Zimbabwe. The general situation in the other five areas differ only slightly from the Mukarakate area. Therefore, the results of this study can be generalised to include at least the whole of the Mangwende communal area. Like communal farmers everywhere else in southern Africa, people in Mukarakate are dependent on resources found on communal lands. It is also evident, that the Mukarakate area, like many other communal areas, has became overcrowded, and severely deforested and degraded due to the long history of dense settlement. Whether this is because of failures in traditional management systems or in state institutions, or both, cannot be said for certain. However, it is evident that the communal management has not been able to solve the problems of unsustainable management of forest and land degradation.

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