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## Evaluation of tree species enumerated in Kitulangalo Mitmiombo plots by uses and benefits

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A study to get peoples' use patterns and perceptions of different tree/shrubs uses and benefits was conducted at Kitulangalo Forest Reserve (Tanzania) in three MITMIOMBO demonstration plots. All trees in the plots were identified by local botanists and verified botanically by experts for easy marching of uses. Guided questions were used to collect data from main stakeholders and local experts. Secondary information was obtained from the existing literature. Ranking was used to analyse species uses/benefits. The highest priority was ranked 5 and lowest 1 while 0 indicated not known. Nine tree species were categorized as most desirable, 45 as desirable species and 18 less desirable ones. Many trees had multiple uses with medicinal use ranking high (87.7%). This was followed by firewood (75.3%), poles (71.2%), food and fodder (61.6%), charcoal (58.9%) and timber (25.7%). Removal of trees for timber, charcoal and fodder are heavily fueled by good infrastructure to the Dar Es Salaam city which provides readily market. The major use (83%) indicated in less desirable tree species was medicinal values. Observations made in this study are specifically for Kitulaghala area and can not be applied in other places as preferences may differ from place to place. However, it provides a guidance of what to be done especially when thinning is considered as one of the management approach in miombo woodland.

Keywords: Kitulangalo, uses and benefits, multiple use

### 1 Introduction

Trees/shrubs have different uses/benefits depending on time, location and culture. Variations in uses of tree products from miombo woodlands depend on the priority of the product in contribution to household economies. For example, Monela et al. (2000) showed that households living in miombo woodlands in Tanzania derive more than 50% of their cash incomes from selling of different forest products such as vegetables, honey, wild fruits, charcoal, firewood and timber. Importance of each of these varies from one local community to another. Increase in population and technology have brought about more variation in uses of miombo trees. Through these, trees which were formally considered not useful in terms of size and quality are presently been taken on board.

There is a very big range of tree uses such that it becomes very difficult to have one tree with only one use. Mbuya et al. (1994) grouped these uses into five use/benefit groups (Table 1).

**Table 1.** Summary uses of trees uses and benefits.

Major group	Uses/benefits
Wood	Firewood, charcoal, timber/furniture, poles/posts, flooring/paneling, roof shingles/ beehives, veneer, tool handles, carvings, utensils, pulp, fiberboard, boat building
Food	fruits/food/nuts, vegetable, flavouring, drink and medicines
Fodder	Fodder and bee forage
Environment	Shade, ornamental, mulch, nitrogen fixation, soil conservation, soil improvement and wind break
Other uses	Fiber/weaving/rope, thatch/roofing/mats, resin/gum/glue/latex, basketry, tannin/ dye, toxin/insecticide, cosmetic/soap/perfume, live fence/dry fencing, ceremonial/ boundary marking, toothbrush/stuffing

**Source:** Mbuya et al. 1994

This causes a very big problem when one needs to categorize or prioritize uses of the same tree. It is also true that the priority use of particular tree in one community may not be the same in another community.

Communities within miombo woodlands have limited alternatives for energy and are also limited in terms of income generation activities. This leads to different experiences in the needs and use of miombo tree species. However, different uses of the woodland may lead to change of the vegetation out of which change in preferences and priorities may occur. To ensure good management and sustainable production in miombo woodlands, one needs to know the priority use of different trees in that particular area. It was the objective of this study to get peoples' experiences, perceptions and use patterns of different tree uses in miombo woodlands at Kitulangalo Forest Reserve. This is very important especially when one considers thinning or removal as one of the management approach. The obtained information will contribute in how the miombo products and services can be optimized and the same time ensure their sustainability and stable ecosystem.

## 2 Methods

### 2.1 Study area

The study was conducted at Kitulangalo Forest Reserve in the three MITMIOMBO demonstration plots. The physical and climatic conditions of Kitulangalo Forest Reserve are as reported elsewhere (Petro et al. 2005).

### 2.2 Data collection

All trees in the demonstration plots were identified by local botanists and marched with botanical identifications. Identification using local botanists was important as local people know the importance of these trees reflected by their physical observation or names. Guided questions were used

to collect data from main stakeholders participating in management of the demonstration plots and some other local experts who are familiar with the forest ecosystem. Secondary information from the existing literature was used to confirm the information.

## 2.3 Data analysis

Ranking was used to analyse species uses/benefits. The highest priority was ranked 5 and the lowest 1 while 0 was used for no particular use. Group consensus was used to attain the end results.

## 3 Observations

Three categories of preferences (most desirable, desirable and less desirable) were used to group uses and benefits. A total of 73 tree and shrubs species were identified in the demonstration plots. Few (9 species) were categorized as most desirable, 46 species as desirable species and 18 as less desirable ones. Just like in many other places, many trees at Kitulangalo demonstration plots do not have one specific use. Luoga (2000) found a total of 133 tree species in Kitulagalo Forest Reserve of which 69% had a variety of uses. There is no formal way of categorizing tree uses within miombo. For example, Luoga (2000) indicates over twelve uses of miombo trees in the Eastern Tanzania. Summary of percentages of trees found in demonstration plots grouped per particular use is as shown (Table 2).

**Table 2.** Percentages of tree species found in MITMIOMBO demonstration plots in different use groups.

Major use	Percentage of total number of tree species
Timber	25.7
Charcoal	58.9
Firewood	75.3
Food and fodder	61.6
Medicines	87.7
Poles	71.2

It is clear that many trees have medicinal values. These are followed by firewood, poles, food and fodder, charcoal and timber. However, these uses do not reflect what is actually happening on the ground. This is due to the fact that for some uses like medicines, food and fodder in many cases it is not the whole plant/tree which is removed but only part or its products. While, for the case of uses like timber and charcoal production whole trees are usually cut. The major tree uses in the area which have considerable impact are extraction for timber, charcoal, firewood and poles. It was observed that priority trees for timber in the area include *Julbernardia globiflora* and *Pterocarpus angolensis* which are very common timber trees within miombo (Frost 1996). High ranking trees for charcoal production include *Julbernardia globiflora*, *Acacia nigrescens*, *Brachystergia spiciformis*, *Brachystergia boehmii* and *Combretum molle*. Rampart use of *Julbernardia globiflora* and *Brachystergia* in charcoal production in miombo woodlands is also reported by Abdallah and Monela (2007). Other tree species heavily extracted for charcoal in miombo include *Pterocarpus angolensis* and *Azelia quanzensis* (Abdallah and Monela 2007). Priority trees for firewood production in Kitulangalo, include *Julbernardia globiflora*, *Brachystergia spiciformis*, *Brchystergia*

*boehmii* and *Combretum molle*. Important trees for poles include *Pterocarpus rotundifolius* var *polynthus* and *Spirostachys africana*. Despite the fact that tree sizes and quality are important factors in allocating different tree species into different uses (Nshubemuki and Mbwambo 2007) this has been changing with time. Because of present technological development many trees of different sizes can now be easily included in charcoal production. This brings about the problem of sorting out particular trees and sizes for charcoal production. At the same time priorities of these species change with time.

It was observed in the study area that the same trees which are heavily removed for charcoal are also removed for fuelwood. Removal of these trees are heavily fueled by the location of this particular area as it is well connected to Dar Es Salaam city which provides readily market for these forest crops. Increasing removal of trees for charcoal, timber and poles have a potential negative effect on the woodland ecosystem. According to Chidumayo (1991) the unique ecosystem of the miombo woodlands is currently undergoing various forms of degradation related to human activity. Of these, charcoaling and fuelwood collection for both domestic and marketing, and land clearing for agriculture rank high.

A few species (18) which have been indicated to be less desirable may actually be very important ecologically. This is because ecological balance in arid and semi-arid environments in which miombo trees are is delicate. Sometimes trees physical uses are not reflected to be related to other growths and associations with the others which may be seen less desirable. As former superior trees get finished people have tendency of going to inferior ones. This means the priority tree for certain use today might not be the same tomorrow. In this category (less desirable) almost none has been indicated to be useful for timber and charcoal. The major use (83%) indicated in the less desirable species was on medicinal values. Use of these trees for the purpose might have no direct impact ecologically and they might fall victims of been first considered for thinning/removal.

## 4 Conclusions

Observations made in this study are specifically for Kitulangalo MITMOMBO demonstration plots area and can not be applied in other places as preferences may differ from place to place. However, it provides a guidance of what one has to expect from miombo woodland areas. In any case application of thinning as one of the management approach has to bear this consideration and approach.

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