

KITULANGALO FOREST RESERVE: AN OVERVIEW

BY
R.E. MALIMBWI

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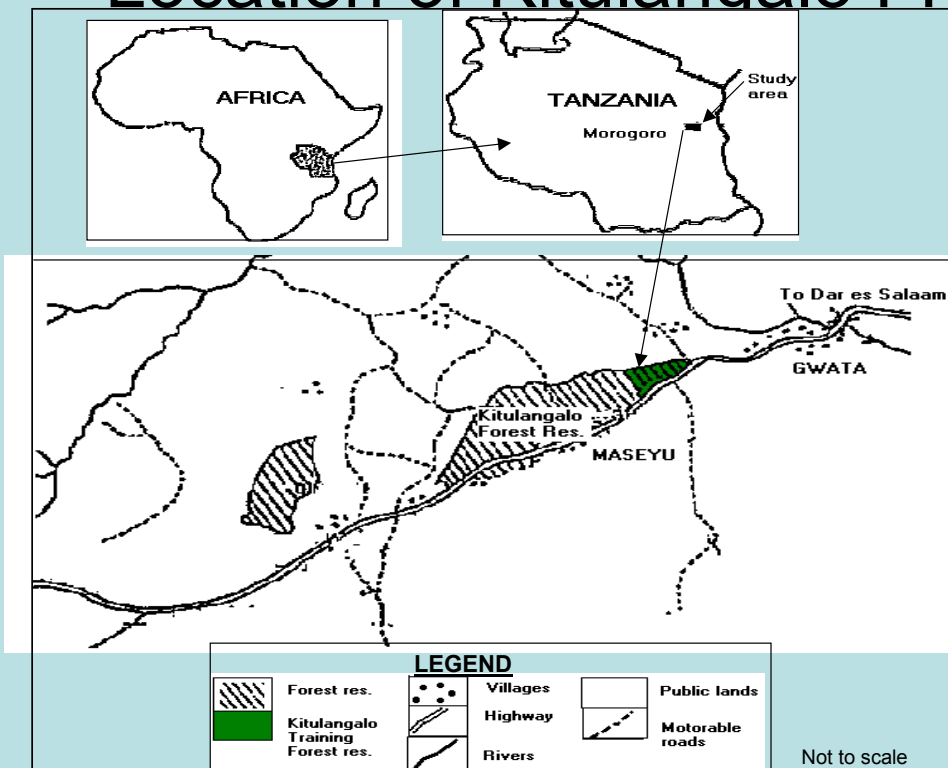
1. INTRODUCTION

- **1.1 General**
- **Tanzania has about 34,368,742.2 hectares of forests and woodlands under the following categories of tenure ;**
 - Central government forest reserves (35.7%) ;
 - Local government forest reserves (4.6%);
 - Private forests(0.12%),
 - Village forest reserves (0.54%) and
 - General land forest - non reserved (59.5)
- **Further be categorized into**
 - *productive* forests 30.6 m ha (88%)
 - *protective*, 3.8 m ha.
- **90% of forest area is miombo woodlands (URT 1998),**
 - provide services and products
 - the rest being plantation and catchment forests.
 - Participatory Forest Management (PFM), encouraged
 - All village forests reserves fall under (PFM)
 - and today there are a total of 994 PFM areas involving 2009 villages with a total area of about 3 m ha.

1.2 Kitulangalo Territorial Forest Reserve

- Productive Forest Reserve now under JFM
- Surrounding villages are Maseyu, Gwata-Ujembe and Lubungo.
- Location- map
- Area 2,637.8 ha (600 ha to SUA).
- Vegetation
 - Woodland (60 per cent)
 - Dry semi-evergreen forest (30 per cent)

Location of Kitulangalo FR



Management of the Forest

- Productive forest reserve
- Management by Regional Catchment Forest Officer Morogoro coordinated by (FBD) in the Ministry of Natural Resources and Tourism.
- Less effective management.
 - Characterized with conflicts between the government agents and the traditional users.
 - Low capacity to successfully guard her forests against encroachment and illegal harvesting.
- Adopted PFM.
- Other forests under PFM are: Mgori forest in Singida region, Duru Haitemba and Ufyomi forests in Babati District and Shume-Magamba (plantation forest) in Lushoto District
- **Rational decisions on management and benefit sharing requires stock assessment**

2. DATA CAPTURE

- Total forest area 2100 ha
- Plot size 0.07 ha
- Number of plots 100
- Sampling intensity 0.33%
- Systematic layout
- The sample plots were concentric, circular with measurements taken as shown in Table 1:

Table 1. Categories of trees measured in the concentric plots

Plot radius (m)	dbh of trees measured (cm)
2	Identification & count of all trees <5
5	5 to 10
10	$10 \geq \text{dbh} \leq 20$
15	$\text{Dbh} > 20$

DATA CAPTURE CONT

- Also recorded: species name (vernacular and later botanical); and total height of sample tree (a tree nearest to the plot center). Other information describing the plot were: ward, village, plot number, slope, vegetation type, and altitude.
- Two distinct strata identified: miombo woodland and semi-evergreen coastal forest
- These were treated as different strata.

Distribution of sample plots according to forest types at Kitulangalo.

Stratum type	Number of sample plots
Miombo woodland	83
Semi-evergreen coastal forest	17

2.2 Data Analysis

- The data analysis involved:
 - development of height/ diam eqn
 - Density i.e. the number of stems per ha (N)
 - Basal area per hectare (Dominance)(G) and
 - Volume per ha (V)
 - Volume equation used
$$Vi = 0.0001di^{2.032} hi^{0.66}$$
- Diversity Indices.
 - Species *Importance Value Index* (IVI)
 - Shannon-Wiener Index of diversity

DIAMETER CLASSES

<u>Size class</u>	<u>Dbh range (cm)</u>
	<u><10</u>
	11-20
	21-30
	31-40
	41-50
	51-60
	61-70
	>70

3 RESULTS, DISCUSSION AND RECOMMENDATIONS

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3.1 Height/diameter equation

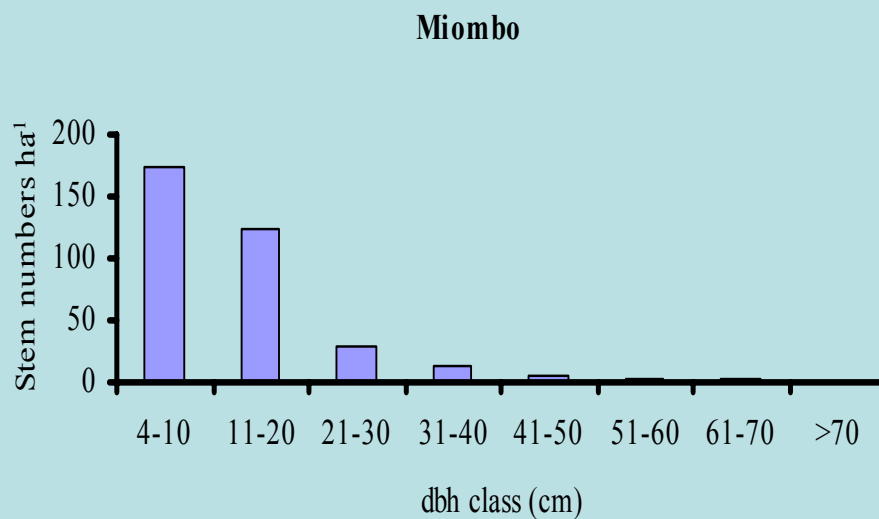
Stratum type	Height diameter equation	R ²	SE	No. of obsvs.
Miombo woodland	$\ln(HT)=0.56+0.6\ln(DBH)$	0.69	1.26	71
Semi-evergreen	$\ln(HT)=0.94\ln(DBH)-0.36$	0.66	0.4	26

3.2 Stand parameters

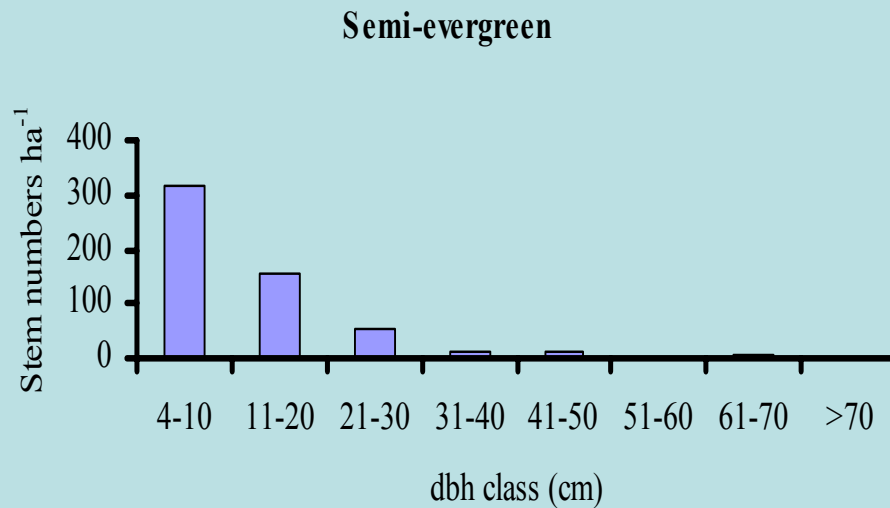
Forest type	Stocking (stems/ha)	Basal area m ² /ha	Volume (m ³ /ha)
Miombo woodland	352±52	8.3±1	64.7±9.4
Semi-evergreen forest	561±122	12.5±2.7	125±53

3.2.1 Stocking

The Semi-evergreen forest has relatively stocking



Stocking cont



Stocking cont

- Stocking in this study 352 and 561 in miombo and semievergreen
- Other studies
 - 1405 and 618 stems ha⁻¹ Forest Reserve and public land
 - Nduwamungu (1996) 691
 - Malaise (1978) 520 to 645 stems ha⁻¹ (Katanga Province)

3.2.2 Regeneration

Miombo 4,637 seedlings from a total of 44 different species

Spp. Code	Local Name	Botanical name	N (stems/ha)
30	Mhondolo	<i>Julbernardia globiflora</i>	1,096
49	Mlama mweusi	<i>Combretum molle</i>	618
17	Mdaa	<i>Euclea divinorum</i>	272
74	Msosoana	<i>Dombeya rotundifolia</i>	253
50	Mlama ng'ombe	<i>Combretum adonogonium</i>	244
8	Kisasa	<i>Acacia goetzei subsp. goetzei</i>	215
19	Mfumbili	<i>Lonchocarpus bussei</i>	197
48	Mlama mwekundu	<i>Combretum zeyheri</i>	197
90	Mzeza	<i>Dalbergia boehmii</i>	159
71	Msinzira	<i>Bridelia cathartica</i>	150
80	Mtogo	<i>Diplorhynchus condylocarpon</i>	141
89	Myombo	<i>Brachystegia boehmii</i>	122
4	Kikulugembe	<i>Dichrostachys cinerea</i>	94

Regen Semiever green

Spp. Code	Local Name	Botanical name	N (stems/ha)
26	Mhande	<i>Scorodophloeus fischeri</i>	5,892
91	Mzindanguruwe	<i>Blighia unijugata</i>	1,752
7	Kisakulasengo	<i>Drypetes gerrardii</i>	1,062
9	Kiweruko	<i>Croton sp.</i>	690
12	Mbeja	<i>Ophopetalus odoratus</i>	265
74	Msosoana	<i>Dombeya rotundifolia</i>	212
13	Mbetamunda	<i>Steculia appendiculata</i>	159
65	Msaluti	<i>Erythroxylum sp.</i>	159
16	Mchalaka	<i>Spirostachys africana</i>	106
Total			10,297

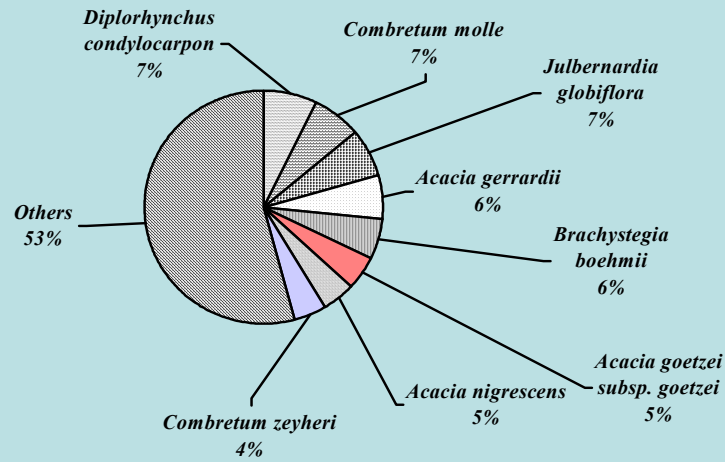
Basal area and wood volume

Forest type	Basal area m ² /ha	Volume (m ³ /ha)
This study		
Miombo woodland	8.3	64.7
Semi-evergreen forest	12.5	125
Other studies		
Malimbwi 2005 (public land)	7	46.2
Malimbwi 2005 (Forest Res	10	78.8
Nduwamungu 1996	10.3	71.2

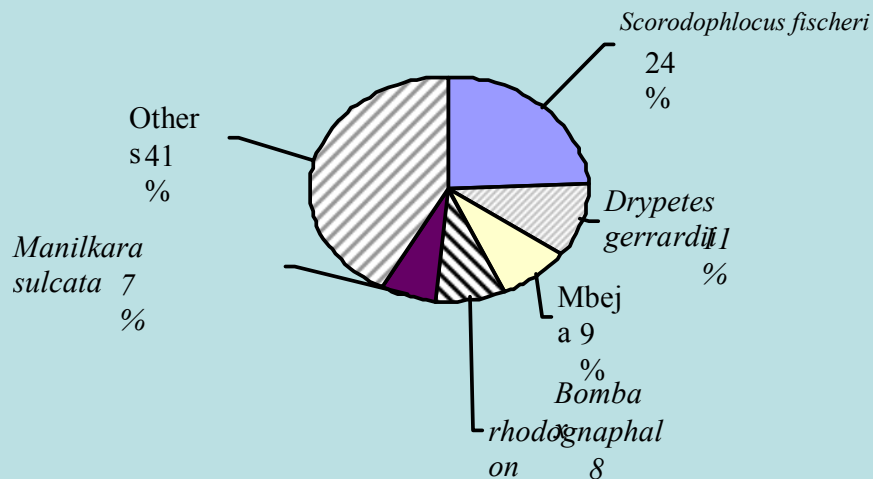
3.2.4 Dominant tree species

- **Miombo woodland**
- a combination of woodland and open deciduous combretum woodland as described by Lovett and Póc's (1993).
- most preferred tree species for charcoal making

IVI in miombo



IVI in semi-ever green



3.3 Local and commercial products from the forest

- Benefits to local people base on socio-economic survey:
 - amelioration of climate,
 - collection of wild honey;
 - hunting of wild animals;
 - lumbering;
 - collection of medicines;
 - collection of wild fruits, mushrooms, vegetables;
 - collection of firewood and charcoal; collection of building poles and rafters, source of water supply, collection of thatching grasses and venue for cultural practices.

Uses that require a considerable amount of wood biomass to be removed from the forest include lumbering, charcoal extraction and harvesting for building poles

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- **3.3.1 Millable timber**
- While nine timber species are found in the miombo vegetation, only five are in the Semi-evergreen forest. These timber species constitute about 18% of 64 m³/ha for the miombo and 35% of 125 m³/ha for the Semi-evergreen forests

Table 6. List of timber species and their location at Kitulangalo Forest Reserve.

Local name	Botanical name	Miombo	Semi-evergreen
Mkongo	<i>Azelia quanzensis</i>	x	x
Mninga	<i>Pterocarpus angolensis</i>	x	
Mpingo	<i>Dalbergia melanoxylon</i>	x	
Mninga maji	<i>Pterocarpus rotundifolius</i>	x	
Mnyenye,	<i>Xeroderris stuhlmannii</i>	x	
Mpilipili	<i>Sorindeia madagascariensis</i>	x	x
Mharaka	<i>Spirostachys africana</i>	x	x
Msufi pori	<i>Bombax rhodognaphalon</i>		x
Msolo	<i>Pseudolachnostylis maprouneifolia</i>	x	
Mkurungo	<i>Terminalia sambesiaca</i>	x	x

HARVESTABLE SIZES

- Minimum sizes based on experience from Rufiji district
- Timber species other than *Dalbergia* 60 cm
- *Dalbergia* 40 cm
 - These minimum timber tree sizes have been adopted but could be reduced to 40 and 25 cm

Annual coupes and allowable cut

- In natural forests it is convenient to work with annual coupes (**AC**)
- **AC** = Area (ha)/ 1/2 rotation age

Vegetation type	Total area (ha)	Felling cycle (yrs)	Annual coupe
Miombo woodland	1,743	30	58
Semi-evergreen forest	357	30	12

Table 8. Harvesting plan for timber species in Kitulangalo forest (2100 ha).

Species name	Rotation age (yrs)	Allowable cut				
		Stems /area	Stems/ Annual coupe	Volume (m ³ /area)	Volume (m ³) /Annual coupe (58 ha)	Utilizable 40% volume (m ³)
Miombo Forest						
Mnyenye (<i>Xeroderris stuhrmannii</i>)	60	1 in 3 ha	19	1.5 (m ³ in 3 ha)	28.5	11.4
Mninga maji (<i>Pterocarpus rotundifolius</i>)	60	1 in 3 ha	19	2 (m ³ in 3 ha)	38	15.2
Mpilipili (<i>Sorindeia nadagarescariensis</i>)	60	1 in 6 ha	10	1.3 (m ³ in 6 ha)	13	5.2
Mkongo (<i>Azelia quanzensis</i>)	60	1 in 6 ha	10	0.6 (m ³ in 6 ha)	6	2.4
Semi-evergreen forest						
Msufi pori (<i>Bombex rhodognaphalon</i>)	60	2 in 1 ha	24	28.3 (m ³ in 1 ha)	339.6	135.8

- Although *Bombax rhodognophalon* has the highest timber volume in the forest its acceptability as timber is low.
- Similar plan for harvesting pole is provided in the main text based on minimum size requirement and species preference

3.3.2 Charcoal extraction

- a major source of employment and income to the Kitulangalo inhabitants
- The surveyed forest reserve has about 33 m³/ha of the preferred tree species and size (>10 cm dbh)
- Assuming
 - conversion factor of fresh wood volume to wood biomass of 0.85
 - kiln efficiency of 19%
 - 33 m³ha⁻¹ (fresh wood) x 0.85 x 0.19 = 5.3 tons per hectare or 5329.5 kgs of charcoal, equivalent to about 97 bags of charcoal per hectare.

4.0 BEEKEEPING POTENTIAL OF KITULANGHALO FOREST RESERVE

- Kitulanghalo woodlands have a close similarity to the Miombo Woodlands in Tabora and these are famous for supporting beekeeping industry.
- Major contrast is the dense grass layer at Kitulanghalo which increases fire risk, may not be favourable to beekeeping.
- In typical Miombo woodland, grass growth is not dense enough to induce fierce fires.
- Cultivated crops around Kitulanghalo notably Simsim *Sesamum indicum*; several species of sorghum; mango and citrus trees provide additional bee forage conducive for beekeeping.
- Experience show that honey hunting is actively taking place in the forest reserve using local technology.
- Regular honey hunters could be persuaded to improve use modern hives which are more productive and less destructive to the trees. A number of *Brachystegia globiflora* trees are regularly ring barked for beehive construction.

5.0. MANAGEMENT INTERVENTIONS TO IMPROVE THE PERFORMANCE OF THE FOREST

- A look at the threats faced by Kitulanghalo Forest Reserve as well as the effectiveness of existing management objectives, hints on management interventions that can be used to enhance sustainability.
- The threats faced include:
 - Over-exploitation of the forest for the provision of building poles, withies, sawn timber, and charcoal.
 - Frequent annual fires resulting from a combination of honey, and wild animal hunting; and reactivation of pastures,
 - Encroachment of portions of the reserve and,
 - Stone mining

MITIGATING INTERVENTIONS

- To establish and or strengthen the reserve boundaries. The genus *Euphorbia* has over 36 species a good proportion of which is fire resistant. As a long term plan, it could serve as boundary trees and live fire breaks
- Advocate early burning
- Zonation of the forest into productive and protective portions in the form of management plans.
- Such zonation is guided by the inventory results as well as terrain classification of the reserve.
- As a rule of thumb, portions of the reserve where the degree of slope is 12% (7°) should be subjected to a minimum or no exploitation. This is intended to maintain the catchment value of such areas
- Follow the recommended harvesting plan
- Location of beekeeping camps in strategic places in the forest reserve and protecting such camps by early burning annually or biannually
- Adhere to the JFM agreement with critical emphasis on modalities of benefit sharing

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Thank you for listening