



Assessment of the biological values of different land cover types in the East Usambara Mountains of Tanzania



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Cover photographs by Charles Leonard From left to right: 1. a sugarcane farmplot that was started to be harvested with a forest patch on the background 2.a photo-mosaic of tea field with forest patch and human settlements

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Tanzania Forest Conservation Group

The Tanzania Forest Conservation Group (TFCG) is a Tanzanian non-governmental organisation that has been promoting the conservation of Tanzania's forests since 1985. TFCG's mission is to conserve and restore the biodiversity of globally important forests in Tanzania for the benefit of present and future generations. We achieve this through capacity building, advocacy, research, community development and protected area management, in ways that are sustainable and foster participation, cooperation and partnership.

TFCG supports field based projects promoting participatory forest management, environmental education, community development, advocacy and research in the Eastern Arc and Coastal Forests. TFCG also supports a community forest conservation network that facilitates linkages between communities involved in participatory forest management. To find out more about TFCG please visit our website www.tfcg.org

TFCG is implementing the Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics project in the East Usambara Mountains.

The World Agroforestry Centre (ICRAF)

ICRAF is an international agroforestry centre with the vision of transforming rural livelihoods in the developing world by increasing the use of trees in agricultural landscapes to improve food security, nutrition, income, health, shelter, energy resources and environmental sustainability.

The mission of ICRAF is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes and to use its research to advance policies and practices that benefit the poor and the environment. ICRAF's goal is to become a partner of choice for a range of scientific and development institutions in their efforts to generate tree-based solutions to the global problems of rural poverty, hunger and environmental degradation.

ICRAF and the Centre for International Forestry Research (CIFOR) jointly lead the Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics project that operates in five sites across the world.

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EXECUTIVE SUMMARY

The East Usambara Mountains of north-east Tanzania are one of the 13 mountain blocks that comprise the Eastern Arc Mountains. The East Usambaras have high concentrations of endemic species including 7 endemic vertebrate species and 40 endemic tree species. However, most of the biodiversity studies in the area have concentrated on the Central Government Catchment Forest Reserves and the Nature Reserves.

This survey was conducted to assess the biological values of different land cover types found in three village landscapes in the East Usambaras by a team of researchers from the Tanzania Forest Conservation Group (TFCG). The survey was conducted as a part of the 'Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics' project, a partnership project between CIFOR and ICRAF, implemented by TFCG in Tanzania. The project was funded by the Swiss Agency for Development and Cooperation.

The survey covered plants, mammals, birds and use of the tree and forest based resources in the village landscapes by the communities. In addition, digital data was collected to validate previously produced land cover maps. Vegetation plots were used to assess plants within the three landscapes. Mammals were mainly assessed by camera trapping method. A combination of methods was used to assess the birds: mist netting and timed-species count methods. Interviews were used to assess resource use by the local people.

The survey team recorded 162 plant species from 67 families across the different land use types in the three village landscapes. The team also recorded 10 mammal species. All the mammal species were recorded in the forests within the village lands. In addition, 88 bird species were recorded in the three village landscapes. The tree-based products that the local communities obtained from village landscapes included local medicines, timber, poles, fuelwoods, fruits and vegetables. A total of 56 species were mentioned to be used by the villagers. Most of them were obtained from the agroforest plots.

The results of the survey indicate that the village landscapes in the East Usambaras support considerable biodiversity resources. These resources are important for conservation and supporting the local livelihoods. Apart from the village forest reserves, the other land use types on village lands, such as agroforests and fallows, support many valuable species that are also found in the forest reserves. Nonetheless few of the East Usambara and Eastern Arc endemic species that are known from the East Usambaras were recorded during the surveys. This highlights the importance of adopting a landscape approach to conservation including both protected areas and land uses such as agroforestry which provide habitat and corridors for some species.

Abbreviations and acronyms

a.s.l	above sea level
CIFOR	Centre for International Forestry Research
DBH	Diameter at Breast Height
FBD	Forestry and Beekeeping Division
FR	Forest Reserve
ICRAF	The World Agroforestry Centre
IUCN	International Union for Conservation of Nature
MTSN	Museo Tridentino di Scienze Naturali, Italy
SDC	Swiss Agency for Development and Cooperation
TFCG	Tanzania Forest Conservation Group
TSC	Timed Species Count
VFR	Village Forest Reserve

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Permission

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Survey team

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Report writing and editing

The report has been written by Charles Leonard and edited by Nike Doggart (TFCG) and Heini Vihemäki (ICRAF). We are also grateful to Salla Rantala from ICRAF and all those who provided advice and help when planning and conducting the survey. *Ahsanteni sana!*

1) Introduction

1.1 Background to the project

This report documents the results of biodiversity surveys carried out in the East Usambara Mountains in Tanzania as a part of the Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics project, also known as Landscape Mosaics project. It is a partnership project between CIFOR and ICRAF, financed by Swiss Agency for Development and Cooperation (SDC). In Tanzania, the project is implemented by the Tanzania Forest Conservation Group (TFCG) in partnership with ICRAF. The purpose of Landscape Mosaics project is to improve the livelihoods of the rural people and contribute to conservation of biodiversity values in the tropical landscape mosaics. The project is a multi-national project involving five selected CIFOR-ICRAF field sites in Africa and Southeast Asia. The botanical survey, transect walk and resource use survey methods have been standardized across the sites.

The biodiversity surveys aimed at assessing the biodiversity of different land cover types and the value of that biodiversity to the local people in the three landscapes of Misalai, Shambangeda and Kwatango villages in the East Usambara Mountains.

1.2 Report structure

The report is organized in seven sections. The report begins with an executive summary followed by an introduction which contains the background of the project and an overview of the East Usambara Mountains. The next five sections provide the results of the surveys on plants, birds, and mammals, the transect walks, as well as the results from the resource use interviews. Each section includes introduction, methodology, results and discussion. The final section includes the conclusions and recommendations of the study.

1.3 An overview of the East Usambara Mountains

The East Usambara Mountains of north-east Tanzania are one of the 13 mountain blocks that comprise the Eastern Arc Mountains. The Eastern Arc is a chain of block-faulted, crystalline mountains under the climatic influence of the Indian Ocean (Lovett, 1985). The East Usambara Mountains extend over an area of 1,082 km² in Korogwe, Muheza and Mkinga districts of Tanga region, between coordinates 4°45' and 5°20' S and between 38°26' and 38°48' E. The mountains are located about 40 km away from the city of Tanga. To the north west of the East Usambara Mountains lie the West Usambara Mountains.

The rainfall distribution is bi-modal, peaking between March and May and between September and December. The dry seasons are from June to August and January to March. Rainfall is greatest at higher altitudes and in the south-eastern part of the mountains, increasing from 1,200 mm annually in the foothills to over 2,200 mm at higher altitudes. The west-facing slopes of the mountains are drier compared to the east-facing slopes due to climatic and topographical interactions. Due to their age, isolation and their role as condensers of the moisture from the Indian Ocean, the East Usambara Mountains support ancient and unique forests, rich in endemic species (Hamilton, 1989).

In the East Usambaras, there are 32 forest reserves including two nature reserves, 10 Central Government Forest Reserves, eighteen Village Forest Reserves and two private forests with a total area of nearly 328 km². The altitude of the East Usambara Mountains ranges from 130 m a.s.l in the lowlands to 1,506 m a.s.l in the highlands (Burgess *et al.*, 2007).

The East Usambara Mountains have the highest number of Eastern Arc endemic/near-endemic trees (40 species) and about 35 Eastern Arc endemic and 42 near endemic vertebrates, excluding fish. In addition there are 7 vertebrate species that are endemic to the East Usambara Mountains (Burgess *et al.*, 2007). An

additional 35 vertebrate species found in the East Usambaras are endemic to the Eastern Arc Mountains and a further 42 vertebrate species have ranges that also extend into the coastal forests and nearby mountain ranges.

The Eastern Arc Mountain forests are the catchment area for the most of the rainfall feeding into the large rivers in the eastern Tanzania. The East Usambara Mountains supply water to Sigi River, a vital source of water for the local communities and the large city of Tanga.

The proportion of recent forest loss in the East Usambara Mountains is quite high compared to other Eastern Arc Mountains of Tanzania. A recent study by Forestry and Beekeeping Division (FBD, 2006) indicates that the forest loss between the 1970s and the early 21st century was 12%. The same study estimates that the woodlands of the East Usambara Mountains have declined from 155 km² to almost 60 km² in the 2000s. A parallel study carried out by Ph.D. Jaclyn Hall with support from TFCG has shown that the rate of forest loss may be even considerably higher. Her data shows a loss of 33 % in the forest cover between 1975 and 2006.

A number of factors have contributed to the loss of forest habitats in the East Usambara. These include forest fires, clearance of forested land for agriculture, commercial fuel wood collection, pitsawing, harvesting for building materials, including poles and timber, and mining.

2) BOTANICAL SURVEYS

2.1 Introduction

The botanical surveys were conducted in the landscapes of Misalai, Shambangeda and Kwatango villages. These areas have not been studied in-depth previously for their biodiversity value. Most surveys have concentrated on the Central Government Catchment Forest Reserves and the Nature Reserves, including intensive biodiversity surveys carried out by Frontier-Tanzania in the 1990s. The aim of the botanical surveys we conducted was to assess the botanical values of different land cover types in terms of plant resources which are important for supporting people's livelihoods and species which are valuable for biodiversity conservation.

2.2 Methods

Twelve 10x200 m vegetation plots were established in the village landscapes of Misalai (four plots), Shambangeda (three plots) and Kwatango (five plots). Within these plots, 1x40 m sub-plots were established for saplings with dbh less than 10 cm, 5x40 m for trees with dbh greater than 10 cm but smaller than 30 cm and 10x200 m for trees with dbh greater than 30 cm. Species identification was done for each individual plant, including trees, saplings, herbs, shrubs and climbers. Also the dbh and height of the plants were recorded. Specimens difficult to identify in the field were collected for further identification in the herbarium.

Out of the twelve vegetation plots established in different land cover types (see appendix 6), three were located within the village forest reserves of Misalai, Shambangeda and Kwatango (one in each village forest reserve); three were within agroforestry sites and two within fallow lands (table 1). In addition, one plot was established in a mosaic of different land cover types, including fallow land, agroforest and monoculture, and another one in a mosaic of monoculture and mixed farming. The remaining two plots were established in an area of mixed farming and within a teak plantation.

Table 1. Frequency of vegetation plots in different land cover types.

Land Cover Type	Number of plots
Forest (within village forest reserves)	3
Agroforestry	3
Fallow land	2
Mosaic of fallow land, agroforestry, mixed farming and/or monoculture	2
Mixed farming	1
Teak plantation	1

Habitat details were recorded at each vegetation plot. These included details of topography, altitude, canopy height, shrub layer, ground layer, aspect, signs of past use and any other feature of interest.

In this study, a herb is defined as any seed-bearing plant which does not have a woody stem. A shrub is defined as a woody plant with a dbh of less than 10 (excluding tree saplings), which may be accompanied with several mainstems arising at or near the ground.

2.3 Results

2.3.1 Number of individual plants recorded

In total, 1,684 plants were found in the twelve vegetation plots established in the three village landscapes studied. Out of these, 8% were trees above 30 cm dbh, 2% were trees ranging dbh of 10-30cm, 35% were saplings (<10 cm dbh), 31% were shrubs, 22% were herbs and 2% were climbers. The numbers of individual plants recorded in each plot are summarized in table 2 below. Details of the location and habitat of the plots are provided in Appendix I.

Table 2. Number of individual plants recorded in the three village landscapes of the East Usambara Mountains.

Site	Land cover type	Number of trees			Number of shrubs	Number of herbs	Number of climbers
		>30 cm dbh	10-30 cm dbh	<10 cm dbh			
Misalai	Forest	26	7	169	128	2	3
	Agroforest	14	5	10	111	17	1
	Fallow land	5	0	4	25	58	22
	Monoculture & Mixed farming	0	1	7	110	39	2
Shambangeda	Forest	23	4	157	3	1	2
	Agroforest	4	2	3	55	67	0
	Fallow land (40%), Agroforest (10%) & Monoculture (50%)	0	3	3	19	57	0
Kwatango	Forest	31	5	72	22	0	2
	Agroforest	2	0	36	2	99	0
	Fallow land	11	2	58	14	4	1
	Mixed farming	6	0	48	32	26	2
	Plantation	10	7	18	3	2	0
Total (% of total)	1,684	132 (8)	36 (2)	535(35)	524 (31)	372 (22)	35(2)

2.3.2 Plant diversity

A total of 162 plant species from 67 families were recorded in different land use/cover types in the three village landscapes (table 3). Out of these, 102 (63%) were tree species, 31 species were herbs (19%), 17 species were shrubs (10%) and 10 species were climbers (6%), and two were ferns.

Table 3. Number of plant families and species recorded in the three village landscapes in the East Usambara Mountains.

Species	Tree	Shrub	Herb	Climber	Ferns	Total
	102	17	31	10	2	162
Families	67					67

Out of the tree species, 58 (57%) species were recorded inside the village forest reserves (table 4). The list includes valuable timber tree species such as *Newtonia buchananii* and *Albizia gummifera*. Twenty four (24%) of the tree species were recorded in the agroforest plots, of which 9 were also recorded in the village forest reserve. Eighteen (18%) of the tree species were recorded in the fallow lands of which three species and

genus *Albizia* were also recorded in the forest reserves. The tree species included *Millettia usaramensis*. Twelve (12%) of the tree species were found in the mixed farming areas, of which one species; *Dialium holtzii* was also recorded in the forest reserves. In the land cover type consisting of a mosaic of fallow land, agroforest and monoculture, three (3%) tree species were recorded, of which none were recorded in the forest. Six (6%) of the tree species were recorded in the monoculture and mixed farming areas, of which none were recorded in the forest. In the teak plantation, twelve (12%) tree species were recorded, of which none were recorded in the forest.

Table 4. Tree species recorded in the landscapes of the East Usambara Mountains.

Vegetation/Land cover type	Number of tree species recorded	Number of tree species also recorded in the forests
Village forest reserves	58	-
Agroforests	24	9
Fallow lands	18	3
Mixed farming plot	12	1
Fallow land, agroforest and monoculture plot	3	0
Monoculture and mixed farming plot	6	0
Plantation	12	0

Out of the shrub species, six (35%) species were recorded inside the village forest reserves (table 5). Seven (41%) species were recorded in the agroforest plots, of which two were also recorded in the village forest reserves. The list includes *Whitfieldia elongata* and *Piper capense*. Five (29%) of the shrub species were recorded in the monoculture and mixed farming plot. Six (35%) of the shrubs were recorded in the fallow lands, one (6%) of the shrubs were recorded in the mosaic of fallow land, agroforest and monoculture plot and one (6%) of the shrub species was found in the mixed farming plot. Of these species, none were recorded in the village forest reserves.

Table 5. Shrub species recorded in the landscapes of the East Usambara Mountains.

Vegetation/Land cover type	Number of shrub species recorded	Number of shrub species also recorded in the forests
Village forest reserves	6	-
Agroforests	7	2
Fallow lands	6	0
Mixed farming plot	1	0
Fallow land, agroforest and monoculture plot	1	0
Monoculture and mixed farming plot	5	0
Plantation	1	0

Out of the herb species, only two species (6%) were recorded in the village forest reserves. Twentytwo (71%) were recorded in the agroforest plots, out of which one was recorded also in the village forest reserves. Eleven herb species (35%) were recorded in the fallow lands, eight (26%) herb species in monoculture and mixed farming plot while four herb species (13%) were recorded in the mixed farming plot, as well as in the mosaic of fallow land, agroforest and monoculture. In the plantation, two herb species were recorded. None of the herb species recorded on the land uses other than agroforests was also recorded in the village forests (table 6).

Table 6. Herb species recorded in the landscapes of the East Usambara Mountains.

Vegetation/Land cover type	Number of herb species recorded	Number of herb species also recorded in the forests
Village forest reserves	2	-
Agroforests	22	1
Fallow lands	11	0
Mixed farming plot	4	0
Fallow land, agroforest and monoculture plot	4	0
Monoculture and mixed farming plot	8	0
Plantation	2	0

In Misalai landscape, 70 plant species were recorded. The list includes valuable timber tree species *Newtonia buchananii*, found in the Misalai Village Forest Reserve (table 7).

Table 7. List of species recorded in different land cover types in Misalai village.

Species	Frequency per land cover type				Uses
	Forest	Agroforest	Fallow land	Monoculture & Mixed farming	
<i>Adenia gummifera</i>	-	-	1	-	
<i>Agelaea pentagyna</i>	1	-	-	-	
<i>Albizia gummifera</i>	6	-	-	-	
<i>Alsodeiopsis schumannii</i>	-	1	-	-	
<i>Aoranche penduliflora</i>	-	1	-	-	
<i>Artocarpus heterophyllus</i>	-	-	1	-	
<i>Asplenium</i> sp	-	37	-	-	Not used
<i>Bersama abyssinica</i>	2	-	-	-	
<i>Bidens pilosa</i>	-	-	1	4	Vegetable
<i>Boehmeria macrophylla</i>	-	19	-	-	Not used
<i>Bridelia micrantha</i>	-	-	4	1	Building poles & fuelwood
<i>Cedrela odorata</i>	-	-	-	1	
<i>Chassalia parvifolia</i>	9	1	-	-	
<i>Cinnamomum</i> sp	-	2	-	14	Spices & fuelwood
<i>Rothea myricoides</i>	-	1	-	-	
<i>Clidemia hirta</i>	-	3	5	-	Not used
<i>Coffea Arabica</i>	-	1	-	-	
<i>Commelina benghalensis</i>	-	-	1	-	
<i>Conyza</i> sp	-	-	34	1	Not used
<i>Costus</i> sp	-	3	-	-	
<i>Culcasia</i> sp	-	-	-	2	
<i>Dasylepis integra</i>	1	-	-	-	
<i>Desmodium repandum</i>	-	2	-	-	

Species	Frequency per land cover type				Uses
	Forest	Agroforest	Fallow land	Monoculture & Mixed farming	
<i>Dissotis rutondifolia</i>	-	-	3		
<i>Dracaena laxissima</i>	5	-	-	-	
<i>Ensete ventricosum</i>	-	1	-	-	
<i>Ficus thonningii</i>	1	1	-	-	
<i>Grevillea robusta</i>	-	-	1	1	
<i>Helichrysum odoratissimum</i>	-	-	1	-	
<i>Hibiscus</i> sp	-	-	-	6	Vegetables
<i>Impatiens</i> sp	-	3	-	-	
<i>Isoglossa lactea</i>	2	1	-	-	
<i>Justicia</i> sp	-	-	2	1	
<i>Landolphia b Buchananii</i>	2	-	-	-	
<i>Lantana camara</i>	-	-	8	36	Not used
<i>Lippia javanica</i>	-	-	-	18	Not used
<i>Macaranga kilimandscharica</i>	4	-	-	-	
<i>Maesa lanceolata</i>	1	-	-	-	
<i>Maesopsis eminii</i>	-	4	-	-	Fuelwood & timber
<i>Manihot esculanta</i>	-	-	-	7	Staple food & vegetable
<i>Milicia excelsa</i>	-	-	2	-	
<i>Myrianthus holstii</i>	8	5	-	-	Fruits are edible
<i>Newtonia b Buchananii</i>	5	-	-	-	
<i>Oplismenus hirtellus</i>	-	2	-	-	
<i>Panicum</i> sp	-	-	1	-	
<i>Panicum trichocladum</i>	-	-	-	1	
<i>Parinari excelsa</i>	4	-	-	-	
<i>Paulinia pinnata</i>	-	-	1	-	
<i>Pavetta abyssinica</i> var. <i>usambarica</i>	2	-	-	-	
<i>Persea americana</i>	-	2	-	2	
<i>Piper capense</i>	9	3	-	-	
<i>Polycias fulva</i>	1	-	-	-	
<i>Pteris</i> sp	-	-	17	29	Not used
<i>Quassia undulata</i>	4	-	-	-	
<i>Rawsonia reticulata</i>	-	2	-	-	
<i>Rothmannia urcelliformis</i>	-	2	-	-	
<i>Rubus</i> sp	-	-	20	-	Fruits are edible
<i>Shirakiopsis elliptica</i>	-	1	1	-	

Species	Frequency per land cover type				Uses
	Forest	Agroforest	Fallow land	Monoculture & Mixed farming	
<i>Solanum terminale</i>	-	1	-	-	
<i>Sorghum</i> sp	-	-	8	-	Staple food
<i>Sorindeia madagascariensis</i>	144	6	-	-	Fruits are edible
<i>Steganotaenia lauraceae</i>	-	-	-	2	
<i>Strembosia scheffleri</i>	1	-	-	-	
<i>Saccharum officinarum</i>	-	-	-	3	
<i>Tabernaemontana pachysiphon</i>	2	-	-	-	
<i>Triumfetta rhomboidea</i>	-	-	2	11	Vegetable
<i>Vernonia lasiopus</i>	-	-	-	15	Not used
<i>Vernonia myriantha</i>	-	-	-	5	Leaves used to cure fever
<i>Whitfieldia</i> sp	114	51	-	-	Used as wathies in house construction
<i>Xymalos monospora</i>	3	2	-	-	

A total of 54 plant species were recorded in the different land cover types in Shambangeda village. The list includes *Allanblackia stuhlmannii*, one of the Eastern Arc near endemic tree species. The species was recorded inside the Shambangeda village forest reserve. Other valuable timber tree species included *Newtonia buchananii* and *Milicia excelsa* (table 8).

Table 8. List of species recorded in different land cover types in Shambangeda village.

Species	Frequency per land cover type			Uses
	Forest	Agroforest	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	
<i>Agelaea pentagyna</i>	1	-	-	
<i>Albizia gummifera</i>	1	-	-	
<i>Allanblackia stuhlmannii</i>	14	-	-	
<i>Ananas comosus</i>	-	1	-	
<i>Antiaris toxicaria</i>	5	-	-	
<i>Artocarpus heterophyllus</i>	-	-	2	
<i>Asplenium</i> sp	1	-	-	
<i>Bidens pilosa</i>	-	14	5	Vegetable
<i>Bridelia micrantha</i>	-	-	3	
<i>Carvalhoa campanulata</i>	2	-	-	
<i>Celtis gomphophylla</i>	2	-	-	
<i>Cephalosphaera usambarensis</i>	16	-	-	
<i>Chrysophyllum gorungosanum</i>	1	-	-	
<i>Rothea myricoides</i>	1	-	-	

Species	Frequency per land cover type			Uses
	Forest	Agroforest	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	
<i>Clidemia hirta</i>	-	1	-	
<i>Conyza sp</i>	-	5	3	Not used
<i>Dracaena laxissima</i>	4	-	-	
<i>Drypetes usambarica</i>	1	-	-	
<i>Erythroxylum emarginatum</i>	1	-	-	
<i>Galiniera saxifrage</i>	1	-	-	
<i>Grevillia robusta</i>	-	3	1	
<i>Ipomoea batatas</i>	-	1	-	
<i>Landolphia buchananii</i>	1	-	-	
<i>Lantana camara</i>		4	-	Stems used as toothbrush.
<i>Leptaulus holstii</i>	1	-	-	
<i>Macaranga kilimandscharica</i>	3	-	-	
<i>Maesopsis eminii</i>	9	-	-	
<i>Manihot esculenta</i>	-	6	3	Staple food & vegetable
<i>Maytenus acuminata</i>	1	-	-	
<i>Mesogyne insignis</i>	8	-	-	
<i>Milicia excelsa</i>	-	5	-	Timber
<i>Mimusops obtusifolia</i>	1	-	-	
<i>Myrianthus holstii</i>	2	-	-	
<i>Newtonia buchananii</i>	2	-	-	
<i>Olyra latifolia</i>	1	-	-	
<i>Parinari excelsa</i>	4	-	-	
<i>Pavetta abyssinica var. usambarica</i>	1	-	-	
<i>Polygala sp</i>	-	1	-	
<i>Polyscias fulva</i>	1	-	-	
<i>Pteris sp</i>	-	44	16	
<i>Quassia undulata</i>	3	-	-	
<i>Rinorea angustifolia</i>	70	-	-	
<i>Rinorea ferruginea</i>	2	-	-	
<i>Rothmannia urcelliformis</i>	1	-	-	To make juice & local beer
<i>Saccharum officinarum</i>	-	39	37	
<i>Synsepalum msolo</i>	2	-	-	Staple food
<i>Sorghum sp</i>	-	-	12	
<i>Sorindeia madagascariensis</i>	12	-	-	

Species	Frequency per land cover type			Uses
	Forest	Agroforest	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	
<i>Stachytapheta jamaicensis</i>	-	1	-	
<i>Tabernaemontana pachysiphon</i>	12	-	-	
<i>Tricalysia pallens</i>	1	-	-	
<i>Trilepisium madagascariensis</i>	1	-	-	
<i>Vepris simplicifolia</i>	1	-	-	Leaves used to cure fever
<i>Vernonia myriantha</i>	-	5	-	-

In Kwatango, 81 plant species were recorded (table 9). The list included an endemic tree species, including *Cynometra engleri* which was found only in the forest. The valuable timber tree species included *Milicia excelsa* and *Pterocarpus tinctorius*. *Milicia excelsa* was found in the fallow land and in the areas where mixed farming was practiced. *Pterocarpus tinctorius* was found in the forest.

Table 9. List of species recorded in different land cover types in Kwatango village.

Species	Frequency per land cover type					Uses
	Forest	Agroforest	Fallow land	Plantation	Mixed farming	
<i>Acalypha neptunica</i>	20	-	-	-	-	
<i>Acalypha volkensii</i>	-	-	31	-	-	Not used
<i>Agelaea</i> sp	1	-	-	-	-	
<i>Albizia adianthifolia</i>	1	-	-	-	-	
<i>Albizia schimperiana</i>	-	-	6	-	-	Timber
<i>Albizia</i> sp	-	-	-	4	1	Not used
<i>Alchornia hirtella</i>	5	-	-	-	-	
<i>Allophylus pervillei</i>	-	-	-	-	2	
<i>Annona senegalensis</i>	-	-	-	1	-	
<i>Annona</i> sp	-	-	1	-	-	
<i>Antiaris toxicaria</i>	-	-	4	-	-	Fuelwood
<i>Blighia unjugata</i>	-	-	1	-	-	
<i>Bosqueiopsis gillettii</i>	8	-	-	-	-	
<i>Bothriocline</i> sp	-	1	-	-	8	
<i>Bosqueopsis gillettii</i>	1	-	-	-	-	
<i>Bridelia micrantha</i>	-	4	-	-	-	
<i>Carpodiptera africana</i>	-	-	-	6	-	Fuelwood
<i>Ceiba pertandra</i>	-	-	2	-	-	
<i>Citrus sinensis</i>	-	2	-	-	-	
<i>Cola clavata</i>	10	-	-	-	-	
<i>Commiphora Africana</i>	-	-	-	2	-	
<i>Conyza</i> sp	-	38	-	-	16	Not used

Species	Frequency per land cover type					
	Forest	Agroforest	Fallow land	Plantation	Mixed farming	Uses
<i>CreMASpora sp</i>	2	-	-	-	-	
<i>Cussonia zimmermanii</i>	-	-	3	2	-	
<i>Cynometra engleri</i>	4	-	-	-	-	
<i>Cynometra sp</i>	13	-	-	-	-	
<i>Deinbollia borbonica</i>	2	1	7	-	-	
<i>Desmodium sp</i>	-	-	-	3	-	
<i>Dialium holtzii</i>	22	-	-	-	6	Fuelwood & poles
<i>Dichapetalum sp</i>	-	-	-	-	2	
<i>Diospyros mespiliformis</i>	10	2	-	-	-	
<i>Dombeya kirkii</i>	-	-	-	7	-	Fuelwood
<i>Dombeya mupangae</i>	-	-	-	-	30	Not used
<i>Drypetes gerrardinooides</i>	1	-	-	-	-	
<i>Elaeis guineensis</i>	-	1	-	-	-	
<i>Emilia sp</i>	-	3	-	-	-	
<i>Erythrococca fischeri</i>	-	-	1	-	-	
<i>Ficus exasperata</i>	-	23	-	-	-	
<i>Fluggea virosa</i>	-	-	3	1	-	
<i>Grewia forbesii</i>	-	-	-	-	1	
<i>Grewia similis</i>	-	-	1	-	-	
<i>Harrissonia abyssinica</i>	-	-	-	2	4	Not used
<i>Hostundia opposite</i>	-	-	2	-	-	
<i>Justicia sp</i>	-	-	3	-	1	
<i>Landolphia buchananii</i>	1	-	-	-	-	
<i>Lansea stuhlmannii</i>	-	-	1	3	-	
<i>Leptactina platyphylla</i>	-	3	-	-	-	
<i>Mangifera indica</i>	-	-	1	-	-	
<i>Manihot esculenta</i>	-	2	-	-	1	
<i>Manilkara sulcata</i>	4	-	-	-	-	
<i>Markhamia sp</i>	1	-	-	-	-	
<i>Milicia excelsa</i>	-	-	7	-	3	Timber
<i>Millettia usaramensis</i>	1	-	1	-	-	
<i>Musa sp</i>	-	5	-	-	-	Fruits
<i>Ochna tomasiana</i>	1	-	-	-	-	
<i>Panicum trichocladum</i>	-	1	1	1	1	
<i>Paulinia pinnata</i>	-	-	1	-	-	
<i>Phyllanthus sp</i>	-	2	-	-	-	
<i>Polysphaera lanceolata</i>	-	-	-	-	21	Fuelwood & poles

Species	Frequency per land cover type					
	Forest	Agroforest	Fallow land	Plantation	Mixed farming	Uses
<i>Pouteria alnifolia</i>	2	-	-	-	-	
<i>Premna sp</i>	-	-	-	-	1	
<i>Pseudobersama mossambicensis</i>	2	-	-	-	-	
<i>Pterocarpus tinctorius</i>	10	-	-	-	-	
<i>Rinorea angustifolia</i>	5	-	--	-	-	
<i>Rothmannia engleriana</i>	2	-	--	-	-	
<i>Rytigynia lichenoxenos</i>	-	-	-	-	8	Fuelwood & poles
<i>Schizogygia coffaioides</i>	9	-	-	-	-	
<i>Sclerochiton sp</i>	2	-	-	-	-	
<i>Cassia abbreviata</i>	-	-	-		2	
<i>Setaria megaphylla</i>	-	-	-	1	-	
<i>Sonchus sp</i>	-	2	-	-	-	
<i>Sterculia appendiculata</i>	-	-	-	-	3	
<i>Stereospermum kunthiomum</i>	-	-	-	2	-	
<i>Strychnos mitis</i>	1		-	-	-	
<i>Tectona grandis</i>	-	-	-	2	-	
<i>Thespesia garckeana</i>	-	1	-	-	-	
<i>Trichillia emetica</i>	-	-	-	4	3	Timber & Fuelwood
<i>Trilepisium madagascariensis</i>	-	1	-	-	-	
<i>Uvaria angolensis</i>	1	-	-	-	-	
<i>Vernonia myriantha</i>	-	-	2	-	-	
<i>Zea mays</i>	-	47	-	-	-	Staple food

2.3.3 Tree regeneration

There were more saplings in the forest than in other land cover types (table 2). In Misalai village forest, most of the saplings recorded were *Sorindeia madagascariensis*. In Shambangeda, *Rinorea angustifolia* dominated. In Kwatango, *Cynometra sp.* and *Diospyros mespiliformis* were the most common ones.

2.4 Discussion

2.4.1 Valuable plant species for conservation

One East Usambara endemic (*Cynometra engleri*) and three Eastern Arc endemic, and seven near endemic plant species were recorded. The Eastern Arc endemics included *Alsodeiopsis schumannii*, *Aorantho penduliflora* and *Drypetes gerrardinoides*. The Eastern Arc near-endemics included *Allanblackia stuhlmannii*, *Carvalhoa campanulata*, *Cephalosphaera usambarensis*, *Dasylepis integra*, *Dialium holtzii*, *Mesogyne insignis* and *Pouteria alnifolia*. In addition, several species are endemic to the Zanzibar Inhambane Regional Mosaic Coastal forest (table 10).

Table 10. Checklist of all the plant species recorded in the East Usambara Mountains.

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Acalypha</i>	<i>volkensii</i>	Pax				X		NES
<i>Acalypha sp</i>			NA	NA	NA	NA		NA
<i>Adenia</i>	<i>gummifera</i>	(Harv.) Harms				X		NES
<i>Agelaea</i>	<i>pentagyna</i>	(Lam.) Baill				X		NES
<i>Agelaea sp</i>			NA	NA	NA	NA		NA
<i>Albizia</i>	<i>adanthifolia</i>	(Schumach.) W.Wright				X		NES
<i>Albizia</i>	<i>gummifera</i>	(J.F.Gmel.) C.A.Sm.				X		NES
<i>Albizia</i>	<i>schimperiana</i>	Oliv. (var.amaniensis)				X		NES
<i>Albizia sp</i>			NA	NA	NA	NA		NA
<i>Alchornea</i>	<i>hirtella</i>	Benth.				X		NES
<i>Allanblackia</i>	<i>stuhlmannii</i>	Engl.			X			VU
<i>Allophylus</i>	<i>pervillei</i>	Blume			ZI			NES
<i>Alsodeiopsis</i>	<i>schumannii</i>	(Engl.) Engl.		X				VU
<i>Ananas</i>	<i>comosus</i>	L. (Mer)				X	X	NES
<i>Annona</i>	<i>senegalensis</i>	Pers.				X		NES
<i>Annona sp</i>			NA	NA	NA	NA		NA
<i>Antiaris</i>	<i>toxicaria</i>	Lesch. ssp. welwitschii var. usambarensis				X		NES
<i>Aorranthe</i>	<i>penduliflora</i>	(K.Schum) Somers		X				VU
<i>Artocarpus</i>	<i>heterophyllus</i>	Lam				X	X	NES
<i>Asplenium sp</i>			NA	NA	NA	NA		NA
<i>Thespesia</i>	<i>garckeana</i>	(F. Hoffm.) Excell & Hillcoat				X		NES
<i>Bersama</i>	<i>abyssinica</i>	Fresen.						NES
<i>Bidens</i>	<i>pilosa</i>	L.				X		NES
<i>Blighia</i>	<i>unijugata</i>	Baker				X		NES
<i>Boehmeria</i>	<i>macrophylla</i>	Hornem.				X		NES
<i>Bosqueiopsis</i>	<i>gilletii</i>	De Wild. & T.Durand						NES
<i>Bothriocline sp</i>			NA	NA	NA	NA		NA

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Bridelia</i>	<i>micrantha</i>	(Hochst.) Baill.				X		NES
<i>Carvalhoa</i>	<i>campanulata</i>	K. Schum.			X			NES
<i>Carpodiptera</i>	<i>africana</i>	Mast.			ZI			NES
<i>Cassia</i>	<i>abbreviata</i>	Oliv.						NES
<i>Cedrela</i>	<i>odorata</i>	L.				X	X	VU
<i>Ceiba</i>	<i>pentandra</i>	L.				X	X	NES
<i>Celtis</i>	<i>gomphophylla</i>	Baker						NES
<i>Cephalosphaera</i>	<i>usambarensis</i>	(Warb.) Warb.			X			VU
<i>Chassalia</i>	<i>parvifolia</i>	K.Schum.				X		NES
<i>Chrysophyllum</i>	<i>gorungosanum</i>	Engl.				X		NES
<i>Cinnamomum sp</i>			NA	NA	NA	NA		NA
<i>Citrus</i>	<i>sinensis</i>	(L.) Osbeck				X	X	NES
<i>Clidemia</i>	<i>hirta</i>	L. D. Don						NES
<i>Coffea</i>	<i>arabica</i>	L.				X	X	
<i>Cola</i>	<i>clavata</i>	Mast.			ZI			DD
<i>Commelina</i>	<i>benghalensis</i>	Wall.				X		
<i>Commiphora</i>	<i>africana</i>	(A.Rich.) Engl.				X		NES
<i>Conyza sp</i>			NA	NA	NA	NA		NA
<i>Costus sp</i>			NA	NA	NA	NA		NA
<i>Cremaspora sp</i>			NA	NA	NA	NA		NA
<i>Culcasia sp</i>			NA	NA	NA	NA		NA
<i>Cussonia</i>	<i>zimmermannii</i>	Harms			ZI	X		LC
<i>Cynometra</i>	<i>engleri</i>	Harms	X					VU
<i>Cynometra sp</i>			NA	NA	NA	NA		NA
<i>Dasylepis</i>	<i>integra</i>	Warb.			X			VU
<i>Deinbollia</i>	<i>borbonica</i>	Scheffler				X		NES
<i>Desmodium</i>	<i>repandum</i>	(Vahl) DC.				X		NES
<i>Desmodium sp</i>			NA	NA	NA	NA		NA
<i>Dialium</i>	<i>holtzii</i>	Harms			X			VU

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Dichapetalum sp</i>			NA	NA	NA	NA		NA
<i>Diospyros</i>	<i>mespiliformis</i>	Harms				X		NES
<i>Dissotis</i>	<i>rotundifolia</i>	(Sm.) Triana				X		NES
<i>Dombeya</i>	<i>kirkii</i>	Mast.				X		NES
<i>Dombeya</i>	<i>mupangae</i>	K.Schum.				X		NES
<i>Dracaena</i>	<i>laxissima</i>	Engl.				X		NES
<i>Drypetes</i>	<i>usambarica</i>	(Pax) Hutch.			ZI			NES
<i>Drypetes</i>	<i>gerrardinoides</i>	Radcl.-Sm		X				VU
<i>Elaeis</i>	<i>guineensis</i>	Jacq.				X		NES
<i>Emilia sp</i>			NA	NA	NA	NA		NA
<i>Ensete</i>	<i>ventricosum</i>	(Welw.) Cheesman				X		NES
<i>Erythrococca</i>	<i>fischeri</i>	Pax						NES
<i>Erythroxyllum</i>	<i>emarginatum</i>	Thonn.				X		NES
<i>Ficus</i>	<i>exasperata</i>	Vahl				X		NES
<i>Ficus</i>	<i>thonningii</i>	Blume				X		NES
<i>Flueggea</i>	<i>virosa</i>	(Willd.) Voigt				X		NES
<i>Galiniera</i>	<i>saxifraga</i>	(Hochst.) Bridson				X		NES
<i>Grevillea</i>	<i>robusta</i>	A. Cunn. ex R.Br.				X	X	NES
<i>Grewia</i>	<i>forbesii</i>	Harv. ex Mast.				X		NES
<i>Grewia</i>	<i>similis</i>	K.Schum.				X		NES
<i>Harrisonia</i>	<i>abyssinica</i>	Oliv.				X		NES
<i>Helichrysum</i>	<i>odoratissimum</i>	(L.) Less.				X		NES
<i>Hibiscus sp</i>			NA	NA	NA	NA		NA
<i>Hoslundia</i>	<i>opposita</i>	vahl				X		NES
<i>Impatiens sp</i>			NA	NA	NA	NA		NA
<i>Ipomoea</i>	<i>batatas</i>	(L.) Lam.				X	X	NES
<i>Isoglossa</i>	<i>lactea</i>	Lindau ex Engl.				X		NES
<i>Justicia sp</i>			NA	NA	NA	NA		NA
<i>Landolphia</i>	<i>buchananii</i>	(Hallier f.) Stapf				X		NES

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Lannea</i>	<i>stuhlmannii</i>	(Engl.) Engl.				X		NES
<i>Lantana</i>	<i>camara</i>	L.				X	X	NES
<i>Leptactina</i>	<i>platyphylla</i>	(Hiern) Wernham				X		NES
<i>Leptaulus</i>	<i>holstii</i>	(Engl.) Engl.				X		NES
<i>Lippia</i>	<i>javanica</i>	(Burm.f.) Spreng.				X		NES
<i>Macaranga</i>	<i>kilimandscharica</i>	Pax				X		NES
<i>Maesa</i>	<i>lanceolata</i>	Forssk.				X		NES
<i>Maesopsis</i>	<i>eminii</i>	Engl.					X	NES
<i>Mangifera</i>	<i>indica</i>	L.				X	X	DD
<i>Manihot</i>	<i>esculenta</i>	L.				X	X	NES
<i>Manilkara</i>	<i>sulcata</i>	(Engl.) Dubard			ZI*			NES
<i>Markhamia sp</i>			NA	NA	NA	NA		NA
<i>Maytenus</i>	<i>acuminata</i>	(L.f.) Loes.				X		NES
<i>Mesogyne</i>	<i>insignis</i>	Engl.			X			VU
<i>Milicia</i>	<i>excelsa</i>	(Welw.) C.C.Berg				X		LR/NT
<i>Millettia</i>	<i>usaramensis</i>	Taub.				X		NES
<i>Mimusops</i>	<i>obtusifolia</i>	Lam.						NES
<i>Musa sp</i>			NA	NA	NA	NA		NA
<i>Myrianthus</i>	<i>holstii</i>	Engl.				X		NES
<i>Newtonia</i>	<i>buchananii</i>	(Baker) G.C.C.Gilbert & Boutique				X		NES
<i>Ochna</i>	<i>thomasiana</i>	Engl. & Gilg ex Engl.			ZI			NES
<i>Olyra</i>	<i>latifolia</i>	L.				X		NES
<i>Oplismenus</i>	<i>hirtellus</i>	(L.) P.Beauv.				X		NES
<i>Panicum</i>	<i>trichocladum</i>	K.Schum.				X		NES
<i>Panicum sp</i>			NA	NA	NA	NA		NA
<i>Parinari</i>	<i>excelsa</i>	Sabine				X		NES
<i>Paullinia</i>	<i>pinnata</i>	L.				X		NES
<i>Pavetta</i>	<i>abyssinica</i>	var. <i>usambarica</i> (Bremek) Bridson				X		VU?

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Persea</i>	<i>americana</i>	Mill.				X	X	NES
<i>Phyllanthus sp</i>			NA	NA	NA	NA		NA
<i>Piper</i>	<i>capensis</i>	L.f.				X		NES
<i>Polygala sp</i>			NA	NA	NA	NA		NA
<i>Polyscias</i>	<i>fulva</i>	(Hiern) Harms				X		NES
<i>Polysphaeria</i>	<i>lanceolata</i>	Hiern				X		NES
<i>Pouteria</i>	<i>alnifolia</i>	(Baker) Roberty			X			NES
<i>Premna sp</i>			NA	NA	NA	NA		NA
<i>Pseudobersama</i>	<i>mossambicensis</i>	(Sim) Verdc.			ZI	X		NES
<i>Pteris sp</i>			NA	NA	NA	NA		NA
<i>Pterocarpus</i>	<i>tinctorius</i>	Welw.				X		NES
<i>Quassia</i>	<i>undulata</i>	(Guill. & Perr.) D.Dietr.				X		NES
<i>Rawsonia</i>	<i>reticulata</i>	Gilg				X		LR/CD
<i>Rinorea</i>	<i>angustifolia</i>	(Thouars) Baill.						NES
<i>Rinorea</i>	<i>ferruginea</i>	Engl.			ZI	X		NES
<i>Rothea</i>	<i>myricoides</i>	(Hochst.) D.A. Steane & Mabb.				X		
<i>Rothmannia</i>	<i>urcelliformis</i>	(Hiern) Robyns				X		NES
<i>Rothmannia</i>	<i>engleriana</i>	K.Schum						
<i>Rubus sp</i>			NA	NA	NA	NA		NA
<i>Rytigynia</i>	<i>lichenoxenos</i>	(K.Schum.) Robyns						
<i>Saccharum</i>	<i>officinarum</i>	L.				X	X	NES
<i>Schizogygia</i>	<i>coffaeoides</i>	Baill.						NES
<i>Sclerochiton sp</i>			NA	NA	NA	NA		NA
<i>Setaria</i>	<i>megaphylla</i>	(Steud.) T.Durand & Schinz				X		NES
<i>Shirakiopsis</i>	<i>elliptica</i>	(Hochst.) Kruijt						NES
<i>Solanum</i>	<i>terminale</i>	Forssk.						NES
<i>Sonchus sp</i>			NA	NA	NA	NA		NA
<i>Sorghum sp</i>			NA	NA	NA	NA		NA

Genus	Species	Author	East Usambara Endemic	Eastern Arc endemic	Eastern Arc near-endemic	Wide spread	Exotic	IUCN Threatened status
<i>Sorindeia</i>	<i>madagascariensis</i>	DC.				X		NES
<i>Stachytarpheta</i>	<i>jamaicensis</i>	L.				X		NES
<i>Steganotaenia</i>	<i>lauraceae</i>	?						
<i>Sterculia</i>	<i>appendiculata</i>	K.Schum. ex Engl.			ZI			NES
<i>Stereospermum</i>	<i>kunthianum</i>	Cham.				X		NES
<i>Strombosia</i>	<i>scheffleri</i>	Engl.				X		NES
<i>Strychnos</i>	<i>mitis</i>	S.Moore				X		NES
<i>Synsepalum</i>	<i>msolo</i>	(Engl.) Pennington				X		NES
<i>Tabernaemontana</i>	<i>pachysiphon</i>	Stapf				X		NES
<i>Tectona</i>	<i>grandis</i>	L.				X	X	NES
<i>Tricalysia</i>	<i>pallens</i>	Hiern				X		NES
<i>Trichilia</i>	<i>emetica</i>	Vahl				X		NES
<i>Trilepisium</i>	<i>madagascariensis</i>	DC.				X		NES
<i>Triumfetta</i>	<i>rhomboidea</i>	Jacq.				X		NES
<i>Uvaria</i>	<i>angolensis</i>	Welw. ex Oliv				X		NES
<i>Vepris</i>	<i>simplicifolia</i>	(Verdoorn) Mziray				X		NES
<i>Vernonia</i>	<i>lasiopus</i>	O.Hoffm.				X		NES
<i>Vernonia</i>	<i>myriantha</i>	Hook.f.				X		NES
<i>Whitfieldia</i>	<i>elongata</i>	(Beauv.) C.B.Cl.				X		NES
<i>Xymalos</i>	<i>monospora</i>	(Harv.) Warb.				X		NES
<i>Zea</i>	<i>mays</i>	L.				X	X	NES

Key to Table 10

NES - No Evaluation status, NA - Not Applicable, VU – Vulnerable
 NT – Near threatened, DD – Data deficient, LR/NT – Lower risk/near threatened
 LR/CD – Lower risk/conservation dependant
 X - Status applies
 ZI - Endemic to Zanzibar Inhambane Regional Mosaic Coastal forest.
 ZI* - All collections are ZI except one from Mandera region of Kenyas

In addition, fourteen of the tree species were found both in the village forest reserves and in other land use types, including agroforests and fallow lands. These included *Millettia usaramensis*, *Dialium holtzii*, *Ficus thonningii*, *Deinbollia borbonica*, *Diospyros mespiliformis* and trees of the genus *Albizia*.

The presence of East Usambara endemic and threatened plant species in the village forest reserves shows that these forests play an important role in the conservation of the region's unique and threatened biodiversity. In addition, the trees in the Village Forest Reserves are used by the local people for various purposes, e.g. for timber, poles, local medicines and fruits. This is discussed in detail in the Resource Use Survey in section six of this report.

The study also recorded several valuable species in other land cover types than the village forest reserve. For instance, some important timber tree species, including *Milicia excelsa*, were recorded in fallow lands, agroforest plots and mixed farming areas. The trees are either sold outside the village or utilized by the villagers. Furthermore, the existence of these tree species outside the forest reserves shows that also the non-reserved areas in the landscapes support valuable tree resources. Hence, while planning conservation strategies, the management of the tree resources outside the forest reserves should be addressed.

2.4.2 Other potential plant resources

Food and cash crops were recorded in several land use types including agroforest, mixed farming, monoculture and fallow land. Plant resources which were mentioned by the respondents to be used for food ranged from tubers and stems to fruits and seeds. The plants used for food included cassava (*Manihot esculenta*), sugarcane (*Saccharum officinarum*), maize (*Zea mays*) and banana (*Musa* sp.). Cash crops cultivated included cardamom (*Elettaria cardamomum*), cinnamon (*Cinnamomum* sp.), clove and sugarcane.

Most of the food and cash crops co-existed with other plants, including timber trees growing in the agroforests and fallow lands. The local people also used the tree resources in these areas to get different products, such as firewood and timber.

3) Transect walks

3.1 Introduction

The aim of conducting the transect walks was to provide data to validate the preliminary land cover maps produced from the interpretation of the satellite images.

3.2 Methods

The first task was to identify and define the key land cover types. This was done in the field through rapid surveys and by using the project's draft land cover maps. The list of land cover types identified is attached as Appendix 6.

Secondly, the transects were located in the field by using the land cover maps and also through discussions with local informants. This was to ensure that the transects will cover an inclusive range of different land cover types, such as village forests, plantations, tea estates, and agroforests.

At each site, straight line transects of one kilometer in length and ten meters wide were conducted (table 11). In total, eight hectares were covered by the transects. Only two transects were conducted in Shambangeda and Misalai landscapes because these areas were not large enough to be surveyed by more than two transects. Four transects were conducted in Kwatango. After each 50 m, the land cover type was recorded within the quadrat of 10 m around the point. At each of these points, where possible, a GPS reading was taken. Photos were also taken at each point. Semi-structured interviews were conducted with local informants whilst walking the transects in order to understand the land cover types. In addition, local names for common plant species were recorded.

Table 11. Number of transects conducted in the East Usambaras.

Village landscape	Number of transects
Misalai	2
Shambangeda	2
Kwatango	4
Total	8

3.3 Results

The land cover types recorded every after 50m section are presented in Appendix 3. In summary, each transect was characterized by having at least three land use types, including agroforests, fallow lands, tea fields, mixed farming sites and monoculture plots.

3.4 Discussion

Most of the fallow lands were recorded adjacent to agroforest, mixed farming sites or monoculture plots suggesting that the fallow lands were used for farming activities previously. The local informants mentioned that most villagers in the area practice shifting cultivation whereby a previously cultivated area is left fallow to return its fertility.

4) Birds

4.1 Introduction

The East Usambara Mountains contain six out of the 19 Eastern Arc endemic bird species and 13 out of 26 near endemic species (Burgess *et al.*, 2007). No single-block endemic bird species have been reported in the East Usambara Mountains (Baker and Baker, 2002).

Birds of the Eastern Arc Mountains are amongst the best studied taxa, as it is the case with other parts of the world. The East Usambara Mountains are one of the most studied mountain blocks in Tanzania. However, most of the studies were confined to the sites which are managed by the central government authorities.

The village landscapes visited during this survey are part of the East Usambara Important Bird Area (Baker and Baker, 2002).

4.2 Methods

Two methods were used to assess the bird fauna of the three village landscapes: Mist netting and Timed Species Count (TSC). The surveys were conducted in the vicinity of the vegetation plots.

4.2.1 Mist netting

Ten nets (five 12 m long and five 10 m long) were placed in a continuous line in each of the three sites for three days. The nets were opened early in the morning, checked frequently throughout the day and closed at dusk. Netting sites were at the vicinity of the vegetation plots in the village forest reserves.

Each captured bird was identified and morphometric measurements were taken including weight, bill, tarsus, wing and tail. Where possible, sex and age were also recorded. Each capture was marked by a marker pen on the bill, as this made it easy to recognise recaptures thus avoiding repeating records of the same bird. Two bird species were recaptured in Misalai: Olive sunbird and Little Greenbul (twice).

4.2.2 Timed Species Count

The field team walked quietly for a period of 60 minutes at each vegetation plot in the morning, stopping frequently to identify and record all birds seen or heard calling. Approximately an area of 1 km² was covered at each site. Notes were recorded in a notebook in order to compile a species list.

4.3 Sampling intensity

The bird survey work was carried out by Victor Mkongewa, a field ornithologist; in three village landscapes of Misalai, Shembangeda and Kwatango. Timed Species Counts were conducted in nine vegetation plots while mist netting was conducted in the vicinity of the three vegetation plots which were established in the forests. Timed species counts were conducted in the vegetation plots with the following coordinates in Misalai between 15/02 – 16/02/2009: 0459964/9446401; 0459623/9444539 and 0459039/9443745 while mist netting was conducted at 0458902/9445582 between 3/11 – 5/11/2008 (Table 7). All sites were situated between 958 and 1212 m a.s.l. For Shembangeda landscape, TSC was conducted between 17/02 – 18/02/2009 at 0458710/9440288 and 0458786/9442508 while mist netting was conducted at 0459231/9440838 between 25/10 – 28/10/2008, altitude ranged from 887 to 971 m a.s.l. In Kwatango village landscape, TSC was carried out at altitudinal variation of 178 to 233 m a.s.l. between 19/02 – 20/02/2009 at 0470734/9446282, 0470745/9447458, 0471931/9443422 and 0471310/9445254 while mist netting was conducted between 30/10 – 01/11/2008 at 0469746/9446451.

A total of ten mist nets (five were 12 m long and the other five were 10 m long) were placed in the three landscapes for a total period of nine days giving an average of 1320 net meter hours per full day of mist netting in each landscape (table 12). All of the mist netting was carried out within the Village Forest Reserves whereas the timed species counts were made outside of the VFRs.

Table 12. Summary for sampling intensity for bird survey.

Village landscape	Total net meter hours	Number of TSC days	Altitudinal range (m a.s.l)	Period (mist netting and TSC respectively)
Misalai	3960	2	958 – 1212	3/11 – 5/11/2008 and 15/02 – 16/02/2009
Shambangeda	3960	2	887 – 971	25/10 – 28/10/2008 and 17/02 – 18/02/2009
Kwatango	3960	2	178 – 233	30/10 – 01/11/2008 and 19/02/ - 20/02/2009

4.4 Results

A total of 88 bird species were recorded through mist netting and Timed Species Counts in the three village landscapes of Misalai, Shambangeda and Kwatango in the East Usambara Mountains. The species are listed in table 13.

Table 13. Checklist of bird species from three village landscapes in the East Usambara Mountains.

Species	Common name	Forest Dependency	Range	Threat Status (March 2009)	Shambangeda	Misalai	Kwatango
<i>Accipiter tachiro</i>	African goshawk	F	W	LC		1	
<i>Alethe fuelleborn</i>	White chested alethe	FF	W		1		
<i>Andropadus masukuensis</i>	Shelley's greenbul	FF	EA N	LC	1	1	
<i>Andropadus striifaces</i>	Stripe-checked greenbul	FF	W		1		
<i>Andropadus virens</i>	Little greenbul	F	W	LC	1	1	1
<i>Anthreptes collaris</i>	Collared sunbird	F	W	LC	1	1	1
<i>Anthreptes neglectus</i>	Uluguru violet backed sunbird	F	W	LC		1	
<i>Anthreptes pallidigaster</i>	Amani sunbird	F	EA N	EN	1		
<i>Anthreptes rubritorques</i>	Banded green sunbird	FF	EA E	VU	1	1	
<i>Apalis melanocephala</i>	Black headed apalis	FF	W	LC		1	
<i>Aplopelia larvata</i>	Lemon dove	FF	W	LC	1		
<i>Apus affinis</i>	Little swift	O	W	LC			1
<i>Artisornis moreaui</i>	Long-billed tailorbird	F	EA N	CR		1	
<i>Batis mixta</i>	Forest batis	FF	EA N	LC	1		

Species	Common name	Forest Dependency	Range	Threat Status (March 2009)	Shambangeda	Misalai	Kwatango
<i>Bias musicus</i>	Black- and -white shrike-flycatcher	O	W	LC		1	
<i>Bradypterus lopezi</i>	Evergreen forest warbler	FF	W	LC	1	1	
<i>Buteo oreophilus</i>	Mountain buzzard	F	W	LC		1	1
<i>Bycanistes brevis</i>	Silvery-cheeked hornbill	FF	W	LC	1	1	1
<i>Bycanistes bucinator</i>	Trumpeter hornbill	F	W	LC	1	1	
<i>Camaroptera brachyura</i>	Grey -backed camaroptera	F	W	LC	1		1
<i>Centropus superciliosus</i>	White-browed coucal	O	W	LC	1	1	1
<i>Cercococcyx montanus</i>	Barred Long-tailed cuckoo	F	W	LC		1	
<i>Ceuthmochares aereus</i>	Yellowbill	F	W	LC			1
<i>Chrysococcyx cupreus</i>	African emerald cuckoo	F	W	LC		1	1
<i>Chrysococcyx klaas</i>	Klaas's cuckoo	F	W	LC		1	1
<i>Circaetus fasciolatus</i>	Southern banded snake eagle	F	W	NT	1		
<i>Cisticola erythropus</i>	Red- faced cisticola	O	W	LC	1	1	1
<i>Colius striatus</i>	Speckled mousebird	O	W	LC	1	1	1
<i>Columba delegorguei</i>	Eastern bronze-naped pigeon	F	W	LC		1	1
<i>Coracina caesia</i>	Grey cuckoo-shrike	FF	W	LC	1	1	
<i>Cossypha heuglini</i>	White-browed robin chat	O	W	LC		1	
<i>Cryptospiza reichenovii</i>	Red faced crimsonwing	FF	W	LC		1	
<i>Dicrurus adsimilis</i>	Fork tailed drongo	F	W	LC		1	1
<i>Dicrurus ludwigii</i>	Square tailed drongo	FF	W	LC	1	1	1
<i>Dryoscopus cubla</i>	Black-backed puffback	F	W	LC	1		1
<i>Emberiza affinis</i>	Cabanis bunting	O	W	LC		1	
<i>Estrilda astrild</i>	Common waxbill	F	W	LC		1	
<i>Euplectes capensis</i>	Yellow bishop	O	W	LC			1
<i>Gypohierax angolensis</i>	Pulm-nut vulture	O	W	LC			1
<i>Halcyon leucocephala</i>	Grey headed kingfisher	O	W	LC		1	1
<i>Hypargos margaritatus</i>	Peters' twin-spot	F	W	LC		1	
<i>Ispidina lecontei</i>	African Pygmy Kingfisher	O	W	LC			1
<i>Ispidina picta</i>		O	W	LC	1		
<i>Lamprotomis corruscus</i>	Black- bellied starling	F	W		1		1
<i>Laniarius aethiopicus</i>	Tropical boubou	F	W	LC	1	1	1
<i>Lanius collaris</i>	Common fiscal	O	W	LC		1	1
<i>Lonchura bicolor</i>	Black-and-white mankin	O	W	LC		1	1

Species	Common name	Forest Dependency	Range	Threat Status (March 2009)	Shambangeda	Misalai	Kwatango
<i>Lophaetus occipitalis</i>	Long-crested eagle	O	W	LC	1	1	1
<i>Malaconotus nigrifrons</i>	Black-fronted bush-shrike	FF	W			1	
<i>Nectarinia bifasciata</i>	Purple banded Sunbird	O	W	LC	1	1	1
<i>Nectarinia olivacea</i>	Olive Sunbird	F	W	LC	1	1	1
<i>Neocossyphus rufus</i>	Red- tailed Ant-thrush	FF	W	LC			1
<i>Nicator gularis</i>	Eastern Nicator	F	W	LC		1	1
<i>Numida meleagris</i>	Helmeted Guineafowl	F	W	LC			1
<i>Ploceus baglafect</i>	Baglafaecht Weaver	O	W				1
<i>Ploceus bicolor</i>	Dark backed Weaver	F	W	LC			1
<i>Ploceus cucullatus</i>	Black headed Weaver	O	W	LC			1
<i>Ploceus subaureus</i>	African Golden Weaver	O	W	LC			1
<i>Ploceus xanthops</i>	Golden Weaver	O	W	LC			1
<i>Oriolus chlorocephalus</i>	Green- headed Oriole	O	W		1		
<i>Phyllastrephus debilis</i>	Tiny Greenbul	FF	W	LC	1		
<i>Phyllastrephus flavostriatus</i>	Yellow- streaked Greenbul	FF	W	LC	1	1	
<i>Platysteira peltata</i>	Black-throated Wattle-eye	F	W	LC	1		
<i>Ploceus bicolor</i>	Dark -backed Weaver	F	W	LC	1		
<i>Ploceus ocularis</i>	Spectacled Weaver	O	W	LC		1	
<i>Poeoptera kenricki</i>	Kenrick's Starling	F	EA N	LC			1
<i>Pogonocichla stellata</i>	White-starred forest Robin	FF	W	LC		1	
<i>Polyboroides typus</i>	African harrier Hawk	F	W	LC	1		1
<i>Prinia subflava</i>	Tawny flanked Prinia	O	W	LC	1	1	1
<i>Psalidoprocne holomelas</i>	Black saw-wing	O	W				
<i>Pycnonotus barbatus</i>	Common Bulbul	O	W	LC	1	1	1
<i>Saxicola torquata</i>	Common Stonechat	O	W	LC		1	
<i>Serinus cirrinelloides</i>	African Cirtil	O	W			1	1
<i>Serinus mozambicus</i>	Yellow fronted Canary	O	W	LC	1	1	1
<i>Stactolaema leucotis</i>	White-eared Barbet	O	W	LC	1	1	1
<i>Stactolaema olivacea</i>	Green Barbet	F	EA N	LC	1	1	1
<i>Stephanoaetus coronatus</i>	African crowned Eagle	FF	W	LC	1	1	1
<i>Streptopelia semitorquata</i>	Red-eyed Dove	F	W	LC		1	1
<i>Tauraco fischeri</i>	Fisher's turaco	FF	W	NT	1	1	1
<i>Tchagra australis</i>	Brown-crowned Tchagra	O	W	LC		1	

Species	Common name	Forest Dependency	Range	Threat Status (March 2009)	Shambangeda	Misalai	Kwatango
<i>Tockus alboterminatus</i>	Crowned Hornbill	F	W	LC			1
<i>Treron calva</i>	African green Pigeon	O	W	LC		1	
<i>Trochocercus albonotatus</i>	White- tailed Crested flycatcher	FF	W	LC			1
<i>Turdoides jardineii</i>	Arrow-marked Babbler	O	W	LC		1	
<i>Turtur afer</i>	Blue-spotted wood Dove	O	W	LC	1	1	
<i>Turtur tympanistria</i>	Tambourine Dove	F	W	LC	1	1	
<i>Vidua macroura</i>	Pin- tailed Whydah	O	W	LC		1	1
<i>Zosterops senegalensis</i>	Yellow White-eye	F	W	LC	1	1	1

Key to Table 13

Forest dependency

FF = strictly confined to forest, F = mainly forest, but also found outside, O = non-forest species

Range

W = widespread, EAE= endemic to the Eastern Arc Mountains, EAN= near endemic to the Eastern Arc Mountains (also found in at least one other African ecoregion)

Threatened status

CR=Critically Endangered, EN=Endangered, NT=Near Threatened, LC=Least Concern

In total, 256 observations were made through TSC comprising 81 species. Similarly through mist netting, 122 birds were ringed from 17 species. Out of these, 10 species were also sighted through TSC. Mist netting data from the three sites is attached as Appendix 4 and TSC data in Appendix 5.

Olive sunbird, little Greenbul, Shelly's greenbul, yellow-streaked greenbul dominated the catch during mist netting. This is a usual case for understory birds.

As the mist netting was conducted in October – February 2008 no birds with moult were observed. The breeding season usually starts from August to February. Forest birds would be expected to moult towards the end of, or immediately after the breeding season. One olive sunbird was found with a brood patch in Shambangeda and two African golden weavers and a spectacled weaver were recorded with breeding plumage in Kwatango. Bird nests were also found: Sharpe's akalat, Little greenbul, African broadbill (Shambangeda), Purple-banded sunbird with two chicks and Forest batis (Kwatango).

4.5 Discussion

4.5.1 Species status and endemism

The banded green sunbird *Anthreptes rubritorques* is the only Eastern Arc endemic bird species that was recorded during the surveys. The bird was recorded in Misalai and Shambangeda village landscapes. Six bird species that are near-endemic to the Eastern Arc Mountains were recorded during the survey including

Andropadus masukuensis, *Anthreptes pallidigaster*, *Batis mixta*, *Poeoptera kenricki*, *Stactolaema olivacea* and *Artisornis moreaui* (table 14). The restricted range species recorded in the three landscapes of Misalai, Shambangeda and Kwatango have populations in other Eastern Arc Mountains and other sites including the coastal forests, Southern Rift and Kilimanjaro, Meru and Kenya Highlands.

Table 14. Eastern Arc endemic and near endemics found in the three village landscapes of Misalai, Shambangeda and Kwatango and their ranges.

Species	Common name	Village landscape in which was recorded	Range (Based on Burgess et al. 2007)
<i>Andropadus masukuensis</i>	Shelley's greenbul	Shambangeda and Misalai	South Pare, West Usambara, Nguu, Nguru, Uluguru, Ukaguru, Rubeho, Mahenge, Udzungwa and the Southern Rift
<i>Anthreptes pallidigaster</i>	Amani sunbird	Shambangeda	Udzungwa and coastal forests from Kenya to Mozambique
<i>Anthreptes rubritorques</i>	Banded green sunbird	Shambangeda and Misalai	West Usambara, Nguu, Nguru, Uluguru and Udzungwa
<i>Artisornis moreaui</i>	Long-billed tailorbird	Misalai	East Usambara, Njesi Plateau in Northern Mozambique
<i>Batis mixta</i>	Forest batis	Shambangeda	North Pare, South Pare, West Usambara, Nguu, Nguru, Udzungwa, Uluguru, Ukaguru, Rubeho, coastal forests from Kenya to Mozambique, Kilimanjaro, Meru and/or Kenya Highlands
<i>Poeoptera kenricki</i>	Kenrick's starling	Kwatango	South Pare, West Usambara, Nguu, Nguru, Uluguru, Rubeho, Udzungwa, Kilimanjaro, Meru and/or Kenya Highlands and the Southern Rift
<i>Stactolaema olivacea</i>	Green barbet	Misalai, Shambangeda and Kwatango	West Usambara, Nguu, Nguru, Uluguru, Ukaguru, Rubeho, Udzungwa, coastal forests from Kenya to Mozambique and the Southern Rift

In terms of degree of endemism, Shambangeda is particularly important as it has five out of seven of the Eastern Arc endemic/near-endemic bird species recorded whilst Misalai and Kwatango have four and two Eastern Arc endemic/near-endemic bird species respectively.

The long-billed tailor bird *Artisornis moreaui*, a critically endangered bird species (IUCN 2008) was only recorded in the agroforest plot in Misalai village landscape. The bird species was previously known to occur in the Nilo Nature Reserve and the Amani Plateau in Tanzania and in the Njezi plateau of northern Mozambique. Other threatened bird species recorded include the Amani sunbird *Anthreptes pallidigaster*, banded green sunbird *Anthreptes rubritorques*, southern banded snake eagle *Circaetus fasciolatus* and Fischer's turaco *Tauraco fischeri* (table 15).

Table 15. Threatened/near-threatened bird species recorded in the three village landscapes of the East Usambara Mountains.

Species	Common name	Village landscape	IUCN 2008 Threat Status
<i>Artisornis moreaui</i>	Long-billed tailorbird	Misalai	Critically Endangered
<i>Anthreptes pallidigaster</i>	Amani sunbird	Shambangeda	Endangered
<i>Anthreptes rubritorques</i>	Banded green sunbird	Misalai and Shambangeda	Vulnerable
<i>Circaetus fasciolatus</i>	Southern banded snake eagle	Shambangeda	Near Threatened
<i>Tauraco fischeri</i>	Fischer's turaco	Misalai, Shambangeda and Kwatango	Near Threatened

4.5.2 Species richness

In terms of number of bird species, Misalai appears to be the richest with 57 species recorded, followed by Kwatango and lastly Shambangeda (table 16). Thus whilst species richness is lower in Shembangeda, the number of restricted range species is highest.

Table 16. Number of bird species recorded in each village landscape.

Village landscape	Number of species
Misalai	57
Kwatango	51
Shambangeda	42

4.5.3 Habitat association

Of the one Eastern Arc endemic and six Eastern Arc near-endemic bird species, all were found in agforest, fallow or plantation whilst only two, *Batis mixta* and *Andropadus masukuensis* were also found in the village forest reserves. Similarly all threatened bird species were found in agroforest, fallow or plantation. To some extent this result reflects the difference in sampling intensity whereby the village forest reserves were only sampled using mist netting whilst the land outside of the village forest reserves was only sampled using timed species counts. Nonetheless, this does suggest that the agricultural mosaic is providing habitat for a significant number of threatened and restricted range bird species.

5) Mammals

5.1 Introduction

The Mammal survey was conducted in the three landscapes of Misalai, Shambangeda and Kwatango through camera trapping. Camera trapping method is normally used for surveying cryptic animal species. Camera traps can be grouped according to the type of sensor. In this study, we used heat in motion sensitive cameras.

In Misalai, the camera traps were set in Misalai VFR while in Shambangeda, the camera traps were set in the Derema forest. In Kwatango, the cameras were set in Kwemazaghati Village Forest Reserve. Within Shambangeda it was not possible to find an appropriate place to put the camera traps, as such the traps were placed on Shembangeda village land within the Derema forest.

5.2 Methods

The aim of camera trapping was to detect the presence of cryptic mammal species in the forested areas of the three landscapes of Misalai, Shambangeda and Kwatango.

Camera traps (Deercam DC 300) were set to take photos 24- hours per day and were mounted with 36 exposures Kodak 200 ISO films. Sites for camera-trapping were selected by inspecting suitable landscape floors for wild animals' trails and other signs. The minimum delay between consecutive photos was set at one minute. The camera traps were retrieved after a month. For each camera-trapped species, the number of events (independent photos) was computed as the number of photos, not considering photos of the same species or individual taken within the same hour.

5.3 Results

A total of ten species were camera-trapped out of 98 events (independent photos), see table 17 below for details.

Table 17. Summary of camera-trapping effort and results obtained.

Site	Number of events	Number of species
Misalai	25	5
Shambangeda	34	7
Kwatango	39	9
Total	98	21

The list of the species trapped and number of events for each landscape are presented in tables 18-20 below. The combined results are presented in table 21. Details of the trap sites are presented in the Appendices.

In Misalai, three cameras were used out of which one did not work. The two operational cameras recorded 25 events of five mammal species.

Table 18. Camera-trapping results for Misalai.

Species	Number of events
Black and rufous sengi (<i>Rhynchoncyon petersi</i>)	2
Squirrel (<i>Paraxerus sp</i>)	1
Blotched genet (<i>Genetta tigrina</i>)	2
Suni (<i>Neotragus moschatus</i>)	4
Giant-pouched rat (<i>Cricetomys gambianus</i>)	16
Total	25

In Shambangeda, four cameras were used out of which one did not work. The three cameras recorded 34 events of five mammal species. The cameras also recorded two bird species: Hadada ibis and lemon dove.

Table 19. Camera-trapping results for Shambangeda.

Species	Number of events
Blotched genet (<i>Genetta tigrina</i>)	8
Suni (<i>Neotragus moschatus</i>)	3
Giant-pouched rat (<i>Cricetomys gambianus</i>)	3
Bushy-tailed mongoose (<i>Bdeogale crassicauda</i>)	13
Banded mongoose (<i>Mungos mungo</i>)	1
Total	28

In Kwatango, seven cameras were used out of which one did not work. The remaining six cameras recorded 39 events of nine species (table 20).

Table 20. Camera-trapping results for Kwatango.

Species	Number of events
Black and rufous sengi (<i>Rhynchoncyon petersi</i>)	9
Suni (<i>Neotragus moschatus</i>)	11
Squirrel (<i>Paraxerus sp</i>)	1
Giant-pouched rat (<i>Cricetomys gambianus</i>)	2
Bushy-tailed mongoose (<i>Bdeogale crassicauda</i>)	2
Banded mongoose (<i>Mungos mungo</i>)	1
Baboon (<i>Papio cynocephalus</i>)	5
Four-toed sengi (<i>Petrodromus tetradactylus</i>)	7
African civet (<i>Civettictis civetta</i>)	1
Total	39

Table 21. Combined camera-trapping results for the three landscapes and degree of endemism.

Species	Number of events	Endemism	IUCN Threat Status
Black and rufous sengi (<i>Rhynchoncyon petersi</i>)	11	N	VU
Suni (<i>Neotragus moschatus</i>)	18	W	LR/cd
Blotched genet (<i>Genetta tigrina</i>)	10	W	LC
Squirrel (<i>Paraxerus sp</i>)	2	?	?
Giant-pouched rat (<i>Cricetomys gambianus</i>)	21	W	LC
Bushy-tailed mongoose (<i>Bdeogale crassicauda</i>)	15	W	LC
Banded mongoose (<i>Mungos mungo</i>)	2		
Baboon (<i>Papio cynocephalus</i>)	5	W	LC
Four-toed sengi (<i>Petrodromus tetradactylus</i>)	7	W	LC
African civet (<i>Civettictis civetta</i>)	1	W	LC
Total	92		

Key to Table 21

Endemism

N = near-endemic to the Eastern Arc Mountains

W = Widespread

? = animal identified to genus only

IUCN Threat Status

VU = Vulnerable

LR = Lower Risk

LC = Least Concern

5.4 Discussion

5.4.1 Species richness and abundance

An assumption is made that the frequency with which an animal species is photo-trapped reflects their abundance. With 10 species of mammals (Table 21), the species richness in the three forest landscapes of Misalai, Shambangeda and Kwatango are relatively low when compared with other forests in the East Usambaras and in the Eastern Arc. By using the same method and comparable sampling efforts, TFCG/Trento Museum of Natural History, Italy surveys recorded 16 mammal species in the four forests of the Rubeho Mountains (Rovero 2008, unpubl.). In addition to the difference in the size of the forests; the variation is also likely to be due to hunting and habitat degradation that has reduced the mammal species diversity and abundance.

The most common mammal species recorded were Suni and Giant pouched rat. No East Usambara or Eastern Arc endemic mammal species were recorded from the landscapes surveyed. Most of the mammal species that were recorded are widespread.

5.4.2 Threatened status

Black and rufous sengi is the only species that was recorded during the surveys which is categorized as being vulnerable according to IUCN categories (IUCN, 2008). It is also near-endemic to the Eastern Arc Mountains (Burgess *et al.*, 2007).

6) Resource use survey

6.1 Introduction

Most local communities in rural Tanzania depend on natural resources to support their livelihoods. In the East Usambara Mountains, the forest resources used most frequently by the local people include fuelwood, timber, poles, medicinal plants and food plants. The forests also provide valuable ecological services, such as reducing soil erosion.

Resource use surveys were conducted by the survey team in the three study villages: Misalai, Shambageda and Kwatango. The aim of the surveys was to gather information on uses of tree-based forest products by the local communities in the landscape. Observations during the field work and discussions with local people imply that most people in the study villages belong to Wasambaa tribe. Most of the villagers are subsistence farmers. The size of farm plots they own ranges from two to four acres. Most people cultivate one or more cash crop, such as cardamom, cinnamon, sugarcane and tea, and subsistence crops, such as maize, beans, bananas and cassava.

6.2 Methods

Interviews were conducted with selected groups of local villagers. The groups included men and women. At the start of the interview, the researcher explained the purpose of the interview, which was to collect information on the resources that they commonly use in the landscape. Then questions on various resource uses were asked, which were intended to identify what the most important tree-based products and services that they commonly use are.

6.3 Results

6.3.1 *Tree-based products and services used by the local communities in Misalai*

In Misalai village, the respondents mentioned 46 wild species of plant that they use within their landscape including medicinal plants, fuelwood, timber, poles and wild fruits (table 22). Respondents also mentioned that they obtain wild vegetables from the landscape. They explained that they obtain most of the medicinal plants from their agroforestry plots, old fallows and nearby forests. In terms of the medicinal plants it is generally the leaves, bark or roots of the plant that are used. The particular part of the plant can either be boiled alone or mixed with some other ingredients to get the medicine.

Timber was obtained from the village lands, including agroforest plots. Poles were commonly obtained from the agroforest areas. Fruits were collected from the agroforest areas and the village forests. Wild vegetables were mainly obtained from the forests, including the village forest reserve and the agroforest plots.

Table 22. List of plant species used by local communities in the Misalai landscape.

Local name	Scientific /English name	Land use type	Use
Mwaka	<i>Annickia kummeriae</i>	Agroforest, old fallows	Leaves used to treat soles / ulcers; roots used to treat gonorrhoea
Muuka	<i>Helichrysium</i> sp	VFR and Agroforest	Leaves used to treat human foot fungi and convulsions
Mkwanga	<i>Tetrapleura tetraptera</i>	Agroforest, old fallows and mixed farming plots	Leaves used as soap and roots used to treat flu
Mweyewana,	<i>Cajanus cajan</i> (Pigeon peas)	Agroforest, old	Roots used to treat convulsions

Local name	Scientific /English name	Land use type	Use
Mbalazi		fallows and mixed farming plont	For treating ear problems
Eza	<i>Solanecio</i> sp	VFR	Leaves mixed with oyster nuts to treat intestinal worms
Mzughwa	<i>Trilepisium madagascariensis</i>	Agroforest	Leaves used to treat malaria and fever
Mhasha	<i>Vernonia myriantha</i>	Agroforest	Leaves used to cure fever
Mzumbasha	<i>Ocimum suaveolens</i>	Agroforest	Leaves and roots used to treat chest diseases and intestinal worms
Khozandogohyi	<i>Spectranthus</i> sp	Agroforest	Leaves were mentioned to treat intestinal worms and convulsions
Fwiza	Unknown sp	Agroforest	Leaves and roots used to treat scabies
Ulenge	Unknown sp	Agroforest	Leaves and roots used treats scabies
Mkweme	<i>Telfairia pedata</i> (oyster nut)	VFR and Agroforest	The nuts are used to treat intestinal worms and oil is used by delivering mothers. Leaves are also used as vegetables.
Longe	Fern	VFR	For treating intestinal worms
Mulungu	<i>Zanthoxylum usambarensis</i>	Agroforest	Bark is used to treat intestinal worms and back aches
Mtura	<i>Solanum incanum</i>	Agroforest and old fallows	For treating ear problems
Mpapata	<i>Pandanus</i> sp (Pineapple tree)	Agroforest	For treating ear problems
Mkulo	<i>Ocotea usambarensis</i> (Camphor)	Agroforest	Timber
Mvule	<i>Milicia excels</i>	Agroforest	Timber
Mnyasa	<i>Newtonia buchananii</i>	Agroforest	Timber
Mkabela	<i>Grevillea robusta</i>	Agroforest	Timber
Mkaratusi	<i>Eucalyptus</i> sp	Agroforest	Timber
Mfimbo	<i>Beilschmiedia kweo</i>	Agroforest	Timber
Mhesi	<i>Maesopsis eminii</i>	Agroforest	Timber
Mwiza	<i>Bridelia micrantha</i>	Agroforest	Timber
Msambu	<i>Allanblackia stuhlmannii</i>	Agroforest	Timber
Mshai	<i>Albizia gummifera</i>	Agroforest	Timber, Poles
Mtambaa	<i>Cephalosphaera usambarensis</i>	Agroforest	Timber
Sedelea	<i>Cederela odorata</i>	Agroforest	Timber
Mlangalanga, Mparachichi	<i>Persea americana</i>	Agroforest	Timber, Poles
Mfenesi	<i>Artocarpus heterophyllus</i>	Agroforest	Poles
Mkungwira	<i>Sorindea Madagascariensis</i>	VFR	Fruits
Msambia	<i>Synsepalum msolo</i>	VFR and mixed farming	Fruits
Samaka	<i>Afromomum</i> sp	VFR	Fruits
Mshaa	Unknown sp.	VFR and mixed farming	Fruits
Machuchu	Unknown sp.	Agroforest	Fruits
Mstaferi	<i>Annona muricata</i>	Agroforest	Fruits
Mnavu	<i>Solanum nigrum</i>	VFR and Agroforest	Vegetables
Msangani	Unknown sp.	Agroforest	Vegetables
Ndelema	<i>Basella alba</i>	Agroforest	Vegetables

Local name	Scientific /English name	Land use type	Use
Mchungu	<i>Sonchos sp</i>	Agroforest	Vegetables
Mbwembwe	<i>Bidens pilosa</i>	Agroforest	Vegetables

6.3.2 Most important income generating tree-based products and services in Misalai

According to the respondents, seven non-timber forest products that provide them with the most income included *Allanblackia*, cinnamon, cardamom, cloves, coffee, oyster nuts and taro tubers. The plant products that earn the greatest incomes are listed in table 23. Respondents also mentioned bananas, beans and sugar cane as being important traded products.

Table 23. List of non-timber and timber forest products that bring the most income in Misalai Landscape and their prices.

Local name	Scientific/English name	Land use type	Price (Tshs)
Masambu	Seeds of <i>Allanblackia stuhlmannii</i>	VFR and Agroforest	250 per kg of seeds
Dalasin	<i>Cinnamomum zeylanicum</i>	Agroforest	
Iliki	Cardamon	Monoculture and Agroforest	3,000 per kg
Karafuu	Cloves	Agroforest	4,000 per kg
Kahawa	<i>Coffea arabica</i>	Agroforest	1,500 per kg
Makweme	Oyster nuts (<i>Telfairia pedata</i>)	VFR and Agroforest	5,000 per basket
Mbao	Timber	Forest and Agroforest	1,500 – 5,000 per piece depending on size
Magimbi	Taro tubers (<i>Colocasia sp</i>)	Agroforest	11,000 – 13,000 per 50 kg bag

6.3.3 Tree-based products and services used by the local communities in Shambangeda

In Shambangeda, the villagers stated that wild plant products that they harvest within their village landscape include: fuelwood, local medicines, mushrooms, *Allanblackia* fruits, timber and poles (table 24). According to the respondents, they mainly collected timber and poles from the agroforest areas after seeking a permit from the village government. *Allanblackia*, local medicines, mushrooms and fuelwood are obtained within the forests in their areas including the VFR as well as the agroforest plots.

Table 24. List of plant species used by local communities in the Shambangeda landscape.

Local name	Scient/Engl name	Land use type	Use
Muuka	<i>Helichrysum sp</i>	Forest and agroforest	Leaves are used to treat intestinal worms
Mkwanga	<i>Tetrapleura tetraptera</i>	Forest and agroforest	Leaves are used to treat Kambaku”
Mwaka	<i>Annickia kummeriae</i>	Forest and agroforest	Leaves are used to treat sores/ulcers
Mzughwa	<i>Trilepisium madascariensis</i>	Forest and agroforest	For treating malaria
Mhesi	<i>Maesopsis eminii</i>	Forest and agroforest	Fuelwood

The respondents in Shambangeda village mentioned medicinal plants and fuelwood to be the most important tree based products that they are obtaining within their landscape. The third one was water including rains which they linked with their efforts to conserve their landscapes well, including the forest. *Allanblackia* fruits, mushroom and timber were also mentioned to be important.

6.3.4 Most important income generating tree-based products and services in Shambangeda

Timber, fuelwood, *Allanblackia* fruits, cardamom, cinnamon, cloves, sugar cane and black pepper were mentioned as the tree-based products which are most traded in the area. Most of the products are sold

outside the village, although timber is mostly traded within the village. Most of the fuelwood is sold to tea factories whilst most of the sugarcane is sold to Dar es Salaam and Tanga cities. Timber was obtained from the agroforest areas, for which a permit had to be applied first from the village government. *Mhesi (Maesopsis eminii)* was among the most preferred tree species for fuelwood.

Table 25. List of plant species that bring the most income in Shembangeda landscape and their prices.

Local name	Scient/English name	Land use type	Price(Tshs)
Mbao	Timber	Agroforest	2,500-3000 per piece
Kuni	Fuelwood	VRF and Agroforest	1,500 per 3ft
Masambu	Seeds of <i>Allanblackia stuhlmannii</i>	VFR and Agroforest	200 per kg
Miwa	Sugarcane	Monoculture sites	80-100 per piece
Iliki	Cardamon	Agroforest and monoculture sites	2,500-3000 per kg
Mdalasini	<i>Cinnamomum zeylanicum</i>	Forest and Agroforest	700 per kg
Karafuu	Clove	Agroforest	
Pilipili manga	Black pepper	Agroforest	

6.3.5 Tree-based products and services used by the local communities in Kwatango

In Kwatango village, respondents mentioned timber, poles, fuelwood, fruits and local medicines as tree – based products which they obtain in their areas (table 26). They mentioned to get timber and poles from the forests within their areas as well as in other areas such as old fallow lands and agroforests. The respondents mentioned to obtain medicinal plants from the forests and also in areas within the village land including agroforest plots and valleys. *Mjavikazi* was the only plant mentioned as being found only in forests around the area including the Village Forest Reserve. The tree was mentioned to treat men’s sexual hormone problems.

Table 26. List plant species used by local communities in the Kwatango landscape.

Local name	Scientific/Englis name	Land use type	Use
Mbambakofi	<i>Azalia quanzensis</i>	Forest and Agroforest	Timber
Mkenge	<i>Albizia versicolor</i>	Forest and Agroforest	Timber and local medicines – treat chest problems and “kambaku”
Mninga	<i>Pterocarpus tinctorius</i>	Forest and Agroforest	Timber and Poles
Mvule	<i>Milicia excelsa</i>	Forest and Agroforest	Timber
Mitiki	<i>Tectona grandis, teak</i>	Plantation and Agroforest	Timber and Poles
Mgude	<i>Sterculia appendiculata</i>	Forest and Agroforest	Timber
Mpopote	Unknown sp.	Forest and Agroforest	Timber
Khozandoghoi	<i>Spectranthus</i> sp	Old fallow lands	Roots used to treat intestinal worms
Mzughwa	<i>Trilepisium madagascariensis</i>	Agroforest	For treating malaria
Mtura	<i>Solanum incanum</i>	Agroforest	For treating stomach problems
Mhasha	<i>Vernonia myriantha</i>	Agroforest	For treating chest problems.
Mwengee	Unknown sp.	?	For treating sores/ulcers
Mjavikazi	Unknown sp.	Forest reserve	Roots used to treat men’s sexual hormonal problems
Mfleta and	<i>Albizia anthelmintica</i>	Agroforest	For treating body tiredness
Msaji	<i>Senna siamea</i>	Agroforest	For treating body tiredness
Mwarobaini	<i>Azadirachta indica</i>	Agroforest	For treating malaria and pesticide

6.3.6 Most important income generating tree-based products and services in Kwatango

Timber, poles and fuelwood were the most frequently traded products within the village and outside (table 26). According to the respondents, *mitiki* (*Tectona grandis*), *mkenge* (*Albizia vescolar*), *mvule* (*Milicia excelsa*), *mningamaji* (*Pterocarpus tinctorius*), *mbambakofi* (*Azalia quanzensis*), *mpopote* and *mgule* (*Sterculia appendiculata*) were among the species traded in their area.

The price for timber was reported to vary depending on the type and size of the timber. Generally, they stated the price to range from Tshs 2,000 to Tshs 3,000 per 10 ft piece. For poles, the price ranged from Tshs 1,000 to Tshs 2,000. The price for fuelwood was reported to vary from 3,000 – 3,500 per cubic metre.

6.4 Discussion

The communities in the three village landscapes of Misalai, Shambangeda and Kwatango depend on many tree-based products and services. The tree-based products obtained from village landscapes include local medicines, timber, poles, fuelwoods, fruits and vegetables. A total of 56 species were mentioned by respondents from the three villages. Of these only one species, *Trilepsium madagascariensis* was mentioned as being used in all three villages and 13 species were mentioned by respondents in two villages.

Most species are collected from agroforest plots. This includes patches of natural vegetation within the mosaic of agricultural land as well as areas where trees have been planted. Thirty species were mentioned as being used from forests of which five species were only collected from forests whilst the rest were also found in ‘agroforest’ areas. Of those species that are only sourced from the village forest reserve, three are used as medicines and two provide fruits. The results highlight the importance of the remaining natural vegetation within the agricultural mosaic as a source of timber and non-timber forest products including medicinal plants and food.

7) Conclusions and recommendations

This study recorded a total of 162 plant species (excluding plants recorded in the resource use survey) in the different land cover types in the village landscapes of Misalai, Shambangeda and Kwatango (table 27). The list includes 102 tree species, 31 herb species, 17 shrub species and ten climbers.

Table 27. Plant species recorded in the three village landscapes of the East Usambaras.

Vegetation/land cover type	Number of plant species recorded	Number of plant species recorded also in the forests
Village Forest Reserves	69	-
Agroforests	56	13
Fallow lands	39	4
Mixed farming plot	18	1
A mosaic of fallow land, agroforest and monoculture plot	9	1
Monoculture and mixed farming plot	21	0
Plantation	15	0

Overall, this shows that the village forest reserves support a higher number of plant species compared to other non-reserved land cover types. Yet, a considerable number of plant species are also found in the agroforests, fallow lands, mixed farming plot as well as in the monoculture and mixed farming plot. In addition, some of the plant species found in the agroforest and fallow lands are also in the forest reserves (Table 27).

Many of the plant species are used by local people for various purposes, e.g. for timber, poles, fuelwood, as source of cash, and most importantly for medicine. The majority of the species used by villagers were found in the agroforests, forest reserves, fallow lands and mixed farming plots. This shows that a considerable number of plant species that are vital for supporting the local livelihoods are found outside the formally protected areas.

The survey recorded one East Usambara endemic plant species, *Cynometra engleri*. It was recorded in the Kwatango village forest reserve. In addition, three Eastern Arc endemic plants were recorded: *Alsodeiopsis schumannii* (in agroforests), *Aorantho penduliflora* (in agroforests) and *Drypetes gerrardinoides* (in village forest reserve). The Eastern Arc near-endemics include *Allanblackia stuhlmannii* (in village forest reserves and agroforests), *Carvalhoa campanulata* (in village forest reserve), *Cephalosphaera usambarensis* (in village forest reserves), *Dasylepis integra* (in village forest reserve), *Dialium holtzii* (in village forest reserve and mixed farming), *Mesogyne insignis* (in village forest reserve) and *Pouteria alnifolia* (in village forest reserve).

Threatened plant species, classified as vulnerable in the most recent IUCN Red List (2010), included the East Usambara endemic species. In addition, they included *Allanblackia stuhlmannii* (in village forest reserves and agroforests), *Alsodeiopsis schumannii* (in agroforests), *Aorantho penduliflora* (in agroforests), *Cephalosphaera usambarensis* (in village forest reserves), *Dasylepis integra* (in village forest reserves) *Dialium holtzii* (in village forest reserve and mixed farming), *Drypetes gerrardinoides* (village forest reserve), *Mesogyne insignis* (in village forest reserve) and possibly *Pavetta abyssinica* var. *usambarica* (village forest reserve).

In terms of bird diversity, the village landscapes appeared to support a high number of species: 88 species were recorded, including the critically endangered Long-billed tailorbird *Artisonis moreaui*, recorded in the agroforest. Other threatened bird species included Amani sunbird (*Anthreptes pallidigaster*), recorded in a mosaic of fallow land, agroforest and monoculture, banded green sunbird (*Anthreptes rubritorques*) in the agroforest, Southern banded snake eagle (*Circaetus fasciolatus*) in a mosaic of fallow land, agroforest and

monoculture and Fischer's turaco (*Tauraco fischeri*), recorded in agroforest, fallow land and mixed farming plots.

The banded green sunbird *Anthreptes rubritorques* was the only bird species recorded that is endemic to the Eastern Arc Mountains. The bird was recorded in the agroforest sites of Misalai and Shambangeda village landscapes. Eastern Arc near-endemic bird species recorded included *Andropadus masukuensis*, *Anthreptes pallidigaster*, *Batis mixta*, *Poeoptera kenricki*, *Stactolaema olivacea* and *Artisornis moreaui*.

In terms of rare mammal species, the vulnerable species - black and rufous sengi (*Rhynchocyon petersi*) - was recorded inside the forest reserves. This species is also near-endemic to the Eastern Arc Mountains.

In conclusion, the results of the study indicate that the village landscapes in the East Usambaras support considerable biodiversity resources. These resources are important for conservation and for supporting the livelihoods of local people. Apart from the village forest reserves, the other land use types, such as agroforests and fallow land, support many valuable species.

The results also suggest that many of the plant and vertebrate species endemic to the East Usambara may be restricted to the Government Forest and Nature Reserves thereby emphasizing the importance of investing in the conservation of the existing protected areas.

The results highlight the importance of taking a landscape approach to conservation whereby conservation values should be recognized and enhanced across all land uses. Whilst protected areas, including village forest reserves, will continue to harbor the vast majority of species in an area such as the East Usambaras, areas of agroforestry can play an important role in providing habitat and corridors for some species.

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Appendix 1. Habitat details for the vegetation plots in the East Usambaras

Village	Veg Plot#	Vegetation/L and Use Type	Altitude	Coordinates	Topography	GL	SL	CC	Aspect	Signs of past use	Features of interest
Misalai	M1	Forest	1212	0458951/9445932	Ridge topo/SUS	>50%	>50%	>50%	N-S		
Misalai	M2	Agroforestry	1125 - 1139	0459964/9446401; 0460167/9446433	VF, GLS	>50%	10 - 50%	>50%	E-W	Shrub clearance	
Misalai	M3	Fallow land	958 - 964	0459623/9444539; 0459751/9444688	SUS with small valley	>50%	10 - 50%	0	E-W	Previously cultivated area	
Misalai	M4	Monoculture+ Mixed farming	982 -1026	0459039/9443745, 0458889/9443869	SMS	>50%	10 - 50%	0	SE-NW		
Shambangeda	S1	Forest	971	0459231/9440838	GUS+SU S	10 - 50%	>50%	>50%	NW-SE	The village forest is encroached in the northwestern part of the forest	
Shambangeda	S2	Agroforestry	887-937	0458710/9440288, 0458552/9440183	GMS	>50%	>50%	10- 50%	SW-NE		Close to river
Shambangeda	S3	Fallow land, Agroforestry & Monoculture	968	0458786/9442508	SMS	>50%	>50%	10- 50%	N-S	Timber harvesting (occasional)	
Kwatango	K1	Agroforestry	179-211	0470734/9446282, 0470744/9446087	GLS/Flat	>50%	>50%	10- 50%	N-S	Pitsawing of <i>Milicia excelsa</i>	
Kwatango	K2	Forest	203-233	0469746/9446451, 0469745/9446645	GUS	10- 50%	>50%	>50%	N-S		The eastern and northern forest boundaries are closer to rubber plantation

Village	Veg Plot#	Vegetation/L and Use Type	Altitude	Coordinates	Topography	GL	SL	CC	Aspect	Signs of past use	Features of interest
Kwatango	K3	Fallow land (old)	243	0470745/9447458	GLS	>50%	>50%	10-50%	E-W		
Kwatango	K4	Mixed farming	178-198	0471931/9443422, 0471735/9443403	GUS	>50%	>50%	10-50%	E-W		
Kwatango	K5	Teak plantation	186	0471310/9445254	GUS	>50%	>50%	10-50%	E-W	Pole cutting especially on the road periphery	

Key:

GL = Ground layer

SL = Shrub layer

CC = Canopy cover

SUS = Steep upper slope

VF = Valley forest

GLS = Gentle lower slope

slope

SMS = Steep mid slope

GUS = Gentle upper slope

GMS = Gentle mid slope

N-S = North-South

E-W = East-West

SE-NW = South-east North-west

NW-SE = North-west South-east

SW-NE = South-west North-east

Appendix 2. List of plants found in the Misalai, Shambangeda and Kwatango villages' landscapes.

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	1X40	Forest	<i>Acanthaceae (H)</i>	<i>Isoglosa lactea</i>	0.2	0.6
Misalai	M1	1X40	Forest	<i>Acanthaceae (H)</i>	<i>Isoglosa lactea</i>	1.1	1
Misalai	M2	1X40	Agroforest	<i>Acanthaceae (H)</i>	<i>Isoglosa lactea</i>		
Kwatango	K4	1X40	Mixed farming	<i>Acanthaceae (H)</i>	<i>Justicia sp</i>	0.2	0.3
Kwatango	K3	1X40	Fallow land	<i>Acanthaceae (H)</i>	<i>Justicia sp</i>	0.2	1
Kwatango	K3	1X40	Fallow land	<i>Acanthaceae (H)</i>	<i>Justicia sp</i>	0.2	2
Kwatango	K3	1X40	Fallow land	<i>Acanthaceae (H)</i>	<i>Justicia sp</i>	2.1	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Acanthaceae (H)</i>	<i>Justicia sp</i>		
Misalai	M3	1X40	Fallow land	<i>Acanthaceae (H)</i>	<i>Justicia sp (2)</i>		
Kwatango	K2	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Sclerochiton sp</i>	0.4	1.5
Kwatango	K2	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Sclerochiton sp</i>	1.2	2
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	0.3	0.5
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	0.4	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	0.5	0.6
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	0.5	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	0.5	1.2
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1	0.6
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1.2	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1.2	1.5
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1.3	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongate</i>	1.5	2
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongata</i>	0.2	1
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongata</i>	0.1	0.3
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongata (50)</i>	0.2	1.5
Misalai	M1	1X40	Forest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongata (51)</i>	0.3	1
Misalai	M2	1X40	Agroforest	<i>Acanthaceae (S)</i>	<i>Whitfieldia elongata (51)</i>		
Misalai	M3	1X40	Fallow land	<i>Adiantaceae (F)</i>	<i>Pteris sp (17)</i>		

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Adiantaceae (F)</i>	<i>Pteris sp (29)</i>		
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Adiantaceae (F)</i>	<i>Pteris sp(16)</i>		
Shambangeda	S2	1X40	Agroforest	<i>Adiantaceae (F)</i>	<i>Pteris sp(44)</i>		
Kwatango	K5	10X200	Plantation	<i>Alariaceae</i>	<i>Cussonia zimmermanii</i>	30.7	12
Kwatango	K5	10X200	Plantation	<i>Alariaceae</i>	<i>Cussonia zimmermanii</i>	44	21
Misalai	M1	10X200	Forest	<i>Alariaceae</i>	<i>Polycias fulva</i>	120	50
Shambangeda	S1	10X200	Forest	<i>Alariaceae</i>	<i>Polyscias fulva</i>	31	15
Kwatango	K3	1X40	Fallow land	<i>Anacardiaceae</i>	<i>Lannea stuhlmannii</i>	0.2	1
Kwatango	K5	1X40	Plantation	<i>Anacardiaceae</i>	<i>Lannea stuhlmannii</i>	0.2	1.25
Kwatango	K5	10X200	Plantation	<i>Anacardiaceae</i>	<i>Lannea stuhlmannii</i>	30	18
Kwatango	K5	10X200	Plantation	<i>Anacardiaceae</i>	<i>Lannea stuhlmannii</i>	35	20
Kwatango	K3	10X200	Fallow land	<i>Anacardiaceae</i>	<i>Mangifera indica</i>	74.5	30
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.1	0.5
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.1	0.6
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.2	0.75
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.2	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.3	0.25
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.3	0.3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.3	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.4	0.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.5	1.5
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.5	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.6	0.6
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.6	1.5
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.6	2
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.6	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.7	0.6
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.7	2.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.8	0.6

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.8	1.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.9	0.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	0.9	0.75
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.1	0.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.1	2.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.2	0.3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.2	0.6
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.2	1.5
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.2	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.2	2.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.3	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.3	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.3	3.5
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.5	1.25
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.5	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.6	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.6	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.6	4.4
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.7	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.7	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.8	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.8	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.9	3.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	1.9	4
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2	2
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2	3
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2	3
Shambangeda	S1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2	3.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	2.2	3.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	3.5	5
Misalai	M1	5X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	29	20
Misalai	M1	10X200	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i>	30	25

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	30.4	12
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	33.6	20
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	34.4	20
Misalai	M2	10X200	Agroforest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	36.7	28
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	37	20
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	38.3	25
Misalai	M2	10X200	Agroforest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	39.5	18
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	40	15
Misalai	M2	10X200	Agroforest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	40	20
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	43.3	15
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	44	15
Misalai	M1	10X200	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i>	45	35
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.2	0.3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.3	0.6
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.3	0.75
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.4	0.3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.4	1
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.5	1
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.6	1
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.8	0.5
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	0.9	0.3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1	0.3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1	0.75
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1	2
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.1	1
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.1	1.5
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.2	3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.3	2.5
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.7	4
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (2)	1.9	3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (3)	0.1	0.3
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (3)	0.2	1
Misalai	M1	1X40	Forest	Anacardiaceae	<i>Sorindeia madagascariensis</i> (3)	0.4	0.6

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)	1.1	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)	1.2	2
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)	1.5	1.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)	1.5	3
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)	1.6	2.5
Misalai	M2	1X40	Agroforest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (3)		
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (4)	0.2	0.6
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (4)	0.7	0.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (4)	1.5	2.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (4)	2	3.5
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (6)	0.9	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (9)	1	1
Misalai	M1	1X40	Forest	<i>Anacardiaceae</i>	<i>Sorindeia madagascariensis</i> (9)	1	1.5
Kwatango	K5	1X40	Plantation	<i>Annonaceae</i>	<i>Annona senegalensis</i>	3.3	2.5
Kwatango	K3	1X40	Fallow land	<i>Annonaceae</i>	<i>Annona</i> sp	2.1	3.5
Kwatango	K2	1X40	Forest	<i>Annonaceae</i>	<i>Uvaria angolensis</i>	1.3	1
Shambangeda	S1	1X40	Forest	<i>Apocyanaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.3	2
Shambangeda	S1	1X40	Forest	<i>Apocyanaceae</i>	<i>Tabernaemontana pachysiphon</i>	4	4
Shambangeda	S1	1X40	Forest	<i>Apocyanaceae</i>	<i>Tabernaemontana pachysiphon</i>	4.3	5
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.2	0.5
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.2	0.6
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.3	1.5
Misalai	M1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.6	1
Misalai	M1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	1	0.75
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	6.6	4
Shambangeda	S1	5X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	11.5	10
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i> (2)	0.4	2
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i>	<i>Tabernaemontana pachysiphon</i>	0.2	0.3
Shambangeda	S1	1X40	Forest	<i>Apocynaceae</i> (C)	<i>Landolphia buchananii</i>		
Kwatango	K2	1X40	Forest	<i>Apocynaceae</i> (C)	<i>Landolphia buchananii</i>		
Misalai	M1	1X40	Forest	<i>Apocynaceae</i> (C)	<i>Landolphia buchananii</i> (2)	0.1	0.3

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Shambangeda	S1	1X40	Forest	<i>Apocynaceae (S)</i>	<i>Carvalhoa campanulata</i>	0.1	0.5
Shambangeda	S1	1X40	Forest	<i>Apocynaceae (S)</i>	<i>Carvalhoa campanulata</i>	1.6	1.5
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides</i>	0.4	1.5
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides</i>	0.5	1.5
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides</i>		
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides</i>	0.4	0.4
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides (2)</i>	0.6	1.5
Kwatango	K3	1X40	Fallow land	<i>Apocynaceae (S)</i>	<i>Schizogygia coffaoides (3)</i>	0.3	0.6
Misalai	M4	1X40	Monoculture & mixed farming	<i>Araceae (C)</i>	<i>Culcasia sp (2)</i>		
Kwatango	K3	5X40	Fallow land	<i>Araliaceae</i>	<i>Cussonia zimmermanii</i>	12	8
Kwatango	K3	5X40	Fallow land	<i>Araliaceae</i>	<i>Cussonia zimmermanii</i>	18	10
Misalai	M2	1X40	Agroforest	<i>Aspleniaceae (F)</i>	<i>Asplenium sp</i>	Collected 5877	
Shambangeda	S1	1X40	Forest	<i>Aspleniaceae (F)</i>	<i>Asplenium sp</i>		
Misalai	M2	1X40	Agroforest	<i>Aspleniaceae (F)</i>	<i>Asplenium sp (36)</i>		
Misalai	M3	1X40	Fallow land	<i>Asteraceae (H)</i>	<i>Bidens pilosa</i>		
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Bidens pilosa (14)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (H)</i>	<i>Bidens pilosa (4)</i>		
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Asteraceae (H)</i>	<i>Bidens pilosa (5)</i>		
Kwatango	K1	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Bothriocline sp</i>		
Kwatango	K4	1X40	Mixed farming	<i>Asteraceae (H)</i>	<i>Bothriocline sp</i>		
Kwatango	K4	1X40	Mixed farming	<i>Asteraceae (H)</i>	<i>Bothriocline sp (3)</i>		
Kwatango	K4	1X40	Mixed farming	<i>Asteraceae (H)</i>	<i>Bothriocline sp (4)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (H)</i>	<i>Conyza sp</i>		
Kwatango	K4	1X40	Mixed farming	<i>Asteraceae (H)</i>	<i>Conyza sp (12)</i>		
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Asteraceae (H)</i>	<i>Conyza sp (3)</i>		

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M3	1X40	Fallow land	<i>Asteraceae (H)</i>	<i>Conyza sp (34)</i>		
Kwatango	K1	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Conyza sp (38)</i>		
Kwatango	K4	1X40	Mixed farming	<i>Asteraceae (H)</i>	<i>Conyza sp (4)</i>		
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Conyza sp (5)</i>		
Kwatango	K1	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Emilia sp (3)</i>		
Misalai	M3	1X40	Fallow land	<i>Asteraceae (H)</i>	<i>Helichrysum odoratissimum</i>		
Kwatango	K1	1X40	Agroforest	<i>Asteraceae (H)</i>	<i>Sonchus sp (2)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	0.1	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	0.2	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	1.2	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	1.3	2.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	1.3	3
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>	1.4	2.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus (2)</i>	0.3	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus (3)</i>	0.3	0.7
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia lasiopus (3)</i>		
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.1	0.3
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.1	0.3
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.1	0.3
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.1	1
Kwatango	K3	1X40	Fallow land	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.1	2
Kwatango	K3	1X40	Fallow land	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.2	0.3

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.2	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.2	1.5
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.3	0.4
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.6	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	2	1.5
Shambangeda	S2	1X40	Agroforest	<i>Asteraceae (S)</i>	<i>Vernonia myriantha</i>	0.2	0.3
Misalai	M2	1X40	Agroforest	<i>Basalminaceae (H)</i>	<i>Impatiens sp (3)</i>		
Kwatango	K2	1X40	Forest	<i>Bignoniaceae</i>	<i>Markhamia sp</i>	2.5	3
Kwatango	K3	10X200	Fallow land	<i>Bombacaceae</i>	<i>Ceiba pentandra</i>	60	50
Kwatango	K3	10X200	Fallow land	<i>Bombacaceae</i>	<i>Ceiba pentandra</i>	71	45
Shambangeda	S2	1X40	Agroforest	<i>Bromeliaceae (H)</i>	<i>Ananas comosus</i>		
Shambangeda	S2	1X40	Agroforest	<i>Bromeliaceae (H)</i>	<i>Ananas comosus</i>		
Kwatango	K5	1X40	Plantation	<i>Bursaraceae</i>	<i>Commiphora africana</i>	2.4	2.5
Kwatango	K5	10X200	Plantation	<i>Bursaraceae</i>	<i>Commiphora africana</i>	35	12
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra engleri</i>	0.2	1
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra engleri</i>	2	4
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra engleri</i>	2.8	5
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra engleri</i>	4	7
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.1	0.6
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.2	0.75
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.2	1
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.2	2
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.3	0.3
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.3	1
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.4	1
Kwatango	K2	1X40	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	0.6	2.5
Kwatango	K2	10X200	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	30	25
Kwatango	K2	10X200	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	36.5	27
Kwatango	K2	10X200	Forest	<i>Caesalpinaceae</i>	<i>Cynometra longipedicellata</i>	40	30

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Cynometra longipedicellata</i>	49	30
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Cynometra sp</i>	130	45
Kwatango	K2	1X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.1	0.3
Kwatango	K2	1X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.1	0.3
Kwatango	K2	1X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.1	0.6
Kwatango	K2	1X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.2	0.3
Kwatango	K2	1X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.2	0.6
Kwatango	K2	5X40	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	21.4	20
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	30	20
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	30	25
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	30	25
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	30	30
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	31	15
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	31	20
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	31	25
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	31	28
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	34	20
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	38	30
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	40.7	35
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	41.5	35
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	45	28
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	55	40
Kwatango	K2	10X200	Forest	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	79.3	30
Kwatango	K4	1X40	Mixed farming	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i>	0.1	0.3
Kwatango	K4	1X40	Mixed farming	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i> (2)	0.2	0.3
Kwatango	K4	1X40	Mixed farming	<i>Caesalpiniaceae</i>	<i>Dialium holtzii</i> (3)	0.2	0.5
Kwatango	K4	1X40	Mixed farming	<i>Caesalpiniaceae</i>	<i>Cassia abbreviata</i> (2)	0.3	1
Kwatango	K2	10X200	Forest	<i>Cecropiaceae</i>	<i>Dialium holtzii</i>	87	45
Misalai	M2	5X40	Agroforest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	10	6
Misalai	M1	5X40	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	11.3	10
Misalai	M2	5X40	Agroforest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	11.7	6
Misalai	M1	5X40	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	12.8	20
Misalai	M1	5X40	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	16.3	15

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	5X40	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	17	20
Misalai	M1	5X40	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	25.3	8
Misalai	M1	10X200	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	31	20
Shambangeda	S1	10X200	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	31.3	15
Shambangeda	S1	10X200	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	38	25
Misalai	M2	10X200	Agroforest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	41.9	20
Misalai	M2	10X200	Agroforest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	42	20
Misalai	M2	10X200	Agroforest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	44	30
Misalai	M1	10X200	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	54	25
Misalai	M1	10X200	Forest	<i>Cecropiaceae</i>	<i>Myrianthus holstii</i>	55.4	35
Shambangeda	S1	1X40	Forest	<i>Celastraceae</i>	<i>Maytenus acuminata</i>	0.5	1
Misalai	M3	1X40	Fallow land	<i>Commelinaceae (H)</i>	<i>Commelina benghalensis</i>		
Kwatango	K2	1X40	Forest	<i>Connaraceae (C)</i>	<i>Agelaea sp</i>		
Shambangeda	S1	1X40	Forest	<i>Connaraceae (C)</i>	<i>Agelaea pentagyna</i>		
Misalai	M1	1X40	Forest	<i>Connaraceae (C)</i>	<i>Agelaea pentagyna</i>	1	1.5
Shambangeda	S2	1X40	Agroforest	<i>Convulvaceae (H)</i>	<i>Ipomoea batatas</i>		
Misalai	M1	1X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	1.5	2
Misalai	M1	1X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	1.8	2
Misalai	M1	1X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	2	2
Shambangeda	S1	1X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	2.4	1
Misalai	M1	1X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	2.8	4
Shambangeda	S1	5X40	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	17.7	10
Shambangeda	S1	10X200	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	110	50
Shambangeda	S1	10X200	Forest	<i>Crysobalanaceae</i>	<i>Parinari excelsa</i>	125	60
Kwatango	K4	1X40	Mixed farming	<i>Dichapetalaceae (C)</i>	<i>Dichapetalum sp (2)</i>		
Misalai	M1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	1.6	2
Misalai	M1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	1.5	2.5
Shambangeda	S1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	0.1	0.6
Shambangeda	S1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	0.4	1
Misalai	M1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima</i>	1.1	2

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	1X40	Forest	<i>Dracaenaceae (S)</i>	<i>Dracaena laxissima (2)</i>	1	2
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	0.1	0.3
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	0.1	0.6
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	0.2	1
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	0.3	0.6
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	0.5	1
Kwatango	K1	1X40	Agroforest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	1.2	0.3
Kwatango	K1	1X40	Agroforest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	1.3	0.6
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	2	3.5
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	2.1	3
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	2.2	2
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	2.2	3
Kwatango	K2	1X40	Forest	<i>Ebenaceae</i>	<i>Diospyros mespiliiformis</i>	4.1	3.5
Shambageda	S1	1X40	Forest	<i>Erythroxylaceae</i>	<i>Erythroxylum emarginatum</i>	0.1	0.3
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	0.1	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	0.2	1.5
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	0.2	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	0.4	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	1.2	2.5
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>		
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii</i>	0.3	1
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (2)</i>	0.1	6
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (2)</i>	1.3	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (3)</i>	1.9	3
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (4)</i>	0.3	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (6)</i>	0.3	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Acalypha volkensii (7)</i>	0.2	2
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Alchornea hirtellus</i>	0.2	1.5
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Alchornea hirtellus</i>	0.3	2
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Alchornea hirtellus</i>	0.5	3
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Alchornea hirtellus</i>	2.3	3
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Alchornea hirtellus</i>	3.1	3
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.1	0.5

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.1	0.5
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.1	0.5
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.1	1
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.3	0.6
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.3	1
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.3	1.25
Misalai	M3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>	0.4	2
Misalai	M3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>		
Misalai	M4	1X40	Monoculture & Mixed farming	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i>		
Misalai	M3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Bridelia micrantha</i> (2)	2	2
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae</i>	<i>Drypetes gerrardinoides</i>	0.2	1
Shambangeda	S1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Drypetes usambarica</i>	37.9	15
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Fluggea virosa</i>	0.1	0.5
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Fluggea virosa</i>	2.1	2
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae</i>	<i>Fluggea virosa</i>	2.1	2
Kwatango	K5	1X40	Plantation	<i>Euphorbiaceae</i>	<i>Fluggea virosa</i>	3.1	5
Shambangeda	S1	5X40	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	17.7	25
Misalai	M1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	32.3	25
Shambangeda	S1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	38	32
Misalai	M1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	46.3	35
Misalai	M1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	48.1	35
Misalai	M1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	54.5	35
Shambangeda	S1	10X200	Forest	<i>Euphorbiaceae</i>	<i>Macaranga kilimandscharica</i>	59	30
Misalai	M3	10X200	Fallow land	<i>Euphorbiaceae</i>	<i>Shirakiopsis elliptica</i>	32	10
Misalai	M2	10X200	Agroforest	<i>Euphorbiaceae</i>	<i>Shirakiopsis elliptica</i>	104	45
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i> (H)	<i>Phyllanthus sp</i>	0.1	0.3
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae</i> (H)	<i>Phyllanthus sp</i>	0.1	0.4

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.2	0.6
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.2	0.6
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.3	0.6
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.3	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.3	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.3	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.4	1.5
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.5	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.7	1.5
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	0.9	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	1.1	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	1.1	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	1.6	2
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	1.9	2
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	2	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	2.1	3
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	2.2	1
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp</i>	2.3	3
Kwatango	K2	1X40	Forest	<i>Euphorbiaceae (S)</i>	<i>Acalypha sp (2)</i>	1	1
Kwatango	K3	1X40	Fallow land	<i>Euphorbiaceae (S)</i>	<i>Erythrococca fischeri</i>	0.2	1
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.1	0.3
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.2	0.3
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.3	0.3
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.6	0.3
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.7	1.5
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.7	1.5
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.8	1

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.8	2
Shambangeda	S2	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	0.9	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1	2
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1.2	0.1
Kwatango	K1	1X40	Agroforest	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1.3	0.4
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1.5	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1.5	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	1.6	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta</i>	2.5	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Euphorbiaceae (S)</i>	<i>Manihot esculenta (2)</i>	0.4	1
Misalai	M1	1X40	Forest	<i>Flacourtiacea</i>	<i>Dasylepis integra</i>	0.8	0.5
Misalai	M2	10X200	Agroforest	<i>Flacourtiacea</i>	<i>Rawsonia reticulata</i>	77	40
Misalai	M2	10X200	Agroforest	<i>Flacourtiacea</i>	<i>Rawsonia reticulata</i>	200	55
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Graminae (H)</i>	<i>Saccharum officinarum</i>		
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.1	0.5
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.1	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.2	0.3
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.5	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.5	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.5	1
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	0.6	1.5
Shambangeda	S1	1X40	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	2.3	3

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Shambangeda	S1	10X200	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	54.1	25
Shambangeda	S1	10X200	Forest	<i>Guttiferae</i>	<i>Allanblackia stuhlmannii</i>	103.5	50
Misalai	M2	10X200	Agroforest	<i>Incacinaceae</i>	<i>Alsodeiopsis schumannii</i>	30	6
Shambangeda	S1	1X40	Forest	<i>Incacinaceae</i>	<i>Leptaulus holstii</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Lamiaceae</i>	<i>Rothea myricoides</i>	0.1	1
Kwatango	K3	1X40	Fallow land	<i>Lamiaceae (S)</i>	<i>Hoslundia opposita</i>	0.3	2
Shambangeda	S2	1X40	Agroforest	<i>Lamiaceae (H)</i>	<i>Stachytapheta jamaicensis</i>		
Kwatango	K3	1X40	Fallow land	<i>Lamiaceae (S)</i>	<i>Hoslundia opposita</i>	0.2	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Lauraceae</i>	<i>Persea americana</i>	0.3	0.3
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Lauraceae</i>	<i>Persea americana</i>	2.2	1.5
Misalai	M2	1X40	Agroforest	<i>Lauraceae</i>	<i>Persea americana</i>	1.5	1
Misalai	M2	1X40	Agroforest	<i>Lauraceae</i>	<i>Persea americana</i>		
Kwatango	K2	10X200	Forest	<i>Loganiaceae</i>	<i>Strychnos mitis</i>	30	25
Kwatango	K1	1X40	Agroforest	<i>Malvaceae</i>	<i>Thespesia garckeana</i>	0.1	0.3
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Malvaceae (H)</i>	<i>Hibiscus sp (6)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Melastomataceae</i>	<i>Dissotis rutondifolia</i>		
Shambangeda	S2	1X40	Agroforest	<i>Melastomataceae (H)</i>	<i>Clidemia hirta</i>	0.1	0.4
Misalai	M2	1X40	Agroforest	<i>Melastomataceae (H)</i>	<i>Clidemia hirta (3)</i>		
Misalai	M3	1X40	Fallow land	<i>Melastomataceae (H)</i>	<i>Clidemia hirta (5)</i>		
Misalai	M3	1X40	Fallow land	<i>Melastomataceae (H)</i>	<i>Dissotis rutondifolia (3)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Meliaceae</i>	<i>Cedrela odorata</i>	2.9	1.5
Kwatango	K2	1X40	Forest	<i>Meliaceae</i>	<i>Pseudobersama mossambicensis</i>	3	3.5
Kwatango	K2	1X40	Forest	<i>Meliaceae</i>	<i>Pseudobersama mossambicensis</i>	4.2	6
Kwatango	K4	1X40	Mixed farming	<i>Meliaceae</i>	<i>Trichilia emetica</i>	0.2	0.4

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K4	1X40	Mixed farming	<i>Meliaceae</i>	<i>Trichilia emetica</i>	0.3	0.6
Kwatango	K4	1X40	Mixed farming	<i>Meliaceae</i>	<i>Trichilia emetica</i>	0.4	0.6
Kwatango	K5	10X200	Plantation	<i>Meliaceae</i>	<i>Trichilia emetica</i>	31	20
Kwatango	K5	10X200	Plantation	<i>Meliaceae</i>	<i>Trichilia emetica</i>	34	20
Kwatango	K5	10X200	Plantation	<i>Meliaceae</i>	<i>Trichilia emetica</i>	40	5
Kwatango	K5	10X200	Plantation	<i>Meliaceae</i>	<i>Trichilia emetica</i>	42.6	30
Misalai	M1	1X40	Forest	<i>Melanthaceae</i>	<i>Bersama abyssinica</i>	0.8	0.5
Misalai	M1	1X40	Forest	<i>Melanthaceae</i>	<i>Bersama abyssinica</i>	1.5	1.2
Kwatango	K3	10X200	Fallow land	<i>Mimosaceae</i>	<i>Albizia adianthifolia</i>	45.5	35
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	0.9	2
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	1.1	2
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	1.5	3
Shambageda	S1	1X40	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	6	3
Misalai	M1	10X200	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	37.5	20
Misalai	M1	10X200	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	50.5	45
Misalai	M1	10X200	Forest	<i>Mimosaceae</i>	<i>Albizia gummifera</i>	86	50
Kwatango	K3	1X40	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	0.3	2.5
Kwatango	K3	1X40	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	2.1	2
Kwatango	K3	1X40	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	2.5	3
Kwatango	K3	10X200	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	32	15
Kwatango	K3	10X200	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	32	25
Kwatango	K3	10X200	Fallow land	<i>Mimosaceae</i>	<i>Albizia schimperiana</i>	38	10
Kwatango	K5	1X40	Plantation	<i>Mimosaceae</i>	<i>Albizia sp</i>	4.1	4
Kwatango	K5	1X40	Plantation	<i>Mimosaceae</i>	<i>Albizia sp</i>	9	7
Kwatango	K5	10X200	Plantation	<i>Meliaceae</i>	<i>Albizia sp</i>	40	12
Kwatango	K5	5X40	Plantation	<i>Mimosaceae</i>	<i>Albizia sp</i>	11	8
Kwatango	K4	1X40	Mixed farming	<i>Mimosaceae</i>	<i>Albizia sp</i>		
Kwatango	K3	10X200	Fallow land	<i>Mimosaceae</i>	<i>Cussonia zimmermanii</i>	73	25
Shambageda	S1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	0.1	0.3
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	1	3
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	1.2	1
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	1.4	2
Shambageda	S1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	3	5

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M1	1X40	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	5	5
Misalai	M1	10X200	Forest	<i>Mimosaceae</i>	<i>Newtonia buchananii</i>	90.5	55
Misalai	M1	1X40	Forest	<i>Monimiaceae</i>	<i>Xymalos monospora</i>	0.7	0.5
Misalai	M1	1X40	Forest	<i>Monimiaceae</i>	<i>Xymalos monospora</i>	0.7	1
Misalai	M1	5X40	Forest	<i>Monimiaceae</i>	<i>Xymalos monospora</i>	12.2	10
Misalai	M2	1X40	Agroforest	<i>Monimiaceae</i>	<i>Xymalos monospora (2)</i>		
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	0.1	0.3
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	0.2	1.5
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	0.3	1.3
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	1	1.5
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	3.3	5
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	5.4	1
Shambangeda	S1	10X200	Forest	<i>Moraceae</i>	<i>Antiaris toxicaria</i>	49	40
Shambangeda	S3	5X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Moraceae</i>	<i>Artocarpus heterophyllus</i>	25	12
Shambangeda	S3	5X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Moraceae</i>	<i>Artocarpus heterophyllus</i>	27.5	12
Misalai	M3	10X200	Fallow land	<i>Moraceae</i>	<i>Artocarpus heterophyllus</i>	81.2	15
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	0.1	1
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	0.3	2
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	0.5	2
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	0.7	2.5
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	0.9	3
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	3.2	5
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	3.7	5
Kwatango	K2	1X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	8.5	5
Kwatango	K2	5X40	Forest	<i>Moraceae</i>	<i>Bosqueiopsis gillettii</i>	10	10
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.2	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.2	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.2	1

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.3	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.4	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	0.6	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	1.1	2
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	1.5	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i>	1.5	1.5
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i> (2)	0.1	0.3
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i> (2)	1.1	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i> (2)	1.3	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i> (3)	1.2	1
Kwatango	K1	1X40	Agroforest	<i>Moraceae</i>	<i>Ficus exasperata</i> (5)	0.1	1
Misalai	M2	10X200	Agroforest	<i>Moraceae</i>	<i>Ficus thonningii</i>	36.8	22
Misalai	M1	10X200	Forest	<i>Moraceae</i>	<i>Ficus thonningii</i>	50	25
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	1.5	3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	2.1	3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	2.9	3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	2.9	3
Shambangeda	S1	1X40	Forest	<i>Moraceae</i>	<i>Mesogyne insignis</i>	4.9	2
Shambangeda	S2	1X40	Agroforest	<i>Moraceae</i>	<i>Milicia excelsa</i>	0.1	0.3
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	2.5	2
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	2.9	3
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	3.5	4
Kwatango	K3	1X40	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	3.7	4
Shambangeda	S2	1X40	Agroforest	<i>Moraceae</i>	<i>Milicia excelsa</i>	12.5	1
Kwatango	K3	10X200	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	30	30
Shambangeda	S2	10X200	Agroforest	<i>Moraceae</i>	<i>Milicia excelsa</i>	33.5	10
Shambangeda	S2	10X200	Agroforest	<i>Moraceae</i>	<i>Milicia excelsa</i>	36.1	12
Shambangeda	S2	10X200	Agroforest	<i>Moraceae</i>	<i>Milicia excelsa</i>	36.9	12
Kwatango	K4	10X200	Mixed farming	<i>Moraceae</i>	<i>Milicia excelsa</i>	39	23
Kwatango	K3	10X200	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	45	20

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K4	10X200	Mixed farming	<i>Moraceae</i>	<i>Milicia excelsa</i>	45	25
Kwatango	K3	10X200	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	49.4	30
Misalai	M3	10X200	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	74.7	35
Kwatango	K4	10X200	Mixed farming	<i>Moraceae</i>	<i>Milicia excelsa</i>	77	25
Misalai	M3	10X200	Fallow land	<i>Moraceae</i>	<i>Milicia excelsa</i>	94.8	25
Kwatango	K1	10X200	Agroforest	<i>Moraceae</i>	<i>Trilepisium madagascariensis</i>	33.5	20
Shambangeda	S1	10X200	Forest	<i>Moraceae</i>	<i>Trilepisium madagascariensis</i>	51.9	40
Misalai	M2	1X40	Agroforest	<i>Musaceae (H)</i>	<i>Ensete ventricosum</i>		
Kwatango	K1	1X40	Agroforest	<i>Musaceae (H)</i>	<i>Musa sp (5)</i>		
Misalai	M1	10X200	Forest	<i>Myrsinaceae</i>	<i>Maesa lanceolata</i>	33.9	20
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.1	0.6
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.1	0.6
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.2	0.6
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.2	0.75
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.3	1
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.3	2
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.4	1
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.7	2
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	0.8	3
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	1.8	1.5
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	3.5	4
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	5.1	5
Shambangeda	S1	1X40	Forest	<i>Myrsinaceae</i>	<i>Cephalosphaera usambarensis</i>	7	6
Kwatango	K2	1X40	Forest	<i>Ochnaceae</i>	<i>Ochna thomasiana</i>	2	3
Misalai	M1	1X40	Forest	<i>Olacaceae</i>	<i>Strembosia scheffleri</i>	0.8	1
Kwatango	K1	10X200	Agroforest	<i>Palmae</i>	<i>Elaeis guineensis</i>	49	7
Kwatango	K2	1X40	Forest	<i>Papilionaceae</i>	<i>Millettia usaramensis</i>	0.2	1.5
Kwatango	K3	1X40	Fallow land	<i>Papilionaceae</i>	<i>Millettia usaramensis</i>	2.2	2.5
Kwatango	K2	1X40	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	1.3	2
Kwatango	K2	1X40	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	9.2	6

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K2	5X40	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	11.1	10
Kwatango	K2	5X40	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	13.7	16
Kwatango	K2	5X40	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	15.7	20
Kwatango	K2	10X200	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	31	25
Kwatango	K2	10X200	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	31	25
Kwatango	K2	10X200	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	32	35
Kwatango	K2	10X200	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	36	35
Kwatango	K2	10X200	Forest	<i>Papilionaceae</i>	<i>Pterocarpus tinctorius</i>	80	35
Misalai	M2	1X40	Agroforest	<i>Papilionaceae (H)</i>	<i>Desmodium repandum (2)</i>		
Kwatango	K5	1X40	Plantation	<i>Papilionaceae (S)</i>	<i>Desmodium sp</i>	0.1	0.75
Kwatango	K5	1X40	Plantation	<i>Papilionaceae (S)</i>	<i>Desmodium sp (2)</i>	0.1	0.5
Misalai	M3	1X40	Fallow land	<i>Passifloraceae (C)</i>	<i>Adenia gummifera</i>		
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	0.8	0.6
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	1.2	2
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	1.5	3
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	1.6	2
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	1.9	3.5
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	2	2.5
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	2.2	4.5
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	2.4	4
Misalai	M1	1X40	Forest	<i>Piperaceae (S)</i>	<i>Piper capense</i>	1.7	3
Misalai	M2	1X40	Agroforest	<i>Piperaceae (S)</i>	<i>Piper capense (3)</i>		
Shambangeda	S1	1X40	Forest	<i>Poaceae (H)</i>	<i>Olyra latifolia</i>		
Misalai	M2	1X40	Agroforest	<i>Poaceae (H)</i>	<i>Oplismenus hirtellus (2)</i>		
Misalai	M3	1X40	Fallow land	<i>Poaceae (H)</i>	<i>Panicum sp</i>		
Kwatango	K3	1X40	Fallow land	<i>Poaceae (H)</i>	<i>Panicum trichocladum</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Poaceae (H)</i>	<i>Panicum trichocladum</i>		
Kwatango	K1	1X40	Agroforest	<i>Poaceae (H)</i>	<i>Panicum trichocladum</i>		
Kwatango	K4	1X40	Mixed farming	<i>Poaceae (H)</i>	<i>Panicum trichocladum</i>		
Kwatango	K5	1X40	Plantation	<i>Poaceae (H)</i>	<i>Panicum trichocladum</i>		

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Poaceae (H)</i>	<i>Saccharum officinarum (37)</i>		
Shambangeda	S2	1X40	Agroforest	<i>Poaceae (H)</i>	<i>Saccharum officinarum (39)</i>		
Kwatango	K5	1X40	Plantation	<i>Poaceae (H)</i>	<i>Setaria megaphylla</i>		
Shambangeda	S3	1X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Poaceae (H)</i>	<i>Sorghum sp. (12)</i>		
Misalai	M3	1X40	Fallow land	<i>Poaceae (H)</i>	<i>Sorghum sp. (8)</i>		
Kwatango	K1	1X40	Agroforest	<i>Poaceae (H)</i>	<i>Zea mays (47)</i>		
Shambangeda	S2	1X40	Agroforest	<i>Polygalaceae (H)</i>	<i>Polygala sp</i>		
Shambangeda	S2	5X40	Agroforest	<i>Protaceae</i>	<i>Grevellia robusta</i>	14	10
Shambangeda	S2	5X40	Agroforest	<i>Protaceae</i>	<i>Grevellia robusta</i>	18	15
Shambangeda	S3	5X40	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	<i>Protaceae</i>	<i>Grevellia robusta</i>	28.3	15
Shambangeda	S2	10X200	Agroforest	<i>Protaceae</i>	<i>Grevellia robusta</i>	30	15
Misalai	M4	5X40	Monoculture&Mixed farming	<i>Protaceae</i>	<i>Grevillea robusta</i>	23	20
Misalai	M3	10X200	Fallow land	<i>Protaceae</i>	<i>Grevillea robusta</i>	30	12
Misalai	M2	10X200	Agroforest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	30	30
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	31	35
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	32	25
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	32	35
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	35	10
Misalai	M2	10X200	Agroforest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	36	40
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	37.2	55
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	37.9	35
Misalai	M2	10X200	Agroforest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	38.1	45
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	45.3	50
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	71	40
Shambangeda	S1	10X200	Forest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>	82.7	45
Misalai	M2	5X40	Agroforest	<i>Rhamnaceae</i>	<i>Maesopsis eminii</i>		
Misalai	M3	1X40	Fallow land	<i>Rosaceae (C)</i>	<i>Rubus sp. (20)</i>		

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M2	1X40	Agroforest	<i>Rubiaceae</i>	<i>Aorantho penduliflora</i>		
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	0.2	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	0.3	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	0.4	0.5
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	0.7	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	0.8	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	1	0.75
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	1	0.75
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	1.1	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>	1.5	1
Misalai	M2	1X40	Agroforest	<i>Rubiaceae</i>	<i>Chassalia parvifolia</i>		
Misalai	M2	1X40	Agroforest	<i>Rubiaceae</i>	<i>Coffea arabica</i>	4.1	2.5
Kwatango	K2	1X40	Forest	<i>Rubiaceae</i>	<i>Cremaspora sp</i>	0.3	0.5
Kwatango	K2	1X40	Forest	<i>Rubiaceae</i>	<i>Cremaspora sp</i>	1	0.5
Shambangeda	S1	5X40	Forest	<i>Rubiaceae</i>	<i>Galiniera saxifraga</i>	15.5	20
Kwatango	K1	1X40	Agroforest	<i>Rubiaceae</i>	<i>Leptactina platyphylla</i>	0.1	0.3
Kwatango	K1	1X40	Agroforest	<i>Rubiaceae</i>	<i>Leptactina platyphylla</i>	0.1	0.4
Kwatango	K1	1X40	Agroforest	<i>Rubiaceae</i>	<i>Leptactina platyphylla</i>	0.3	0.5
Shambangeda	S1	1X40	Forest	<i>Rubiaceae</i>	<i>Pavetta abyssinica var. usambarica</i>	0.1	0.3
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Pavetta abyssinica var. usambarica</i>	0.4	1
Misalai	M1	1X40	Forest	<i>Rubiaceae</i>	<i>Pavetta abyssinica var. usambarica</i>	0.6	1.2
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata</i>	0.1	0.3
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata</i>	0.2	0.5
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata (3)</i>	0.3	0.4
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata (5)</i>	0.1	0.4
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata (5)</i>	0.2	0.5
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Polysphaera lanceolata (5)</i>	0.3	0.5
Kwatango	K2	1X40	Forest	<i>Rubiaceae</i>	<i>Rothmannia engleriana</i>	0.3	2
Kwatango	K2	1X40	Forest	<i>Rubiaceae</i>	<i>Rothmannia engleriana</i>	1.9	3
Shambangeda	S1	1X40	Forest	<i>Rubiaceae</i>	<i>Rothmannia urcelliformis</i>	0.1	0.75
Misalai	M2	5X40	Agroforest	<i>Rubiaceae</i>	<i>Rothmannia urcelliformis</i>	10	5

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M2	5X40	Agroforest	<i>Rubiaceae</i>	<i>Rothmannia urcelliformis</i>	13.6	5
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Rytigynia lichenoxenos</i>	0.1	0.6
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Rytigynia lichenoxenos</i>	0.2	1
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Rytigynia lichenoxenos (3)</i>	0.1	0.6
Kwatango	K4	1X40	Mixed farming	<i>Rubiaceae</i>	<i>Rytigynia lichenoxenos (3)</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Rubiaceae</i>	<i>Tricalysia pallens</i>	0.5	2
Kwatango	K1	1X40	Agroforest	<i>Rutaceae</i>	<i>Citrus sinensis</i>	1.7	1.5
Kwatango	K1	1X40	Agroforest	<i>Rutaceae</i>	<i>Citrus sinensis</i>	2.2	1
Shambangeda	S1	1X40	Forest	<i>Rutaceae</i>	<i>Vepris simplicifolia</i>	0.6	1.5
Kwatango	K4	1X40	Mixed farming	<i>Sapindaceae</i>	<i>Allophylus pervillei</i>	0.2	0.6
Kwatango	K4	1X40	Mixed farming	<i>Sapindaceae</i>	<i>Allophylus pervillei</i>	0.3	1
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Bligia unijugata</i>	1.9	2.5
Kwatango	K1	1X40	Agroforest	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	0.2	0.3
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	0.2	1
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	0.3	0.6
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	0.6	1.5
Kwatango	K2	1X40	Forest	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	1.2	1
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	2.1	1.5
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	2.2	1
Kwatango	K2	1X40	Forest	<i>Sapindaceae</i>	<i>Deinbollia borbonica</i>	2.3	1
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae</i>	<i>Deinbollia borbonica (2)</i>	0.3	1
Misalai	M3	1X40	Fallow land	<i>Sapindaceae (C)</i>	<i>Paulinia pinnata</i>		
Kwatango	K3	1X40	Fallow land	<i>Sapindaceae (C)</i>	<i>Paulinia pinnata</i>		
Shambangeda	S1	1X40	Forest	<i>Sapotaceae</i>	<i>Chrysophyllum gorungosanum</i>	0.1	0.3
Kwatango	K2	10X200	Forest	<i>Sapotaceae</i>	<i>Manilkara sulcata</i>	45	40
Kwatango	K2	10X200	Forest	<i>Sapotaceae</i>	<i>Manilkara sulcata</i>	57	40
Kwatango	K2	10X200	Forest	<i>Sapotaceae</i>	<i>Manilkara sulcata</i>	59	45
Kwatango	K2	10X200	Forest	<i>Sapotaceae</i>	<i>Manilkara sulcata</i>	59.9	40
Shambangeda	S1	1X40	Forest	<i>Sapotaceae</i>	<i>Mimusops obtusifolia</i>	2.3	4
Kwatango	K2	1X40	Forest	<i>Sapotaceae</i>	<i>Pouteria alnifolia</i>	0.1	1
Kwatango	K2	1X40	Forest	<i>Sapotaceae</i>	<i>Pouteria alnifolia</i>	0.2	0.6
Shambangeda	S1	1X40	Forest	<i>Sapotaceae</i>	<i>Sensyplum msolo</i>	0.2	0.5
Shambangeda	S1	10X200	Forest	<i>Sapotaceae</i>	<i>Sensyplum msolo</i>	120	30

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K4	1X40	Mixed farming	<i>Simaroubaceae</i>	<i>Harrisonia abyssinica</i>	0.2	1.5
Kwatango	K4	1X40	Mixed farming	<i>Simaroubaceae</i>	<i>Harrisonia abyssinica</i>	3.5	2
Kwatango	K4	1X40	Mixed farming	<i>Simaroubaceae</i>	<i>Harrisonia abyssinica</i> (2)	0.1	0.3
Kwatango	K5	1X40	Plantation	<i>Simaroubaceae</i>	<i>Harrisonia abyssinica</i>	0.1	0.5
Kwatango	K5	1X40	Plantation	<i>Simaroubaceae</i>	<i>Harrisonia abyssinica</i>	0.2	1.5
Shambangeda	S1	1X40	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	0.1	0.3
Shambangeda	S1	1X40	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	0.2	1
Misalai	M1	1X40	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	0.5	0.6
Misalai	M1	1X40	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	0.5	0.6
Misalai	M1	10X200	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	30	32
Shambangeda	S1	10X200	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	39	45
Misalai	M1	10X200	Forest	<i>Simaroubaceae</i>	<i>Quassia undulata</i>	54	50
Misalai	M2	1X40	Agroforest	<i>Solanaceae (C)</i>	<i>Solanum terminale</i>		
Kwatango	K2	1X40	Forest	<i>Sterculiaceae</i>	<i>Cola clavata</i>	0.1	0.3
Kwatango	K2	1X40	Forest	<i>Sterculiaceae</i>	<i>Cola clavata</i>	0.7	2
Kwatango	K2	1X40	Forest	<i>Sterculiaceae</i>	<i>Cola clavata</i>	0.7	2.5
Kwatango	K2	1X40	Forest	<i>Sterculiaceae</i>	<i>Cola clavata</i>	3.3	2.5
Kwatango	K2	1X40	Forest	<i>Sterculiaceae</i>	<i>Cola clavata</i> (6)	0.1	0.3
Kwatango	K5	1X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	2.5	3
Kwatango	K5	1X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	5	3
Kwatango	K5	1X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	5	4
Kwatango	K5	1X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	5	6
Kwatango	K5	1X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	7	4
Kwatango	K5	5X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	10	7
Kwatango	K5	5X40	Plantation	<i>Sterculiaceae</i>	<i>Dombeya kirkii</i>	10	7
Kwatango	K4	10X200	Mixed farming	<i>Sterculiaceae</i>	<i>Sterculia appendiculata</i>	36	20
Kwatango	K4	10X200	Mixed farming	<i>Sterculiaceae</i>	<i>Sterculia appendiculata</i>	54	30
Kwatango	K4	10X200	Mixed farming	<i>Sterculiaceae</i>	<i>Sterculia appendiculata</i>	76	25
Kwatango	K5	5X40	Plantation	<i>Sterculiaceae</i>	<i>Stereospermum kunthianum</i>	24.1	12
Kwatango	K5	5X40	Plantation	<i>Sterculiaceae</i>	<i>Stereospermum kunthianum</i>	26	15
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.7	1.5
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.2	0.6
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.2	1

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.3	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.3	1.5
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.4	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	0.6	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	1.9	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	2.3	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae</i>	2.5	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae (2)</i>	0.3	0.75
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae (3)</i>	0.2	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae (4)</i>	0.1	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae (5)</i>	0.5	1.5
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Dombeya mupangae (7)</i>	0.4	1
Kwatango	K4	1X40	Mixed farming	<i>Sterculiaceae (S)</i>	<i>Polysphaera lanceolata</i>	0.1	0.3
Kwatango	K5	1X40	Plantation	<i>Tiliaceae</i>	<i>Carpodiptera africana</i>	0.3	1.5
Kwatango	K5	1X40	Plantation	<i>Tiliaceae</i>	<i>Carpodiptera africana</i>	0.3	2
Kwatango	K5	1X40	Plantation	<i>Tiliaceae</i>	<i>Carpodiptera africana</i>	0.4	2
Kwatango	K5	1X40	Plantation	<i>Tiliaceae</i>	<i>Carpodiptera africana</i>	3	4
Kwatango	K5	1X40	Plantation	<i>Tiliaceae</i>	<i>Carpodiptera africana (2)</i>	2.2	3
Kwatango	K4	1X40	Mixed farming	<i>Tiliaceae</i>	<i>Grewia forbesii</i>	0.2	0.6
Kwatango	K3	1X40	Fallow land	<i>Tiliaceae</i>	<i>Grewia similis</i>	0.1	0.4
Misalai	M3	1X40	Fallow land	<i>Tiliaceae (H)</i>	<i>Triumfetta rhomboidea</i>		
Misalai	M3	1X40	Fallow land	<i>Tiliaceae (H)</i>	<i>Triumfetta rhomboidea</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Tiliaceae (H)</i>	<i>Triumfetta rhomboidea (11)</i>		
Shambangeda	S1	1X40	Forest	<i>Ulmaceae</i>	<i>Celtis gomphophylla</i>	7.7	10
Shambangeda	S1	1X40	Forest	<i>Ulmaceae</i>	<i>Celtis gomphophylla</i>	9	10
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Umbeliferae</i>	<i>Steganotaenia lauraceae</i>	1.9	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Umbeliferae</i>	<i>Steganotaenia lauraceae</i>	2	3
Misalai	M2	1X40	Agroforest	<i>Urticaceae (S)</i>	<i>Boehmeria macrophylla (19)</i>		
Kwatango	K4	1X40	Mixed farming	<i>Verbanaceae</i>	<i>Premna sp</i>	0.7	1.5
Kwatango	K5	5X40	Plantation	<i>Verbanaceae</i>	<i>Tectona grandis</i>	6	9

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Kwatango	K5	5X40	Plantation	<i>Verbanaceae</i>	<i>Tectona grandis</i>	9	7
Shambangeda	S2	1X40	Agroforest	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.1	0.3
Shambangeda	S2	1X40	Agroforest	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.1	0.3
Shambangeda	S2	1X40	Agroforest	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.1	0.3
Shambangeda	S2	1X40	Agroforest	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.1	0.4
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.1	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.3	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	0.5	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara</i>	2	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara (2)</i>	0.2	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara (2)</i>	0.1	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara (2)</i>	0.2	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara (22)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lantana camara (4)</i>	0.3	1.5
Misalai	M3	1X40	Fallow land	<i>Verbanaceae (S)</i>	<i>Lantana camara (8)</i>		
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lippia javanica</i>	2	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lippia javanica (2)</i>	0.2	2
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lippia javanica (3)</i>	0.1	1
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lippia javanica (4)</i>	0.2	1
Misalai	M2	1X40	Agroforest	<i>Verbanaceae (S)</i>	<i>Rotheca myricoides</i>		

Village	Plot number	Sub-plot size (m)	Land cover type	Family (Habit)	Species	DBH (cm)	Height (m)
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Verbanaceae (S)</i>	<i>Lippia javanica (3)</i>		
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.1	0.4
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.1	0.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.1	0.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.2	0.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.2	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.3	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.3	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.3	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.4	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.4	1.75
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.5	3
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.6	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.6	2
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.6	2.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.7	2
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	0.8	2
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	1.2	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	1.4	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	2	2
Kwatango	K2	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	2.2	2.5
Kwatango	K2	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	2.2	3
Kwatango	K2	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i>	3.9	4
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (16)</i>	0.1	0.3
Kwatango	K2	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (2)</i>	0.2	0.3
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (2)</i>	0.2	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (2)</i>	0.4	2
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (2)</i>	1.3	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (3)</i>	0.3	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (3)</i>	0.3	2
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (3)</i>	1.4	1.5
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia (5)</i>	0.4	2

Village	Plot number	Sub-plot size (m)	Land cover type				
				Family (Habit)	Species	DBH (cm)	Height (m)
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i> (6)	0.2	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea angustifolia</i> (9)	0.1	1
Shambangeda	S1	1X40	Forest	<i>Violaceae</i>	<i>Rinorea ferruginea</i> (2)	0.5	1.5
Misalai	M4	1X40	Monoculture&Mixed farming	<i>Zingiberaceae</i> (H)	<i>Cinnamom sp</i> (14)		
Misalai	M2	1X40	Agroforest	<i>Zingiberaceae</i> (H)	<i>Cinnamomum sp</i> (2)		
Misalai	M2	1X40	Agroforest	<i>Zingiberaceae</i> (H)	<i>Costus sp.</i> (3)		

Key for the abbreviations: H= herb, S=shrub, C =climber and F=fern.

Appendix 3. Transect walks data.

Village	Transect Number	Distance along transect	Coordinates	Land cover
Misalai	MT2	0	0460072/9446405	Agroforest
Misalai	MT2	50	0460097/9446378	Agroforest
Misalai	MT2	100	0460135/9446344	Agroforest
Misalai	MT2	150	0460179/9446317	Old fallow
Misalai	MT2	200	0460201/9446259	Old fallow
Misalai	MT2	250	0460235/9446226	Old fallow
Misalai	MT2	300	0460264/9446191	Old fallow
Misalai	MT2	350	0460296/9446157	Old fallow
Misalai	MT2	400	0460326/9446124	Old fallow
Misalai	MT2	450	0460357/9446089	Mixed farming
Misalai	MT2	500	0460392/9446065	Mixed farming
Misalai	MT2	550	0460427/9446065	Monoculture
Misalai	MT2	600	0460468/9445999	Old fallow
Misalai	MT2	650	0460498/9445969	Mixed farming
Misalai	MT2	700	0460562/9445884	Agroforest
Misalai	MT2	750	0460594/9445855	Monoculture
Misalai	MT2	800	0460634/9445823	Monoculture
Misalai	MT2	850	0460677/9445784	Mixed farming
Misalai	MT2	900	0460717/9445763	Tea field
Misalai	MT2	950	0460752/9445735	Monoculture
Misalai	MT2	1000	0460782/9445699	Mixed farming
Misalai	MT3	0		Monoculture
Misalai	MT3	50		Fallow
Misalai	MT3	100	0459696/9444478	Mixed farming
Misalai	MT3	150	0459728/9444442	Monoculture
Misalai	MT3	200	0459753/9444402	Mixed farming
Misalai	MT3	250	0459787/9444364	Bushland
Misalai	MT3	300	0459837/9444328	Bushland
Misalai	MT3	350	0459874/9444301	Tea field
Misalai	MT3	400	0459896/9444265	Tea field
Misalai	MT3	450	0459925/9444230	Tea field

Village	Transect Number	Distance along transect	Coordinates	Land cover
Misalai	MT3	500	0459959/9444195	Tea field
Misalai	MT3	550	0459992/9444158	Tea field
Misalai	MT3	600	0460027/9444124	Tea field
Misalai	MT3	650	0460050/9444082	Tea field
Misalai	MT3	700	0460097/944048	Bushland/Tea field
Misalai	MT3	750	0460159/9443987	Tea field
Misalai	MT3	800	0460202/9443948	Tea/road
Misalai	MT3	850	0460276/9443891	Agroforest
Misalai	MT3	900	0460304/9443854	Human settlement
Misalai	MT3	950	0460356/9443821	Human settlement
Misalai	MT3	1000	0460453/9443777	Tea/eucalyptus plantation
Shambangeda	S1	0		Agroforest
Shambangeda	S1	50		Monoculture
Shambangeda	S1	100		Monoculture
Shambangeda	S1	150		Monoculture
Shambangeda	S1	200	0459387/9440985	Agroforest
Shambangeda	S1	250	0459426/9441038	Agroforest
Shambangeda	S1	300	0459444/9441080	Old fallow
Shambangeda	S1	350		Monoculture
Shambangeda	S1	400	0459540/9441153	Monoculture
Shambangeda	S1	450	0459576/9441183	Monoculture
Shambangeda	S1	500	0459603/9441218	Monoculture
Shambangeda	S1	550	0459646/9441257	Monoculture
Shambangeda	S1	600	0459680/9441282	Monoculture
Shambangeda	S1	650	0459718/9441317	Monoculture
Shambangeda	S1	700	0459753/9441344	Monoculture
Shambangeda	S1	750	0459791/9441373	Monoculture
Shambangeda	S1	800	0459845/9441433	Monoculture
Shambangeda	S1	850	0459866/9441436	Agroforest
Shambangeda	S1	900	0459905/9441455	Forest
Shambangeda	S1	950	0459920/9441494	Forest
Shambangeda	S1	1000	0459968/9441518	Forest
Shambangeda	S2	0	0458525/9440187	Agroforest
Shambangeda	S2	50	0458486/9440210	Monoculture

Village	Transect Number	Distance along transect	Coordinates	Land cover
Shambangeda	S2	100	0458460/9440250	Old fallow
Shambangeda	S2	150	0458409/9440276	Old fallow
Shambangeda	S2	200	0458364/9440302	Monoculture
Shambangeda	S2	250	0458335/9440313	Monoculture
Shambangeda	S2	300	0458291/9440345	Agroforest
Shambangeda	S2	350	0458254/9440378	Agroforest
Shambangeda	S2	400	0458221/9440409	Monoculture
Shambangeda	S2	450	0458196/9440536	Mixed farming
Shambangeda	S2	500	0458167/9440494	Monoculture
Shambangeda	S2	550	0458140/9440534	Fallow
Shambangeda	S2	600	0458107/9440571	Fallow
Shambangeda	S2	650	0458083/9440604	Fallow
Shambangeda	S2	700	0458036/9440651	Fallow
Shambangeda	S2	750	0458015/9440673	Monoculture
Shambangeda	S2	800	0457977/9440704	Monoculture
Shambangeda	S2	850	0457938/9440738	Fallow
Shambangeda	S2	900	0457908/9440774	Monoculture
Shambangeda	S2	950	0457875/9440809	Fallow
Shambangeda	S2	1000		Monoculture
Kwatango	K1	0	0469314/9447640	Bushland
Kwatango	K1	50	0469729/9446780	Bushland
Kwatango	K1	100	0469725/9446834	Forest
Kwatango	K1	150	0469724/9446881	Monoculture
Kwatango	K1	200	0469719/9446928	Monoculture
Kwatango	K1	250	0469717/9446979	Monoculture
Kwatango	K1	300	0469711/9447027	Monoculture
Kwatango	K1	350	0469713/9447075	Monoculture
Kwatango	K1	400	0469714/9447125	Monoculture
Kwatango	K1	450	0469716/9447174	Monoculture
Kwatango	K1	500	0469714/9447228	Fallow
Kwatango	K1	550	0469716/9447276	Fallow
Kwatango	K1	600	0469714/9447328	Fallow
Kwatango	K1	650	0469713/9447375	Fallow
Kwatango	K1	700	0469717/9447427	Fallow

Village	Transect Number	Distance along transect	Coordinates	Land cover
Kwatango	K1	750	0469729/9447476	Fallow
Kwatango	K1	800	0469722/9447522	Monoculture
Kwatango	K1	850	0469720/9447575	Fallow
Kwatango	K1	900	0469726/9447626	Monoculture
Kwatango	K1	950	0469722/9447677	Bushland
Kwatango	K1	1000	0469718/9447725	Fallow
Kwatango	K2	0	0470948/9447456	Old fallow
Kwatango	K2	50	0470995/9447457	Old fallow
Kwatango	K2	100	0471048/9447455	Old fallow
Kwatango	K2	150	0471096/9447458	Fallow
Kwatango	K2	200	0471143/9447459	Fallow
Kwatango	K2	250	0471193/9447469	Fallow
Kwatango	K2	300		Mixed farming
Kwatango	K2	350	0471292/9447480	Monoculture
Kwatango	K2	400	0471340/9447482	Fallow
Kwatango	K2	450	0471388/9447487	Fallow
Kwatango	K2	500	0471440/9447489	Fallow
Kwatango	K2	550	0471493/9447488	Fallow
Kwatango	K2	600	0471541/9447486	Monoculture
Kwatango	K2	650	0471590/9447483	Fallow
Kwatango	K2	700	0471644/9447484	Monoculture
Kwatango	K2	750	0471689/9447484	Fallow
Kwatango	K2	800	0471739/9447474	Fallow
Kwatango	K2	850	0471785/9447464	Fallow
Kwatango	K2	900	0471839/9447461	Fallow
Kwatango	K2	950	0471889/9447460	Fallow
Kwatango	K2	1000	0471934/9447465	Fallow
Kwatango	K3	0	0471735/9443403	Mixed farming
Kwatango	K3	50	0471732/9443457	Fallow
Kwatango	K3	100	0471731/9443500	Bushland
Kwatango	K3	150	0471723/9443549	Bushland
Kwatango	K3	200	0471720/9443602	Bushland
Kwatango	K3	250	0471712/9443651	Fallow
Kwatango	K3	300	0471710/9443701	Fallow

Village	Transect Number	Distance along transect	Coordinates	Land cover
Kwatango	K3	350	0471708/9443749	Fallow
Kwatango	K3	400	0471688/9443791	Fallow
Kwatango	K3	450	0471677/9443836	Fallow
Kwatango	K3	500	0471665/9443882	Monoculture
Kwatango	K3	550	0471650/9443934	Bushland
Kwatango	K3	600	0471630/9443981	Bushland
Kwatango	K3	650	0471615/9444026	Bushland
Kwatango	K3	700	0471604/9444071	Fallow
Kwatango	K3	750	0471592/9444123	Fallow
Kwatango	K3	800	0471576/9444169	Fallow
Kwatango	K3	850	0471570/9444216	Bushland
Kwatango	K3	900	0471576/9444267	Bushland
Kwatango	K3	950		Monoculture
Kwatango	K3	1000	0471580/9444369	Monoculture
Kwatango	K4	0	0471345/9445330	Fallow
Kwatango	K4	50	0471315/9445367	Mixed farming
Kwatango	K4	100	0471276/9445398	Monoculture
Kwatango	K4	150	0471238/9445431	Monoculture
Kwatango	K4	200	0471194/9445446	Monoculture
Kwatango	K4	250	0471150/9445468	Fallow
Kwatango	K4	300	0471109/9445496	Fallow
Kwatango	K4	350	0471071/9445532	Old fallow
Kwatango	K4	400	0471025/9445554	Old fallow
Kwatango	K4	450	0470981/9445581	Old fallow
Kwatango	K4	500	0470940/9445616	Old fallow
Kwatango	K4	550	0470903/9445641	Old fallow
Kwatango	K4	600	0470864/9445665	Monoculture
Kwatango	K4	650	0470824/9445697	Monoculture
Kwatango	K4	700	0470782/9445724	Mixed farming
Kwatango	K4	750	0470741/9445755	Monoculture
Kwatango	K4	800	0470702/9445785	Monoculture
Kwatango	K4	850	0470664/9445814	Fallow
Kwatango	K4	900	0470625/9445844	Old fallow
Kwatango	K4	950	0470588/9445890	Old fallow

Village	Transect Number	Distance along transect	Coordinates	Land cover
Kwatango	K4	1000	0470560/9445925	Old fallow

Appendix 4. Bird ringing data.

Date	Village	Time	Species	Age	Sex	Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	Tail (mm)	Remarks
25.10.2008	shambangeda	810	Olive sunbird			9.5	55	30	17	55	
25.10.2008	shambangeda	913	Olive sunbird	juv		8	57	22	16	42	
25.10.2008	shambangeda	1007	Little greenbul			26	83	17	25	80	
25.10.2008	shambangeda	748	Yellow streaked greenbul			30	98	22	23	100	
25.10.2008	shambangeda	1040	Olive sunbird			10	60	23	19	48	
25.10.2008	shambangeda	930	Olive sunbird			9.5	57	25	17	44	
25.10.2008	shambangeda	1050	Little greenbul			22	76	12	20		
25.10.2008	shambangeda	1120	Olive sunbird			9.5	58	24	17	50	
25.10.2008	shambangeda	1125	Little greenbul			29	75	19	15	80	
25.10.2008	shambangeda	1240	Olive sunbird			10	60	24	18	86	
25.10.2008	shambangeda	1248	Shelley's greenbul			26	80	15	14	78	
25.10.2008	shambangeda	1254	Little greenbul			26	76	13	15	80	
25.10.2008	shambangeda	1257	Olive sunbird			9	62	25	19	51	
25.10.2008	shambangeda	249	Olive sunbird			8.5	51	26	15	46	Blood patch
25.10.2008	shambangeda	250	Little greenbul			24	73	12	18	72	With down feathers
25.10.2008	shambangeda	245	Little greenbul			26	83	13	19	78	
25.10.2008	shambangeda	302	Forest batis			12	55	15	18	30	
25.10.2008	shambangeda	415	Shelley's greenbul			28	80	14	19	73	With yellow gap
25.10.2008	shambangeda	418	Little greenbul			26	81	15	18	72	
25.10.2008	shambangeda	425	Little greenbul			27	83	14	17	75	
25.10.2008	shambangeda	430	Little greenbul			26	83	13	18	75	
25.10.2008	shambangeda	432	Shelley's greenbul								Escaped
25.10.2008	shambangeda	441	Shelley's greenbul			31	75	14	19	77	
25.10.2008	shambangeda	515	Olive sunbird			9	59	21	17	52	
27.10.2008	shambangeda	830	Little greenbul			25.5	85	13	19	75	
27.10.2008	shambangeda	920	Little greenbul			25	86	13	19	77	
27.10.2008	shambangeda	1001	Shelley's greenbul			22.5	84	12	19	76	
27.10.2008	shambangeda	1220	little greenbul			23	86	14	20	77	

Date	Village	Time	Species	Age	Sex	Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	Tail (mm)	Remarks
27.10.2008	shambangeda	1304	Shelley's greenbul			26.5	82	13	19	76	
27.10.2008	shambangeda	1408	Forest batis			11.5	61	12	19	31	
27.10.2008	shambangeda	1410	Olive sunbird			9.5	52	22	16	37	
27.10.2008	shambangeda	1506	Olive sunbird			7.5	54	22	15	44	
27.10.2008	shambangeda	1630	Olive sunbird			9.5	62	22	17	55	
27.10.2008	shambangeda	1704	little greenbul			22.5	76	10	20	71	
27.10.2008	shambangeda	1720	little greenbul			26.5	87	11	21	78	
27.10.2008	shambangeda	1722	white stated forest robin			15.5	77	11	23	57	
27.10.2008	shambangeda	1728	white stated forest robin			14.5	75	11	23	55	
27.10.2008	shambangeda	1800	little greenbul			24.5	51	12	21	76	
27.10.2008	shambangeda	1810	Stripe ckecked greenbul								Escaped
28.10.2008	shambangeda	900	white stared forest robin			16	76	12	24	54	
28.10.2008	shambangeda	915	yellow seaked greenbul			25	85	17	22	86	
28.10.2008	shambangeda	945	yellow seaked greenbul			25.5	87	16	22	87	
28.10.2008	shambangeda	1206	white browed robin chat			32	58	15	28	81	
28.10.2008	shambangeda	1209	Little greenbul			24	75	12	17	75	
28.10.2008	shambangeda	1210	white browed robin chat			40	96	17	33	82	
28.10.2008	shambangeda	220	Little greenbul			24	81	12	18	77	
28.10.2008	shambangeda	259	shelley's greenbul			26	82	13	20	78	
28.10.2008	shambangeda	304	shelley's greenbul			25	79	12	18	74	
28.10.2008	shambangeda	420	olive sunbird			8.5	55	22	14	45	
28.10.2008	shambangeda	522	peter's twinsport			16	50	14	19	54	
28.10.2008	shambangeda	530	Red faced crimsonwing			16	55	15	24	53	
28.10.2008	shambangeda	620	olive sunbird			10.5	62	24	17	54	
28.10.2008	shambangeda	635	shelley's greenbul			26	80	13	18	78	
28.10.2008	shambangeda	636	white stared forest robin			16	72	11	24	55	
28.10.2008	shambangeda	638	white stared forest robin			14	75	11	23	57	
28.10.2008	shambangeda	639	Little greenbul			23	80	11	21	79	
28.10.2008	shambangeda	641	Little greenbul			24	81	12	21	76	
28.10.2008	shambangeda	641	olive sunbird			8.5	55	22	18	42	
28.10.2008	shambangeda	642	olive sunbird			10	62	22	17	53	

Date	Village	Time	Species	Age	Sex	Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	Tail (mm)	Remarks
30.10.2008	Kwatango	1130	yellow streaked greenbul	juv		34.5	100	25	23	97	With yellow gop on the bill
30.10.2008	Kwatango	1232	yellow streaked greenbul	juv		32	82	22	22	90	With yellow gop on the bill
30.10.2008	Kwatango	133	Black headed weaver		m	40	84	22	23	53	
30.10.2008	Kwatango	228	peter's twinsport		m	9	40	10	12	40	
30.10.2008	Kwatango	229	Golden weaver		f	25	73	15	20	43	
30.10.2008	Kwatango	237	Golden weaver		f	24.5	69	16	12	44	
30.10.2008	Kwatango	320	Red faced cisticola			14	48	14	23	44	
30.10.2008	Kwatango	340	Black headed weaver		m	39	83	20	22	50	
30.10.2008	Kwatango	346	African golden weaver		m	25	70	15	23	45	With breeding plumage.
30.10.2008	Kwatango	348	spectacled weaver		f	25	63	17	20	55	With breeding plumage
30.10.2008	Kwatango	350	African golden weaver			24	75	23	22	45	
30.10.2008	Kwatango	406	Red faced cisticola			16	55	15	24	50	
30.10.2008	Kwatango	409	peter's twinsport		m	15	50	14	19	54	
30.10.2008	Kwatango	500	Red faced cisticola			14	48	14	23	45	
30.10.2008	Kwatango	510	Red faced cisticola			14	49	13	22	46	
30.10.2008	Kwatango	522	peter's twinsport		m	9.5	40	12	11	44	
30.10.2008	Kwatango	523	African golden weaver		m	26	70	15	23	45	With breeding plumage
30.10.2008	Kwatango	523	spectacled weaver		f	25	63	17	22	56	
30.10.2008	Kwatango	530	Red faced cisticola			14	49	13	23	46	
30.10.2008	Kwatango	532	Black headed weaver		m	41	85	23	26	56	
31.10.2008	Kwatango	930	Little greenbul			24	76	13	18	76	
31.10.2008	Kwatango	936	white browed robin chat			39	96	17	33	84	
31.10.2008	Kwatango	1208	Shelley's greenbul			25	82	14	20	79	
31.10.2008	Kwatango	128	Shelley's greenbul			26	78	12	19	75	
31.10.2008	Kwatango	130	yellow streked greenbul			35	101	25	23	99	
31.10.2008	Kwatango	330	yellow streked greenbul			32.5	86	23	22	98	
31.10.2008	Kwatango	408	white starred forest robin			16	73	11	24	56	
31.10.2008	Kwatango	520	Olive sunbird			8.5	55	22	18	42	

Date	Village	Time	Species	Age	Sex	Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	Tail (mm)	Remarks
31.10.2008	Kwatango	530	African gowshak								Escaped from the net.
1.11.2008	Kwatango	900	Forest batis		f	12	62	11	21	32	
1.11.2008	Kwatango	932	Forest batis		m	10.5	60	13	18	34	
1.11.2008	Kwatango	1220	African broadbill								Escaped
1.11.2008	Kwatango	1240	Yellow streaked greenbul			35	10	25	24	97	
1.11.2008	Kwatango	430	Yellow streaked greenbul			33	83	22	22	90	
1.11.2008	Kwatango	433	Olive sunbird			8.5	55	22	14	45	
1.11.2008	Kwatango	439	Olive sunbird			9	54	23	15		
1.11.2008	Kwatango	445	Red faced crimsonwing		f	12	56	10	18	43	
1.11.2008	Kwatango	520	Shelley's greenbul			26	80	13	18	78	
3.11.2008	Misalai	1020	Olive sunbird			9.5	50	27	17	45	
3.11.2008	Misalai	1022	Olive sunbird			10.5	45	26	18	49	
3.11.2008	Misalai	1130	Shelley's greenbul			27	80	13	19	81	
3.11.2008	Misalai	511	Red faced crimsonwing		m	12	58	11	19	45	
3.11.2008	Misalai	512	Olive sunbird			9	54	24	16	51	
3.11.2008	Misalai	515	Yellow streaked greenbul			34	85	24	21	92	
3.11.2008	Misalai	530	white starred forest robin			18	75	12	25	57	
4.11.2008	Misalai	830	Little greenbul			25.5	86	14	19	76	
4.11.2008	Misalai	843	Little greenbul								Recaptured
4.11.2008	Misalai	920	Shelley's greenbul			25.5	81	11	24	79	
4.11.2008	Misalai	1230	Shelley's greenbul			26.5	84	13	24	80	
4.11.2008	Misalai	1248	Olive sunbird			9.5	62	22	17	56	
4.11.2008	Misalai	320	Olive sunbird								Recaptured
4.11.2008	Misalai	333	Little greenbul								Recaptured
4.11.2008	Misalai	340	Red faced cisticola			14	54	16	22	52	
4.11.2008	Misalai	508	Red faced cisticola			16	56	17	24	51	
4.11.2008	Misalai	517	Peter's twinsport		m	15	50	14	20	55	
4.11.2008	Misalai	520	Yellow streaked greenbul			35	86	25	22	92	
4.11.2008	Misalai	521	Little greenbul			27	89	15	20	75	

Date	Village	Time	Species	Age	Sex	Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	Tail (mm)	Remarks
5.11.2008	Misalai	830	White browed robin chat			33	86	16	29	52	
5.11.2008	Misalai	847	Little greenbul			27	87	12	20	81	
5.11.2008	Misalai	945	Olive sunbird			10.5	62	25	17	55	
5.11.2008	Misalai	1015	Shelley's greenbul			26	80	13	19	79	
5.11.2008	Misalai	1130	Olive sunbird			8	53	23	13	39	
5.11.2008	Misalai	130	Olive sunbird			8.5	54	22	14	38	

Appendix 5. Timed species count data.

Date	Site	Land use /vegetation cover type	Species	Scientific name
15.2.2009	Misalai	Agroforest	Common bulbul	<i>Pycnonotus barbatus</i>
15.2.2009	Misalai	Agroforest	African citril	<i>Turtur tympanistria</i>
15.2.2009	Misalai	Agroforest	Tambourine dove	<i>Stactolaema leucotis</i>
15.2.2009	Misalai	Agroforest	White- eared barbet	<i>Stactolaema leucotis</i>
15.2.2009	Misalai	Agroforest	Silvery-cheeked hornbill	<i>Bycanistes brevis</i>
15.2.2009	Misalai	Agroforest	Long-billed Tailbird	<i>Apalis moreaui</i>
15.2.2009	Misalai	Agroforest	Red faced cisticola	<i>Cisticola erythrops</i>
15.2.2009	Misalai	Agroforest	Tawny flanked prinia	<i>Prinia subflava</i>
15.2.2009	Misalai	Agroforest	Green barbet	<i>Stactolaema olivacea</i>
15.2.2009	Misalai	Agroforest	Evergreen forest warbler	<i>Bradypterus lopezi</i>
15.2.2009	Misalai	Agroforest	White-browed coucal	<i>Centropus superciliosus</i>
15.2.2009	Misalai	Agroforest	Tropical boubou	<i>Laniarius aethiopicus</i>
15.2.2009	Misalai	Agroforest	Olive sunbird	<i>Nectarinia olivacea</i>
15.2.2009	Misalai	Agroforest	Common stone chat	<i>Saxicola torquata</i>
15.2.2009	Misalai	Agroforest	Banded green sunbird	<i>Anthreptes rubritorques</i>
15.2.2009	Misalai	Agroforest	Black-fronted bush-shrike	<i>Malaconotus nigrifrons</i>
15.2.2009	Misalai	Agroforest	Black headed apalis	<i>Apalis melanocephala</i>
15.2.2009	Misalai	Agroforest	Grey-backed camaroptera	<i>Camaroptera brachyuran</i>
15.2.2009	Misalai	Agroforest	Grey cuckoo-shrike	<i>Coracina caesia</i>
15.2.2009	Misalai	Agroforest	Yellow-streaked greenbul	<i>Phyllastrephus flavostriatus</i>
15.2.2009	Misalai	Agroforest	Eastern Nicator	<i>Nicator gularis</i>
15.2.2009	Misalai	Agroforest	Blue-spotted wood dove	<i>Turtur afer</i>
15.2.2009	Misalai	Agroforest	Eastern bronze-naped pigeon	<i>Columba delegorguei</i>
15.2.2009	Misalai	Agroforest	Klaas's cuckoo	<i>Chrysococcyx klaas</i>
15.2.2009	Misalai	Agroforest	Shelley's greenbul	<i>Andropadus masukuensis</i>
15.2.2009	Misalai	Agroforest	Long-crested eagle	<i>Lophaetus occipitalis</i>
15.2.2009	Misalai	Agroforest	Pin tailed whydah	<i>Vidua macroura</i>
15.2.2009	Misalai	Agroforest	Fisher's turaco	<i>Tauraco fischeri</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
15.2.2009	Misalai	Agroforest	Speckled mousebird	<i>Colius striatus</i>
15.2.2009	Misalai	Agroforest	Yellow white-eye	<i>Zosterops senegalensis</i>
15.2.2009	Misalai	Agroforest	Uluguru violet-backed sunbird	<i>Anthreptes neglectus</i>
15.2.2009	Misalai	Agroforest	Spectacled weaver	<i>Ploceus ocularis</i>
15.2.2009	Misalai	Agroforest	Trampeter hornbill	<i>Bycanistes bucinator</i>
15.2.2009	Misalai	Agroforest	Cabanis bunting.	<i>Emberiza cabanisi</i>
15.2.2009	Misalai	Fallow land	Common bulbul	<i>Pycnonotus barbatus</i>
15.2.2009	Misalai	Fallow land	Purple banded sunbid	<i>Nectarinia bifasciata</i>
15.2.2009	Misalai	Fallow land	White-browed robin-chat	<i>Cossypha heuglini</i>
15.2.2009	Misalai	Fallow land	Collared sunbird	<i>Anthreptes collaris</i>
15.2.2009	Misalai	Fallow land	Tropical boubou	<i>Laniarius aethiopicus</i>
15.2.2009	Misalai	Fallow land	Blue-spotted wood dove	<i>Turtur afer</i>
15.2.2009	Misalai	Fallow land	Fisher's turaco	<i>Tauraco fischeri</i>
15.2.2009	Misalai	Fallow land	Red faced cisticola	<i>Cisticola erythrops</i>
15.2.2009	Misalai	Fallow land	Tawny flanked prinia	<i>Prinia subflava</i>
15.2.2009	Misalai	Fallow land	African citril	<i>Serinus citrinelloides</i>
15.2.2009	Misalai	Fallow land	Yellow fronted canary	<i>serinus mozambicus</i>
15.2.2009	Misalai	Fallow land	Banded green sunbird	<i>Estrilda astrild</i>
15.2.2009	Misalai	Fallow land	Common waxbill	<i>Colius striatus</i>
15.2.2009	Misalai	Fallow land	Black and white mankin	<i>Lonchura bicolor</i>
15.2.2009	Misalai	Fallow land	Cabanis bunting	<i>Emberiza cabanisi</i>
15.2.2009	Misalai	Fallow land	Augur bazzard	<i>buteo oreophilus</i>
15.2.2009	Misalai	Fallow land	African crowed eagle	<i>stephanoaetus coronatus</i>
15.2.2009	Misalai	Fallow land	Red eyed dove	<i>streptopelia semitorquata</i>
15.2.2009	Misalai	Fallow land	Long crested eagle	<i>Lophaetus occipitalis</i>
15.2.2009	Misalai	Fallow land	Eastern bronze-naped pigeon	<i>Columba delegorguei</i>
15.2.2009	Misalai	Fallow land	Trampeter hornbill	<i>Bycanistes bucinator</i>
15.2.2009	Misalai	Fallow land	African green pigeon	<i>Treron calva</i>
15.2.2009	Misalai	Fallow land	Black and white shrike flaycatcher	<i>Bias musicus</i>
15.2.2009	Misalai	Fallow land	Fork tailed drongo	<i>Dcruru adsimilis</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
16.2.2009	Misalai	Monoculture&mixed farming	Common bulbul	<i>Pycnonotus barbatus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Squire tailed drongo	<i>Dicurus ludwigii</i>
16.2.2009	Misalai	Monoculture&mixed farming	African citril	<i>Turtur tympanistria</i>
16.2.2009	Misalai	Monoculture&mixed farming	Tambourine dove	<i>Stactolaema leucotis</i>
16.2.2009	Misalai	Monoculture&mixed farming	Tropical boubou	<i>Laniarius aethiopicus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Speckled mousebird	<i>Colius striatus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Common waxbill	<i>Colius striatus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Fisher's turaco	<i>Tauraco fischeri</i>
16.2.2009	Misalai	Monoculture&mixed farming	Banded green sunbird	<i>Anthreptes rubritorques</i>
16.2.2009	Misalai	Monoculture&mixed farming	Yellow fronted canary	<i>serinus mozambicus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Olive sunbird	<i>Nectarinia olivacea</i>
16.2.2009	Misalai	Monoculture&mixed farming	Grey headed kingfisher	<i>Halcyon leucocephala</i>
16.2.2009	Misalai	Monoculture&mixed farming	Barred Long-tailed cuckoo	<i>Cercococcyx montanus</i>
16.2.2009	Misalai	Monoculture&mixed farming	African emerald cuckoo	<i>Chrysococcyx cupreus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Eastern nicator	<i>Nicator gularis</i>
16.2.2009	Misalai	Monoculture&mixed farming	Common fiscal	<i>Lanius collaris</i>
16.2.2009	Misalai	Monoculture&mixed farming	Uluguru violet backed sunbird	<i>Anthreptes neglectus</i>
16.2.2009	Misalai	Monoculture&mixed farming	Shelley's greenbul	<i>Andropadus masukuensis</i>
16.2.2009	Misalai	Monoculture&mixed farming	Little greenbul	<i>Andropadus virens</i>
16.2.2009	Misalai	Monoculture&mixed farming	Arrow-marked babbler	<i>Turdoides jardineii</i>
16.2.2009	Misalai	Monoculture&mixed farming	Brown-crowned tchagra	<i>Tchagra australis</i>
16.2.2009	Misalai	Monoculture&mixed farming	Blue-spotted wood dove	<i>Turtur afer</i>
16.2.2009	Misalai	Monoculture&mixed farming	White browed robin chat	<i>Cossypha heuglini</i>
16.2.2009	Misalai	Monoculture&mixed farming	Purple banded sunbid	<i>Nectarinia bifasciata</i>
16.2.2009	Misalai	Monoculture&mixed farming	Long-crested eagle	<i>Lophaetus occipitalis</i>
16.2.2009	Misalai	Monoculture&mixed farming	African goshawk	<i>Accpiter tachiro</i>
17.2.2009	Shambangeda	Agroforest	Collared sunbird	<i>Anthreptes collaris</i>
17.2.2009	Shambangeda	Agroforest	Olive sunbird	<i>Nectarinia olivacea</i>
17.2.2009	Shambangeda	Agroforest	Red faced cisticola	<i>Cisticola erythrops</i>
17.2.2009	Shambangeda	Agroforest	Common waxbill	<i>Colius striatus</i>
17.2.2009	Shambangeda	Agroforest	Little greenbul	<i>Andropadus virens</i>
17.2.2009	Shambangeda	Agroforest	African citril	<i>Turtur tympanistria</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
17.2.2009	Shambangeda	Agroforest	Common bulbul	<i>Pycnonotus barbatus</i>
17.2.2009	Shambangeda	Agroforest	Tawny flanked prinia	<i>Prinia subflava</i>
17.2.2009	Shambangeda	Agroforest	Yellow fronted canary	<i>serinus mozambicus</i>
17.2.2009	Shambangeda	Agroforest	Black-backed puffback	<i>Dryoscopus cubla</i>
17.2.2009	Shambangeda	Agroforest	White-browed coucal	<i>Centropus superciliosus</i>
17.2.2009	Shambangeda	Agroforest	African Pygmy kingfisher	<i>Ispidina picta</i>
17.2.2009	Shambangeda	Agroforest	Long-crested eagle	<i>Lophaetus occipitalis</i>
17.2.2009	Shambangeda	Agroforest	Fisher's turaco	<i>Tauraco fischeri</i>
17.2.2009	Shambangeda	Agroforest	Green barbet	<i>Stactolaema olivacea</i>
17.2.2009	Shambangeda	Agroforest	Silvery-cheeked hornbill	<i>Bycanistes brevis</i>
17.2.2009	Shambangeda	Agroforest	Trampeter hornbill	<i>Bycanistes bucinator</i>
17.2.2009	Shambangeda	Agroforest	Grey backed camaroptera	<i>Camaroptera brachyuran</i>
17.2.2009	Shambangeda	Agroforest	Dark backed weaver	<i>Ploceus bicolor</i>
17.2.2009	Shambangeda	Agroforest	Puple banded sunbird	<i>Nectarinia bifasciata</i>
17.2.2009	Shambangeda	Agroforest	Squire tailed drongo	<i>Dicrurus ludwigii</i>
	Shambangeda	Agroforest	Yellow white eye	<i>Zosterops senegalensis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Tambourine dove	<i>Stactolaema leucotis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Tropical boubou	<i>Laniarius aethiopicus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	White-browed coucal	<i>Centropus superciliosus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Tiny greenbul	<i>Phyllastrephus debilis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	White eared barbet	<i>Stactolaema leucotis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Blue-spotted wood dove	<i>Turtur afer</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Shelley's greenbul	<i>Andropadus masukuensis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Banded green sunbird	<i>Anthreptes rubritorques</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Evergreen forest warbler	<i>Bradypterus lopezi</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Fisher's turaco	<i>Tauraco fischeri</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Grey cuckoo-shrike	<i>Coracina caesia</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Yellow-streaked greenbul	<i>Phyllastrephus flavostriatus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Green-headed oriole	<i>Oriolus chlorocephalus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Little greenbul	<i>Andropadus virens</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Olive sunbird	<i>Nectarinia olivacea</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Common bulbul	<i>Pycnonotus barbatus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	White-chested alethe	<i>Alethe fuellerborni</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Yellow white eye	<i>Zosterops senegalensis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	African crowned eagle	<i>stephanoaetus coronatus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Green barbet	<i>Stactolaema olivacea</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Speckled mousebird	<i>Colius striatus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Purple banded sunbird	<i>Nectarinia bifasciata</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Black-bellied starling	<i>Lamprotornis corruscus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Southern banded snake eagle	<i>Circaetus fasciolatus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Long-crested eagle	<i>Lophaetus occipitalis</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	African harrier -hawk	<i>polyboroides typus</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Little sparrow hawk	<i>Andropadus virens</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Black-throated wattle-eye	<i>Platysteira peltata</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Forest batis	<i>Batis mixta</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Lemon dove	<i>Aplopelia larvata</i>
18.2.2009	Shambangeda	Fallow land (40%) & Agroforest (10%) & Monoculture (50%)	Amani sunbird	<i>Anthreptes pallidigaster</i>
19.2.2009	Kwatango	Fallow land	Common bulbul	<i>Pycnonotus barbatus</i>
19.2.2009	Kwatango	Fallow land	Little greenbul	<i>Andropadus virens</i>
19.2.2009	Kwatango	Fallow land	Olive sunbird	<i>Nectarinia olivacea</i>
19.2.2009	Kwatango	Fallow land	African harrier -hawk	<i>polyboroides typus</i>
19.2.2009	Kwatango	Fallow land	Tawny flanked prinia	<i>Prinia subflava</i>
19.2.2009	Kwatango	Fallow land	Red eyed dove	<i>streptopelia semitorquata</i>
19.2.2009	Kwatango	Fallow land	Eastern bronze-naped pigeon	<i>Columba delegorguei</i>
19.2.2009	Kwatango	Fallow land	Black headed weaver	<i>Ploceus cucullatus</i>
19.2.2009	Kwatango	Fallow land	Crowned hornbill	<i>Tockus alboterminatus</i>
19.2.2009	Kwatango	Fallow land	Palm -nut vulture	<i>Gypohierax angolensis</i>
19.2.2009	Kwatango	Fallow land	Red-tailed ant thrush	<i>Neocossyphus rufus</i>
19.2.2009	Kwatango	Fallow land	Black-bellied starling	<i>Lamprotornis corruscus</i>
19.2.2009	Kwatango	Fallow land	Dark backed weaver	<i>Ploceus bicolor</i>
19.2.2009	Kwatango	Fallow land	White-browed coucal	<i>Centropus superciliosus</i>
19.2.2009	Kwatango	Fallow land	Kenrick's starling	<i>Poeoptera kenricki</i>
19.2.2009	Kwatango	Fallow land	Collared sunbird	<i>Anthreptes collaris</i>
19.2.2009	Kwatango	Fallow land	Folk tailed drongo	<i>Dcruru adsimilis</i>
19.2.2009	Kwatango	Fallow land	Tropical boubou	<i>Laniarius aethiopicus</i>
19.2.2009	Kwatango	Fallow land	Speckled mousebird	<i>Colius striatus</i>
19.2.2009	Kwatango	Fallow land	Grey backed camaroptera	<i>Camaroptera brachyuran</i>
19.2.2009	Kwatango	Fallow land	Red faced cisticola	<i>Cisticola erythrops</i>
19.2.2009	Kwatango	Fallow land	Yellow bishop	<i>Euplectes capensis</i>
19.2.2009	Kwatango	Fallow land	Yellowbill	<i>Ceuthmochares aereus</i>
19.2.2009	Kwatango	Fallow land	African citril	<i>Turtur tympanistris</i>
19.2.2009	Kwatango	Fallow land	African pygmy kingfisher	<i>Ispidina lecontei</i>
19.2.2009	Kwatango	Fallow land	Long-crested eagle	<i>Lophaetus occipitalis</i>
19.2.2009	Kwatango	Fallow land	Brown -hooded kingfisher	<i>Halcyon leucocephala</i>
19.2.2009	Kwatango	Fallow land	Pin tailed whydah	<i>Vidua macroura</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
19.2.2009	Kwatango	Fallow land	Black-backed puffback	<i>Dryoscopus cubla</i>
19.2.2009	Kwatango	Fallow land	Green barbet	<i>Stactolaema olivacea</i>
19.2.2009	Kwatango	Fallow land	African crowned eagle	<i>stephanoaetus coronatus</i>
19.2.2009	Kwatango	Fallow land	Yellow fronted canary	<i>serinus mozambicus</i>
19.2.2009	Kwatango	Fallow land	Fisher's turaco	<i>Tauraco fischeri</i>
19.2.2009	Kwatango	Fallow land	Baglafaecht weaver	<i>Ploceus baglafaecht</i>
19.2.2009	Kwatango	Agroforest	Tawny flanked prinia	<i>Prinia subflava</i>
19.2.2009	Kwatango	Agroforest	Red faced cisticola	<i>Cisticola erythrops</i>
19.2.2009	Kwatango	Agroforest	Folk tailed drongo	<i>Dcruru adsimilis</i>
19.2.2009	Kwatango	Agroforest	Black headed weaver	<i>Ploceus cucullatus</i>
19.2.2009	Kwatango	Agroforest	Long-crested eagle	<i>Lophaetus occipitalis</i>
19.2.2009	Kwatango	Agroforest	Common bulbul	<i>Pycnonotus barbatus</i>
19.2.2009	Kwatango	Agroforest	Square-tailed drongo	<i>Dicrurus ludwigii</i>
19.2.2009	Kwatango	Agroforest	Purple banded sunbid	<i>Nectarinia bifasciata</i>
19.2.2009	Kwatango	Agroforest	Eastern bronze-naped pigeon	<i>Columba delegorguei</i>
19.2.2009	Kwatango	Agroforest	Augur bazzard	<i>buteo oreophilus</i>
19.2.2009	Kwatango	Agroforest	Red eyed dove	<i>streptopelia semitorquata</i>
19.2.2009	Kwatango	Agroforest	White-browed coucal	<i>Centropus superciliosus</i>
19.2.2009	Kwatango	Agroforest	Dark-backed weaver	<i>Ploceus bicolor</i>
19.2.2009	Kwatango	Agroforest	African golden weaver (yellow weaver)	<i>Ploceus subaureus</i>
19.2.2009	Kwatango	Agroforest	White eared barbet	<i>Stactolaema leucotis</i>
19.2.2009	Kwatango	Agroforest	African pygmy kingfisher	<i>Ispidina lecontei</i>
19.2.2009	Kwatango	Agroforest	Black-bellied starling	<i>Lamprotornis corruscus</i>
19.2.2009	Kwatango	Agroforest	Spectacled weaver	<i>Ploceus ocularis</i>
19.2.2009	Kwatango	Agroforest	Crowned hornbill	<i>Tockus alboterminatus</i>
19.2.2009	Kwatango	Agroforest	Grey backed camaroptera	<i>Camaroptera brachyuran</i>
19.2.2009	Kwatango	Agroforest	Tropical boubou	<i>Laniarius aethiopicus</i>
19.2.2009	Kwatango	Agroforest	African citril	<i>Turtur tympanistria</i>
19.2.2009	Kwatango	Agroforest	Yellowbill	<i>Ceuthmochares aereus</i>
19.2.2009	Kwatango	Agroforest	Yellow white eye	<i>Zosterops senegalensis</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
19.2.2009	Kwatango	Agroforest	Black and white mankin	<i>Lonchura bicolor</i>
19.2.2009	Kwatango	Agroforest	Tambourine dove	<i>Stactolaema leucotis</i>
19.2.2009	Kwatango	Agroforest	Olive sunbird	<i>Nectarinia olivacea</i>
19.2.2009	Kwatango	Agroforest	Kenrick's starling	<i>Poeoptera kenricki</i>
19.2.2009	Kwatango	Agroforest	African emerald cuckoo	<i>Chrysococcyx cupreus</i>
19.2.2009	Kwatango	Agroforest	Pin tailed whydah	<i>Vidua macroura</i>
19.2.2009	Kwatango	Agroforest	Silvery-cheeked hornbill	<i>Bycanistes brevis</i>
20.2.2009	Kwatango	Mixed farming	Red eyed dove	<i>streptopelia semitorquata</i>
20.2.2009	Kwatango	Mixed farming	Red faced cisticola	<i>Cisticola erythrops</i>
20.2.2009	Kwatango	Mixed farming	Tawny flanked prinia	<i>Prinia subflava</i>
20.2.2009	Kwatango	Mixed farming	Common bulbul	<i>Pycnonotus barbatus</i>
20.2.2009	Kwatango	Mixed farming	Crowned hornbill	<i>Tockus albeterminatus</i>
20.2.2009	Kwatango	Mixed farming	Black bellied starling	<i>Lamprotornis corruscus</i>
20.2.2009	Kwatango	Mixed farming	White-browed coucal	<i>Centropus superciliosus</i>
20.2.2009	Kwatango	Mixed farming	Pin tailed whydah	<i>Vidua macroura</i>
20.2.2009	Kwatango	Mixed farming	Black-backed puffback	<i>Dryoscopus cubla</i>
20.2.2009	Kwatango	Mixed farming	Collared sunbird	<i>Nectarinia olivacea</i>
20.2.2009	Kwatango	Mixed farming	Green barbet	<i>Stactolaema olivacea</i>
20.2.2009	Kwatango	Mixed farming	Tropical boubou	<i>Laniarius aethiopicus</i>
20.2.2009	Kwatango	Mixed farming	Speckled mousebird	<i>Colius striatus</i>
20.2.2009	Kwatango	Mixed farming	Grey backed camaroptera	<i>Camaroptera brachyuran</i>
20.2.2009	Kwatango	Mixed farming	African Pygmy kingfisher	<i>Ispidina lecontei</i>
20.2.2009	Kwatango	Mixed farming	Long-crested eagle	<i>Lophaetus occipitalis</i>
20.2.2009	Kwatango	Mixed farming	Palm -nut vulture	<i>Gypohierax angolensis</i>
20.2.2009	Kwatango	Mixed farming	African crowed eagle	<i>stephanoaetus coronatus</i>
20.2.2009	Kwatango	Mixed farming	African citril	<i>Turtur tympanistria</i>
20.2.2009	Kwatango	Mixed farming	Yellow fronted canary	<i>serinus mozambicus</i>
20.2.2009	Kwatango	Mixed farming	Red-tailed ant thrush	<i>Neocossyphus rufus</i>
20.2.2009	Kwatango	Mixed farming	Fisher's turaco.	<i>Tauraco fischeri</i>
20.2.2009	Kwatango	Mixed farming	Spectacled Weaver	<i>Ploceus ocularis</i>
20.2.2009	Kwatango	Mixed farming	Yellow Bishop	<i>Euplectes capensis</i>
20.2.2009	Kwatango	Mixed farming	Helmeted Guineafowl	<i>Numida meleagris</i>

Date	Site	Land use /vegetation cover type	Species	Scientific name
20.2.2009	Kwatango	Mixed farming	Common Waxbill	<i>Colius striatus</i>
20.2.2009	Kwatango	Mixed farming	Green Wood hoope	<i>Lamprotornis corruscus</i>
20.2.2009	Kwatango	Mixed farming	Common Fiscal	<i>Lanius collaris</i>
20.2.2009	Kwatango	Plantation	Tropical boubou	<i>Laniarius aethiopicus</i>
20.2.2009	Kwatango	Plantation	Speckled mousebird	<i>Colius striatus</i>
20.2.2009	Kwatango	Plantation	Grey backed camaroptera	<i>Camaroptera brachyuran</i>
20.2.2009	Kwatango	Plantation	African Pygmy kingfisher	<i>Ispidina lecontei</i>
20.2.2009	Kwatango	Plantation	Long-crested eagle	<i>Lophaetus occipitalis</i>
20.2.2009	Kwatango	Plantation	Palm -nut vulture	<i>Gypohierax angolensis</i>
20.2.2009	Kwatango	Plantation	African crowed eagle	<i>stephanoaetus coronatus</i>
20.2.2009	Kwatango	Plantation	Pin tailed whydah	<i>Vidua macroura</i>
20.2.2009	Kwatango	Plantation	Black-backed puffback	<i>Dryoscopus cubla</i>
20.2.2009	Kwatango	Plantation	Collared sunbird	<i>Nectarinia olivacea</i>
20.2.2009	Kwatango	Plantation	Green barbet	<i>Stactolaema olivacea</i>
20.2.2009	Kwatango	Plantation	Spectacled Weaver	<i>Ploceus ocularis</i>
20.2.2009	Kwatango	Plantation	Yellow Bishop	<i>Euplectes capensis</i>
20.2.2009	Kwatango	Plantation	Helmeted Guineafowl	<i>Numida meleagris</i>
20.2.2009	Kwatango	Plantation	Red eyed dove	<i>streptopelia semitorquata</i>
20.2.2009	Kwatango	Plantation	Red faced cisticola	<i>Cisticola erythrops</i>
20.2.2009	Kwatango	Plantation	Tawny flanked prinia	<i>Prinia subflava</i>
20.2.2009	Kwatango	Plantation	Common bulbul	<i>Pycnonotus barbatus</i>
20.2.2009	Kwatango	Plantation	Common bulbul	<i>Pycnonotus barbatus</i>
20.2.2009	Kwatango	Plantation	Common Fiscal	<i>Lanius collaris</i>
20.2.2009	Kwatango	Plantation	Red-tailed ant thrush	<i>Neocossyphus rufus</i>
20.2.2009	Kwatango	Plantation	Klaas's cuckoo	<i>Chrysococcyx klaas</i>
20.2.2009	Kwatango	Plantation	Eastern nicator	<i>Nicator gularis</i>
20.2.2009	Kwatango	Plantation	White-tailed crested flycatcher	<i>Trochocercus albonotatus</i>
20.2.2009	Kwatango	Plantation	Little swift	<i>Apus affinis</i>

Appendix 6. Definition of key land use types used in the survey

Agroforest – land which is having mixed crops (subsistence crops (such as maize, oranges etc) and/or cash crops such as cardamom, cinnamon etc) plus timber tree species.

Bushland – an area of predominantly indigenous herbs, shrubs and saplings, less than 2 m in height.

Eucalyptus – commercial plantation of Eucalyptus trees.

Fallow – land which was previously cultivated and is currently left unattended/without crops for up to 3 years.

Forest – land which has been dominated by indigenous trees and the land should be set aside purposely for certain activities such as protection or production purposes.

Human settlement – an area predominantly covered in houses, roads, shops including the cleared area around them.

Mixed farming – land which is occupied by two or more crops such as maize, cocoyam and sugarcane.

Monoculture (Single crop field) – land which is dominated by one type of crop such as cassava, sugarcane, cocoyams etc

Old fallow – as above but for more than 4 years.

Plantation – land dominated by planted timber tree species such as teaks, Eucalyptus, Pines etc

Tea estates – land which is mostly dominated by tea fields with scattered forest/tree patches.

Tea field – monoculture of tea plants.

Where two land cover types are listed it indicates that the plot includes a proportion of both land covers.