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Annexes

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Ornis Consult A/S

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Contents

Annex A

Consultancy Report to Ornis Consult based on Fieldwork conducted in southeastern Tanzania, Sept.- Oct. 2001

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1. INTRODUCTION:

The coastal forests of Tanzania have been the focus of a number of biodiversity surveys over the past ten years (Frontier Tanzania,). The results of these and other surveys and studies were published by Burgess & Clarke (2000). As a result of these studies and analyses, the high levels of species richness and endemism of Tanzania's forests have been recognized, and these forests are now considered, along with those of the Eastern Arc mountains, to rank tenth globally in their biodiversity importance (Mittermeier, Myers & Mittermeier, 1999).

Features which characterize the coastal forests include their high degree of fragmentation; most are small and no longer connected among each other, and they have strong seasonal differences in rainfall both within and among years. Under past conditions of relatively low population densities and low levels of utilization, some coastal forests may have been exploited sustainably. However, with increasing pressure for farm land and the pressure of commercial markets from larger urban centers, the very existence of some coastal forests is threatened.

Despite the recent recognition of the importance of coastal forests in terms of high species biodiversity values, many remain poorly known. Some have not received the detailed attention of biologists for many years. The coastal forests of Lindi Region, including Lindi and Kilwa Distrcts, are among the more remote and least studied in Tanzania.

As part of a project dealing with the management of forests in Lindi Region, a brief herpetological survey was conducted in four forested areas in Lindi and Kilwa Districts in September and October 2001.

2. STUDY SITES:

Sites visited included: Nihima Village, Rondo Plateau, 23-28 September; Dimba Forest Reserve, 2-7 October; Kikole Village Woodland, 12-16 October and Kitope Forest Reserve: 19-23 October 2001. These sites were also those sampled by other team members focusing on ornithological surveys, and the vegetation of each site was characterized by botanical specialists.

3. METHODS:

3.1 Trapping

Standard survey methods employed in other coastal and Eastern Arc forests were used in this survey (see Stanley, Goodman. & Kihaule, 1998). Pitfall traps and drift fences were used in an array termed a Bucket Pit Fall Line (BPFL). Each BPFL consisted of eleven 20 litre plastic buckets dug into the ground in such a way that they did not protrude, but allowed smaller amphibians and reptiles to fall into them. Each bucket had a number of small holes in the bottom to prevent rainwater from being trapped.

These buckets were arranged in a straight line, and over the middle of each was stretched a 0.5 high plastic sheet stapled to vertical wooden support stakes. This "drift fence" was buried in the soil in such a way that any small herptile would be unable to pass under it; it was high enough to prevent smaller animals from climbing or jumping over it.

Such BPFLs have been shown to be extremely effective in sampling small forest amphibians, reptiles and mammals such as shrews and small rodents in coastal and Eastern Arc forests (Stanley, Goodman & Hutterer, 1996; Stanley, Goodman. & Kihaule, 1998) and often reveal the presence of species which otherwise would go unnoticed using traditional detection techniques, such as visual encounter searching (VES) or plot sampling. BPFLs also offer an easy method of quantifying trap effort and catch.

Experience in trapping small mammals, amphibians and reptiles in coastal and Eastern Arc forests suggests that a ten night trapping effort is optimal (pers. obs.). This is especially true in a species-rich environment; on occasion, it is the last or last but one night of trapping on which a species is recorded.

If traps had not been set on that last night, a species would have gone undetected. However, due to financial and time restrictions, we were not able to conduct such intensive sampling.

3.2 Time Constrained Searches

Although BPFL sampling is effective for small vertebrates of the forest floor, or burrowing forms, it is not effective in sampling animals which climb, or do not spend most of their time on the lower substratum. Therefore, a Time Constrained Search (TCS) method was also used to sample herptiles. Using this method, an observer or observers spend a fixed about of time, and, it is assumed, a fixed effort, sampling a habitat. This includes not only recording animals simply observed on a path or moving in front of an observer, but also those which were detected under cover, such as logs, bark and rocks. The results of Time Constrained Searches also permit the quantifying of search effort and resulting observations.

3.3 Consultations, informal interviews with local residents

Local residents, many of whom have spent all of their lives in the study areas, potentially are able to provide detailed information on species present. In fact, however, usually it is only the larger, more common species which are recognized. Nevertheless, informal discussion with local residents often yields useful information, and this was collected on an ad hoc basis.

3.4 Identification and processing of specimens

Animals captured were examined, some were photographed, and standard measurements taken. Samples were euthenised using standard techniques, and preserved in formalin (10%) or 70% ethanol. Each specimen received an individual field number in the CAM (Charles Andekia Msuya) series. Amphibians were identified using Schiotz (1975) and duplicate material in the collection of the University of Dar es Salaam's Dept. of Zoology & Marine Biology. Reptiles were identified using Broadley & Howell (1991) and Spawls et. al, (2002). Only two types of small mammals were taken in the traps, a common rodent and shrews in the genus *Crocidura*. The latter will require examination by a specialist.

Specimens will be deposited in the collections of the Dept. of Zoology & Marine Biology and the associated data entered in the National Biodiversity Database (using MS Access) of the same institution.

4. RESULTS:

4.1 Trapping Results for Nihima Village, Rondo Plateau, Lindi Region 23-28 September 2001

BPFL locations with GPS Readings

BPFL Number	Notes	GPS: L	GPS: UTM
BPFL1	-	37L 0514917	8871874
BPFL2	Nhima valley wetland	None recorded	None recorded
BPFL3	Chiundu junction	37L 0516543	8875674
BPFL4	Panda Nne junction	37L 0517086	8871555

Trapping Results:

Date	BPFL	BPFL Catch
23 Sep	BPFL1: 11	Nil
	BPFL2: 11	*Mastomys*, 2 *Bufo*, 4 *Arthroleptis stenodactylus*, 6 *Schoutedenella xenodactyloides*, 1 *Ptychadena mossambica*, 2 *Phrynobatrachus acridoides*, 2
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps	44	
24 Sep	BPFL1: 11	Nil
	BPFL2: 11	*Bufo*, 3 *Arthroleptis stenodactylus*, 2 *Ptychadena oxyrhynchus*, 2
	BPFL3: 11	*Panaspis wahlbergi*, 1
	BPFL4: 11	*Panaspis wahlbergi*, 1
Total Traps:	44	
Cum. BPF effort:	88	
Date	Traplines	Catch
25 Sep	BPFL1: 11	Nil
	BPFL2: 11	*Mastomy natalensis*, 2 *Bufo*, 2 *Schoutedenella xenodactyloides*, 1 *Ptychadena mascareniensis*, 1
	BPFL3: 11	*Panaspis wahlbergi*, 1
	BPFL 4: 11	Nil
Total traps:	44	
Cum. Trap Effort	132	
26 Sept	BPFL1: 11	Nil
	BPFL2: 11	*Bufo*, 2 *Schoutedenella xenodactyloides*, 2

	BPFL3: 11	*Panaspis wahlbergi*, 2
	BPFL4: 11	*Panaspis wahlbergi*, 1
Total Traps:	44	
Cum. Trap Effort:	172	
27 Sept	BPFL1: 11	*Chilorinophis butleri*, 1
	BPFL2: 11	*Bufo*, 2 *Schoutedenella xenodactyloides*, 1
	BPFL3: 11	*Panaspis wahlbergi*, 1
	BPFL4: 11	*Panaspis wahlbergi*, 1
Total Traps:	44	
Cum. Trap Effort:	216	
28 Sept	BPFL1: 11	Nil
	BPFL2: nil	No traps set
	BPFL3: 11	*Nucras boulengeri*, 1
	BPFL4: 11	Nil
Total Traps:	33	
Cum. Trap Effort	249	

The Cumulative Trap Effort, Cumulative Number of Species (CNS) and Cumulative Number of Individuals are indicated in Figures 1a,b.

Fig. 1a: Amphibian BPFL Trapping, Nihima

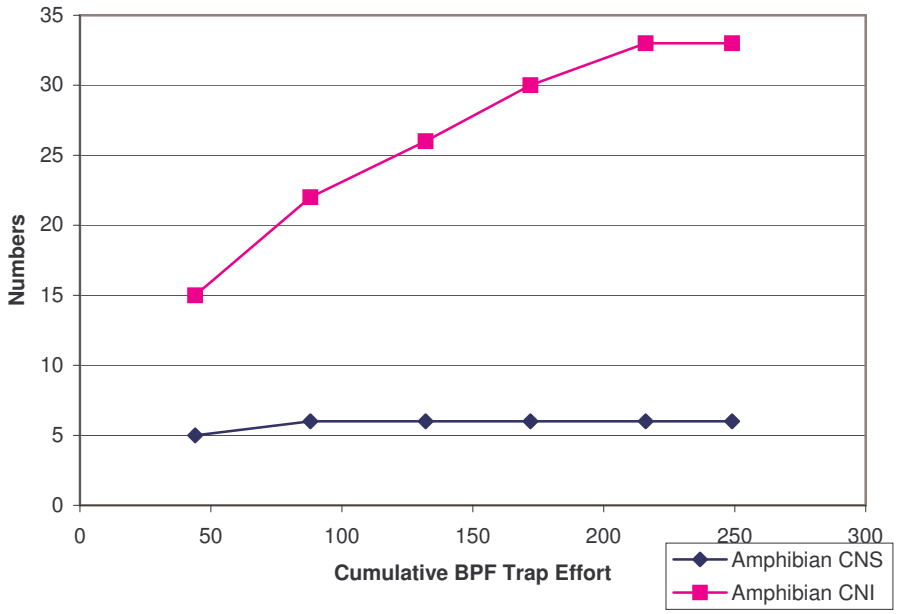
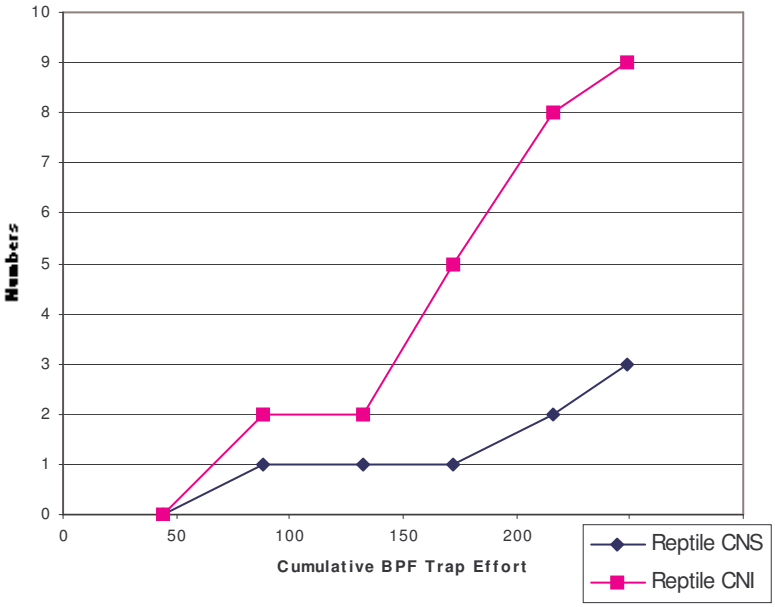


Fig. 1b: Reptile BPFL Trapping, Nihima



4.2 Trapping results, Dimba Forest Reserve, Lindi District, 2-7 Oct 2001

BPFL locations with GPS Readings

BPFL Number	Notes	GPS: L	GPS: UTM
BPFL1	Camp site at edge of forest, between Mloo and Mvuleni villages; trapline set 50 m inside forest, off abandoned Mikoe Sisal Estate	37L 0572010	8940159
BPFL2	1 km inside forest, South of base camp	None recorded	None recorded
BPFL3	3.5 km in forest, along foot path linking Dimba and Mvuleni villages, forest similar to that at edge	37L 0570372	8937586
BPFL4	Foret edge at corner near Mloe village	37L 0574688	8938545

Trapping Results, Dimba Forest Reserve, Lindi District, 2-7 October 2001

Date	**Traplines**	**Catch**
2 Oct	BPFL1: 11	Nil
	BPFL2: 11	Nil
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
3 Oct	BPFL1: 11	Nil
	BPFL2: 11	Nil
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort	88	
4 Oct	BPFL1: 11	Nil
	BPFL2: 11	Nil
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort	132	
5 Oct	BPFL1: 11	Nil
	BPFL2: 11	Nil
	BPFL3: 11	*Stephopaedes loveridgei*, 1
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	176	
6 Oct	BPFL1: 11	Nil
	BPFL2: 11	Nil
	BPFL3: 11	Nil
	BPFL4: 11	*Stephopaedes loveridgei*, 1
Total Traps:	44	
Cum. Trap Effort	220	
7 Oct	BPFL1: 11	Nil
	BPFL2: 11	*Arthroleptis stenodactylus*, 1 *Stephopaedes loveridgei*, 2
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	264	

The Cumulative Trap Effort, Cumulative Number of Species (CNS) and Cumulative Number of Individuals are indicated in Figures 2a,b.

Fig. 2a: Amphibian BPFL Trapping, Dimba

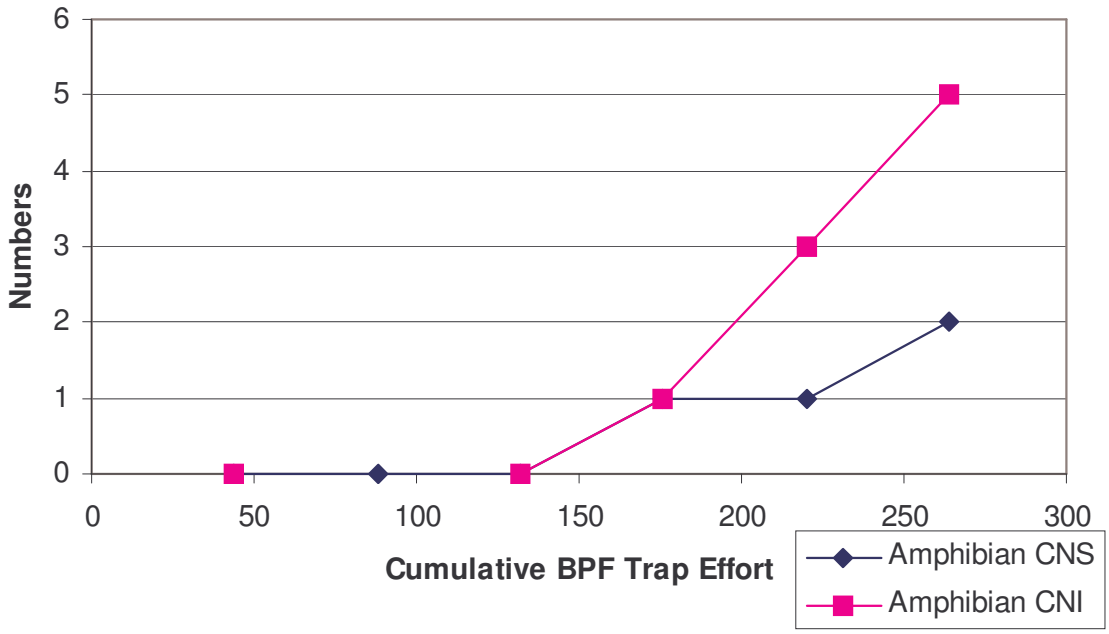
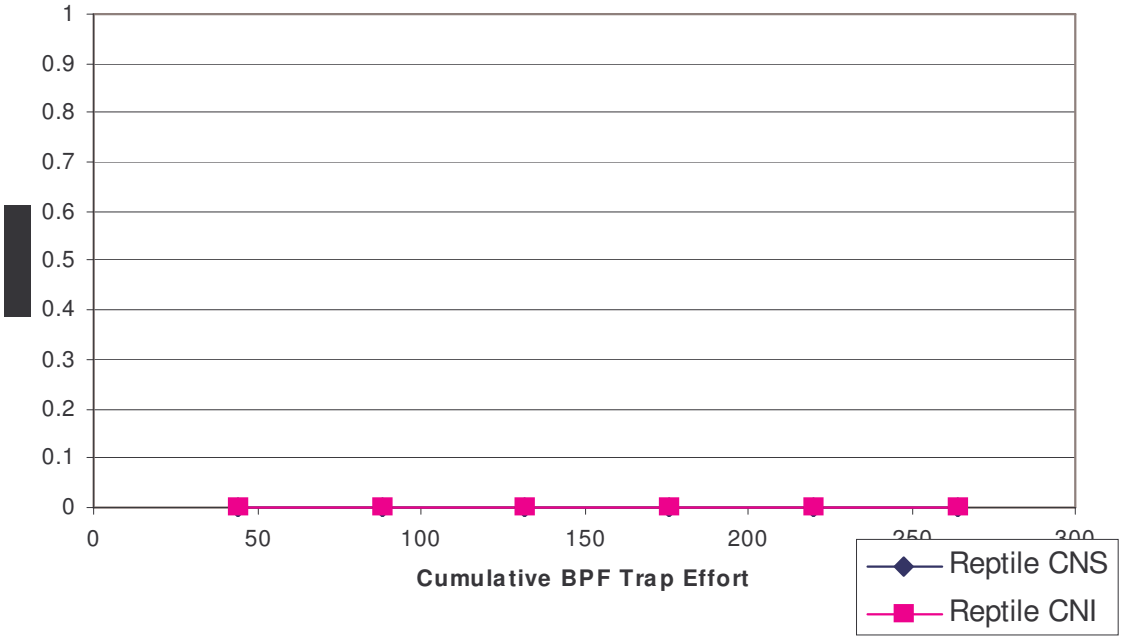


Fig. 2b Reptile BPFL Trapping, Dimba



4.3 Trapping Results, Kikole Village Woodland, Kilwa District, 12-16 Oct 2001

BPFL locations, Kikole Village Woodland

BPFL locations with GPS Readings

BPFL Number	Notes	GPS: L	GPS: UTM
BPFL1	Near water hole along Majongoo valley, about 3.5 km W of Base camp	37L 0509234	9024606
BPFL2	In bamboo dominated vegetation along valley near base camp	37L 0511477	9027145
BPFL3	In bamboo dominated vegetation along hill slopes near base camp	37L 0511477	9027145
BPFL4	Sandy banks along Matandu River, about 2.5 km N. of base camp	37L 0511408	9029096

Kilwa District, Kikole Village Woodland, 12-16 Oct 2001
Trapping Results

Date	Traplines	Catch
12 Oct	BPFL1: 11	*Crocidura*, 1 *Phrynobatrachus acridoides*, 523 *Hemisus marmoratum*, 1
	BPFL2: 11	Nil
	BPFL3: not set	-
	BPFL4: not set	-
Total Traps	22	
13 Oct	BPFL1: 11	*Phrynobatrachus acridoides*, 78 *Stephopaedes loveridgei*, 1
	BPFL2: 11	Nil
	BPFL3: 11	Nil
	BPFL4: not set	-
Total Traps:	33	
Cum. Trap Effort:	55	
14 Oct	BPFL1: 11	*Phrynobatrachus acridoides*, 85
	BPFL2: 11	*Panaspis wahlbergi*, 1
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	99	
15 Oct	BPFL1: 11	*Phrynobatrachus acridoides*, 48 *Hemisus marmoratum*, 1 *Mabuya boulengeri*, 1
	BPFL2: 11	*Panaspis wahlbergi*, 1
	BPFL3: 11	Nil
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	143	

16 Oct	BPFL1: 11	*Phrynobatrachus acridoides*, 168 *Phrynobatrachus mababiensis*, 6
	BPFL2: 11	Nil
	BPFL3: 11	*Agama mossambica*, 1
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	187	

The Cumulative Trap Effort, Cumulative Number of Species (CNS) and Cumulative Number of Individuals are indicated in Figures 3a,b.

Fig. 3a Amphibian BPFL Trapping, Kikole

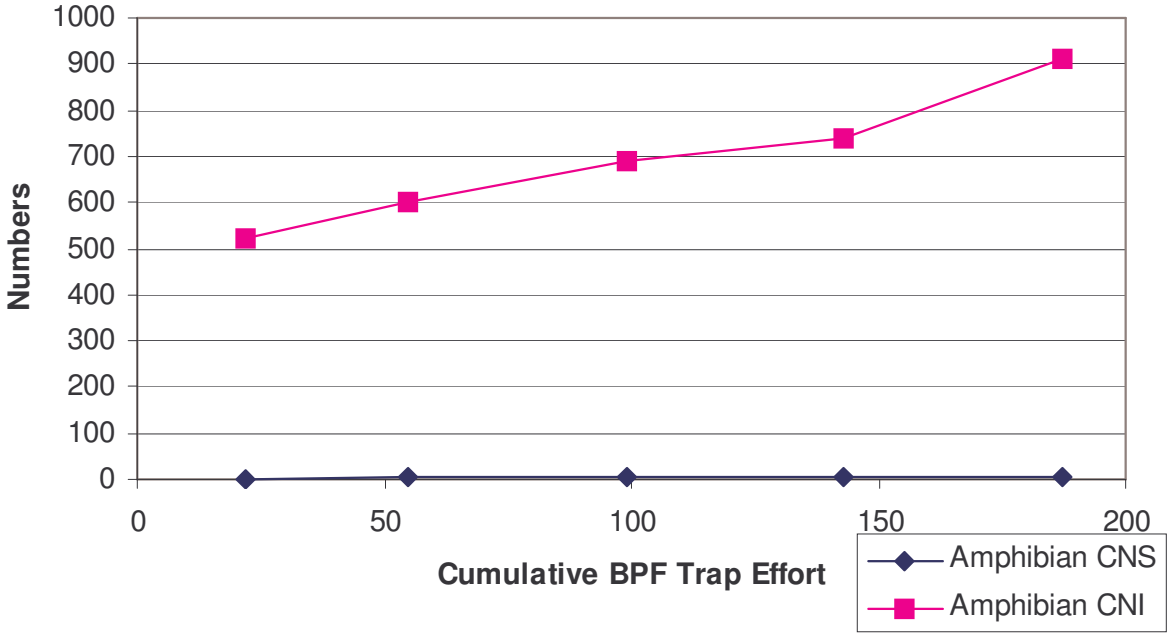
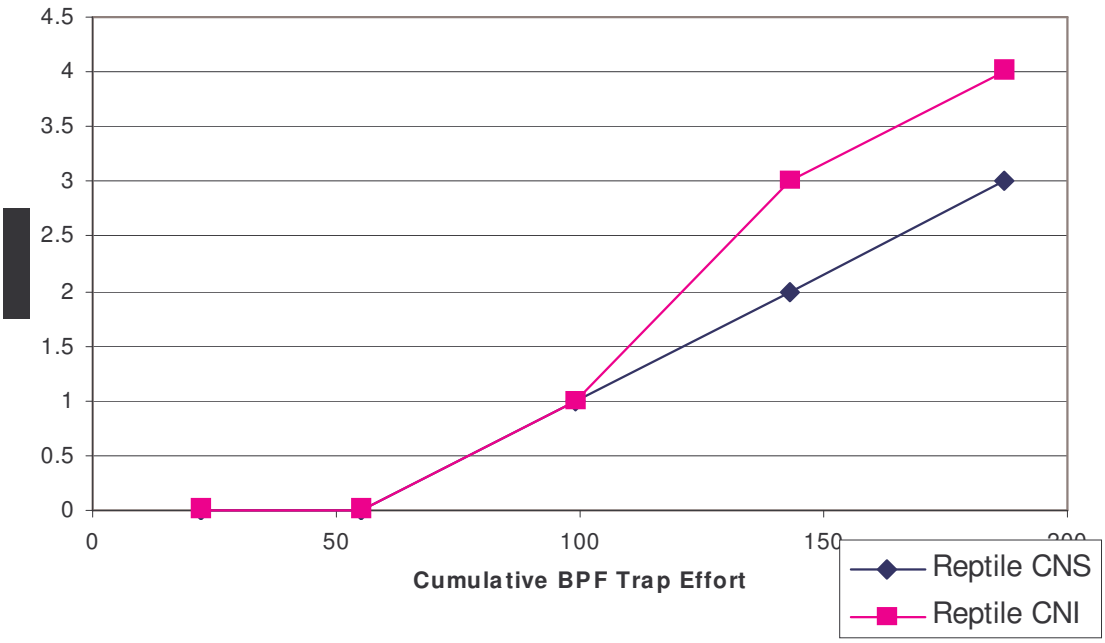


Fig 3b: Reptile BPFL Trapping, Kikole



4.4 Trapping Results, Kitope Forest Reserve, Kilwa District,19-23 Oct 2001

BPFL locations with GPS Readings

BPFL Number	Notes	GPS: L	GPS: UTM
BPFL1	Near base camp in dry secondary forest	37L 0517713	9077940
BPFL2	In valley along drying river bed; woodland area which is highly disturbed by elephant and buffalo	37L 0516649	9078251
BPFL3	Kitope Kitongojini in dried pond bordering village and Kitope FR	37L 0517635	9075645
BPFL4	Closed forest at Kitope FR plateau, about 150 m N. of Communications tower	37L 0518310	9078130

Kilwa District, Kitope Forest Reserve: 19-23 Oct 2001
Trapping Results

Date	Trapline	Catch
19 Oct	BPFL1: 11	*Sepsina tetradactyla*, 1
	BPFL2: 11	*Arthroleptis stenodactylus*, 3 *Schoutedenella xenodactyloides*, 23
	BPFL3: not set	-

	BPFL4: Not set	-
Total Traps:	22	
Cum. Trap Effort:	22	
20 Oct	BPFL1: 11	*Arthroleptis stenodactylus*, 2 *Stephopaedes loveridgei*, 1
	BPFL2: 11	*Arthroleptis stenodactylus*, 7 *Schoutedenella xenodactyloides*, 23 *Hemusus marmoratum*, 1 *Stephopaedes loveridgei*, 1 *Aparallactus guentheri*, 1
	BPFL3: 11	*Crocidura*, 1 *Schoutedenella xenodactyloides*, 1 *Hemusus marmoratum*, 2
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	66	
21 Oct	BPFL1: 11	Nil
	BPFL2: 11	*Xenopus muelleri*, 1 *Arthroleptis stenodactylus*, 1 *Schoutedenella xenodactyloides*, 1
	BPFL3: 11	*Crocidura*, 1 *Schoutedenella xenodactyloides*, 1 *Hemisus marmoratum*, 2
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	110	
22 Oct	BPFL1: 11	Nil
	BPFL2: 11	*Arthroleptis stenodactylus*, 4 *Schoutedenella xenodactyloides*, 14 *Stephopaedes loveridgei*, 1
	BPFL3: 11	*Schoutedenella xenodactyloides*, 1 *Hemisus marmoratum*, 1 *Stephopaedes loveridgei*, 1
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	154	
23 Oct	BPFL1: 11	*Sepsina tetradactyla*, 1 *Stephopaedes loveridgei*, 5
	BPFL2: 11	*Xenopus muelleri*, 1 *Arthroleptus stenodactylus*, 2 *Schoutedenella xenodactyloides*, 1 *Phrynobatrachus acridoides*, 2
	BPFL3: 11	*Hemisus marmoratum*, 2
	BPFL4: 11	Nil
Total Traps:	44	
Cum. Trap Effort:	198	

The Cumulative Trap Effort, Cumulative Number of Species (CNS) and Cumulative Number of Individuals are indicated in Figures 4a,b.

Fig. 4a Amphibian BPFL Trapping, Kitope

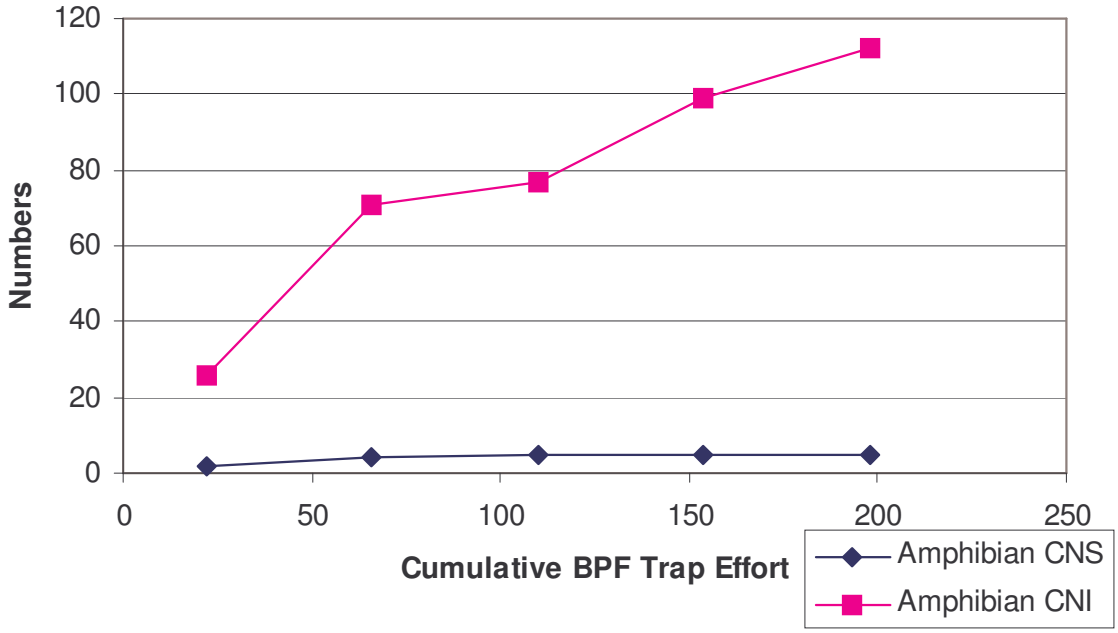
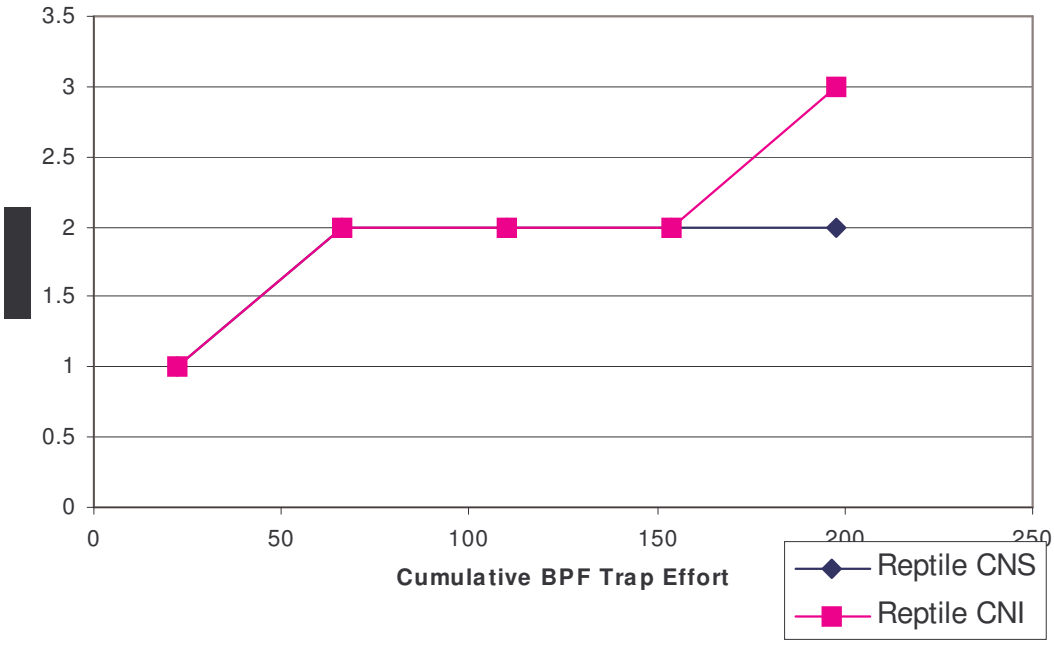


Fig. 4b Reptile BPFL Trapping, Kitope



4.5 Time Constrained Searches

Table 1: Results of Time Constrained Searches: amphibians and reptiles
Animals seen: animals seen/person hour

	Locality	**Locality**	**Locality**	**Locality**
	Nhima Village area, Rondo Plateau, Lindi District: 40 person hours	Dimba FR, Lindi District: 18.45 person hours	Kikole Village: 40 person hours	Kitope FR: 50 person hours
Species	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour
Class Amphibia		Nil	Nil	Nil
Arthroleptis stenodactylus Common Squeaker	Nil	Nil	Nil	Nil
Schoutedenella xenodactyloides Tiny Squeaker	Nil	Nil	Nil	Nil
Bufo sp., near ***maculata***	Nil	Nil	Nil	Nil
Stephopaedes loveridgei, Loveridge's Stephopaedes	Nil	8: 0.43	Nil	Nil
Hemisus marmoratum Marbled Snout-burrower	Nil	Nil	Nil	Nil
Hyperolius sp.	Nil	Nil	Nil	Nil
Hyperolius mitchelli Mitchell's Reed Frog	>50: >1.25	Nil	Nil	Nil
Afrixalus sp.	Nil	Nil	1: 0.04	Nil
Afrixalus brachycnemis Short-legged Spiny Reed Frog	Nil	Nil	8: 0.31	Nil
Amnirana galamensis Galam White-lipped Frog	Nil	Nil	Nil	1: 0.02
Phrynobatrachus acridoides Eastern Puddle Frog	Nil	Nil	Nil	1: 0.02
Phrynobatrachus mababiensis Mababe Puddle Frog	Nil	Nil	Nil	2: 0.04
Ptychadena mascareniensis Mascarene Ridged Frog	Nil	Nil	Nil	
Ptychadena mossambica Mozambique Ridged Frog	Nil	Nil	Nil	1: 0.02
Ptychadena oxyrhynchus Sharp-nosed Ridged Frog	Nil	Nil	Nil	Nil
Xenopus muelleri, Mueller's Clawed frog	Nil	Nil	Nil	Nil
Class Reptilia	Nil			
Kinixys belliana Bell's Hinged Tortoise	1: 0.02	1: 0.05	Nil	Nil
Chirindinia rondoensis, Rondo Round-headed Worm Lizard	8: 0.2	Nil	Nil	Nil
Ancylocranium barkeri, Barker's Sharp-snouted Worm Lizard	1: 0.02	Nil	Nil	Nil
***Agama* sp.**	15: 0.37	1: 0.05	Nil	Nil
	Locality	**Locality**	**Locality**	**Locality**
	Nhima Village	Dimba FR,	Kikole Village:	Kitope FR: 50

	area, Rondo Plateau, Lindi District: 40 person hours	Lindi District: 18.45 person hours	40 person hours	person hours
Species	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour
Agama mossambica Mozambique Agama	Nil	Nil	2: 0.08	7: 0.14
Acanthocerus cyanocephalus Blue-headed (or Black-necked) Tree Agama	Nil	Nil	Nil	Nil
Chamaeleo dilepis Flap-necked Chameleon	1: 0.02	1: 0.05	Nil	Nil
Chamaeleo melleri, Giant Chameleon	Nil	Nil	Nil	Nil
Rhampholeon sp. Pygmy Chameleon	Nil	1: 0.05	Nil	Nil
Cordylus tropidosternum	Nil	3: 0.16	Nil	Nil
Hemidactylus mabouia House Gecko	7: 0.17	54: 2.92	10: 0.38	4: 0.08
Lygodactylus capensis Cape Dwarf Gecko	6: 0.15	19: 1.03	8: 0.31	8: 0.16
Lygodactylus luteopicturatus Yellow-headed Dwarf Gecko	6: 0.15	2: 0.12	9: 0.35	7: 0.14
Gerrhosaurus nigrolineatus	3: 0.07	3: 0.16	1: 0.04	2: 0.04
Gastropholis vittata Striped Keel-bellied Lizard	Nil	Nil	2: 0.08	Nil
Holaspis guentheri	Nil	Nil	Nil	Nil
Nucras boulengeri Boulenger's Scrub Lizard	Nil	Nil	Nil	Nil
Mabuya boulengeri Boulenger's Skink	Nil	Nil	Nil	Nil
Mabuya maculilabris Speckle-Lipped Skink	1: 0.02	6: 0.32	3: 0.11	1: 0.02
Mabuya striata Striped Skink	11: 0.27	Nil	Nil	Nil
Panaspis sp	13: 0.32	Nil	Nil	Nil
Panaspis wahlbergi Wahlberg's Snake-eyed Skink	Nil	Nil	Nil	Nil
Sepsina tetradactyla Four-toed Fossorial Skink	Nil	Nil	Nil	Nil
Varanus niloticus Nile Monitor	Nil	Nil	Nil	1: 0.02
Aparallactus guentheri Black Centipede Eater	Nil	1: 0.05	Nil	Nil
Chilorinophis butleri	1: 0.02	Nil	Nil	Nil
Python natalensis, Southern African Rock Python	Nil	Nil	1: 0.04	Nil
Crotaphopeltis hotamboeia Herald Snake	Nil	Nil	Nil	1: 0.02
	Locality	**Locality**	**Locality**	**Locality**
	Nhima Village area, Rondo Plateau, Lindi District: 40 person hours	Dimba FR, Lindi District: 18.45 person hours	Kikole Village: 40 person hours	Kitope FR: 50 person hours

Species	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour	Animals seen: animals/person hour
Hemirrhagerrhis nototaenia Bark Snake	Nil	Nil	1:0.04	Nil
Philothamnus sp. Green Bush Snake	Nil	Nil	Nil	2: 0.04
Psammophis orientalis	3: 0.07	Nil	Nil	Nil
Thelotornis capensis	1: 0.02	1: 0.05	Nil	Nil
Dendroaspis angusticeps Green Mamba	1: 0.02	1: 0.05	1: 0.04	1: 0.02
Naja nigricollis Black-necked Spitting Cobra	1: 0.02	Nil	Nil	Nil
Bitis arietans Puffadder	Nil	Nil	1: 0.04	Nil
Bitis gabonica Gaboon Viper	Nil	Nil	Nil	Nil
Unidentified snake	Nil	1: 0.05	Nil	Nil

Table 2: Summary of results by site and method of detection:X= Trapped in BPFL; TCS = found in Time Constrained Search ; *=reported to occur by local residents; - = not detected or reported

	Locality	**Locality**	**Locality**	**Locality**
Species	Nhima Village area, Rondo Plateau, Lindi	Dimba FR	Kikole Village	Kitope FR
Class Amphibia				
Arthroleptis stenodactylus Common Squeaker	X	X	-	X
Schoutedenella xenodactyloides Tiny Squeaker	X	-	-	X
Bufo sp., near ***maculata***	X	-	-	-
Stephopaedes loveridgei, Loveridge's Stephopaedes	-	X, TCS	X	X
Hemisus marmoratum Marbled Snout-burrower	-	-	X	X
Hyperolius sp.				
Hyperolius mitchelli Mitchell's Reed Frog	TCS	-	-	-
Afrixalus sp.	-	-	X	-
Afrixalus brachycnemis Short-legged Spiny Reed Frog	-	-	TCS	-
Amnirana galamensis Galam White-lipped Frog	-	-	-	TCS
Phrynobatrachus acridoides Eastern Puddle Frog	X	-	X	TCS
Phrynobatrachus mababiensis Mababe Puddle Frog	-	-	X	TCS
Ptychadena mascareniensis Mascarene Ridged Frog	X	-	-	-
Ptychadena mossambica Mozambique Ridged Frog	X	-	-	TCS
Ptychadena oxyrhynchus Sharp-nosed Ridged Frog	X	-	-	-
Pyxicephalus sp.	*	*	-	*
Xenopus muelleri, Mueller's Clawed frog	-	-	-	X
Chiromantis xerampelina, ***Foam Nest Frog***	-	*	-	-
Class Reptilia				
Kinixys belliana Bell's Hinged Tortoise	TCS	TCS	-	-

	Locality	**Locality**	**Locality**	**Locality**
	Nhima Village area, Rondo Plateau, Lindi	Dimba FR	Kikole Village	Kitope FR
Chirindinia rondoensis, Rondo Round-headed Worm Lizard	TCS	-	-	-
Ancylocranium barkeri, Barker's Sharp-snouted Worm Lizard	TCS	-	-	-
***Agama* sp.**	TCS	TCS		
Agama mossambica Mozambique Agama	-	-	X	X
Acanthocerus cyanocephalus Blue-headed (or Black-necked) Tree Agama	TCS	-	TCS	TCS
Chamaeleo dilepis Flap-necked Chameleon	TCS	TCS	-	-
Chamaeleo melleri, Giant Chameleon	*	*	-	-
Rhampholeon sp. Pygmy Chameleon	*	TCS	-	-
Cordylus tropidosternum	-	TCS	-	-
Hemidactylus mabouia House Gecko	X, TCS	TCS	TCS	TCS
Lygodactylus capensis Cape Dwarf Gecko	TCS	TCS	TCS	TCS
Lygodactylus luteopicturatus Yellow-headed Dwarf Gecko	TCS	TCS	TCS	TCS
Gerrhosaurus nigrolineatus	TCS	TCS	TCS	TCS
Gastropholis vittata Striped Keel-bellied Lizard	-	-	TCS	-
Holaspis guentheri	*	*		
Nucras boulengeri Boulenger's Scrub Lizard	X, *	*	-	-
Mabuya boulengeri Boulenger's Skink	-	-	X	-
Mabuya maculilabris Speckle-Lipped Skink	TCS	TCS	X	TCS
Mabuya striata Striped Skink	TCS	-	-	-
Panaspis sp	TCS	-	-	-
Panaspis wahlbergi Wahlberg's Snake-eyed Skink	X	-	X	-
Sespina tetradactyla Four-toed Fossorial Skink	-	-	-	X
Varanus niloticus Nile Monitor	-	-	-	TCS

	Locality	**Locality**	**Locality**	**Locality**
	Nhima Village area, Rondo Plateau, Lindi	Dimba FR	Kikole Village	Kitope FR
Aparallactus guentheri Black Centipede Eater	-	TCS	-	-
Chilorinophis butleri	X, TCS	-	-	-
Python natalensis, Southern African Rock Python	*	-	X	-
Crotaphopeltis hotamboeia	-	-	-	X
Hemirrhagerrhis nototaenia Bark Snake	-	-	TCS	-
Philothamnus sp. Green Bush Snake	*	*	-	TCS
Psammophis orientalis	TCS	-	-	-
Thelotornis capensis	TCS	TCS	-	-
Dendroaspis angusticeps Green Mamba	TCS	TCS	TCS	TCS
Dendroaspis polylepis Black Mamba	*	-	-	-
Naja nigricollis Black-necked Spitting Cobra	TCS	*	-	-
Bitis arietans Puffadder	*	*	-	-
Bitis gabonica Gaboon Viper	*	*	TCS	-
Unidentified snake	-	-	-	TCS

4.6 Comparison of Detection Methods

Table 3: Comparison of Efficacy of Detection Methods (for legend, see Table 2)

Group	BPFL (X) Trapping only	TCS only	X+TCS only	* only	* + TCS	X+TCS	X+*
Amphibian species	8	3	4	2	4	0	0
Reptile species	5	20	3	4	4	0	2
Total species	13	23	7	6	8	0	2

The TSC method was most effective for reptiles, but trapping also yielded species not detected using any other method.

4.7 Species Detected

ANNOTATED ACCOUNTS OF SPECIES DETECTED AND/OR REPORTED TO OCCUR IN THE AREAS SAMPLED: **= Tanzanian endemic species

Class Mammalia

Order Insectivora

Family Soricidae, "Typical" Shrews

Crocidura sp. White-toothed or Musk Shrews

Members of this genus are extremely difficult to identify. Determination to the species level requires measurements of dental and cranial characters, and only a very few specialists are willing to identify material from eastern Africa. Until the material has been studied in detail, it is not possible to say more than that superficially, the diversity of shrews sampled appeared to be low. It should be noted that compared to other sites sampled using BPFLs in Tanzania, the catch rate was very low.

Order Rodentia

Family Muridae, the muroid rodents, rats and mice

Mastomys natalensis Multi-mammate Rat

This is a widely spread species regarded as a "field rodent" and an agricultural pest. As the common name suggests, females have up to 6 pair of mammae, and thus are able to raise large numbers of young, and may be capable of breeding more than once a year. This species is often associated with disturbed conditions rather than natural, undisturbed habitats.

Class Amphibia

Family Arthroleptidae, Bush Squeakers

Arthroleptis stenodactylus Common Squeaker

A widespread species of forest and woodlands, capable of surviving in highly disturbed situations such as suburban areas and shambas.

Schoutedenella xenodactyloides Tiny Squeaker

A species usually associated with forest; widespread in coastal and Eastern Arc forests.

Family Bufonidae, Toads

Bufo sp., near *maculata*

Members of the genus *Bufo* are often extremely difficult to identify on the basis of morphology. No calls of this specimens collected were recorded. The individuals appear rather small for the widespread and abundantly common *Bufo gutturalis*; they also did not have red thigh patches, and the call differed from that of *B. gutturalis*.

Stephopaedes loveridgei, Loveridge's Stephopaedes

The genus *Stephopaedes* was split off from *Bufo* by Channing; the tadpole has a unique "crown" structure on the top of its head, and the only species for which details are known breeds in small amounts of water such as those found in holes in trees. tree holes. *S. loveridgei* is found in forests in southern Tanzania, including the Rondo forests, Kiwengoma, and the Mahenge area (Poynton, 1991). Recently two new Tanzanian endemic species in this genus have been described, *S. howelli*, endemic to Mlola forest (a remnant forest patch on Mafia Island) and *S. usambarae*, from small forests in the eastern Usambara mountains.

Family Hemisotidae, Snout-Burrowers

Hemisus marmoratum Marbled Snout-burrower

A wide-spread species in East Africa, associated with seasonal water bodies.

Family Hyperoliidae, Tree, Sedge and Reed Frogs

Hyperolius sp.

Hyperolius mitchelli Mitchell's Reed Frog

Afrixalus sp. A single specimen of a species which seemed not to have the characteristics of any previously known from the coastal strip was collected but a series would probably be needed to confirm identification. The microhabitat situation, inside a small crevice in a bamboo stem, is also unusual.

Afrixalus brachycnemis Short-legged Spiny Reed Frog

A small reed frog found in open grassland and edge situations, not a forest species.

Family Ranidae, "Typical" Frogs

Amnirana (formerly known as *Hylarana*) *galamensis* Galam White-lipped Frog

This is a widely-distributed species associated with seasonal wetlands; able to survive the dry season by sheltering in termite mounds.

Phrynobatrachus acridoides Eastern Puddle Frog

A widely distributed, non-forest species.

Phrynobatrachus mababiensis Mababe Puddle Frog

A widely distributed, non-forest species common in many parts of Tanzania.

Ptychadena mascareniensis Mascarene Ridged Frog

This is a species which is widely distributed in a variety of habitats but not associated with forest.

Ptychadena mossambica Mozambique Ridged Frog

As the name suggests, this Ridged Frog is known from southern as well as eastern Africa; it is associated with open areas and woodlands, not forest.

Ptychadena oxyrhynchus Sharp-nosed Ridged Frog

This species is not associated with forest and is widely distributed in more open habitats.

Pyxicephalus sp. African Bullfrog

Two forms are now recognized, *P. adspersus*, the Giant African Bullfrog, found over much of central and southern Africa and also in Tanzania, and *P. edulis*. This latter form is known in Tanzania mainly from the coastal strip. Not detected during our sampling, but reported as present by local residents.

Family Rhacophoridae, Foam Nest Frogs

Chiromantis xerampelina Foam Nest Frog

This distinctive species was reported as occurring by local residents but not surprisingly given the dry conditions of our field sessions, was not detected by our sampling.

Family Pipidae, African Clawed Frogs

Xenopus muelleri, Mueller's Clawed frog

An aquatic species, common on the East African coast.

Class Reptilia

Order Chelonii, Chelonians: Tortoises, Terrapins

Family Testudinidae, Tortoises

Kinixys belliana Bell's Hinged Tortoise

CITES Appendix II. A species of savanna and coastal thicket in much of Tanzania and Kenya, but is also found further inland. Reported from the Rondo Plateau. Trade in all tortoises is considered as likely to affect natural populations and is therefore controlled.

Order Amphisbaenia, Amphisbaenians or Worm Lizards

Ancylocranium barkeri, Barker's Sharp-snouted Worm Lizard

**A Tanzanian endemic species known only from Lindi District and Newala. Almost nothing is known about its biology. Until the present study, the form *A. b.* barkeri had been known only from the holotype collected at Mbemkuru, Lindi District.

Chirindinia rondoensis, Rondo Round-headed Worm Lizard

**A Tanzanian endemic, known only from woodland and low altitude moist savanna of the Makonde and Rondo Plateaux in souther Tanzania. Little is known about its biology.

Order Sauria, Lizards

Family Agamidae, Agamas

Agama mossambica Mozambique Agama

As its common name suggests, this species was first described from Mozambique, but it is widespread in a variety of habitats in coastal eastern Africa and further south.

Acanthocerus cyanocephalus Blue-headed (or Black-necked) Tree Agama

Although formerly placed in the genus Agama, latest taxonomic treatment places this animal in the genus *Acanthocerus*. Some confusion exists over the correct specific name. A widely distributed, non-forest species.

Family Chameleonidae, Chameleons

Chamaeleo dilepis Flap-necked Chameleon

CITES Appendix II. The Flap-necked Chameleon is found in a wide variety of habitats in eastern Africa and is not strictly limited to forest.

Chamaeleo melleri, Meller's Giant Chameleon

CITES Appendix II. This species which is restricted to forest and rich woodland is reported to occur in the area; its presence would be expected.

Rhampholeon sp. Pygmy Chameleon

At least one species, *R. brevicaudatus*, is widespread in coastal and Eastern Arc forests, but other species in this genus also are probably present.

Family Cordylidae, Girdled Lizards

Cordylus tropidosternum Tropical Girdled Lizard

CITES Appendix II. This is a species strongly associated with coastal and Eastern Arc forests. Because it is exported in large numbers, its trade is controlled.

Family Gekkonidae, Geckos

Hemidactylus mabouia House Gecko

A widespread, common species often associated with human habitation.

Lygodactylus capensis Cape Dwarf Gecko

One of two members of the genus detected, this dwarf day gecko is widespread in a variety of habitats; as its name suggests, its range extends to South Africa.

Lygodactylus luteopicturatus Yellow-headed Dwarf Gecko

This is a small, conspicuous dwarf gecko most abundant on the coast of eastern Africa. It is often associated with human dwellings and cultivation and is especially abundant on cashew trees.

Gerrhosauridae, Plated Lizards

Gerrhosaurus nigrolineatus Black-lined Plated Lizard

This species is widely distributed in the eastern half of Tanzania and is also found in

Family Lacertidae, Lacertid Lizards

Holaspis guentheri Blue-tailed Gliding Lizard

A species of forest and/or rich woodland. This is an unusual species in that it is the only East African reptile known to be specialized for gliding from tree to tree.

Nucras boulengeri Boulenger's Scrub Lizard

This is a widely but apparently sparsely distributed species in central and eastern Tanzania woodlands and drylands. The single individual captured is apparently *N. boulengeri*, but another species, *N. ornata*, the Ornate Scrub Lizard, is also known to occur on the Rondo Plateau and extends to southern Africa. The two differ in small differences of scalation and it would be of interest to have a larger series of specimens to examine.

Gastropholis vittata Striped Keel-bellied Lizard

This is one of the least known of the lizards in East Africa. It occurs along the coast of Kenya and Tanzania, but until the two specimens collected, none was known from between Dar es Salaam to Liwale. It also occurs in northern Mozambique. The few collected in the recent past (Zaraninge FR) have been taken in pit fall traps, but the two individuals captured at Kikole were found in hollow bamboo stems 15 m above ground, indicating that this species may live a largely arboreal life. Its congener, *G. prasina*, the Green Keel-bellied Lizard, may also occur in our area, as the two species are known to be sympatric in some coastal forests.

Family Scincidae, Skinks

Mabuya boulengeri Boulenger's Skink

Boulenger's Skink is known from southeastern Tanzania and further south, but has only infrequently been recorded, probably simply because of lack of searching and trapping effort.

Mabuya maculilabris Speckle-Lipped Skink

A widespread, common species of forest and forest edge, but able to tolerate disturbance such as small-scale cultivation; also able to survive in peri-urban areas.

Mabuya striata Striped Skink

A common, widespread species of open habitats such as woodlands; also found in relatively dry areas.

Panaspis sp.

A single large individual of what may be either *P. wahlbergi* or a closely related species was taken.

Panaspis wahlbergi Wahlberg's Snake-eyed Skink

This is a small, abundant species of leaf litter in woodland and forest edge situations.

Sepsina tetradactyla Four-toed Fossorial Skink

This species is found in south eastern Tanzania (Kiwengoma FR, Rondo and Litipo forests), with a different subspecies found in western Tanzania (Tabora and Ujiji). The colour photograph taken by the expedition appears to be the first which clearly demonstrates the bright blue tail colour of this subspecies.

Family Varanidae, Monitor Lizards

Varanus niloticus, Nile Monitor

CITES Appendix II. A widespread species but one which is usually associated with permanent water courses or seasonal channels. In some parts of Africa, tens of thousands are killed for the leather trade, and hence its inclusion in the CITES appendices.

Order Serpentes, Snakes

Family Astractaspididae, Burrowing asps, Centipede eaters and Burrowing Snakes

Aparallactus guentheri Black Centipede-eater

A single specimen was taken crawling on soil after a shower of rain.

Chilorinophis butleri Butler's Black and Yellow Burrowing Snake

The subspecies *C. butleri carpenteri* is poorly known in eastern Africa and has been previously reported from only five Tanzanian localities: Liwale, Lindi, Ruponda and Masasi, all in Lindi Region. It is also known from Ancuabe in north-eastern Mozambique. The nominate subspecies is found at Mongalla on the White Nile in the Sudan. Very little is known about the biology of this rarely collected species.

Family Boidae, Pythons

Python natalensis, Southern African Rock Python

CITES Appendix II. This species has only recently been recognized as separate from *Python sebae*. Pythons are widely distributed in Tanzania, although often associated with water and damp or moist areas. In some places, pythons are killed for their skins, which are usually sold to a middleman and exported for future processing and eventually sold for handbags, shoes, etc.

Family Colubridae, Typical Snakes

Crotaphopeltis hotamboeia Herald or White-lipped Snake

A widely distributed species with no notable habitat restriction except that it is not usually found deep inside forest.

Hemirrhagrrhis nototaenia Bark Snake

A widespread species of woodland, as its name suggests, extremely cryptic and usually found under the loose bark of trees.

Philothamnus sp. Green Bush Snake

Several members of this genus are found in coastal forests.

Thelotornis capensis Vine Snake

This is a widespread species of the East African coast which also is found to western Tanzania and in parts of northern Tanzania and southern Kenya.

Psammophis orientalis Eastern Stripe-bellied Sand Snake

A species largely limited in distribution to eastern Tanzania and Kenya. Spawls et. al. (2002) discuss the complexities of names applied to this group of snakes; many older reference lists would refer this form to *Psammophis subtaeniantus.*

Family Elapidae, cobras and mambas

Dendroaspis angusticeps Green Mamba

This is a widespread species, often found in coastal forest, but can survive in urban and peri-urban settings.

Dendroaspis polylepis Black Mamba

This is typically a dry country species but does occur on the coast albeit not usually in forest. Local residents noted its presence.

Naja nigricollis Black-necked Spitting Cobra

A widespread species found in open habitats, not a species of closed forest.

Family Typhlopidae, Blind Snakes

**_Typhlops rondoensis_ Rondo Plateau Blind Snake

A Tanzanian endemic known only from drier woodland of the Rondo Plateau and Mtwara Region, extreme south-eastern Tanzania.

Family Viperidae, Vipers and Adders

Bitis arietans Puffadder

A species which is not generally found in forest, but rather, in a wide variety of habitats and edge situations.

Bitis gabonica Gaboon Viper

This is a species typical of forest in eastern Africa.

5. DISCUSSION:

5.a Limitations of Sampling Methods

As noted in the description of the sampling methods, a longer trapping and sampling period is preferable. In addition, the best time for sampling amphibian and reptile activity is at the onset of the rainy season, when amphibians aggregate to breed and when males are vocal. Many reptiles are also attracted to such aggregations because they are a rich, albeit temporary, source of food.

5.b Comparisons of different sampling methods

BPFLs sampled species not taken during Time Constrained Searches, and vice versa. Smaller, cryptic forms were taken in BPFLs, but also, during TCSs. Local knowledge, which covers a longer time frame, also indicated the presence of species not detected during the short term sampling.

5.c Comparisons among sampling sites

The Nhima site with eight species of amphibians and twenty of amphibians yielded the highest numbers of species; perhaps this was related to its proximity to the larger Rondo forests. Dimba, with two amphibians and thirteen reptiles had the lowest numbers of species. The other two sites, Kikole with six species of amphibians and fourteen of reptiles, and Kitope, with nine amphibians and thirteen reptiles, were relatively similar. It should be noted that none of these sites was "prime" forest, but rather, was more in the nature of disturbed woodland, often associated presently or in the past with cultivation.

5.d Comparison with other coastal forest herpetofaunal studies

Poynton (2000) and Broadley & Howell (2000) have summarized the information available for the coastal forest amphibian and reptile coastal forest faunas, respectively. The only study site which was specifically covered by these authors and which was also sampled by our study was the Rondo Plateau area. However, our study focused on relatively disturbed forest/woodland, whereas at least some of the specimens cited by the studies of Poynton (2000) and Broadley & Howell (2000) came from the Government Forest Reserve proper. Furthermore,studies of these authors were based on numerous literature references and specimens in collections made over many years. Thus, it is not possible to directly compare such species lists compiled over relatively long time periods with the present short term study. However, Tables 4 and 5 indicate the forest species recorded by these review studies.

Table 4: Amphibians of the Rondo area. + = recorded in Poynton (2000); for other symbols refer to Table 2.

Species	Recorded from Rondo by Poynton (2000)	Nhima Village area, Rondo Plateau, Lindi	Notes
Class Amphibia			
Arthroleptis affinis	+	-	
Arthroleptis stenodactylus Common Squeaker	+	X	
Schoutedenella xenodactyloides Tiny Squeaker	+	X	
Bufo sp., near ***maculata***		X	
Mertensophryne micranotis	+	-	A typical coastal forest species
Stephopaedes loveridgei, Loveridge's Stephopaedes	+	-	A species typical of coastal forest

			but sometimes found in woodland
Hyperolius mitchelli Mitchell's Reed Frog	-	TCS	
Breviceps mossambicus	+	-	In the Tanzanian coastal strip often associated with forest, but not elsewhere in its range
Phrynomantis bifasciatus	+	-	A non-forest species of seasonal wetlands
Phrynobatrachus acridoides Eastern Puddle Frog	-	X	Not typical of forest
Ptychadena mascareniensis Mascarene Ridged Frog	-	X	Not typical of forest
Ptychadena mossambica Mozambique Ridged Frog	-	X	Not typical of forest
Ptychadena oxyrhynchus Sharp-nosed Ridged Frog	-	X	Not typical of forest
Pyxicephalus sp.	-	*	Not typical of forest

Table 5: Reptiles of the Rondo area. + = recorded in Broadley & Howell (2000); for other symbols refer to Table 2.

	Recorded from Rondo and Litipo Forests (Broadley & Howell, 2000)	Nhima Village	Notes
Class Reptilia			
Kinixys belliana Bell's Hinged Tortoise	-	TCS	
Chirindinia rondoensis, Rondo Round-headed Worm Lizard	-	TCS	A Rondo endemic
Ancylocranium barkeri, Barker's Sharp-snouted Worm Lizard	-	TCS	
Ancylocranium ionidesi haasi	+	-	
***Agama* sp.**		TCS	
Agama mossambica Mozambique Agama	+	-	A non forest species
Acanthocerus cyanocephalus Blue-headed (or Black-necked) Tree Agama	-	TCS	A non forest species
Chamaeleo dilepis Flap-necked Chameleon	+	TCS	
Chamaeleo melleri, Giant Chameleon	-	*	A species of forest and rich woodland
Rhampholeon sp. Pygmy Chameleon	+	*	A forest species
Cordylus tropidosternum	+	-	A forest species
Hemidactylus mabouia House Gecko	+	X, TCS	
Hemidactylus platycephalus	+	-	Would not have been separated from the previous species in the field
Lygodactylus capensis Cape Dwarf Gecko	+	TCS	Not a forest species
Lygodactylus luteopicturatus Yellow-headed Dwarf Gecko	-	TCS	Not a forest species
Gerrhosaurus nigrolineatus	-	TCS	Not a forest species
Holaspis		*	

guentheri			
Nucras boulengeri Boulenger's Scrub Lizard		X,*	Not a forest species
Lygosoma afrum	+	-	Not a forest species
Mabuya maculilabris Speckle-Lipped Skink	-	TCS	
Melanoseps rondoensis	+	-	
Panaspis sp		TCS	
Panaspis wahlbergi Wahlberg's Snake-eyed Skink		X	Not a forest species
Sespina tetradactyla Four-toed Fossorial Skink	+	-	
Atractaspis bibronii	+	-	Not a forest species
Chilorinophis butleri	-	TCS	Not a forest species
Philothamnus sp. Green Bush Snake	+	TCS	Not possible to determine sight records to species level
Philothamnus hoplogaster	+	?	
Philothamnus macrops	+	?	A coastal forest species
Psammophis orientalis	-	TCS	Not a forest species
Psammophis phillipsi	+	-	Not a forest species
Thelotornis capensis	+	TCS	
Dendroaspis angusticeps Green Mamba	-	TCS	

Naja nigricollis Black-necked Spitting Cobra	-	TCS	Not a forest species
Bitis arietans Puffadder	-	*	Not a forest species
Bitis gabonica Gaboon Viper	+	*	Usually restricted to forest or dense vegetation

Nevertheless, at least for the Rondo Plateau, we detected species of amphibians and reptiles not previously reported from that area.

Because the sampling period was very dry, little if any amphibian breeding activity was taking place, and relatively few amphibians were detected. In a recent long-term study on amphibians in coastal forest in Bagamoyo District, Msuya (2001) demonstrated that even in the dry season, some amphibians are active but many remain in hiding, or are relatively difficult to detect, and that it is important to sample during periods of maximum amphibian activity to obtain the most species. It is possible that a caecilian (legless amphibians or gymnophionan) remains undetected; this group of amphibians depends on moist conditions and so would be expected either near permanent streams or in forests with moist, rich humus. An apodan recently found in a coastal forest near Dar es Salaam is the only representative of this group to be found in the area in coastal forest in some thirty years (Frontier-Tanzania, unpublished).

Msuya's study further showed the importance of conserving forest patches near wetlands in order to ensure long term survival of seasonal breeders, since animals which move to breeding pools may then move back up to distances of over 1 km, seeking cover in which to survive the long dry season. Simply conserving wetlands alone will not suffice to ensure the survival of amphibians.

Based on experience in other coastal forests (KMH, pers. observ.) it is likely that even for an area such as Rondo, a number of species of amphibians and reptiles remain undetected and/or unreported. In almost each coastal forest, a cryptic species of *Lygodactylus* Dwarf Gecko has eventually been found to be present.
Similarly, Pygmy chameleons of the genus *Rhampholeon* are poorly known in the area, and undescribed species could be present in isolated forests. For example, two new Pygmy chameleons are in the process of being formally described from isolated forests in the Eastern Arc mountains. The single specimen of an *Afrixalus* which appears unreported also confirms the likelihood of new distribution records and possibly the presence of undescribed or poorly known taxa.

In southern Tanzania, it is extremely likely that amphisbaenids will be found which so far have remained unrecorded; they might also prove to be species new to science. Also, cryptic burrowing lizards and snakes are likely to be unrecorded. Furthermore, *Gastropholis prasina*, a large, bright green lizard sympatric with *G. vittata* elsewhere, has yet to be found in Lindi region.

Large, highly mobile species also often are not detected in short surveys; an example from coastal forests is the Forest Cobra *Naja melanoleuca* is almost certainly present. Other such species include the Mozambique Spitting Cobra, *Naja mossambica*.

An unusual problematic record is that of the Pancake Tortoise *Malacochersus tornieri* reported from Lindi by Loveridge in the 1940s. This species is found in central and northern Tanzania and Kenya and it would be unexpected on zoogeographical grounds to find it in Lindi Region. However, this early report has caused some confusion, and recently claimed exports from Zambia and Mozambique (in neither country has the species been known to be found) have continued to raise questions about this species and it

As an example indicating how little is known about the herpetofauna of southern Tanzania, recently a typically southern African genus of lizard, *Platysaurus*, was found amongst misidentified older

specimens collected at Masasi more than 40 years ago. Until much more intensive collecting is conducted over longer periods of time and over wet and dry seasons, the south eastern third of Tanzania will remain an area in need of further herpetological collecting.

6. WHAT FUTURE FOR COASTAL FOREST HERPETOLOGICAL COMMUNITIES IN TANZANIA?

As the already small and fragmented coastal forests come under more pressure from non-sustainable use, further fragmentation and eventual severe alteration will result. Such ecological changes need not take place rapidly or dramatically; they may occur over time, and unless monitored, may hardly be noticed; indeed, evidence suggests they have already occurred, and are continuing now.

Threats to the coastal forests and their associated faunas include:

Non-sustainable use of wood (including timber and non-timber) forest products:

Hall & Rodgers (1986) appear to be the only authors who have examined the effects of non-sustainable pole cutting in coastal forests in Tanzania. They suggest that too great a pressure exerted by non-sustainable sapling removal will change the structure and species composition of such forests.

Other uses likely to lead to great change in forest structure and ecology include timber felling and charcoal making; both of these are likely to increase as populations near forests increase, and/or access to what in the past were remote forests is increased by roads and bridges.

Fire

In addition to such ecological changes, as forests change in structure, they may also become more vulnerable to fires which are set annually, usually in association with preparing land for farming, or for hunting. Fires may also spread from traditional harvesting of wild honey, in which fire is used to "smoke out" bees, but may spread uncontrollably.

Other than observations on the effects of fire on tortoises in the savannas of northern Tanzania (Kabigumila, 2001) there appear to no studies which have quantified the effects of fire on Tanzania's reptiles, and none addressing the effects of fires on coastal forest herpetofauna.

In contrast, small mammals have been the focus of studies on the effects of fire in various habitats in eastern and southern Africa (Bowland and Perrin, 1988; Kern, 1981; Neal, 1970; Rowe-Rowe & Lowry, 1982).

Mineral exploitation

In southern Africa, where coastal dunes and associated forests have been removed in connection with mineral extraction, attempts have then been made to "rehabilitate" the ecosystem, intensive monitoring of small mammals has been conducted (Ferreira & van Aarde, 1996). No such studies have taken place in eastern Africa, possibly because as yet no massive mining extraction has occurred in coastal forests. The only potentially comparable situation of which we are currently is aware in Tanzania is that at Pugu Forest Reserve, which lies above the world's second largest kaolin deposit. However, extraction has been on a relatively small scale by underground mining, not by an open cast or pit mine. Kenya coastal forests have recently come under threat from a proposed titanium mine. We have no information as to the possibility of future mine developments in relation to the coastal forests of Lindi Region.

Live animal trade

A further possible threat to the herpetofauna of the coastal forests is collection for the live animal export trade. At first glance this threat may seem unimportant, but in the last ten years, Tanzania's exports of amphibians and reptiles have increased greatly, despite the absence of non-detriment findings as required by CITES. The only attempt at monitoring of reptiles with respect to possible removal for the export trade is the study of Jenkins et al., (1999), on chameleons in Madagascar forests. Species which are highly territorial, strictly habitat limited, or with low reproductive potentials may be especially vulnerable. If coastal forest faunal populations are already reduced, and if strict control on commercial collecting is not enforced, it is possible that some species found in coastal forests would be negatively affected by excessive collecting.

Threats to seasonal breeding pools and dry season refugia

Observations in seasonal dry/wetlands in the Usangu area (Howell, unpublished) as well as in coastal forests (Msuya, 2001) indicate that in addition to the need to conserve temporary seasonal breeding sites (ponds, pools, etc.) it is also critically important to conserve habitat in which animals aestivate or remain inactive during long dry seasons. Msuya (2001) demonstrated that some small frogs may move more than 1000 m between breeding ponds and dry season refugia. Simply protecting a wetland is insufficient to maintain amphibian poplations; it is important to allow for differences in spatial and temporal differences over an annual season.

Various forms of infrastructural improvement, such as roads, pipelines, and bridges may also block migratory breeding movements to and from seasonal wetlands, and it is therefore important to include herptiles in Environmental Impact Assessment studies.

For areas which receive seasonal flooding, such observations also apply to reptiles, which may seek shelter on elevated termitaria, or in forest on elevated hills. As noted above, both amphibians and reptiles need shelter from seasonally set fires.

7. CONCLUSIONS AND RECOMMENDATIONS:

There is a need is to maintain forest integrity and manage the forests in a sustainable manner. If this is done, it is likely that the coastal forest amphibians and reptiles will also continue to survive.

In addition to traditional approaches to forest conservation, such as the use of centrally controlled forest reserves, a number of other options are in the process of being developed in Tanzania. These include zoning of existing forests, the involvement of local communities in forest management, and the establishment of Nature Reserves.

With the introduction of regular air travel to Kilwa, and the planned bridge-road complex from Dar es Salaam to Mtwara, some local communities living near forests may be able to benefit from tourism by developing simple camping facilities for visitors from within and outside of Tanzania. In the long term, interest shown by such visitors as well as cash generated through associated fees, sale of food, handicrafts, employment as guides, porters, etc. may help members of the local community realize that the value of "their" forest is recognized by others, and that there are real benefits and compensation for efforts (and sometimes loss of access to resources) spent on its conservation.

Whichever approaches are taken, it is important to have in place a system for monitoring biodiversity to permit an objective assessment of whether or not particular systems and approaches are in fact conserving biodiversity. Such monitoring programmes should, of course, involve the training and participation of local communities, and include contributions from specialist biologists. Monitoring biodiversity involves many complexities and needs considerable attention to methods and statistical details (Heyer et al., 1994; Wilson et al., 1996; Thompson, White & Gowan,1998). An example of an existing monitoring scheme being conducted with a conservation programme in Tanzania is that of the East Usambara Catchment Forest Project.

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Annex B

List of the bird species recorded in the study areas during the fieldwork in connection with this project

Dimba Forest Reserve

Bird species recorded

Hadada Ibis *Bostrychia hagedash*
Great Sparrowhawk *Accipiter melanoleucus*
African Goshawk *Accipiter tachiro*
Tambourine Dove *Turtur tympanistria*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
African Wood-owl *Ciccaba woodfordii*
Narina Trogon *Apaloderma narina*
Green Wood Hoopoe *Phoeniculus purpureus*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Green Tinkerbird *Pogoniulus simplex*
Golden-tailed Woodpecker *Campethera abingoni*
African Broadbill *Smithornis capensis*
Square-tailed Drongo *Dicrurus ludwigii*
Black Cuckoo Shrike *Campephaga flava*
Common Bulbul *Pycnonotus barbatus*
Nicator *Nicator gularis*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Fischers Greenbul *Phyllastrephus fischeri*
Tiny Greenbul *Phyllastrephus debilis*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
Eastern Bearded Scrub-robin *Cercotrichas quadrivirgata*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Reichenows Batis *Batis reichenowi*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Sulfur-breasted Bush-shrike *Malaconotus sulfureopectus*
Grey-headed Bush Shrike *Malaconotus blanchoti*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
Retz's Helmet-shrike *Prionops scopifrons*
Chestnut-fronted Helmet Shrike *Prionops scopifrons*
Violet-backed Starling *Cinnyricinclus leucogaster*
Black-breasted Glossy Starling *Lamprotornis corruscus*

Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Mouse-coloured Sunbird *Nectarinia veroxii*
Plain-backed Sunbird *Anthreptes reichenowi*
Violet-backed Sunbird *Anthreptes longuemarei*
Dark-backed Weaver *Ploceus bicolor*
Peters Twinspot *Hypargos nieoguttatus*
Green-backed Twinspot

Woodlands near Mhima – Rondo Plateau

Bird species recorded

Harrier Hawk *Polyboroides radiatus*
Southern banded Snake Eagle *Circaetus fasciolatus*
Bateleur *Terathopius ecaudatus*
Lizzard Buzzard *Kaupifalco monogrammicus*
Black-chested Snake Eagle *Circaetus pectoralis*
Dark Chanting Goshawk *Melierax metabates*
Crowned Eagle *Stephanoaetus coronatus*
Coqui Francolin *Francolinus coqui*
Ring-necked Dove *Streptopelia capicola*
Emerald-spotted Wood Dove *Turtur chalcospilos*
Green Pigeon *Theron australis*
Brown-necked Parrot *Poicephalus robustus*
Violet-crested Turaco *Tauraco porphyreolophus*
Klaas's Cuckoo *Chrysococcyx klaas*
Thick-billed Cockoo *Pachycoccyx audeberti*
African Wood-owl *Ciccaba woodfordii*
Spotted Eagle Owl *Bubo africanus*
Fiery-necked Nightjar *Caprimulgus pectoralis*
Striped Kingfisher *Halcyon chelicuti*
Little Bee-eater *Merops pusilla*
European Bee-eater *Merops apiaster*
Swallow-tailed Bee-eater *Merops hirundineus*
Hoopoe *Upupa epops*
Green Wood Hoopoe *Phoeniculus purpureus*
Common Scimitarbill *Phoeniculus cyanomelas*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Green Tinkerbird *Pogoniulus simplex*
Yellow-fronted Tinkerbird *Pogoniulus chrysoconus*
Black-throated Honeyguide *Indicator indicator*
Golden-tailed Woodpecker *Campethera abingoni*
Little Spotted Woodpecker *Campethera cailliatii*
Cardinal Woodpecker *Dendropicos fuscescens*
Bearded Woodpecker *Thripias namaquus*
Stierling's Woodpecker *Dendropicos stierlingi*
African Broadbill S*mithornis capensis*
Flappet Lark *Mirafra rufocinnamomea*
Black Rough-wing *Psalidoprocne pristoptera*
Common Drongo *Dicrurus adsimilis*

Square-tailed Drongo *Dicrurus ludwigii*
Black-headed Oriole *Oriolus larvatus*
Pied Crow *Corvus albus*
Rufous-bellied Tit *Parus rufiventris*
African Penduline Tit *Remiz caroli*
Black Cuckoo Shrike *Campephaga flava*
White-breasted Cuckoo Shrike *Coracina pectoralis*
Nicator *Nicator gularis*
Common Bulbul *Pycnonotus barbatus*
White-browed Scrub-robin *Cercotrichas leucophrys*
Eastern Bearded Scrub-robin *Cercotrichas quadrivirgata*
Kurrichane Trush *Turdus libonyanus*
Yellow-breasted Apalis *Apalis flavida*
Black-headed Apalis *Apalis melanocephala*
Grey-backed Camaroptera *Camaroptera brachyura*
Barred Wren-warbler *Camaroptera stierlingi*
Tabora Cisticola *Cisticola fulvicapilla*
Yellow-bellied Eremomela *Eremomela icteropygialis*
Red-winged Warbler *Heliolais erythroptera*
Yellow-bellied Hyliota *Hyliota flavigaster*
Tawny-flanked Prinia *Prinia subflava*
Red-faced Crombec *Sylvietta whytii*
Pale Flycatcher *Bradornis pallidus*
Ashy Flycatcher *Muscicapa caerulescens*
East Coast Batis *Batis soror*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Brubru *Nilaus afer*
Sulfur-breasted Bush-shrike *Malaconotus sulfureopectus*
Grey-headed Bush Shrike *Malaconotus blanchoti*
Four-coloured Bush Shrike *Malaconotus quadricolor*
Black-headed Tchagra *Tchagra senegala*
Brown-headed Tchagra *Tchagraaustralis*
Common Helmet-shrike *Prionops plumata*
Retz's Helmet-shrike *Prionops scopifrons*
Violet-backed Starling *Cinnyricinclus leucogaster*
Amethyst Sunbird *Nectarinia amethystina*
Little Purple-banded Sunbird *Nectarinia bifasciata*
Scarlet-chested Sunbird *Nectarinia senegalensis*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Violet-backed Sunbird *Antreptes longuemarei*
Yellow White-eye *Zosterops senegalensis*
Peters Twinspot *Hypargos nieoguttatus*
Green-winged Pytilia *Pytilia melba*
Cordon-bleu *Uraeginthus angolensis*
Bronze Manikin *Lonchura cucullata*
Black and White Manikin *Lonchura bicolor*
Golden-breasted Bunting *Emberiza flaviventris*
Cabanis Bunting *Emberiza cabanisi*
Yellow-fronted Canary *Serinus mozambicus*
Yellow-rumped Seed-eater *Serinus atrogularis*
Stribe-breasted Seed-eater *Serinus reichardi*

Kitope Forest Reserve

Bird species recorded

Hadada Ibis *Bostrychia hagedash*
Africa White-backed Vulture *Gyps africanus*
African Harrier Hawk *Polyboroides radiatus*
Bateleur *Terathopius ecaudatus*
Crowned Eagle *Stephanoaetus coronatus*
African Goshawk *Accipiter tachiro*
Helmeted Guineafowl *Numida meleagris*
Emerald-spotted Wood Dove *Turtur chalcospilos*
Tambourine Dove *Turtur tympanistria*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
Klaas's Cuckoo *Chrysococcyx klaas*
Yellowbill *Ceuthmochares aereus*
African Wood-owl *Ciccaba woodfordii*
Palm Swift *Cypsiurus parvus*
Narina Trogon *Apaloderma narina*
Brown-hooded Kingfisher *Halcyon albiventris*
Pygmy Kingfisher *Ispindina picta*
Böhms Bee-eater *Merops boehmi*
Green Wood Hoopoe *Phoeniculus purpureus*
Common Scimitarbill *Phoeniculus cyanomelas*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
White-eared Barbet *Buccanodon leucotis*
Pallid Honeyguide *Indicator meliphilus*
Golden-tailed Woodpecker *Campethera abingoni*
Cardinal Woodpecker *Dendropicos fuscescens*
African Broadbill S*mithornis capensis*
Lesser Striped Swallow *Hirundu abyssinica*
Eurasian Swallow *Hirundo rustica*
Mosque Swallow *Hirundo senegalensis*
Common Drongo *Dicrurus adsimilis*
Square-tailed Drongo *Dicrurus ludwigii*
Black Cuckoo Shrike *Campephaga flava*
Nicator *Nicator gularis*
Common Bulbul *Pycnonotus barbatus*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Fischers Greenbul *Phyllastrephus fischeri*
Terrestrial Brownbul *Phyllastrephus terrestris*
Tiny Greenbul *Phyllastrephus debilis*
Zanzibar Sombre Greenbul *Andropadus importunus*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
Eastern Bearded Scrub-robin *Cercotrichas quadrivirgata*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Siffling Cisticola *Cisticola brachyptera*
Red-faced Cisticola *Cisticola erythrops*
Red-winged Warbler *Heliolais erythroptera*

Tawny-flanked Prinia *Prinia subflava*
Ashy Flycatcher *Muscicapa caerulescens*
Reichenows Batis *Batis reichenowi*
Black and White Flycatcher *Bias musicus*
Black-throated Wattle-eye *Platysteira peltata*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Sulfur-breasted Bush-shrike *Malaconotus sulfureopectus*
Four-coloured Bush Shrike *Malaconotus quadricolor*
Black-headed Tchagra *Tchagra senegala*
Brown-headed Tchagra *Tchagra australis*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
Retz's Helmet-shrike *Prionops scopifrons*
Chestnut-fronted Helmet Shrike *Prionops scopifrons*
Little Purple-banded Sunbird *Nectarinia bifasciata*
Scarlet-chested Sunbird *Nectarinia senegalensis*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Uluguru Violet-backed Sunbird *Anthreptes neglectus*
Mouse-coloured Sunbird *Nectarinia veroxii*
Red-headed Weaver *Anaplectes rubriceps*
Grosbeak Weaver *Amblyospiza albifrons*
Dark-backed Weaver *Ploceus bicolor*
Peters Twinspot *Hypargos nieoguttatus*
Bronze Manikin *Lonchura cucullata*

Woodlands at Kikole

Bird species observed

Hamerkop *Scopus umbretta*
Marabou Stork *Leptoptilos crumeniferus*
Africa White-backed Vulture *Gyps africanus*
Lapped-faced Vulture *Torgos tracheliotus*
African Harrier Hawk *Polyboroides radiatus*
Bateleur *Terathopius ecaudatus*
Great Sparrowhawk *Accipiter melanoleucus*
Little Sparrowhawk *Accipiter minullus*
African Goshawk *Accipiter tachiro*
Wahlbergs Eagle *Aquila wahlbergi*
African Hawk Eagle *Hieraaetus spilogaster*
Lizzard Buzzard *Kaupifalco monogrammicus*
Gabar Goshawk *Melierax gabar*
Dark Chanting Goshawk *Melierax metabates*
African Fish Eagle *Haliaeetus vocifer*
Crested Francolin *Francolinus sephaena*
Helmeted Guineafowl *Numida meleagris*
Tree-banded Plover *Charadrius tricollaris*
Common Sandpiper *Tringa Actitis hypoleucos*
Greenshank *Tringa nebularia*
Emerald-spotted Wood Dove *Turtur chalcospilos*
Blue-spotted Wood Dove *Turtur chalcospilos*
Ring-necked Dove *Streptopelia capicola*
Red-eyed Dove *Streptopelia semitorquata*
Laughing Dove *Streptopelis senegalensis*
Green Pigeon *Theron australis*
Brown-headed Parrot *Poicephalus cryptoxanthus*
Brown-necked Parrot *Poicephalus robustus*
Violet-crested Turaco *Tauraco porphyreolophus*
Livingstones Turaco *Tauraco livingstonii*
African Cuckoo *Cuculus gularis*
Klaas's Cuckoo *Chrysococcyx klaas*
White-browed Coucal *Centropus superciliosus*
African Wood-owl *Ciccaba woodfordii*
Palm Swift *Cypsiurus parvus*
Böhm's Spinetail *Neafrapus boehmi*
Mottle-throated Spinetail *Telacanthura ussheri*
Pied Kingfisher *Ceryle rudis*
Striped Kingfisher *Halcyon chelicuti*
Grey-headed Kingfisher *Halcyon leucocephala*
Brown-hooded Kingfisher *Halcyon albiventris*
Malachite Kingfisher *Alcedo cristata*
Little Bee-eater *Merops pusilla*
Böhm's Bee-eater *Merops boehmi*
European Bee-eater *Merops apiaster*
Swallow-tailed Bee-eater *Merops hirundineus*
White-fronted Bee-eater *Merops bullockoides*
Broad-billed Roller *Eurystomus glaucurus*
Lilac-breasted Roller *Coracias caudata*
Eurasian Roller *Coracias garrulus*
Green Wood Hoopoe *Phoeniculus purpureus*

Common Scimitarbill *Phoeniculus cyanomelas*
Grey Hornbill *Tockus nasutus*
Crowned Hornbill *Tockus alboterminatus*
Trumpeter Hornbill *Bycanistes bucinator*
Ground Hornbill *Bucorvus cafer*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Yellow-fronted Tinkerbird *Pogoniulus chrysoconus*
Brown-breasted Barbet *Lybius melanopterus*
Crested Barbet *Trachyphonus vaillantii*
Black-throated Honeyguide *Indicator indicator*
Lesser Honeyguide *Indicator minor*
Golden-tailed Woodpecker *Campethera abingoni*
Little Spotted Woodpecker *Campethera cailliatii*
Cardinal Woodpecker *Dendropicos fuscescens*
African Broadbill S*mithornis capensis*
Mosque Swallow *Hirundo senegalensis*
Lesser Striped Swallow *Hirondo abyssinica*
Black Rough-wing *Psalidoprocne pristoptera*
Common Drongo *Dicrurus adsimilis*
Black-headed Oriole *Oriolus larvatus*
European Oriole *Oriolus oriolus*
Rufous-bellied Tit *Parus rufiventris*
Arrow-marked Babbler *Turdoides jardineii*
Black Cuckoo Shrike *Campephaga flava*
White-breasted Cuckoo Shrike *Coracina pectoralis*
Nicator *Nicator gularis*
Common Bulbul *Pycnonotus barbatus*
Fischers Greenbul *Phyllastrephus fischeri*
Zanzibar Sombre Greenbul *Phyllastrephus strepitans*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
White-browed Scrub-robin *Cercotrichas leucophrys*
Eastern Bearded Scrub-robin *Cercotrichas quadrivirgata*
Red-capped Robin Chat *Cossypha natalensis*
White-headed Black Chat *Thamnolaea arnoti*
Kurrichane Trush *Turdus libonyanus*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Tabora Cisticola *Cisticola fulvicapilla*
Siffling Cisticola *Cisticola brachyptera*
Red-winged Warbler *Heliolais erythroptera*
Tawny-flanked Prinia *Prinia subflava*
Red-faced Crombec *Sylvietta whytii*
Grey Flycatcher *Bradornis microrhynchus*
East Coast Batis *Batis soror*
Livingstones Flycatcher *Erythrocercus livingstonei*
Southern Black Flycatcher *Melaenornispammelaina*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Sulfur-breasted Bush-shrike *Malaconotus sulfureopectus*
Black-headed Tchagra *Tchagra senegala*
Brown-headed Tchagra *Tchagraaustralis*
Common Helmet-shrike *Prionops plumata*
Retz's Helmet-shrike *Prionops scopifrons*
Black-breasted Starling *Lamprotornis corruscus*
Violet-backed Starling *Cinnyricinclus leucogaster*

Red-billed Oxpecker *Buphagus erythrorhynchus*
Amethyst Sunbird *Nectarinia amethystina*
Little Purple-banded Sunbird *Nectarinia bifasciata*
Scarlet-chested Sunbird *Nectarinia senegalensis*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Violet-backed Sunbird *Antreptes longuemarei*
Yellow White-eye *Zosterops senegalensis*
Black-headed Weaver *Ploceus cucullatus*
Lesser Masked Weaver *Ploceus intermedius*
Spectacled Weaver *Ploceus ocularis*
African Golden Weaver *Ploceus subaureus*
Dark-backed Weaver *Ploceus bicolor*
Red-headed Weaver *Anamalospiza rubriceps*
Yellow Bishop *Euplectes capensis*
White-winged Widowbird *Euplectes albonotatus*
Common Waxbill *Estrilda astrild*
Peters Twinspot *Hypargos nieoguttatus*
African Firefinch *Lagonosticta rubricata*
Green-winged Pytilia *Pytilia melba*
Cordon-bleu *Uraeginthus angolensis*
Bronze Manikin *Lonchura cucullata*
Black and White Manikin *Lonchura bicolor*
Golden-breasted Bunting *Emberiza flaviventris*
Cabanis Bunting *Emberiza cabanisi*
Yellow-fronted Canary *Serinus mozambicus*

List of birds recorded in Chitoa Forest

Bird species recorded
Purple Heron *Ardea purpurea*
Black Crake *Limnocorax flavirostra*
Jacana *Actophilornis africanus*
Bateleur *Terathopius ecaudatus*
Crowned Eagle *Stephanoaetus coronatus*
African Goshawk *Accipiter tachiro*
Tambourine Dove *Turtur tympanistria*
Red-eyed Dove *Streptopelia semitorquata*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
Barred Long-tailed Cuckoo *Cercococcyx montanus*
African Wood-owl *Ciccaba woodfordii*
Palm Swift *Cypsiurus parvus*
Narina Trogon *Apaloderma narina*
Mangrove Kingfisher *Halcyon senegaloides*
Eurasian Bee-eater *Merops apiaster*
Green Wood Hoopoe *Phoeniculus purpureus*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Eastern Green Tinkerbird *Pogoniulus simplex*
Yellow-fronted Tinkerbird *Pogoniulus chrysoconus*
Scaly-thoated Honeyguide

Golden-tailed Woodpecker *Campethera abingoni*
Little Spotted Woodpecker *Campethera cailliautii*
Cardinal Woodpecker *Dendropicos fuscescens*
African Broadbill *Smithornis capensis*
Square-tailed Drongo *Dicrurus ludwigii*
Golden Oriole *Oriolus oriolus*
Black Cuckoo Shrike *Campephaga flava*
Nicator *Nicator gularis*
Common Bulbul *Pycnonotus barbatus*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Fischers Greenbul *Phyllastrephus fischeri*
Tiny Greenbul *Phyllastrephus debilis*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
East Cost Akalat *Sheppardia gunningi*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Red-faced Crombec *Sylvietta whytii*
Ashy Flycatcher *Muscicapa caerulescens*
Spotted Flycatcher *Muscicapa striata*
East Cost Batis *Batis soror*
Reichenows Batis *Batis reichenowi*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Sulphur-breasted Bush Shrike *Malaconotus sulfureopectus*
Four-collared Bush Shrike *Malaconotus quadricolor*
Black-breasted Glossy Starling *Lamprotornis corruscus*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Uluguru Violet-backed Sunbird *Anthreptes neglectus*
Plain-backed Sunbird *Anthreptes reichenowi*
Grosbeak Weaver *Amblyospiza albifrons*
Golden Weaver *Ploceus subaureus*
Dark-backed Weaver *Ploceus bicolor*
Peters Twinspot *Hypargos niveoguttatus*
Black and White Mannikin *Lonchura bicolor*

Mitumdumbea Forest reserve

Bird species recorded

Hadada Ibis *Bostrychia hagedash*
Red-necked Spurfowl *Francolinus afer*
Hooded Vulture *Neophron monachus*
Harrier Hawk *Polyboroides radiatus*
Bateleur *Terathopius ecaudatus*
Common Buzzard *Buteo buteo*
Ayres's Hawk eagle *Hieraaetus dubius*
Crowned Eagle *Stephanoaetus coronatus*
Afircan Fish Eagle *Haliaeetus vocifer*
African Goshawk *Accipiter tachiro*
Green-backed Heron *Butorides striatus*
Crested Guineafowl *Guttera edouardi*
Wood Sandpiper *Tringa glareola*
Tambourine Dove *Turtur tympanistria*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
Barred long-tailed Cuckoo *Cercococcyx montanus*
Emerald Cuckoo *Chrysococcyx cupreus*
Klaas's Cuckoo *Chrysococcyx klaas*
Asian Lesser Cuckoo *Cuculus poliocephalus*
Yellowbill *Ceuthmochares aereus*
African Wood-owl *Ciccaba woodfordii*
Böhm's Spinetail *Neafrapus boehmi*
Mottle-throated Spintail *Telacanthura ussheri*
Narina Trogon *Apaloderma narina*
Giant Kingfisher *Ceryle maxima*
Brown-hooded Kingfisher *Halcyon albiventris*
Mangrove Kingfischer *Halcyon senegaloides*
African Pygmy Kingficher *Ispidina picta*
Green Wood Hoopoe *Phoeniculus purpureus*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Green Barbet *Buccanodon olivaceum*
Scaly-throated Honeyguide *Indicator variegatus*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Cardinal Woodpecker *Dendropicos fuscescens*
African Broadbill S*mithornis capensis*
African Pitta *Pitta angolensis*
Black Rough-wing *Psalidoprocne pristoptera*
Square-tailed Drongo *Dicrurus ludwigii*
Golden Oriole *Oriolus oriolus*
Nicator *Nicator gularis*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Fischers Greenbul *Phyllastrephus fischeri*
Tiny Greenbul *Phyllastrephus debilis*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Pale Flycatcher *Bradornis pallidus*

Reichenows Batis *Batis reichenowi*
Black-throated Wattle-eye *Platysteira peltata*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Sulfur-breasted Bush-shrike *Malaconotus sulfureopectus*
Chestnut-fronted Helmet Shrike *Prionops scopifrons*
Black-breasted Glossy Starling *Lamprotornis corruscus*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Uluguru Violet-backed Sunbird *Anthreptes neglectus*
Plain-backed Sunbird *Anthreptes reichenowi*
Yellow White-eye *Zosterops senegalensis*
Red-headed Weaver *Anaplectes rubriceps*
Dark-backed Weaver *Ploceus bicolor*
Black and White Mannikin *Lonchura bicolor*

Ngarama North Forest reserve

Bird species recorded

Harrier Hawk *Polyboroides radiatus*
Bateleur *Terathopius ecaudatus*
Crowned Eagle *Stephanoaetus coronatus*
African Goshawk *Accipiter tachiro*
Crested Guineafowl *Guttera edouardi*
Emerald Spotted Wood Dove *Turtur chalcospilos*
Tambourine Dove *Turtur tympanistria*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
Emerald Cuckoo *Chrysococcyx cupreus*
Klaas's Cuckoo *Chrysococcyx klaas*
Asian Lesser Cuckoo *Cuculus poliocephalus*
African Wood-owl *Ciccaba woodfordii*
Eurasian Swift *Apus apus*
Mottle-throated Spintail *Telacanthura ussheri*
Narina Trogon *Apaloderma narina*
Little Bee-eater *Merops pusillis*
Böhms Bee-eater *Merops boehmi*
Eurasian Bee-eater *Merops apiaster*
Broad-billed Roller *Eurystomus glaucurus*
Hoopoe *Upupa epops*
Green Wood Hoopoe *Phoeniculus purpureus*
Scimitarbill *Rhinopomastus cyanomelas*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Southern Ground Hornbill *Bucorvus leadbeateri*
Green Barbet *Buccanodon olivaceum*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Greater Honeyguide *Indicator indicator*
Golden-tailed Woodpecker *Campethera abingoni*
Little Spotted Woodpecker *Campethera cailliautii*
African Broadbill S*mithornis capensis*
African Pitta *Pitta angolensis*
Eurasian Swallow *Hirundo rustica*

Black Rough-wing *Psalidoprocne pristoptera*
Common Drongo *Dicrurus adsimillis*
Square-tailed Drongo *Dicrurus ludwigii*
Black-headed Oriole *Oriolus larvatus*
Golden Oriole *Oriolus oriolus*
Common Bulbul *Pycnonotus barbatus*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Fischers Greenbul *Phyllastrephus fischeri*
Tiny Greenbul *Phyllastrephus debilis*
Yellow-bellied Greenbul *Chlorocichla flaviventris*
Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
Kurrichane Thrush *Turdus libonyanus+A80*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Siffling Cisticola *Cisticola brachyptera*
Ashy Flycatcher *Muscicapa caerulescens*
Spotted Flycatcher *Muscicapa striata*
Reichenows Batis *Batis reichenowi*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
Black-headed Tchagra *Tchagra senegalensis*
Retz's Helmet Shrike *Prionops retzii*
Four-collared Bush Shrike *Malaconotus quadricolor*
Black-breasted Glossy Starling *Lamprotornis corruscus*
Violet-backed Starling *Cinnyricinclus leucogaster*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Uluguru Violet-backed Sunbird *Anthreptes neglectus*
Plain-backed Sunbird *Anthreptes reichenowi*
Black-headed Weaver *Ploceus cululliatus*
Golden Weaver *Ploceus subaureus*
Dark-backed Weaver *Ploceus bicolor*
Peters Twinspot *Hypargos niveoguttatus*

Ruawa Forest Reserve

Bird species recorded

Harrier Hawk *Polyboroides radiatus*
African Goshawk *Accipiter tachiro*
Common Buzzard *Buteo buteo*
Cuckoo Hawk *Aviceda cuculoides*
Bat Hawk *Macheiramphus alcinus*
Emerald-spotted Wood Dove *Turtur chalcospilos*
Tambourine Dove *Turtur tympanistria*
Brown-necked Parrot *Poicephalus robustus*
Livingstones Turaco *Tauraco Livingstonii*
Lesser Asian Cuckoo *Cuculus poliocephalus*
Black Cuckoo Cuculus clamosus
Barred Long-tailed Cuckoo *Cercococcyx montanus*
Klaa's Cuckoo *Chrysococcyx klaas*

Emerald Cuckoo *Chrysococcyx cupreus*
White-browed Coucal *Centropus superciliosus*
African Wood-owl *Ciccaba woodfordii*
Palm Swift *Cypsiurus parvus*
Mottled-throated Spinetail *Telacanthura ussheri*
Narina Trogon *Apaloderma narina*
Mangrove Kingfisher *Halcyon senegaloides*
Pigmy Kingfisher *Ispidina picta*
Crowned Hornbill *Bycanistes bucinator*
Trumpeter Hornbill *Tockus alboterminatus*
Green Barbet *Buccanodon olivaceum*
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*
Eastern Green Tinkerbird *Pogoniulus simplex*
African Broadbill S*mithornis capensis*
African Pitta *Pitta angolensis*
Square-tailed Drongo *Dicrurus ludwigii*
Nicator *Nicator gularis*
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Terrestrical Brownbul *Phyllastrephus terrestris*
Fischers Greenbul *Phyllastrephus fischeri*
Tiny Greenbul *Phyllastrephus debilis*
Zanzibar Sombre Greenbul *Andropadus importunus*
Red-capped Robin-chat *Cossypha natalensis*
Red-tailed Ant Thrush *Neocossyphus rufus*
East Cost Akalat *Sheppardia gunningi*
Yellow-breasted Apalis *Apalis flavida*
Grey-backed Camaroptera *Camaroptera brachyura*
Reichenows Batis *Batis reichenowi*
Livingstones Flycatcher *Erythrocercus livingstonei*
Crested Flycatcher *Trochocercus cyanomelas*
Black-backed Puffback *Dryoscopus cubla*
Four-collared Bush Shrike *Malaconotus quadricolor*
Black-breasted Glossy Starling *Lamprotornis corruscus*
Olive Sunbird *Nectarinia olivacea*
Collared Sunbird *Antreptes collaris*
Uluguru Violet-backed Sunbird *Anthreptes neglectus*
Plain-backed Sunbird *Anthreptes reichenowi*
Dark-backed Weaver *Ploceus bicolor*
Lesser Masked Weaver
Peters Twinspot *Hypargos niveoguttatus*

Annex C

Report of Botanical Survey and list of trees collected during the field surveys of this project

BIODIVERSITY SURVEY IN LINDI REGION

REPORT ON BOTANICAL SURVEY

For Ornis Consult Ltd.

By
Frank Mgalla Mbago
Botanist
University of Dar Es Salaam

February 2002

INTRODUCTION

Under the Environmental Peace and Stability Fund(EPSF) the Government of Tanzania and Danida are from January 2001 starting a village based Forest and Woodland management project in Lindi Region. Also called UTUMI, short for" Utunzani wa Misitu" in Kiswahili. The Project aims at supporting the introduction of a sustainable utilisation of the natural resources in Lindi Region including the extraction of products from Coastal forests
One of the objectives of the survey is:
-To provide up to date information of the major vegetation types of Lindi and Kilwa Districts with special attention to localities, size and biological important of the coastal forest.
-To survey the woodland and forest flora and fauna of the selected four project area to ensure that the planning and implementation of the project activities are based on a proper understanding of their biological value and importance.
-Produce baseline information for participatory project activities.
It is for the above objectives 13 weeks fields work have been assigned to conduct a botanical survey to the selected areas in the study area. The botanical survey was conducted during the periods of mid August to mid December 2001.

The field survey mainly focused on: -
-Systematic collection of vegetation types
-Detailed sampling in the selected areas.
-Systematic collection of plant specimens and identification of plants in the selected study areas.

The survey conducted in eight selected forests of Kilwa and Lindi Districts.
The forests surveyed includes:-Kitope, Kikole Mitundumbeya and South Ngarama in Kilwa District. In Lindi District it includes forests of Dimba, Miima, Ruawa and Chitoa.

In each forest surveyed, vegetation types classified basing on physiognomic classification and vegetation sample plots were established and all trees with DBH>10 cm were identified and measured in different sites for determining structural of the forests.
Other task conducted was the vegetation mapping where the vegetation was identified and classified from Landsat ETM+ satellite images.

This report therefore covers vegetation types classified and identified from each site visited as mentioned above as well as their biological important. A list of tree species identified in each forest, summarized number of transects established in each forest with minimum and maximum DHB and height measured are also included in the report.

The report also covers a list of plant species with biological important identified from the study areas. A list of all plant specimens collected for further identification and preservation to the herbarium is also included.
A tentative checklist of all plant species collected and recorded from the study areas with their scientific and local names in Ngindo and Makonde languages is also attached.

METHODOLOGY

The survey based on a combination of two methodologies. The first one was the qualitative method, which employs the ground survey by car and on foot on each study site. This method used for the classification of the vegetation types, collection of plant specimens and general identification of plant species occurring in the study area. Also it helps on knowing the status of the forest such as primary and secondary as well as sees various exploited species for timber and poles respectively.
The second method was quantitative where by a standardized method used for establishment of sample plots of 60m x 5m for structural determination of the vegetation type. Some sample plots were established on points, which were initially marked on satellite images map, and GPS used to locate those points. Other sample plots established according to uniqueness of the vegetation types in the areas. In each established sample plot, all trees with DBH 10cm> were identified and measured their DBH, Height and crown cover. Most of the trees were identified in the field and for those difficult ones, herbarium specimens were collected, pressed and dried in the field for further identification in herbarium.

All specimens were collected in three set. One set for the herbarium of the university of Dar es Salaam, Tanzania, other set for Kew Garden herbarium, UK and last one for the Botanical Museum in Copenhagen Denmark for further identification and preservation for future references.
Instruments used in the field includes GPS for marking position of the transects and locating marked position on satellite images map.
Tape measure of 50m used to establish 60m x 5m sample and canopy cover of trees plot while DBH tape were used to measure the DBH of trees.
Sunto hypsometer used to measure the tree height.

A pair of plant press with bloating papers with newspaper was used on pressing the specimens and a kerosene stove with woody plant drier used for drying the plant specimens in the field. A pair of secateures used for collecting the fertile plant specimens.

SURVEY FINDINGS
1.Vegetation types and biological important of each forest.
1.1.MIIMA FOREST
Vegetation types identified in this area is **Mixed woodland** with common tree species of *Pseudolachnostylis maprounefolia,Hymenocardia ulmoides Parinari curatellifolia, Pterocarpus angolenis* and *Makhamia obtusifolia*.

Biological important species
Pterocarpus angolensis-Mninga/ Mtumbatu. Vulnerable timber species.

1.2. KITOPE FOREST
Three vegetation types identified. **Mixed woodland, Mixed scrub forest** and **Open woodland**

Mixed woodland: Dominant tree species *Makhamia obtusifolia, Turraea robusta* and *Annona senegalensis.*

Mixed scrub forest: Dominant tree species *Rothmannia urcelliformis Vitex doniana* and *Erythroxylum fischeri.*

Open Woodland: Dominant tree species *Annona senegalensis*, *Pterocarpus angolensis* and *Piliostigma thonningii.*

Biological important species
Pterocarpus angolensis-Mninga/ Mtumbatu. Vulnerable timber species.

1.3. DIMBA FOREST
Two vegetation types identified in this forest**. Legume dominated forest** and **Mixed dry forest.**

Legume dominated dry forest: Dominant trees species: *Cynometra cf. alexandrie,Cynometra sp., Vitex mombassana* & *Zanthoxylum chalybeum*

Mixed dry forest: Dominant tree species: ***Lettowianthus stellatus, Makhamia obtusifolia, Cynometra sp. & Pteleospis myrtifolia***
Biological important species: *Cynometra sp.* &*Cynometra cf. alexandie* are possible new species and endemic to coastal forests of East Africa.

1.4.KIKOLE MAJOGOO FOREST
Two vegetation types identified**. Mixed scrub forest** and **Mixed woodland.**
Mixed scrub forest: Dominant tree species: *Millettia stuhlamnii, Dalbergia melanoxylon,Sclerocarya birrea Pteleopsis myrtifolia* and *Combretum zeyheri*
Mixed woodland: Dominant tree species: *Lannea stuhlmanii, Kigelia africana, Maprounea africana,Makhamia obtusifolia* and *Salvaroda persica.*

Biological important species*:Millettia stuhlmanii(Mnyamwezi)*Vulnerable timber species*, Dalbergia melanoxylon*(Black wood/Ebony/Mpingo) Vulnerable for Makonde carvings.

1.5. NGARAMA NORTH FOREST

Four vegetation types identified **: Legume dominated dry forest, Mixed scrub forest, Mixed dry forest** and **Eastern Africa *Brachystegia* forest.**

Legume dominated dry forest: Dominant tree species: *Guibortia schliebenii, Scorodophloeus fischeri,Hymanaea, Afezlia quanzensis* and *Dialium holstii*

Mixed scrub forest: Dominant tree species**:** *Hymenocardia ulmoides,Pteleopsis myrtifolia, Nersogodonia holstii, Bombax rhodognaphalon* and *Drypetes arguta.*

Mixed dry forest: Dominant tree species: *Hymanaea verucosa,Hymenocardia ulmoides, Diospyros shimbaensis,Pteleospis apetala* and *Nersogodonia holstii.*

Eastern Africa *Brachystegia* forest. Dominant tree species :*Brachystegia spiciformis, B.longifolia ,Pseudolachnostylis maprouneifolia, Xeroderris stuhlmannii* and *Pterocarpus angolenis.*

Biological important species: *Guibortia schliebenii*,*Peleopsis apetala and Vismia pauciflora* -Lindi endemic. *Diospyros shimbaensis*-Endemic to coastal forests of East Africa.
Prerocarpus angolenis- Vulnerable timber species. *Baphia cf. keniensis Leptactina cf. oxyloba*-Possible Ngarama endemic.

1.6.MITUNDUMBEYA/NAMATIMBILI FOREST
Three vegetation types identified**. Riverine forest, Mixed scrub forest** and **Legume dominated forest**

Riverine forest: Dominant tree species:*Khaya anthotheca, Pteryogota sp. nov., Parkia filicoides, Lettowianthus stellatus, Barringtonia racemosa* and *Sorindeia madagascariensis.*

Mixed scrub forest: Dominant tree species:*Strychnos henningsii,Drypetes arguta, Makhamia lutea, Haplocoelium inopleum, Pteleospis myrtifolia* and *Bombax rhodognaphalon*

Legume dominated forest: Dominant tree species: *Cynometra gilmanii, C.greenwayi, Erythrina schliebenii, .Scorodophloeus fischeri* and *Codyala africana.*

Riverine Forest: Dominant tree species: *Pteryogota sp. nov. Sorindeia madagascariensis,Milicia excelsa, Lettowianthus stellastus,Barringtonia racemosa Newtonia paucijuga,Parkia filicoides, Khaya anthotheca* and *Pouteria alnifolia.*

Biological important species: *Cynometra gilmanii, C.greenwayi* and *Erythrina schliebenii,*-Endemic to Lindi. *Pteryogota sp. nov.*-Possible Namatimbili Endemic.
Codyala africana(Mnidu), *Khaya anthotheca*(Mkangazi/Mahogani)and
Milicia excelsa (Mvule)- Vulnerable timber species.

Note: The forest is less disturbed and has got a high abundance of timber species and Cycard (*Encephalartos hildebrandtii*) threatened species covered by CITES. Also the forest has a high diversity and big number of wild animals such as elephant, buffalo, wild pig, Crocodile, Hippo, birds and fish.

1.7.CHITOA FOREST
Two vegetation types identified**. Legume dominated forest** and **Mixed scrub forest.**

Legume dominated forest. Dominant tree species: *Tessamannia densiflora,*
T. martiana var. martiana,Newtonia paucijuga,Hymanaea verrucosa, Scorodophloeus fischeri,Baphia cf. wollastinii, Guibortia schliebenii, Baphia macrocalyx,Teclea nobilis and *Cola microcarpa.*

Mixed scrub forest: Dominant tree species**:***Hymenocardia ulmoides, Pteleopsis myrtifolia,Swartizia madagascariensis,Dialium holstii, Bombax rhodognaphalon,Fernandoa magnifica, Grewia conocarpa* and *Afzelia quanzensis*

Biological important species: *Guibortia schliebenii, Tessamannia densiflora, Baphia macrocaly,* ,and *Monanthotaxis trichantha* -Endemic species to Lindi. *Asteranthe cf.lutea* also possible endemic species to Lindi.

Tessmannia martiana var. martiana,Uvariodendron gorgonis, Diospyros shimbaensis, Baphia punctulata ssp.puctulata and *Artabortys modestus*- Endemic species to Coastal forests of East Africa.

Note: Unique **Legume dominated forest** due to high diversity of legume tree species. Most of the legume tree species, which forms these vegetation types, are available in this forest.

1.8.RUAWA FOREST:
Three vegetation types identified. **Mixed dry forest Legume dominated forest** and **Groundwater forest.**

Mixed dry forest: Dominant tree species: *Milicia excelsa, Baphia macrocalyx, Cussonia zimmermannii,Bombax rhodognaphalon* and *Scorodophloeus fischeri*

Legume dominated forest. Dominant tree species: *Scorodophloeus fischeri ,Millettia bussei* and *Craibia cf. brevicaudata*
Ground water forest: Dominant tree species:*Pouteria alnifolia,Trichilia sp., Pteryogota sp. nov. Ricinodendron heudelotii, Sterculia cf. schliebenii Ficus exasperata* and *Sorindeia madagascariensis*

Biological important species: *Preryogota sp. nov.*- Possible Lindi Endemic. *Milicia excelsa*- Vulnerable timber species. *Craibia cf. brevicaudata, Sterculia cf. schliebenii* -Possible Endemic to coastal forests of East Africa. *Lasiodiscus holstii, Mkilua fragans,Olax pentandra,Asteranthe lutea* and *Uvariodendron gorgonis*-Endemic to coastal forests of East Africa.

2.Summarised # of Sample plots (60m x5m) sampled in each forest

Forest	#samples plots	Min. DBH(cm)	Max. DBH	Min.Ht. (metre)	Max. Ht
Miima	12	14	52	7	12
Dimba	6	12	43	6	13
Kikole	8	10	41	8	15
Kitope	11	11	24	8	16
Ngarama South	12	11	43	11	26
Namatimbili/ Mitundumbeya	12	13	25	12	25
Chitoa	12	13	35	14	28
Ruawa	8	12	56	14	30

LIST OF PLANT SPECIMENS COLLECTED THE STUDY AREA
August/September 2001(F.M.Mbago & Eric Prins)

Noto Plateau, Noto Forest Reserve. Mixed dry forest with evergreen & deciduous species. Canopy psecies are *Milicia excelsa, Pteleopsis myrtifolia, Commiphora eminnii* and *Baphia macrocalyx.* (Location 37M 0548578 UTM 8904490) Date: 31/8/2001				
COLL.# FMM	**SPECIES NAME**	**FAMILY**	**HABIT**	**BIOLOGICAL IMPORTANT**
2114	**Baphia cf. wollastonii Bak.f.**	**Papilionaceae**	**T**	
2115	**Ruspolia seticalyx (C.B.cl.)Milne.Redh.**	**Acanthaceae**	**H**	
2116	**Boivinia jalbertii Tul.**	**Flacourtiaceae**	**T**	
2117	**Pavetta cf. pseudo-albicaulis Bridson**	**Rubiaceae**	**S**	
2118	**Oxyanthus zanguebaricus (Hiern)Bridson**	**Rubiaceae**	**S**	
2119	**Rinorea ferruginea Engl.**	**Violaceae**	**S**	
2120	**Euphorbiaceae???**	**Euphorbiaceae?**	**S**	
2121	**Dichapetalum mossambicense (Klotzch)Engl.**	**Dichapetalaceae**	**CL**	
2122	**Monodora grandidieri Bail.**	**Annonaceae**	**T**	
2123	**Teclea trichocarpa Engl.**	**Rutaceae**	**S**	
2124	**Salacia madagascariensis (Lam.)DC.**	**Celastraceae**	**S**	
2125	**Ipomoea shirambensis Jacq.**	**Convolvulaceae**	**CL**	
2126	**Commiphora mollis(Oliv.)Engl.**	**Burseraceae**	**T**	
2127	**Mkilua fragans Verdc.**	**Annoanceae**	**S**	**Coastoal forest endemic**
2128	**Grewia glandulosa Vahl.**	**Tiliaceae**		
2129	**Ziziphus mucronata Willd. ssp. muctonata**	**Rhamnaceae**	**T**	
2130	**Dichapetalum barbosae Torre**	**Dichapetalaceae**	**T**	
2131	**Baphia marocalyx harms**	**Papilionaceae**	**T**	**Lindi Endemic**
2132	**Coffea pseudozanguebaricae Bridson**	**Rubiaceae**	**S**	**Coastoal forest endemic**
2133	**Pleiocarpa pycnatha (K.Schum.) Stapf.**	**Apocynaceae**	**S**	
2134	**Rytyginia decussata (K.Schum.)Robyns**	**Rubiaceae**	**S**	
2135	**Dichapetalum stulmannii Engl.**	**Dichapetalaceae**	**T**	
2136	**Monathotaxis trichantha (Diels)Verdc.**	**Annonaceae**	**S**	**Lindi endemic**
2137	**Dracaena usambarensis Engl.**	**Agavaceae**	**T**	
2138	**Grewia glandulosa Vahl.**	**Tiliaceae**	**S**	

Ruawa Forest Reserve.Groundwater forest with canopy species of *Milicia excelsa, Drypetes Lettowiathus Ricinodendron & Pteryogota* (Location: 37M 560470 UTM 8922591) Date 1/9/2001				
COLL# FMM	**SPECIES NAME**	**FAMILY**	**HABIT**	**BIOLOGICAL IMPORTANT**
2139	**Pteriogota sp. nov.**	**Sterculiaceae**	**T**	**Possible New sp.**
2140	**Lepisanthes senegalensis (Boir)Leenl.**	**Sapindaceae**	**T**	
2141	**Mkilua fragans Verdc.**	**Annonaceae**	**S**	**Coastal forest endemic**
2142	**Gardenia posoquerioides S.More**	**Rubiaceae**	**S**	
2143	**Mimusopsis schliebenii Mildbr.**	**Sapotaceae**	**T**	
2144	**Justicia cf. interrupta (L.)C.B.Cl.**	**Acanthaceae**	**H**	
2146	**Oxyanthus zanguebaricus (Hiern)Bridson**	**Rubiaceae**	**T**	
2147	**Drypetes reticulata Pax**	**Euphorbiaceae**	**T**	
2148	**Uvariodendrom gorgonis Verdc.**	**Annonaceae**	**S**	
2149	**Adhatoda engleriana(L.)C.B.Cl.**	**Acanthaceae**	**S**	
2150	**Craibia cf. brevicaudata (Vatke)Dunn. ssp. brevicaudata**	**Papilionaceae**	**T**	
2151	**Codyla africana Lour**	**Caesalpiniaceae**	**T**	
2152	**Sterculua cf. schliebenii Mil**	**Sterculuaceae**	**T**	**Possible Lindi Endemic**
2153	**Sloetiopsis usambarensis Engl.**	**Moraceae**	**S**	
2154	**Drypetes reticulata Pax**	**Euphorbiaceae**	**T**	
2155	**Craibia brevicaudata (Vatke)Dunn. ssp. brevicaudata**	**Papilionaceae**	**T**	**Rare**
2156	**Ipomoea shirambensis Jacq.**	**Convolvulaceae**	**Cl**	
2157	**Encephalartos hildebrandtii A.Br.Bouche**	**Cycadaceae**	**S**	**Threaterned CITES app.1**
2158	**Rinorea ilicifolia (Oliv.)O.Kuntze var. ilicifolia**	**Violaceae**	**S**	
2159	**Sansevieria cf. gracilis N.E.Br.**	**Agavaceae**	**S**	
2160	**Asteranthe lutea Vollesen**	**Annonaceae**	**S**	**Coastal forests Endemic**
2161	**Olax pentandra Sleumer**	**Olacaceae**	**S**	**Coastal forests Endemic**
2162	**Asteranthe lutea Villesen**	**Annonaceae**	**S**	**Coastal forests Endemic**
2163	**Pancovia golungensis (Hiern)Ex.&Mendoca**	**Sapindaceae**	**T**	

Milola Division Nahoro Woodland. Dominant tree species is Brachystegia microphylla on rocky soil. (Location 37L 0519637 UTM 8900708) Date: 3/9/2001				
2164	**Leptactina papyrophloea Verdc.**	**Acanthaceae**	**S**	
2165	**Diospyros mafiensis F.White**	**Ebenaceae**	**T**	**Endemic to coatal forests**
2166	**Myrsine africana L.**	**Myrsinaceae**	**S**	
2167	**Dichapetalum mossambisense (Klotsch.)**	**Dichapetalaceae**	**S**	
2168	**Monathotaxis trichantha (diels)Verdc.**	**Annonaceae**	**S**	**Lindi Endemic**
2169	**Hexalobus monopetalus (A.Rich.)Engl.**	**Annonaceae**	**S**	
2170	**Millettia stuhlmannii Taub.**	**Papilionaceae**	**Cl**	
2171	**Ochna afzelii R.Br.**	**Ochnaceae**	**S**	
2172	**Millettia semseii Gillette**	**Papilionaceae**	**CL**	
2173	**Thylachium africanum Lour.**	**Capparidaceae**	**S**	
2174	**Tristachya bequaertii De Willd.**	**Gramineae**	**Grass**	
2175	**Cobretum fragans F. hoffman**	**Combretaceae**	**T**	
2176	**Dichapetalum brownii Engl.&Krause**	**Dichapetalaceae**	**CL**	
2177	**Burkea africana**	**Caesalpiniaceae**	**T**	
2178	**Rytigynia cf.monantha (K.Schum.)Robyns**	**Rubiaceae**	**S**	**Rare**

Chitoa Forest Reserve, Lindi. Legume dominated forets. Canopy species are *Scorodophloeus fischeri ,Tessmannia martiana* and *Teclea nobilis* Date: 4/9/2001				
2179	**Tessmannia martiana Hierns var. martiana**	**Caesalpiniaceae**	**T**	
2180	**Teclea nobilis Del.**	**Rutaceae**	**T**	
2181	**Guibortia schliebenii (Harms) J.Leon.**	**Caesalpiniaceae**	**T**	
2182	**Baphia macrocalyx Harms**	**Papilionaceae**	**T**	
2183	**Diospyros cf. shimbaensis F.White**	**Ebenaceae**	**T**	
2184	**Vepris lanceolata(Lam.)G.Don**	**Rutaceae**	**S**	
2185	**Uvariodendron gorgonis Verdc.**	**Annonaceae**	**S**	
2186	**Entada cf. stuhlmannii (Taub.)Engl.&Harms**	**Mimosaceae**	**L**	
2187	**Dalbergia armata E.May**	**Papilionaceae**	**L**	
2188	**Baphia punctulata Harms ssp. punctulata**	**Papilionaceae**	**S**	
2189	**Fernandoa magnifica Seem**	**Bignoniaceae**	**T**	
2190	**Combretum adenogonium A.Rich.**	**Combretaceae**	**S**	
2191	**Salacia madagascariensis (Lour)DC.**	**Celastraceae**	**S**	

Lindi road between Simara and Kitunda. Mixed shrub with emergent trees of *Hymanaea verrucosa & Albizia adiantifolia* Date:5/9/2001				
2192	**Combretum molle G.Don**	**Combtretaceae**	**T**	
2193	**Acacia senegal (L.)Wild. var. senegal**	**Mimosaceae**	**T**	

Riurungu Forest rserve-Lindi Date:6/9/2001. Mixed dry forest with patches of evergreen trees, grasses and clumps of shrubs				
2194	**Carpodiptera aficana Mast.**	**Tiliaceae**	**T**	
2195	**Xylia schriebenii Harms**	**Mimosaceae**	**T**	**Lindi endemic**
2196	**Thylachium cf. thomsonii Gilg.**	**Capparidaceae**	**T**	

South Ngarama Forest Reserve-Kilwa District. Evergreen coastal dominated by *Dialum holstii, Hymanaea verrucosa Newtonia paucijuga, mimusopsis acutifolia* and *Diospyros shimbaensis*. Date: 10/9/2001				
2197	**Diospyros shimbaensis F.White**	**Ebenaceae**	**T**	**Endemic to Coastal Forests**
2198	**Artabotrys modestus**	**Annonaceae**	**S**	
2199	**Polyalthia tanganyikensis Vollsesn**	**Annonaneae**	**T**	**Endemic to Coastal forests**
2201	**Strychnos henningsii Gilg.**	**Loganiaceae**	**T**	
	Hurmbertochloa greenwayi C.E.Hubbard	**Gramineae**	**G**	**Endemic to Coastal forest(only recordrd from Pugu hills forest**
2202	**Thunbergia cf. stelligera Lindau**	**Acanthaceae**	**CL**	
2203	**Pteleopsis apetala Vollesen**	**Combretaceae**	**T**	**Endemic to Coastal forest**
2204	**Dichapetalum brwonii Engl.& crause**	**Dichapetalaceae**	**S**	
2205	**Combretum collinum Fresen**	**Combtretaceae**	**S**	
2206	**Ochna holstii Engl.**	**Ochnaceae**	**S**	

Nainoko area, Kilwa Ditrsict. Woodland subject into fire. Dominant species are *Brachystegia, Combtrem* and *Terminalia.* Date:11/9/2001				
2207	**Asclepias randii S.Moore**	**Asclepiadaceae**	**H**	
2208	**Cynometra cf. longipedicellata Harms**	**Caesalpiniaceae**	**T**	
2209	**Oldenlandia aegiolodes Bremek**	**Rubiaceae**	**H**	**Endemic to sandy beaches of Tanzania (Only recored from Mafia Kikutani beach)**

Mitundumbeya forest on limestone gorge. Dominant species *Parkia filicoides , Pteryogota sp. Breonardia salicina Khaya anthotheca & Diospyros magogoana Date: 13/9/2001*				
2210	**Uvariodendron gorgonis Verdc.**	**Annonaceae**	**S**	
2211	**Paranecepsia alchrmeifolia A.R.Sm**	**Euphorbiaceae**	**S**	**Rare**
2212	**Rinorea elliptica(Oliv.)Kuntze**	**Violaceae**	**S**	
2213	**Mesogyne insigns Engl.**	**Moraceae**	**S**	
2214	**Cynometra schleshteri Harms**	**Caesalpiniaceae**	**T**	

Nandembo Mbinga F.R. near the Caves.Dry evergeen forest forest dominated *by Scorodophloeus fischeri, Newtonia paucijuga, Cola* and *Drypetes.* Date: 14/9/2001				
2215	**Ruspolia seticalyx (C.B.cl.) Milne.Redh.**	**Acanthaceae**	**H**	**Rare**
2216	**Haplocoelium inopleum Redhl.**	**Sapindaceae**	**T**	
2217	**Ziziphus mucronata Wild. Ssp. mucronata**	**Rhamnaceae**	**T**	

September/October 2001
(Bonifance Mhoro & Flemming)

COLL #BM	SPECIES NAME	FAMILY
13220	Mimusopis fruticosa A.DC.	Sapotaceae
13221	Ficus vallis-choudae Del.	Moraceae
13222	Brachystegia microphylla Harms	Caesalpiniaceae
13223	Securidaca longipedunculata Fres.	Polygalaceae
13224	Xylotheca tettensis(Klotsch,)Gilg	Flacourtiaceae
13225	Pseudolachnostylis maprouneifolia Pax.	Euphorbiaceae
13226	Combretum zeyheri Sond.	Combretaceae
13227	Erythrophleum africanum(Benth.)Harms	Caesalpiniaceae
13228	Garcinia huilensis Well.	Guttiferae
13229	Syzygium cuminii(L.)Skells	Myrtaceae
13230	Ficus lingua De Wild.	Moraceae
13231	Ochna holstii Engl.	Ochnaceae
13232	Diospyros natalensis(Harv.)Brenan	Ebenaceae
13233	Vismia orientalis Engl.	Guttiferae
13234	Hymenocardia ulmoides Oliv.	Hymenocardiaceae
13235	Strychnos panganensis Gilg.	Loganiaceae
13236	Ochna holstii Engl.	Ochnaceae
13237	Erythrophleum africanum(Benth.)Harms	Caesalpiniaceae
13238	Garcinia volkensii Engl	Guttiferae
13239	Julbernardia globiflora(Benth.)Troupin	Caesalpiniaceae
13240	Julbernardia globiflora(Benth.)Troupin	Caesalpiniaceae
13241	Albizia petersiana(Balle)Oliv.	Mimosaceae
13242	Parinari curatellifolia Benth.	Chrysobalanaceae
13243	Vitex schliebenii Meldenke	Verbenaceae
13244	Millettia ysaramensis Taub.	Papilionaceae
13245	Pteleospsis myrtifolia(Lows)Engl.	Combretaceae
13246	Strychnos potatorium L.f.	Loganiaceae
13250	Strychnos potatorium L.f.	Loganiaceae
13251	Strychnos potatorium L.f.	Loganiaceae
13252	Strychnos potatorium L.f.	Loganiaceae
13253	Newtonia paucijuga(harms)Brenan	Mimosaceae
13254	Vismia orientalis Engl.	Guttiferae
13255	Diospyros shimbaensis F.white	Ebenaceae
13256	Pteleospsis myrtifolia(Lows)Engl.	Combretaceae
13258	Albizia gummifera(J.F.Gmel.)C.A.M	Mimosaceae
13259	Tetracera boiviniana Baill.	Dilleniaceae
13260	Swartzia madagascariensis desv.	Caesalpiniaceae
13261	Ochna holstii Engl.	Ochnaceae

13262 Ochna holstii Engl.	Ochnaceae
13263 Terminalia sericea DC.	Combretaceae
13264 Makhamia obtusifolia(baill.)Sprague	Bignoniaceae
13265 Bridelia carthatica Bertol.f.	Euphorbiaceae
13266 Strychnos cocculoides Bak.	Loganiaceae
13267 Ochna holstii Engl.	Ochnaceae
13268 Maprounea africana Muell.Arg.	Euphorbiaceae
13269 Crossopteryx frebifuga Benth.	Rubiaceae
13270 gardenia transvenulosa Verdc.	Rubiaceae
13271 Ochna holstii Engl.	Loganiaceae
13272 Vitex mombassae Vatke	Verbenaceae
13274 Albizia gummifera(J.F.Gmel.)C.A.M	Mimosaceae
13275 Dictyophleba lucida (K.Schum.)Pierre	Apocynaceae
13276 Acacia xanthophloea Benth.	Mimosaceae
13277 Deinbollia borbonica Schelf.	Sapindaceae
13278 Hymenocardia ulmoides Oliv	Hymenocardiaceae
13280 Albizia gummifera(J.F.Gmel.)C.A.M	Mimosaceae
13281 Blighia unijugata Baker	Sapindaceae
13282 Aeschinomene rubrofasinecea(taub.)F.white	Papilionaceae
13283 Polysphaeria multiflora Hiern	Rubiaceae
13284 Lannea stuhlmannii(engl.)Kokwaro	Anacardiaceae
13285 Rinorea angustifolia(Thon)bail.	Violaceae
13286 Cordia sinensis Lam.	Boraginaceae
13287 Cola microcarpa Brenan	Sterculiaceae
13288 Strychnos madagasraciensis Poir.	Loganiaceae
13290 Antidesma venosum E-Mey	Euphorbiaceae
13291 Cassia afrofistula Brenan	Caesalpiniaceae
13293 Maerua angolensis DC.	Capparidaceae
13294 Polysphaeria multiflora Hiern	Rubiaceae
13295 Cola greenwayi Brenan	Sterculiaceae
13296 Rinorea elliptica(Oliv.)Kunzte	Violaceae
13298 Cola microcarpa Brenan	Sterculiaceae
13299 Milicia excelsa(Welw.)C.C.Berg.	Moraceae
13300 Codyala africana Lowr	Caesalpiniaceae
13301 Bombax rhodognaphalon K.Schum.	Bombacaceae
13302 Hymenocardia ulmoides Oliv.	Hymenocardiaceae
13303 Ficus ingens(Miq.)Miq.	Moraceae
13304 Garcinia volkensii Engl.	Guttiferae
13305 Apodytes dimidiata E.Meyer	Icacinaceae
13306 Millettia usaramensis Taub.	Mimosaceae
13307 Cola microcarpa Brenan	Sterculiaceae

13308 Maytenus mossambiscensis(Kcltz.)Bl.	Celastraceae
13309 Caloncoba welwetschii(Oliv.)gilg.	Flacourtiaceae
13310 Cynometra sp.	Caesalpiniaceae
13312 Bysocarpus orientalis(Baill.)Schlieben.	Connaraceae
13313 Combretum schuhlmannii engl.	Combretaceae
13314 Vitex zanzibarensis Vatke	Verbenaceae
13315 Monotes africanus A.DC.	Dipterocapaceae
13316 zanthoxylum chalybeum Engl.	Rutaceae
13317 Salacia elegans Oliv.	Celastraceae
13318 Cassia afrofistula Brenan	Caesalpiniaceae
13319 Vitex mombassae Vatke	Verbenaceae
13320 Rourea coccinea(Schum.)Benth.	Connaraceae
13321 Croton megalocarpoides Friis&Gilbert	Euphorbiaceae
13322 Diospyros shimbaensis F.white	Ebenaceae
13323 Craibia brevicaudata (Vatke)Dunn.	Papilionaceae
13324 Tarchonanthus camphoratus L.	Compositae
13325 Cynometra cf. alexandri C.H.Wight	Caesalpiniaceae
13326 Cynometra sp.	Caesalpiniaceae
13327 Crossopteryx frebifuga Benth.	Rubiaceae
13328 Fernandoa magnifica Seem	Bignoniaceae
13329 Julbernardia globiflora(Benth.)Troupin	Caesalpiniaceae
13330 Maerua angolensis DC.	Capparidaceae
13331 Rinorea angustifolia(Thon)bail.	Violaceae
13332 Millettia semseii Gillette	Papilionaceae
13333 Grewia simils K.schum.	Tiliaceae
13334 Diospyros usambarensis F.White	Ebenaceae
13335 Bysocarpus orientalis(Baill.)Schlieben.	Connaraceae
13336 Dombeya shupangae K.Schum.	Sterculiaceae
13337 Pseudolachnostylis maprouneifolia Pax	Euphorbiaceae
13338 Omocarpum kirkii S.Moore	Papilionaceae
13339 Hollarhena pubescens Klotsch.	Apocynaceae
13343 Ochna holstii Engl.	Ochnaceae
13345 Brachystegia boehmii Taub.	Caesalpiniaceae
13346 Makhamia obtusifolia (Bak.)spreng.	Bignoniaceae
13347 Combretum hereroense Schinz	Combretaceae
13348 Dalbergia nitidula Welw.	Papilionaceae
13349 Millettia stuhlmannii taub.	Papilionaceae
13350 Sorindeia madagascariensis DC.	Anacardiaceae
13351 Millettia stuhlmannii taub.	Papilionaceae
13352 Ochna sp.	Ochnaceae
13353 Diospyros usambarensis F.White	Ebenaceae

13354 Acacia nilotica(L.)Del	Mimosaceae
13355 Lonchocarpus eriocalyx Harms	Papilionaceae
13356 Makhamia acumitana(Klotzsch.)K.Schum.	Bignoniaceae
13357 Combretum paniculatum Vent.	Combretaceae
13358 Ricinodendron heudelotii Muell.Arg.	Euphorbiaceae
13359 Strychnos scheffleri Gilg.%Busse	Loganiaceae
13360 Brachystegia microphylla Harms	Caesalpiniaceae
13361 Hymanaea verrucosa gaertn.	Caesalpiniaceae
13362 Vepris glomelata (F.Hoffm.)Engl.	Rutaceae
13363 Polysphaeria multiflora Hiern	Rubiaceae
13364 Strychnos henningsii Gilg.	Loganiaceae
13365 Keetia zanzibarica(Klotzsch.	Rubiaceae
13366 Coffea pseudozanguebarica Bridson	Rubiaceae
13367 Garcinia huillensis Welw.	Guttiferae
13368 Polyalthia tanganyikensis Vollesen	Annonaceae
13369 Sapium triloculare Pax &K.Hoffman	Euphorbiaceae
13371 Sorindeia madagascariensis DC.	Anacardiaceae
13372 Rauvolfia mombassana stapf.	Apocynaceae
13373 Rinorea alliptica(oliv.)Kuntze	Violaceae
13374 Rhus natalensis Benth.	Anacardiaceae
13375 Vismia orientalis engl.	Guttiferae
13377 Antidesma venosum E-Mey	Euphorbiaceae
13378 Syrostachys africana Sond.	Euphorbiaceae
13379 Vangueria infausta Bulchell	Rubiaceae
13383 Eugenia capensis (Eckl.&Zeyh.)Sond.	Myrtaceae
13384 Casearia engleri Gilg	Flacourtiaceae
13386 Hymanaea verrucosa gaertn.	Caesalpiniaceae
13387 Syncepalum brevipes (Baker)Pennington	Sapotaceae
13389 Leptactina papyrophloea vrdc.	Rubiaceae
13391 Diospyros verrucosa Hiern	Ebenaceae
13392 Makhamia acumitana(Klotzsch.)K.Schum.	Bignoniaceae
13394 Vismianthus punctatus Mildbr.	Connaraceae
13395 Oxyanthus speciosus DC.	Rubiaceae
13396 Coffea pseudezanguebariae Bridson	Rubiaceae
13397 Vepris lanceolata(lam.)G.Don	Rutaceae
13398 Rothmannia manganjae(Hiern)Keay	Rubiaceae
13399 Cordia sinensis Lam.	Boraginaceae
13400 Strychnos madagascariensis Poir.	Loganiaceae
13401 Lannea schimperi(Hoschst.)Engl.	Anacardiaceae
13403 Coffea pseudozanguebarica Bridson	Rubiaceae
13404 Vitex sp.	Verbenaceae

13405 Dobera loranthifolia(Warb.)Harms	Salvadoraceae
13406 Ochna atropurpurea Engl.	Ochnaceae
13407 Psychotria punctata Vatke	Rubiaceae
13408 Albizia gummifera(J.F.Gmel)C.A.Sm	Mimosaceae
13409 Hymanaea verrucosa gaertn.	Caesalpiniaceae
13410 Vitex mombassae Vatke	Verbenaceae

November/December 2001
(F.M.Mbago & Anders)

Namatimbili(Mitundumbeya Forest Reserve. Mixed scrub.Dominant tree species *Brachystegia longifolia.B.spiciformis Pseudolachnostylis maprouneifolia & Pterocarpus angolensis*
.
(Location 37L 0521800 UTM 8992600) Date: 24/11/2001

COLL.# FMM	SPECIES NAME	FAMILY	HABIT	BIOLOGICAL IMPORTANT
2221	Rauvolvia sp.	Annonaceae	S	
2222	Croton sp.	Euphorbiaceae	S	
2223	Millettia stuhlmannii Taub.	Papilionaceae	T	
2224	Cynometra gilmanii J.Leon.	Caesalpiniaceae	T	Lindi endemic
2225	Euphorbiaceae?	Euphorbiaceae	T	
2226	Coffea schliebenii?	Rubiaceae	S	Lindi endemic
2227	Ludia sp.	Flacourtiaceae	T	
2228	Dalbergia sp.	Papilionaceae	T	
2229	Dalbergia arbutofolia Bak. Ssp. Arbutifolia	"	L	
2230	Cynometra webberi Harms	Caesalpiniaceae	T	
2231	Cynometra greenwayi Brenan	"	T	Lindi endemic
2232	Croton sp.	Euphorbiaceae	S	
2233	Phyllanthus schliebenii?	"	S	Possible Lindi end.
2234	Vismia sp.	Guttiferae	T	
2235	Erythrina schliebenii Harms	Papiluonaceae	T	Lindi endemic
2236	Makhamia zanzibarica(DC.)Engl.	Bignoniaceae	T	
2237	Heinsi sp.?	Rubiaceae	S	
2238	Preryogota sp. nov.	Sterculiaceae	T	Possible Lindi end.
2239	Dracaena usambarensis?	Agavaceae	T	
2240	Diospyros kabuyeana F. White	Ebenaceae	T	
2241	Diospyros magogona?	Ebenaceae	T	Possible Lindi end.
2242	Monodora grandidieri?	Annonaceae	S	
2243	Codyala africana Lour	Caesalpiniaceae	T	Timber species
2244	Paranecepsia alchrmeifolia A.R.Sm.	Euphorbiaceae	S	
2245	Hugonia sp.?	Linaceae	L	
2246	Strychnos henningsiiGilg.	Loganiaceae	T	
2247	Garcinia sp.	Guttiferae	S	
2248	Crabea sp.	Acanthaceae	H	
2249	Violaceae	Viloceae	S	
2250	Diospyros shimbaensis F.White	Ebenaceae	T	East Africa coastal forests endemic
2251	Artabotrys modestus?	Annonaceae	S	
2252	Baphia cf. keniensis	Papilionaceae	S	Possible Lindi end.
2253	Sphaerocoryne gracilis (Engl.&Diels)Verdc.	Annonaceae	S	
2254	Leptactina oxyloba?	Rubiaceae	S	Possible EA coastal forests endemic
2255	Vismia pauciflora Milne-Redh.	Guttiferae	S	Lindi endemic

2256	**Coffea sp.**	**Rubiaceae**	**S**	
2257	**Artabotrys modestus?**	**Annonanceae**	**S**	
2258	**Acanthaceae**	**Acanthaceae**	**H**	
2259	**Pavetta sp.**	**Rubiaceae**	**H**	
2260	**Uvaria sp.**	**Annonaceae**	**S**	
2261	**Tessmannia densiflora**	**Caesalpiniaceae**	**T**	**Lindi endemic**
2262	**Cassia sp.**	**"**	**S**	
2263	**Trichilia cf. lovetii**	**Meliaceae**	**T**	**Possible new sp.**
2264	**Craibia brevicaudata?**	**Papilionaceae**	**T**	
2265	**Asteranthe cf. lutea**	**Annonaceae**	**S**	**Possible Lindi end.**
2266	**Memecylon sp.**	**Melastomataceae**	**S**	
2267	**Mimusopsis cf. fruticosa**	**Sapotaceae**	**T**	
2268	**Canthium sp.**	**Rubiaceae**	**T**	
2269	**Xylopia sp.**	**Annoanceae**	**S**	**Possible new sp.**
2270	**Tessmannia densiflora**	**Caesalpiniaceae**	**T**	**Lindi endemic**
2271	**Baphia cf. wollastonii**	**Papilionaceae**	**T**	
2272	**Balbergia bracteolata Bak.**	**"**	**S**	
2273	**Clerodendrum sp.**	**Verbenaceae**	**S**	
2274	**Dioscores cf. hiltiflora**	**Dioscoreaceae**	**CL**	
2275	**Monadenium sp.**	**Euphorbiaceae**	**H**	
2276	**Mimusopsis schliebenii Mildbr. &Schult.**	**Saporaceae**	**T**	**Lindi endemic**
2277	**Euphorbiaceae?**	**Euphorbiaceae**	**T**	
2278	**Lasiodiscus holstii Engl.**	**Rhamnaceae**	**T**	**Endemic to coastal forests of EA**
2279	**Cola clavata Mst.**	**Sapotaceae**	**T**	
2280	**Pavetta sp.**	**Rubiaceae**	**S**	
2281	**Pseudolachnostylis sp?**	**Euphorbiaceae**	**S**	
2282	**Mimusopsis zeyheri Sond.**	**Sapotaceae**	**T**	
2283	**Diopsyros magogoana?**	**Ebenaceae**	**T**	**Possible Lindi end.**
2284	**Fernandoa magnifica Seem**	**Bignoniaceae**	**T**	

Table 2.List of all species collected from the localities

Adhatoda engleriana(L.)C.B.Cl.	Acanthaceae	S
Justicia cf. interrupta(L.)C.B.Cl.	Acanthaceae	H
Leptactina papyrophloea Verdc.	Acanthaceae	S
Ruspolia seticalyx (C.B.cl.) Milne.Redh.	Acanthaceae	H
Ruspolia seticalyx (C.B.cl.)Milne.Redh.	Acanthaceae	H
Thunbergia cf. stelligera Lindau	Acanthaceae	CL
Dracaena usambarensis Engl.	Agavaceae	T
Sansevieria cf. gracilis N.E.Br.	Agavaceae	S
Artabotrys modestus	Annonaceae	S
Asteranthe lutea Villesen	Annonaceae	S
Asteranthe lutea Vollesen	Annonaceae	S
Hexalobus monopetalus (A.Rich.)Engl.	Annonaceae	S
Mkilua fragans Verdc.	Annoanceae	S
Mkilua fragans Verdc.	Annonaceae	S
Monathotaxis trichantha (Diels)Verdc.	Annonaceae	S
Monathotaxis trichantha (diels)Verdc.	Annonaceae	S
Monodora grandidieri Bail.	Annonaceae	T
Polyalthia tanganyikensis Vollsesn	Annonaneae	T
Uvariodendrom gorgonis Verdc.	Annonaceae	S
Uvariodendron gorgonis Verdc.	Annonaceae	S
Uvariodendron gorgonis Verdc.	Annonaceae	S
Pleiocarpa pycnatha (K.Schum.) Stapf.	Apocynaceae	S
Asclepias randii S.Moore	Asclepiadaceae	H
Fernandoa magnifica Seem	Bignoniaceae	T
Commiphora mollis(Oliv.)Engl.	Burseraceae	T
Burkea africana	Caesalpiniaceae	T
Codyla africana Lour	Caesalpiniaceae	T
Cynometra cf. longipedicellata Harms	Caesalpiniaceae	T
Cynometra schleshteri Harms	Caesalpiniaceae	T
Guibortia schliebenii (Harms) J.Leon.	Caesalpiniaceae	T
Tessmannia martiana Hierns var. martiana	Caesalpiniaceae	T
Thylachium africanum Lour.	Capparidaceae	S
Thylachium cf. thomsonii Gilg.	Capparidaceae	T
Salacia madagascariensis (Lam.)DC.	Celastraceae	S
Salacia madagascariensis (Lour)DC.	Celastraceae	S
Cobretum fragans F. hoffman	Combretaceae	T
Combretum adenogonium A.Rich.	Combretaceae	S
Combretum collinum Fresen	Combtretaceae	S
Combretum molle G.Don	Combtretaceae	T
Pteleopsis apetala Villesen	Combretaceae	T
Ipomoea shirambensis Jacq.	Convolvulaceae	CL
Ipomoea shirambensis Jacq.	Convolvulaceae	Cl
Encephalartos hildebrandtii A.Br.Bouche	Cycadaceae	S
Dichapetalum barbosae Torre	Dichapetalaceae	T
Dichapetalum brownii Engl.&Krause	Dichapetalaceae	CL
Dichapetalum brwonii Engl.& crause	Dichapetalaceae	S

Dichapetalum mossambicense (Klotzch)Engl.	Dichapetalaceae	CL
Dichapetalum mossambisense (Klotsch.)	Dichapetalaceae	S
Dichapetalum stulmannii Engl.	Dichapetalaceae	T
Diospyros mafiensis F.White	Ebenaceae	T
Diospyros cf. shimbaensis F.White	Ebenaceae	T
Drypetes reticulata Pax	Euphorbiaceae	T
Drypetes reticulata Pax	Euphorbiaceae	T
Euphorbiaceae???	Euphorbiaceae?	S
Paranecepsia alchrmeifolia A.R.Sm	Euphorbiaceae	S
Boivinia jalbertii Tul.	Flacourtiaceae	T
Hurmbertochloa greenwayi C.E.Hubbard	Gramineae	G
Tristachya bequaertii De Willd.	Gramineae	Grass
Strychnos henningsii Gilg.	Loganiaceae	T
Acacia senegal (L.)Wild. var. senegal	Mimosaceae	T
Entada cf. stuhlmannii (Taub.)Engl.&Harms	Mimosaceae	L
Xylia schriebenii Harms	Mimosaceae	T
Mesogyne insigns Engl.	Moraceae	S
Sloetiopsis usambarensis Engl.	Moraceae	S
Myrsine africana L.	Myrsinaceae	S
Ochna afzelii R.Br.	Ochnaceae	S
Ochna holstii Engl.	Ochnaceae	S
Olax pentandra Sleumer	Olacaceae	S
Baphia cf. wollastonii Bak.f.	Papilionaceae	T
Baphia macrocalyx Harms	Papilionaceae	T
Baphia marocalyx harms	Papilionaceae	T
Baphia punctulata Harms ssp. punctulata	Papilionaceae	S
Craibia brevicaudata (Vatke)Dunn. ssp. brevicaudata	Papilionaceae	T
Craibia cf. brevicaudata (Vatke)Dunn. ssp. brevicaudata	Papilionaceae	T
Dalbergia armata E.May	Papilionaceae	L
Millettia semseii Gillette	Papilionaceae	CL
Millettia stuhlmannii Taub.	Papilionaceae	Cl
Ziziphus mucronata Willd. ssp. muctonata	Rhamnaceae	T
Ziziphus mucronata Wild. Ssp. mucronata	Rhamnaceae	T
Coffea pseudozanguebaricae Bridson	Rubiaceae	S
Gardenia posoquerioides S.More	Rubiaceae	S
Oldenlandia aegiolodes Bremek	Rubiaceae	H
Oxyanthus zanguebaricus (Hiern)Bridson	Rubiaceae	S
Oxyanthus zanguebaricus (Hiern)Bridson	Rubiaceae	T
Pavetta cf. pseudo-albicaulis Bridson	Rubiaceae	S
Rytigynia cf.monantha (K.Schum.)Robyns	Rubiaceae	S
Rytyginia decussata (K.Schum.)Robyns	Rubiaceae	S
Teclea nobilis Del.	Rutaceae	T
Teclea trichocarpa Engl.	Rutaceae	S
Vepris lanceolata(Lam.)G.Don	Rutaceae	S
Haplocoelium inopleum Redhl.	Sapindaceae	T
Lepisanthes senegalensis (Boir)Leenl.	Sapindaceae	T
Pancovia golungensis (Hiern)Ex.&Mendoca	Sapindaceae	T
Mimusopsis schliebenii Mildbr.	Sapotaceae	T

Pteriogota sp. nov.	Sterculiaceae	T
Sterculua cf. schliebenii Mil	Sterculuaceae	T
Carpodiptera aficana Mast.	Tiliaceae	T
Grewia glandulosa Vahl.	Tiliaceae	
Grewia glandulosa Vahl.	Tiliaceae	S
Rinorea ferruginea Engl.	Violaceae	S
Rinorea ilicifolia (Oliv.)O.Kuntze var. ilicifolia	Violaceae	S
Rinorea elliptica(Oliv.)Kuntze	Violaceae	S