



Tanzania Forest  
Conservation Group  
Shirika la Kuhifadhi  
Misitu ya Asili Tanzania



## TFCG Technical Paper 42

### The biodiversity and forest condition of Chome Nature Reserve

By J. Gwegime, J. Latham, M. Mwangoka, E. Mulungu, J. Kitenana,  
R. Mwakisoma, R.E. Gereau and N. Doggart

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## Executive Summary

As part of the Forest Justice in Tanzania project, the Tanzania Forest Conservation Group (TFCG) conducted biodiversity and forest condition surveys in selected forests in the Eastern Arc Mountains and Coastal Forests. The aim of the surveys was to document the biodiversity values and the levels of resource use and disturbance in these nationally important forests.

The overall objective of the survey in Chome NR was to provide an up-to-date assessment of the biodiversity value and condition of this forest.

Chome NR is the largest forest in the South Pare Mountains. The South Pare Mountains are part of the Eastern Arc Mountains. The Eastern Arc Mountains are considered to be a global priority for biodiversity conservation due to the high concentration of endemic and threatened species. There are four vertebrate species that are strictly endemic to the South Pare Mountains and nine vertebrate species that are found in the South Pare Mountains are endemic to the Eastern Arc Mountains (Rovero *et al.* 2014). In terms of threatened species, there are two Critically Endangered, three Endangered and two Vulnerable vertebrate species in the South Pare Mountains.

Chome is a Central Government Protective Forest Reserve and has been proposed for gazettelement as a Nature Reserve.

The reserve extends over 14,283 ha. The altitudinal range of the reserve is from 1250 m asl – 2463 m asl. The highest point is Shengena Peak.

Chome NR is mainly composed of sub-montane, montane and upper montane forest, with some patches of montane grassland and moss-draped elfin forest mainly above 2,300 m.

The reserve is located between 4°10' – 4°25'S and 37° 53' –38° 00'E. Villages adjacent to the reserve include: Mbakweni, Msindo, Duma, Bwambo, Mjema, Mvaa, Gwang'a, Marieni, Mhero, Menamo, Ndolwa, Vudee, Gonjanza, Malindi, Tae, Myombo, Mtii, Mvango, Ntenga, Kirore, Kambeni, Mang'a, Lugulu, Kanza, Ivuga, Sambweni and Mpinji.

## Results

The surveys recorded 238 species of plant and animal including 17 restricted range species and 8 classified as threatened or near-threatened by IUCN.

Taxon	Species richness	Endemism		IUCN status		
		Eastern Arc Endemic species	Eastern Arc near-endemic species	Endangered	Vulnerable	Near-threatened
Birds	95	1	3	1		
Mammals	7		1		1	
Plants	136	3	9		5	1
<b>Total</b>	<b>238</b>	<b>4</b>	<b>13</b>	<b>1</b>	<b>6</b>	<b>1</b>

In addition to the species recorded by the current survey, the reserve is of critical importance as habitat for the two amphibian species known only from Chome NR and classified as Critically Endangered.

## Birds

A total of 95 bird species, including 81 genera and 40 families, were recorded across all survey sites in Chome NR. The highest number of species per site were recorded at Site 1: Kirore despite this site being quite disturbed.

## Mammals

Seven mammal species were recorded using both transect and camera trap methods in Chome NR including the black-and-rufous sengi, classified as Vulnerable by IUCN.

## Plants

A total of 136 plant species were recorded by botanical surveys. Of the total sample, 3 taxa (species, subspecies) were endemic to the Eastern Arc Mountains (EAM), and 9 were endemic to the combined Eastern Arc and Coastal Forest zone (CF) and/or adjacent mountain areas (NV = Neogene Volcanics of northern Tanzania, LN = Lake Nyasa Climatic Region of Tanzania). Results indicate a higher number of

plant species in the Eastern side of the reserve, at Site 4 – Chome, despite ongoing illegal mining in this area. Five vulnerable species and one near-threatened species were recorded.

### **Disturbance**

A total 6,888 trees were sampled along the 14 transects across all sites, with an overall disturbance rate of 111.9 disturbance events/ha. Disturbance intensity was found to vary between the five survey sites, with the highest rate of overall disturbance recorded at Site 1 – Kirore and the least in Site 4 – Chome.

However, it was at Site 4 – Chome that the highest rate of other disturbance events, such as pit sawing, mining and roads/paths, were recorded. The rate of tree cutting was highest at Site 5 – Muvaa and Site 1 – Kirore.

### **Conclusions**

Findings of this survey highlight the biodiversity value of Chome NR, with 136 plant species, 95 bird species and seven mammals recorded in the reserve. Of the species recorded 5% (n=5) of birds, 14% (n=1) of mammals and 3% (n=4) of plants were Red Listed above Least Concern. In addition, 4% (n=4) of birds and 4% (n=6) of plants recorded were endemic or near endemic to the Eastern Arc Mountains.

However, threats in the form of several types of disturbances are apparent in Chome NR, with a high rate of disturbance events/ha observed. Continued monitoring of species richness and threat intensity is required to understand the long-term impacts of the high disturbances recorded in the forest.

### **Recommendations**

Following this survey the following actions are recommended to ensure the biodiversity value of Chome NR is sustained:

- 1) Improved law enforcement at site level and controlled issuing of resource use licenses.
- 2) Increased manpower for effective forest patrol and law enforcement.
- 3) Careful monitoring of biodiversity and resource use in the forest.
- 4) A Participatory Forest Management (PFM) approach, in the form of Joint Forest Management (JFM) is recommended to include nearby communities in the conservation and management of the forest.

### **Tanzania Forest Conservation Group**

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

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

<http://www.tfcg.org>.

### **Forest Justice in Tanzania**

Forest Justice in Tanzania (FJT) is a three-year project (2011-2013) that aims to promote improved governance and increased accountability in Tanzania's forest sector. The initiative is a partnership between the Community Forest Conservation Network of Tanzania, known as MJUMITA and the Tanzania Forest Conservation Group (TFCG). The project is working through four inter-related strategies, which include 1) monitoring forest governance and forest condition; 2) promoting enforcement; 3) conducting research, analysis and communication; and 4) setting standards. The project is financed by DfID through the Accountability in Tanzania programme (AcT). For more information about the project, please visit

<http://www.tfcg.org/publications.html>.



View of CHome NR. Photo by Elinasi Monga



Survey Team Botanist, Moses Mwangoka. Photo by Elinasi Monga



Impatiens. Photo by Michele Mengon



South Pare white-eye. Photo by Marc Baker.



Callulina sp. Photo by Michele Menegon



Chome NR is an important source of water for Same. Photo by Michele Menegon



Illegal logging. Photo by Elinasi Monga.



Mining around a Chome NR stream. Photo by Elinasi Monga.

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### **Permission**

This survey was conducted with permission from Tanzania Forest Sector (TFS) of the Ministry of Natural Resource and Tourism, the Tanzania Wildlife Research Institute (TAWIRI), the Tanzania Commission of Science and Technology, Chome Nature Reserve Office and Same District Natural Resource Office.

### **Survey Team**

Team leader:	Justine Gwegime
Forest disturbances surveyor:	Justine Gwegime
Botanist:	Moses Mwangoka
Ornithologist:	Elia Mulungu
Primate and Ungulate surveyors:	James Kitenana and Reuben Mwakisoma
TFCG volunteer:	Habibu Said
Field assistants:	Nikundiwe Majoya, Innocent Chagenda and Yonaz Kiogwe

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### **Report writing**

This report was written by Justine Gwegime, Julia Latham, Nike Doggart, Moses Mwangoka, Elia Mulungu and James Kitenana.

### **Overall report editing**

The overall report editing was carried out by Julia Latham and Nike Doggart.

### **Maps**

We are grateful to Sylvia Kalemera for the production of the maps in the report.

### **Technical Advice**

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# 1 Introduction

## 1.1 Background to the survey

As part of the Forest Justice in Tanzania project, the Tanzania Forest Conservation Group (TFCG) conducted biodiversity and forest condition surveys in selected forests in the Eastern Arc Mountains and Coastal Forests. The aim of the surveys is to document the biodiversity values and the levels of resource use and disturbance in these nationally important forests.

The overall objective of the survey in Chome NR was to provide an up-to-date assessment of the biodiversity value and condition of this forest. Specific objectives were: i) To assess the status of plants, primates, forest antelopes and birds in Chome NR, and the extent of flagship animal and plants species, including endemic and IUCN redlisted species, still supported by this forest; and ii) To evaluate the current extent of forest disturbance and make site-level recommendations for improving protection and management.

## 1.2 Biodiversity and ecological value of Chome NR

The Eastern Arc Mountains are a chain of ancient forested mountains that extend from central Tanzania east towards the coast and then in an arc into southern Kenya. The South Pare Mountains comprise one of the 13 Eastern Arc Mountain blocks situated between the West Usambara Mountains and the North Pare Mountains. The Eastern Arc Mountains are home to many unique species, including over 500 plant species and 136 vertebrate species that are endemic to the Eastern Arc Mountains, of which 79 are found in only a single mountain block (Rovero *et al.*, 2014).

Chome NR is the largest forest block in the South Pare Mountains. Chome NR is known within the Eastern Arc Mountains as an area of importance for biodiversity. There are four vertebrate species that are strictly endemic to the South Pare Mountains (Rovero *et al.* 2014). Of these three are amphibians: *Callulina shengena*, *Callulina stanleyi* and *Arthroleptis anotis*; and one is a bird: the South Pare white-eye, *Zosterops winifredae*. All four species have been recorded from Chome NR ([www.iucnredlist.org](http://www.iucnredlist.org)). Nine vertebrate species endemic to the Eastern Arc Mountains have been recorded in the South Pare Mountains (Rovero *et al.* 2014):

### Birds

*Bubo vosseleri*

*Nectarinia usambarica*

*Turdus roehli*

### Mammals

*Crocidura usambarae*

### Reptiles

*Kinyongia tavetana*

*Rhampholeon viridis*

### Amphibian

*Arthroleptis fichika*

*Leptopelis parkeri*

*Scolecophorus vittatus*

Three species of primate are known to occur in Chome, the Angolan Pied Colobus (*Colobus angolensis*), the Gentle Monkey or Blue Monkey (*Cercopithecus mitis*) and the Zanzibar lesser galago (*Galagoides zanzibaricus*). Other mammals in the reserve include 12 rodent species, which occur in lower densities at higher elevations (Stanley *et al.*, 1996), and the Vulnerable Black and Rufous Elephant Shrew (*Rhynchocyon petersi*) has been recorded at an estimated density of 16.26 animals/km<sup>2</sup> and is near endemic to the Eastern Arc Mountains (Baker, 2001). In addition, Harvey's Duiker (*Cephalophus harveyi*) has been recorded in the reserve near the Shengena Peak, and Bush pigs (*Potamochoerus larvatus*) are known to occur mainly in the northern quarter of the reserve however they are highly threatened by hunting for food and persecuted for crop damage.

At least 94 bird species have been recorded in Chome NR, including 30 forest specialists (Baker, 2001). Chome NR is recognized as an important Bird Area, with two recorded bird species of high conservation concern: the South Pare White-eye (*Zosterops winifredae*) which is endemic to the South Pare Mountains, and Hunter's cisticola (*Cisticola hunteri*) which is a restricted range species.

Some of the plant species in Chome are of special interest as they were previously recorded in only a few areas outside the reserve, such as *Manilkara butugi*, which was previously only reported in Southern Sudan, Ethiopia, Uganda and North and central Kenya, was tentatively reported from Chome based on a sterile specimen (*Mwangulango & Mwangoka 553*), and is in need of confirmation with fertile material. The reserve is predominantly montane forest, and a well-known habitat for East African camphor trees (*Ocotea usambarensis*).

In terms of species listed as threatened on the IUCN Red List, the following species recorded from the South Pare Mountains (Rovero *et al.* 2014) are considered threatened:

Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)
<i>Callulina shengena</i>	<i>Arthroleptis fichika</i>	<i>Bubo vosseleri</i>
<i>Callulina stanleyi</i>	<i>Crocidura usambarae</i>	<i>Rhynchocyon petersi</i>
	<i>Leptopelis parkeri</i>	

Chome NR is among the least surveyed forests in the Eastern Arc Mountains (MNRT, 2010), and so further biodiversity surveys in the area may yield more plant and animal species of high conservation concern.

### 1.3 Threats to Chome NR

The major threats to Chome NR are large-scale logging and hunting of duikers, black and white colobus monkeys and bush pigs, with these threats also recorded by Baker (2001). In addition, Persha (2003) recorded four plant species under pressure of overexploitation: *Ocotea usambarensis*, *Afrocarpus falcatus*, *Podocarpus latifolius* and *Afrocarpus usambarensis*. The same survey also recorded pit sawing as a threat, particularly in the southern part of the reserve. Illegal gold mining is a threat in the periphery of the western area of the Reserve, near Chome village, and fire is a major challenge across the South Pare Mountains, including Chome NR (MNRT, 2010).

## 2 Nature reserve description

### 2.1 General description

**Name:** Chome Proposed Nature Reserve

**Size:** 14,283 ha

**Location:**

Coordinates: 4°10' - 4°25'S, 37° 53' - 38° 00'E

District: Same District, Kilimanjaro Region

Mountain block: South Pare Mountains

**Elevation:** 1,250 – 2,463 m (Mt Shengena is the highest peak in the South Pare Mountains)

**Management:** Designated as FR in 1951; a central government Forest Reserve. Proposed as a Nature Reserve.

**Status:** Protective Central Government Forest Reserve

**Major Threats:** Illegal tree felling, hunting, illegal gold mining, forest fires.

**Villages:** Villages adjacent to the reserve include: Mbakweni, Msindo, Duma, Bwambo, Mjema, Mvaa, Gwang'a, Marieni, Mhero, Menamo, Ndolwa, Vudee, Gonjanza, Malindi, Tae, Myombo, Mtii, Mvango, Ntenga, Kirore, Kambeni, Mang'a, Lugulu, Kanza, Ivuga, Sambweni and Mpinji.

**Projects that have operated around Chome NR:** East African Cross-Border Biodiversity Project implemented through UNDP / GEF; Filling the Knowledge Gap Project financed by CEPF and led by the Tanzania Forest Conservation Group; Sustainable Management of Chome Nature Reserve in Same District financed by the EU and led by ONGAWA in partnership with TFCG; and the Forest Justice in Tanzania project, led by TFCG in partnership with MJUMITA.

### 2.2 Vegetation

Chome NR is mainly composed of sub-montane, montane and upper montane forest, with some patches of montane grassland and moss-draped elfin forest mainly above 2,300 m. *Erica benguelensis* occurs along rocky ridges in shallow, acidic soils; secondary heath and grassland have colonized large areas between 1,600 m and 2,000 m in the drier montane forest that have been subject to fires. The dominant emergent tree is *Ocotea usambarensis*, with one recorded specimen reaching 42 m high and 2 m in diameter.

### 2.3 Climate

The estimated minimum annual rainfall in Chome is 1,400 mm, and the temperature ranges between 15°C minimum (July) and 20°C maximum (February). The short rains are between November and December, and long rains between March and May (MNRT, 2010).

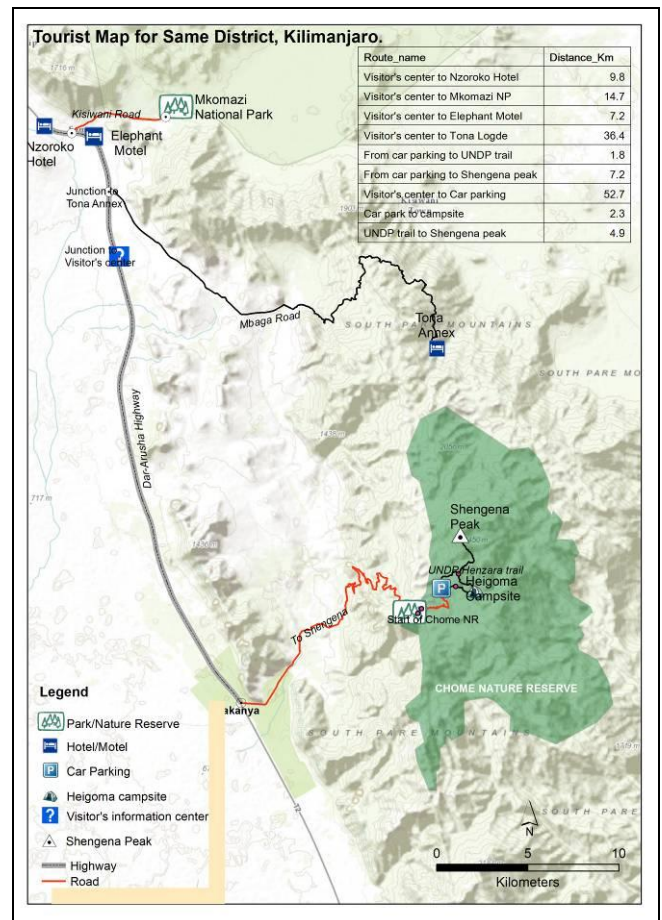
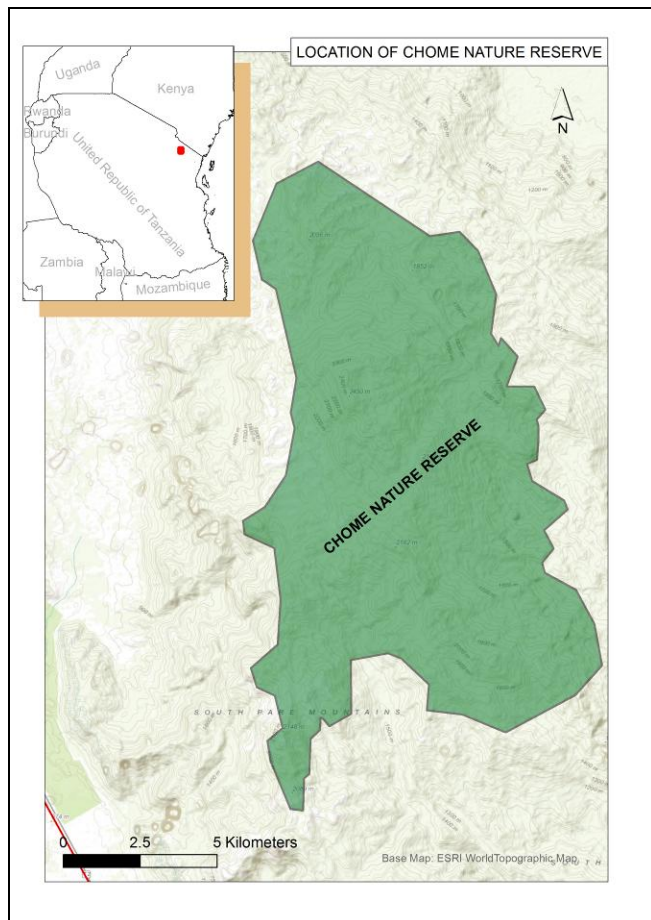
### 2.4 Survey sites

Surveys were conducted at five sites in Chome NR: Site 1 - Kirore (degraded/semi-degraded), Site 2 - Bwambo/Chome (degraded forest), Site 3 - Kanza (degraded/semi-degraded/good forest), Site 4 - Chome (grassland/bracken/*Erica* spp./ good forest), and Site 5 - Muvaa (bracken/ *Erica* spp./good forest) (Table 1). Characteristics of these sites, labeled 1-5 respectively, are described in further detail in the following sections.

**Table 1.** Location of survey sites in Chome NR.

Site	Location (UTM)	Survey type
Site 1: Kirore (degraded / semi-degraded)	386788 / 9519296	Bird, primate, ungulate and disturbance survey
Site 2: Bwambo / Chome (degraded forest)	382850 / 9519490	Bird, primate, ungulate and disturbance survey
Site 3: Kanza (degraded / semi-degraded / good forest)	384792 / 9522996	Bird, primate, ungulate, vegetation and disturbance survey
Site 4: Chome (grassland / bracken / erica spp./ good forest)	382393 / 9523818	Bird, primate, ungulate, vegetation and disturbance survey
Site 5: Muvaa (bracken/erica spp./good forest)	382827 / 9530251	Bird, primate, ungulate and disturbance survey

**Figure 1.** Location of Chome Nature Reserve



### 3 Birds

#### 3.1 Background

At least 94 different bird species have been recorded in Chome NR (Baker, 2001). Chome is one of Tanzania's Important Bird Areas due to the presence of the South Pare White-eye (*Zosterops winifredae*), endemic to the South Pare Mountains, and Hunter's Cisticola (*Cisticola hunteri*), a restricted range species (Baker, 2001).

#### 3.2 Objective

To provide an updated checklist of birds in Chome NR, with a focus on threatened and coastal or Eastern Arc endemic bird species.

#### 3.3 Methods

Two methods were used to assess bird fauna in the five survey sites: observation and mist netting. These methods were adapted from Daggart et al. (2006).

##### 3.3.1 Observations

Opportunistic surveys were carried out in all survey sites. At each site, a birder walked in different directions (West, East, North and South) to compile a list of bird species present in the forest. Every bird species seen or heard was recorded, and bird vocalizations were recorded using an acoustic recording device. For each site, bird observation survey effort was approximately 12 hours per day.

##### 3.3.2 Mist netting

Mist nets were set up in selected areas with good vegetation structure to increase the probability of sampling a high diversity of bird species. Every day during sampling, mist nets were set at first light in the morning and then checked frequently at 10-15 minute intervals throughout the day, until sunset. Captured birds were removed from the net, identified and then immediately released. Based on their physical features, birds were identified to the species level.

##### 3.3.3 Birds survey sites

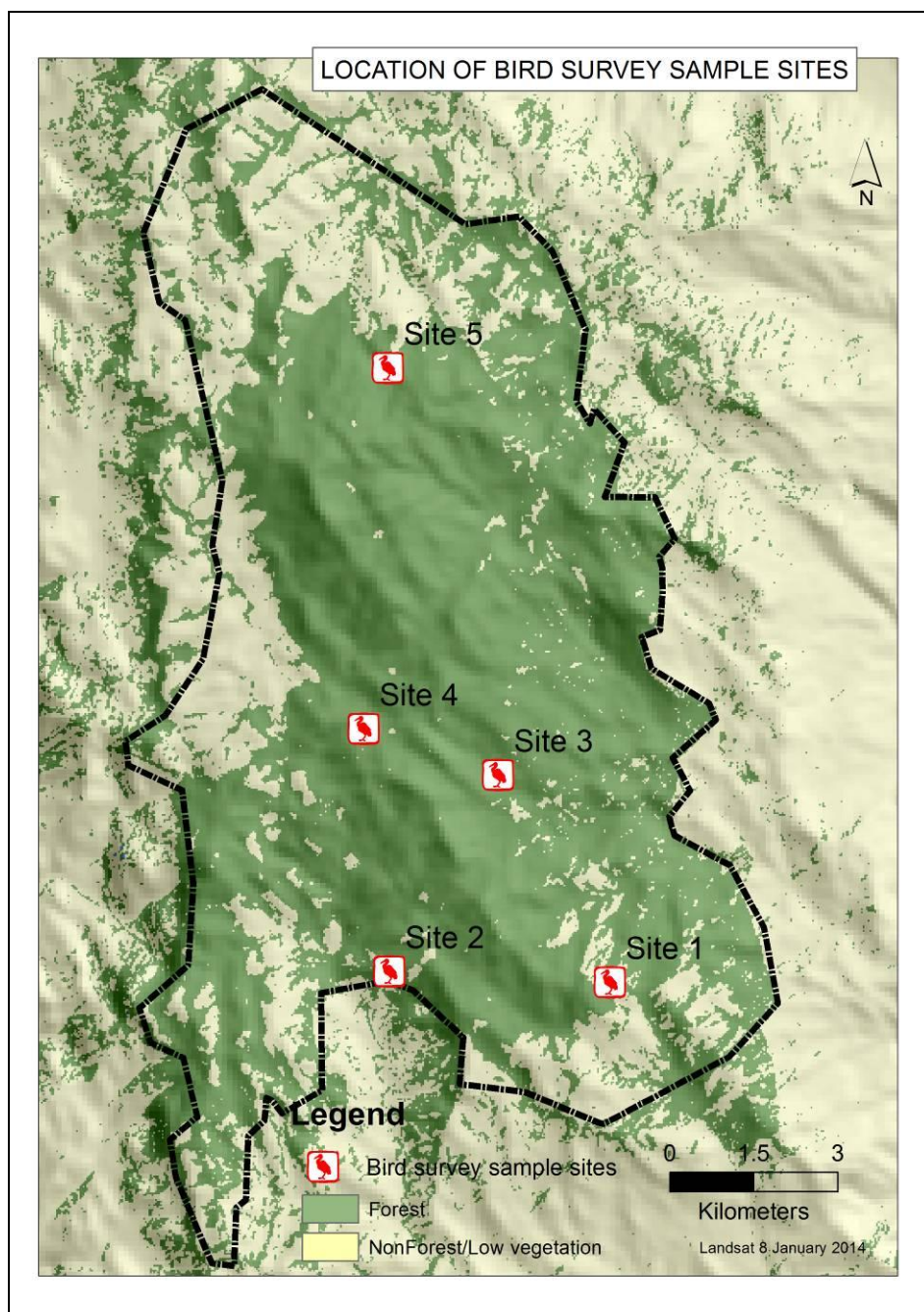
All five sites were surveyed opportunistically and mist-netting was carried out in Site 3: Kanza only (Table 2).

**Table 2.** Bird survey sampling intensity

Survey site	Category	NMH	Survey methods	Number of observation hours/day	Survey coordinates		Survey dates	
					X	Y	Start	End
Site 1	Degraded/ Semi- degraded	NA	Opportunistic	9	386788	9519296	29/07/ 2012	30/07/ 2012
Site 2	Degraded	NA	Opportunistic	8	382850	9519490	31/7/ 2012	2/8/ 2012
Site 3	Degraded/ Semi- degraded/ Good forest	2592	Opportunistic & Mist netting	5	384792	9522996	8/8/ 2012	11/8/ 2012
Site 4	Grassland/ Bracken/ Erica spp./ Good forest	NA	Opportunistic	7	382393	9523818	3/8/ 2012	4/8/ 2012
Site 5	Bracken/ Erica spp./ Good forest	NA	Opportunistic	9	382827	9530251	5/8/ 2012	7/8/ 2012

**NB.**Net-Meter-Hours (NMH) = Total length of the net x numbers of hours the net was up in the field.

**Figure 2.** Location of bird survey sample sites



### 3.4 Results

A total of 95 birds species, including 81 genera and 40 families, were recorded across all survey sites in Chome NR (Table 3). This number includes five species from the IUCN Red-listed above Least Concern: the Bateleur (*Terathopius ecaudatus*) (NT); the Mountain buzzard (*Buteo oreophilus*) (NT); the Crowned Hawk-eagle (*Stephanoaetus coronatus*) (NT); the Southern banded snake-eagle (*Circaetus fasciolatus*) (NT); and the Usambara Hylia (*Hylia usambara*) (EN), which is also endemic to the Eastern Arc Mountains. In addition, three species that are near endemic to the Eastern Arc Mountains (i.e they are found in at least one other African ecoregion) species were recorded: Shelley's greenbul (*Andropadus masukuensis*), Forest Batis (*Batis mixta*) and Kenrick's starling (*Poeoptera kenrickii*). The highest number of species (52 species) was recorded in Site 1: Kirore (Figure 2), also the site where the majority of threatened and endemic/near-endemic species were recorded. The lowest number of species (32 species) were recorded in Site 2: Bwambo/Chome.

**Table 3.** Checklist of 95 bird species recorded in five different survey sites of Chome NR.

Scientific name	Common name	Author	H	R	RL	Survey sites				
						1	2	3	4	5
<b>SCOPIDAE</b>										
<i>Scopus umbretta</i>	Hamerkop	Gmelin 1789	O	W	LC	0	0	0	1	1
<b>ACCIPITRIDAE</b>										
<i>Terathopius ecaudatus</i>	Bateleur	Daudin 1800	O	W	NT	1	0	1	0	1
<i>Polyboroides typus</i>	African harrier hawk	Smith 1829	F	W	LC	1	0	0	1	0
<i>Accipiter tachiro</i>	African goshawk	Daudin 1800	F	W	LC	1	1	1	0	0
<i>Buteo oreophilus</i>	Mountain buzzard	Hartert and Neumann 1914	F	W	NT	1	1	0	1	0
<i>Buteo augur</i>	Augur buzzard	Ruppell 1836	F	W	LC	0	1	0	1	0
<i>Stephanoaetus coronatus</i>	Crowned Hawk-eagle	Linnaeus 1766	F	W	NT	1	0	1	0	1
<i>Lophaetus occipitalis</i>	Long-crested eagle	Daudin 1800	O	W	LC	1	1	0	0	1
<i>Circaetus fasciolatus</i>	Southern banded snake-eagle	Kaup 1850	F	W	NT	0	1	0	0	0
<b>NUMIDIDAE</b>										
<i>Guttera pucherani</i>	Crested guinea fowl	Hartlaub 1861	FF	W	LC	0	0	1	0	0
<b>PHASIANIDAE</b>										
<i>Coturnix delegorguei</i>	Harlequin quail	Delegorgue 1847	O	W	LC	1	0	1	0	1
<b>COLUMBIDAE</b>										
<i>Columba arquatrix</i>	Olive pigeon	Temminck 1809	F	W	LC	0	0	1		0
<i>Streptopelia semitorquata</i>	Red-eyed dove	Ruppell 1837	F	W	LC	0	1	0	1	1
<i>Turtur chalcospilos</i>	Emerald-spotted wood dove	Walglie 1827	O	W	LC	0	0	0	1	1
<i>Turtur afer</i>	Blue-spotted wood dove	Linnaeus 1766	O	W	LC	1	0	1	1	1
<i>Treron calvus</i>	African green pigeon	Temminck 1808	F	W	LC	1	0	0	1	1
<b>MUSOPHAGIDAE</b>										
<i>Tauraco porphyreolophus</i>	Purple-crested Turaco	Vigors 1831	F	W	LC	1	0	0	0	0
<b>CUCULIDAE</b>										
<i>Cuculus solitarius</i>	Red-chested cuckoo	Stephens 1815	F	W	LC	1	0	1		0
<i>Tauraco hartlaubi</i>	Hartlaub's Turaco	Fischer & Reichenow 1884	F	W	LC	1	1	1	1	1
<i>Cuculus clamosus</i>	Black cuckoo	Latham 1801	F	W	LC	0	0	0	1	0
<i>Chrysococcyx klaas</i>	Klaas's cuckoo	Stephens 1815	O	W	LC	1	0	0	0	0
<i>Centropus superciliosus</i>	Burchell's coucal	Vieillot 1817	F	W	LC	0	0	0	0	1
<b>STRIGIDAE</b>										
<i>Strix woodfordii</i>	African wood owl	Smith A 1834	F	W	LC	1	1	0	0	1
<b>CAPRIMULGIDAE</b>										
<i>Caprimulgus poliocephalus</i>	Montane nightjar	Ruppell 1840	O	W	LC	0	0	1	0	1
<b>APODIDAE</b>										
<i>Cypsiurus parvus</i>	African palm swift	Lichtenstein 1823	O	W	LC	0	0	0	0	1

Scientific name	Common name	Author	H	R	RL	Survey sites				
						1	2	3	4	5
<i>Apus affinis</i>	Little swift	Gray 1830	O	W	LC	0	0	0	1	0
<b>COLIIDAE</b>										
<i>Colius striatus</i>	Speckled Mousebird	Gmelin 1789	O	W	LC	0	1	0	1	1
<b>TROGONIDAE</b>										
<i>Apaloderma vittatum</i>	Bar-tailed trogon	shelley 1882	FF	W	LC	1	0	1	0	1
<b>MEROPIIDAE</b>										
<i>Merops pusillus</i>	Little bee-eater	Muller 1776	O	W	LC	0	0	0	0	1
<i>Merops oreobates</i>	Cinnamon chested bee-eater	Sharpe 1892	O	W	LC	1	0	1	1	1
<b>PHOENICULIDAE</b>										
<i>Phoeniculus purpureus</i>	Green wood-hoopoe	Miller 1784	O	W	LC	1	1	0	0	0
<b>UPUPIDAE</b>										
<i>Upupa epops</i>	Common hoopoe	Bachstein 1811	O	W	LC	0	0	0	0	1
<b>BUCEROTIDAE</b>										
<i>Tockus alboterminatus</i>	Crowned hornbill	Buttkofer 1889	F	W	LC	0	1	0	1	1
<i>Bycanistes bucinator</i>	Trumpeter hornbill	Temminck 1824	F	W	LC	1	1	0	1	0
<b>RAMPHASTIDAE</b>										
<i>Pogoniulus bilineatus</i>	Yellow-rumped tinkerbird	Sundevall 1850	F	W	LC	0	0	1	0	1
<i>Stactolaema leucotis</i>	White-eared barbet	Sundevall 1850	F	W	LC	0	0	1	0	0
<b>INDICATORIDAE</b>										
<i>Indicator variegatus</i>	Scaly-throated honey guide	Lesson 1830	O	W	LC	1	1	0	0	0
<i>Prodotiscus regulus</i>	Wahlberg's Honeyguide	Sundevall 1850	O	W	LC	0	0	0	0	1
<b>HIRUNDINIDAE</b>										
<i>Hirundo fuligula</i>	Rock martin	Lichtenstein 1842	O	W	LC	0	1	1	0	1
<i>Psalidoprocne pristoptera</i>	Black saw-wing	Ruppell 1840	F	W	LC	1	0	1	0	0
<b>MOTACILLIDAE</b>										
<i>Motacilla aguimp</i>	African pied wagtail	Dumont 1821	O	W	LC	0	0	0	1	0
<i>Motacilla clara</i>	Mountain wagtail	Sharpe 1908	O	W	LC	0	0	1	1	1
<b>PYCNONOTIDAE</b>										
<i>Andropadus masukuensis</i>	Shelley's greenbul	Shelley 1897	FF	EAN	LC	1	0	1	0	0
<i>Andropadus nigriceps</i>	Mountain greenbul	shelley 1889	FF	W	LC	1	1	1	1	1
<i>Phyllastrephus flavostriatus</i>	Yellow – streaked greenbul	Sharpe 1876	FF	W	LC	1	1	0	0	0
<i>Chlorocichla flaviventris</i>	Yellow-bellied greenbul	Smith 1834	FF	W	LC	0	0	0	1	1
<i>Phyllastrephus cerviniventris</i>	Grey-olive greenbul	Shelley 1894		W	LC	1	0	1	0	0
<i>Pycnonotus barbatus</i>	Common bulbul	Desfontaines 1789	O	W	LC	1	0	1	1	1
<b>TURDIDAE</b>										
<i>Turdus olivaceus</i>	Olive thrush	Linnaeus 1766	F	W	LC	1	1	1	1	0



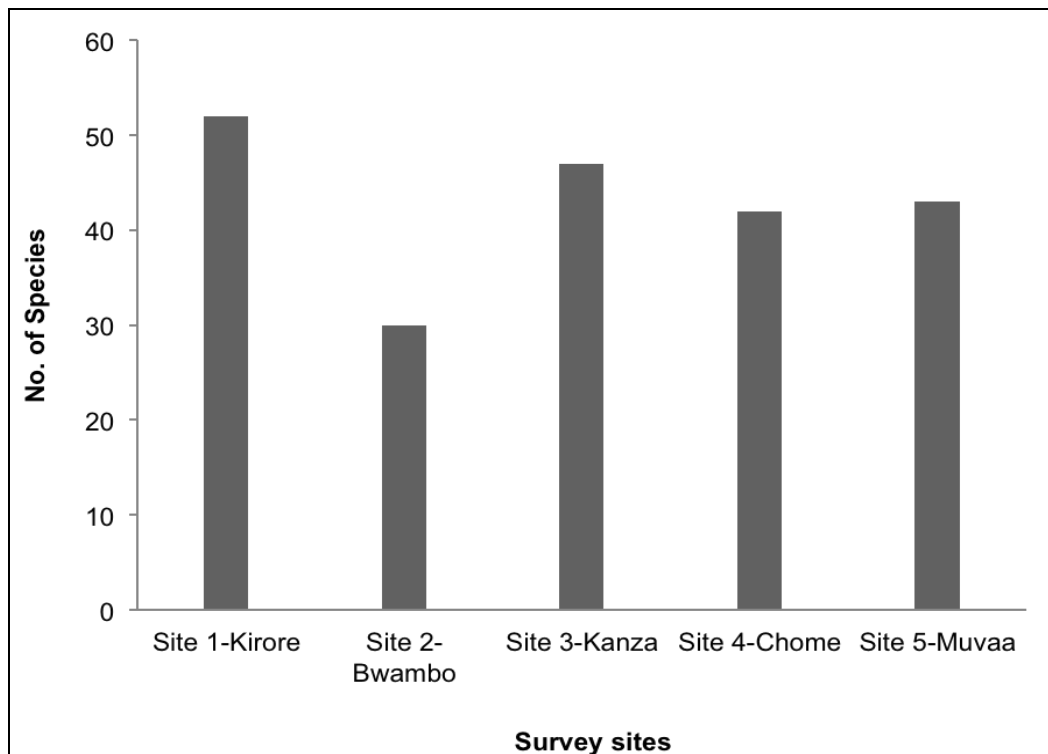
Scientific name	Common name	Author	H	R	RL	Survey sites				
						1	2	3	4	5
<i>Turdus libonyanus</i>	Kurrichane thrush	Smith 1836	O	W	LC	0	0	1	0	1
<i>Alethe fuelleborni</i>	White-chested alethe	Reichenow 1900	FF	W	LC	0	1	0	1	1
<b>SYLVIIDAE</b>										
<i>Phylloscopus ruficapilla</i>	Yellow-throated woodland Warbler	Sundevall 1850	FF	W	LC	1	1	1	1	1
<i>Bradypterus lopezi</i>	Evergreen forest warbler	Alexander 1903	FF	W	LC	1	0	1	1	0
<i>Hyltiota usambara</i>	Usambara Hyltiota	Sclater 1932	O	EA	EN	0	0	0	1	0
<b>CISTICOLIDAE</b>										
<i>Apalis flavida</i>	Yellow-breasted apalis	Strickland 1852	F	W	LC					1
<i>Apalis melanocephala</i>	Black-headed apalis	Fischer and Reichenow 1884	FF	W	LC	1	1	0	0	1
<i>Apalis thoracica</i>	Bar-throated apalis	Shaw 1811	F	W	LC	1	1	0	0	1
<i>Prinia subflava</i>	Tawny-flanked prinia	Gmelin 1789	O	W	LC	0	1	0	1	1
<b>MUSCICAPIDAE</b>										
<i>Cossypha anomala</i>	Olive-flanked robin-chat	Shelley 1893	F	W	LC	1	0	1	1	0
<i>Saxicola torquatus</i>	Common stonechat	Linnaeus 1766	O	W	LC	1	0	0	0	1
<i>Muscicapa striata</i>	Spotted flycatcher	Pallas 1764	O	W	LC	0	1	0	0	1
<i>Muscicapa adusta</i>	African dusky flycatcher	Boie 1828	O	W	LC	1	0	1	0	1
<b>MONARCHIDAE</b>										
<i>Trochocercus albonotatus</i>	White-tailed crested flycatcher	Sharpe 1819	FF	W	LC	1	0	1	0	1
<i>Trochocercus cyanomelas</i>	Blue-mantled flycatcher	Vieillot 1818	F	W	LC	1	0	1	0	0
<i>Terpsiphone viridis</i>	Paradise flycatcher	Statius muller 1776	F	W	LC	1	0	0	0	0
<b>PLATYSTEIRIDAE</b>										
<i>Batis mixta</i>	Forest Batis	Shelley 1889	FF	EAN	LC	1	1	0	1	0
<b>TIMALIIDAE</b>										
<i>Pseudoalcippe abyssinica</i>	African hill babbler	Rüppell 1840	F	W	LC	1	1	1	1	1
<i>Illadopsis rufipennis</i>	Pale-breasted illadopsis	Sharpe 1872	FF	W	LC	0	0	1	0	0
<b>ZOSTEROPIDAE</b>										
<i>Zosterops senegalensis</i>	Yellow white-eye	Bonaparte 1850	FF	W	LC	1	0	1	1	0
<b>NECTARINIIDAE</b>										
<i>Anthreptes neglectus</i>	Uluguru violet-backed sunbird	Neumann 1922	FF	W	LC	0	1	1	0	0
<i>Anthreptes collaris</i>	Collared sunbird	Viellot 1819	F	W	LC	1	1	0	0	0
<i>Nectarinia amethystina</i>	Amethyst sunbird	Shaw 1812	O	W	LC	0	0	0	1	0
<i>Nectarinia olivacea</i>	Olive sunbird	Smith A 1840	F	W	LC	1	1	1	1	1
<i>Nectarinia reichenowi</i>	Golden-winged sunbird	Fischer 1884	F	W	LC	0	0	0	1	0
<b>MALACONOTIDAE</b>										
<i>Prionops retzii</i>	Retz's helmet-shrike	Wahlberg 1856	O	W	LC	0	0	0	1	0

Scientific name	Common name	Author	H	R	RL	Survey sites				
						1	2	3	4	5
<i>Laniarius aethiopicus</i>	Tropical boubou	Gmelin 1788	O	W	LC	1	0	1	1	0
<i>Dryoscopus cubla</i>	Black-backed puffback	Shaw 1809	F	W	LC	0	0	1	1	0
<b>LANIIDAE</b>										
<i>Lanius collaris</i>	Common Fiscal	Linnaeus 1766		W	LC	0	0	0	1	0
<b>CORVIDAE</b>										
<i>Corvus albicollis</i>	White-necked Raven	Latham 1790	O	W	LC	1	0	0	1	0
<b>ORIOLOIDAE</b>										
<i>Oriolus larvatus</i>	African black-headed oriole	Lichtenstein 1823	F	W	LC	1	0	1	0	0
<b>PASSERIDAE</b>										
<i>Passer griseus</i>	Grey-headed sparrow	Vieillot 1817	O	W	LC	0	0	1	0	0
<b>ESTRILDIDAE</b>										
<i>Hypargos niveoguttatus</i>	Peters` s twinspace	Peters 1868	F	W	LC	1	0	1	0	0
<i>Lonchura bicolor</i>	Black-and-white Munia	fraser 1843	F	W	LC	1	0	1	1	0
<i>Cryospiza reichenovii</i>	Red-faced crimson-wing	Hartlaub 1874	FF	W	LC	1	0	1	0	0
<i>Uraeginthus bengalus</i>	Red- cheeked cordonbleu	Linnaeus 1766	O	W	LC	0	1	0	1	0
<i>Estrilda astrild</i>	Common wax bill	Linnaeus 1758	O	W	LC	1	1	0	0	0
<i>Lonchura cucullata</i>	Bronze munia	Swainson 1837	O	W	LC	1	0	1	0	0
<b>STURNIDAE</b>										
<i>Poeoptera kenricki</i>	Kenrick`s starling	Shelley 1894	FF	EAN	LC	0	0	1	0	0
<i>Onychognathus morio</i>	Red-winged starling	Linnaeus 1766	O	W	LC	1	0	0	0	0
<i>Cinnyricinclus leucogaster</i>	Violet-backed starling	Boddaert 1783	O	W	LC	1	0	1	1	0
<b>PLOCEIDAE</b>										
<i>Ploceus ocularis</i>	Spectacled weaver	Smith 1839	O	W	LC	0	0	1	0	1
<i>Ploceus melanocephalus</i>	Black-headed Weaver	Muller 1776	O	W	LC	1	0	0	1	0
<i>Euplectes capensis</i>	Yellow bishop	Linnaeus 1766	O	W	LC	0	0	0	0	1
<b>VUDUIDAE</b>										
<i>Vidua macroura</i>	PinTailed whydah	Pallas 1764	O	W	LC	0	0	1	0	0
<b>EMBERIZIDAE</b>										
<i>Emberiza cabanisi</i>	Cabanis`s bunting	Reichenow 1875	O	W	LC	0	0	1	0	1
<b>SPECIES RICHNESS PER SITE</b>						<b>52</b>	<b>30</b>	<b>47</b>	<b>42</b>	<b>43</b>

### Key to Table 3

H = Habitat with: F = Forest, FF = Strictly Forest Dependent, O = Open;  
R = Range with: W = Widespread, EAN = Near Endemic to Eastern Arc Mountains; EA = Endemic to Eastern Arc Mountains;  
RL = Red List status: LC = Least Concern, NT = Near Threatened; EN = Endangered;

1 indicates presence of a certain birds species in a given survey site and 0 indicates that it was not recorded.



**Figure 3.** Bird species richness at the difference survey sites in Chome NR.

### 3.5 Discussion

This survey recorded a similar number of bird species in Chome NR to that of Baker (2001). Both endemic and IUCN Red Listed bird species were recorded in Chome NR during this survey, including the endemic and endangered Usambara Hyliota (*Hyliota usambara*). The hyliota was observed by Elia Mulungu for over one hour. The South Pares are not listed as being part of the Usambara hyliota range on the IUCN red list and further surveys are needed in order to assess local distribution and size of this population. Chome Reserve's flagship species, Hunter's Cisticola and South Pare White-eye, were not recorded during this survey. The highest number of species was recorded in Site 1 – Kirore, despite this being one of the degraded/semi-degraded sites and the site with the highest rate of recorded disturbance events.

## 4 Mammals

### 4.1 Background

Six near endemic to the Eastern Arc species are known to occur in the South Pare Mountains: the long-tailed pouched rat (*Beamys hindei*); the Eastern tree hyrax (*Dendrohyrax validus*); the Zanzibar/Udzungwa galago (*Galagoides zanzibaricus*); the Arc Mountain wood mouse (*Hylomyscus arcimontensis*); Decken's Horseshoe Bat (*Rhinolophus deckenii*); and the Vulnerable Black and Rufous Elephant Shrew (*Rhynchocyon petersi*) which has been recorded in Chome NR. In addition the Eastern Arc endemic and endangered Usambara shrew (*Crocidura usambarae*) is also known to occur in the South Pare Mountains (Rovero *et al.* 2014). Previous surveys have recorded a number of mammal species in Chome NR, including two primates (the Angolan Pied Colobus, *Colobus angolensis* and Blue Monkey, *Cercopithecus mitis*), two ungulates (Harvey's duiker, *Cephalophus harveyi* and Bush pigs, *Potamochoerus larvatus*), 12 rodents and the Vulnerable and Eastern Arc near endemic Black and Rufous Elephant Shrew (*Rhynchocyon petersi*) (Baker 2001). The Zanzibar dwarf galago (*Galagoides zanzibaricus*) has been recorded from Chome NR (Perkin pers. comm.).

### 4.2 Objective

The main objective was to provide an updated checklist of mammals in Chome NR. Transect methods were used to survey mammals, with a focus on primates and forest antelopes. Camera trapping was also used to determine the presence of other, more cryptic mammals such as civets and genets

### 4.3 Methods

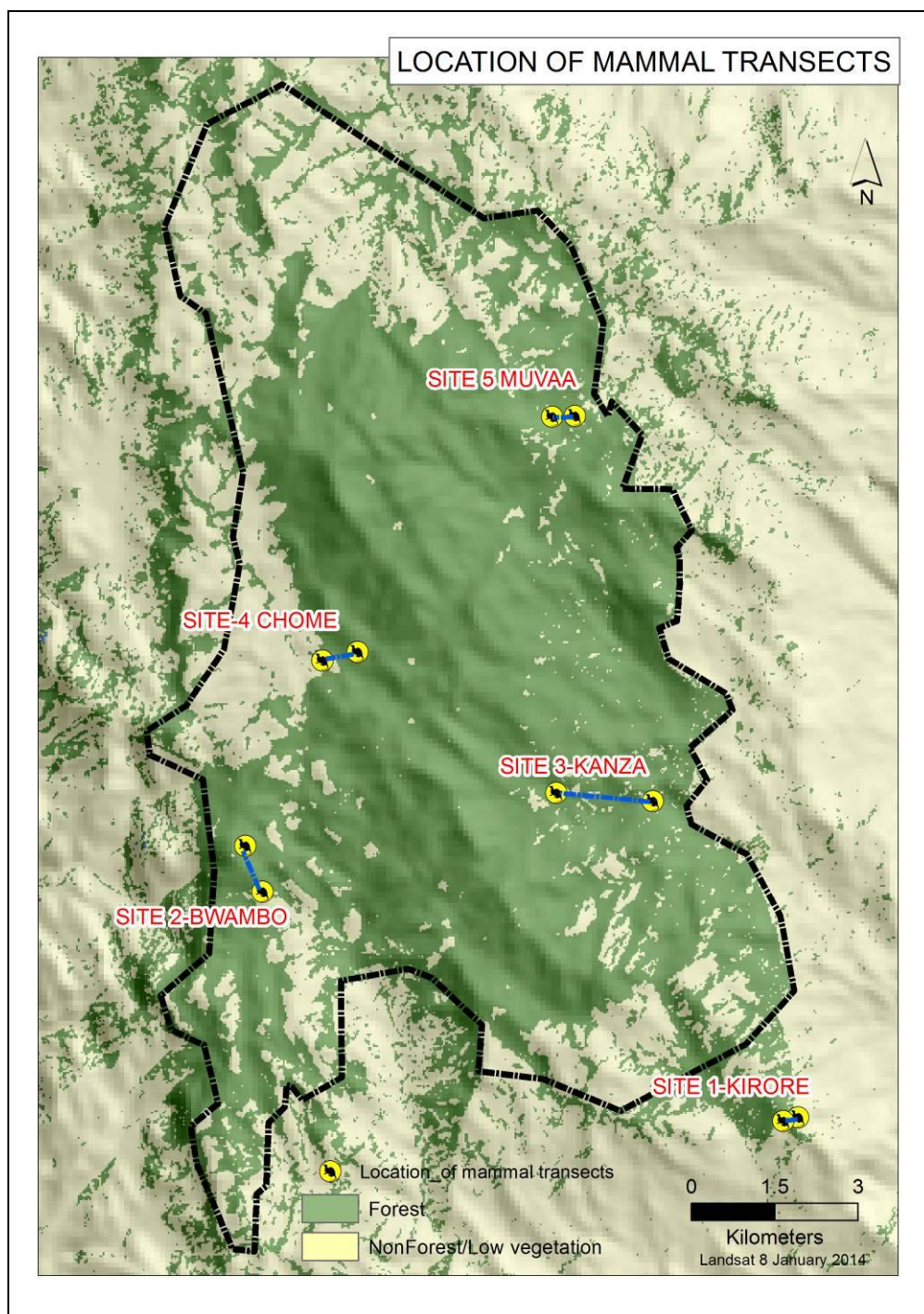
#### 4.3.1 Transects

Line transects between 2 km and 3 km in length were used to survey primates and ungulates (Table 4). Transects were walked during the day and animal sightings, sounds, tracks and other signs of diurnal species were recorded.

**Table 4.** Transect survey intensity for Primates and Ungulates.

Survey sites	Categories	Survey coordinates		Survey dates		Elevation (m)	Transect length (m)	Total number of transects covered
		X	Y	Start	End			
Site 1 - Kirore	Degraded/ Semi-degraded	389862	9516649	29 <sup>th</sup> July 2012	30 <sup>th</sup> July 2012	1500- 1700	2.5	2
		389594	9516583					
Site 2 - Bwambo	Degraded	379918	9521535	1 <sup>st</sup> August 2012 1/8/2012	2 <sup>nd</sup> August 2012	1800- 2050	2.5	3
		380231	9520709					
Site 3 - Kanza	Degraded/ Semi-degraded/ Good forest	387249	9522339	8 <sup>th</sup> August 2012	11 <sup>th</sup> August 2012	1300- 1700	2.5	4
		385514	9522488					
Site 4 - Chome	Grassland/ Bracken/ <i>Erica</i> spp./ Good forest	381309	9524869	3 <sup>rd</sup> August 2012	4 <sup>th</sup> August 2012	1800- 1995	2.4	2
		381940	9525022					
Site 5 - Muvaa	Bracken/ <i>Erica</i> spp./ Good forest	385850	9529264	5 <sup>th</sup> August 2012	7 <sup>th</sup> August 2012	1500- 1800	2.5	3
		385441	9529249					
<b>Total length/Number of transects covered</b>							<b>12.4</b>	<b>14</b>

**Figure 4.** Location of mammal transects



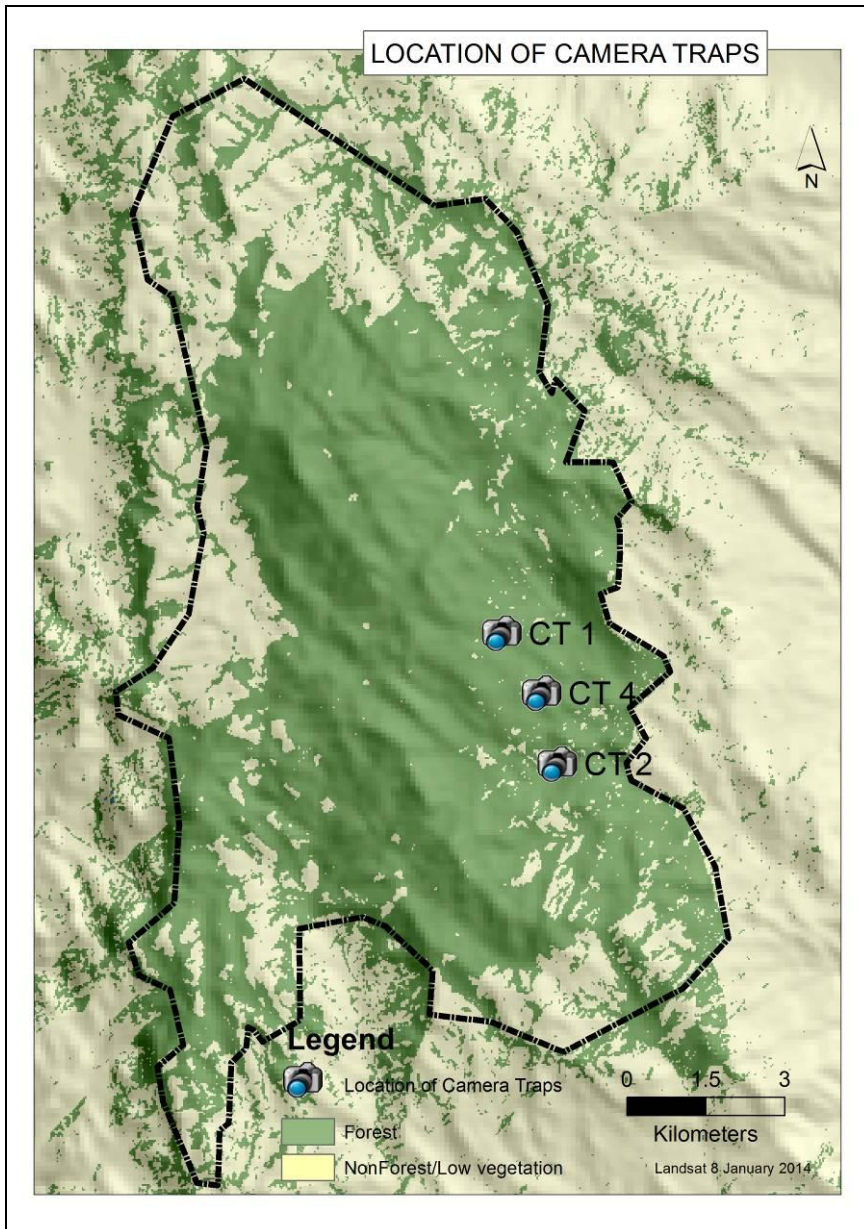
### 4.3.2 Camera trapping

Three camera traps were set at Site 3 – Kanza near Miombo village, in the area categorized as good forest. Cameras were set in western, eastern and northern areas of the site and left for 41-42 days (Table 5).

**Table 5.** Camera trapping sampling intensity at Site 3: Kanza for the survey to Chome NR in 2012

Camera trap No.	Camera trap location	Altitude (m)	Habitat	Canopy cover	Cover density	Floor cover	Period (Duration)	Total trap effort (days)
1	0385482/ 9524700	1738	Sub-montane	Closed	Moderately dense	Leaf litter	09/08- 20/09/ 2012	41
2	0386540/ 9522221	1506	Sub-montane	Closed	Dense	Leaf litter	08/08- 20/09/ 2012	42
4	0386245/ 9523565	1582	Sub-montane	Closed	Dense	Leaf litter/ seedling	09/08- 20/09/ 2012	41

**Figure 5.** Location of camera traps.



## 4.4 Results

### 4.4.1 Transects

Five mammal species, two primates and three ungulates, were recorded by the transect surveys (Table 6). No Red Listed species above Least Concern were recorded during the surveys, and none of the species were endemic or near endemic to the Eastern Arc Mountains. The number of each species encountered varied for both ungulates (Table 7) and primates (Table 8), with the most mammal species recorded in Site 2 – Bwambo (Figure 2).

**Table 6.** Checklist of mammal's species recorded on survey to Chome NR in 2012.

Order	Family	Species	Common name	RL	Site no.				
					1	2	3	4	5
<b>Primates</b>									
Primate	Cercopithecidae	<i>Cercopithecus mitis</i>	Blue Monkey	LC	X	X	X		X
	Cercopithecidae	<i>Colobus angolensis</i>	Black and White Colobus monkey	LC	X	X		X	X
<b>Ungulates</b>									
Artiodactyla	Bovidae	<i>Cephalophus harveyi</i>	Red duiker	LC	X	X	X	X	X
	Bovidae	<i>Nesotragus moschatus</i>	Suni	LC	X	X	X	X	X
	Suidae	<i>Potamochoerus larvatus</i>	Bushpig	LC	X	X	X	X	X

**Key to table 6**

RL=Red List, LC=Least Concern

**Table 7.** Ungulate encounters per survey site.

Family	Scientific name	Common name	SURVEY SITES																				Total number of encounters
			1				2				3				4				5				
			S	T	TR	D	S	T	TR	D	S	T	TR	D	S	T	TR	D	S	T	TR	D	
Bovidae	<i>Cephalophus harveyi</i>	Harvey's duiker	0	0	3	3	0	0	8	0	0	0	4	0	0	2	2	0	1	0	6	1	<b>30</b>
Bovidae	<i>Neotragus moschatus</i>	Suni	0	1	0	0	0	0	2	1	0	1	2	1	0	1	0	0	0	1	3	1	<b>14</b>
Suidae	<i>Potamochoerus larvatus</i>	Bushpig	1	0	2	0	0	1	2	0	0	2	4	0	0	0	2	0	0	1	1	1	<b>15</b>
<b>Total encounter per survey site</b>			<b>1</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>10</b>	<b>3</b>	<b>59</b>

**Key to table 7**

S=Seen, T=Trail, TR=Track, D=Dung

**Table 8.** Primate encounters per survey site.

Family	Scientific name	Common name	SURVEY SITES										Total number of encounters
			1		2		3		4		5		
			S	H	S	H	S	H	S	H	S	H	
Cercopithecidae	<i>Cercopithecus mitis</i>	Blue monkey	9	2	8	0	2	0	0	0	1	0	<b>22</b>
Cercopithecidae	<i>Colobus angolensis</i>	Black and White Colobus monkey	0	2	6	0	0	0	3	0	2	0	<b>13</b>
<b>Total encounter per site</b>			<b>9</b>	<b>4</b>	<b>14</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>35</b>

**Key to table 8**

S=Seen, H=Hear

#### 4.4.2 Camera traps

In total, 39 images of two species were captured by the three camera traps at Site 3 (Table 9). One of these, the near endemic to the Eastern Arc Black and rufous elephant shrew (*Rhynchocyon petersi*), is listed as Vulnerable by the IUCN Red List. The Giant pouched rat (*Cricetomys sp*) was captured the most by the camera traps (n = 24). It was not possible to identify nine of the images captured by one camera trap, with further identification needed.

**Table 9.** Camera traps results for the survey to Chome NR.

Family	Scientific name	Taxon	RL	Camera trap-Photo numbers (CT)	CT1	CT2	CT4	Total images
NESOMYIDAE	<i>Cricetomys</i>	Giant pouched rat	LC	CT2-N <sub>26&amp;56</sub>	0	24	0	24
MACROSCOLID-IDAE	<i>Rhynchocyon petersi</i>	Black and rufous sengi	VU	CT1-N <sub>3&amp;4</sub> , CT2-N <sub>23&amp;24</sub>	2	4	0	6
NA	NA	Unidentified	NA	CT2-N <sub>29&amp;37</sub>	0	9	0	9
Total images of different animal species/device (Camera trap)					2	37	0	39

#### Key to table 9

RL = Red list, CT=Camera Trap, CT-N=Camera trap photo no.



*Cricetomys* caught on CT 2



*Rhynchocyon petersi* caught on CT 1

**Figure 6.** Camera trap images of the pouched rat and black-and-rufous sengi.

#### 4.5 Discussion

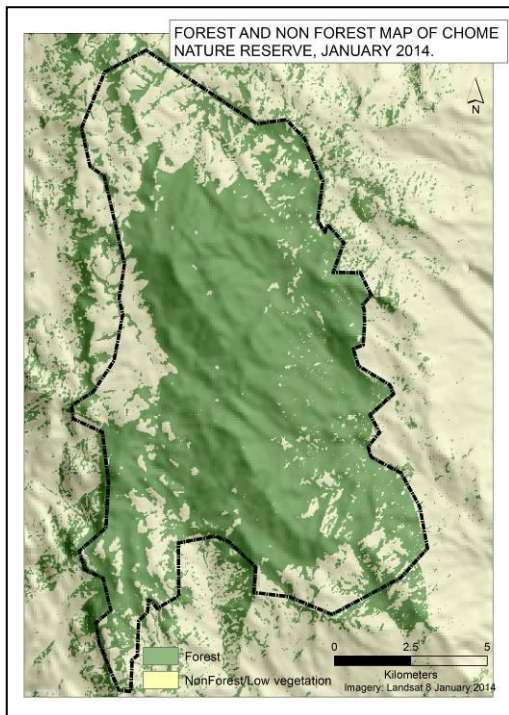
Seven mammals in total were recorded using both transect and camera trap methods in Chome NR. This included three ungulate species, two of which have been previously recorded in Chome NR (Harvey's duiker, *Cephalophus harveyi*) and Bush pigs, *Potamochoerus larvatus*. In addition the total number of mammals recorded included two primates, both of which have previously been recorded in the reserve (*Colobus angolensis* and Blue Monkey, *Cercopithecus mitis*). One of the species recorded was listed as above Least Concern by the IUCN Red List, the Vulnerable Black and rufous elephant shrew (*Rhynchocyon petersi*), which is near endemic to the Eastern Arc Mountains and also previously recorded in Chome NR. As such, all except two (Suni, *Neotragus moschatus*, and Giant pouched rat, *Cricetomys* spp.) of the mammal species recorded by this survey were also recorded in Chome by Baker (2001).



## 5 Plants

### 5.1 Background

Chome NR is home to a diversity of plant species. A number of these species have been collected and entered into the TROPICOS database, maintained by the Missouri Botanical Garden (MNRT, 2010). Some of the plant taxa in Chome are of special interest as they were previously recorded in only a few areas outside the Reserve, for example *Manilkara butugi*, which was previously only reported in Southern Sudan, Ethiopia, Uganda and North and central Kenya, was tentatively reported from Chome based on a sterile specimen (Mwangulango & Mwangoka 553), and is in need of confirmation with fertile material; *Millettia oblata* subsp. *teitesis* (Mlangwa & Shengena 394) and *Coffea fadenii* (Kindeketa 1326), which were



previously considered endemic to the Taita Hills in Kenya but are now also known from the South Pare and West Usambara Mountains; *Manikara obovata*, which was only known from west and central Africa, Zambia, Angola and in Tanzania only from Bukoba Rural and Kigoma Rural Districts, was tentatively reported from Chome based on a sterile specimen (Mwangulango & Mwangoka 567), and is in need of confirmation with fertile material; *Macaranga monandra*, a Guineo-Congolese species previously only known in Tanzania from Bukoba Rural District, was tentatively reported from Chome based on two sterile specimens (Phillipson & Rogers 5160, 5169), and is in need of confirmation with fertile material; *Pouteria adolfi-friedericii* subsp. *australis* (Massawe & Mwasumbi 430), which was previously reported from the Zambia/Malawi border and southwestern Tanzania but is now also known from Monduli Forest Reserve; and *Mitriostigma usambarense* (Kindeketa 1302), which was considered endemic to the West Usambaras (MNRT, 2010).

These taxa have now been recorded in Chome NR, with specimens cited above deposited in the Missouri Botanical Garden herbarium (MO) and the National Herbarium of Tanzania (NHT); however, none of the above taxa were collected or observed in the present study.

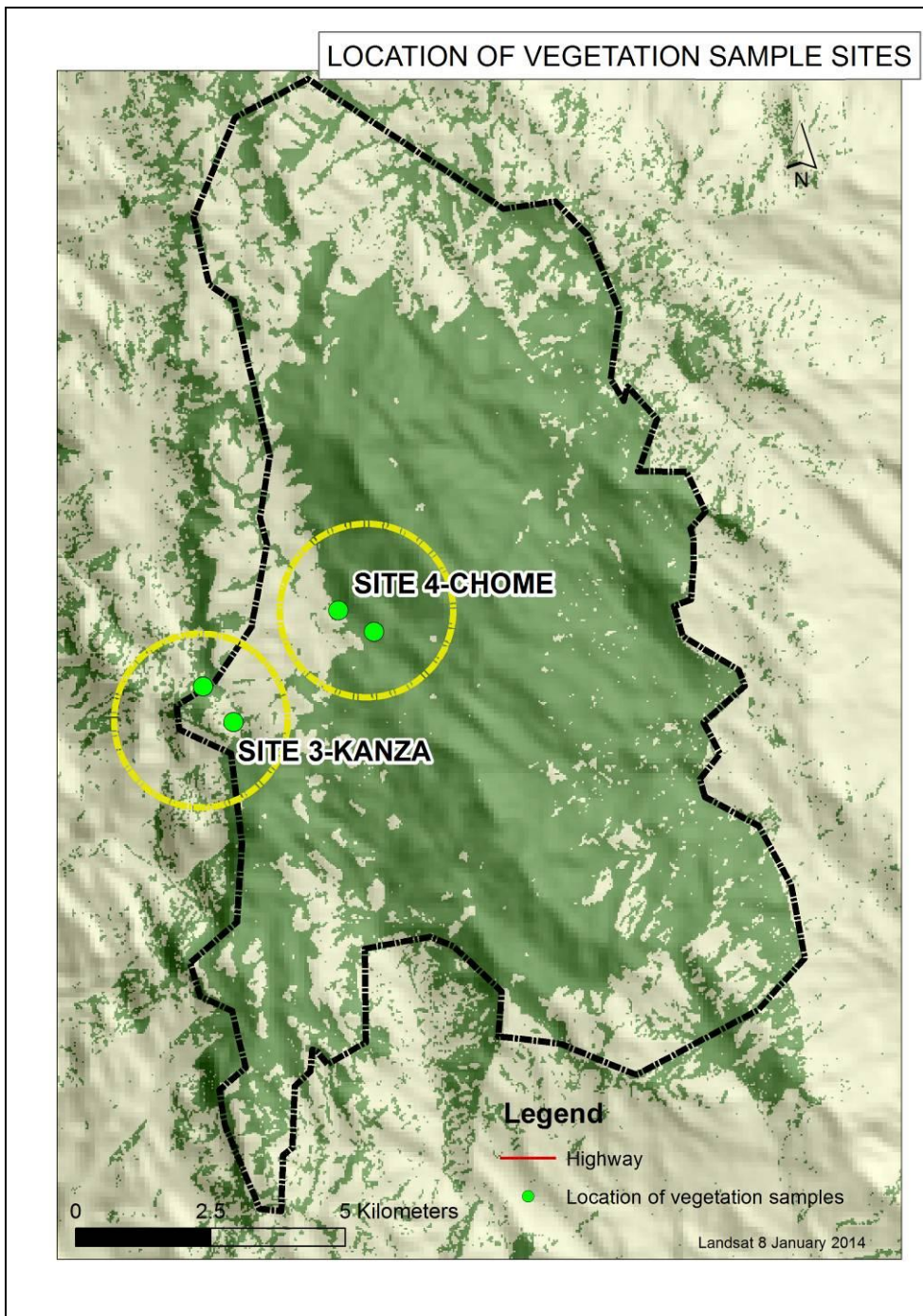
The objectives of this botanical survey in Chome NR were as follows:

- 1) To document the current status of the botanical species composition of Chome NR.
- 2) To document the presence of plant species endemic to the East Arc Mountains and Coastal Forests or to Chome NR.
- 3) To identify invasive plant species present in Chome NR.

### 5.2 Methods

Botanical surveys were conducted in Chome NR, specifically in Site 3 - Kanza and part of Site 4 – Chome, for a period of five days in August 2012. In each survey site, botanical surveys were conducted within different vegetation types. Sampling was conducted in both sites to allow for detailed identification of plant species (Table 10). At each site the transect number, altitudinal range, and vegetation type were recorded. Plant species were identified and recorded along transects 1 km long and 5 m wide either side. Specimens were also sent to the National herbarium for further identification.

**Figure 7.** Location of vegetation sample sites.



**Table 10.** Botanical survey sampling intensity in Chome NR

Survey sites	Categories	Survey coord		Number of samples/site	Survey dates		Total number of collections/site
		X	Y		Start	End	
Site 3 - Kanza	Good forest/ Semi- degraded/ Degraded	378639	9523966	95	15/08/2012	17/08/2012	24
	Good forest/ Semi- degraded/ Degraded	379202	9523306				
Site 4 - Chome	Grassland/ Bracken/ Good forest	381150	9525375	139	18/08/2012	20/08/2012	50
	Grassland/ Bracken/ Good forest	381807	9524980				

### 5.3 Results

A total of 136 plants species, including 66 families and 123 genera, were identified by the botanical surveys (Table 11). Of the total sample, 3 taxa (species, subspecies) were endemic to the Eastern Arc Mountains (EAM), and 9 were endemic to the combined Eastern Arc and Coastal Forest zone (CF) and/or adjacent mountain areas (NV = Neogene Volcanics of northern Tanzania, LN = Lake Nyasa Climatic Region of Tanzania) (Table 12). It was not possible to identify 13 of the plant species recorded. Six species, *Tithonia diversifolia*, *Acacia mearnsii*, *Eucalyptus* sp., *Passiflora edulis*, *Solanum wrightii*, and *Stachytarpheta jamaicensis*, were exotic to Chome NR. Six taxa with a Red List status greater than Least Concern were recorded by the surveys (Table 13). Four families were found to dominate the sample: Rubiaceae, Asteraceae, Fabaceae and Acanthaceae. Species richness was highest in Site 4 - Chome (n=138), compared to 95 species recorded in Site 3 - Kanza.

**Table 11.** Check-list of plants from Chome NR

Family	Scientific name	Habitat	Habit	Coll. No	SS		World Distribution	RL
					3	4		
Acanthaceae		Forest	Herb		1	1		-
Acanthaceae	<i>Crossandra tridentata</i>	Forest	Shrub	MM 8052	1	1	AFR	-
Acanthaceae	<i>Hypoestes aristata</i>	Forest	Herb	MM 8024	1	1	AFR	LC
Acanthaceae	<i>Isoglossa lactea</i> var. <i>saccata</i>	Forest	Herb	MM 8047	1	1	AFR	-
Acanthaceae	<i>Justicia</i>	Forest	Herb		1	1		-
Acanthaceae	<i>Justicia pseudorungia</i>	Forest	Shrub		1	1	EAM+CF+NV	-
Acanthaceae	<i>Thunbergia alata</i>	Forest	Herb		1	1	WS	-
Anacardiaceae	<i>Sorindeia madagascariensis</i>	Forest	Tree		1	1	WS	-
Apocynaceae	<i>Landlophia buchananii</i>	Forest	Liana		1	1	AFR	-
Apocynaceae	<i>Rauvolfia caffra</i>	Forest	Tree		1	1	AFR	-
Apocynaceae	<i>Rauvolfia volkensii</i>	Forest	Tree/ Shrub	MM 8025	1	1	EAM+NV	-
Araceae	<i>Culcasia falcifolia</i>	Forest	Climber		1	1	AFR	LC
Araliaceae	<i>Polyscias fulva</i>	Forest	Tree		1	1	AFR	-
Araliaceae	<i>Schefflera myriantha</i>	Forest	Liana	MM 8054	1	1	WS	LR/lc
Asparagaceae	<i>Asparagus</i>	Forest	Climber		1	1		-
Asparagaceae	<i>Asparagus asparagoides</i>	Forest	Climber	MM 8031	1	1	WS	-
Asparagaceae	<i>Asparagus setaceus</i>	Forest	Climber		1	1	AFR	-
Asteraceae	<i>Adenostemma</i>		Herb	MM 8045				
Asteraceae	<i>Bidens magnifolia</i>	Forest	Herb		1	1	AFR	-
Asteraceae	<i>Conyza newii</i>	Grassland	Shrub	MM 8034	0	1	AFR	-
Asteraceae	<i>Crassocephalum</i>	Forest	Herb	MM 8063	1	1		-
Asteraceae	<i>Helichrysum forskahlii</i> var. <i>forskahlii</i>	Grassland	Herb	MM 8037	0	1	WS	-
Asteraceae	<i>Helichrysum schimperi</i>	Grassland	Herb	MM 8036	0	1	WS	
Asteraceae	<i>Helichrysum setosum</i>	Grassland	Herb	MM 8065	0	1	AFR	-
Asteraceae	<i>Microglossa pyrifolia</i>	Grassland	Herb	MM 8016	0	1	WS	-
Asteraceae	<i>Senecio deltoideus</i>	Forest	Herb	MM 8021	1	1	AFR	-
Asteraceae	<i>Senecio syringifolius</i>	Forest	Herb	MM 8062	0	1	AFR	
Asteraceae	<i>Solanecio mannii</i>	Forest	Tree		1	1	AFR	-
Asteraceae	<i>Tithonia diversifolia</i>	Forest	Shrub		1	1	introduced	-
Asteraceae	<i>Vernonia</i>	Forest	Herb	MM 8051	0	1		-
Balsaminaceae	<i>Impatiens nana</i>	Forest	Herb		0	1	EAM+NV	-
Balsaminaceae	<i>Impatiens raphidothrix</i>	Forest	Herb	MM 8061	0	1	AFR	
Balsaminaceae	<i>Impatiens teitensis</i> subsp. <i>oblanceolata</i>	Forest	Herb	MM 8046	0	1	EAM: S Pare, W Usambara	-
Campanulaceae	<i>Lobelia gibberoa</i>	Forest	Herb		0	1	AFR	-

Family	Scientific name	Habitat	Habit	Coll. No	SS		World Distribution	RL
					3	4		
Campanulaceae	<i>Lobelia holstii</i>	Grassland	Herb	MM 8035	0	1	AFR	-
Celastraceae	<i>Maytenus acuminata</i>	Forest	Tree	MM 8058	1	1	AFR	-
Celastraceae	<i>Salacia madagascariensis</i>	Forest	Liana		1	1	WS	-
Clusiaceae	<i>Garcinia buchananii</i>	Forest	Tree		1	1	AFR	-
Clusiaceae	<i>Garcinia livingstonei</i>	Forest	Tree		0	1	AFR	-
Connaraceae	<i>Rourea orientalis</i>	Forest	Tree		1	1	WS	-
Convolvulaceae	<i>Ipomoea wightii</i>	Grassland	Climber		0	1	WS	-
Cornaceae	<i>Cornus volkensii</i>	Forest	Tree		0	1	AFR	-
Cyatheaceae	<i>Cyathea manniana</i>	Forest	Tree		1	1	AFR	-
Dennstaedtiaceae	<i>Blotiella stipitata</i>	Forest	Fern	MM 8048	1	1	AFR	LC
Dracaenaceae	<i>Dracaena laxissima</i>	Forest	Shrub		1	1	AFR	-
Dryopteridaceae	<i>Dryopteris kilemensis</i>	Roadsides	Fern	MM 8049			AFR	
Ericaceae	<i>Agarista salicifolia</i>	Forest	Tree		0	1	WS	-
Ericaceae	<i>Erica benguelensis</i> var. <i>benguelensis</i>	Grassland	Shrub	MM 8064	0	1	AFR	-
Euphorbiaceae	<i>Acalypha volkensii</i>	Forest	Shrub		1	1	AFR	-
Euphorbiaceae	<i>Alchornea hirtella</i>	Forest	Tree		1	1	AFR	-
Euphorbiaceae	<i>Clutia abyssinica</i>	Grassland	Shrub		1	1	AFR	-
Euphorbiaceae	<i>Clutia abyssinica</i> var. <i>usambarica</i>	Forest	Shrub	MM 8038	0	1	AFR	-
Euphorbiaceae	<i>Macaranga capensis</i> var. <i>kilimandscharica</i>	Forest	Tree		1	1	AFR	-
Euphorbiaceae	<i>Margaritaria discoidea</i>	Forest	Tree		1	1	AFR	-
Euphorbiaceae	<i>Shirakiopsis elliptica</i>	Forest	Tree		1	1	AFR	-
Fabaceae	<i>Acacia mearnsii</i>	Forest	Tree		0	1	introduced	-
Fabaceae	<i>Adenocarpus mannii</i>	Forest	Shrub	MM 8033	0	1	AFR	-
Fabaceae	<i>Caesalpinia volkensii</i>	Forest	Liana		1	0	AFR	-
Fabaceae	<i>Crotalaria agatiflora</i> subsp. <i>engleri</i>	Forest	Shrub	MM 8018	1	1	AFR	
Fabaceae	<i>Crotalaria lukwangulensis</i>	Grassland	Shrub	MM 8059	0	1	EAM+CF+LN	-
Fabaceae	<i>Dalbergia lactea</i>	Forest	Liana		1	1	AFR	-
Fabaceae	<i>Eriosema montanum</i>	Grassland	Shrub		0	1	AFR	-
Fabaceae	<i>Indigofera swaziensis</i> var. <i>perplexa</i>	Grassland	Shrub	MM 8041	0	1	AFR	-
Fabaceae	<i>Kotschy thymodora</i> subsp. <i>septentrionalis</i>	Forest	Shrub	MM 8032	0	1	AFR	-
Fabaceae	<i>Milletia oblata</i>	Forest	Tree		1	1	AFR	-
Fabaceae	<i>Tephrosia aequilata</i>	Forest	Shrub	MM 8029			AFR	LC
Fabaceae	<i>Tephrosia interrupta</i>	Grassland	Shrub		0	1	AFR	-
Flacourtiaceae	<i>Aphloia theiformis</i>	Forest	Tree		1	1	WS	-
Flacourtiaceae	<i>Dasylepis integra</i>	Forest	Tree		0	1	EAM+NV	VU
Gesneriaceae	<i>Streptocarpus glandulosissimus</i>	Forest	Herb	MM 8050	0	1	AFR	-
Hamamelidaceae	<i>Trichocladus ellipticus</i> subsp. <i>malosanus</i>	Forest	Tree	MM 8055	0	1	AFR	-
Icacinaceae	<i>Apodytes dimidiata</i>	Forest	Tree		1	1	WS	-
Iridaceae	<i>Dietes iridioides</i>	Forest	Herb		1	1	AFR	-
Lamiaceae	<i>Plectranthus</i>	Forest	Herb		0	1		-
Lamiaceae	<i>Plectranthus triangularis</i>	Forest	Herb	MM 8053	0	1	EAM: Taita, S Pare, W Usambara, Nguru, Uluguru	NT
Lamiaceae	<i>Pycnostachys meyeri</i>	Forest	Herb	MM 8042	0	1	AFR	-
Lauraceae	<i>Ocotea usambarensis</i>	Forest	Tree		1	1	AFR	-
Loganiaceae	<i>Anthocleista grandiflora</i>	Forest	Tree		1	0	WS	-
Loganiaceae	<i>Mostuea brunonis</i>	Forest	Shrub		1	1	WS	-

Family	Scientific name	Habitat	Habit	Coll. No	SS		World Distribution	RL
					3	4		
Loganiaceae	<i>Nuxia congesta</i>	Forest	Tree	MM 8040	0	1	AFR	-
Loganiaceae	<i>Nuxia floribunda</i>	Forest	Tree		1	1	AFR	-
Loranthaceae	<i>Agelanthus elegantulus</i>	Forest	Parasite	MM 8020	1	1	AFR	-
Malvaceae	<i>Hibiscus fuscus</i>	Forest	Shrub		0	1	AFR	-
Marattiaceae	<i>Marattia fraxinea</i>	Forest	Fern		1	1	WS	-
Melastomataceae	<i>Memecylon cogniauxii</i>	Forest	Tree		1	1	EAM: S Pare, E Usambara, W Usambara, Nguru, Uluguru	VU
Meliaceae	<i>Trichilia dregeana</i>	Forest	Tree		0	1	AFR	-
Meliaceae	<i>Turraea holstii</i>	Forest	Tree	MM 8013	1	1	WS	-
Meliantaceae	<i>Bersama abyssinica</i>	Forest	Tree		1	1	AFR	-
Menispermaceae	<i>Stephania abyssinica</i>	Forest	Climber		1	1	AFR	-
Monimiaceae	<i>Xymalos monospora</i>	Forest	Tree	MM 8022	1	1	AFR	-
Moraceae	<i>Ficus sycomorus</i>	Forest	Tree		1	1	WS	-
Moraceae	<i>Trilepisium madagascariensis</i>	Forest	Tree		1	1	WS	-
Myricaceae	<i>Morella salicifolia</i> subsp. <i>kilimandscharica</i>	Forest	Tree		0	1	AFR	-
Myrsinaceae	<i>Embelia schimperi</i>	Forest	Liana		1	1	AFR	-
Myrsinaceae	<i>Myrsine melanophloeos</i>	Forest	Tree		1	1	AFR	-
Myrtaceae	<i>Eucalyptus</i>	Forest	Tree		0	1	introduced	-
Ochnaceae	<i>Ochna holstii</i>	Forest	Tree		1	1	AFR	-
Olacaceae	<i>Strombosia scheffleri</i>	Forest	Tree		1	1	AFR	-
Oleaceae	<i>Olea capensis</i> subsp. <i>macrocarpa</i>	Forest	Tree		1	1	AFR	-
Passifloraceae	<i>Passiflora edulis</i>	Forest	Shrub		1	1	introduced	-
Piperaceae	<i>Piper capense</i>	Forest	Shrub		1	1	WS	-
Poaceae	<i>Oplismenus hirtellus</i>	Forest	Grass		1	1	WS	-
Poaceae	<i>Panicum trichocladum</i>	Forest	Grass		1	1	AFR	-
Podocarpaceae	<i>Afrocarpus falcatus</i>	Forest	Tree		1	1	AFR	-
Podocarpaceae	<i>Podocarpus latifolius</i>	Forest	Tree		1	1	AFR	-
Polygonaceae	<i>Rumex usambarensis</i>	Forest	Herb		0	1	AFR	-
Pteridaceae	<i>Pteris catoptera</i> var. <i>catoptera</i>	Forest	Fern	MM 8043	1	1	WS	-
Ranunculaceae	<i>Clematis hirsuta</i>	Forest	Climber		1	1	AFR	-
Ranunculaceae	<i>Thalictrum rhynchocarpum</i>	Forest	Herb	MM 8019	0	1	AFR	-
Rhamnaceae	<i>Guoania longispicata</i>	Forest	Liana		1	1	AFR	-
Rhamnaceae	<i>Rhamnus prinoides</i>	Forest	Tree	MM 8027	1	1	AFR	-
Rosaceae	<i>Prunus africana</i>	Forest	Tree		0	1	WS	VU
Rubiaceae	<i>Canthium oligocarpum</i>	Forest	Tree		1	1	AFR	-
Rubiaceae	<i>Canthium oligocarpum</i> subsp. <i>intermedium</i>	Forest	Tree	MM 8030	1	1	EAM+NV	VU
Rubiaceae	<i>Galium</i>	Forest	Herb		0	1		-
Rubiaceae	<i>Heinsenia diervilleoides</i> subsp. <i>diervilleoides</i>	Forest	Tree		1	1	AFR	-
Rubiaceae	<i>Keetia queinzii</i>	Forest	Liana		1	1	AFR	-
Rubiaceae	<i>Lasianthus</i>	Forest	Tree		1	1		-
Rubiaceae	<i>Lasianthus kilimandscharicus</i>	Forest	Tree	MM 8044	1	1	AFR	-
Rubiaceae	<i>Mitragyna rubrostipulata</i>	Forest	Tree		1	1	AFR	-
Rubiaceae	<i>Pauridiantha paucinervis</i>	Forest	Tree		1	1	WS	-
Rubiaceae	<i>Pentas lanceolata</i> subsp. <i>quartiniana</i>	Forest	Herb	MM 8014	1	1	AFR	-
Rubiaceae	<i>Psychotria</i>	Forest	Tree	MM 8028	1	1		
Rubiaceae	<i>Psychotria cyathicalyx</i>	Forest	Tree	MM 8026	1	1	EAM+CF+NV	VU

Family	Scientific name	Habitat	Habit	Coll. No	SS		World Distribution	RL
					3	4		
Rubiaceae	<i>Psychotria goetzei</i>	Forest	Tree		1	1	EAM+NV+LN	-
Rubiaceae	<i>Psychotria goetzei</i>	Forest	Tree	MM 8023	1	1	EAM+NV+LN	-
Rubiaceae	<i>Rutidea orientalis</i>	Forest	Liana		1	1	AFR	-
Rubiaceae	<i>Tarenna pavettoides</i> subsp. <i>affinis</i>	Forest	Tree	MM 8017	0	1	AFR	-
Rutaceae	<i>Toddalia asiatica</i>	Forest	Liana		1	1	WS	-
Rutaceae	<i>Vepris</i>	Forest	Tree		1	1		-
Sapindaceae	<i>Dodonaea viscosa</i> var. <i>angustifolia</i>	Grassland	Tree		1	1	WS	-
Sapotaceae	<i>Synsepalum cerasiferum</i>	Forest	Tree		0	1	AFR	-
Scrophulariaceae	<i>Halleria lucida</i>	Forest	Tree		1	1	WS	-
Scrophulariaceae	<i>Selago</i>			MM 8066	0	1		-
Smilacaceae	<i>Smilax anceps</i>	Forest	Liana		1	1	WS	-
Solanaceae	<i>Solanum wrightii</i>	Forest	Shrub	MM 8060	0	1	introduced	-
Sterculiaceae	<i>Cola greenwayi</i>	Forest	Tree		0	0	AFR	-
Sterculiaceae	<i>Dombeya torrida</i> subsp. <i>erythroleuca</i>	Forest	Tree	MM 8015	0	1	AFR	-
Theaceae	<i>Ficalhoa laurifolia</i>	Forest	Tree	MM 8057	0	1	AFR	-
Thymelaeaceae	<i>Peddiea fischeri</i>	Forest	Tree		1	1	AFR	-
Urticaceae	<i>Pilea usambarensis</i> var. <i>engleri</i>	Forest	Herb	MM 8056	1	1	AFR	-
Urticaceae	<i>Urera trinervis</i>	Forest	Liana		1	1	WS	-
Verbenaceae	<i>Clerodendrum cephalanthum</i> subsp. <i>impensum</i>	Forest	Shrub	MM 8039	1	0	EAM+CF	-
Verbenaceae	<i>Stachytarpheta jamaicensis</i>	Forest	Herb		1	1	introduced	-
Vitaceae	<i>Rhoicissus tridentata</i>	Forest	Liana		1	1	WS	-
<b>SPECIES RICHNESS ACROSS SURVEY SITES</b>					<b>95</b>	<b>138</b>		

### Key to table 11

SS = Survey sites, RL= Red List

WS = widespread, in Eastern Arc and also outside continental Africa

AFR = in Eastern Arc and in continental Africa outside adjacent mountain areas and Coastal Forest zone

EAM = endemic to Eastern Arc Mountains

EAM+CF = endemic to combined Eastern Arc and Coastal Forest zone

EAM+NV = endemic to combined Eastern Arc and Neogene Volcanics of Tanzania

EAM+CF+LN = endemic to combined Eastern Arc, Coastal Forest zone, and Lake Nyasa Climatic Region

EAM+CF+NV = endemic to combined Eastern Arc, Coastal Forest zone, and Neogene Volcanics

EAM+NV+LN = endemic to combined Eastern Arc, Neogene Volcanics, and Lake Nyasa Climatic Region

**Table 12.** Summary of Eastern Arc Mountain endemic and regionally endemic plant taxa recorded from Chome NR.

Family	Scientific name	Habitat	Habit	Coll. No	Survey Sites		Distribution	RL
					3	4		
Acanthaceae	<i>Justicia pseudorungia</i>	Forest	Shrub		1	1	EAM+CF+NV	-
Apocynaceae	<i>Rauvolfia volkensii</i>	Forest	Tree/Shrub	MM 8025	1	1	EAM+NV	-
Balsaminaceae	<i>Impatiens nana</i>	Forest	Herb		0	1	EAM+NV	-
Balsaminaceae	<i>Impatiens teitensis</i> subsp. <i>oblanceolata</i>	Forest	Herb	MM 8046	0	1	EAM: S Pare, W Usambara	-
Fabaceae	<i>Crotalaria lukwangulensis</i>	Grassland	Shrub	MM 8059	0	1	EAM+CF+LN	-
Flacourtiaceae	<i>Dasylepis integra</i>	Forest	Tree		0	1	EAM+NV	VU
Lamiaceae	<i>Plectranthus triangularis</i>	Forest	Herb	MM 8053	0	1	EAM: Taita, S Pare, W Usambara, Nguru, Uluguru	NT
Melastomataceae	<i>Memecylon cogniauxii</i>	Forest	Tree		1	1	EAM: S Pare, E Usambara, W Usambara, Nguru, Uluguru	VU
Rubiaceae	<i>Canthium oligocarpum</i> subsp. <i>intermedium</i>	Forest	Tree	MM 8030	1	1	EAM+NV	VU
Rubiaceae	<i>Psychotria cyathicalyx</i>	Forest	Tree	MM 8026	1	1	EAM+CF+NV	VU
Rubiaceae	<i>Psychotria goetzei</i>	Forest	Tree	MM 8023	1	1	EAM+NV+LN	-
Verbenaceae	<i>Clerodendrum cephalanthum</i> subsp. <i>impensum</i>	Forest	Shrub	MM 8039	1	0	EAM+CF	-
<b>Endemic taxon richness</b>					<b>7</b>	<b>11</b>		

**Key to table 12**

RL = Red List; VU = Vulnerable; NT = Near Threatened

**Table 13.** Summary of the IUCN red listed species above least concern in this survey to Chome NR.

Family	Scientific name	Habitat	Habit	Coll. No	Survey Sites		Distribution	RL
					3	4		
Flacourtiaceae	<i>Dasylepis integra</i>	Forest	Tree		0	1	EAM+NV	VU
Lamiaceae	<i>Plectranthus triangularis</i>	Forest	Herb	MM 8053	0	1	EAM: Taita, S Pare, W Usambara, Nguru, Uluguru	NT
Melastomataceae	<i>Memecylon cogniauxii</i>	Forest	Tree		1	1	EAM: S Pare, E Usambara, W Usambara, Nguru, Uluguru	VU
Rosaceae	<i>Prunus africana</i>	Forest	Tree		0	1	WS	VU
Rubiaceae	<i>Canthium oligocarpum</i> subsp. <i>intermedium</i>	Forest	Tree	MM 8030	1	1	EAM+NV	VU
Rubiaceae	<i>Psychotria cyathicalyx</i>	Forest	Tree	MM 8026	1	1	EAM+CF+NV	VU
<b>Total/survey site</b>					<b>3</b>	<b>6</b>		

RL=Red list, VU=Vulnerable, NT=Near Threatened

## 5.4 Discussion

A total of 136 plant species were recorded by botanical surveys. Of the total sample, 3 taxa (species, subspecies) were endemic to the Eastern Arc Mountains (EAM), and 9 were endemic to the combined Eastern Arc and Coastal Forest zone (CF) and/or adjacent mountain areas (NV = Neogene Volcanics of northern Tanzania, LN = Lake Nyasa Climatic Region of Tanzania). Results indicate a higher number of plant species in the Eastern side of the reserve, at Site 4 – Chome, despite ongoing illegal mining in this area. The Rubiaceae family dominated both the endemic sample and the total sample of plant species recorded. A number of plant species have only recently been recorded as present in Chome NR, however none of these were observed by this survey.



## 6 Forest disturbance

### 6.1 Background

Like many Forest Reserves in the South Pare Mountains, Chome NR is subject to a number of disturbance pressures such as illegal logging, fire, agricultural encroachment and pit sawing. Illegal mining is the most dominant threat in the eastern area of the forest, and widespread pit sawing has previously been observed throughout Chome NR (Persha 2003).

### 6.2 Objective

The disturbance surveys were carried out to achieve the following objectives:

- 1) To assess the level of disturbance in Chome NR by documenting all observations of disturbance and their intensities.
- 2) To gain a general understanding of the level of threats to Chome forest and its fauna and flora.
- 3) To identify site-specific priorities for conservation and management.

### 6.3 Methods

A total of 14 disturbance transects were carried out across the survey sites (Table 14). Methods used were adapted from the TFCG survey manual (Doggart, 2006). Each transect was 1 km long and 10 m wide, except for transect 5 which was 550 m long, totaling an area of 13.55 ha surveyed. Following Persha (2003), survey sites were grouped into five categories: Bracken/Erica species thicket (at Muvaa and part of Chome), Closed canopy forest (at Kanza and part of Chome), Degraded forest (at Bwambo and part of Kanza and Kirore), Grassland/bracken/Erica species(at Chome) and Semi-degraded forest (at Kirore and Kanza).

**Table 14.** Number of transects covered per survey site in Chome NR.

Site	Site name	Total number of transects/site	Comments
1	Site 1-Kirore (Degraded/Semi-degraded forest)	2	Good forest dominated by <i>Parinari spp</i>
2	Site 2- Bwambo (Degraded forest)	3	Mainly disturbed by fire
3	Site3-Kanza (Closed canopy forest and Semi- degraded)	4	High number of pitsawing were recorded (especially at the outskirts of the forest and some inside the good forest)
4	Site4-Chome (Closed canopy and Grassland/ bracken and Erica species)	2	The area is dominated by <i>Macaranga kilimandscharica</i> , <i>Erica species</i> and bracken. Whilst, further east there is closed canopy with some fire damage
5	Site 5-Muvaa (Bracken and Erica species with very limited closed canopy)	3	Slightly closed canopy with Brackens and Erica species
<b>Total number of transects</b>		<b>14</b>	

A 50 m long rope was used to measure 50 m sections along the 1 km transects. Disturbance level was measured by recording the number of incidents of pole cutting, timber cutting, traps and other disturbances in a 10 m strip (5 m either side of the transect line) along each transect. The transect was sub-divided into 50 m sections using a 50 m length of rope, and data recorded separately for each section. The longitude, latitude and altitude of the start and end points of each disturbance transect were marked with a GPS, and transect bearing was recorded and followed using a compass (Table 15).

For the purpose of this survey, poles were defined as all trees with a diameter at breast height (DBH) of 5-15 cm. Timber trees were defined as all trees exceeding 15 cm DBH (see Appendices). All other forms of anthropogenic disturbance within 5 m of either side of each transect were also recorded for every 50 m section. These other forms of disturbance were defined as follows:

1. Fire damage: area affected by fire, demonstrated by burnt trees and ground vegetation.

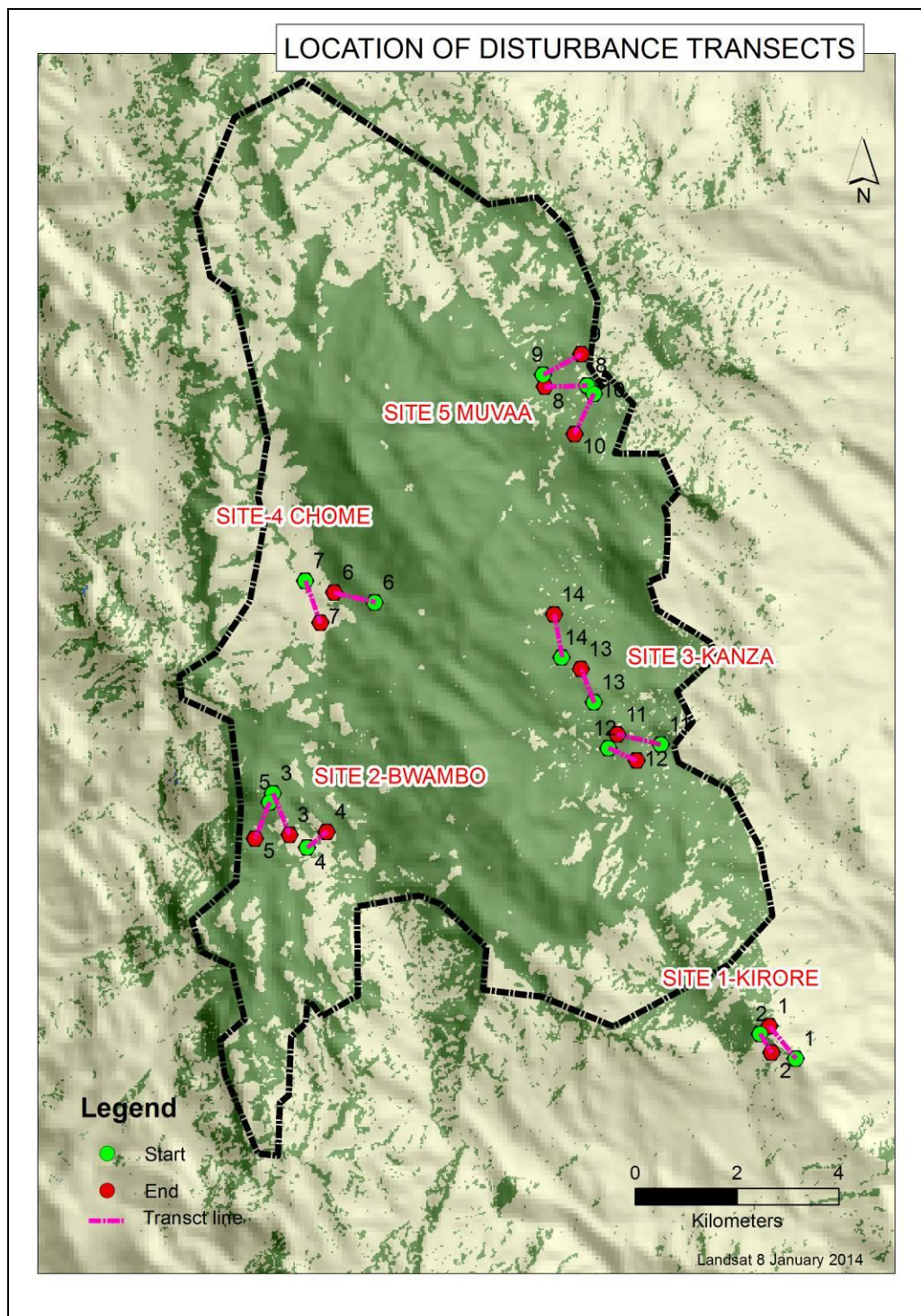
2. Charcoal: area of charcoal burning evidenced by small patches of burnt ground with charcoal remains.
3. Pitsaw: area cleared for pitsaw activities, with pitsaw platform, or remains of such.
4. Timber/planks/poles: cut timber, planks or cut poles found on the ground ready for transport.
5. Trapping: animal traps of all varieties whether set or sprung.
6. Cultivation: evidence of crop cultivation (past or present).
7. Grazing: direct evidence or remains of cattle or goat grazing.
8. Footpath: including all human-used paths.
9. Clearing: well-established clearings within the forest as a consequence of human disturbance (usually short grassland, potentially previous settlement).

**Table 15.** Disturbance survey sampling intensity

Site No.	Site name	Categories	Transect Number	Coordinates		Survey date	Transect Length (km)	Transect Area (ha)	Bearing	Elevation	Number of transects covered/site	Vegetation type
				Start	End							
1	Kirore	Semi degraded & Degraded	1	390247/9516136	389733/9516770	29/07/2012	1	1.55	NW	1577/1619	2	DEF With perinary spp
1	Kirore	Semi degraded & Degraded	2	389548/9516616	389777/9516251	29/07/2012	0.55		SE	1687/1596		DEF With perinary spp
2	Bwambo	Degraded	3	379985/9521313	380312/9520501	1/8/2012	1	3	SE	2022/1946	3	Disturbed DEF (Montane)
2	Bwambo	Degraded	4	380656/9520256	381043/9520563	2/8/2012	1		NE	1827/1838		Disturbed DEF (Montane)
2	Bwambo	Degraded	5	379921/9521140	379638/9520426	2/8/2012	1		SE	2076/1981		Disturbed DEF (Montane)
3	Kanza	Good forest /Semi-degraded/Degraded	11	387601/9522269	386750/9522466	8/8/2012	1	4	NW	1345/1562	4	DEF (Montane Forest)
3	Kanza	Good forest /Semi-degraded/Degraded	12	386572/9522195	387130/9521951	8/8/2012	1		SE	1515/1500		DEF (Montane forest)
3	Kanza	Good forest /Semi-degraded/Degraded	13	386288/9523089	386032/9523741	9/8/2012	1		WWN	1585/1640		DEF/disturbed forest (Montane forest)
3	Kanza	Good forest /Semi-degraded/Degraded	14	385657/9523969	385505/9524808	10/8/2012	1		N	1682/1727		DEF/ disturbed forest (Montane forest)
4	Chome	Grassland/Bracken/Good forest	6	381984/9525038	381189/9525238	3/8/2012	1	2	SW	1970/1978	2	Grassland/Bracken
4	Chome	Grassland/Bracken/Good forest	7	380622/9525459	380922/9524648	3/8/2012	1		SE	1932/1934		Grassland/Bracken
5	Muvaa	Bracken/Thicket/ Erica Spp.	8	386157/9529274	385324/9529255	5/8/2012	1	3	SW	1669/1747	3	DEF/ disturbed forest (Montane)

Site No.	Site name	Categories	Transect Number	Coordinates		Survey date	Transect Length (km)	Transect Area (ha)	Bearing	Elevation	Number of transects covered/site	Vegetation type
												forest)
5	Muvaa	Bracken/Thicket/ Erica Spp.	9	385291/9 529489	386040/ 9529888	6/8/ 2012	1		NE	1744/1549		DEF/ disturbed forest (Montane forest)
5	Muvaa	Bracken/Thicket/ Erica Spp.	10	386288/9 529120	385907/ 9528326	7/8/ 2012	1		NW	1607/1753		DEF/ disturbed forest (Montane forest)
<b>Total</b>							<b>13.55</b>	<b>13.55</b>			<b>14</b>	

**Figure 8.** Location of disturbance transects



## 6.4 Results

A total 6,888 trees were sampled along the 14 transects across all sites, with an overall disturbance rate of 111.9 disturbance events/ha. Variation in disturbance intensity was found to vary between the five survey sites, with the highest rate of overall disturbance recorded at Site 1 – Kirore and the least in Site 4 – Chome (Table 16). However, it was at Site 4 – Chome that the highest rate of other disturbance events, such as pit sawing, mining and roads/paths, were recorded. Tree disturbances were highest at Site 5 – Muvaa and Site 1 – Kirore.

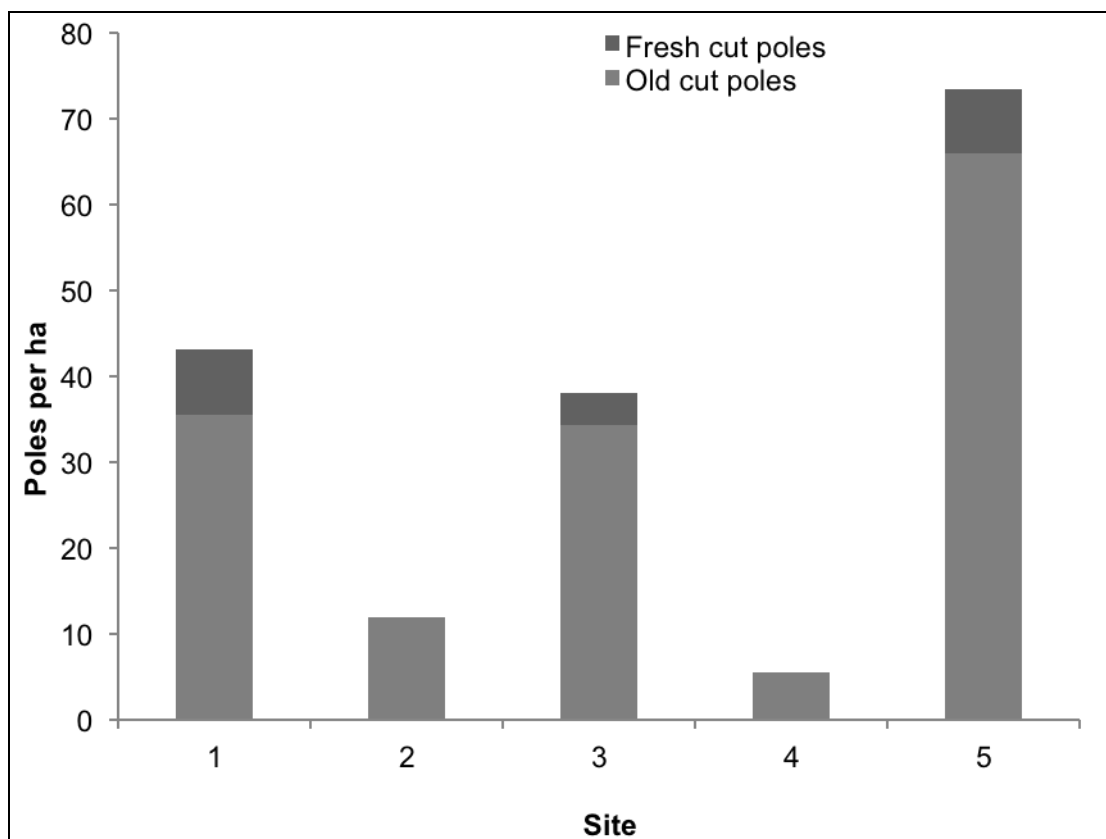
**Table 16.** Summary of disturbance events by survey site.

Site No.	Site Name	Categories	Transect	QUANTITY POLES (5-15cm dbh)				QUANTITY TIMBER (>15cm dbh)				Other disturbance	Total number of disturbances/ Total rate of disturbance
				Live	Naturally dead	Cut		Live	Naturally dead	Cut			
						Old	Fresh			Old	Fresh		
1	Kirore	Semi degraded & Degraded	1	71	1	39	7	146	1	169	1	31	
1	Kirore	Semi degraded & Degraded	2	160	0	16	5	37	1	76	0	14	
<b>Subtotal Site 1</b>				<b>160</b>	<b>1</b>	<b>55</b>	<b>12</b>	<b>183</b>	<b>2</b>	<b>245</b>	<b>1</b>	<b>45</b>	<b>258</b>
<b>Disturbance subtotal/ha – site 1</b>						<b>35.5</b>	<b>7.7</b>			<b>158.1</b>	<b>0.6</b>	<b>29</b>	<b>231</b>
2	Bwambo	Degraded	3	267	1	18	0	190	0	45	0	20	
2	Bwambo	Degraded	4	94	0	6	0	64	0	49	0	16	
2	Bwambo	Degraded	5	336	2	12	0	324	9	31	0	3	
<b>Subtotal Site 2</b>				<b>697</b>	<b>3</b>	<b>36</b>	<b>0</b>	<b>578</b>	<b>9</b>	<b>125</b>	<b>0</b>	<b>39</b>	<b>200</b>
<b>Disturbance subtotal/ha – site 2</b>						<b>12</b>	<b>0</b>			<b>41.7</b>	<b>0</b>	<b>13</b>	<b>66.7</b>
3	Kanza	Good forest/ Semi- degraded/ Degraded	11	128	0	55	14	155	3	70	8	23	
3	Kanza	Good forest/ Semi- degraded/ Degraded	12	238	2	74	0	223	7	56	0	10	
3	Kanza	Good forest/ Semi- degraded/ Degraded	13	156	1	6	1	276	2	48	0	23	
3	Kanza	Good forest/ Semi- degraded/ Degraded	14	300	0	2	0	357	0	17	7	9	
<b>Subtotal site 3</b>				<b>822</b>	<b>3</b>	<b>137</b>	<b>15</b>	<b>1011</b>	<b>12</b>	<b>191</b>	<b>15</b>	<b>65</b>	<b>423</b>

Site No.	Site Name	Categories	Transect	QUANTITY POLES (5-15cm dbh)				QUANTITY TIMBER (>15cm dbh)				Other disturbance	Total number of disturbances/ Total rate of disturbance
				Live	Naturally dead	Cut		Live	Naturally dead	Cut			
						Old	Fresh			Old	Fresh		
<b>Disturbance subtotal/ha – site 3</b>						<b>34.3</b>	<b>3.8</b>			<b>47.8</b>	<b>3.8</b>	<b>16.3</b>	<b>105.8</b>
4	Chome	Grassland / Bracken / Good forest	6	305	2	4	0	258	2	11	0	14	
4	Chome	Grassland/Bracken / Good forest	7	6	0	7	0	16	0	3	0	55	
<b>Subtotal site 4</b>				<b>311</b>	<b>2</b>	<b>11</b>	<b>0</b>	<b>274</b>	<b>2</b>	<b>14</b>	<b>0</b>	<b>69</b>	<b>94</b>
<b>Disturbance subtotal/ha – site 4</b>						<b>5.5</b>	<b>0</b>			<b>7.5</b>	<b>0</b>	<b>34.5</b>	<b>47</b>
5	Muvaa	Bracken / Thicket/ Erica Spp.	8	328	0	78	16	158	3	69	10	23	
5	Muvaa	Bracken / Thicket/ Erica Spp	9	173	0	51	3	177	1	37	2	20	
5	Muvaa	Bracken / Thicket/ Erica Spp	10	275	0	69	3	184	3	44	1	15	
<b>Subtotal site 5</b>				<b>776</b>	<b>0</b>	<b>198</b>	<b>22</b>	<b>519</b>	<b>7</b>	<b>150</b>	<b>13</b>	<b>58</b>	<b>441</b>
<b>Disturbance subtotal/ha – site 5</b>						<b>66</b>	<b>7.4</b>			<b>50</b>	<b>4.3</b>	<b>19.3</b>	<b>147</b>
<b>TOTAL</b>				<b>2766</b>	<b>9</b>	<b>437</b>	<b>49</b>	<b>2565</b>	<b>32</b>	<b>725</b>	<b>29</b>	<b>276</b>	<b>1516</b>
<b>TOTAL DISTURBANCE / HA</b>						<b>32.3</b>	<b>3.6</b>			<b>53.5</b>	<b>2.1</b>	<b>20.4</b>	<b>111.9</b>

### 6.4.1 Poles extraction

A total of 486 cut poles were recorded. Of these, 90% (n=437) were old cut poles and 10% (n=49) were new cut poles. Site 5 - Muvaa had the highest rate of total cut poles per hectare, and Site 4 – Chome the lowest (Figure 9).

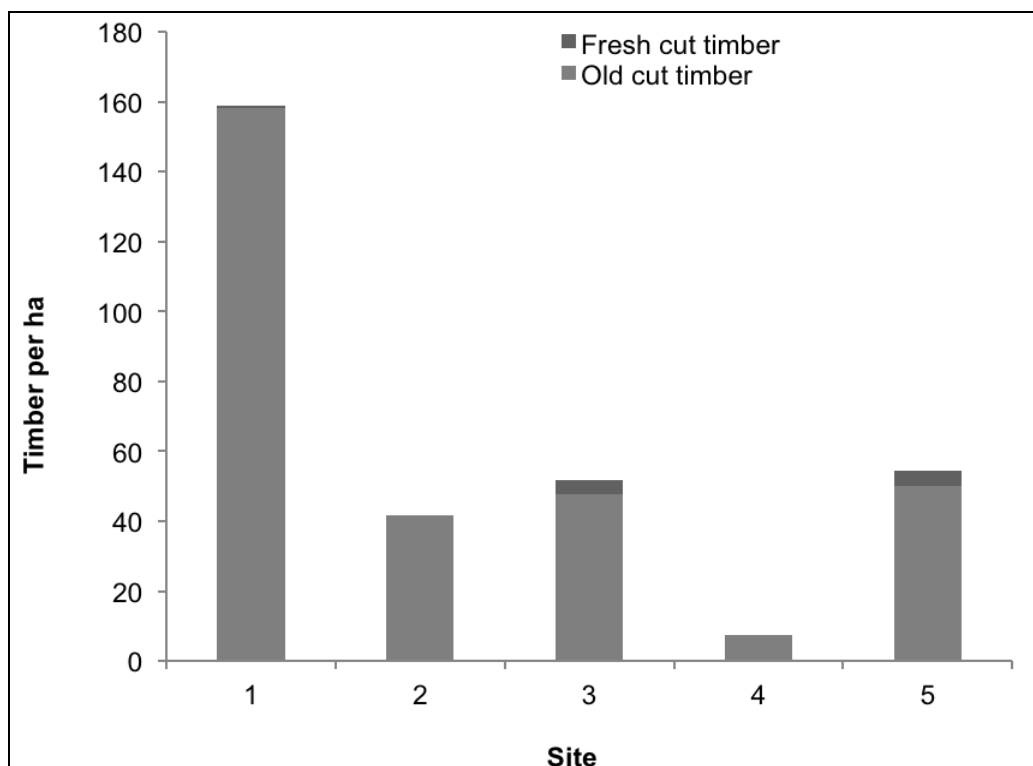


**Figure 9.** Rate of cut poles recorded per hectare across survey sites in Chome NR.

### 6.4.2 Timber extraction

In total, 754 cut trees in the 'timber' category were recorded. Of these, 96% (n= 725) were old cut timbers and 4%, (n=29) were new cut timbers. Site 1 - Kirore had the highest rate of total cut timbers per hectare, and Site 2 – Bwambo the lowest (Figure 10).





**Figure 10.** Rate of cut timber recorded per hectare across survey sites in Chome NR.

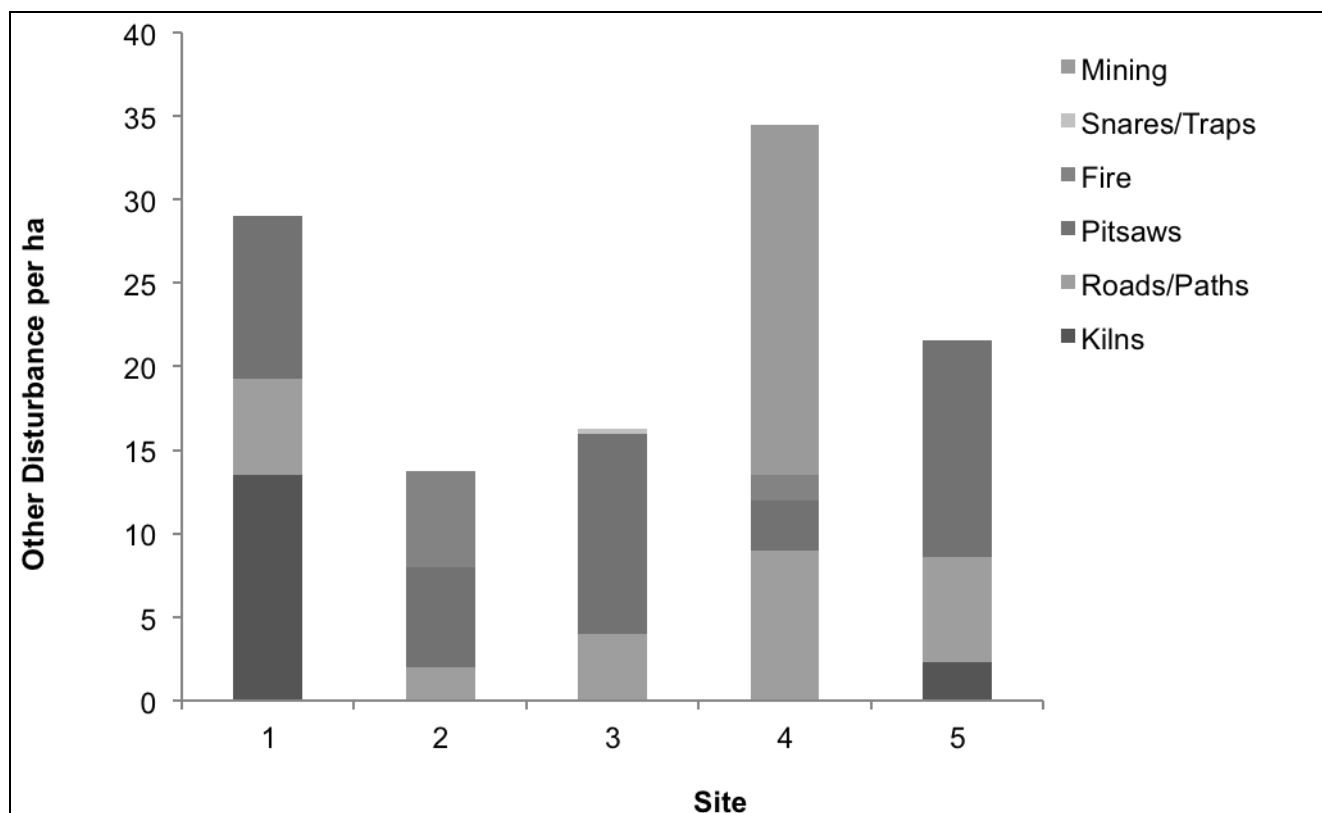
### 6.4.3 Other disturbances

A total of 285 other disturbance events were recorded across the survey sites (Table 17). Of these, 10% (n = 28) were Charcoal kilns, 24% (n = 68) were paths/roads, 44% (n= 126) were pitsaws, 7% (n= 20) were fire damages, 0.4 % (n=1) were snare/trap and 15% (n=42) were mining. Pitsawing was the most dominant type of other disturbance type recorded. Site 4 - Chome had the highest rate of other disturbance events per hectare and was the only site with mining activities recorded. Site 2 - Bwambo had the lowest number of disturbance events recorded (Figure 11).

**Table 17.** Summary of other disturbances recorded by survey site

Survey site	Transect No.	Disturbance type						Total other disturbance/ Total rate of disturbance
		Kilns	Roads/ Paths	Pitsaws	Fire	Snare/ Traps	Mining	
Site 1- Kirore	1	12	8	11	0	0	0	
	2	9	1	4	0	0	0	
<b>Subtotal – site 1</b>		<b>21</b>	<b>9</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>Subtotal/ha – site 1</b>		<b>13.5</b>	<b>5.8</b>	<b>9.7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>
Site 2- Bwambo	3	0	2	11	7	0	0	
	4	0	2	6	10	0	0	
	5	0	2	1	0	0	0	
<b>Subtotal – site 2</b>		<b>0</b>	<b>6</b>	<b>18</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>41</b>
<b>Subtotal/ha – site 2</b>		<b>0</b>	<b>2</b>	<b>6</b>	<b>5.7</b>	<b>0</b>	<b>0</b>	<b>13.7</b>
Site 3- Kanza	11	0	5	17	0	1	0	
	12	0	4	6	0	0	0	
	13	0	5	18	0	0	0	
	14	0	2	7	0	0	0	
<b>Subtotal – site 3</b>		<b>0</b>	<b>16</b>	<b>48</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>65</b>
<b>Subtotal/ha – site 3</b>		<b>0</b>	<b>4</b>	<b>12</b>	<b>0</b>	<b>0.25</b>	<b>0</b>	<b>16.25</b>
Site 4- Chome	6	0	5	6	3	0	0	
	7	0	13	0	0	0	42	
<b>Subtotal – site 4</b>		<b>0</b>	<b>18</b>	<b>6</b>	<b>3</b>	<b>0</b>	<b>42</b>	<b>69</b>
<b>Subtotal/ha – site 4</b>		<b>0</b>	<b>9</b>	<b>3</b>	<b>1.5</b>	<b>0</b>	<b>21</b>	<b>34.5</b>
Site 5- Muvaa	8	0	7	16	0	0	0	
	9	7	7	13	0	0	0	

Survey site	Transect No.	Disturbance type						Total other disturbance/ Total rate of disturbance
		Kilns	Roads/ Paths	Pitsaws	Fire	Snare/ Traps	Mining	
	10	0	5	10	0	0	0	
<b>Subtotal – site 5</b>		<b>7</b>	<b>19</b>	<b>39</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>65</b>
<b>Subtotal/ha – site 5</b>		<b>2.3</b>	<b>6.3</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21.7</b>
<b>TOTAL</b>		<b>28</b>	<b>68</b>	<b>126</b>	<b>20</b>	<b>1</b>	<b>42</b>	<b>285</b>
<b>TOTAL/HA</b>		<b>2.1</b>	<b>5</b>	<b>9.3</b>	<b>1.5</b>	<b>0.07</b>	<b>3.1</b>	<b>21</b>



**Figure 11.** Rate of other disturbance events recorded per hectare across survey sites in Chome NR.

## 6.5 Discussion

The types of disturbance observed within Chome Forest Reserve varied by survey site. However, incidents of newly cut poles and timber were relatively low across all survey sites, although the rate of old tree cutting disturbances were high at Sites 1 – Kirore and 5 – Muvaa. Pitsaws were the most frequently recorded type of other disturbance and were recorded in all survey sites, signifying the continued threat of this activity in Chome NR since Persha (2003). The high number of paths/roads recorded by transects suggests easy access within the forest, potentially contributing to continued exploitation of forest products. Removal of even a single species may have a considerable effect on the health of an ecosystem (Baker, 2001), and this survey identifies the exploitation of Camphor (*Ocotea usambarensis*) and Podo (*Afrocarpus falcatus*; *Podocarpus latifolius*; *Afrocarpus usambarensis*) species. The most exploited plant species was Camphor (*Ocotea usambarensis*), also observed by Baker (2001) and Persha (2003), with such sustained pressure a threat to this species in the forest.

## 7 Conclusions & Recommendations

Findings of this survey highlight the biodiversity value of Chome NR, with 134 plant species, 95 bird species and seven mammals recorded in the reserve. Of the species recorded 5% (n=5) of birds, 14% (n=1) of mammals and 3% (n=4) of plants were Red Listed above Least Concern. In addition, 4% (n=4) of birds and 4% (n=5) of plants recorded were endemic or near endemic to the Eastern Arc Mountains. However, threats in the form of several types of disturbances are apparent in Chome NR, with a high rate of disturbance events/ha observed. Yet, bird species richness was highest at Site 1, in which overall disturbance rate was also highest. In addition, plant species richness was highest in Site 4, which had the lowest overall disturbance rate but the highest rate of 'other disturbances', in particular mining. Continued monitoring of species richness and threat intensity is required to understand the long-term impacts of the high disturbances recorded in the forest.

Following this survey the following actions are recommended to ensure the biodiversity value of Chome NR is sustained:

- 5) Improved law enforcement at site level and controlled issuing of resource use licenses.
- 6) Increased manpower for effective forest patrol and law enforcement.
- 7) Careful monitoring of biodiversity and resource use in the forest.
- 8) A Participatory Forest Management (PFM) approach, in the form of Joint Forest Management (JFM) is recommended to include nearby communities in the conservation and management of the forest.

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## 9 Appendices

### Appendix 1. Checklist of botanical collection in Chome NR

Family	Scientific name	Habitat	Habit	Coll. No	Survey Sites		World
					3	4	Distribution
Acanthaceae	<i>Crossandra tridentata</i>	Forest	Shrub	MM 8052	1	1	AFR
Acanthaceae	<i>Hypoestes aristata</i>	Forest	Herb	MM 8024	1	1	AFR
Acanthaceae	<i>Isoglossa lactea var. saccata</i>	Forest	Herb	MM 8047	1	1	AFR
Apocynaceae	<i>Rauvolfia volkensii</i>	Forest	Tree/Shrub	MM 8025	1	1	EAM+NV
Araliaceae	<i>Schefflera myriantha</i>	Forest	Liana	MM 8054	1	1	WS
Asparagaceae	<i>Asparagus asparagoides</i>	Forest	Climber	MM 8031	1	1	WS
Asteraceae	<i>Adenostemma</i>		Herb	MM 8045			
Asteraceae	<i>Conyza newii</i>	Grassland	Shrub	MM 8034	0	1	AFR
Asteraceae	<i>Crassocephalum</i>	Forest	Herb	MM 8063	1	1	
Asteraceae	<i>Helichrysum forskahlii var. forskahlii</i>	Grassland	Herb	MM 8037	0	1	WS
Asteraceae	<i>Helichrysum schimperi</i>	Grassland	Herb	MM 8036	0	1	WS
Asteraceae	<i>Helichrysum setosum</i>	Grassland	Herb	MM 8065	0	1	AFR
Asteraceae	<i>Microglossa pyrifolia</i>	Grassland	Herb	MM 8016	0	1	WS
Asteraceae	<i>Senecio deltoideus</i>	Forest	Herb	MM 8021	1	1	AFR
Asteraceae	<i>Senecio syringifolius</i>	Forest	Herb	MM 8062	0	1	AFR
Asteraceae	<i>Vernonia</i>	Forest	Herb	MM 8051	0	1	
Balsaminaceae	<i>Impatiens raphidothrix</i>	Forest	Herb	MM 8061	0	1	AFR
Basalminaceae	<i>Impatiens teitensis subsp. oblanceolata</i>	Forest	Herb	MM 8046	0	1	EAM: S Pare, W Usambara
Campanulaceae	<i>Lobelia holstii</i>	Grassland	Herb	MM 8035	0	1	AFR
Celastraceae	<i>Maytenus acuminata</i>	Forest	Tree	MM 8058	1	1	AFR
Dennstaedtiaceae	<i>Blotiella stipitata</i>	Forest	Fern	MM 8048	1	1	AFR
Dryopteridaceae	<i>Dryopteris kilemensis</i>	Roadsides	Fern	MM 8049			AFR
Ericaceae	<i>Erica benguelensis var. benguelensis</i>	Grassland	Shrub	MM 8064	0	1	AFR
Euphorbiaceae	<i>Clutia abyssinca var. usambarica</i>	Forest	Shrub	MM 8038	0	1	AFR
Fabaceae	<i>Adenocarpus mannii</i>	Forest	Shrub	MM 8033	0	1	AFR
Fabaceae	<i>Crotalaria agatiflora subsp. engleri</i>	Forest	Shrub	MM 8018	1	1	AFR
Fabaceae	<i>Crotalaria lukwangulensis</i>	Grassland	Shrub	MM 8059	0	1	EAM+CF+LN
Fabaceae	<i>Indigofera swaziensis var. perplexa</i>	Grassland	Shrub	MM 8041	0	1	AFR
Fabaceae	<i>Kotschya thymodora subsp. septentrionalis</i>	Forest	Shrub	MM 8032	0	1	AFR

Family	Scientific name	Habitat	Habit	Coll. No	Survey Sites		World
					3	4	Distribution
Fabaceae	<i>Tephrosia aequilata</i>	Forest	Shrub	MM 8029			AFR
Gesneriaceae	<i>Streptocarpus glandulosissimus</i>	Forest	Herb	MM 8050	0	1	AFR
Hamamelidaceae	<i>Trichocladus ellipticus subsp. malosanus</i>	Forest	Tree	MM 8055	0	1	AFR
Lamiaceae	<i>Plectranthus triangularis</i>	Forest	Herb	MM 8053	0	1	EAM: Taita, S Pare, W Usambara, Nguru, Uluguru
Lamiaceae	<i>Pycnostachys meyeri</i>	Forest	Herb	MM 8042	0	1	AFR
Loganiaceae	<i>Nuxia congesta</i>	Forest	Tree	MM 8040	0	1	AFR
Loranthaceae	<i>Agelanthus elegantulus</i>	Forest	Parasite	MM 8020	1	1	AFR
Meliaceae	<i>Turraea holstii</i>	Forest	Tree	MM 8013	1	1	WS
Monimiaceae	<i>Xymalos monospora</i>	Forest	Tree	MM 8022	1	1	AFR
Pteridaceae	<i>Pteris catoptera var. catoptera</i>	Forest	Fern	MM 8043	1	1	WS
Ranunculaceae	<i>Thalictrum rhyhocarpum</i>	Forest	Herb	MM 8019	0	1	AFR
Rhamnaceae	<i>Rhamnus prinoides</i>	Forest	Tree	MM 8027	1	1	AFR
Rubiaceae	<i>Canthium oligocarpum subsp. intermedium</i>	Forest	Tree	MM 8030	1	1	EAM+NV
Rubiaceae	<i>Lasianthus kilimandscharicus</i>	Forest	Tree	MM 8044	1	1	AFR
Rubiaceae	<i>Pentas lanceolata subsp. quartiniana</i>	Forest	Herb	MM 8014	1	1	AFR
Rubiaceae	<i>Psychotria</i>	Forest	Tree	MM 8028	1	1	
Rubiaceae	<i>Psychotria cyathicalyx</i>	Forest	Tree	MM 8026	1	1	EAM+CF+NV
Rubiaceae	<i>Psychotria goetzei</i>	Forest	Tree	MM 8023	1	1	EAM+NV+LN
Rubiaceae	<i>Tarenna pavettoides subsp. affinis</i>	Forest	Tree	MM 8017	0	1	AFR
Scrophulariaceae	<i>Selago</i>	Grassland	Herb	MM 8066	0	1	
Solanaceae	<i>Solanum wrightii</i>	Forest	Shrub	MM 8060	0	1	introduced
Sterculiaceae	<i>Dombeya torrida subsp. erythroleuca</i>	Forest	Tree	MM 8015	0	1	AFR
Theaceae	<i>Ficalhoa laurifolia</i>	Forest	Tree	MM 8057	0	1	AFR
Urticaceae	<i>Pilea usambarensis var. engleri</i>	Forest	Herb	MM 8056	1	1	AFR
Verbenaceae	<i>Clerodendrum cephalanthum subsp. impensum</i>	Forest	Shrub	MM 8039	1	0	EAM+CF

**Appendix 2. Disturbance transect 1-Site 1-Kirore**

<b>Names of recorders:</b>	Justine Gwegime				
<b>Date of survey (dd/mm/yyyy):</b>	29/07/2012	<b>District:</b>	Same		
<b>Village:</b>	Kirore	<b>Nearest sub-village:</b>	Lugulu/Mamba myamba		
<b>Village Forest Reserve:</b>	Chome Nature Reserve	<b>Transect Number:</b>	1		
<b>Dominant vegetation:</b>	DEF With perinary spp	<b>Bearing:</b>	NW		
<b>Start point</b> Longitude:	390247	<b>Latitude:</b>	9516136	<b>Altitude (m):</b>	1577
<b>End point</b> Longitude:	389733	<b>Latitude:</b>	9516770	<b>Altitude (m):</b>	1619

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

Section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	5	0	0	0	8	0	11	0	R (1)	
50-100	11	0	2	0	5	0	14	0		
100-150	0	1	7	0	10	0	6	0	K (1)	
150-200	5	0	2	1	2	0	5	0	R (1) & K (1)	
200-250	5	0	2	0	7	0	1	0	R (1)	
250-300	1	0	0	2	11	0	5	1	K (2)	
300-350	4	0	0	4	5	0	15	0	P (1)	
350-400	10	0	3	0	5	0	10	0	P (1)	
400-450	0	0	2	0	7	0	9	0	R (2) & P (1)	
450-500	12	0	4	0	8	0	10	0	P (1) & R (1)	
500-550	1	0	0	0	5	0	8	0	P (1) & R (1)	
550-600	4	0	1	0	6	0	8	0	P (1) & R (1)	
600-650	1	0	0	0	7	0	13	0	P (1) & R (1)	
650-700	3	0	2	0	10	0	5	0	P (1)	
700-750	0	0	1	0	9	0	7	0	R (1)	
750-800	2	0	4	0	10	0	12	0		
800-850	0	0	3	0	3	0	5	0	K (1) & P (1)	
850-900	3	0	2	0	8	0	9	0	K (1)	

Section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
900-950	4	0	3	0	10	1	12	0	K (2) & P (1)	
950-1000	0	0	1	0	10	0	4	0	K (4) & P (1)	
<b>Total</b>	<b>71</b>	<b>1</b>	<b>39</b>	<b>7</b>	<b>146</b>	<b>1</b>	<b>169</b>	<b>1</b>	<b>R (8) ,K (12) &amp; P (11)</b>	

Key to topography							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
Key to vegetation cover							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>			<b>3 (&gt;50%)</b>		

Invasive alien species					
<b>LC</b> = Lantana camara	<b>CO</b> = Cedrela Odorata	<b>RU</b> = Rubus spp	<b>SJ</b> = Stachytarpheta jamaicensis	<b>O</b> = Other (specify)	
High conservation values					
<b>S</b> = Stream or spring	<b>M</b> = Ming'oko	<b>T</b> = Threatened plant species	<b>E</b> = Coastal forest or E. Arc endemic species	<b>O</b> = Other e.g. edible mushrooms	

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	1	2			
50-100	GUS	2	1	2			E. shrew trail and Duiker trail.
100-150	GUS	2	1	2			Sykes monkeys (Seen)
150-200	GUS	2	1	2			
200-250	GUS	2	1	2			Duiker trail
250-300	GUS	2	1	2			
300-350	GUS	2	1	2			



<b>Section (m)</b>	<b>Topography</b>	<b>Canopy cover</b>	<b>Shrub layer</b>	<b>Ground layer</b>	<b>Invasive alien species</b>	<b>High conservation values</b>	<b>Other observations</b>
350-400	GUS	2	2	2			Sykes monkey (Heard)
400-450	GUS	2	2	2			
450-500	GUS	2	2	2			
500-550	GUS	2	2	2			
550-600	GUS	2	1	2			
600-650	GUS	2	1	2			
650-700	GUS	2	1	2			
700-750	GUS	2	1	2			
750-800	GUS	2	1	2			
800-850	GUS	2	1	2			Duiker trail
850-900	GUS	2	1	2			
900-950	GUS	2	1	2			
950-1000	GUS	2	1	2			
OTHER NOTES: - The area is highly dominated by Parinari species							

**Appendix 3. Disturbance transect 2-Site 1-Kirore**

<b>Names of recorders:</b>		Justine Gwegime			
<b>Date of survey (dd/mm/yyyy):</b>		29/07/2012	<b>District:</b>	Same	
<b>Village:</b>		Kirore	<b>Nearest sub-village:</b>	Lugulu/Mamba myamba	
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>	2	
<b>Dominant vegetation:</b>		DEF (Montane forest)	<b>Bearing:</b>	SE	
<b>Start point Longitude:</b>	389548	<b>Latitude:</b>	9516616	<b>Altitude (m):</b>	1687
<b>End point Longitude:</b>	389777	<b>Latitude:</b>	9516251	<b>Altitude (m):</b>	1596

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

Section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	30	0	2	0	1	0	1	0	R(1)	
50-100	15	0	0	0	2	0	13	0	P(1)	
100-150	13	0	2	0	3	1	2	0	P(1)	
150-200	13	0	0	0	7	0	6	0	P(1)	
200-250	19	0	2	1	6	0	0	0	P(1)	
250-300	5	0	5	0	4	0	13	0	K(2)&R(1)	
300-350	6	0	4	3	0	0	10	0	K(3)	
350-400	10	0	1	1	5	0	6	0	K(3)	
400-450	14	0	0	0	2	0	12	0	0	
450-500	21	0	0	0	7	0	6	0	K(1)	
500-550	14	0	0	0	0	0	7	0	0	
550-600										
600-650										
650-700										
700-750										
750-800										
800-850										
850-900										
900-950										

Section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
950-1000										
<b>Total</b>	<b>160</b>	<b>0</b>	<b>16</b>	<b>5</b>	<b>37</b>	<b>1</b>	<b>76</b>	<b>0</b>	<b>R(1),P(4) &amp;K(9)</b>	

#### Key to topography

<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor

#### Key to vegetation cover

<b>1 (&lt;10%)</b>	<b>2 (10-50%)</b>	<b>3 (&gt;50%)</b>
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#### Invasive alien species

<b>LC</b> =Lantana camara	<b>CO</b> = Cedrela Odorata	<b>RU</b> = Rubus spp	<b>SJ</b> = Stachytarpheta jamaicensis	<b>O</b> = Other (specify)
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#### High conservation values

<b>S</b> = Stream or spring	<b>M</b> = Ming'oko	<b>T</b> = Threatened plant species	<b>E</b> = Coastal forest or E. Arc endemic species	<b>O</b> = Other e.g. edible mushrooms
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Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	1	2			
50-100	GUS	2	1	2			E. shrew trail
100-150	GUS	2	1	2			Duiker trail
150-200	GUS	2	1	2			Duiker trail & pelletes
200-250	GUS	2	2	2			Duiker pellets
250-300	GUS	2	2	2			
300-350	GUS	2	2	2			Duiker trail / E.shrew trail
350-400	GUS	2	1	2			Dikdik pelletes and Trail
400-450	SLS	2	1	2			Duiker trail
450-500	SLS	2	2	2			E.shrew trail
500-550	SLS	2	2	2			
550-600	SLS						
600-650	GUS						
650-700	GUS						

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
700-750	GUS						
750-800	GUS						
800-850	GUS						
850-900	GUS						
900-950	GUS						
950-1000	GUS						
<b>OTHER NOTES:</b> - The area is highly dominated by duiker/ dikdik trail meanwhile there is some timber and charcoal making.							

**Appendix 4. Disturbance transect 3-Site 2-Bwambo**

<b>Names of recorders:</b>		Justine Gwegime			
<b>Date of survey (dd/mm/yyyy):</b>		1/8/2012	<b>District:</b>	Same	
<b>Village:</b>		Bwambo	<b>Nearest sub-village:</b>	Mamba myamba/Chome	
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>	3	
<b>Dominant vegetation:</b>		Montane Forest	<b>Bearing:</b>	SE	
<b>Start point Longitude:</b>	379985	<b>Latitude:</b>	9521313	<b>Altitude (m):</b>	2022
<b>End point Longitude:</b>	380312	<b>Latitude:</b>	9520501	<b>Altitude (m):</b>	1946

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	20	0	0	0	15	0	1	0	0	
50-100	15	0	3	0	10	0	2	0	0	
100-150	22	0	2	0	12	0	4	0	P(1)	
150-200	21	0	0	0	9	0	2	0	0	
200-250	10	0	3	0	17	0	6	0	P(1)	
250-300	11	0	1	0	13	0	2	0	P(1)	
300-350	19	0	1	0	8	0	2	0	P(1)	
350-400	5	0	0	0	3	0	8	0	P(3)	
400-450	11	0	0	0	5	0	1	0	P(1)	
450-500	4	0	0	0	10	0	3	0	P(1)	
500-550	14	0	2	0	8	0	2	0	P(2)	
550-600	12	0	2	0	17	0	3	0	0	
600-650	12	0	3	0	17	0	5	0	K(1) &R(1)	
650-700	6	0	0	0	7	0	0	0	F&R(1)	
700-750	9	0	1	0	12	0	1	0	F	
750-800	15	0	0	0	8	0	2	0	F	
800-850	21	1	0	0	6	0	1	0	F	
850-900	22	0	0	0	7	0	0	0	F	
900-950	12	0	0	0	5	0	0	0	F	
950-1000	6	0	0	0	1	0	0	0	F	

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
<b>Total</b>	<b>267</b>	<b>1</b>	<b>18</b>	<b>0</b>	<b>190</b>	<b>0</b>	<b>45</b>		<b>P(11), R(2)&amp; F(7)</b>	

#### Key to topography

<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor

#### Key to vegetation cover

<b>1 (&lt;10%)</b>	<b>2 (10-50%)</b>	<b>3 (&gt;50%)</b>
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#### Invasive alien species

<b>LC</b> = Lantana camara	<b>CO</b> = Cedrela Odorata	<b>RU</b> = Rubus spp	<b>SJ</b> = Stachytarpheta jamaicensis	<b>O</b> = Other (specify)
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#### High conservation values

<b>S</b> = Stream or spring	<b>M</b> = Ming'oko	<b>T</b> = Threatened plant species	<b>E</b> = Coastal forest or E. Arc endemic species	<b>O</b> = Other e.g. edible mushrooms
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Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	3	1	2			Duiker trail
50-100	GUS	3	1	2			
100-150	GUS	3	1	2			Duiker trail
150-200	GUS	3	1	2			
200-250	GUS	3	1	2			Duiker trail
250-300	GUS	3	1	2			
300-350	GUS	3	1	2			Duiker trail
350-400	GUS	3	1	2			Duiker trail
400-450	GUS	3	1	2			
450-500	GUS	3	1	2			
500-550	GUS	2	1	2			
550-600	GUS	2	1	2			E.shrew trail
600-650	GUS	2	1	2			
650-700	GUS	2	2	2			

<b>Section (m)</b>	<b>Topography</b>	<b>Canopy cover</b>	<b>Shrub layer</b>	<b>Ground layer</b>	<b>Invasive alien species</b>	<b>High conservation values</b>	<b>Other observations</b>
700-750	GUS	2	2	2			
750-800	GUS	2	2	2			Duiker trail/ Elephant shrew trail
800-850	GUS	2	2	2			Duiker trail
850-900	GUS	2	2	2			Duiker trail
900-950	GUS	2	2	2			
950-1000	GUS	2	2	2			

OTHER NOTES:- 1/4 of the transect were affected by fire few year ago.

**Appendix 5. Disturbance transect 4-Site 2-Bambo**

<b>Names of recorders:</b>		Justine Gwegime			
<b>Date of survey (dd/mm/yyyy):</b>		1/8/2012	<b>District:</b>	Same	
<b>Village:</b>		Bwambo/Mtai	<b>Nearest sub-village:</b>	Mamba myamba/ Mtai	
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>	4	
<b>Dominant vegetation:</b>		Brackens	<b>Bearing:</b>	NE	
<b>Start point Longitude:</b>	380656	<b>Latitude:</b>	9520256	<b>Altitude (m):</b>	1827
<b>End point Longitude:</b>	381043	<b>Latitude:</b>	9520563	<b>Altitude (m):</b>	1838

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	3	0	0	0	0	0	6	0	F	
50-100	16	0	1	0	6	0	4	0	F	
100-150	8	0	0	0	11	0	2	0	F	
150-200	3	0	0	0	1	0	3	0	F	
200-250	9	0	2	0	8	0	3	0	P(1)	
250-300	12	0	0	0	17	0	1	0	F	
300-350	15	0	0	0	11	0	6	0	F	
350-400	22	0	1	0	4	0	5	0	P(1)&F	
400-450	1	0	0	0	2	0	5	0	P(1)&F	
450-500	3	0	1	0	2	0	4	0	F&R(1)	
500-550	0	0	0	0	2	0	5	0	P(2),F&R(1)	
550-600	2	0	1	0	0	0	5	0	P(1)	
600-650										
650-700										
700-750										
750-800										
800-850										
850-900										
900-950										
950-1000										
<b>Total</b>	<b>94</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>64</b>	<b>0</b>	<b>49</b>	<b>0</b>	<b>F(10),P(6)&amp;R(2)</b>	

<b>Key to topography</b>
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<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor

<b>Key to vegetation cover</b>		
<b>1 (&lt;10%)</b>	<b>2 (10-50%)</b>	<b>3 (&gt;50%)</b>

<b>Invasive alien species</b>				
LC =Lantana camara	CO = Cedrela Odorata	RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)
<b>High conservation values</b>				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	1	2	2			
50-100	GUS	1	2	2			River
100-150	GUS	1	2	2			River
150-200	GUS	1	2	2			River
200-250	GUS	1	2	2		S	River
250-300	VF	1	2	2		S	Duiker trail
300-350	VF	1	2	2		S	
350-400	VF	2	2	2		S	Duiker trail
400-450	GUS	2	2	2			
450-500	GUS	2	2	2			
500-550	GUS	2	2	2			
550-600	GUS	2	2	2			
600-650	GUS	2	2	2			
650-700	GUS	1	22	2			
700-750	GUS	1	2	2			
750-800	GUS	1	2	2			
800-850	GUS	1	2	2			
850-900	GUS	1	2	2			
900-950	GUS	1	2	2			
950-1000	GUS	1	2	2			

OTHER NOTES:- The areas highly affected by fires incidences, Huge trees was found fallen due to fire incidences. However, Utilization of already fallen trees is going on.

**Appendix 6. Disturbance transect 5-Site 2-Bwambo**

<b>Names of recorders:</b>	Justine Gwegime				
<b>Date of survey (dd/mm/yyyy):</b>	2/8/2012		<b>District:</b>	Same	
<b>Village:</b>	BWAMBO		<b>Nearest sub-village:</b>	Mtai	
<b>Village Forest Reserve:</b>	Chome Nature Reserve		<b>Transect Number:</b>	5	
<b>Dominant vegetation:</b>	DEF with camphor		<b>Bearing:</b>	SE	
<b>Start point Longitude:</b>	379921	<b>Latitude:</b>	9521140	<b>Altitude (m):</b>	2076
<b>End point Longitude:</b>	379638	<b>Latitude:</b>	9520426	<b>Altitude (m):</b>	1981

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Natural ly dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	10	0	5	0	9	0	2	0	P(1)	
50-100	17	0	0	0	11	0	2	0	0	
100-150	25	0	0	0	10	1	4	0	0	
150-200	20	0	0	0	15	0	0	0	0	
200-250	22	0	0	0	23	0	2	0	0	
250-300	12	0	2	0	10	0	1	0	0	
300-350	13	0	0	0	10	1	0	0	0	
350-400	20	0	0	0	10	0	2	0	R(1)	
400-450	20	1	1	0	26	1	7	0	0	
450-500	24	0	4	0	26	1	3	0	0	
500-550	13	0	0	0	11	0	2	0	R(1)	
550-600	7	0	0	0	23	0	2	0	0	
600-650	20	0	0	0	13	0	1	0	0	
650-700	12	0	0	0	12	1	2	0	0	
700-750	9	0	0	0	28	1	0	0	0	
750-800	15	1	0	0	26	1	0	0	0	
800-850	26	0	0	0	16	0	0	0	0	
850-900	23	0	0	0	7	0	0	0	0	
900-950	11	0	0	0	20	2	0	0	0	
950-1000	17	0	0	0	18	0	1	0	0	
<b>Total</b>	<b>336</b>	<b>2</b>	<b>12</b>	<b>0</b>	<b>324</b>	<b>9</b>	<b>31</b>	<b>0</b>	<b>P(1) &amp; R(2)</b>	

<b>Key to topography</b>							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	CL	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	VF	Valley floor

**Key to vegetation cover**

<b>1 (&lt;10%)</b>	<b>2 (10-50%)</b>	<b>3 (&gt;50%)</b>
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**Invasive alien species**

LC =Lantana camara	<b>CO</b> = Cedrela Odorata	<b>RU</b> = Rubus spp	<b>SJ</b> = Stachytarpheta jamaicensis	<b>O</b> = Other (specify)
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**High conservation values**

<b>S</b> = Stream or spring	<b>M</b> = Ming'oko	<b>T</b> = Threatened plant species	<b>E</b> = Coastal forest or E. Arc endemic species	<b>O</b> = Other e.g. edible mushrooms
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Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	1	2			Duiker trail
50-100	GUS	2	1	2			Unidentified rodent pit
100-150	GUS	2	1	2			Duiker trail
150-200	GUS	2	1	2			Duiker trail
200-250	GUS	3	1	2			Duiker trail(2)
250-300	GUS	3	1	2			Duiker trail
300-350	GUS	3	1	2		S	
350-400	GUS	3	1	2		S	Duiker trail
400-450	GUS	3	1	2		S	
450-500	VF	3	1	2		S	
500-550	VF	3	1	2			
550-600	VF	3	1	2			
600-650	GUS	3	1	2			
650-700	GUS	3	1	2			E.shrew ( Seen)
700-750	GUS	3	1	2			Duiker trail
750-800	GUS	2	1	2			Duiker trail(2)
800-850	GUS	2	1	2			Duiker trail
850-900	GUS	2	1	2			Duiker / E.shrew trail
900-950	GUS	2	1	2			
950-1000	GUS	3	1	2			Dikdik/Duiker trail.

**Appendix 7. Disturbance transect 11- Site 3-Kanza**

<b>Names of recorders:</b>	Justine Gwegime				
<b>Date of survey (dd/mm/yyyy):</b>	8/8/2012	<b>District:</b>	Same		
<b>Village:</b>	Kanza	<b>Nearest sub-village:</b>	Mtii		
<b>Village Forest Reserve:</b>	Chome Nature Reserve	<b>Transect Number:</b>	11		
<b>Dominant vegetation:</b>	DEF with some perinary	<b>Bearing:</b>	NW		
<b>Start point</b> Longitude:	387601	Latitude:	9522269	<b>Altitude (m):</b>	1345
<b>End point</b> Longitude:	386750	Latitude:	9522466	<b>Altitude (m):</b>	1562

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	2	0	1	0	1	1	0	0	P(1)&N(1)	
50-100	6	0	2	0	7	0	1	0	0	
100-150	6	0	3	0	5	0	0	0	0	
150-200	11	0	2	0	10	0	4	0	0	
200-250	5	0	0	0	4	0	0	0	0	
250-300	5	0	2	0	8	0	3	0	0	
300-350	5	0	6	0	5	1	3	0	R(1)	
350-400	10	0	3	2	8	0	6	0	0	
400-450	3	0	6	3	8	0	1	3	P(3)	
450-500	10	0	5	0	15	0	4	0	R(1)	
500-550	1	0	6	6	6	0	3	1	P(1)	
550-600	8	0	3	1	3	0	3	2	P(3)	
600-650	7	0	2	0	4	0	3	0	P(1)	
650-700	8	0	2	0	9	0	7	2	R(1)	
700-750	5	0	5	2	14	0	3	0	P(2)&R(1)	
750-800	0	0	1	0	8	0	4	0	P(1)	
800-850	1	0	2	0	15	0	7	0	P(3)&R(1)	
850-900	8	0	2	0	7	1	2	0	0	
900-950	12	0	1	0	3	0	10	0	P(2)	
950-1000	15	0	1	0	15	0	6	0	0	
<b>Total</b>	<b>128</b>	<b>0</b>	<b>55</b>	<b>14</b>	<b>155</b>	<b>3</b>	<b>70</b>	<b>8</b>	<b>P(17),R(5)&amp;N(1)</b>	

**Key to topography**

<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
<b>Key to vegetation cover</b>							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			

<b>Invasive alien species</b>				
LC =Lantana camara	CO = Cedrela Odorata	RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)
<b>High conservation values</b>				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	VF	2	2	2		S	W.pig footprints&trail.
50-100	VF	2	2	2		S	E.shrew & Duiker trail
100-150	GUS	2	2	2			Duiker trail (4)
150-200	GUS	2	2	2			Duiker trail
200-250	GUS	2	2	2			
250-300	GUS	2	2	2			Duiker trail(2)
300-350	GUS	2	2	2			Aardvak pit & duiker trail
350-400	GUS	2	2	2			E.shrew trail
400-450	GUS	2	2	2			
450-500	GUS	2	2	2			
500-550	GUS	2	2	2			
550-600	GUS	2	2	2			
600-650	GUS	2	2	2			
650-700	GUS	3	2	2			
700-750	GUS	2	2	2			Tree squirrel
750-800	GUS	2	2	2			
800-850	GUS	2	2	2			
850-900	GUS	2	2	2			Duiker trail
900-950	SS	2	2	2			
950-1000	SS	2	2	2			

OTHER NOTES:- Serious extraction of camphor trees in this area is well pronounced

**Appendix 8. Disturbance transect 12-Site 3-Kanza**

<b>Names of recorders:</b>		Justine Gwegime			
<b>Date of survey (dd/mm/yyyy):</b>		08/08.2012	<b>District:</b>		Same
<b>Village:</b>		Kanza	<b>Nearest sub-village:</b>		Mtii/Lugulu
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>		12
<b>Dominant vegetation:</b>		DEF with huge perinary/camphor	<b>Bearing:</b>		SE
<b>Start point Longitude:</b>	386572	<b>Latitude:</b>	9522195	<b>Altitude (m):</b>	1515
<b>End point Longitude:</b>	387130	<b>Latitude:</b>	9521951	<b>Altitude (m):</b>	1500

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fres h			old	fresh		
0-50	16	0	6	0	8	0	5	0	0	
50-100	30	0	7	0	14	0	6	0	P(1)	
100-150	8	0	1	0	13	1	2	0	P(1)&R(1)	
150-200	3	0	1	0	7	1	3	0	P(1)	
200-250	20	0	0	0	3	0	4	0	0	
250-300	5	0	2	0	7	0	7	0	0	
300-350	3	0	6	0	13	1	4	0	0	
350-400	7	1	2	0	11	1	2	0	P(1)	
400-450	11	0	3	0	8	0	1	0	0	
450-500	6	0	6	0	9	2	4	0	P(1)&R(1)	
500-550	3	0	1	0	12	0	2	0	0	
550-600	13	0	0	0	20	0	4	0	R(1)	
600-650	2	0	0	0	23	0	1	0	0	
650-700	27	0	4	0	10	0	3	0	0	
700-750	42	0	7	0	17	0	0	0	0	
750-800	6	0	10	0	15	1	2	0	R(1)	
800-850	12	0	0	0	2	0	0	0	0	
850-900	10	0	3	0	9	0	1	0	0	
900-950	8	1	11	0	13	0	3	0		
950-1000	6	0	4	0	9	0	2	0	P(1)	
<b>Total</b>	<b>238</b>	<b>2</b>	<b>74</b>	<b>0</b>	<b>223</b>	<b>7</b>	<b>56</b>	<b>0</b>	<b>P(6)&amp;R(4)</b>	

<b>Key to topography</b>
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<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
<b>Key to vegetation cover</b>							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			

<b>Invasive alien species</b>				
LC =Lantana camara	<b>CO</b> = Cedrela Odorata	<b>RU</b> = Rubus spp	<b>SJ</b> = Stachytarpheta jamaicensis	<b>O</b> = Other (specify)

<b>High conservation values</b>				
S = Stream or spring	<b>M</b> = Ming'oko	<b>T</b> = Threatened plant species	<b>E</b> = Coastal forest or E. Arc endemic species	<b>O</b> = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	3	1	2			Duiker trail
50-100	GUS	3	1	2			
100-150	GUS	3	1	2			
150-200	VF	3	1	2		S	
200-250	VF	3	1	2		S	
250-300	GUS	3	1	2			
300-350	GUS	2	1	2			
350-400	GUS	2	1	2			
400-450	GUS	2	1	2			Duiker trail
450-500	GUS	2	1	2			
500-550	SUS	2	1	2			
550-600	SUS	2	2	2			
600-650	SUS	2	2	2			Wildpig trail
650-700	GUS	2	2	2			
700-750	GUS	3	2	2			
750-800	GUS	3	2	2			
800-850	GUS	3	2	2			Wildpig trail
850-900	GUS	3	2	2			
900-950	GUS	3	2	2			
950-1000	GUS	3	2	2			

OTHER NOTES:- Parinari species are dominant

**Appendix 9. Disturbance transect 13-Site 3-Kanza**

<b>Names of recorders:</b>		Justine Gwegime&Habibu Said			
<b>Date of survey (dd/mm/yyyy):</b>		9/8/2012	<b>District:</b>	Same	
<b>Village:</b>		Kanza	<b>Nearest sub-village:</b>	Mtii	
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>	13	
<b>Dominant vegetation:</b>		DEF	<b>Bearing:</b>	WWN	
<b>Start point Longitude:</b>	386288	<b>Latitude:</b>	9523089	<b>Altitude (m):</b>	1585
<b>End point Longitude:</b>	386032	<b>Latitude:</b>	9523741	<b>Altitude (m):</b>	1640

<b>Key to disturbance categories</b>							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	6	0	0	0	16	0	1	0	R(2)	
50-100	10	0	1	0	13	1	2	0	0	
100-150	15	0	0	0	9	0	4	0	P(1)	
150-200	13	0	0	0	25	0	0	0	0	
200-250	12	0	1	1	16	0	2	0	P(1)&R(1)	
250-300	5	0	0	0	9	1	3	0	P(1)	
300-350	9	0	0	0	14	0	2	0	R(1)	
350-400	9	1	0	0	15	0	2	0	P(1)	
400-450	8	0	0	0	16	0	2	0	P(1)	
450-500	0	0	2	0	6	0	2	0	P(1)	
500-550	4	0	0	0	11	0	4	0	P(3)	
550-600	6	0	0	0	10	0	3	0	P(2)	
600-650	9	0	0	0	8	0	0	0	0	
650-700	3	0	0	0	15	0	0	0	0	
700-750		0	0	0	21	0	0	0	0	
	14									
750-800	4	0	0	0	12	0	1	0	R(1)	
800-850	7	0	0	0	11	0	6	0	P(2)	
850-900	8	0	1	0	14	0	6	0	P(3)	
900-950	7	0	1	0	19	0	4	0	P(2)	
950-1000	7	0	0	0	16	0	4	0	0	
<b>Total</b>	<b>156</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>276</b>	<b>2</b>	<b>48</b>	<b>0</b>	<b>P(18)&amp; R(5)</b>	

<b>Key to topography</b>							
<b>GLS</b>	Gentle lower	<b>GMS</b>	Gentle mid-	<b>GUS</b>	Gentle upper	<b>CL</b>	Cliffs



	slope		slope		slope		
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
<b>Key to vegetation cover</b>							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
<b>Invasive alien species</b>							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

<b>High conservation values</b>				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	2	2			
50-100	GUS	2	2	2			
100-150	GUS	2	2	2			Elephant shrew trail
150-200	GUS	2	2	2			Elephant shrew trail
200-250	GUS	2	2	2			
250-300	GUS	2	2	2			
300-350	GUS	2	2	2			
350-400	GUS	2	2	2			
400-450	GUS	2	2	2			
450-500	GLS	2	2	2			
500-550	GLS	2	2	2			
550-600	GLS	2	2	2			
600-650	GLS	2	2	2		S	
650-700	SLS	2	2	2			E.shrew trail and Aardvack pit
700-750	SLS	2	2	2			
750-800	SLS	2	2	2			
800-850	GUS	2	2	2			
850-900	GUS	2	2	2			
900-950	GUS	2	2	2			
950-1000	GUS	2	2	2			
OTHER NOTES:- Almost 3/4 of the area is disturbed by timber cutting / extraction .							

**Appendix 10.** Disturbance transect 14 –Site 3-Kanza

<b>Names of recorders:</b>	Justine Gwegime				
<b>Date of survey (dd/mm/yyyy):</b>	9/8/2012	<b>District:</b>	Same		
<b>Village:</b>	Kanza/Miombo	<b>Nearest sub-village:</b>	Mtii		
<b>Village Forest Reserve:</b>	Chome Nature Reserve	<b>Transect Number:</b>	14		
<b>Dominant vegetation:</b>		<b>Bearing:</b>	N		
<b>Start point</b> Longitude:	385657	<b>Latitude:</b>	9523969	<b>Altitude (m):</b>	1682
<b>End point</b> Longitude:	385505	<b>Latitude:</b>	9524808	<b>Altitude (m):</b>	1727

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	15	0	0	0	9	0	0	1	P(1)	
50-100	7	0	0	0	19	0	0	3	0	
100-150	10	0	0	0	18	0	0	1	R(1) &P(1)	
150-200	9	0	1	0	15	0	6	0	P(1)	
200-250	16	0	0	0	4	0	3	0	P(1)	
250-300	15	0	1	0	20	0	0	0	P(1)	
300-350	12	0	0	0	30	0	1	1	P(1)	
350-400	16	0	0	0	13	0	3	1	P(1)	
400-450	13	0	0	0	21	0	2	0	R(1)	
450-500	12	0	0	0	20	0	1	0	0	
500-550	20	0	0	0	13	0	0	0	0	
550-600	14	0	0	0	24	0	0	0	0	
600-650	13	0	0	0	24	0	1	0	0	
650-700	17	0	0	0	22	0	0	0	0	
700-750	14	0	0	0	12	0	0	0	0	
750-800	14	0	0	0	18	0	0	0	0	
800-850	19	0	0	0	25	0	0	0	0	
850-900	30	0	0	0	19	0	0	0	0	
900-950	14	0	0	0	16	0	0	0	0	
950-1000	20	0	0	0	15	0	0	0	0	
<b>Total</b>	<b>300</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>357</b>	<b>0</b>	<b>17</b>	<b>7</b>	<b>P(7)&amp;R(2)</b>	

Key to topography							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
Key to vegetation cover							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
Invasive alien species							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

High conservation values				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	SUS	2	2	2			
50-100	GUS	2	2	2			
100-150	GUS	2	2	2			
150-200	GUS	2	2	2			
200-250	GUS	2	2	2			
250-300	GUS	2	2	2		S	
300-350	GUS	2	2	2			
350-400	GUS	2	2	2			
400-450	GLS	2	2	2			E. shrew trail
450-500	GLS	2	2	2		S	
500-550	GUS	2	2	2			
550-600	GUS	2	2	2			
600-650	GUS	2	2	2			
650-700	GUS	2	2	2		S	
700-750	GUS	2	2	2		S	
750-800	GUS	2	2	2		S	
800-850	GUS	2	2	2			
850-900	GUS	2	2	2			
900-950	GUS	2	2	2			
950-1000	GUS	2	2	2			
OTHER NOTES:- High number of H2O streams/ water sources.							

Appendix 11. Disturbance transect 6-Site 4 –Chome.

<b>Names of recorders:</b>		Justine Gwegime			
<b>Date of survey</b>		3/8/2012	<b>District:</b>		Same
<b>Village:</b>		Chome	<b>Nearest sub-village:</b>		Mtai
<b>Village Forest Reserve:</b>		Chome Nature Reserve	<b>Transect Number:</b>		6
<b>Dominant vegetation:</b>		DEF	<b>Bearing:</b>		SW
<b>Start point</b>					
Longitude:	381984	<b>Latitude:</b>	9525038	<b>Altitude (m):</b>	1970
<b>End point</b>					
Longitude:	381189	<b>Latitude:</b>	9525238	<b>Altitude (m):</b>	1978

Key to disturbance categories							
<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	20	0	1	0	11	0	2	0	P(1)&R(1)	
50-100	19	0	0	0	15	0	0	0	P(1)	
100-150	11	0	0	0	15	0	1	0	0	
150-200	12	0	1	0	8	0	1	0	P(1)	
200-250	11	0	0	0	10	1	0	0	P(1)	
250-300	9	0	0	0	20	0	1	0	R(1)	
300-350	25	1	0	0	23	0	0	0	R(1)	
350-400	26	1	0	0	19	0	0	0	R(1)	
400-450	19	0	0	0	10	0	0	0	0	
450-500	17	0	0	0	12	0	0	0	R(1)	
500-550	25	0	0	0	17	0	0	0	0	
550-600	8	0	0	0	16	0	1	0	0	
600-650	17	0	0	0	18	1	0	0	0	
650-700	6	0	0	0	14	0	0	0	0	
700-750	10	0	0	0	13	0	0	0	0	
750-800	38	0	1	0	13	0	1	0	P(1)	
800-850	21	0	0	0	14	0	0	0	P(1)	
850-900	11	0	0	0	4	0	0	0	F(1)	
900-950	0	0	0	0	5	0	1	0	F(1)	
950-1000	0	0	1	0	1	0	3	0	F(1)	
<b>Total</b>	<b>305</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>258</b>	<b>2</b>	<b>11</b>	<b>0</b>	<b>P(6), R(5) &amp; F(3)</b>	

Key to topography							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
Key to vegetation cover							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
Invasive alien species							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

High conservation values				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	SLS	3	1	2			
50-100	GUS	3	1	2			
100-150	GUS	3	1	2			
150-200	GUS	3	1	2			
200-250	GUS	3	1	2			
250-300	GUS	3	1	2			
300-350	SLS	3	1	2			
350-400	GUS	3	1	2			
400-450	GUS	3	1	2			
450-500	GUS	3	1	2			Black & white colobus monkey seen
500-550	GUS	2	1	2			Duiker trail
550-600	GUS	2	1	2			E.shrew trail
600-650	GUS	2	1	2			Duiker trail
650-700	GUS	2	1	2			Duiker trail
700-750	GUS	2	1	2			E.shrew trail & duiker trail
750-800	GUS	1	1	2			E.shrew trail, Unidentified rodent pit
800-850	VF	1	1	2		S	
850-900	GUS	1	2	2			
900-950	GUS	1	2	2			
950-1000	GUS	1	2	2			

**Appendix 12.** Disturbance transect 7-Site 4-Chome

<b>Names of recorders:</b>	Justine Gwegime & Habibu Said		
<b>Date of survey (dd/mm/yyyy):</b>	08/03/2012	<b>District:</b>	Same
<b>Village:</b>	Chome	<b>Nearest sub-village:</b>	Mtai
<b>Village Forest Reserve:</b>	Chome Nature Reserve	<b>Transect Number:</b>	7
<b>Dominant vegetation:</b>	Grassland/Brackens	<b>Bearing:</b>	SE

<b>Start point</b> Longitude:	<b>380622</b>	Latitude:	<b>9525459</b>	Altitude (m):	1932
<b>End point</b> Longitude:	<b>380922</b>	Latitude:	<b>9524648</b>	Altitude (m):	1934

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	0	0	0	0	1	0	0	0	M(2)	
50-100	0	0	0	0	0	0	0	0	M(1)	
100-150	0	0	0	0	0	0	0	0	M(2)&R(1)	
150-200	0	0	0	0	1	0	0	0	M(3)&R(1)	
200-250	6	0	0	0	0	0	0	0	R(1)	
250-300	0	0	7	0	3	0	1	0	M(3)	
300-350	0	0	0	0	2	0	2	0	M(3)	
350-400	0	0	0	0	0	0	0	0	M(4)	
400-450	0	0	0	0	0	0	0	0	M(2)&R(1)	
450-500	0	0	0	0	0	0	0	0	M(3)&R(1)	
500-550	0	0	0	0	1	0	0	0	R(1)	
550-600	0	0	0	0	0	0	0	0	R(1)	
600-650	0	0	0	0	0	0	0	0	R(1)	
650-700	0	0	0	0	0	0	0	0	R(1)&M(2)	
700-750	0	0	0	0	0	0	0	0	0	
750-800	0	0	0	0	0	0	0	0	M(7) & R(1)	
800-850	0	0	0	0	3	0	0	0	M(7) & R(1)	
850-900	0	0	0	0	4	0	0	0	0	
900-950	0	0	0	0	0	0	0	0	M(3)&R(1)	
950-1000	0	0	0	0	1	0	0	0	R(1)	
<b>Total</b>	<b>6</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>16</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>M(42)&amp;R(13)</b>	

Key to topography							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
Key to vegetation cover							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
Invasive alien species							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

High conservation values				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	VF	1	1	2		S	
50-100	VF	1	1	2		S	
100-150	VF	1	1	2		S	
150-200	VF	1	2	2		S	
200-250	VF	1	2	2		S	
250-300	VF	1	2	2		S	
300-350	VF	1	2	2		S	
350-400	VF	1	2	2		S	
400-450	VF	1	2	2		S	
450-500	VF	1	2	2		S	
500-550	VF	1	2	2		S	
550-600	VF	1	1	2		S	
600-650	VF	1	1	2		S	
650-700	VF	1	1	2		S	
700-750	GUS	1	1	2		S	
750-800	GUS	1	1	2		S	
800-850	GUS	1	1	2		S	Cattle dungs
850-900	GUS	1	1	2		S	Cattle dungs
900-950	GUS	1	1	2		S	Cattle dungs
950-1000	GUS	1	1	2		S	Cattle dungs

OTHER NOTES:-The area is highly affected by small scale gold mining. Mining activities were recorded in almost 3/4 of the transect. Non of the timber sized trees were recorded in this site (Transect).

**Appendix 13.** Disturbance transect 8-Site 5 –Muvaa

<b>Names of recorders:</b>	<b>Justine Gwegime</b>				
<b>Date of survey (dd/mm/yyyy):</b>	<b>08/06/2012</b>		<b>District:</b>	<b>Same</b>	
<b>Village:</b>	<b>Bombo /muvaaa</b>		<b>Nearest sub-village:</b>	<b>Mvango/ Gonja</b>	
<b>Village Forest Reserve:</b>	<b>Chome Nature Reserve</b>		<b>Transect Number:</b>	<b>8</b>	
<b>Dominant vegetation:</b>	<b>DEF/Disturbed forest/Brackens</b>		<b>Bearing:</b>	<b>SW</b>	
<b>Start point Longitude:</b>	<b>386157</b>	<b>Latitude:</b>	<b>9529274</b>	<b>Altitude (m):</b>	<b>1669</b>
<b>End point Longitude:</b>	<b>385324</b>	<b>Latitude:</b>	<b>9529255</b>	<b>Altitude (m):</b>	<b>1747</b>

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	21	0	9	0	6	0	1	0	P(1)	
50-100	23	0	1	0	10	0	2	0	0	
100-150	16	0	2	1	5	1	0	0	P(1)	
150-200	12	0	1	0	19	0	0	0	0	
200-250	19	0	5	0	10	0	0	0	0	
250-300	14	0	0	0	1	1	0	0	0	
300-350	22	0	8	2	10	0	4	1	P(1) &R(1)	
350-400	10	0	10	0	14	0	2	0	R(1)	
400-450	14	0	4	1	11	0	3	1	P(1)	
450-500	21	0	7	0	12	0	3	0	P(1)	
500-550	11	0	8	0	2	0	8	0	P(1)	
550-600	18	0	4	0	8	1	6	2	0	
600-650	8	0	3	0	8	0	1	1	P(2)&R(1)	
650-700	35	0	5	8	8	0	11	1	P(2)&R(1)	
700-750	14	0	2	0	7	0	7	0	P(2)&R(1)	
750-800	20	0	1	0	2	0	13	0	P(2)*	
800-850	12	0	4	0	4	0	2	0	0	
850-900	12	0	2	3	7	0	2	0	P(2)&R(1)	
900-950	11	0	0	1	4	0	3	4	R(1)	
950-1000	15	0	2	0	10	0	1	0	0	
<b>Total</b>	<b>328</b>	<b>0</b>	<b>78</b>	<b>16</b>	<b>158</b>	<b>3</b>	<b>69</b>	<b>10</b>	<b>P(16)&amp;R(7)</b>	

**Key to topography**

<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
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<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
<b>Key to vegetation cover</b>							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
<b>Invasive alien species</b>							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

<b>High conservation values</b>				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	3	1	2			
50-100	GUS	3	1	2			E.shrew trail
100-150	GUS	3	1	2			Duiker trail
150-200	GUS	3	1	2			Duiker trail
200-250	GUS	3	1	2			Duiker trail
250-300	SS	3	1	2			Duiker trail
300-350	SS	3	1	2			
350-400	SS	3	1	2			
400-450	GUS	2	1	2			E.shrew trail & Duiker trail
450-500	GUS	2	2	2			Duiker /Dikdik trail
500-550	GUS	2	2	2			Duiker /Dikdik trail
550-600	GUS	2	2	2			
600-650	GUS	2	2	2			
650-700	GUS	3	2	2			Duiker/dikdik trail
700-750	GUS	3	2	2			
750-800	GUS	3	1	2			
800-850	GUS	2	1	2			
850-900	GUS	2	1	2			
900-950	VF	2	1	2		S	Unidentified pit
950-1000	GUS	3	1	2		s	

**Appendix 14. Disturbance transect 9-Site 5-Muvaa**

<b>Names of recorders:</b>	<b>Justine Gwegime</b>		
<b>Date of survey (dd/mm/yyyy):</b>	<b>08/05/2012</b>	<b>District:</b>	<b>Same</b>
<b>Village:</b>	<b>Muvaaa</b>	<b>Nearest sub-village:</b>	<b>Gonja/ Muvango</b>
<b>Village Forest Reserve:</b>	<b>Chome Nature Reserve</b>	<b>Transect Number:</b>	<b>9</b>
<b>Dominant vegetation:</b>	<b>DEF/ disturbed forest</b>	<b>Bearing:</b>	<b>NE</b>

<b>Start point</b> Longitude:	<b>385291</b>	Latitude:	<b>9529489</b>	Altitude (m):	1744
<b>End point</b> Longitude:	<b>386040</b>	Latitude:	<b>9529888</b>	Altitude (m):	1549

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	11	0	0	1	9	0	0	0	P(2)&R(1)	
50-100	11	0	0	0	11	0	1	0	P(2)	
100-150	10	0	2	0	11	0	0	0	P(1)	
150-200	20	0	6	0	7	0	2	0	0	
200-250	17	0	8	2	2	0	2	1	P(1)	
250-300	17	0	6	0	8	0	6	0	P(3)	
300-350	5	0	3	0	5	0	2	0	0	
350-400	33	0	2	0	2	0	4	0	0	
400-450	11	0	2	0	8	0	5	0	P(1)	
450-500	15	0	3	0	9	0	2	0	P(1)&R(1)	
500-550	10	0	1	0	11	0	1	0	0	
550-600	0	0	2	0	20	0	0	0	0	
600-650	5	0	5	0	6	0	1	0	P(1) & C	
650-700	0	0	3	0	13	1	2	0	R(1)	
700-750	0	0	1	0	12	0	2	0	R(1)	
750-800	0	0	1	0	5	0	5	1	P(1)	
800-850	2	0	0	0	15	0	0	0	0	
850-900	1	0	3	0	10	0	1	0	R(1)	
900-950	5	0	3	0	10	0	1	0	R(1)	
950-1000	0	0	0	0	3	0	0	0	R(1)	
<b>Total</b>	<b>173</b>	<b>0</b>	<b>51</b>	<b>3</b>	<b>177</b>	<b>1</b>	<b>37</b>	<b>2</b>	<b>P(13)&amp;R(7)</b>	

Key to topography							
<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
Key to vegetation cover							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
Invasive alien species							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

High conservation values				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	1	2			
50-100	SS	2	1	2		S	
100-150	SS	2	1	2			
150-200	SS	3	1	2			
200-250	GUS	3	1	2			
250-300	GUS	3	1	2			
300-350	GUS	3	1	2			
350-400	GUS	2	1	2			
400-450	GUS	2	1	2			
450-500	GUS	2	1	2			
500-550	GUS	2	1	2			
550-600	GUS	2	1	2			Duiker trail
600-650	GUS	2	1	2			
650-700	GUS	2	1	2			
700-750	GUS	2	1	2			
750-800	GUS	2	1	2			
800-850	GLS	3	1	2		S	
850-900	GUS	3	1	2		S	
900-950	GUS	3	1	2		S	
950-1000	GUS	2	1	2		S	

**Appendix 15. Disturbance transect 10-Site 5-Muvaa**

<b>Names of recorders:</b>		<b>Justine Gwegime</b>			
<b>Date of survey (dd/mm/yyyy):</b>		<b>08/06/2012</b>		<b>District:</b>	<b>Same</b>
<b>Village:</b>		<b>Muvaa/ Bomboo</b>		<b>Nearest sub-village:</b>	<b>Gonja/ Muvaango</b>
<b>Village Forest Reserve:</b>		<b>Chome Nature Reserve</b>		<b>Transect Number:</b>	<b>10</b>
<b>Dominant vegetation:</b>		<b>Riverline forest/Disturbed forest</b>		<b>Bearing:</b>	
<b>Start point</b>			<b>9529120</b>		
Longitude:	<b>386288</b>	Latitude:		Altitude (m):	<b>1607</b>
<b>End point</b>			<b>9528326</b>		
Longitude:	<b>385907</b>	Latitude:		Altitude (m):	<b>1753</b>

**Key to disturbance categories**

<b>P</b>	Pitsaw	<b>S</b>	Settlement	<b>T</b>	Timber, planks, poles	<b>R</b>	Path or road
<b>F</b>	Fire damage	<b>B</b>	Bark or root harvesting	<b>K</b>	Charcoal kiln	<b>G</b>	Gunfire
<b>C</b>	Cultivation	<b>M</b>	Mining	<b>N</b>	Traps or snares	<b>O</b>	Other

section (m)	Qty of poles (5 – 15 cm)				Qty of timber (> 15 cm dbh)				Other disturbances	
	Live	Naturally dead	Cut		Live	Naturally dead	Cut		Within the transect (qty)	Outside the transect (qty)
			old	fresh			old	fresh		
0-50	0	0	0	0	3	0	0	0	R(1)	
50-100	2	0	10	0	3	0	3	0		0
100-150	7	0	1	0	3	0	0	0		0
150-200	7	0	2	0	16	0	3	0	R(1)	
200-250	5	0	2	0	14	0	1	0	R(1)	
250-300	2	0	0	0	15	0	0	0		0
300-350	2	0	0	0	5	0	0	0	P(1)	
350-400	8	0	0	0	8	0	0	0	P(2)	
400-450	17	0	0	0	9	2	0	0		0
450-500	12	0	4	0	9	0	0	0		0
500-550	7	0	5	1	8	1	7	0		0
550-600	7	0	12	0	7	0	3	1		0
600-650	27	0	12	0	16	0	4	0		0
650-700	38	0	0	0	15	0	0	0	R(1)	
700-750	28	0	1	0	9	0	6	0	P(2)	
750-800	25	0	7	0	15	0	6	0	R(1)	
800-850	25	0	5	2	4	0	5	0		0
850-900	19	0	0	0	6	0	2	0	P(1)	
900-950	14	0	6	0	10	0	2	0	P(2)	
950-1000	23	0	2	0	9	0	2	0	P(2)	
<b>Total</b>	<b>275</b>	<b>0</b>	<b>69</b>	<b>3</b>	<b>184</b>	<b>3</b>	<b>44</b>	<b>1</b>	<b>P(10)&amp;R(5)</b>	

**Key to topography**

<b>GLS</b>	Gentle lower slope	<b>GMS</b>	Gentle mid-slope	<b>GUS</b>	Gentle upper slope	<b>CL</b>	Cliffs
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<b>SLS</b>	Steep lower slope	<b>SMS</b>	Steep mid-slope	<b>SUS</b>	Steep upper slope	<b>VF</b>	Valley floor
<b>Key to vegetation cover</b>							
<b>1 (&lt;10%)</b>		<b>2 (10-50%)</b>		<b>3 (&gt;50%)</b>			
<b>Invasive alien species</b>							
LC =Lantana camara		CO = Cedrela Odorata		RU = Rubus spp	SJ = Stachytarpheta jamaicensis	O = Other (specify)	

<b>High conservation values</b>				
S = Stream or spring	M = Ming'oko	T= Threatened plant species	E = Coastal forest or E. Arc endemic species	O = Other e.g. edible mushrooms

Section (m)	Topography	Canopy cover	Shrub layer	Ground layer	Invasive alien species	High conservation values	Other observations
0-50	GUS	2	1	2		S	
50-100	GUS	2	1	2		S	
100-150	GUS	2	1	2			Giant pouched rat & Trail
150-200	GUS	2	2	2			
200-250	GUS	3	2	2		S	Duiker trail
250-300	SLS	3	2	2		S	
300-350	SLS	3	2	2			
350-400	SLS	3	2	2			
400-450	SLS	2	2	2		S	
450-500	GUS	2	2	2		S	
500-550	GUS	2	2	2			
550-600	GUS	2	2	2			
600-650	GUS	2	2	2			
650-700	GUS	2	2	2			
700-750	GUS	2	2	2			
750-800	GUS	2	2	2			
800-850	GUS	2	2	2			
850-900	GUS	2	2	2			
900-950	GUS	2	2	2			
950-1000	GUS	2	2	2			Unidentified birds pelletes

OTHER NOTES:- Despite the area having reach in water sources but timber extraction is still prominent.