



## **Towards a Sustainably Funded Protected Area Network in the Coastal Forests of Tanzania**



**Synthesis Document of Available Baseline Information on the Coastal Forests Protected Area Sub-System**

**January 2012**

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## Executive Summary

### Biodiversity Baseline Situation

The coastal forests of eastern Africa are a well-known biodiversity hotspot, supporting more than 500 species of plants that are found only in the forest habitat, and an additional more than 800 species that are found in the much larger areas of miombo woodland, thicket and coastal margin vegetation types in the broader coastal region. They are found in regions of the coast that are often densely populated with people, with millions of people living in close proximity to these forests and the surrounding woodlands and bushland habitats. The forests and woodlands provide important part of the livelihoods for many rural people.

Our updated analysis of the endemic and near-endemic species shows that hundreds of species are endemic to the Tanzanian coastal forests; the majority of which are plants. Within Tanzania, at least 700 plants are endemic to the coastal region, with 300-400 endemic to the forests. There are also populations of 14 endemic bird species, with four unique species on Pemba Island. Moreover populations of 13 of the 14 endemic coastal forest mammals are found in Tanzania, together with populations of seven endemic amphibians and at least 20 endemic reptiles, with several species again confined to Pemba Island. Precise statistics on the number of endemics are, however, difficult to generate with complete confidence (especially for the plants). An analysis of the International Union for the Conservation of Nature and Natural Resources (IUCN) red list to assess which species are threatened with extinction, shows that there are 97 threatened plants (and an additional two regarded as extinct or possibly extinct), 14 threatened mammals, 10 threatened birds, five threatened amphibians, and two threatened reptiles in the Tanzanian coastal forests (most reptiles have not been assessed for threat though). More detailed analysis of the species found in the main intervention landscapes shows that there are hundreds of species in each landscape; 759 in Rufiji, 231 in Kilwa, 455 in Lindi and 398 on Zanzibar. Detailed lists of all species in these landscapes have been prepared from older existing data.

Fieldwork was conducted (2011) in the coastal forests of southern Tanzania rediscovered, or reconfirmed, the existence of two species that were regarded as extinct or possibly extinct on the IUCN red list; the trees *Erythrina schleibenii* and *Karomia gigas*. These are now proposed to be re-classified as Critically Endangered. A further 10 threatened plants were also located during the survey period. Other results from biological field work were somewhat disappointing; the forests were very dry at the time of the surveys and the field teams recorded only common species of mammals and reptiles, only one species of amphibian of conservation relevance (*Mertensophryne loveridgei*), and only a few of the coastal forest specialist birds (plain backed sunbird – *Anthreptes reichenowi* and the locally distributed flycatcher - *Batis reichenowi*). It must be noted that the seasonality of the study, in the dry part of the year, has affected the information gathered. On Zanzibar, no further species were added to the lists of species that are already known from these islands. Overall, the Kilwa landscape is under-studied compared to the Lindi and Rufiji landscapes. Protecting the coastal forest habitat and the key species that it contains is a core element of the projects work and these baselines will allow progress against that objective to be measured.

In 2007, the overall area of coastal forest in Tanzania (protected and unprotected) covered an area of 273,700 ha, falling from 420,765 ha in 1990 and 358,333 ha in 2000. By 2007, Pwani and Lindi regions together had 236,633 ha or 86% of the remaining coastal forest, while only 385 ha of forest remained in Dar es Salaam. Across the study area, the rate of forest loss had slowed from the 1.0 % yr<sup>-1</sup> in the 1990s to 0.4 % yr<sup>-1</sup> in 2000–2007. Deforestation also slowed in each of the five regions.

The aggregate deforestation rate inside reserves was nine times slower in reserves than in the unreserved forest lands. Rates of forest loss inside reserves were 0.2 % yr<sup>-1</sup> in 1990–2000 and in 2000–2007 versus 1.3 % yr<sup>-1</sup> in the 1990s and 0.6 % yr<sup>-1</sup> in 2000–2007 outside reserves. While in 2000–2007 forest loss rates decreased in unreserved areas, forest loss rates in reserved areas remained almost constant between 1990–2000 and 2000–2007.

Data from the period 1990-2000 and 2000-2007 shows that the greatest carbon dioxide emissions were in the period 1990-2000, and that the greatest rates in this period were in Lindi Region, followed by Mtwara and Pwani. In the 2000-2007 period the greatest rate was in Pwani region, with losses being much reduced in all other Regions. Total carbon emissions per annum from the coastal forest areas between 1990-2000 was 631,933 tCO<sub>2</sub>yr<sup>-1</sup>, and had declined to 198,154 tCO<sub>2</sub> per annum in the period 2000-2007.

### **Spatial Planning Baseline Situation**

Many of the important areas of forest are already protected, mainly within national and local authority Forest Reserves, but with increasing numbers of Village Land Forest Reserves as well. Despite this work to gazette important forest areas, there remain a number of key gaps in the protection of forest and woodland habitats that support important assemblages of species, including rare and endemic plants, and rare and range-restricted animals.

On the mainland of Tanzania, 110,000 ha Saadani National Park contains Coastal Forest habitats, within the Zaraninge/Kiono plateau forest patch and smaller lowland forest patches that were formally part of the Mkwaja ranch. In total over 3,000 ha of forest is found in this park. On Unguja an important area of Coastal Forest / swamp forest is found within the Jozani National Park, which was gazetted in 2004 and covers 5,000 ha with around 1,000 ha of forest habitat.

Coastal regions of Tanzania contain at least 166 Forest Reserves in lowland areas, which cover 1,191,000 ha of land. Of this total area, almost 960,000 ha are coded as 'production forest' for sustainable utilization, whereas around 231,000 ha are coded as protection forest, primarily for water catchment and habitat conservation purposes. The precise area of forest within these reserves has not been calculated beyond the situation in 2007, but there are plans to update to 2010 with support of the ongoing UNDP - GEF project.

The conservation of unprotected forest areas in southern Tanzania and Zanzibar forms the focus of the UNDP-GEF project 'extending the coastal forest protected area sub-system in Tanzania'. Large areas of unprotected coastal forest habitat are found in Rufiji and Kilwa Districts – with the largest areas in Kilwa. Improving the protection status of these ungazetted forests, and strengthening the existing reserves, forms the majority of the project's work. Upgrading some areas to the status of Nature Reserve – for example the Rondo Nature Reserve in Lindi, forms another part of the projects activities, as does seeking ways to enhance the financial sustainability of the forest management systems. On Zanzibar similar activities are being undertaken, to formally protect some of the remaining patches of natural forest on the island, to upgrade the status of some other areas to Nature Reserve, and to make the reserve system more financially sustainable.

### **Management Issues**

Assessment of the effectiveness of the reserve management has been completed for the protected areas across the coastal forests of Tanzania, with 146 Management Effectiveness Tracking Tool (METT) sheets being filled in. Most effort has been made in the focal landscapes for the project. Mean METT scores for the reserves in these districts are 30.9 in Lindi, 39.46 in Rufiji, 51.3 in Kilwa, 51 on Zanzibar – against a score of 48.5 for the rest of the coastal districts that are not focal areas of the project.

The analysis from recent METT indicate that, the best managed reserves are National Parks managed by Tanzania National Parks (TANAPA), and Village Land Forest Reserves managed at village level. Less well-managed reserves are a combination of National and Local Authority Forest Reserves, which tend to have similar and weak management effectiveness. Very often these reserves have no clear boundary, no management plan, and no management budget allocated by central or local government authorities. Not surprisingly, several of these reserves have also been encroached for farmland, heavily logged for timber, and some have been more or less cleared of woody vegetation to produce charcoal. Improving the effectiveness of management is a core part of the work of this project and the baseline information will allow progress to be measured over time. At the bottom of the list are proposed reserves.

In the target landscapes in Lindi, Kilwa and Rufiji the territorial reserves are not very effectively managed, which has resulted in extensive uncontrolled logging of high value timber and considerable bush-meat hunting. This includes the poaching of elephants both for meat and for Ivory. Several carcasses of elephants were observed during the field survey work in Kilwa in late 2011.

### **Financial Sustainability**

The coastal forests protected area network has very limited funds at present time. In most districts there is no financial allocation to management of the reserves beyond the salary for the District Forest or Natural Resources Officer. Allocations to forest management from the Tanzanian government in the focal landscapes are estimated at: Rufiji USD 13,333, Kilwa USD 22,000, Lindi USD 12,328 and Unguja USD 8,000. This brings the long term sustainability of the system into question. Remaining funding for project activities and field work comes from various kinds of donor funding, which runs in USD 100s of thousands per annum in the same districts outlined above.

In many of the reserves there is also considerable legal and licensed exploitation of timber and other woody products, which brings significant income to the District Council budget. For example in 2010 Rufiji district collected USD 773,333, Kilwa USD 82,000 and Lindi USD 47,162 from natural resources, mainly logging. Illegal exploitation will have generated much more money than this. In this way the reserves are bringing more revenues to the districts than the districts are putting back in financial terms; there is also significant illegal harvesting from the reserves as well, which further reduces the financial sustainability of reserve management as there is less available to use. Capturing more of the benefits of utilisation of the production reserves in the coastal areas would do much to enhance the financial sustainability of the reserve system.

### **Socio-Economic Baseline Situation**

Communities living in the projects focal scapes in Rufiji, Kilwa and Lindi, and on Zanzibar are poor. They are also dependant on farming – a range of cash and food crops - and the exploitation of natural resources for their livelihoods, from timber to charcoal. A social baseline in Rufiji, Kilwa and Lindi has quantified the socio-economic position of communities in intervention landscapes. Income generating options exist through the sustainable, and certified, exploitation of high value timber in southern Tanzania. In Kilwa, the Mpingo Conservation Project Initiative is working with villages to market their timber using sustainable harvesting approaches and using the Forest Stewardship Council (FSC) Group certification scheme. These approaches to sustainable timber harvesting have a chance to improve the financial sustainability of the village Forest Reserves and also can provide significant benefit to the local people involved in that work. A social baseline does not, yet, exist for Zanzibar and income generating options are more likely to involve tourism than sustainable use of timber resources.

## Abbreviations and Acronyms

CARE	Care International in Tanzania
CBD	Convention on Biological Diversity
CBFM	Community Based Forest Management
CBO	Community Based Organization
CF	Coastal Forest
CFs	Coastal Forests
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered (IUCN Red List)
DD	DD (IUCN Red List)
DFO	District Forest Officer
DFNRNR	Department of Forestry and Non-Renewable Natural Resources
EMA	Environmental Management Act
EN	Endangered (IUCN Red List)
FBD/TFS	Forestry and Beekeeping Division now Tanzania Forest Service
FR	Forest Reserve
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GR	Game Reserve
IBAs	Important Bird Areas
IUCN	International Union for the Conservation of Nature and Natural Resources
JFM	Joint Forest Management
KPFR	Kiwengwa Pongwe Forest Reserve
LAFR	Local Authority Forest Reserve
LC	Least Concern (IUCN Red List)
MCDI	Mpingo Conservation and Development Initiative
METT	Management Effectiveness Tracking Tool
NE	Northeast
NEAP	National Environmental Action Plan
NGO	Non-Government Organisation
NP	National Park
NSGRP	National Strategy for Growth and Reduction of Poverty
NT	Near Threatened (IUCN Red List)
PA	Protected Area

## SYNTHESIS OF BASELINE INFORMATION ON TANZANIA'S COASTAL FORESTS – 2011

PFM	Participatory Forest Management
REDD	Reduced Emissions from Deforestation and Degradation
SE	Southeast
TANAPA	Tanzania National Parks
TFCG	Tanzania Forest Conservation Group
TFCMP	Tanzania Forest Conservation and Management Programme
UNCCD	United Nations Convention to Combat Desertification
UNEP-WCMC	Nations Environment Programme – World Conservation Monitoring Centre
UNFCCC	United Nations Framework Convention on Climate Change
UTUMI	Danish Funded Project (defunct)
VLFR	Village Land Forest Reserve
VU	Vulnerable (IUCN Red List)
WCS	Wildlife Conservation Society
WCST	Wildlife Conservation Society of Tanzania
WMA	Wildlife Management Area
WWF	World Wide Fund for Nature
WWF ESARPO	World Wide Fund for Nature East and Southern Africa Regional Office
WWF-TCO	World Wide Fund for Nature Tanzania Country Office

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# 1 Introduction

## 1.1 Overview

Forests contain as much as 90% of terrestrial biodiversity, with tropical forests being particularly important in terms of both species richness and their concentration of endemic species (Brooks et al. 2006). The world's forests are also globally important carbon stores and sinks (Gullison et al. 2007) and provide a wide variety of other ecosystem services for people, such as the protection of fisheries, watersheds and soils. Furthermore, forests constitute an important source of raw materials for both the rural poor who depend on a wide range of forest products to meet basic livelihood needs, and for industry's demand for timber and non-timber products.

Approximately 30% of the global land area is currently forested, but this total is decreasing with mean global deforestation rates amounting to 13 million hectares a year (Achard et al. 2002). This is caused by mankind's continuous destruction and degradation of the world's forests, particularly in tropical countries. Forest biodiversity is also threatened in boreal and temperate forests due to increasingly industrialized management of these forests.

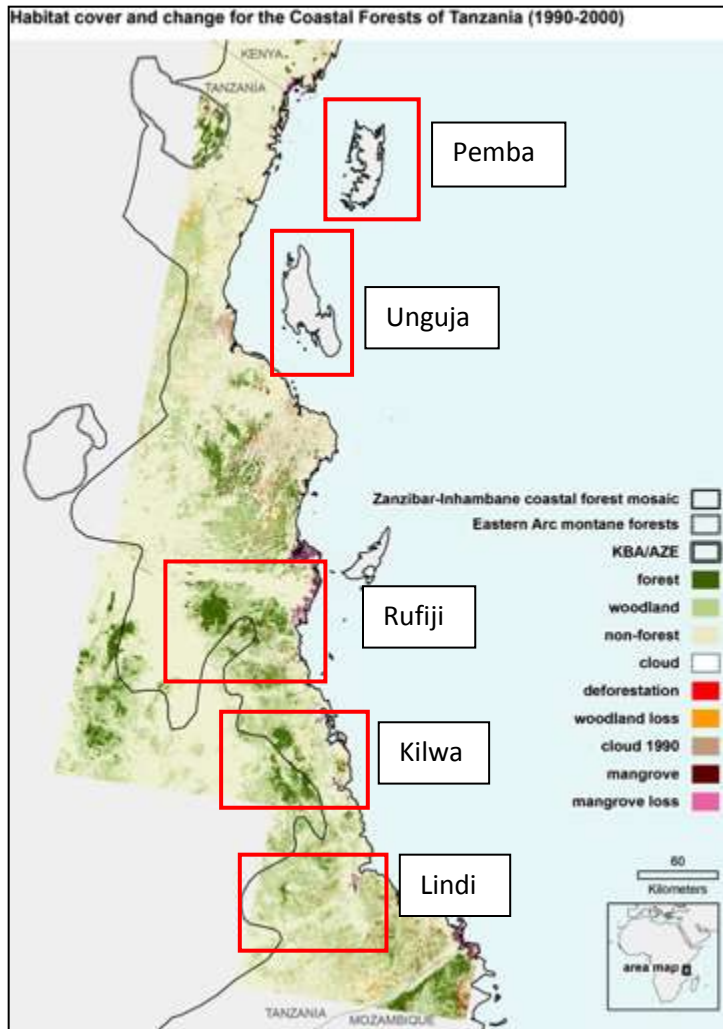
The terms coastal and forest are important to define in this document. "Coastal" means the area lying over sedimentary rocks of the coastal plain and plateaux, to the east of the older basement complexes inland. "Forest" is closed-canopy woody vegetation over 8m tall. The Coastal Forests in this context are not mangroves. Today the eastern Africa coastal strip is mapped by scientists as a Moist Savannah – Forest Complex, but the forest has largely gone. Within this complex there is a wide range of floristic associations with considerable endemism, including different forest types. What we see today is the remains of a once more widespread set of different forest covers along the eastern seaboard. There are stretches of coast that are always moist, with higher plateaux and hills that attract the rain. It is especially these strategically placed plateaux and hills that are rich in biological diversity and endemics.

The overall project is working across the entire coastal region of Tanzania (mainland and offshore islands). Within this there are six landscapes that have been recognised by the Strategic Framework for conservation of the Eastern Africa Coastal Forest Ecoregion; namely Matumbi-Kichi Hills, Kilwa, Lindi-Rondo, Pugu-Kazimzumbwi-Ruvu South, Kiono-Zaraninge-Msubugwe-Gendagenda and the Lowland East Usambaras.

The focus of this Global Environment Facility (GEF) investment on the ground is into the three southern landscapes in Tanzanian mainland (Matumbi, Kiwa and Lindi) and the islands of Unguja and Pemba. These are therefore the focus of the information presented here. Details of the other landscapes are provided in other World Wide Fund (WWF) publications and in the baseline report by Kashaigili *et al.* (2011) that was prepared for the GEF project.

The subsequent subsections provide information on the focal landscapes; this includes descriptions, ecological data, updated maps that show PAs in the landscapes and proposed corridors; they also present information on social-economic and biological values of the natural resources found in the landscapes; conservation issues, threats and drivers are highlighted as well. In addition to the general Tanzania Coastal Forests Map (Figure 1), individual maps for each landscape have been developed and are presented in the respective subsections.

**INTRODUCTION: TANZANIA'S COASTAL FORESTS 2011**



*Figure 1: Coastal forests of mainland of Tanzania and Zanzibar, showing location of the main implementation landscapes for the project*



## 2 Biodiversity Baseline

### 2.1 Overview

The Coastal Forests of Eastern Africa epitomize the difficulties of maintaining biodiversity values in the tropics, in that they show virtually all of the conservation problems faced by conservation planners and protected area managers. The Coastal Forests are:

- Small, and highly fragmented, consisting of many (over 150) separate forest patches, most of which are less than 500 ha in size, and little protected by government agencies.
- Surrounded by impoverished rural communities with a growing demand for farmland and forest resources.
- Individually distinctive, with high local forest endemism and a great array of different plant communities.
- Without the national level 'hard' resources such as commercial timber or water catchment, that would allow species resources to piggyback on their continuation.

The amount of forest remaining in the coastal regions of Tanzania is debated, but the current estimate is around 358,000 ha (Godoy et al. 2011), declining each year as forest cover is converted to farmland or heavily cut for timber and charcoal and is changed from forest to bushland or thicket.

### 2.2 Biological Values of the Coastal Forests

During the past twenty years, the Coastal Forest mosaic of eastern Africa has increasingly become recognized as an area of major conservation importance on the African continent. White (1983) described the vegetation of Africa and recognized the Zanzibar-Inhambane Regional Transition Zone along the eastern seaboard of Africa, and estimated that it possessed 'at least several hundred' endemic plant species. This total was upgraded by Clarke et al. (2000) to at least 1,356 species based on an examination of botanical literature, allowing the area to be upgraded to a regional centre of plant endemism (Clarke, 1998). The Coastal Forest habitat mosaic is also recognized as globally important in analyses of endemic bird species (Stattersfield, 1998) and overall animal and plant species values (WWF) (Burgess 2004). Twelve Important Bird Areas (IBAs) are recognized in the Coastal Forests of Tanzania (Baker and Baker 2002).

Today the Coastal Forests of Eastern Africa are recognized as a globally important conservation priority by BirdLife International, WWF and Conservation International (Stattersfield et al. 1998; Olson and Dinerstein 1998; Burgess et al. 2004; Mittermeier et al. 2004). In 2002 this Hotspot ranked first among the Global Hotspots in terms of the number of endemic plant and vertebrate species per unit area and eighth (globally) in terms of levels of threat (Brooks et al. 2004). The coastal forests are now recognized as a separate biodiversity hotspot, one of 33 globally, having been divided from the Eastern Arc in the updated analysis that was published in 2004. Tanzania contains parts of three distinct *forest-based* global "hotspots for biodiversity."<sup>1</sup> These are the Eastern Arc Montane Forests (95% in Tanzania), the

---

Albertine Rift Forests (5% in Tanzania) and the Coastal Forests (CF) shared with Kenya and Mozambique, with 40% in Tanzania (Myers et al. 1999). Despite being one of the world's "Global Biodiversity Hotspots" (Myers et al. 1998), coastal forests are much less well known than East Africa's montane forests.

The zone of highest biological importance within the Coastal Forests covers around 113,000 km<sup>2</sup> of Kenya and Tanzania, but new work is also showing that the coastal forests of northern Mozambique are also of importance (Timberlake et al. 2011; Clarke 2011).

At a finer scale, two important sub-centres of endemism can also be recognised. The first straddles the border between Kenya and Tanzania - the 'Kwale-Usambara' local centre of endemism, while the second is found in southern Tanzania - the 'Lindi' local centre of endemism (Burgess et al. 1998; Clarke 2001).

### **2.2.1 Species richness and endemism**

The entire Coastal Forests of Eastern Africa Hotspot contains over 3,000 plant species within more than 800 plant genera, of which around 1,356 plant species and 27 genera are endemic (Clarke et al. 2000). The lowland forest habitat is the most biologically valuable and contains at least 554 forest-dependant endemic plant species, with 17 of the 27 described endemic genera confined to forest habitats, although further taxonomic revisions and study might raise this figure to some 800 forest-dependant endemic species (Clarke et al. 2000).

Non-forest vegetation types cover at least 275,000 km<sup>2</sup> of land (0.3 regional endemics plants per 100 km<sup>2</sup> of habitat), whereas the Coastal Forests cover a total of 6,259 km<sup>2</sup> (15.3 regional endemics per 100 km<sup>2</sup> of habitat) (data from Clarke et al. 2000), so it is clearly the forest patches that have the highest biodiversity importance per unit area. A substantial proportion of the endemic plants are confined to a single forest (for example, the Rondo Forest area in southern Tanzania has at least 60 strict endemics, the Litipo Forest, also in southern Tanzania has at least 30 strict endemics and the Shimba Hills in Kenya has 12) (Clarke et al. 2000; Clarke 2001).

Similarly, these forest patches are important in terms of vertebrate diversity and endemism. Birds are represented by 94 species, of which 14 species are endemic to the Coastal Forest hotspot. In the Tanzanian portion, Pemba Island contains four endemic bird species (*Treron pembaensis*, *Nectarinia pembae*, *Zosterops vaughani* and *Otus pembaensis*). Other endemics are scattered in the Coastal Forest remnants in Kenya and Tanzania (*Erythrocerus holochlorus*, *Anthus sokokensis* (EN), Sokoke scops owl (*Otus ireneae*, EN) and *Campethera mombassica*). Among the near-endemic species, two are shared with the adjacent Eastern Arc forests, Fischer's turaco (*Tauraco fischeri*), and Amani sunbird (*Anthreptes pallidigaster*, EN). There are no endemic bird genera or families.

Some 154 mammal species are recorded from this hotspot, of which 14 are endemic (including four undescribed shrews). Endemic Coastal Forest mammals present in the Tanzanian Coastal Forests include Aders' duiker (*Cephalophus adersi*, EN), Pemba flying fox (*Pteropus voeltzkowi*, CR), Dar es Salaam pipistrelle (*Pipistrellus permixtus*, DD), Zanzibar red colobus (*Procolobus kirkii*, EN), Rondo galago (*Galagoides rondoensis*, CR), which may eventually be separated into two species, and the rodent *Grammomys caniceps*.

Among the remaining terrestrial vertebrates, some 109 reptiles are recorded, 132 species are endemic or near-endemic to the hotspot (Broadley undated). In addition, there are 72 amphibian species, of which seven endemic and near-endemic species are found in coastal Tanzania: *Mertensophryne micranotis*, *Stephopaedes howelli*, *S. loveridgei*, *S. usambarensis*, *Afrixalus sylvaticus* and *Hyperolius rubrovermiculatus*. The species *Kassina jozani* is endemic to the Jozani Forest on Zanzibar. The toad genus *Mertensophryne* is endemic to the hotspot.

## BIODIVERSITY BASELINE: TANZANIA'S COASTAL FORESTS 2011

While the endemism within vertebrates is impressive, rates of endemism are even higher in invertebrate groups such as millipedes (80% of all the forest species) and molluscs (68%) (Burgess and Clarke 2000). Interestingly, in the dragonflies there is a notable Gondwana relict species (*Coryphagrion grandis*) that has its nearest relatives in Central and Southern America.

Narrow ranges and disjunct distributions typify the endemic species, for example among the birds and the plants (Burgess and Clarke 2000). There is also a huge turnover of species between forest patches, especially in the less mobile species. Forests that are only 100 km apart can differ in 70% of their millipedes (Hoffman 2000), and in 80% of their plants (Clarke et al. 2000). The flora has affinities with that of West Africa, suggesting an ancient connection with the Guineo-Congolian lowland forests (Lovett and Wasser 1993; Clarke et al. 2000). Endemism is primarily ancient and relictual rather than recently evolved (Burgess et al. 1998; Clarke et al. 2000).

Table 1: Threatened species of vertebrates in the coastal forests of Tanzania (based on 2010 version of the IUCN Red List)

Genus	Species	Synonyms	Red List status	Red List criteria
<b>Birds</b>				
<i>Anthreptes</i>	<i>pallidigaster</i>	Amani Sunbird	EN	B1ab(i,ii,iii,v); B2ab(i,ii,iii,v)
<i>Anthreptes</i>	<i>reichenowi</i>	Plain-backed Sunbird	NT	-
<i>Anthus</i>	<i>sokokensis</i>	Sokoke Pipit	EN	B1ab(i,ii,iii,v)
<i>Apalis</i>	<i>chariessa</i>	White-winged Apalis	VU	B1ab(i,ii,iii,iv,v)
<i>Circaetus</i>	<i>fasciolatus</i>	Southern Banded Snake Eagle	NT	-
<i>Otus</i>	<i>ireneae</i>	Sokoke Scops Owl	EN	B1ab(iii)
<i>Otus</i>	<i>pembaensis</i>	Pemba Scops Owl	VU	C2a(ii)
<i>Sheppardia</i>	<i>gunningi</i>	East Coast Akalat	NT	-
<i>Swynnertonia</i>	<i>swynnertoni</i>	Swynnerton's Robin	VU	B1ab(ii,iii,v); C2a(i)
<i>Terathopius</i>	<i>ecaudatus</i>	Bateleur	NT	-
<i>Treron</i>	<i>pembaensis</i>	Pemba Green Pigeon	VU	C2a(ii)
<i>Zoothera</i>	<i>guttata</i>	Spotted Ground Thrush	EN	C2a(i)
<b>Mammals</b>				
<i>Cephalophus</i>	<i>adersi</i>	Aders' Duiker	CR	A4cd
<i>Diceros</i>	<i>bicornis</i>	Black Rhinoceros	CR	A2abcd
<i>Galagoides</i>	<i>rondoensis</i>	Rondo Dwarf Galago	CR	B1ab(ii,iii)
<i>Hippopotamus</i>	<i>amphibius</i>	Hippopotamus	VU	A4cd
<i>Kerivoula</i>	<i>africana</i>	Tanzanian Woolly Bat	EN	B2ab(iii)

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<i>Loxodonta</i>	<i>africana</i>	African Elephant	VU	A2a
<i>Myonycteris</i>	<i>relicta</i>	East African Little Collared Fruit Bat	VU	A4c
<i>Panthera</i>	<i>leo</i>	Lion, African Lion	VU	A2abcd
<i>Procolobus</i>	<i>kirkii</i>	Zanzibar Red Colobus	EN	B1ab(ii,iii,v)
<i>Pteropus</i>	<i>voeltzkowi</i>	Pemba Flying Fox	VU	D2
<i>Rhynchocyon</i>	<i>chrysopygus</i>	Golden-rumped Elephant Shrew	EN	B1ab(iii)
<i>Rhynchocyon</i>	<i>petersi</i>	Black And Rufous Elephant Shrew	VU	B1ab(iii)
<i>Taphozous</i>	<i>hildegardeae</i>	Hildegarde's Tomb Bat	VU	B1ab(iii)
<b>Reptiles</b>				
<i>Elapsoides</i>	<i>nigra</i>		EN	B1ab(iii)
<i>Lygosoma</i>	<i>mafianum</i>		EN	B1ab(iii)
<b>Amphibians</b>				
<i>Afrixalus</i>	<i>sp.</i>		VU	B1ab(iii)
<i>Afrixalus</i>	<i>sylvaticus</i>		EN	B2ab(iii)
<i>Afrixalus</i>	<i>uluguruensis</i>		EN	B1ab(iii)
<i>Hyperolius</i>	<i>rubrovermiculatus</i>		EN	B1ab(iii)
<i>Stephopaedes</i>	<i>sp.</i>		EN	B1ab(iii)

Table 2: Species richness\* within the GEF project implementation landscapes \*\*

	Kilwa Landscape	Lindi Landscape	Matumbi Landscape	Zanzibar Landscape
Amphibia	10	16	22	11
Aves	52	58	40	31
Plantae	133	249	625	286
Mammalia	28	48	46	42
Reptilia	8	84	26	28
TOTAL NUMBER OF SPECIES	231	455	759	398

\*only species of some conservation interest are included; widespread species have been omitted so the total species number is actually higher

\*\* based on the synthesis of past survey work and the results of new surveys concluded during this projects baseline phase

## 2.2.2 Flagship species

The Coastal Forests in Tanzania, especially in the south, support significant populations of elephants (*Loxodonta africana*). Other African flagship species occur, for example, African wild dog (*Lycaon*

*pictus*), lion (*Panthera leo*), leopard (*Panthera pardus*) and perhaps a few black rhinoceros (*Diceros bicornis*).

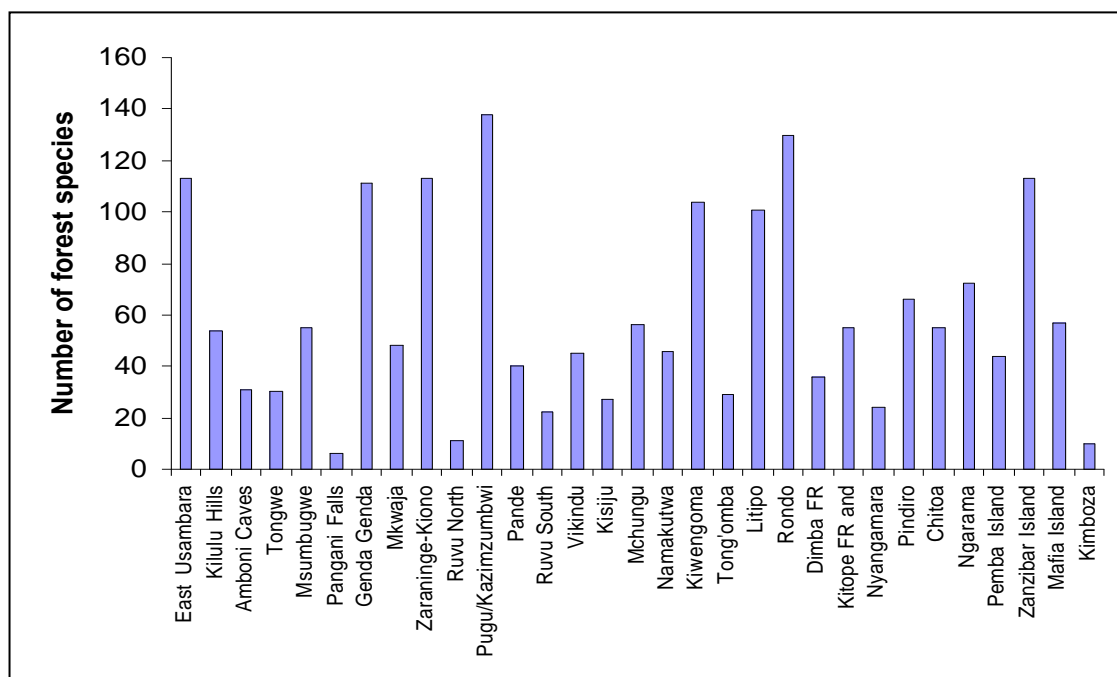
The Zanzibar red colobus (*Procolobus kirkii*) is also a flagship species on Unguja Island. The estimated global population is around 2,500 individuals, mainly living in and around the Jozani Forest, but also in a number of village forests in close association with people. It is not hunted by the Muslim inhabitants of this island and has become a significant tourist attraction. A few individuals have also been introduced into Pemba island, but are not doing well.

Among the plants, the main flagship species in the coastal forests are African violets (*Saintpaulia* sp), which are only present in a few of the wetter forests, mainly close to the East Usambara mountains. These plants are globally cultivated as houseplants, but originate in Tanzanian and Kenyan forests. The Coastal Forests also contain 11 species of wild coffee, of which eight are endemic (Clarke et al. 2000). None of these have been exploited as commercial crops. There are also important stands of cycads in some well sheltered areas where fire is not a strong threat, with the common species being *Encephalartos hildebrandtii*. Preliminary botanical explorations in the little-known Namatimbili-Ngarama forest block located some 35 km inland of Kilwa in south-east Tanzania have rediscovered and further confirmed the presence of two tree species, *Erythrina schliebenii* Harms and *Karomia gigas* (Faden) Verdc., that were previously thought to have become extinct. Both trees are endemic to the Coastal Forests of Eastern Africa hotspot and to the Swahilian Regional Centre of Endemism (Clarke et al. 2011).

## 2.3 Priority Analyses

### 2.3.1 Simple number of important vertebrates

A simple addition of the forest species of birds, mammals, reptiles and amphibians found in those Coastal Forests of Tanzania that have been studied, indicates a rough idea of biological priority (Figure 2). This shows that several sites have more than 100 forest species present, East Usambara lowlands, Gendagenda, Zaraninge (now part of Sadaani NP), Pugu/Kazimzumbwe (now heavily degraded), Kiwengoma, Litipo, Rondo and Zanzibar Island. The last four of these sites are within the intervention landscapes of this GEF project.



*Figure 2: Number of forest vertebrates across the Coastal Forest sites of Tanzania (based on data from Burgess and Clarke 2000); these data are historical and for heavily degraded sites near Dar es Saalam species richness is certainly now much lower than this*

### **2.3.2 Other priority setting approaches**

Various analytical approaches exist for assessing the degree of biological 'priority' within the Coastal Forests of Tanzania. At the larger scale, the biogeographical region that contains the Coastal Forests has been defined as a global biological priority. Moreover, work undertaken as a part of the IUCN Coastal Forests of Eastern Africa book (Burgess and Clarke 2000) and the WWF conservation planning (WWF EARPO 2006) has also defined some of the areas of higher biological value within the coastal region.

Other approaches using computer based priority setting can also provide some guidance on the importance of different areas within the broader Coastal Forests region. Below we present the results of two such approaches, one an analysis using the programme WORLDMAP of the biological databases developed at the University of Copenhagen in Denmark (<http://130.225.211.158/subsaharanafrica>), and the other using the programme C-Plan applied to the threatened species data collected by the Critical Ecosystem Partnership Fund and their partners in East Africa for the CEPF Profile for eastern arc and coastal forests (CEPF 2003).

*1) Priority areas for African vertebrates.* This presents a minimum set of areas in ranked order that have been identified as essential to protect all the 4,202 vertebrates in Africa (Figure 3). Six one degree grid cells are identified as critically important for species conservation using this analytical approach, including the Rondo, Matumbi, Pugu, Gendagenda, and the lowland East Usambaras areas (2 grids). These areas correspond well with the priority intervention landscapes selected for this GEF coastal forests project.

## BIODIVERSITY BASELINE: TANZANIA'S COASTAL FORESTS 2011

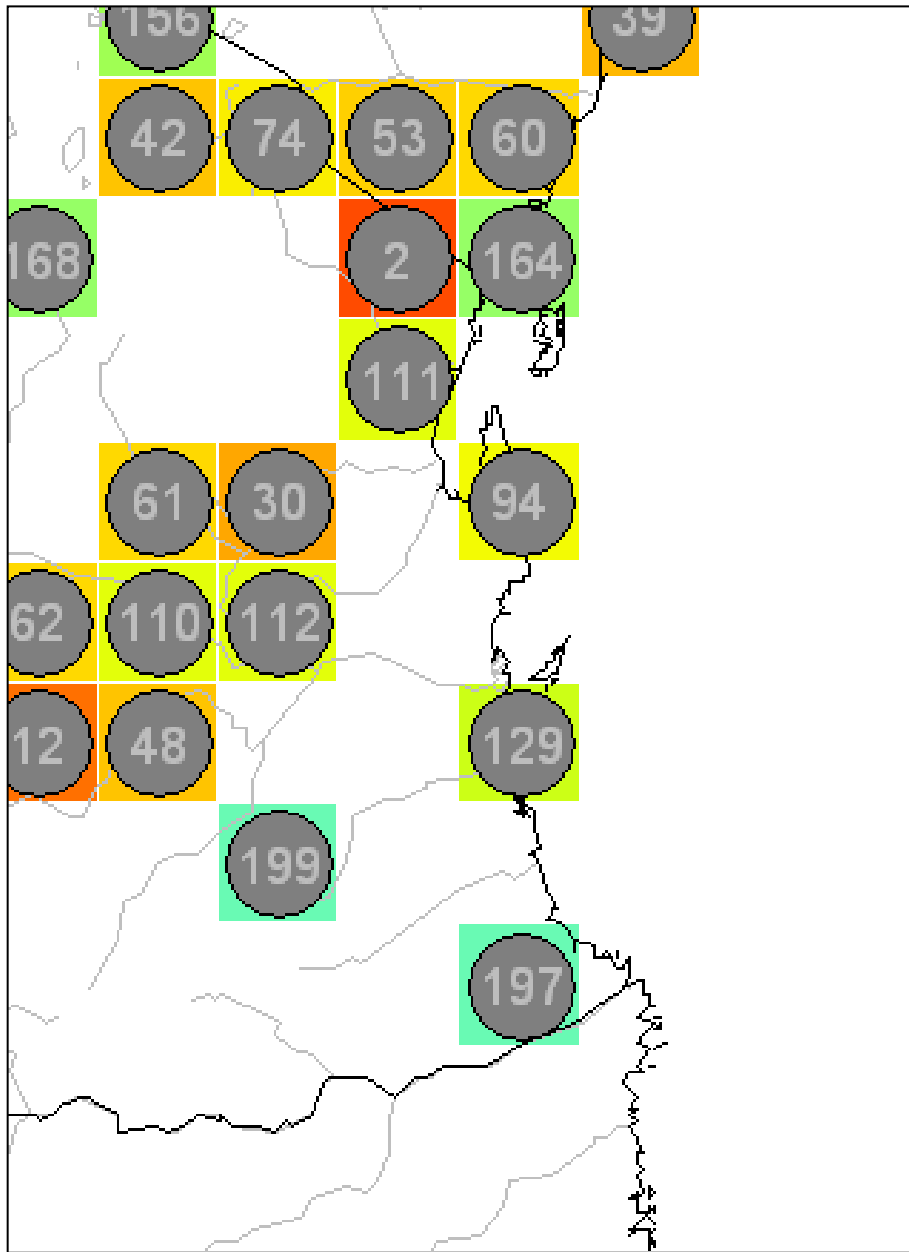


Figure 3: Ranked priority areas for the conservation of 4,202 species of birds, mammals, amphibians and snakes (not other reptiles) in Sub-Saharan Africa (based on databases compiled to 2007)

2) *Priority sites for threatened species.* An analysis of the irreplaceability of sites in the coastal region of Tanzania has also been completed; based on records of threatened vertebrates, plants and invertebrates. The approach identifies a scattering of sites within the Tanzanian Coastal Forests, many of which are regarded as wholly irreplaceable (no other options for conservation of that species), while other areas provide more options for conservation (Figure 4). It is perhaps important to note that there are priority sites along the entire coast of Tanzania.

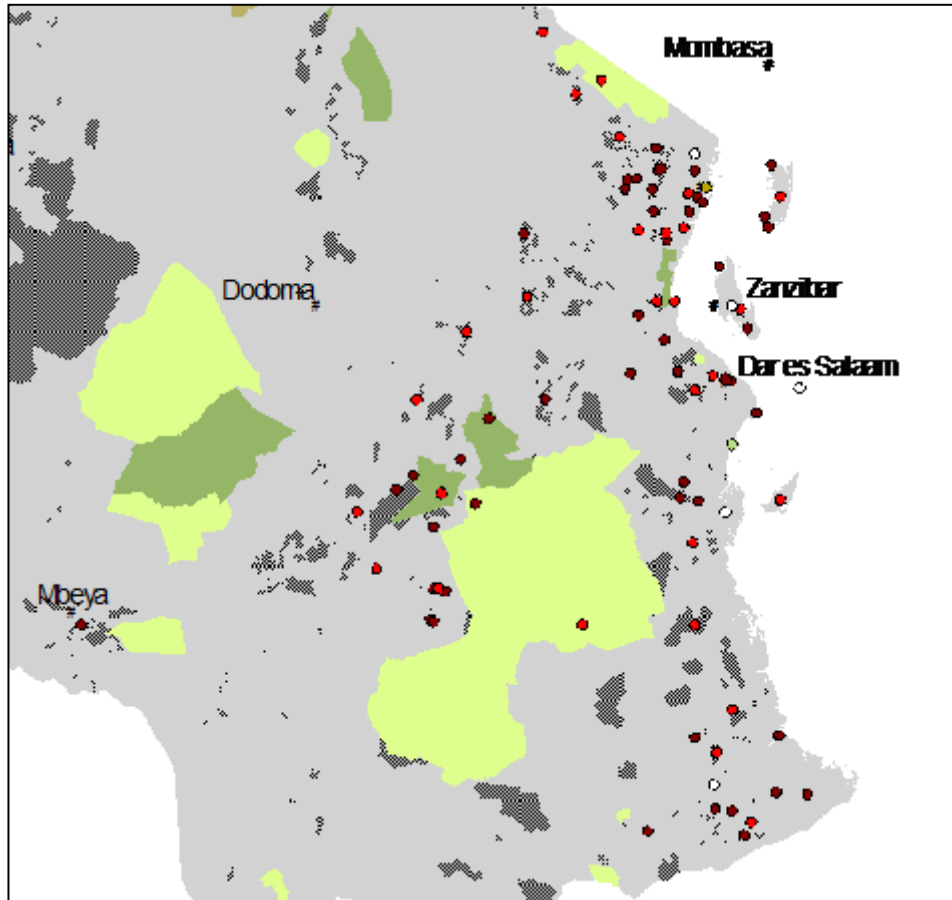


Figure 4: Map of irreplaceable sites (dark red) and optional sites (red) for the conservation of all the threatened species in the Eastern Arc and Coastal Forests Hotspot of Tanzania (based on data in Burgess and Clarke 2000; and Eastern Arc data from Burgess et al. 2007b)

## 2.4 The Coastal Forest Habitat in Eastern Africa

The coastal strip of eastern Africa supports a mosaic of different natural vegetation types. Much of the area supports bushland/thicket habitats and coastal variants of savannah woodland habitats. There are also smaller areas of wetland, and patches of lowland forest. Large areas have also been converted to farmland and 'mango/cashew nut savannah'. The total area of land covered by this mosaic of habitats is around 280,000 km<sup>2</sup> (Coastal Forest mosaic and Zambezi coastal savannah – but excluding mangrove forests).

Data from Burgess and Clarke (2000) shows that Coastal Forests are usually found up to 500 m above sea level, although in Tanzania they can occur to over 1,000 m on isolated hills, for example on the Rondo Plateau in SE Tanzania and Handeni Hill in NE Tanzania. Rainfall ranges between 2,000 mm/year (Pemba) and 600 mm/year (northern Kenya and parts of southern Tanzania/northern Mozambique). There are two rainy seasons (long, April-June; short, November-December) in the north, but only one (November to April) in the south. Dry seasons can be severe and El Niño effects can be dramatic. Climate change impacts are starting to be felt in some areas. Climatic conditions along the coast are



believed to have been relatively stable for the last 30 million years (Axelrod and Raven, 1978), although variation from year to year can be considerable, leading to droughts or floods.

The Coastal Forests and the Eastern Arc forests share a large number of widespread African forest species, although this apparent similarity is misleading as these species only represent a fraction of the total number of individual trees in each forest type, yet this has nonetheless resulted in the distinction between the two forest types becoming a matter of some debate (e.g. Lovett *et al.* 2000, Clarke *et al.* 2000). The altitudinal separation is generally placed around 500-800 m (e.g. White 1983), but varies according to local ecological conditions (Clarke 2000). A gradation between the two forest types is found on the East Usambara, Uluguru, Udzungwa and Nguru ranges. Other Coastal Forests are not contiguous with mountain forest habitats and are often separated from the mountains by 100s of km of drier Zambebian woodlands.

## 2.5 Forest Cover and Change in Coastal Tanzania

Sokoine University of Agriculture and Conservation International, working with technical input from WWF and Tanzania Forest Conservation Group (TFCG) have developed an improved forest change map for the Coastal Forests of Tanzania from 1990-2000-2007. This map uses Landsat imagery to assess the area of forest at these three dates, and calculates the area of forest that has been lost over this decade.

In 2007, coastal forest cover in Tanzania covered an area of 273,700 ha, falling from 420,765 ha in 1990 and 358,333 ha in 2000 (Godoy *et al.* 2011). By 2007, Pwani and Lindi regions together had 236,633 ha or 86 % of the remaining coastal forest, while only 385 ha of forest remained in Dar es Salaam. Across the study area, the rate of forest loss had slowed from the 1.0 % per year in the 1990s to 0.4 % per year in 2000–2007. Deforestation also slowed in each of the five regions.

The aggregate deforestation rate inside reserves was nine times slower in reserves than in the unreserved forest lands. Rates of forest loss inside reserves were 0.2 % per year in 1990–2000 and in 2000–2007 versus 1.3 % per year in the 1990s and 0.6 % per year in 2000–2007 outside reserves (Table 3). While in 2000–2007 forest loss rates decreased in unreserved areas, forest loss rates in reserved areas remained almost constant between 1990–2000 and 2000–2007.

*Table 3: Forest change in the coastal districts of Tanzania from 1990-2000-2007 (from Godoy *et al.* 2011).*

	Forest cover	Forest cover	Forest cover	Yearly forest change	Yearly forest change	Cloud Factor	Yearly forest change	Yearly forest change	Cloud Factor
	~1990	~2000	~2007	1990-2000	1990-2000	1990-2000	2000-2007	2000-2007	2000-2007
	ha	ha	ha	ha/ y	%/ y	%	ha/ y	%/ y	%
Dar es Salaam	2,007	650	385	66	-7.9	3	1	-0.2	14
Lindi	152,026	141,977	114,789	1,106	-0.8	100	181	-0.2	81
Mtwara	43,576	29,601	16,942	1,553	-4.2	100	103	-0.6	59
Pwani	201,133	165,714	121,844	1,537	-0.9	54	908	-0.7	58
Tanga	22,023	20,390	19,749	57	-0.3	60	0	0.0	55

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Total	420,765	358,333	273,709	3,735	-1.0	67	1,233	-0.4	65
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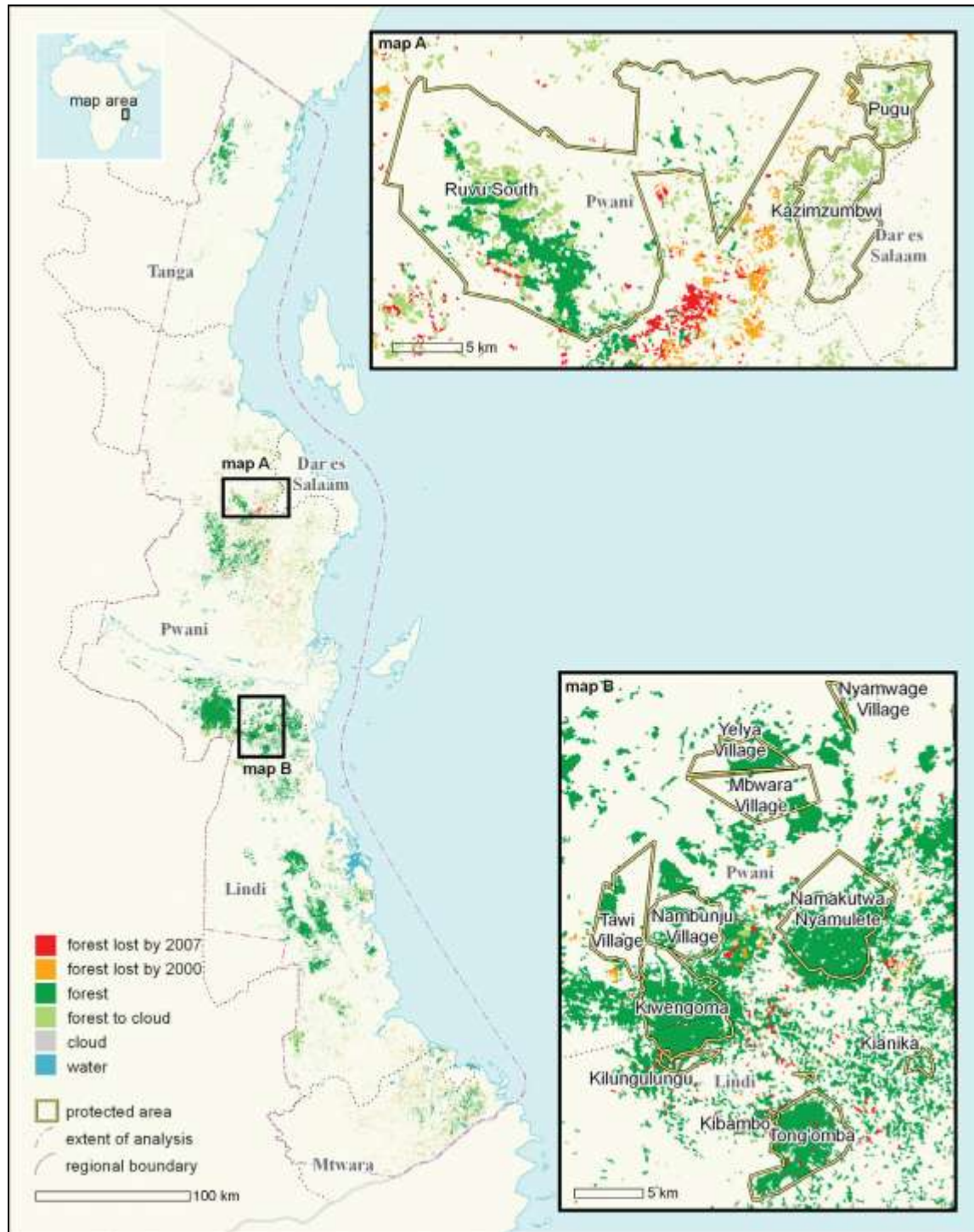


Figure 5: The extent of the coastal forests of Tanzania, across Tanga, Pwani, Lindi, Mtwara and Dar es Salaam regions, and forest cover in 1990–2000–2007. The two map insets detail patterns of deforestation from 1990–2000–2007 around reserved areas near Dar es Salaam (map A) and the Matumbi Hills (map B) (from Godoy et al. 2011)

## 2.6 Implications for Carbon Emissions

The forest status and change analysis of Godoy et al. (2011) has also been turned into an assessment of carbon stock and change. The carbon data used was from an African wide map of above ground carbon developed by Baccini et al. (2008). Carbon content was assumed to be 50 % of dry weight. Average carbon stock for above- and below-ground biomass was calculated for each district based on the forested area in 2000. The map of carbon stocks was combined with that of forest-loss data for 1990–2000 and 2000–2007 to estimate gross carbon emissions during each period. It was assumed that all carbon content was released into the atmosphere once the vegetation was cleared.

Results (Table 4) show that the greatest CO<sup>2</sup> emissions were in the period 1990-2000, with the greatest rates in Lindi, followed by Mtwara and Coast regions. In the 2000-2007 period the greatest rate was in Coast region, with losses reduced in all other Regions. Total carbon emissions per annum from the coastal forest areas between 1990-2000 were 631,933 tCO<sup>2</sup> per annum, and had declined to 198,154 tCO<sup>2</sup> per annum in the period 2000-2007.

Table 4: Annual emissions among Tanzanian regions – 1990-2000 and 2000-2007 (emission measures are in tonnes CO<sup>2</sup> per year)

Region	Annual Emission rate tCO <sup>2</sup> yr <sup>-1</sup>	
	1990-2000	2000-2007
Dar es Salaam	553	14
Lindi	267,524	56,576
Mtwara	198,132	16,042
Coast	151,151	125,521
Tanga	14,574	0
Total	631,933	198,154

## 2.7 Matumbi Landscape

Previous biodiversity surveys by WWF and Frontier-Tanzania have revealed that the forest/woodland mosaic of the Matumbi/Kichi Hills have high species richness, diversity and endemism. These results are summarised in Clarke and Dickinson (1995), St. John (2007) and Perkin et al. (2008).

### *Types of trees*

There are number valuable trees in landscape, although species like *Azelia quanzensis*, *Khaya anthotheca*, *Milicia excelsa* and *Pterocarpus angolensis* have been depleted through illegal harvesting. Table 5 outlines the perceived abundance and use of some tree species, as observed by local communities in 2011.

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Table 5: Perceptions of villagers on abundance of some useful tree species in the surrounding forest areas

Local name	Scientific name	Abundance	Use value
Mvule	<i>Milicia excelsa</i>	Medium	Timber
Mkongo	<i>Azelia quanzensis</i>	Medium	Timber
Mninga	<i>Pterocarpus angolensis</i>	Medium	Timber
Mpondo	<i>Commiphora africana</i>	Medium	Firewood
Msufi mwitu	<i>Bombax rhodognaphalon</i>	Medium	Timber
Mtondoro	<i>Brachystegia spiciformis</i>	High	Timber
Mkarati	<i>Bridelia micrantha</i>	High	Timber
Msekeseke	<i>Ochna densicoma</i>	Medium	Timber
Mkuruti	<i>Diospyros consolatae</i>	Medium	Medicinal
Mnondondo (Mdamudamu)	<i>Julbernardia globiflora</i>	High	Timber
Mdundu	<i>Lonchocarpus bussei</i>	Medium	Medicinal

### Birds

The landscape is an important area for coastal forest birds. The area supports coastal forest endemic species including: southern-banded snake eagle (*Circaetus fasciolatus*), plain backed sunbird (*Antheptes reichenowi*), tiny greenbul (*Phyllastrephus debilis*), Fischer's greenbul (*Phyllastrephus fischeri*) and Livingstone's flycatcher (*Erythrocerus livingstonii*).

### Mammals

Matumbi- Kichi Hill landscape provides excellent habitat for a number of mammals. Near endemic species include the chequered elephant shrew *Rhynchocyon cirnei*. There are also populations of elephant (*Loxodonta africana*) and lion (*Panthera leo*). An undescribed species of shrew *Crocidura* sp. is found in Tong'omba. Other large and medium sized mammals include buffalo (*Syncerus caffer*), leopard (*Panthera pardus*), wild dog (*Lycaon pictus*), dik dik (*Madoqua kirkii*), bush pig (*Potamocheirus porcus*), baboons (*Papio spp.*), vervet monkey (*Chlorocebus pygerythrus*), greater kudu (*Tragelaphus strepsiceros*), spotted hyena (*Crocuta crocuta*), black and white colobus monkey (*Colobus guereza*), bushbuck (*Tragelaphus scriptus*), common duiker (*Sylvicapra grimmia*), hartebeest (*Alcelaphus buselaphus*), sable antelope (*Hippotragus niger*), waterbuck (*Kobus ellipsiprymnus*), zebra (*Equus burchelli*), impala (*Aepyceros melampus*), wildebeest (*Connochaetes taurinus*), eland (*Taurotragus oryx*), porcupines (*Hystrix spp.*) and warthog (*Phacochoerus aethiopicus*). The abundance of mammals increases towards the Selous Game Reserve.

### Other animal biodiversity

This landscape supports a diverse assemblage of reptiles. The prominent ones are African rock python (*Python sebae*), Cobra spp., Viper spp., *Lygodactylus spp.*, *Cnemaspis uzungwae*, *Hemidactylus spp.*, *Agama mossambica*, *Chamaeleo spp.*, *Rhampholeon spp.*, *Sepsina t. tetradactyla*, *Bitis g. gabonica*, *Melanoseps loveridgei*, *Atractaspis bibronii*, *Philothamus hoplogaster*, and *Thelotornis capensis*

*mossambicanus*. The rare montypic scarlet-snouted frog *Spelaeophryne methneri* whose type locality is the Nangoma caves, has since been collected in some of the Eastern Arc mountains. The landscape also contains at least three endemic species of plants, an endemic butterfly, and at least 16 undescribed species of millipedes.

## **2.8 Kilwa Landscape**

In the Kilwa Landscape, there are distinct strips of vegetation running parallel with coast (Prins and Clarke 2006). Moving inland from the coast, the strips are made up of Coastal Forests on the discontinuous chain of hills along the coast, scrub forests, *Brachystegia* forest, thick miombo, to open woodland dominated by miombo (*sensu* Clarke 2000; Clarke 2001).

The majority of the Coastal Forests are concentrated in Ruwawa (Ngarama North and South, and Mitundumbea Forest Reserves) and Mbarawala (including Pindi Forest Reserve) Plateaus. Rungo FR is located on the western part of the landscape, with Ngarama North and South Forest Reserves in the east, and Mitundumbea FR and Uchungwa also in the east. The reserves are surrounded by miombo woodlands and areas of un gazetted coastal forest that is in the process of being included within Village Land Forest Reserves and Wildlife Management Areas. The eastern part of the plateaus towards the coastal plain is largely dominated by dry forests and woodlands (Perkin et al. 2008b).

### ***Ruwawa Plateau***

This plateau is characterized by an escarpment facing to the east formed by sea level changes and uplift processes. The plateau is mainly ancient coral rag limestone which results in free draining dry conditions and the formation of caves, which some animals find them (caves) suitable habitats. Mitundumbea, Ngarama North and South FRs protect parts of the plateau. The plateau is covered with different types of scrub forest. There are also a few patches of Coastal Forest that occur on the plateau particularly to the North West along ridges of well-developed mixed dry forest and legume-dominated forest in the North and Western part of Ngarama North FR (Prins and Clarke 2006). The plateau hosts estimated 43 km<sup>2</sup> of scrub forest and ca. 13 km<sup>2</sup> of mixed dry forest (UTUMI 2002). *Grewia* sp., *Hymenocardia ulmoides*, *Cussonia zimmermannii*, *Bombax rhodognaphalon* and *Vitex schliebenii* dominate large part of the scrub forest while the outer part of the forest block is composed of *Hymenaea verrucosa*, *Scorodophloeus fischerii*, *Strychnos henningsii* and *Synaptolepis kirkii* (Clarke, 1995).

In Ngarama South FR, vegetation differing from open to dense woodland to scrub forest is dominated by *Milicia excelsa*, *Markhamia obtusifolia* and *Pteleopsis myrtifolia* (Clarke, 1995). *Hymenaea verrucosa* dominated forest only remains in a tiny part of Ngarama South FR (Eriksen et al. 1994; Clarke, 1995).

Mitundumbea FR protects most of the northerly part of the Ruwawa plateau. Although there are a few patches of coastal thicket and closed-canopy forest (UTUMI 2002), the area is mainly *Brachystegia* woodland with *Pterocarpus angolensis* and *Milicia excelsa*.

### ***Mbarawala Plateau***

This plateau is partly protected by the Pindi Forest Reserve in the south. However, ca. 75km<sup>2</sup> of scrub forest and 5km<sup>2</sup> of mixed dry forest (Prins and Clarke 2006) occur outside to the north and north-west. There is a mosaic of scrub forest with patches of dry forest, which appear to be similar to the ones in Ngarama FR. The scrub forest on Mbarawala plateau is similar to the scrub forest around Uchungwa Peak (Prins and Clarke 2006).

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In the northern end of the Mbarawala Plateau there is the Uchungwa forest (also known as Namateule or Namatimbili). This forest remains largely unsurveyed and is not reserved under any status, but remote sensing indicates significant areas of various coastal forest types including ca. 29 km<sup>2</sup> of scrub forest and ca. 34 km<sup>2</sup> of mixed dry forest. The Uchungwa and Mitundumbea forests are split by the Mavuji River which has cut a dramatic gorge through the ancient coral rag escarpment. The area contains a mosaic of different types of dry forest in pristine condition. The coral rag area contains a unique type of dry forest including high densities of the cycad *Encephalartos hildebrandtii* (UTUMI 2001). This area is dominated by the Lindi region endemic trees *Cynometra filifera*, *Cynometra gillmannii* and *Erythrina schliebenii*. The tree species *E. schliebenii* was considered to be extinct (IUCN 2008). There is also a little disturbed and well developed band (ca. 3 km<sup>2</sup>) of riverine forest along the gorge of the Mavuji River.

### Types of trees

There is a wide diversity of tree species in Kilwa Landscape with both miombo woodland and coastal forest species found in high proportions. Some of the main species in the woodlands are presented in Table 6. The rest of areas of this landscape are covered by coastal forest, grassland/wetland and rock outcrops. The landscape forms important parts of water catchment for Matandu, Mavuji and Mbwemkuru rivers that drains different parts as seen above.

Table 6: Main tree species and perceptions of villages on abundance of some tree species in the landscape

Local Name	Scientific names	Perceived Abundance	Use
Mninga	<i>Pterocarpus angolensis</i>	Medium	Timber
Mkongo	<i>Afzelia quanzensis</i>	Medium	Timber
Mpingo	<i>Dalbergia melanoxylon</i>	High	Timber
Mtondo	<i>Brachystegia spiciformis</i>	High	Timber
Mkangazi	<i>Khaya anthotheca</i>	Medium	Timber
Myombo	<i>Brachystegia boehmii</i>	High	Timber
Mbuyu	<i>Adansonia digitata</i>	High	
Mikunya	<i>Sterculia appendiculata</i>	High	
Msufi pori	<i>Bombax rhodognaphalon</i>	Medium	
Mng'ong'o	<i>Sclerocarya birrea</i>	High	
Mkwanga	<i>Zanha africana</i>	High	
Mgelegele	<i>Brachystegia bussei</i>	High	
Msekeseke	<i>Ochna densicoma</i>	Medium	

There are also a number of threatened plant species in the landscape.

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Table 7: Plants within the Kilwa landscape listed as threatened on the IUCN Red list (2008)

Site	Family	Species	Habitat	Habit	RL cat
Uchungwa	Fabaceae (Caes.)	<i>Cynometra filifera</i>	F	T	CR B1+2abcde ver 2.3 (1994)
Uchungwa	Fabaceae (Caes.)	<i>Cynometra gillmanii</i>	F	T	CR B1+2abcde, C2b ver 2.3 (1994)
Uchungwa	Tiliaceae	<i>Grewia goetzeana</i>	F, W,	T	DD ver 2.3 (1994)
Uchungwa	Ebenaceae	<i>Diospyros magogoana</i>	F	T, S	EN B1+2bc ver 2.3 (1994)
Uchungwa	Fabaceae (Pap.)	<i>Erythrina schliebenii</i>	F	T	EX ver 2.3 (1994)
Uchungwa	Zamiaceae	<i>Encephalartos hildebrandtii</i>	F	T	NT ver 3.1 (2001)
Uchungwa	Rubiaceae	<i>Gardenia transvenulosa</i>	F, W,	T, S	VU B1+2b ver 2.3 (1994)
Uchungwa	Annonaceae	<i>Lettowianthus stellatus</i>	F	T	VU B1+2b ver 2.3 (1994)
Uchungwa	Papilionaceae	<i>Milletia stuhlmanii</i>	F,W	T	VU B1+2b ver 2.3 (1994)
Uchungwa	Rutaceae	<i>Vepris sansibarensis</i>	F	T, S	VU B1+2b ver 2.3 (1994)
Uchungwa	Rutaceae	<i>Zanthoxylum holtzianum</i>	F,W	T	VU B1+2d, D2 ver 2.3 (1994)

Source: Perkin et al (2008b).

In Kilwa Landscape there are six plants that are strictly endemic to the Kilwa Landscape (data from Prins and Clarke 2006; Clarke 2001):

- *Karomia gigas* – effectively endemic to Mitundumbea Forest Reserve and Ngarama North Forest Reserve following the extinction of the only known individual from Kenya
- *Erythrina schliebenii* – effectively endemic to Uchungwa forest following its probable extinction from the lake Lutamba area.
- *Pterygota* sp. nov. – Uchungwa forest
- *Trichilia* sp. nov. a ff. *lovetii* – Uchungwa forest. Probably the same *Trichilia* sp. nov found in Chitoo Forest Reserve in 1995.
- *Baphia* cf. *keniensis* – Ruwawa Plateau (Ngarama North and South Forest Reserves)
- *Leptactina* cf. *oxyloba* - Ruwawa Plateau (Ngarama North and South Forest Reserves)
- (Source: Perkin et al.2008b).

The landscape harbours many tree species of medicinal and cultural values to the surrounding communities. In the landscape local communities get timber, poles, charcoal, local medicines, fuel

wood, land for cultivation, wild meat, honey, wild fruits, sources of water, building materials, clean air and rain.

**Birds**

The landscape is an important area for coastal forest birds. Uchungwa, Mitundumbea, Ngarama N&S and Pindirol contain populations of plain backed sunbird (*Anthreptes reichenowi*), and southern-banded snake eagle (*Circaetus fasciolatus*). Other forest dependent species present in the landscape include African Broadbill *Smithornis capensis*, little greenbul *Andropadus virens* (only in Litipo), tiny greenbul (*Phyllastrephus debilis*) and yellow-streaked greenbul (*P. flavostriatus*). Within the landscape, the near endemic subspecies, the Rondo green barbet (*Stractolaema olivacea* spp. *hylophona*) is present in Uchungwa, Mitundumbea and Ngarama N&S, whilst Reichenow's batis (*Batis mixta reichenowi*) occurs in Uchungwa, Mitundumbea, Ngarama N&S and Pindirol.

**Mammals**

Namatimbili, Mitundumbea, Ngarama N&S and Pindirol FR is important for the near endemic Grant's galago (*Galagoides granti*), the lesser pouched rat (*Beamys hindei*) and the chequered elephant shrew (*Rhynchocyon cirnei macrurus*). Elephant (*Loxodonta africana*) and lion (*Panthera leo*) occur in low numbers, and African wild dog (*Lycaon pictus*) has been seen in recent years. There is an interesting isolated population of bush hyrax (*Heterohyrax* sp) in Uchungwa and Mitundumbea. Other large and medium sized mammals include buffalo (*Syncerus caffer*), hartebeest (*Alcelaphus buselaphus*), bush pig (*Potamochoerus porcus*), leopard (*Panthera pardus*), zebra (*Equus brucheli*), impala (*Aepyceros melampus*) wildebeest (*Connochaetes taurinus*), sable antelope (*Hippotragus niger*), dik dik (*Madoqua kirkii*), common duiker (*Sylvicapra grimmia*), porcupine (*Hystrix spp*), hippopotamus (*Hippopotamus amphibious*) and spotted hyena (*Crocuta crocuta*).

## 2.9 Lindi Landscape

**Biodiversity status**

The natural vegetation of the Rondo/Noto landscape is extremely variable and includes: scrub forest, dry evergreen forest, woodland and transitional woodlands, riverine forest, and thickets. Other land cover types include the Rondo pine plantation forest.

**Type of trees**

Different types of trees are found in the landscape. These are detailed in Table 8 together with their perceived abundance levels as cited by interviewed communities.

*Table 8: Perceptions of villages on abundance of some tree species in the surrounding woodlands around Rondo Forest Reserve*

S/N	Local name	Scientific name	Abundance
1	Mvule	<i>Milicia excelsa</i>	Medium
2	Mbambakofi/Mkongolo	<i>Azelia quanzensis</i>	Medium
3	Mninga	<i>Pterocarpus angolensis</i>	High
4	Mpairosa	<i>Swartzia madagascarenis</i>	Low
5	Mmula	<i>Parinalia curratellifolia</i>	High



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6	Njiligwi		High
7	Mtuganjiwa	<i>Albizia sp</i>	High
8	Mpingo	<i>Dalbergia melanoxylon</i>	High
9	Mpangapanga	<i>Euphorbia candelabrum</i>	Low
10	Mgama	<i>Mimusops schliebenii</i>	High
11	Mtondoo	<i>Brachystegia spiciformis</i>	Medium
12	Myombo	<i>Brachystegia bohemii</i>	High
13	Mchalaka	<i>Spirostachys africana</i>	High
14	Msungura	<i>Tarenna graveolens</i>	High
15	Mkonge	<i>Psychotria bibracteata</i>	Medium
16	Msufi pori	<i>Bombax rhodognaphalon</i>	Medium
17	Msama		Medium

### Birds

This landscape is also an important area for coastal forest birds. Rondo contains populations of east coast akalat (*Sheppardia gunningi*), plain backed sunbird (*Anthreptes reichenowi*) and Southern-banded snake eagle (*Circaetus fasciolatus*). There are also interesting sub-species of birds – such as rondo green barbet (*Stractolaema olivacea spp. hylophona*) and Reichenow's Batis (*Batis reichenowi*). Rondo Plateau is a breeding site for the East African population of spotted ground thrush (*Zoothera guttata*).

### Mammals

Rondo, Chitoo, Litipo and Ruawa are critical sites for the Tanzanian endemic Rondo Galago (*Galagoides rondoensis*) – which is known from five other small forest patches in coastal Tanzania. There is an interesting isolated population of bush hyrax (*Heterohyrax sp*) in Ruawa and the landscape is important for the near endemic Grant's galago (*Galagoides granti*), the lesser pouched rat (*Beamys hindei*) and the Chequered elephant shrew (*Rhynchocyon cirnei macrurus*). The landscape is also important for more widespread species such as elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*), leopards (*Panthera pardus*), lion (*Panthera leo*), bushbuck (*Tragelaphus scriptus*), bush pig (*Potamochoerus porcus*), baboon (*Papio spp.*), vervet monkey (*Chlorocebus pygerythrus*), zebra (*Equus burcheli*), hartebeest (*Alcelaphus buselaphus*) and spotted hyenas (*Crocuta crocuta*).

### Reptiles

Reptile species that are endemic to the Lindi Landscape include three species of reptile (*Melanoseps rondoensis*, *Scolecoseps litipoensis* and *Typhlops rondoensis*). There are also two near-endemic reptiles: (*Chirindia rondoensis* and *Chirindia ewerbecki*). All of these species have been recorded from the Rondo plateau.

## 2.10 Zanzibar Landscape

The Zanzibar landscape includes numerous small islands and two large ones: Unguja (the main island, informally referred to as "Zanzibar"), and Pemba (Figure 4). The biodiversity priority landscapes and ecosystems of Zanzibar are high forests covering 98,329 ha, coral rag forests covering 6,119 ha and

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20,000 ha of mangroves. The Protected Area System includes the Jozani-Chwaka Bay NP (5,000 ha), Kiwengwa-Pongwe FR (3,325 ha), Ngezi-Vumawimbi NR (2,900 ha), Ras Kiuyu proposed FR (270 ha), Masingini FR (566 ha) and Msitu Mkuu proposed FR (180 ha). In addition, 20,000 ha of mangrove forests have been put under conservation management.

The most significant biodiversity within the Zanzibar landscape includes endemic plant species and subspecies such as *Aloe pembana*, *Erica mafiensis* and *Dypsis pembana*, endemic mammal species such as *Procolobus kirkii*, *Pteropus voeltzkowi*, *Cephalophus monticola pembae* and the near-endemic *Cephalophus adersi*. Endemic bird species on Pemba Island include Pemba green pigeon *Treron pembaensis*, Pemba scops owl *Otus pembaensis*, Pemba white-eye *Zosterops vaughani*, Pemba sunbird *Nectarinia pembae*. Zanzibar Island has some endemic bird sub-species – for example *Tauraco fischcheri zanzibaricus*. In terms of reptiles, *Phelsuma abbotti*, *Lygosoma pembanus* and *Leptotyphlops pembae* are endemic and *Cassina jozani* is an endemic amphibian.

### **2.11 Concluding Remarks**

The biological values of the key landscapes that the project will focus on are very high, and recent field work has confirmed that there are biologically interesting areas that are still little known to science. Within these areas there the project has found two species of trees previously thought to be extinct. Large areas of coastal forest remain outside the protected area network and hence ensuring that they are managed sustainably under some management regime would make a strong contribution to conservation in the area.

## 3 Spatial Planning Baseline

### 3.1 Overview

Protected Areas (PAs) provide the principal method for protecting areas of significant biodiversity in Tanzania, and this is the key strategy laid out in the BSAP and National Environmental Action Plan (NEAP) documentation, and explicitly stated in the National Forest Policy (1998) and law – such as the Tanzania Forest Act (2002). The Coastal Forests were singled out as priority areas for conservation. However, whilst Tanzania's PA estate is huge, relatively little of the Coastal Forest (CF) resource is adequately protected. Forests in Tanzania, including Coastal Forests, have been mainly protected by the Forestry and Beekeeping Division (now Tanzania Forest Service TFS) of Government, through a network of Forest Reserves (WCMC/UNEP 2006). Two coastal forests were recently incorporated into a mainland National Park (Sadaani), and Zanzibar created a National Park and Nature Reserve for two more. The Tanzanian mainland is also proposing to upgrade one coastal forest area (Rondo) as a potential Forest Nature Reserve. More than 20 distinct coastal patches are still not protected, including areas of recognized endemism and areas that would increase connectivity between reserved patches.

### 3.2 Definition of a Protected Area and the IUCN Categories

Protected areas are internationally recognized as a major tool in conserving species and ecosystems (Box 1). They also provide a range of goods and services essential to the sustainable use of natural resources, such as protecting watersheds and preventing soil erosion. Protected areas provide resources that local communities and indigenous peoples may depend upon for survival, and can play a role in maintaining cultural values. They are also important for scientific research and education, and can make significant contributions to local economies.

*Box 1: What is a 'protected area'? (from Dudley 2008)*

The IUCN defines a protected area as: "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".

In applying the categories system, the first step is to determine whether or not the site meets this definition and the second step is to decide on the most suitable category.

IUCN protected area categories (explained in full in Dudley 2008):

Category Ia: Strict nature reserve

Category Ib: Wilderness area

Category II: National park

Category III: Natural monument or feature

Category IV: Habitat/species management area

Category V: Protected landscape/seascape

Within the coastal forests of Tanzania, only a few of the existing reserves have a protected area category assigned. This is elaborated further below.

### **3.3 Forest Protection under the Convention of Biological Diversity**

The UN Convention on Biological Diversity (CBD) considers protected areas as cornerstones for biodiversity conservation and as critical tools for reducing the current rate of loss of species and habitats. The CBD Cop10 meeting in Japan in 2010 defined a new set of targets for the period 2010-2020, to be achieved by all nations who are parties to the CBD. Specific targets include those to halve deforestation and reduce degradation and fragmentation (Target 5), manage all forests sustainably (Target 7), effectively conserve at least 17% of all terrestrial areas (Target 11), and restore at least 15% of degraded ecosystems to enhance both biodiversity and carbon (Target 15).

A recent analysis by the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC) shows that the Northern Zanzibar-Inhambane Coastal Mosaic ecoregion (Kenya and Tanzanian Coastal Forests) has 4.3 % of the remaining forest habitat protected within IUCN I-IV coded protected areas. This is below the 10% target, and well below the 17% target, and was one of the reasons for additional GEF investment in the area.

### **3.4 Protected Area Gaps**

Gap analysis is a tool promoted by the CBD (Dudley and Parrish 2006) to assess the degree to which protected area networks are representative of different attributes of biodiversity. Past gap analyses undertaken by conservation NGOs and academic institutions have indicated the lack of protected area coverage of the Coastal Forest Habitats; with regard to habitats (Hoekstra et al. 2005), global species diversity (Rodrigues et al. 2004b), conservation priority areas (Rodrigues et al. 2004a), African birds (De Klerk et al. 2004), African mammals (Fjeldså et al. 2004) and African plants (Burgess et al. 2005). The situation remains the same today even though these analyses are almost 10 years old now. Indeed, a recent gap analysis of Important Bird Areas in Tanzania (Sritharan and Burgess 2011) shows the gaps in bird protection that remain in 2009, including a number in the coastal forests. Gaps in protection for other species groups, for example plants, will be more than for birds.

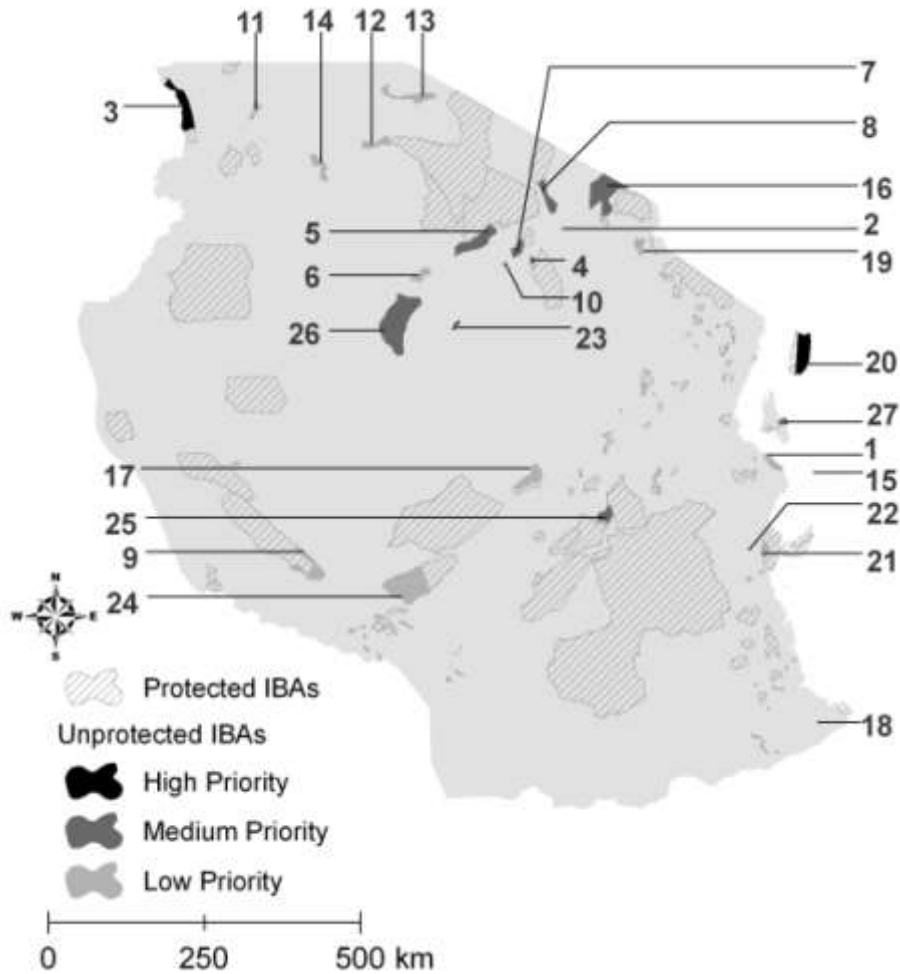


Figure 6: Distribution of Important Bird Areas

Distribution of Important Bird Areas (IBAs) and conservation priorities of 27 unprotected IBAs in Tanzania in 2009: 1, Dar es Salaam Coast; 2, Eluanata Dam; 3, Kagera Swamps; 4, Lake Burungi; 5, Lake Eyasi; 6, Lake Kitangire; 7, Lake Manyara National Park; 8, Lake Natron and Engaruka Basin; 9, Lake Rukwa; 10, Lake Tlawi; 11, Lake Victoria: Bumbire Islands; 12, Lake Victoria: Bunda Bay; 13, Lake Mara Bay and Masirori Swamp; 14, Lake Victoria: Mwanza Gulf; 15, Latham Island; 16, Longido Game Controlled Area; 17, Mtera Reservoir; 18, Mtwara District Coastal Forest; 19, Nyumba va Mungu Reservoir; 20, Pemba Island; 21, Rufiji Delta; 22, Rufiji District Coastal Forests; 23, Singida Lakes; 24, Usangu Flats; 25, Uvidunda Mountains; 26, Wembere Steppe; 27, Zanzibar Island: East Coast.

### 3.5 The Current Reserve Network for the Coastal Forests

#### 3.5.1 Reserves that are internationally recognised as protected areas

Tanzania (mainland and Zanzibar) has a number of reserves that have been coded as protected areas according to the IUCN protected area criteria and categories (see above). Those within the coastal regions are briefly described below, with the majority of the data coming from the World Database on Protected Areas ([www.unep-wcmc.org/wdpa](http://www.unep-wcmc.org/wdpa)).

***National Parks***

On the mainland of Tanzania the 110,000 ha Saadani National Park (an IUCN category II protected area) contains Coastal Forest habitats. This Park was gazetted in 2005 and is managed by TANAPA. Important Coastal Forests included are the Zaraninge/Kiono forest that was previously a Forest Reserve and the forest patches that were formally part of the Mkwaja ranch. In total over 3,000 ha of forest is found in this park, where it is well protected. On Unguja an important area of Coastal Forest / swamp forest is found within the Jozani National Park (an IUCN category II protected area). This reserve was gazetted in 2004 and covers 5,000 ha and contains around 1,000 ha of forest habitat that supports the majority of the global population of the Zanzibar red colobus monkey. The Park is managed by the government of Zanzibar with a strong community involvement through the Jozani Environment Conservation Association (JECA), under a different set of laws and regulations to those that operate on mainland Tanzania.

***Game Reserves***

The huge (4,400,000 ha) Selous Game Reserve (an IUCN category IV protected area) contains some Coastal Forest habitats on its eastern margins. These are not well known and have not been visited in recent years, but are assumed to provide good protection to habitats and species that occur. This reserve is managed by the Wildlife Department from Tanzania mainland and has a significant staff and considerable resources as it is used for tourist hunting.

***Marine Parks***

The Mafia Island Marine Park (IUCN category VI protected area) covers a variety of marine and coastal habitats, including an area of coastal forest termed Mlola that is otherwise included within a Forest Reserve. The Marine Park is 82,200 ha in extent (forests are only 100 ha) and is managed by the Tanzania Fisheries Department, with collaborative input from surrounding communities. Coral rag thicket habitats are also found within the Dar es Salaam Marine Park (2,600 ha, no IUCN category assigned), which is centred on three islands close to the capital. And coastal habitats are also found within the Mnazi Bay Marine Park in Mtwara (220,000 ha, IUCN category VI).

***Marine Conservation Areas.***

The Menai Bay Conservation Area on Unguja (44,700 ha, IUCN category VI) and Pemba Channel Conservation Area on Pemba (area unknown) are primarily marine reserves, but both contain some terrestrial habitats. The marine conservation area on Pemba, in particular, includes a number of smaller islands that are known to contain thicket and even small areas of forest habitat.

***Private Reserves***

The tiny protected area of Chumbe Island Marine Park contains coral rag thicket and has been classified as an IUCN category II protected area. It covers only 100 ha of land and sea.

**3.5.2 Other reserves that are not internationally recognized as protected areas**

***Forest Nature Reserves***

The only Nature Reserve within the coastal forests region is found on Pemba Island. This Ngezi-Vumawimbi Nature Reserve was gazetted in 2007 and covers around 2,000 ha of lowland forest habitat. Proposed Nature Reserves include Rondo in Lindi Region and Masingini on Unguja island.

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### *Forest Reserves (national, local authority and village)*

No Forest Reserve in the coastal region of Tanzania has been assigned an IUCN protected area category, and many will not meet the definition of a protected area (established and managed for biodiversity conservation), although some will (Burgess et al. 2007). Coastal regions of Tanzania contain at least 166 Forest Reserves in lowland areas, which cover 1,191,000 ha of land (Table 9). Of this total area, almost 960,000 ha are coded as 'production forest' for sustainable utilization, whereas around 231,000 ha are coded as 'protection forest', primarily for water catchment and habitat conservation purposes.

The majority (146) of the 166 Forest Reserves in the coastal regions of mainland Tanzania are coded in the national list of Forest Reserves (latest from 2000) as national Forest Reserves and hence are supposed to be managed by the Forestry and Beekeeping Division directly. Most of these reserves have practically no management input from the Forestry and Beekeeping Division (FBD) (now Tanzania Forest Service, TFS) as day-to-day management has been devolved to the District Councils and the District Forest Officer. Management budgets and staffing levels are extremely low, with operational funds often being nothing, an exception being the Rondo Forest Plantation and to a limited level Pugu Kazimzumbwi which have moderate resources with staff and other resources from FBD/TFS.

Another 20 Forest Reserves on the mainland are coded as Local Authority Forest Reserves. These are managed by the District Natural Resources Departments. They can also be managed for protection (a minority) or for sustainable harvesting (the majority). These reserves receive very few resources for management from the District Authorities and most are supposed to generate revenue for the District.

In recent years further areas of forested land have been protected as Village Forest Reserves under the authority of the village government. The location and area of these reserves is now as well catalogued and mapped (Kashaigili et al. 2011). Some large Coastal Forests on the Matumbi Hills and also further south in Kilwa District, e.g. the Namateule forest and forest on the Noto and Mbwalawala plateaux have no formal protection.

Despite the low levels of management input into most Forest Reserves (except forest plantations and catchment forests) in Tanzania, their boundaries are usually respected and encroachment into the reserves is rare. Illegal logging is however widespread.

*Table 9: National, Local Authority and Village Forest Reserves within the Coastal Regions of mainland Tanzania (according to list from FBD in 2000). Recent updates to the PA network are only partly captured here*

Regions	National FR	Local Authority FR	Village FR	Proposed FR	Productive (ha)	Protective (ha)
Pwani (Coast)	46	4	6	2	302,841.7	64,324.7
Dar es Salaam	13	0	0	0	0.0	4,503.9
Lindi	27	3	10	5	542,042.6	82,455.5
Mtwara	5	8	0	6	56,356.6	17,812.2
Tanga	55	5	1	1	58,654.8	62,488.7
Totals	146	20	7	14	959,895.7	231,585.0

On Zanzibar, Forest Reserves are also found on Unguja and Pemba Islands. There are four Forest Reserves in total (Kiwengwa-Pongwe, and Masingini catchment forest on Unguja, and Misitu Mkuu on

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Pemba), that cover areas of coral rag thicket and high forest. They protect some of the best remaining habitat areas on these islands and are managed by the Department of Forestry and Non-Renewable Natural Resources (DFNRNR). An area of thicket at Muyuni is also proposed as a forest reserve on Unguja, as is Ras Kiuyu on Pemba.

An increasingly important category of reserve in the coastal districts is the Village Land Forest Reserve and Wildlife Management Area. These two, community owned and managed, reserve types are being developed in the open forest land between the existing reserves. There are a number of village land FRs in Rufiji and Kilwa Districts, with more being developed in these districts, but also in Lindi and further north between Dar es Salaam and the Kenya border. Wildlife Management Areas are also being developed in the area, with one already existing between the Kichi Hills Forest Reserve and the Selous Game Reserve in Rufiji District – and others being planned for further south in Kilwa district.

In coastal districts, types of forests where central government, local government and Non-Government Organisations (NGOs) are putting more efforts in ensuring their management and sustainability were divided into different categories, including (i) the central government managed forest; (ii) district council managed forests; (iii) village land forest reserves (iv) forests on public/general land and (v) privately owned forests. Sizes of the respective forests based on the ownership as identified by the consulted district forest officers are given below.

*Table 10: Total Hectares of Reserves Based on the Type of the Forest Ownership in focal landscapes on the Tanzania Mainland and Zanzibar*

Type of Forest Based on the Ownership	Total forest in ha in Coastal Districts				
	Rufiji	Kilwa	Lindi	Unguja	Pemba
Central government managed forest	125,346	201,900	45,828	21,557	20,080
Forest on Public lands	Ni	450,000	470,000	38,328	8000
Local Authority Forests (District)	84,957	83,000	3,080	Ni	50
Village Forest Reserves (community woodlots for Pemba)	18,807	126,000	5,132.63	Ni	5000

Ni = No information available



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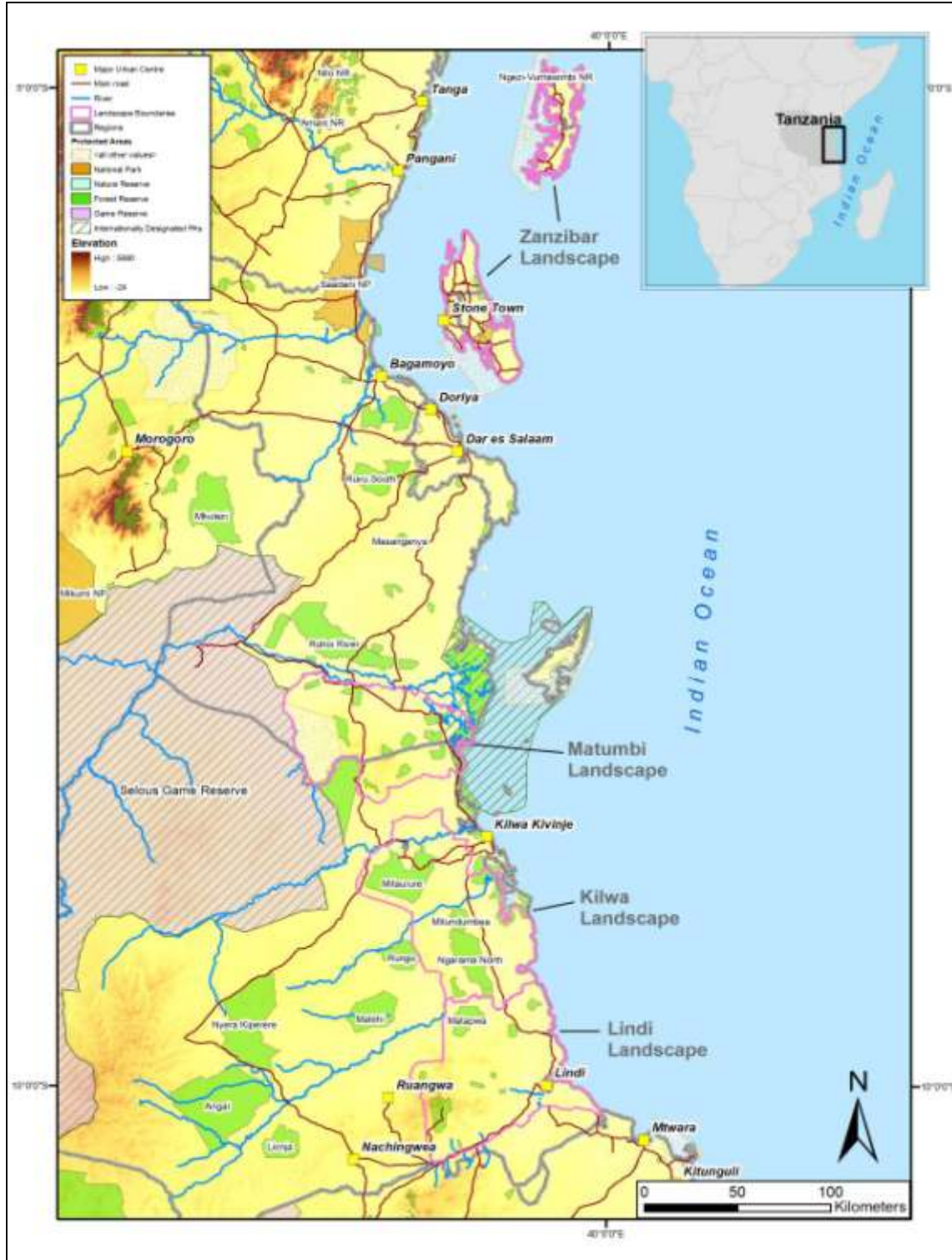


Figure 7: The existing network of protected areas and other reserves in coastal Tanzania

### 3.6 Matumbi Landscape

Matumbi and Kichi hills are located in Rufiji and Kilwa Districts south of the Rufiji River. These hills contain more than 26,000 ha of closed canopy coastal forest, grading into larger areas of coastal woodland and thicket habitats (Perkin *et al.* 2008a,b). The Kichi Hills lies to the west of the Matumbi hills but is connected by a forest belt that has partially been included in a Local Authority Forest Reserve which also falls within the Ngarambe/Tapika wildlife management area.

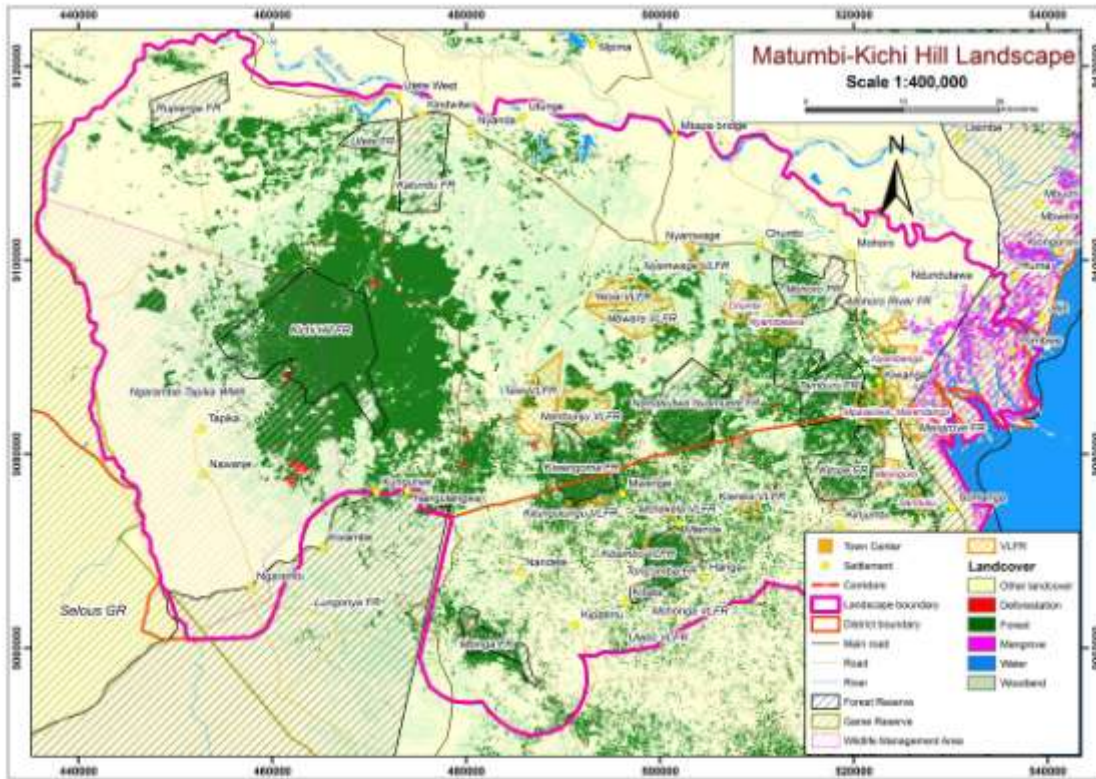


Figure 8: PAs network in Matumbi-Kichi Hill Landscape (from Kashaigili *et al.* 2011)

Three main features characterize the topography of the landscape. These are Coastal belt zone, the river basins and lowlands zone, and the highland zone. The Matumbi-Kichi Hills is within the highland zone which is characterized with coastal hills and highland areas (but not plateaus) rising between 150 - 580 masl.

Matumbi-Kichi Hills Landscape, as with the majority of other coastal region areas, experiences tropical East African oceanic climate with an average temperature of 28°C. Climate varies slightly with altitude. The nearest rainfall station is at the Mohoro Dispensary (8°08'S, 39°11'E 20 m asl), where an average of 1083 mm of rainfall per year was recorded for 27 years from 1939 to 1966, with June, July, August, September and October having a monthly average of less than 50 mm rainfall during this period. A peak annual rainfall of 1546 mm and a minimum annual rainfall of 533 mm have been recorded between 1939 and 1966 from this rainfall station. There are two main seasons with average rainfall of about 800 to 1000 mm per year which are the main rain season and short rain season. The main rain season lasts for roughly 120 days between March and June every year. The rains are usually heavy and spread throughout the region. This is also the main crop planting season for all crops, but especially so for the seasonal crops such as maize, paddy and cotton. The short rain season lasts for 60 days between

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October and December each year. The rains are not evenly distributed and they are not very much reliable. They are most suitable for short term crops such as pulses.

*Table 11: Summary of GIS-generated Areas of Forests in Matumbi-Kichi Hills Landscape*

Forest name	Area (ha)	Area (ha)	Status	Source
	2010	2011		
Rupiange	1,884.56	-	FR	TZA Protected Area 2010
Rupiange	525.13	-	FR	TZA Protected Area 2010
Katundu	4,595.26	-	FR	TZA Protected Area 2010
Utete	1,495.96	-	FR	TZA Protected Area 2010
Tamburu	5,227.80	-	FR	TZA Protected Area 2010
Kitope	4,093.46	-	FR	TZA Protected Area 2010
Lungonya	5,862.46	-	FR	TZA Protected Area 2010
Mbinga	1,943.89	-	FR	TZA Protected Area 2010
Kiwengoma	3,588.86	-	FR	TZA Protected Area 2010
Mohoro	3,119.41	-	FR	TZA Protected Area 2010
Mangrove	18,797.02	-	FR	TZA Protected Area 2010
Kichi Hill	14,494.62	-	FR	TZA Protected Area 2010
Namakutwa Nyamuete	4,684.92	-	FR	TZA Protected Area 2010
Selous	1,448.26	-	GR	TZA Protected Area 2010
Tong'omba	3,005.74	-	FR	TZA Protected Area 2010
Ngarambe-Tapika	77,824.72	-	WMA	TZA Protected Area 2010
Mohoro River	257.58	-	FR	TZA Protected Area 2010
Nyambenga	-	1,798.12	Proposed VLFR	TFCG
Marendengo	-	790.59	Proposed VLFR	TFCG
Mpwakilwa	-	912.80	Proposed VLFR	TFCG
Mkongoro	-	515.46	Proposed VLFR	TFCG
Sanduku	-	222.68	Proposed VLFR	TFCG
Nyambalawa	-	1,631.26	Proposed VLFR	TFCG
Chumbi	-	1,132.60	Proposed VLFR	TFCG
Minganje*	-	453.95	Proposed VLFR	TFCG
Nyamwage	-	127.67	VLFR	TFCG
Mchonga	-	4.02	VLFR	TFCG

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Mchekela	-	24.30	VLFR	TFCG
Mbwara	-	2,274.88	VLFR	TFCG
Kilungulungu	-	349.44	VLFR	TFCG
Kibambo	-	33.93	VLFR	TFCG
Kianika	-	232.83	VLFR	TFCG
Yelya	-	1,293.38	VLFR	TFCG
Nambunju	-	2,071.18	VLFR	TFCG
Tawi	-	2,515.31	VLFR	TFCG

\*This forest is located about 30km north of the boundary of the Matumbi-Kichi Hills Landscape

Source: Kashaigili et al. 2011

Within the Matumbi landscape tropical ferruginous sandy soils are common and support dry or semidry forests including areas of miombo and the Kichi Hills FR. Clayey vertisols (black cotton soil) occurs along river banks (Mwasumbi et al. 2000). A catenary sequence is found on the hill tops with a thin (3-4 cm) humus layer. On the hill sides, soils are coarser, shallower and better aerated with the depth of humus related to the level of human disturbance. Valley bottoms have deep loamy soils underlain by fine clays with high water retention ability. Soils do degenerate quickly once forests are cleared for agriculture reaching complete degradation in about 15 years.

The main river that runs through the Matumbi landscape is the Rufiji River on the northern boundary of the landscape. Small rivers within the landscape include the Tamburu, Muhoro and Hanga Rivers which originate within the Matumbi Hills landscape. The Matumbi Hills is quite a dry landscape with settlements occurring in the valleys relying on numerous seasonal rivers, marsh lands and shallow wells for water supplies. Perennial pools are found in valleys and serve as important water sources for animals during the dry season.

### ***Village land forest reserves***

Some of the large areas of unprotected forest in the landscape have been included within Village Land Forest Reserves: Nambunju (1996 ha), Tawi (2775 ha) and Mbwara (600 ha) (Figure 8). Other areas proposed to be conserved as village land forest reserves include Masangasi, Muulah, Kiwambo and Kitemambagalo forests.

### ***Wildlife corridors***

A preliminary study by Perkin et al. (2008a) identified a number of potential corridors in this landscape. The corridors include:

- Kichi Hill–Selous GR. Animals pass to and from Selous Game Reserve to Kichi Hill FR through coastal forests outside the Kichi especially on the Western and Southern part of the hill.
- Kiwengoma FR–Tong'omba FR. This corridor also harbours Kianika and Kilungulungu Village Land Forest Reserve( VLFRs) which in essence serve as stopovers for animals in search of water and food.
- Namakutwa/Nyamwete–Tamburu–Kitope FR.
- Namakutwa/Nyamwete–Nambunju–Kiwengoma FR.
- Ruhoi–Ngumburuni–Rufiji Mangroves

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A broad consultation with stakeholders from this landscape in 2011 (Kashaigili et al. 2011) identified and mapped the remaining corridors, which are:

- Selous Game Reserve (GR)–Tapika–Kichi–Katundu FR–Rufiji River
- Tawi–Kiwengoma–Namakutwa FR–Tamburu–Kiwanga and then cross the main tarmac road.
- Tawi–Kitope–Somanga–Simu (Sanduku FR). This corridor is followed during the breeding season.

A modelling approach was also used to define potential corridors (Figure 10); some of these confirm those identified by stakeholders, notably between Rupiange FR and Kichi Hill FR and Namakutwa-Nyamwete FR and Mohoro FR and Tamburu FR (Figure 9). However, a simulated corridor between Kingoma FR and Mangroves passes through settlements because that is the least cost route between the two patches. This is an example of where the model produces a corridor which cannot work in the real world.

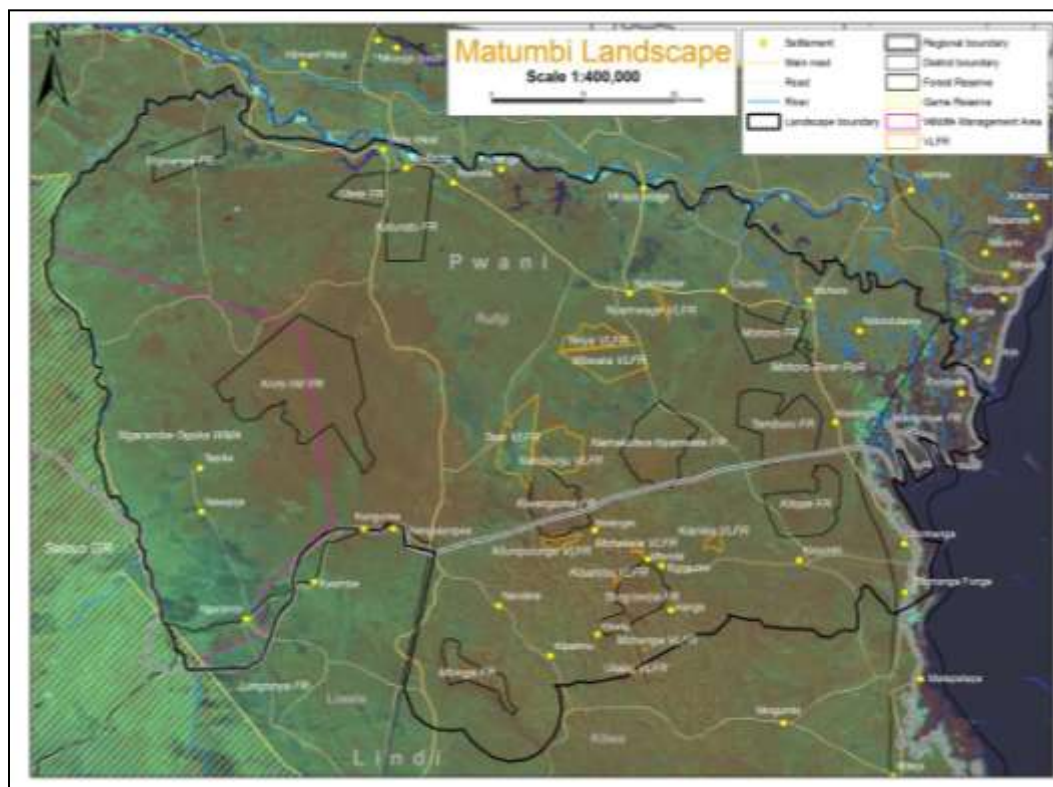


Figure 9: Remote sensing image showing vegetation and location of reserves and villages in Matumbi-Kichi Hills landscape (from Perkin et al. 2008a)

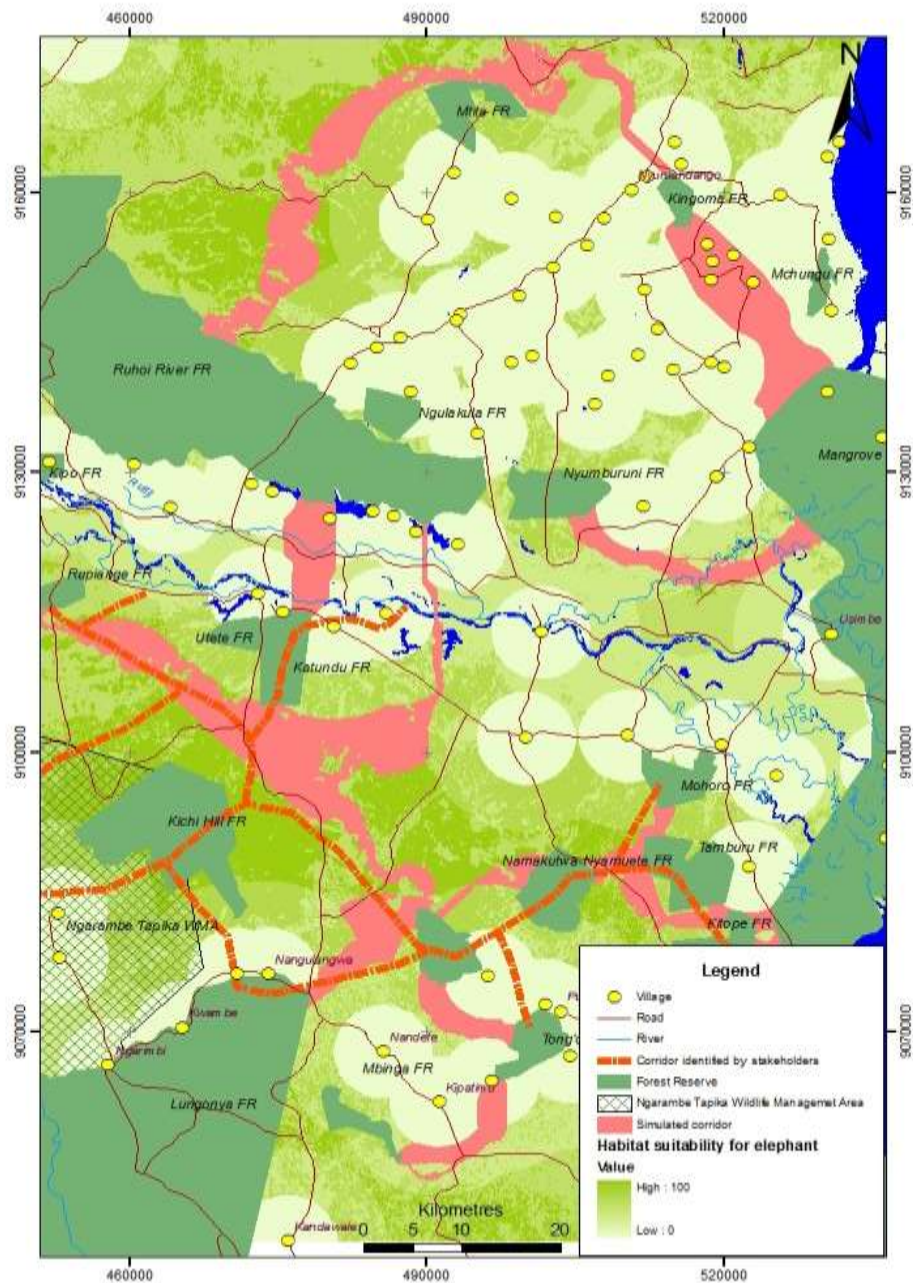


Figure 10: Map of Matumbi-Kichi Hills -simulated corridors (from Kashaigili et al. 2011)

### 3.7 Kilwa Landscape

Kilwa landscape is found in Kilwa district in Lindi Region, South East of the Tanzanian coastal zone. It lies on latitude 8°20'S to 9°56'S and longitude 38°36' E to 39°50' East. The landscape is dominated by two elongated plateaus running parallel to the coast some 40 km and 60 km inland between the Matumbi Hills to the North and the wide Mbemkuru valley to the South. The Western (inland) of these is known

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as the Mbarawala Plateau while the Ruwawa Plateau is located towards the coast. Both plateau systems are interrupted at their northern end by the Mavuji River, giving rise to the spectacular and little known forested Rudadonga gorge with sheer 100 m sides of ancient coral-rag limestone. Coastal Forest is mainly found on these plateaus but is also present along a large length of the Mavuji River.

The Ruwawa (including Ngarama N & S and Mitundumbea FRs) and Mbarawala (including Pindirol FR) plateaus contain the bulk of the Coastal Forests. On the westerly landscape boundary is Rungo FR and the east is delineated by Ngarama North FR and Ngarama South FR, Mitundumbea FR and Uchungwa or Namatimbili/Namateule - a large area of ungazetted forest. To the east of the plateaus on the coastal plain there are areas of coastal thicket and dry forest as well as woodlands. Miombo woodland is present outside of forest areas in all the reserves. These are important sources of the commercial timber trees *Pterocarpus angolensis* and African Blackwood (*Dalbergia melanoxylon*). On the North east of the landscape is the Miturure FR which used to be very rich in African Blackwood until in 1980s, when it was heavily extracted.

The altitude of the landscape ranges from 15m to 480m. The highest points being Ngarama North Forest Reserve in the North and Pindirol Forest Reserve in the south. Mitundumbea is the highest point in the North along the Mbarawala Plateau. In the west the landscape goes down to plain land at approximately 120m while in the east the land drops to 15m and becomes plain towards the coast.

Kilwa District has a coastal climate which is hot and humid with the average temperature range between 22°C to 30°C. Humidity is high, nearly 98-100% during the long rains. The landscape receives a total rainfall of 800-1400 mm/year and its distribution varies according to locality. The land North of Kilwa Masoko receives 1000-1400 mm, while that to the south receives less, about 800-1400 mm/year. The period of rainfall coincide with the onset of each monsoon; the long rains, from about mid March to May, and the short rains from about late October to December.

Kilwa landscape is dominated with deep sandy soils collected from terrestrial sands, calcretes, laterites and gravels believed to be of Miocene and Pleistocene ages. The escarpments are generally composed of old coral rag, sandy loam and clay soils (Perkin et al. 2008b)).

The two plateaus Mbarawala and Ruwawa are the main sources of rivers that flow in the landscape. Eastern and Southern sides of Ngarama are being drained by Kihimbwi and Mbwemkuru rivers respectively while Mavuji River flows to the northern end of the landscape. There are a few numbers of seasonal rivers and wetlands that form small habitats for hippos like Pindirol pool. Matandu River, in addition to Mavuji River, drains the northern part of this landscape. In the south the landscape is being drained by Pindirol River a tributary of the Mbwemkuru that flows between the two plateaus.

The two plateaus receive the highest rainfall in the landscape, and most drains rapidly into the sandy soils and into the underlying limestone, where rivers and small lakes in the valleys are formed. This results in agricultural being practiced in the valleys and at the plateaus' bases which is one of the reasons for the relatively better conserved plateaus' top forests.

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*Table 12: Summary of Forest Reserves and Village Land Forest Reserves in Kilwa Landscape in 2008*

Forest Reserves	Area (ha)	Status	Altitudinal range (m)	Vegetation types
Uchungwa(also known as Namateule or Namatimbili)	Approx 10,000	Not Gazetted but parts of this signed over to BioShape	150 – 404	Dry coastal forest (coral rag type and non-coral rag type), woodland, riverine forest.
Mitarure	60,484	Central Government FR	92-154	Woodland, wooded grassland, coastal thicket
Mitundumbea	8,547	Central Government FR	100 - 500	Dry coastal forest, coastal thicket, woodland, riverine forest
Rungo	22,586	Central Government FR	120 – 220	Woodland, wooded grassland, coastal thicket
Ngarama North	32,628	Central Government FR	120 - 480	Dry coastal forest
Ngarama South	2,018	Central Government FR	50 - 170	Dry coastal forest
Pindiro	11,795	Central Government FR	80- 480	Dry coastal forest, coastal thicket, woodland, riverine forest and ground water forest
Kikole	1,200	VLFR		Brachystegia woodland with many mpingo to the North of the Matandu River
Kisangi Kimbarambara	2,000	VLFR		Closed Brachystegia woodland to the South of the Matandu River

SOURCE: Perkin et al. 2008b.

*Table 13: Summary of new Village Land Forest Reserves within the Kilwa landscape (Kashaigili et al. 2011)*

Forest name	Area (ha)	Area (ha)	Status	Source
	2010	2011		
Lupyagile	-	1,426.71	VLFR	WWF
Liwiti	-	4,376.82	VLFR	WWF
Mrambani	-	9,572.93	LAFR	WWF
Likawage	-	5,765.51	VLFR	WWF
Long'ou	-	19,286.03	VLFR	WWF
Nambondo	-	2,547.77	Proposed VLFR	Mpingo
Mtandi	-	1,063.50	Proposed VLFR	Mpingo
Kiranjeranje	-	604.77	Proposed VLFR	Mpingo
Milumba	-	1,729.76	Proposed VLFR	Mpingo
Mbarawala	-	35,000	Proposed LAFR	Mpingo



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Likawage WMA	-	6,664.42	Proposed WMA	WWF
Naku WMA	-	876.27	Proposed WMA	WWF

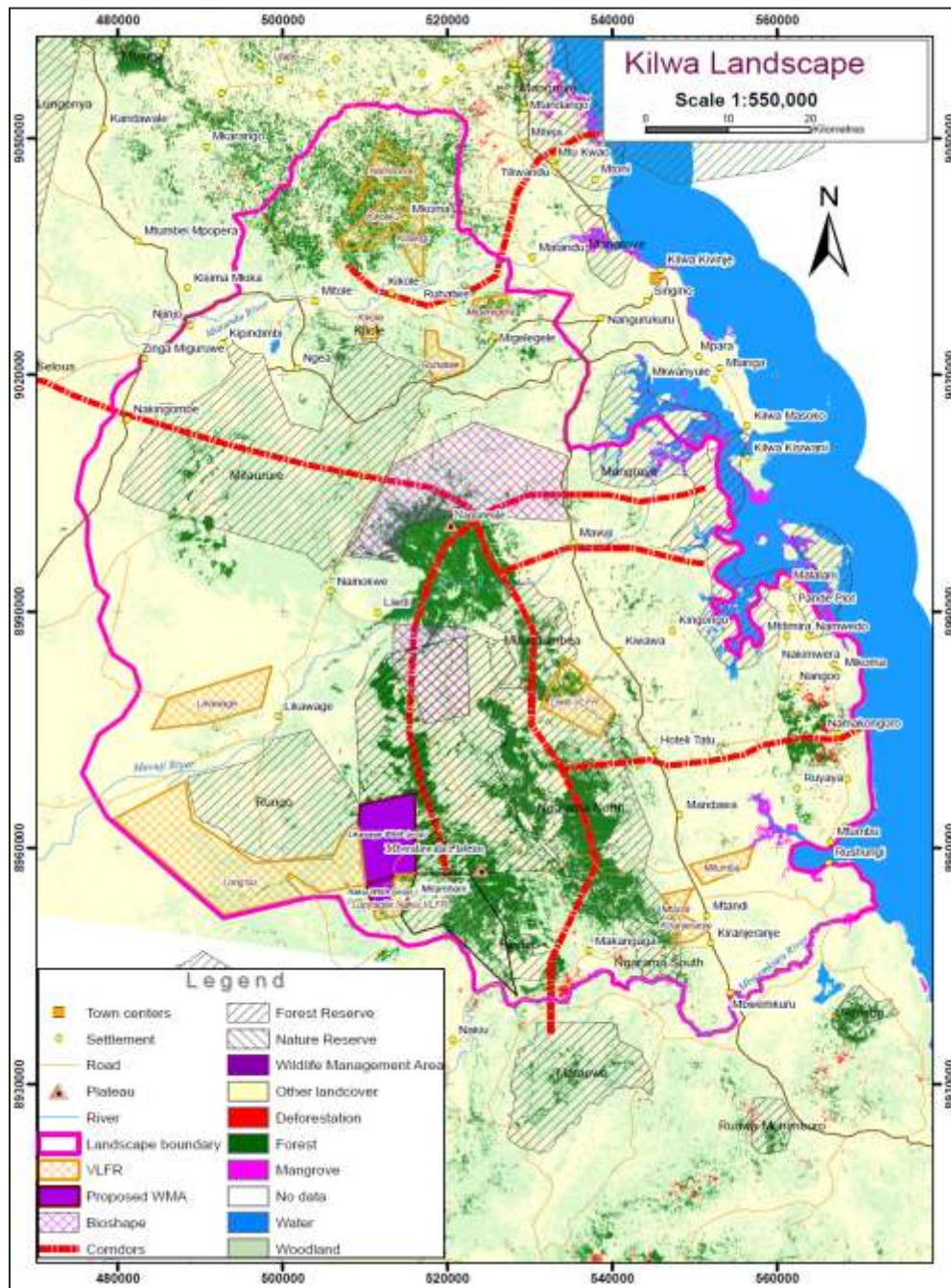


Figure 11: Network of PAs in Kilwa landscape(from Kashaigili et al. 2011)

**Ritual areas**

Mihima village forest reserve has a special area for rituals called Kwanamweve where local communities pray for rain and other blessings. Another ritual area called Paligongolelo is located in Liganga VLFR. In Mtene VLFR there is a special area called Nandele, which is reported to be a ritual site charged with

ghosts. If people want to harvest forest products in it, they use the area for rituals so that in the course of harvesting and finally as they leave the forest no harm happens to them.

***Open lands to be protected***

Available remote sensing images from 2000 and 2007 (Prins and Clarke 2006; Godoy et al. 2011) show that large areas of coastal forest habitat in southern Tanzania fall outside the Forest Reserve or protected area network. Particularly large and potentially important unreserved forest patches are found on the Uchungwa plateau to the north of Mitundumbea FR, and on the Mbwalawala plateau north of Pindiuro FR. Various proposals have been made for the protection of these forests.

***WMA***

Local communities in various villages have proposed some current forests to be upgraded to Wildlife Management Areas. The forests of Kiwawa, Liwiti, Likawage, Nakiu, Makangaga, Hoteli Tatu, Mandawa (Figure 10) were proposed to be WMAs as they are rich in terms of wildlife populations but also good habitats for different species. Nanjirinji A & B is proposed to be split between VLFRs in the forested areas and WMAs for the wooded grassland areas with wildlife movements.

Changing existing and proposed Protected Areas (PAs) into WMAs may result into some costs. The costs may include lack of access to timber and building poles as these activities are not allowed in WMAs. In addition, increased wildlife-human conflicts are likely to happen if the wildlife populations in the proposed WMAs will increase. Specifically, crops being raided by wild animals, livestock being eaten by wild predators and threat to human life are top on the list of such likely conflicts.

On the other hand, there are benefits that could be accrued from the shift. The benefits are increased security for wildlife as in WMAs animals are better protected and managed if the resources needed for management are made available, and tourist hunting through which villages will benefit from revenue that will be collected. The ownership of the resources by the villages will, at some levels, reduce poaching as it is expected there will be collective protection effort by the villages or communities where the WMAs are.

However, the majority of the proposed PAs are neither surveyed nor inventoried, aspects that are important for designating their protection status. Accordingly, changing protection status of any PA should be done subject to supporting evidence. Secondly, the proposal should fit within the existing National Policies and Legislations. For example, according to Reference Manual for Implementing Guidelines for the Designation and Management of Wildlife Management Areas (WMAs) in Tanzania (2003) stipulates that:

Wildlife management areas may be established in the following areas:

- Areas that are outside of core wildlife protected areas
- Areas used by local communities
- Areas within the village land
- And also no area shall be designed as a WMA unless it meets the following criteria
- It has significant accessible resources
- It is ecologically viable or forms part of an ecologically viable ecosystem.
- It belongs to one or more villages in accordance to the relevant provisions of the legislation governing village land, and other legislation relating to occupation and use of village land.

**Wildlife corridors**

Due to its large size and different bands of vegetation progressing from inland to coast and richness in different wildlife species Kilwa landscape, has a number of wildlife corridors (Figure 12) which animals use while in search for food, water, refuge and or for reproduction purposes. During this study, the following corridors were identified:

- Matapwa FR-Pindirol FR–Ngarama North FR–Kiwawa proposed VLFR–Mitundumbea FR–Uchungwa open areas/Namateule Plateau–Selous GR.
- Likawage proposed VLFR–Liwiti VLFR–Uchungwa open areas /Namateule Plateau.
- Uchungwa open areas /Namateule Plateau to the shores of Indian Ocean along the small delta of Mavuji river.
- Namateule FR–(through Bioshape jatropa farm)–Mbarawala proposed Local Authority Forest Reserve (LAFR) –Mbarawala Plateau.
  - Kisangi VLFR–Kikole VLFR –Ruhatwe VLFR–Matandu village–Mtu kwao village–shores of Indian Ocean.
- Ngarama North FR–Hotel tatu–Namakongoro–shores of Indian Ocean.
- Selous Game Reserve –Mitarure FR- through Bioshape jatropa farm-Namateule- Mavuji - shores of Indian Ocean.

The potential establishment of larger areas of *Jatropha* plantation in this landscape blocks an important elephant corridor which stretches from Matapwa FR to Selous GR. Also a corridor from Selous GR-Namateule- Mavuji- to shores of Indian Ocean could be blocked.

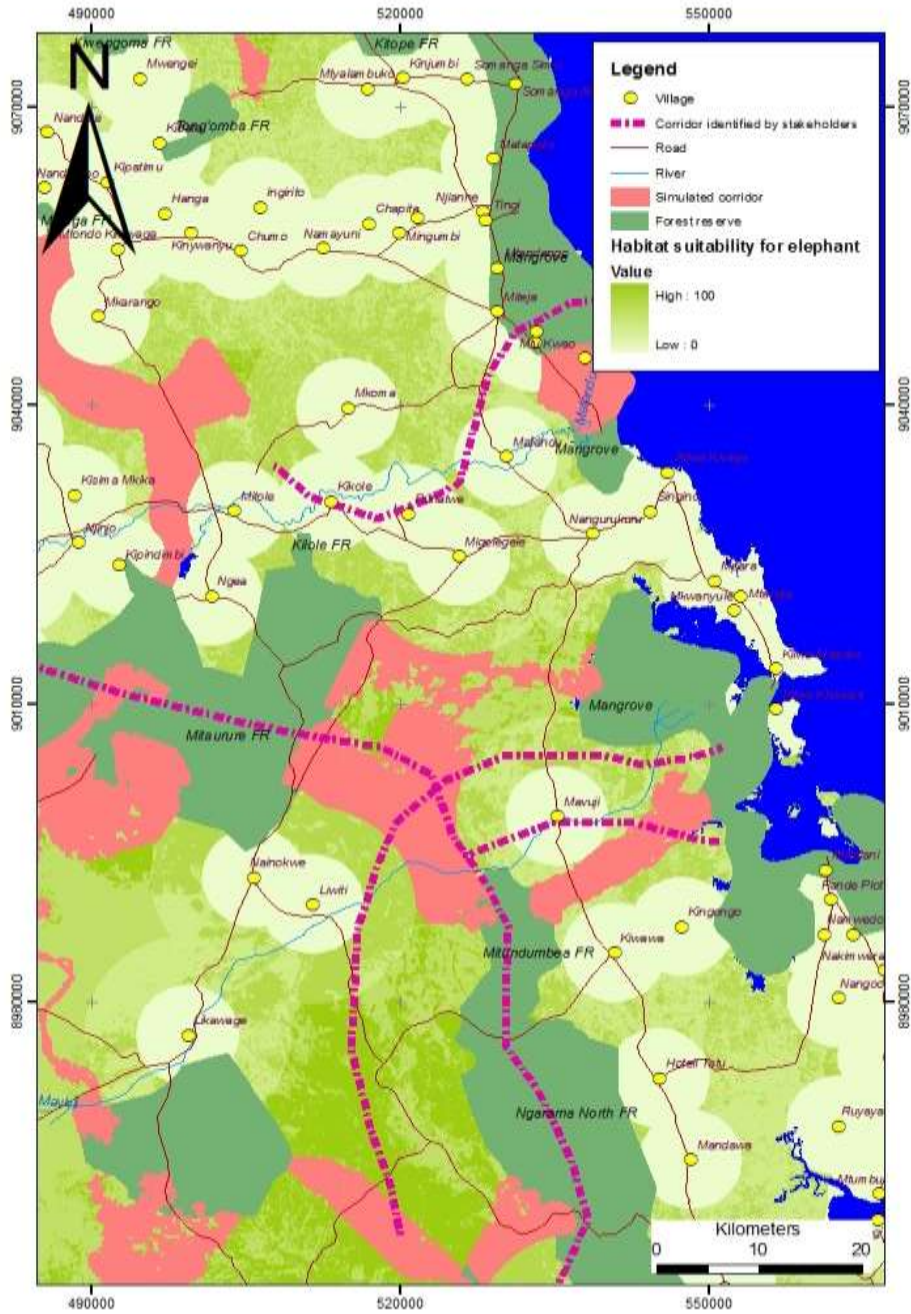
A previous study by Perkin et al. (2008b) also revealed the following potential corridors:

- A corridor to the North West linking Uchungwa open areas with Mitare FR.
- A corridor linking Pindirol FR and Ngarama north FR.
- A potential corridor linking Pindirol North along the Mbarawala plateau North to Uchungwa open forests.

There is considerable overlap between these past corridors and the modelled ones presented in Figure 12. For example Uchungwa areas, ,Mitarure , ,Pindirol and Ngarama north FR corridors are part of the reported Matapwa FR-Pindirol FR–Ngarama North FR–Kiwawa VLFR–Mitundumbea FR–Uchungwa FR/Namateule Plateau–Selous GR corridor. Similarly, Pindirol North along the Mbarawala plateau North to Uchungwa forest corridor is part of the Namateule FR–(through Bioshape jatropa farm)–Mbarawala proposed LAFR–Mbarawala Plateau corridor.

The simulated corridors (Figure 12) diverge from settlements despite the shorter distance between PAs if it could pass through them. This is because the Corridor Designer software considers among other factors, the suitability of the corridor.

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*Figure 12: Map of Kilwa Landscape and simulated wildlife corridors*

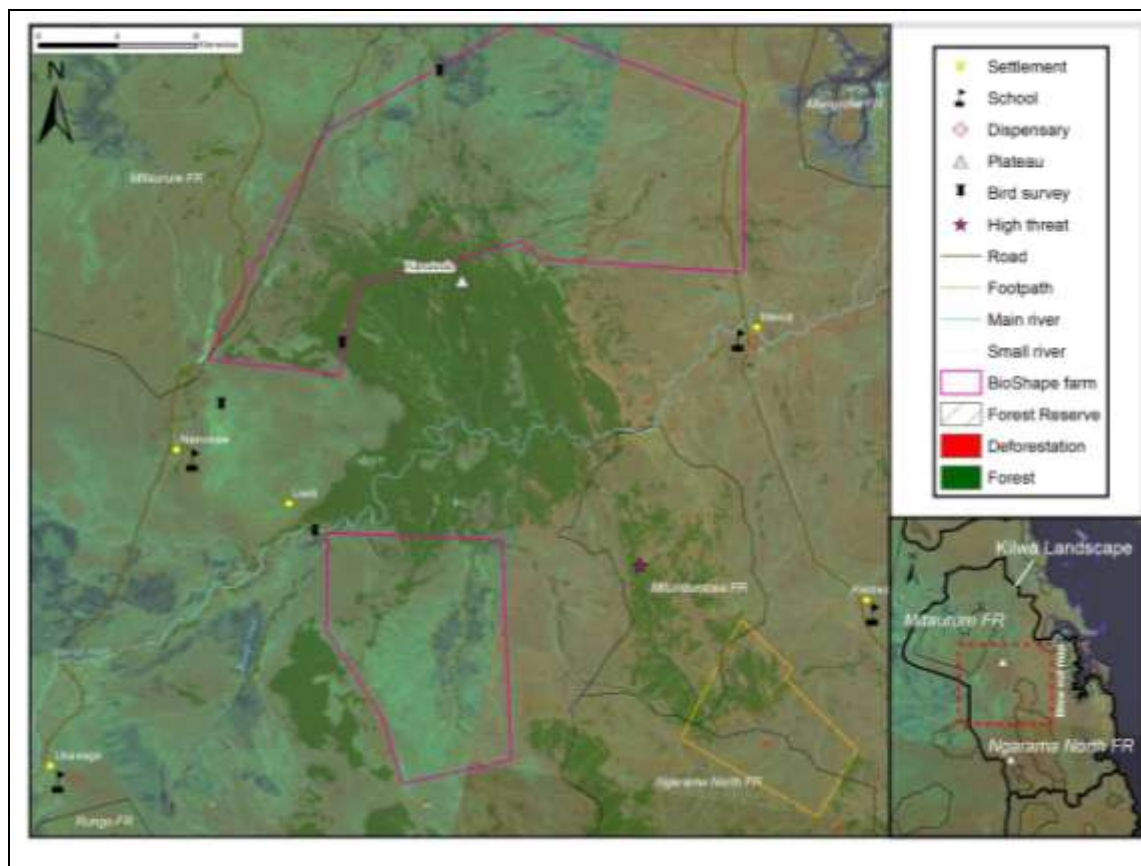


Figure 13: Forest areas on the Mbwalawala and Uchungwa Plateaux in Kilwa district, also showing the location of the bioshape biofuel plantation areas (Perkin et al. 2008c – using data provided by Sokoine University and Conservation International)

### 3.8 Lindi Landscape

The landscape includes a narrow coastal plain, rising in a series of sandstone ridges that run more or less parallel to the coast. The lowland areas have deep, leached sandy soils derived from terrestrial sands, gravels, calcretes and laterites of Miocene to Pleistocene age (Perkin et al. 2008c).

The Rondo, Noto, Chitoa, Mputwa and Likonde plateaus are composed of soft friable Miocene sands and the smooth tops of these plateaus appear to be remnants of an ancient rolling Miocene surface that is being eroded away through a process of retreating scarp erosion (Burgess and Clarke 2000). Small patches of forest are located on and around these plateaus, as well as near the coast.

The altitude of the landscape ranges from 0 m-asl at the coast to 900 m-asl on the western side of the Rondo plateau. The Noto Plateau extends up to 534 m and the Chitoa plateau extends up to 260 m.

Table 14: Summary of forest reserves in the Rondo Landscape

Forest Reserves	Area	Status	Altitude (m)	Vegetation types	Reference
Chitoa	770*	CGFR	240-420	Dry evergreen forest, riverine	Clarke (1995),

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				forest, dry semi-deciduous forest, scrub, woodland / fallow.	Burgess & Clarke (2000)
Litipo	1000	CGFR	180-280	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, woodland	Clarke (1995), Burgess & Clarke (2000)
Dimba	2687	CGFR	75 - 150	Dry forest, thicket and plantation.	Clarke (1995), Burgess & Clarke (2000)
Rondo	14060	CGFR	465 - 885	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, & woodland	Clarke (1995), Burgess & Clarke (2000)
Ruawa	2949	CGFR	150-460	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, woodland/fallow, groundwater pandanus	Clarke (1995), Burgess & Clarke (2000)
Makangala	1271	LGFR	200-280 approx	Miombo woodland , dry semi-deciduous forest, evergreen thicket	Clarke (1995)
Mtama	1027	LGFR		Mainly woodland with trial plots of <i>Pinus caribea</i> and <i>P. insularis</i> .	Clarke (1995)
Nyangamara	1120.2	LGFR		Dry semideciduous forest and woodland	Lindi DFO
Mtama	1040	LGFR		Miombo woodland	
Matapwa	16493	CGFR		Mialy woodland, dry deciduous forest ,riverine forest	Lindi DFO
Nandimba	1250	CGFR		Said to be dry semi-deciduous forest, the forest is in Ruangwa district.	Lindi DFO
Noto	12000**	No status	250-497	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, & woodland	Clarke and Prins (2006),
Nndawa	646	VLFR	Approx. 450 -600	Said to be mainly miombo woodland, dry semideciduos	Lindi DFO
Njau	93	VLFR		Said to be miombo woodland	Lindi DFO
Lwii	949	VLFR		Mainly dry deciduous miombo woodland	Lindi DFO
Namangale	221	VLFR		Dry deciduous miombo woodland	Lindi DFO
Mihima		VLFR	approx. 450-600	Parinari and <i>Brachystegia</i> woodland, dry semi-deciduous forest, evergreen thicket	

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Nndawa	646	VLFR		Mainly woodland with forest patches.	DFO Lindi
Mnamba	93	VLFR		Said to be mainly woodland with forest patches.	DFO Lindi
Namupa	109	VLFR		Said to be mainly woodland with forest patches	DFO Lindi

Source Perkin et al. (2008c)

Other Village Land Forest Reserves not include Liganga and Mtene which like many VLFRs, are not surveyed and inventoried and therefore, there is no realistic data on them.

*Table 15: Summary of new Village Land Forest Reserves within Lindi landscape (Kashaigili et al. 2011)*

Forest name	Area (ha)	Area (ha)	Status	Source
	2010	2011		
Ruaha	-	118.76	VLFR	WWF
REDD Project	-	11672.03	VLFR	TFCG
Njau	-	94.94	VLFR	WWF
Nandambi	-	3635.41	VLFR	WWF
Nambidi	-	144.07	VLFR	WWF
Namangale	-	215.31	VLFR	WWF
Milolo -REDD	-	1210.91	VLFR	TFCG
Mihima	-	3211.14	VLFR	WWF
Lwii	-	998.65	VLFR	WWF
Ntene A	-	5273.64	VLFR	WWF
Liganga	-	3457.62	VLFR	WWF

Source: Kashaigili et al. 2011

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Figure 14: Protected Areas in the Lindi Landscape (from Kashaigili et al. 2011)

This landscape is characterised by deep, leached sandy soils derived from terrestrial sands, gravels, calcretes and laterites of Miocene to Pleistocene age. There is severe erosion where trees had been cleared on the forest boundaries.

Most of the major rivers supplying water to Lindi District originate at the base of the Rondo, Noto or Chitoo plateaus. As such these areas are important water catchments. Rivers flowing from the eastern



side of the Rondo Plateau include the Nyengedi river which then flows into the Lukuledi River and the Nali and Mirole streams which contribute to the irrigation schemes around Lutamba. At the southern base of the Chitoo plateau there are two lakes, Lake Lutamba and Lake Nampawara which support small-scale fishing activities in the communities living at Lutamba, Milola and Nampawara. From Lake Lutamba flows the Ngahava River. The valley between the Noto and Chitoo plateaus is the source of the Mahuiui River which provides water to Lindi Town. Several rivers flowing towards Ruangwa have their sources at the western base of the Rondo Plateau.

The largest forest in the landscape is Rondo forest is located at 10°04'S - 10°14'S and 39°08'E - 39°15'E in Lindi district, Lindi region. Rondo forest reserves comprise an area of 14,060 ha of both plantation and natural forests. The forest is located on part of the Rondo (Mwera) plateau at around 870 m asl (to a maximum of 885 m asl). The Rondo Forest Reserve receives a single rainy season (November-May), with an average annual rainfall of 1088 mm (1951-1979) recorded at the Rondo Forest station. Temperatures vary between 11°C and 32°C with the coolest period between June and August (Annual Report of the Forest Department, 1952). Part of the forest is found on the escarpment edge from 465 m asl in the Mchindiji, Mtandi and Nanyolyo valleys. The reserve is about 4 km from Ntene Rondo village, itself approximately 60 km west of Lindi. The Rondo Forest Reserves are found along the eastern facing ridges or on slightly raised ground east of the ridges. Further inland there are a number of deeply fissured plateau and on these are the better stands of remaining forest. The forest is also found along some of the river valleys that drop from these plateaus.

#### ***Wildlife corridors***

Four animal movement corridors have been identified. First, is the elephant corridor which connects Matapwa Forest Reserve in the North and Ndawa forest area in the South. This corridor goes through Namunda, Mputwa, Nahoro, Mtere village areas and Rondo Forest Reserve (Figure 14). Elephants start their journey at the Mbwemkuru River between September and October and move southwards to Ndawa FR. However, once they are within this southern area the animals may remain in the region of Rondo FR up to three months before they start their way back to Matapwa FR in the North in January to February.

Another corridor connects Matapwa Forest Reserve to Kilangala forest area through Namikongo area and Dimba Forest Reserve (Figure 14). This is also used mainly by elephants during the crop growing season. Buffalo' movement corridors are also present but these are shorter and the buffaloes tend to co-use corridors used by elephants. The Buffaloes' corridors include those between Nambambi and Noto Plateau and Tandangoro and Noto Plateau (Figure 15). Another route which was identified is the one believed to be shared between buffaloes and elands. This connects Mandawa and Mihima through grassland areas on the west side of Rondo FR.

It should be noted, however, that among the animals mentioned only elephants appear to have permanent routes unlike others that change routes from time to time. Moreover, unlike simulated corridors that generate routes away from villages, some of the identified animals routes, which are historical in nature, pass close to or even through villages (Figure 15) causing human-wildlife conflicts. For example, the identified animal corridor between Matapwa FR and Dimba FR passes through settlements, which have low habitat suitability according to calculations by the Corridor Designer. This corridor has been associated with crop raiding. It is likely that the corridor existed before the establishment of villages which did not consider animal corridors.

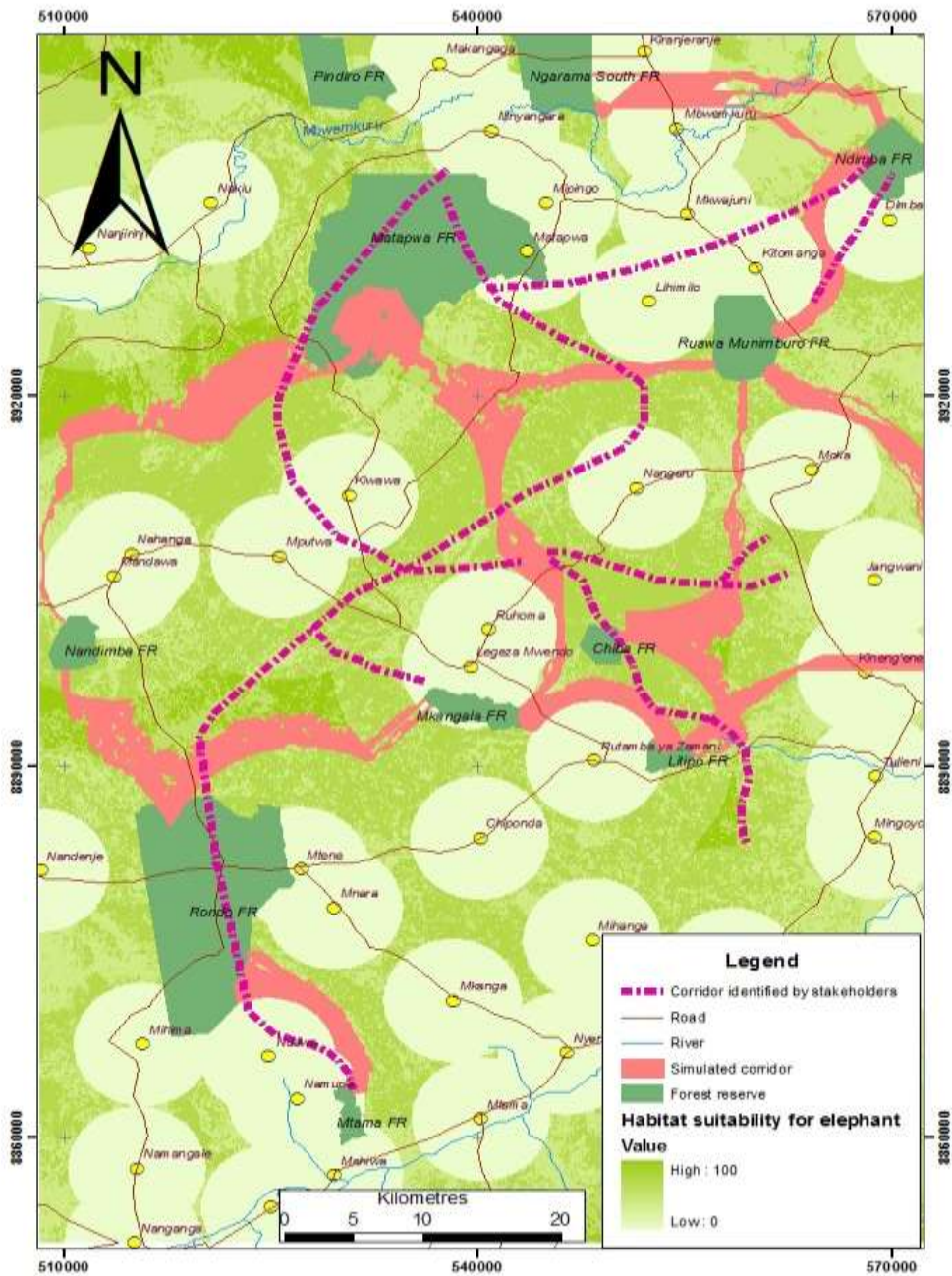


Figure 15: Map of Lindi Landscape- simulated corridors (from Kashaigili et al. 2011)

### 3.9 Zanzibar Landscape

The Zanzibar landscape consists of two main islands, the northern island of Pemba and the southern island of Unguja. These islands lie between 4°50' - 6°30' south latitude and 39°10' - 39°90' east longitude.

All regions of Unguja and Pemba, and in particular the remaining patches of coral thicket forests, are severely threatened by a very high human population density (400 individuals/km<sup>2</sup>), which is increasing at an estimated rate of five percent per year (three percent intrinsic and two percent immigration). The vast majority of Zanzibar's human population is dependent upon shifting cultivation and forest products, such as building poles, firewood, and charcoal. Due to the high price of electricity, even Zanzibar's urban population is heavily reliant on firewood and charcoal for cooking. Wood cutting to supply this demand continues to be a major threat to Zanzibar's wildlife. Zanzibar is currently losing an estimated 1.2 percent of its forest each year. Thus, in order to conserve Zanzibar remaining wildlife and ensure the genetic viability of these species into the future, all of the remaining forests patches important to wildlife must be identified, protected and linked by functional corridors in a comprehensive Protected Areas (PA) network of community and government forests.

### **3.9.1 Unguja Island**

Unguja island, the largest in the Zanzibar archipelago, is located on the continental shelf and is separated from mainland Tanzania by approximately 40 km by the Zanzibar channel. Unguja island is a small island of approximately 1650 km<sup>2</sup> and is largely old coral reef and sand bar. The island has been separated from the mainland for approximately 10,00-15,000 years due to a rise in sea level.

The western portion of Unguja Island receives more rain, and is more fertile containing soils derived from limestone or non-calcareous sediment. Historically, this portion of the island is presumed to have supported tropical high forest. Large scale deforestation in this region began during the early 19<sup>th</sup> century with the arrival of the Omani Arabs who replaced the original forest with coconut and clove plantations and food crops. The eastern half of the island is much drier and consists of old coral rock sparsely covered with variously sized pockets of red-brown sandy soil. These conditions would have given rise to deciduous woodland and dry evergreen bush. Today, this area, the eastern half of the island, still supports dry evergreen bush (or coral-thicket forest) which is where most of Unguja's remaining wildlife is found.

On Unguja the remaining best habitat for Zanzibar's unique wildlife and those which must be included in the development of the PA network include: Jozani-Chwaka Bay National Park (JCBNP), Kiwengwa Pongwe Forest Reserve (KPFR) (Figure 16), the High Protection and Low Impact Use zones of the community forests surrounding JCBNP (17 Communities) and KPFR (10 communities), and the Proposed Muyuni-Jambiani Forest Reserve (Figure 17). These forests are all still relatively well linked by a series of 5 corridors (Figure 15,16). These habitat corridors are mainly on community lands, overlap the Proposed Muyuni-Jambiani Forest Reserve, and are all actively used by wildlife (as determined by reconnaissance surveys and camera trapping). However, many of these connections might be lost in coming years due to agriculture expansion and cutting for building poles, firewood and charcoal production. Hence corridor conservation is an urgent priority at present (Siex et al. 2011).

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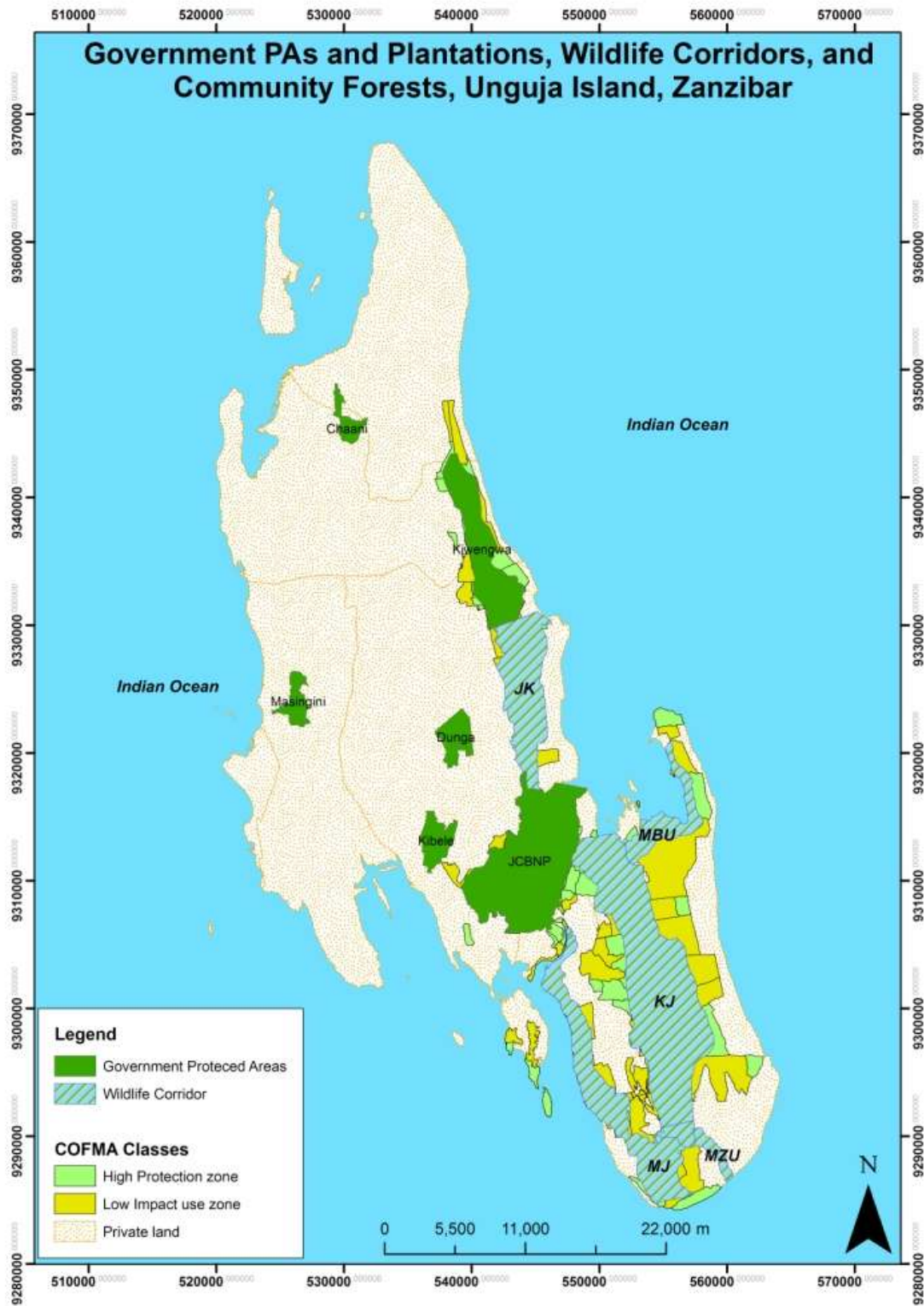


Figure 16: Zanzibar Landscape: Unguja Island, land use map (from Siex et al. 2011)

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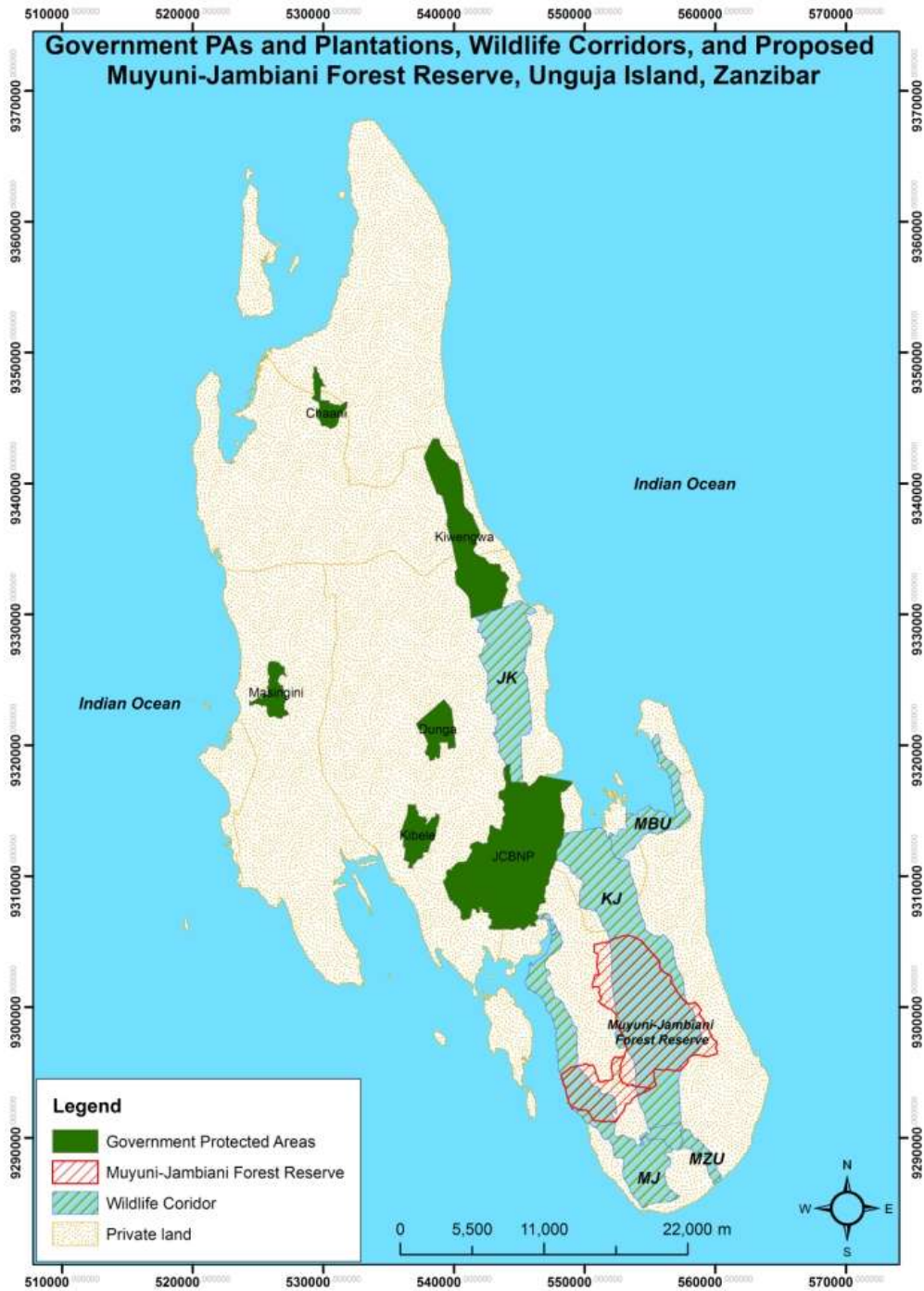


Figure 17: Location of the proposed Muyuni-Jambiani reserve (from Siex et al. 2011)

### 3.9.2 Pemba Island

Pemba Island, 1014km<sup>2</sup>, lies approximately 50 km from the mainland and is surrounded by comparatively deep water with strong currents. Unlike Unguja, Pemba has been separated from the mainland since the end of Miocene about 10 million years ago. Also unlike the relatively flat terrain of Unguja Island, Pemba has an undulating landscape with valleys, some of which are quite steep, and dry river beds. The only high forest remaining on Pemba is in the extreme North, the rest of the island is covered by a mosaic of agriculture, grassland, bushland, or forest in various stages of growth or regeneration from cultivation.

On Pemba, the areas of the greatest importance for wildlife and those to be included in the PA network include: the three government PAs of Ngezi-Vumawimbi Nature Reserve, Msitu Mkuu Forest Reserve and Ras Kiuyu Proposed Forest Reserve, and the High Protection and Low Impact Use zones of the 13 community forests (Figure 17). There are also a number of additional forest patches which need to be further studied to determine their importance to wildlife. These include: Kwa Konondo, Ngulu, Makuwe-gando, Kangagani, and Kideke; and the community managed forest patches of Fundo, Matambwe, Mgelema, and Mbiji/Changaweni (Figure 18). Unlike on Unguja, most of these important areas are spread out across the island and are not well connected; none of the 3 government PAs are connected by wildlife corridors. There was reported to be a corridor between Msitu Mkuu and Kangagani but recent exploration has shown that no longer to exist. There is still a corridor between Ngezi and Makuwe but this corridor is mainly via mangrove forest rather than terrestrial forest which will limit the usefulness of the corridor to a select number of species. There may also be a corridor linking Kangagani and Makaani which is currently being explored.

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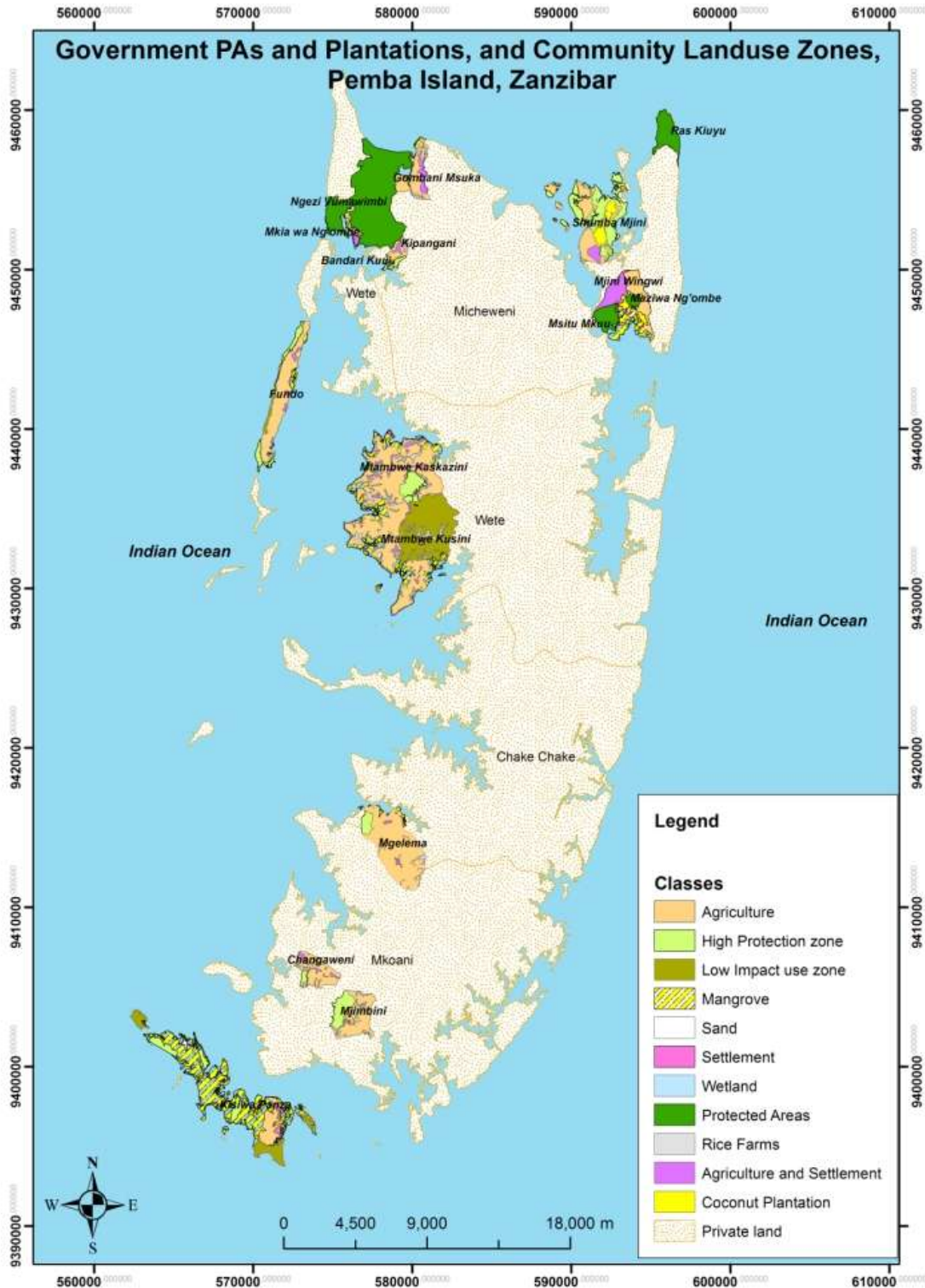


Figure 18: Zanzibar Landscape: Pemba Island (Siex et al. 2011)

### **3.10 Concluding Remarks**

The protected area estate for the coastal forests covers many of the remaining patches of natural forest and woodland habitat. The status of some of the reserves is not totally clear, however, and there seems to be moderate levels of confusion on which of the reserves exist on the ground, and who is tasked to manage them. The project is working to clarify this situation and produce a definitive list of reserves in the coastal districts, in particular in the focal landscapes in southern Tanzania. In Rufiji, Kilwa and Lindi districts there is also considerable scope for the gazettelement of additional forest patches as various kinds of reserve, ranging from community-based to central government. Emphasis will be on community based approaches, through Village Land Forest Reserves and Wildlife Management Areas. These approaches will be promoted and developed during the period of the ongoing GEF support to the coastal forests.



## 4 Management Issues

### 4.1 Overview

Past management (since colonial time) of Forest Reserves was not always biodiversity friendly (e.g. planting the core of perhaps the richest patch of Coastal Forest, Rondo Plateau FR, with exotic pine in 1952). In 1977 Forest Reserves with no national catchment or timber values (i.e. most of the Coastal Forest patches) were passed to districts for their management as part of Tanzania's decentralisation process, with fewer staff, less funds and little conservation interest or capacity. Districts manage both the timber-rich woodlands around the biodiversity rich forests and the forest patches. This has now changed especially in the 1990s after the Rio summit.

### 4.2 Policy and Legislative Context for the Management of Biodiversity

Environmental management in Tanzania is complex, multi-sectoral and cross sectoral; it requires a holistic approach and multi-level operation. There is a strong policy framework for environmental management and for biodiversity conservation in Tanzania. Environmental concerns are embedded in the constitution of the United Republic of Tanzania, where article 27 (1) states that, *"Every person has the duty to protect the natural resources of the United Republic of Tanzania, the property of the state authority, all property collectively owned by the people, and also to respect another person's property"*. The 2025 country's vision overall goal specifically includes; 'sustainable development endeavours, on intergeneration equity basis, such that the present generation derives benefits from the rational use of natural resources of the country without compromising the needs of future generations'.

The environmental related laws of mainland Tanzania and Zanzibar differ and are separated here:

#### 4.2.1 Zanzibar

On Zanzibar there are two relevant laws that relate to the implementation of this project: The Environmental Management for Sustainable Development Act, 1996, Part 1 to the Zanzibar Government Gazette Vol CVI No 5743 of 31<sup>st</sup> May 1997, and the Forest Resources Management and Conservation Act No 10 of 1996, Part 1 to Zanzibar Government Gazette Vol. No. 5769 of 6<sup>th</sup> December 1997. These laws provide the basis for developing a network of protected areas, and in recent years there have been important additions to the protected area network of Zanzibar, including the Jozani National Park (2004) on Unguja.

The mandate of the Department of Forestry and Non Renewable Natural Resources (Formally Department of Commercial crops, fruits and forests,) is stated in the National Forest Policy of 1995 and partly in the Agricultural sector policy. The department is instructed to 'Protect, conserve and develop forest resources as well as to promote sustainable development of the agricultural sector for the social, economic and environmental benefit of present and future generations of the people of Zanzibar'.

The Department of the Environment is governed by the Environmental Policy of 1992, which is currently under review. The aim of the policy is stated as to ensure that the economic development is accompanied by proper environmental management, so that Zanzibar's natural heritage is passed on undiminished to future generations.

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The National Protected Areas Board (NPA Board) has been established as a consultative authority to provide policy guidance in the designation, management and coordination of protected areas system in Zanzibar. The Board draws members from various disciplines, including environment, forestry, fisheries, local government, finance, women groups, tourism and trade as well as a number of prominent Zanzibar scientists. In undertaking its duties, the newly constituted Board is seriously constrained by the lack of appropriate expertise, facilities and equipment within Zanzibar. The Board itself has inadequate experience, and few linkages with other regional and international networks. This board is now being reactivated through the support of the ongoing GEF coastal forests project for Tanzania

### 4.2.2 Mainland Tanzania

On mainland Tanzania the Tanzanian National Environmental Action Plan (United Republic of Tanzania 1994) identified six major environmental problems: land degradation; lack of accessible, good quality water for both urban and rural inhabitants; pollution; loss of wildlife habitats; deterioration of marine and freshwater systems; and deforestation. The National Environment Policy (1997), as an umbrella instrument, defines in broad terms the sectoral obligations and requirements for biodiversity conservation. This policy aims "to achieve sustainable development that maximizes the long-term welfare of both present and future generations of Tanzanians".

In response to environmental problems, Tanzania has made considerable progress in achieving sustainable environmental management through putting in place Environmental Management Act No. 20 of 2004 (EMA 2004) and the National Strategy for Growth and Reduction of Poverty (NSGRP 2005) in which environmental issues have been mainstreamed. In addition, the National Environmental Action Plan 2006 (NEAP), Local Government Reforms Programme, National Development Vision 2025 and sector specific policies, legislations, programmes and strategies do all reflect important environmental management issues.

The government of Tanzania, being a signatory to the Convention on Biological Diversity (CBD) Convention since 1992, developed a National Biodiversity Strategy and Action Plan (NBSAP) in 2001 as an obligation to the country as Contracting Party. The NBSAP is guided by the overall vision which is to build a society that values all the biodiversity richness using it sustainably and equitably while taking the responsibility for actions that meet both the competing requirements of the present and the legitimate claims of the future generations

The Government of Tanzania is also committed to related conventions such as Convention on International Trade in Endangered Species (CITES), United Nations Convention to Combat Desertification (UNCCD) and the Convention of Biological Diversity (CBD) for the conservation and sustainable utilization of biological diversity.

The Forest Policy of Tanzania (1998) establishes a framework for the conservation of biological diversity through participatory forest management, decentralization and privatization and recognizes the roles of local communities and the private sector in managing forest resources. Implementation of the Forest Policy is through the National Forest Act (2002) and the National Forest Programme of the Ministry of Natural Resources and Tourism (2001).

The National Forest Programme was launched in 2001 and aims to reduce poverty through increasing employment in forest based industries by 25% by 2010 and increasing the income generated from forest resources and services that is retained by local communities by 20% by 2010. The Tanzania Forest Conservation and Management Programme (TFCMP) have been financing implementation of the National Forest Programme and the institutional strengthening of national forestry sector agencies and

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institutions. Implementation is being carried out through partnerships involving local government, communities, civil society and the private sector.

In line with the Forest Policy, the Forest Act and the Village Land Act (1999), the Ministry of Natural Resources and Tourism issued Guidelines for Community-Based Forest Management in 2001 to provide practical guidance to staff and district and village authorities for implementation. The Guidelines make clear that the target population for community-based forest management is the local population living adjacent to, or within, the forests. The establishment of joint management committees (village and sub-village level) and joint management agreements are promoted.

A Participatory Forest Management approach allows villages to collaborate in managing forest resources. It is assumed that if local communities are granted appropriate user rights and security of tenure as incentives for sustainable forest management, they are likely to participate actively and effectively in the conservation and management of their forest resources. There are a number of challenges to this and the impact of the PFM approach has been less than hoped, although community-based forest management where the communities take full responsibility seems to have been more successful than 'joint forest management' where the communities and forest authorities work together to make a designated government reserve.

*Table 16: Summary of sector ministries with policies and Legal Acts supporting Coastal Forests*

Ministry/department	Policies	Legal Acts
Ministry of Natural Resources and Tourism with:		
a. Forestry and Beekeeping Division	National Forest Policy (1998)	Forest Act No. 14 of 2002
b. Beekeeping Division	National Beekeeping Policy (1998)	The Beekeeping Act No.15 of 2002.
c. Wildlife Division	National Wildlife Policy (2007)	The Wildlife Conservation Act, 1974
		Wildlife Conservation (Wildlife Management Areas) Regulations 2002.
d. Tourism Division	National Tourism Policy (1999)	Guidelines for Coastal Tourism Development in Tanzania 2003
e. Fishery Division	National Fisheries Sector Policy and Strategy Statements (1997)	Fisheries Act No/ 22 of 2003
Ministry of Lands and Settlement	National Land Policy (1997)	Land Act No. 4 of 1999
		Village Land Act No. 5 of 1999
		The Land Dispute Courts Act No. 2 of 2002.
Ministry of Agriculture, Food Security and Cooperation	Agriculture and Livestock Policy (1997)	Veterinary Act 2003 and Animal Diseases Act 2003.
Ministry of Water and Irrigation	National Water Policy. (2002)	
Ministry of Energy and Minerals	National Energy Policy (2003)	
	National Mineral Policy (1997)	
Ministry of Community Development,	Women and Gender Development	The Community Service Act No. 6 of

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Ministry/department	Policies	Legal Acts
Gender and Children	Policy (2000)	2002 and Community Service Regulation No. 87 of 2004
	National Strategy for Gender Development (2005)	
	Rural Development Policy (2003)	
Ministry of Science, Technology and Higher Education	National Science and Technology Policy (1996)	
Vice President's Office	The National Policy on NGOs (2001)	The Environment Management Act No. 3 of 2004.
	National Environmental Policy (1997)	
	Integrated Coastal Environment Management Strategy (2003)	
Ministry of Livestock Development & Fisheries	Livestock Policy (2006)	
Ministry of Industry and Trade	National Trade Policy (2003)	
	Small and Medium Enterprise Development Policy (2003)	Employment Promotion Services. Act No. 9 of 1999
Ministry of Works	Construction Industry Policy (2003)	
Ministry of Communications and Transport	National Information and Communications Technologies Policy (2003)	Public Roads Act No. 12 of 2002

### 4.3 Participatory Forest / Natural Resources Management

There are two types of Participatory Forest Management (PFM) in Tanzania – Joint Forest Management and Community Based Forest Management.

#### 4.3.1 Joint Forest Management

Joint Forest Management (JFM) is where local people and FBD or District Councils have formed an agreement over the management of a particular Forest Reserve, or a part of it. The roles and responsibilities of the community and the government authorities should be clear and there is some evidence from the coastal forests (and other forest types in Tanzania) that the condition of the forest within Forest Reserves under Joint Forest Management (JFM) agreements is better than in reserves where there is no community involvement (Blomley et al. 2008). Within the relevant regions of Tanzania well over 100 villages are involved with JFM, covering at least 200,000 ha of reserved land.

Table 17: Status of Joint Forest management in the Coastal Forest Regions in Tanzania (data from PFM survey of 2009 by the Forestry and Beekeeping Division)

Region	Districts Counted	Number of NFRs	Number of LAFRs	Protection Forests	Production Forests	Number of Villages	JMAs signed or pending signing	Total Area (ha)
Tanga*	7	47	11	49	42	130	37	43,483.9
Lindi	4	5	2	4	5	43	0	119,237.3
Pwani (Coast)	8	10	2	5	5	72	0	115,612.0
Mtwara	1	2	0	2	0	15	0	9,052.0

NFR = National Forest Reserve; LAFR = Local Area Forest Reserve; JMA = Joint Management Agreement; JFM = Joint Forest Management

\* only one of these Districts is relevant to the coastal forests area, and even in that District (Muheza) the JFM agreements also include montane forests.

#### 4.3.2 Community Based Forest Management

Community Based Forest Management (CBFM) is where the communities manage the forest resource within their village lands, with advice and assistance from the District (Forest Office) as requested. Within the relevant regions of Tanzania there are over 70 villages participating in CBFM schemes, covering over 250,000 ha of forested land. In many cases the boundaries of these CBFM forest areas are not well known, and may not be mapped.

Table 18: Status of Community Based Forest Management in the Coastal Forests Regions (data from PFM survey of 2009 by the Forestry and Beekeeping Division)

Region	Districts Counted	Number of villages	VNRC Established	Number VLFRs	Gazetted VLFRs	Total Area	Facilitators
Tanga*	4	94	93	22	1	12,390.7	EUCAMP, TFCG, WWF
Lindi	4	31	25		0	145,405.8	UTUMI, PFM, WWF
Pwani (Coast)	6	20	19	19	2	57,401.0	REMP, WWF, TFCG
Mtwara	1	25	24		0	73,121.0	Data from 2002
Totals	15	170	161	41	3	288,318.5	

\* only one of the Districts is relevant to the Coastal Forests area, and even in that District (Muheza) the JFM agreements also include montane forests.

## 4.4 Threat Prioritization

Degradation and loss of Coastal Forests and associated habitats and the species that they support is a result of a wide range of natural and man-made causes interacting at different levels and intensities on the east African Coastal Forest ecosystems. An estimated 60% of natural habitats in the EACFE have been converted over time to farmland and urban areas. Stakeholders have identified three-quarters of the remaining Coastal Forest areas to be highly or very highly threatened.

A methodology developed by The Nature Conservancy in the USA was applied in September and December 2006 to prioritize threats in the Coastal Forests ecoregion. Threats were ranked in terms of:

- *Area*. How wide an area does the threat affect? Is it going to affect the entire area or just a small part of it?
- *Intensity*. How strong is the impact of the threat on a given piece of habitat, ecosystem service or wildlife population? Will it destroy it completely? Or will it cause only minor damage?
- *Urgency*. How urgent is the action to deal with the threat? Is the threat occurring now? Or is it only likely to be important in future years?

*Table 19: Ranked threats in the coastal forest ecoregion (WWF Eastern African Coastal Forests Programme 2006).*

Threat	Criteria			Total	Rank
	Area	Severity	Urgency		
Conversion to agriculture	14	14	14	42	V HIGH
Increased demand for fuelwood (charcoal, firewood)	13	12	13	38	V HIGH
Infrastructure development	10	13	10	33	HIGH
Unsustainable logging (timber, poles)	12	9	12	33	HIGH
Uncontrolled fire	11	8	11	30	HIGH
Over-harvesting of wood for carving	8	7	9	24	MED
Unsustainable hunting (legal & illegal)	9	5	8	22	MED
Conversion for salt pans, aquaculture	6	11	5	22	MED
Mining	5	10	6	21	MED
Adverse climate change	7	6	2	15	MED
Unsustainable collection for trade	4	3	7	14	LOW
Vegetation destruction by elephants	2	4	4	10	LOW
Invasive species	3	1	3	7	LOW
Effluent pollution	1	2	1	4	LOW

### 4.4.1 Expanding agriculture

The most important threat facing the natural habitats of eastern Africa, and the Coastal Forests, is the expansion of agriculture. In general the soils of coastal east Africa are poor and cannot easily support settled agriculture. Coastal agriculture traditionally takes the form of short-term shifting cultivation, concentrating on food crops such as cassava and maize, along with some banana, papaya and coconut.

The soils under the remaining patches of lowland forest are more fertile than those of surrounding woodlands and hence face pressure to be converted for agriculture. Growing population pressures also tend to decrease the length of fallow periods. Plantations of coconut, sisal and cashew nut also occupy considerable areas of coastal land, replacing lowland Coastal Forest and other natural habitats.

A newly emerging threat is the establishment of large industrial plantations for the production of biofuels on the eastern African coast. Large areas of woodland and coastal forest habitats have already been cleared for *Jatropha* production in Kilwa District and around Pugu close to Dar es Salaam, and sugar cane plantations are also planned for the Bagamoyo area. Land allocation for plantations of trees is also being explored in southern Tanzania, through Green Resources, and there are also major development plans for agriculture in southern Tanzania, with potential for huge amounts of inward investment. These kinds of agricultural developments are proceeding rapidly and have the potential to transform the coastal region of Tanzania. In particular these developments have the potential to split the remaining migration corridors between the reserved patches of forest in many of coastal districts.

#### 4.4.2 Charcoal production

Charcoal production is a major cause of habitat loss in areas close to large cities and alongside main roads, particularly in Tanzania. Although not well quantified, the business of charcoal production has heavily impacted forest areas up to 200 kilometres from Dar-es-Salaam, and is spreading ever further into the bush. Away from towns and roads this threat is much less important as local people use firewood for cooking and transport difficulties discourage charcoal production as a cash crop. The major supply routes of charcoal to Dar es Salaam are along the Kilwa, Morogoro and Pugu roads; with the Kilwa road accounting for 50% of the total supply – much of this being sourced from the forests and woodlands up to 150 km distance from Dar es Salaam (Ahrends 2005; Ahrends et al. 2010).

Table 20: Daily amounts of charcoal transported to Dar es Salaam (Malimbwi et al. 2007)

Routes	Average load per day (bags)				Percentage (%)
	Commercial Vehicles	Bicycles	Non-Commercial	Total	
Kilwa road	3,018	204	139	3,361	50
Morogoro road	1,301	167	152	1,620	24
Pugu road	578	276	15	869	13
Bagamoyo	108	97	27	232	3
TAZARA railway**				450	7
TRC railway				245	4
<b>Total</b>	<b>5,005</b>	<b>744</b>	<b>333</b>	<b>6,777</b>	<b>100</b>
Percentage (%)	84	11	5	100	

\*\*There were no current amount obtained

Previous studies indicated that charcoal production sites for Dar es Salaam city were located in Pwani (Coast) and Morogoro Regions and had changed from a 50 km radius in the 1970's to about 200 km in the 1990's (Ahrends et al. 2010). The spatial distribution of charcoal harvesting for Dar es Salaam now targets most of the coast and is spreading further inland. In 2007 charcoal was being sourced from

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several regions more than 300 km distance from Dar es Salaam, and the transport by rail from Tabora is over 1,000 km from Dar es Salaam. Considerable amounts of charcoal came from the coastal forest landscapes in 2007 (Figure 19), a situation that continues today.

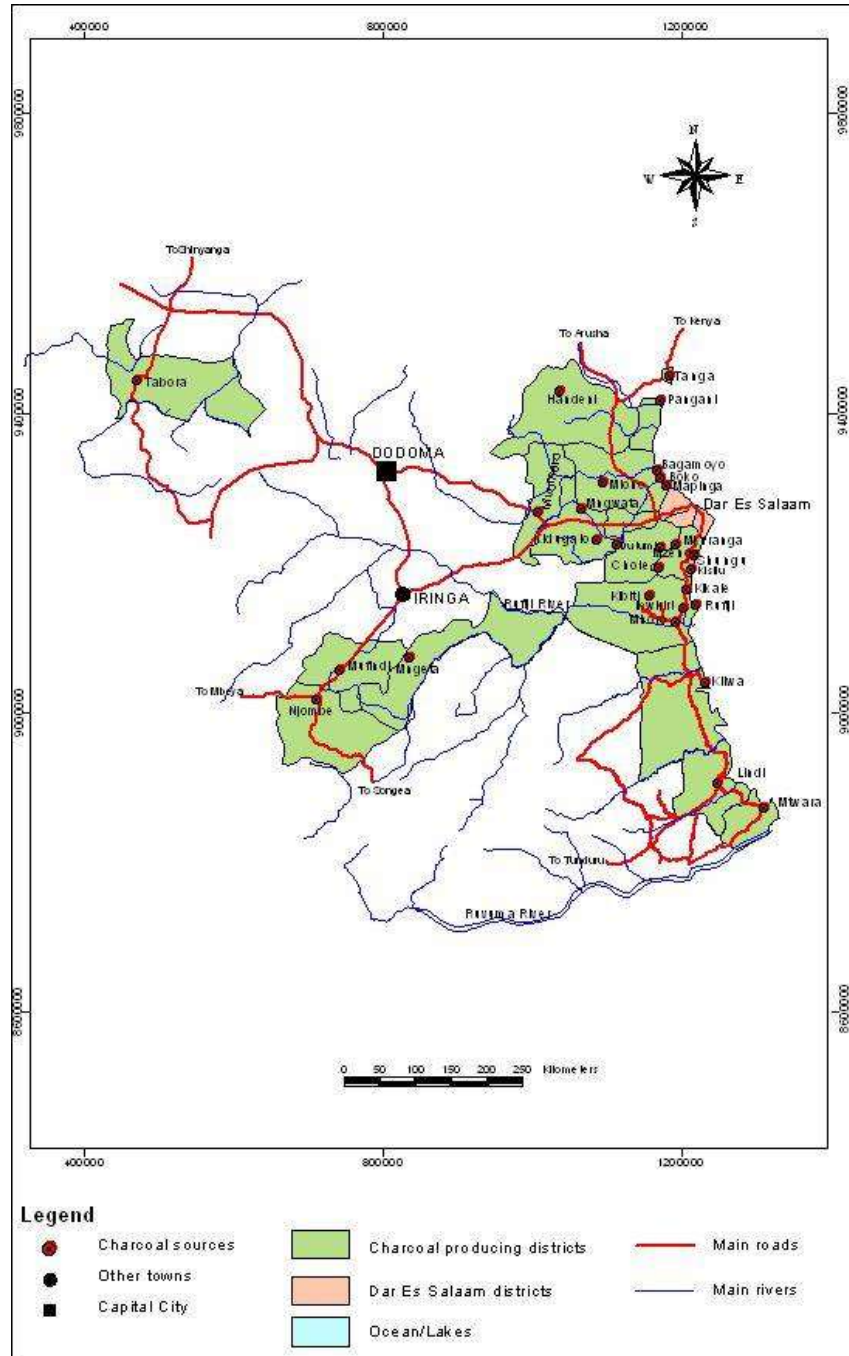


Figure 19:Charcoal sources for Dar es Salaam city (2006-2007) (from Malimbwi et al. 2007)



### 4.4.3 Logging

The commercial logging of Coastal Forest tree species currently occurs mainly in northern Mozambique and the remoter areas of Tanzania, especially to the south. Logging using pit sawing techniques occurs in those Coastal Forests where commercial timber trees remain. Many forests have already been logged to exhaustion for the usual commercial timber trees but are ever threatened by further logging when commercial attention shifts to new species.

Particularly heavy exploitation for round wood export recently occurred in the Coastal Forests of the Rufiji, Kilwa and Lindi Districts of Tanzania, although this has now been stopped to a limited extent. Although some of this logging is undertaken using licences obtained from the relevant authorities, most is illegal. Logging of the valuable trees is often the first major disturbance to a forest, which then progresses to fire wood collection and charcoal burning, and in the worse cases to clearance for agricultural use. Studies within 10 forests from Dar es Salaam south to the Matumbi Hills (Ahrends 2005) have shown that logging of the highest value trees is concentrated more than 150 km south of the city – for the simple reason that these high value timber species have already been exploited in the forests closer to Dar es Salaam (Figure 20).

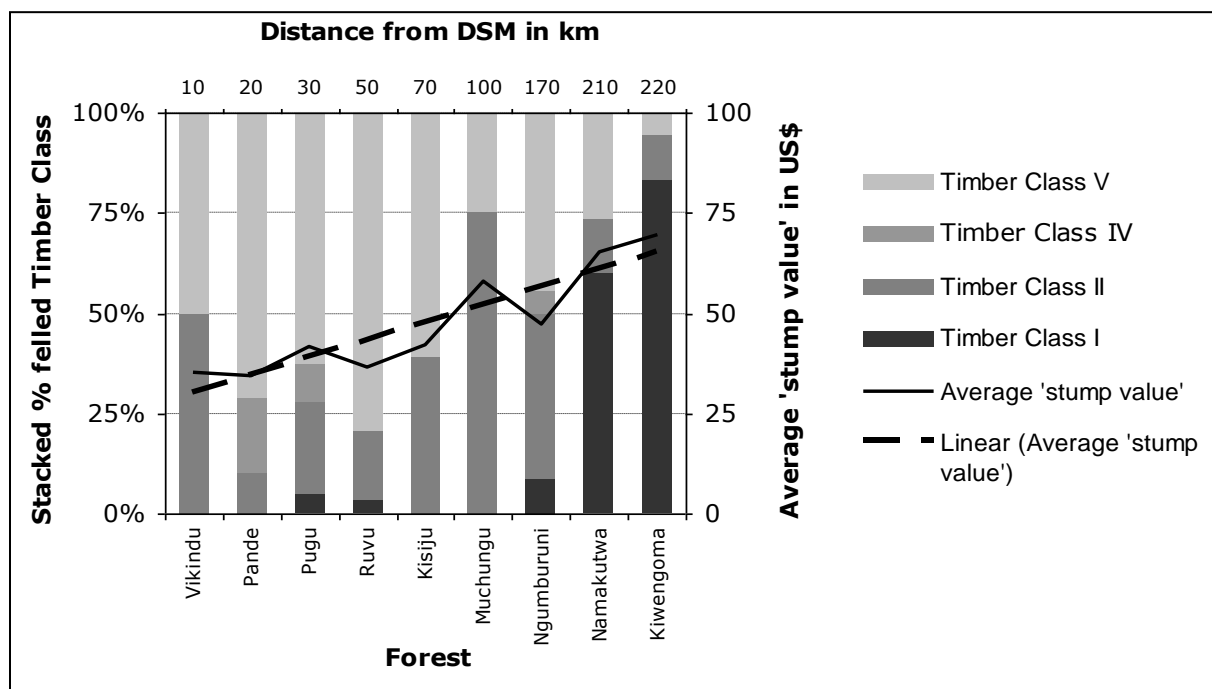


Figure 20: Logging of timber trees in the forests from Dar es Salaam to the Matumbi Hills (From Ahrends 2005)

### 4.4.4 Uncontrolled fires:

Although forest fires are an occasional natural phenomenon in eastern Africa, due mainly to lightning strikes, the vast majority are started by people, who use fire to clear farmland, drive animals for hunting, collect honey, and remove tsetse flies from an area. Some other fires are started accidentally, for example from cigarettes thrown from passing vehicles or by pedestrians. Fire can invade lowland

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Coastal Forest patches and thicket vegetation during the dry season. At this time it can be irreversibly destructive to the vegetation that is not adapted to being burnt. Over time and with frequent and intense burning it is believed that lowland Coastal Forest and thicket vegetation is converted to more fire-adapted vegetation types similar to the Zambesian Miombo woodlands (dominated by *Brachystegia* and *Julbernardia* species). This results in a loss of the narrowly endemic Coastal Forest specialist species and their replacement by wide-ranging species typical of Miombo. The probability of burning in the coastal districts of Tanzania is moderate, but not as high as further inland (Figure 21). Fire frequency is linked to human population increase and the opening of new farmlands, as well as the incidence of dry years (e.g. 2003). There are almost no fires on the densely populated areas of the coast, nor on the offshore islands (Figure 21).

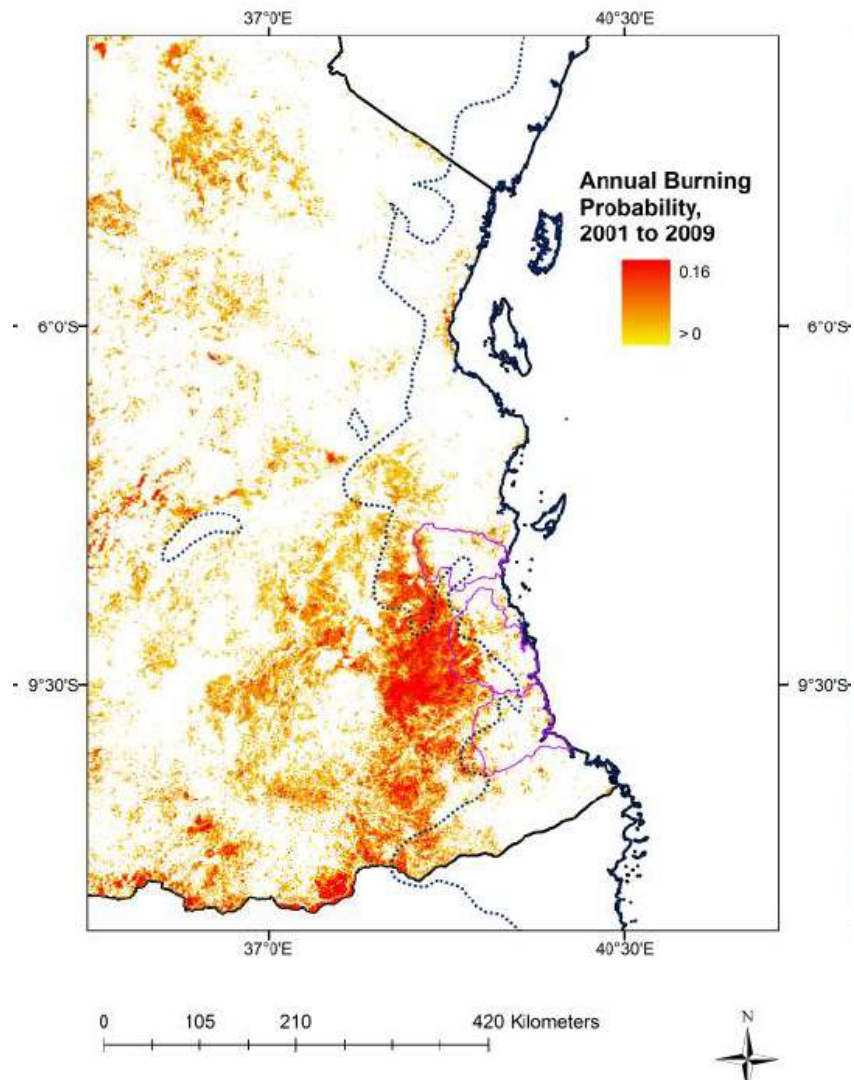


Figure 21: Annual burning probability in the coastal area of Tanzania, 2001-2009. Data derived from MODIS fire points database, University of Maryland (map by Dr Marion Pfeifer, University of York)

#### 4.4.5 Pole harvesting and firewood collection

Pole harvesting is widespread in the coastal forests, especially in rural areas where they are used in the construction of houses. The same is true for firewood harvesting, which is primarily conducted in the rural areas and forms a major extraction in these areas. The levels of forest damage that are caused by pole cutting or firewood harvesting are much less severe than for charcoal or timber harvesting, but in areas close to rural villages they can form a significant forest use.

#### 4.4.6 Climate change

Predictions for climate change in eastern Tanzania suggest only moderate changes, with temperatures rising slightly and rainfall patterns tending towards an overall increase, but with potentially more severe dry seasons and longer 'short rains' periods. The sea level may rise to some degree. Overall the impact of the various climate change predictions on the eastern African Coastal Forests are unknown, but available prediction suggest that they may be less dramatic than elsewhere in Africa (Case 2007), although locally devastating in the case of rainstorms and associated flooding.

#### 4.4.7 Lack of prioritisation

The Coastal Forest habitat type is not recognized as a priority for investment by the national government, or the Districts along the coast. Typically these reserves are seen as a source of timber, charcoal and other materials to supply increasing urban centres, or for export. This use is compromising the globally significant biodiversity values, which are mainly found in the Forest Reserves being managed by District authorities.

### 4.5 Coastal Forest Area Systems of Management

In this section, coastal forest management and current financial status in the selected coastal districts of the main land (Rufiji, Kilwa and Lindi) as well as Unguja and Pemba are discussed. Issues discussed include the coastal forest management systems; financing forest in the coastal districts and the financial status; available finances for forest management activities in the coastal districts; financial commitment for forest activities in the respective selected areas; actual annual central government budget allocated to coastal districts for forest management activities as well as NGOs and other donors' support to forestry activities in the selected coastal districts of Tanzania.

In coastal districts, types of forests where central government, local government and NGOs are putting more efforts in ensuring their management and sustainability were divided into different categories, including (i) the central government managed forest; (ii) district council managed forests; (iii) village forest reserves (iv) forests on public/general land and (v) privately owned forests. Sizes of the respective forests based on the ownership as identified by the consulted district forest officers are given in Table 21.

Table 21: Total Hectares Based on the Type of the Forest Ownership in Tanzania

Type of Forest Based on the Ownership	Total forest in ha in Coastal Districts				
	Rufiji	Kilwa	Lindi	Unguja	Pemba
Central government managed forest	125,346	201,900	45,828	21,557	20,080
Forest on Public lands	Ni	450,000	470,000	38,328	8000

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Local Authority Forests (District)	84,957	83,000	3,080	Ni	50
Village Forest Reserves (community woodlots for Pemba)	18,807	126,000	5,132.63	Ni	5000

NI = NO INFORMATION AVAILABLE

Forests types indicated above, receive funding from various stakeholders. The actors that are funding forest activities in the respective areas include the Central Government, Local Government through respective district council budgets, donors channelling funds through the Central Government and Local Governments directly, as well as NGOs working directly in these forests. Most NGOs do work on local government forests, mainly the district and village forest reserves.

### 4.5.1 NGOs and other Donors' Support for Forestry Activities

Different Non-Governmental Organizations have been allocating money for forest activities in the selected coastal districts. These include WWF Tanzania Country Office, CARE International in Tanzania, Mpingo Conservation and Development Initiative (MCDI), International Union for Conservation of Nature (IUCN) and the Tanzania Forest Conservation Group (TFCG).

#### *WWF-Tanzania Country Office*

WWF Tanzania, through the agreement of government, is utilising UNDP-GEF project funds to support landscape level initiatives in the Coastal Forests. WWF is utilising a total sum of USD 94,600 for forest conservation activities in each of the three selected districts (Rufiji, Kilwa and Lindi) in 2010-2011. The main activities are forest conservation, including the establishment of Territorial, Local Authority and Village Land Forest Reserves with a total of 49,000 ha in Rufiji, 54,000 ha in Kilwa and 25,000 ha in Lindi.

#### *Tanzania Forest Conservation Group*

Tanzania Forest Conservation Group (TFCG) has projects in Rufiji, Kilwa and Lindi districts in Community Based Forest Management (CBFM). In Rufiji district, TFCG covers a total of 4,544 ha; in Kilwa 2,442 ha and a total of 1,873 ha in Lindi rural. In these districts, the estimated funds that TFCG has invested in forest activities include USD 62,500 in Rufiji; USD 22,500 in Kilwa and USD 150,000 in Lindi in 2010-2011. Most of these funds are for piloting Reduced Emissions from Deforestation and Degradation (REDD+) and come from the Norwegian Government.

#### *International Union for Conservation of Nature*

International Union for Conservation of Nature (IUCN) is working in two different forests in Rufiji district. These forests are Mtanza Msona Village Forest Reserve (7,395 ha); and the 13,500 ha Ngurumbuni Forest. The main activity is Participatory Forest Management and the investment in 2010-2011 was USD 82,425.

#### *Mpingo Conservation and Development Initiative*

Mpingo Conservation and Development Initiative (MCDI) is working in two districts, Rufiji and Kilwa. In Rufiji, a total of USD 14,500 was spent for forestry activities in 2010/2011. MCDI has a number of activities in Kilwa District, including Participatory Forest Management (PFM), REDD+ and forest certification. In Kilwa, a total of USD 372,117 was budgeted and spent for these activities in this district.

Under this organization, most of the funds are for the PFM for piloting REDD+ pilot project and certification initiatives.

***CARE International in Tanzania***

CARE International in Tanzania is piloting REDD+ in coastal forests in Unguja and Pemba under community forest management. In Unguja, CARE is working in a total of 25,000 ha and 15,000 ha in Pemba. In these two areas, the budget that has been budgeted for and spent in the fiscal year 2010/2011 amounts to USD 50,000 for Unguja and USD 40,000 for Pemba.

## **4.6 Application of Legal Frameworks and Business Tools**

Application of legal regulatory frameworks and business-planning tools for effective forest management and the use of tools for revenue collections in the case study districts were studied using a Financial Sustainability Scorecard developed by GEF. In this scorecard, elements of the existence and implementation of the legal and regulatory frameworks; application of the business-planning tool for cost effective forest management; and application of revenue collection tools were documented.

### **4.6.1 Prevalence and Application of Legal Regulatory Frameworks and Implications to Forest Resource Management**

Data from the GEF financial sustainability scorecard shows that the existence and implementation of legal regulatory frameworks in all selected districts is below 50%; with levels of 15.8% in Rufiji, 30.5% in Lindi and 37.9% in Kilwa. On Zanzibar, levels of implementation of legal regulatory frameworks are 12.6% in North Unguja, 21.4% in Central district and 41.1% in Western Urban. The low level of legal regulatory framework implementation leads to forest resources degradation as well as the poor contribution of forest resources to community livelihoods and the national economy.

### **4.6.2 Prevalence and Application of Business Planning Tools and Implications on Forest Resource Management**

Results from the GEF financial sustainability scorecard indicated that the existence and application of business planning tool for cost effective management in the selected coastal districts was also very low. Application of the business-planning tool was 11.5% in Kilwa, 34.4% in Lindi and 44.3% in Rufiji. On Zanzibar, application of the business-planning tool for cost effective management is 0% in North Unguja, 11.5% in Central district and 13.1% in Western Urban district.

### **4.6.3 Revenue Collection Tools and Application Implications on Forest Resources Management**

Results indicate that there is a low level of financial tools application in revenue collection in almost all the case study districts. Application of relevant tools was 19.7% in Lindi, 26.8% in Rufiji and 29.6% in Kilwa. On Zanzibar use of revenue collection tools use ranged from 4.2% in North Unguja to 23.9% in Western Urban district. This implies that a lot of revenue from the coastal forests was lost. This is also supported by the fact that there was no information on revenue collected from selected coastal forest resources reported in districts.

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*Table 22: Percentage Application Level of Legal Regulatory Frameworks and Business Planning Tools*

Component Element	Percentage Level in the Respective Districts						
	Rufiji	Kilwa	Lindi	Central District, Zanzibar	North Unguja District, Zanzibar	Western Urban District, Zanzibar	Average % use of frameworks and tools
Legal regulatory frameworks (bylaws, financial regulations)	15.79	37.89	30.53	27.37	12.63	41.05	27.54
Business planning tool for cost effective forest management	44.26	11.48	34.43	11.48	0.00	13.11	19.13
Revenue collection tools	26.76	29.58	19.72	16.90	4.23	23.94	20.19

NOTE: DETAILS OF THE ANALYSIS IS GIVEN IN ANNEX 9.5

## 4.7 Management Effectiveness

The effectiveness of reserve management in the coastal Districts of mainland Tanzania and Zanzibar island has been assessed through the completion of 146 Management Effectiveness Tracking Tool forms in 2011. This work covers all coastal districts, but with a focus on the main implementation landscapes in Rufiji, Kilwa and Lindi, and all reserves on Unguja and Pemba.

Analysis of these data shows that the most effective reserve management approaches (according to the scores derived from the tool) are National Parks and Village Land Forest Reserves. No Nature Reserves were assessed using the tool as there are none in the mainland coastal forests and one in Pemba that is recently established.

The National and Local Authority Forest Reserves assessed all have lower scores than the National Parks or Village Land Forest Reserves, suggesting they have lower effectiveness in terms of their ability to conserve the habitat or species that are found within their boundaries. This is broadly confirmed by the high levels of logging, charcoal burning, pole cutting and bushmeat hunting that occurs in many of these reserves. Some of this is legally licensed by the districts (and hence is a source of income), but a lot is illegal and only providing benefits to a few traders and those controlling the trade, often based in Dar es Salaam. The lack of effective management makes it hard for these illegal practices to be controlled.

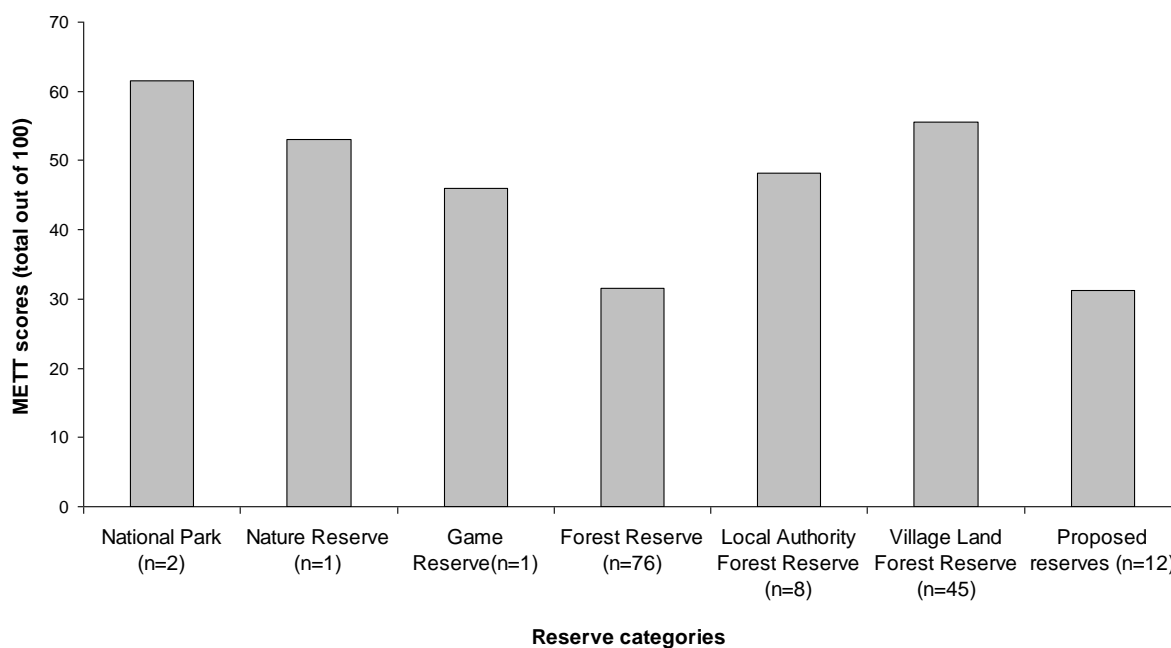


Figure 22: Mean management effectiveness scores across different reserve management regimes in coastal Tanzania (n=146 sites with data)

Average scores for the reserves within the focal intervention landscapes are 30.9 in Lindi, 39.46 in Matumbi, 51.3 in Kilwa, 51 on Zanzibar – against a score of 48.5 for the rest of the coastal districts that are not focal areas of the project. These average scores imply that the weakest managed reserves are in Lindi district, but that all the reserves are not very effectively managed. Reserves often lack clearly marked boundaries, have no management plan, lack staff, and do not have effective agreements with surrounding local communities.

## 4.8 Potential Projects as Revenue Sources to be Applied in Coastal Forest

In the coastal areas, the potential additional sources of funding apart from the existing ones may be achieved through different project write ups. Potential areas that have been indicated to interest different funding organizations include:

Sustainable logging can be one of the potential project sources of revenue to the communities and the forest sector in coastal forests. An example comes from MCDI where a total of 84m<sup>3</sup> of blackwood (worth TZS 13,337,800/-) and 23m<sup>3</sup> of five other species (*msenjele*, *mpangapanga*, *mtondoro*, *mninga* and *mkongo* worth 2,683,400/-) was harvested from Village Land Forest Reserve (MCDI pers comm 2011). Certification of these harvests is resulting in sustainable logging and communities can benefit from harvesting their own forests.

Butterfly farming is another potential revenue generation activity which could be introduced to communities around selected coastal forests. This type of the project has been applied in a number of areas in Tanzania, including Zanzibar and Tanzania mainland. In Kwezitu Village in the East Usambara, households involved in the butterfly farming project can earn up to TShs 200,000 per month.

### **Project Based Approaches:**

*Wildlife Management Areas (WMA).* Wildlife Management Areas are village level management arrangements focussed on wildlife conservation, and operating under different legal and regulatory frameworks than those for Village Land Forest Reserves. Communities within the focal landscapes, and indeed across the coast, expressed a strong interest in developing WMAs, often because benefits were perceived to be greater than in VLFR systems.

*Sustainable charcoal production.* A more sustainable approach to charcoal production is another way of revenue generation for the communities in coastal districts. As observed in Malimbwi et al. (2007) there is huge amount of charcoal flowing into Dar es Salaam from coastal areas. In 2007, at least 6,777 bags of charcoal entered Dar es Salaam every day, with 50% coming in along the Kilwa Road. It is expected that the amount of bags moving to Dar es Salaam along this road will have increased since 2007. WWF has been exploring more efficient and sustainable charcoal production using Half Orange Kilns, which could increase community income in coastal forests as well as reduce the pressure on the forests due to haphazard charcoal burning which causes degradation of forests in coastal districts. Sumbi and Songela (2010) show that sustainable charcoal production by two groups in Bumba-Msoro village earned TSh. 1.8 million by selling 180 bags of sustainable charcoal to Destinations All Ltd, so there is potential in this approach to be expanded further in this region. in the case study area which will result into improved livelihoods of the communities in the respective areas and reduce pressure to the forest resources in these areas.

### **4.8.1 Emerging Opportunities:**

*Reducing Emissions from Deforestation and Forest Degradation (REDD+).* Such projects are another way to develop an alternative source of revenue to continue with forest activities. Significant REDD+ funding is being channelled to coastal districts for different forest activities. Based on the existing experience, further funds might be obtained for forest conservation and management activities based on the conservation of forest carbon. Currently, most of the activities carried out in these areas entirely depend on the project funding.

*Ecotourism.* This is one kind of revenue generating activity that could not only benefit the community in the respective areas but also the revenue collected could be re-invested into conservation activities in the respective areas where coastal forests do exist.



#### 4.8.2 Baseline of Institutional Involvement

Until 2009 a WWF facilitated Coastal Forests Task Force existed. This included representatives of all the major players in the conservation of these forests. The funding for the Task Force was stopped by WWF as the GEF project came into being and the Steering Committee for the GEF Coastal Forests Project now fulfils the same coordination role as the earlier Task Force meetings.

Between 2002 and 2009 WWF also facilitated the development of a Coastal Forest conservation strategy. The implementation of that strategy has been handed over to the GEF Coastal Forests project in large part, and with other elements being undertaken by the WWF Coastal East Africa Network Initiative.

Researchers have also undertaken some work on identifying gaps in the protected area system for the Coastal Forests, primarily at the research level and again not strongly linked into government process. At the national level there are also processes to promote participatory forest management, but these do not focus on the Districts containing the landscapes proposed for intervention here.

Table 23: Current Baseline of Organizational Involvement

Baseline	Organisation	Gaps
FR management	FBD (mainland)	FBD manages the National FR in the Coastal Area under their authority. This basically equates to the Rondo Forest in the Lindi Landscape. This has only modest resources for management and staffing.
FR management	District Councils (mainland)	The District Councils manage the Forest Reserves in the mainland landscapes. They issue licences for harvesting in these reserves and collect the revenue. Some reserves are closed for harvesting officially. Much illegal logging also goes on and the reserves are weakly managed as there is practically no budget or staffing.
FR, NP, NR management	DCCFF (Zanzibar)	DCCFF manages the protected area network of Zanzibar. It has limited funds and capacity for this task.
VLFR management	Village Governments (mainland)	Aside for where projects (e.g. WWF and the Mpingo Conservation and Development Initiative) have established VLFR, they are not being developed.
Land alienation	Commercial companies	Operations such as Bioshape are purchasing land in the coastal regions of Kilwa and converting woodland and some forest habitat to monoculture. Similar activities are planned by other companies.
Land alienation	Reserves	Some of the reserves owned and managed by the central government have alienated land from the local people. This mainly relates to the stricter protection areas, such as the Selous and the Sadaani National Park.
Agricultural Support	Extension offices	District Agriculture offices have extremely limited staff and financial resources. This severely constrains their work to assist with agricultural improvement in the focal Districts.
Credit	Banks and Microloans	Aside from a few microcredit schemes established by NGO projects (e.g. CARE in Zanzibar) access to credit by local communities is extremely constrained. In some Districts there may also be some credit available via the World Bank TASAB project, or through the PFM interventions. But these are all small.

Baseline	Organisation	Gaps
Logging	Various	In the period 2000-2003 logging was out of control in this region, for export to the Far East. Although better regulated and controlled, it is believed the significant illegal logging activity still takes place. In addition, there is also a significant amount of legal logging.
Biodiversity Conservation	Various	The NGO projects operating in the area provide some funds for biodiversity (forest) conservation in the Matumbi Hills, Kilwa and Zanzibar landscapes. However, aside from these funds there is no funding available from government for biodiversity conservation.

#### 4.8.3 Baseline for Mainland Tanzania and Forestry and Beekeeping Division (FBD) Institutional Capacity

##### *Management and governance*

Over the past year Forestry and Beekeeping Division has instigated a section that is dedicated to the conservation of the Coastal Forests and mangroves, splitting this from the section that was responsible for the management of mountain catchment forests. However, despite this change it remains true that the Coastal Forests are not a priority for investment by mainland Districts, and are rather seen as a source of income.

##### *Management of existing PAs and establishment of new PAs*

*At the landscape level*, all three areas have been the subject of a variety of project inputs over the past decade. This has assisted in some cases with improving the protected area coverage and management effectiveness. In other landscapes the advances made during project support, may not have been sustained as projects have ended. Most of the project inputs on mainland Tanzania have involved elements of Participatory Forest Management and the establishment of Village Land Forest Reserves. These approaches have been encouraged by the Forest Policy of 1998 and the Forest Act of 2002. Fully embedding these approaches within the work of the District Forest Officers has proven more challenging and most efforts have been externally funded by projects. Solving the capacity and funding issues at District level remains a fundamental problem to scale up PFM as a forest management approach in these landscapes, or more broadly within Tanzania.

## 4.9 Matumbi Landscape

The Matumbi–Kichi Hills contain one of the largest blocks of contiguous forest in coastal Tanzania, with only some of the area under official protection. Degradation and loss of Coastal Forests and associated habitats and the species that they support is a result of a wide range of natural and man-made causes interacting at different levels and intensities on the east African Coastal Forest ecosystems (Burgess and Clarke 2008). High among the threats to forests in the area are illegal logging, pit sawing, and shifting cultivation, and forest fires especially those which happen after prolonged dry spells. Although these threats are mainly the result of local people struggling for survival, wild fires are sometimes made purposely by poachers to burn grasses so that when grasses sprout animals are attracted to these opened areas and hence made easy prey to the poachers. Illegal loggers also use fire to clear grass and understorey so that they can easily pass in the forest towards logging sites.

Shifting cultivation is practiced by the local communities because coastal soils are relatively infertile. This condition forces local communities to switch to new farm lands after every 2-3 years. Shifting cultivation is also practiced from an experience point of view where weeds seem to increase as one

cultivates on the same land for many years. Therefore, to avoid weeding cost they always clear new forest areas. This has been exacerbated by the construction of a road from Utete to the gate in the Selous GR of Kingupira. There have been high levels of logging throughout the landscape, especially along the main roads between the Mkapa Bridge over the Rufiji River and Somanga, but few areas remain unaffected. There is also charcoal production and bags are sold on the main Dar to Lindi road as well as around Utete.

***Costs of conservation to communities***

Wildlife-human conflict is an apparent problem in all villages bordering PAs. It was reported that in forests under PFM, due to improved forest condition, the number of wildlife has increased posing a serious wildlife-human conflict in the areas. Lions visit village neighbourhoods and sometimes are reported to obliterate human life. Leopards do also visit village neighbourhoods and are often reported to kill chicken and dogs. Elephants often raid crops like rice, sorghum, cassava and maize. Village councils should be guided on how to handle such a situation. Measures like sustainable animal cropping could be introduced to balance the situation.

**4.9.1 Baseline for Matumbi and Kichi Hills Landscape**

***Conservation.***

The landscape has benefited from FBD-WWF involvement for the past 15 years, and which is continuing. A Forest Management Plan was developed for the Matumbi Hills section of the landscape, Community Conservation Committees were established in several villages, and Village Forest Reserves were established (some partially gazetted Village Land Forest Reserves need to be finalized). Between 2001 and 2003 an IUCN-supported project also worked in the area, through the Rufiji District, and gathered significant data on the region and mapped the distribution of forest and forest harvesting activities.

***Management and Governance***

The protected forests in the landscape are a mixture of national forest reserves, local authority forest reserves and village forest reserves. In theory the national forest reserves should receive support from the central government while the local authority and village forests are managed from the District Forest Office of Rufiji and Kilwa Districts. In practice, neither the central nor the local government can provide significant funding for management and the District Forest Officer (DFO) is effectively responsible for management. There is pressure from the District to generate revenue from the forests and licenses have been issued for logging for export from many parts of the landscape. Logging is also taking place in the national, local authority and village forest reserves and a large proportion of this is illegal. This activity reached its peak in 2003, but still continues today.

***Rural Livelihoods***

As with other parts of rural Tanzania, people are mainly poor subsistence farmers practicing shifting cultivation. This activity is augmented by logging and some charcoal production. Participatory forest management systems have been established with WWF project support, and these are providing a mechanism for communities to gain better control of their forest lands, but further work is needed to strengthen them. There is also a need to further improve local financing systems for micro or rural credit to farmers. These issues will be captured during the monitoring process.

**4.10 Kilwa Landscape**

Due to its relatively intact habitats, Kilwa attracts people seeking natural resources products, and land. This increases the threats to these relatively pristine landscapes and the associated

biodiversity. Threats to biodiversity populations and habitats in the landscape are mainly anthropogenic activities; shifting cultivation, wildfires, unsustainable logging especially the high valued timbers, uncontrolled settlement and charcoaling. These threats not only reduce and change habitats for animals, reptiles and insects but also reduce populations of various biological species i.e. plants and animals.

Both illegal hunters and legalized professional hunters purposely start fires so as to encourage grass re-growth that attracts animals and eases vehicle movement within the forests. Most of the forest areas, which are vast, are not under controlled forest management. Although there are efforts for PFM, the areas that are already covered are much smaller than what remains.

***Community responsibilities in management of forest resources***

Some community members are eager to assist forest management activities; however, they do not have the required technical expertise, e.g. tree planting in open patches. Some would also like to be involved in wildlife patrols. It is difficult for villagers to patrol the forest areas because of their vastness, difficulty of access and lack of incentives.

**4.10.1 Baseline for Kilwa Landscape**

***Conservation***

Parts of the Kilwa landscape receive support from WWF under the Eastern Selous project and the Coastal Forest Project. The Mpingo Conservation Project has been supporting several villages developed Village Land Forest Areas through the PFM process, and has recently been awarded the first certificate by the Forest Stewardship Council (FSC) for community-managed natural forest in Africa. Several unprotected forest areas in Kilwa need to be gazetted and protected as soon as possible as new investment and development initiatives pose a new threat to the forests of this region.

***Management and Governance***

The District Forest Officer in Kilwa has no dedicated vehicle although he can get fuel money. Only three forest officers are employed and although a fourth position is open but they have not been able fill it. The district forestry department is also struggling to support communities interested to engage in participatory forest management due to limited resources. Many reserves do not show any evidence of beacons or boundary clearance and there are no management plans. A complex issue is dealing with compensation claims from loggers whose licenses were cancelled by the government before they had expired.

***Rural Livelihoods***

Although quantitative data on the rural livelihoods for these landscape areas are not available, the rural population is believed comparable to many other parts of rural Tanzania. This means that most people are poor subsistence farmers with few income generating opportunities.

**4.11 Lindi Landscape**

**4.11.1 Conservation issues, threats and drivers**

Currently, the Rondo forests are highly threatened by frequent wild fires, which are sometimes set on purpose or sometimes spread from neighbouring farming fields in the dry season between July/August and November. It was reported that fires start most frequently from Liganga village and spread out to other areas. Liganga Village is a new settlement that was officially recognized as a

village in 2010, after it was abandoned during the villagisation operation in the 1970s. Presumably, the fire is associated with opening of new farms and settlements in this new village.

Furthermore, the forests in the landscape have been subjected to human disturbances especially on its buffer zones and adjacent forest on the slopes of the plateau. Shifting cultivation, pole cutting and charcoaling are other threats to forests and woodlands in the landscape.

***Costs of conservation to communities***

Problem animals are the main cost of conservation in the landscape. Forest adjacent communities lose crops to elephants, monkeys, bush pigs and warthogs. There are also reports of people being killed by animals and at least one person has been killed every year since 2009. The problem of elephant attacks has increased recently.

***Community responsibilities in management of forest resources***

Communities conduct patrols against illegal harvesting, charcoaling, and help with fire fighting. However, both patrols and fire fighting are limited by lack of facilitation including lack of transport facilities, patrol camps, fire fighting equipment and fire watch towers.

## **4.12 Zanzibar landscape**

### **4.12.1 Conservation issues, threats and drivers**

All regions of Zanzibar (Unguja and Pemba), and in particular the remaining patches of coral thicket forests, are severely threatened by a very high and rapidly increasing human population (400 individuals/km<sup>2</sup>). The vast majority of Zanzibar's human population is dependent upon shifting cultivation and forest products, such as building poles, firewood, and charcoal. Cutting trees and bushes to supply this demand continues to be a major threat to Zanzibar's wildlife. Zanzibar is currently losing an estimated 1.2 percent of its forest each year. Hunting is also a major threat to some of Zanzibar's wildlife species; in particular to the small forest antelopes.

***Rural Livelihoods and Community responsibilities in management of forest resources***

Zanzibar's wildlife survives in small habitat fragments within a human dominated landscape. Only some of these critical wildlife habitat fragments lie within Government managed protected areas, at least half are on community lands. Thus, conservation of Zanzibar's unique flora and fauna is contingent on successful conservation management of a network of protected areas not only on government but also on community lands.

Zanzibar's communities are highly dependent on natural resources [including firewood, charcoal, building materials, and other non-timber forest products (NTFPs)] for their survival and for income generation. Nutritionally, they are dependent on a wide variety of produce grown on the island, and the vast majority of their protein requirement is provided by legumes, fish and shell fish. Although hunting occurs, it is thought to provide a negligible and unnecessary amount to total protein intake.

Over the last decade and a half, DFNRNR has worked to bring communities into every aspect of land use planning and management of natural resources across the island. Communities have been empowered to manage their forests by the development of Community Forest Management Agreements (CoFMA). CoFMAs are legally binding documents giving communities the mandate to manage their forests. During the development of a Community's CoFMA, all land surrounding the village and over which the community will be responsible is zoned into high protection zones, low impact use zones, or higher impact use zones such as agricultural and settlement zones. One of the main benefits to communities of developing a CoFMA is that they restrict open access to their land. In order to obtain CoFMAs, communities must also agree to a set of responsibilities which include

the protection of areas which are designed as high protection zones and the sustainable management of lands designated for various levels of use. Each Community's Village Conservation Council (VCC) receives a share of the tourism revenue from Jozani-Chwaka Bay National Park to help them fulfill these management and protection responsibilities. This revenue is generated from tourism mainly to view the Zanzibar red colobus.

***Costs of conservation to communities***

There are some minor costs to conservation especially in community lands directly adjacent to Jozani-Chwaka Bay National Park (JCBNP), due to some (although a relatively low occurrence) of crop raiding by wildlife. This cost, however, is currently being offset by a revenue sharing scheme between the Government of Zanzibar and the communities that live adjacent to JCBNP. As explained above, this is revenue that is generated by tourists who visit JCBNP to view the wildlife (mainly the Zanzibar red colobus).

***Management and Governance***

On Zanzibar the DFNRNR gives a higher priority to Coastal Forest conservation than the mainland. The DFNRNR has received some support via projects such as the GEF funding Jozani Chwaka Bay project, but this has always been small. Government allocations to conservation are also small.

*Management of existing PAs and establishment of new ones:* Under the baseline scenario there would be very little active management of the Coastal Forest sites, except the few (such as Jozani-Chwaka Bay National Park) that generate their own funding.

## **4.13 Concluding Remarks**

The management regimes in the coastal forests follow the national policies, laws and regulations. These provide a framework for the protection of forests within various kinds of reserves. This includes those managed under central, local authority and village governments. The number and area of village based management regimes have been increasing in recent years. And this trend is set to continue. Benefit sharing frameworks also exist and need to be promoted in order to make the management of the forests sustainable in the long run.

## 5 Financial Sustainability

### 5.1 Overview

The funding available for the management of the Coastal Forests in Tanzania is woefully inadequate. There is a zero allocation from the central government for the management of the national Forest Reserves in southern Tanzania, and the Forest Reserves are seen as an income generating resource by the District Councils. As an example, natural resources contribute the majority of the revenue available to the Rufiji District Council. It has been estimated from available data compiled from around the world, that adequate management of reserves similar to those of the eastern African coastal forests can be achieved if managers have around US\$1,500-US\$1,750 for each sq km of forest under their management (Love and Morrison 2007). Hence, there is an urgent need for a source of sustainable funding that can be used to assist protect and manage the reserves in the coastal regions of Tanzania.

There are several stakeholder/actors that are investing money for forest activities in coastal areas and most of these actors have been conducting their activities in the Tanzania mainland than in the Island. Funding contributions from Central and Local Governments for forest conservation and management activities are limited and mostly in-kind. The collected revenue from forest products and services are not directly retained for forest conservation and management activities in the case study coastal districts. Non-existent or inadequate follow up of implementation of legal regulatory frameworks (bylaws, financial regulations) is common; the use of business planning tool for cost effective management and the use of tools for revenue collection in the selected coastal districts is low. This results in more encroachment to forest resources, inadequate information about forest conservation activities expenditures and revenue losses.

There are possible potential projects that can be used as source of revenue for the forest activities in the coastal areas. These sources can be in different broad categories such as commercial / market driven funding approaches; community level approaches; project based approaches and emerging opportunities such as REDD. As efforts to explore different sources of income are still being worked out, it has to be noted that these coastal areas are characterized by community with low level of education, and limited sources of income generation activities. Moreover, the communities much depend on forests and forest related products and services. These necessitate the need for sustainable forest management in these coastal areas.

### 5.2 Financing Forest in Coastal Districts and the Financial Status

Financing forest conservation in the coastal districts (Rufiji, Kilwa, Lindi, Unguja and Pemba) comes from various different sources (Table 24).

Table 24: Different Actors Working in the Selected Case Study Areas

Actor	Rufiji	Kilwa	Lindi	Unguja	Pemba
Central government – Through respective ministries	v	v	v	v	v
Local government-District Council	v	v	v	v	v
WWF Tanzania Country Office	v	v	v	v	v

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CARE International in Tanzania				v	v
Tanzania Forest Conservation Group	v	v	v		
IUCN	v				
Mpingo Conservation and Development Initiative	v	v			
Other donors through central government (DANIDA, FINNIDA)	v	v	v	v	v

### 5.2.1 Available Finances for Forest Management Activities in Coastal Districts

Available finances for forest management activities, both operational and investment costs are analyzed for each of the three coastal districts as well as Pemba and Unguja. Several aspects are discussed based on the financial information that was obtained as a baseline. These include (i) total annual Central Government budget allocated to the coastal districts for forest management activities. This information was harmonized from two sources, that is, from FBD and those that were obtained from respective district councils; (ii) total annual donor budget and finances dedicated to coastal forest management in the respective coastal districts; (ii) total annual district revenue collected from forests in the respective coastal districts; and (iii) total annual expenditure for forest activities in the respective district. Table 24 presents the annual budget that different actors are allocating in for forestry activities in the five selected areas where this assignment was carried out. The budget is drawn from actors based on the 2010/2011 financial year.

### 5.2.2 Financial Commitment and Current Financial Status

The project on improving conservation of selected coastal forests of Tanzania mainland and Zanzibar that UNDP-GEF has committed USD 3.5 million. Several other commitments were set by different actors to fund different forest activities in the selected project districts. The type of financial commitment were both in cash and in-kind. Forestry and Beekeeping Division (FBD); Ministry of Agriculture and Natural Resources of Zanzibar; Rufiji, Kilwa and Lindi district councils committed to offer some in-kind contributions to the project. In the project stating, there has been a need to identify the exact financial status that is being injected into different forest conservation and management activities in the coastal forests in the respective selected areas. The actual total annual budgets and expenditures for different actors have been documented and the information obtained can be used as a baseline status for the project onset. In the year 2010/2011 as a baseline year, an estimated total of USD 3,665,594 have been invested in forest conservation and management related activities in Rufiji, Kilwa Lindi rural districts as well as Unguja and Pemba. These are receiving funds from central and local governments, some development partners as well as NGOs working in these areas. The table below presents financial commitments by different stakeholders and the baseline financial status (for the year 2010/2011) for funds that have been invested in the selected coastal districts for coastal forest conservation activities.

Table 25: Financial Commitments by Actors and Current (2010/2011) Financial Investment

Responsible Party/ Implementing Agent	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	*Baseline Expenditure (2010/2011)
GEF	902,000	1,095,500	857,500	695,500	3,550,500	0
UNDP	100,000	100,000	100,000	100,000	400,000	0



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Responsible Party/ Implementing Agent	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	*Baseline Expenditure (2010/2011)
FBD (In kind)	320,000	320,000	320,000	320,000	1,280,000	47,661
DCCFF (In kind)	433,000	433,000	433,000	433,000	1,732,000	8,000
Rufiji District council (in kind)	51,000	51,000	51,000	51,000	204,000	12,000
Kilwa District council (in kind)	60,000	60,000	60,000	60,000	240,000	18,667
Lindi district council (in kind)	54,000	54,000	54,000	54,000	216,000	14,667
TFCG	100,000	100,000	100,000	100,000	400,000	235,000
CARE	150,000	150,000	150,000	150,000	600,000	90,000
Mpingo Conservation and Development Initiative	100,000	100,000	100,000	100,000	400,000	386,667
WWF TCO and Partners						597,800
WWF UK	120,000	120,000	120,000	120,000	480,000	
WWF Finland	347,500	0	0	0	347,500	
WWF Denmark	40,000	0	0	0	40,000	
WWF Sweden	200,000	200,000	200,000	200,000	800,000	
IUCN	0	0	0	0	0	82,425
SMOLE II	0	0	0	0	0	2,100,000
Other development partners through central government	0	0	0	0	0	62,707
<b>Total Project Finance</b>	<b>2,977,500</b>	<b>2,783,500</b>	<b>2,545,500</b>	<b>2,383,500</b>	<b>10,690,000</b>	<b>3,655,594</b>

**SOURCE:** PROJECT DOCUMENT (PIMS NO: 2760 PROPOSAL ID: 00049523, PROJECT ID: 00060459)

1US\$ = 1500TSHS AND 1EURO = 1.4 US\$

### 5.3 Annual Central Budget Allocated Funds for Forest Management Activities

#### 5.3.1 Budget Allocated to Respective Districts from Central Government

Budget allocations from Central Government are estimated at USD 13,333, Kilwa USD 22,000; Lindi USD 12,328 and Unguja USD 8,000.

### **5.3.2 Local Government Allocations from District Council Budget**

The financial commitments from local governments to the project are: USD 51,000 (Rufiji District Council); USD 60,000 Kilwa District Council); and USD 54,000 (Lindi District Council).

### **5.3.3 Support from the Development Partners**

In the selected coastal districts, various donors have funded different forest activities. These include DANIDA with USD 18,020 for PFM in Kilwa; and USD 24,687 in Lindi. In Rufiji, a total of USD 20,000 was provided by FINNIDA to facilitate various forest activities in this district.

In Zanzibar (MANRZ 2010), there is a second phase of the programme on Sustainable Management of Land and Environment (SMOLE- II). This programme aims at reduction of absolute poverty in Zanzibar through environmentally sound land management and socio-economic as per the government's strategy for growth and poverty reduction (called MKUZA). The government of Finland has donated a total of 9 million Euros to the Government of Zanzibar for execution of SMOLE II. Half of the funds (4.5 million Euros) have been set as operational cost for the programme and the other half is set for technical assistance. Thus it is estimated that there is a total of 1.5 million Euros (USD 2.1 million) per year budgeted for operational activities.

### **5.3.4 Total Financial Investment Based on the 2010/2011 Different Actors Budget**

Based on the financial figures obtained from different actors working in the selected coastal areas, a total of USD 3,655,594 was invested for different forest conservation and management activities in the project area during 2010/2011. Other funding that might impact some of the project area includes the Finnish funding in Liwale and Nachingwea that supports good forest governance, benefit sharing and poverty alleviation activities at a tune of 9 million Euros, Mama Misitu phase II which is also supported by Ministry of Foreign Affairs – Finland through TNRF coordination in Kilwa and Rufiji Districts at a tune of 0.8 million Euros (USD 1.1 million).

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*Table 26: Estimated Budgets (in USD) from Different Actors Working in the Selected Districts*

<b>Actor</b>	<b>Rufiji</b>	<b>Kilwa</b>	<b>Lindi</b>	<b>Zanzibar</b>	<b>Total (USD)</b>
Central government	13,333	22,000	12,328	8,000	55,661
Local governments	12,000	18,667	14,667	0	45,334
WWF Tanzania Country Office	94,600.00	94,600.00	94,600.00	314,000	597,800
CARE International in Tanzania	0	0	0	90,000	90,000
Tanzania Forest Conservation Group	62,500.00	22,500.00	150,000.00	0	235,000
IUCN	82,425.00	0	0	0	82,425
Mpingo Conservation and Development Initiative	14,500.00	372,166.67	0	0	386,666
Other development partners through the government (DANIDA for Kilwa and Lindi and FINNIDA for Rufiji)	20,000	18,020	24,687	0	62,707
SMOLE 11	0	0	0	2,100,000	2,100,000
<b>Estimated Total</b>	<b>299,358</b>	<b>547,954</b>	<b>296,282</b>	<b>2,512,000</b>	<b>3,655,594</b>

## 5.4 Revenue Collection from Forests in the Coastal Districts

Most of the royalties are collected from sales of forest goods obtained from forests on the public lands or within district forest reserves. Rufiji district has the highest reported revenue collection compared to other districts. This was attributed to its proximity to Dar es Salaam where there is high demand of wood based products including charcoal. Moreover, the district has good road networks encouraging transportation of the forest products. Studies in Rufiji district have indicated that forest products are also being produced and illegally sold without revenue been collected (WWF 2010).

Table 27: Revenue Collected from Coastal Forests in the Selected Districts

	Collected amount in a district in USD				
	Rufiji	Kilwa	Lindi	Unguja	Pemba
Total revenue collected	733,333	82,000	47,162	-	-

## 5.5 Overview

In the focal landscapes of the GEF Coastal Forests project an average 79% of the population was married in 2011, with low cases of divorce across the area. With an exception of the Magharibi (Zanzibar) and Lindi (mainland) districts, where the number of widows was high, the remaining districts had low number of widows. About half of the population has completed primary school, and about 30% has not received any formal education. With low levels of education, opportunities for income generation often mean relying on natural resource such as the forest, fisheries, and agriculture. Those who are considered 'well-off' typically had more access to education opportunities (Shemdoe and Abdalah 2011).

The amount of land owned and/or used varies between communities. Within Kilifi, Lindi and Rufiji, the average land size owned by individual households ranged from 2.8 to 6.1 acres with the overall mean land size being 4.8 acres. The main use of the land is crop production and very small areas of land are set aside for woodlots. The most common crops are maize and rice; average land area used for maize production ranges from 0.6 acres to 2.2 acres with an average of 1.6 acres. For rice, the land area used ranges from 0.3 acres to 1.8 acres with an average of 1.1 acres (Shemdoe and Abdalah 2011).

Households have set aside small areas for woodlots because wood resources such as charcoal, firewood and other related wood products are obtained from surrounding forests. Lack of inputs for agricultural production limit the *de facto* access to land to the few well-off groups leaving a majority of the poor households with small areas of used land (Shemdoe and Abdalah 2011).

Animals are a source of food, more specifically, protein for human diets and income. For low-income producers, livestock can serve as store of wealth (Shemdoe and Abdalah 2011). In these districts, livestock keeping in the studied communities include cow, goat and poultry (chicken and duck). In these districts, the average number of cows ranges from 0 to 1 and average number of goats are between 1 and 2. Most of the livestock (mainly goats) are owned by the well-off group, followed by the middle group, and then the poor. The poor were mainly confined to keeping smaller stock such as goats and chicken.

The majority (86%) of households live in houses that are grass thatched, with 56% having well-thatched grass and 31% having dilapidated grass thatch. Moreover, majority of these houses were constructed using poles, which are among timber products derived from the forests. In the surveyed villages in these districts, only 12% of the interviewed households possess houses that are roofed

using iron sheet, and only 1% of the respondents own houses that are roofed with tiles (Shemdoe and Abdalah 2011).

Energy is an important element of survival for communities. In the case study area, the main types of energy sources for cooking are firewood, charcoal and kerosene. The majority of households (84.6%) use firewood as the main source of energy for cooking. The well-off tend to mix charcoal and firewood, and the middle income and very poor categories use firewood. Forest Reserves are situated in the vicinity of these villages. Their uses are restricted by the law, but were being accessed by those communities that live adjacent to them for charcoal and firewood.

This baseline information indicate that people in these areas much depend on crop production and extraction of other natural resources such as forest products for their livelihoods. These lead to a need for the establishment of alternative income generation activities that are intended to help people reduce forest product overutilization and their associated resources if forest conservation is to be attained (Shemdoe and Abdalah 2011).

The existing sources of water for domestic purposes include wells, rivers, springs and taps. Half of the households interviewed in the selected coastal areas depend on wells as sources of domestic water followed by those depending on rivers, springs and very few (4%) with access to tap water (Shemdoe and Abdalah 2011). Although the main water source is wells, poor people have fewer choices for water sources compared to the well-off and middle wealth groups. There is a clear need to ensure that forests are conserved, as they are the catchments for all water sources that the communities in these areas depend upon.

## **5.6 Matumbi Landscape**

According to the Census of 2002, the official population of Kilwa District was 171,650 people with 82,817 male and 89,033 female. Rufiji District had a population of 202,001 people of which 52% are females and 48% are males. The following data is based on a 2011 socioeconomic baseline survey. 75% of the greater Rufiji landscape is married; 6% is widowed; 2% is divorced and 17% is single. 71% of the population has received primary education; 12% has received secondary education; 16% has not received any formal education and 1% has completed adult school.

The average land size is 2.8 acres where; where 0.1 of the acres have woodlots; 0.63 have maize; and 0.6 of the acres have rice. Of those surveyed, there was an average of one cow and one goat per household, and 5 chickens or ducks. Results from the survey indicate that 84% have thatched grass roofing; 13% have iron sheet roofing; and 2% have tile roofing. The main source of cooking energy for 83% of the greater Rufiji landscape is firewood; charcoal for 15% and kerosene for 2%. For a source of water, 48% use wells, 41% get water from rivers; 1% from springs; and 10% from taps.

The Matumbi – Kichi Hills forests are important for catchment and for the local communities living adjacent to them who depend on these forests for various forest products and services. The local community fetches firewood, medicinal plants, fruits, etc. Trees which are commonly used as medicinal plants are *Dalbergia melanoxylon* (mpingo), *Pygeum africanum* (mkondekonde). Others (in local language) are *mpingapinga*, *mnyulunyulo*, *mneke* and *mpakacha*.

The main economic activities in Rufiji district are farming, livestock keeping, fishing and forest production. Agriculture is the major source of income for people of Coast Region. Crops cultivated within the landscape area include simsim, cassava, cashew nuts, oranges, maize, rice, sorghum and potatoes.

Kingongolilo ritual site is inside Kichi Hill Forest Reserve. Here, local communities ask their gods for rain and food. Other areas of similar importance include Kinyanjilwa, Mtengela and Kutikuti.

## 5.7 Kilwa Landscape

The total population of Kilwa District in 2002 was 171,057 living in 36,549 households. It is administratively divided into 6 divisions 20 wards and 97 registered villages (Masoko and Kivinje Urban areas inclusive). The following data is based on a 2011 socioeconomic baseline survey; 85% of the Kilwa district's population is married; 3% is widowed; 5% divorced and 7% are single. 70% of the population has received primary education, 5% has received secondary education; 20% have not received any formal education, and 5% have completed adult school.

The average land holding is 5.7 acres; where 0.17 acres have woodlot; 1.42 acres have maize; 0.78 acres have rice and the rest is not used. Of those surveyed, no-one owned cattle, there was an average of two goats and 9 poultry animals (chicken or ducks) per household. Results from this survey indicate that 86% have thatched grass roofing; 14% have iron sheet roofing, and none have tile roofing. The main source of cooking energy for 81% of Kilwa residents is firewood; for 11% is charcoal, and none reportedly use kerosene. For a source of water, 59% use wells, 36% use rivers, 5% use springs, and none use taps.

The economy of Kilwa Landscape hinges on crop production, livestock keeping, fishing, trade and to a very limited extent industrial activities. Like in most districts in Tanzania, Kilwa residents and their District Council draw a substantial amount of income and food from small holder cultivators. The most popular crops are cashew nuts, simsim and coconuts. There is not much cash generated from maize, cassava and rice. The average per capital income is estimated to TSh. 150,000/= per year.

## 5.8 Lindi Landscape

### *Population Size*

According to the Census of 2002, the official population of Lindi District was 215,764 people of which 102,530 were males and 113,234 females. Updates on the population status could not be found during the study visit and therefore, these data are only indicative. Based on a 2011 socioeconomic baseline survey, 76% of Lindi's population is married; 10% is widowed; 4% is divorced and 10% are single. 70% of the population has received primary education; 6% has received secondary education; 24% have not received any type of formal education, and none of the representative sample had completed adult school.

### *Social economic*

The main economic activity for the majority of the local community in Lindi region is agriculture which employs over 90% of the population. Crops farmed in the area, and particularly in villages in the landscape, include cashew nuts, simsim, groundnuts, pigeon peas, cow peas, green gram, palm trees, mbambara nuts, cassava, sorghum and maize. Cashew nuts, simsim and coconuts are mainly for sale.

The average land size is 3.2 acres, and there are no woodlots; 1.12 of the acres have maize and 0.33 of the acres have rice. Of those surveyed, no-one owned cattle within the Lindi district, there was one goat on average per household, and each house had nine poultry animals (chicken or ducks). Results from this survey indicate that 88% of the houses have thatched grass roofing, 10% have iron sheets, and 2% have tiles. The main source of cooking energy for 83% of Lindi residents is firewood, 17% is charcoal, and none reportedly use kerosene. For a source of water, 48% use wells, 33% use rivers, 13% use springs and 6% use taps.

This landscape is also a source of forest products to the community. The products gathered/harvested and services provided from the forests in the landscape include bush meat, vegetables, timber, building poles, tubers (ming'oko), mushrooms, fruits, thatch grasses, edible

insects, grasshoppers (senene), termites, (likukungunguni), medicines, water and climate amelioration, and firewood (mainly from open areas).

## **5.9 Zanzibar Landscape**

Socio-economic data for Zanzibar was not gathered for this baseline.

## **5.10 Concluding Remarks**

The protected area network in the southern Tanzanian landscapes is funded through a number of projects. These projects provide the greatest source of funds for conservation and development in the region, with government providing salaries and some logistical support. Government is also responsible for law enforcement and control over harvesting and hunting. Opportunities to improve the income potential from these forests are available in the form of sustainable logging of high value tree species, and of developing forest carbon projects. Attempts have also been made to use the forest land for plantation agriculture, for example for *Jatropha* biofuels. But, these schemes have so far not managed to deliver sustainable agriculture, and even less sustainable forest use.

The socio-economic situation of the communities surrounding the coastal forests in southern Tanzania is one where the people are dependent on some forest resources for cash and subsistence, but are also very poor and seeking other ways to make money to support their lives. As such there is significant involvement in illegal bushmeat hunting, elephant poaching and logging of high value timber from the forests and woodlands.

## 6 Conclusions

In this report we bring together all available information on the Coastal Forests of Tanzania. This includes data on biodiversity, protected areas location, protected areas management effectiveness, protected areas financing, socio-economic conditions in the broader landscape, carbon values in the broader landscape and the administrative and legal settings within which these forests are sitting. The main conclusions we derive from this work are as follows:

### 6.1 Biodiversity Issues

The coastal forests are of global importance for the conservation of rare, endemic and threatened species of plants and animals. New field work shows that there are still areas of forest that are not well known, but which have high biological importance. In this project we can see that all intervention areas have significant biological importance and are in need of conservation. There is also a pressure on some of the species, particularly the larger mammals as they are intensively hunted for bushmeat for local consumption and there is also evidence of poaching of elephants for Ivory, including observations made during the field work in September 2011.

The coastal forest habitat has shrunk dramatically over the past centuries and this shrinkage continues. Rates of forest loss seem to have slowed in recent years, but forest degradation in the form of charcoal burning of the forest biomass, and the logging of valuable timber and building poles, continues. All of these pose threats to disappearance of some of biodiversity values. Charcoal burning is focused around Dar es Salam and logging is focused in the southern areas of the forests.

### 6.2 Spatial Planning Issues

The protected area network in the coastal forests is mainly in the form of Forest Reserves that are owned by the central government, but managed by the local authority. Official records for these reserves are poorly managed and scattered, and in many cases there is confusion on whether certain reserves exist, or do not exist. This situation makes the production of a reliable list and set of data on the current protected area network problematic. Despite this, there are clearly gaps in the protection of key forest areas, particularly in Kilwa District, but actually in all areas of the coast on the mainland and on Zanzibar. Closing these protected area gaps is a major focus on this GEF project, using a combination of approaches ranging from Village Land Forest Reserves, Local Area Forest Reserves, and upgrading selected reserves to the status of Nature Reserve. Significant areas of forested land are being put under conservation management and sustainable use in this way.

### 6.3 Management Issues

The effectiveness of management of the government forest reserve network is weak in the coastal areas of mainland and somewhat better on Zanzibar. The best managed reserves according to the data collected are the Village Land Forest Reserves and the Sadaani National Park. All other reserve categories are very weakly managed. Most are used as a source of revenue for the District Councils and there are very significant levels of illegal logging, charcoal burning and pole harvesting in most reserves.

### 6.4 Financial Sustainability

The financial sustainability of the reserves in this area is also very weak. Most of the districts have very little to zero funding available for operational management, and apart from salaries there is not



much funding available to support forest conservation. This is at odds with the situation that natural resources, logging in particular, are a major source of income for some of the coastal forest districts – particularly Rufiji. Apart from legal logging that is recorded, there is far larger illegal logging going on, with movement of timber through various means to Dar es Salaam and for export to the Far East, especially China. In addition to the export of valuable timber, there is also an extensive and illegal trade in charcoal being produced in the coastal forest reserves, bushmeat hunting and ivory poaching. So there is significant value contained within the forests, which is being realised by several actors, but this does not translate into funding to ensure sustainable forest management.

## **6.5 Socio-economic Issues**

In some of the Village Land Forest Reserves there are efforts being made to set up sustainable and certified logging of high value timber, especially *Dalbergia melanoxylon*. These schemes are aiming to enhance the ability of villagers to gain benefit from the forests in terms of financial benefits from logging, while at the same time sustaining the timber stock and preventing illegal harvesting by outsiders. This project aims to work with the villages and the relevant project and authorities to expand the coverage of the forest that is under these schemes and make further FSC certified timber available on the market.

Other options for improving the sustainable financing of the reserve network include forest carbon projects, small scale ecotourism projects, and beekeeping and income generating activities linked to the forest. But none of these seem able to deliver rapid livelihood improvements for local people, or significant income to government, and hence have been downplayed as intervention strategies by the project. Instead the main effort will be put into Village Land Forest Reserves.

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## 8 Annexes

### 8.1 Management Effectiveness Tracking Tool (METT) Scores

Table 28: Summary METT Scores by Protected Area

Forest Reserve	Landscape	Total	Rank
Kisangi Village Land Forest Reserve	Kilwa	71	1
Imbende-Nainokwe Village Land Forest Reserve	Kilwa	70	2
Liwiti Village Land Forest Reserve	Kilwa	70	3
Namajongoo Village Land Forest Reserve	Kilwa	70	4
Jozani Chwaka Bay National Park	Zanzibar	63	5
Mihima Village Land Forest Reserve	Lindi	62	6
Mtene Village Land Forest Reserve	Lindi	61	7
Nahoro (Milola magharibi) Village Land Forest Reserve	Lindi	61	8
Nndawa Village Land Forest Reserve	Lindi	61	9
Mchonga Village Land Forest Reserve	Kilwa	60	10
Saadani National Park	Other	60	11
Somanga Simu Village Land Forest Reserve	Kilwa	59	12
Ulabo Village Land Forest Reserve	Kilwa	59	13
Liganga Village Land Forest Reserve	Lindi	59	14
Nambidi (Muunganoli) Village Land Forest Reserve	Lindi	59	15
Njau (Mnamba) Village Land Forest Reserve	Lindi	59	16
Kianika Village Land Forest Reserve	Kilwa	58	17
Namangale Village Land Forest Reserve	Lindi	58	18
Kilwa Mangroves Forest Reserve	Kilwa	57	19
Nawelewele (Makonde) Village Land Forest Reserve	Lindi	57	20
Ruaha Village Land Forest Reserve	Lindi	57	21
Tawi Village Land Forest Reserve	Matumbi	57	22
Lwii (Chiwerere) Village Land Forest Reserve	Lindi	56	23
Nyamwage Village Land Forest Reserve	Matumbi	56	24
Yelya Village Land Forest Reserve	Matumbi	56	25
Lipadang'ombe (Hingawali) Village Land Forest Reserve	Lindi	55	26
Litutu (Mtumbya) Village Land Forest Reserve	Lindi	55	27

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

<b>Forest Reserve</b>	<b>Landscape</b>	<b>Total</b>	<b>Rank</b>
Sanduku-Marendego Village Land Forest Reserve	Lindi	55	28
Mbwara Village Land Forest Reserve	Matumbi	55	29
Mtanzamsona Village Land Forest Reserve	Matumbi	55	30
Kibambo Village Land Forest Reserve	Kilwa	54	31
Nambawala-Kipindimbi Village Land Forest Reserve	Kilwa	54	32
Lindi Mangroves Forest Reserve	Lindi	54	33
Kilungulungu Village Land Forest Reserve	Kilwa	53	34
Mtende Village Land Forest Reserve	Kilwa	53	35
Nambunju Village Land Forest Reserve	Matumbi	53	36
Kiwengwa Forest Reserve	Zanzibar	53	37
Ngezi-Vumbawimbi Nature Forest Reserve	Zanzibar	53	38
Mkoko Village Land Forest Reserve	Matumbi	52	39
Utunge Village Land Forest Reserve	Matumbi	52	40
Nulai Village Land Forest Reserve	Kilwa	51	41
Kiwawa Local Authority Forest Reserve (proposed)	Kilwa	50	42
Lung'ou-Likawage Village Land Forest Reserve	Kilwa	50	43
Miteja Village Land Forest Reserve	Kilwa	50	44
Rondo Forest Reserve	Lindi	50	45
Tegwe-Matipwili Village Land Forest Reserve	Other	50	46
Kichi Local Authority Forest Reserve	Matumbi	50	47
Hotelitatu Local Authority Forest Reserve (proposed)	Kilwa	49	48
Kandawale Local Authority Forest Reserve	Kilwa	49	49
Mangarengare-Likawage Local Authority Forest Reserve	Kilwa	49	50
Ruhatwe Village Land Forest Reserve	Kilwa	49	51
Tong'omba Local Authority Forest Reserve	Kilwa	49	52
Mitialambuko Village Land Forest Reserve	Kilwa	48	53
Mitole Local Authority Forest Reserve	Kilwa	48	54
Mlola 'A' Forest Reserve	Other	47	55
Migeregere Village Land Forest Reserve	Kilwa	46	56
Gongo Village Land Forest Reserve	Other	46	57
Mbwebwe Village Land Forest Reserve	Other	46	58
Pande Game Reserve	Other	46	59
Mkange Village Land Forest Reserve	Other	45	60

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

<b>Forest Reserve</b>	<b>Landscape</b>	<b>Total</b>	<b>Rank</b>
Masingini Forest Reserve	Zanzibar	45	61
Nandundu Forest Reserve	Matumbi	44	62
Kitope Forest Reserve	Kilwa	43	63
Kumbi Forest Reserve	Matumbi	43	64
Nerumba Forest Reserve	Matumbi	43	65
Mlola 'B' Forest Reserve	Other	42	66
Ruhoi Local Authority Forest Reserve	Matumbi	42	67
Katundu Forest Reserve	Matumbi	41	68
Utete warm spring Forest Reserve	Matumbi	41	69
Msitu Mkuu Forest Reserve	Zanzibar	41	70
Pugu Forest Reserve	Other	40	71
Rufiji Mangroves Forest Reserve	Matumbi	40	72
Rupiage Forest Reserve	Matumbi	40	73
Mpanga Forest Reserve	Matumbi	39	74
Mtanza Forest Reserve	Matumbi	39	75
Makangara Local Authority Forest Reserve	Lindi	38	76
Ngulakula Forest Reserve	Matumbi	38	77
Kipo Forest Reserve	Matumbi	37	78
Kikale Forest Reserve	Matumbi	36	79
Mtita Forest Reserve	Matumbi	36	80
Nyambawala Village Land Forest Reserve (proposed)	Matumbi	36	81
Ras Kiuyu Forest Reserve	Zanzibar	36	82
Dimba Forest Reserve	Lindi	35	83
Litipo Forest Reserve	Lindi	35	84
Mbumi Forest Reserve	Matumbi	35	85
Minganje Village Land Forest Reserve (proposed)	Matumbi	35	86
Mtunda Village Land Forest Reserve (proposed)	Matumbi	35	87
Ruaruke Village Land Forest Reserve (proposed)	Matumbi	35	88
Urembo Village Land Forest Reserve (proposed)	Matumbi	35	89
Kiwengoma Forest Reserve	Matumbi	34	90
Nyamitandai Village Land Forest Reserve (proposed)	Matumbi	34	91
Nzenge Village Land Forest Reserve (proposed)	Matumbi	34	92
Jogoobahari Village Land Forest Reserve (proposed)	Matumbi	33	93



**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

<b>Forest Reserve</b>	<b>Landscape</b>	<b>Total</b>	<b>Rank</b>
Mangwi Village Land Forest Reserve (proposed)	Matumbi	33	94
Mbingo Village Land Forest Reserve (proposed)	Matumbi	33	95
Mchungu Forest Reserve	Matumbi	33	96
Mkupuka Village Land Forest Reserve (proposed)	Matumbi	33	97
Msubugwe Galafuno Forest Reserve	Other	32	98
Muyuyu Village Land Forest Reserve (proposed)	Matumbi	32	99
Utete Forest Reserve	Matumbi	32	100
Chitoa Forest Reserve	Lindi	31	101
Semdoe Forest Reserve	Other	31	102
Ngumburuni Forest Reserve	Matumbi	31	103
Segoma Forest Reserve	Other	30	104
Marenda Forest Reserve	Matumbi	30	105
Bamba Ridge Forest Reserve	Other	29	106
Ruvu South Forest Reserve	Other	29	107
Simbo-Msinune Forest Reserve	Other	29	108
Muhoro Forest Reserve	Matumbi	29	109
Nyamakutwa-Namuete Forest Reserve	Matumbi	29	110
Tamburu Forest Reserve	Matumbi	29	111
Malehi Forest Reserve	Kilwa	28	112
Mbinga Kimaji Forest Reserve	Kilwa	28	113
Mitalule Forest Reserve	Kilwa	28	114
Mitundumbea Local Authority Forest Reserve	Kilwa	28	115
Ngarama North Forest Reserve	Kilwa	28	116
Ngarama South Forest Reserve	Kilwa	28	117
Rungo Forest Reserve	Kilwa	28	118
Matapwa Forest Reserve	Lindi	28	119
Nyangamara Local Authority Forest Reserve	Lindi	28	120
Gwami Forest Reserve	Other	28	121
Mlungui Forest Reserve	Other	28	122
Kazimzimbwi Forest Reserve	Other	27	123
Kikoka Forest Reserve	Other	27	124
Kingoma Forest Reserve	Matumbi	27	125
Gendagenda Village Land Forest Reserve	Other	26	126

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

<b>Forest Reserve</b>	<b>Landscape</b>	<b>Total</b>	<b>Rank</b>
Kwangumi Forest Reserve	Other	26	127
Kwani-Tongwe Forest Reserve	Other	26	128
Masanganya Forest Reserve	Other	26	129
Uzigua Forest Reserve	Other	26	130
Pindirola Forest Reserve	Kilwa	25	131
Muhoro River	Matumbi	24	132
Mtama Local Authority Forest Reserve	Lindi	23	133
Mchungu Forest Reserve	Matumbi	23	134
Kirengoma Forest Reserve	Matumbi	22	135
Kolokole Forest Reserve	Other	20	136
Vikindu Forest Reserve	Other	20	137
Ruawa Forest Reserve	Lindi	19	138
Amboni Caves Historical Site	Other	18	139
Genda Genda Forest Reserve	Other	15	140
Kwa Marimba Forest Reserve	Other	14	141
Ruhoi Forest Reserve	Matumbi	14	142
Kambai Forest Reserve	Other	12	143
Manga Forest Reserve	Other	12	144
Kisiju Forest Reserve	Other	11	145
Nyambawala B Village Land Forest Reserve (proposed)	Matumbi	3	146

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Table 29: METT Scores by Landscape and Category

Category	Kilwa Landscape Average Score	Others Average Score	Lindi Landscape Average Score	Matumbi Landscape Average Score	Zanzibar Landscape Average Score	Max Score	Kilwa Landscape % Score	Others % Score	Lindi Landscape % Score	Matumbi Landscape % Score	Zanzibar Landscape % Score
	Ordinal Scores						Percentage Scores				
TOTALS	51.38	48.58	30.91	39.46	51.00	102.00	50%	48%	30%	39%	50%
1 Does the protected area have legal status	2.65	2.67	2.88	2.20	2.83	3	88%	89%	96%	73%	94%
2 Are there good regulations to control landuse & activities	2.12	2.25	1.69	1.44	2.17	3	71%	75%	56%	48%	72%
3 Can managing staff sufficiently enforce protected area rules	1.06	1.33	0.84	0.50	1.83	3	35%	44%	28%	17%	61%
4 Is management undertaken as per agreed objectives	2.21	1.75	1.44	1.78	2.00	3	74%	58%	48%	59%	67%
5 Is the PA design optimal for species & ecosystem function	2.65	2.29	2.06	1.88	2.33	3	88%	76%	69%	63%	78%
6 Is the PA boundary known & demarcated	2.26	2.71	2.13	1.68	2.00	3	75%	90%	71%	56%	67%
7 Is there a management plan & is it being implemented	0.97	2.29	0.91	0.72	1.33	3	32%	76%	30%	24%	44%
7a Planning process allows adequate stakeholder participation	1.00	0.63	0.31	0.72	1.00	1	100%	63%	31%	72%	100%

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Category	Kilwa Landscape Average Score	Others Average Score	Lindi Landscape Average Score	Matumbi Landscape Average Score	Zanzibar Landscape Average Score	Max Score	Kilwa Landscape % Score	Others % Score	Lindi Landscape % Score	Matumbi Landscape % Score	Zanzibar Landscape % Score
	Ordinal Scores							Percentage Scores			
7b Established schedule & process for review of mngmt pln exists	0.71	0.75	0.22	0.50	0.17	1	71%	75%	22%	50%	17%
7c Monitoring research & evaluation are used to update mngmt pln	0.00	0.00	0.06	0.00	0.33	1	0%	0%	6%	0%	33%
8 Is there a regular work plan & is it being implemented	0.71	0.75	0.56	0.50	1.50	3	24%	25%	19%	17%	50%
9 Do you have enough information to manage the area	1.59	2.50	0.66	1.16	1.67	3	53%	83%	22%	39%	56%
10 Are systems in place to control resource use	1.79	1.71	0.88	1.28	1.83	3	60%	57%	29%	43%	61%
11 Is there a programme of management-orientated research	0.88	1.21	0.78	0.22	1.17	3	29%	40%	26%	7%	39%
12 Is active resource management being undertaken	1.26	1.75	0.78	0.50	1.50	3	42%	58%	26%	17%	50%
13 Are there enough staff for the protected area	2.15	2.04	1.06	1.24	1.50	3	72%	68%	35%	41%	50%
14 Are staff adequately trained for management objectives	1.97	2.00	0.91	1.48	1.33	3	66%	67%	30%	49%	44%
15 Is the current budget	0.76	1.42	0.25	0.88	1.17	3	25%	47%	8%	29%	39%

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Category	Kilwa Landscape Average Score	Others Average Score	Lindi Landscape Average Score	Matumbi Landscape Average Score	Zanzibar Landscape Average Score	Max Score	Kilwa Landscape % Score	Others % Score	Lindi Landscape % Score	Matumbi Landscape % Score	Zanzibar Landscape % Score
	Ordinal Scores						Percentage Scores				
sufficient											
16 Is the budget secure?	0.91	0.50	0.28	0.86	0.83	3	30%	17%	9%	29%	28%
17 Is the budget managed to meet critical management needs	1.41	0.54	0.28	0.86	1.33	3	47%	18%	9%	29%	44%
18 Is equipment sufficient for management needs	0.59	0.88	0.31	0.26	0.83	3	20%	29%	10%	9%	28%
19 Is equipment adequately maintained?	0.59	0.13	0.09	0.44	1.00	3	20%	4%	3%	15%	33%
20 Is there a planned education programme linked to management	1.68	1.04	1.00	1.12	1.00	3	56%	35%	33%	37%	33%
21 Is land & water planning integrated with PA needs	2.56	0.29	0.69	1.80	1.50	3	85%	10%	23%	60%	50%
21a Land & water planning for habitat conservation	0.21	0.21	0.19	0.72	0.50	1	21%	21%	19%	72%	50%
21b Land & water planning for connectivity	0.82	0.54	0.09	0.66	0.50	1	82%	54%	9%	66%	50%
21c Land & water planning for ecosystem services & conserving sp	1.00	1.00	0.03	0.90	0.33	1	100%	100%	3%	90%	33%
22 Is there cooperation with adjacent land & water users	0.06	0.00	1.06	0.08	2.00	3	2%	0%	35%	3%	67%

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Category	Kilwa Landscape Average Score	Others Average Score	Lindi Landscape Average Score	Matumbi Landscape Average Score	Zanzibar Landscape Average Score	Max Score	Kilwa Landscape % Score	Others % Score	Lindi Landscape % Score	Matumbi Landscape % Score	Zanzibar Landscape % Score
	Ordinal Scores						Percentage Scores				
23 do indigenous / local peoples input into management decisions	2.41	2.29	1.56	1.94	1.17	3	80%	76%	52%	65%	39%
24 Do local communities input into management decisions	2.41	2.29	1.59	1.78	1.17	3	80%	76%	53%	59%	39%
24a Communication & trust between local/indigenous pple & mngers	1.00	1.00	0.34	0.92	0.67	1	100%	100%	34%	92%	67%
24b Programmes to enhance community welfare implemented	0.76	0.67	0.38	0.90	0.50	1	76%	67%	38%	90%	50%
24c Local/indigenous people actively support the protected area	1.00	0.92	0.06	0.92	0.83	1	100%	92%	6%	92%	83%
25 Is the protected providing benefits to local communities?	1.12	1.54	1.13	0.94	2.17	3	37%	51%	38%	31%	72%
26 Are management activities monitored against performance?	1.12	1.00	0.63	1.14	0.83	3	37%	33%	21%	38%	28%
27 Are visitor facilities adequate?	0.00	0.08	0.22	0.00	1.00	3	0%	3%	7%	0%	33%
28 Do tour operators contribute to protected	0.00	0.00	0.44	0.06	0.67	3	0%	0%	15%	2%	22%

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Category	Kilwa Landscape Average Score	Others Average Score	Lindi Landscape Average Score	Matumbi Landscape Average Score	Zanzibar Landscape Average Score	Max Score	Kilwa Landscape % Score	Others % Score	Lindi Landscape % Score	Matumbi Landscape % Score	Zanzibar Landscape % Score
	Ordinal Scores						Percentage Scores				
area management?											
29 If fees are applied, do they help protected area management?	0.00	0.00	0.22	0.00	0.50	3	0%	0%	7%	0%	17%
30 What is the relative improvement of status of key PA values?	2.00	1.83	1.38	1.76	2.33	3	67%	61%	46%	59%	78%
30a The assessment of values is based on research / monitoring	1.00	0.13	0.25	0.90	0.17	1	100%	13%	25%	90%	17%
30b Programmes are implemented to address threats to values	1.00	1.00	0.22	0.92	0.83	1	100%	100%	22%	92%	83%
30c Activities to maintain values are routine	1.00	0.67	0.06	0.90	0.67	1	100%	67%	6%	90%	67%

## 8.2 Lists of endemic, near-endemic and threatened species of birds, mammals, reptiles and amphibians in the Coastal Forests

The lists that follow in this section are still 'works-in-progress' and should not be regarded as definitive.

Table 30: List of threatened plant species

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
TOTAL SPECIES COUNT			133	51	55	32						
ALOACEAE	Aloe	boscowenii	0	0	0	0	-	CR	D	3.1	2006	unknown
ALOACEAE	Aloe	pembana	0	0	0	1	-	CR	B1ab(iii,v) +2ab(iii,v); C2a(ii)	3.1	2006	decreasing
ANNONACEAE	Monodora	hastipetala	0	0	1	0	T. L. P. Couvreur (WAG) 2006	CR	B1ab(iii) +2ab(iii)	3.1	2008	unknown
ANNONACEAE	Uvaria	puguensis	0	0	0	0	R. E. Gereau (MO) 2006	CR	B1ab(iii)	3.1	2006	decreasing
COMBRETACEAE	Combretum	tenuipetiolatum	0	0	0	0	FTEA: TYPE	CR	B1+2c	2.3	1998	not stated
FABACEAE	Cynometra	gillmanii	1	0	0	0	F.M. Mbago, 1992	CR	-	-	-	-
ARACEAE	Culcasia	orientalis	0	1	0	1	FTEA	DD	-	3.1	2009	unknown
CAPPARACEAE	Maerua	acuminata	0	1	0	0	FTEA	DD	-	2.3	1998	not stated
EBENACEAE	Diospyros	capricornuta	0	0	1	0	FTEA	DD	-	2.3	1998	not stated
EBENACEAE	Diospyros	occulta	0	0	0	0	FTEA: TYPE	DD	-	2.3	1998	not stated



**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
SAPINDACEAE	Haplocoelopsis	africana	0	0	1	0	-	DD	-	2.3	1998	not stated
TILIACEAE	Grewia	goetzeana	0	0	1	0	-	DD	-	2.3	1998	not stated
ANNONACEAE	Asteranthe	lutea	0	0	1	0	-	EN	B2ab(iii)	3.1	2008	unknown
ANNONACEAE	Isolona	cauliflora?	0	0	0	0	-	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	3.1	2006	decreasing
ANNONACEAE	Isolona	heinsenii	0	0	1	0	-	EN	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Monodora	carolinae	0	1	1	0	T. L. P. Couvreur (WAG) 2006	EN	B1ab(iii) +2ab(iii)	3.1	2008	decreasing
ANNONACEAE	Polyalthia	tanganyikensis	0	0	1	0	-	EN	B1ab(ii,iii,v)	3.1	2006	decreasing
ANNONACEAE	Sanrafaelia	ruffonammari	0	0	0	0	C.J. Kayombo, 1999	EN	B1ab(iii) +2ab(iii)	3.1	2006	unknown
ANNONACEAE	Uvaria	pandensis	0	0	0	0	F.M. Mbago & H.O. Suleiman, 1989	EN	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Uvariadendron	pycnophyllum	0	0	0	0	F. M. Mbago (DSM) 2006	EN	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Xylopia	collina	1	1	0	0	C.J. Kayombo (NHT) 2003	EN	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Xylopia	mwasumbii	0	0	1	0	D. M. Johnson, 1999	EN	B1ab(iii)	3.1	2006	decreasing
ARACEAE	Amorphophallus	stuhmannii	0	0	0	0	FTEA	EN	B2ab(iii)	3.1	2006	unknown

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
ARACEAE	Gonatopus	marattioides	0	0	0	0	FTEA: TYPE	EN	B2ab(i,ii,iii,iv,v)	3.1	2006	decreasing
ARACEAE	Stylochiton	bogneri	0	0	0	0	FTEA: TYPE	EN	B1ab(iii) +2ab(iii)	3.1	2006	decreasing
BIGNONIACEAE	Fernandoa	lutea	0	1	0	0	Type of Fernandoa magnifica Seem. var. lutea Verdc.	EN	B1+2bc	2.3	1998	not stated
BORAGINACEAE	Ehretia	glandulosissima	0	1	0	0	FTEA: TYPE	EN	B1+2c	2.3	1998	not stated
CANELLACEAE	Warburgia	elongata	0	0	0	0	FTEA: TYPE	EN	B1+2c	2.3	1998	not stated
CLUSIACEAE	Garcinia	bifasciculata	0	0	0	0	FTEA: TYPE	EN	-	-	-	-
COMBRETACEAE	Vismia	pauciflora	0	1	0	0	-	EN	-	-	-	-
DIPTEROCARPACEAE	Monotes	lutambensis	0	1	0	0	FTEA: TYPE	EN	B1+2c, C2b	2.3	1998	not stated
EBENACEAE	Diospyros	magogoana	0	1	0	0	FTEA: TYPE	EN	B1+2bc	2.3	1998	not stated
EBENACEAE	Diospyros	shimbaensis	0	0	0	0	Daniel K. Abbiw (GC), 1993	EN	-	-	-	-
EUPHORBIACEAE	Euphorbia	wakefieldii	0	0	0	0	-	EN	-	-	-	-
EUPHORBIACEAE	Lingelsheimia	sylvestris	0	0	0	0	-	EN	-	-	-	-
FABACEAE	Baikiaea	ghesquiereana	0	0	1	0	-	EN	-	-	-	-
FABACEAE	Baphia	pauloi	0	0	0	0	W.R.Q. Luke (EA) 2007	EN	-	-	-	-
FABACEAE	Baphia	puguensis	0	0	1	0	K. Vollesen	EN	-	-	-	-

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
							(K) 2002					
FABACEAE	Bussea	eggelingii	0	1	0	0	L.B. Mwasumbi (DSM), 1984	EN	-	-	-	-
FABACEAE	Cynometra	ulugurensis	0	0	0	0	R. Gereau (MO) 2004	EN	-	-	-	-
FABACEAE	Gigasiphon	macrosiphon	0	1	0	0	R.C. Wingfield (DSM), 1978	EN	-	-	-	-
FABACEAE	Tessmannia	densiflora	0	0	1	0	FTEA	EN	-	-	-	-
MELIACEAE	Lovoa	swynnertonii	0	0	1	0	FTEA: TYPE	EN	A1cd	2.3	1998	not stated
MELIACEAE	Turraea	kimbozensis	0	0	0	0	-	EN	C2b, D	2.3	1998	not stated
RUBIACEAE	Cuviera	schliebenii	0	1	0	0	-	EN	B1+2bc	2.3	1998	not stated
RUBIACEAE	Leptactina	papyrophloea	0	1	0	0	R. E. Gereau 2004	EN	B1+2c	2.3	1998	not stated
RUBIACEAE	Rytigynia	longipedicellata	0	1	0	0	Y.S. Abeid 2000	EN	B1+2bc	2.3	1998	not stated
RUBIACEAE	Tapiphyllum	schliebenii	0	0	0	0	-	EN	B1+2c, C2b	2.3	1998	not stated
BORAGINACEAE	Cordia	subcordata	0	0	0	0	-	LR/lc	-	2.3	1998	not stated
MORACEAE	Milicia	excelsa	1	1	1	0	R.E. Gereau, 1994	LR/nt	-	2.3	1998	not stated
ALOACEAE	Aloe	leachii	0	0	0	0	-	VU	B1ab(iii) +2ab(iii)	3.1	2006	decreasing
ALOACEAE	Aloe	massawana	0	0	0	1	-	VU	B1ab(iii) +2ab(iii)	3.1	2006	decreasing

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
ANNONACEAE	Lettowianthus	stellatus	1	0	1	0	C.J. Kayombo (NHT) 2003	VU	-	3.1	2006	not stated
ANNONACEAE	Mkilua	fragrans?	0	1	1	1	FTEA	VU	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Monanthes	trichantha	0	1	1	0	-	VU	B2ab(ii,iii,v)	3.1	2006	unknown
ANNONACEAE	Ophrypetalum	Odoratum <sup>1</sup>	0	0	1	0	FTEA: TYPE	VU	B1ab(ii,iii,v)	3.1	2006	decreasing
ANNONACEAE	Ophrypetalum	Odoratum <sup>2</sup>	0	0	1	0	FTEA: TYPE	VU	B1ab(ii,iii,v)	3.1	2006	decreasing
ANNONACEAE	Ophrypetalum	odoratum	0	1	1	0	FTEA: TYPE	VU	B1ab(ii,iii,v)	3.1	2006	decreasing
ANNONACEAE	Polyalthia	stuhmannii	0	0	0	0	FTEA	VU	B1ab(ii,iii,v)	3.1	2006	decreasing
ANNONACEAE	Polyceratocarpus	scheffleri	0	0	0	0	Greenway 1951	VU	B1ab(i,ii,iii,iv,v)	3.1	2006	unknown
ANNONACEAE	Toussaintia	orientalis	0	0	1	0	Y.S. Abeid, 1999	VU	B1ab(i,ii,iii,iv,v)	3.1	2006	decreasing
ANNONACEAE	Uvaria	tanzaniae	0	0	0	0	-	VU	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Uvarioidendron	gorgonis	1	0	0	0	D. Johnson (OWU) 2006	VU	B2ab(iii)	3.1	2006	unknown
ANNONACEAE	Uvarioidendron	kirkii	0	0	1	1	FTEA	VU	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Uvarioidendron	oligocarpum	0	0	0	0	K. Vollesen (K), 1999	VU	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Uvarioidendron	usambarensis	0	0	0	0	I. Rajabu Hizza, 1998	VU	B1ab(iii)	3.1	2006	decreasing
ANNONACEAE	Xylopia	arenaria	0	0	0	0	-	VU	B1ab(i,ii,iii,iv,v)	3.1	2006	decreasing
ARACEAE	Gonatopus	petiolulatus	0	0	0	0	W.R.Q. Luke (EA) 2006	VU	B2ab(iii)	3.1	2006	decreasing

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
ARACEAE	Stylochiton	crassispatus	0	0	0	0	FTEA: TYPE	VU	B1ab(iii) +2ab(iii);D2	3.1	2006	unknown
ARACEAE	Stylochiton	euryphyllus	0	1	0	0	FTEA: TYPE	VU	B2ab(iii)	3.1	2006	unknown
ARECACEAE	Dypsis	pembana	0	0	0	1	R. E. Gereau 2003	VU	-	-	-	-
BUXACEAE	Buxus	obtusifolia	0	0	0	0	-	VU	-	-	-	-
CANELLACEAE	Warburgia	stuhlmannii	0	0	0	0	R. Gereau (MO) 2006	VU	B1+2c	2.3	1998	not stated
CLUSIACEAE	Allanblackia	stuhlmannii	0	0	0	1	-	VU	-	-	-	-
CLUSIACEAE	Garcinia	acutifolia	0	0	0	0	FTEA	VU	-	-	-	-
CLUSIACEAE	Garcinia	semseii	0	0	0	0	E.A.H	VU	-	-	-	-
EBENACEAE	Diospyros	amaniensis	0	0	0	0	MW, 1983	VU	B1+2bc	2.3	1998	not stated
EBENACEAE	Diospyros	greenwayi	0	0	0	0	KEW 1981	VU	B1+2c	2.3	1998	not stated
EUPHORBIACEAE	Aristogeitonia	monophylla	0	0	1	0	-	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Croton	jatrochoides	0	0	0	1	H. J. Esser (M) 2004	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Drypetes	sclerophylla	0	1	0	0	FTEA: TYPE	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Meineckia	paxii	0	0	0	0	-	VU	-	-	-	-
EUPHORBIACEAE	Micrococca	scariosa	0	0	0	1	Syntype	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Mildbraedia	Carpinifolia <sup>3</sup>	0	0	0	1	FTEA	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Mildbraedia	Carpinifolia <sup>4</sup>	0	0	1	0	R. E. Gereau (MO) 2006	VU	B1+2b	2.3	1998	not stated

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
EUPHORBIACEAE	Mildbraedia	carpinifolia	0	0	0	0	RW 1976	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Pycnocomma	littoralis	0	0	0	0	W.R.Q. Luke (EA) 2006	VU	B1+2b	2.3	1998	not stated
EUPHORBIACEAE	Shirakiopsis	trilocularis	0	0	0	0	M.A. Mwangoka 2001	VU	-	-	-	-
EUPHORBIACEAE	Sibangea	pleioneura	0	0	0	0	A.R.Smith	VU	-	-	-	-
EUPHORBIACEAE	Suregada	lithoxyla	0	0	0	0	W.R.Q. Luke (EA) 2006	VU	B1+2b	2.3	1998	not stated
FABACEAE	Angylocalyx	braunii	0	0	0	0	K. Vollesen (K) 2003	VU	-	-	-	-
FABACEAE	Baphia	kirkii	1	0	1	0	-	VU	-	-	-	-
FABACEAE	Bauhinia	loeseneriana	0	1	1	0	-	VU	-	-	-	-
FABACEAE	Berlinia	orientalis	0	1	0	0	K. Vollesen (K) 2002	VU	-	-	-	-
FABACEAE	Cynometra	brachyrrhachis	0	0	0	0	-	VU	-	-	-	-
FABACEAE	Cynometra	engleri	0	0	0	0	P. Ezrom (NHT) 2006	VU	-	-	-	-
FABACEAE	Cynometra	suaheliensis	0	0	0	0	FTEA	VU	-	-	-	-
FABACEAE	Cynometra	webberi	1	0	0	0	A. Randrianasolo (MO) 2001	VU	-	-	-	-
FABACEAE	Dalbergia	acariiantha	0	1	0	0	A. Randrianasolo	VU	-	-	-	-

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
							(MO) 2001					
FABACEAE	Dalbergia	vacciniifolia	0	0	0	1	A. Randrianasolo (MO) 2002	VU	-	-	-	-
FABACEAE	Dialium	holtzii	0	1	1	0	L.B. Mwasumbi (DSM), 1979	VU	-	-	-	-
FABACEAE	Erythrina	sacleuxii	0	0	0	0	D. Johnson (OWU) 2007	VU	-	-	-	-
FABACEAE	Guibourtia	schliebenii	0	1	0	0	FTEA	VU	-	-	-	-
FABACEAE	Intsia	bijuga	0	0	0	1	-	VU	-	-	-	-
FABACEAE	Julbernardia	magnistipulata	0	0	0	0	M.A. Mwangoka (NHT) 2003	VU	-	-	-	-
FABACEAE	Millettia	bussei	0	0	1	0	F.M. Mbago & H.O. Suleiman, 1990	VU	-	-	-	-
FABACEAE	Millettia	elongatistyla	0	0	0	0	-	VU	-	-	-	-
FABACEAE	Millettia	micans	0	0	0	0	I. Rajabu Hizza, 1999	VU	-	-	-	-
FABACEAE	Millettia	sacleuxii	0	0	0	0	C.J. Kayombo (NHT) 2003	VU	-	-	-	-
FABACEAE	Newtonia	paucijuga	0	1	1	0	Y.S. Abeid 2000	VU	-	-	-	-

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Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
FABACEAE	Stuhlmannia	moavi	0	0	0	0	O. Kibure 2000	VU	-	-	-	-
FABACEAE	Zenkerella	egregia	0	0	0	0	W.D. Stevens 2002	VU	-	-	-	-
MELIACEAE	Khaya	anthotheca	0	0	0	0	M. Thulin (UPS) 2003	VU	A1cd	2.3	1998	not stated
MORACEAE	Mesogyne	insignis	0	0	0	0	FTEA	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Afrocanthium	siebenlistii	0	0	0	0	-	VU	-	-	-	-
RUBIACEAE	Aoranthe	penduliflora	0	0	1	0	-	VU	B1+2bc	2.3	1998	not stated
RUBIACEAE	Canthium	impressinervium	0	1	0	0	-	VU	B1+2b, D2	2.3	1998	not stated
RUBIACEAE	Coffea	costatifructa	1	0	0	0	R. Gereau (MO) 2007	VU	D2	2.3	1998	not stated
RUBIACEAE	Coffea	Pseudo- zanguebariae	0	0	0	1	FTEA	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Gardenia	transvenulosa	1	1	1	0	M.A. Mwangoka (NHT) 2003	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Kraussia	speciosa	0	0	0	0	-	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Multidentia	castaneae	0	0	0	0	R. Gereau (MO) 2002	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Pavetta	holstii	0	0	0	0	M.A. Mwangoka 2002	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Pavetta	tarenoides	0	0	0	0	H. J. Esser (M)	VU	-	-	-	-



ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
							2004					
RUBIACEAE	Psychotria	cyathicalyx	0	1	0	0	M.A. Mwangoka 2002	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Psydrax	faulknerae	0	1	0	0	-	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Psydrax	kibuwae	0	0	0	0	G. McPherson, 1994	VU	B1+2b, D2	2.3	1998	not stated
RUBIACEAE	Psydrax	micans	0	1	0	0	C.J. Kayombo (NHT) 2004	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Rothmannia	macrosiphon	0	0	1	0	-	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Rytigynia	binata	0	1	0	0	Y.S. Abeid 2000	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Tarenna	drummondii	0	0	1	0	C.J. Kayombo (NHT) 2004	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Tricalysia	acidophylla	0	0	0	0	R. Gereau (MO) 2003	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Tricalysia	pedicellata	0	0	0	0	-	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Tricalysia	schliebenii	0	1	0	0	I. Darbyshire (K) 2007	VU	B1+2b	2.3	1998	not stated
RUBIACEAE	Vangueria	bicolor	0	0	0	0	C.J. Kayombo (NHT), 1995	VU	B1+2c, D2	2.3	1998	not stated
RUBIACEAE	Vangueria	pallidiflora	0	0	0	0	Y.S. Abeid 2001	VU	-	-	-	-

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
RUTACEAE	Vepris	sansibarensis	0	0	1	0	K. Vollesen (K), 1995	VU	B1+2b	2.3	1998	not stated
RUTACEAE	Zanthoxylum	deremense	0	1	0	0	K. Vollesen (K) 2002	VU	B1+2b	2.3	1998	not stated
RUTACEAE	Zanthoxylum	Holtzianum <sup>5</sup>	0	0	0	0	-	VU	B1+2d	2.3	1998	not stated
RUTACEAE	Zanthoxylum	holtzianum	0	1	0	0	-	VU	B1+2d	2.3	1998	not stated
RUTACEAE	Zanthoxylum	lindense	0	0	1	0	Darbyshire & Vollesen (K) 2008	VU	B1+2b	2.3	1998	not stated
SAPINDACEAE	Allophylus	chirindensis	0	0	0	0	W.R.Q. Luke (EA) 2008	VU	-	-	-	-
SAPOTACEAE	Mimusops	acutifolia	0	1	0	0	-	VU	-	-	-	-
SAPOTACEAE	Mimusops	obtusifolia	1	0	0	1	FTEA	VU	B1+2b	2.3	1998	not stated
SAPOTACEAE	Pouteria	Pseudo- racemosa	0	0	0	0	FTEA	VU	B1+2b, D2	2.3	1998	not stated
SAPOTACEAE	Synsepalum	kaessneri	0	0	0	0	A. Randrianasolo (MO) 2001	VU	B1+2c	2.3	1998	not stated
SAPOTACEAE	Vitellariopsis	cuneata	0	0	0	0	A. Randrianasolo (MO) 2001	VU	B1+2b	2.3	1998	not stated
SAPOTACEAE	Vitellariopsis	kirkii	0	0	0	0	F.M. Mbago, 1993	VU	-	-	-	-
STERCULIACEAE	Cola	scheffleri	0	0	0	0	R. E. Gereau	VU	B1+2b	2.3	1998	not stated

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Family	Genus	species	KILWA	LINDI	MATUMBI	ZANZIBAR	det. by (Herbarium), date	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
							(MO) 2005					
STERCULIACEAE	Sterculia	schliebenii	0	1	0	0	F.M. Mbago & L.B. Mwasumbi (DSM) 2007	VU	D2	2.3	1998	not stated
VERBENACEAE	Premna	hans-joachimii	0	1	0	0	FTEA	VU	B1+2b	2.3	1998	not stated
VERBENACEAE	Premna	schliebenii	0	0	0	0	-	VU	B1+2b	2.3	1998	not stated
VERBENACEAE	Premna	tanganyikensis	0	1	0	0	FTEA: TYPE	VU	B1+2b	2.3	1998	not stated
VERBENACEAE	Vitex	amaniensis	0	0	0	0	D. Frodin, 1997	VU	B1+2b	2.3	1998	not stated
VERBENACEAE	Vitex	zanzibarensis	0	0	0	0	W.D. Stevens 2001	VU	B1+2c	2.3	1998	not stated
ANNONACEAE	Asteranthe	asterias	0	0	0	0	FTEA: TYPE	NT	-	3.1	2006	decreasing
ANNONACEAE	Asteranthe	asterias	1	0	0	1	L.B. Mwasumbi (DSM), 1978	NT	-	3.1	2006	decreasing
ANNONACEAE	Asteranthe	asterias	1	0	0	1	-	NT	-	3.1	2006	decreasing
ANNONACEAE	Monodora	minor	0	1	0	0	-	NT	-	3.1	2006	unknown
ANNONACEAE	Uvaria	kirkii	0	0	1	1	R. E. Gereau (MO) 2006	NT	-	3.1	2006	unknown
ARACEAE	Calloopsis	volkensis	0	0	0	0	R.C. Wingfield (DSM)	NT	-	3.1	2006	decreasing
CYCADACEAE	Encephalartos	hildebrandtii	1	0	0	1	FTEA	NT	-	-	-	-

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Notes: infraspecies

- <sup>1</sup> subsp. Longip-edicellatum
- <sup>2</sup> subsp. odoratum
- <sup>3</sup> var. carpi-nifolia
- <sup>4</sup> var. strig-osa Radcl.-Sm.
- <sup>5</sup> subsp. Holtzi-anum

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Table 31: List of threatened amphibians

Genus	Species	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	Synonyms	Red List status	Red List criteria	Red List version	Year assessed	Population trend
TOTAL SPECIES COUNT		10	16	22	11							
Phrynobatrachus	ukingensis	0	0	1	0	Small range in Malawi otherwise only known from Tanzania.		DD	-	3.1	2004	unknown
Afrivalus	sylvaticus	0	0	0	0	If the Kazimzumbwi record is correct - this is exciting as this is the first record outside Kenya and a "considerable" range extension		EN	B2ab(iii)	3.1	2004	decreasing
Afrivalus	uluguruensis	0	0	0	0	Tanzania endemic, mainly highland species.		EN	B1ab(iii)	3.1	2008	decreasing

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Genus	Species	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	Synonyms	Red List status	Red List criteria	Red List version	Year assessed	Population trend
Hyperolius	rubrovermiculatus	0	0	0	0			EN	B1ab(iii)	3.1	2004	decreasing
Stephopaedes	sp.	0	0	0	0		Stephopaedes howelli ??	EN	B1ab(iii)	3.1	2004	decreasing
Afrixalus	sp.	0	0	0	0		Afrixalus dabagae?	VU	B1ab(iii)	3.1	2004	decreasing
Arthroleptis	affinis	0	1	0	1	Localised Tanzania endemic.	Arthroleptis adolfi-friederici ssp. leleupi	LC	-	3.1	2004	stable
Bufo	lindneri	0	0	0	0	Only a very few records.	Bufo lindneri	LC	-	3.1	2004	decreasing
Bufo	steindachneri	0	0	0	0	Few and very scattered records	Bufo steindachneri	LC	-	3.1	2004	decreasing
Hyperolius	mitchelli	0	1	0	1	Wieczorek, Drewes, and Channing 2000, J. Biogeograph, 27: 1241, provides a map and a considerable altered concept of		LC	-	3.1	2004	decreasing

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Genus	Species	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	Synonyms	Red List status	Red List criteria	Red List version	Year assessed	Population trend
						this species						
Leptopelis	flavomaculatus	0	0	1	0	Relatively widespread in eastern Africa		LC	-	3.1	2004	decreasing
Mertensophryne	micranotis	0	1	1	1	Localised in East Africa. Kenya and Tanzania endemic.		LC	-	3.1	2004	decreasing
Spelaeophryne	methneri	0	1	0	1	Tanzania endemic. Distribution: s and e Tanzania		LC	-	3.1	2004	unknown
Stephopaedes	loveridgei	1	1	1	1	Localised in East Africa. Tanzania endemic.	Stephopaedes loveridgei	LC	-	3.1	2004	decreasing

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Table 32: List of Threatened Birds

Genus	species	Authority	KILWA	LINDI	MATUMBI	ZANZIBAR	Synonyms	Red List status	Red List criteria	Red List version	Year assessed	Population trend
TOTAL SPECIES COUNT			2	4	1	3						
Anthreptes	pallidigaster	Slater & Moreau, 1935	0	0	0	0		EN	B1ab(i,ii,iii,v); B2ab(i,ii,iii,v)	3.1	2008	decreasing
Anthus	sokokensis	van Someren, 1921	0	0	0	0		EN	B1ab(i,ii,iii,v)	3.1	2008	decreasing
Otus	ireneae	Ripley, 1966	0	0	0	0		EN	B1ab(iii)	3.1	2008	decreasing
Zoothera	guttata**	(Vigors, 1831)	0	1	0	0	Turdus fischeri  Zoothera fischeri	EN	C2a(i)	3.1	2008	decreasing
Anthreptes	rubritorques*	Reichenow, 1905	0	0	0	0		VU	B1ab(i,ii,iii,v)	3.1	2008	decreasing
Apalis	chariessa	Reichenow, 1879	0	0	0	0		VU	B1ab(i,ii,iii,iv,v)	3.1	2008	decreasing
Bubo	vosseleri	Reichenow, 1908	0	0	0	0		VU	B1ab(ii,iii,v)	3.1	2008	decreasing
Otus	pembaensis	Pakenham, 1937	0	0	0	1		VU	C2a(ii)	3.1	2008	decreasing
Swynnertonia	swynnertoni	(Shelley, 1906)	0	0	0	0		VU	B1ab(ii,iii,v); C2a(i)	3.1	2008	decreasing
Treron	pembaensis	Pakenham, 1940	0	0	0	1		VU	C2a(ii)	3.1	2008	decreasing
Anthreptes	reichenowi	Gunning, 1909	1	1	0	0		NT	-	3.1	2008	-
Circaetus	fasciolatus	Kaup, 1850	1	1	1	0		NT	-	3.1	2008	-



ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Sheppardia	gunningi	Haagner, 1909	0	1	0	1		NT	-	3.1	2008	-
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Table 33: List of Threatened Mammals

Genus	Species	Authority					Notes	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
			KILWA	LINDI	MATUMBI	ZANZIBAR						
TOTAL SPECIES COUNT			5	7	5	5						
Cephalophus	adersi	Thomes, 1918	0	0	0	1		CR	A4cd	3.1	2008	decreasing
Diceros	bicornis	Linnaeus, 1758	1	0	0	0		CR	A2abcd	3.1	2008	increasing
Galagoides	rondoensis		1	1	0	0		CR	B1ab(ii,iii)	3.1	2008	decreasing
Gramnomys	caniceps	Hutterer & Dieterlen, 1984	0	0	0	0		DD	-	3.1	2008	unknown
Miniopterus	minor	Peters, 1866	0	0	0	0	Check the ZMUC database literature for a Kenya record	DD	-	3.1	2008	unknown
Pipistrellus	permixtus		0	0	0	0		DD	-	3.1	2008	unknown
Scotoecus	albofuscus	Thomas, 1890	0	1	0	0	Check the zmuc literature (Aggundey & Schlitter 1984(279); Ansell & Dowsett 1988(274); Uganda University 1997(562); Kearney & Taylor 1997(730); Kock pers. comm. 1997(810)) for a record on the Ke/Tz border	DD	-	3.1	2008	unknown

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Genus	Species	Authority	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
Kerivoula	africana	Dobson, 1878	0	0	1	0	LAH comments: MacPhee and Flemming (1999) consider this species to be extinct. The matter has been referred to the relevant Specialist Group for a final decision (ref: MacPhee, R.D.E. and Flemming, C. 1999. Requiem Æternam. The last five hundred years of	EN	B2ab(iii)	3.1	2008	decreasing
Procolobus	kirkii	Waterhouse, 1838	0	0	0	1		EN	B1ab(ii,iii,v)	3.1	2008	decreasing
Rhynchocyon	chrysopygus	Günther, 1881	0	0	0	0		EN	B1ab(iii)	3.1	2008	decreasing
Hippopotamus	amphibius	Linnaeus, 1758	1	1	0	0		VU	A4cd	3.1	2008	decreasing
Loxodonta	africana	Blumenbach, 1776	1	1	1	0		VU	A2a	3.1	2008	increasing
Myonycteris	relicta	Bergmans, 1980	0	1	1	0		VU	A4c	3.1	2008	decreasing
Panthera	leo	Linnaeus, 1758	1	1	1	0		VU	A2abcd	3.1	2008	decreasing
Pteropus	voeltzkowi	Matschie, 1909	0	0	0	1		VU	D2	3.1	2008	increasing
Rhynchocyon	petersi	Bocage, 1880	0	1	1	1	[ ] ref is <a href="http://www.york.ac.uk/res/celp/webpages/projects/ecology/coastal%20forests/pdf/tanga/MSU_MBUGWE%20FOREST%20RESERVE.pdf">http://www.york.ac.uk/res/celp/webpages/projects/ecology/coastal%20forests/pdf/tanga/MSU_MBUGWE%20FOREST%20RESERVE.pdf</a>	VU	B1ab(iii)	3.1	2008	unknown

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

Genus	Species	Authority	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	Red List status	Red List criteria	Red List criteria version	Year assessed	Population trend
Taphozous	hildegardeae	Thomas, 1909	0	0	0	1		VU	B1ab(iii)	3.1	2008	decreasing
Eidolon	helvum	Kerr, 1792	0	0	0	1		NT	-	3.1	2008	decreasing
Otomops	martiensseni	Matschie, 1897	0	0	0	0		NT	-	3.1	2008	decreasing
Panthera	pardus	Linnaeus, 1758	1	1	1	1		NT	-	3.1	2008	decreasing
Rhinolophus	deckenii	Peters, 1867	0	1	1	1		NT	-	3.1	2008	decreasing
Rhynchocyon	cirnei	Peters, 1847	1	1	1	0		NT	-	3.1	2008	unknown

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Table 34: Threatened List of Reptiles

Genus	species	Authority	Site	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
TOTAL SPECIES COUNT				8	84	26	28							
Elapsoides	nigra	Günther, 1888	Elapechis niger  Elapsoidea sundevallii	0	1	0	0	Broadley mention that it "inhabits lowland forest. Include?"		EN	B1ab(iii)	3.1	2009	unknown
Lygosoma	mafianum	Broadley, 1994		0	1	0	0			EN	B1ab(iii)	3.1	2009	unknown
Prosymna	janii	Bianconi, 1862	Rhinotyphlops feae  Typhlops principis	0	0	0	0		E	LC		3.1	2009	unknown
Melanoseps	ater	Günther, 1874	Herpetosaura atra	0	1	0	1	Pangani falls is a records from Loroogwe, Pangani River	E	LC		3.1	2009	unknown
Acontias	plumbeus	Biaconi, 1849	Acontias niger	0	0	0	0			LC		3.1	2009	unknown
Chamaeleo	d. dilepis	Leach, 1819	Chamaeleo angusticoronatus  Chamaeleo bilobus	0	0	1	0			LC		3.1	2009	stable

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Genus	species	Authority	Site					Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
				KILWA	LINDI	MATUMBI	ZANZIBAR							
			Chamaeleo capellii   Chamaeleo planiceps											
Homopholis	wahlbergii	A. Smith, 1849	Geko walbergii   Homopholis macrolepis   Homopholis wahlbergii   Platypholis walbergii	0	1	0	0		LC		3.1	2009	unknown	
Loveridgea	ionidesi	Battersby, 1950	Amphisaena ionidesii	0	1	0	0		LC		3.1	2009	unknown	
Lycophidion	capense loveridgei	Laurent, 1968	Lycophidion capense	0	0	0	0		LC		3.1	2009	unknown	
Natriciteres	olivacea	Peters, 1854	Coronella olivacea   Natrix olivacea   Natrix olivacea   Natrix olivaceus   Neusterophis atratus   Tropidonotus olivaceus	0	1	0	0		LC		3.1	2009	unknown	
Thelotornis	capensis mossambicanus	Bocage, 1895	Dryiophis oatesi   Thelotornis kirtlandi	0	0	0	0		LC		3.1	2009	stable	

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Genus	species	Authority	Site	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
Aparallactus	turneri	Loveridge, 1935		0	1	0	0		E	NE	-	-	-	-
Bradypodion	mlanjense	Broadley, 1965		0	1	1	1		E	NE	-	-	-	-
Bradypodion	tenuis	Matschie, 1892		0	1	0	0		E	NE	-	-	-	-
Gastropholis	prasina	Werner, 1904		1	1	0	0		E	NE	-	-	-	-
Gastropholis	vittata	Fischer, 1886		0	1	1	1	Supposed to occur coastal area of Tz and N Mozambique	E	NE	-	-	-	-
Leptotyphlops	macrops	Broadley & Wallach, 1996		0	1	0	0	& Kambai forest (0838 D3). Lah comments: Spawls et al. 2002 mentioned that there are some problematic specimens from the Kenya	E	NE	-	-	-	-

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Genus	species	Authority	Site	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
								highlands. Kenya and Tanzania endemic.						
Lygodactylus	broadleyi	Pasteur, 1995		0	0	0	0	(also Amani)	E	NE	-	-	-	-
Lygodactylus	conradti	Matschie, 1892		0	0	1	0	Kambai and other sites in East Usambaras	E	NE	-	-	-	-
Lygodactylus	kimhowelli	Pasteur, 1995		0	1	0	0		E	NE	-	-	-	-
Lygodactylus	rex	Broadley, 1963		0	0	1	0		E	NE	-	-	-	-
Lygodactylus	viscatus	Vaillant, 1873		0	0	0	0		E	NE	-	-	-	-
Lygodactylus	williamsi	Loveridge, 1952		0	1	0	0	In Kimoza not kisiju (ermias)	E	NE	-	-	-	-
Melanoseps	rondoensis	Loveridge, 1942		0	1	1	0		E	NE	-	-	-	-
Natriciteres	variegata sylvatica	Broadley, 1966		0	1	1	0		E	NE	-	-	-	-
Philothamnus	macrops	Boulenger, 1895		0	1	1	1		E	NE	-	-	-	-

ANNEXES: TANZANIA'S COASTAL FORESTS 2011

Genus	species	Authority	Site					Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
				KILWA	LINDI	MATUMBI	ZANZIBAR							
Philothamnus	natalensis	A. Smith, 1848		0	1	0	0		E	NE	-	-	-	-
Rhinotyphlops	lumbriciformis*	Peters, 1874		0	1	0	0		E	NE	-	-	-	-
Scelotes	duttoni	Broadley, 1990		0	1	0	0		E	NE	-	-	-	-
Scelotes	insularis	Broadley, 1990		0	1	0	0		E	NE	-	-	-	-
Sepsina	t. tetradactyla	Peters, 1874		0	1	0	0		E	NE	-	-	-	-
Typhlops	rondoensis	Loveridge, 1942		0	1	0	0		E	NE	-	-	-	-
Aparallactus	guentheri	Boulenger, 1895		0	1	1	0		E	NE	-	-	-	-
Aparallactus	weneri	Boulenger, 1895		0	1	0	0		E	NE	-	-	-	-
Bitis	g. gabonica	Dumžril & Bibron, 1854		0	1	1	1		E	NE	-	-	-	-
Cnemaspis	barbouri	Perret, 1986		0	1	1	0		E	NE	-	-	-	-
Cnemaspis	uzungwae	Perret, 1986		1	1	1	1		E	NE	-	-	-	-
Crotaphopeltis	tornieri	Werner, 1908		0	0	0	0		E	NE	-	-	-	-
Dendroaspis	angusticeps	A. Smith, 1849		0	1	0	0		E	NE	-	-	-	-



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Genus	species	Authority	Site	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
Holaspis	laevis	Werner, 1895		0	1	0	0	Elevated to species by: Broadley (2000) African Herp News, 31: 13-14, however see also Kroniger etc. (2001) Podarcis 2 (3): 72-80	E	NE	-	-	-	-
Lygodactylus	uluguruensis	Pasteur, 1964		0	0	0	0		E	NE	-	-	-	-
Melanoseps	loveridgei	Brygoo & Roux, 1981		0	1	0	1		E	NE	-	-	-	-
Natriciteres	variegata pembana	Loveridge, 1935		0	1	0	0	Endemic to Pemba island. LAH comments: you have a record from Dondo (in Moz), this is very interesting - as the species	E	NE	-	-	-	-

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Genus	species	Authority	Site	KILWA	LINDI	MATUMBI	ZANZIBAR	Notes	ENDEMIC	Red List status	Red List criteria	Red List version	Year assessed	Population trend
								was/is believed to be endemic to Pemba. What is the source to this record?						
Prosymna	semifasciata	Broadley, 1996		0	1	0	0	Tanzania endemic. Types from Kwamgumi Forest Reserve (0438 D3). Lah comments: this is in the E Usambaras	E	NE	-	-	-	-
Rhampholeon	brachyurus	Günther, 1893		0	1	0	0		E	NE	-	-	-	-
Rhampholeon	brevicaudatus	Matschie, 1892		0	1	1	0		E	NE	-	-	-	-
Rhampholeon	platyceps	Günther, 1893		0	0	0	0		E	NE	-	-	-	-
Typhlops	obtusus	Peters, 1865		0	1	0	1		E	NE	-	-	-	-
Urocotyledon	wolterstorffi	Tornier, 1900		0	1	0	0		E	NE	-	-	-	-

### 8.3 Annex 3. List of Reserves Containing Coastal Habitats in the Relevant Coastal Districts of Tanzania

Table 35: List of Forest Reserves Containing Coastal habitat

District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
Bagamoyo	Gwami	421	T. T.	5,633.0		364/25/7/1958			
	Kikoka	415	T. T.	1,655.0		399/15/8/1958			
	Mangroves -Bagamoyo	-	T. T.	9,184.0		Cap. 132 p. 1947			
	Mtakuja (Ruvu F. R.)	1054	T. T.	1,249.3		Sch.		321 of 1958	
	Pongwe	1052	T. T.		875.0	Cap. 132 p. 1354			
	Msakulembe /Simbo	RE/B/1/1	T. T.	609.5		Sch.		374/20/7/1958	
	Simbo Bagamoyo	413	T. T.	591.0		365/25/7/1958			
	Uzigua	431	T. T.	24,722.0		466/26/9/1958			
	Goyo	2409	V. F	547.0					
	Mbwebwe	2411	V. F	61.0					
	Matipwili	2410	V. F						

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
				70.0					
	Zaraninge	2281	L. A.	17,869.0		426/26/8/1998			
Kisarawe	Kazimzumbwi	2242	T. T.		8,011.0	306/24/5/1954			Need Var.
	Kiregese	1045	T. T.	799.7		Sch.		360/24/8/1962	
	Kola (South Ruvu)	331	T. T.		3,108.0	159/1/1/1958			Partly in Ruvu N.
	Bagala		Proposed		6,000.0				Proposed
	Dendeni		Proposed		200.0				Proposed
	Kisarawe	1044	T. T.	613.5		Cap. 132 p. 1349		113/15/4/1966	
	Mangroves - Kisarawe		T. T.	6,051.0		Cap. 132 p. 1346			
	Marenda	1050	T. T.	184.0		Sch.	349/1995		
	Masangania	104/1040	T. T.	2,599.0		Cap. 132 p. 1349			
	Mkonore	1042	T. T.	824.4		Cap. 132 p. 1349		444/20/9/1963	
	Mogo	14/477	T. T.	157.0		Sch.		153/3/6/1966	
	Mpiji Valley	E/K/2/1	T. T.	654.4		Sch.		415/6/9/1963	
	Hundogo	150/1195	T. T.	1,012.0		162/29/5/1950			Part in Kinondoni

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Pugu - Kisarawe	32/606	T. T.		2,410.0	Cap. 132 p. 1348			Cont. Ilala
	Ruvu South	1460	T. T.		35,500.0	Sch.	81/29/6/1979		
	Tongoro	E/K/2/1	T. T.		659.7	Sch.		444/20/9/1963	
	Vikindu	1051	T. T.	1,599.0		Cap. 132 p. 1347			
Kibaha	Bana/N. Ruvu	261/665	T. T.	31,930.0		309/13/9/1959	128/8/9/1978		
Mafia	Mangroves- Mafia		T. T.	4,365.0		153 of 1930			
	Mlola	2352	Marine reserve	2,596.0					Proposed
Rufiji	Bumi	E/R/2/1	T. T.	519.8		Sch.		415/17/7/1964	
	Kichu Hills		L. A.		4,000.0				
	Katundu	1086	T. T.	4,727.0		155/3/6/1966			
	Kikale	1983	T. T.	1,000.0		Cap. 132 p. 1351			
	Kireungoma	RE/R/6/1	T. T.	34.0		Sch.		413/17/7/1964	
	Kiwengoma	2310	T. T.		3,561.0		545 of 28/8/1998		
	Kipo	1084	T. T.	1,749.0		Cap. 132 p. 1351			
	Kumbi	E/R/2/1	T. T.	27.9		Sch.		433/24/7/1964	

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Rufiji Delta Mangroves	634	T. T.	67,612.0		Cap. 132 p. 1350			
	Mohoro	615	T. T.	2,349.0		Cap. 132 p. 1349			
	Mohoro River	602	T. T.	49.0		204/22/7/1966			
	Mchungu	1082	T. T.	1,000.0		Cap. 132 p. 1352			
	Mpanga	1959b	T. T.	900.0		Cap. 132 p. 1352/1947			
	Mtanza	1959b	T. T.	4,922.0		Cap. 132 p. 1352/1947			
	Mtita	1026/RE/R/7/1	T. T.	2,998.0		Cap. 132 p. 1350		329/26/7/1960	
	Mandundu	RE/R/2/1	T. T.	29.9		Sch.		414/17/7/1964	
	Namakutwa	610	T. T.	3,748.0		Sch.			
	Nerumba	E/R/2/1	T. T.	23.1		Sch.		434/24/7/1964	
	Ngulakula		L. A.	2,399.0		Cap. 132 p. 1352	331/15/7/1960		
	Nyamute	610	T. T.	400.0		Sch.			
	Nyumburuni		L. A.	2,999.0		Sch.	330/15/7/1960		
	Ruhoi River	508	L. A.			444/26/10/1962			

**ANNEXES: TANZANIA'S COASTAL FORESTS 2011**

District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
				68,639.0					
	Rupiage	-	T. T.	4,118.2		Sch.			
	Tamburu	1620	T. T.	5,997.0		Cap. 132 p. 1351			
	Utete	625	T. T.	949.0		Cap. 132 p. 1351			
	Namakutwa /Namute	2320	T. T.	4,705.0					Need Var.
	Tawi V. F.	2351	V. F	2,775.0					Proposed
	Nambuufu V. F.	2353	V. F	1,996.0					Proposed
	Mbwara V. F.	2354	V. F	600.0					Proposed
				302,841.7	64,324.7				
Ilala	Mangroves along Msimbazi		T. T.		25.3				
Kinondoni	Pande	1039	T. T.		1,226.0	327/14/11/1952		862/25/11/1988	Game Sanctuary
	Hundogo	150	T. T.		1,012.0	162/29/5/1953		863/25/11/1988	Kiluvya village
	Kunduchi Creek Mangroves		T. T.		68.7	Sch.			
	Basi Kilimani Mangroves		T. T.		20.2	Sch.			

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Mbweni Mangroves		T. T.		100.0	Sch.			
Temeke	Mangroves along Mbezi		T. T.		570.3	Sch.			
	Near Mbuyuni Mangroves		T. T.		476.7	Sch.			
	Shungu bay Mtundila Mangroves		T. T.		270.8	Sch.			
	Ras Dege Mangroves		T. T.		245.0	Sch.			
	Mbwamaji Mangroves		T. T.		29.6	Sch.			
	Mji Mwema Mangroves		T. T.		80.9	Sch.			
	Mtoni Mangroves		T. T.		378.4	Sch.			
					-	4,503.9			
Kilwa	Kitope	323	T. T.	3,387.0		312/12/9/1957			
	Kisangi	469	T. T.	310.8		Ger. Res.		251/14/2/1961	
	Maleh	398	T. T.	38,850.0		175/25/4/1957			
	Mangroves - Kilwa	1003	T. T.	36,737.0		Ger. Res.			



ANNEXES: TANZANIA'S COASTAL FORESTS 2011

District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Mbinga Kimaji	450	T. T.		1,874.0	103/27/-/1959			
	Mtarure	328	T. T.	60,484.0		313/13/9/1957			
	Mitundumbea	353	T. T.		8,547.0	376/15/11/1957			
	Nampekeso Naminange	994	T. T.	599.8		Sch.			
	Ngarama North	244	T. T.	3,110.0	1,528.0	400/11/11/1955			
	Ngarama South	286	T. T.	1,848.0	170.0	300/12/9/1957			
	Pindiuro	1009	T. T.	9,295.0	2,500.0	Cap. 132 p. 1363			
	Rondondo -Kilwa	464	T. T.	380.6		Sch.			Revoked
	Rungo	293	T. T.	22,586.0		319/2/11/1956			
	Tangomba Old	14/965	T. T.	307.6		Sch.		251/14/7/1961	
	Tongomba New	2337	T. T.		1,987.0	250/14/7/1961			Need Var.
Lindi	Chitoo	591	T. T.	590.9	180.0	Cap. 132 p. 65			
	Liwengula	1022	T. T.	2,983.1		Sch.		287/2/12/1960	
	Litipo	488	T. T.	999.6		Sch.			
	Kitunda		Proposed		237.0				Proposed

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Mpigamiti		Proposed		30,000.0				Proposed
	Mmongo		Proposed		19.5				Proposed
	Makangala	417	L. A.	1,271.0		554/19/12/1958			
	Matapwa	657	T. T.		16,493.0	Cap.132 p. 1363			
	Nyangamara	2289	T. T.		920.0				
	Mangroves -Lindi		T. T.	7,301.0		G.N. 21 of 1930			
	Mnacho	452	Proposed	1,129.1					Proposed
	Mtama	418	L. A.	1,026.7		554/19/12/1958			
	Nandimba	425	L. A.	1,250.5		554/19/12/1958			
	Nanguile	288	Proposed	650.6					Proposed
	Nyangedi	287	Proposed	4,540.7					Proposed
	Ndimba	1010	T. T.	7,530.6		Cap. 132 p. 1364			
	Rondo	464/2380	T. T.	14,630.2		Cap. 132 p. 1364	354/20/11/1959		
	Ruawa	2349	T. T.	2,949.0		Cap. 132 p. 1363			
Liwale	Lungonya	320	T. T.	208,380.0		233/5/7/1957			

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Nyera/Kiperere	274	T. T.	80,423.0	18,000.0	79/30/3/1956			
Nachingwea	Lionja	441	T. T.	28,490.8		551/19/12/1958			
				542,042.6	82,455.5				
Masasi	Masasi Hills	2085	L. A.	1,628.0		271/26/8/1988			
	Mbagala	333	T. T.	28,490.0		143/11/4/1958			
	Mchonda	426	T. T.	6,216.0		552/19/12/1958			
	Kambona	560	L. A.		29.9	124/6/3/1964			
	Nagaga	236	L. A.	1,653.2		78/30/3/1956			
	Ndechela	442	T. T.		6,216.0	551/19/12/1958			
Mtwara	Mangroves (Mikindani)	1023	T. T.	13,350.0		21 of 1930			
	Naliendele	239	T. T.	404.7		355/30/9/1955			
	Ziwani	383	L. A.	667.7		216/23/6/1961			
Newala	Chilangala	479	L. A.	7.3		137/29/3/1963			
	Liteho	481	L. A.	1,400.2		255/15/6/1962			

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Mahuta	478	L. A.	1,489.3		379/3/11/1961			
	Makonde Scarp I	474	Proposed		1,748.3				Proposed
	Makonde Scarp II	475	Proposed		1,554.0				Proposed
	Makonde Scarp III	476	Proposed		1,434.7				Proposed
	Mtiniko/Mniwata		Proposed		1,736.0				Proposed
	Mtuli/Ninju		Proposed		296.0				Proposed
	Namikupa	493	L. A.	1,050.2		512/12/12/1962			
	Mkunya river	989	Proposed		4,797.3				Proposed
					56,356.6	17,812.2			
Handeni	Bondo	1614	L. A.		328.0	273/12/8/1988			
	Derema	788/1673	T. T.		3,928.0	133 of 1934			
	Gendagenda	2401	T. T.		3,139.0	Cap 389 p. 59 1958	24/7/3/1980		Need Var.
	Handeni Hill	783	T. T.	544.0		426/23/9/1960			
	Kilindi	623	T. T.	153.8	4,974.2	45/28/2/1969			
	Kiriguru	580	T. T.		548.4	Sch.			
	Korogwe Fuel	297	T. T.	10,805.0		383/22/11/1957			
	Kwamarukanga	269	T. T.	181.3		330/4/10/1957			

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Kwasumba	789	T. T.	2,933.3		Sch.			
	Kwasunga - I	1910	L. A.		230.0	262/12/8/1988			
	Kwasunga - II	1627	L. A.		200.0	261/12/8/1988			
	Kwediboma	466	T. T.	270.3	14.2	Sch.			
	Mkuri	524	T. T.	599.8		Sch.			
	Luhanga	630	L. A.		630.0	260/12/8/1988			
	Magambazi	658	T. T.	749.5		Sch.			
	Mkuli Exten.	524	T. T.		2,931.2	Cap. 389 p. 32/33/1958	576/22/11/1963		
	Mkongo	523	T. T.		984.6	Cap. 389 p. 33/1959	187/20/3/1964		
	Mkoro	581	T. T.		90.0	Sch.			
	Mbwegere	484	T. T.		372.0	392/2/9/1960			
	Mtunguru	483	T. T.		3,305.2	Supp. 59 Cap. 389	314/8/9/1961		
	Msingeho Hill	522	T. T.		115.0	Sch.			
	Jungu	1896	T. T.		261.0	259/12/8/1988			
	Nguru North	619	T. T.		14,041.5	133 of 1934			
	Pumula	540	T. T.		1,062.0	Sch.	346/29/9/1961		
	Rudewa South	449	T. T.		555.6	Cap. 132 p. 1337	341/22/7/1960		
	Handeni village	2311	V. F.		156.0				

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
Muheza	Bamba Ridge	393	T. T.	1,109.0		409/22/9/1958			
	Bassi	531/805	T. T.	1,197.5		Cap. 132 p. 1947			
	Bwiti	313	T. T.		3,006.7	Cap. 132 p. 1947		207/17/5/1963	
	Gombero	B/Print	T. T.		2,399.1	Cap. 389 Vol VI		166/20/5/1960	
	Kihuhwi	802/803	T. T.	488.5		105 of 1941			
	Kihuhwi Sigi	302	T. T.	393.0	511.5	43 of 1934			
	Kihuhwi Teak	205	T. T.	26.3		194/3/6/1955			
	Kilanga	29/270	T. T.		379.2	154/25/5/1956			
	Kolekole	427/807	T. T.	301.0		411/22/8/1958			
	Kwangumi	204	T. T.	170.0	978.9	195/3/6/1955			
	Kwamkoro	796	T. T.		2,209.6	24/20/1/1961			
	Kwamrimba	189	T. T.	200.7	601.8	Sch.			
	Kwamsambia	1583	T. T.	404.7	1,415.6	95/23/4/1954			
	Kwani	271	T. T.		2,545.1	248/28/8/1956			
	Longuza	115	T. T.	1,541.5		194/9/7/1954			

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Magogoni	514	T. T.	2,541.5		Cap. 389 p. 138	146/28/4/1961	204/17/5/1963	
	Magogoni Msaimbazi	B/Print	T. T.	3,396.2		Cap. 389 p. 139	146/28/4/1961		
	Mleni	2095	Proposed		95.0				Proposed
	Manga	2282	T. T.	1,635.0		112/25/3/1955			
	Mangroves	B/Print	T. T.	12,931.0		Sch.			
	Mtai	2241	T. T.		3,107.0	306 of 1967	25/26/1/1968		
	Nkombola	325	T. T.	191.8		38/1/2/1957			
	Sigi Knee	B/Print	T. T.	779.4		Sch. 1951			Blueprint
	Magoroto	2270	T. T.		1,124.0				
	Mgambo	2291	T. T.		1,346.0	546/28/8/1998			
	Tongwe	271	T. T.		1,560.0	249 + 288 of 1956			
	Mlinga	2213	T. T.		840.0	443 of 6/12/1996			
	Kambai	2100	T. T.		1,050.0	310/12/8/1994			
	Steinbruch	268	T. T.		353.3	155/25/5/1956		145 of 1976	Var. JB 1094
	Segoma	220	T. T.		1,100.0	113/25/3/1955			
	Mpanga	2273	L. A.	24.0		542/28//8/1998			
	Mlungui F. R.	2247	T. T.	200.0					

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District	Name of Forest Reserve	JB	Ownership	Area in Hectares		Declaration G. N. No.	Variation G. N. No.	Revocation G. N. No.	Remarks
				Productive	Protective				
	Semdoe/Msige	2261	T. T.	980.0		547/28/8/1998			
Pangani	Garafuno	693	T. T.	195.0		Sch. Cap. 132 p. 1331			
	Jasini	775	T. T.	117.7		Sch.		168 of 1960	
	Mangroves	-	T. T.	9,184.0		Sch.			
	Msumbugwe	2402	T. T.	4,410.0		Sch. 1947			Var. required
					58,654.8	62,488.7			



## 8.4 Socio-economic Information and Livelihoods Strategies

### 8.4.1 Household Characteristics

Analysis of socio-economic data at district level in the selected case study coastal districts, shows that majority of interviewed respondents were males (61.5%, Table 32). Although the nature of these areas is that they are male dominated as indicated in the number of respondents, the team solicited information from a substantial number of women (38.5%). This implies that the reported socio-economic issues in the districts have included both men and women's feelings and perceptions.

As presented in Table 32, the majority of the interviewed respondents in the districts where data were collected are married (79.1%). Cases of divorces were very low in all districts - with the exception of the Magharibi District (Zanzibar) and Lindi (Main land) District, where the number of widows was high. The remaining districts had low number of widows.

Levels of respondents' education in the case study districts differ. Generally, half (50.7%, Table 32) of the interviewed respondents had primary school level of education. The other major group were those with no formal education (30% Table 32), followed by those with secondary school education level. The dominance of the community segment with primary school education followed by those with no formal education, implies that the level of dependence of locally available natural resources such as forest, fisheries and agricultural resources was very high as these were the kind of people who had few alternatives for income generation.

In the area, respondents varied from 36 to 45 years with the overall mean age being 41 years (Table 32). Table 5y the people who were actively involved in the production and that, for any intervention that may be taken in ensuring coastal forests are conserved, could involve the people who are actively engaged in the production and use of natural resources in the area.

Table 36: Household Characteristics in the Case Study Districts

Characteristics		Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)	Total (N=416)
Respondents' Sex (%)	Male	71.8	88.9	67.8	65.6	78.4	26.7	72.3	61.5
	Female	28.2	11.1	32.2	34.4	21.6	73.3	27.7	38.5
Marital status (%)	Married	74.4	94.4	84.7	75.6	67.6	86.7	74.7	79.1
	Widow	10.3	0.0	3.4	10.0	24.3	7.8	6.0	8.7
	Divorced	7.7	5.6	5.1	4.4	2.7	5.6	2.4	4.6
	Single	7.7	0.0	6.8	10.0	5.4	0.0	16.9	7.7
Education level (%)	Primary	28.2	16.7	69.5	70.0	43.2	20.0	71.1	50.7
	Secondary	48.7	50.0	5.1	5.6	45.9	12.2	12.0	17.8
	No formal	23.1	33.3	20.3	24.4	10.8	65.6	15.7	30.0
	Adult	0.0	0.0	5.1	0.0	0.0	2.2	1.2	1.4
Mean age (years)		36	42	42	44	45	40	36	41

Socio-economic analysis at village/shehia level revealed that there were higher figures of divorce in Mopofu Shehia compared to the rest of villages/shehias. Higher incidences of widows were observed in Muungano (Lindi Rural) and Dole (Unguja Magharibi) compared to other villages/shahia (Table33).

Table 37: Marital Status by Village/Shehia

Sampled Village	Village/Shehia	Number of respondents	% Married	% Single	% Divorced	% Widow
Rufiji	Mbware	21	76.2	4.8	9.5	9.5
Rufiji	Utunge	32	65.6	25.0	0.0	9.4
Rufiji	Nyamwage	30	83.3	16.7	0.0	0.0
Kilwa	Hotel 3	28	89.3	0.0	3.6	7.1
Kilwa	Kiwawa	31	80.6	12.9	6.5	0.0
Lindi Rural	Ndawa	25	84.0	8.0	0.0	8.0
Lindi Rural	Mihima	35	77.1	11.4	8.6	2.9
Lindi Rural	Muungano	30	66.7	10.0	3.3	20.0
Magharibi	Dole	37	67.0	5.7	2.7	24.8
Kati	Uzing'ambwa	18	94.4	0.0	5.6	0.0
Kaskazini	Upenja	40	75.0	7.5	7.5	10.0
Micheweni	Kiuyu	30	96.7	0.0	3.3	0.0
Micheweni	Wingwi	20	85.0	0.0	0.0	15.0
Micheweni	Mapofu	22	63.6	0.0	18.2	18.2
Micheweni	Msuka	17	100.0	0.0	0.0	0.0
Total		416	79.1	7.7	4.6	8.7

Table 34 indicates that respondents' education levels from the sample villages were relatively low. Most of respondents (50%) had attained primary education. Very few (17.8%) had attained secondary education, while a sizeable (30%) had no formal education. Respondents in Wingi Shahia were the least educated at 15.0%. Kiuyu, Wingwi and Mapofu had very high proportion of respondents (63%, 65% and 72.6%, respectively) with no formal education at all. An insignificant percentage had attained tertiary education. This group comprised teachers and local government employed members of staff residing in the villages. In general, this implies that many people in the project area had limited opportunities to access income generating activities that demand educational skills.

Table 38: Levels of Education by Village/Shehia

District	Village/ Shehia	Number of respondents	Primary education %	Secondary education%	Adult education %	No formal education%
Rufiji	Mbware	21	61.9	4.8	0.0	33.3
Rufiji	Utunge	32	75.0	9.4	3.1	12.5
Rufiji	Nyamwage	30	73.3	20.0	0.0	6.7
Kilwa	Hotel 3	28	71.4	0.0	0.0	28.6
Kilwa	Kiwawa	31	67.7	9.7	9.7	12.9
Lindi Rural	Ndawa	25	76.0	0.0	0.0	24.0
Lindi Rural	Mihima	35	62.9	5.7	0.0	31.4
Lindi Rural	Muungano	30	73.3	10.0	0.0	16.7
Magharibi	Dole	37	43.3	45.9	0.0	10.8
Kati	Uzing'ambwa	18	16.7	50.0	0.0	33.3
Kaskazini	Upenja	40	27.5	47.5	0.0	25.0
Micheweni	Kiuyu	30	16.7	20.0	0.0	63.3
Micheweni	Wingwi	20	15.0	10.0	10.0	65.0
Micheweni	Mapofu	22	18.2	9.1	0.0	72.6
Micheweni	Msuka	17	35.3	5.9	0.0	8.8
Total		416	50.7	17.8	1.4	30.0

Analysis of education by wealth categories shows that the middle group formed a majority of the primary school leavers at 49.1%, followed by the poor and well-off groups at 42.8 % and 8.1%, respectively (Table 35). As expected, the well-off group had more people with secondary education at 66.7%, followed by the middle group at 33.3%. The middle and poor groups were the least educated in the study area with 51.5% and 44.3% of the respondents having not attended any schooling at all.

Table 39: Education Level by Wealth Categories

Village Name	Respondents education	Wealth categories		
		Well-off %	%Middle wealth	% Poor
Hotel 3	Primary	5.0	55.0	40.0
	No Formal Education	0.0	37.5	62.5
Kiwawa	Primary	11.8	52.9	35.3
	Secondary	33.3	66.7	0.0
	No Formal Education	0.0	66.7	33.3
	Adult Education	0.0	100.0	0.0
Mbware	Primary	7.7	53.8	38.5
	Secondary	100.0	0.0	0.0
	No Formal Education	0.0	42.9	57.1
Mihima	Primary	9.1	59.1	31.8
	Secondary	50.0	50.0	.0
	No Formal Education	9.1	54.5	36.4
Muungano II	Primary	9.1	50.0	40.9
	Secondary	66.7	33.3	.0
	No Formal Education	.0	60.0	40.0
Ndawa	Primary	5.3	42.1	52.6
	No Formal Education	.0	50.0	50.0
Nyamwage	Primary	4.5	36.4	59.1
	Secondary	83.3	16.7	.0
	No Formal Education	.0	50.0	50.0
Utunge	Primary	12.5	45.8	41.7
	Secondary	66.7	33.3	.0
	No Formal Education	25.0	50.0	25.0
Total	Primary	8.1	49.4	42.5
	Secondary	66.7	33.3	0.0
	No Formal Education	4.3	51.5	44.3
	Adult Education	.0	100.0	.0

On average, a high proportion of respondents was aged 41. Hotel Tatu, Mbware and Mihima villages/shehia had the highest number of aged respondents, while Nyamwage and Utunge had the lowest number of elderly Households (Table 36).

*Table 40: Respondents' Age by Village*

Village	Mean
Hotel 3	46.11
Kiwawa	39.58
Mbware	47.1
Mihima	46.83
Muongano II	42.77
Ndawa	42.84
Nyamwage	32.2
Utunge	33
Total	41.07

#### 8.4.2 Average Land Size Owned and Used for Crop and Woodlots

Land is the basic resource depended upon by a majority of rural communities in Tanzania. The amount of land owned and/or operated varies between communities' dependence on the availability of land resources and the nature of social structures governing access to land. In the selected districts, the average land size owned by individual households ranged from 2.8 to 6.1 acres with the overall mean land size being 4.8 acres (Table 37). The main use of the land is crop production and very small land sizes have been set for woodlots. The main crops that are being grown in these districts are maize and rice. In these districts, the average land size set for maize production range from 0.6 acres to 2.2 acres with an overall average being 1.6 acres. As for rice production, the average land size used for production range from 0.3 acres to 1.8 acres with an overall average land size being 1.1 acres (Table 37).

Regarding the land size set for woodlots in the surveyed district, results indicate that, in some districts, (Lindi and Micheweni), individual households did not set aside land for woodlots. The overall mean size for the districts whereby individual households set aside land for woodlots was 0.1 acres. The implication of households that had no land set aside for woodlots or having small land sizes for woodlots was that most of the wood resources such as charcoal, firewood and other related wood products are obtained from surrounding forests hence a high pressure is imposed to the existing coastal forests in the districts.

Table 41: Average Land Size Owned and Used for Crop and Woodlots

Land size	Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)	Overall (N=416)
Land	6.1	5.9	5.7	3.2	5.5	4.5	2.8	4.8
Acres with woodlot	0.23	0.17	0.15	0	0.16	0	0.1	0.1
Acres with maize	2.18	2.08	1.42	1.12	1.88	1.6	0.63	1.6
Acres with rice	1.67	1.70	0.78	0.33	1.84	0.98	0.6	1.1

Contrary to literature, the well-off category reported small land size holdings (Table 38) across all villages compared to other wealth groups. Although many households from the very poor category reported ownership of larger land size holdings, it was clear that not every household could fully use their land. Lack of inputs for agricultural production tends to limit *de facto* access to land to the few well-off groups leaving a majority of the poor households struggling the best they can with the land that they can operate. Therefore, any intervention should consider the very poor category.

Table 42: Land Ownership by Wealth Groups and Villages

Village Name	Land Size in Acres Relative to Group Wealth		
	Well-off	Middle wealth)	Very poor
Hotel 3	2.0	6.9	4.3
Kiwawa	3.5	6.7	2.6
Mbware	2.0	2.9	5.1
Mihima	2.0	2.6	3.5
Muongano II	4.5	3.5	3.9
Ndawa	2.8	3.2	3.2
Nyamwage	5.0	2.3	3.0
Utunge	1.5	1.9	2.1
Average	2.9	3.7	3.5

### 8.4.3 Livestock Ownership

In these districts, types of livestock kept by the studied communities include cow, goat and poultry (chickens and ducks). Results indicate that, in these districts, the average number of cow ranges from 0 to 1 and those of goat are between 1 and 2. With regard to poultry, the number of chickens/ducks owned by individual households ranged from 5 to 9 (Table 39). This baseline information indicates that people in these areas heavily depend on crop production and extraction of other natural resources such as forest products for their livelihoods. These lead to a need for establishing alternative income generation activities intended to help people reduce forest product overutilization and their associated resources if forest conservation is to be attained.

Table 43: Average Number of Livestock Owned by Individual Households

Type of Livestock	Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)
Number of cattle	1	1	0	0	1	0	1
Goat	1	1	2	1	1	1	1
Poultry	9	8	9	6	9	8	5

A comparison across wealth groups across villages (Table 40) shows that a majority of livestock (mainly goats) are owned by the well-off group, followed by the middle group, and then the poor. The poor were mainly confined to keeping of smaller stock such as goats and chickens. Livestock is vital to economies of many areas in the country. Animals are a source of food, more specifically, protein for human diets and income. For low income producers, livestock can serve as store of wealth.

Table 44: Livestock Ownership Across Wealth Categories in the Sample Villages

Wealth status	Village Name	Cattle	Goats	Chicken/Duck
Well off	Hotel 3	0	21	10
	Kiwawa	4	3	6
	Mbware	0	20	18
	Mihima	0	0	12
	Muongano II	0	6	10
	Ndawa	4	0	9
	Nyamwage	0	6	14
	Utunge	0	0	8
Middle wealth	Hotel 3	0	20	14
	Kiwawa	0	3	11
	Mbware	0	0	9
	Mihima	0	18	18
	Muongano II	0	0	8
	Ndawa	0	0	8
	Nyamwage	0	0	11
	Utunge	0	0	7
Very poor	Hotel 3	0	0	10
	Kiwawa	0	4	11
	Mihima	0	0	4
	Muongano II	4	0	0
	Ndawa	0	0	6
	Nyamwage	0	0	4
	Utunge	0	0	4



#### 8.4.4 Type of Houses Based on Roofing Materials

In the case study districts as indicated in Table 41, majority (86.5%) of households own houses that are grass thatched with 56% having well thatched grass houses and 30.5% having dilapidated grass thatched houses. Moreover, a majority of these houses were constructed using poles, which are among the timber products that are harvested from the surrounding coastal forests. In the surveyed villages in these districts, whereas 12.3% of the interviewed households possess houses that are roofed using corrugated iron sheeting, only 1.2% of the total interviewed respondents own houses that were roofed with tiles. This implies that communities in these areas benefit a lot from forest based products for shelter, hence the need to conserve forests.

Table 45: House Types Based on Roofing Materials

Type of roofing material	Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)	Total (N=416)
Tiles	0.00	0.00	0.00	2.20	0.00	1.10	2.40	1.20
Iron sheet	15.40	11.10	13.60	10.00	13.50	11.10	13.30	12.30
Thatched grass	84.6	88.9	86.4	87.8	86.5	87.8	84.3	86.5

Annex 6 shows sampled villages and the roofing materials used. The information in Annex 6 is consistent with the data in Table 41. Most of the village households had main houses built using grass as main roofing material, followed by iron sheets. Besides, Mbwara Mihima Muungano II and Nyamwage villages had reported higher percentages of houses being roofed with iron sheets

#### 8.4.5 Energy Sources for Cooking

Energy is an important aspect for communities to survive in the respective areas. In the case study area, the main types of energy sources for cooking include firewood, charcoal and kerosene. Findings from this study indicate that majority of households (84.6%, Table 42) in all selected villages in the respective districts use firewood as the main source of energy for cooking. Very few (14.9%, Table 42, see also Annex 7) reported using charcoal and less than 1% were using kerosene as a cooking energy source (these villages included Ndawa, Wingwi, Kiuyu, Muungano II, Upenja and Utunge). More than 90% of households were using firewood as the main source of energy for cooking. This implies that communities in the respective villages in the selected districts depend entirely (with an exception of 0.4% from Rufiji district) on forest products as a source of cooking energy which justifies the need for ensuring that forest resources are sustainably managed for the well-being of these communities in the coastal areas of Tanzania.

Table 46: Energy Sources for Cooking

Type	Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)	Total (N=416)
Kerosene	0	0	0	0	0	0	2.4	0.4
Charcoal	10.3	11.1	18.6	16.7	10.8	15.6	14.5	14.9
Firewood	89.7	88.9	81.4	83.3	89.2	84.4	83.1	84.6

Table 42 compares the main source of cooking energy across wealth categories. As expected, the well-off tend to mix charcoal and firewood. Firewood energy for cooking dominated the middle and very poor categories (Table 43). Forest Reserves are situated in the vicinity of these villages. Their uses are restricted by the law, but were being accessed by those communities that live adjacent to them for charcoal and firewood.

Table 47: Energy for Cooking by Wealth Categories

	Well-off (%)	Middle (%)	Very poor (%)
Kerosene	0	0	0.5
Charcoal	45.5	13.9	11.1
Firewood	54.5	86.1	88

#### 8.4.6 Sources of Water for Domestic Use

In the surveyed villages, the existing sources of water for domestic purposes include wells, rivers, springs and taps. As indicated in Table 44, half (50%) of the households interviewed in the selected coastal areas depend on wells as sources of domestic water followed by those depending on rivers, springs and very few (4.3%) with access to tap water.

Table 48: Source of Water for Domestic Use

Source	Kaskazini (n=39)	Kati (n=18)	Kilwa (n=59)	Lindi (n=90)	Magharibi (n=37)	Micheweni (n=90)	Rufiji (n=83)	Total (N=416)
Wells (%)	56.4	55.6	59.3	47.8	54	42.2	48.2	50.0
River (%)	38.5	38.9	35.6	33.3	40.5	43.3	41.0	38.7
Spring (%)	5.1	5.6	5.1	13.3	5.4	8.9	1.2	7.0
Tap (%)	0.0	0.0	0.0	5.6	0.0	5.6	9.6	4.3

Although the main water source is wells, the poor categories use fewer choices of water sources compared to the well-off and middle wealth groups (Table 45). This implies that, by all means, there was a need for ensuring that forests are conserved as they act as the catchments for all these water sources on which the community depends.

Table 49: Source of Water for Domestic Use by Wealth Categories

Water source	Well-off (%)	Middle (%)	Very poor (%)
Well	35.7	60.8	90.9
River	0.0	28.9	52.1
Spring	0.0	6.6	8.5
Tap	9.1	3.7	3.7

## 8.5 Financial Score Cards

Table 50: Scores for elements of Legal regulatory and institutional frameworks assessed in the selected coastal forests in Tanzania

Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
Element 1: Legal, policy and regulatory support for revenue generation by coastal forests							
(i) Bylaws or policies are in place that facilitate revenue mechanisms in the coastal forest	2	0	0	2	1	2	
(ii) Financial instruments such as taxes on tourism and water or breaks existing to promote coastal forest financing	0	0	0	1	0	2	
Element 2: Legal policy and regulatory support for revenue retention and sharing within coastal forest systems							
(i) bylaws or policies are in place for coastal forest revenues to be retained by central government and at the local level	1	1	0	2	2	2	
(ii) Bylaws or policies are in place for coastal revenues to be retained at the specific coastal forest level	0	2	0	0	0	2	
(iii) Bylaws or policies in place for revenue sharing at the coastal forest site level with local stakeholders	0	1	0	1	0	2	
Element 3: Legal and regulatory conditions for establishing funds (endowment, sinking or revolving)							
i) A fund has been established and capitalized to finance the forest activities in this district	2	1	2	0	2	0	
ii) Funds have been created to finance the forest activities in this district	2	1	1	0	0	0	
iii) Funds expenditures are integrated with national forest financial planning and accounting	1	0	0	1	3	0	
Element 4: Legal, policy and regulatory support for alternative institutional arrangements for Coastal forest management to reduce cost burden to the government							

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
i)There are bylaws or policies which allow and regulate concessions for forest resources in the district	0	2	0	0	0	2	
ii)There are bylaws or policies which allow and regulate co-management of forests in this district	0	2	2	2	0	2	
iii)There are bylaws or policies which allow and regulate local government management of the forest	0	2	2	2	0	3	
iv)There are bylaws which allow, promote and regulate private Forest Reserves in the coastal areas	0	0	2	2	1	3	
<b>Element 5: National Forest financing policies and strategies</b>							
(i)There are key forest financing system	1	0	1	0	0	0	
-Comprehensive, standardized and coordinated cost accounting systems (both input and activity based accounting)	1	1	1	0	0	0	
Revenue generation and fee levels for forests in the district	1	1	0	0	0	0	
Allocation of forest budgets to district forest department (criteria based on size, threats, business plans, performance etc)	1	1	2	1	0	1	
Safeguards to ensure that revenue generation does not adversely affect conservation objectives for forest areas in the district	0	1	1	1	0	1	
District forest management plans exist	1	1	1	0	0	0	
(ii)Degree of formulation, adoption and implementation of a district financing strategy	1	1	1	0	0	0	
<b>Element 6: economic valuation of coastal forests</b>							
(i)Economic valuation studies on the contribution of forest to local and national development are available at the district level	0	0	0	1	0	0	
(ii) Forest economic valuation influences local government decision making	0	0	0	2	0	2	

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
Element 7: Improved government budgeting for district forest systems							
(i) Local government policy promotes budgeting for Forest based on financial need as determined by forest management plans in the district	0	2	1	0	0	3	
(ii) Forest budgets including funds to finance threats reduction strategies in buffer zones (e.g. Livelihoods of communities living around forests) exist in this district	0	2	1	2	0	3	
(iii) Administrative (e.g. procurements) procedures facilitate budget to be spent, reducing risk of future budget cuts due to low disbursement rate in the district	0	0	1	2	0	3	
(iv) District plans to increase budget over the long term to reduce the forest financing gap in this district	0	2	1	3	3	3	
Element 8: Clearly defined institutional responsibilities for financial management of forest in the district							
(i) Mandates of public institutions regarding Forest finances are clear and agreed in this district	0	2	1	0	0	0	
Element 9: Well defined staffing requirement, profiles and incentive at the district level							
(i) There is an organizational structure with a sufficient number of economists and financial planners to help forest department in this district	0	2	1	0	0	0	
ii) District Forest officer responsibilities include, financial management, cost-effectiveness and revenue generation	0	2	2	0	0	1	
(iii) Budgetary incentives motivate district forest officers to promote district level financial sustainability (e.g. sites generating revenues do not experience budget cuts)	0	1	0	0	0	1	
(iv) Performance assessment of district forest officers includes assessment of sound financial planning, revenue generation, fee collection and cost-effective management	0	1	1	0	0	1	

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
(v)There are is auditing capacity for district forest finances	0	2	2	0	0	0	
(vi)District forest officers have the possibility to budget and plan for long term (e.g. over 5 years)	1	2	2	1	0	0	
<b>Total score for component 1</b>	<b>15</b>	<b>36</b>	<b>29</b>	<b>26</b>	<b>12</b>	<b>39</b>	<b>26.17</b>
<b>Total possible scores</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>	<b>95</b>
<b>%</b>	<b>15.79</b>	<b>37.89</b>	<b>30.53</b>	<b>27.37</b>	<b>12.63</b>	<b>41.05</b>	<b>27.54</b>
Benchmarks used in determining the existence and application of the legal regulatory frameworks Not existing Underdevelopment Developed but needs improvement Developed and implemented							

Table 51: Scores for business planning tool for cost effective management as a component to the elements of financing systems

Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
Element 1: District level badness planning							
(i) District Forest management plans includes conservation objectives, management needs and costs based on cost-effective analysis	1	0	2	1	0	1	
(ii) Forest management plans are used at the district level	2	0	1	0	0	0	
(iii) Forest business plans, based on standard formats and link to forest management plans and conservation objectives are developed in this district	1	0	0	0	0	0	
(iv) Forest business plans are implemented in this district (degree of implementation measured by achievement of objective)	2	0	0	0	0	1	
(v) Forest business plans for forests contribute to system level planning and budgeting at the district level	2	0	0	0	0	1	
(vi) Costs of implementing management and business plans in this district are monitored and contributes to cost-effective guidance and financial performance reporting	2	0	1	1	0	1	
Element 2: Operational, transparent and useful accounting and auditing systems							
(i) There is a transparent and coordinated cost (operational and investment) accounting system functioning for coastal forest system	1	0	2	0	0	1	
(ii) Forest revenue tracking systems in the district is in place and operational	1	0	2	1	0	1	

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
(iii)There is a system so that accounting data contribute to system level planning and budgeting	2	0	0	0	0	0	
Element 3:Systems for monitoring and reporting on financial management performance							
(i)All district forest revenues and expenditures are fully and accurately reported by district authorities to stakeholders	3	0	3	0	0	0	
(ii)Financial returns on tourism related investments are measured and reported where possible (e.g. track increase in visitor revenues before and after establishment of a visitor center) in this district	1	0	0	1	0	0	
(iii)a monitoring and reporting in place to show how and why funds are allocated across the district and the central authority	1	0	3	0	0	0	
(iv)A reporting and evaluation system is in place to show how effectively this district use its available finances (i.e. disbursement rate and cost-effectiveness)to achieve management objectives	1	0	3	0	0	0	
Element 4: Methods of allocation funds across individual coastal districts							
(i)National budget is allocated to districts based on agreed and appropriate criteria (size, threats, performance)	0	0	2	0	0	0	
(ii)Funds raised by co-managed coastal forests do not reduce government budget allocation where funding gap still exist	0	0	0	2	0	2	
Element 5: Training and support networks to enable coastal forest managers to operate more cost-effectively							
(i)Guidance on cost-	1	1	0	0	0	0	



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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
effective management developed and being used in the respective districts							
(ii) Inter-district level network exist for district forest managers to share information with each other on their costs, practice and impact	1	1	1	1	0	0	
(iii) Operational and investment cost comparison between the districts complete, available and being used to track coastal forest manager performance	1	1	1	0	0	0	
(iv) Monitoring and leaning systems of cost-effectiveness are in place and feed into system management policy and planning	1	1	0	0	0	0	
(v) District forest officers are trained in technical management and cost effective management	1	1	0	0	0	0	
(vi) District forest financing system facilitates different coastal forest districts to share cost of common practices with each other and with the FBD	2	2	0	0	0	0	
<b>Actual total scores for component 2</b>	<b>27.00</b>	<b>7.00</b>	<b>21.00</b>	<b>7.00</b>	<b>0.00</b>	<b>8.00</b>	<b>11.67</b>
<b>Total possible scores</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>
<b>%</b>	<b>44.26</b>	<b>11.48</b>	<b>34.43</b>	<b>11.48</b>	<b>0.00</b>	<b>13.11</b>	<b>19.13</b>
<p>Benchmarks used in determining the existence and application of the business planning tool for cost effective management</p> <p>Not existing</p> <p>Underdevelopment</p> <p>Developed but needs improvement</p> <p>Developed and implemented</p>							

Table 52: Scores for tool for revenue generation as a component to the elements of financing systems

Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
Element 1: Number and variety of revenue sources used across the district							
(i) An up – to – date analysis of revenue options for the district to complete and available including feasibility studies	0	1	1	0	0	0	
(ii) There is a diverse set of sources and mechanisms, generating funds for the forest activities in the district	0	0	1	1	0	0	
(iii) Districts are operating revenue mechanisms for forests that generate positive net revenues (greater than annual operating costs and over long-term payback initial investment cost)	0	2	1	0	0	0	
(iv) Districts forest authorities enable local communities to generate revenues, resulting in reduced threats to the forests	0	1	1	2	0	0	
Element 2: Setting and establishment of user fees across the district forest systems							
(i) A system wide strategy and action plan for user fees is complete and adopted by the local government	0	1	0	1	0	1	
(ii) The national tourism industry and Ministry are supportive and are partners in the forest service's user fee system and programmes existing in the district	1	1	0	1	0	0	
(iii) Tourism related infrastructure investment is proposed and developed in the district based on analysis of revenue potential and return on investment	1	1	0	0	0	1	
(iv) Where tourism is promoted district forest officers can demonstrate maximum revenue whilst not threatening coastal forest conservation objectives	3	1	0	0	0	1	
(v) None tourism user fees are applied and generate additional	1	1	0	0	0	1	

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
revenue in the district							
Element 3: Effective fee collection systems in the1 district							
System wide guidelines for fee collection are complete and approved by district authorities	1	2	2	0	0	1	
Fee collection systems are being implemented at the district level in a cost-effective manner	1	1	1	1	0	1	
Fee collection systems are monitored, evaluated and acted upon by the district councils	1	3	2	1	0	1	
Coastal forest visitors are satisfied with the professionalism of fee collection and the services provided	0	0	1	0	0	1	
Element 4:Marketing and communication strategies for revenue generation mechanisms at the district level							
(i)Communication campaigns and marketing for the public about tourism fees, conservation taxes etc are widespread and high profile at district level	1	1	0	0	3	1	
(ii) Communication campaigns and marketing for the public about forest fees are in place in this district	1	2	3	0	0	1	
Element 5: Operational Payment Ecosystem Services (PES) schemes in this district							
(i) A system wide strategy and action plan for PES is complete and adopted by the local government	0	0	0	1	0	0	
(ii) There is a pilot PES schemes developed in this district	0	0	0	1	0	0	
(iii) Operational performance of (PES) pilots is monitored, evaluated and reported	1	0	0	0	0	1	
(iv) Scale up of PES in the district is underway	0	0	0	0	0	1	
Element 6:Concessions operation within coastal forests in the district							
(i) A system wide strategy and implementation action plan is complete and adopted by local	1	0	0	1	0	1	

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Component element	Mainland			Zanzibar			Average total
	Rufiji	Kilwa	Lindi	Central District	North Unguja	Western Urban	
government for concessions							
(ii) Concession opportunities are operational at the district level	1	0	0	0	0	1	
(iii) Operational performance (environmental and financial) of pilots is monitored, evaluated, reported and acted upon	2	0	0	1	0	1	
(iv) Scale up of concessions across the district is underway	2	2	0	1	0	1	
<b>Element 7: District Forest training programmes on revenue generation mechanisms</b>							
(i) Training courses run by the government and other competent organizations for forest officers on revenue mechanisms and financial administration	1	1	1	0	0	1	
<b>Actual total scores for component 3</b>	<b>19.00</b>	<b>21.00</b>	<b>14.00</b>	<b>12.00</b>	<b>3.00</b>	<b>17.00</b>	<b>14.33</b>
<b>Total possible scores</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>
<b>%</b>	<b>26.76</b>	<b>29.58</b>	<b>19.72</b>	<b>16.90</b>	<b>4.23</b>	<b>23.94</b>	<b>20.19</b>
<p>Benchmarks used in determining the use of revenue collection tools</p> <p>The tool does not exist</p> <p>Underdevelopment</p> <p>Developed but not used</p> <p>Developed and used</p>							

## Forms Used for the Socio-economic Studies

Table 53: Wealth Group Ranking Criteria in the Sample Villages

Wealth Group	Ranking Criteria
Well-off	<p>Have at least one off-farm business; able to buy and sell goods, engaged in businesses such as shops; own big businesses within and outside of the villages.</p> <p>Own up to 50 acres of land; have farm implements such as ox ploughs and tractors.</p> <p>Extensive use of fertilizers.</p> <p>Own a modern house with cement plastered brick walls and floors plus corrugated iron sheet roofs.</p> <p>Highly food secure; managing three meals per day.</p> <p>Have more cattle</p> <p>Can own motor vehicles such as trucks, cars, or a motorbike.</p> <p>Can afford school fees for their children.</p> <p>Own some milling machines.</p>
Middle	<p>Own 5-10 acres of land.</p> <p>Own and/or rent farm implements such as ox ploughs and tractors.</p> <p>Uses fertilizers and farmyard manure.</p> <p>Own motorbikes and bicycles for transportation of goods.</p> <p>Own normal house made of bricks and corrugated iron sheets roof; sometimes the iron-roofs have stones placed on top to prevent wind blows.</p> <p>Food secured and can manage at least 2 meals in a day.</p> <p>Livestock: have heads of cattle.</p> <p>Normally run small businesses such as shops, kiosks, etc.</p> <p>They can meet basic needs such as food, education, and can educate their children.</p> <p>Most have primary level of education or more.</p>
Poor	<p>Own land size 0.5 - 2 acres, but cultivates only 1 acre; renting the rest to middle group farmers; uses a hand hoe for farming; no fertilizers are applied in the farms.</p> <p>Do not have any livestock.</p> <p>Have poor grass-thatched houses.</p> <p>Food insecure; can manage only one meal per day.</p> <p>Dependent on casual labour; a source of cheap labour for middle and well-off groups.</p> <p>Many who live near forest resources indulge in charcoal production.</p> <p>Illiterate (both parents and children).</p> <p>Can't meet basic needs and are often dressed in tattered clothes.</p>

