

COASTAL FORESTS OF TANZANIA: AN ASSESSMENT OF THE RESOURCE¹

By

**Dr. Fanuel Shechambo, Institute of Resource Assessment,
University of Dar es Salaam**

Introduction

Although an exact definition of what constitutes coastal forests continues to be debated (Clarke in Burgess and Clarke, 2000, p.9-26), there is agreement that coastal forests stretch the eastern coast of Africa from Somalia, Kenya, Tanzania to Mozambique. These forests have immense value globally, regionally, nationally and locally because of their biodiversity values, high level of endemism, climate stabilization effects and as an important source of livelihoods for local communities. In Tanzania, there are 66 known coastal forests in Tanga, Coast and Lindi Regions with a total area of nearly 700 square kilometres².

Coastal forests are considered to be remnants of a former extensive cover belonging to the Zanzibar-Inhambane section of the Guinea-Congolian phytogeographical region (White, 1983)³. The biodiversity value of these forests lies in the fact that they contain about 190 forest species, of which 92 are endemic. This is besides many other endemic species of animals and plants found in these forests⁴.

However, coastal forests, like other types of forests elsewhere, have been shrinking over time due to various underlying factors. The case of anthropic (human) disturbance of the coastal forests is documented (Clarke and Karoma in Burgess and Clarke, 2000, p. 251-261), citing activities such as introduction of fire-making (and therefore the spread of fires), introduction of crops and cultivation, development of iron tools, trade and urbanization of the coast, colonial and post-colonial forest exploitation practices and management styles.

¹ Paper presented to WWF Tanzania Programme Office, March 2004

² See the list appended to this paper. However running down from the Kenyan border, the main 44 coastal forests include: 1. Hororo, 2. Kilulu Hill, 3. Lowland Usambaras, 4. Tongwe, 5. Kwani/Makinyumbi, 6. Mkulumuzo Gorge (Amboni Caves), 7. Yambe Island, 8. Gendagenda North and South, 9. Mgambo, 10. Msubugwe, 11. Pangani River, 13. Kiono Zaraninge 14. Ruvu North, 15. Pande 16. Pugu/Kazimzumbwi 17. Ruvu South 18. Vikindu 19. Kisiju 19. Mchungu 21. Nyamakutwa/Nyakiete 22. Kiwengoma 23. Mafia Sea Board 24. Kilindoni 25. Tong'omba 26. Mbinga 27. Mitundembea 28. ungo 29. Ngarama North and South 30. Pindirola 31. Rondo 32. Lipito 33. chitoa 34. Nyangamara 35. Ndimba 36. Ruawa 37. Matapwa 38. Chilangala 40. Ngezi (Pemba) 41. Msitu Mkuu (Pemba) 42. Ras Kiuyu (Pemba) 43. Jozani (Unguja) 44. Muyani (Unguja).

³ White, F. (1983), *Vegetation Map of Africa: A Descriptive Memoir*. Paris: UNESCO

⁴ See Burgess, Neil D. and Clarke, G. Phillip (2000), *Coastal Forests of Eastern Africa*. Gland: IUCN Section 4: Biodiversity values in terms of vascular plants, birds, mammals, reptiles amphibians, millipedes, molluscs and butterflies. Neil Baker identified important bird areas (IBA) in the coastal forests to include Pangani, Lindi, Muheza, Rufiji, Handeni, East Usambara, Mtwara, Newala, Bagamoyo, Kisarawe and Pemba and Unguja

Over time, forests are cut down to give way to farms, settlements as well as exploitation of woody biomass for timber, firewood, charcoal and other forest products demanded to meet ever increasing human needs.

According to predictions made in the early 1990's (Marshall, 1991, p.120)⁵, the area along the eastern coast of East Africa is classified as one that is likely to face deficit of forests by the year 2010 if current trends of forest cover removal continue unabated. The loss of forests leads to loss of plant life, loss of animal life, loss of sources of water and water itself, increasing soil deterioration and erosion as well as adverse climate changes that have global impacts.

Despite forest conservation and management efforts over time (Burgess and Mbwana in Burgess and Clarke 2000, p.263-279, Sumbi, 1991), conflicts between local people who wish to exploit forest resources, commercial companies that wish to exploit the forest for profit and forest departments who attempt to police the forest from such exploitation continue to bedevil the management of forests coastal forests in Tanzania. The situation has been exacerbated by dwindling allocations of funding and other crucial resources to institutions charged with management of forests in Tanzania (p.272). Thus for example, in US Dollar terms, the annual recurrent budget for the forestry sector has ranged between 797,688 and 1,180,530 over the period 1990/91 to 1995/96.

It is therefore pertinent that the World Wide Fund for Nature (WWF) in Eastern Africa is developing a coastal forest programme to enhance the conservation and better management of those resources for the benefit of local communities and global values that these forests hold⁶. This paper intends to make a contribution to the development of the coastal forests programme by attempting an assessment of the coastal resources based on existing literature. The paper focuses on the extent and status of coastal forests as well as the availability of maps and other data.

Extent and Status of Forests in Tanzania

a) A Note on Overall Forest Cover

Previous assessments of the forest cover in Tanzania have relied on satellite images (Rodgers, Mziray and Shishira 1985⁷) and records of the forestry department, which are also submitted to international agencies such as the Food and Agriculture Organization (FAO). However, there has also been specific research programmes aimed at assessing the location and extent of specific types of forests such as coastal forests e.g. Frontier Tanzania Coastal Forests Research Programme (1989-1994) and the Centre for Law and Policy (University of York) on 27 coastal forests (www.york.ac.uk). These have

⁵ See Marshall, Bruce (1991), *The Real World: Underlying Forces that Shape Our Lives*. London: Mifflin.

⁶ Sumbi, Peter (1991) *Conservation of lowland coastal forests of Tanzania by developing alternative forest cover exploitation*. Dar es Salaam: WWF

⁷ See Rodgers, W.A., Mziray, W. and Shishira, E.K. (1995). *The extent of forest cover in Tanzania using satellite imagery*. University of Dar es Salaam, Institute of Resource Assessment Research Paper 12, p. 1-15 and Sayer, J.A; Harcourt C.S. and Collins, N.M. (1992). *The conservation atlas of tropical forests: Africa*. Cambridge: WCMC/IUCN.

contributed greatly to the understanding of the biology, status, recent history and current management of the forests.

The coastal forests of Tanzania are a part of the forest resources of Tanzania whose total land areas is about 88, 359,000 hectares. The Food and Agriculture Organization, in the year 2000, estimated total forest cover to be 38,811,000 hectares. The change in forest cover has been declining at a rate of 0.23 percent or 91,000 hectares per year between 1990 and 2000 (www.fao.org).

Looked at from another angle, forest resources of Tanzania can be depicted by looking at the land use/land cover figures for 1995 as shown in table 1.

Table 1: Simple Categorization of Land use/Land cover in Tanzania, 1995

Category	Area ('000)	Percentage
Forest	39, 282	41.5
-Closed	8, 305	8.8
-Open	30, 842	32.6
- Plantation	135	0.1
Other Wooded Land	22,196	23.5
-Shrubs /Trees	12, 964	13.7
-Forest fallow	9, 232	9.8
Other Land	26,881	28.4
Inland Water	6,150	6.5
TANZANIA	94, 619	100

Source: www.fao.org

b) On Coastal Forests

The numbers and areas of coastal forests can be classified according to criteria such as class of size, altitude and conservation status as shown in tables 2, 3 and 4.

Table 2: Number and Size of Coastal Forests in Tanzania by Class

Size class	Number	Area (Square Km) ⁸
0-1	7	2.3
1-5	18	45.9
5-15	24	211.7
15-50	17	440
50+	0	0
Total	66	699.9

Source: Burgess and Clarke, 2000, p. 71

From table 2, it is noted that most of the coastal forests range from 1 to 50 sq. km, with the largest group in the 15-50 category. No coastal forest exceeds the size of 50 sq. km. This is perhaps the reason why these forests are sometimes described as forest "patches" along the coast of Tanzania. Many of them are isolated from each other, forming "Islands" as it were.

Most coastal forests in Tanzania (and Kenya) are located close to the Indian Ocean but others are found further inland up to the base of the Eastern Arc Mountains. In the northern part of Tanzania (and this applies to both Kenya and Somalia as well), the forest strips are very thin but as one moves south, they broaden further inland such that in Malawi and Zimbabwe, they are very wide. In terms location along the gradient from the sea, we get the picture as shown in table 3.

Table 3: Number of coastal forests in different altitudinal bands

Altitudinal categories (metres)	Number
0-50	15
50-100	10
100-200	24
200-300	18
300-500	21
500-1000	21
Total	99*

Source: Burgess and Clarke, 2000, p. 72

* The figure exceeds 66 because some forests are along a range of altitudes

⁸ Frontier Tanzania collected data on forest patches of at least 2 square kilometers compared to Kenya where even the smallest patches were recorded.

It is noted that some forests are located in a range of altitudinal bands. However, most of the coastal forests are located between 0-50 and 300 metres above sea level. Only a few coastal forests in Tanzania are higher than the average altitude. These are: Handeni Hill (up to 1040m), Tongwe, (up to 648m), Kiwenga on the Matumbi Hill (up to 750m) and the Rondo Plateau (up to 885m).

The status of coastal forests differs in terms of the legal status is shown in table 4.

Table 4: Legal Status of Coastal Forests in Tanzania

Category of status	Number	Area (km ²)
National park	1	2
National reserve	-	-
National monument	-	-
Game reserve	2	10+
Forest reserve	41	532
Sacred forest	-	-
Private land	3	13
No known status	21	145
Totals	66	702

Source: Burgess and Clarke, 2000, p.74

- The blank categories are common in Kenya but not present in Tanzania.

The table shows that the status of nearly one third of the coastal forests in Tanzania is not known and as such they remain unprotected. Only one forest in Tanzania (Saadani) enjoys the highest level of protection e.g. a national park status. However, it is gratifying that 41 out of 66 are designated as forest reserves. Nevertheless, this alone cannot be a consolation as one is not sure about the actual situation of the reserves on the ground. How many personnel of different categories e.g. forest guards are there? Do they have the requisite morale, incentives equipment and gear to enable them performs their jobs satisfactorily? The answer in most cases is a big NO.

This is not surprising because a review of management capability and funding for the forestry department (Burgess and Mbwana in Burgess and Clarke p.271 ff) revealed that, following an increase in forest department staff in the 1960 and 1970's, things became bad in the mid 1980's and worse today due to downsizing of government under the structural adjustment programmes (SAP) of the mid 1980' and 1990's. As a measure to reduce government expenditure under SAP, many forestry staff e.g. forest guards and extension workers, were retrenched, especially in rural areas. Despite the government allowing the forestry department to retain some of its revenue, its expenditure far exceeds the revenue collected. All this contributes to the inability of the forest department to manage forests effectively.

According to Burgess and Mbwana (op. cit.), the official duties of forestry officers in Tanzania have not changed much over time. They include: survey and reserve management, production of management/working plans, silviculture (controlled burning, natural regeneration, state plantation) and protection (annual boundary marking, protection from encroachment, apprehension of offenders, dealing with problems of animal and fungal pests). However, what has changed is the level of finance available to the Forest Department to undertake these tasks.

The coastal forests in Tanzania play a very central role in providing environmental functions and are a source of livelihood for local people but they are under threat from unsustainable actions that include:

- Slash and burn farming practices
- Logging for timber
- Firewood collection pole cutting
- Charcoal making
- Mining
- Forest fires

As long as they remain unprotected or ineffectively protected, they will continue to dwindle and it will be a great environmental loss as well as diminishing of livelihood opportunities of coastal communities.

Availability of Data and Maps

The availability of data and information on the biological values, status, recent history, threats and current management practices is important in evaluating the importance of the individual forests and the entire ecosystem in order to highlight plans for conservation. To this end, a commendable job has been done by various initiatives on research and conservation of coastal forests. The work of Frontier Tanzania from 1989 to 1994 involved detailed studies of at least 27 forests in Tanga, Coast and Lindi Regions. Other efforts include the FAO/UNDP/GEF Biodiversity Support Programme for East Africa and the Wildlife Conservation Society of Tanzania (WCST).

Examples of the work by Frontier Tanzania for Tanga, Coast and Lindi Regions is given below:

THE FORESTS OF TANGA REGION

Although Tanga Region is the smallest of the regions covered by the three volumes of the Status Reports, the region contains many more forest reserves than either Coast Region or Lindi Region. Most of these forest reserves contain montane and submontane forest that can be classified as belonging to the Afromontane archipelago-like regional centre of endemism by White (1983). Coastal Forest is predominantly found in lowland areas close to the coast.

Most of Tanga Region's forest reserves are located in the East and West Usambara Mountains, and are administered by the East Usambara Catchment Forest Project and by

the Magamba Forest Project respectively. The remaining forest reserves cover outlying hills of the Usambara Mountains and the North Nguru Mountains, with a few reserves found at lower altitudes nearer the coast. Most of these reserves have recently been visited by biologists, especially by Lovett & Pocs (1993) as part of a botanical appraisal conducted for the Catchment Forestry Project based in Tanga.

The seven Coastal Forests listed in the Status Reports include the most important known Coastal Forests of Tanga Region outside those in the lowland areas of the East Usambara mountains. The more detailed information on the biological values of the forest has been included and the "Management Proposals" section has been replaced with a commentary on the conservation issues relevant to each forest.

The suggested citation for these reports is: **Clarke, G.P. & Stubblefield, L.K. (1995) *Status Reports for 7 Coastal forests in Tanga Region, Tanzania*. Frontier Technical Report No. 16. The Society for Environmental Exploration, U.K./University of Dar es Salaam, Tanzania.**

Other Coastal Forests in Tanga Region (outside the East Usambaras) include the following :

Muheza District

A small patch of Coastal Forest is present near the main Tanga to Mombasa road 1 km south of the border post at Horohoro. This forest has been extensively damaged by fuelwood collection for salt production.

Coastal Forest is cited from the garden of the Manager's house on the Mtotohovu sisal estate to the north of Moa. This forest is the type locality for *Mkilua fragrans* Verdc., an endemic Coastal Forest plant genus.

Large tracts of *Brachylaena huillensis* forest are present to the north of the East Usambara mountains up to the Kenya border. The extent, importance and location of these forests are yet to be determined, but they are reported to be heavily exploited for the *Brachylaena* by people from Kenya (who cross the border illegally to obtain the wood).

About 2 square km of scrub forest are present on Yambe Island near Tanga with emergent baobabs *Adansonia digitata* over a dense forest/thicket with a canopy to 6 m.

Kwani Forest Reserve adjoins to the immediate south-west of the Tongwe Forest Reserve and still contains some 6 km² of natural forest. More information on this forest is contained as an addendum to the Pangani Falls Status Report.

Steinbruch Forest Reserve, Gombero Forest Reserve, Bwiti Forest Reserve, Magogoni Forest Reserve have all been revoked as forest reserves and are currently government land without status.

Kolekole Forest Reserve on the Pongwe to Tongoni road has been planted with teak but still contains some natural forest.

Pangani District

The Bushiri, Mwera, Kilimanguido and Sakura sisal estates near Pangani all contain remnant patches of Coastal Forest, and the forest/thicket at Kilimanguido, as well as the riverine forest near the village of Langoni within the Mwera estate are discussed in Hawthorne (1984, pp. 209-214). A number of rare plant species have been found in these forests.

The Tanga Catchment Forest Office is presently proposing the gazettelement of forest patches at Kibubu, Jipe and Misakazi (in between the Msumbugwe and Garafuno Forest Reserves).

Handeni District

A large patch of dry scrub forest is present to the south of the army base at Mgambo, on the old road from Pangani to Kabuku. Part of this forest reaches the main Dar es Salaam to Tanga road along a river a few miles south of Kabuku, where the botanist Faulkner has made some collections.

Patches of Coastal Forest occur along the railway line from Tanga to Dar es Salaam south of Gendagenda, near Mkalamu. **Magambazi Forest Reserve**, **Mtunguru Forest Reserve**, **Kwasumba Forest Reserve** and **Handeni Hill Forest Reserve** all contain Coastal Forest.

Kwediboma Forest Reserve, **Mkuli Forest Reserve** and **Pumula Forest Reserve** in the North Nguru Mountains area all contain elements of Coastal Forest vegetation in the drier forest types at the lower altitudes, as indicated by the presence of *Scorodophloeus fischeri*. These forests may be intermediate between Afromontane and Zanzibar-Inhambane types.

Lushoto District

Bombo West Forest Reserve contains Coastal Forest/Thicket with *Cynometra sp.* and *Brachylaena huillensis*, *Croton sp.*, *Euphorbia sp.*, *Teclea sp.* and *Uvaria sp.*

Mweni-Gombelo Forest Reserve contains dry lowland Coastal Forest and riverine forest with *Scorodophloeus fischeri*, *Antiaris toxicaria*, *Sterculia appendiculata*, *Milicia excelsa*, *Parkia filicoidea*, *Sorindeia madagascariensis*, *Trilepesium madagascariensis*, *Malacantha alnifolia*, *Cola scheffleri* and *Bequaertiodendron natalense*.

Migombani Forest Reserve contains lowland groundwater forest that can be expected to include some Coastal Forest species, especially in the shrub layer. *Bombax rhodognaphalon* is present.

THE FORESTS OF COAST REGION

The Coast Region is the largest and least known of the three regions covered by the Status Reports. Although most of the forest reserves in Coast Region can be expected to contain Coastal Forest, only thirteen forest reserves covered by this volume of the Status Reports.

These reports follow a similar format to the "Management Summaries". The more detailed information on the biological values of the forest has been included and the "Management Proposals" section has been replaced with a commentary on the conservation issues relevant to each forest. The suggested citation for these reports is:

Clarke, G.P. & Dickinson, A. (1995) *Status Reports for 11 Coastal forests in Coast Region, Tanzania*. Frontier Technical Report No. 17. The Society for Environmental Exploration, U.K./University of Dar es Salaam, Tanzania.



Forests of the Coast Region include: Kazimzumbwi Forest Reserve, Kisiju Forest Reserve, Kiwengoma Forest Reserve, Mchungu Forest Reserve, Mrora Forest Reserve, Mafia Island, Namakutwa-Nyamute Forest Reserve, Pugu Forest Reserve, Ruvu North Forest Reserve, Ruvu South Forest Reserve, Vikindu Forest Reserve Zaraninge (Kiono) Forest Reserve

THE FORESTS OF LINDI REGION

Lindi Region is the largest and least known of the three regions covered by the Status Reports. Although most of the forest reserves in Lindi Region can be expected to contain Coastal Forest, only the six forest reserves covered by this volume of the Status Reports, together with Pindi Forest Reserve, Ngarama Forest Reserve, Nyangamara forest, and the forest patches in the Selous Game Reserve and Matumbi Hills have been recently visited by biologists. Many other forest patches must exist, both within and outside the formal protection of Forest Reserves.

The fauna and flora of Lindi Region is still poorly known, and most species records are from the detailed collections of a few scientists, in particular by Busse, Schlieben, Loveridge, Ionides and Vollesen. In spite of being under collected, Lindi Region is acknowledged to be rich in endemic species, especially reptiles, plants and amphibians. It is for this reason that Status Reports for Ruawa and Ndimba Forest Reserves have been included in this volume, even though these forests have been only briefly visited by the Frontier-Tanzania Coastal Forest Research Programme.

These reports follow a similar format to the "Management Summaries". The more detailed information on the biological values of the forest has been included and the "Management Proposals" section has been replaced with a commentary on the conservation issues relevant to each forest. The suggested citation for these reports is:

Clarke, G.P. (1995) Status Reports for 6 Coastal forests in Lindi Region, Tanzania. Frontier Technical Report No. 18. The Society for Environmental Exploration, U.K./University of Dar es Salaam, Tanzania.

Other known and possible Coastal Forests in Lindi Region include the following (in approximately north to south order):

Kilwa District

Kitope Forest Reserve (8°20'S, 39°10'E) contains approximately 8 square km of forest which occurs mainly on the south side of Kitope Hill. The forest has yet to be studied for its biological values, but as it occurs at 100-230 m elevation, 7 km from the coast it can be expected to reveal some interesting species. Efforts are currently underway by the regional and district Forestry Offices to settle a boundary encroachment dispute, and to then clear the boundaries and plant exotic tree species as boundary markers.

Old records in the Forestry office in Dar es Salaam indicate that the Naminangu Forest Reserve has now been incorporated into the Kitope Forest Reserve. Naminangu means 'place of the Gum Copal trees' in the Kimatumbi language, which must indicate that this species is here, and therefore that forest is also present. The reserve was gazetted during the German administration.

Mbinga Forest Reserve (8°30'S - 8°32'S, 38°49' - 38°51'E) on the southern scarp edge of the Matumbi Hills contains about 6 square km of secondary evergreen thicket and low forest (canopy to 4 m on Kimate Hill) with scattered mvule *Milicia excelsa* in the north (Kilwa District Forestry Office records). Riverine forest is also present along the watercourses. This forest is probably similar to that on the Kichi Hills and in Namakutwa-Nyamute forest (see Status Reports for 12 Coastal Forests in Coast Region).

The Nangoma Caves (located between Nandete and the Mbinga Forest Reserve, at approximately 8°30'S, 38°52'E) contain a small patch of forest around the sink-hole mouth of the caves. This forest is the type locality for the rare amphibian *Spelaeophryne methneri*. The forest here was more extensive in 1910 when it was first visited by the Germans.

Mitarure Forest Reserve (8°50'S - 9°06'S, 39°00'E - 39°10'E) is described by the Kilwa District forestry records as containing miombo with 'good green thicket in places' and was included in the 1961 Southern Province Enumeration Project when it was found to contain 'mature mninga'. The forest reserve also contains a 4 acre trial plot of mninga *Pterocarpus angolensis* that was established in 1968.

Mitundumbea Forest Reserve (9°10'S, 39°15'E) forms a northern extension of Ngarama North Forest Reserve on the Ruwawa Plateau. This reserve was enumerated by the 1961 Southern Province Enumeration Project and was found to contain miombo woodland with mninga *Pterocarpus angolensis* as well as 'thicket patches containing a few mvule

Milicia excelsa. These 'thicket patches' may be a type of scrub forest similar to that on Ngarama North Forest Reserve.

Rungo Forest Reserve (9°30'S, 39°00'E) and Malehi Forest Reserve to the west and south-west of Kilwa have yet to be visited by biologists, but might contain Coastal Forest on the low hills within the reserves. The Kilwa District forestry records indicate that 'poor miombo' is present in these reserves.

Ngarama North Forest Reserve (9°15'S - 9°33'S, 39°15'E - 39°27'E) has been visited briefly by a Danish ICBP expedition (see Eriksen et al., 1994), who report that patches of closed lowland forest exist on the western boundary of the reserve, with riverine forest along the rivers. Ngarama North was enumerated by the Southern Province Enumeration Project in 1961, which found a belt of Baobab *Adansonia digitata* forest in the southern part of the reserve, with a very large area of scrub forest on the Ruwawa plateau with a fairly high concentration of mvule *Milicia excelsa* as emergents above a 9 m canopy forest with *Grewia* sp., *Hymenocardia ulmoides*, *Polysphaeria* sp., *Cussonia zimmermannii*, *Bombax rhodognaphalon*, *Draecaena usambarensis*, *Cordyla africana* and *Vitex schliebenii*.

The northern part of the reserve consists of miombo where mninga *Pterocarpus angolensis* was reported to have become scarce from over-exploitation during the 1960s. A small remnant patch of forest (9°24'S, 39°22'E) has recently been found on the eastern edge of the reserve with a 25 m high canopy of *Hymenaea verrucosa* together with smaller trees including *Scorodophloeus fischeri*, *Strychnos henningsii*, *Diospyros* sp. and *Synaptolepis kirkii*. This forest patch contains the rare tree *Karomia gigas*, which was previously thought to be extinct.

Ngarama South Forest Reserve (9°31'S - 9°33'S, 39°23'E - 39°26'E) has also been visited by the Danish ICBP expedition (Eriksen et al., 1994) and contains low forest and scrub forest with *Milicia excelsa*, *Markhamia* sp., *Pteleopsis myrtifolia* and *Zanthoxylum* sp. Elsewhere mpingo *Dalbergia melanoxylon* is numerous on the higher rocky areas with shallow soils. The boundaries of the reserve are currently being cleared and planted with *Cassia* sp.

Pindiuro Forest Reserve (9°27'S - 9°34'S, 39°14'E - 39°19'E) has been visited by the Danish ICBP expedition (Eriksen et al., 1994), and followed by a further visit by Danish botanists for two months. The Kilwa District Forestry office records the occurrence of a 'grassy type of miombo' with lots of *Brachystegia microphylla* in the south of the reserve. Elsewhere in the reserve are patches of closed forest with a low canopy, together with at least 15 ha of swamp forest (Eriksen et al., 1994). Pindiuro has been enumerated by transects 73-76 of the Southern Province Enumeration Project in 1961.

More forest may be present further to the north of Pindiuro on the Mbwalawala Plateau.

Lindi District

A small patch of dry forest (9°41'30"S, 39°43'E) dominated by the rare tree *Cynometra filifera* (known elsewhere only from the Lindi Creek area) together with *Scorodophloeus fisheschi* is found by the coast 4 km north of Mchinga mbili. Patches of forest occur on the steep, rocky hills on either side of the main Dar es Salaam to Lindi road in the vicinity of Mchinga (e.g. at 9°43'S, 39°41'E).

Matapwa Forest Reserve (9°38'S - 9°47'S, 39°14'E - 39°24'E) was gazetted during the German administration and contains predominately Mpingo *Dalbergia melanoxylon* wooded grassland, although a patch of forest is said to occur on a low ridge in the south of the reserve. Riverine forest is also present in the reserve. Tendaguru Hill (9°42'S, 39°13'E) lies about 1km to the west of the reserve, where a few endemic plants and *Brachyosaurus* sp. have been collected. The hill is covered by wooded grassland.

A patch of Boabab (*Adansonia digitata*) forest (9°51'S, 39°47'E) is present near Kikwetu, to the east of Lindi Airport, and near Mbanja where the endemic reptile *Chirindia ewerbecki* was found. This forest may be similar to that found elsewhere on coral rag where Baobabs are also prominent.

A small area of forest has been reported from the western end of the Likonde Plateau (9°47'S - 9°49'S, 39°23'E - 39°29'E), but has not been visited. The proximity of this forest to those of the Noto and Rondo Plateaux would suggest that it will contain many rare species.

Most of the northern and eastern part of the Kiwawa Plateau (9°46'S - , - 39°16'E) has been visited which contains a mosaic of patches of scrub forest within closed canopy Mninga *Pterocarpus angolensis* woodland. A small area of closed canopy forest occurs on the extreme northern escarpment edge.

A large tract of forest is said to still exist on the Noto Plateau (9°51'S - 9°54'S, 39°19'E - 39°27'E) where the botanist Schlieben collected a number of rare plants in the 1930s, including *Artabotrys modestus* Diels ssp. *modestus* [Annonac.], *Xylia schliebenii* Harms [Fabac.], *Homalium elegantum* Sleumer [Flacourtiac.], and *Clerodendrum* sp. A of FTEA [Verbenaceae] which have not been recollected elsewhere, so gazettelement and protection of this forest is essential to ensure the survival of these species. Other rare species found here include *Mimusops acutifolia* Mildbr. [Sapotac.], *Premna hans-jochimii* Verdc. [Verbenac.] both of which are only found in the Rondo & Noto forests, and *Canthium impressinervum* Bridson [Rubiaceae] which is only known from 3 other sites in SE Tanzania.

The local authority Nandimba Forest Reserve (not to be confused with the Ndimba Forest Reserve dealt with in this volume of the Status Reports) is present near Mandawa but nothing is known of its status.

Makangala Forest Reserve (9°59'S - 10°01'S, 39°20'E - 39°25'E) lies on the south side of the main road between Rutamba and Milola and contains miombo woodland with scattered patches of thicket. Given its proximity to the Rondo Plateau, this reserve may contain some interesting plant species.

The hills on the eastern side of Lindi Creek contain a number of diverse patches of forest. Of these, the forest patches at Kitunda (immediately opposite Lindi town) are theoretically protected to safeguard the catchment for part of Lindi's water supply, but cultivation is nonetheless taking place here. These forests are on land owned by the abandoned sisal estate on the hilltop.

The Mnacho Forest Reserve on the road between Lindi and Mingoyo/ Mnazi Mmoja contains thicket and scrub of 1 square mile in extent planted with *Cassia siamea* in 1978 to provide woodfuel for Lindi town.

A forest at Mlinguru should be present '20km from Lindi' according to the citation for *Cynometra filifera* in the Flora of Tropical East Africa, although the Mlinguru Sisal Estate (10°06'S, 39°44'E) is just 10 km from Lindi as the Coucal flies, on the other (eastern side) of Lindi Creek. Mlinguru forest is probably located somewhere on the escarpment edge to the west of the sisal estate, overlooking Lindi Creek, which is cited as another of the collection localities for *Cynometra filifera*. The botanist Schlieben collected a number of plant species in Mlinguru that have not been collected since.

Liwengula Forest Reserve (10°00'S - 10°01'S, 39°33'E - 39°34'E) was gazetted during the German Administration and is found 1 km north of the main Lindi to Milola road, near Lake Narunyu and immediately north of the Naitivi coconut plantation. The reserve was cancelled in 1960 (G.N. 487) and is now an old cashewnut woodland, although the local people say that forest did exist there in the past and that forest is still present to the north-west of the reserve area.

Forest is still present at the extreme southeastern corner of the Rondo Plateau on a hill to the immediate south-east of the Chiponda trig point (10°11'S, 39°26'E).

Mtama Forest Reserve is located about halfway between Lindi and Masasi, about 2 km north of Nyangao (10°19'S, 39°17'E). This reserve contains woodland rather than forest but may still include some rare plant species as it is on the base of the Rondo massif. 2 acre trial plots of *Pinus caribea* and *Pinus insularis* were established here during the 1960s.

Nyangamara forest (10°23'S, 39°35'E) in the extreme south of the region has been visited by a Danish ICBP expedition (see Faldborg et al., 1991), and comprises some 6 square km of low forest with bamboos in the understorey. Discussions are currently under way with the local villages to have the forest gazetted into a reserve.

Old botanical collections at Sudi (10°05'S - 10°07'S, 39°52'E - 39°54'E) on the coast at the extreme south-east of the region include *Hymenaea verrucosa* and *Scorodophloeus*

fischeri which suggest that Gum Copal forest may be present on the coastal sands near Sudi village. If this should be the case then this would be the only known Gum Copal forest south of the Rufiji River, and possibly the largest and least threatened tract of this forest type remaining in Tanzania, therefore urgently in need of gazettelement. The other Gum Copal Forests at Kisiju, Mchungu and Kilindoni on Mafia Island are described in more detail in the Coast Region volume of the Status Reports. *Xylopi* sp. A of FTEA is endemic to Sudi.

Liwale and Nachingwea Districts

Liwale and Nachingwea Districts in Lindi Region are almost completely unexplored by biologists and contain just one forest reserve each - **Lionja Forest Reserve** (Nachingwea) and **Nyera Kiperere Forest Reserve** (Liwale), both near the Nachingwea to Liwale road. Records of rare amphibians (e.g. of the forest dependant *Stephopaedes loveridgei* and *Spelaeophryne methneri*) as well as of reptiles collected by J.P. Ionides (who ususally just cited the district rather than giving a precise locality) indicate that forest must exist in these districts.

The Lungonya Forest Reserve at the extreme north-east of Liwale District is now contained within the Selous Game Reserve where Coastal Forest is known to occur, e.g. the groundwater forest near the Miombo Research Centre at Kingupira, and on the Tundu Hills. These are the least threatened of all the Coastal Forests in Tanzania, as they are far from human habitation.

Availability of Other Forest Data

Other data on Tanzanian forests in the form of maps is found in Okello, L. (1984), Vegetation Cover Map of Mainland Tanzania and HUNTINGS Technical Services (1977), National Reconnaissance Level Land Use and Natural Resource Mapping. An update of this work in the mid 1990's is available at the data base of the Tanzania Natural Resources Information Centre located t the Institute of Resource Assessment (Contact person is Prof. Yanda, Tel 2410144).

Another useful source of maps is the National Environment Management Council (NEMC) on mapping of changes in land use/land cover in the coastal areas of Tanzania (contact person is Mr. Makota, Tel . 2127817)). This is a Canadian.

Another useful source of mapping data is from the Centre for Law and Policy (CLP), University of York (www.york.ac.uk), where they have a plant mapping project known as WORLDMAP. The CLP intends to map 10-15 percent of known plant species. To date they have mapped over 3500 available species at 1 degree resolution using WORLDMAP.

Another initiative on coastal forest mapping is by Prins Enengineering (www.prinsengineering.com). This company has identified yet undescribed coastal forest and species in Tanzania in 2001-2002. An integrated survey was carried out in Kilwa and

Lindi Districts using digitally enhanced images. They found out, classified and mapped large areas so far undescribed coastal forest types and tree species. The method has implications for locating, quantifying and assessing the inventory of remaining coastal forests in Eastern Africa.