Tanzania Forest Conservation Group
Shirika la Kuhifadhi Misitu ya Asili Tanzania

Landscape Profile: Rondo / Noto

Document prepared as an input to the GEF PPG process to develop a full sized proposal for the Tanzanian Coastal Forests

By Andrew Perkin, Charles Leonard and Nike Doggart,
Tanzania Forest Conservation Group
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1) Introduction

This report aims to support a project proposal to GEF / UNDP for investment in the conservation of Tanzania's Coastal Forests. The Rondo / Noto landscape is one of three landscapes that has been prioritised for investment due to its global economic values. The report provides the detailed findings of a review of the literature about the Rondo / Noto landscape together with the results of a field visit to Rondo, Noto and Makangala by a team from the Tanzania Forest Conservation Group. The report has also incorporated data from a report prepared by the botanical expert Phil Clarke. The detailed results of the resource use surveys, disturbance transect and indicator species assessments are provided in the appendices.

2) Description of the location, physical landscape and climate

2.1 Location

The Rondo / Noto Landscape comprises a group of dissected plateaus between the Mbemkuru / Mbwemburu and Lukuledi Rivers and extends to the coast in SE Tanzania. The landscape is in Lindi District, Lindi Region and includes nine wards[1].

2.2 Topography

The Rondo / Noto landscape is in south-east Tanzania. 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.

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 (Clarke & Burgess, 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.

2.3 Hydrology and water useMost of the major rivers supplying water to Lindi District originate at the base of the Rondo, Noto or Chitoa plateaus. As such these areas are important water catchments.

Rivers flowing from the eastern side of the Rondo Plateau include the Nyangedi 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 Chitoa 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 Chitoa 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.

Orographic precipitation (rain and mist) contributes to the high levels pf precipitation on the plateaus. However this water quickly drains away through the free draining sands and gravels of the plateaus. The water re-emerges as rivers and lakes in valleys on the edge of the plateaus and at the base of the Rondo, Noto and Chitoa plateaus. As a result, settlements and agriculture are based in the valleys and at the base of the plateaus. This has contributed significantly to conserving the plateau top forests.

Ntene village and other villages in the North and East of the Rondo plateau obtain water from rainfall harvested from roofs and bought from vendors who transport it from the valleys below. There are signs of old farms on the Noto plateau but people were moved at Ujamaa time (in the early 1970s) but were also forced to move due to the scarcity of water. In other parts of the landscape the villages around (and

[1] Some maps show Rondo as being within Lindi District whilst others show it as being within Ruangwa District. In this profile we have cited Rondo as being within Lindi District on the basis of information provided by the Lindi District Forest Officer. We have also requested Mr Nashanda to make follow up during his field visit.

inside) Ruawa FR and Ndimba rely on well water and rainwater harvesting. In many cases the well water is slightly brackish.

Climate
Across Lindi District the highest rainfall occurs between November and January, and March to May. The highest rainfall figures are recorded on the plateau areas with an average annual rainfall of 1088 mm (1951-1979) recorded at the Rondo Forest station. Across the District, annual rainfall varies from 800 mm in the lowlands to 1200 mm on the plateaus.

Rainfall on the Rondo Plateau appears to be quite variable, with the rainfall station at Ntene Rondo (10°08'S, 39°15'E, 758 m altitude) recording an average of 1215 mm of rainfall per year for the 19 years prior to 1973, with June, July, August, September & October having a monthly average of less than 50 mm rainfall during this period. Loveridge (1944) describes a significant occult precipitation effect from both the morning and evening mists that gather over the Rondo plateau.

Across the District, average monthly temperatures vary between 11° C and 32° C with the coolest period between June and August. The average annual temperature across the District ranges from 24°C - 28°C.

3) Biological values
Individual forest descriptions and habitat types
The natural vegetation of the Rondo / Noto landscape is extremely variable and includes: scrub forest, dry evergreen forest, woodland, riverine forest, transition woodland / *Brachystegia* forest and thicket. Other land cover types include the Rondo pine plantation, subsistence agriculture (main crops are: maize, millet, rice, cashew nuts, coconuts and mangoes) and irrigated rice schemes.

Rondo plateau
Rondo forest is located between 10°04' S - 10°14' S and 39°08' E - 39°15' E in Lindi district, Lindi region. Rondo forest reserve comprises an area of 14,060 ha of both plantation and natural forests. The forest is located on the Eastern edge of the Rondo plateau at around 870 m a.s.l. (to a maximum of 885 m a.s.l., although the plateau goes up to 900 m asl). Some forest is found on the escarpment edge from 465 m a.s.l. in the Mchindiji, Mtandi and Manyolyo valleys. The reserve is about 4 km from Ntene Rondo village, itself approximately 60 km west of Lindi.

The Rondo plateau was once covered by extensive stands of Mvule *Milicia excelsa*, but this was heavily logged from the 1950s onwards and much of the area was stripped of all large trees. Logging stopped in the 1980s, and since that time there has been significant regeneration of forest within the reserve. Some areas were also planted with *Milicia excelsa*. *Milicia excelsa* continues to be one of the dominant species in the 25 m high canopy within the Rondo Forest Reserve. Many of the trees appear to have coppiced from the stumps of the trees that were harvested. Other dominant canopy species include *Albizia gummifera*, *Dombeya* sp., *Ricinodendron heudelotii* and *Dialium holtzii*. In the forest understorey, the dominant species include *Tabernaemontana ventricosa*, *Bussea eggelingii*, *Tricalysia pallens*, *Clausena anisa* and a new species of *Cleistanthus* endemic to Rondo. The Rondo plantation is primarily *Pinus* sp. with small trial plots of *Milicia excelsa*, *Tectona grandis* and *Maesopsis eminii*.

On village land to the west of Rondo Forest Reserve the TFCG survey team recorded a mosaic woodland with

patches of evergreen forest. As with the forest in the Rondo Forest Reserve, the canopy of the evergreen forest patches is dominated by *Milicia excelsa* with *Albizia adianthifolia* and *Millettia usaramensis* also being very common. The canopy height in these areas varies from 15 – 30 m. In the understorey, dominant species include: *Dialium holtzii, Rawsonia lucida, Carlvahoa campanulata, Blighia unijugata* and *Vepris trichocarpa.* These forest patches include some of the coastal forest endemic plant species including at least three Rondo endemic tree species: *Leptactina papyrophloea*, *Canthium rondoense*, *Sterculia schliebenii* and the Rondo endemic herb, *Plumbago ciliata* as well as some rare coastal forest species including the tree, *Pteleopsis apetala* and the shrub, *Dichapetalum braunii*. Some of the woodland is included in the Mhima Village Forest Reserve which is app. 4.5 km north of the village Mihima at an altitude of 600m and a few kilometres west of Rondo FR (UTUMI 2002). It is dominated by *Parinari curatellifolia* woodland.

Makangala Forest Reserve
Makangala Forest lies between the Rondo and Chitoa plateaus approximately 20km south of Chitoa forest reserve 48 km from the Indian ocean in Lindi district, Lindi region and approx 5-10 km S of Kinyope village. The reserve is mainly covered in miombo woodland. The 10 - 12 m high canopy is dominated by *Brachystegia spiciformis*, *Pterocarpus angolensis* and *Pteleopsis myrtifolia*. In terms of endemic species, the TFCG survey team recorded the tree *Monotes lutambensis* formerly thought to be endemic to Litipo / Lake Lutamba.

Chitoa plateau
The Chitoa plateau extends over approximately 3000 ha. It includes extensive areas of dry evergreen forest, mixed woodland forest and mixed scrub forest with a canopy height of 12 m with emergents of up to 20 m in height. The most important patch of forest on the plateau is the Chitoa Forest Reserve. Chitoa Forest Reserve is located between 9°56'S - 9°58'S and 39°26'E - 39°28'E some 45 km from the Indian ocean and 3km NE from Kinyope and Nampawara villages. Chitoa Forest Reserve includes 770 ha of woodland and scrub forest on the escarpment edge with dry evergreen forest dominated by *Cola clavata* and various species of *Diospyros* sp. It is home to three tree species, strictly endemic to Chitoa. On the plateau edge, the dominant species include *Scorodophloeus fischeri, Afzelia quanzesis, Manilkara sulcata, Milicia excelsa* and *Euphorbia spp*. Other trees present on the plateau include *Bombax rhodognaphalon* and *Newtonia buchananii*.

Litipo Forest
Litipo forest is located between 10°01'S - 10°03'S and 39°28'E - 39°31'E some 35 km from the Indian ocean and 1 km NE from Rutamba village. Litipo FR comprise an area of 996 ha of of woodland, riverine, scrub and dry evergreen forest. Litipo FR has an altitudinal range of 240-420 m a.s.l. and protects a small part of the southern rim of the Chitoa plateau. Litipo Forest Reserve contains a unique stand of forest dominated by *Berlinia orientalis*. Other areas of the forest are dominated by *Hymenocardia ulmoides*, *Grewia conocarpa*, *Ricinodendron heudelottii* and *Dialium holtzii*.

Ndimba Forest
Ndimba forest is located between 9°34'S - 9°37'S and 39°35'E - 39°04'E on the coastal plain 10 km from the Indian ocean and 8 km from Kitope village. Ndimba FR covers an area of 2687 ha on a low hill and has an altitudinal range of 75 – 150bm a.s.l. Ndimba FR has a unique stand of dry forest strongly dominated by its endemic species *Cynometra gillmannii*, which is quite different in tree structure from other areas in the landscape. The reserve also includes areas of thicket.

Mchinga Mbili
The small patch of forest at Mchinga Mbili contains a unique stand of forest dominated by *Scorodophloeus fischerii* and *Cynometra filifera*.

Ruawa Forest
Ruawa forest is located between 9°43'S - 9°46'S and 39°32'E - 39°35'E on the eastern side of the Likonde plateau approximately 1km NE on the Dar to Lindi main road.

Ruawa FR has an altitudinal range of 150-460 m a.s.l. and protects a small part of the eastern rim of the Likonde plateau.

Located approximately 20 km inland, there is approximately 9 km^2 of forest remaining on the ancient coral rag formation. The forest is dominated by a *Scorodophloeus fischerii* - *Craibia zimmermannii* association with some swamp forest in the narrow valleys leading up to the plateau. This is the southernmost known stand of *Pandanus rabaiensis* swamp forest.

Noto plateau

The Noto Plateau is predominantly covered by dry evergreen forest, with a well-developed canopy at 12 m and emergent trees extending to 20 m. Dominant canopy species recorded by the TFCG surveys include *Pteleopsis myrtifolia*, *Afzelia quanzensis*, *Zanthoxylum deremense* and *Grewia conocarpa*, In the understorey the dominant species include *Annona senegalensis*, *Tabernaemontana elegans*, *Strychnos* sp., *Xylotheca tectensis Carvalhoa campanulata*, *Erythrococca fischeri* and *Cyathula* sp. According to UTUMI (2002) this area has been extensively logged in the past. The forest differs from the adjacent Chitoa plateau in having few *Scorodophloeus fischeri* and few *Milicia excelsa*. Three Coastal Forest endemic plant species are known from the Noto forest (*Mkilua fragans*, *Baphia marocalyx* and *Monathotaxis trichantha*) (Clarke 2001). The coastal forest near-endemic shrub *Coffea pseudozanguebaricae* is also found there.

Nandimba and Ntama Forests

Nandimba Forest is located approximately 20 km N/NW of Rondo FR, and Ntama is approximately 10km S of Rondo. Little is known about the current status of these reserves. Satellite imagery indicates that there are very small patches of coastal forest vegetation in these reserves (Prins and Clarke, 2006) although most of the reserve contains *Brachystegia* forest.

Miombo woodland is present outside of forest areas in many of the reserves.

More detailed descriptions of the vegetation found in some of these forests is given in Clarke (1995).

Plants

The Rondo forest and surrounding area contains more endemic plant species than any other Coastal forest including two endemic genera. 91 of the 180 endemic plant species restricted to the coastal hinterland of southern Tanzania are collectively restricted to the Rondo / Noto Landscape. Many of these species (taxa) are as yet formally imperfectly known/described. 40 of the 91 species are fully described, a further 16 are partially described, whilst the remaining 35 have only been collected recently, and have been given a preliminary identification at the Royal Botanic Garden, Kew as new or possible new species (list in Appendix 1). Two endemic and two near-endemic plant genera and ca. 55 endemic plant species have only been found in the Rondo forest and one near-endemic genus and 12 endemic species in Litipo. This is a higher total than in the East Usambara Mountains, which is widely known as an important centre of plant endemism and has received a far greater level of collection intensity.

Recent biological surveys in Rondo continue to discover new and rare species here, despite the massive levels of disturbance suffered by this forest. Rondo forest is ranked as the most important Coastal Forest in eastern Africa for endemic species, but care must be taken to not focus all conservation attention on this single locality within the Lindi landscape, for high levels of endemism are also found in the other and less studied forests in the area, and these include a number of species not recorded at Rondo.

Fauna

The level of faunal endemism within the Rondo landscape is high (Table 1). Vertebrate 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.

Table 1. The number of endemic vertebrate species in the Rondo Landscape.

Forest Reserve	Number of Lindi Landscape endemic vertebrates	Number of CF endemic Vertebrates (not including landscape endemic)	Number of CF Near endemic vertebrates	Total endemic and near-endemics
Total for landscape	3	6	15	24

Rondo, Chitoa, 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 an important area for coastal forest birds. Rondo, Noto, Chitoa and Litipo contain populations of Spotted Ground Thrush (*Zoothera guttata*) (excluding Noto), East Coast Akalat (*Sheppardia gunningi*) (also in Ruawa), Plain backed sunbird (*Anthreptes reichenowi*), white-chested Alethe *Alethe fuelleborni* (in Chitoa only, this is the only coastal forest population) 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*), Yellow-streaked Greenbul (*P. flavostriatus*), The near endemic subspecies, the Rondo Green Barbet (*Stractolaema olivacea* spp. *hylophona*) is only present in Rondo whilst Reichenow's Batis (*Batis mixta reichenowi)* occurs in Chitoa, Noto Litipo, Rondo and Ruawa. Rondo Plateau is a breeding site for the East African population of Spotted Ground Thrush.

The invertebrates have not been well studied, but there are at least two endemic species of butterflies. More details about the endemic and near-endemic species are given in Clarke (1995).

Rondo Forest Reserve with its 24 restricted range species and nine threatened vertebrate species is clearly a priority forest. However this should be considered in the context of uneven survey intensity. It is therefore likely that with increased survey effort the importance of the forest on the Noto Plateau as well as other forests may be highlighted.

Globally threatened species

There are nine vertebrate species in the Rondo landscape that are listed as threatened according to the IUCN red-list (Table 2 & 3). This includes two endangered species, two vulnerable, and five near threatened species. Some species have not been assessed or updated but existing data suggests that they will also be listed as vulnerable or endangered including Rondo galago.

Elephant occur in low numbers in the Rondo, Noto, Chitoa, Litipo and Ruawa.

Table 2. The threatened species of the Rondo Landscape (IUCN 2008).

Species	**Common name**	**Red list status**
Galago rondoensis	Rondo dwarf galago	EN B2ab(i,ii,iii,iv,v) ver 3.1 (2001)
Zoothera guttata	Spotted ground-thrush	EN C2a(i) ver 3.1 (2001)
Loxodonta africana	African elephant	VU A2a ver 3.1 (2001)
Panthera leo	African lion	VU A2abcd ver 3.1 (2001)
Anthreptes reichenowi	Plain-backed sunbird	NT ver 3.1 (2001)
Circaetus fasciolatus	Southern banded snake-eagle	NT ver 3.1 (2001)
Sheppardia gunningi	East Coast akalat	NT ver 3.1 (2001)
Beamys hindei	Lesser hamster-rat	NT ver 3.1 (2001)
Rhynchocyon cirnei	Chequered sengi	NT ver 3.1 (2001)

EN – endangered, VU – vulnerable and NT – near threatened.

Table 3. The number of vertebrates on the Redlist by reserve.

Forest Reserve	Number of vertebrates on Red list
Chitoa	9
Litipo	9
Makangala	Not known
Mtama	Not known
Nandimba	Not known
Ndimba	4
Rondo	9
Ruawa	6
Total for landscape	**9**

4) Forest Reserves

Within the Rondo / Noto landscape there are approximately 25,014 ha of forest and woodland within eight Central and Local Authority Forest Reserves (5 Central Government, 3 Local Authority Forest Reserves). There are also at least 4 Village Forest Reserves.

There are significant patches that are unprotected on the Noto and Chitoa plateaus. There are also extensive areas of woodland and forest which are ungazetted west, north and south of the Rondo. Gazettement of the forest and woodland around the Noto and Chitoa plateaus should be a priority for the project. Assessing the status of Ruawa FR should also be a priority due to the presence of settlements within the reserve.

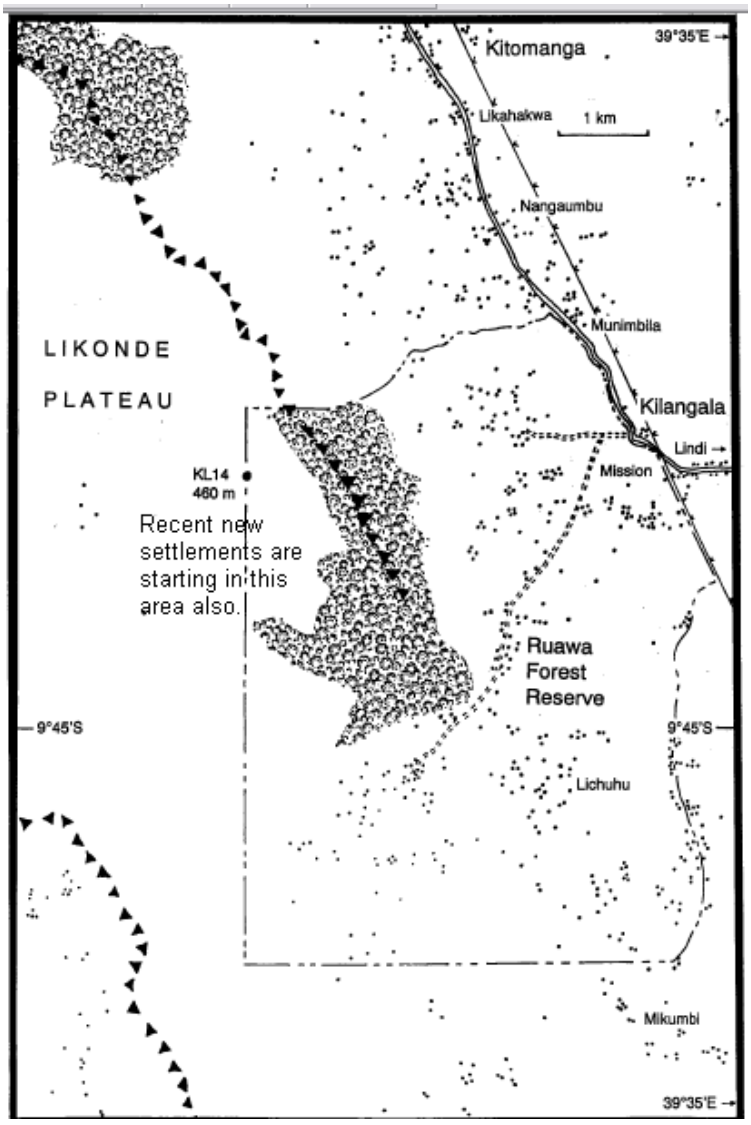
Table 3. Summary of forest reserves in the Rondo Landscape.

Forest Reserves	Area	Status	Altitude (m)	Vegetation types	Reference
Chitoa	770*	Central Government	240-420	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, woodland / fallow.	Clarke (1995), Burgess & Clarke (2000)
Litipo	1000	Central Government	180-280	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, woodland	Clarke (1995), Burgess & Clarke (2000)
Ndimba	2687	Central Government	75 - 150	Dry forest, thicket and plantation.	Clarke (1995), Burgess & Clarke (2000)
Rondo	14060	Central Government	465 - 885	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, & woodland	Clarke (1995), Burgess & Clarke (2000)
Ruawa	2949	Central Government	150-460	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, woodland/fallow, groundwater pandanus	Clarke (1995), Burgess & Clarke (2000)
Makangala	1271	Local Authority forest reserve	200-280 approx	Brachystegia woodland, dry semi-deciduous forest, evergreen thicket	Clarke (1995), Perkin and Leonard, Pers. Obs. this survey
Mtama	1027	Local Authority forest reserve		Mainly woodland with trail plots of *Pinus carribea* ann *P. Insularis.*	Clarke (1995)
Nandimba	1250	Local Authority forest reserve		Said to be dry semi-deciduous forest,	Lindi DRO pers comm
Noto	12000**	No status	250-497	Dry evergreen forest, riverine forest, dry semi-deciduous forest, scrub, & woodland	Clarke and Prins (2006), Perkin and Leonard, Pers. Obs. this survey
Mihima		Village forest reserve	450-600 approx.	*Parinari* and *Brachystegia* woodland, dry semi-deciduous forest, evergreen thicket	Perkin and Leonard, Pers. Obs. this survey
Nndawa	646	Village forest reserve		Mainly woodland with forest patches.	DFO Lindi pers com
Namba		Village forest reserve		Said to be mainly woodland with forest patches.	DFO Lindi pers com
Namupa		Village forest reserve		Said to be mainly woodland with forest patches.	DFO Lindi pers com

*There are differences in the reported area for Chitoa. In the FBD List of Tanzania Forest Reserves it is listed as being 5909 ha. In UTUMI 2002 it is listed as 7718 ha. On the JB map it is listed as 1905 acres (770 ha). We have used the figure from the JB Map as this appears to reflect the situation on the ground most accurately. However, it highlights a need for re-surveying this and other forests.
** This is a rough estimate based on estimating the forest area from satellite images and from the TFCG field team's visit to the area.

Management
Although the District is responsible for the forests, the Lindi DFO explained that he had no vehicle specifically for his office and that getting fuel is difficult. The DFO mentioned that field visits are conducted for special tasks such as the recent forest inventory and otherwise only occasionally. He has at least one person to assist him. The team did not encounter any other staff close to the reserves (with the exception of the Rondo plantation manager). Transport and a shortage of staff, seriously reduce the capacity of the District to actively manage the forests.

Map 1. Map of the Ruawa Forest Reserve



Rondo
Much of the Rondo forest boundary is marked by roads or driveable tracks. There are also some beacons still in place. The TFCG Team did not observe any planted trees along the boundary. According to the Manager of the Rondo Plantation, most of the pine from the plantation has now been harvested. Until five years go there was little re-planting so the stock has been depleted. Replanting has been taking place intensively over the last five years. There are five permanent staff including a manager, secretary and three others working full-time on the plantation. Additional casual labourers are employed from Ntene Village. There is at least one functioning project vehicle, a lorry and a tractor and trailer. The staff have a functioning office although no computers were observed.

According to the Rondo Plantations Project Manager, there is a plan to clear the boundary of the whole of the Rondo Forest Reserve to improve access.

Ruawa
No signs of boundary clearance were observed. In comparing the boundary maps in Clarke 1995 and by talking to the DFO for Lindi, the team noted that on the Eastern side of the Ruawa Reserve there is one settlement with 50 – 100 houses. The DFO reported that in the 1990s attempts were made to move people out of the reserve but that this was not successful for a mixture of political and resource availability issues. Another smaller settlement is growing on the western side.

Makangala
According to the Kinyope Village Chairman, the reserve boundary has been cleared and beacons have been put in place. He also mentioned that the District have prepared a management plan for the reserve and that the village participated preparing this. During the brief visit by TFCG, the team

observed that the boundary had been cleared although it was largely overgrown and difficult to follow. No beacons were observed.

Chitoa
The boundary of the reserve has been cleared but not planted. No beacons were observed. There is a sign board in Kinyope indicating the direction to Chitoa. No sign boards were observed near the forest. No-one mentioned a management plan for the reserve.

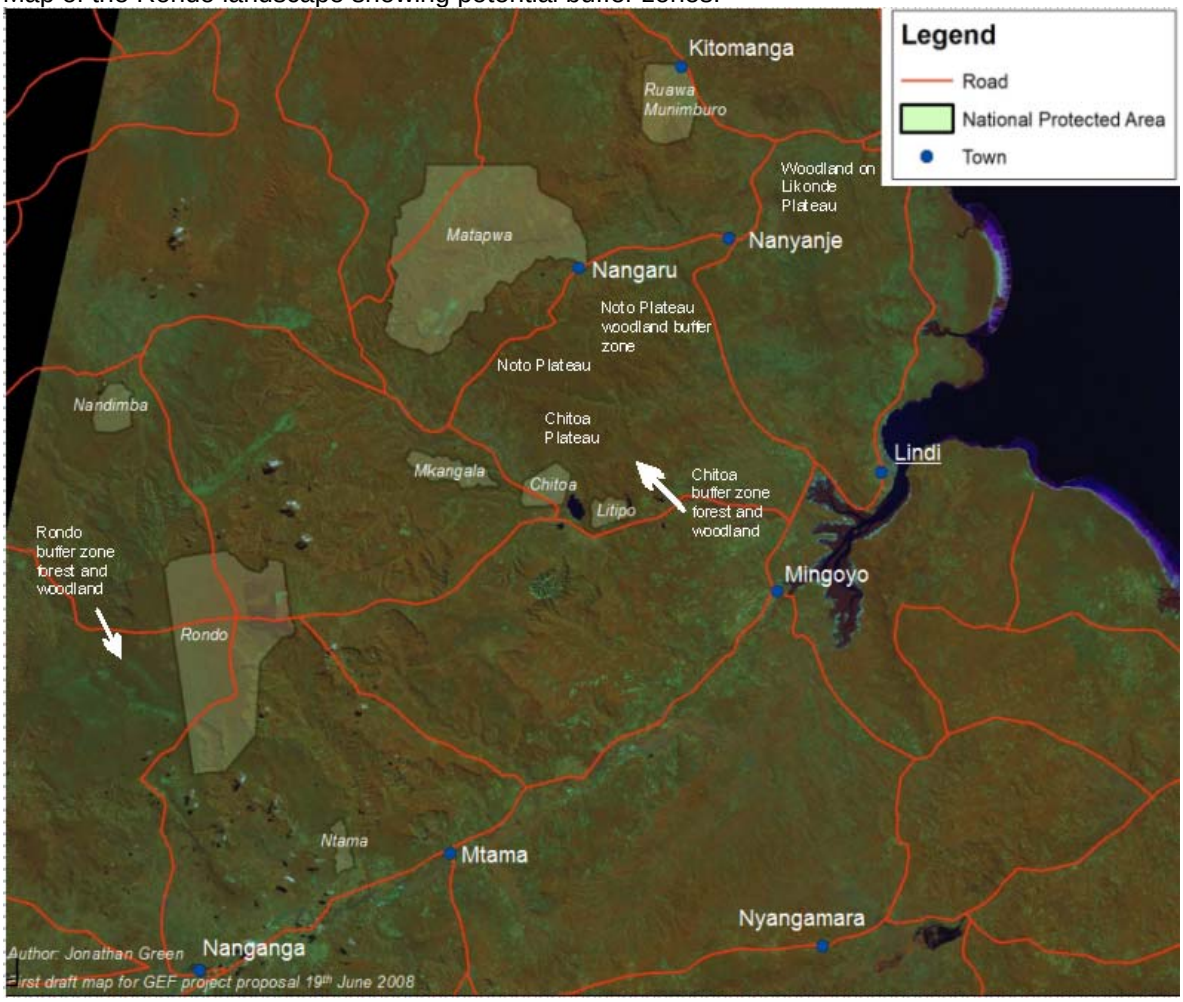
Litipo
The boundary of the reserve has been cleared but not planted. Part of the boundary follows the road.

Ndimba
The boundary was cleared a long time ago although it is now largely overgrown.

5) Connectivity

Potential buffer zones

Map 2. Map of the Rondo landscape showing potential buffer zones.



Rondo: Rondo has buffer zones of woodland and coastal thicket/forest to the west, north and south. To the east the land is mostly settled by people from Ntene Village, but the natural forest is buffered by the plantation forest. The western buffer zone is on the plateau and has a different woodland type to the woodland found at lower elevations. This area is mainly dominated by *Parinaria curatifolia, Pteleopsis* and *Julbernardia* sp. with a few areas of *Brachystegia* and *Pterocarpus angolensis.* Old and new farms occur in this area associated with Liganga sub-village. Restricted range and threatened species that we found in this area include the chequered elephant shrew, and elephant and the Rondo endemic plant *Afromomum* sp. nov. aff. *alboviolaceum*. To the north the forest reserve ends at the escarpment edge and quite large areas of *Brachystegia microphylla* dominate the eroded slopes but this changes at the

base of the plateau to what looks like a rich woodland and coastal thicket/forest area spreading north and east to Mganagala FR and the Milola valley. To the south, coastal forest and thicket occur in the Mchinjidi valley for an estimated 5-7 km. Several cleared farms were visible within this mosaic to take advantage of the water source. Threats appeared low to the west and north but high in the Mchinjidi valley.

Chitoa Plateau: Chitoa FR has buffer zones of natural vegetation to the north, west and east but much less to the south where only a small area of woodland separates the reserve from Kinyope village farms and settlements. The northern, west and eastern areas includes a mosaic of dry coastal forest, riverine forest (Mkomore river valley) and woodland. Restricted range and threatened species living on the plateau (outside of Chitoa FR) include chequered elephant shrew, and elephant. Key threats to the area include logging and farming settlement in the Mkomore river valley.

Noto Plateau: The forests of the high Noto plateau are one of the most important areas of coastal forest currently ungazetted. An estimated 20 km^2 of coastal forest occurs on the plateau above 400 m asl which could be considered as a 'core' area. Woodland occurs widely at lower elevations and on the ridges surrounding Noto plateau. A further approximately 30 km^2 of coastal forest and woodland occurs on a lower 'step' of the plateau to the SE at around 300 m asl. The Noto plateau appears to be well buffered by woodland and coastal thicket of various types.

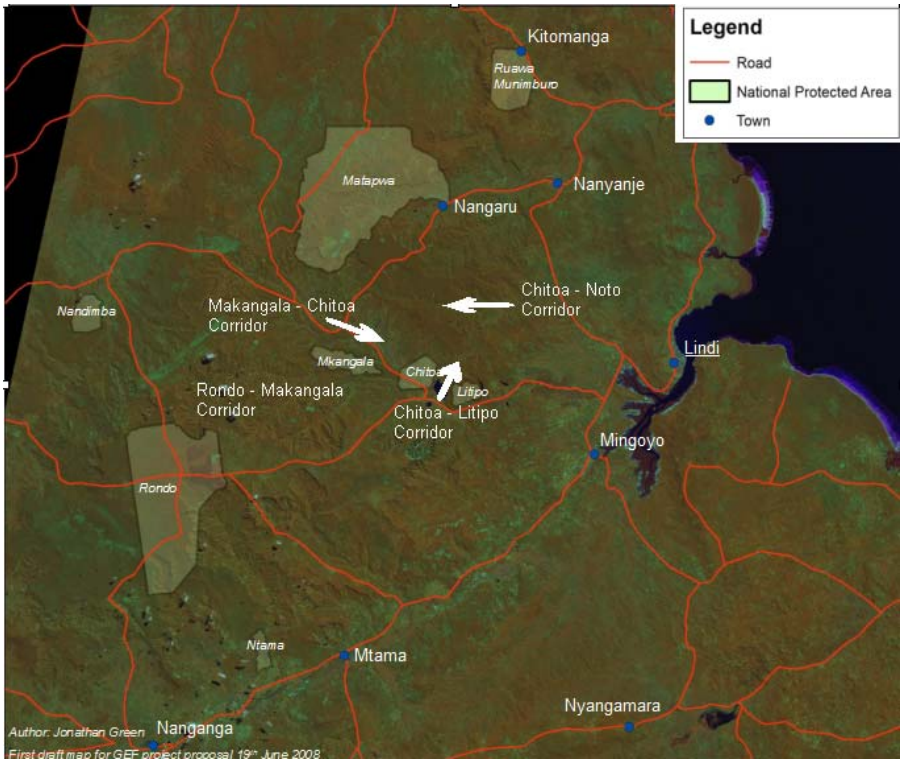
Woodland and forest East of the Noto Plateau: To the East of the main Noto Plateau there are a series of hills and small plateaus, mostly covered with dry coastal forest and woodland.

Ruawa – Some small patches of forest are thought to exist to the north of Ruawa FR on the Likonde plateau. There is high population pressure in this area with villages being established on the plateau despite the problems of accessing water.

In the intervening areas outside forest reserves satellite imagery indicates that the most significant areas of coastal forest vegetation occur on the Chitoa and Noto plateaus. Many small patches of forest of approximately 1-5 km^2 also appear to occur in the landscape (Clarke and Prins 2006).

Potential corridors

Map 3. Map of potential corridors



Rondo – Makangala: There is a high degree of opportunity to restore connectivity between these forests. The distance between the two reserves is approximately 20 km. The area with the highest potential for restoring connectivity is the land along the forested streams that flow from the Rondo plateau towards the Makangala Forest Reserve. The most continuous area of habitat starts from the northern slopes of the Rondo FR and follows north east to Mkangala. Most of the habitat in the corridor is woodland and coastal thicket/ forest with patches of fallow grassland. Small settlements also occur in some of the valleys of the corridor.

Makangala – Chitoa: There is limited opportunity to restore connectivity between these forests. The distance between these two reserves is approximately 8 km. The land between the lowland Makangala FR and the Chitoa FR on the plateau includes coastal forest on the slopes leading up to Chitoa FR. However much of the land in the valley is settled and there is a substantial irrigated rice scheme at Kinyope village. This area is potentially very important as a corridor for large mammal such as elephants seeking water sources in the valleys.

Makangala – Litipo: There is limited opportunity to restore connectivity between these forests. The distance between these two reserves is approximately 7 km. Most of the natural vegetation has been cleared in this area, particularly around Lake Nampawara, Rutamba and Tandangogoro. Intervening land use includes farms growing coconuts, cashew nuts, cassava, rice and maize.

Chitoa – Litipo: There is a high degree of opportunity to conserve the existing connectivity between these forests. This corridor extends south along the rim of the Chitoa Plateau from Chitoa FR to the Litipo FR (for approximately 10 km) in the lowlands. There is still a lot of natural vegetation between these reserves including significant patches of coastal thicket, scrub woodland, dry coastal, and riverine forest. As with the Makangala – Chitoa corridor, this area is potentially important for altitudinal migrants. However there are signs that the lowland vegetation is being cleared for farming. Other threats in this area include logging and pole cutting.

Chitoa Plateau – Noto Plateau: There is a high degree of opportunity to maintain the current connectivity between these forests however this needs to be addressed urgently as there is growing pressure on the intervening land. The two plateaus are divided by a steep sided valley going down to the Mkomore River. There are signs of intensifying cultivation along the valley. We observed signs of farms in the valley which are said to occur at varying intensity along the valley. Dry coastal forest and wooded grassland occurs on either side and connects Chitoa FR to the lower forests of the Noto to the higher Noto plateau forests.

6) Forest Resource use and Threats

The Lindi area was the focus of investments in infrastructure and sisal plantations at the beginning of the 20th century, followed by saw-mills and forestry plantations in the 1950s. These developments have undoubtedly led to the clearance of large areas of coastal forest mosaic along the coast and parts of the Rondo Forest.

Based on the results of field surveys conducted by TFCG it is apparent that the forests and woodlands are an important resource for local people. Some of the products which people use include: firewood, timber, herbal medicines, bush meat, honey, wild fruits and mushrooms. Given the low population density

in Lindi District (12 people / km^2) , the rate of resource use is low relative to other Coastal Forest areas such as the Matumbi Hills. For example in the 3550 m of transect that we assessed we recorded no fresh cut timbers and only 5 freshly cut poles. Disturbance was highest within Rondo FR where all of the freshly cut poles and most of the old cut poles (7 out of a total of 13 old cut poles recorded in all transects) and timber (17 out of 23 of the old cut timbers recorded in all transects) were recorded. The only two traps that we recorded were also in Rondo Forest Reserve. This pattern of higher resource use within Rondo FR would appear to reflect the higher population density on the Eastern side of the Rondo Plateau from about 300 m altitude and associated with the employment opportunities provided by the Rondo Plantation. It was reported that plantation staff also collect poles and soil from within the natural forest for the pine tree nurseries and the network of roads that service the plantation provide access for other forms of disturbance.

Fire remains a widespread threat across the landscape. We recorded fire as affecting 20 % of the 50 m transect sections that we visited. It was particularly prevalent in the wooded grassland on the western side of the Rondo Plateau.

Agricultural encroachment is a minor threat at present in Rondo FR (particularly around the Mchindiji River Valley), Noto Plateau (especially in the North), Chitoa Plateau and Makangala. Agricultural encroachment is a major problem for Ruawa FR where at least three settlements are inside the reserve boundaries and attempts to move people out have so far failed. Threats are also relatively high on the boundaries of Ndimba FR. Much of the agriculture in the landscape is basic subsistence agriculture with no irrigation. Forest is cleared using slash and burn. Crops that were observed include maize, cassava, fruit trees (mango, papaya, coconut), beans with some small-scale tomato cultivation. Irrigated rice is cultivated near Lake Lutamba. Cashew nut trees are widespread near Mhima.

On the Noto Plateau, the TFCG survey team recorded signs of abandoned cultivation including mango and cashewnut trees interspersed with the natural vegetation. According to local people, there were people living on the Noto plateau until 1974 including a German settlement. There is now a Celtel (T) telecommunication mast at the center of the forest on the plateau with an access road from Ruhoma village.

Subsistence hunting is occurring throughout the landscape, but little commercial hunting licensed by the district occurs. In Ruawa a potentially interesting and isolated population of bush hyrax seems to be hunted to the edge extinction. Elephants and buffalo are hunted locally both for meat and to control threats to humans. Hyena and lion are sometimes hunted when they pose a threat. Preliminary data suggests that small antelopes have been heavily hunted in the past and occur in low densities in Rondo, Noto, Ruawa and Ndimba. Local hunters in Rondo were seen to be trapping forest birds using glue as a form of hunting since antelope densities are so low.

There is a low risk of commercial plantations being established around Rondo. A project proposed by Oji Paper Co., Ltd (Oji Paper), a large paper manufacturing company based in Japan plans to establish 50 000 hectares (ha) of Eucalyptus and Acacia plantations in the Mtwara and Lindi Regions. Although they considered land adjacent to the Rondo Plateau, it appears that a more suitable site was selected close to the coast.

With the growing interest in biofuel plantations, there has been interest in establishing plantations in Lindi District. Such plantations pose a particular threat to unprotected forest particularly by attracting more people to the area to work on the plantations as well as clearing forest for the planting. Increased populations close to the reserves is likely to increase pressure for timber, fuel wood and agricultural land.

Timber

Logging further north along the coast has already led to the commercial extinction of several species in parts of the Coast Region. As it becomes increasingly difficult to access timber to the North, so it is inevitable that pressure is going to grow on the forests of the Rondo / Noto landscape. This is probably the greatest current threat to the forests and highlights the importance of securing the legal protection of the key forest such as those on the Noto and Chitoa plateaus.

7) Conservation issues

From 1950 until 1980 the Rondo Plateau forest was an important centre of wood extraction, wood processing and plantation forestry (Clarke, 1995). These activities slowed down in the 1990s but have recently picked up and need to be closely monitored by the conservation community.

The Rondo FR effectively protects the remaining evergreen forest and surrounding pine plantation and woodlands help to buffer the evergreen forest. However unprotected forests in the Mchinjidi, Mtandi, Mihima and Nanyolyo valleys on the slopes of the plateau act as a buffer zone to the Rondo forest and may need some form of formal protection. Elsewhere on the Plateau there is Mihima VFR with protects an area of woodland buffering the main forest.

The Noto plateau contains the largest and most important block of forest without any protection status and represents the greatest conservation priority within the Rondo landscape. This area of forest, coastal woodlands, regenerating forest and thickets stretch to the Chitoa plateau as well as to valleys in the East and North of Noto. Collectively protecting the Chitoa and Noto plateaus would conserve probably the last significant tract of unprotected coastal forests in the landscape. There seems to be considerable scope for the establishment of VFRs and establishing a landscape conservation plan in the Noto and Chitoa areas. The local village governments seemed supportive of these ideas, citing the need to conserve and manage water sources and timber stocks. In general people that the team spoke with were receptive to the idea of village forest reserves.

Ruawa and Ndimba are probably the most threatened reserves for which there is data. Ruawa requires urgent intervention to deal with the villages currently inside the reserve. Ndimba has very little surrounding buffering vegetation but the local village government seem to be preventing direct encroachment.

Although no detailed socio-economic study was carried out by the team, it was observed that most people living close to the forest live in mud / pole huts with thatch roofs and depend on shallow wells and in some places bore holes (in Kitomanga close to the main road the team observed a village bore holes with a storage tank that had been provided by the Japanese). None of the villages that we visited are connected to the national grid. People appeared to be better off in Rutamba and Kinyope due to the irrigation scheme. Most houses in Rutamba and Kinyope villages have corrugated iron roofs.

No-one mentioned pastoralists as being an issue. In general few livestock were seen. Tsetse flies are a problem in the area.

Eco-tourism

Following the recent development of a tourist industry centred around the beaches of Mtwara and the Mnazi Bay Marine Reserve, Rondo forest is now being offered as a destination for ornithologists who visit the area. The fine and hitherto undiscovered beaches along the coast of the Lindi landscape hold much promise for a big increase in tourism into the area over the coming years, and with this development there is a possibility that the dinosaur graveyard at Tendaguru might also become a tourism destination.

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Appendix 1: Plant species which are endemic to the Lindi Landscape

Family/Species	**Habit**	**Locality**	**No.**	**Data source**
Acanthaceae				
Barleria sp. ?nov. det K (= Clarke 11)	Climber	Rondo	1	Vollesen, pers comm.
**Streptosiphon hirsutus* Mildbr.	Herb	Rondo, Lutamba	7	Frontier coll.; *Kew Bull.* **49**: 401-407
Annonaceae				
Asteranthe sp. nov. (= B. & al. 1552)	Small tree	Rondo	1	Voll. & Bid. 1992; Notes
Monanthotaxis trichantha (Diels) Verdc.	Shrub	Lutamba	4	FTEA
Monanthotaxis sp. ?nov. (= B. & al. 1402)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Monodora sp. A of FTEA	Tree	Rondo	1	FTEA
Uvaria decidua Diels	Climber	Rondo, Mlinguru	3	FTEA; Voll. & Bid. 1992
Asclepiadaceae				
Ceropegia sp. ?nov. aff. *brevirostris* P.R.O. Bally & D.V. Field (= B. & al. 1449)	Climber	Rondo	2	Voll. & Bid. 1992; Notes
Ceropegia sp. ?nov. aff. *meyeri-johannis* Engl. (= B. & al. 1608)	Climber	Rondo	2	Voll. & Bid. 1992; Notes
Gongronema sp. nov. (= B. & al. 1435)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Secamone sp. nov. aff. *delagoensis* Schltr. (= B. & al. 1518)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Tylophora sp. ?nov. (= Eggeling 6421)	Climber	Rondo	2	Voll. & Bid. 1992; Notes
Asteraceae				
**Hystricophora macrophylla* Mattf.	No data	Rondo	1	*Kew Bull.* **43**: 249
Bignoniaceae				
Fernandoa lutea (Verdc.) Bidgood	Tree	Rondo	?	*Kew Bull.* **49**: 383
Boraginaceae				
Cordia sp. C of FTEA	Shrub	Mingoyo	1	FTEA
Cordia trichocladophylla Verdc.	Shrub	Mlinguru	1	FTEA
Ehretia glandulosissima Verdc.	Small tree	Rondo	1	FTEA
Celastraceae				
Pristemera sp. ?nov. aff.*graciliflora* (Welw. ex Oliv.) N. Hallé (= B. & al. 1688)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Clusiaceae				
Vismia pauciflora Milne-Redh.	Tree	Rondo	2	FTEA; Opera Botanica **59**: 1-117
Convulvulaceae				
Ipomoea flavivillosa Schulze-Menz	Shrub	Rondo	1	FTEA
Ipomoea sp. B of FTEA	Herb	Rondo	1	FTEA
Ipomoea sp. D of FTEA	Climber	Rondo	1	FTEA
Cucurbitaceae				
Momordica sp. nov. aff. *glabra* A. Zimm. (= B. & al. 1376)	Climber	Rondo	2	Voll. & Bid. 1992; Notes
Dilleniaceae				
Tetracera sp. ?nov. aff. *litoralis* Gilg (= B. & al. 1347)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Dipterocarpaceae				
Monotes lutambensis Verdc.	Tree	Lutamba	1	FTEA
Ebenaceae				
Diospyros magogoana F.White	Tree	Rondo	1	FTEA
Euphorbiaceae				
Acalypha sp. A of FTEA	Shrub	Lutamba	1	FTEA
Cleistanthus sp. nov. (= B. & al. 1515)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Phyllanthus schliebenii Mansf. ex A.R.-Sm.	Shrub	Lutamba	2	FTEA
Fabaceae				

Bussea eggelingii Verdc.	Shrub, tree	Rondo	2	FTEA
Cynometra filifera Harms	Tree	Mlinguru, Lindi Creek & Mchinga	4	FTEA; Clarke 1995
Cynometra gillmanii J. Léonard	Tree	Mkoe	1	FTEA
Erythrina schliebenii Harms	Tree	Lutamba	2	FTEA
?Indigofera bussei J.B. Gillett	Herb	'Near Lindi'	1	FTEA
Rhynchosia calobotrya Harms	Herb	Lutamba	2	FTEA
Xylia schliebenii Harms	Tree	Noto	1	FTEA
Flacourtiaceae				
Homalium elegantum Sleumer	Shrub	Noto	1	FTEA
Loganiaceae				
Mostuea sp. A of FTEA	Shrub	Rondo	1	FTEA
Mostuea sp. B of FTEA	Shrub	Rondo	1	FTEA
Strychnos sp. ?nov. aff. *scheffleri* Gilg (= B. & al. 1521)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Loranthaceae				
Agelanthus rondensis (Engl.) Polh. & Wiens	Parasite	Rondo	1	FTEA
Malphigiaceae				
Triaspis schliebenii A. Ernst	Climber	Lutamba, Chitoa	2	FTEA
Melastomaceae				
Cincinnobotrys pulchella (Brenan) Jacq.-Fél.	Herb	Rondo	2	Voll. & Bid. 1992; Notes; FTEA
Memecylon sp. nov. (= B. & al. 1338)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Memecylon sp. nov. det. K (= Clarke 56)	Tree	Chitoa	1	Vollesen, pers comm.
Meliaceae				
Trichilia sp. nov. aff. *lovettii* Cheek det. K (= Clarke 55)	Tree	Chitoa	1	Vollesen, pers comm.
Menispermaceae				
Tinospora sp. nov. aff. *tenera* Miers (= B. & al. 1392)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Ochnaceae				
Ochna sp. nov. aff. *holstii* Engl. (= B. & al. 1661)	Shrub	Rondo	1	Voll. & Bid.,1992; Notes
Ouratea lutambensis Sleumer	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Passifloraceae				
Adenia sp. ?nov. det. K (= Clarke 37)	Climber	Rondo	1	Vollesen, pers comm.
Plumbaginaceae				
Plumbago ciliata Wilmot-Dear	Herb	Rondo	1	*Kew Bull.* **31:** 848-849; FTEA
Rubiaceae				
*?genus nov. tribe VANGUERIEAE of FTEA	?	Rondo	1	FTEA
Canthium rondoense Bridson	Shrub	Rondo	3	*Kew Bull.* **47**: 3; FTEA
Chazaliella sp. aff. *abrupta* (Hiern) E.M.A. Petit & Verdc. (=Semsei 680, B & al. 1367)	Shrub	Rondo	2+	Voll. & Bid. 1992; Notes
Chazaliella sp. aff. *abrupta* (Hiern) E.M.A. Petit & Verdc., not matched (=B. & al. 1704)	Shrub	Lutamba	3	Voll. & Bid. 1992; Notes
Coffea schliebenii Bridson	Shrub	Rondo, Lutamba	3	*Kew Bull.* **49**: 331
Cuviera migeodii Verdc.	Shrub	Tendaguru	1	FTEA
Didymosalpinx sp. A of FTEA	Shrub	Lutamba	1	FTEA
Ixora sp. nov. aff. *narcissodora* K. Schum.	Tree	Rondo	1	Voll. & Bid. 1992; Notes
Keetia sp. nov. det K (= Clarke 34)	Tree	Rondo	2	Vollesen, pers comm.
Leptactina papyrophloea Verdc.	Tree, shrub	Rondo	4	FTEA
Oldenlandia patula Bremek.	Herb	Tendaguru	2	FTEA

Oxyanthus sp., not matched (= B & al. 1383)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Pavetta lindina Bremek.	Shrub	Rondo	2	FTEA
Pavetta schliebenii Bremek.	Shrub	Lutamba	2	FTEA
Pavetta sp. nov. (= B. & al. 1342)	Shrub	Rondo, Chitoa	6	Voll. & Bid. 1992; Notes
Pentas sp. aff. *bussei* K. Krause, not matched (= B. & al. 1573)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Psychotria sp. J of FTEA	Shrub	Lutamba	1	FTEA
Psychotria sp. nov. (= B. & al. 1585)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Pyrostria sp. D of FTEA	Shrub	Rondo	1	FTEA
Rytigynia sp. K of FTEA	Herb	Mbemkuru	1	FTEA
Tapiphyllum schliebenii Verdc.	Small tree	Lutamba	1	FTEA
Tarenna sp. A of FTEA	Shrub	Rondo, Mlinguru	2	FTEA
Tricalysia sp. G of FTEA	Shrub	Lutamba	1	FTEA
Tricalysia sp. ?nov. aff. *delagoensis* Schinz (= B. & al. 1452)	Shrub	Rondo	1	Voll. & Bid. 1992; Notes
Triclaysia sp. ?nov. aff. *pedicellata* Robbr. (= B. & al. 1461)	Tree	Rondo	1	Voll. & Bid. 1992; Notes
Rutaceae				
Vepris schliebenii Mildbr.	Shrub	Mlinguru	1	FTEA
Vepris sp. not matched, det. K (= Clarke 52)	Tree	Chitoa	1	Vollesen, pers comm.
Sapindaceae				
Allophyllus bussei Gilg	Shrub	Rondo	1	FZ; FTEA
Sapotaceae				
Mimusops acutifolia Mildbr.	Shrub, tree	Rondo, Noto	2	FTEA
Thymealaceae				
Craterosiphon sp. ?nov. (= B. & al. 1683)	Climber	Rondo	1	Voll. & Bid. 1992; Notes
Tiliaceae				
Grewia sp. ?nov. aff. *calymmatosepala* K. Schum. (= B. & al. 1337)	Shrub	Rondo	2	Voll. & Bid. 1992; Notes
Grewia sp. ?nov. aff. *meizophylla* Burret (= B. & al. 1685)	Tree	Rondo	1	Voll. & Bid. 1992; Notes
Verbenaceae				
Premna hans-joachimii Verdc.	Shrub, tree	Rondo, Noto	3	FTEA
Premna sp. A of FTEA	Shrub	Rondo	1	FTEA
Clerodendrum sp. A of FTEA	Shrub	Mlinguru	1	FTEA
Clerodendrum sp. G of FTEA	Shrub	Lutamba	1	FTEA
Violaceae				
Rinorea sp. ?nov. aff. *ferruginea* Engl. (= B. & al. 1352)	Shrub	Rondo	2	Voll. & Bid. 1992; Notes
Vitaceae				
Cissus rondoensis Verdc.	Climber	Rondo	2	FTEA
Cyphostemma bidgoodiae Verdc.	Climber	Rondo	1	FTEA
Zingiberaceae				
Afromomum sp. nov. aff. *alboviolaceum* (Ridl.) K. Schum. (= Milne Redhead & Taylor 7610)	Herb	Rondo	3	Voll. & Bid. 1992; Notes

***Abbreviations**: B. & al., Bidgood & al.; FTEA, Flora of Tropical East Africa; FZ, Flora Zambesiaca; No., Cited number of collections; Notes, collection notes; Voll. & Bid., Vollesen & Bidgood; *, genus endemic to the Lindi Landscape.*

Appendix 2: Resource use interviews
Resource use interviews in the Rondo and Kilwa landscapes

By Charles Leonard, Research Officer, TFCG

Introduction
Most local communities in rural Tanzania, depend on natural resources to support their livelihoods. In the Coastal Forests of Tanzania, the resources used most frequently include timber and non-timber forest products and services such as medicinal plants and game.

The resource use surveys were conducted by the TFCG Research Officer in four villages: Ntene, Kinyope and Ruhoma in the Rondo / Noto landscape, Lindi District and Migeregere village in Kilwa landscape in Kilwa District. Also, Makangaga village in the Kilwa landscape was visited briefly for the survey. The aim was to gather information on the various uses of forest products and services by the local communities in the landscape. There are about 4,900 people in Ntene village, 2,326 in Kinyope and about 400 people in Ruhoma village. People in these villages are belonging to Wamwera tribe and some immigrants including Wamakonde (in the Rondo landscape) and Wangindo, Wamatumbi, Wamwera and immigrants such as Wasukuma and Wanyasa in the Kilwa landscape. Most of the villagers are peasants and own plots of land which vary in size from two to five acres. The size of their families varies, with an average of six to seven members per family or even more than that. They cultivate mainly subsistence crops including maize, sorghum, coconuts, pigeon peas and beans.

Methods
Interviews were conducted to selected group of local villagers. Due to time constraints, the greatest effort was targeted to interview members of the Village Natural Resources Committees and other few people who were knowledgeable with the natural resources in their areas. The groups included men and women. At the start of the interview, the researcher explained the purpose of the interview, which was to collect information on their resource use in the landscape. Then questions on various resource use were asked, which were based on the following points:

- Forest products and services timber and non-timber that they commonly use. The respondents were also asked to gauge them on the four levels of importance: important, of medium importance, of low importance and non-important
- Information on the products and services which are marketed and those for domestic consumption and where possible to gather their 'shilling' values and volumes/amounts consumed over a month/year.
- Any forest goods and services that might exist but so far not utilized eg. ecotourism, water etc
- Key stakeholders/players in the forest management (and mismanagement)
- Forest dependency: whether the local communities are forest dependent or not.

Sampling intensity
Interviews were conducted with four different groups in the four villages of the Rondo and Kilwa landscapes between 4th – 14th July 2008. The sizes of the groups were as follows: 13 (9 men, 4women) interviewees in Ntene, nine (7 men, 2 women) in Kinyope, 15 (10 men, 5 women) in Ruhoma village and 20 (14 men, 6 women) interviewees in Migeregere village.

The villages were selected in order to include villages adjacent to different vegetation types in order to understand any differences in patterns of use for different vegetation types eg. Forest vs woodland. Ntene is close to evergreen coastal forest on Rondo Plateau, whereas Kinyope is close to Brachystegia woodland in Makangala FR and Ruhoma is close to dry evergreen forest on the Noto plateau. Migeregere village is close to evergreen coastal forest on the Mbarawala plateau.

Results
Forest products and services used by the local community from Coastal Forest close to Ntene village
In Ntene village, the respondents mentioned various products and services which they get from Rondo Forest Reserve including fuelwood, poles for constructing their houses, herbal medicines, wild meat, wild fruits, vegetables, oyster nuts, mushroom and water for their domestic use. They mentioned they

get the waters from valley bottoms around the Rondo plateau including Mchindiji, Mahiwa, Chipwapwa and Maindigani valleys. The respondents also mentioned that the Rondo Forest Reserve protects them from wild animals such as elephants and also the forest is an important source of rains in their areas. They also mentioned that some people are employed by the Rondo Plantation Project. They also mentioned that the forestry project allow them to cultivate in the harvested plantation plots.

Forest products and services used by the local community around Kinyope village
In Kinyope village, fuelwood, charcoal, timber, building poles, herbal medicines, meat, honey and mushrooms were mentioned as the benefits which the surrounding local community gets from Makangala forest. Other benefits include wild fruits such as **usofu, vitolo** and **manjichi**. They also mentioned earning money from selling timber and fuelwood from the reserve. They also mentioned that the Makangala forest, apart from playing a key role in the rain cycle in their area, it is also an important source of the Kinyope river, which is one of their dependable water supplies in their village.

Forest products and services used by the local community around Ruhoma village
In Ruhoma village, the respondents mentioned the following products and services from Noto forest: poles, timber, edible root tubers, herbal medicines, wild meat, fish from the Mkomole dams, land for cultivation and economic gains such as fees from researchers who visit the forest. Other benefits mentioned included water from the valley bottoms of the plateau including dams which are in Mkomole valley, mushroom, wild fruits such as **vitolo, usofu, makungu, manjichi, matili** and **magulugai** and also the natural vegetation of the Noto forest which plays a great role in the rain cycle in their areas. They mentioned also that they feel proud to be associated with such a natural coastal forest, the resource which is absent to other neighboring villagers.

Forest products and services used by the local community around Migeregere village
In Migeregere village, timber, poles, local medicines, fuelwood, land for cultivation, wild meat, honey, mushroom, wild fruits, wild vegetables including **mlenda** and **mingoko** and water were mentioned as forest products and services which the local community obtains from Namatimbili forest on the Mbarawala plateau. Other benefits included building materials such as thatches for roofing their houses, land for settlements, clean air, rains and economic gains such as fees from the visitors who visit the forest. They mentioned to get the wild meat from the forest and also from the woodlands as these areas are inhabited by various wild animals such as red duiker, common duiker, bushbuck, eland, elephants, buffalo and sable antelope. Commercial hunting is also conducted in the woodlands by the licensed hunters who obtain permits from the Kilwa District.

Also a large portion of woodland and forest of Namatimbili has been given to Biofuel plantation. Tree nurseries and water wells have already been established in the area in the initial stages of the project.

Table 1. List of various timber and non-timber forest products and services which the communities use in the Rondo and Kilwa landscapes

Landscape	Village	Adjacent vegetation	Benefits (products & services, timber & non-timber)
Rondo	Ntene	Evergreen forest Rondo (including the plantation)	Fuelwood, poles, local medicines, wild meat, wild fruits, wild vegetables, mushroom, oyster nut, water, security against wild animals, employment, areas for cultivation, source of rains
	Kinyope	Woodland Makangala	Fuelwood, timber, charcoal, poles, local medicines, honey, wild meat, mushrooms, wild fruits, income from selling the various products such poles, source of rains and water from Kinyope river. Other benefits are milling pestle and mortar, wooden spoons, coconut grater, wooden handles for hoes and *pangas* etc.

	Ruhoma	Dry forest Noto	Poles, timber, edible root tubers, local medicines, wild meat, fish, areas for cultivation, income, water, mushroom, source of rains and proud.
Kilwa	Migeregere	Evergreen forest Namatimbili (locally known as Uchungwa forest). Other forests are Muungano and Ndwiwu VFRs	Timber, poles, local medicines, fuelwood, land for cultivation, wild meat, honey, mushroom, wild fruits, wild vegetables, water, building materials such as thatches, land for settlement, clean air, rains and fees from the visitors to the forest. Occassional commercial hunting in the woodlands for the big game.

Most of the poles and timbers from the forests are used as building materials. Local medicines taken from the forests include bark, leaves, roots and seeds of some plants. The medicines were mentioned to be used to treat ailments such as problems associated with human gastro-intestinal tract, dental problems, polio, eyes and nerves. Also people bitten by snakes were mentioned to be cured by some of the medicines. The respondents also mentioned that most of them rely on the forests to get their medicinal supply as the costs for modern medicines are high. In Migeregere village, about 90% of the interviewees mentioned to rely on the surrounding forests including Namatimbili for their local medical supplies. Secondly, dispensaries and hospitals are not enough in their areas and the few dispensaries which are present are stocked with insufficient medicines and also very few clinical officers including nurses.

Common duiker, suni, bushbuck, red duiker and birds such as guinea fowl and francolins and even greenbuls were mentioned as being hunted by some of the villagers. The meat is either for local consumption at the household level or for selling to other people in the village. In the woodlands around Namatimbili forest, licensed hunting for the big game such as buffalo and eland is also occasionally conducted (Table 1).

All of the benefits mentioned by the respondents were consumed locally at the village level but also the respondents mentioned some of the benefits which were traded among themselves in the village or even outside their areas. Table 2 below shows the forest products and services that are marketed in the Rondo and Kilwa landscapes.

Table 2. List of various timber and non-timber forest products and services that are marketed around the Rondo landscape

Landscape	Village	Adjacent vegetation	Products & services	Amount (Tsh)
Rondo	Ntene	Rondo (Evergreen forest & plantation)	Fuelwood	500 – 1,000 per bundle
			Poles	1,000 per piece
			Mushroom	300 per bunch
			Wild meat	500 per piece
			Water	500 per 20litre
			Vegetables	200 per bunch
			Oyster nuts	500 per fruit
	Kinyope	Makangala (Woodland)	Timber	3,000 per 10 ft piece
			Charcoal	4,000 per bag
			Fuelwood	100 per piece
			Honey	2,500 per litre
			Poles	500 per piece

			Wild meat	6,000 -30,000 per whole (for small antelopes such as suni and common duiker respectively) or 1,000 per piece
			Milling pestle	1,500 per piece
			Milling mortar	5,000 per piece
			Wooden spoons	200 - 300
			Coconut grater	3,000 per piece
			Wooden handles for hoes, *pangas*, axes etc	500 per piece
	Ruhoma	Noto (Dry forest)	Poles	300 per piece
			Wild meat	1,000 per piece
			Timber	2,500 per piece
Kilwa	Migeregere	Evergreen forest Namatimbili (locally known as Uchungwa forest). Other forests are Muungano and Ndwiwu VFRs	Timber	3,000 per piece
			Poles	500 per piece
			Fuelwood	250 per bundle
			Wild meat	2,500 for small antelopes such as suni
			Honey	2,000 per litre
			Mushroom	100 per bunch
			Wild fruits	100 per bunch
			Water	200 per 20 litre can

Table 3. Gauging the benefits on the four levels of importance: important, medium, low important and non-important

Landscape	Village	Adjacent forest	Benefits	Level of importance
Rondo	Ntene	Rondo	Poles	Important
			Water	Important
			Fuelwood	Important
			Wild meat	Important
			Oyster nut	Medium
			Wild vegetables	Low
	Kinyope	Makangala	Fuelwood	Important
			Charcoal	Important
			Timber	Important
			Poles	Important
			Wild meat	Important
			Water	Important
			Local medicines	Important
			Wild fruits	Less important
			Honey	Less important
	Ruhoma	Noto	Poles	Important
			Timber	Important
			Water	Important
			Local medicines	Important

			Areas for cultivation	Medium
			Wild fruits	Important
			Mushroom	Important
			Fish	Important
Kilwa	Migeregere	Namatimbili	Timber	Important
			Poles	Important
			Wild meat	Important
			Local medicines	Important
			Fuelwood	Important
			Land for cultivation	Important
			Land for settlement	Important

Table 4. Key stakeholders in the forest management

Landscape	Forest/Plateau	Stakeholders
Rondo	Rondo	Ntene village government through VNRC and other surrounding villages such as Mihima, Liganga and Mandaware.
		Rondo Plantation Project
		Naliendele Agricultural Research College-have one hector of Eucalyptus in partnership with Ntene village
	Makangala	Village governments of Kinyope, Legezamwendo, Rutamba ya Sasa and Makangala villages through their VNRCs
		Lindi District Council
	Noto	Ruhoma village government and other surrounding villages such as Milola, Nangaru, Kinyope and Mtangi
		Celtel – they have put a mast at the centre of the forest on the plateau. They have also established a road up to the tower area.
Kilwa	Namatimbili/Mbarawala	Migeregere village government and other surrounding villages such as Nainokwe, Liwiti, Mavuji, Mchakama villages.
	Makangaga forest patch-a potential corridor btn Pindiro and Ngarama FRs and the sacred forest with the hippo pool (Nyange River forest)	The Biofuel company-Bioshape
		Kilwa District Council
		Makangaga village government
		The gypsum mining company
		Kilwa District Council
		Care taker clan and family of Nyange River forest

Forest goods and services which are unutilized in the Rondo and Kilwa landscapes

Ecotourism is the major product which has not been utilized in the two landscapes. The two sites in the Mbarawala plateau: Namatimbili and the sacred forest at Nyange River in Makangaga village can offer a lot to ecotourism. Apart from the evergreen coastal vegetation, Namatimbili has caves which have been formed under the coral rag limestone rocks.

The Nyange River has the hippo pool which is the major tourist attraction in the area together with the pristine undisturbed forest.

The forests of the Rondo landscape can be connected to the recently established network of the tourist attractions in the southern tourist industry.

The extent to which the local communities depend on the forest
In all the villages visited, all of the respondents mentioned to depend largely on the forests resources which are in their areas for livelihood support due to the benefits which they get from the forests (Table 1).

Discussion

The importance of the forest products and services to the economies of the local communities
The local communities in the Rondo and Kilwa landscapes are benefiting from the outlined timber and non-timber forest products such as building materials (timber and poles) and local medicinal supplies (Table 1). Most of the households are poor which implies that they can not afford economically to sustain their lives without depending on the forest resources. For instance, most of the respondents mentioned the costs for modern medicines and building materials such as cement to be high. Therefore, they opted for the building materials from the forests such as timbers, poles and thatches which appear to be cheap.

Apart from these benefits which were mentioned to be used by the local communities, there are also other under-utilized products such as ecotourism.

Resource use in forests and woodlands
Generally, most of the resources mentioned to be used by respondents in the two landscapes were mentioned to be obtained from the forest areas and the adjacent woodlands. The extent of the resource uses in the forests and in woodlands varies from one area to another within the landscapes due to various reasons including population size of the villages. For instance in the eastern side of the Rondo landscape in Ntene village, the respondents reported a decrease in stock of most of the resources including timber which they were getting from the woodlands. Ntene village is one of the populated areas in the eastern side of Rondo compared to the western side where it is less populated. The woodland in the south-western side and western side of Rondo is still good in terms of valuable timber tree species such as Afzelia quanzensis and Milicia excelsa.

In Kilwa landscape, most of the resource such as timbers, fuelwood and poles are obtained by the local communities mostly in the woodlands. The woodlands are adjacent to Namatimbili forest and two woodland Village Forest Reserves of Ndwiwu and Muungano in Migeregere and Ruhatwe villages. They depend on the forest for other resources such as water and local medicines.

Gender preferences in resource use
Forest products such as fuelwood, mushroom, wild vegetables and fruits are normally collected by women from the forests for either domestic consumption or trading. Men are more involved with activities such as hunting wild animals and pitsawing.

Resource use between rich and poor communities
During the surveys, it was evident that both the rich and poor households depend on the forest resources and services to meet their needs but in different ways. Most of the households with poor economy (which are the majority in the area) are depending on the forest resources directly to meet their needs such as building materials (poles and timbers) and medicinal supplies. The rich people buy the forest products from the poor people.

Most of the households with poor economies own small cultivation plots. Crops which are harvested such as maize and millet are insufficient to cater for their household needs. Thus, the last option is on the forest resources.

Appendix 3: Disturbance transects
By Charles Leonard, Research Officer-TFCG

Introduction

Objectives

The objectives of the landscape disturbance work were:

- To assess the intensity and distribution of human disturbances within Rondo/Noto landscapes
- To record the types of human disturbances affecting the Rondo/Noto landscapes

Methods

Disturbance transects were used to provide information on rates of timber extraction and pole cutting and other disturbances within the Rondo/Noto landscapes. Disturbance was assessed within three 10 m wide transects in the landscape. Each transect was 500m in length with the exception of one of the transects in (RN 3) which was 550 m in length. At each site, at least one transect was conducted in the closed forest and in the woodlands. Transects were placed starting at the forest boundary and following a constant bearing. The bearing depended on the orientation of the forest. The location of the start and end points were recorded using a GPS.

Disturbance rates were recorded for each 50 m section along the transect lines. The level of disturbance was assessed in terms of the number of poles and timbers which were cut or left standing in a 10 m strip (5 m either side of the transect line). Poles were defined as those trees with straight stems at least 2 m in length and with 5 - 15 cm dbh. Timber trees were defined as all trees with straight stems at least 3 m in length and exceeding 15 cm dbh.

Every cut tree stump and cut pole was measured within the transect. The diameter at breast height (dbh) was measured at the standard height of 1.3 m above the ground. The diameter of cut trees and poles were measured at the point of cut. Fallen tree trunks or branches were not counted, only stumps.

Other forms of human disturbance were also recorded in the Rondo/Noto landscape. These disturbances include: fire, paths, hunting, roads, settlement and medicinal plant harvesting.

Table 1. Number of live, dead and cut poles in the Rondo

Transect number	Transect area (ha)	Total number poles sampled	Average live poles	Average dead poles	Average old cut poles	Average fresh cut poles
RN1	0.5	338	292	41	3	2
RN2	0.5	161	139	15	4	3
RN3	0.5	158	148	10	0	0
Total	1.5	657	579	66	7	5

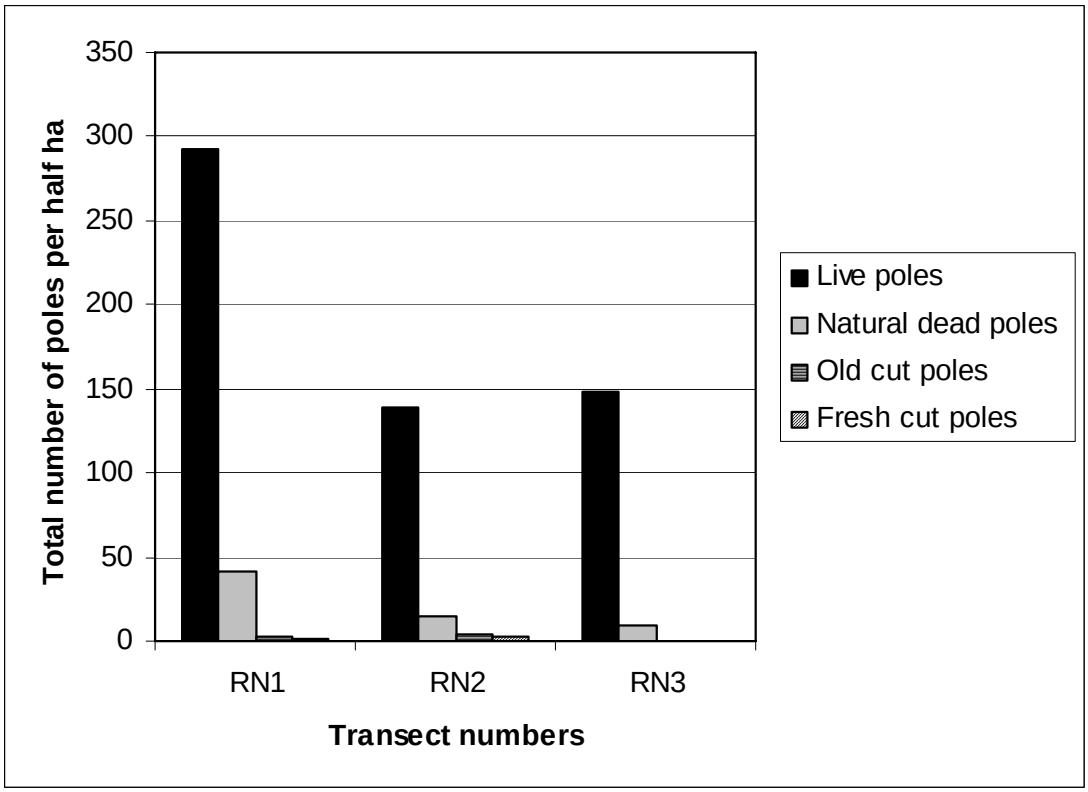

Fig 1. Abundance of live, natural dead, old cut and fresh cut poles along disturbance transects, Rondo

Table 2. Number of live, dead and cut timbers in the Rondo

Transect number	Transect area (ha)	Total number timbers sampled	Average live timbers	Average dead timbers	Average old cut timbers	Average fresh cut timbers
RN1	0.5	173	141	18	14	0
RN2	0.5	115	99	13	3	0
RN3 (Woodland)	0.5	61	46	12	3	0
Total	1.5	349	286	43	20	0

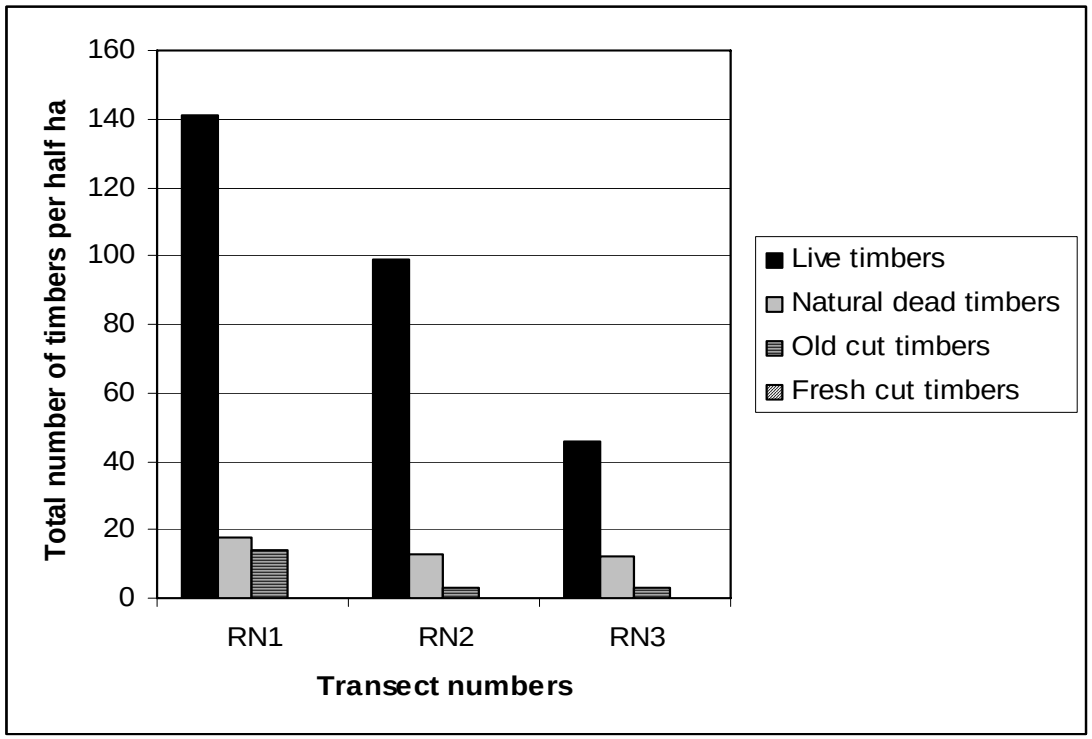

Fig 2. Abundance of live, natural dead, old cut and fresh cut timbers along disturbance transects, Rondo

Table 3. Number of live, dead and cut poles in Makangala Forest Reserve. The vegetation is dominantly coastal woodland

Transect number	Transect area (ha)	Total number poles sampled	Average live poles	Average dead poles	Average old cut poles	Average fresh cut poles
MK1	0.5	146	131	13	2	0
MK2	0.5	135	121	12	2	0
Total	1	281	252	25	4	0

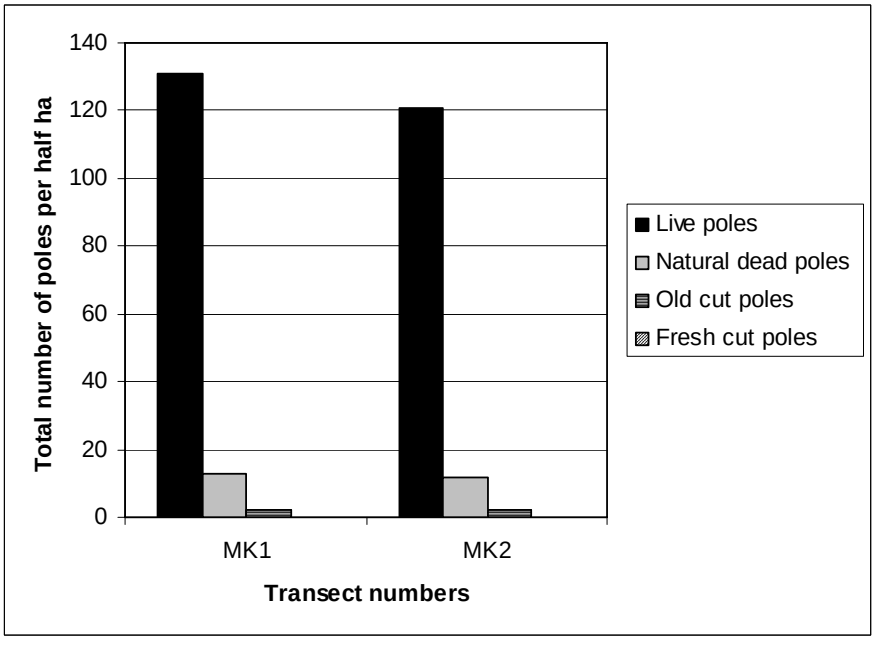

Fig 3. Abundance of live, natural dead, old cut and fresh cut poles along disturbance transects, Makangala

Table 4. Number of live, dead and cut timbers in Makangala Forest Reserve. The vegetation is dominantly coastal woodland.

Transect number	Transect area (ha)	Total number timbers sampled	Average live timbers	Average dead timbers	Average old cut timbers	Average fresh cut timbers
MK1	0.5	60	53	6	1	0
MK2	0.5	62	60	2	0	0
Total	1	122	113	8	1	0

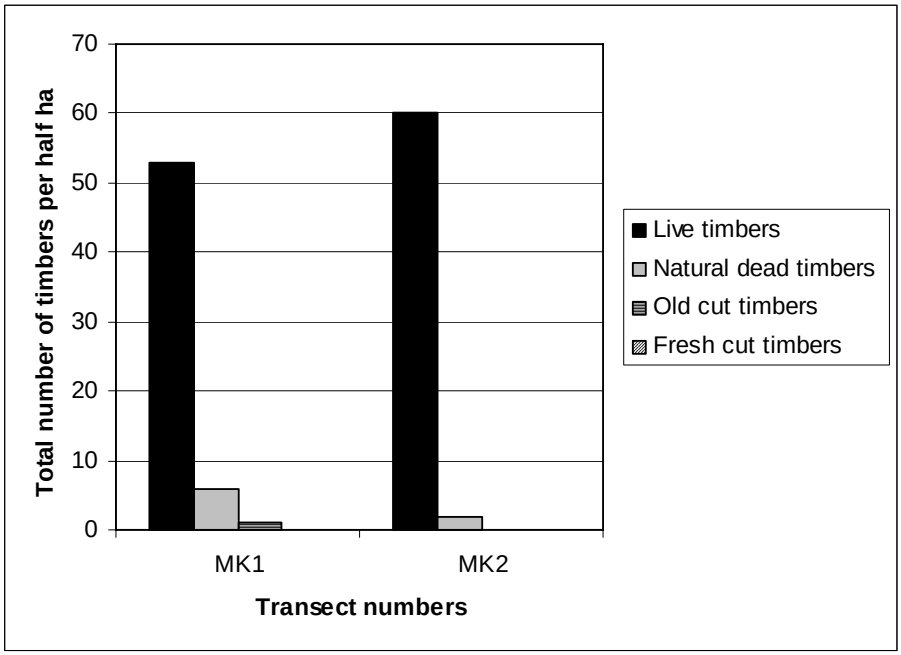

Fig 4. Abundance of live, natural dead, old cut and fresh cut timbers along disturbance transects, Makangala

Table 5. Number of live, dead and cut timbers in Noto forest

Transect number	Transect area (ha)	Total number poles sampled	Average live poles	Average dead poles	Average old cut poles	Average fresh cut poles
NT1	0.5	259	238	20	1	0
NT2 (woodland)	0.5	221	206	14	1	0
Total	1	480	444	34	2	0

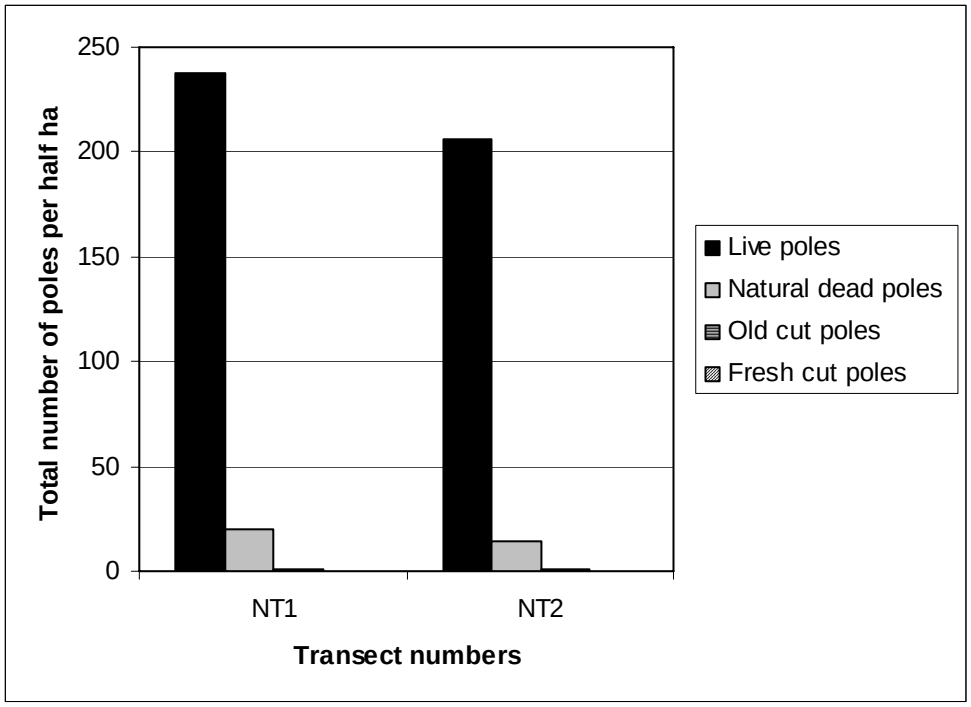

Fig 5. Abundance of live, natural dead, old cut and fresh cut poles along disturbance transects, Noto

Table 6. Number of live, dead and cut timbers in Noto

Transect number	Transect area (ha)	Total number timbers sampled	Average live timbers	Average dead timbers	Average old cut timbers	Average fresh cut timbers
NT1 (Woodland)	0.5	82	67	15	0	0
NT2	0.5	103	88	13	2	0
Total	1	185	155	28	2	0

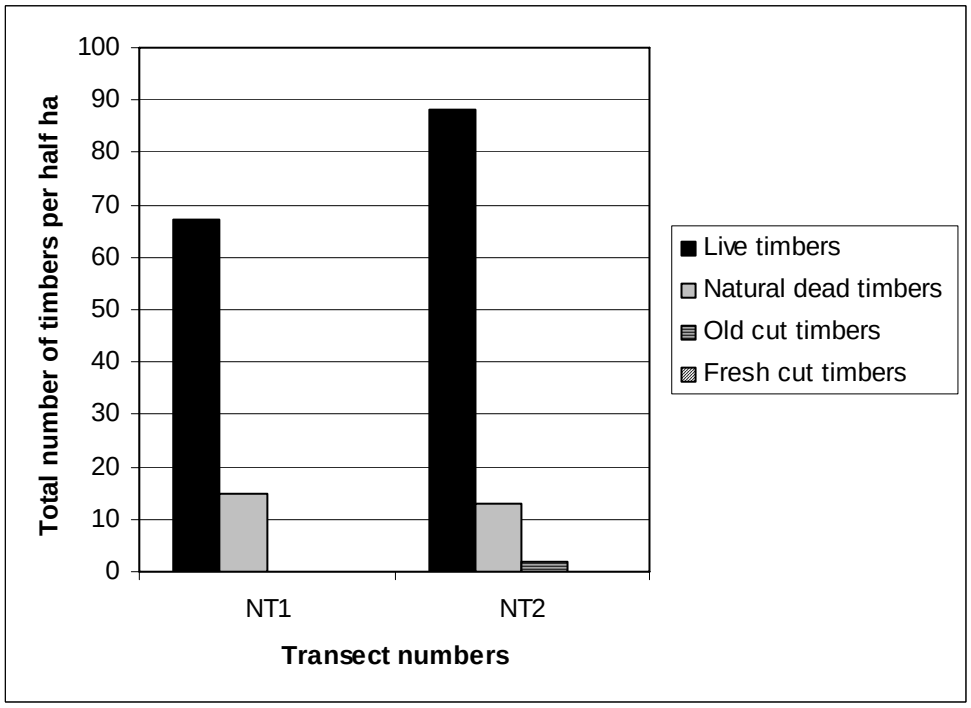

Fig 6. Abundance of live, natural dead, old cut and fresh cut timbers along disturbance transects, Noto

Other human disturbances

Rondo

In addition to the cut poles and timbers presented in Tables 1&2 above, fire damage, path, hunting, planks and medicinal plant harvesting were other human disturbances which were also recorded along the transects. Path was observed five times, fire damage eight times, hunting two times and pitsawing and planks were noted only once. Transectwise, RN3 appears to have more events of disturbance whereby fire was recorded six times, pitsawing, path and planks once each. Along transect RN2; path was encountered three times, fire once, hunting twice and tree debarking for local medicine only once. Path and fire damage were recorded only once along transect RN1.

Also, piles of cut poles were found inside the closed forest. The villagers at Ntene mentioned the poles to be used by the Rondo Plantation Project for establishing tree nurseries.

The Plantation project has established a network of roads on the peripheries as well inside the indigenous forest. The roads are used to access their plantation plots which some of them are in the centre of the indigenous forest.

Makangala

Fire and path were the only disturbances recorded along the transects in addition to the cut poles and timbers presented in Tables 3&4 above. Fire was recorded two times in transect MK1 and only once in transect MK2. Path was only recorded along transect MK2.

Noto forest

Fire, pitsawing and planks were the disturbances which were recorded in Noto forest. Fire was recorded once in each transect while pitsawing and planks were recorded in transect NT2. This is in addition to the cut timbers and poles presented in Table 5&6.

Also, forest gaps with secondary growth were observed in Noto plateau. According to the interviews with the locals, people were living on the plateau before Tanganyika independence. Even after independence, some people were still living and cultivating on the plateau till 1974. The forest in these areas comprised of a mosaic of coastal vegetation plus trees such as mango and cashewnut trees. Also, an old track and old settlement site which were used by Germans (according to the locals) during the colonial period was seen in the forest.

Celtel (T) Company has constructed a telecommunication mast at the center of the forest on the plateau. The company has also established a road which goes up to the tower through Ruhoma village.

Appendix 4. Indicator species on the Rondo Plateau.

Forest	**Rondo**	**Rondo**	**Rondo Plateau West of Forest Reserve**
Date	040708	050708	050708
Transect Number	1	2	3
Transect length	500	500	500
Easting start	522143	515476	515331
Easting end	521710		514848
Northing start	8883686	8887933	8883940
Northing end	8883671		8883832
Altitude			
Vegetation type	Forest border to the E> is Rondo plantation (harvested) to west is the Rondo coastal forest.	Evergreen forest patch in wooded grassland on west boundary road of the forest	Evergreen forest patch along the boundary road to west in woodland outside of Rondo FR
Dominant canopy species	*Milicia excelsa, Albizia gummifera, Dombeya spl, Ricinodendron hudelotii*	*Albizia adianthifolia, Cussonia zimmermannii and Milicia excelsa*	*Milicia excelsa, Millettia usaramensis, Albizia adianthifolia*
Common understorey tree, shrub and herb species	*Tabernaemontana, Pachysipon, Afromomum sp, Brillantasia sp., Tricalysia pallens, Clausena anisa, Tabaernaemontana ventricosa*	*Dialium holtzii, Rawsonia lucida, Acalpha sp., Carlvahoa campanulata, Blighia unijugata, Rourea sp., Chassalia sp. Vepris trichocarpa*	*Afromomum sp. Markhamia obustifolia, Justicia sp.*
Canopy height (m)	20 - 25	15-20	25-30
% Canopy cover	100	> 50	> 50
Topography	Plateau		
Signs of resource use:	Very little but to the east is the Rondo plantation	None	None
Afzelia quanzensis trees			1
Pterocarpus angolensis trees			
Milicia excelsa trees	12	3	3
Millettia stuhlmannii tree			
Hymenaea verrucosa tree			
Albizia gummifera tree	24		
Albizia adianthifolia tree			1
Afzelia quanzensis sapling			

Forest	**Rondo**	**Rondo**	**Rondo Plateau West of Forest Reserve**
Milicia excelsa sapling		3	6
Millettia stuhlmannii sapling			
Hymenaea verrucosa sapling			
Albizia gummifera sapling	7		
Albizia adianthifolia sapling			1
Pterocarpus angolensis sapling			
Afzelia quanzensis seedling (presence)			
Milicia excelsa seedling (presence)		1	
Millettia stuhlmannii seedling (presence)			
Hymenaea verrucosa seedling (presence)			
Presence			
Saintpaulia ionantha			
Baikiaea ghesquiereana			
Tessmannia densiflora			
Cynometra filifera			
Cynometra gillmannii			
Cynometra longipedicellata			1
Scorodophloeus fischerii			
Streptosiphon hirsutus			
Erythrina schliebenii			
Karomia gigas			
Gigasiphon macrosiphon			
Encephalartos hildebrandtii			
Other species recorded	*Pyrostria sp., Chassalia sp* and *Canthium rondoense*		Endemics: *Pteleopsis apetala, Dichapetalum braunii, Plumbago ciliata, Leptactina papyrophloea, Canthium rondoense, Sterculia schliebenii, Barleria sp.*

Appendix 5 Indicator species in Makangala and Noto Plateau

Forest	**Makangala FR**	**Makangala FR**	**Noto Plateau**	**Noto Plateau**	**Noto Plateau**
Date	70708	70708	80708	80708	90708
Transect Number	4 south	5	6	7	
Transect length	500	500	500	500	
Easting start	543765	542761	546401	547608	No GPS point available
Easting end	543850	542786	546369	547364	No GPS point available
Northing start	8895151	8895159	8906220	8906674	No GPS point available
Northing end	8894580	8895662	8906722	8906496	No GPS point available
Altitude			509	511	
Vegetation type	Miombo woodland	Miombo woodland	Closed woodland	Closed woodland.	Closed woodland down to open woodland mixed with abandoned cultivated areas
Dominant canopy species	*Brachystegia spiciformis, Pterocarpus angolensis*	*Brachystegia spiciformis, Pteleopsis myrtifolia* and *Monotes sp.*	*Pteleopsis myrtifolia, Afzelia quanzensis*	*Zanthoxylum deremense, Grewia conocarpa, Afzelia quanzensis, Pteleopsis myrtifolia*	*Pteleopsis myrhifolia, Milicia excelsa, Afzelia quanzensis*
Common understorey tree, shrub and herb species	*Diplorrhynchus candylocarpon, Ximenia anericana, Securidaca longipedicellata*	*Diplorrhunchus randylocarpon, Dichrostachyus cinerea*	*Annona senegalensis, Strychnos sp., Xylotheca tectensis*	*Carvalhoa campanulata, Erythrococca fischeri, Cyathula sp.*	
Canopy height (m)		10-12	10-15	15-20	10-20
% Canopy cover	< 50	50	<50	> 50	> 50
Topography					
Signs of resource use:	Some pole cutting and logging (Pterocarpus angolensis)	Old pole cutting and burning	Pole cutting, little burning	Abandoned cultivation more than 30 years ago and pole cutting	
Afzelia quanzensis trees	2	6	6	13	26
Pterocarpus angolensis trees	8	2	4		

Forest	**Makangala FR**	**Makangala FR**	**Noto Plateau**	**Noto Plateau**	**Noto Plateau**
Milicia excelsa trees			2	4	20
Millettia stuhlmannii tree	1	1			2
Hymenaea verrucosa tree		1	1	2	10
Albizia gummifera tree					
Albizia adianthifolia tree					
Afzelia quanzensis sapling			2		17
Milicia excelsa sapling			1	4	9
Millettia stuhlmannii sapling		3			10
Hymenaea verrucosa sapling			1	1	2
Albizia gummifera sapling					
Albizia adianthifolia sapling					
Pterocarpus angolensis sapling		3			
Afzelia quanzensis seedling (presence)	1	1	1	1	1
Milicia excelsa seedling (presence)			1	1	1
Millettia stuhlmannii seedling (presence)		1			1
Hymenaea verrucosa seedling (presence)			1	1	1
Presence					
Saintpaulia ionantha					
Baikiaea ghesquiereana					
Tessmannia densiflora					
Cynometra filifera					
Cynometra gillmannii					
Cynometra longipedicellata					
Scorodophloeus fischerii					1
Streptosiphon hirsutus					
Erythrina schliebenii					
Karomia gigas					
Gigasiphon macrosiphon					
Encephalartos hildebrandtii					
Other species recorded	*Monotes lutambensis*		*Lettowianthus stellatus*	*Lettowianthus stellatus*	