

IUCN Eastern Africa Programme

Mnazi Bay Ruvuma Estuary Marine Park

Rapid Assessment of Terrestrial Plant Diversity of Mnazi Bay Ruvuma Estuary Marine Park, Tanzania

W. R. Q. Luke



July 2004



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The World Conservation Union

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**For the UNDP/GEF Development of
Mnazi Bay Ruvuma Estuary Marine Park (MBREMP) Project**

July 2004

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Cover photo: W. R. Q. Luke. *Berlinia orientalis* Brenan Leguminous tree endemic to southern Tanzania/northern Mozambique.

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1. INTRODUCTION

The importance of the Eastern African coastal strip in terms of plant diversity was first highlighted by White during his preparation of his Vegetation Map of Africa (**White, 1983**). Assigning boundaries to this strip and giving the name “Zanzibar-Inhambane (ZI) Regional Mosaic”, he drew attention both to the limited area occupied and the richness of species restricted to this region. Various workers continued to document the distribution of the ZI endemics, including the author (**Robertson & Luke, 1993**) and this led to the selection of this area with the addition of the Eastern Arc Mountains as one of the 25 Global Biodiversity Hotspots (**Myers et al, 2000**).

In assessing this combined area for the “Ecosystem Profile” in 2003 as a precursor for the release of funding under the Critical Ecosystems Partnership Fund (CEPF), the author found that the coastal area included within the “hotspot” did not correspond to White’s ZI mosaic, but was delimited by the political boundaries of Kenya and Tanzania. However, WWF’s ecosystem approach did include the extension into Mozambique (**Schipper & Burgess, 2003**). With a view to clarifying the plant distributions throughout the area, particularly the endemic species reported from coastal southern Tanzania, the author obtained funding from Conservation International to travel via southern Tanzania to northern Mozambique to investigate. On notifying the IUCN Technical Advisor to the UNDP/GEF Development of Mnazi Bay - Ruvuma Estuary Marine Park project (MBREMP) that he would be passing through Mtwara on this mission, the author was contracted by IUCN to carry out a Rapid Assessment (RA) of the Marine Park.

2. AIMS

Travelling with Omari Kibure of the Botanical Training Programme based in Arusha, Quentin Luke (QL) was given the following terms for the assessment:

1. *Develop an inventory of plants and description phytogeographic (terrestrial plant) zones based on a rapid assessment of the area and advice from MBREMP staff. The results should be geo-referenced for inclusion in the MBREMP database and GIS.*
2. *Identify rare/endemic plant species in MBREMP based on the rapid assessment.*
3. *Provide an inventory of alien plant species within MBREMP based on the rapid assessment.*
4. *Provide recommendations to MBREMP on terrestrial plant conservation and management for any sites of special conservation value identified during the rapid assessment.*
5. *Identify any areas of ecotourism potential relating to terrestrial plant ecosystems, based on the rapid assessment.*
6. *Submit a report that draws together the above, the findings of the rapid assessment and the recommendations for conservation and ecotourism potential based on the rapid assessment.*

3. THE PARK

The terrestrial component of MBREMP covers approximately 450 Km² of land, from the Ruvuma river in the south to the Msangamkuu peninsular, near Mtwara town, in the north (see Map **Appendix 5**). The area includes 12 villages and 3 sub-villages, with a population of approximately 30,000 people. Land-use is predominately based on subsistence agriculture and coconut/cashew-nut groves. Seasonal cultivation of rice and maize is predominately carried out on the Ruvuma river flood-plain.

4. TIMETABLE

It was agreed that four days would be sufficient for the RA, and since the rains appeared to be late, it was agreed to spend 2 days prior to entering Mozambique and 2 days after. Thus the following itinerary was completed (GPS points in brackets):

Nov. 30 th	Beach area – sand dunes near Msimbati (462); Ruvula – Latham House (463) Saltworks Peninsula (464)
Dec. 1 st	Rd to Kilambo (465) and Ferry landing; and upriver to Mahurunga (466, 467, 468, 469, 470); above Mahurunga (471)
Dec. 18 th	Ruvula to Naponda Island (542)
Dec. 19 th	Liteembe – Ruvuma Delta; Luwave and seafront forest

5. DATA COLLECTION – METHODOLOGY

Given the large area, the short study period and the lack of any aerial photos, the choice of survey points for natural vegetation was left to MBREMP staff, many of whom, being marine oriented, did not have much knowledge of the terrestrial part of the Park. The poor condition of the vegetation due to the lateness of the rains was a great impediment, both in selecting areas and in finding identifiable material amongst the dry ‘sticks’. No quantitative survey was attempted and the inventory proceeded on a totally random, serendipitous basis. Species encountered that QL was positive of the identity were ‘sight recorded’, plants that were unfamiliar or difficult to name with certainty were collected for pressing, drying and later identification using floral keys (**FTEA, 1952 -**) and comparison back in the Herbarium in Nairobi.

6. RESULTS

During the four days, a total of 254 records were made, representing 248 taxa. Of these, 119 taxa were trees, 49 shrubs, 45 climbers or scandent shrubs, 32 herbs, 2 ferns and 1 hemi-parasite.

- 6.1. Exotics.** 35 species can be classed as exotic plants ie those not naturally present in the area (see **Appendix 1**). This is debatable in the cases of the coconut and casuarina, claimed by some experts to be international drift-seeds and therefore ‘naturally’ present! None of these aliens can be considered 'virulent'. Most are either crop plants or irritating exotic ornamentals like the sweet smelling tree near Latham's house, *Millingtonia hortense*.

- 6.2. Msimbati Dunes Pt 462.** Rising to approximately 15m, these white dunes are similar in structure to other East African coastal dunes and are similarly sparse in vegetation, more so than usual due to the dry season (thus lacking any of the usual annuals). Three plants were possible new records (see **Appendix 2**) for T8, *Vepris lanceolata*, *Pentarrhopalopilia umbellulata* and *Tarennia littoralis* with the most exciting find being a small tree near the beach that is most likely *Diospyros quiloensis* (named after the port of Kilwa), apparently not collected in Tanzania for over 100 years (**White, 1996**) although known from Mozambique, Malawi, Zambia and Zimbabwe. Further northwest, amongst the many exotics around Latham's house (pt 463), the climbing orchid, *Vanilla roscheri*, was seen. As this has not been recorded from T8 before, a proper collection should be made.
- 6.3. Saltworks Woodland Pt 464.** South of the road into Msimbati, opposite the Saltworks, is an area of indigenous woodland. The survey noted several typical coastal species and on-going clearance of this natural area for farms. Many more species would have been identifiable in this area had it been wetter, but in the dry conditions, the only species of note was a sedge that could be the fairly rare species *Remirea maritima* (**Haines & Lye, 1983**). A collection is needed to confirm this.
- 6.4. Kilambo Road Pt 465.** Survey of this road and on down to the ferry crossing produced many typical flood-plain species such as the red flowered *Combretum constrictum*, the common shrub, *Pluchea dioscoridis* and the spiny purple flowered herb, *Hygrophila auriculata*. It was surprising to find that the white flowered twiner, *Derris trifoliata*, many years ago the source of the insecticide "Derris Powder", had not been recorded from T8 previously.
- 6.5. Berlinia Woodland Pt 468.** The road to Mahurunga passes through a depression (pt 466) on the sides of which was found the T8/Moz endemic tree, *Baphia macrocalyx* and the extremely rare T8 endemic shrub, *Premna hans-joachimii*. This latter plant was identified in Kew by the author of the species, Bernard Verdcourt (**FTEA, 1992**). A little further on a wet seepage area (pt 467) produce several 'swamp' records such as the mangrove fern *Acrostichum aureum*, the water cabbage, *Pistia stratiotes* in the arum family and the bright yellow flowered *Nidorella microcephala*. Not far from this stands probably the last remaining population of the rare (in Tanzania) T8/Moz endemic tree *Berlinia orientalis*. Although found in quite extensive *Berlinia* dominant woodland in northern Mozambique (where we found it in a mass of white flower), it would appear to be extremely rare in Tanzania. Every effort should be made to preserve what little remains within MBREMP (also see under **7. Comments and Recommendations**).
- 6.6. Ruvuma Bank Pt 469.** The edge of the Ruvuma is not very exciting on the northern bank, in contrast to the much steeper Mozambican side. It was hoped that the team would find the rare, white flowered *Bauhinia loeseneriana* (**Bidgood, 1992**) but, in this, they failed. Apart from a lot of the tall bamboo-like grass, *Phragmites mauritianus*, and a few *Borassus aethiopum* palms, this part of the flood-plain added few records to the inventory.
- 6.7. Mahurunga Heights Pt 470.** Climbing up above the village of Mahurunga, a large area of natural bushland was found. It was difficult, at the time, to judge whether this was within the Park boundary (the map shows the GPS point to be outside the

boundary), but it was of interest in that most was under immediate threat of slashing and burning. It was extremely dry and only a few species were recognisable amongst the flames other than a few more *Baphia macrocalyx* and a *Milicia excelsa* (mvule). Even though this area falls outside the boundary, it should still be a priority to check further clearance and carry-out an inventory during the rains with a view to preserving some of it..

- 6.8. Roadside Patch Pt 471.** On the return trip to Mtwara, a small area of natural vegetation was noticed by the roadside. This was found to contain many interesting species, including what appears to be the first record of *Cassipourea mossambicensis* in Tanzania. Other records of interest were the yellow flowered shrub *Hugonia busseana* and the tree *Strychnos cocculoides* with its extremely corky, fire-proof bark.
- 6.9. Namponda Island Pt 542.** An old map of the area (c.1910) gives the name of this island as 'Mwana Hawandja'. On returning from Mozambique, the team made it a priority to survey of this raised, fossil coral island . Immediately on stepping ashore from the MBREMP boat, another tree of *Diospyros quiloensis vel sp aff* was found. It became apparent that a little rain had fallen in the intervening weeks and most of the deciduous species were beginning to flower or flush with new leaf. A tree of what might prove to be *Canthium vollesenii* was found in bud, but will need recollecting to be certain (FTEA, 1991a). This was previously only known from groundwater forest in the Selous GR (T6 and T8) and, since the habitat is so different, it may prove to be a new species close to *C. vollesenii*.

A small tree of the rare species *Commiphora madagascariensis* was collected. Contrary to what its name suggests, this *Commiphora* is endemic to T6/T8, although there is evidence that it was cultivated many years ago in India and Mauritius for its strong smelling sap (FTEA, 1991b). An extremely attractive tree was found with large white flowers and no leaves. This was the member of the Coffee family, in the section *Gardenieae*, described from the Selous GR (Vollesen, 1980) (but known from Malawi and Mozambique), *Phellocalyx vollesenii*. Another two plants were recorded for the first time in T8, *Aloe massawana* and *Psydrax recurvifolia*. Although the Aloe was not in flower, its habit exactly matched those seen in Kenya growing next to the sea at Waa and Shimoni and the author is confident of the identification.

During the survey the team walked through the fishing village on the southeastern end. Apart from witnessing a high degree of destruction of the vegetation for firewood, they also came across 8 fresh turtle shells (remnants of meat still attached) being used as seats for either a meeting or a drinking ceremony. The latter is suggested by the high degree of intoxication amongst the residents witnessed at 11 am. Also noted were the mounds of sea shells, most likely collected as bait or food species rather than for their ornamental shells (see 7. **Recommendations** below). Close to this encampment, the team was shown a large baobab with a natural water reservoir formed between its branches.

- 6.10. The Delta Mangroves and Forest Patches** (no GPS readings, position on map estimated). The last day of the survey was spent visiting the Ruvuma delta. This was achieved by meeting up with the project crew members who had taken the MBREMP boat round to spend the night before at Litembe. After navigating through the mangroves, a forest patch was visited at Luwave. The dominant species, although

still completely leafless, is thought to be *Pteleopsis myrtifolia*. Very few additions were made to the species list, apart from the first mistletoe, *Viscum gracile*, but in the third patch visited perhaps the most exciting plant of the survey was found. A close relative of the genus *Coffea*, the shrub, *Psilanthus sp A* of FTEA, was found almost leafless, but with candle-like, cream, tubular flowers in bud, with the apices curiously twisted. As the name suggests, this plant has been collected before but in insufficient quantity or quality to be able to describe and give it a scientific epithet (FTEA, 1988). The fruits still need to be collected before a proper description can be made.

7. ECOTOURISM

The potential for tourism in this area is huge. Whether this potential can be tapped in the near future is another question. The one, semi-functioning, tourism enterprise at Ruvula that was visited, closed soon after due to a dispute over park entrance fees. The long sandy beaches and clear warm sea are the architypal tourists' paradise. Coupled with the reported interesting coral species (King, *pers. comm.*) so that recreational diving should be saleable, there is little doubt that as Mtwara develops, MBREMP will become increasingly busy. The development of the natural gas field to supply Mtwara should hasten the towns expansion, but the Park is unlikely to keep pace unless some very enlightened approach is taken to encouraging investment in the area. Already a somewhat avaricious entrance fee tariff has been adopted before any facilities/security/information is available for visitors. With sensible long-term planning, this area could become an income generating concern, as well as serving the local community in employment and improved food security.

There are a few suggestions/warnings that can be made:

- a) The first is that the Msimbati sand dune area should be left untouched. The delicate nature of these dunes would not survive any kind of development.
- b) The island (Namponda) is the prime tourism site of the Park, but should not be considered without an extremely stringent EIA, followed by a cast-iron development contract (see also paragraph 8.3).
- c) This also applies to the 'forest islands' in the Delta. The ocean front, with its sandy beaches, may be very tempting as development sites, but would be far more valuable as temporary visiting sites and would not then conflict with local communities fishing and mangrove harvesting.
- d) On this brief visit one robbery was experienced. In talking to villagers, it was apparent that a fairly negative attitude exists towards visitors. Unless a long careful education programme on 'ecotourism, its management and needs' is carried-out, the industry will flounder before it is very much beyond inception.

8. COMMENTS AND RECOMMENDATIONS

This study was too brief in duration and carried-out during the worst possible season for a vegetation survey. Nevertheless, it has produced many interesting records and valuable additions to our knowledge of the area. It should not be left there. The following recommendations are made:

- 8.1. As part of a management plan for the Park, the plant species inventory should be continued and expanded to include community knowledge and use of these resources.
- 8.2. As part of an overall monitoring programme for the health of the terrestrial portion of the Park, some permanent vegetation plots should be selected and demarcated within the different zones. This is of greatest importance within the mangroves so as to be able to monitor off-take and set management guidelines.
- 8.3. Namponda Island is much too valuable to be slowly destroyed by the unruly fishing camp. As much for social reasons as for conservation concerns, this village should be relocated to the mainland where proper health, schooling and administration will be available. Whether at a later date the Park management decides it is in the interests of the Park to lease this area to a tourist development (with the controls mentioned above) does not need to be decided now.
- 8.4. Some decision must be taken as to what effort will be made to preserve and improve what little indigenous vegetation remains. Due to the complexity of the many human settlements within the gazetted terrestrial portion of the Park, the process of negotiating 'no-development' areas will require much time and resources (as mentioned above, the *Berlinia* Woodland would be one such area). However it is extremely important that these boundaries are set if this terrestrial portion is to be taken seriously.
- 8.5. The integrity of the Park would be hugely increased by the expansion into a 'trans-boundary' Park with Mozambique. As part of the Mtwara Development Corridor Plan (**Min. T. & I., 2003**) this should be made a priority whilst there is still very little settlement on the Mozambique side. By adding the other bank, the Ruvuma immediately becomes a major focus and attraction for the Park both for wildlife and tourism activities such as boating.
- 8.6. A further expansion of the Park land could be achieved by incorporating the Ziwani Forest Reserve. This was discussed briefly with the Project staff and it was thought to be too far outside the boundary. With the advent of new approaches to corridor establishment using land-use agreements, it is not impossible that this reserve could be connected and regenerated in the future. This has huge potential for community involvement in the production of fuelwood (a mammoth problem in the Mtwara area) as well as the opportunity of conserving a greater area of natural vegetation.

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APPENDIX 1: EXOTIC SPECIES RECORDED WITHIN MBREMP

Exotic Species recorded within MBREMP	Common name/Comment
<i>Acacia sp</i>	Australian acacia
<i>Albizia lebbbeck</i> (L.)Benth.	
<i>Anacardium occidentale</i> L.	Cashewnut
<i>Ananas comosus</i> (L.)Merr.	Pineapple
<i>Annona muricata</i> L.	Soursop
<i>Annona squamosa</i> L.	Sugar Apple
<i>Azadirachta indica</i> A.Juss.	Neen
<i>Bauhinia galpinii</i> N.E.Br.	
<i>Carica papaya</i> L.	Pawpaw
<i>Cassia fistula</i> L.	
<i>Casuarina equisetifolia</i> L.	Casuarina
<i>Catharanthus roseus</i> (L.)G.Don	Malagasy Periwinkle
<i>Ceiba pentandra</i> (L.)Gaertn.	Kapok
<i>Citrus sp</i>	
<i>Cocos nucifera</i> L.	Coconut
<i>Cordia sebestena</i> L.	
<i>Datura metel</i> L.	
<i>Delonix regia</i> (Hook.)Raf.	Flamboyant
<i>Ipomoea carnea</i> Jacq. ssp <i>fistulosa</i> (Choisy)D.Austin	
<i>Jatropha curcas</i> L.	Physic Nut
<i>Justicia gendarussa</i> Burm.f.	
<i>Leucaena latisiliqua</i> (L.)Gillis?	
<i>Mangifera indica</i> L.	Mango
<i>Manihot esculenta</i> Crantz	Casava
<i>Millingtonia hortensis</i> L.f.	
<i>Mimosa pigra</i> L.	Sensitive Plant
<i>Moringa oleifera</i> Lam.	Horseradish Tree
<i>Musa acuminata</i> Colla	Banana
<i>Plumeria obtusa</i> L.	Frangipani
<i>Psidium guajava</i> L.	Guava
<i>Ricinus communis</i> L.	Castor-oil
<i>Saccharum sp</i>	Sugarcane
<i>Senna siamea</i> (Lam.)Irwin & Barnaby	
<i>Stachytarphetoides urticifolia</i> Sims	
<i>Thevetia peruviana</i> (Pers.)Merr.	

APPENDIX 2: PLANT RECORDS BY LOCATION

Species	Comment
Msimbati Dunes - pt462	
<i>Azelia quanzensis</i> Welw.	
<i>Abrus precatorius</i> L. <i>ssp africanus</i> Verdc.	
<i>Balanites maughamii</i> Sprague <i>ssp acuta</i> Sands?	
<i>Capparis sepiaria</i> L.	
<i>Cassytha filiformis</i> L.	
<i>Clerodendrum glabrum</i> E.Mey.	
<i>Commiphora ugogensis</i> Engl.?	
<i>Cyperus crassipes</i> Vahl	
<i>Deinbollia borbonica</i> Scheff.	
<i>Diospyros quiloensis</i> (Hiern)F.White <i>vel sp aff</i>	Not collected in Tz for 100yrs!
<i>Diospyros loureiriana</i> G.Don	
<i>Dovyalis hispidula</i> Wild	
<i>Erythroxylum platyclados</i> Bojer	
<i>Euclea divinorum</i> Hiern	
<i>Eugenia capensis</i> (Eckl. & Zeyh <i>ssp multiflora</i> Verdc.	
<i>Garcinia livingstonei</i> T.Anders.	
<i>Hyphaene coriacea</i> Gaertn.	
<i>Indigofera</i> sp	
<i>Ipomoea pes-caprae</i> (L.)R.Br. <i>ssp braziliensis</i> (L.)van Ooststr.	
<i>Lannea schweinfurthii</i> (Engl.)Engl. <i>var acutifoliolata</i> (Engl.)Kokw.	
<i>Mystroxydon aethiopicum</i> (Thunb.)Loes.	
<i>Olax dissitiflora</i> Oliv.	
<i>Ozoroa obovata</i> (Oliv.)R. & A.Fernandes	
<i>Pentarrhopalopilium umbellulata</i> (Baill.)Hiepko	No T8 in FTEA
<i>Scaevola plumieri</i> (L.)Vahl?	If frt black
<i>Sideroxydon inerme</i> L. <i>ssp diospyroides</i> (Bak.)J.H.Hemsley	
<i>Strychnos spinosa</i> Lam.	
<i>Tarenna littoralis</i> (Hiern)Bridson	DNA specimen to UPS. 1st T8
<i>Tephrosia pumila</i> (Lam.)Pers. <i>var aldabraensis</i> (J.R.Drum. & Hems.)Brummitt	
<i>Vepris lanceolata</i> (Lam.)G.Don	1st T8
<i>Vigna</i> sp	
<i>Xenostegia tridentata</i> (L.)Austin & Staples	
<i>Xylothea tettensis</i> (Klotzsch)Gilg	
Latham House pt 463	
<i>Azima tetracantha</i> Lam.	
<i>Canavalia rosea</i> (Sw.)DC.	
<i>Cleistanthus schlechteri</i> (Pax)Hutch.	
<i>Dichrostachys cinerea</i> (L.)Wight & Arn.	
<i>Flagellaria guineensis</i> Schumach.	
<i>Hibiscus tiliaceus</i> L.	
<i>Maclura africana</i> (Bureau)Corner	
<i>Macrotyloma</i> sp	

Species**Comment**

Phyllanthus reticulatus Poir.?
Polysphaeria multiflora Hiern
Salacia stuhlmanniana Loes.
Salvadora persica L.
Sclerocarya birrea (A.Rich.)Hochst. *ssp caffra* (Sond.)Kokw.
Tamarindus indica L.
Triainolepis africana Hook.f. *ssp africana*
***Vanilla roscheri* Reichb.f.**

1st T8? Collect

Nr Saltworks pt 464

Acacia nilotica (L.)Del.
Albizia harveyi Fourn.
Albizia petersiana (Bolle)Oliv.
Ancylobotrys petersiana (Klotzsch)Pierre
Asparagus flagellaris (Kunth)Baker
Cassia abbreviata Oliv. *ssp beareana* (Holmes)Brenan
Cissus sp cf egestosa Werderm.
Cocculus hirsutus (L.)Diels
Dalbergia melanoxylon Guill. & Perr.
Diospyros bussei Guerke
Dobera loranthifolia (Warb.)Harms
Elaeodendron schlechterianum (Loes.)Loes.
Entada stuhlmannii (Taub.)Harms
Kigelia africana (Lam.)Benth.
Maerua kirkii (Oliv.)F.White
Manilkara sansibarica?
Pentodon pentandrus (Schum. & Thonn.)Vatke
Piliostigma thonningii (Schumach.)Milne-Redh.
Pseudolachnostylis maprouneifolia Pax
Pyrostria bibracteata (Bak.)Cavaco
***Remirea maritima* Aubl.?**
Rhynchosia sp
Senna auriculata (L.)Roxb.
Sterculia africana (Lour.)Fiori
Terminalia sp
Thilachium africanum Lour.
Vitex payos (Lour.)Merr.

1st T8? Collect

Road to ferry

Bonamia mossambicensis (Klotzsch)Hall.f.
Brachystegia spiciformis Benth.
Dichapetalum stuhlmannii Engl.
Diplorhynchus condylocarpon (Muell.Arg.)Pichon
Markhamia acuminata (Klotzsch)K.Schum.
Pteleopsis myrtifolia (Laws.)Engl. & Diels
Tetracera boiviniana Baill.
Vitex doniana Sweet

Species	Comment
Nr Kilambo pt465	
<i>Abildgaardia triflora</i> (L.)Abeywickr.	det Muasya
<i>Acacia polyacantha</i> Willd. <i>ssp campylacantha</i> (A.Rich.)Brenan	
<i>Acacia robusta</i> Burch. <i>ssp usambarensis</i> (Taub.)Brenan	
<i>Adansonia digitata</i> L.	
<i>Barringtonia racemosa</i> (L.)Spreng.	
<i>Bombax rhodognaphalon</i> K.Schum.	
<i>Chamaecrista absus</i> (L.)Irwin & Barneby	
<i>Combretum constrictum</i> (Benth.)Laws.	
<i>Combretum pentagonum</i> Laws.	
<i>Derris trifoliata</i> Lour.	1st T8?
<i>Eclipta prostrata</i> (L.)L.	
<i>Ficus bussei</i> Mildbr. & Burret	
<i>Ficus sycomorus</i> L.	
<i>Grewia pedunculata</i> K.Schum.	
<i>Hewittia malabarica</i> (L.)Suresh	
<i>Hygrophila auriculata</i> (Schumach.)Heine	
<i>Hyphaene compressa</i> H.Wendl.	
<i>Imperata cylindrica</i> (L.)Raeuschel	
<i>Ipomoea aquatica</i> Forssk.	
<i>Keetia zanzibarica</i> (Klotzsch)Bridson <i>ssp zanzibarica</i>	
<i>Lonchocarpus bussei</i> Harms	
<i>Maerua angolensis</i> DC.	
<i>Millettia stuhlmannii</i> Taub.	
<i>Momordica trifoliolata</i> Hook.f.	
<i>Pluchea dioscoridis</i> (L.)DC.	
<i>Premna velutina</i> Guerke	
<i>Psychotria</i> sp	
<i>Pyrenacantha kaurabassana</i> Baill.	
<i>Rinorea elliptica</i> (Oliv.)Kuntze	
<i>Synaptolepis alternifolia</i> Oliv.	
<i>Tiliacora funifera</i> (Miers)Oliv.	
Road to Mahurunga pt466	
<i>Baphia macrocalyx</i> Harms	T8/Moz endemic
<i>Gonatopus boivinii</i> (Decne.)Engl.	
<i>Olox pentandra</i> Sleumer	
<i>Premna hans-joachimii</i> Verdc.	Rare T8 endemic.
Det Verdc.	
<i>Salacia elegans</i> Oliv.	
<i>Strophanthus kombe</i> Oliv.	
Road to Mahurunga pt467	
<i>Acrostichum aureum</i> L.	
<i>Antidesma venosum</i> Tul.	
<i>Ceratopteris thalictroides</i> (L.)Brongn.	

Species	Comment
<i>Dissotis rotundifolia</i> (Sm.) Triana	
<i>Ethulia paucifructa</i> M.G. Gilbert	
<i>Ipomoea mauritiana</i> Jacq.	
<i>Ludwigia leptocarpa</i> Nutt.	
<i>Millettia bussei</i> Harms	
<i>Nidorella microcephala</i> Steetz	
<i>Oldenlandia affinis</i> (Roem. & Schult.) DC. <i>ssp fugax</i> (Vatke) Verdc.	
<i>Pistia stratiotes</i> L.	
<i>Scleria racemosa</i> Poir.	
<i>Tephrosia villosa</i> (L.) Pers. <i>ssp ehrenbergiana</i> (Schweinf.) Brummitt	
<i>Torenia thouarsii</i> (Cham. & Schlechtd.) Kuntze	
<i>Typha domingensis</i> Pers.?	
Berlinia patch pt468	
<i>Albizia glaberrima</i> (Schumach. & Thonn.) Benth.	
Berlinia orientalis Brenan	T8/Moz endemic
<i>Blighia unijugata</i> Bak.	
<i>Culcasia orientalis</i> Mayo	
<i>Smilax anceps</i> Willd.	
Ruvuma riverbank pt 469	
<i>Borassus aethiopum</i> Mart.	
<i>Phragmites mauritianus</i> Kunth	
<i>Trichilia emetica</i> Vahl	
pt470	
<i>Milicia excelsa</i> (Welw.) C.C. Berg	
Mahurunga Ziwa	
<i>Cordyla africana</i> Lour.	
<i>Lawsonia inermis</i> L.	planted? Henna
Road Patch pt471	
<i>Artabotrys brachypetalus</i> Benth.	
<i>Buchnerodendron lasiocalyx</i> (Oliv.) Gilg	
Cassipourea mossambicensis (Von Brehm.) Alston	1st Tanz?
<i>Commiphora africana</i> (A. Rich.) Engl. <i>var africana</i>	
<i>Flacourtia indica</i> (Burm.f.) Merr.	
<i>Grewia conocarpa</i> K. Schum.	
<i>Hugonia busseana</i> Engl.	
<i>Margaritaria discoidea</i> (Baill.) Webster <i>var triplosphaera</i> A.R.-Sm.?	
<i>Maytenus mossambicensis</i> (Klotzsch) Blakelock <i>var mossambicensis</i>	
<i>Ochna kirkii</i> Oliv. <i>ssp kirkii</i>	det Verdc.
<i>Paropsia braunii</i> Gilg	
<i>Strychnos cocculoides</i> Bak.	
<i>Uvaria acuminata</i> Oliv. <i>forma = Robertson 6461</i>	peds not pilose

Species	Comment
Msimbati Village	
<i>Calotropis gigantea</i> (L.)Dryand.	
<i>Phoenix reclinata</i> Jacq.	
Namponda Island	
<i>Adenia kirkii</i> (Mast.)Engl.	
<i>Aloe massawana</i> Reynolds	1st T8
<i>Ampelocissus africana</i> (Lour.)Merr. var <i>africana</i>	
<i>Boscia</i> sp	
<i>Bridelia cathartica</i> Bertol.f.	
<i>Canthium mombazense</i> Baill.	
<i>Canthium vollesenii</i> Bridson vel sp aff	Recollect
<i>Cassipourea mossambicensis</i> (Von Brehm.)Alston	
<i>Cissus phymatocarpa</i> Masinde & L.E.Newton	
<i>Cleistanthus schlechteri</i> (Pax)Hutch.	
<i>Cleistanthus schlechteri</i> (Pax)Hutch.	
<i>Commiphora glandulosa</i> Schinz?	
<i>Commiphora madagascariensis</i> Jacq.	Rare T6/8 Endemic
<i>Commiphora zanzibarica</i> (Baill.)Engl.	
<i>Craibia brevicaudata</i> (Vatke)Dunn ssp <i>brevicaudata</i>	
<i>Diospyros consolatae</i> Chiov.	
<i>Diospyros quiloensis</i> (Hiern)F.White vel sp aff	Recollect fertile
<i>Drypetes reticulata</i> Pax	Male
<i>Drypetes reticulata</i> Pax	Female
<i>Euphorbia ampliphylla</i> Pax	
<i>Euphorbia tirucalli</i> L.	
<i>Gonatopus clavatus</i> Mayo	
<i>Grewia glandulosa</i> Vahl	
<i>Guettarda speciosa</i> L.	
<i>Justicia stachytarphetoides</i> (Lindau)C.B.Clarke	
<i>Ledebouria revoluta</i> (L.f.)Jessop	
<i>Mallotus oppositifolius</i> (Geisel.)Muell.Arg. var <i>lindicus</i> (A.R.-Sm.)A.R.-Sm.	
<i>Markhamia zanzibarica</i> (DC.)Engl.	
<i>Opilia amentacea</i> Roxb.	
<i>Phellocalyx vollesenii</i> Bridson	photo
<i>Psydrax recurvifolia</i> (Bullock)Bridson	1st T8
<i>Rhoicissus tridentata</i> (L.f.)Wild & Drummond	
<i>Rinorea arborea</i> (Thouars)Baill.	
<i>Sansevieria fischeri</i> (Baker)Marais	
<i>Scadoxus multiflorus</i> (Martyn)Raf. ssp <i>multiflorus</i>	
<i>Suregada zanzibariensis</i> Baill.	
Ruvula	
<i>Caesalpinia bonduc</i> (L.)Roxb.	
<i>Euphorbia cuneata</i> Vahl	

Species	Comment
Delta	
<i>Avicennia marina</i> (Forssk.)Vierh.	
<i>Ceriops tagal</i> (Perr.)C.B.Robinson	
<i>Dicerocaryum zanguebarium</i> (Lour.)Merrill	No T8 in FTEA. Collect
<i>Heritiera littoralis</i> Ait.	
<i>Lumnitzera racemosa</i> Willd.	
<i>Rhizophora mucronata</i> Lam.	
<i>Sonneratia alba</i> Sm.	
<i>Xylocarpus granatum</i> Koen.	
Luwave	
<i>Drypetes natalensis</i> (Harv.)Hutch. <i>var leiogyna</i>	
<i>Erythroxylum emarginatum</i> Thonn.	
<i>Euclea natalensis</i> A.DC. <i>ssp obovata</i> F.White	
<i>Strychnos panganensis</i> Gilg	
Ruvuma Bay	
<i>Ancylobotrys petersiana</i> (Klotzsch)Pierre	
<i>Commiphora pteleifolia</i> Engl.	
<i>Euphorbia nyikae</i> Pax?	
<i>Haplocoelum foliolosum</i> (Hiern)Bullock <i>ssp mombasense</i> (Bullock)Verdc.	
<i>Monanthes fornicata</i> (Baill.)Verdc.	1st T8?
<i>Psilanthus sp A</i> of FTEA	1st T8? Recollect DNA specimen
<i>Viscum gracile</i> DC.	

APPENDIX 3. – CHECKLIST OF THE PLANTS OF MBREMP

PTERIDOPHYTA

Parkeriaceae

Ceratopteris thalictroides (L.) Brongn.

Pteridaceae

Acrostichum aureum L.

SPERMATOPHYTA

ANGIOSPERMAE DICOTYLEDONES

Acanthaceae

Hygrophila auriculata (Schumach.) Heine
Justicia gendarussa Burm.f.
Justicia stachytarphetoides (Lindau) C.B. Clarke

Anacardiaceae

Anacardium occidentale L.
Lanea schweinfurthii (Engl.) Engl. var
acutifoliolata (Engl.) Kokw.
Mangifera indica L.
Ozoroa obovata (Oliv.) R. & A. Fernandes
Sclerocarya birrea (A. Rich.) Hochst. ssp
caffra (Sond.) Kokw.

Annonaceae

Annona muricata L.
Annona squamosa L.
Artabotrys brachypetalus Benth.
Monanthotaxis fornicata (Baill.) Verdc.
Uvaria acuminata Oliv. forma = Robertson
6461

Apocynaceae

Ancylobotrys petersiana (Klotzsch) Pierre
Catharanthus roseus (L.) G. Don
Diplorhynchus condylocarpon
(Muell. Arg.) Pichon
Plumeria obtusa L.
Strophanthus kombe Oliv.
Thevetia peruviana (Pers.) Merr.

Asclepiadaceae (Apocynaceae)

Calotropis gigantea (L.) Dryand.

Balanitaceae

Balanites maughamii Sprague ssp
acuta
Sands?

Bignoniaceae

Kigelia africana (Lam.) Benth.
Markhamia acuminata (Klotzsch) K. Schum.
Markhamia zanzibarica (DC.) Engl.
Millingtonia hortensis L.f.

Bombacaceae

Adansonia digitata L.
Bombax rhodognaphalon K. Schum.
Ceiba pentandra (L.) Gaertn.

Boraginaceae

Cordia sebestena L.

Burseraceae

Commiphora africana (A. Rich.) Engl. var
africana
Commiphora glandulosa Schinz?
Commiphora madagascariensis Jacq.
Commiphora pteleifolia Engl.
Commiphora ugogensis Engl.?
Commiphora zanzibarica (Baill.) Engl.

Caesalpiniaceae (Fabaceae)

Afzelia quanzensis Welw.
Bauhinia galpinii N.E.Br.
Berlinia orientalis Brenan
Brachystegia spiciformis Benth.
Caesalpinia bonduc (L.)Roxb.
Cassia abbreviata Oliv. *ssp beareana*
(Holmes)Brenan
Cassia fistula L.
Chamaecrista absus (L.)Irwin & Barneby
Delonix regia (Hook.)Raf.
Piliostigma thonningii
(Schumach.)Milne-Redh.
Senna auriculata (L.)Roxb.
Senna siamea (Lam.)Irwin & Barnaby
Tamarindus indica L.

Capparaceae

Boscia sp
Capparis sepiaria L.
Maerua angolensis DC.
Maerua kirkii (Oliv.)F.White
Thilachium africanum Lour.

Caricaceae

Carica papaya L.

Casuarinaceae

Casuarina equisetifolia L.

Celastraceae

Elaeodendron schlechterianum
(Loes.)Loes.
Maytenus mossambicensis
(Klotzsch)Blakelock *var mossambicensis*
Mystroxydon aethiopicum (Thunb.)Loes.
Salacia elegans Oliv.
Salacia stuhlmanniana Loes.

Combretaceae

Combretum constrictum (Benth.)Laws.
Combretum pentagonum Laws.
Lumnitzera racemosa Willd.
Pteleopsis myrtifolia (Laws.)Engl. & Diels

Terminalia sp

Compositae (Asteraceae)

Eclipta prostrata (L.)L.
Ethulia paucifruca M.G.Gilbert
Nidorella microcephala Steetz
Pluchea dioscoridis (L.)DC.

Convolvulaceae

Bonamia mossambicensis (Klotzsch)Hall.f.
Hewittia malabarica (L.)Suresh
Ipomoea aquatica Forssk.
Ipomoea carnea Jacq. *ssp fistulosa*
(Choisy) D.Austin
Ipomoea mauritiana Jacq.
Ipomoea pes-caprae (L.)R.Br. *ssp*
braziliensis (L.)van Ooststr.
Xenostegia tridentata (L.)Austin &
Staples

Cucurbitaceae

Momordica trifoliolata Hook.f.

Dichapetalaceae

Dichapetalum stuhlmannii Engl.

Dilleniaceae

Tetracera boiviniana Baill.

Ebenaceae

Diospyros bussei Guerke
Diospyros consolatae Chiov.
Diospyros loureiriana G.Don
Diospyros quiloensis (Hiern)F.White *vel*
sp aff
Euclea divinorum Hiern
Euclea natalensis A.DC. *ssp obovata*
F.White

Erythroxylaceae

Erythroxylum emarginatum Thonn.
Erythroxylum platyclados Bojer

Euphorbiaceae

Antidesma venosum Tul.
Bridelia cathartica Bertol.f.
Cleistanthus schlechteri (Pax)Hutch.
Drypetes natalensis (Harv.) Hutch var
leiogyna

Euphorbiaceae cont.

Drypetes reticulata Pax
Euphorbia ampliphylla Pax
Euphorbia cuneata Vahl
Euphorbia nyikae Pax?
Euphorbia tirucalli L.
Jatropha curcas L.
Mallotus oppositifolius
(Geisel.)Muell.Arg. var *lindicus*
(A.R.-Sm.)A.R.-Sm.
Manihot esculenta Crantz
Margaritaria discoidea (Baill.)Webster
var *triplosphaera* A.R.-Sm.?
Phyllanthus reticulatus Poir.?
Pseudolachnostylis maprouneifolia Pax
Ricinus communis L.
Suregada zanzibariensis Baill.

Flacourtiaceae

Buchnerodendron lasiocalyx (Oliv.)Gilg
Dovyalis hispidula Wild
Flacourtia indica (Burm.f.)Merr.
Xylothea tettensis (Klotzsch)Gilg

Goodeniaceae

Scaevola plumieri (L.)Vahl?

Guttiferae (Clusiaceae)

Garcinia livingstonei T.Anders.

Icacinaceae

Pyrenacantha kaurabassana Baill.

Lauraceae

Cassytha filiformis L.

Lecythidaceae

Barringtonia racemosa (L.)Spreng.

Linaceae

Hugonia busseana Engl.

Loganiaceae (Strychnaceae)

Strychnos cocculoides Bak.
Strychnos panganensis Gilg
Strychnos spinosa Lam.

Lythraceae

Lawsonia inermis L.

Malvaceae

Hibiscus tiliaceus L.

Melastomataceae

Dissotis rotundifolia (Sm.)Triana
Psidium guajava L.

Meliaceae

Azadirachta indica A.Juss.
Trichilia emetica Vahl
Xylocarpus granatum Koen.

Menispermaceae

Cocculus hirsutus (L.)Diels
Tiliacora funifera (Miers)Oliv.

Mimosaceae (Fabaceae)

Acacia nilotica (L.)Del.
Acacia polyacantha Willd. ssp
campylacantha (A.Rich.)Brenan
Acacia robusta Burch. ssp *usambarensis*
(Taub.)Brenan

Acacia sp cf latifolia
Albizia glaberrima (Schumach. & Thonn.)Benth.
Albizia harveyi Fourn.
Albizia lebbeck (L.)Benth.
Albizia petersiana (Bolle)Oliv.
Dichrostachys cinerea (L.)Wight & Arn.
Entada stuhlmannii (Taub.)Harms
Leucaena latisiliqua (L.)Gillis?
Mimosa pigra L.

Moraceae

Ficus bussei Mildbr. & Burret
Ficus sycomorus L.
Machura africana (Bureau)Corner
Milicia excelsa (Welw.)C.C.Berg

Moringaceae

Moringa oleifera Lam.

Myrtaceae

Eugenia capensis (Eckl. & Zeyh.)Sond. ssp
multiflora Verdc.

Ochnaceae

Ochna kirkii Oliv. ssp *kirkii*

Olacaceae

Olax dissitiflora Oliv.
Olax pentandra Sleumer

Onagraceae

Ludwigia leptocarpa Nutt.

Opiliaceae

Opilia amentacea Roxb.
Pentarhopalopilia umbellulata
(Baill.)Hiepko

Papilionaceae (Fabaceae)

Abrus precatorius L. ssp *africanus*
Verdc.

Baphia macrocalyx Harms
Canavalia rosea (Sw.)DC.
Cordyla africana Lour.
Craibia brevicaudata (Vatke)Dunn ssp
brevicaudata
Dalbergia melanoxyton Guill. & Perr.
Derris trifoliata Lour.
Indigofera sp
Lonchocarpus bussei Harms
Macrotyloma sp
Millettia bussei Harms
Millettia stuhlmannii Taub.
Rhynchosia sp
Tephrosia pumila (Lam.)Pers. var
aldabraensis J.R.Drum. & Hems.)Brummitt
Tephrosia villosa (L.)Pers. ssp
ehrenbergiana (Schweinf.)Brummitt
Vigna sp

Passifloraceae

Adenia kirkii (Mast.)Engl.
Paropsia braunii Gilg

Pedaliaceae

Dicerocaryum zanguebarium (Lour.)Merrill

Rhizophoraceae

Cassipourea mossambicensis (Von
Brehm.)Alston
Ceriops tagal (Perr.)C.B.Robinson
Rhizophora mucronata Lam.

Rubiaceae

Canthium mombazense Baill.
Canthium vollesenii Bridson vel sp aff
Guettarda speciosa L.
Keetia zanzibarica (Klotzsch)Bridson ssp
zanzibarica
Oldenlandia affinis (Roem. & Schult.)DC.
ssp *fugax* (Vatke)Verdc.
Pentodon pentandrus (Schum. &
Thonn.)Vatke
Phellocalyx vollesenii Bridson
Polysphaeria multiflora Hiern
Psilanthus sp A of FTEA
Psychotria sp

Psydrax recurvifolia (Bullock)Bridson
Pyrostria bibracteata (Bak.)Cavaco
Tarenna littoralis (Hiern)Bridson
Triainolepis africana Hook.f. ssp
africana

Rutaceae

Citrus sp
Vepris lanceolata (Lam.)G.Don

Salvadoraceae

Azima tetraacantha Lam.
Dobera loranthifolia (Warb.)Harms
Salvadora persica L.

Sapindaceae

Blighia unijugata Bak.
Deinbollia borbonica Scheff.
Haplocoelum foliolosum (Hiern)Bullock
ssp *mombasense* (Bullock)Verdc.

Sapotaceae

Manilkara sansibarica (Engl.)Dubard?
Sideroxylon inerme L. ssp *diospyroides*
(Bak.)J.H.Hemsley

Scrophulariaceae

Torenia thouarsii (Cham. &
Schlechtd.)Kuntze

Solanaceae

Datura metel L.

Sonneratiaceae

Sonneratia alba Sm.

Sterculiaceae

Heritiera littoralis Ait.
Sterculia africana (Lour.)Fiori

Thymelaeaceae

Synaptolepis alternifolia Oliv.

Tiliaceae

Grewia conocarpa K.Schum.
Grewia glandulosa Vahl
Grewia pedunculata K.Schum.

Verbenaceae

Avicennia marina (Forssk.)Vierh.
Clerodendrum glabrum E.Mey.
Premna hans-joachimii Verdc.
Premna velutina Guerke
Stachytarphetoides urticifolia Sims
Vitex doniana Sweet
Vitex payos (Lour.)Merr.

Violaceae

Rinorea arborea (Thouars)Baill.
Rinorea elliptica (Oliv.)Kuntze

Viscaceae

Viscum gracile DC.

Vitaceae

Ampelocissus africana (Lour.)Merr. var
africana
Cissus phymatocarpa Masinde & L.E.Newton
Cissus sp cf egestosa Werderm.
Rhoicissus tridentata (L.f.)Wild &
Drummond

ANGIOSPERMAE MONOCOTYLEDONES

Aloaceae

Aloe massawana Reynolds

Amaryllidaceae

Scadoxus multiflorus (Martyn)Raf. ssp
multiflorus

Araceae

Culcasia orientalis Mayo
Gonatopus boivinii (Decne.)Engl.
Gonatopus clavatus Mayo
Pistia stratiotes L.

Asparagaceae

Asparagus flagellaris (Kunth)Baker

Bromeliaceae

Ananas comosus (L.)Merr.

Cyperaceae

Abildgaardia triflora (L.)Abeywickr.
Cyperus crassipes Vahl
Remirea maritima Aubl.?
Scleria racemosa Poir.

Dracaenaceae

Sansevieria fischeri (Baker)Marais

Flagellariaceae

Flagellaria guineensis Schumach.

Gramineae (Poaceae)

Imperata cylindrica (L.)Raeuschel
Phragmites mauritianus Kunth
Saccharum sp

Hyacinthaceae

Ledebouria revoluta (L.f.)Jessop

Musaceae

Musa acuminata Colla

Orchidaceae

Vanilla roscheri Reichb.f.

Palmae (Arecaceae)

Borassus aethiopum Mart.
Cocos nucifera L.
Hyphaene compressa H.Wendl.
Hyphaene coriacea Gaertn.
Phoenix reclinata Jacq.

Smilacaceae

Smilax anceps Willd.

Typhaceae

Typha domingensis Pers.?

