BOTANICAL ASSESSMENT OF NGEZI FOREST, PEMBA

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Prepared for the Zanzibar Forestry Development Project of FINNIDA and the Finnish National Board of Forestry

CONTENTS

RECOMMENDATION

1. - A policy decision should be taken about the role of Ngezi Forest Reserve. If there is an interest in either forestry based on indigenous species, or in conservation, then a core forest area should be protected completely, without any disturbance, as a gene pool of forest species, and two buffer zones should be declared in which activities such as harvesting can take place; rehabilitation of the secondary bush should be accelerated. Specific recommendations about zonation are made in 3.3.5.1.

2. - For any timber harvesting zone there should be a plan involving a balance between extraction and growth rate of the standing timber; such a plan requires research into sustained yield capability. Minimum diameter size classes for harvesteable timber are strongly recommended, to prevent depletion of stock.

3. - Verani tourist development: the establishment of a hotel for sport fishing is not compatible with the function of a Forest Reserve. It is recommended that the hotel is sited elsewhere. If this is not possible, strict guidelines should be adhered to; the site for the hotel should not be as large as 900 x 300 meter; and the fishing boat harbour for the hotel should under no circumstances be sited on the southeast of the Verani{Tondooni peninsula, because of the fragile and unique vegetation there. The authority of the hotel site should remain under the Forest Department, so the FD can keep control over any changes on the site. The permanent accommodation for researchers, as recommended by Bensted-Smith, in the form of two bandas, would greatly help the research on Ngezi by Tanzanian and overseas researchers.

4.- The spread of *M aesopsis eminii* should be monitored. If there is reason to assume that the species is going to be a problem, larger stands should be harvested, and other individuals should be ring barked. A year later the forest should be checked again for new saplings, which should be removed.

BETWEEN 20 DECEMBER 1989 AND 2 JANUARY 1990 I VISITED NGEZI FOREST WITH THE PURPOSE OF PREPARING A REPORT, WHICH WAS TO INCLUDE:

A. -a description of vegetation types and their location in the reserve area
B. - an assessment of the conservation values and importance of the vegetation types for conservation in Pemba and globally; identification of the species that are most important from a conservation viewpoint and their main areas of occurrence
C. -ecological aspects affecting the management of Ngezi Forest for conservation or for forestry, and an assessment of the effects of the exploitation and the introduction of exotic species in the ecology of the forests .
D. -a review of the existing plant lists, and the list of vernacular names/botanical names of the tree species
E. -general forest and vegetation maps and any maps necessary to illustrate the findings, results and recommendations .
F. -identification of areas of concern or proposals for future management considerations

Ngezi Forest is situated in northwest Pemba (Northern Region, Micheweni District).

The soils of the main part of the forest are recent alluvial sands, but in the southern half there are stands of *Philippia* heath-land on white and red loam sands (these are very leached, and thus poor in minerals; the groundwater table is low). On the western side of the reserve (Tondooni peninsula) the soils are of the so-called "coral rag" type: thin sandy soil over coral, with many coral outcrops.

The climate of Ngezi is no different from that of the rest of Pemba: temperature between 212 celsius at the coldest and 342 celsius at the warmest; mean rainfall 1860 mm per year, with the Masika, or long rains (March-May), averaging 363 mm per month, and the Vuli, or short rains (November-December), averaging 175 mm per month. The climate is equable, and there is rain almost every week of the year.

Ngezi is a forest reserve, and the gazetted area covers 14.4 km2 (1440 hectare); of this area, some 550 hectare are covered with moist forest; 200 hectare are covered with coastal evergreen thicket and dry coastal forest; and 220 hectare are covered with giant heath vegetation. The remaining 490 hectares are secondary bush, resulting from over harvesting of the moist forest.

The status of Forest Reserve has been in force since the early 1920s. In 1923 the first planned extraction of timber started: mainly Mvule *(Milicia),* Mgulele *(Antiaris),* Msufi mwitu *(Bombax)* and Mwavi *(Erythrophloeum).* Since then, all of the moist forest has been used for selective harvesting, with the exception of the swamp forest. The forest on coral rag near Tondooni has also been exploited, mainly for Mvule. Replanting with both exotic and indigenous species has been carried out on harvested plots since the late 1940s. The Reserve is now divided into 84 compartments, which are marked by both cement beacons and boundary paths in the northern-central and eastern parts of the forest.

The ground staff at Ngezi Forest currently consists of 4 people; three of these accompanied me on all my visits to the forest, and impressed me by their sound knowledge of the trees of the forest.

Outside disturbance is encountered in the form of the cutting of poles (for building purposes) and firewood-collecting. This happens mostly near the margins of the forest, although the central heartland is regularly visited by poachers to collect firewood; in 1988 these poachers (or honey collectors) were probably responsible for the fire that devastated the entire heath area. In the Tondooni peninsula there is some collecting of young Mkindu *(Phoenix)* leaves for basketry.

A recent development is the proposed establishment of a beach hotel at Verani, near Tondooni village, but entirely within the Forest Reserve. At the time of my visit the

boundaries of this hotel plot, some 900m long and 300m wide, had been cleared and marked with small cement markers. The hotel is supposed to cater for a sport-fishing clientele, and I have heard reports that the organization concerned also wants to establish a base for their fishing boats on the south-eastern side of the Tondooni peninsula.

1. VEGETATION TYPES

1.1 MOIST FOREST

Situated on deep alluvial soils in the central Western part of the Reserve, the moist forest is dominated by Mjoho *(Odyendea zimmermannii),* with as common associates Mchenza msitu *(Uapaca guineensis),* Mgulele *(Antiaris toxicaria),* Mchikichi *(Elaeis guineensis),* Mwavi *(Erythrophloeum suaveolens),* Mchocha mke *(Pachystela brevipes),.* Msufi mwitu *(Bombax rhodognaphalon)* and Mdawadawa *(Croton sylvaticus).*

The number of tree species is generally quite high: in the 29 tree plots of this type there are (6-) 9-10 (-13) species per 30 trees counted. The canopy in the mature plots is some 30-40m high, and the common trees often have a DBH of a meter or more. It is noticeable that there are very few epiphytes.

Within the moist forest I was unable to distinguish separate subtypes, as Rodgers et al. did, and I cannot agree with Rodgers' division of moist high forest in two vegetation types: based on my 31 tree counts I was unable to distinguish any types, even when arranging my tables the way Rodgers et al. did theirs, I do believe the south eastern part of Ngezi is moister than other pans, with species not occurring elsewhere: *Ensete, Dracaena fragrans;* and near the heath zone, the vegetation changes to a drier facies, with *Uapaca* becoming more important.

1.2 SWAMP FOREST

Riverine swamp forest is confined to a narrow belt, some 30-50m wide, along forest streams. The soils here are muddy and have a higher concentration of organic contents than those of the moist forest. *Barringtonia racemosa* and *Samadera indica* fonn an almost pure stand, with various lianas (see description of compartment # 18); the canopy is some 15-20m high, and stands are dense, although not many trees have diameters of ≥ 20cm.

Pond swamp forest: in compartments 12 and 19 there are swamps which have pure stands of *Raphia farinifera,* or stands of *Raphia* and *Barringtonia* , with some *Anthocleista.*

1.3 COASTAL THICKET AND DRY EVERGREEN FOREST

The coastal thicket is confined to the coral rag on the Tondooni peninsula. Dominant species are Mpilipili doria *(Sorindeia madagascariensis)* and Mjengo *(Diospyros consolatae),* with Mkwaju *(Tamarindus indica),* Mbambakofi *(Afzelia quanzensis),* Mkunguni *(Terminalia boivinii),* Mpapai dume *(Cussonia zimmermannii),* Mgulele *(Antiaris),* Mchungwa mwitu *(Olea woodiana).*

The number of tree species is as high as in the moist forest, but the canopy is much lower (8-15m, with emergents to 20-25m) and trunk DBH is generally less than that of the moist forest species. However, stands are much denser (more individuals per area). Towards the moist forest the character of the thicket changes: the canopy gets higher, *Antiaris* and Mvule *(Milicia)* become more common.

1.4 PHILIPPIA HEATHLAND

This type occurs in the centre of the reserve, surrounded by forest on all sides (although the strip of forest to the west is very thin). Soils are very poor; species are low in number - mainly Mdamba *(Philippia mafiensis)* which forms almost pure stands, although scattered individuals of Msambarau ziwa *(Syzygium cordatum),* Mfuu *(Vitex doniana),* Mlangawa *(Ficus lutea), Psychotria holstii* occur, mainly near the numerous little ponds; *Raphia* is often present in these ponds. Proper inventarization of this area was not possible- it looked like a battle area, since it had been burned at the end of the long dry season 1988. Dead trees dotted the landscape, and although *Philippia* is regenerating vigorously, most plants of this species were still only 1-2m high.

Rodgers et al. visited this area in December 1983, and found the canopy completely dominated by *Philippia,* at some 6-9m high. Some trees found were *Apodytes dimidiata, Canthiwn bibracteatum, Myrica sp., Mystroxylon aethiopicwn, Psychotria holtzii, Psydrax recurvifolia, Syzygiwn cordatu a*nd *Vitex doniana.*

1.5 FRESHWATER SWAMP

Not visited by me situated at the northern edge of Ngezi, but outside the reserve itself. Rodgers et al. describe this vegetation type as a complex of grasses, sedges and fern, with towards the moist forest an area of dryer grassland with occasional thicket clumps of 8-10m high, with *Parinari curatellifolia, Syzygiun cordatun* and *Uapaca sansibarica.*

To the south of the reserve, south of compartment 65, there is an area of freshwater swamp with sedges, *Typhonodorum,* and *Raphia.*

1.6 MANGROVE / SALINE SWAMP FOREST

A large mangrove area occurs north of the reserve, in the bay south of the Kigomasha peninsula; this is outside the Forest Reserve, and I did not visit it. Rodge,rs et al. did visit this area, and give some details *(Sonneratia alba, Avicennia marina, Bruguiera,Rhizophora, Ceriops, Lumnitzera, Heritiera).*

Smaller patches of mangrove occur within the Reserve area, around the bay to the east of the Tondooni peninsula. *Rhizophora, Bruguiera, Ceriops, Heritiera, Xylocarpus granatum* were seen on the west side of compartment 65.

CONSERVATION VALUES

2.1 VEGETATION TYPES

Introduction

Forest in lowland East Africa is not common. Excessive exploitation, agricultural encroachment, wholesale clearing for the establishment of plantations, tourism development and its concurrent spreading disturbance, are all factors affecting the existing natural forests. The protection of *any* type of forest in lowland East Africa is a logical step, if one is interested in conserving the natural resources of a country; and this conservation is becoming more urgent as more and more forest is disappearing. Some reasons for the general conservation of forests:

-storehouses of species: the amount of species of plants and animals in a forest is higher than in almost any other kind of terrestrial habitat. The fact that many species are interdependent (for shelter, food, pollination or procreation) means that if forest species are a target for protection, then their original habitat is the cheapest and most convenient way to conserve them. Reasons for species protection may range from pure economic (timber, medicinal plants, local products, source of foreign exchange through tourism) through

abstract economic (in-situ gene bank for possible future uses)to religious (protection of species for their own sake).

- the reasons to protect the forest for the forests sake, rather than as an assemblage of species, range from environmental (global and local climate buffering, pollution buffering, erosion control) to cultural (the role of the forest in local community culture, as part of a peoples' history).

Ngezi Forest.

Ngezi encompasses some vegetation types that are important for their specific Conservation values.

The moist forest of Ngezi shows an assemblage of species that is not paralleled in any other East African forest. Not only is the most common Ngezi species, Mjoho,

classified as globally rare (see Atlas of the rare trees of Kenya), but the occurring together of species restricted to coastal East African forests *(Odyendea, Bombax),* montane elements *(Cassipourea, PhiIippia),* Eastern Indian species *(Samadera* of the swamp forest. *ChrysophyIum lanceolatum)* and Madagascan links *(Chrysalidocarpus, Typhonodorun)* is unique in a global sense.

Quite apart from these considerations, Ngezi is the only sizeable forest on all of Pemba. Up to year 1840 most of Pemba was covered with forest; it is only in the last 150 years that clearing for plantations has destroyed over 95 % of the former forest area. Ngezi is, together with Ras Kiuyu forest (200 hectare) and Msitu Mkuu forest (200 hectare) the only forest left on Pemba. It is, therefore, part of the historical and cultural inheritance of the people of Pemba. The least disturbed parts of the forest are also extraordinarily beautiful.

The Philippia heath type is unique to Mafia and Pemba, and is rapidly being destroyed on Mafia (see a recent article in News Bulletin); therefore, conservation of this type of vegetation also assumes a global importance.

The coastal evergreen thicket/dry evergreen forest was once a common type, widespread on coral rag in East Africa. However, the "widespread" was confined to a narrow coastal belt, in which many land use factors are nowadays competing for space; as usual, natural vegetation loses out to agriculture and tourism development in most areas. The importance of the remaining coral rag forests increases with their diminution in extent. Many species in this zone are restricted to this type of vegetation; again, conservation values are local, national, regional and global. As far as Zanzibar, Unguja and Pemba are concerned, the coral rag thicket/forest of Ngezi is the best and most undisturbed I have seen (and I have visited all of these forests and most of the thicket).

Mangroove vegetation is of national importance, both as a nursery for many commercial marine fish and crustaceans, and as a renewable source of poles. The area of mangrove within the Reserve is quite small, however.

2.2 PLANT SPECIES

The two Ngezi Forest endemics: *Chrysalidocarpus pembanus* and *Ensete proboscoideum* are of global importance. *Chrysalidocarpus* is in the category endangered in the World IUCN Red Data Book; *Ensete* was not known to the compilers of this book but should be in the same category. *Chrysalidocarpus* is doing well all over the forest, in areas of high forest, in rather secondary areas, and in the coral rag (forest/ thicket there must be several thousand individuals (estimate 3000). *Ensete* is much less common, and is restricted to the south western part of Ngezi high forest; there' are an estimated 400 individuals.

Rare species occurring in Ngezi are *Odyendea zimmermannii, Philippia mafiensis, Typhonodorum lindleyanum, Allophylus vestitus, Eugenia sp. novo* The first two species are common within the forest; *Typhonodorum* is not uncommon in the swamps to the north and south; *Allophylus vestitus* is very rare within the forest; and *Eugenia* occurs in the southern' part of Tondooni peninsula, in coral rag thicket.

I believe that there will be more exciting finds, probably including new plant species, when a systematic and careful inventory of the forest is undertaken. Collections up to now have been casual (Vaughan, Greenway), or systematic but short-term (Rodgers et al., this study).

2.3 OTHER WILDLIFE

Although not really part of this study, faunal considerations also have to be taken into account when looking at the conservation values of Ngezi.

Pteropus voeltzkowi Matschie, the Pemba flying fox, is endemic to Pemba, and we found a colony of 150-200 animals roosting in the north western part of the forest (Compartment #4).

Cercopithecus aethiops nesiotes Schwarz, the Pemba vervet or green monkey, is near endemic to Pemba, and occurs in Ngezi.

Cephalophus monticola pembae Kershaw, the Pemba Blue Duiker, is possibly endemic to Pemba (at the moment the status of the races is uncertain), and occurs in Ngezi.

I am uncertain whether *Otus pembaensis/rutila,* the Pemba Scops Owl, and a full endemic species, occurs in the Reserve.

Of the endangered Zanzibar endemic *Colobus basius kirkii* Gray, the Zanzibar red colobus, some fourteen specimens were translocated to Ngezi forest in the early 1970s (1974?). Nd. Toufiq tells me there are now some 240 of these animals; however, I never saw any myself.

Again, I believe that there are many undiscovered species in Ngezi, especially with regard to insects (no investigations done to my knowledge), arachnids, annelids, amphibians and so forth.

3. ECOLOGICAL ASPECTS OF FOREST MANAGEMENT

3.1 EFFECTS OF EXPLOITATION AND INTRODUCTION OF EXOTIC SPECIES

N gezi Forest has been exploited systematically since it was gazetted as a forest reserve. Details are only available on timber harvesting since 1957.

Between 1957 and 1964 an Indian sawmiller, V.R. Joshi, had a sawmill in what is now compartment 32. The cut trees had to be taken out by truck, for which access tracks had to be cut. Replanting took place with Mvule *(Milicia),* Mtondoo *(Calophyllum), TerminaIia catappa, Cordia alliodora, Khaya nyasica, Tabebuia pentaphylla* and *Grevillea robusta.*

From 1964 to 1966 the sawmill was run by the Government, but in 1966 it was dismantled.

In 1975 the Kizimbani Sawmill was established at Wete, and Chinese experts used N gezi Forest Reserve as the main source of raw materials. They did their harvesting between 1975 and 1978, and took out logs with a tractor, which made more parts of the forest accessible with less need for good tracks. Replanting was done with Mvule *(Milicia),* Mtondoo *(Calophyllum), TerminaIia ivorensis* and *Cordia alliodora.*

Between 1978 and 1988 felling continued for the Kizimbani sawmill, first under the Ministry of Industries and Trade [replanting with *Msisi, Maesopsis eminii, and Cordia alliodora],* but from 1983 under the Forestry Department (replanting with Mtondoo, Mvule, *Terminalia catappa, T. ivorensis, Cordia alliodora, Maesopsis eminii, Khaya sp, Tabebuia pentaphylla).*

At present the Forestry Department is responsible for the issue of permits for the felling of trees in the Forest Reserve. The favorite tree is still Mvule *(Milicia excelsa)* but supplies of mature trees are running low.

HARVESTING OVERVIEW:

Comp	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	22	23	24	25
Joshi					x				x	x		x	x	x	x	x	x	x	x	x						
Chinese								x	x	x	x				x	x	x	x			x	x				
78-83		x		x											x						x					
83-88																					x	x	x	x	x	x

Comp 26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Joshi			x		x	x	x	x	x	x	x	x	x	x	x					x	x	x		
Chinese																								
78-83													x											
83-88					x		x			x												x		

Comp 51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Joshi				x																				
Chinese																x								
78-83	x																			x				
83-88	x								x	x						x						x	x	x

Comp	76	77	78	79	80	81	82	83	84	85
Joshi			x							
Chinese										
78-83		x	x							
83-88		x								

As can be seen in the notes on Compartments (see 8) there is enormous variation in the effects of exploitation. Some compartments, having been harvested only once (e.g. compts. 8 and 11, harvested by the Chinese in 1975-78) are low and bushy, and the canopy is almost completely destroyed. Adjacent plots may be in better shape, despite having undergone harvesting twice (e.g. compt. 10, harvested by Joshi in 1958-63, and by the Chinese in 1975-78: canopy 30-40 % at 40m, 80 % at 20m) or may be in deplorable shape (e.g. compt. 9, harvested at the same times as compt. 10).

Most introduced timber species need careful tending, otherwise they are unable to compete with the indigenous species, at least in their sapling stage; examples are plot nr. 36 and plot 70: this last plot was planted with Khaya, but we were unable to find a single one.

There are only two species that do well in competition. One is A verrhoa, which we found rejuvenating in plots 58 and 70; the other one is Maesopsis, which we found rejuvenating in plots 1, 3, 4, 6, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 35; this concerns seedlings and saplings, presumably wild-sown by birds. Obviously this species is doing quite well, and monitoring of the spread of Maesopsis is recommended. In the Usambara mountains (Tanzania) *Maesopsis* is a serious weed, taking over large parts of the indigenous forests.

3.2 MANAGEMENT CONSIDERATIONS: CONSERVATION VIEWPOINT AND FORESTRY VIEWPOINT

Present management is restricted to the patrolling of the forest against unlicensed cutting and to the licensing of incidental timber harvesting; but from my field visits clear signs of an overall forest policy seem to be quite absent.

In some plots, especially those along the only road, undergrowth seems to be cleared at regular intervals. This is done, I presume, from reasons of "selection" forestry: all competition is removed, so the selected timber species may grow unhampered. Strict adherence to this policy has produced an impressive spectacle of giant trees soaring to some 40 meters - but no young trees or secondary canopy. This may be a very cosmetic spectacle; but from a nature conservation view it is not impressive, although the view of the mature trees is. For natural forest second and third stories, including a vigorous under storey, are an integral part of the whole. From a foresters' view, rejuvenation of timber species might seem useful - not an even-aged stand of mature trees.

As far as land use is concerned, I do not believe there is any conflict about the existence or boundaries of the Forest Reserve.

3.3 AREAS OF CONCERN; PROPOSALS FOR FUTURE MANAGEMENT

Introduction: forest use in general

Forests have always been a source of local products, but the use of large diameter trees of selected species as building materials is a development of the last century, from which Ngezi has not yet recovered.

Local products such as binding materials from climbers *(Landolphia, Flagellaria, Uvaria)* thatching material from palms *(Phoenix, Alaeis)* and building poles and laths *(Diospyros, Averrhoa,* many other species) are relatively cheap, they are a renewable resource, and they preserve traditional building skills that are suited to local climate. Firewood and honey, medicines, edible fruits, basketry materials, hardwood for small

implements; all these "minor" forest products are part of traditional forest use by local people, and in other parts of the country make the forest part of the community, and provide local people with an interest in forest conservation. It is not known to me how many licences are given out for such products; but if core and buffer zones are established, the outer buffer zone might well be used by local people for such purposes, on a license basis, and sustainable yield of such products should be monitored at regular intervals, to prevent overuse and the resultant genetic erosion. Sustainable yield can be defined as the cropping of a resource without pushing the system beyond its limits of recovery; a wide safety margin is essential, in case of unforeseen factors.

3.3.1 Damaged sites

It is clear that plots like 8 and 9 are useless as far as yield is concerned. They have effectively been raped for short-term gain, without any thought for sustainable use. This is waste-ful, and bad policy. If the forest is to be exploited, it should be done on a sustainable yield base: the interest of the forest capital should be used, and the capital itself should not be depleted. If the plots which are now in bad shape (1, 5, 6, 7, 8. 9, 11, 13, 14, 15, 20, 21, 35, 53, 58, 59, 64. 68, 70, 71, 74 , 75, 76, 71, 78) are to be rehabilitated, the method to go about this depends on the purpose - is the whole forest to be conserved as a Nature Reserve/National Park, or are the plots intended for sustained use by the Forestry Department

If conservation is the main aim, there should be limited replanting with fast growing pioneer species so that a quick canopy can be established under which natural regeneration can take place. At the moment the tangled bush inhibits forest regeneration as it lets in too much light, and. chokes pioneer forest species. Some limited clearing of bush before replanting is probably useful. *Ficus exasperata, Croton sylvaticus* and *Antiaris toxicaria* are species which might be considered, as I believe them to be the pioneer canopy trees of Ngezi.

If forestry is the main purpose, replanting should be done with pioneer species which are fast growing, and harvestable besides. There is probably more expertise within the Forest Department than I have, but species which seem to be doing well in a forest environment are *Cordia alliodora, Terminalia ivorensis* and *Maesopsis;* however, this last species should be harvested quickly, as there is a danger of its becoming a weed., The eventual target might be to establish semi-natural forest in a marginal buffer zone, with high value species such as Mvule *(Milicia)* and Mtondoo *(Calophyllwn)* as the main timber species.

3.3.2 good forest sites

If forestry is to be the purpose of the Reserve, there should be research into the amount of timber which can be extracted on a sustainable yield basis. Although I am no forester, I can see that up to now most parts of the forest have been overexploited; especially the Chinese experts have harvested plots in such a way that they will not recover for a long time. I would think that the size of the high, moist forest in good state (canopy over 25m, canopy cover ≥70 %) is less than 2 km2, and too small to give a viable yield.

There is a larger area with a lower canopy (say, 20m high and with a more or less closed canopy) but the harvesting of non-mature trees does not seem a very viable proposition either.

So the choice seems to narrow down to the exploitation of the forest on a quick-gain basis, with no consideration for conservation; this is how it has been done in the past, and most mature trees of timber species (Milicia, Antiaris) have been harvested already. I believe that Ngezi as a selection/exploitation forest is long past its prime; unless other timber species are found to be economically exploitable (such as Odyendea) the whole idea of large-scale harvesting might have to be abandoned. Advice from a professional forester should be sought if the forest is to be exploited further.

Another possibility is incidental harvesting of single trees; this seems to be the policy at the moment. If this way of exploiting the forest is economically worthwhile, it might

very well be combined with conservation: a central core area might be declared a Nature Reserve, while the area around it would be a buffer zone where incidental harvesting could take place, and where local people can harvest minor forest products, with a license from the Forest Department. The core area would serve as a gene pool *of* forest species, specifically *of* timber trees, from which planting material can be used for the rehabilitation *of* the buffer area.

If the whole forest is to be conserved as a Nature Reserve or National Park, without exploitation of any kind, some rehabilitation will have *to* take place, also starting from such a core area.

3.3.3 heath zone

Up to now, management *of* this area has been absent. I think that is probably a good thing - if fires like the 1988 one can be prevented in the future. The 1988 fire was caused by illegal entrants who were either collecting honey (when smoking out a hive?) or collecting firewood. Access *to* this area should be restricted, for instance by making the present track through plots 76-77-33 impassable to oxcarts. The point can be made that heath in general benefits from regular or cyclical burning and/or grazing, because it might otherwise revert to another type of vegetation; burning, however, if on the scale of a major conflagration, will attack the margins of the forest and push back these margins. This should not be allowed to happen.

The Forestry Department has *so* far not done anything with this area; Philippia, which is absolutely dominant over the whole area, is not used for anything (except firewood). Since this species is a rare one and the vegetation type rare as well, the heath zone might well be made into a conservation area. The planted trees (there are *some* Eucalyptus and cashew trees) should be removed. Any scientific investigation o(this area would yield interesting data - as far as I *know* no serious studies have ever been done on the heath areas of either Mafia or Pemba.

3.3.4 coastal belt

Exploitation has been restricted *to* the harvesting of timber species; due to the nature of the terrain (rather low canopy, with only the large emergents interesting to the exploiter) this has not been as destructive as in other parts of the Reserve, with the possible exception of compartment 74. This coastal thicket/dry forest is much *more* vulnerable to disturbance, with its much shallower soil over coral, which also causes it to be drier than the rest of the forest. Any development in this area, and especially the proposed beach hotel, should be restricted as much as possible if the forest is to remain more or less intact. Tourism, especially if geared towards sport fishing, is not dangerous to the forest in itself; the building activities, access, and staff needs (firewood; small plots; kitchen gardens; living quarters?) definitely are a cause of prime disturbance. In Kenya, I have seen several hotels being built adjacent to dry forest of a similar kind; when the hotel is built, everything looks fine, and everybody pledges their soul to conservation; but after a few years, the forest within a radius of a kilometer is intensely degraded, or has completely disappeared. A study visit to Diani forest, on the south Kenya coast, might prove illuminating in this respect.

It is unclear to me why a hotel for sport fishing should be sited inside a Forest Reserve; especially since this Forest Reserve contains most of the natural forest on Pemba, and the hotel would contribute nothing to nature conservation or to forestry practices.

If it is true that this beach hotel would be connected to a boat harbour on the southern side of the peninsula (compartment 84) this whole southern area would be opened up to disturbance. It is this southern part of the peninsula which has the best and most undisturbed example of coral rag. thicket/forest, and Rodgers et al. in their 1986 report recommended this area (plots 82, 83, 84) as a strict Nature Reserve. I would suggest the plots 80 and 81 are added to this proposed Reserve, to preserve this kind of vegetation' which formerly was widespread on Pemba and Zanzibar, and that any activities are banned

from this area, specifically including this harbour area for tourist boats and any paths leading to, or through, this area.

3.3.5 general and specific recommendations

3.3.5.1 zonation - establishment of a core and two buffer zones. The core zone would form an area in which disturbance is absent; it should serve as a refuge for forest wildlife, and an undisturbed gene pool from which the buffer areas can be rehabilitated. The forest core zone could be formed from compartments 18, 19,23,24,25,28,29,30, 31,36,37; no timber cutting or undergrowth clearing should be effected in this zone. An inner buffer (with minimal disturbance initially, and rehabilitation efforts concentrated here) could be of compartments 16, 17, 10, 11, 12, 13,20,26, 32,44,43,42,41,35,34,33, 27,21 and 22. The other compartments could form an outer buffer, with licensing to local people for the use of minor forest products (see 3.3, introduction)

The coastal forest/thicket core zone could be formed from compartments 82, 83, 84, with an inner buffer (minimal disturbance) of plots 80, 81 and an outer zone (minor local use, selected species harvesting) of 72, 73, 74, 78, 79.

3.3.5.2 the removal of timber from the buffer zones should be done with minimum interference of the structure and functioning of the ecosystem: harvesting should be on a true selection basis, with sustained yield as a target, based on (over)mature specimens, with established minimum diameter sizes. The accelerated removal of Maesopsis, to prevent this species of becoming a serious problem, could be considered.

3.3.5.3 establishment of nature trails for educational purposes; hiking trail for tourist purposes.

A nature trail, possibly with a small exhibit banda, for school use could be established near the eastern entrance to the reserve. Such a nature trail could go through high forest to the edge of the heath area and back to the entry by way of the stream; local guides and supporting leaflets would be necessary. A larger hiking trail through high forest, swamp forest; Raphia swamp, heath zone and coastal forest could form an attraction to tourists, and entrance fees.(for tourists) could generate some income; accommodation for tourists should be outside the Reserve, generating income to local people; and care should be taken that such trails are not used by illegal forest product poachers. .

3.3.5.4 A reserve such as Ngezi, with its diverse habitats (moist forest, swamp forest, coastal thicket/forest, heathland, swamps, mangrove) within such a small area is a prime site for integrated research projects by students of the University.

3.3.5.5 The area between compartments 38/45 and the bay to the west shows houses and cultivated plots on the 1979 aerial photographs. Habitation so near the Reserve, and almost completely surrounded by the Reserve, is bound to cause conflicts. If there is a move towards conservation, this is one of the serious land use problems to be solved: with regards to nature conservation, there should be no strip of cultivation between the Reserve and the Bay. A visit to this area might prove whether this is still inhabited or not.

4. REVIEW OF EXISTING LITERATURE, REPORTS, PLANT LISTS, LOCAL NAMES LISTS, AND MAPS

Existing literature is minimal: the only report on Ngezi is the one by W.A. Rodgers, John Hall, L. Mwasumbi, 1. Swai and K. Vollesen (July 1986) - the conservation status and values of Ngezi Reserve, Pemba Island, Tanzania (cyc1ostyled report of the Forest Conservation Group, University of Dar es Salaam). This is an excellent report based on a four-day visit to the Reserve in 1984. I do not agree with some of their identifications (see species list, 9) and with their division of moist high forest in two vegetation types: based on my 31 tree counts I was unable to distinguish any types, even when arranging my tables the way Rodgers et al. did theirs. Apart from these minor criticisms, I found the report an extremely useful introduction to the forest, and I made much use of it; especially their list of local names/botanical names saved me a lot of time. I have expanded their list with 85 local names, and their species list with 51 species.

A typed report by Grant, Conservator of Forests in the early part of this century, states that Antiaris (15%) and Erythrophloeum (10 %) are the most common species; he calls Mvule scarce. In 3 transects he found Antiaris the most common tree of more than 3.6m circumference (estimated at 522 cubic feet/acre) and Odyendea second with 300 cubic feet/acre; other species totaled 528 cubic feet/acre.

A letter by L. Wigg (Forest Dept., Morogoro, dated 23.2.1939) gives the local names of common species and some tentative identification.

It should be noted that there are discrepancies between the various maps of Ngezi Forest Reserve: the map by T. Khamis (1950) and the map in Rodgers et al. (1986). On the Rodgers map the compartment numbers between plots 43 and 69 do not agree with those of the Khamis map: the plot to the east of 43 should be 44 (numberless on the Rodgers map) and all plots between here and 68 should have one added to their number; so 68 should be 69 (and the Rodgers 69 is part of the Khamis 69). The Rodgers report should be read with this in mind.

I cannot agree with the recommendations of Rodgers et al. towards the strict conservation of compartments 6, 7, 11,.17 and 18 (or 10 and 12 instead of 17 and 18) . These are quite disturbed plots, and would not be as good a gene pool and source of planting material as the core area recommended in 3.3.5.1. With their recommendation of plots 82, 83 and 84 to protect the coastal thicket/dry forest I concur absolutely. Plots 45 and 46 (called 44, 45 and 51 in the Rodgers report) do not need formal protection, since utilization of the heath zone is minimal (see 3.3.3)

5. ACKNOWLEDGEMENTS

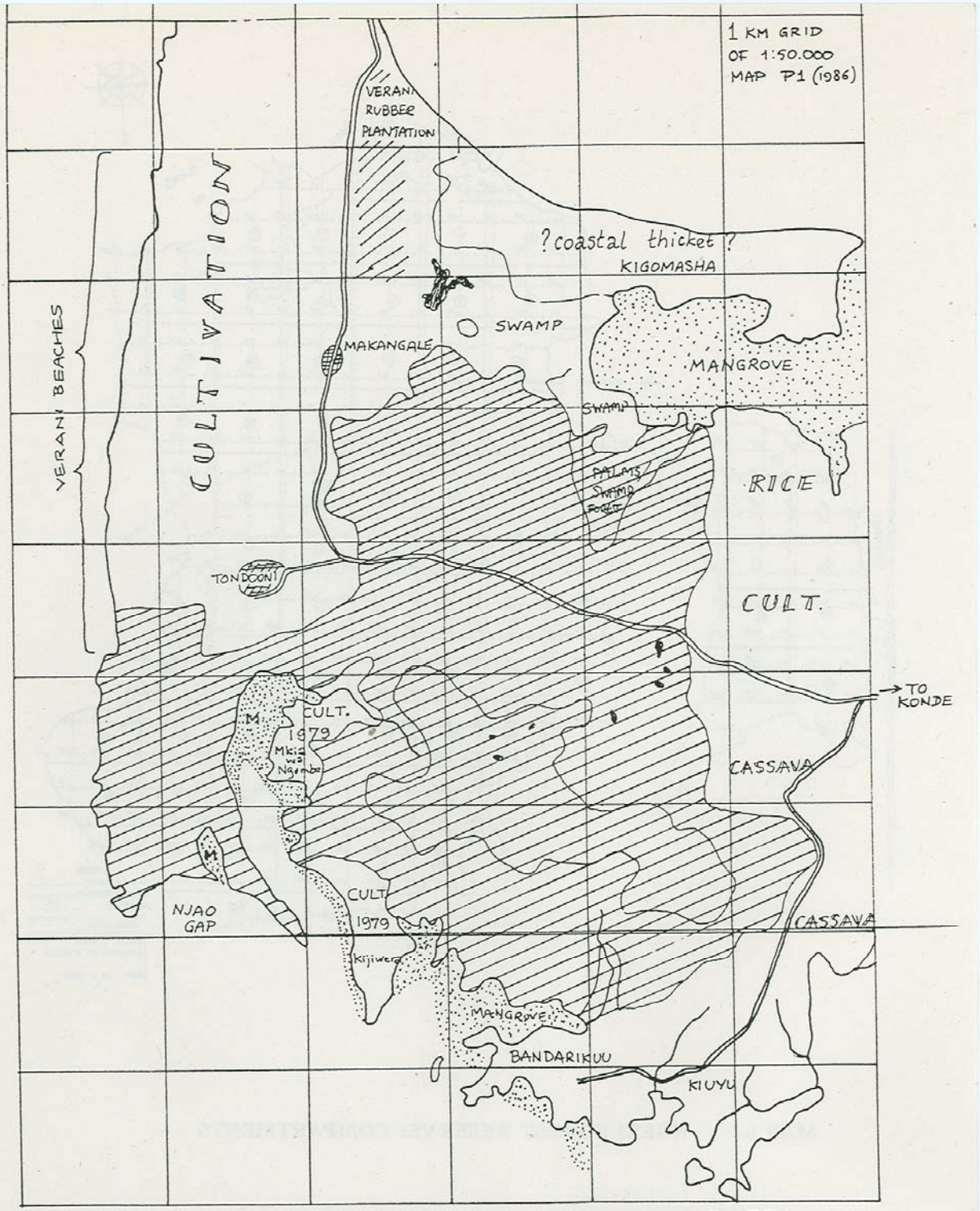
My thanks are due to FINNIDA and the Finnish National Board of Forestry for commissioning this report.

I would like to thank Ndugu Toufiq Juma Toufiq, Assistant Forester in Charge; Ndugu Sadiq Hamisi Sadiq, Forest Assistant, and Ndugu Said Abdallah Yunis, Forest Assistant, for their companionship and their entire expert help during the fieldwork in Ngezi.

Without their expertise I would have missed a great deal, and the work would have taken me much more time. Nd. Toufiq, who has worked in Ngezi for many years, has an unrivalled knowledge of the whole Reserve, and gave me additional information on harvesting of various plots and the planting of exotic species.

I am also grateful for the help I received from the staff of the Forest Department at Wete, and especially from Nd. Hamoud S. Abdulla and from Nd. Massoud, in introducing us to the forest staff and organizing transport; and to Nd. Issa, the driver, who cheerfully and professionally braved the nasty track from Konde to Ngezi (and beyond) many a time.

6. MAPS



MAP 6.1 NGEZI FOREST RESERVE AND ITS SURROUNDING AREA

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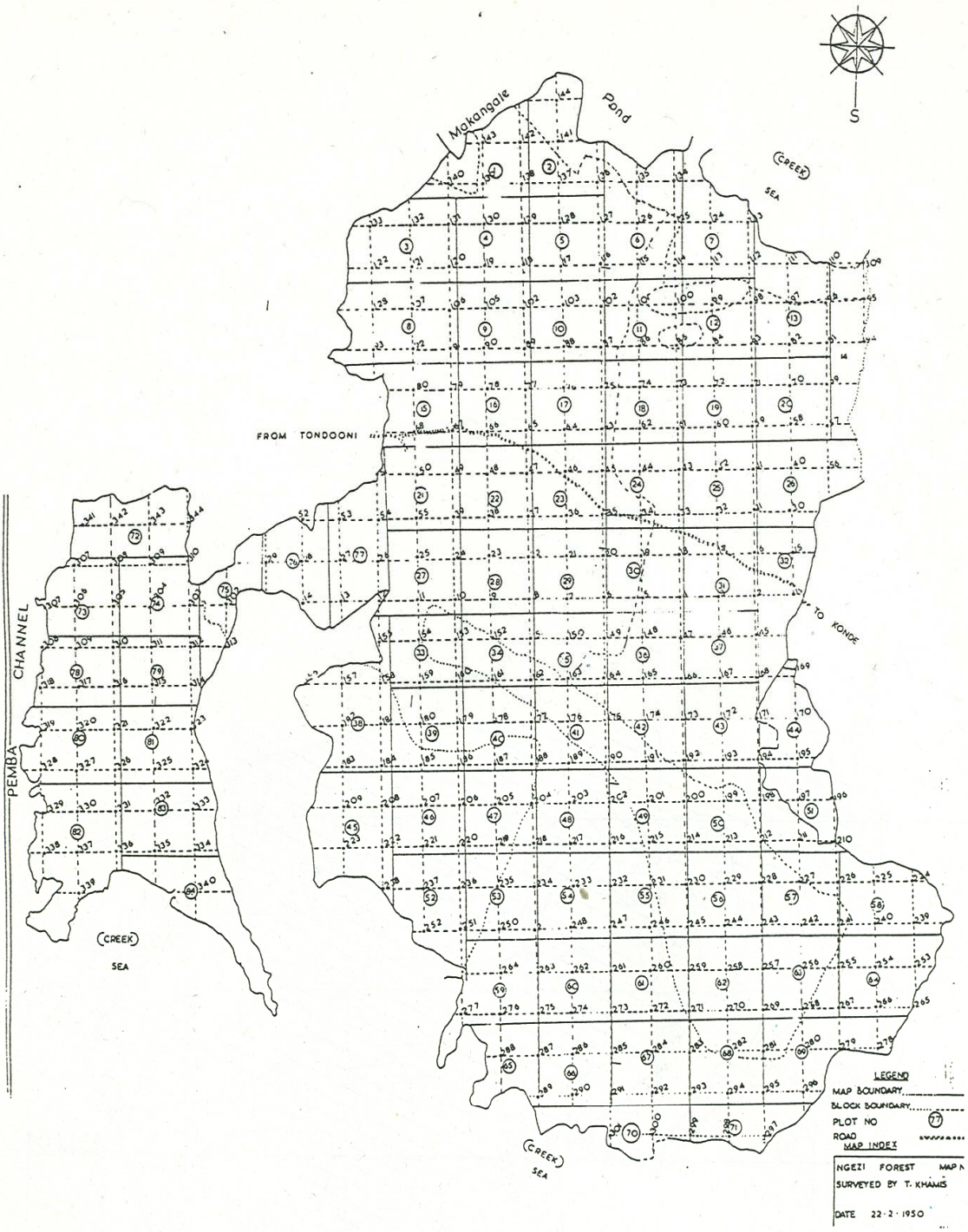
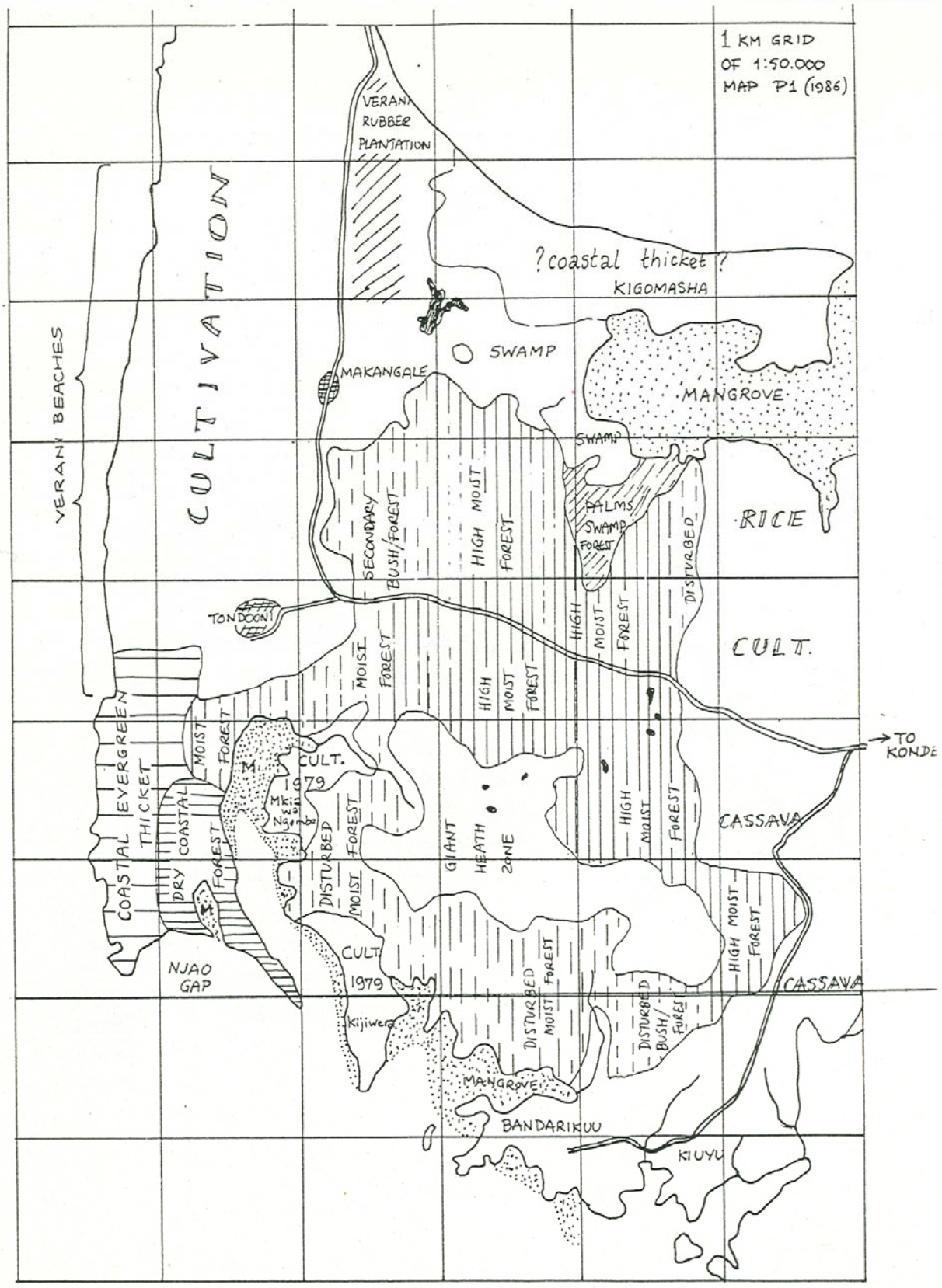
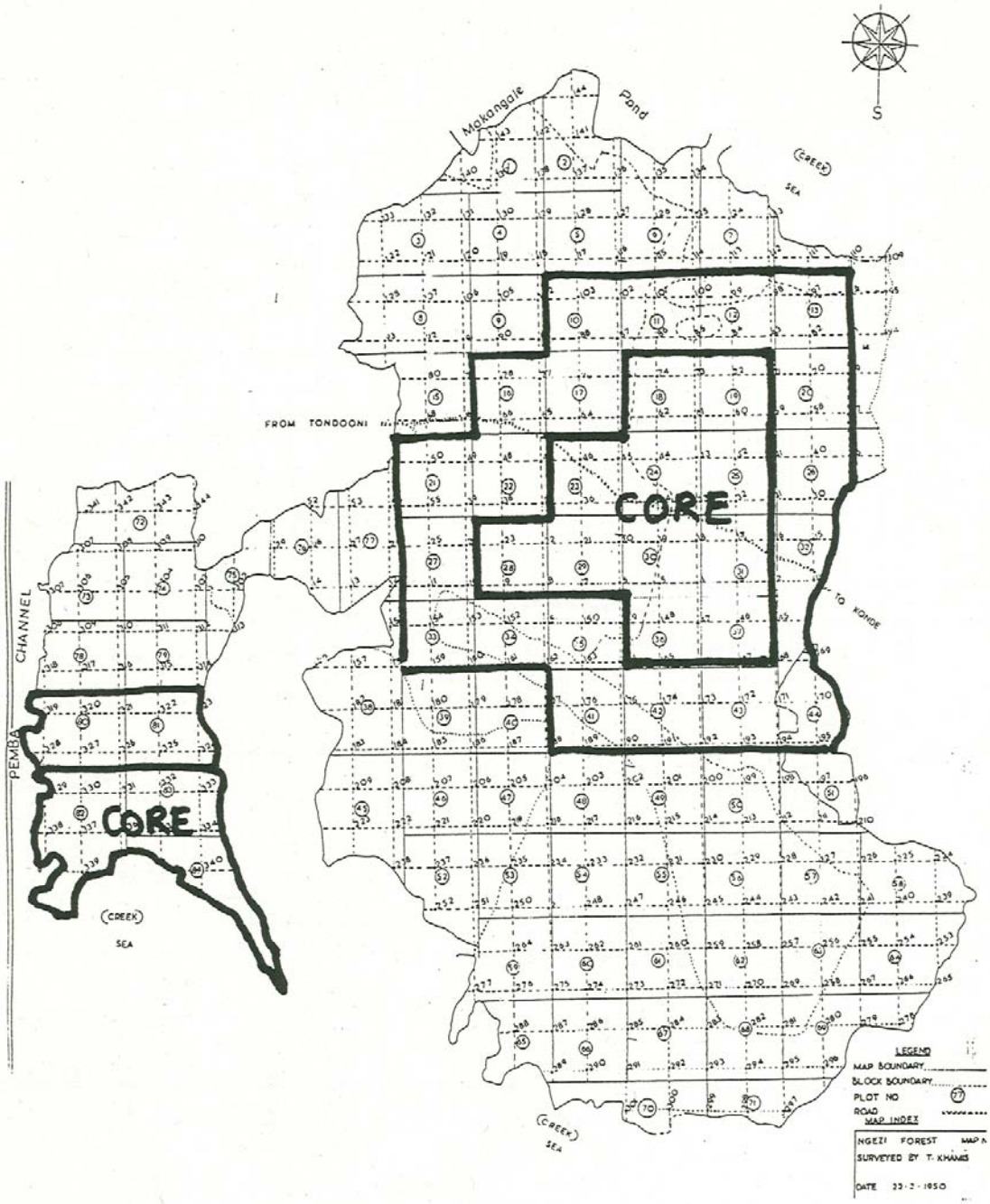


MAP 6.2 NGEZI FOREST RESERVE: COMPARTMENTS



MAP 6.3 VEGETATION TYPES

18



MAP 6.4 PROPOSED ZONATION

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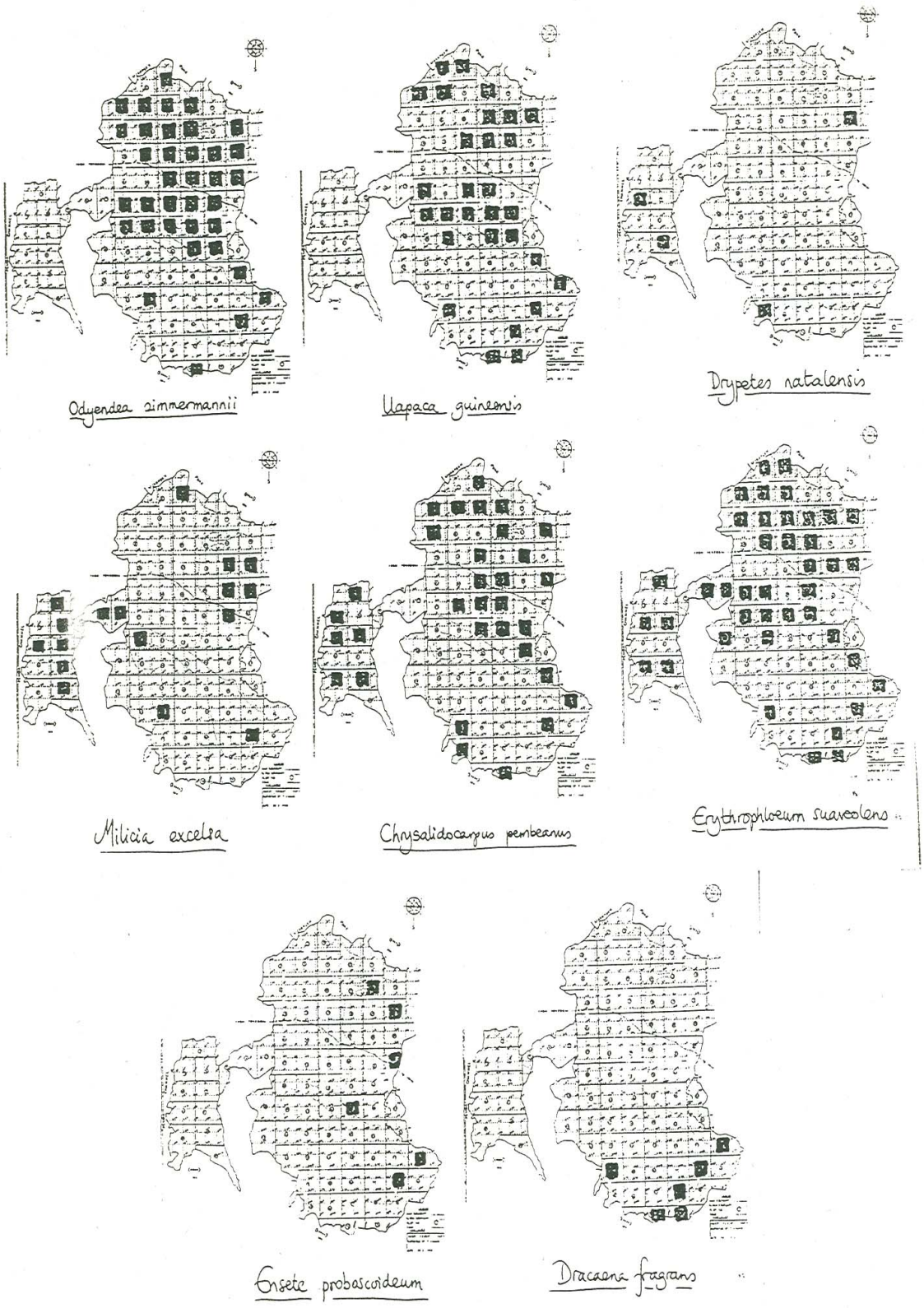

MAP 6.5 DISTRIBUTION OF SOME INTERESTING SPECIES

7. COMPARTMENT NOTES

Note that in 30 TREE COUNTS only those trees have been counted which have a DBH of more than 20cm; they are enumerated in sequence of most common first, least common last; only genus is mentioned, except in cases where this can lead to confusion. For the full species names, see 10.

The other species mentioned are the ones noticed during the quick survey of the compartments, and in general these will be the common ones.

Compartment # 1

Very open; boundary to N planted with, *Eucalyptus* and *Calophyllum.* Soil somewhat Swampy.

The whole aspect of this plot is bushy, with some larger *Albizia adianthifolia, Elaeis (common), Erythrophloeum, Ficus lutea, F. natalensis, Macaranga, Pachystela spp., Syzygium cumini, Uapaca, Vitex.*

Shrubs, lianas and herbs: *Asplenium, Culcasia, Harungana* (common), *Lomariopsis, Dissotis, Nephrolepis* (common), *Salacia, Zamioculcas Maesopsis: young* ones occasional.

Compartment # 2

Canopy 30m high, canopy cover 60-75 %, soil sandy; signs of firewood collecting and pole-cutting.

30 TREE COUNT: Odyendea 14, Uapaca 9, Syzygium cumini 4, Cas.sipourea 1, Elaeis 1, Erythrophloeum 1.

Other trees: *Calophyllum, Cassipourea, Chrysalidocarpus, Elaeis, Ficus natalensis, . Tabernaemontana ventricosa, Macaranga, Milicia, Pachystela sp., Rawsonia*
Shrubs, lianas, herbs: *Asplenium, Chassalia, Culcasia, Flagellaria, Landolphia kirkii, MelaStomataceous herb, Nephrolepis, Strychnos, Zamioculcas*

Compartment # 3

Canopy 20m high, canopy cover 70-80 %. Signs of recent cutting (poachers). Soil sandy. Harvested 1978-83.

30 TREE COUNT: Elaeis 5, Antiaris 4, Maesopsis 4, Bridelia 3, Erythrophloeum 3, Croton 2, Ficus exasperata 2, Cassipourea 1, Macaranga 1, Mango 1, Odyendea 1, Syzygium cumini 1, Terminalia catappa 1, Uapaca 1

Other trees: *Antiaris, Chrysalidocarpus* (a grove of large specimens - DBH to 16cm!), *Elaeis* (common), *Erythrophloeum, Tabernaemontana ventricosa, Ficus lutea, Pachystela*

Herbs, lianas and shrubs: *Adenia rumicifo, lia Culcasia, Dioscorea, Landolphia, Nephrolepis, Saba, Smilax, Zamioculcas Maesopsis:* young ones occasional

Compartment # 4

Canopy 10-20 (-30)m high, canopy cover 60 %; also one sizeable patch with canopy 30m high, canopy cover 60-80 %; clearings frequent,

30 TREE COUNT: Odyendea 22, Maesopsis 2, Albizia adianthifolia 1, Erythrophloeum 1, Majidea 1, Mango 1, Syzygium cumini 1, Uapaca 1.

Other trees: *Albizia adia, nthifolia Chrysalidocarpus, Elaeis, Tabernaemontana ventricosa, Odyendea, Pachystela sp., Rauvolfia,.*

Shrubs, lianas, herbs: *Culcasia, Dioscorea, Flagellaria, Gossypioides, cf Holarrhena, Landolphia, Nephrolepis, Polysphaeria parvifolia, Saba, Salacia, Strychnos, Suregada, Zamioculcas*

Maesopsis occasional young plants, frequent medium trees.

150-200 flying fox seen roosting here. Swahili name "popo".

Compartment # 5

Canopy patchy: 30m high cover < 50 %; 12-15m high cover 60 %; soil sandy. : Plot harvested in the early'1960s (and then replanted with *Cordia alliodora* and *Maesopsis)* and In early 1980s.

30 TREE COUNT: Cordia alliodora 7, Odyendea 7, Maesopsis 6, Bombax 4, Elaeis 3, Erythrophloeum 2, Antiaris 1, Pachystela brevipes 1

Other trees: *Bombax, Chrysalidocarpus, Odyendea, Pachystela sp., Rauvolfia*

Shrubs, lianas and herbs: *Acanih white, Aframomum, Costus, Culcasia, Cyperus, Gonatopus, Flagellaria, Landolphia, Polysphaeria parvifolia, Zamioculcas*

Compartment # 6

Canopy patchy; up to 40m high but canopy cover < 50 %; soil sandy.

30 TREE COUNT: Odyendea 9, Maesopsis 6, Elaeis 5, Antiaris 2, Bombax 2, Cordia 2, Croton 1, Pachystela brevipes 1, Majidea 1, Uapaca 1

Other trees: *Albizia adianthifolia, Chrysalidocarpus, Chrysophyllum cf. lanceolatum, Ficus sp., Pachystela sp., Rawsonia*

Shrubs, lianas and herbs: *Asplenium, Chassalia, Oncinotis tenuiloba, Psychotria schliebenii, Zamioculcas*

Maesopsis: occasional young ones

The northern part of this plot is low and bushy. There is an oxcart track here, possibly leading from the Makangale area to the Raphia swamp in #7 and #12

Compartment # 7

I did not visit this compartment. Nd. Toufiq says it is low and bushy, and that the northern part grades into the mangrove area to the north. This information is consistent with the vegetation of plot 6.

Compartment # 8

Very low and bushy. Soil sandy. Undergrowth tangled, with many lianas. Harvested in 1975-78.

Larger trees: Maesopsis (frequent), Odyendea, Antiaris, Erythrophloeum, Majidea

Other species: *Albizia adianthifolia, Chrysalidocarpus* (very few), *Culcasia, Elaeis, Tabernaemontana ventricosa, Landolphia, Pachystela, Rawsonia, Saba, Suregada, Zamioculcas*

Maesopsis young plants locally common.

Compartment # 9

Harvested in 1957-64 and in 1975-78. Very bushy and low, with many open places and tangled undergrowth choked by lianas; with few larger trees: Antiaris 3, Croton 2, Macaranga 2, Antidesma 1, Ficus exasperata 1, Odyendea 1.

Other trees: *Erythrophloeum, Tabernaemontana ventricosa* (common), *Pachystela spp, Rauvolfia*

Shrubs, lianas and herbs: *Adenia rumicifolia, Chassalia, Culcasia, Flagellaria, Landolphia, Saba, Salacia, Strychnos, Zamioculcas*

Maesopsis rare; though Nd. Toufiq informs me this plot was planted with *Maesopsis* and *T erminalia catappa.*

Boundary beacon found destroyed.

Compartment # 10

Canopy at 20m high with canopy cover of 80 %; at 40m high with canopy cover of 30 40 %. Soil sandy. Harvested in 1957-64 and in 1975-78.

30 TREE COUNT: Pachystela brevipes 6, Bombax 4, Odyendea 4, Antiaris 3, Elaeis 3, Cassipourea 2, Artocarpus 1, Averrhoa 1, Bridelial, Croton 1, Erythrophloeum 1, Ficus lutea 1, Tabernaemontana ventricosa 1, Macaranga 1

Other trees: *Erythrophloewn, Tabernaemontana ventricosa, Pachystela sp, Rauvolfia, Rawsonia, Rinorea*

Shrubs, lianas and herbs: *Aspleniwn, Culcasia, Dorstema, Flagellaria, Salacia, Smilax, Zamioculcas*

Compartment # 11

Trees to 40m high but canopy very patchy. Soil very sandy, sloping down to the east. There is a pond of 70 x 50m in the centre of this plot, with open water. Harvested in 197578. '

30 TREE COUNT: Odyendea 11, Elaeis 4, Uapaca 4, Cassipourea 3, Antiaris 2, Croton 1, Erythrophloeum 1, Maesopsis 1, Mango 1, Pachystela brevipes 1, P. msolo 1

Other trees: *Chrysalidocarpus, Chrysophyllum cf. lanceolatum, Odyendea, Rawsonia*

Maesopsis: no young ones seen, but one large tree.,

Compartment # 12

Southeast corner with high forest, harvested in 1957-64; rest *Raphia-Barringtonia* swamp. The edge of the swamp has *Anthocleista, Costus, Cerberus, Macaranga, Nephrolepis, Rauvolfia, Saba;* inside the swamp *Raphia* and *Barringtonia* are almost the only species.

High forest to 30m; canopy cover some 50 %

30 TREE COUNT: Uapaca 15, Elaeis 6, Tabernaemontana ventricosa 4, Pachystela msolo 2, Croton 1, Macaranga 1, Pachystela brevipes 1

Other trees: *Averrhoa* (young), *Calophyllum, Elaeis, Erythrophloewn, Ficus lutea, Pachystela spp., Rauvolfia, Rawsonia, Suregada*

Shrubs, lianas and herbs: *Adenia rumicifolia, Asplenium, Costus, Ensete, Landolphia, Lomariopsis, Nephrolepis, Schizozygia*

Compartment # 13

Canopy 35-40m high; canopy cover patchy, less than 40 %. Soil sandy. Harvested in 1957-64. '

30 TREE COUNT: Antiaris 6, Tectona 5, Elaeis 4, Erythrophloeum 4, Odyendea 3, Uapaca 3, Bombax 2, Calopphyllum 1, Croton 1, Maesopsis 1.

Other trees: *Chrysalidocarpus, Erythrophloeum, Tabernaemontana ventricosa, Pachystela brevipes, P. msolo, Rawsonia.*

Shrubs, lianas and herbs: *Acanth* 17, *Chassalia, Culcasia, Entada, Flagellaria, Landolphia, Nephrolepis, Polysphaeria parvifolia, SchiZozygia, Zamioculcas.*

Maesopsis: occasional saplings.

Boundary beacon found destroyed; hoard of poles found.

Compartment # 14

Harvested in the early 1960s. Very few large trees left *(Antiaris, Bombax, Cassipourea; Ficus exasperata, Terminalia catappa),* most of this compartment is very bushy with much *Elaeis, CostUS, Entada.*

Maesopsis planted along the boundary in 1963, now 20-25m high, 40cm DBH.

Boundary beacons destroyed.

Compartment # 15

Harvested in 1957-64, in 1975-78, and in 1978-83; replanted with *Maesopsis* by FD.

Canopy 20-25m high, very open; undercanopy cover 80 % at 1O-12m high.

30 TREE COUNT: Maesopsis 24, Pachystela brevipes 2, Antiaris 1, Cassipourea 1, Ficus exasperata 1, Tabernaemontana ventricosa 1,

Other trees *Elaeis, Tabernaemontana ventricosa* (common), *Macaranga, Pachystela* (frequent), *Rauvolfia*

Shrubs, lianas and climbers: *Culcasia, Landolphia, Nephrolepis, Psychotria schliebenii, Zamioculcas*

Maesopsis frequent as young trees.

Compartment # 16

Canopy 15-20 (-25)m, canopy cover broken, 50-90 %. Soil sandy. Harvested in 1957-64 and 1975-78.

30 TREE COUNT: Elaeis 7, Maesopsis 7, Macaranga 6, Erythrophloeum 3, Odyendea 3, Ficus exasperata 1, F. lutea 1, Tabernaemontana ventricosa 1, "MUSINDAZI" 1 (unidentified).

Other trees: *Elaeis, Funtumia, Odyendea, Pachystela spp, SoriOOeia, Rawsonia*

Herbs, shrubs and lianas: *Adenia rumicifolia, Culcasia, Dorstenia, Flagellaria, Landolphia, Nephrolepis, Psychotria schliebenii, Saba, Strychnos angolensis, Zamioculcas*

Maesopsis occasional young trees.

Compartment # 17

Canopy 15-20m high, canopy cover 50-70 %, few emergents to 35m high; soil sandy. Harvested by the Chinese. Southern part more bushy. Harvested in 1957-64 and 197578.

30 TREE COUNT: Odyendea 15, Croton 4, Antiaris 3, Elaeis 3, Averrhoa 1, Blighia 1, Bombax 1, Cassipourea 1, Erythrophloeum 1, Uapaca 1.

Other trees: *Albizia adianthifolia, Chrysalidocarpus, Chrysophyllum, Tabernaemontana ventricosa, Pachystela spp., Rawsonia*

Lianas, herbs, shrubs: *Adenia rumicifolia, Chassalia, Culcasia, Dorstenia, Entada, Flagellaria, Landolphia, Nephrolepis, Polysphaeria parvifolia, Saba, Salacia, Schizozygia, Smilax, Strychnos, Synaptolepis, Uncaria , Uvaria, Zamioculcas*

Maesopsis: young ones occasional.

Compartment # 18

Harvested in 1957-64 and 1975-78.

Sampled here was the SWAMP FOREST near and in the stream running south-north. In the stream: canopy 15-20m high, canopy cover 90 %, co-dominant *Barringtonia, . Samadera;* occasional species *Combretum, Uncaria, Entada, Mucuna, Scuria, Adenia rumicifolia.*

Forest close to stream: canopy 25m high, cover 80 %. Soil sandy.

30 TREE COUNT: Barringtonia 8, Odyendea 7, Maesopsis 4, Uapaca 4, Elaeis 3, Macaranga 2, Bombax 1, Tabernaemontana ventricosa 1.

Other trees: *Erythrophloeum, Rawsonia*

Shrubs, lianas, herbs: *Acanthac., Adenia rumicifolia, Asplenium, Costus, Dorstenia, Entada, LaOOo/phia, Scutia, Vanilla sp.., Zamioculcas*

Maesopsis: one patch.

Compartment # 19

On the northern edge there is a swamp with an almost pure stand of Raphia.

Southern half: canopy 20m, canopy cover 80 %, soil sandy. Harvested in 1957-64.

30 TREE COUNT: Uapaca 5, Bombax 4, Maesopsis 3, Odyendea 3, Croton 2, Mango 2, Pachystela brevipes 2, P. msolo 2, Averrhoa 1, Cassipourea 1, Elaeis 1, Tabernaemontana ventricosa 1, Macaranga 1, Milicia 1, "MULELE" 1 (not identified).

Other trees: *Chrysalidocarpus, Elaeis, Ficus exasperata, F. lutea, Taber~aemontana ventricosa, Rauvolfia, Rawsonia* (common)

Herbs, shrubs and lianas: *Adenia rumicifolia, Landolphia sp., Nephrolepis, Smilax, Whitfteldia, Zamioculcas*

Maesopsis: occasional saplings.

In the centre of the compartment there are 3 pools, one covered with *Raphia* and two with *Barringtonia;* also here are *Impatiens,* large *Chrysalidocarpus, Funrwnia.*

Compartment # 20

Canopy very patchy; some trees to 40111 but most trees only to 15m. Northern part very
bushy and low. Soil sandy. Harvested in 1957-64 .

30 TREE COUNT: Ficus exasperata 8, Croton 7, Antiaris 4, Odyendea 3, Maesopsis 2, Alangium 1, Bridelia 1, Cassipourea 1, Ficus lutea 1, Majidea 1, Terminalia ivorensis 1

Other trees: *Antidesma, Drypetes, Elaeis, Tabernaemontana ventricosa, Milicia, Rauvolfia, Rawsonia*

Shrubs, lianas, herbs: *Acanth* 17, *Adenia rumicifolia, Dioscorea, Ensete, Entada, Phyllanthus, Scutia, Tragia, Zamioculcas*

Maesopsis: occasional seedlings seen.

Compartment # 21

Very bushy, low, patchy and with tangled undergrowth. Harvested in 1975-78, in 1978-83, and in 1983-88.

Trees: *Chrysophyllum, Cordia alliodora, Elaeis, Leptactina, Pachystela spp., Rawsonia,*

Herbs, shrubs, lianas: *Asplenium, Chassalia, Nephrolepis, Suregada*
Maesopsis: many young trees.

Compartment # 22

This, compartment was clearcut in the middle 1970's (under the Chinese experts) and the intention was to replant it with rubber. Political pressure was put on to replant it with indigenous species; the result was the replanting in 1977 with Msisi, *Maesopsis eminii,* an exotic species but a very fast growing one. The compartment is a pure stand of this Msisi, already some 30m high.

Compartment # 23

Canopy 30-40m high, canopy cover 80 %; in northern quarter more open and rather bushy, with a pond. Harvested in 1983-85.

30 TREE COUNT: Odyendea 16, Antiaris 2, Cassipourea 2, Maesopsis 2, Syzygium cumini 2, Bombax 1, Lannea 1, Ficus lutea 1, Mango 1.

Other trees: *Chrysalidocarpus, Ficus lutea, Macaranga, Pachystela brevipes, P. msolo, Rauvolfia* '

Shrubs and herbs: *Asplenium, Chassalia, Costus, Culcasia, Flagellaria, Gonatopus, Polysphaeria parvifolia, Whitfieldia, Zamioculcas.*

Compartment # 24

Canopy 20-30m high, canopy cover 80 %; emergents to 35-40111 high, cover 70 %; soil
sandy. Harvested in 1983-85.-

30 TREE COUNT: Antiaris 10, Odyendea 10, Erythrophloeum 2, Pachystela brevipes 2, Bombax 1, Bridelia 1, Cassipourea 1, Elaeis 1, Mango 1, Pachystela msolo 1

Other trees: *Chrysalidocarpus, Chrysophyllum, Erythrophloeum, Macaranga, Odyendea, Pachystela spp., Rawsonia*

Shrubs, lianas and herbs: *Asplenium, Cnestis, Culcasia, Dorstenia, Gonatopus, Impatiens, Leptactina, Polysphaeria parvifolia, Psychotria schliebenii, Salacia, Schizozygia, Strychnos, Tiliacora, Uncaria, Whitfieldia, Zamioculcas*

M aesopsis: occasional.

The southern part, near the road, has a canopy of 35-40m high, canopy cover 80-90 %, with very little understorey: only *Costus* and *Dracaena laxissima* to 2m. This area has been kept intact, as a nature reserve, since 1950; this is according to Nd. Toufiq. This would certainly agree with my observations here, although I believe that the southern part, Le. that part near the road, has been cleared from undergrowth at regular intervals. This

plot, when seen from the road, presents a very maridadi, majestic and tidy appearance (although rather unnatural to a botanists' eye) with smooth, thick trunks rising to a high canopy.

Compartment # 25

Southern part: much cultivated *Cydrela, Tectona, Tabebuia, Prosopis;* occasional *Elaeis, Tabernaemontana, Rawsonia lucida.* The part just N of the road is a so-called "Arboretum" which was planted in the early 1960's for girth increment measurements: *Cordia alliodora, Maesopsis eminii, Ceiba pentandra, Terminalia ivorensis* (very large!), *Milicia excelsa, Khaya ivorensis, Tectona grandis, Eucalyptus sp.* The undergrowth here consists of *Costus, Zamioculcas, Acanthaceae, Gonatopus.*

Northern part: Canopy 35m high, canopy cover 80 %; harvested in 1983-85.

30 TREE COUNT: Cordia alliodora 7, Erythrophloeum 5, Odyendea 5, Antiarj.s 3, Croton 2., Alangium 1, Bridelia 1, Cassipourea 1, Ficusexasperata 1, Ficus lutea 1, Macaranga 1, Pachystela brevipes 1, Syzygium cumini 1

Understorey with Rawsonia, Sorindeia, Rauvolfia, Whitfieldia, Dioscorea. Maesopsis occurs occasionally, both as young plants and as trees.

Compartment # 26

Canopy 20-25m high, canopy cover patchy, 40-70 %; soil sandy. Harvested in 1957 64.

30 TREE COUNT: Odyendea 12, Antiaris 6, Milicia 3, Pachystela brevipes 2, Averrhoa 1, Bombax 1, Croton 1, Erythrophloeum 1, Ficus exasperata 1, F. lutea 1, Macaranga 1, Terminalia ivorensis 1

Other trees: *Chrysalidocarpus, Tabernaemontana ventricosa, Rauvolfia, Rawsonia, Sorindeia*

Shrubs, lianas and herbs: *Achyranthes, Adenia rumicifolia, Costus, Culcasia, Flagellaria, Gossypioides, Haemanthus, Landolphia sp., Leptactina, Phyllanthus, Strophanthus, Strychnos angolensis, Whitfieldia (common), Zamioculcas.*

Maesopsis occasionally as saplings; planted along the boundaries, where they are rejuvenating.

Compartment # 27

Harvested in 1983-84.

Trees: *Albizia adianthifolia, Bombax, Elaeis, Erythrophloeum, Tabernaemontana ventricosa, Odyendea, Pachystela, Rawsonia, Sorindeia, Syzygium cumini, Uapaca*

Herbs, shrubs and lianas: *Adenia rumiGifolia, Culcasia, Nephro lep is, Polysphaeria parvifolia, Saba, Strychnos, Vittaria, Zamioculcas*

An oxcart trail leads from Tondoni to the Philippia area, and looks frequently used. The vegetation near the Philippia has much *Hibiscus, Vernonia, Phyllanthus, Phymatodes,* bracken *(Pteridium), Smilax;* pools on the edge of the Philippia area are covered with *Nymphaea, Nymphoides,* while the edges have much *Melastomataceae, Xyris.* The Philippia area starts roughly at the southern boundary of this compartment (see # 33).

Compartment # 28

Canopy some 35m high, canopy cover 60-80 %, soil sandy. Harvested in 1957-64. 30

TREE COUNT: Odyendea 16, Pachystela brevipes 4, Elaeis 2, Erythrophloeum 2, Cassipourea 2, Antiaris 1, Bombax 1, Lannea 1, Pachystela msolo 1.

Trees: *Chrysalidocarpus, Elaeis, Rawsonia.*

Herbs and shrubs: *Chassalia, Dioscorea, Flagellaria, Polysphaeria parvifolia, Psychotria schliebenii, Zamioculcas.*

Compartment # 29

The southern part is very open and disturbed; in the better parts - canopy 30-35m high, canopy cover 70 %, soil sandy. Harvested in 1957-64, and in 1983-88.

30 TREE COUNT: Odyendea 13, Uapaca 4, Antiaris 3, Maesopsis 3, Bombax 2, Pachystela brevipes 2, Antidesma 1, Bridelia I, Elaeis 1

Other trees - *Chrysalidocarpus, Elaeis, Ficus sur, Pachystela msolo, Rawsonia, Sorindeia* Shrubs & herbs - *Acanthac, Aframomum, Asplenium, Chassalia, Costus, Cyperus, Flagellaria, Impatiens, Nephrolepis, Polysphaeria, Sansevieria, Schizozygia, Virraria, Zamioculcas*

Maesopsis no seedlings seen, few trees.

Compartment # 30

Canopy 35-40m high, canopy cover 60-80 %; soil sandy. Harvested in 1957-64.

30 TREE COUNT(near stream): Odyendea 17, Uapaca 7, Cassipourea 2, Antiaris 1, Barringtonia 1, Elaeis 1, Pachystela brevipes 1

Other trees: *Chrysalidocarpus, Elaeis, Erythrophloeum, Ficus lurea,Tabernaemontana ventricosa, Macaranga, Pachystelaspp., Rauvolfia*

Shrubs, lianas and herbs: *Acanth., Aframomum, Chassalia, Costus, Cremaspora, Culcasia, Flagellaria, Impatiens, Landolphia, Nephrolepis, Polysphaeria, Saba, Salacia, Sansevieria, Uvaria, Zamioculcas*

Compartment # 31

Canopy some 35m high, canopy cover 60-80 %, most trees over 50cm DBH, few trees over 100cm DBH; undergrowth dense with much *Costus, Aframomum.* Harvested in 1957-64.

30 TREE COUNT: Elaeis 5, Milicia 4, Odyendea 4, Maesopsis 3, Antiaris 2, Tabernaemontana ventricosa 2, Bombax 2, Majidea 2, Pachystela brevipes 2, Pachystela msolo 2, Alangium 1, Artocarpus 1.

Compartment # 32

Forest nursery plot. Not surveyed. Harvested in 1957-64, and in 1983-88. Several ponds.

Compartment # 33

The western part of this plot is occupied by Philippia bush; the eastern part with forest.

Forest: canopy 20-25m high, canopy cover 40-70 % with a patchy aspect, undergrowth bushy; soil sandy with humus. Harvested in 1957-64.

30 TREE COUNT: Uapaca 7, Odyendea 5, Pachystela brevipes 5, Antiaris 4, Erythrophloeum 4, Averrhoa 2, Elaeis 1, Macaranga 1, Majidea I, Milicia 1.

Other trees: *Elaeis, Erythrophloeum, Ficus lutea, Lannea, Macaranga, Odyendea, Parinari* (edge), *Rawsoma*

Shrubs, lianas, herbs: *Adenia rumicifolia, Allophylus* ? *vestitus, Chassalia, Gossypioides, Landolphia, Nephrolepis, Polysphaeria parvifolia, Saba, Smilax, Suregada, Synaptolepis, Zamioculcas*

Compartment # 34

Canopy 25-30m high, canopy cover patchy, 30-60 %; soil sandy. Harvested in 1957 64.

30 TREE COUNT: Bombax 6, Odyendea 6, Uapaca 6, Erythrophloeum 4, Pachystela brevi pes 3, Cassipourea 2, Antiaris I, Antidesma I, Elaeis 1

Understorey with young *Macaranga, Rawsonia, Sorindeia;* herbs and shrubs *Adenia rumicifolia, Costus, Culcasia, Keetia, Nephrolepis, Tiliacora, Smilax*

Compartment # 35

The northern part was harvested in 1982 and replanted with *Maesopsis.* Due to poor tending (caused by lack of staff) this is not doing as well as it could.

The southern part was harvested in the 1960s; the canopy reaches 30-35m but canopy cover is patchy and generally only 50%. *Maesopsis* is frequent in the understorey, together with *Chrysalidocarpus, Flagellaria, GonLltopus, Psychotria schliebenii, Tetracera litoralis.*

30 TREE COUNT: Antiaris 7, Odyendea 6, Bombax 5, Uapaca 4, Pachystela brevipes 3, Antidesma 1, Cassipourea 1, Elaeis 1, Erythrophloeum 1, Macaranga 1, Rawsonia 1.

There is a small stream running west-east.

Compartment # 36

Harvested in the 1960s; replanted but poorly tended, very patchy. Canopy 25-30m high, canopy cover 60-80 %; soil sandy.

30 TREE COUNT: Uapaca 15, Odyendea 6, Antiaris 4, Elaeis 2, Macaranga 2, Pachystela brevipes 1

Other trees: *Chrysalidocarpus, Erythrophloeum, Funtumia, Pachystela msolo, Rawsonia, Rinorea*

Shrubs, herbs, lianas: *Acanthac., Adenia rumicifolia, Chassalia, Cnestis, Costus, Culcasia, Flagellaria, Nephrolepis, Saba, Uvaria, Zamioculcas.*

Compartment # 37

Demonstration plot, for girth increment measuring. Not surveyed; said to be carefully surveyed by an American scientist in the early 1980s. The southern part has many *Maesopsis,* some *Polyscias* (same age as the group in 42), *Odyendea, Elaeis, Ficus lutea, Calophyllum* (young), *Pachystela, Uapaca;* undergrowth with *Nephrolepis, Allophylus, Asplenium, Dracaena laxissima. Chrysalidocarpus, Rawsonia, Cnestis, Saba, Polysphaeria.* Harvested in 1957-64.

Compartment # 38

Mainly Philippia; on the western side there is a thin belt of mainly *Elaeis,* with some *Bombax* and *Erythrophloeum* ; I was told this borders the sea and the mangrove, but studying the 1:10.000 maps and aerial photographs of 1979 afterwards I realized that this is the area (called Mkia ya ngombe) where there used to be houses and cultivation on the west-facing slopes down to the bay. The Khamis map, however, shows the forest boundary to be the Forest Reserve boundary, and so this slope is possibly outside tQe Reserve.

Compartment # 39

Philippia.

Compartment # 40

Common trees: *Albizia adianthifolia, Elaeis, Erythrophloeum, Ficus lutea, Tabernaemontana ventricosa, Pachystela brevipes, P. msolo, Rauvolfia, Rawsonia, Sorindeia, Uapaca* (especially near the Philippia area), *Vitex* In general a compartment intermediate between the Philippia heath and the moist forest. No reports on harvesting, but looks disturbed.

Lianas, shrubs and herbs: *Nephrolepis, Lomariopsis, Phymatodes, Synaptolepis, Smilax, Strychnos angolensis, Zamioculcas.*

On the eastern side there is a steep dip to a gully stream running north.

Compartment # 41

Most of this compartment is occupied by *Philippia mafiensis* scrub, looking very poor due to a fIre which devastated this whole "mdamba" area about a year ago (end dry season 1988).The Philippia is now 1-2 m high, the soil, consisting of leached sand, is covered with bits of charcoal, and there are dead trees dotted over a dismal landscape. Between the

forest (northern edge of #41, see nr. 35 for composition) and the Philippia there is a large pool.

Compartment # 42

Southern part Philippia; northern quarter with pools with *Elaeis.* Forest with a few large *Odyendea,* some *Uapaca, Lagynias, Suregada,* a few *Ensete.*

We found (and destroyed) 3 caches of poles in the forest (mainly *Averrhoa* and *Leptactina).* Just north of the pool there is a stand of *Polyscias fulva,* by Rodgers et al. believed to be indigenous; I am not sure, since they are fairly young, even-aged, and moreover of roughly the same age of a stand of Maesopsis and Calophyllum at the same site. Nd. Toufiq says these *Polyscias* have not been planted. The forest part was harvested in 1957-64.

Compartment # 43

Canopy 30m high, canopy cover 60-70 %; soil sandy, with humus. Harvested in 1957-64.

30 TREE COUNT: Uapaca 13, Odyendea 6, Bombax 4, Erythrophloeum 3, Pachystela brevipes 2, Averrhoa 1, Elaeis 1, Pachystela msolo 1, Syzygium curnini 1

Other trees: *Chrysa/idocarpus, Elaeis, Macaranga, Rawsonia, Sorindeia,*

Lianas, shrubs and herbs: *Chrysophyllum, Chassalia, Dracaena laxissima, Flagellaria, Landolphia, Muivuivu (not identified), Nephrolepis, Polysphaeria paTVifolia, Saba, Schizozygia, Smilax, Strychnos, Uvaria* 4366, *Zamioculcas.*

Compartment # 44

A marginal plot similar to # 43; harvested in '1957~64 and in 1985-88.

Compartment # 45

Philippia; See 38.

Compartment # 46

Philippia.

Compartment: # 47

Philippia.

Compartment # 48

Philippia.

Compartment # 49

Philippia.

Compartment # 50

Philippia.

Compartment # 51

Canopy 30-35m, canopy cover 60 % and patchy, large open sited. Soil sandy. Harvested in 1957-64.

30 TREE COUNT: Erythrophloeum 12, Uapaca 6, Bombax 2, Croton 2, Averrhoa 1, Calophyllum 1, Macaranga 1, Mango 1, Odyendea 1, Pachystela brevipes 1, Terrninalia catappa 1, Syzygium curnini 1.

Other trees: *Albizia adianthifolia, Bombax, Chrysa/idocarpus, Elaeis, Erythrophloeum, Funtumia, Odyendea, Pachystela spp., Rauvolfia, Sorindeia, Syzygium cumini, Uapaca*

Shrubs, lianas, herbs: *Chassalia, Costus, Culcasia, Dracaena laxissima, Flagellaria, Nephrolepis, Salacia, Smilax, Zamioculcas*

Southern part with large pond full of *Raphia.*

Compartment # 52
Philippia, as far as I can ascertain

Compartment # 53
Patchy and low, bushy. Canopy broken, generally low, with some larger trees *(Antiaris, FiatS lurea, F. exasperata, Milicia, Odyendea, Terminalia catappa).* No records of harvesting, but possibly near old settlementS.

Recently (1989) 4 youths were caught here at night, after felling an *Antiaris* without a pennit and pitsawing it into planks. I saw the stump, which was 1.3m across. The case is still pending.

A small stream here, flowing to the sea (due west).

Going east we encountered Philippia again - but it is difficult to say where, in 53 or 54 (or even 60)

Compartment # 54
Not visited. Possibly all Philippia and pools.

Compartment # 55
Philippia.

Compartment # 56
Philippia.

Compartment # 57
Philippia.

Compartment # 58
Canopy 12m high, canopy cover 80 %; emergents to 40m high, cover 10-40 %, some very large trees with DBH > Im. Harvested in 1986-87 (partially - mainly outer edge)

30 TREE COUNT: Odyendea 8, Antiaris 7, Uapaca 3, Elaeis 2, Pachystela brevipes 2, Averrhoa 1, Blighia 1, Bombax 1, Croton 1, Erythrophloeum 1, Ficus lutea 1, Pachystela msolo 1, Syzygium cumini 1

Other trees: *Chrysalidocarpus* (frequent), *Elaeis, Tabernaemontana ventricosa, Macaranga, Rauvolfia, Tapura, Uapaca*

Shrubs, lianas, herbs: *Cnestis, Asplenium, Chassalia, Costus, Culcasia, Dioscorea, Dracaenafragrans, Ensete* (frequent), *Flagellaria, Gonatopus, Gossypioicks, Harungana, Landolphia, Phyllanthus, Polysphaeria parvifolia, Saba, Salacia, Schizozygia, Strychnos, Tinospora, Zamioculcas.*

Maesopsis: none seen; *Averrhoa* occasionally seedlings spotted.

Compartment # 59
Canopy 12-15m, canopy cover 70 %, with emergents to 30m high (and some 40 % cover). Impression: patchy and secondary. Soil sandy. Ruins of a village (abandoned within the last two decades?) said to be close: Harvested in 1986.

30 TREE COUNT: Mango 9, Tabernaemontana ventricosa 5, Elaeis 4, Bombax 3, Uapaca 3, Macaranga 2, Pachystela brevipes 2, Artocarpus 1, Erythrophloeum 1

Other trees: *Albizia adianthifolia, Calophyllum, Chrysalidocarpus, Chrysophyllum, Ficus lutea*

Shrubs, herbs, lianas: *Adenia rumicifolia, Asplenium, Chassalia, Cremaspora, Culcasia, Dioscorea, Dracaenafragrans, Entada, Gonatopus, Landolphia, Nephrolepis, Saba, Salacia, Schizozygia, Zamioculcas*

Compartment # 60
Not visited

Compartment # 61
Not visited

Compartment # 62
Philippia.

Compartment # 63
Philippia in western half; soil sandy, greyish, leached. ..
- Eastern half forest, with canopy 30m high, canopy cover 60-80 %, soil sandy.
30 TREE COUNT: Odyendea 14, Antiaris 6, Milicia 3, Bombax 1, ErythropWoeum 2, Ficus exasperata 1, Ficus lutea 1, Majidea 1, Uapaca 1
Other trees: *Albizia adianthifolia, Chrysa/idocarpus, Chrysophy//um, Elaeis, Funtumia, Macaranga, Pachystela spp., Rauvo/fia, Tabernaemontana ventricosa, Trema, Uapaca*
Shrubs, lianas, herbs: *Asplenium, Cnestis, Chassa/ia, Costus, Culcasia, Dracaena fragrans, Ensete* (rare), *Landolphia, Tarenna pavettoides, Uvaria, Zamioculcas.*
Margin Philippia/forest: *Syzygium cordatum*

Compartment # 64
Very similar to # 58. Harvested in 1975-78 and in 1983-88.

Compartment # 65
Access difficult because of swampy southern side with *Raphia, Typhonodorum,* sedges. The western edge is mangrove, with *fJruguiera, Ceriops, Heritiera, Rhizophora, Xylocarpus.* .
The margin mangrove/forest (where the ground rises steeply) is characterized by *Heritiera, Chrysa/idocarpus, Elaeis, Pandanus kirkii,* with *Synaptolepis, Cnestis, Strychnos, Zamioculcas, Cremaspora, Psychotria sch/iebenii, Dracaena laxissima, Polysphaeria parvifo/ia,* with slightly higher *Vitex, Macaranga, Chrysophy//um, Pachystela, Drypetes, Rawsonia, Bombax.*

Compartment # 66, 67
Not visited. The southern edge has swamps with *Raphia*

Compartment # 68
Southern part bushy forest rather open, with occasional large trees. Probably harvested in 1986.
Trees: *Albizia adianthifolia, Croton, Elaeis, Erythrophloeum, Tabernaemontana ventricosa, Lannea, Macaranga, Pachystela msolo, Uapaca, Vitex*
Shrubs, lianas, herbs: *Adenia rumicifolia, Asplenium, Chassalia, Cu/casia, Dracaena fragrans, Flage//aria, Landolphia, Melastomat., Nephrolepis, Phymatodes, Saba, Smilax, Vanilla sp., Zamioculcas*
Northern half Philippia area: main part with 0.5-2m high *Philippia.,* dead trees;some planted cashew and eucalypts, *Vernonia,* bracken *(Pteridium), Ficus lutea;* ponds with *Nymphaea, Utricularia, Xyris,* some *Raphia* trees. On the margins *Psychotria holtzii, Syzygium cordatum.*
Margin Philippia area/forest with *Antidesma, Chassa/ia, Croton, Disperis, Erythrophloeum, Flage//aria, Nephrolepis, Pachystela spp., Psychotria holtzii, Smilax, Strychnos, Synaptolepis, Zamioculcas,.* .

Compartment # 69
Harvested in 1976 along the outer boundary.

Compartment # 70

Canopy 20m high, canopy cover 90 %; emergents to 40m high, cover 30 %. After harvesting in 1985-86 replanted with *Khaya,* but these were not seen, probably because they have died due to lack of tending.

30 TREE COUNT: Pachystela brevipes 7, Odyendea 6, Calophyllum 4, Bridelia 3, Antiaris 2, Erythrophloeum 2, Artocarpus 1, Croton 1, Elaeis 2, Macaranga 1, Uapaca 1

Other trees: *Antidesma, Chrysophyllum, ChrysaIidocarpus, Elaeis, Erythrophloeum, Ficus lutea, Macaranga, Majidea, Pachystela brevi pes, P. msolo, ,Rauvolfia, Syzygium cumini,*

Lianas, herbs and shrubs: *Adenia rumieifolia, Aframomum, Asplenium, Cnestis, ChassaIia, Cremaspora, Culcasia, Dracaenafragrans, Entada, Flagellaria, Polysphaeria parvifolia, Psyehotria sehliebenii, Saba, Salacia, Suregada, Tinospora, Uvaria, Zamioeuleas*

A verrhoa: seedlings and young trees, occasional

Compartment # 71

Rather open and bushy, with the occasional tree to 30m high. Harvested in 1985-86.

Trees: *Albizia adianthifolia, Croton, Elaeis, Erythrophloeum, Tabernaemontana ventricosa, Lannea, Maearanga, Paehystela msolo, Uapaea, Vitex* .

Shrubs, lianas, herbs: *Adenia rumicifolia, Asplenium, Chassalia, Culcasia, Dracaena fragrans, Flagellaria, Landolphia, Melastomat., Nephrolepis, Phymatodes, Saba, Smilax, Vanilla sp., Zamioculcas*

Compartment # 72

Coastal evergreen bushland with main canopy at 6-9m high, with emergent trees to 25m. Harvested in 1986.

Main trees: *Afzelia, Chrysalidoearpus, Croton, Cussonia, Erythrophloeum, Haploeoelum, Leptactina, Milicia, Phoenix, Sorindeia, Tamarindus, Terminalia catappa* (beach only)

Understorey species: *Asparagusfalcatus, Chassalia, Cremaspora, Flagellaria, Ludia, Phyllanthus, Polysphaeria multiflora, P. parvifolia, Rauvolfia, Sansevieria, Suregada, Tragia, Zamioculcas*

The boundary for the proposed beach hotel site has alrea<;ly been cleared (some 900m N -S x 300m wide from HWM) and marked with concrete markers.

Compartment # 73

Coastal evergreen bushland; larger trees *Afzelia quanzensis* and the occasional *Tamarindus.* The area close to the beach has (common species) *Ancylobotrys petersiana, Chassalia umbratieola, Chrysalidoeatpus pembeanus, Grewia stuhlmannii, Haplocoelum inoploeum, Mystroxylon aethiopieum, Pandanus kirkii, Polysphaeria parvifolia, Phymarodes scolopendria, Sansevieria kirkii, Sideroxylon inerme;* (occasional' species) *Casuarina, Colubrina asiatiea, Cussonia zimmermannii, Ficus lutea, F. natalensis, Flagellaria guineensis, Hibiscus tiliaeeus, Indigofera sp., Manilkara sulcata, Scutia myrtina,.Terminalia eatappa,*

The Casuarinas here are said to have been planted by a Greek forester i~ the 1950s.

Compartment # 74

Canopy 20m high, canopy cover 50 %, undergrowth thick; soil sandy. Harvested in 1978-83 and in 1983-88; two large Mvule were being cut in January 1990.

30 TREE COUNT: Milicia 9, Antiaris 6, Ficus exasperata 6, Elaeis 5, Croton 2, Ficus lutea 1, Pterocarpus 1

Other trees: *Paehystela spp.*

Shrubs, herbs, lianas: *Ancylobotrys, Cassia, Culcasia, Landolphia, Melasromatac., Polysphaeria parviflora, Psyehotria schliebenii, Salacia, Smilax, Tiliacora,*

The northern boundary is planted with *Pteroearpus.*

In January 1990 *Milicia* was still being harvested in this plot.

Compartment # 75-76

Canopy 15m high, canopy cover 70 %, emergents to 30m high; open patches present; soil sandy. Harvested in 1978-83.

30 TREE COUNT: Antiaris 9, Erythrophloeum 4, Milicia 4, Elaeis 3, Croton 2, Maesopsis 2, Pachystela brevipes 2, Albizia adianthifolia 1, Bridelia 1, Ficus exasperata 1, Vitex 1.

Other trees: *Chrysophyllum, Elaeis, Tabernaemontana ventricosa, Pachystela msolo, Rauvolfia*

Shrubs, herbs, lianas: *Chassalia, Culcasia, Deinbollia, Flagellaria, Gonatopus, Landolphia, Nephrolepis, Psychotria schliebenii, Sa/acia, SmUax, Zamiocu/cas*

Compartment # 77

Canopy 20m high, canopy cover 60 %, with emergents to 30 m and open patches. Soil sandy. Harvested in 1978-8 and in 1983-88.

30 TREE COUNT: Antiaris 9, Milicia 4, Elaeis 3, Croton sylvaticus 2, Erythrophloeum4, Maesopsis 2, Pachystela brevipes 2, Albizia adiantifolia 1, Bridelia 1, Ficus exasperata 1, Vitex doniana 1.

Other trees: *Chrysophyllum, Deinbollia, Tabernaemontana ventricosa, Pachystela, Rauvolfia*

Other plants: *Chassalia, Culcasia, Flagellaria, Gonatopus, Landolphia, Nephrolepis, Psychotria schliebenii, Salacia, Smilax, Zamiocu/cas,*

Compartment # 78

Canopy to l2m, canopy cover 40-60 %, with emergents to 20m; soil sandy with coral outcrops. Harvested in 1957-64 and in 1978-83.

30 TREE COUNT: Diospyros consolatae 10, Sorindeia 6, Croton 2, "Entandophragma" 2 (not identified), Haplocoelum 2, Milicia 2,- Cussonia 1, Erythrophloeum 1, Ficus lutea 1, F. scasselattii 1, Sideroxylon 1, Terminalia catappa 1

Other trees: *Chrysalidocarpus, Cussonia, Drypetes, Milicia, Mystroxylon, Pandanus kirkii, T ermina/ia boivinii*

Shrubs, lianas and herbs: *Flacourtia, Flueggia, Phymatodes, Rhoicissus, Synaptolepis*

Compartment # 79

Canopy 12-15m, canopy cover 80 %; emergents to 30m; some large open patches. Harvested in 1960-61 (and replanted), harvested 1979.

30 TREE COUNT: Bridelia 9, Milicia 5, Croton 4, Elaeis 2, Erythrophloeum 2, Pachystela brevipes 2, Syzygium cumini 2, Albizia adianthifolia 1, Antiaris 1, Ficus exasperata 1, Sorindeia 1

Other trees: *Calophyllum, Chrysalidocarpus, Chrysophyllum, Dalbergia, Dichrostachys, Elaeis* (young ones common), *Ficus sur, Flagellaria, Harungana, Macaranga, Mango, Milicia, Pachystela, Rauvolfia, Sorindeia, Syzygium cumini*

Shrubs, lianas and herbs~ *Aframomum, Chassalia, Costus, Cremaspora, Cu/casia, Gonatopus, Landolphia, Nephrolepis, Phyllanthus, Polysphaeria parvifolia, Saba, Smilax*

Compartment # 80

Very similar to # 78, but with more *Terminalia boivinii* and many Rubiaceae shrubs and Acanthaceae herbs.

Additional species: *Allophylus, Eugenia sp. nov., Nervilia, Pachystela sp., Phoenix, Rawsonia, Rhus sp., Suregada, Vepris eugeniifolia.*

Here we encountered some illegal entrants who had come to poach young Phoenix, for weaving.

Compartment # 82-83

Canopy 8-1Om high, cover 90 % with emergents to 20- 25m; soil sand with coral.

30 TREE COUNT: Sorindeia 14, Elaeis 3, Ficus exasperata 3, Croton 2, Ficus lutea 2, Ehretia 1, Erythrophloeum 1, Haplocoelum 1, Milicia 1, Pachystela brevipes 1, Tamarindusl

Other trees: *Antiaris, Chrysalidocarpus, Diospyros consolatae, Drypetes, Margaritaria, Olea, Pachystela msolo, Phoenix, Rawsonia,*

Shrubs, herbs, lianas: *Chassalia, Cremaspora, Dioscorea, Eugenia sp. nov., Flagellaria, Gonatopus, Landolphia, Polysphaeria parvifolia, Schizozygia, Vepris, Zamioculcas*

Compartment # 84

Very much like #82-83. There is some mangrove in small bays.

Near, the sea *Haemanthus* , *Pemphis, Sideroxylon, Guettarda, Vanilla roscheri* and *Erythroxylum* were found.

Additional species: *Ficus exasperata, Flacourtia, Manilkara sulcata, Phymatodes, Polysphaeria spp., Suregada, Synaptolepis, Terminalia boivinii, Zanthoxylum*

Kikwayakwaya	Lobelia fervens
Kirukia	generalized name for epiphytes
Majani mwitu	general ("forest leaves':) name for shrubs
Makunjuzi	generalized name for climbers
Mavimavi	Alangium salviifolium
Mbambakofi	Afzelia quanzensis
Mbirimbi	A verrhoa sp
Mbirimbi mwitu	Polyscias fulva.
Mbiye	Typhonodorum'lindleyanum
Mbungo	Saba comorensis
Mbuni mwitu	Leptactina platyphylla (NOT Panax spp)
Mbura	Parinari curatellifolia
Mchapia tumbili	Albizia adianthifolia
Mchenya	Majidea zanguebarica
Mchenza msitu	Uapaca guineensis
Mchilichi	Elaeis guineensis
Mchocha dume	Pachystela msolo
Mchocha mke	Pachystela brevipes
Mchochoni	Dioscorea spp.
Mchongoma	Flacourtia indica
Mchungwa mwitu	Olea woodiana
Mchungwa mwitu	Vepris cf. eugeniifolia
Mdamba	Philippia mafiensis
Mdamudamu	Harungana madagascariensis
Mdamudamu	Pterocarpus angolensis .
Mdawadawa	Croton sylvaticus
Mdimu	Lemon (Citrus aurantiacus)
Mdimu msitu	Suregada zanzibarensis
Mfenesi mfuu	Artocarpus heterophyllus, A. integrifolia
Mfupapu	Lannea schweinfurthii
Mfuu	Vitex doniana
Mgembakofi	Typhonodorum lindleyanum
Mgindekuti	Nephrolepis biserrata
Mgjani matano	Tabebuia pentaphylla
Mgole	Adenia rurnicifolia (also more general?)
Mgombatumbili	Ensete proboscideum
Mgulele	Antiaris toxicaria
Mguni mwitu	Leptactina platyphylla
Mjafari	Drypetes natalensis, D. reticulata
Mjafari ya kipemba	Zanthoxylum holtzianum
Mjengo	Diospyros consolatae
Mjoho	Odyendea zimmermannii
Mkadi	Pandanus kirkii
Mkala	Tetracera litoralis
Mkalamu	Flagellaria guineensis
Mkamasi	Cordia alliodora
Mkangashale	Smilax anceps
Mkanja	Cremaspora triflora
Mkanja	Polysphaeria parvifolia
Mkaranga	Macaranga capensis
Mkarati	Bridelia rnicrantha
Mkaratusi	Eucalyptus spp.
	Smilax anceps

Mkekewa	
Mkilua	Uvaria spp. (aromatic)
Mkindu	Phoenix reclinata
Mkodia	Cordia alliodora
Mkoke	Mimusops sp.
Mkorosho	Cashew (Anacardium occidentale)
Mkukilemba	Blighia unijugata
Mkunde nyika	Cassia sp.
Mkungu	Terminalia catappa
Mkungu india	Terminalia ivorensis
Mkunguni	Terminalia boivinii
Mkungu kienyeji	Hibiscus. tiliaceus
Mkunguma	Deinbollia borbonica
Mkuu(o)ngo	Entada pursaetha
Mkuyu	Ficus sur
Mkwaju	Tamarindus indica
Mlandege	Ficus natalensis
Mlangamakelele	Funtumia africana
Mlangamakelele	Macaranga capensis
Mlangawa	Ficus lutea
Mpamba mwitu	Gossypioides kirkii
Mpapei dume	Cussonia zimmermannii
Mpapei mwitu	Cussonia zimmermannii
Mpapindi	Chrysalidocarpus pembeanus
Mpelewa	Dracaena laxissima
Mpelewa	Flagellaria guineensis
Mpenjepaa	Whitfieldia elongata
Mpera mwitu	Rawsonia lucida (NOT Combretum schumannii)
Mpesi	Trema orientalis
Mpilipili doria	Sorindeia madagascariensis
Mpinepaa	Whitfieldia elongata
Mpingo	Dalbergia melanoxylon
Mpoo	generalized name for climbers resembling *Landolphia*
Msaji	Tectona grandis
Msambarau ziwa	Syzygium cordatum
Msambarau	Syzygium cumini
Msanaka	young Pandanus kirkii (no trunk)
Msasa dume	Ficus exasperata
Msikundazi	Cassipourea gummiflua
Msikundazi	Heritiera littoralis
Msikundazi	Inhambanella henriquesii
Msindazi	?
Msinduzi	Croton sylvaticus
Msisi	Maesopsis eminii
Msisimizi	Antidesma venosum
Msoo	Scutia myrtina
Msoo	Uncaria africana
Msufi mwitu	Bombax rhodognaphalon
Msufi peri	Ceiba pentandra
Mtamamwitu	Tapura fischeri
Mtambu mwitu	Anthocleista grandiflora
Mti nilaya	Pterocarpus angolensis
Mtomondo dume	Samadera indica
Mtomondo mke	Barringtonia racemosa
Mtondoo	Calophyllum inophyllum
	Tabemaemontana/Funtumia

Mtonga	
Mtonga	Xylocarpus granatum
Mtonga mwitu	Tabemaemontana ventricosa
Mtonga mwitu	Ficus natalensis
Mtonga mwitu	Schizozygia .coffaeoides
Mtoria	Salacia madagascariensis
Mtumbaku mwitu	Vernonia zanzibarica
Mtumbi	Haplocoelum inoploeum
Muale	Raphia farinifera
Muarobaini	Azadirachta indica
Muchochoni	Dioscorea spp.
Muembe	Mango (Mangifera indica)
Muhina mwitu	Margaritaria discoidea
Muivuivu	Cpt 43,poss. Suregada
Mukuongo	Entada pursaetha
Mulele	(in 19)
Muongochaa	Cerbera sp.
Mutumbi	Garcinia livingstonei
Mututututu	Bridelia micrantha
Muumbu	Lannea schweinfurthii
Mvinje	Casuarina equisetifolia
Mvuje msitu	Strychnos angolensis
Mvule	Milicia excelsa
Mvunjachoka	("ax breaker") Dichrostachys cinerea
Mwangachaa	Cerberus sp.
Mwangao	Erythrophloeum suaveolens, also Ficus sp?
Mwavi	Erythrophloeum suaveolens
Mwembe	Mangifera indica
Mwengechaa (cult.)	Voacanga africana, Rauvolfia mombasiana, Cerbera
Ndiga	Dioscorea zanzibarensis
Ngimbikuti	Lomariopsis warneckei
Upupu	Mucuna gigantea
Vikwa	Dioscorea zanzibarensis
Vitungu	Costus sarmentosus
Wangadume	Zamioculcas zamiifolia
Weni	Tragia furialis

9. LIST OF PLANT SPECIES

BN - collections by Beentje.

RMH - collections by Rodgers, Mwasumbi & Hall. Records seen by Rodgers, Hall, Mwasumbi, Swai & Vollesen have been incorporated in this list; where I have not been able to confIrm their sightings, I have indicated such.

SR denotes sight record by both Rodgers et al. and Beentje; otherwise there is a qualifier.

FI denotes field identification (this differs from sight record: in FI one actually gets a piece of the plant and uses keys to identify it). .

Plants are arranged by family; the families are listed alphabetically, within the supergroupings Pteridophytes/Dicotyledons/Monocotyledons.

PTERIDOPHYTES (FERNS)

Acrostichum aureum L. RMH-SR
mangrove fern

Asplenium nidus L. SR
birdsnest fern (epiphyte)

Cyclosorus sp. RMH-SR

Dicranopteris linearis (Burm.f.) Underw RMH-SR

Lomariopsis warneckei (Hieron.) Alston - Mgimbikuti BN 4313
climbing fern

Nephrolepis biserrata (W.) Schott RMH 2691
common terrestrial

Phymarodes scolopendria (Burm.f.) Ching
common terrestrial or climbing fern SR

Pteridium aquilinuni L. SR
terrestrial in ruderal situations

Psi/otum nudum (L.) Beauv. RMH 2783
small terrestrial

Stenochlaena tenuifolia (Desv.) S. Moore. RMH 2783

Thelypteris totta (Thunb.) Schelpe *Vittaria elongata* Sw. RMH-SR
small epiphyte, usually together with birdsnest fern

DICOTYLEDONS

ACANTHACEAE

Adharoda englerana (Lindau) CRG.
woody herb; not seen by me

Asystasia multiflora Kl.
herb RMH 2669

Justicia tenella (Nees) T. Anders RMH 2750
herb

Pseuderanthemum tunicatum (Afz.) Milne-Redh woody herb BN 4317

Ruspolia sp. RMH-sr
woody herb

Whitfieldia elongata (Beauv.) CRCI. –Mpenjepaa shrub of forest margins; RMH 2651

ALANGIACEAE RMH 2707

Alangium salviifolium (L.f.) Wangerin - Mavimavi
canopy tree

AMARANTHACEAE

Achyranthes aspf!ra L.
herb — SR

Cyathula prostrata (L.) Bl. — RMH 2697
herb

Pupalia lappaceq (L.) Juss. — RMH sr
herb

ANACARDIACEAE

[Lannea antiscorbutica (Hiern) Engl. tree, only known from southern Tanzania; I believe this sight record to be a mistake in identification; see next species. — RMH sr

Lannea schweinfurthii (Engl.) Engl. var. *acutifoliolata* (Engl.) Kokw. -Muumbu, Mfupapu — BN-fi
canopy tree; coastal Kenya and Tanzania, Zanzibar & Pemba

Mangifera indica L. - Mwembe — SR
Mango tree; introduction from Asia, usually associated with human habitation

Rhus sp. — BN-sr
shrub; only found sterile.

Sorindeia madagascariensis DC. -Mpilipili doria — BN 4250
medium-sized tree, especially in coastal bushland; East Africa and Madagascar.

ANNONACEAE

Uvaria sp. B of FrEA — BN 4366
restricted to north coastal Tanzania

APOCYNACEAE

Alafia caudata Stapf — RMH2722
large liana

Ancylobotrys petersiana (Kl.) Pierre — BN-fi
medium-sized liana

Funtumia africana (Benth.) Stapf - Mtonga, Mlangamakelele — BN 4349
medium to large tree.

Landolphia kirkii Dyer - Mpoo — BN-fi
large liana

Oncinotis tenuiloba Stapf — BN 4323
Small climber; **new record for Pemba**

[Rauvolfia caffra, sight record of Rodgers et at - believed to be the following species]

Rauvolfia mombasiana Stapf- Mwengechaa — BN-fi
small tree

Saba comorensis (Bojer) Pichon - Mbungo — BN-fi
large liana

Schizozygia coffaeoides (Bojer) Baill. - Mtonga mwitu — BN 4310
shrub

Strophanthus zimmennannii Monach. — BN 4319
Medium-sized liana; south coastal Kenya, coastal Tanzania; **new record for Pemba; rare species**

T abernaemontana pachysiphon Stapf — RMH 2788
medium-sized forest margin tree (40)

T abernaemontana ventricosa ADC. - Mtonga mwitu — BN 4364
large tree

ARALIACEAE

Cussonia zimmennannii Hanns - Mpapei dume, Mpapei mwitu — BN-fi
large tree, especially in coastal bushland

Polysciasfulva (Hiern) Harms - Mbirimbi mwitu — BN 4374
Medium-sized tree; a single even-aged population which I believe to be introduced

ASCLEPIADACEAE

Secamone rerusa NE Br. BN 4360
Climber in heath/forest margin. New record for Pemba.
BALSAMINACEAE
Impatiens wallerana Hook. f. RMH 2645
herb of moist sites
BIGNONIACEAE
Tabebuia pentaphylla (BenoL) DC. - Mgjani matano RMH2690
introduced timber tree
BOMBACACEAE
Bombax rhodognaphalon K. Schum. var. *rhodognaphalon* (Rhodognaphalon schumannianum) - Msufi mwitu BN 4341
Canopy tree; restricted to coastal Kenya to Mozambique
BORAGINACEAE
Bourreria petiolaris (Lam.) Thulin [Ehretia petiolaris] BN 4334
shrub or small tree
Cordia alliodora (Ruiz & Pavon) Oken - Mkamasia, Mkodia SR
Introduced timber tree
CAPPARACEAE
Cladostemon kirkii (Oliv.) Pax & Gilg RMH 2771
coastal climber
CASUARINACEAE.
Casuarina equisetifolia L. — Mvinje large tree on beach crest; usually said to be introduced, but possibly native; most individuals planted SR
CELASTRACEAE
Hippocratea sp. RMH-sr
May tenus senegalensis (Lam.) Exell RMH 2706
small spiny tree
Mystroxylon aethiopicum (Thunb.) Loes RMH 2782
medium-sized ttee
Salacia elegans Oliv. RMH 2705
climbing shrub
Salacia madagascariensis (Lam.) DC. - Mtora, mtoria BN 4369
liana
CHRYSOBALANACEAE

Hirtella zanzibaricaOliv. RMH -sr
large tree
Parinari curatellifolia Benth. ssp. *curatellifolia* - Mbura BN 4342
large tree of heathland margin
COMBRETACEAE
Combretum paniculatum Vent BN 4375
Climber to canopy**. new record for Pemba**
Terminalia boivinii Tul [T. fatraea] - Mkunguni BN -fi
medium to large tree of coastal thicket
Terminalia catappa L. - Mkungu SR
large tree; introduced
Terminalia ivorensis A. Chev. or *Terminalia superba* EngL & Diels - Mkungu india introduced timber tree BN -sr
T erminalia sambesiaca EngL & Diels RMH sr
large tree - not seen by me
COMP0SITAE

Vernonia zanzibarensis Less - Mtumbaku mwitu — RMH 2760
shrub of heathland margin
Pluchea sordida (Vatke) Oliv. & Hiem — RMH sr
herb of moist sites- not seen by me
CONNARACEAE
Agelaea sp — RMH sr
liana
Connarus sp. novo — RMH-?
liana - not seen by me
Cnestis corniculata Lam. — BN 4370
liana
DICHAPETALACEAE
Tapura fischeri Engl. - Mtama mwitu — RMH 2658
medium tree
DILLENIACAEA
Tetracera litoralis Gilg - Mkala — BN 4315
shrub; coastal Kenya and Tanzania, Pemba
EBENACEAE
Diospyros consolatae Chiov.- Mjengo — BN 4328
medium-sized tree of coastal thicket
ERICACEAE
Philippia mafiensisEngl. - Mdamba — BN 4337
Giant heath, a medium-sized shrub; restricted to Mafia and Pemba; **a rare/vulnerable species**
ERY1HROXYLACEAE
Erythroxylwn emarginarum Thonn. — BN -fi
shrub or tree of coastal thicket
EUPHORBIACEAE
Antidesma venosum Tul - Msisimizi — BN 4365
shrub or small tree
Bridelia micrantha(Hochst) Baiil. - Mkarati, Mututututu — RMH 2669a
large tree
Croton scheffleri Pax — RMH 2708
shrub - not seen by me
Croton sylvaticus Krauss - Mdawadawa — RMH 2671
canopy tree
Drypetes natalensis (Harv.) Hutch var. *leiogyna* Brenan -Mjafari . , BN 4302 — BN 4302
medium tree; restricted to coastal Kenya, NE and W Tanzania, Zanzibar and Pemba
Drypetes reticulata Pax — RMH 2761
small tree - not seen by me
Erythrococca kirkii (Mull. Arg.) Prain — RMH 2673
shrub - not seen by me
Flueggia virosa (Willd.) Voigt — BN –fi
shrub
Macaranga capensis (Baiil.) Sim. - Mlangamakelele, Mkaranga — SR
canopy tree
Margaritaria discoidea (Baill) Webster var. *nitida* (or *triplosphaera)* — RMH 2683
Large tree found only in #82-83.
Phyllanthus nummulariifolius Poir. — BN 4301
small shrublet
Suregada zanzibariensis Baill. - Mdimu msitu — BN 4216
shrub or small tree

Tragia jurialis Bojer - Weni — BN-sr
small stinging nettle
Uapaca guineensis Mlill. Arg. - Mchenza msitu — RMR 2715
Large tree
Uapaca sansibarica Pax — RMR-sr
large tree - not seen by me; if true, a new record for Pemba
Tragiajurialis Bojer - Weni — BN-sr
small stinging nettle
Tragiajurialis Bojer - Weni — RMR-sr
small stinging nettle
FLACOURTIACEAE
Casaeria gladiiformis Mast — RMR 2681
medium tree
Flacourtia indica (Burm.f.) Merr. -Mchongoma — BN –fi
medium tree
Ludia mauritiana Gmelin — RMH 2761
shrub
Rawsonia lucida HaIV. & Sond. - Mpera mwitu — RMH 2693
small tree
GUTTIFERAE
Calophyllum inophyllum L. - Mtondoo — SR
large tree; most individuals planted
Garcinia livingstonei T. Anders — RMH s.n
small tree - not seen by me
Harungana madagascariensis Poir. - Mdarnudamu — SR
forest margin shrub
ICACINACEAE
Apodytes dimidiata Am. var. *acutifolia* (A.Rich.) Boutique — RMH 2762
medium tree in Philippia area - not seen by me (at least not alive)
LECYTHIDACEAE
Barringtonia racemosa (L.) Spreng - Mtomondo (mke) — RMH 2744
medium tree in swamp forest
LEGUMINOSAE-CAESALPINIACEAE
Afzelia quanzensis Welw. – Mbambakoti — SR
Large tree in coastal thicket
Caesalpinia volkensii Harms — BN 4377
liana; restricted to Uganda, Kenya, Tanzania
Erythrophloeum suaveolens (Guill. & Perr.) Brenan - Mwavi — SR
canopy tree
Tamarindus indita L. - Mkwaju — BN –fi
canopy tree/emergent in coastal thicket
LEGUMINOSAE-MIMOSACEAE
Albizia adianthifolia (Schum.) WF Wight - Mchapia tumbili — RMH 2727
canopy tree
Dichrostachys cinerea (L.) Wight& Am. ssp. *cinerea* - Mvunja choka BN-sr — BN –sr
spiny small tree at forest margin
Entada pursaetha DC. -Mkuungo, mukuongo — SR
large liana
Prosopis sp.
introduced tree reported
LEGUMINOSAE-PAPILIONACEAE
Dalbergia melanoxylonGuill. & Perr. - Mpingo — BN 4348
Small to medium tree in coastal thicket. **New record for Pemba.**
Indigofera sp. — BN-sr
small shrub in coastal thicket
M illettia oblata Dunn ssp. *intermedia* Gillett — RMH 2716
medium tree - not seen by me

Mucuna gigantea (Willd) DC. [rather than M. pruriens] ─ Upupu SR
large liana
Pterocarpus angolensis/indicus Willd.- Mdamudamu SR
introduced large tree, used for marking boundaries of forest on Verani side and SE margin
LENTIBULARIACEAE
Utricularia gibba L. RMH 2785
submerged aquatic in pools
LOBELIACEAE
Lobeliafervens Thunb. -Kikwayakwaya BN-sr
herb of forest margin
LOGANIACEAE
Anthocleista grandif/ora Gilg - Mtambu mwitu small tree of swamp forest SR
Strychnos angolensis Gilg - Mvuje msitu RMH 2778
liana
LY1HRACEAE
Pemphis acidula Forst. BN-fi
shrub on beach crest- usually on coral
MALPIDGIACEAE
Acridocarpus zanzibaricus (Loud.) A. Juss. SR
shrub in caoastal Wcket; restricted to coast from Somalia to central Tanzania
MALVACAEA
Gossypioides kirkii (Mast.) JB Hutch. -Mpamba mwitu BN 4316
small shrub
Hibiscus tiliaceus L. RMH 2703
Shrub on beach
MELASTOMATACEAE
Tristemma mauritianum IF Gmel. RMH 2718
shrubby herb of marshy sites
Melastomasrrum segregarum (Benth.) A & R Femandes RMH 2768
shrub of swamps
Dissoiis rotundifolia (Srn.) Triana BN-sr
creeping herb of ruderal sites
MELIACEAE
Cedrela mexicana SR
introduced timber tree
Entandophragma???
reported to occur by foresters - but not seen
Khaya sp. SR
introduced timber tree
Trichilia emetica Vahl RMH SR
tree
Xylocarpus granatum Koen - Mtonga BN-sr
mangrove tree
MENISPERMACEAE
Dioscoreophyllum volkensii Engl. var. *volkensii* RMH 2769
liana
Triclisia sacleuxii (Pierre) Diels var. *sacleuxii* BN 4344
liana
Tinospora oblongifolia (Engl.) Troupin BN-sr
liana - if true, a new record for Pemba
MENYANTIIACEAE
Nymphoides cf. kirkii (NE Br.) ined. BN-sr
floating aquatic in ponds; **new record for Pemba**

MORACEAE

Antiaris toxicaria Lesch. - Mgulele — SR
canopy tree.

Artocarpus altiUs (parkinson) Fosberg - Mfenesi mfuu introduced tree — SR

Artocarpus heterophyllus Lam. — SR
introduced tree

Dorstenia tayloriana Rendle — BN 4372
restricted to coastal Kenya and -Tanzania; a rare species

Ficus exasperata Vahl- Msasa dume — SR
canopy tree

Ficus lutea Vahl- Mlangawa canopy tree — RMH 2783

Ficus natalensis Hochst - Mlandege, Mtonga mwitu canopy tree , — SR

Ficus nekbudu Warb. — RMH -sr
not seen by me

Ficus scasselatii Pamp. — BN-fi
large tree

Ficus sur Forssk. [F. capensis] - Mkuyu — RMH 2680
canopy tree

Milicia excelsa (Welw.) CC Berg [Chlorophora excelsa] - Mvule — SR
canopy tree

MYRICACEAE

Myrica sp. — RMH 2758
shrub; not seen by me.

MYRTACEAE

Eucalyptus sp - Mkaratusi — SR
introduced timber tree

Eugenia sp nov = Vaughan 1676 – Mkaage — BN 4219
shrub; **new, undescribed species restricted to Unguja and Pemba**

Syzygium cordatUm Krauss - Msambarau ziwa — SR
medium tree in Philippia area

Syzygium cumini (L.) Skeels - Msambarau — BN 4238
canopy tree

NYMPHAEACEAE

Nymphaea nouchaU Bunn. var. *zanzibarensis* (Casp.) Verdc. — BN-sr
aquatic

OCHNACEAE

Sauvagesia erecta L. — RMH 2735
herb

OLFACEAE

Olea woodiana Knob!. - Mchungwa mwitu — BN 4332
large tree in coastal thicket; new record for Pemba

OXALIDACEAE

Averrhoa sp. *(A. colambola* in Forestry records) - Mbirimbi — SR
introduced tree

PASSIFLORACEAE

Adenia gununifera (Harv.) Harms var. *gummifera* — BN 4346
Climber in forest margins or disturbed forest.

Adenia rwnicifoUa Engl. - Mgole — RMH 2677
climber in forest margins

PIPERACEAE

BN 4368

Piper betle L.
small climber, possibly introduced
RHAMNACEAE
Colubrina asiatica (L.) Brongn. BN -fi
climbing shrub
Maesopsis eminii Engl. - Msisi SR
Introduced timber ttee
Scutia myrtina (Burm.f.) Kurz - Msoo BN-fi
climbing shrub with thorns; **new record for Pemba**

RHIZOPHORACEAE
Bruguiera gymnorrhiza (L.) Lam. - Mchonga SR
mangrove tree
Cassipourea gummiflua Tul. var. *verticillata* (NE Br.) J Lewis - Msikundazi BN
4303 Medium-sized tree; south coastal Tanzania to south; **usual altitude above 1800m**
Ceriops tagal (Perr.) CB Robinson - Mkandaa mwekundu SR
mangrove ttee
Rhizophora mucronata L. - Mkoko SR
mangrove tree
RUBIACEAE
Agathisanthemum bojeri Klotzsch RMH -sr
herb
Canthium mombazense Baill. BN 4343
shrub
Chassalia umbraticola Vatke RMH 2649
shrub
Craterispermum schweinfurthii Hiern Greenway
1482 small tree
Cremaspora triflora (Thonn.) K. Schum. ssp. *confluens* (K. Schum.) Verdc. Mkanja Shrub or small tree. Kenya and Tanzania. BN-fi
Geophila repens (L.) IM Johnston RMH 2790
herb
Guettarda speciosa L. RMH 2704
beach, tree
Keetia gueinzii (Sond.) Bridson [Canthium gueinzii] RMH 2779
shrub
Keetia zanzibarica (Klotzsch) Bridson [Canthium zanzibaricum] RMH -sr
shrub or climber
Kraussia speciosa Bullock RMH 2657
shrub
Lagynias pallidiflora Bullock BN 4378
shrub or small tree
Leptactinaplaryphylla (Hiern) Wernh. - Mguni mwitu
Small tree. A favourite for poles. **new record for Pemba**
Pavetta sp. RMH-sr
not seen by me
Pentas micrantha Bak. RMH 2647
not seen by me
Polysphaeria parvifolia Hiem - Mkanja SR
shrub

Psychotria goetzei (K. Schum.) Petit — RMH -sr
I doubt this record: this tree usually occurs above 900m, and *Psychotriasare* notoriously difficult to identify in the field.
Psychotria sp (sent to Verdcourt) — BN 4311
Psychotria holtzii (K. Schum.) Petit var. *holtzii* Small shrub of giant heath/forest margins. Restricted to coastal south Kenya and central Tanzania. — BN 4359
Psychotria lauracea (K. Schum.) Petit — RMH 2725
shrub
Psychotria schliebenii Petit var. *schliebenii* — RMH 2659
shrub
Psychotria tanganyicensis Verdc. *var.ferruginea* Verdc. — RMH 2724
shrub
Psydrax kaessneri (S. Moore) Bridson — RMH 2799
shrub
Psydrax livida (Hiern) Bridson [Canthium huillense] — RMH –sr
shrub or small tree
Psydrax recurvifolia (Bullock) Bridson — RMH 2751
shrub
Pyrostria bibracteata(Bak.) Cavaco [Canthium bibracteatum] — RMH 2763
shrub
Tarenna pavettoides (Harv.) Sim ssp. *affinis* (K. Schum.) Bridson — BN 4361
restricted to coastal East Africa
Uncaria africana G. Don var. *orientalis* Verdc. - Msoo — BN 4388
climber to canopy

RUTACEAE

Vepris eugeniifolia (EngI.) Verdoom - Mchungwa mwitu — BN4336
shrub; new record for Pemba
Zanthoxylum holtzianum (EngI.) Waterm. - Mjafari ya kipemba — BN -fi
medium tree in coastal thicket

SAPINDACEAE

Allophylus griseo-tomentosum Gilg — RMH -sr
not seen by me
Allophylus pervillei Bl. — BN-fi
liana
Allophylus vestitus FG Davies ined. — BN 4339
only known from central Tanzania before
Allophylus sp. near *grotei* — BN 4330
shrub
Blighia unijugata Bak. — RMH 2723
large tree
Deinbollia borbonica Scheff. - Mkunguma — SR
small tree
Haplocoelum inoploeum Radlk. - Mtumbi — SR
medium tree in coastal thicket
Majidea zanguebarica Oliv. - Mchenya — RMH 2702
canopy tree
Paullinia pinnata L. — SR
climber

SAPOTACEAE

Bequaertiodendron magalismontanum (Sond.) Heine & JH Hemsl — BN-fi
[B. natalense SR of RMH]; medium tree
Chrysophyllum lanceolatum (BI.) DC. ver. *stellatocarpum* van Royen 4304,4376 small tree — BN

lnhambanella henriquesii (Engl. & Warb.) Dubard - Msikundazi — BN 4389
Medium-sized tree; coastal East Africa; **new record for Pemba**

Manilkara sansibarensis (Engl.) Dubard — RMH 2772
medium tree

Manilkara sulcara (Engl.) D\lbard — BN-fi
small tree of coastal thicket

Pachystela brevipes (Baker) Engl. - Mchocha (mke) — SR
canopy tree

Pachystela msolo (Engl.) Engl. - Mcocha dume — SR
canopy tree

Sideroxylon inerme L. ssp. *diospyroides* (Baker) JH Hemsl. — BN-fi
small tree in coastal thicket

SCROPHULARlACEAE

Bacopa crenata (p. Beauv.) Hepper — RMH 2700
herb

Limnophila indica (L.) Druce — RMH 2699
herb

SIMAROUBACEAE

Quassia indica (Gaerm.) Nooteboom [Samadera indica] - Mtomondo dume — BN
4322 Medium-sized tree of swamp forest; an eastern species**; Pemba only African site**

Quassia undulata (Guill. & PeIT.) D. Dietr. [Odyendea zimmermannii] - Mjoho canopy tree, — BN 4307

SONNERATIACEAE

Sonneratia alba Srn. - Mpira, Mlilana — SR
mangrove tree

STERCULIACEAE

Heritiera littoralis Ail. - Msikundazi — SR
Mangrove tree.

THYMELEACEAE

Synaptolepis kirkii Oliv. — SR
Small shrub or climber

TILIACEAE

Grewia stuhlmannii K. Schum. — BN-fi
climbing shrub

ULMACEAE

Trema orientalis (L.) Bl. - Mpesi — SR
small tree

VERBENACEAE

Avicen~ia marina (Forssk.) Vierh. - Mchu — SR
mangrove tree

Premna obrusifolia R. Br. — RMH 2728
shrub - not seen by me

Tectonagrandis — SR
introduced timber tree

Vitex doniana Sweet - Mfuru, mfuu — SR
medium tree in open areas"

VIOLACEAE

Rinorea arborea (Thou) Baill. — BN 4327
coastal Kenya to Mozambique, Madagascar

VITACEAE

BN 4345

Cissus integrifolia (Bale.) Planch.
Climber in forest margins. New record for Pemba

Cissus oliveri Gilg — RMH 2666
climber

Rhoicissus revoilii Planch. — BN-fi
climber

Rhoicissus tridentata (L.f.) Wild & Drum. — BN-fi
climber

MONOCOTYLEDONS

AMARYLLIDACEAE

Scadoxus multiflorus (Martyn) Raf. — SR
herb

ARACEAE

Culcasia orientalis Mayo — SR
climber

Gonatopus boivinii (Decne.) Engl. — SR
herb

Typhonodorum lindleyanum Schott — SR
herb; restricted to Madagascar and Pemba, Unguja

Zamioculcas zamiifolia (Lodd.) Engl. - Wangadume — SR
herb

COMMELINACEAE

Commelina diffusa Burm. f. — RMH 2695
herb

Murdannia axillaris Brenan — RMH 2698
herb

CYPERACEAE - the sedges

Cyperus prolifer Lam. ssp. *isoclados* Kukenth — RMH 2756

Cyperus tenax Boeck. var *tenax* — RMH 2754

Eleocharis acurangula (Roxb.) Schult. — RMH 2741

Eleocharis geniculata (L.) Roem. & Schult — RMH 2742

Fimbristylis longiculmis Steud — RMH 2737

Fuirena claviseta Poir. — RMH 2732

Fuirena umbellata Ronb. — RMH 2729

Pycreus lanceolatus (Poir.) CRCl — RMH 2733

Pycreus mundtii Nees — RMH 2730

Rhynchospora candida (Nees) Boeck — RMH 2740

DIOSCOREACEAE

Dioscorea sansibarensis Pax - Mchochoni, Muchochoni, Ndiga, Vikwa — BN 4314
wild yam; climber; **new record for Pemba**

FLAGELLARIACEAE

Flagellaria guineensis Schum. - Mkalamu, Mpelewa
climbing grass

GRAMINEAE - the grasses

Olyra latyfolia L — RMH 2665

Oplismenus sp. — SR

Panicum laticomum Nees — RMH 2652

Panicum parvifolium L. — RMH 2753

Pdnicum subjlabellatum Stapf — RMH 2738

Paspalum vaginatum Sw. — RMH 2736

Pseudoechinolaena polystachya (Kunth.) Stapf — RMH 2726

Schizachyrium rupestre (K. Schum.) Stapf — RMH 2755

Setaria megaphylla (Steud.) Th. Dur. & Schinz — FTEA

Vetiveria nigritiana (Benth.) Stapf — RMH

LILIACEAE

Asparagus falcams L. — SR
climber .

Dracaena fragrans/deremensis — BN 4363
small shrub of high forest. Rare species; **new record for Pemba**

Dracaen4 laxissima Engl. – Mpelewa — RMH 26
sarmentose shrub

Sansevieria conspicua N.E. Br. — SR
succulent herb in coastal thicket

MUSACEAE .

Ensete sp. near proboscideum (Oliv.) Cheesm. - Mgombatumbili — BN 4362
Wild banana; **endemic to Ngezi Forest; vulnerable species**

ORCHIDACEAE-the orchids

Acampe sp. — RMH -sr

Aerangis hologlottis (Schltr.) Schltr. — RMH 2787

Aerangis kirkii (Reichb.f.) Schltr. — RMH 2765

Bulbophyllum sp. — RMH -sr

Disperis johnstonii Rolfe — BN 4367
Small terrestrial orchid. new record for Pemba.

Eulophia sp. — BN 4333

Nervilia umbrosa (Reichb.f.) Schltr. — BN 4335
small terrestrial orchids

Vanilla roscheri Reichb. — SR
liana .

PALMAE

Chrysalidocarpus pembanus Moore — BN 4387
Medium-sized palm tree. Endemic to Ngezi Forest. **A vulnerable species**

Elaeis guineensis Jacq. — RMH 2662
. the oil palm (occurs wild)

Phoenix reclinata Jacq. — RMH 2661
the wild date palm

Raphiafarinifera (Gaertn.) Hyland [Raphia ruffia] — BN -fi
the Raffia palm; forms stands in swamps.

PANDANACEAE

Pandanus kirkii Rendle — SR
The beach screw pine

SMILACACEAE

Smilax anceps Willd. [So kraussiana] - Mkekewa — SR
spiny climber

XYRIDACEAE

Xyris anceps Lam. — BN 4338
Small aquatic or swamp species

ZINGIBERACEAE

Aframomum angustifolium (Senn.) K. Schum. — RMH 2667
herb in moist sites

Costus sarmentosus Bojer - Vitungu — SR
herb