

their timber resources and start/manage a programme of systematic exploitation. At this time the Forest Reserves were established primarily for the exploitation of their timber resources, a policy which was continued until the 1990s.

- The 1930s, when the global economic decline reduced the markets for timber products and Forestry Departments had considerable economic problems.
- The Second World War to early 1950s, when timber resources were heavily exploited to supply the demands of the war and to finance debts immediately following the war.
- The later 1950s to early independence period when Forestry Departments pursued both exploitation and conservation policies within their forestry estates, at a time when there was adequate funding for the work.
- The early 1970s onwards, when the oil price shocks and a worsening economic situation in eastern African nations was reflected in declining financial resources, salary levels and work within the Forestry Departments. Data compilation and quality also declined dramatically from this period.
- The later 1970s onwards, when aid donors started to provide funds for forestry work. By the 1980s funds available from government typically covered meagre salaries and little more. In many Coastal Forests forestry work largely ceased during this time, with exploitation becoming less well controlled.
- The late 1980s and early 1990s, when there was considerable aid financing, but forestry policy was still very much based on the colonial laws and foresters were often viewed as policemen protecting the forests from use by others. However, during this period considerable progress in forestry work was made. It was more widely recognised that the Forest Reserves of Tanzania contain a very significant biodiversity resource, and the provision of funds to the Forestry Department to maintain these forests for the species that they contain became increasingly common (particularly by national and international conservation NGOs).
- The later 1990s when the aid funding is falling, a proportion of the Forestry staff have been retrenched (made redundant), and the Department is being encouraged both to seek ways to increase its revenue and involve the local people in participatory forest management programmes. A new 1998 forest policy allows 'participatory' management of the forests for the first time and several projects are starting to experiment with this agenda. However, the authority of the Department is being challenged by powerful local people and institutions, and some areas of forest have been claimed by local people for farmland.

The current situation in Tanzania at least is well summarised in Chapter 5.4 where the pertinent question is asked 'who controls the forest resources of Tanzania?' The resolution of this question will be of major importance to the future of all forests in Tanzania. Recent news of the proposed degazettement of a large portion of the Arabuko-Sokoke forest in Kenya for farmland (Fanshawe, pers. com.) indicates that the same question is also relevant there, and that there are considerable challenges ahead if the Forest Reserves are to be maintained as one of the major ways to achieve the conservation of the Coastal Forests of eastern Africa.

Acknowledgements

We would like to thank Sarah Woodward and Phil Clarke for assisting in the compilation of data on Forest Reserves in coastal Tanzania. The library of the Forestry Department at the Ivory Rooms on the Pugu Road in Dar es Salaam, and the library of the University of Dar es Salaam also helped to locate information from Forestry Department files, and other historical documents. Comments on this chapter were received from Phil Clarke, Alan Rodgers, Jon Lovett and Peter Gibbon.

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Although coastal forests appear to be under less pressure than inland forests, they are nevertheless under threat. The extent of the remaining coastal forests is estimated to be about 10% of the original forest cover (Woodcock 1995). The loss of the coastal forests is a serious problem for the coastal people who depend on them for their livelihoods. The coastal forests are a source of timber and other forest products, and they also provide a habitat for many species of plants and animals. The loss of the coastal forests would therefore have a serious impact on the coastal people and the environment.

This chapter examines the impact of the coastal forests on the coastal people, and the role of the coastal forests in the coastal economy. It also discusses the role of the coastal forests in the coastal environment, and the role of the coastal forests in the coastal culture.

Uses of Coastal Forests

The relative frequency of a number of uses of the coastal forests in the coastal region has been studied by Woodcock (1995). The results of his study are shown in Figure 2.1. The results show that the coastal forests are used for a wide range of purposes. The most common uses are for timber and other forest products, and for fuelwood. The coastal forests are also used for a variety of other purposes, including for the production of honey, for the collection of medicinal plants, and for the collection of other forest products. The coastal forests are therefore a very important part of the coastal economy and the coastal environment.

Wood products

The coastal forests of the coastal region have been a source of timber and other forest products for many years. The coastal forests are a very important part of the coastal economy and the coastal environment. The coastal forests are therefore a very important part of the coastal economy and the coastal environment.

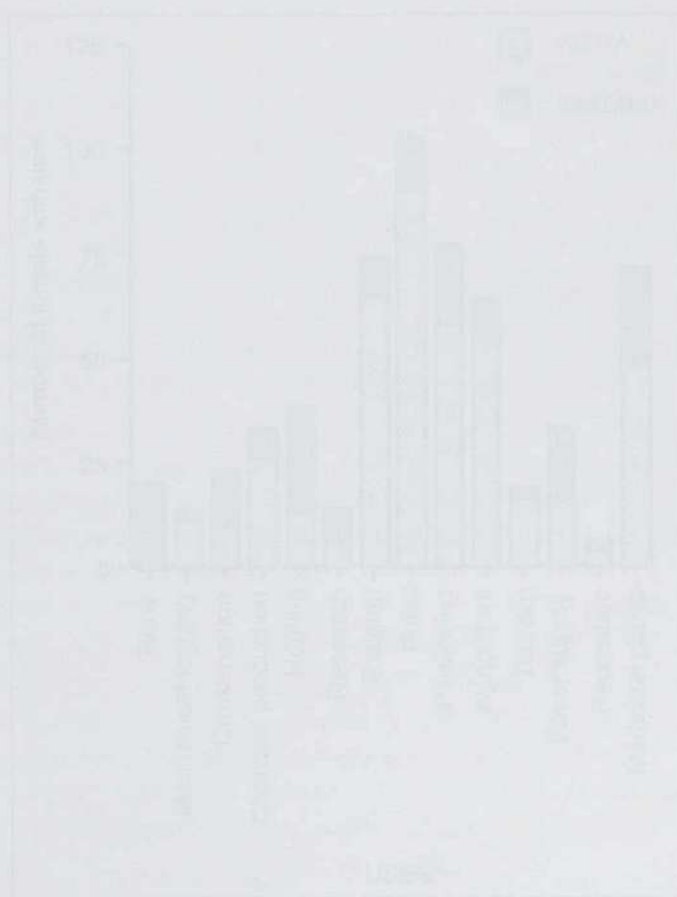


Figure 2.1. Number of households using coastal forests for various purposes in 1990 and 1995. (Source: Woodcock 1995).

5.3 Non-timber uses, threats and local attitudes

N.D. Burgess, P. Matthews, Y. Evers and K. Woodcock

Introduction

The Coastal Forests are used for many purposes in addition to the production of timber. These uses often have a long history, sometimes extending back over thousands of years (see Chapter 5.1). The use of the forest varies from non-destructive, such as the limited gathering of medicines from 'sacred forests', to wholesale clearance of the forest to convert the land to agriculture.

Although Coastal Forests appear to be resistant to considerable use, there is a threshold beyond which the use becomes a threat to the continued existence of the forest. Forests close to coastal towns, where the population is increasing rapidly (up to 10% per annum; World Bank, 1992), are especially threatened. In a region with an average population increase of 2.5–3.5% per annum (World Bank, 1992) the demand for additional farmland, building materials and fuel-wood is also increasing every year. The way the local people think about the Coastal Forests is also an important factor in what happens to them. Recent studies in the Coastal Forests have tried to assess the attitudes of the local people towards various Coastal Forest areas (Mogaka, 1992; Evers, 1994; Msonganzila *et al.*, 1994; Lagerstedt, 1994; Woodcock, 1995).

This Chapter summarises the non-timber uses of the Coastal Forests, assesses which are the greatest threats to the forests' future, and outlines the results of studies which have investigated what people think about these forests.

Uses of Coastal Forests

The relative frequency of a number of uses in the Coastal Forests of Kenya and Tanzania has been recently assessed (Figure 5.3.1 – Burgess and Muir, 1994). The most frequently reported uses of these forests (> 50 forests) were pole collection for the construction of houses, pit-sawing to produce timber for house construction and furniture-making, religious (spiritual) sanctity and ceremonies, the gathering of medicinal plants and the clearance of the forest to grow crops (agriculture). Further uses (not presented on Figure 5.3.1) include the collection of edible plants and honey from the forests, conversion of Coastal Forest into plantations of exotic trees (e.g. pines and eucalyptus), mining, and building of hotels and other large developments (mainly for tourism in Kenya).

Wood products

Eastern Africa's Coastal Forests have been exploited for hardwood timber for at least the past 100 years (see Chapter 5.2), and have provided a source of building

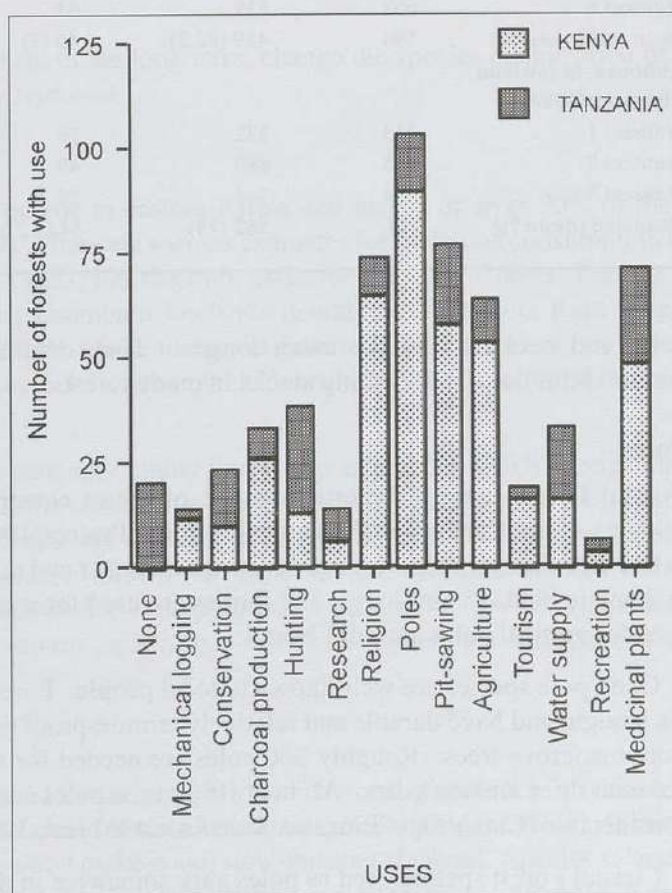


Figure 5.3.1 Numbers of forests in Kenya ($n = 130$) and Tanzania ($n = 75$) where various uses have been reported (from Burgess and Muir, 1994).

Table 5.3.1 Natural and man-made disturbance of three Coastal Forest sites in Tanzania, 1993–1994. Data were gathered using a series of 250m long transects (30 metres apart). All standing or cut trees (>10cm DBH) and shrubs/saplings (>10cm DBH) 2.5m either side of the transect line were measured (data from Frontier-Tanzania).

Sites and transects	Total measured	Standing stems <10cm DBH	Standing stems ≥10cm DBH	Cut stems <10cm DBH	Cut stems ≥10cm DBH	Total natural falls
Gendagenda in northern Tanzania (1993)						
Transect 1	498	328	85	40	1	44
Transect 2	479	259	100	95	1	24
Transect 3	417	274	63	61	0	19
Transect 4	429	316	59	39	0	15
Transect 5	490	317	81	81	0	11
Transect 6	485	314	74	30	4	63
Transect 7	403	274	69	18	0	42
Transect 8	522	346	105	11	3	57
Transect 9	402	221	83	38	3	57
Transect 10	309	215	51	4	0	39
Mean and (mean %)	443	286 (64.5)	77 (17.5)	42 (14.6)	1.2 (0.3)	19 (4.3)
Litipo in southern Tanzania (1994)						
Transect 1	451	336	11	67	6	31
Transect 2	490	425	40	10	10	5
Transect 3	428	357	40	17	8	6
Transect 4	928	801	41	60	10	16
Transect 5	608	480	44	49	16	19
Transect 6	658	539	67	28	3	21
Mean and (mean %)	594	489 (82.3)	40 (7)	38 (6.8)	9 (1.6)	13 (2.3)
Kimboza in lowland Ulugurus (1994)						
Transect 1	443	322	59	49	5	8
Transect 2	815	680	49	70	2	14
Transect 3	984	744	54	161	1	24
Mean and (mean %)	747	582 (78)	54 (7.2)	93 (12)	2.6(0.34)	15.3 (2)

poles and cooking fuel for much longer. They continue to be an important source of these commodities despite dwindling stocks in many forests.

Poles

Coastal Forests are an important source of house construction poles for local people (Hall and Rodgers, 1986; Cambridge-Tanzania Rainforest Project, 1994; Woodcock, 1995). Poles are collected in two size classes, ones which are c.2cm in diameter and c.2.5m long, and others which are 10–15cm in diameter and 2.5–3m long. The former are used for withies in the house walls, and the latter are used for vertical poles and roof beams.

Good pole species are well-known to local people. Forest species are often selected because they are straight and have durable and relatively termite-proof timber, although the best poles of all come from mangrove trees. Roughly 300 poles are needed for an average-sized rural house, which lasts between three and ten years. At most 10% of the poles can be re-used, thus the demand for poles is considerable (Cambridge-Tanzania Rain Forest Project, 1994).

Coastal Forest species used as poles vary somewhat in different forests, presumably according to availability (Mogaka, 1992; Cambridge-Tanzania Rain Forest Project, 1994; Lagerstedt, 1994; Woodcock, 1995). The Coastal Forest canopy trees *Scorodophloeus fischeri* and *Cynometra webberi* are widely exploited where they occur. Other species which produce good poles are *Vepris*

eugeniifolia, *Hymenocardia ulmoides*, *Pouteria alnifolia*, *Dialium holtzii*, *Manilkara sansibarensis*, *Diospyros squarrosa*, *D. verrucosa*, *D. mespiliformis*, *Drypetes parvifolia*, *Greenwayodendron suaveolens*, *Pachystela msolo*, *Psidium guajava*, *Markhamia hildebrandtii*, *M. zanzibarica*, *Lecaniodiscus fraxinifolius*, *Baphia kirkii*, *Brachylaena huillensis*, *Millettia dura* and *M. bussei*.

Information on levels of pole cutting has been obtained from a number of Coastal Forests in Tanzania (Table 5.3.1). Pole cutting rates in these forests were in all cases above 7%, and in some cases over 16% of available poles. This information augments previous studies on pole cutting in Pande, Pugu and Kimboza (Hall and Rodgers, 1986). Comparison of the data from the 1990s with those of Hall and Rodgers (1986) indicate that rates of pole cutting may have decreased. For example, maximum cutting rates in Kimboza at the base of the Ulugurus were 44% in Hall and Rodgers (1986) and 16% in 1994. Pole cutting is concentrated in the areas closest to human populations, for example on the forest margin, close to villages and farms and alongside access routes through the forest (Figure 5.3.2; Hall and Rodgers, 1986). Pole cutting may even, in the long term, change the species composition of a forest, as preferred species are selectively removed.

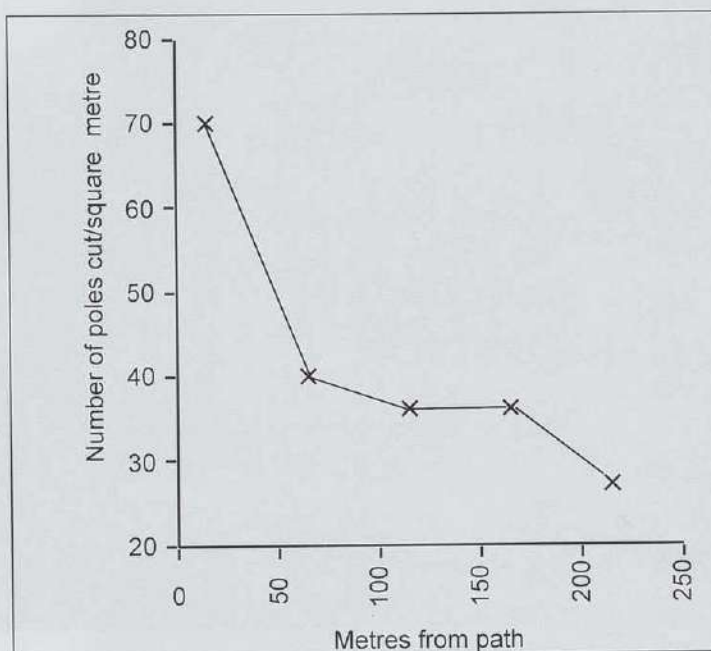


Figure 5.3.2 Pole cutting intensity on increasing distance from a path in Gendagenda Forest, Tanzania (from data collected by P. Smith, Frontier-Tanzania).

Fuelwood

Wood is the major fuel-source for rural people in eastern Africa and makes up over 90% of their energy consumption (e.g. DANIDA, 1989). There are various estimates for fuelwood consumption in Tanzania (e.g. Ongara, 1991; Kimaryo, 1982), but the only estimate from the Coastal Forests is 332–572kg per person/annum in the East Usambara lowlands (Cambridge-Tanzania Rain Forest Project, 1994). Dead wood makes up the bulk of the fuelwood gathered. Live trees are rarely cut, except in areas of very high demand (Figure 5.3.3), although the branch wood of trees felled for their timber is often collected.

Women collect fuelwood and they are generally highly knowledgeable about which species they prefer, selecting features such as high calorific value, little smoke, ease of recognition etc. Preferred fuelwood species from the Coastal Forests are *Pavetta stenosepala*, *Brachylaena huillensis*, *Combretum schumanii*, *Markhamia hildebrandtii*, *M. zanzibarica*, *Annona senegalensis*, *Hymenocardia ulmoides*, *Loranthus hildebrandtii*, *Lecaniodiscus fraxinifolius*, *Grewia goetzeana*, *Manilkara sulcata*, *Millettia* spp., *Newtonia paucijuga*, *Cynometra webberi* and *Sorindeia madagascariensis*.

Charcoal

Some Coastal Forests have been heavily used for the production of charcoal (Figure 5.3.3(d) and (e)) which is the preferred cooking fuel in urban areas (Anderson and Holm, 1990; Ongara, 1991). Coastal Forest trees, shrubs and lianas with dense wood make good, slow-burning charcoal. Species selected preferentially are *Vitex zanzibarica*, *Dialium holtzii*, *Markhamia zanzibarica*, *Baphia kirkii*, *Cynometra webberi*, *Brachylaena huillensis* and *Millettia* spp, although where exploitation is intense, all woody species are cut. The charcoal is produced using the pit burning technique, which takes



Figure 5.3.3(a) Forest disturbance in Tanzania; farming underneath dead forest canopy (killed by burning cut shrubs at the base of the trees) in Kiono/Zaraninge forest, 1989. (Photo: N.D. Burgess)



Figure 5.3.3(b) Forest disturbance in Tanzania; farming beneath dead canopy trees at Kisiju forest, 1989. (Photo: N.D. Burgess)

Figure 5.3.3(c) Forest disturbance in Tanzania; cut tree, Pande forest, 1989. (Photo: N.D. Burgess)



Figure 5.3.3(d) Forest disturbance in Tanzania; charcoal pit in the process of being constructed in Miombo woodland area near forest, Kiwengoma forest area, 1990. (Photo: S. Davies)



Figure 5.3.3(e) Forest disturbance in Tanzania; charcoal pit which has been burnt and the charcoal removed, Pande forest, 1989. (Photo: N.D. Burgess)



Figure 5.3.3(f) Forest disturbance in Tanzania; logging road in Pande forest, 1989. (Photo: N.D. Burgess)

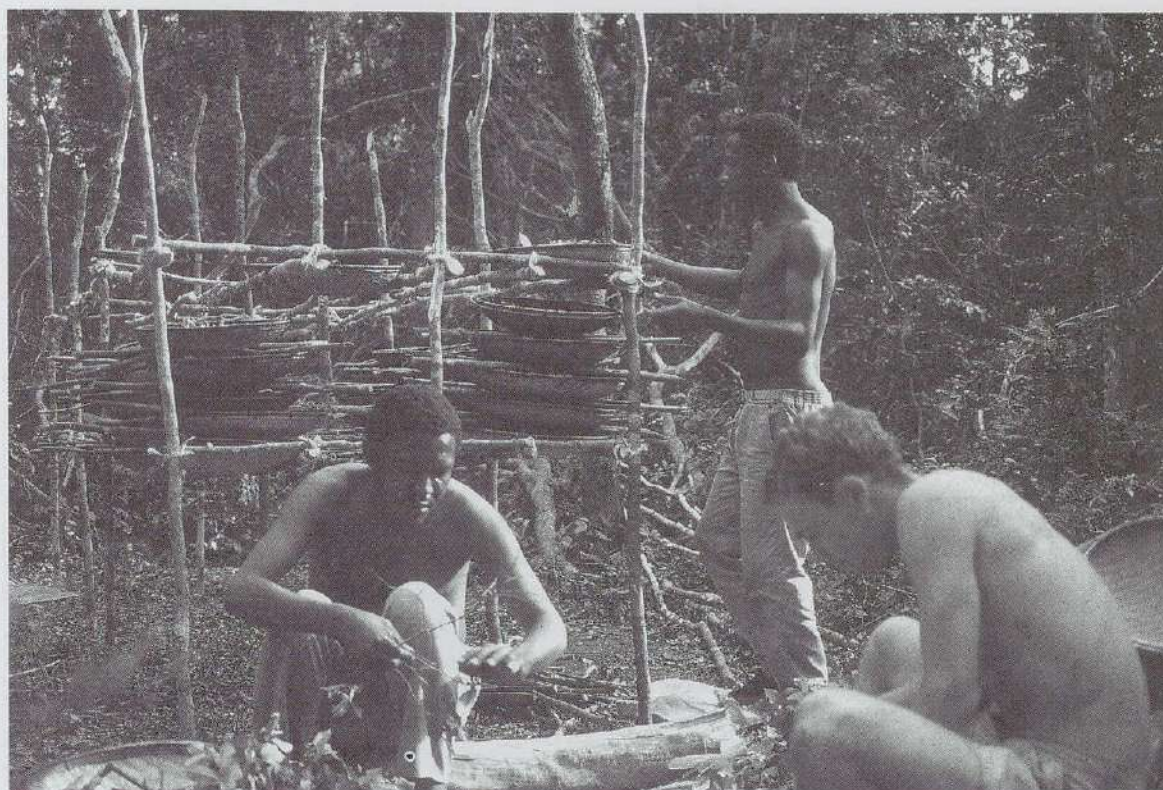


Figure 5.3.3(g) University of Dar es Salaam Botany Department staff and a European volunteer collecting plants to assess their medicinal values. (Photo: N.D. Burgess)

between 1–2 weeks. An average pit might consume 5–6m³ of wood (2–3 large trees), producing twelve 35kg bags of charcoal (Frontier-Tanzania, unpublished).

In August 1995 a bag of charcoal fetched TSh 1,200 (\$2.00) in Dar es Salaam, and Tsh 800–900 (\$1.5) in the Pugu Hills forest 25km from Dar es Salaam (Frössling, *in lit*). The major profit was from transporting the charcoal. A lorry can carry at least 50 bags of charcoal and for each trip between Pugu and Dar es Salaam the value was increased by 50 x TSh 400 = Tsh 20,000 (\$31). At this time, a forest guard's monthly salary was TSh 18,000/month (\$30), and hence the incentive for the guard to allow charcoal production to continue in the forest in return for a little money was considerable. Monela *et al.* (1993) also reported that charcoal production is a profitable activity for rural people with access to wood and transport to major urban markets.

Utensils/handles

Many of the cooking utensils and handles of tools used in villages are made from hardwood. In the coastal region these often come from forests. Coastal Forest species which are known to be used for these purposes are: *Markhamia zanzibarica*, *Diospyros verrucosa*, *Hymenocardia ulmoides* and *Loranthus hildebrandtii* (Lagerstedt, 1994).

Non-woody forest products

People living close to Coastal Forests also make use of their non-woody products. Medicinal uses have been previously reported (Kokwaro, 1976; Von Reis and Lipp, 1982; Oliver-Bever, 1986), and some tree species are already known to be 'useful' in other ways than their wood (ICRAF, 1992; Mbuya *et al.*, 1994). Here we summarise the non-woody products derived from the Coastal Forests.

Gum Copal

Gum Copal (fossilised resin from *Hymenaea verrucosa*) is the only non-woody forest product from the Coastal Forests, and areas where Coastal Forest had previously existed (Chapter 5.1), which has ever been seriously traded, mainly to India and the Arabic nations, where it was used to make varnish

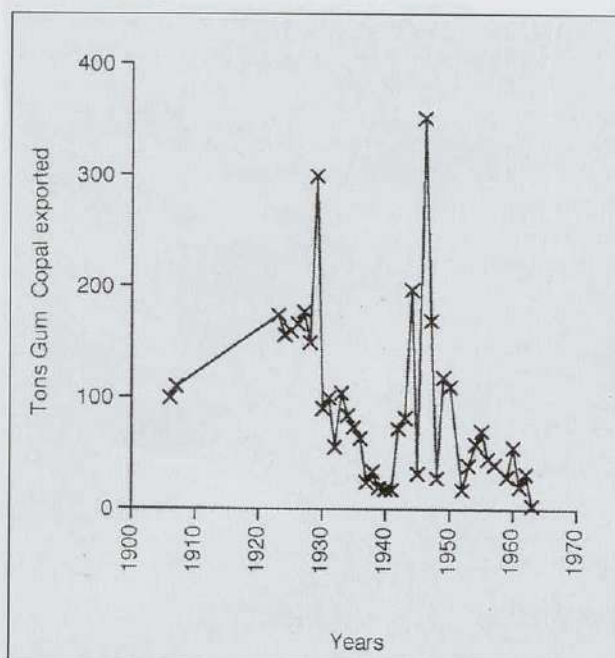


Figure 5.3.4 Fluctuations in the quantity (tons) of Gum Copal exported from Tanzania between 1903 and 1964. (Data from Forest Department, 1920–1964.) Trade effectively ceased in 1964.

and incense (Rodgers, 1992; Figure 5.3.4). Pieces of semi-fossilised resin excavated from around a tree or from former forest sites were most valued, giving copal which produced a very hard varnish (Howes, 1949). Today, with the availability of synthetic resins, use of *Hymenaea* gum is almost exclusively confined to rural communities.

Medicinal plants

Between 70 and 80% of the population of Africa is believed to rely on traditional medicine (mostly plants) as their primary source of healthcare (Cunningham, 1993). Medicinal plants are widely used in eastern Africa (Kokwaro, 1976; Hedberg *et al.*, 1982; 1983a,b; Croom, 1983; Fleuret, 1986; Akerele *et al.*, 1991; Johnson, 1992; Mshigeni *et al.*, 1994), as they are elsewhere in Southern Africa (e.g. Cunningham, 1991), and West Africa (e.g. Falconer, 1991; Leach, 1994). In the early 1980s it was estimated that there were 30,000–40,000 traditional healers in Tanzania, in comparison with about 600 western-trained

doctors, most of whom were working in hospitals in big cities (Hedberg *et al.*, 1982). Plants from the Coastal Forests have continued to form a significant proportion of the medicine available to surrounding populations (Kokwaro, 1976; Hedberg *et al.*, 1982; 1983a,b; Madgwick *et al.*, 1988; Mogaka, 1992; Cambridge-Tanzania Rainforest Project 1994; Evers, 1994; Matthews, 1994; Woodcock, 1995).

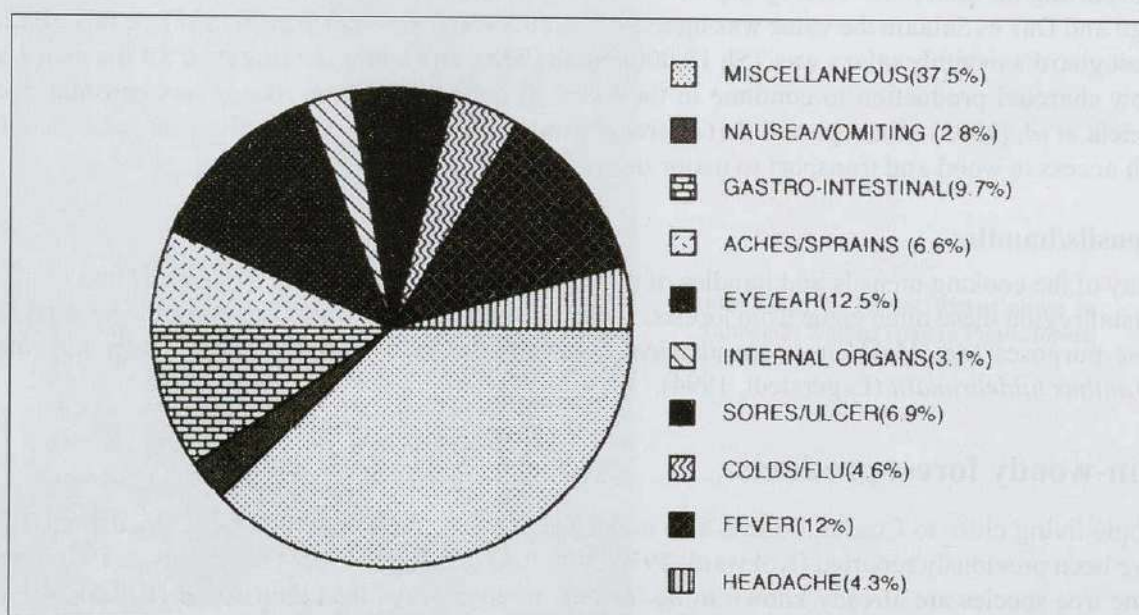


Figure 5.3.5 Pie chart of major ailments treated by Coastal Forest plants from five Coastal Forests, Tanzania (from Matthews, 1994).

Table 5.3.2 Examples of medicinal uses of selected Coastal Forest plants.

Species	Local name	Use
<i>Sorindeia madagascariensis</i>	—	Roots used against malaria, hookworm and haemorrhoids. Stem bark for treatment of syphilitic sores.
<i>Monanthotaxis fornicata</i>	—	Bark burnt and used against mental diseases. Powdered leaves are used against snake bites.
<i>Anchomanes abbreviatus</i>	likupu (mat)	Leaves used to treat boils.
<i>Chassalia umbraticola</i>	lupembesi (mat) npembesi (mat)	Leaf infusion used to treat fever.
<i>Clausena anisata</i>	mjaviali (zig) mingaoka (mat)	Wazigua use for rashes (root infusion). Wamatumbi use for lethargy (leaf juice rubbed on face).
<i>Combretum pentagonum</i>	mpurupuru (mat)	Root used for toothache.
<i>Dichrostachys cinerea</i>	mkunguti (mat)	Infusion of leaves for fever.
<i>Erythrococca trichogyne</i>	nakayemba (mat)	Leaf sap used to treat earache.
<i>Hugonia castaneifolia</i>	mambaato (mat) ngachawa (mat)	Root powder applied to snakebite.
<i>Olyra latifolia</i>	kilai (mat)	Infusion of leaves used to treat swollen spleen.
<i>Paullinia pinnata</i>	utumbu wa ndembo (mat)	Root infusion used as cough linctus.
<i>Suregada zanzibariensis</i>	mwiya (mat)	Infusion of leaves for fever.
<i>Triclisia saculeuxii</i>	ukumbuya (mat) ukumbuza (mat)	Root infusion used to treat hernia.
<i>Uvaria</i> species	—	Roots and leaves used for epilepsy, malaria treatment, lunacy.
<i>Vismia orientalis</i>	mtuno (mat)	Bark applied to itching and nettle rash.

Notes: mat = Kimatumbi language (Kiwengoma Forest, Tanzania).

zig = Kizigua language (Gendagenda and Zaraninge Forests, Tanzania).

Further detail on the uses and methods of preparation of many of these species is found in Hedberg *et al.* (1982; 1983a,b).

Medicinal plant collections in the Matumbi Hills, Gendagenda, Zaraninge, Kazimzumbwi and Ruvu South Coastal Forests (Matthews, 1994), supplemented by information from local traditional medicine practitioners, demonstrated that of the 2500 fertile plant specimens collected, 367 species were used for a total of 507 medicinal applications (Figure 5.3.5). Gastro-intestinal disorders (including diarrhoea), fever (including malaria) and eye and ear problems had the greatest number of treatments. Many medicines comprise cold or hot infusions taken orally, although external application is more common for wounds and ulcers (e.g. Table 5.3.2). Bathing in infusions is occasionally practised (Matthews, 1994). The use of medicinal plants has also been assessed in the Pugu Hills (Evers, 1994) and the East Usambaras (Woodcock, 1995).

The extent to which local populations rely on medicinal plants from the Coastal Forests of Tanzania seems to vary according to a number of factors:

- **Accessibility of the forest.** In areas close to Coastal Forests, medicines are collected from the forest, but also from forest-derived thicket and woodland. In the Pugu Hills, only 4.3% of the households said they used species from within the Forest Reserve (Evers, 1994). Village 'bushlands' were apparently a more important source of medicines, as they were in the East Usambaras (Woodcock, 1995). However, these results could be due to the reluctance of the interviewed people to state that they obtain products from the Forest Reserve as this was an illegal activity for which they could be punished. Some herbalists have responded to restricted access to the forest by domesticating plants near their homes. In areas away from Coastal Forests people collect medicines from woodland/grassland vegetations.
- **Proximity of modern pharmacies, clinics or hospitals.** Where available, modern medicine tends to be preferred to traditional medicine for major illnesses, but the traditional herbal remedies are still used to treat minor ailments. The use of medicinal plants remains strong in remote areas containing Coastal Forest, but people who have lived in towns for some time tend to rely more on 'modern' medicine (Evers, 1994). This trend is exacerbated by the loss of the traditional herbalist knowledge that is passed orally from one generation to another. There is often collaboration between the herbalists and modern nurses in remote villages.

- **Period of residence of tribal group in the area.** Ethnobotanic knowledge appears to reflect the length of residence of the people in a particular area. Our experience is that only the people with a long association with forests, such as the Wadigo, Wasambaa and Wamatumbi people in Tanzania have a high level of perceived wisdom on plant names and medicinal applications. In other areas knowledge seemed much poorer.

Some plants used for medicine in the Coastal Forest belt are also used in other areas, although most are not forest species. The herbs *Commelina* spp. yield a well known eye treatment also used by the Wasambaa and Chagga (Von Reis and Lipp, 1982; Chhabra *et al.*, 1989). Stem sap of the herb *Gonatopus boivinii*, used by the Wamatumbi for earache, is also used for this purpose elsewhere. Leaves of the riverine herb *Dissotis rotundifolia*, used in the Matumbi area to treat bilharzia, are also used by the Wadigo people (Kokwaro, 1976). The root of the climber *Artabotrys modestus*, used by the Wamatumbi for stomach ache, is reportedly also used for this purpose by the Wadigo (Kokwaro, 1976).

Leaf and root infusions of *Strychnos* spp. are also used in both northern and southern coastal areas for the treatment of stomach ache (Matthews, 1994). Sedges *Cyperus* spp. are also commonly used for the treatment of indigestion. The leaves of the climbing herb *Gloriosa superba* are used by both the Wazigua and Wamatumbi to treat insect bites and swelling. The climber *Adenia gummifera*, and bark from *Psychotria* spp. shrubs, were recorded as being used to treat snakebite, as in other areas (Kokwaro, 1976).

Medicinal compounds in Coastal Forest plants

A literature review has revealed that a number of Coastal Forest species are already known to contain bioactive agents (Table 5.3.3), or may do (Table 5.3.4). Potentially important species are *Uvaria acuminata*, which contains anti-tumour agents (Jolad *et al.*, 1985) and other Coastal Forest endemic and near endemic *Uvaria* species which have anti-malarial action (Nkunya *et al.*, 1990). Another important species is *Rauvolfia mombasiana*, the roots of which contain over 100 physiologically active alkaloids, including reserpine which is used as a sedative in the treatment of mental illness, and ajmaline which is used to treat arrhythmic heartbeat (Sofowara, 1982). Further collections of potential medicinal plants have also been made in the Tanzanian Coastal Forests (Figure 5.3.3(g)).

Edible plants

Tropical forests are known to provide food to local people in many areas (e.g. Scoones *et al.*, 1992; Falconer, 1990; 1991; Myers, 1988). Coastal Forests also contain plants which are eaten (Tables 5.3.5 and 5.3.6), and indigenous knowledge of wild edible plants is high in some areas.

For example, in the East Usambara lowlands some species are actively exploited locally and are highly palatable (notably members of the plant family Annonaceae), but others are only gathered during times of hardship and some are regarded as 'poor-mans food' (Woodcock, 1995). Knowledge of which plants are edible is passed on from mothers to their daughters, and all households regularly use wild edible plants in their diet. 25 different varieties were named in the Magrotto Hill Forest Reserve area (Woodcock, 1995), nine from forest and 16 from shambas (cultivation) and bushland. In Kenya, 60% of the people living adjacent to the Arabuko-Sokoke forest use it routinely for fruit collection, mainly for personal consumption (Mogaka, 1992; Wass, 1995).

Edible mushrooms

In the East Usambara lowlands and probably other areas, edible mushrooms are gathered by many households, from forest, bushland and farmland. As with other resources a greater number of species were utilised from farmland than from forest (Woodcock, 1995). Collection is seasonal, and can be undertaken by either women or men, generally as a minor activity associated with other work (Härkönen *et al.* 1995).

Table 5.3.3 Coastal Forest plant species containing biologically active compounds.

Species	Active agents/actions	Information Source
Species confined to Zanzibar – Inhambane regional mosaic/Swahalian region <i>sensu lato</i>		
<i>Uvaria lucida lucida</i> and <i>U. pandensis</i>	Extracts show <i>in vitro</i> activity against multidrug resistant strains of <i>falciparum</i> malaria parasites	Nkunya <i>et al.</i> (1990)
<i>Rauvolfia mombasiana</i>	Contains reserpine and deserpidine. Root extract produces hypotension and counteracts effects of adrenaline	Chhabra <i>et al.</i> (1987)
<i>Warburgia stuhlmannii</i>	Contains compounds with strong anti feedant and molluscicidal properties	Chhabra <i>et al.</i> (1987)
More widespread species with close relatives in the Coastal Forests		
<i>Phyllanthus welwitschianus</i> (Coastal Forest sister species = <i>P. harrisii</i> , <i>P. schliebenii</i> , <i>P. wingfieldii</i>)	<i>Phyllanthus</i> species reduce or eliminate hepatitis B virus antigen <i>in vitro</i> and <i>in vivo</i>	Unander and Blumberg (1991)
<i>Uvaria acuminata</i> (Coastal Forest sister species = <i>U. faulknerae</i> , <i>U. pandensis</i> and various others (see Appendix 3))	Uvaricin and desacetylurvaricin show <i>in vivo</i> antitumour action, also antibacterial action shown by leaf and root	Chhabra <i>et al.</i> (1987)
<i>Vernonia cinerea</i> (Coastal Forest sister species = <i>V. zanzibarensis</i>)	Contains vernonin, a hypotensive	Oliver-Bever (1986)
More widespread species		
<i>Annona senegalensis</i>	Bark and rootbark contain diterpenes. Extracts show antimicrobial and antitumour activity <i>in vitro</i>	Chhabra <i>et al.</i> (1987)
<i>Antiaris toxicaria</i>	Small doses of dried latex may be stimulant to heart and circulation. Very toxic in high doses	Oliver-Bever (1986)
<i>Capparis sepiaria</i>	Roots contain alkaloids and anthracene glycosides	Chhabra <i>et al.</i> (1987)
<i>Dioscorea dumetorum</i>	Tubers contain alkaloids with central nervous system stimulating properties	Chhabra <i>et al.</i> (1989)
<i>Dracaena deremensis</i>	Shows antimicrobial activity	Chhabra and Uiso (1991)
<i>Gloriosa superba</i>	Contains colchicine, an anti-inflammatory agent	Sofowara (1982)
<i>Momordica foetida</i>	Contains charantin and foetidin which lowers blood sugar levels of fasting rats	Chhabra <i>et al.</i> (1989)
<i>Ocimum gratissimum</i>	Contains thymol and has antimicrobial action. Ilium relaxant <i>in vitro</i> . Shown empirically to be an ant repellent	Sofowara (1982)
<i>Parquetina nigrescens</i>	Contains aglycones – cardiotonic action	Oliver-Bever (1986)
<i>Paullinia pinnata</i>	Contains a cardiotonic flavotannin and a saponin with antimicrobial action	Oliver-Bever (1986)
<i>Scadoxus multiflorus</i>	Bulb contains alkaloids lycorine, chlidanthine, haemanthidine, hippeastrine and haemultine	Chhabra <i>et al.</i> (1987)
<i>Schizogygia coffaeoides</i>	Roots, twigs, leaves and bark contain alkaloids	Chhabra <i>et al.</i> (1987)
<i>Strophanthus petersianus</i>	Contains sormontogenin, used in cortisone manufacture	Chhabra <i>et al.</i> (1987)
<i>Strychnos lucens</i>	Contain strychnine, powerful poison	Chhabra <i>et al.</i> (1987)
<i>Strychnos panganensis</i>	Stimulant (but highly toxic)	Chhabra <i>et al.</i> (1987)
<i>Terminalia sambesiaca</i>	Stembark shows antibacterial activity	Chhabra <i>et al.</i> (1989)

Table 5.3.4 Coastal Forest species potentially containing biologically active compounds.

Species	Possible active agents and actions	Source
Zanzibar – Inhambane regional mosaic/Swahilian region <i>sensu lato</i> endemics		
<i>Diospyros verrucosa</i>	Rootbark of <i>D. usambarensis</i> has fungicidal and molluscicidal properties	Chhabra <i>et al.</i> (1989)
<i>Maerua holstii</i>	<i>M. angolensis</i> stem-bark contains alkaloids, coumarin and steroids. Bark of this and <i>M. kirkii</i> show antibacterial activity	Chhabra <i>et al.</i> (1989)
<i>Maytenus mossambicensis</i>	<i>M. buchananii</i> contains maytensine, an anti-tumour agent <i>M. senegalensis</i> extract shows antimicrobial activity <i>M. ilicitifolia</i> rootbark extract shows cytotoxic activity	Chhabra and Uiso (1991) Itokawa <i>et al.</i> (1991)
<i>Thylachium densiflorum</i>	<i>T. africanum</i> roots contain alkaloids L-stachydrine and hydroxy-3-stachydrine	
More widespread species		
<i>Bridelia atroviridis</i>	<i>B. ferruginea</i> has been very effective in the treatment of diabetics	Sofowara (1982)
<i>Bridelia cathartica</i>		
<i>Combretum pentagonum</i>	<i>C. microanthum</i> stem contains antimicrobial agents. Also anthelmintic	Sofowara (1982)
<i>Holarrhena pubescens</i>	<i>H. febrifuga</i> bark and leaves contain steroidal alkaloids. Bark of this species also contains conessine, an amoebocide	Chhabra <i>et al.</i> (1987)
<i>Lannea schweinfurthii</i>	<i>L. schimpera</i> and <i>L. stuhlmannii</i> have antibacterial activity	Chhabra <i>et al.</i> (1987)
<i>Mallotus oppositifolius</i>	<i>M. japonicus</i> pericarps contain mallojaponin, an anti-tumour promoter	Arisawa <i>et al.</i> (1991)
<i>Momordica foetida</i>	<i>M. dioica</i> extract antimalarial against <i>Plasmodium berghei</i>	Misra <i>et al.</i> (1989)
<i>Zanthoxylum holtzianum</i>	<i>Z. zanthoxyloides</i> contains alkaloids and benzoic acid derivatives – has antimicrobial action	Sofowara (1982)

Table 5.3.5 Some Coastal Forest plants with edible fruit.

Scientific name	Local name**
<i>Allophyllus pervillei</i>	mulalati (zig)
<i>Ancylobothrys petersiana</i>	kituwe (zig)
<i>Annona senegalensis</i>	mtopetope (mat)
<i>Antidesma venosum</i>	muyembayemba (zig)
<i>Asteranthe asterias</i>	
<i>Asystasia gangetica</i>	komba (zig)
<i>Canthium bibracteatum</i>	mpulya (zig)
<i>Canthium mombazense</i>	msonzo (zar)
<i>Carpolobia goetzii</i>	mzuki (zig)
<i>Cissus rotundifolia</i>	vlanga (zig)
<i>Commiphora lindensis</i>	pingi (zar)
<i>Cola microcarpa</i>	mtomokwe (zig)
<i>Cucumis melo</i>	utongo (zig)
<i>Dictyophleba lucida</i>	kimbaruka (mat); kinoc (zar)
<i>Diospyros verrucosa</i>	ujamitu (zig)
<i>Grewia conocarpa</i>	mkole (zig)
<i>Grewia holstii</i>	msofu (zar)
<i>Grewia microcarpa</i>	mkole (zig)
<i>Jasminum meyeri - johannis</i>	mblumbulamundi (zig)
<i>Kraussia kirkii</i>	mkadilowa (zig)
<i>Landolphia kirkii</i>	bungu (zar)
<i>Manilkara sulcata</i>	mchejimtunda (zig)
<i>Manilkara sansibarensis</i>	mkwichimbi (mat)
<i>Meyna tetraphylla</i>	mgola (zig)
<i>Monanthes buchananii</i>	msenzele (zig)
<i>Pachystela brevipes</i>	mgerezi (zar)
<i>Paropsia braunii</i>	moyomoyo (zar)
<i>Phyllanthus nummulariifolius</i>	mpilipili (mat)
<i>Pseudocalyx heterochondros</i>	buku (zar)
<i>Pyrostria bibracteata</i>	mkonge mwitu (zar)
<i>Rinorea</i> spp.	mkoko (zig)
<i>Rytigynia bugoyensis</i>	kipela (zig)
<i>Saba comorensis</i>	ngombe (mat)
<i>Salacia madagascariensis</i>	mbwiku (zig)
<i>Sorindeia madagascariensis</i>	
<i>Strychnos madagascariensis</i>	mtonga mtonga (zig)
<i>Tamarindus indica</i>	ukwaju (mat)
<i>Thespesia danis</i>	mkangala (zig)
<i>Uvaria acuminata</i>	msofufufu (zig)
<i>Uvaria kirkii</i>	msofu (zig)
<i>Uvaria leptocladon</i>	sofu mwitu (zar)
<i>Uvaria pandensis</i> *	kisemvule (zig)
<i>Uvariadendron</i> sp.* ?	lukunde (zig)
<i>Vangueria madagascariensis</i>	mwelu (mat)
<i>Vigna vexillata</i>	mankamba (zig)
<i>Xylothea tettensis</i>	msekaseka (zar)

Note:

* Zanzibar – Inhambane/Swahilian near endemics found only in forests.

** From local herbalists in their own language: zig – Kizigua, mat – Kimatumbi, zar – Kizaramo

Table 5.3.6 Some plants found in Coastal Forests which have edible leaves or roots.

Scientific name	Local names*
<i>Aerva lanata</i>	bwache (zig)
<i>Ageratum conyzoides</i>	gugudulu (zig)
<i>Buchnera hispida</i>	pombomaji (zig)
<i>Cucurbita moschata</i>	
<i>Grewia lepidopetala</i>	mnanga (zig)
<i>Ipomoea</i> sp.	pwapwa (zig); longwe (zig)
<i>Memecylon amaniense</i>	kilumbu (zig)
<i>Oldenlandia johnstonii</i>	kipulwe (zig)
<i>Oliverella hildebrandtii</i>	mkwambe (zig)
<i>Pilea</i> sp. ?	bambiko (zig)
<i>Siphonochilus aethiopicus</i>	manjano (zig)
<i>Tacca leontopetaloides</i>	uwana (zar)
<i>Tamarindus indica</i>	ukwaju (zig)
<i>Teclea</i> sp.	kidenka (zig)
<i>Vernonia aemulans</i>	sunga (zig)
<i>Vernonia cinerea</i>	

Note: * From herbalists in their own language: zig - Kizigua, mat - Kimatumbi, zar - Kizaramo

Miscellaneous uses of Coastal Forest plants

The smoke from the bark of *Caloncoba welwitschii* ('mwabu') and *Xylothea tettensis* ('linemiambopo') are used in the Matumbi area to sedate bees prior to collecting honey from wild nests. *Dichapetalum stuhlmannii* ('nkichi' in Kimatumbi) is used to produce a tranquilizer for buffaloes (and kills cattle).

Mosquito repellents are made from leaf infusions of *Tetracera boiviniana* and *Keetia zanzibarica*. Stem pieces of the herb *Psilotrichum scleranthum* ('kijafuno' in Zigua) and the liana *Strychnos angolensis* ('tonga') are used as toothbrushes and the roots of *Dichapetalum mossambicense* and *Clerodendrum incisum* are boiled to produce mouthwashes. Bark from the 'mdaa' tree – *Diospyros zombensis* – is used by the Wamatumbi male as a tongue colourant to make him more attractive to women. The roots of this tree are also an aphrodisiac. Roots of the shade-bearing herb *Drimiopsis botryoides* ('nakatumba' in Kimatumbi) are ground and used for tattooing. Shampoos and soaps are produced from the sedge *Kyllinga cartilaginea* and from the leaves of *Ludwigia jussiaeoides* and *Rhynchosia* sp.. The Landolphia rubber creeper, *Landolphia kirkii* ('mpila' in Kiswahili), is used on a small scale for making footballs, snare trip wires and various other items. Its sap was formerly collected as a tax during the German administration of Tanzania (Rodgers, 1993).

Glue can be derived from the root of *Gardenia transvenulosa* and from the latex of *Ficus sycomorus*, *Garcinia livingstonei* and *Maytenus* sp. The bark of the tree *Vismia orientalis* ('mtuno' in Zigua) is used to produce an orange – yellow dye for woven reed mats.

Grass species that frequently occur in more open or disturbed areas, such as *Paspalum glumaceum* and *Sporobolus pyramidalis* are used as roof thatch. Twigs of *Combretum apiculatum* are reportedly used in basket weaving and twigs of *Scorodophloeus fischeri* and *Uvaria* spp. seedlings can be made into a strong twine for binding. Many other liane and vine species are suitable for use as rope. A review by Kabuye (1988) suggests that Coastal Forest species are not important for basket-making, which is supported by our experience.

Nitrogen-fixing plants are also found in the Coastal Forests, for example *Tamarindus indica* ('mkwaju' in Kiswahili), *Entada pursaetha* ('mkuluma' in Kimatumbi) and *Trichilia emetica* ('nukulio' in Kimatumbi), which is also reported to reduce pests when grown alongside crops. *Thunbergia alata*, a herb occurring at forest margins is reportedly planted with dry rice in the

Matumbi area and is said to increase yields. Other species with agricultural value are lianas and climbers used to form a dense live fence. *Hewittia malabarica*, *Smilax anceps* and *Tylophora* sp. were all reportedly used for this purpose in Kisarawe District, Tanzania.

Genetic resources

Some of the plant species found within the Coastal Forests could represent important genotypes of commercial crops. The most important of these may be *Coffea* spp. Some 11 species of coffee (out of a global total of 90 species) are found only in the Coastal Forests and some of these are caffeine-free varieties not yet exploited for these properties (Charrier and Berthaud, 1990). Also of potential interest are wild vanilla and wild yams, although extensive processing may be needed to reduce the natural toxicity of the latter.

Bush-meat

In many Coastal Forests the wild animals are hunted to provide meat for local populations. This hunting is either undertaken by men within the forest, or undertaken by all members of the family with the main aim of reducing animal damage to crops.

In Tanzanian forests, the most frequently hunted species are Red Duiker *Cephalophus natalensis*, Suni *Neotragus moschatus*, Bushbuck *Tragelaphus scriptus*, elephant-shrews – *Petrodromus* and *Rhynchocyon* species, Porcupine *Hystrix* spp. and Bush Pigs *Potamochoerus larvatus*. However, a wide range of species are hunted throughout the range of the Coastal Forests. Details for the Arabuko-Sokoke forest in Kenya are provided by FitzGibbon *et al.* (1995).

The most common hunting methods are the laying of snares (often using bent saplings or metal wire), other traps, the use of bows and arrows, tracking with dogs, and occasionally shooting. A case study in the East Usambara lowlands in Tanzania shows that the communities do not generally depend on hunted animals as a source of protein, and bushmeat is either perceived as an occasional luxury or, by the younger generation, as 'old fashioned poor-mans food' (Woodcock, 1995). However, in other areas, bush-meat may have a high value to local communities, either through money saved by not buying meat at market, or through income gained by selling the meat to others. For example, around 60% of households living adjacent to the Arabuko-Sokoke Forest in Kenya hunt there regularly, and in 1991 about 350kg meat/km² forest was harvested, with an estimated value of KShs 1,306,000 per annum (c.\$35,000) (FitzGibbon *et al.*, 1995). In the coastal area hunting also takes place in the grassland/woodland areas outside the forest in the dry season. The fires used to drive the animals and allow their capture may encroach into the forests themselves.

In many coastal areas, local communities also hunt Bush Pigs, Sykes Monkey *Cercopithecus mitis*, Vervet Monkey *Chlorocebus aethiops* and Yellow Baboon *Papio hamadryas* because they raid crops grown near the forest. In most of the Muslim areas the pigs' meat is not eaten, although it may be sold to other people. The monkeys are also not generally eaten, although this varies with locality and the Black and White Colobus *Colobus angolensis* has been exterminated by hunting from the Pugu Hills near Dar es Salaam.

In some forests (e.g. Rondo) small children may hunt birds for food, for entertainment, and occasionally to sell into the wild bird trade (Bhatia, *in lit.*). This practice may also occur elsewhere in the coastal area.

Wild honey

The importance of Coastal Forests for honey collection varies greatly. In the Arabuko-Sokoke forest, 30–40% of people collect honey from the forest, mostly during the time of peak production in May and June (Mogaka, 1992). However, the practice is uncommon in the East Usambara lowlands (Woodcock, 1995). In general the forests are less important for the collection of wild honey than areas of *Brachystegia* woodland. In most Coastal Forests, honey collection is opportunistic from naturally occurring hives and the honey is consumed by the collector's family or traded for other goods.

Traditional spiritual value

Some Coastal Forests occupy sites of traditional spiritual value. The best known are the 'Kaya' forests of southern Kenya (Spear, 1978). However, such values are also found elsewhere in the coastal area. For example, historical studies of the coastal Wazaramo people in Tanzania reveal that one of their cultural myths tells of Mwene Mbaga 'owner of the forest' to whom all trees belonged (Knappert, 1987). Discussions about the ritual or cultural uses of the forest are often a taboo subject, probably due to pressures to abandon traditional beliefs by both Muslim and Christian religious groups (Evers, 1994). However, interviews with forest guards confirmed that sacred groves containing grave sites are still visited within the Pugu Forest (Evers, 1994), and that large trees are still retained 'for the spirits to live in' (Frössling, *in lit*). A small burial grove near Pugu Forest also still has local sanctity and is the only known location for the endemic genus and species *Stephanostemma stenocarpum* (Apocynaceae) (Burgess *et al.*, 1992). Such beliefs about forests and trees are thought to be widespread in the Coastal Forests area.

Land

Historically the conversion of Coastal Forest to farmland has been the main use of this resource. When first cleared, forest land is relatively fertile and produces good crops for 2–3 seasons (see Figure 5.3.3). The state of the forest prior to its clearance, be it rich in timber species, biodiversity or other values is of little relevance to the people wishing to utilise the forest to realise its agricultural land value. However, valuable timber trees are often cut prior to clearance, and species which are important to the people (fruits, timbers and poles) are retained during agricultural conversion as a 'stock' of building materials and food (Evers, 1994; Woodcock, 1995).

A similar situation occurs where the mineral interest of a forested area is high. Existing values of the forest are unlikely to be higher than the value of the material to be mined. Mining activities are taking place near the Pugu Forest Reserve in Tanzania and in Mrima Hill in Kenya.

Attitudes to forest conservation

The attitudes of people towards the Coastal Forests are important to understand if effective conservation is to be achieved. The essence of the problem – conflicting viewpoints – is outlined here, with some examples of how resources are used, and what people living around some Coastal Forests think about them. Assessing the reliability of these data is complex, as it is derived from replies to questions posed by a researcher, who is always likely to be seen either as a threat, or a potential saviour – neither being an ideal basis from which to collect objective information.

Conflicting viewpoints

One of the most important aspects of human attitudes to Coastal Forests is the variation in perception of the 'worth' of a forest by different sectors of the community in eastern Africa, leading to conflicts over potential land use options. Three main viewpoints can be identified (from Rodgers, 1993):

- At one end of the spectrum is the local farmer living on the forest margin, who sees the forest as the family's source of land, food and fuel (either now or for future generations).
- At another end is the local government, who see forest as a source of employment and revenue through the exploitation of products such as timber.
- In contrast with this, international and local conservation organisations see the forests as important gene pools (biodiversity areas) and environmental buffer zones of value to the country/world. The national forestry authorities also have similar perspectives in that they see the forests in terms of their water catchment and timber values for the country.

These different perspectives and views are of fundamental significance to the conservation of forest resources in the area. Indeed, in the Coastal Forests, where there are no water catchment values of national importance, and few remaining timber resources through which the Forestry Department or local government could create local employment, there is a strong potential conflict between the

conservationists who wish to protect the forests for their biodiversity values, and the local people who wish to use the forests to survive.

Comparative value of resources

A recent review (IIED, 1994) argues that the critical question of how to promote conservation of natural resources as a long-term strategy by local people is influenced by the perceived comparative value of these resources. The three main factors identified by IIED (1994) are: the distribution and characteristics of the natural resources; the value of the natural resources in terms of local income and its distribution; and the socio-economic, political and cultural institutions of local stakeholders and their relationship to higher level structures (IIED, 1994).

Hence, if the value of the standing forest is perceived to be low compared to alternative uses such as agriculture or clear-felling for charcoal production, then the interest in conserving forest resources is likely to be limited. This is particularly true of more accessible areas near urban market centres, where the differentiation within communities tends to be high and in-migration creates greater pressure on resources (for example, Pugu, Pande and Kazimzumbwi Forest Reserves in Tanzania). Where the political, legislative and administrative frameworks are weak there is also a greater threat from illegal exploitation.

On the other hand, in more marginal areas with greater dependence on the resources for livelihood strategies, the local value of the resources will be high. This is likely to apply to those forests located in more remote areas, such as southern Tanzania. Strong linkages within communities, more equitable access rights and income distribution, are also found to be important factors for successful community conservation.

Case studies of local perceptions

The results of several recent participatory studies with villages adjacent to Coastal Forests in Tanzania and Kenya (Mogaka, 1992; Evers, 1994; Lagerstedt, 1994; Woodcock, 1995) give an indication of the generally negative perceptions of local people towards protected Coastal Forests at the present time. Their main concerns related to forests focus around current constraints to agricultural production and improving their income levels. Some examples from these studies are given on the following pages:

Box 5.3.1 Pugu Kajiungeni/Pugu Forest Reserve (Evers, 1994)

In this study, the men's perception of the forest was generally a resentment at being excluded from the reserve by the Forest Department. There was also frustration with a lack of directly communicated information about changes in forest regulations. Commercial use of the forest by outsiders has continued, however, as evidenced by trucks of charcoal, and by other forest products passing through the village, and this was perceived as having a negative impact on the forest. It was felt that timber restrictions should be better enforced, although it is possible that at least some of the local men are employed by the contractors.

It was strongly stated that there should be some flexibility in the regulations to allow for subsistence use of the forest, such as harvesting of fuelwood and poles. Many mentioned the problem of land scarcity, declining soil fertility, and the need for improved technology or access to the fertile land under forest in the future. However, large scale deforestation was seen as negative and examples were given from Dodoma Region where deforestation was believed to have affected the rainfall.

Women's perceptions focused on the need for access to fuelwood as the most important forest product, particularly given its increasing scarcity in the village area. Another problem was the declining availability of building poles which now forces people to substitute inferior species, such as cashewnut tree poles.

Youth in the village focused almost entirely on the problem of access to land, rather than perceptions of benefits from the forest *per se*. All the available land within the village boundaries has already been allocated to individuals by the village government. Many expressed a desire for economic independence by requesting a piece of the parental land, or trying to earn income through small businesses or skilled labour, such as becoming a mechanic.

Other informants felt that the relatively high earnings which could be made from pole harvesting and charcoal production created incentives to exploit these resources. Such activities are easier to get involved in when compared with other small businesses which require skills training, capital, loans and equipment.

Box 5.3.2 Homboza and Vigama Villages/Kazimzumbwi Forest Reserve(Msonganzila *et al.*, 1994; Lagerstedt, 1994; Mwamfupe, 1997).

The attitudes to forests in the Vigama Village close to Kazimzumbwi Forest Reserve vary depending on the people who are responding to questions (Table 5.3.7).

The men's main concern focused on the decline in soil fertility and increasing unreliability of the rains in the last twenty years. Increasing degradation outside the reserves was seen as the result of the mixing of cultures and the loss of traditional systems of managing the environment. Again, large-scale deforestation was seen as negative, particularly as the forest was regarded as providing better rainfall and important resources such as timber. The sudden eviction from the forest in the late 1950s, and the continuing enforcement of exclusion by the Forest Department, was still, however, resented.

Women also mentioned declining soil fertility and the lack of water sources. Crop-raiding pests from the forest (such as monkeys and bush pigs) were found to have serious impacts on harvest levels. While fuelwood was not seen as a problem by women in these villages, the negative effects of over-exploitation of trees was understood. However, the cash income derived from harvesting trees was seen as critical to their livelihoods.

Youth again emphasised the need to earn cash, mostly through the sale of agricultural products. There was also a feeling of resentment that the Forest Department claimed all the rights and derived all the benefits from 'trees that God and their grandparents had planted'.

In a more recent study of this forest (and Pugu) by Mwamfupe (1997) (Table 5.3.8) it has been more clearly shown that in this particular forest, it is the woody resources which are the most highly valued by the local people. Environmental services are ranked much lower in importance. With an increasing population in the area, a huge market in Dar es Salaam, and these attitudes held by the local people, the difficulties experienced in the conservation of these forests (see Chapters 5.4 and 5.5) can be readily understood.

Table 5.3.7 Ranked perceived value of products from Kazimzumbwi Forest Reserve, by men, young men, and women.

Rank	Men	Young men	Women
1	To hunt animals for food	Timber	Firewood
2	Charcoal	Charcoal	Charcoal
3	Building materials	Building poles	Building poles
4	Medicines	Firewood	Ropes
5	Firewood	Honey	Withies
6	Honey	To hunt animals for food	—
7	Land for farming	—	—

Table 5.3.8 Percentage of villagers valuing different attributes of Pugu and Kazimzumbwi Forests, based on field survey in 1996 (from Mwamfupe, 1997).

	Important	Neither important nor unimportant	Unimportant	Rank
Source of fuelwood	40	8	2	1
Charcoal production	32	12	6	2
Source of timber	28	14	8	3
Crop cultivation	22	19	9	4
Logging	28	12	10	5
Cultural significance	17	22	11	6
Water catchment	14	20	16	7
Medicinal value	8	30	12	8
Environmental value	8	28	14	9
Honey harvesting	12	18	20	10

5.3.3 Manga Forest Reserve and Magoroto Hill – East Usambaras (Woodcock, 1995).

Villagers living around Manga Forest Reserve and Magoroto Hill in the East Usambaras see the public forest as a resource for their day-to-day subsistence; for agricultural land, building poles, timber, firewood, weaving materials, ropes, vegetables and medicine. On Magoroto Hill they were also keen to be able to cultivate cardamom within the forest and suggested this as a way whereby the forest could be conserved whilst also providing them with an income.

In both areas villagers were well-aware of the restrictions placed on the use of Forest Reserves, and who officially controlled them. Some villagers admitted to 'stealing' into the Reserves to obtain building poles, saying that they had no choice, since all good quality materials had been used up in the public forest. Villagers feared that they could be caught by forest guards, taken to the police, asked many questions and possibly given a fine. Another major complaint was that the forest guards, by protecting the forest, also protect the crop pests which live in the forest, such as bush pigs and monkeys, which farmers spend a great deal of time protecting their crops from.

In general the villagers could see the advantage of conserving forests for water catchment, to prevent soil erosion and perhaps for future subsistence uses. However, most felt that due to the low availability of agricultural land, timber and building poles, if the forests are not guarded, villagers would have no alternative but to cut the forest down.

Summary

The Coastal Forests are heavily used by both local populations and outsiders to provide woody (non-timber) and non-woody products for people.

In many cases these uses are so intensive that they threaten the continued existence of the forests. The five most destructive uses (in descending order) are: conversion to agriculture, cutting to produce charcoal, timber logging, pole cutting and fuelwood gathering.

The Coastal Forests most heavily used are those closest to major centres of human population (e.g. close to Dar es Salaam), or in areas of expanding human populations and economic activity (e.g. coastal Kenya). Those least used are located in remote areas of low human population and poor transport infrastructure (e.g. southern Tanzania).

The authorities in charge of the conservation and management of the Coastal Forests (Forestry Departments and elders in charge of 'sacred groves') are both beset with the problems of declining ability to protect the forests under their control. In some Forest Reserves there has been no official presence for many years and hence the local people believe that the government has given the reserve up. Mainstream religions and 'westernisation' have reduced the authority of the elders.

The local people living around Coastal Forests have various perceptions of its importance or value to them. In many cases there was a general appreciation that the forests were useful in helping to guarantee rainfall, but there was also resentment that 'traditional' lands were under the control and management of the Forestry Department and that any 'benefits' did not come back to the local populations. In many villages the need for further land either now or in the future was an over-riding concern, and the need to earn money was identified as a very important consideration by the younger people. These needs would be in conflict both with sustainable forest management and forest conservation.

All in all the future of the Coastal Forests does not look very secure. They are threatened by the surrounding populations and their life-sustaining activities. They are already small and often damaged by previous/existing intensive exploitation activities. The power of those who protect them has been eroded considerably in the past decade. They could easily be written off by national government planners or local people, and left to gradually disappear. An outline of what is being done, and could be done, to prevent this happening is presented in the last Chapter.

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5.4. Coastal forest conservation problems

W.A. Rodgers and N.D. Burgess

Introduction

Recently there has been considerable interest in the conservation of biodiversity, both at a global level (e.g. WCED, 1987; Wilson, 1988; Reid and Miller, 1989; McNeely *et al.*, 1990; WCMC, 1992 etc.) and within developing countries (e.g. Rodgers, 1998; Government of Tanzania, 1998). Tropical forests have been identified as one of the most important ecosystems for biodiversity conservation. These include the Coastal Forests of eastern Africa (e.g. ICBP, 1992; Burgess *et al.*, 1998; Olson and Dinerstein, 1998; Mittermeier *et al.*, 1998; Stattersfield *et al.*, 1998).

Earlier chapters have summarised both the biological values of the Coastal Forests (Chapter 4.9) and the intense use of these forests by humans over many years (Chapters 5.1 and 5.3). This Chapter reviews the main issues facing forest conservation.

The majority of the Coastal Forests are gazetted as Forest Reserves, and are controlled by government forestry departments (Chapter 5.2). Conservation is therefore closely linked with the future capacity and policies of these departments.

Although modern forest policy (e.g. Government of Tanzania, 1998) has made a significant shift towards the involvement of local communities in the management of forest resources, including Forest Reserves, it is likely that real participation will take time to develop. Tanzania's draft Forest Act, for example, appears to exclude collaborative management for national reserves (Government of Tanzania, 1999). The need to increase the focus on people is emphasised throughout this Chapter.

The introduction (Chapter 1.1) stated that Coastal Forests share most of the conservation problems associated with forest conservation in the tropics. The forests were summarised as follows:

- small fragmented patches, most less than 500ha in size;
- surrounded by relatively impoverished rural communities with a high and growing demand for forest resources;
- individually distinctive, with a significant level of local forest endemism, and a great variety of different vegetation communities;
- lacking the national-level "hard" resources, such as timber or water catchment values, that would allow species biodiversity values to be incorporated in their continuation; and
- under-protected by government agencies at present.

Problems facing conservationists

These facts have meant that conservationists have been unable to do the following:

- devise a realistic core and buffer zone strategy, where the forest edge can be used to provide resources to local people, and the centre can be maintained as an inviolate refuge. Patches of only a few hundred hectares don't provide enough space for buffer zones to satisfy the demands of many villagers.
- convince rural people about the concept of conservation, based on essential water catchment values, or convince national or district governments (because of the obvious large-scale commercial timber value).
- decide which of the 150 forest patches are essential for biodiversity conservation, and which have high or medium priority. It has also not been determined which criteria should be used to make such decisions.

The first two of these conservation issues are explored in this Chapter within a set of broader problem headings, including those which are increasingly referred to as the underlying or "root" causes of biodiversity and forest loss. Root causes are the deeper symptoms (e.g. population increase, inadequate tenure, etc.) of loss, rather than the surface signs of loss, such as excessive logging, non-sustainable collection of fuelwood and other natural products, fire and encroachment. Root cause analysis asks the questions: "Why is there excessive logging?" and "Why is there increasing encroachment?" Ideally conservation initiatives should address both the deeper causes and the surface signs. This Chapter suggests that, at the present time, they are not doing either.

The third issue, developing priorities for conservation, is also discussed, drawing on data from earlier chapters in the book.

Forest loss is not unique to the Coastal Forest ecosystems or to Africa. Tropical forest loss continues to increase worldwide, the immediate cause being clearance for cultivation. Rodgers (1997a), reviewing patterns of tropical forest loss, concluded that there was little likelihood of this loss diminishing in the near future. Population growth, lack of alternative employment and need for arable land, as well as the need for woody biomass, are the root causes of the use and conversion of forested land. This conversion starts with non-protected areas; eventually pressure builds up to encroach on and then degazette reserved lands (see IUCN, 1996, for a case history in Kenya).

Tanzania has long had policies to maintain forest cover for the good of its people. However, the fact that the government's own figures suggest an annual forest loss of 400,000 ha, indicates that these policies are not working. Why is this so? Are they inadequate? Are they inadequately implemented? Or are once adequate forest policies failing because of new pressures from other sectors (e.g. agriculture, industry) or from population growth? There is a need for more sophisticated levels of policy analysis (Rodgers, 1997b; Rodgers *et al.*, 1999).

Conservation priorities

There are three conservation priorities in the region:

- Developing a protected area (PA) network that reserves priority resources and allows adequate site-based resource management. In Tanzania this has been at the level of reserve status; there are no National Parks for Coastal Forests, and only one forest park (Udzungwa) in the country. In Kenya, Shimba Hills is a park with forest values, although it was established for large mammal conservation; Tana and part of Arabuko-Sokoke forests have National Reserve status.
- Persuading local communities and government stakeholders to accept these protected areas, by showing that real benefits outweigh costs, and by using the resources inside (where permitted) and outside the PAs in sustainable ways.
- Developing alternative resources and incomes for people around these PAs to reduce the demand for forest resources.

The failure to act on these priorities has led to four main problem areas in Coastal Forest conservation:

- an inadequate protected area network, with individual PAs that are poorly managed;
- increasing human populations practising shifting cultivation and using resources in a way which is not sustainable;
- a breakdown of traditional forest protection practices, and unwillingness on the part of local people to adopt conservation concepts; and
- insufficient management input by government authorities, caused by the low priority and lack of funding for forestry, and lack of leadership.

An inadequate protected area network

The patches of remnant forest that exist as government Forest Reserve are the survivors of a larger extent of forest and thicket along eastern Africa's coastal plains and hills. If it wasn't for their reserve status many of these remnants — with the exception of those forests considered sacred by the local people — would have been cleared for cultivation this century. The protection system brings some benefit, therefore, but still has many serious inadequacies.

- Several forests are still not protected (e.g. Kisiju/Dendene and Kiwengoma south of Dar es Salaam, coral rag forest in Zanzibar and Pemba; the timber-rich (*Brachylaena*) forest thickets in northern Tanzania, etc.). There have been plans to reserve them for years but, due to the lack of government will, it does not happen.
- Reserve status is often inadequate for the long-term conservation of important resources. Earlier chapters discussed the pattern of clearing reserved natural forest in colonial times, both for plantations (since all useful timber had been extracted from the natural forest) and for agricultural development. Degazettement was, and is, achieved with the stroke of a Minister's pen. In Kenya, degazettement has brought frequent encroachment of Nairobi City Forest and Karura Forest. This loss is heightened during election periods (see IUCN, 1996). There is a growing feeling that Kenya's natural forests should be placed under the jurisdiction of the Wildlife Service to prevent such Ministerial excision. (Box 5.4.1 highlights the recent loss of Coastal Forest resources in East Africa). National Park status provides much greater security, in that degazettement must be carried out by Act of Parliament.
- Forest Reserves are "managed" by forest departments, but these departments rarely have the resources to undertake the task and Coastal Forests are often a low priority to them. Structural Adjustment Programmes in Tanzania have led to many districts laying off most forest guards in the past years. This was done with little regard for, or commitment to, the concept of resource conservation.

As yet there is little real capability to involve local people in management, despite the new Forest Policy in Tanzania (1998) that permits real empowerment and ownership. Expertise, funding and legislation are still needed to make the policy operational.

This book is largely about the biological diversity of forests. Such diversity is dependent on maintaining the complexity of the forests' natural woody cover. Maintaining such cover, therefore, should be the ultimate goal of forest management. Utilisation can be permitted if there is sufficient regeneration, and if forest integrity — in terms of species variation, structure and light regimes — is maintained. Management success must be measured against these objectives.

Forestry departments, by tradition, have been resource use agencies. Management was governed by production targets, not conservation of species or plant communities. Where there were no official production targets, then management satisfied local demands. Wildlife departments have been obsessed with preventing all extractive use and have developed huge staffs to eliminate poaching. The silviculture practices of clearing climbers and figs (*Ficus* spp.), and of felling non-commercial species for the sake of uniformity, dominated the forest management practices of government departments in much of the region (see Rodgers, 1995).

Forestry was traditionally concerned with valuable timber and, on a large scale, water catchment capability. The harvesting of fuelwood, poles, honey and duikers was not seen as a problem and was tacitly accepted while staffing levels remained low. As populations increased and resources became scarce, however, the pressure on reserves rose rapidly. Moreover, governments were becoming financially impoverished, and staffing levels were frozen or even reduced. The wildlife sector was more responsive to change, with input from economists, sociologists and biologists from outside the profession. Forestry, however, remained the domain of foresters. Acceptance of new ideas, such as community involvement, took longer.

Box 5.4.1 Destruction of Coastal Forests

a. Tanzania

Kisiju (also known as Dendene)

This is perhaps the last surviving patch of gum copal (*Hymenaea*) forest along the Tanzanian coast. Some 200 hectares, with closed canopy and black and white Colobus monkeys, it is rapidly being cleared for cassava. Coast Region Forestry started the gazettement process with GEF funding in 1994, but activities have ceased.

Vikindu

Vikindu is a closed evergreen Coastal Forest Reserve just south of Dar es Salaam, partially cleared by the British colonial government for a fuelwood reserve (using exotic *Senna*). Although the edges and valleys were left intact, the Dar es Salaam Regional Forest Officer allowed encroachment of the forest for settlement.

Mafia Island

Tall evergreen forest was cleared recently for coconut estate expansion. A part of the coral rag forest is now in the Marine National Park, but plans to gazette the rest as Forest Reserve have stalled.

Pugu/Kazimzumbwi

This area still faces severe encroachment (see details in chapter 5.5).

Pande

Once a Forest Reserve just north of Dar es Salaam, with several valuable plant and bird species, it was degazetted and declared a "private zoo". This failed and the area was subsequently subject to extremely high levels of collection of charcoal and poles. It was regazetted as a Game Reserve, but no resources were allotted for management. High levels of charcoal cutting continue, mainly by the Tanzanian army.

Rondo Plateau

Described by Kew Gardens botanists as the "richest plant site in Africa's Coastal Forests", this Lindi Region Forest Reserve was largely felled by the British for commercial softwood plantations and some mvule (*Milicia excelsa*). The periphery remains as good forest, and the new mvule understorey has importance for rare birds, although there is little management input.

b. Kenya

Arabuko-Sokoke

This area provides important habitat for several species of rare birds and mammals and is under threat from land clearance and acquisition (see details in chapter 5.5).

The Kayas

These are sacred forests of the coastal people, not gazetted in forest law, although some patches are National Monuments. They are vulnerable to commercial exploitation and encroachment when traditional leadership breaks down.

Chale/Diani

Good coral rag forest and thicket have been taken over by developers. Communities have been bought out, despite ecotourism opportunities.

It is important to stress that these problems are not unique to Tanzania. In other parts of the world deforestation has led to the fragmentation of once continuous forest cover. Caldecott (1998), quoting Norman Myers, states: "A rough guide is that a tropical forest reserve should be 500km² or more, if most native species are to survive". This is not the case on Hainan Island in China. There is 4 per cent forest cover remaining, but it is in 19 small discrete fragments. But even there, with only one patch larger than 212km² and nine patches only about 20km², the situation is better than on the East African coast.

Caldecott describes this area in China and others in the Philippines as "sites where fragmentation is so far advanced that forest conservation projects have to link people and their resource constraints to ecological principle". He believes that in parts of the Philippines, forest conservation is best addressed on a large scale through work undertaken within IUCN Category V (Protected Landscapes), rather than individually dealing with the small remaining forest patches. Such an approach may offer a suitable model for the conservation of the smaller forest patches along the eastern African coast.

Increasing population pressure, shifting cultivation and unsustainable resource use

Historical research on East Africa documented a considerable decline in human populations from late in the 1800s to the 1920s, due to colonial impact, disease, cattle rinderpest, and World War I (Kjekshus, 1977). Since then the human population has continued to rise, with the increase averaging 2.3–3.8 per cent yearly in the last decades (see Table 5.4.1; Vooren and Sayer, 1992). As most people in eastern Africa are cultivators, the demand on land and on natural resources (such as building materials, timber, fuelwood and grazing to obtain animal proteins) has increased substantially.

Rates of agricultural growth in the region have declined since the 1960s, especially in Mozambique, which experienced a decrease in production (Vooren and Sayer, 1992). Declines have been due to many causes, including lack of incentive, increased central planning, drought and war. Food intake (measured in calories) has declined, agricultural plot sizes have fallen, and forests have been lost. Even if the agricultural and population targets set out in Table 5.4.1 were achieved, the standards of living would remain low for most people. Population growth means that there will be twice as many subsistence farmers by 2020 as there were in 1995. Unlike the drier countries of Somalia and Kenya, Tanzania and Mozambique still have suitable land for agriculture, although some of it would have to come from the remaining Coastal Forests.

Coastal agriculture is inefficient. Much is short-term shifting cultivation (four to eight years) concentrating on food crops like cassava, maize and valley-bottom rice. As rotation times decrease declining yields lead to increased pressure on forest areas. Agricultural extension support has also declined in the past decade.

Non-sustainable use affects forest products as well as land. In Tanzania, fuelwood use projections estimate some 22 million cubic m at the household level, compared to a sustainable yield of 13 million m³ (an additional five million goes to industry). This demand is likely to reach 52 million m³ by the year 2020. Much of this will come from the clearing of forest and woodland (when calculating harvest sustainability, however, it should be noted that most woodland and many tree species will regrow from stump). Most fuelwood goes to supply the needs of urban centres such as Dar es Salaam and Tanga, even Mombasa, which has a severe impact on Coastal Forest resources.

Although concern about fuelwood use in Tanzania extends back to the 1970s (see e.g. Leach and Mearns, *Beyond the Woodfuel Crisis*, Earthscan 1987), some of the predictions made then were based on flawed data. The data was predicated on the assumption that cut forest does not regenerate; in addition, it was based on traditional forest inventories, which do not take into account branch wood (up to 50 per cent of the wood volume available for fuel) or on-farm woody biomass resources (live fences, scattered trees).

Hall and Rodgers (1986) drew attention to high levels of polewood cutting in lowland forests, an issue later commented on by other workers in and around Pugu Forest (see further data in Chapter 5.3). There is no tradition of sustainable harvesting of poles from within private sector interests, communities or from the forest service. Over time uncontrolled pole harvesting eliminates the young trees of forest canopy species.

Uncontrolled fires are another long-term threat to the Coastal Forests. Fire can penetrate into a forest and destroy part of it, especially at the end of the dry season when the leaf-litter on the forest floor dries out. The threat is particularly intense during the period prior to cultivation, when fires are set to burn weeds and clear fields. Before the 1960s fire was prevented from entering the Forest Reserves by controlled burning of the grassland at the margin of the forests (see Forestry Department Annual Reports), but this practice ceased due to a lack of funds.

Table 5.4.1 Food consumption, agriculture, population and the environment in eastern Africa (from Vooren and Sayer, 1992).

	Eastern African Countries			
	Somalia	Kenya	Tanzania	Mozambique
Agricultural production growth rates (per cent per annum)				
1965–1973	no data	6.2	3.1	no data
1980–1988	3.9	3.3	4.0	(0.8)
1990–2020 (target)	3.0	4.0	4.0	4.0
Population growth rate (per cent per annum)				
1965–1973	2.6	3.4	3.2	2.3
1980–1988	2.9	3.8	3.5	2.7
1990–2020 (target)	3.0	1.9	2.3	2.3
Per capita calorie consumption per day				
1965	1824	2289	1832	1979
1988	1749	2060	2192	1595
2010 (target)	2200	2400	2400	2200
Percentage of population who are food insecure				
1980/81	50	37	35	49
2020 (target)	15	10	10	20
Reforestation rates per annum (per cent)				
1980s	(0.1)	(1.7)	(0.3)	(0.8)
1990–2020 (target)	1.5	1.5	1.5	1.5
Per capita arable land area (ha)				
1965	0.3	0.2	0.3	0.3
1987	0.2	0.1	0.2	0.2
Percentage of total land under crops				
1987	1	4	6	4
2020 (minimum target)	2	4	10	7
Percentage wilderness area to total area				
Present %	24	25	10	9
Minimum target %	22	25	10	9

Note: Numbers in brackets denote negative values.

Limited awareness of conservation issues locally and nationally

Breakdown of traditional forest protection practices

Small areas of forest have traditionally been conserved as sacred places all along the eastern African coast, most notably in southern Kenya (see Spear, 1978; Robertson, 1987 re: the Kaya Forests). Small sacred groves, usually ancestor worship sites, are also found in coastal Tanzania. These areas have been protected by traditional customs, but are now threatened by immigration of people who do not owe allegiance to traditional authorities, and by the increasing influence of Islam and Christianity. Experience from Kenya suggests that if traditions are lost or unduly weakened, then the forests are cleared for farmland and construction.

There has been little research into traditional forms of resource management, including forest and fuelwood resources. Most traditional conservation practices follow from perceptions of scarcity (hunting rules), practicality (no felling along springs) or ethics (no hunting of nursing females). Traditional custom did regulate land use, and governed the use of resources that were perceived to be scarce.

Negative views of the values of forest conservation

Although there may be many scientific and broad societal reasons for conserving the Coastal Forests (see Section 4), these generally have limited relevance for those engaged in subsistence agriculture and forest use. Forest conservation must be presented in more practical terms, stressing existing and potential benefits to local people (Emerton, 1998).

Local communities suffer the direct and indirect costs of forest conservation, such as crop damage by forest animals and lost agricultural opportunities. Households living adjacent to Arabuko-Sokoke forest, for example, are estimated to lose between half and three-quarters of the crops they grow to damage by elephants, baboons, monkeys and bush pigs. For the majority of the local inhabitants, these problems outweigh any of the potential benefits of conserving the forest. Where the forest is located within a Forest Reserve people also feel that the land has been appropriated by the government for its own ends. There is often an antagonism towards the management authorities as being those who are "preventing" access to needed resources, especially if the authorities are also involved in harvesting the resource (particularly if this use is thought to be illicit).

There is, therefore, a gulf between those who want to save or sustainably manage the forests, and those who live close by them and who need to be persuaded of the benefits of conservation. Experience in the Coastal Forests indicates that at best the local inhabitants regard their forest as a valuable resource to be utilised. At worst, they see the forests as a stock of unclaimed farmland, or a wild area harbouring animals that damage crops. In a study of the East Usambara lowland forests (Woodcock, 1997) farmers were found to have divided feelings about Forest Reserves. On the one hand, they felt that it was necessary for the government to protect the reserves; otherwise, all forest would be converted to agricultural land and it would then be difficult to obtain poles or firewood.

Some also commented on water catchment values. On the other hand, people regretted that they would be unable to use the forest as land for future generations. Most farmers could see no solution to these conflicting viewpoints; their biggest problem was where to obtain "fresh" agricultural land for themselves and their children.

Changing patterns and priorities in conservation

The present conservation pattern in eastern Africa stems from past colonial practice, and is embodied in natural resource laws in the wildlife, forestry, and water sectors. These laws stipulate a centralised control of reservation, and proscribe most resource use by local people. Any incentive to conserve was removed by alienating local communities from resource ownership. Even the use of valued trees (*Milicia*) on private land was controlled; a government permit was needed to fell it, transport it, or sell it.

New concepts about conserving forests have not yet taken hold with decision-makers; it is only in the last five years that African forest conservationists have begun to push for more local participation in management, decision-making, and benefit sharing. (It should be noted, however, that only four years ago, Tanzania added several tree species to the reserved trees order, including bamboo.) This push for broader participation has arisen from an increasing realisation that command and control under a central authority does not work. In Tanzania these changes are given official sanction by the new Forest Policy (1998), and the advent of Joint Forest Management devolution and initiatives on the ground. In Kenya progressive policy processes (a Forest Master Plan and Draft Forest Policy) have been stalled for some time.

Now that the emphasis of conservation programmes is shifting towards the involvement of the local people, a new problem has arisen. Most conservation or development organisations and individuals come with their own perceptions of problem-solving. These perceptions are rarely derived from an understanding of the historical, social and financial constraints of the local area and people. Moreover, ideas that are used to design conservation programmes vary between conservation (or development) organisations, and between staff within those organisations. Such a variation in approaches and policies can cause confusion in national forestry departments as well as local villages.

Addressing some of the major problems of Coastal Forest conservation – such as agricultural encroachment, illegal charcoal production and logging, and corruption – can be an extremely sensitive political issue; this is illustrated by the Jozani Forest Project in Zanzibar (see Box 5.5.4). Many conservation/development organisations shy away from tackling these issues for fear of offending national governments or local populations, or finding themselves in opposition to powerful vested interests. In some cases donor country sentiments prohibit certain conservation actions, such as relocating encroachers; in Uganda, for example, the issue of Kibale Forest squatters meant a cessation of EU funding.

Lack of money, poor governance and lack of management input by government

As most Coastal Forests are gazetted Forest Reserves, the capacity of government forestry departments to manage them, and their attitudes and policies, are critical to the prospects for forest conservation.

For most of its history the Forestry Service of Tanzania has not generated sufficient income from issuing felling licences for timber and other mechanisms to cover its own costs (see Chapter 5.2). The only time it generated more income than it spent was during intense and unsustainable timber exploitation (especially during the British colonial period just after World War II). Although its calculations fail to take into consideration the values of the forest products extracted on licence from the forest, or other values such as water supply, climatic stabilization and prevention of erosion, etc., it has been this perception of a deficit which has influenced government funding of forestry activities.

This was discussed extensively within the Tanzania Forest Action Plan process (see Government of Tanzania, 1992; Rodgers, 1993). During that process it was stressed that forestry's contribution to GDP was much greater than just direct earnings of fees and royalties. It was suggested that if fuelwood support to the energy sector, and agricultural and water support were included, then the proportion of GDP would exceed 6 per cent. Recent Food and Agricultural Organization (FAO) statistics have suggested that a realistic figure would actually be around 20 per cent of GDP.

In Tanzania, the Forest and Beekeeping Division, in its role as the guardian of a large share of the country's biodiversity, is the logical recipient of biodiversity conservation funding from external donors. Such support will need to be provided over the long term if it is to succeed fully. Novel ways to provide long-term support at a moderate level are required, and establishing such mechanisms is a challenge to all conservationists. As of mid-1999 the Forest and Beekeeping Division in Tanzania did not have an office with responsibility for Coastal Forests, or a section responsible for conservation.

Low priority attached to forestry in government

Within government, the highest priority (in terms of recurrent and development expenditures) is typically given to departments concerned with education, health and infrastructure works such as roads, electricity and communications. Much lower levels of funding are allocated to forestry departments. With the declining economic fortunes of eastern African countries since the 1970s, the proportion of funds available to forestry has declined even further. By the mid 1980s, when even core forest areas (plantations, major catchment forests) were poorly funded, there was little more than salary money available. This remains true today, despite the retrenchment of significant numbers of staff and the saving of their salary payments. Indeed, recent statistics for the forest sector funding in Tanzania indicate a donor to government ratio of 19 to 1.

The decline in funds for forestry departments

Over the past 20 years national funds available for forestry have declined, and they continue to fall in most countries with Coastal Forests. In Tanzania and Kenya in the 1960s, the typical District Forestry Officer was equipped with a vehicle, a house and equipment to do the job, and was paid at a level where he could maintain a professional standard of living for himself and his family. Forest Assistants had access to some form of transport (a bicycle), equipment, field clothes, a machete, and a uniform and beret as symbols of authority.

Now these officers are without transport and have little equipment. More importantly, salaries in Tanzania do not cover a family's average monthly expenditures, forcing people to find alternative sources of income. Howard (1992) showed that by 1990 the salary purchasing power of a forest guard in Uganda had declined to one per cent of 1960 levels. In many areas, actual payment of the salary may be delayed for months. It is no longer possible for staff to carry out regular patrols in the forests, supervise any harvesting or silviculture operations (if there are any), meet with representatives of local populations to resolve disputes – or in some places even to go to the forests at all.

In Tanzania decentralisation led to an incremental reduction in supervision. Without regular visits from senior forestry officials, there is little incentive for people at the lower levels of the forestry service to carry out their jobs. In some cases there may be pressure on the forest guards living in the community not to convict local offenders, or to take payoffs to turn a blind eye to offences (Rodgers *et al.*, 1983).

One of the reasons for a decline in available funds is the poor rate of revenue collection. Recent analyses (e.g. FRMP, 1997; Cobb, 1998) show that the Tanzanian government has been able to collect less than five per cent of the timber and produce royalties due. Revenue retention schemes could be an incentive for greater collection, but the schism between central and district ownership has prevented them from being implemented.

Poor governance

Governance refers to the pattern of institutional administration, including issues of democracy in decision-making, financial probity (or corruption) and style of leadership. Forestry in eastern Africa has long been subject to misappropriation of funds, poor collection of royalties, etc. Indeed, the Director of Forestry and Beekeeping in Tanzania recently described corruption by officers of his division as the single most important factor leading to illegal harvesting of forest products. He drew attention to the report from Tabora Region (FRMP, 1997) citing royalty collection as averaging between 0.9 and 1.5 per cent of expected payments (Statement at Eastern Arc Conference, December 1997). To a great extent these problems are understandable; wages are extremely poor, there is little field level or management supervision, and valuable natural resources are easily exploited. More systematic exploitation of forest resources by people in authority is also thought to occur (although not so frequently in the Coastal Forests as elsewhere, since these forests do not have much high-value timber remaining).

In addition to the illegal exploitation of timber resources, control over charcoal and pole production and the issuing of rights to farm within reserves are also believed to provide a considerable underground income. All these factors can lead to corrupt practices; once started they become part of a *laissez-faire* attitude towards forest resources.

The forestry sector in all three East African countries is undergoing or will undergo major institutional change. Issues being discussed include decentralisation, a move to self-financing agencies or authorities instead of civil-service departments (as in Tanzania and Uganda, respectively), passing plantations to the private sector, and devolving some responsibility for natural forest conservation to National Park organisations. In theory, the governance system would then alter significantly, with greater local empowerment and accountability. But while this process is underway – with new legislation, new staffing levels and new reporting systems – capacity is weakened rather than strengthened. Forestry capacity is at a low ebb in the eastern Africa region; further declines may have serious consequences for forest and biodiversity conservation.

Limited suitability of some forms of donor assistance

Project time scales

Conservation of the Coastal Forests will be a long-term task, but most donor funding and national projects are generally short-term, typically lasting three to five years. This limits long-term planning by forestry departments and other stakeholders, and can reduce the chances of involvement by local populations. Short-term projects are much less likely to tackle conservation problems effectively, although they can be useful in certain situations, such as providing boundary demarcation to prevent encroachment. Short-term projects can also create a project-dependence culture, however, where nothing happens unless a project provides the finances. Short-term projects may cause confusion in local populations who see a stream of such projects (or worse, studies) in different areas with different approaches.

Project finances

Most donors have a far greater financial capability than the groups with whom they are working. A typical budget for a three-year project is one million US dollars, compared to a typical three-year district forestry operational budget in Tanzania (including salaries) of a few thousand US dollars. There is a 'boom and bust' pattern as projects come and go. Also, projects typically pay higher salaries than governments. Although this can induce essential people to leave government, better project salaries do allow staff to concentrate on the job without having to earn money or farm to survive. Today in the Coastal Forest countries project financing is almost the only basis for forestry departments to work, or to incorporate new ideas into forestry management.

The efficiency of the modern project approach to conservation, when applied to working with communities, has been questioned (e.g. Kiss, 1999). The short-term, result-oriented and often externally driven agendas of projects limit communities' capacity and abilities to address longer-term issues of land reform and land use. Although greater emphasis on tenure, access, and financial inducements (incentives and disincentives) to achieve behaviour change is seen as critical, to date the short-term project approach remains dominant.

Project intervention periods

The length of project support is a critical issue. A three-year project will only allow a conservation process to start, except for dealing with some of the more immediate problems such as marking a forest boundary. This is particularly true in cases where there is a shift from direct control by the Forestry Department to more participation by the communities. INGOs, NGOs or CBOs can mediate such a shift. This could take 10–15 years, with a monitoring role continuing after that. Funding mechanisms need to be developed that allow for this long-term involvement, including ways to share

benefits and revenues derived from the forest. Such longer-term interventions, linked to the presence of forest in an area, should also increase the local communities' perceived value of the forest.

Kiss (1999) stressed that short-term projects are often driven by short-term goals, and often ignore the longer-term goal of changing behaviours to allow conservation principles to be incorporated into land-use planning. In 30–50 years there should be a major change in attitudes to forests and to integrating them into the land ownership pattern as a valued and respected part of the landscape. There is also hope for a decrease in forest destruction and overuse, and even for attempts to enlarge targeted forest areas. Only time will tell if the appropriate changes can be made, and, if they can, whether they work or lead to over-exploitation by the communities and clearance of the forests for farming land.

Conclusions

This Chapter has outlined the main problems facing conservation in the eastern African Coastal Forests. Forests have been fragmented to a point where traditional forest reserves may not provide adequate protection of biodiversity. In other parts of the world an approach is being advocated which more fully involves the local communities in forest management and land use. Government departments – which have traditionally held responsibility for the management of these forests – are changing, and further major changes are likely in the near future. What these changes mean for forest conservation in the area is not yet known, but a paradigm shift in forest conservation planning and implementation in the region may occur. External financing has become an essential part of conserving forest resources and their biodiversity. More of this will be needed, but longer-term planning that allows sufficient time to fully engage the local communities is also required. This cannot be accomplished using three-year projects, but longer-term alternatives and the required financial mechanisms do not yet exist in the region.

The situation on the ground is serious and is exacerbated by an apparent lack of concern about Coastal Forests within forest agencies. All is not lost, however; there is both the need and the capability for successful conservation intervention. Chapter 5.5 suggests ways in which this can be achieved.

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5.5 Taking conservation action¹

W.A. Rodgers and N.D. Burgess

Chapter 5.4 describes the threats facing the Coastal Forests of eastern Africa, including the severity of these threats and the difficulties of seeking sustainable solutions for long-term conservation of small forest patches. There are a number of potential ways forward, which are discussed in this Chapter.

Several types of conservation initiatives are being considered for Coastal Forests by governments, their conservation partners and local communities. This Chapter describes these initiatives, using case studies where appropriate. Priority sites for Coastal Forest conservation are reviewed and recommendations are made for actions to be tested and implemented over the coming years.

There are two critical themes for successful conservation. These are:

- focusing on the most important sites (priority sites) for conservation action; and
- undertaking actions that reduce the primary threats to the long-term survival of these sites.

Focusing on priority sites for conservation

In general the most important Coastal Forest sites are those with high levels of biodiversity (using species richness and degree of endemism as a measurement). The conservation literature has many methods to determine levels of priority using hard quantitative data. Several methods focus on "complementarity" as an approach, where the site with the highest number of species is used as a starting point. Thereafter the site that adds the highest number of new species is chosen, and so on until all species are represented. This allows the determination of the minimum number of sites needed to include all taxa, for example. This can be done for each taxonomic group separately, or all combined. Chapter 4.2 showed that all presently known forest bird species in the Coastal Forests could be represented by having a minimum of six Protected Areas (PAs). However, the lack of comparable data for other taxonomic groups, such as plants, precludes the use of this approach.

In this Chapter we use a simpler approach, focusing on sites with high levels of animal and plant species endemism. The number of endemic taxa thus defines the level of priority. Rondo Forest Reserve (FR), for example, has many more such species than Pande FR. From this general statement, two sets of data can be generated. One list (Table 5.5.1) is based on the size of remaining forest; larger sites give greater chances of population viability (only sites larger than 400 ha were used).

The second list (Table 5.5.2) is based on the immediacy and magnitude of threat. Threats include non-reserved status, unchecked deforestation, and encroachment. Small forest size increases the level of conservation concern in terms of population viability and perturbation impacts. This would include sites of less than 400ha.

¹ The original material for this Chapter was edited and reorganised by the IUCN Forest Programme in Gland, Switzerland.

Table 5.5.1 High-priority sites for long-term conservation

Site	Status	a	b	Notes
Kenya				
Arabuko-Sokoke	NR, FR	> 4	1	EU Project support via BirdLife
Shimba Hills	NP	> 12	0	GTZ Project support
Tana River Forests	NR	> 4	7	GEF Project support
Tanzania				
Lowland East Usambara *, Tanga	FR, O	> 20	3-4	4 x FINNIDA, 3+ not supported
Rondo (not plantation), Lindi	FR	> 50	4	Minor WCST/ IUCN Holland
Pugu, Coast Region	FR	12	2	WCST with SSNC support
Matumbi-Kiwengoma, Coast-Lindi	O	> 3	2	DfID via WWF Tanzania
Kiono-Zaraninge, Coast Region	O	> 2	0	DfID via WWF Tanzania
Litipo, Lindi Region	FR	> 16	1	Minor WCST/IUCN Holland
Pemba Island (including Ngezi)	FR	> 4	5	No support
Zanzibar Island (including Jozani)	FR	> 4	1	CARE-Tanzania
Kimboza, Morogoro Region	FR	17	1	NORAD via Catchment Forestry
Gendagenda, Tanga Region	FR	4	1	No support
Others				
Mozambique, Bazaruto, **		?	3	
Malawi, S Mulanje, Nkhata Bay		?	3	
Zimbabwe, Haroni-Rusitu		?	0	

Key: a: Plant endemics b: Vertebrate endemics

Notes: *These lowland forest areas would include: Kambai, Segoma, Manga and Kwagumi FRs managed by the East Usambara Catchment Forest Project and Mzimbaizi, Magogo and North Bombo FRs which fall outside such project support. There is also some ungazetted closed forest north of the East Usambara Mts.

** Mozambique also includes parts of the Macondes Plateau, although details are not available.

Some of the sites in this table are already within National Parks or National Reserves, and thus have a high level of protection. Exceptions requiring additional strong protection in our opinion are: the remaining area of the Arabuko-Sokoke forest, the remaining forest on the Tana River in Kenya, the open forests around the East Usambaras, Pugu, Kiwengoma, Ngezi on Pemba Island and the Rondo/Litipo forest areas in Tanzania.

Table 5.5.2 Coastal Forest sites in danger

Site	Area and status	Plant endemics	Notes
Kenya			
Mrima Hill	FR, 600ha?	10?	Small, very rich botanically.
Several 'Kayas'	M	10	Uncertain management authority.
Diani, Chale Island	O	?	Coral rag forest, not reserved.
Tanzania			
Pande, Dar es Salaam Region	GR, 1100ha	3	GR status but no input at all.
Kazimzumbwi, Coast Region	FR, 1400ha	12 in Pugu	Still facing severe encroachment.
Kisiju /Dendene	O, 200ha	Gum copal	NOT gazetted, 5 years trying!
Amboni Gorge	O, 200ha	2?	Rapid degradation, African Violet values.

Key: FR = Forest Reserve; GR = Game Reserve; M = Monument; O = open land.

Box 5.5.1 Protecting Coastal Forests

The strongest set of practical guidelines comes from Wild *et al.* (1999) writing about Coastal Forests in Tanzania. Part of their report is summarised here.

Protection of forests from agricultural clearance, settlement, timber and woodcutting and fire is essential. This protection must include a high level of community involvement and even leadership. Communities must gain clear benefits if they are going to be involved, and some level of community use or benefit sharing will be necessary. Efforts should concentrate on establishing what constitutes wise use.

Boundary demarcation is crucial for proper management but conservation boundaries should not be drawn so closely around the forests that subsequent changes in land use leaves them isolated from each other or from adjoining habitats.

Improving the conservation status of the forests is important but it is crucial that this be done in a way that **strengthens local communities' stake** in management. "Village Forest Reserve" is the preferred status for future forest reserves, while community participation in local and central government reserves should be increased and formalised. Additionally, communities must gain clear tenure and rights (as well as responsibilities, i.e. for protection).

While there has been a concerted effort to gain information about the forests through biological inventory, this should be broadened to include other knowledge, especially about the use of the forest and of individual species.

Governance was seen as a major problem in all communities, with complaints about both village government and forest authorities. Lack of information about appropriate forest, wildlife and village government policies and legislation meant villagers felt helpless in assessing the procedures being followed.

Timber revenue was a contentious issue. Community members claimed that, while they were exhorted to conserve the forest, their villages received no benefit from timber licences. Land tenure and forest use issues were also cited as problematic, with government staff telling villagers that the forests belonged to the community but not allowing communities to use them.

Crop damage by forest animals was a problem faced by adjacent farmers; villagers did not see forest clearance as an appropriate solution to this problem.

The Coastal Forests need **greater recognition of their global values** at district, ward and village levels. They also need adequate protection, appropriate use and effective management.

Communities, on the other hand, need improved livelihood opportunities, access to basic services, and clear rights and responsibilities for managing and benefiting from forests in their areas. Forests also play a role in generating income for the districts.

While several of these needs appear to be in conflict, it may be possible to reconcile them, given appropriate approaches and inputs. This will, however, require a concerted long-term effort. A number of factors will influence this:

- some communities are protecting certain forests for cultural reasons. Although these initiatives often receive little official government support, they should be recognized and supported;
- communities do value the forests. Many villagers living close to the forests depend on them for a number of reasons. While the value of these goods and services in comparison to alternative sources is difficult to measure, villagers valued the forests because of them;
- certain individuals living in close proximity to the forests have an intimate knowledge of them, the species within them and their uses and values. This is a critical body of knowledge for future forest management;
- collection of indigenous knowledge and linking it to scientific knowledge will lead to very thorough information upon which to base management;
- decentralizing government services to the district level provides the opportunities to increase accountability;
- conservation and development projects already exist in most districts; and as sustainable forest management is now a goal of sustainable development and biodiversity conservation, it will be possible to mobilise the support of non-conservation organisations, such as development NGOs and religious groups.

Cont.

Box 5.5.1 Protecting Coastal Forests (cont.)

A holistic approach to planning must be taken so as to integrate the Coastal Forests. Village land-use plans are part of national policy; this is preferable to planning only for Coastal Forests.

Promoting community-based management is essential:

- effective Joint Forest Management arrangements between communities and government must be established, with the support of civil institutions (i.e. CBOs, NGOs and INGOs). Effective JFM must be put in place if the Coastal Forests are to survive intact;
- strengthen communities to play their most effective role in managing the Coastal Forests; and
- facilitate government departments (especially forestry at the district and national level) and appropriate NGOs to support communities while strengthening their own forest management activities (the serious shortage of forestry staff and experienced NGOs at the district level is a constraint to this, however).

Income generation (appropriate and sustainable forest and non-forest enterprises) also needs to be developed. To support this it is important to provide interim financial assistance.

- as well as sustainable forest management, the potential for forest product certification for forests and woodlands should be explored.
- forest and non-forest income generation activities will need to be promoted, especially beekeeping and appropriate forest harvesting.
- some kind of financial intervention will be necessary to stimulate appropriate income generating activities and to channel conservation funds to the village level while ensuring accountability.

Integrating conservation and development

There are many viewpoints, often conflicting, on optimal approaches to conserving natural resources in developing countries. Several recent publications deal with the issue (e.g. Sayer, 1991; Hannah, 1992; IIED, 1994; Pimbert and Pretty, 1995; Fisher, 1995; Hackel, 1999; Rodgers *et al.*, in press). The approaches can be grouped into three broad categories:

- the “**social-anthropological**” approach, where indigenous peoples are allowed to continue their practices in harmony with their local environment and are actively involved in the protection of natural resources (and by implication, biodiversity);
- the “**hard-line protectionist**” command and control approach, where people are excluded from a defined area and suffer penalties if they break the rules. This is based on a wilderness concept, where a pristine ecosystem is maintained free of people;
- a more recent “**progressive**” conservationist approach, where the integrity of the protected area (National Park, Forest Reserve, sacred grove or whatever) is maintained through local people’s involvement in management, including self-regulation. Theoretically the people derive enough benefit from the area to support such control.

The hard-line protectionist approach has been difficult to maintain as pressures grow and governments can no longer finance such control. There is much recent literature on the progressive approach for forest conservation. There are few direct examples of successful long-term project interventions, however (see Rodgers, 1993; Fisher, 1995; Caldecott, 1998). Experience in Asia with Joint Forest Management has largely focused on rehabilitating degraded forest land, and involves much extractive use of usufruct resources. There are few examples involving forests with globally significant biodiversity. Most experience in Africa relates to wildlife projects (MacKinnon *et al.*, 1986; McCracken, 1987; Hannah, 1992; Pimbert and Pretty, 1995; Leader-Williams *et al.*, 1996). There are few forestry examples (see Wiley, 1997 and Rodgers, 1998 for beginnings in Tanzania). Hackel (1999) points out the difficulties of using this approach with poverty-stricken people.

The potential link between development benefit and conservation status has led to a series of Integrated Conservation and Development Projects (ICDPs) around the world. Their implementation

over the last ten years has led to a number of "lessons learned" reviews. Hannah (1992) summarised the experiences of early ICDP projects in Africa, and further relevant information is found in Sayer (1991), Fisher (1995) and Caldecott (1998).

The most successful of the progressive people-centred conservation projects are long-term and have a relatively low but sustained financial input. In contrast, high levels of funding and short-term time lines cannot achieve a long-term sustainable situation. Short-term projects can be very effective in solving immediate problems, such as infrastructure development, boundary encroachment and reserve gazettement, and they provide an immense boost to morale in underfunded and largely inactive government departments. Kiss (1999) describes the limitations of short-term, donor-driven project initiatives, which seek solutions that necessitate major changes in the use of the land and resources by a large number of people.

It is essential to have an adequate protection component in forest conservation projects. In all successful projects reviewed in Hannah (1992) this was an important aspect. More recent reviews (Sanjayan *et al.*, 1997; Wiley, 1997) showed that it is a mistake to assume that providing improved development will lead to improved conservation within ICDPs. ICDPs should focus on development only if this is a suitable means to achieve conservation. Even if this is the case, development efforts need to be complemented either through continued government controls (where these can be made effective), or through locally enforced regulatory mechanisms, or a combination of these. A true joint management approach is effective, if it is attainable.

Successful projects were often undertaken by local community groups with financing provided by tourism initiatives. In theory, pit-sawing, collection of building materials and fuel from Coastal Forests can bring shared benefits, but in practice these are harvested illegally at unsustainable rates in most forests. There are few, if any, high-value resources left to provide incentives. There would therefore need to be effective law enforcement before the sharing of the values from these resources could provide a viable conservation system. Preliminary assessment of collaborative forest management initiatives in Lushoto showed that villagers continued to have a great interest in short-term extraction benefits, rather than investing in longer-term conservation responsibility. The scale of benefit is unlikely to be a sufficient incentive to bring about change when resources are freely available.

Integrating local communities into the management process

Integrating local people into the management of forest resources is seen as an essential step in eastern Africa, particularly in the case of small areas such as the Coastal Forests. In many places such integration has only recently begun and appropriate methodologies and control mechanisms are still being formulated. In Tanzania at least, the strong need for this integration follows from the huge reduction in the staffing levels of the Forestry Department. There has been no increase in the salaries or operational capacity of the remaining staff except where projects are providing support.

Restoring local control of forest management

Most conservationists agree that restoring some level of rights to utilise forest products to local communities could empower them – either alone, or jointly with public sector forestry agencies – to manage the resources better than could such agencies by themselves (see Fisher, 1995; Wiley, 1999 for review). Communities with a long-term interest in the forest should be better guardians than more remote government institutions.

There is no long-term project experience of people-orientated conservation in the forests of eastern Africa; no projects using this approach are more than five years old. Nevertheless, such an approach may offer hope for the conservation of some small Coastal Forests with a close link to local people. There are promising examples of projects following the people-based model from elsewhere in Africa (e.g. Hannah, 1992), in India (Gadgil, 1992) and in Nepal (see Fisher, 1995). However, other projects have failed to deliver as much as their potential suggested (Wells, 1994; Pimbert and Pretty, 1995).

Very few projects have assessed their results objectively to determine if the approach is more successful than earlier methods (Fisher, 1995).

One approach is Community Forest Management (CFM) or Joint Forest Management (JFM), which is now embodied in the 1998 National Forest Policy for Tanzania (although the Draft Forest Bill that would implement the policy makes little mention of CFM/JFM, apart from references to "village forests"). In the CFM/JFM approach government and local communities, generally with the support of a third party (a community-based organisation or non-governmental organisation), develop a set of agreements and rules for the management of the forest resource. These rules can be given legal authority. They include information on who can collect what, what is not allowed, who has the authority to prevent certain activities occurring, and how revenues can be shared locally (Wiley, 1997).

Supporting land-use planning initiatives

For some parts of the eastern African coast, land use plans have been developed, either by central or village government authorities. At the village level the boundaries of different land attributes and needs are well known, as are the boundaries of different farmers' land. Village forests may be incorporated into such a system, and there may be privately owned areas of trees. In all parts of eastern Africa, private ownership of land is increasing and will almost certainly continue to grow. Collective ownership and government ownership of large amounts of land is declining markedly. In Tanzania, a new land bill has paved the way for this to happen, and created the possibility of land speculation. Under such a scenario it is strongly desirable to develop land-use plans at the relevant level for forest conservation.

Box 5.5.2 Involving Local Communities

A practical set of recommendations for involving local communities in the management of the Coastal Forests has recently been proposed by Wild *et al.* (1999):

Stage One: Provisional Community Management

- communities local to, and wanting to manage, a particular forest with the District Authorities are registered; this could be initiated by either of the parties.
- village government is issued with a letter authorising provisional management powers and bylaws, including powers to patrol, arrest, collect fees and identify the boundary.
- villages (with support from forest officers and NGO staff) draft a provisional harvesting plan, which is reviewed, amended and then approved by the District Forest Office.

Stage Two: Full Planning and Implementation of Community Management

- district government staff and communities enter into a participatory planning exercise which results in a village land use plan, a village forest plan, species vulnerability assessments and village bylaws, which include forest revenue collection methodology.
- forest and village boundaries are demarcated and full implementation of the plan starts.
- village receives title deeds for the forest.
- joint monitoring of the management process is in place.

This two-stage process will quickly allow communities to become involved in forest management, and should prevent communities from over-harvesting their forests. The detailed planning process will attempt to solve some of the more difficult management issues. This can be tackled as time and resources allow, but will not preclude communities becoming quickly involved in the basic management process.