

SPECIES IN DANGER

# HARD TIMES FOR HARDWOOD

INDIGENOUS TIMBER AND  
THE TIMBER TRADE IN KENYA

NINA T. MARSHALL and MARTIN JENKINS

A TRAFFIC NETWORK REPORT



## TRAFFIC

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checks the validity of a wood-cutter's  
permit.

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**HARD TIMES FOR HARDWOOD:  
INDIGENOUS TIMBER AND THE  
TIMBER TRADE IN KENYA**

Nina T. Marshall and Martin Jenkins

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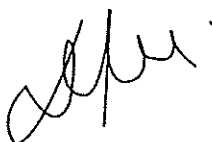
Invaluable assistance was also provided by members of the Kenya Wildlife Service and the Forestry Department, many of whom were willing to participate in this project at a moment's notice. Special thanks are due to Gideon Gathara (Kenya Wildlife Service) and to Mr C.D. Kahuki (Forestry Department), not only for their expert guidance, but also for their dedication to this effort throughout each and every phase.

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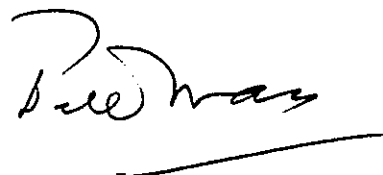
**PREFACE**

Over the past two years, KIFCON<sup>1</sup> has been preparing a national profile of the status of Kenya's indigenous forests. Part of the exercise required the identification of key management issues and their solutions. Repeatedly we came up against the problem that information on the East African regional and Kenyan national timber trade was difficult to obtain; if it existed it was incomplete and imprecise.

We believe that this study goes a long way to fill the gaps. Initial discussions with IUCN's East African regional office led to a decision that KIFCON would commission TRAFFIC to do a study of the Kenyan situation, hopefully to be followed by complementary studies of Uganda, Tanzania and possibly Zaire, which IUCN would endeavour to promote. Terms of reference of the present study were agreed following detailed discussions with the Kenya Forestry Department and Kenya Wildlife Service. We hope the results will be useful to these two organizations and wish them luck in their future work to regulate the timber trade and manage Kenya's remaining natural forests on a sound and sustainable basis.



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**FOREWORD**

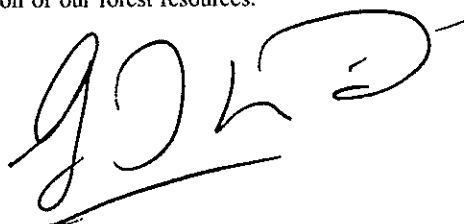
Demand for timber in Kenya is expanding with the growing population and new development activities. At the same time, the vital importance of conserving the natural forests is recognized, so regulated and sustainable forest use must be given high priority to help meet national need for wood, whilst ensuring conservation of biodiversity and ecological functions of forests. The Forestry Department and Kenya Wildlife Service are currently implementing a Memorandum of Understanding for the joint management of selected natural forests. We were closely involved in planning the consultancy on the Kenyan timber trade which led to the production of this report. It was anticipated that it would form part of a larger study of the whole East African region, which would give a clearer perspective of the interrelationships in timber trade between countries in the region. We hope that the second phase of the study will still go ahead.

This publication highlights some of the major problems which we shall have to tackle in our future work, focusing on multiple use for sustainable forest management.

The report benefits from the incorporation of independent finding and views of the TRAFFIC consultants on the formal and informal timber trade. We hope it will assist the Kenyan authorities in highlighting priority issues, including review of policies and regulations, in order to rationalize marketing and external trade for the enhancement of sound utilization and conservation of our forest resources.



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## **EXECUTIVE SUMMARY**

Natural forests provide many benefits to Kenyans, including fuelwood, and non-timber forest products such as food, medicines and household materials, while both natural and plantation forest resources are essential to a large number of timber-based industries in the country. Timber is of critical importance on both subsistence and commercial levels. While plantation softwoods account for approximately 80-90% of the industry's needs, indigenous hardwood timber from Kenya and hardwood imports are preferred in the furniture, flooring, joinery, and carving sectors, and to some extent for construction.

Plantation-grown pine *Pinus*<sup>2</sup> spp. and cypress *Cupressus lusitanica* are the most widely used species in the timber industry. Other species appearing in trade include East African Camphor *Ocotea usambarensis*, of which between 10 000m<sup>3</sup> and 18 000m<sup>3</sup> are used per year; mahogany *Khaya* spp. (in the African context), imported from Zaire and Uganda, of which an estimated 3500 to 4700m<sup>3</sup> are used per year; Mvule *Milicia excelsa*, primarily imported, with annual use around 800 to 1100m<sup>3</sup>; Elgon Teak *Olea welwitschii*, with use estimated at 700 to 950m<sup>3</sup> per year, and Meru Oak *Vitex keniensis*, largely from plantation stock with annual use estimated at between 350 and 450m<sup>3</sup>. Mukui *Newtonia buchananii*, East African Pencil Cedar *Juniperus procera*, Mbambakofi *Azelia quanzenensis*, and a wide variety of other indigenous hardwoods also appear in trade in lesser quantities. The volumes listed above largely pertain to use in the construction, joinery, furniture, flooring and carving industries; these figures should be regarded as minimum volumes of use in Kenya.

The most significant source area for indigenous timber is Mount Kenya, because of its central location. However, the forests of Mount Elgon, Kakamega, Aberdare, Lamu, Arabuko-Sokoke, Leroghi, South-West Mau, Trans-Mara, the Shimba Hills, Nyambene, and Nandi also supply the country with indigenous timber. Timber is imported from neighbouring countries, in particular Zaire, Uganda and Tanzania. Kenya does not export any hardwood timber; exports are chiefly plantation-grown *Pinus* spp. and *Cupressus* spp. Mangrove forests are a significant source of construction poles for the coastal cities of Mombasa, Malindi and Kilifi.

Legally acquired indigenous timber is extracted from private land and selected Forest Reserves where harvest of live trees is permitted on a minor scale, but the vast majority of legal indigenous timber appearing in trade is extracted under licence as dead or fallen timber. Regulation of timber extraction suffers however, from poor law enforcement, and as such the proportion of illegally extracted timber on the market is substantial.

Illegal harvest can occur in numerous ways, such as extraction without a permit, harvesting more than the authorized quantity, ring-barking of live trees, document forgery or duplication, or "legalizing" illicit timber by forging hammer marks. At present the Forestry Department lacks the capacity to enforce existing forestry legislation effectively, and is hampered by insufficient penalties and fines for offenders and inadequate implementation of the Forests Act by prosecutors and others involved, at various stages of the procedures.

An increasing scarcity in hardwood timber supply is indicated. Rising demand for timber necessitates that natural forests be allowed to recover, and that management of both natural forests and plantations be improved, to ensure a sustainable supply and a future for Kenya's timber-based industries. In order to ensure that Kenya's natural forests are conserved in a manner that will allow continued extraction of both timber and non-timber forest products, improvements must be made in law enforcement, forest management (plantations and natural forests), and in the timber industry itself.

Law enforcement efforts should be improved by enhancing the current Memorandum of Understanding between the Forestry Department and Kenya Wildlife Service (KWS), and by providing training in law enforcement. Fines and penalties should be reviewed and increased and offenders should be punished to the full extent of the law. Law enforcement should be intensified, particularly for the transport and consumer phases of the trade. Forest management should be improved through diversification of plantation softwoods, increasing the productivity of existing plantations, and by creating plantations of the desired indigenous hardwoods, in particular *Ocotea usambarensis*, *Vitex keniensis* and *Juniperus procera*. Also, natural forests should be closed to further extraction until stocks recover; during this period the current system of extraction from natural forests should be reviewed and an effective marking system for indigenous timber in trade should be developed.

The timber industry must also make changes, the most important of which should be to explore the use of alternative species. Development and promotion of alternatives such as mango *Mangifera indica*, Australian Blackwood *Acacia melanoxylon*, Grevillea *Grevillea robusta*, and Neem *Azadirachta indica* would be especially useful as all of these species have potential in the furniture, joinery and carving sectors. *A. melanoxylon* is already the top species used in flooring and potential exists to promote this species in other sectors, yet this effort must be coupled with increased planting.

As timber supplies are depleted, it is important for the industry to examine ways to reduce wastage and to improve drying and treatment of timber; much timber is discarded because of unnecessary warping and splitting resulting from improper treatment. New products such as fibreboard and blockboard, and the use of veneers, must also be considered with greater willingness as solid hardwood timber is increasingly unavailable.

It is clear that the agencies controlling Kenyan forest resources must act now to halt unregulated timber extraction, for the sake of forest conservation. The timber industry should work with the Forestry Department and other relevant institutions to diversify its resource base, to secure a future for timber-based industries in Kenya.

# HARD TIMES FOR HARDWOOD: INDIGENOUS TIMBER AND THE TIMBER TRADE IN KENYA

Location of towns and cities mentioned in the report



## **INTRODUCTION**

Closed-canopy forests in Kenya cover less than three per cent of the country and are under extreme pressure for both subsistence and commercial use. Kenyans rely on forests for a variety of forest products, including medicinal and household materials, fuelwood and fodder. Timber is one of the most important products derived from forests in Kenya, however, current demand for indigenous timber far exceeds legal, available supply. In order to manage existing resources effectively and to attempt to ensure that Kenya's timber-based industries have a steady timber supply in the future, the dynamics of the timber trade must be understood. KIFCON (the Kenya Indigenous Forest Conservation Programme), the Forestry Department, the Kenya Wildlife Service (KWS)'s Forest Conservation Programme, and IUCN — The World Conservation Union, recognized this need and jointly planned a project to address this issue. The result, *Hard Times for Hardwood: Indigenous Timber and the Timber Trade in Kenya*, presents information on supply, demand, trade patterns and current use of timber in Kenya, and provides recommendations designed to improve forest management, with the ultimate goal of ensuring the sustainability of both forests and timber-based industries in Kenya.

## **METHODOLOGY**

This survey of the timber trade in Kenya was carried out between 15 December 1993 and 15 February 1994 and entailed a total of 60 man days of labour. Information was obtained through interviews with timber users and individuals knowledgeable about timber trade and utilization, and through visits to source areas.

### **Interviews**

An open approach was employed in interviews with timber users in the formal commercial sector. Information was requested on the species and volumes used, prices, and origins of the timber. Data were also gathered on imports and exports. Opinions were sought on the characteristics and uses of different timbers, as well as on future prospects for the industry sectors relevant to the interviewee. Additionally, users were asked to gauge the size of their business, relative to others in the industry, in terms of volumes used and quality of product. This last question was particularly important as it allowed the interviewers to determine overall figures for timber use in Kenya.

In cases where an open approach was thought unlikely to yield pertinent data, the interviewers posed as prospective buyers of timber or timber products, or as individuals interested in the trade in question. The main limitation in this method was that although data on species availability and price was easily obtained, it was much more difficult to obtain estimates of volume.

Interviews were conducted in both Nairobi and source areas with officials from the Forestry Department and the KWS. Other agencies consulted include the Kenya Bureau of Standards, the National Museums of Kenya, KIFCON, the Kenya Forestry Master Plan, and the Customs and Excise Department.

Information on licensing was obtained from the Forestry Department, and on timber imports, exports and re-exports from the statistics branch of the Customs and Excise Department in Nairobi. In addition, Customs officers were interviewed, and records examined, at border crossings or ports in Malaba, Busia, Kisumu, Mombasa and Lungalunga. Where possible, information was also collected on the identities of importers and exporters.

### Visits to source areas

Visits were made to the key consumer and source areas in Kenya to interview officials and timber users. These areas include the coast (the south coast, Mombasa, Malindi and Lamu), western Kenya (Eldoret, Iten, Mount Elgon, Kitale, Bungoma, Kakamega, and Kisumu), and central Kenya (Nairobi, Nyeri, Naro Moru, Nyahururu, Rumuruti, Maralal, Meru and Nyambene). Information on areas not visited was collected during discussions with knowledgeable individuals and through a review of available literature.

Information on consumer areas in North Eastern Province (Mandera and Moyale) was not obtained during this study.

### SPECIES IN TRADE

Over 50 species are used commercially in the timber industry in Kenya. Of the African taxa, seven are used in significant quantities: East African Pencil Cedar *Juniperus procera*, mahogany *Khaya* spp., Mvule *Milicia excelsa*, Mukui *Newtonia buchananii*, East African Camphor *Ocotea usambarensis*, Elgon Teak *Olea welwitschii*, and Meru Oak *Vitex keniensis*. Of these, *O. usambarensis* is by far the most important, accounting for well over half of all usage. *Khaya* species (imported from Zaire and Uganda) are second in importance and together these two taxa almost certainly account for well over 80% of the African timber used in the established commercial sector.

A wider range of other indigenous African taxa are either used in small quantities or were indicated as having been used in the recent past. These include Mbambakofi *Azelia quanzensis*; *Albizia* spp.; Mrihi *Brachystegia spiciformis*; East African Satinwood *Fagara macrophylla* (syn. *Zanthoxylum gillettii*); Rosewood *Hagenia abyssinica*; Mngambo *Manilkara sansibarensis*; African Olive *Olea africana*; Podos *Podocarpus gracilior* and *Podocarpus milanjianus*; Muiri *Prunus africana*; and imported Mninga *Pterocarpus angolensis*. For most of these species, use is primarily for the informal commercial *jua kali* sector, or for the formal sector in areas close to the timber source. Additional species important in the informal sector include: Mukamari *Cordia abyssinica*, *Hymenaea verrucosa*, *Pleurostyliya africana*, Mfunda *Cynometra suaheliensis*, and *Combretum schumannii*.

It is worth noting that a number of species preferred for use in the carving industry do not generally appear as sawn timber. The most important of these are Muhuhu *Brachylaena huillensis* and African Blackwood *Dalbergia melanoxylon*, although others such as *Olea africana* and Mutunga *Cynometra webberi* are also used in this industry.

Non-African species, grown in plantations, play an important role in the timber industry in Kenya. Cypress *Cupressus* spp. (essentially *C. lusitanica*) and pine *Pinus* spp. (mostly *P. patula*) are used in enormous quantities in the construction, furniture and joinery industries. Others such as Australian Blackwood *Acacia melanoxylon* are valued for flooring, and eucalyptus *Eucalyptus* spp. are used for construction, furniture, flooring and as posts and poles.

Several exotic species are becoming important alternatives in the carving industry and include: Grevillea *Grevillea robusta*, mango *Mangifera indica* and *Acacia melanoxylon*.

As the supply of indigenous species becomes more irregular, the importance of exotics throughout the timber industry will increase.

The species mentioned above, as well as others for which a use in the timber industry has been recorded, are listed in Appendix 2 of this report, with notes on common names, distribution, uses, references and other comments.

**KENYA'S FORESTS AS A SOURCE OF TIMBER**

As noted, Kenya has both natural and plantation forest resources, which provide the raw material for the country's furniture, joinery, construction and carving industries. Given Kenya's rapid population growth, paralleled by an ever-increasing need for timber resources, forestry authorities in Kenya must manage forests successfully and plan for the future, in order to avert crises in supply.

This section outlines existing timber resources in indigenous forests, mangroves and plantations, and the demands for their use.





### Natural forests

At present the exploitation of live trees from official forest lands (i.e. those covered by the provisions of the Forests Act) is prohibited in Kenya, with the exception of certain forests. Licensed extraction has, however, been authorized for dead and fallen trees in numerous forests. It is under this authorization that some indigenous hardwoods enter the market, although much extraction is likely to be illegal (see *Illegal Trade Problems*).

Indigenous hardwoods also enter the market legally when extracted from private land. *Juniperus procera*, for example, is harvested from private farms west of Maralal, and *Dalbergia melanoxylon* is said to come from farms in Kwale District.

Separating the legally and illegally harvested timber is difficult, but it is certain that the amount of hardwood found on the market grossly exceeds authorized harvest. The main timber-producing forests are examined individually below, and destinations for the timber (legally and illegally harvested) identified.

#### ● Aberdares

The northeastern portion of the Aberdares (Ndaragwa Forest) is a source of timber for Nairobi, Kisumu and Mombasa. The main species extracted is *Juniperus procera*, which is harvested for use as posts and for charcoal. This forest has been the focus of a recent investigation by the Forestry Department and the KWS into illegal extraction of *J. procera* for posts. Extraction is limited in the western part of the Aberdares, owing to the existence of numerous ranger posts, and in the south because plantations are present and close to Nairobi, but this investigation revealed extensive destruction of the forest as well as illicit cultivation in areas such as steep slopes.

#### ● Arabuko-Sokoke Forest Reserve

This forest reserve covers approximately 41 000 ha, is the largest single area of true forest in Coast Province, and is unique in Kenya as a terrestrial forest abutting mangrove forest (at Mida Creek). It has long served as a source of timber for the region, especially Kilifi District, in which the forest is situated. In the early part of this century numerous sawmillers were active in the forest, but by the 1950s much of the saleable timber had been extracted and most of the sawmills closed down.

At present, one sawmiller is licensed to cut *Brachystegia spiciformis* for timber, and licences are issued for the collection of dead *Brachylaena huillensis*, for firewood and carving, and for other species for poles and head-loads of fuel wood. In recent years whole trunks of *Manilkara sansibarensis* have also been extracted under licence, to allow completion of a traditional dhow at Watamu (Robertson and Luke, 1993). This timber is also extracted for large building poles used in hotels, although it is unclear if this is licensed or not. Much extraction of *B. huillensis* appears to be of newly dead and possibly ring-barked trees or of illegally cut live trees. A substantial amount of pole-cutting is also believed to be unlicensed.

In addition, there is extraction of illegally pit-sawn *Azelia quanzensis*, *Hymenaea verrucosa* and *Pleurostyliia africana* (not usually known as a timber species). Both legal and illegal extraction of timber is often damaging to the forest structure, and inefficiently carried out (Robertson and Luke, 1993).

#### ● Kakamega Forest

This forest lies within the Kakamega Forest Reserve (17 800 ha) and the Buyangu National Reserve (3900 ha), which have a combined area of forest cover of 15 400 ha. The remainder of the reserves consists of plantations or open glades. There is extensive extraction of *Olea welwitschii*, primarily for sawn timber for the local market, and some extraction of other hardwood, for example, *Prunus africana*. *Combretum*

*schumannii* is heavily exploited for charcoal production (Omollo, 1991b). Kakamega forest has diminished as a result of overcutting and its future survival is threatened.

- Lamu

The forests in Lamu District are an important source of mangroves, and also supply several terrestrial hardwood species. *Azelia quanzensis* is used almost exclusively by Lamu carvers who make doors, furniture and smaller carved items like picture frames and signs. These products are bought by Lamu residents and tourists, who often export their purchases, Europe being a prime destination for Lamu carvings. *Brachylaena huillensis* is also harvested in Lamu District, but this hardwood is transported to Mombasa for use in the carving industry; it is not used in Lamu.

- Leroghi

Just north of Maralal, this forest is noteworthy for its stands of *Juniperus procera* and *Podocarpus* spp. No licensed extraction was authorized in 1993 for these species, yet it is likely that some *J. procera* is harvested for local use. Additionally, there are some group ranches west of Maralal which harvest *J. procera* for posts. The majority of these posts are used in the region although some are illegally transported south to Nairobi.

- Mount Elgon

Mount Elgon is a source for two valued species, *Ocotea usambarensis* and *Olea welwitschii*. *O. welwitschii* is harvested for veneers and flooring and is destined principally for Nairobi. Local use of these species is quite extensive as well, with the main markets located in Kitale, south to Kisumu. *Hagenia abyssinica* is also exploited commercially in this forest.

- Mount Kenya

Mount Kenya is without question the largest source of indigenous timber in the country. From its central location, timber from Mount Kenya is transported to numerous urban centres, for example, Nakuru, Nanyuki, Meru, Embu, Moyale, Mandera, Mombasa, and Malindi, although the largest market is Nairobi. The main species harvested from Mount Kenya is *Ocotea usambarensis*, although numerous others are extracted as well, including *Vitex keniensis*. However, as stocks of *V. keniensis* are now reportedly largely depleted, the majority of the *V. keniensis* on the market is from plantations.

- Nandi

*Olea welwitschii* is harvested from the Nandi Forest, mainly for dispatch to Nairobi for use in veneers and flooring. *Hagenia abyssinica* is also taken from Nandi Forest.

- Nyambene

*Ocotea usambarensis* is extracted illegally from the Nyambene Forest, primarily for markets in Nairobi.

- Shimba Hills

This forest area encompasses the Shimba Hills National Reserve (19 243 ha), the adjacent Mkongani North (1113 ha) and Mkongani West (1366 ha) Forest Reserves, and the Maluganji Forest Reserve (1715 ha), which lies slightly to the north. These forests are the most floristically diverse area in Coast Province, and among the most diverse in Kenya. In the past they were heavily logged, particularly for *Milicia excelsa* and *Cynometra suaheliensis*. There are reports that some *M. excelsa* is still being extracted. In late 1990, logs of *Combretum schumannii* felled some years ago were being removed (Robertson and Luke, 1993). There is reportedly a fairly extensive collection of *Brachylaena huillensis* in these forests for the carving industry in Mombasa, and of *Brachystegia spiciformis* for sawn timber, although the identity of the latter has been questioned (Thomson and Ochieng, 1993).

- South-West Mau and Trans-Mara Forests

The entire Mau forest complex represents the largest area of Afro-montane forest in East Africa. These forests have been heavily exploited, in the past for both local use and for plywood production, largely for manufacturing tea chests. Local exploitation was seriously disrupted by tribal clashes in 1992 (Thomson, 1993). Principal species exploited now are *Fagara macrophylla* and *Podocarpus* spp., for the local timber trade, and *Olea* spp. for charcoal production. There is also some exploitation of *Juniperus procera*, principally for posts (Thomson, 1993).

- Other forests

Other noteworthy natural forests include those of the Ndotos and the Mathews ranges, both of which are exploited primarily for local use. Commercial extraction of these forests has been precluded by the long distances over poor roads which would be necessary for transportation.

Marsabit forest is exploited for local consumption, although some sources state that timber used locally may in fact come from either Mount Kenya or from the Ethiopian escarpment. The northern urban centres of Moyale and Mandera may also obtain timber from Mount Kenya or the Ethiopian escarpment.

The Loita and Nguruman forests, managed by their local communities, are important for cultural and household uses, and have been relatively well conserved.

### **Mangroves**

Mangrove forests in Kenya have a long history of exploitation, both for local and international use. As early as the ninth century, mangrove poles were exported to the Persian Gulf area for house construction (Ferguson, 1993).

Kenyan Government records for the period 1905 to 1910 indicate an average export of 483 000 mangrove poles per year. This figure is similar to annual average exports for the period 1973 to 1978, (497 000 poles) (Ferguson, 1993). After 1978, however, exports were banned, owing to depletion of export-grade poles (Kigomo, 1991). This ban was lifted in 1981, but then reinstated in 1982 (Kigomo, 1991).

The present mangrove resource is estimated at 50 000 ha (Ferguson, 1993), while in 1981 it was estimated to be 54 000 ha (Doute *et al.*, 1981). Estimates of areas of mangrove forests, by district, have been made by Doute *et al.*, and are listed below in Table 1.

**Table 1**  
**Estimates of mangrove forests in Kenya**

District	Area (ha)
Kwale District	8795
Mombasa District	3420
Kilifi District	6060
Tana River District	2665
Lamu District	33 500
<b>Total</b>	<b>54 440</b>

Source: Doute *et al.*

Mangrove forests in all districts are exploited for both poles and for fuelwood. Exploitation of the mangrove resource is permitted under licence, specifically for the cutting of poles and fuelwood; passes are also issued for the harvesting of small quantities for domestic use (FAO, 1991). Poles are used in building, especially of traditional houses and tourist hotels. Large amounts of commercial fuelwood are harvested on the South Coast. Lamu District contains the largest tract of forest, and in a few inaccessible areas there are still reasonable resources remaining, though in most areas of the Kenyan coast, the desired mangrove pole sizes of good quality are severely depleted.

The average pole harvest in Lamu from 1987 to 1991, as recorded by the District Forest Office in Lamu District, was 22 086 (Ferguson, 1993). It is estimated that 80% of the mangrove products used in Kenya originate in this District (Kigomo, 1991). Internal markets for mangrove poles exist in the central and south coastal regions, as the mangrove forests in these areas are smaller and depleted, and supply from these forests no longer meets the local demand. There is no evidence of export, Tanzania being the major exporter of mangrove poles in the region (FAO, 1991).

The situation in Kwale, Mombasa and Kilifi Districts is quite different from that in Lamu. Larger populations and the preponderance of tourist facilities has led to an intense demand for mangrove poles. Illicit removal of both poles and fuelwood is substantial south of Malindi, as well as in Mombasa, Kilifi and part of the Kwale mangrove forests (FAO, 1991). Shortages in local availability have resulted in some builders turning to exotic substitutes, such as Whistling Pine *Casuarina equisetifolia* and *Eucalyptus* spp. (Omollo, 1991a). Interest in the establishment of plantations is increasing, as poles are needed not only for initial construction, but also for periodic maintenance (Omollo, 1991a).

Most sources indicate an urgent need for management of the Kenyan mangrove resource. Much of the commercial exploitation is being carried out on an unsustainable basis, and is often illegal. Yet with the lack of alternative sources of fuelwood and building materials, the mangrove forests will continue to be subject to pressure.

### Plantations

Table 2 presents the major species currently growing in plantations, by area.

**Table 2**

#### Species in plantations in Kenya

Species	Area (ha)
<i>Cupressus</i> spp.	74 500
<i>Pinus</i> spp.	53 900
<i>Eucalyptus</i> spp.	15 800
other species <sup>1</sup>	13 350
<b>Total</b>	<b>157 550</b>

<sup>1</sup> Predominantly indigenous hardwoods, although exotic hardwoods and some indigenous softwoods are also included.

Source: KIFCON, 1994.

### **Softwood plantations**

Softwood plantations in Kenya provide for approximately 80-90% of Kenya's industrial timber needs, and as such help to relieve pressure on indigenous forests. *Cupressus lusitanica*, currently under threat from Cypress Aphids *Dothistroma pinii*, is the main species of cypress planted. *Cupressus macrocarpa* ceased to be planted in 1952 because of its excessive susceptibility to canker.

*Pinus patula* has become the predominant species planted in recent years. Planting of *P. radiata* has been abandoned because of its susceptibility to *Dothistroma pinii*, although remaining plantings are showing signs of recovery and planting may be possible with disease resistant strains. Diversification with *P. oocarpa* and *P. kesiya*, for example, has been suggested. *P. radiata* is relatively hard for a softwood and has many uses, as well as being very fast growing.

The softwood plantations continue to provide for the great majority of Kenya's industrial timber needs. However, grave concern has been voiced amongst users about future prospects, as they have perceived a very marked deterioration in plantation management and particularly in levels of replacement planting over the past six or seven years.

### **Hardwood plantations**

Small-scale planting of hardwoods other than *Eucalyptus* spp., including planting some indigenous species, began over 80 years ago and has continued since. Much of it has been reportedly for conservation rather than production purposes or on an experimental basis only, however. The only indigenous species planted over substantial areas are *Juniperus procera* and *Vitex keniensis*. As noted previously, most commercially available supplies of the latter appear to originate in plantations.

# HARD TIMES FOR HARDWOOD: INDIGENOUS TIMBER AND THE TIMBER TRADE IN KENYA

Data on species and areas planted are set out in Table 3.

**Table 3**

**Plantation area (ha) of hardwoods for stands of differing ages**

Species	Age of stand (years)					Total
	<20	20-39	40-59	60-79	>80	
<i>Acacia fraxinoides</i>			9			9
<i>Acacia mearnsii</i>	273	43	14		4	334
<i>Acacia melanoxylon</i>	240	30	89	12		371
<i>Azalia quanzensis</i>	75					75
<i>Arundinaria alpina</i>		1				1
<i>Azadirachta indica</i>		4				4
<i>Rhodognaphalon</i> spp.		5				5
<i>Brachylaena huillensis</i>	11	9	40	9		69
<i>Casuarina equisetifolia</i>	402	16				418
<i>Cordia abyssinica</i>	1	14	232	16		263
<i>Croton megalocarpus</i>	26	79	30	2	1	138
<i>Cryptomeria japonica</i>	2					2
<i>Mukeo Dombeya goetzenii</i>	8		37	5		50
<i>Fagara macrophylla</i>			1			1
Green Ash <i>Fraxinus pennsylvanica</i>		8	2		10	
<i>Gmelina arborea</i>	21	11				33
<i>Hagenia abyssinica</i>	51		23			74
<i>Juniperus procera</i>	169	112	2234	2398	23	4936
<i>Musizi Maesopsis eminii</i>	31	176	7			214
<i>Markhamia platycalyx</i>	42	42				84
<i>Milicia excelsa</i>		22				22
<i>Olea africana</i>	162	70	226	42		500
<i>Olea welhvitschii</i>					14	14
<i>Podocarpus gracilior</i>	10	5	24	36	1	76
<i>Podocarpus milanjanus</i>	24		17	17		58
<i>Polyscias kikuyensis</i>			6	14		20
<i>Prunus africana</i>	67	22	41	23		153
<i>Pterocarpus angolensis</i>		2				2
<i>Spathodea nilotica</i>	6		10			16
<i>Tristania conferta</i>		8				8
<i>Vitex keniensis</i>	862	806	25		20	1713
<i>Widdringtonia whytei</i>		57	5			62
Mixed species	1704	252	757	18	15	2746
Stands of unknown age						869
<b>Total</b>						<b>13 349</b>

Source: KIFCON, 1993.

## ANALYSIS OF COMMERCIAL USE OF TIMBER WITHIN KENYA

Of the variety of industries in Kenya for which timber is an essential resource, furniture-making, joinery and construction are thought to be the largest consumers of timber in Kenya, and will be considered below, together with the flooring, post-making and carving industries. Other industries in the country which utilize timber are bridge construction, boat building, paper manufacture, and the fuel industry.

### Construction and joinery

The construction and joinery industries are discussed together in this section, largely because the two are often linked. Joinery entails the manufacture of doors and door frames, window frames, shelves, fitted cupboards, kitchen units, and various sorts of mouldings and panels. Most construction firms carry out joinery work, although many joinery works undertake specific contracts which do not involve building construction.

Although the majority of building construction material consists of *Cupressus* spp. and *Pinus* spp., hardwood is also used. Likewise, the joinery industry also uses both softwood and hardwood, and demand for hardwood is strong. Demand for high-quality hardwood is generally not so marked as for furniture, but, as in the furniture industry, there appear to be two distinct groups of users requiring indigenous hardwoods: the upper end of the formal commercial market, and the *jua kali* market in areas with good access to indigenous forests.

Within the formal commercial market, the African indigenous hardwoods employed in joinery are primarily *Ocotea usambarensis* and *Khaya* spp. Some *Milicia excelsa*, *Newtonia buchananii* and *Juniperus procera* are also used. Until the 1970s, the last named was the preferred timber for joinery, but supplies became depleted and now harvest and transport of the species is regulated. Small amounts of *Pterocarpus angolensis* and *Azelia quanzensis* reportedly are or have been used for specialized work, for example, the making of kitchen units. The latter, along with *Brachylaena huillensis*, was the major timber used for elaborate carved "Lamu" joinery on the coast.

In the urban centres of Nairobi and Mombasa, the alternative to these hardwoods is *Cupressus* spp., with apparently little use of African or introduced hardwoods. Outside these areas the picture is somewhat different again — in western Kenya, there is widespread and apparently increasing use of eucalyptus *Eucalyptus saligna* and some use of *Acacia melanoxylon*. Both these timbers are reportedly difficult to use for joinery, tending to warp and split, but their low price is attractive, as it is said that most consumers in western Kenya cannot afford openly available indigenous hardwoods (*Newtonia* spp., *Ocotea usambarensis* and *Khaya* spp.) for this purpose. On the other hand, there is evidently widespread covert use of other hardwoods, particularly within the informal sector and in rural and smaller urban centres. Thomson (1993) found *Fagara macrophylla*, probably originating from the South-West Mau forest, widely available in the region and in particular in Kericho and Kisumu. Notable quantities of *Podocarpus* spp. are also believed to be used for joinery.

In yet other locations, other local timbers are used, such as *Juniperus procera* around the Trans-Mara forest and in Maralal, and *Brachystegia spiciformis*, some *Azelia quanzensis* and *Albizia* spp., along the coast. The reported extensive use of *A. quanzensis* in Nakuru (Thomson, 1993) seems very unlikely and is likely to be based on mis-identification.

At a very rough estimate, joinery and associated activities in construction probably account for 60% of hardwood use in Kenya.

### Furniture

After joinery and construction, the furniture industry is the next largest consumer of hardwoods in Kenya. The two distinct consumer groups demanding hardwood are, as for joinery, the upper end of the formal, commercial sector, and the informal *jua kali* sector in areas with access to hardwood stocks.

A wide range of hardwoods is or has been used in the furniture industry. However, the industry is acknowledged to be conservative, from both the perspective of manufacturers and customers. Manufacturers are generally reluctant to experiment with new or unusual timbers, and consumers demand furniture made from timber with a recognizable name. At present, within the formal sector, the preferred familiar species are *Ocotea usambarensis*, *Khaya* spp., *Milicia excelsa*, and *Vitex keniensis*. More rarely customers may request *Olea welwitschii*, *Azelia quanzensis* or *Brachylaena huillensis* and a limited number of manufacturers offer furniture in yet other timbers, such as *Pterocarpus angolensis*, *Juniperus procera* or *Olea africana*.

*Khaya* spp. is without question the most widely requested furniture wood, although not always will purchasers obtain genuine *Khaya* spp.: manufacturers sometimes stain alternative timbers to resemble *Khaya* spp. Some of the timbers that are amenable to this practice include *Azelia quanzensis*, *Ocotea usambarensis*, *Newtonia buchananii*, and *Pterocarpus angolensis*. Many customers are unable to identify *Khaya* spp. and unwittingly purchase furniture for an unjustly inflated price.

Despite the popularity of *Khaya* spp. furniture, *Ocotea usambarensis* is the most extensively used hardwood timber for furniture in Kenya, as *Khaya* spp. is too expensive for many. Of other timbers, *Milicia excelsa* has a specialist, high-quality market, while *Vitex keniensis*, although still fairly widely used, is apparently less popular than it was in the early 1980s. This may be associated with a change in fashion (*V. keniensis* is a light coloured timber and has a characteristic "Scandinavian" appearance which is decreasing in popularity), but also because good quality *V. keniensis* is increasingly difficult to obtain.

Use of hardwoods in the formal sector, in general, is undergoing change attributable to increasing prices and scarcity of available supplies. Solid furniture is now being replaced by many manufacturers with veneers covering blockboard or softwood. Numerous manufacturers are also using *Cupressus* spp. or, more rarely, *Pinus* spp. for areas concealed by upholstery. Tables are usually veneered, a solid table commanding at least twice the price of one produced using veneer.

In the *jua kali* informal sector, use of other hardwood species is undoubtedly widespread, particularly close to source areas. Thomson (1993) noted that *Fagara macrophylla* was very popular in the west, with *Hagenia abyssinica* also sought after in the Molo, Elburgon, and Nyeri areas. *Olea welwitschii*, *Juniperus procera* and *Podocarpus gracilior* and *P. milanjanus* are also fairly widely used, the first of these especially around Kakamega and the last two particularly in Narok. *Prunus africana* is used in Nyeri District. On the coast, some *Azelia quanzensis*, *Brachystegia spiciformis* and *Albizia* spp. are used (Thomson and Ochieng, 1993). In general, however, users in this sector noted that these timbers were becoming hard to obtain and expensive. In consequence, *jua kali* furniture makers are increasingly using *Eucalyptus* spp., *Cupressus* spp. and *Pinus* spp.

### Flooring

Parquet flooring is popular in Kenya, although only five companies in the country are said to produce it. Several timbers have the appropriate qualities for flooring, which are durability and hardness. In the past, *Juniperus procera* was the preferred species; it is exceptionally durable, has a fine grain, and a pinkish



colour, which is particularly appealing. However, as this species is no longer available, manufacturers have turned to other indigenous species, including *Ocotea usambarensis*, *Olea welwitschii*, *O. africana*, *Newtonia buchananii*, to imported *Khaya* spp. and *Milicia excelsa*, and to the non-natives *Acacia melanoxylon*, *Eucalyptus saligna* and *Cupressus lusitanica*.

*Acacia melanoxylon* is the main species used, followed by *Olea welwitschii*. Both of these species are extremely hard and are attractively patterned with dark and light streaks. Supplies of both species are decreasing, however. Harvest of *O. welwitschii* is restricted, and the supply of *A. melanoxylon* is dwindling at a rapid rate. Manufacturers estimate that reliable supplies of *A. melanoxylon* will be available for only three to four more years, and some stated that their output is already limited by supply.

As a result, alternatives are being sought, one of which is *Eucalyptus saligna*. Flooring made from this wood has been produced in quantity but has acquired a poor reputation, being reportedly prone to insect infestation and to lifting and curling after one or two years. It is not clear whether these problems are insurmountable or are a result of poor treatment and preparation. One company which previously supplied such flooring has now stopped, while two others are still producing (in one case 5000-6000 sq. ft a month) and believe the product's image can be improved. *Cupressus* spp. parquet is also produced in quantity, but its popularity is not growing as the wood is considered too soft and unable to withstand stiletto heels. Of the other species mentioned above, quantities of flooring produced are minimal and are likely only to be produced on special request.

Parquet flooring is made with small pieces of timber and can often be manufactured from off-cuts and wastage from other products. One major producer stated that all their flooring was a by-product of veneer production. In the case of *Acacia melanoxylon*, however, flooring is the major product for which the timber is used.

### **Veneer**

As indicated, veneers are becoming more widely used in furniture manufacture, and this is true also for panelling in the construction industry. This is largely because of the increasing cost and difficulty experienced in obtaining good quality hardwoods.

Only one company in Kenya manufactures veneers. At present it produces veneers from *Cupressus* spp., *Acacia melanoxylon*, *Olea welwitschii*, *Khaya* spp., and also reportedly from *Ocotea usambarensis* and *Vitex keniensis*. This firm uses approximately 1000m<sup>3</sup> of hardwood for veneer production annually, with about a 30% recovery rate (i.e. approximately 30% of the wood is actually used for veneer), the remaining wood being used in the production of parquet flooring.

Substantial quantities of veneer are also imported, chiefly from Southeast Asia (Hong Kong, Malaysia, Singapore, Taiwan) and, in the case of one informant, South Africa. While exact figures are impossible to obtain, it is likely that tens of thousands of sheets (measuring eight feet by four feet) are imported annually. Imported veneers are of comparable price to Kenyan-produced veneers, but are viewed as higher quality.

As Kenyan firms become more aware of the diversity of veneer products and their uses, products using veneered plywood, blockboard and softwoods are appearing increasingly on the market.

### **Posts and poles**

The manufacture of posts and poles in Kenya was not examined in detail during this study, but their widespread use for building, scaffolding, fencing, and power line supports was noted.

Throughout Kenya, *Juniperus procera* has traditionally been the favoured species for fencing posts, as it is extremely resistant to fungus, insect attack, and underground rotting. Use has been intensive during the last few decades, and consequently controls were imposed in the 1980s to restrict harvest and transport. As a result, *J. procera* is difficult to get and often impossible to obtain legally. Industrial consumers and local users situated in areas removed from standing stock have increasingly turned to *Eucalyptus* spp. as an acceptable and widely available substitute. When treated by impregnation, *Eucalyptus* spp. posts are considered reasonably durable, although they are not as long-lasting as *J. procera*. Other species have localized use for fencing and probably also for poles. For example, in Lamu District, Tamarind *Tamarindus indica* is widely used for fencing.

The two largest industrial consumers of transmission poles in the country are *Kenya Power and Lighting* and *Kenya Posts and Telecommunications*. Their combined estimated demand for large poles in 1989 was approximately 170 000 poles per year (FAO/World Bank, 1989). Posts are harvested from *Eucalyptus* spp. plantations according to an eight- to nine-year rotation cycle, while the length of cycle for industrial poles is somewhat longer.

In coastal areas, most poles sold in timber yards appear to be *Agave sisalana* or the mangrove species *Rhizophora mucronata*, although, exceptionally, *Manilkara sansibarensis* is harvested for large poles valued in hotel construction. However, the total range of species cut for local use, both on the coast and elsewhere, is wide and includes *Combretum schumannii*, *Cynometra webberi*, and *Terminalia spinosa*. On Mount Kenya both *Ocotea usambarensis* and Murendetie *Xymalos monospora* are used for posts and poles.

It should be mentioned that extensive harvest of *Juniperus procera* for posts still takes place around the Trans-Mara Forest, in the eastern portion of the South-West Mau Forest, and in parts of Narok District (Thomson, 1993). In this area, much cutting appears to be from private land. In Nyeri District and in the Aberdare, Uaso Narok and Leroghi Forests, harvest of the cedar is also intense, again much of it on private land. Illegal harvest in the Aberdare Forest, however, has resulted in a recent joint investigation by KWS and the Forestry Department to halt the illicit taking of *J. procera* for posts destined for markets in Nairobi and Muranga. The operation included large-scale confiscation and searches for caches in the forest and by late January 1994, approximately 10 000 posts had been confiscated. Owing to this enforcement activity, illegal harvesting in the Aberdares and in the Uaso Narok Forest near Nyahururu has been reduced.

Harvest of *Juniperus procera* is also often for charcoal production, much of it for sale in Nairobi. Numerous sources noted that in the northerly forests near Nyahururu, Rumuruti and Maralal, harvest of the timber for posts and construction material was generally for local use, but that charcoal produced was for the Nairobi market and was often illegally harvested using fraudulent licences. Where *J. procera* posts from Maralal are for sale in Nairobi, the price per metre is Ksh75-100, whereas at source it is nine Kenyan shillings per metre (in July 1994 Ksh60 = US\$1.00). Owing to the ban on transport of cedar posts, those available in Nairobi are likely to have been illegally obtained.

### Carving

Wood carving is a major artisanal industry in Kenya, closely dependent on tourism, thus generating considerable foreign exchange for the country through direct exports and the sale of tourist souvenirs.

Although wood carving is practised widely in Kenya, as a commercial pursuit the industry is dominated by the Akamba tribe and is essentially confined to the coast and the semi-arid areas of Ukambani and Kibwezi. Carvers are generally organized into co-operatives of which one of the largest, the Kenya Crafts

Co-operative Union Ltd, has approximately 6000 members. Another large co-operative is based outside Mombasa, and has around 3000 carving members. Other smaller centres on the coast are at Malindi (around 250 carvers), Lungalunga (around 50-100) and Mwabungu (Omollo, 1991a; Thomson and Ochieng, 1993).

Several different tree species are used for carving. The main criteria for choice are that the wood should be close-grained and should not crack. Preferred colours range from light brown to black. The two most popular species are *Dalbergia melanoxylon*, marketed as ebony, and *Brachylaena huillensis*, marketed as *Khaya* spp. Other species used include *Newtonia buchananii* (marketed as *Hagenia abyssinica*), *Olea africana* (marketed as oak), *Combretum schumannii*, *Cynometra webberi*, *Terminalia brownii*, *T. prunioides* and *Erythrina abyssinica*. As the two preferred species become more difficult to obtain, increasing quantities of the other woods, particularly *C. schumannii*, are used.

While the industry in general is said to be conservative and reluctant to use new woods, there are some initiatives underway to investigate the use of alternative species. The Nairobi-based Kenya Crafts Co-operative Union Ltd is conducting research into substitutes and the current status of valued species. Otherwise, some carvers on the coast are starting to experiment with introduced species, for example, *Azadirachta indica* and *Mangifera indica* (Thomson and Ochieng, 1993). *M. indica* is regarded as a species with high potential for carving, and is well known for its wood, which has traditionally been used to make dugout canoes. Additionally, the Forestry Department has targeted *Acacia melanoxylon* as a suitable alternative species for the carving industry.

Estimates of volumes used are difficult to make, but clearly reach thousands of cubic metres annually. Thomson and Ochieng (1993) estimated 2100m<sup>3</sup> of wood was used annually at the Mombasa co-operative, on the basis of reports of two seven-tonne lorries delivering each day, for six days a week, or just over 600 lorry loads a year. The Malindi co-operative stated that it uses an estimated five lorry loads per month, or 60 each year, an amount to be expected as this co-operative is approximately one tenth the size of the one in Mombasa. Because carvers use wood in a wide range of sizes, including relatively small branches, it is much more difficult to relate volumes or weights used to standing stocks than with sawn timber where standard conversion rates can be used to give at least approximate measures.

The wood used by the carvers originates from a variety of sources. *Brachylaena huillensis* is harvested in Lamu District and transported to Mombasa, as sources nearer to the carvers are heavily depleted. Even so, exploitation continues in considerable quantities, illegally, from Maluganji Forest Reserve south of Mombasa. The carvers at Lungalunga reportedly collect *B. huillensis* from the Gongu Forest Reserve near the Tanzanian border. *Dalbergia melanoxylon*, not generally a forest species, is said to come mainly from private farms in Kwale District, and is also likely to be imported from Tanzania. It has also been reported that *D. melanoxylon* is traded in Voi, and may originate from the nearby Tsavo East and Tsavo West National Parks.

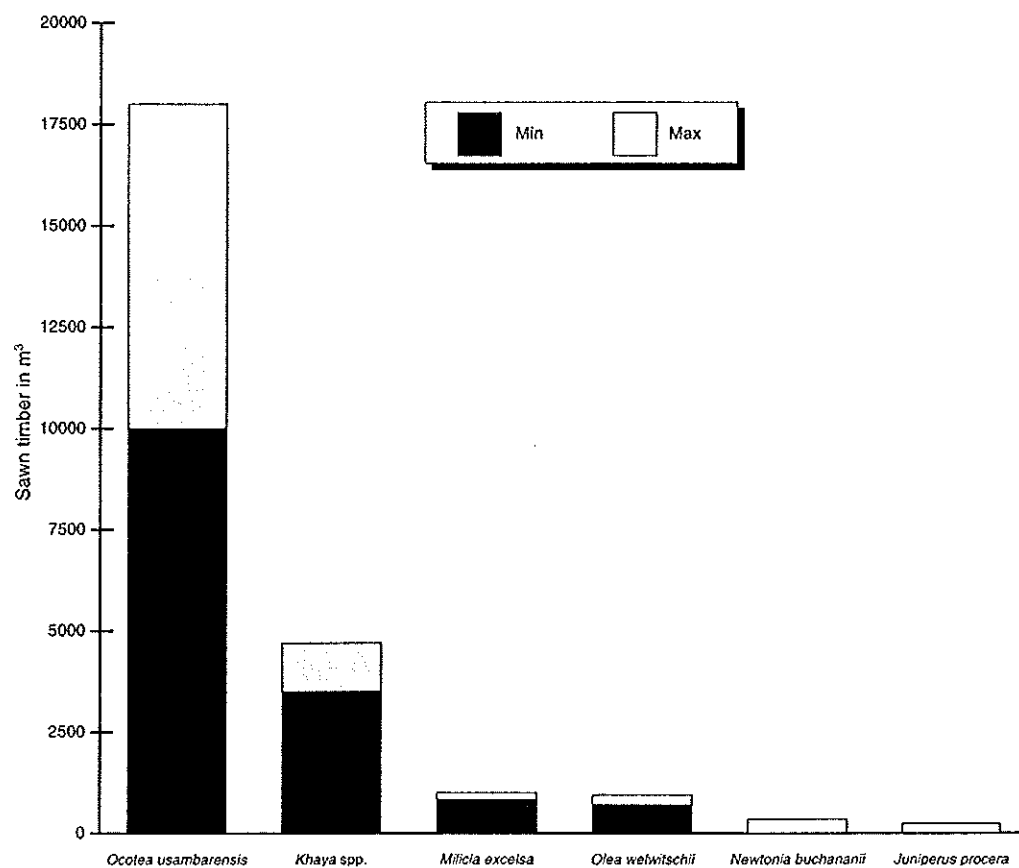
The wood carving industry merits further attention to determine the number of active carvers, particularly in the Ukambani and Kibwezi areas, the quantities of specific woods used and their origins, and the impact of harvest on populations of the tree species involved.

### VOLUME OF TIMBER IN TRADE IN KENYA

Estimates for use of sawn timber have been made for the key hardwood species found in trade, according to their main uses within key consuming regions. Volumes for posts and poles were not assessed. Overall figures for use are presented in Figure 1.

**Figure 1**

**Estimated volumes of sawn timber used**



### ***Ocotea usambarensis***

#### **Nairobi**

##### ● *Furniture*

In Nairobi, there are about 12 medium-to-large-sized furniture manufacturers who use hardwood (several produce furniture made exclusively from *Cupressus* spp. and *Pinus* spp.). Eight of these firms were interviewed and were found to have an average use of *Ocotea usambarensis* of 140m<sup>3</sup> per year. Total use for all 12 firms is therefore likely to be approximately 1700m<sup>3</sup> per year. These firms are estimated to constitute 70% of the furniture business in Nairobi, the remaining 30% belonging to the informal sector. If *jua kali* manufacturers use the same proportion of *Ocotea* as the formal sector, then it is likely that overall volume of the species consumed for furniture in Nairobi is close to 2400m<sup>3</sup> per year. However, since use of *Ocotea* is likely to be less in the informal sector, as this caters for less wealthy customers, overall annual consumption probably lies between 1700 and 2400m<sup>3</sup>.

##### ● *Joinery and retail timber supply*

There are about five major timber suppliers in Nairobi, who sell on average 480m<sup>3</sup> each or 2400m<sup>3</sup> together, per year. This is estimated to be around 70% of the total timber supply/joinery business in the city but, as with furniture, it may be expected that the remainder of the industry will use less *Ocotea usambarensis*. This indicates usage of between 2400 and 3000m<sup>3</sup> per year.

##### ● *Construction*

The larger construction companies possess their own joinery workshops and obtain much of their wood from brokers and middlemen. The number of companies involved, and annual use of different timbers is difficult to estimate reliably as it may vary considerably from year to year. There are probably five or six major companies, each using in the region of 230-350m<sup>3</sup> per year, or 1400-2100m<sup>3</sup> per year, overall. Smaller companies generally obtain their joinery from one of the major joinery suppliers.

By combining the figures for the construction, joinery and furniture sectors, overall volume of *Ocotea usambarensis* used in Nairobi is estimated to be between 5400 and 7500m<sup>3</sup> per year. Because of the uncertainty over volumes used within the construction industry, reasonable limits are 4700 to 8300m<sup>3</sup> per year.

#### **Mombasa**

##### ● *Furniture and Joinery*

In the Mombasa region most companies produce both furniture and joinery and therefore consumption of *Ocotea usambarensis* by the two sectors is considered together. There are five to seven medium-to-large-sized furniture and/or joinery businesses, using an average of about 140m<sup>3</sup> per year, calculated on the basis of interviews with four of the firms. The volume used by these firms is therefore estimated to be within the range of 700-950m<sup>3</sup> per year. In addition, there are numerous smaller businesses (estimates of 30-40), but these are unlikely to account for more than 350-470m<sup>3</sup> annually. Overall volume used is estimated to be approximately 1100-1400m<sup>3</sup> per year.

##### ● *Construction*

Three large construction companies are located in the vicinity of Mombasa. Use of *Ocotea usambarensis* by these companies is variable, but appears to be between 240m<sup>3</sup> and 470m<sup>3</sup> each per year. In addition there are several smaller companies whose combined use is likely to be in the region of 240-470m<sup>3</sup> per year. Overall volume used in construction is therefore probably in the range 950-2000m<sup>3</sup>.

Overall use of *O. usambarensis* in Mombasa can be estimated at 2000-3500m<sup>3</sup> per year.

### Malindi

- *Furniture and Joinery*

In Malindi, as in Mombasa, furniture and joinery are not distinct industries. There are three major joiners/furniture makers using, together, 600-700m<sup>3</sup> of *Ocotea usambarensis* per year. Other businesses in Malindi and its environs are very unlikely to account for more than 120m<sup>3</sup> per year, thus overall use is estimated at 720-820m<sup>3</sup> per year.

- *Construction*

There are five or six medium-sized construction companies in Malindi which use, on average, 50-70m<sup>3</sup> of *Ocotea usambarensis* per year. Combined use by other companies is not likely to be more than 71m<sup>3</sup> per year. Total volume used is estimated to be 300-500m<sup>3</sup> per year.

The overall volume estimate for *Ocotea usambarensis* in Malindi is expected to be in the region of 1000-1300m<sup>3</sup> per year.

### Overall volume estimates for *Ocotea usambarensis*

Combined volume estimates for Nairobi, Mombasa and Malindi indicate that roughly between 7500m<sup>3</sup> and 13 000m<sup>3</sup> per year of this species are used. These three areas probably represent about 70% of total use in the country, in which case, the overall use in Kenya can be estimated at 10 000-18 000m<sup>3</sup> per year.

### *Khaya* spp.

#### Nairobi

- *Furniture*

Interviews with furniture manufacturers in Nairobi indicated that the 12 major companies used roughly half as much *Khaya* spp., on average, as *Ocotea usambarensis*, putting overall consumption at circa 800m<sup>3</sup> per year. Because of its expense, it is not apparently used in any quantity by smaller businesses. This figure is therefore likely to be a reasonably accurate estimate of overall use of *Khaya* spp. in the furniture business in the Nairobi region.

- *Joinery and retail timber supply*

The five major suppliers sell on average 240m<sup>3</sup> per year. Again, smaller suppliers are unlikely to sell much *Khaya* spp., so total sales can be estimated at between 1200-1400m<sup>3</sup> per year.

- *Construction*

As in the case of *Ocotea usambarensis*, estimating consumption by construction companies is difficult. However, its use is confined to the larger, prestigious companies and is likely to be in the range of 700-1200m<sup>3</sup> per year.

Total volume of *Khaya* spp. used in the Nairobi area is probably between 2500 and 3500m<sup>3</sup> per year.

#### Western Kenya

One company in western Kenya uses the equivalent of 472m<sup>3</sup> *Khaya* spp. per year. Additionally, one or two furniture companies use a small amount of *Khaya* spp., probably in the range of 50-70m<sup>3</sup> per year.

### Mombasa and Malindi

No evidence was found of any extensive use of *Khaya* spp. in the coastal area. It was reported that the wood did not withstand the humid climatic conditions of the coast well.

### Overall volume estimates for *Khaya* spp.

Because *Khaya* spp. is imported and expensive, its use in Kenya is limited to the upper end of the commercial market. It is probable, therefore, that the above figures represent the great majority (80-90%) of use in Kenya, indicating overall use of an estimated 3500-4700m<sup>3</sup> per year.

### *Olea welwitschii*

Only one major user of *Olea welwitschii* was located in Kenya, and this firm reported annual usage of about 470m<sup>3</sup>. Small quantities are used by some furniture makers and timber and flooring suppliers. Total quantities used in the formal sector are probably in the region of 700-950m<sup>3</sup> per year.

Clearly there is much greater use of this species in local markets in regions where stocks remain. Omollo (1991b) estimated extraction of some 1400m<sup>3</sup>/year from Kakamega forest, most of which was sold locally. In this area it was noted as being the main hardwood timber sold. Thomson (1993) also found major extraction of *Olea* spp. from the South-West Mau and Trans-Mara forests (a medium estimate of 5900m<sup>3</sup>/year), but stated that this was for charcoal production, not sawn timber.

### *Milicia excelsa*

*Milicia excelsa* is used by a few furniture makers and high-class joiners in Nairobi and Mombasa, and in small quantities in Malindi. Five companies used an average of 165m<sup>3</sup> per year. It is likely that these represent the majority of users of this timber in Kenya. Total use in the formal sector is therefore likely to be in the range of 800-1100m<sup>3</sup> per year.

There is probably some local use in the coastal region (particularly the south) of timber from the Shimba Hills area and imported from Tanzania, although this is unlikely to be extensive.

### *Vitex keniensis*

*Vitex keniensis* is used in small quantities by a number of furniture makers in Nairobi. Five companies used on average about 35m<sup>3</sup> per year. One company produces some oak veneer, although not apparently in great quantity. Total usage is likely to be in the region of 350-450m<sup>3</sup> per year.

It is not clear how much use there is of this species in local markets. However, as supplies appear to be very largely of plantation origin, it is likely to be small.

### *Newtonia buchananii*

*Newtonia buchananii* is in limited use as a standard hardwood. Two timber merchants and joiners sold limited quantities (35-50m<sup>3</sup> per year) and one furniture maker used a small amount (less than 10m<sup>3</sup> per year). It is unlikely that more than 350m<sup>3</sup> per year is used in the commercial market.

This timber may well be used more extensively in local markets, but data are lacking.

***Juniperus procera***

This species is now not generally available. One joinery firm recently obtained 70m<sup>3</sup>, although it noted that this was exceptional. One construction company uses 50-70m<sup>3</sup> per year from stockpiles. It is unlikely that more than 250m<sup>3</sup> per year is used commercially.

Local use of this timber in areas that still have standing stocks is certainly far greater than this, chiefly for posts, but also for furniture and joinery.

As noted above in *Analysis of Commercial Use of Timber Within Kenya*, approximately 10 000 *Juniperus procera* posts were recently confiscated in the Aberdares forest. However, owing to the difficulty in calculating the volume of posts and the ongoing nature of the Aberdares investigation, these posts are not included in the overall figure for volume used, mentioned above.

Estimating overall consumption of some of the species listed above and others where local use considerably exceeds formal commercial use is very difficult (see Appendix 1). However, estimated extraction rates, and surveys of local timber use in western Kenya (Omollo, 1991b; Thomson, 1993) and the coastal region (Omollo, 1991a; Thomson and Ochieng, 1993) help to corroborate the estimates of this report. Figures from these references accord reasonably well with the assumptions that the usages calculated above probably account for around 70% of total sawn hardwood timber use, and that the remainder is largely local timber use. Thus, Thomson and Ochieng (1993) estimated annual extraction of around 440m<sup>3</sup> of *Brachystegia spiciformis* from the Mkongani area in the Shimba Hills region, this representing most of the timber harvest for sawlogs in the region (although note that Thomson and Ochieng (1993) observe that there is some question as to whether this is indeed the species involved). Whatever the species, this figure for local use can be compared with an estimated annual hardwood consumption in the much larger nearby centres of Mombasa and Likoni of about 2300 to 4000m<sup>3</sup>. Similarly, median extraction rates for the Trans-Mara and South-West Mau forests in western Kenya were estimated at 550m<sup>3</sup> for *Podocarpus* spp., and 700m<sup>3</sup> for *Fagara macrophylla*, for local use in one of the most heavily populated regions of Kenya.

**TIMBER PRICES IN KENYA**

Virtually all hardwood is bought by users "at the door", from middlemen, for cash. Prices are therefore negotiated on a case-by-case basis and may vary considerably, depending on the quality of timber, the amount bought, and the relationship between the seller and the buyer, amongst other things. Nevertheless, prices quoted by a wide range of buyers were remarkably consistent, especially for the timbers available in larger quantities. Note, however, that sample sizes for some timbers were very small and that timber is often stockpiled, particularly if imported (e.g. *Milicia excelsa* and *Khaya* spp.). Some interviewees may not have bought a shipment of a particular timber recently and prices quoted may be those paid several months ago — the price of *Khaya* spp. in particular is said to have risen sharply in the past 18 months. In general, however, the following prices can be taken as wholesale, to established members of the trade, for beam-sawn timber, and dated late 1993.



**Table 4****Wholesale prices of timbers, late 1993, Ksh per bd ft (board feet)**

Species	Range	Median
<i>Azelia quanzensis</i> (1ft x 1.5ft)	170-200	
<i>Cupressus</i> spp.	11-16	
<i>Fagara macrophylla</i>	20	
<i>Hagenia abyssinica</i>	15	
<i>Khaya</i> spp.	35-90	60
<i>Milicia excelsa</i>	70-120	
<i>Newtonia buchananii</i>	20-35	
<i>Ocotea usambarensis</i> — Nairobi	24-36	32
<i>Ocotea usambarensis</i> — Mombasa	35-45	36
<i>Olea welwitschii</i>	40	
<i>Vitex keniensis</i>	27-40	

Source: TRAFFIC East/Southern Africa.

**STRUCTURE OF THE TIMBER TRADE****The domestic trade network**

The trade network for timber and wood products within Kenya is a complex one. There are significant differences between the hardwood and softwood trades, owing in large measure to the illegal, or at least irregular, nature of much of the former.

The major extractors of timber in the country are pit-sawyers and sawmills. There are over 350 licensed sawmills which buy logs directly from the Forestry Department (see section on legislation) and also many unlicensed mills, processing logs purchased from private land owners, or from licensed operators, or illegally. Most mills are small, semi-portable and operate on one-year licences. Around 60 operate on five-year licences and have an average log intake of circa 4000m<sup>3</sup> per year (FAO/World Bank, 1989).

The larger sawmills deal mostly or entirely with plantation timbers (very largely *Cupressus* spp. and *Pinus* spp.). They may be owned by companies which produce a variety of products from wood (plyboard, blockboard, veneer), in addition to sawn timber, and they may also be involved in joinery production and retail. The major businesses which are involved in the timber trade — furniture manufacturers, joiners, construction companies, timber and wood product wholesalers and retailers — which do not own sawmills generally buy their softwood timber from one or two sawmills. Smaller companies may also buy softwood directly from sawmills, or sometimes from intermediaries (wholesalers). Timber is usually supplied cut to standard size and may be in treated form.

Hardwood timber, by contrast, is almost invariably bought "at the door" from a timber trader (generally claimed to be licensed), who acts as an intermediary between the user and the sawmill or pit-sawyer. This is the case even amongst the largest users of such timber (major construction companies and large joinery and furniture manufacturers). Such timber is generally beam-sawn usually in irregular sizes, and is bought, almost always for cash, and only after inspection. The larger users reportedly have fairly regular supplies from a small number of suppliers, particularly for *Ocotea usambarensis*, the most widely used hardwood. Other users rely on suppliers turning up on an irregular basis. In the case of *Khaya* spp. and

*Milicia excelsa*, both imported, all users reported that supplies were irregular and unpredictable. Because of the general unpredictability of supplies, almost all users stated that they stockpiled as much hardwood timber as possible. Also, in most areas, much local, informal sector use appears to be of locally harvested timber.

Hardwood timber is reportedly almost always completely unseasoned, that is freshly cut and sawn, when purchased. Virtually all buyers therefore season their own timber, or have it seasoned for them. The need to season their own timber also explains why companies stockpile as much as possible. There are few kilns in the country and even fewer of international standard (reportedly only four or five companies possess them) and much seasoning is carried out by air-drying which may take up to three years, or longer if the timber is kept as large beams. Air-drying can achieve satisfactory results in Nairobi and the highlands. On the coast, humidity is generally too high for timber to be adequately seasoned by this method. To date, there are reportedly no high-class kilns on the coast, although one construction company is in the process of installing one. The lack of good seasoning facilities has resulted in the widespread production of sub-standard joinery and furniture.

### **Transportation**

Because of the uneven geographical distribution of timber resources in the country, much timber, both hardwood and softwood, is transported a considerable distance before being used. For example, the coastal region, which is a major consumer of timber, appears to obtain most of that used in the formal commercial sector, both hardwood and softwood, from western and central Kenya, and from Uganda and Zaire. Timber has therefore travelled at least 600km before use.

The expense and difficulty of transportation was cited by many users as having a significant impact on the cost of timber. Transporters charge up to Ksh19 000 per lorry load (5000-7000bd ft) to carry timber from, for example, Nandi to Nairobi. For softwood timber this could be a significant part of the cost of the timber (up to 30%). For hardwoods, which are considerably more expensive, this percentage would be lower (e.g. around 10% for a lorry load of *Ocotea usambarensis* transported from the north-east of Mount Kenya to Nairobi). However, it is still significant enough to account for the difference in average price of *O. usambarensis* between Mombasa and Nairobi.

### **The International Timber Trade**

#### **Imports**

Kenya imports hardwood timber from numerous countries, the most important of which are Tanzania, Uganda, Zaire and Australia (imports from Australia are probably of eucalyptus *Eucalyptus marginata*, for railway sleepers). In order to ascertain the volume of these imports to Kenya, summarized import data for 1992 were obtained (Table 5), and for 1993, approximate monthly statistics were obtained for January-June (Table 6). In addition, ports of entry were visited at Malaba, Busia, Kisumu (usually ports for imports from Uganda); Mombasa (international imports) and Lungalunga (imports from Tanzania). Where possible, logbooks and import certificates were examined at these locations. Data are incomplete, but allow an approximate assessment of timber imports to Kenya.

## TRAFFIC FOCUS

### *Kenyan timber species in need of protection*

Timber is one of the most versatile and valuable of all natural resources. As well as being a major construction material throughout the world, it can be used to make objects of exquisite and durable beauty. It is also a resource which is coming under increasing pressure almost everywhere. Nowhere is this better illustrated than in a country like Kenya, with its burgeoning human population and, because of its largely arid climate, limited forest area.



Natural forests are the source of numerous plants valued for medicinal purposes.



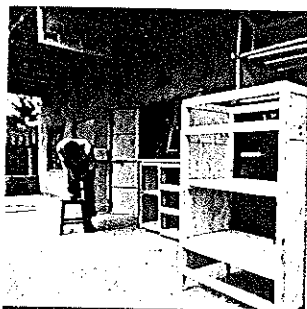
Ring-barking, or removal of bark from the entire circumference of the tree, causes the tree to die and is illegal.

*Maesopsis eminii*, an indigenous species used locally for construction and joinery.

Kenya's timber, like that of many other countries, comes from two main sources: natural or semi-natural forests and plantations. The former are the major source of hardwoods, the most desirable and expensive forms of timber, produced by slow-growing native tree species. The latter largely produce softwoods – pine and cypress – which meet the vast majority of basic building and carpentry requirements. The natural forests, such as Kakamega, Mount Kenya, the Aberdares, the Shimba Hills and Sokoke, are not just sources of timber but are also major repositories of the country's rich biological diversity, often being home to significant numbers of unique and threatened species. Many of them also play an important



**Cows grazing illegally in Kakamega Forest Reserve.**



**Furniture makers in Elburgon using timber extracted from the Mau forest.**

role in watershed management – vital in a country where freshwater is a scarce and valuable commodity. These forests are therefore a resource of enormous value which demand careful and continuous management if they are to be able to meet the needs of future generations of Kenyans.

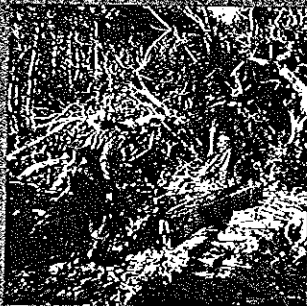
Sadly, despite good nominal protection, this management is currently falling far short of what is needed and the forests are being progressively degraded. Logging, much of it illegal, proceeds on an unsustainable basis and forest lands are being progressively encroached upon for crop growing and livestock grazing. So depleted is Kenya's hardwood resource that the country now imports significant amounts of African mahogany from Uganda, Tanzania and Zaire, placing increased pressure on these countries' own forests. At the same time the condition of the softwood plantations in Kenya is deteriorating, storing up further problems for the future.



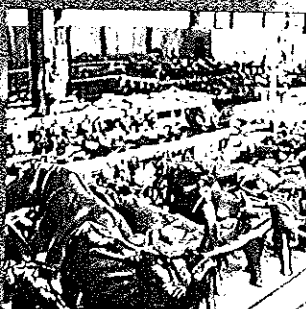
**Shop in Malindi displaying hardwood furniture.**



Kakamega forest is under pressure from timber extraction and land conversion.



Illegally felled Mbambakofi (*Azela guanzensis*) ready for pit sawing, but discovered by forest rangers in Arabuko-Sokoke.



Tourist souvenirs on sale at a craft co-operative.



Neem *Azadirachta indica*, an exotic planted throughout Kenya, and has potential for use in a variety of industries.



Mangrove forests have been a source of building poles for local and international markets for centuries: exports are no longer permitted from Kenya.



Mangrove poles harvested from Mida Creek, Kilifi District.



Plantation-grown eucalyptus to be used as fuel in the tea drying stoves of Kericho.

The solution to all this lies in improving protection of the remaining native forests, rejuvenating existing softwood plantations, establishing plantations of hardwood species and searching for non-native hardwoods to act as alternatives to the hard-pressed native species. A start has been made towards some of these goals – the first native hardwood plantations were established over 70 years ago and fast-growing exotic hardwoods, such as Australian Blackwood *Acacia melanoxylon*, are meeting at least some of the demands previously exerted on native species.

However, much more needs to be done. In particular, it is vital that a long-term view of forest management is adopted as decisions made and actions undertaken now will often not have their full impact for decades. This is particularly the case with hardwoods, which may well take over 50 years to reach harvestable size. Careful planning and action now has the potential to yield a bountiful harvest in the coming millennium. Inaction may lead to disaster.



Forest ranger stamps wood piles to show that they have been harvested legally.



**IUCN**  
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**Table 5**  
**Imports of timber to Kenya, 1992**

Country	Type of timber	Amount m <sup>3</sup>
Australia	unspecified, roughly worked	3322
Tanzania	"mahogany"	1465
Uganda	"mahogany"	225
UK	worked conifer wood	56
Zaire	"mahogany"	157
Zaire	hardwood other than "mahogany"	318
Zambia	"mahogany"	22
Zambia	hardwood other than "mahogany"	55
Total	"mahogany"	1869
Total	hardwood other than "mahogany"	428
Total	other wood	3378

Source: Kenyan Customs statistics.

Classification of timbers, as in Table 5, should be treated with caution. It is widely held that some timber imported, particularly from Tanzania, under the name "mahogany" (in the African context meaning *Khaya* spp.) is often other wood such as *Pterocarpus angolensis*. A considerable proportion of the timber identified as "other hardwood" is almost certainly *Milicia excelsa*.

It appears that the great majority of timber imported to Kenya is, or is at least sold as, *Khaya* spp. and *Milicia excelsa*. As such, the figures in Table 5 are certainly consistent with the estimates for use of these species mentioned in the section **Volume of Timber in Trade in Kenya**, where overall annual use of *Khaya* spp. in Kenya was estimated at 3500-4700m<sup>3</sup>, while for *M. excelsa* it was calculated to be around 820-1100m<sup>3</sup>. These figures give a combined total of 4320-5800m<sup>3</sup>, thus the approximate total of 3500m<sup>3</sup> in Table 5 would account for about 1.5 million bd ft, or 60-80% of the Kenyan usage of these two timbers. It is interesting to note that almost all users were disparaging about the quality of Tanzanian timber, particularly in comparison with that from Uganda. It seems likely that rather more Tanzanian timber is used than is admitted.

For 1993, data are only available for the months January to June in the categories "wood in the rough" and "wood simply worked" (Table 6). Countries of export are not listed. The data are also evidently incomplete (by comparison with data collected at Malaba and Lungalunga — see Tables 7 and 8) and they are therefore of very limited use in interpretation.

**Table 6****Summarized data for timber imports into Kenya, January-June 1993**

Month	Category	Volume
January	Wood simply worked	<sup>a</sup> 1100m <sup>3</sup>
February	Wood simply worked	87m <sup>3</sup>
March	Wood in the rough	43 t
March	Wood simply worked	428m <sup>3</sup>
April	Wood simply worked	522m <sup>3</sup>
May	-	0
June	Wood simply worked	25m <sup>3</sup>

<sup>a</sup> from the overall value of these shipments quoted, this may well be a misprint for 110m<sup>3</sup>; <sup>b</sup> this is cited in the printout as 52 200m<sup>3</sup>, but from the value quoted and comparison with other figures, this is almost certainly a misprint for 522m<sup>3</sup>, although conceivably for 5220m<sup>3</sup>

Source: Kenyan Customs statistics.

**Table 7****Imports by lorry through Kenyan port of Malaba for six months of 1993**

Month	No. of shipments	Total weight, t	Conversion to m <sup>3</sup>
April	6	60	85
May	5	90	128
June	2	30	42
July	16	280	400
November	13	260	371
December	14	270	385
<b>Total</b>	<b>56</b>	<b>990</b>	<b>1414</b>

Notes: shipments were recorded as hardwood; from the logbook it was unclear if shipments originated in Uganda or Zaire.

Source: Kenyan Customs statistics.

Assuming that the figures for Malaba in Table 7 are representative for the whole of 1993, they would indicate that total timber imports by lorry through that port were approximately 2400m<sup>3</sup> in 1993. It is interesting to note that imports increased markedly half-way through the year. This may well be associated with a general upturn in movement of goods through this port. It should be noted here that illegal trade in *Milicia excelsa* from Uganda has been reported in the Ugandan press (Kawule, 1993), though the scale of this trade is not quantifiable.



**Table 8**

**Imports of timber from Tanzania through Kenyan port of Lungalunga, apparently for all of 1993**

Month	No. of shipments	Total volume m <sup>3</sup>
January	3	73
February	6	122
March	7	199
April	6	149
May	5	112
June	6	136
July	8	178
August	4	91
<b>Total</b>	<b>45</b>	<b>1060</b>

Notes: all records of timber imports ceased in August, when Tanzania reportedly banned export of hardwoods; all shipments were recorded as being of mixed hardwood, sometimes specified as "camphor, mahogany, mvule".

Source: Kenyan Customs statistics.

Imports through Lungalunga (Table 8) were around 45% of the recorded amount of the same through Malaba, although for only eight months, giving a monthly rate of just under two-thirds of the rate of imports through Malaba.

Unfortunately, data are lacking for imports through Namanga (from Tanzania) and by rail through Malaba. The latter, in particular, is noted as a route by which substantial amounts of hardwood are imported to Kenya. Both Kisumu and Busia stated that they essentially received no shipments of timber, nor were any records of imports seen at Mombasa.

These figures confirm the trend outlined in Emerton (1992), showing that while Tanzania was the major exporter of hardwoods to Kenya during 1987-89, accounting for about 80% of imports (circa 5700m<sup>3</sup> in total), after 1989, Uganda became the most important exporter, accounting for approximately 66% of imports to Kenya.

The total volume of timber reported as exported to Kenya has declined somewhat in the last five years, from 7062m<sup>3</sup> and 7128m<sup>3</sup>, respectively in 1989 and 1990, to 3926m<sup>3</sup> in 1991, 2297m<sup>3</sup> in 1992, and at least 3400m<sup>3</sup> (probably between 4000 and 5000m<sup>3</sup>) in 1993. This is consistent with reports from the industry (particularly from construction firms), which note a downturn in use of timber in the last two years, and also indicates incidence of stockpiling around 1989 and 1990, which was also reported by several users.

### **Exports**

Exports of timber from Kenya are regulated under The Timber Act of 1970, Chapter 386, revised in 1972. This Act requires exports of timber of Kenyan origin to be accompanied by an export permit issued by the Chief Conservator of Forests and, if of Ugandan or Tanzanian origin, to be accompanied by a document issued in the country concerned allowing such export.

Export must take place from a designated port. The Timber Act also allows the Minister of Environment and Natural Resources to restrict or prohibit the export of Kenyan timber by notice in the gazette. As such, Kenyan exports of unworked indigenous hardwood timber have been banned since 1983. Export of charcoal and mangrove products has reportedly also been prohibited, since 1982. As stated earlier, the export ban on mangroves was initially instituted in 1978, then lifted in 1981, and reinstated in 1982.

Licensed exports are therefore almost entirely of *Pinus* spp. and *Cupressus* spp. In 1993, there was also very small (five cubic metres) licensed export of *Milicia excelsa* to Ethiopia and of 900 power transmission poles of *Eucalyptus saligna* to Tanzania (Zanzibar). One shipment of timber to the UK in mid-1993 (from Customs records in Mombasa) could well have been of hardwood, but this is not confirmed.

Most exports are to nearby countries, at present particularly Somalia, but also Ethiopia, Rwanda, the Seychelles, Sudan, Tanzania and Uganda. A few companies export further afield (e.g. to Israel, Japan, Saudi Arabia, Sri Lanka), but it should be stressed that in general the timber industry is not export-oriented. However, a number of companies noted that they formerly exported in quantity, particularly to the UK and Germany in the 1970s.

Several joinery and construction companies are engaged in projects in Uganda and Tanzania. It is not clear if timber for use in these (which would include hardwoods) is obtained locally or exported, or re-exported, from Kenya.

There is some export of furniture. One company specializes in the export of hardwood English Regency and Georgian reproduction furniture to the UK and North America and another is now concentrating on exporting *Cupressus* spp. system furniture (flat-packed, self-assembly, unit furniture) to the UK. Most other companies which export do so on an irregular basis and usually to nearby countries. However, that proportion of manufacturers' output bought by expatriate residents in Kenya may ultimately be destined for export upon their return to home countries. Furniture carved in Lamu, made of *Afzelia quanzensis*, is exported if requested: much of the furniture is produced for the tourist market, and as a result the Lamu manufacturers are adept at setting up shipping orders for export. Chairs, tables and even doors are made to order in Lamu, with Europe as a prime destination. Most furniture production, however, is to supply the domestic market.

Considerable quantities of small carvings are exported wholesale, in addition to the enormous number taken out of the country as personal effects by tourists. Export documents in Mombasa show, for example, four wholesale shipments of carvings in July and August 1993 to the USA and Germany, totalling over 12 000kg. This trade requires further investigation and indeed will be studied in 1994 in a joint project to be carried out by the National Museums of Kenya, the Kenya Crafts Co-operative Union Ltd, the ngo KENGO (Kenya Energy and Environment Organizations), the Government organization KEFRI (Kenyan Forestry Research Institute), and the Mennonite Central Committee (a Christian organization undertaking rural development work).

Some timber has been re-exported, including a small amount of *Juniperus procera* in 1993, from Tanzania to Germany. Much of the timber (generally *Khaya* spp. and *Milicia excelsa*) exported from Uganda and Zaire and passing through the Kenyan border at Malaba is reported to be officially destined for re-export via Mombasa. It seems, however, as if a large proportion of it actually stays in Kenya (see *Imports* above — domestic usage appears to exceed imports). This practice of maintaining goods officially for re-export within the country may be undertaken to avoid import duties, as no payment is required for shipments in transit. This aspect of the trade is also in need of further investigation.

## DOMESTIC POLICY AND LEGISLATION

### Principal laws governing utilization of Kenyan forests

The main legal instrument controlling the exploitation of Kenya's forests is the Forests Act (CAP, 385), originally drafted under the colonial regime in 1942 and last revised in 1992. Forest policy is based on White Paper No. 1 of 1968, which is a slight revision of White Paper No. 1 of 1957, itself implementing the recommendations of the 6th Commonwealth Forestry Conference, in Ottawa, in 1952. Forest policy is currently (early 1994) undergoing revision.

The Forests Act's jurisdiction covers only Government land. Most of its provisions concern Forest Reserves. Under the Act, the President has the power to declare Public Lands or Special Areas (subject to the provisions of the Trust Land Act) to be Forest Areas and, subject to three months' public notice, to be a Demarcated (gazetted) Forest. The Forests Act therefore has no jurisdiction over forests or timber resources on private land.

For extraction of timber within Forest Reserves, licences are issued by the National Licensing Committee, which comprises the Permanent Secretary, all Provincial Forest Officers, as well as representatives from KWS, the Ministry of Agriculture, the Ministry of Water, and the Office of the President. The Director of Forests (referred to in the Act as Chief Conservator) also has the authority to approve licences, a situation which has caused confusion, owing to difficulties in record-keeping. Licences are issued for the "felling, cutting, taking, burning, injuring or removal of any forest produce", and may be subject to payments of fees or royalties. A similar provision, pertaining to the felling, cutting, taking, burning or removal of any tree, refers particularly to unalienated and unreserved Public Land. The maximum penalty, set in 1982, for contravention of these licensing laws is Ksh3000, or six months' imprisonment, or both. The court may also order a person, once convicted under these laws, to pay the Director of Forests compensation for the value of forest produce damaged or injured or removed.

The Minister of Environment and Natural Resources is empowered to regulate the following:

- the sale and disposal of forest produce and the felling, working and removal thereof;
- controlling entry of persons into Forest Reserves;
- regulating and controlling the manner and circumstances in which licences may be granted, refused or cancelled;
- prescribing fees and royalties.

He may also make rules for the protection and management of indigenous forests on alienated Government Land.

Under the Forests Act there is a presumption that forest produce has been cut in or obtained from a Forest Reserve unless the contrary is proven.

### Fees and Royalties

In practice, licences for timber extraction in Forest Reserves are allocated to sawmillers for a period of one or five years. Licence fees for sawmillers for the year 1994 are presented in Table 9.

**Table 9**  
**1994 licence fees for sawmillers**

Type of licence	Annual intake capacity (m <sup>3</sup> )	Fee (Kshs)
Special licence	over 20 000	100 000
Large-scale sawmill	10 000-20 000	30 000
Medium-sized sawmill	4 000-10 000	10 000
Small-scale sawmill	up to 4000	6000
Minor licences	-	3000
Stone quarrying	-	6000
Compulsory non-refundable application fee	1000	

Source: Forestry Department.

Royalties are assessed annually and, following the Forests Act, are to be based on the volume of unsawn timber extracted and the value of that timber. The value is calculated on the basis of the average selling price per cubic metre, free on rail mill station, of sawn timber of that species.

For all non-plantation species the volume of unsawn timber is estimated on the basis of ground-scaling, that is the volume of logs measured after felling. The value per cubic metre of unsawn timber is fixed at 47.4% of the price per cubic metre of sawn timber. Royalties are then taken as a percentage of this value. For most hardwood species, royalties are 22% of the value.

For plantation species (in the Act confined to exotic coniferous species, *Juniperus procera* and *Vitex keniensis*), calculations are rather more complex. The volume of unsawn timber is measured by stumpage (i.e. estimate of the standing stock before felling). The value of the unsawn timber is again calculated from the value of sawn timber per cubic metre but this time on a sliding scale. The scaling is dependent on the size of the trees felled, based on diameter at breast height (DBH), so that the value per cubic metre of unsawn timber of large trees is greater than that of small trees. Royalties are then taken as a percentage of this value, again on a sliding scale dependent on the species, DBH and whether the timber is clear-felled or thinned.

# HARD TIMES FOR HARDWOOD: INDIGENOUS TIMBER AND THE TIMBER TRADE IN KENYA

Table 10 presents royalty fees by species for the period 1993/1994.

**Table 10**  
**1993/1994 royalty fees by species**

Species <sup>1</sup>	Ksh <sup>2</sup>	Species	Ksh <sup>2</sup>
<i>Azelia quanzensis</i>	725	<i>Manilkara sansibarensis</i>	460
<i>Albizia gummifera</i>	460	<i>Milicia excelsa</i>	725
<i>Aningeria altisa</i>	307	<i>Newtonia buechananii</i>	460
<i>Antiaris toxicaria</i>	376	<i>Newtonia paucijuga</i>	460
<i>Avicennia marina</i>	139	<i>Ocotea usambarensis</i>	725
<i>Bosquiea phoberos</i>	460	<i>Olea africana</i>	725
<i>Brachylaena huillensis</i>	628	<i>Olea hochestetteri</i>	725
<i>Brachystegia spiciformis</i>	307	<i>Olea welwitschii</i>	725
<i>Brugueria gymnorhiza</i>	139	<i>Podocarpus spp.</i>	558
<i>Chrysophyllum albida</i>	376	<i>Podocarpus kikuyensis</i>	460
<i>Combretum schumannii</i>	460	<i>Prunus africana</i>	725
<i>Cordia spp.</i>	628	<i>Trachylobium verrucosum</i>	460
<i>Croton macrostachys</i>	376	<i>Trichilia roka</i>	460
<i>Croton megalocarpus</i>	376	<i>Vitex keniensis</i>	725
<i>Dalbergia melanoxylon</i>	725	<i>Acacia melanoxylon</i>	558
<i>Dombeya goetzenii</i>	460	<i>Araucaria spp.</i>	167
<i>Euphorbia spp.</i>	376	<i>Casuarina equisetifolia</i>	125
<i>Fagara macrophylla</i>	460	<i>Erythrophleum guineense</i>	460
<i>Ficus spp.</i>	376	<i>Cynometra webberi</i>	460
<i>Funtumia africana</i>	376	<i>Nesogordonia parvifolia</i>	460
<i>Hagenia abyssinica</i>	725	<i>Vitex doniana</i>	460
<i>Juniperus procera</i>	836	<i>Terminalia kilimandscharica</i>	460
<i>Maesopsis eminii</i>	460	<i>Terminalia catappa</i>	460
<i>Manilkara butugi</i>	460	<i>Nesogordonia spp.</i>	460

<sup>1</sup> Royalty fees for *Cupressus spp.*, *Pinus spp.*, *Eucalyptus spp.*, *Grevillea robusta*, and plantation-grown *Juniperus procera* and *Vitex keniensis* are discussed below. For all other species not listed in this table, the royalty fee is Ksh210 per cubic metre.

<sup>2</sup> The amount to be paid is per cubic metre.

Source: Forestry Department.

The royalty fees for *Cupressus spp.*, *Pinus spp.*, *Eucalyptus spp.*, *Grevillea robusta*, and plantation-grown *Juniperus procera* and *Vitex keniensis* vary, depending on diameter of the tree, on whether or not the trees have been pruned, and on whether the harvest is a clearfell or a thinning.

Selection hammers are used to indicate standing trees which may be extracted, and revenue hammers to mark legally extracted timber.

### Other regulations

A series of regulations exist in addition to those already mentioned, although these are often difficult to verify. For example, transport of *Juniperus procera* from Isiolo District is reportedly forbidden, and felling of *Azelia quanzensis*, *Milicia excelsa* and *Hymenaea verrucosa* has been banned in Coast Province since 1981.

### The Presidential Ban on Logging of Indigenous Timber

One of the most problematic regulations controlling the use of indigenous timber is a Presidential Decree, of uncertain date, although usually dated 1986, banning the felling of indigenous tree species. Because no separate legislation exists to enforce this ban its implementation has to take place under existing legislation. Within Forest Reserves, implementation can be carried out under the powers given to the Minister as outlined above, that is, he may withhold or cancel licences for logging, or close some or all indigenous forest areas. Those contravening these rulings may then be fined or imprisoned under the provisions of the Forests Act. Outside Forest Reserves, implementation of the Presidential Ban falls under the Chief's Authority Act (Cap 128) 1962 (revised 1970), the Trust Land Act (Cap 288) 1962 (revised 1970) and the Local Authority Government Act (Cap 265). In all cases, implementation of the ban is dependent on interpretation under different acts.

In practice, at present, if people wish to cut trees on private land (including group ranches) they should approach the local Forest Officer and local Chief, who together advise on the suitability of the cutting. However, their advice reportedly has little legal force.

Within Government Forest Land various exceptions to the Presidential Ban have been made (at least up to the end of 1993). These include:

- An apparently general provision to licensed operators to remove dead and fallen timber from forests, and also standing timber for which royalties had been paid (and which had therefore been hammer-stamped) before the ban. The species concerned in this case were chiefly *Juniperus procera* and *Ocotea usambarensis*.
- A licence for one operator to remove *Olea welwitschii* and some other species from Mount Elgon and Nandi.
- A licence for three sawmills on the coast to remove small quantities of indigenous timber, chiefly *Brachystegia spiciformis*. Two were permitted 500m<sup>3</sup>, the other 400 m<sup>3</sup> per annum. The justification of this has been that plantation timber is extremely limited in the region.
- In 1993, extraction was authorized for *Azelia quanzensis* (500m<sup>3</sup>), *Brachylaena huillensis* (300m<sup>3</sup>), *Manilkara sansibarensis* (100m<sup>3</sup>), and *Tamarindus indica* (120m<sup>3</sup>) in Lamu District.

Other exceptions appear to have been made from time to time. These are usually at the District or Provincial Forest Office level, and it is unclear the extent to which they have been authorized, formally or informally, by the Director of Forests. For example, limited extraction of *Azelia quanzensis* and *Manilkara sansibarensis* has reportedly been permitted at Arabuko-Sokoke Forest in Coast Province for the completion of a traditional dhow built at Watamu. Similarly, extraction of large *Manilkara sansibarensis* building poles (for hotels) has reportedly been licensed at the same site.

### ***Kaya forests***

Kaya forests are traditionally protected, sacred forest sites, usually on hills, in the Coastal Province of Kenya. They are generally small but are often very diverse, with significant numbers of endemic species and are considered nationally, and sometimes internationally, important for biodiversity conservation. These forests are not covered by the Forests Act. Traditional protection of many of these sites has declined in recent years and they are suffering from encroachment, degradation and unsustainable logging of timber, particularly for woodcarving. Some of these have been gazetted as National Monuments under the responsibility of the National Museums of Kenya and are therefore covered by the National Monument Act.

Controls on the exportation of Kenyan timber have been discussed separately in the section on Kenya's international timber trade.

### **INTERNATIONAL LEGAL CONTROLS AND LAWS IN ADJACENT COUNTRIES**

Both Tanzania and Uganda, the principal foreign suppliers of hardwoods to Kenya, have recently introduced more stringent controls on the exportation of hardwoods.

Tanzania reportedly banned the exportation of all unworked hardwood in 1993. This is confirmed by Kenyan Customs Officers at Lungalunga, who reported that the last registered shipment of timber was received in August 1993.

In Uganda, unworked timber is reportedly a prohibited export product under **Statutory Instrument No. 56** of 1987. An exception to this has apparently been the licensed exportation of some timber in goods for barter exchange with Kenya and, recently, as traded goods to Europe and elsewhere to generate foreign exchange. It is unclear whether the large quantities imported to Kenya since 1989 have all been licensed. Several informants considered that timber from Uganda was being exported to Kenya with Zairean permits.

Controls in Zaire are very unclear at present and would appear to be very unlikely to be enforced in view of the current political situation.

### **ILLEGAL TRADE PROBLEMS**

Determination of the legality or illegality of timber was one of the most difficult issues encountered during the course of this study. Numerous fraudulent actions are undertaken to "legalize" illicitly harvested timber and, in other cases, no action at all is taken. Manufacturers who purchase timber which arrives at their door generally do not question vendors about the legality of a shipment; most feel sufficiently removed from the situation to ignore the issue. They are certainly not unaware of the ban on felling of indigenous timber; on the contrary many timber users are up-to-date on the issue and fear that future supplies are uncertain. Several timber users expressed concern about the fate of indigenous forests and are interested in assisting authorities in ensuring the health of indigenous forests so that their businesses will have a future.

Outlined below are some of the means by which illegal timber may be harvested and/or delivered to an end-user.

- Timber may be covertly extracted (usually by pit-sawyers working at night) and delivered without detection.

- Live trees may be ring-marked to kill them so that they can be legitimately removed.
- Timber harvested illegally from gazetted forest may be claimed to have come from a legitimate source, i.e. from private land or group farms, as a dead or fallen tree removed from a Forest Reserve, as a plantation tree, or as a different species.
- Forged Forestry Department hammers and documents may be used to "legalize" illicitly harvested timber.
- Documentation may be obtained from the Forestry Department through bribery or undue influence.
- Licences may be duplicated and illegally reused in order to harvest more than the authorized quantity.
- Timber may be allowed to pass through various check-points without documentation, through bribery or undue influence, or because officials do not inspect shipments.

It seems extremely likely that all these methods are or have been extensively used, particularly since the Presidential Decree banning the felling of indigenous timber came into effect. It is extremely difficult to assess which of these is most widespread or important at present.

## **PROSPECTS FOR THE FUTURE**

### **Demand**

Varying opinions on the future demand for hardwoods have been voiced. Construction and joinery, the major consumers of hardwood in the formal commercial sector, are highly sensitive to the overall state of the economy. Such consumers invariably pointed out that business had been very depressed over the past two years. Some saw prospects for improvement during 1994, while others were not optimistic in the short term. Most assumed, however, that the economy would eventually start to grow again and that demand would pick up. Users who supplied the hotel trade, an important part of the large-scale construction business, observed that although construction of new hotels had slowed or even stopped, refurbishment (usually carried out every eight or nine years) would still continue to consume large quantities of hardwoods.

Companies in the furniture business, particularly those supplying furniture for the domestic market, appear to have been generally less affected by the economic downturn, and reported steady demand.

### **Supply**

Again, the opinions of interviewees varied on present and future problems of hardwood supply. Some stated that they had no difficulty in obtaining good quality timber of the type they used (usually *Ocotea usambarensis* and *Khaya* spp.) and did not expect to have problems in the immediate future. Others (the majority of interviewees) stated that they thought supply would become increasingly disrupted because of the imposition of stricter controls by the Forest Department, or because stocks would become exhausted. Some stated that they had increasing difficulty in obtaining good quality timber, complaining that much of it was cut too young (particularly *Vitex keniensis*), and this problem was expected to worsen in the future. Some interviewees also expected imported African hardwoods (from Tanzania, Uganda and Zaire) to become increasingly difficult to obtain. Many stressed that they thought that the management of the country's plantation resources had seriously deteriorated in the past few years and thought that this would pose great problems for softwood supply in the future.



### Alternative sources of supply and substitutes

Although, as noted above, there is widespread apprehension that supplies of indigenous hardwoods will become increasingly difficult to obtain, surprisingly few users were actively searching for substitutes or alternative sources of supply. It should be stressed that, functionally, the great majority of uses of sawn hardwood timber can be perfectly adequately substituted by the plantation softwoods *Cupressus* spp. and *Pinus* spp. These two already supply around 90% of the sawn timber in the country. Similarly, demand for posts and poles can be met (as in the industrial sector at present) with plantation-grown *Eucalyptus* spp. Demand for hardwoods in the formal commercial sector is thus based on demand for those which are perceived to be high quality, expensive products, by those with money to spare.

Many timber users stressed that the conservatism of customers acted as a major constraint on the search for alternatives. Those who could afford them still demanded hardwood timbers with recognized names and would not accept softwoods nor unfamiliar hardwoods.

However, some changes in use are evident. One large furniture manufacturer and one construction company, having previously used large amounts of hardwood, stated that they had ceased using hardwood entirely, or almost entirely, and for the past year had used mainly softwood (mostly *Cupressus* spp.). In addition many users, particularly in the furniture business, reported the increasing use of veneers rather than solid wood for table-tops, desk-tops, and panelling. In flooring, the use of the introduced *Acacia melanoxylon* has already largely taken over from the native *Juniperus procera*, *Olea africana* and *Olea welwitschii*, although stocks of *Acacia melanoxylon* are now reportedly running low. In some parts of the country, particularly western Kenya, there is increasing use of *Eucalyptus* spp. for furniture and joinery, although this is reportedly a function of financial stringency rather than preference (*Eucalyptus* spp. are much cheaper than other hardwoods and comparable in price to *Cupressus* spp.).

The industry itself is conservative also, and appears reluctant to experiment and to promote new timbers. Some timbers have a seemingly unjustifiably poor reputation, or are not used because of problems which could be overcome with proper management and handling. An example is *Grevillea robusta*, a widely planted, fast-growing exotic which produces an attractive, workable and strong timber. It is however, reputedly very prone to insect infestation after cutting and for this reason is little used.

Some interviewees thought that once local hardwood timbers became unobtainable, users would turn to imports of hardwoods to meet their needs.

Relatively little innovation was seen in the wood-products industry, with only one or two companies experimenting with, for example, products based on sawdust or wood waste or being familiar with newer wood substitutes such as MDF (medium density fibreboard).

Despite the lack of experimentation with alternative species and uses, there is a real need to diversify within the timber industry as indigenous hardwoods become more difficult to acquire. Several species with potential for development are presented in Table 11.

**Table 11**

**Exotic hardwoods with potential for further development within Kenya**

Species	Current and/or potential use	Comments
<i>Acacia mearnsii</i>	Flooring, hardboard	Grown extensively in Kenya for tannin production.
<i>Acacia melanoxylon</i>	Flooring, veneers, furniture, carving, turnery	Used for flooring and veneer. Plantations should be encouraged.
<i>Azadirachta indica</i>	Carving, furniture, joinery, veneer, plywood	Agroforestry tree and ornamental. Should be planted more widely.
<i>Eucalyptus</i> spp.	Furniture, joinery	Widely used, but more research on use for furniture and joinery needed.
<i>Fraxinus pennsylvanica</i>	Furniture, joinery	Planted as an ornamental; owing to potential for use, plantations and research should be encouraged.
<i>Gmelina arborea</i>	Furniture, joinery, plywood, carving	Fast-growing and versatile. Plantations should be encouraged.
<i>Grevillea robusta</i>	All-purpose timber, carving	Extensively planted; research and promotion needed.
<i>Mangifera indica</i>	Furniture, joinery, turnery, flooring, carving	Extensively planted; research and promotion needed.
<i>Populus</i> spp.	All-purpose timber	Research needed to determine suitability for growth in Kenya.

Source: TRAFFIC East/Southern Africa.

It is evident that the timber industry will only turn to alternatives for indigenous hardwoods when supplies of these become irregular or unavailable. Consequently, efforts must be made to develop and promote alternative species now, before shortages are realized. For all species mentioned in Table 11, research has been carried out on mechanical and working properties, drying, shrinkage, durability and preservation (Chudnoff, 1984). Some of the most widely planted species, such as *Azadirachta indica*, *Grevillea robusta*, and *Mangifera indica*, are in use around the world for joinery, furniture, flooring, veneers, and light construction. *Eucalyptus* spp., while not used in veneer manufacture, are used for pallets, posts, construction, flooring, paper products and utility plywood.

These species are plentiful in Kenya, yet not widely used (with the exception of *Eucalyptus* spp.) in the various sectors of the timber industry. Awareness about the qualities of these species is needed, which will only come about through concerted efforts involving education and promotion. Efforts should be made to demonstrate the varying uses pertaining to these species, for example, by holding a trade show to exhibit products made from these species, which could be attended by manufacturers and consumers alike.

Aside from promotion of alternative species, Kenya would also benefit from training in and promotion of innovative wood products. Some manufacturers have already found that solid furniture or panelling is prohibitively expensive and dependent upon irregular supplies, and this is a problem being addressed in many parts of the world, through research and development of new types of fibreboard, blockboard, and other wood products. Research into the efficient use of sawdust and off-cuts has resulted in a wide variety of new products. The timber industry in Kenya is largely unaware of these innovations, yet would benefit greatly from education and training in this field; progress in this area would provide economic advantages and would also improve the efficiency of timber use.

### **ANALYSIS OF PROBLEMATIC ASPECTS OF THE REGULATION OF KENYAN TIMBER TRADE**

During the course of this study, a number of issues have constantly surfaced as the most important ones requiring thought and attention. These are law enforcement, management of forest resources, and research and development within the timber industry. These issues will be discussed below, with specific recommendations being presented in the following section.

#### **Law enforcement**

Legislation pertaining to forest resources in Kenya provides a good framework for regulation. The jurisdiction of the Forests Act extends to Government lands, such as Forest Reserves, although it does not extend to private land. The Act sets regulations for licensing, and specifically outlines actions which are prohibited in the regulated areas. Penalties and fines are prescribed in the Act, and the Minister of Environment and Natural Resources may make rules pertaining to confiscation and other relevant issues.

In recognition of increasing forest destruction and the need for stronger protection, the **Presidential Ban on Logging of Indigenous Timber** was enacted. However, the text of this ban is unavailable, and as such, the ban must be implemented under existing legislation, including the Forests Act, the Chief's Authority Act, the Trust Land Act and the Local Authority Government Act. While this does not mean that full implementation of the ban is impossible, it does mean that it must be carried out subject to various constraints of the legislation mentioned above. To improve this situation, clarification of the Presidential Ban is needed in order to provide the Forestry Department with the direct authority for its implementation.

Apart from clarification of the Presidential Ban, this study did not reveal a need for additional forestry legislation regulation within Kenya, under the present forest policy. However, when the new policy is implemented, the legislation will have to be revised to reflect the much broader use of forests and institutional management arrangements which it contains, with some new regulations to control use of forest products. In the meantime, the existing system of regulation should be enforced as is specified in the current legislation, a process which cannot always be carried out effectively owing to the following problems.

- Forest Guards lack the capacity to police areas under their jurisdiction effectively, owing to insufficient resources, for example, means of transport. Training in enforcement and team-building is needed.
- Present court fines and fines for illegal activities within forests are small in comparison with the potential profits and do not act as a deterrent. This is despite the fact that Forest Officers are authorized under the Forests Act to increase fines to five times the amount of royalty owing for the confiscated material.

- Many sources indicated that illicit licence duplication or forgery was occurring, and that changes are needed to eliminate this practice. Additionally, complications have arisen when the Director of Forestry has approved permits after the National Licensing Committee has met and approved the permits for the year. This situation arises in particular when appeals or special requests are made. These additional permits make record-keeping more difficult.
- Occasionally Government officials are found to be involved in unethical practices involving the exploitation of forests.
- Individuals who violate forest regulations are sometimes apprehended, but not convicted. This shortfall can be attributed to insufficient training of prosecutors, but most importantly, to inadequate commitment to the implementation of the Forests Act and application of the law. While training in prosecution will help to enforce forestry regulations in Kenya effectively, attitudes to forests and the Forests Act will also have to change.
- Insufficient and untimely communication hinders the work of the Forestry Department. This situation could be improved by altering reporting requirements (about current illegal activities) so that the Forestry Department Headquarters is made aware as soon as possible of matters on the ground affecting forests under its jurisdiction.
- In order to improve protection of the small but biologically important coastal Kaya forests, the National Monument Act should be adapted and strengthened to cover forest protection and prevent timber extraction from the Kaya forests covered by the Act. Alternatively these forests should be brought under the jurisdiction of the Forests Act.

With regard to the international aspects of the timber trade, there appears to be insufficient communication between the agencies involved in regulation of imports and exports within Kenya. As a result, statistical tabulations compiled at the Customs and Excise Department do not always correlate well with figures registered at the borders. These inconsistencies could be reconciled by improved communication and collaboration between the Forestry Department, the Customs and Excise Department, and the various ports of entry and exit. Specific concerns relating to importation and exportation are noted below.

- Unauthorized shipments may enter Kenya, either through the actions of an unauthorized importer, or as a consequence of an individual attempting to import more than is authorized.
- Imports could be better regulated in other ways, laws of other countries better respected, and accurate figures for imports compiled for improved statistical analysis.
- Shipments entering Kenya as re-exports sometimes remain in the country (having entered as transshipments in order to avoid payment of duty). In this manner much revenue is lost.
- Better collaboration between international regulatory agencies is needed to control the timber trade.

Also of critical importance is the existence of illegal use of timber. At present, legally extracted timber is validated with a hammer mark. Yet this marking system is difficult to enforce because some timber has been marked illegally with a hammer mark, and also there are legal stocks of timber, supplied from private lands, which do not require marking. Confusion also occurs when individuals take advantage of licences permitting the collection of dead and fallen trees, and cut live trees, or pay to collect material but then do not retrieve it for many months.

In order to judge effectively the legality of a timber shipment, the Forestry Department needs to develop a system of marking that includes all timber appearing in trade (from both Government Land and private land), and which cannot easily be tampered with. At present the Forest Stewardship Council, an international group concerned with the sustainable utilization of forest resources, is working to develop a suitable marking system for timber. This work has developed out of efforts to define and identify sustainable logging operations, and to then be able to mark sustainably logged timber as it appears on the international market.

### Forest management

Both plantations and natural forests in Kenya would benefit from more intensive management. Plantation softwoods in particular require attentive management, as they fulfil the majority of the timber industry's needs. Hardwood plantations are also important, owing to the preference for hardwoods for use in the furniture, joinery and flooring sectors. Natural forests, with their potential as a renewable resource, must be managed sustainably to ensure future availability. There is room for greater involvement in forestry on the part of KWS, through their Memorandum of Understanding with the Forestry Department, both within and outside protected areas.

The following points need to be addressed in order to improve management of Kenya's forest resources.

- Numerous manufacturers are concerned about the state of Kenya's plantation resources because of insufficient management (such as pruning and general maintenance) and lack of replanting. Discussions are underway to transfer control of some plantation areas to private (including parastatal) hands. These discussions should be furthered, firstly, because the Forestry Department has insufficient funds to carry out all of its duties effectively, and secondly, because private supervision could be expected to lead to more active management for better financial return.
- Hardwoods are preferred by many timber users, and with the demand for timber in Kenya rising, plantation areas (of indigenous and exotic species, and fast-growing hardwoods such as *Acacia melanoxylon*) must be increased to ensure future supplies. In particular, plantation areas of *Juniperus procera* and *Vitex keniensis* should be increased, and plantations of *Ocotea usambarensis* should be established, as this is the most popular species used in several sectors. Plantations of species valued in the carving sector should also be established, especially *Dalbergia melanoxylon* and *Brachylaena huillensis*.
- The Forestry Department is confronted with the problem of misuse of permits, in particular with regard to overharvest and detrimental logging techniques.

It should be recognized that improvement of law enforcement and/or management does not always tackle overexploitation or misuse of forest resources successfully. Sometimes a variety of strategies is necessary to achieve proper management and levels of utilization. The Forestry Department, in collaboration with other agencies, such as KWS, should review alternative strategies leading to forest conservation, and in particular should explore the possibility of involving local communities in forest management.

### Improvement of the timber industry

The timber industry in Kenya is conservative in its use of species and processing practices, yet many timber users would benefit from increased use of alternative species and wood products. While shortages of indigenous timber will eventually necessitate this development, active efforts could be made now to widen the range of timbers and types of goods in regular use.

The potential for more extensive use of hardwoods such as those mentioned in Table 11, and in particular *Grevillea robusta*, *Acacia melanoxylon*, *Mangifera indica*, *Eucalyptus* spp., and *Azadirachta indica*, has been well researched around the world. Basic research into wood properties is therefore not required, although additional research on *Eucalyptus* spp. would be useful to perfect its use in the furniture, joinery and flooring sectors: while it is successfully used in other parts of the world, in Kenya it is prone to splitting, cracking and warping. The Kenya Forestry Research Institute (KEFRI) could play the lead role in this effort, with collaboration from members of the timber industry.

Collaboration between KEFRI and the timber industry has great potential, as many timber users are not only eager to ensure a future for their business, but also are concerned about the fate of indigenous forests. The challenge, however, is not to develop links between institutions and business for carrying out research, but to promote the alternative species so that manufacturers and consumers will find them acceptable.

Likewise, a multitude of techniques have been developed around the world to produce wood products which use less solid wood and utilize materials which might otherwise be considered waste substances, but many such materials and techniques are still outside the experience of most Kenyan manufacturers. A launch of these alternative wood products would need to be accompanied by education and training, not only about the products, but also their manufacture.

Another significant problem within the industry involves the quality of the timber received by manufacturers from sawmills. Numerous complaints were heard about improperly dried timber, which after several months inevitably warps or splits. Consequently, many large manufacturers have their own drying facilities. Even so, damage or loss is still prevalent throughout the industry. A forestry training centre for sawmillers has already been established in Nakuru, and courses on grading, treatment and preservation, production, and equipment maintenance are held. Even so, problems of wastage and improper treatment continue to plague the timber industry. This situation can be attributed to irregular course sessions, and poor attendance by those in the industry.

## **RECOMMENDATIONS**

The recommendations listed below largely relate to the three areas requiring attention mentioned in Analysis of Problematic Aspects of The Regulation of Kenyan Timber Trade above.

### **Law Enforcement**

1. Clarify the Presidential Ban on indigenous logging by requesting that the specified legislation be published in the forest gazette.
2. Potential exists under the present terms of the Memorandum of Understanding between the KWS and the Forestry Department to enhance their capacity to enforce existing forest legislation. This potential should be realized and the Memorandum of Understanding strengthened and enhanced to this end, where necessary.
3. The Forestry Department, in collaboration with KWS and other agencies, should review methods to enable more effective monitoring and control of timber once it has left the forest. Means to achieve more effective road-blocks and to conduct market inspections should be explored.
4. Penalties for illegal actions in Forest Reserves should be reviewed and brought more into line with the value of the resource. Additionally, confiscation should extend not only to the timber taken, but to other items, such as saws and lorries. Confiscated material should be sold at the market price and disposal be the direct responsibility of the Forestry Department in collaboration with KWS. Strict records should be kept of all transactions.
5. If the existing legislation is revised in the light of the new forest policy, it must be ensured that revised regulations governing trade in hardwoods provide for adequate control.
6. The system of permits for timber extraction should be improved to eliminate forgery of licences. A standardized licence, which cannot be tampered with, should be developed, with for example, a system of security stamps, or an embossed stamp, unique to each permit. In order to be able to check the validity of permits, a central register of permits should be kept both at headquarters and in designated points in the field so that any official in any agency (police, Customs, etc.) can contact the central register to verify a permit.

Transport permits should also be standardized and should be issued by a single authority.

The permitting system should be streamlined so that all permits are approved at one time by the National Licensing Committee, to avoid the current difficulties in record-keeping.

7. Government officials found to be involved in illegal activities involving forest resources should be dismissed at once and punitive measures applied within the context of existing forestry legislation. The actions of such individuals should be publicized in the local community where the offence occurred. The Forestry Department should make a concerted effort to tackle this issue as it is one of the most important factors impeding effective enforcement of existing forestry legislation.
8. Provide training for prosecutors in the specifics of the Forests Act and the judicial system so that those who violate the Forests Act will not only be apprehended but also convicted. Encourage prosecutors and others involved to increase their commitment to implementation of the Forests Act.

9. Increase communication within the Forestry Department by improving lines of reporting so that Forestry Department Headquarters will be made aware in a timely manner of activities affecting forests under its jurisdiction.
10. Improved communication between the Forestry Department and Customs is wanted: the former should advise the latter of the identity of authorized timber importers and of their allotted volumes authorized for importation. This information should be available to Customs officials at all borders, to assist in the refusal of entry to unauthorized shipments.
11. When imports are received, this information should be relayed to the Forestry Department and the Customs and Excise Department in Nairobi. When import quotas are filled, all ports of entry should be notified.
12. When shipments designated as re-exports enter Kenya, the port of exit should be notified of such transshipments so that their export can be recorded. Failure of shipments to arrive at the destined port of exit should result in punitive action on the part of the Customs and Excise Department and the Forestry Department.
13. The Commissioners of Forestry for Kenya, Uganda and Tanzania have met to expand consultation and collaboration over forestry development; the timber trade has been a focus of their discussions. International collaboration of this nature should be continued and expanded, to regulate the international timber trade effectively.
14. The Forestry Department and KWS should contact the Forest Stewardship Council to request information on timber marking systems, and should maintain communication so that Kenya can develop an appropriate and effective timber marking system.

#### **Forest Management**

15. In order to improve the management of plantations in Kenya, discussions are underway to transfer control of some plantations to private hands. These discussions should be encouraged, as a way of reducing the financial liability of the Forestry Department and promoting active management.
16. Hardwood plantations should be increased. In particular, the establishment of *Ocotea usambarensis* plantations is recommended, as this is one of the most popular species used in the timber industry, and of *Acacia melanoxylon*, an important species in the flooring sector. Plantation establishment of fast-growing hardwoods and species valued in the carving sector should also be encouraged.  
  
Additionally, a study of the long-term benefits of the development of plantation of indigenous species should be carried out, in collaboration with relevant research institutions, so that selection of species for plantations will directly address Kenya's forestry needs.
17. Integrated harvesting methods should be explored to optimize timber use so that the highest quality timber is reserved for specialized sectors of the industry.
18. The possibility of increasing royalty rates for timber harvested should be examined, as this might increase revenue to the Forestry Department and encourage more efficient use of the resource. Additionally, the system of allocation of revenue derived from harvest of timber should be reviewed to determine whether it is possible to channel more funds directly into maintenance of natural forests.



19. It would be useful to examine the possibility of supervising extraction in indigenous forests (where it is still permitted), as well as the harvest of dead and fallen timber, in order to discontinue destructive and/or intrusive logging techniques. The contraction of private logging units, operating in both plantations and indigenous forests, to supply timber for public auction, with profits unrelated to logging operations, might provide satisfactory means to overcome illegal activities associated with logging, and therefore should be examined further.
20. The Forestry Department, in collaboration with other agencies such as KWS, should review alternative strategies to achieve forest conservation (including leases), and in particular should explore the possibility of involving local communities in forest management.
21. Explore the possibility of increased involvement of KWS in forestry sector development, particularly because KWS is jointly responsible for many quality forests in Kenya; there is potential for collaboration especially in and around protected areas.
22. In view of increasing threats from pests such as *Dothistroma pinii*, there is a need to diversify softwood plantation development so that the timber industry is not so reliant on one or two species of trees.

**Improvement of the timber industry**

23. KEFRI, in collaboration with the timber industry, should conduct research on *Eucalyptus* spp. to improve its suitability for use in the furniture, flooring and joinery sectors.
24. In order to change attitudes about alternative timber species, the Forestry Department, KEFRI, the Timber Products Promotions Centre (at Ngong), and the various timber associations in Kenya should collaborate to organize a trade show to exhibit products made from alternative species. Manufacturers need to see that attractive products can be produced, and a trade show, if a reasonable size, could tour Nairobi, Kisumu, Mombasa and Malindi.
25. Promotion of new wood products, such as fibreboard and blockboard, is needed to improve the efficiency of the timber industry and to demonstrate that there are viable alternatives to solid wood products. A trade show should be arranged to display these new products.
26. Training in the manufacture of new wood products must accompany their promotion. The Forestry Department should approach suitable institutions which have both conducted research on these products and developed training methods for their promotion, to bring this technology to Kenya. Suitable institutions include government forestry research agencies, in the USA and countries in Europe, for example, which conduct training courses attended by individuals in forest-products industries from the world over. The obstacle of funding such training may possibly be overcome with assistance from organizations such as the International Tropical Timber Organization, or government aid agencies. The timber associations within Kenya should be involved in any preparatory plans for training and development of new products within the country.
27. Efforts must be made to reduce the amount of wastage which occurs in the timber trade as a result of improperly dried or treated timber. Training in efficient and effective methods of timber treatment should take place, both at the forestry centre in Nakuru, and at designated sawmills around the country, as sawmillers may be more likely to attend courses if they are held locally.

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**NOTES**

<sup>1</sup> The Kenya Indigenous Forest Conservation Programme ran from 1991-94. Its overall mission was to promote and support the conservation of biodiversity, ecological services and productivity of indigenous closed-canopy forests in Kenya, through improved management. Major fields of work included determination of the status and trends of the natural forests; initial piloting of innovative approaches to forest management, including promotion of community participation; and support to institutional development and strengthening for forest conservation and management.

The programme was funded by the Overseas Development Administration of the UK Government.

<sup>2</sup> Scientific names for species are used throughout in this text. Where possible, a common synonym is given where initial reference to a species is made.

Whereas there are generally familiar common names for animals, for plants this is not always the case. Furthermore, common species names may be well known in some areas yet unheard of in others. *Milicia excelsa*, for example, known as Mvule in East Africa, is referred to as Iroko further west and in Europe. Thus scientific names have been used to minimize potential confusion.

## **APPENDIX 1**

### **Conversion rates**

During this study the following conversion rates were used:  $1\text{m}^3 = 424 \text{ board feet (bd ft)}$  = approximately 0.7t (of hardwoods). One lorry was estimated to hold 10t, or roughly 6000bd ft, although some sources indicate that lorries may vary in size from seven tonnes to 14t, or may not be full to capacity. Because of this variability, where possible estimates for volumes were obtained in board feet or cubic metres as these are generally much more reliable. Figures are quoted in the report in cubic metres, as this is the most widely used unit internationally. However most figures obtained from timber users were in board feet, still the preferred unit in Kenya. Virtually all figures given are approximate estimates and have therefore been widely rounded up or down in conversion.

In July 1994, Ksh60 = US\$1.00.

### **Obstacles encountered during the study**

Difficulties were encountered in estimating the volume of timber used in Kenya, by species, market, and region for the following reasons:

- It was not possible to interview every timber user in Kenya. However, the interviewers focused on a representative sample of users from different sectors of the industry, from which overall figures for volume were extrapolated.
- As a proportion of the trade in local hardwood species is illegal, it can be expected that some informants withheld information, or provided distorted information, to indicate lower rates of timber consumption than in actuality.
- While many informants were quite open about the volume of timber used, many could only provide approximate figures for use. Volume used was often reported in a variety of units (usually board feet, cubic metres, tonnes, or lorry loads). Users in the construction and furniture industries noted that volumes used were often dependent upon contracts, which vary from year to year, and usually reflect the state of the economy.
- Some informants provided figures for combined hardwood use, and could only roughly estimate the proportion by species. Additionally, it was sometimes unclear as to the exact identity of a species because non-standard names are widely used, and different species are often referred to under a general name such as "mahogany". Occasionally an informant did not know what type of timber they were using.
- Estimates of usage volume by sector (e.g. joinery, furniture, flooring) were complicated by the versatility of manufacturers. Many manufacturers are routinely involved in several different sectors (e.g. many joiners also make furniture), while others may make products (e.g. flooring) as a by-product of other timber uses. These complications will have led to some double-counting.

Owing to the reasons mentioned here, volumes quoted in this report should be viewed as order of magnitude estimates. As such, they are reasonably reliable.

## APPENDIX 2

### Indigenous species

#### *Acridocarpus zanzibaricus*

**Distribution:** Coast Province; Mount Lorienatum, Northern Turkana above 2000ft.

**Common Names:** Mwenda-usiku, Mtandusi, Mkenda-ya-paka (Swahili); Finyangurura (Sanya); Edapalakuyen (Turkana); Chandarusi.

**Uses:** Timber.

**Other Comments:** This species was exploited in the past; it is not known whether exploitation is taking place at present.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

#### *Azelia quanzensis*

**Distribution:** Coast Province.

**Common Names:** Mahogany Bean, Lucky Bean Tree; Mkumbakusi, Mbambakofi (Swahili); Mwamba (Giriama); Yamicha (Sanya); Yam-ed (Boni).

**Uses:** Furniture, doors, dhows, carving.

**Other Comments:** This is the primary species used by Lamu carvers.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

#### *Albizia gummifera*

**Distribution:** Highland forests from 5000 to 8000ft.

**Common Names:** Peacock Flower; Mukuriwa, Mukurue (Kikuyu); Mwethia (Kamba); Msarawachi (Taita); Kiriwigri (Taveta); Set, Seyet (Nandi, Lumbwa or Kipsigis); Se (Kamasia or Tugen, Cherangani); Mukhonzuli (Kakamega); Sogore (Samburu); Omugonjoro (Kisii).

**Uses:** Furniture.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

#### *Albizia versicolor*

**Distribution:** Kwale District 10-300 m, also in Tanzania.

**Common Names:** Mchani-ndovu; Mtanga.

**Uses:** Timber.

**References:** Kenya Bureau of Standards, 1976.

#### *Aningeria altissima*

**Distribution:** N. Nyanza District, Kakamega Forest, 5500ft.

**Common Names:** Mukangu (Kakamega).

**Uses:** Heartwood is pale pink, good quality, easy to saw and suitable for construction.

**References:** Dale and Greenway, 1961; Omollo, 1991b.

#### *Antiaris toxicaria*

**Distribution:** Central and North Nyanza Districts (Kakamega Forest), Lamu District (Witu), Kwale District (Shimba Hills).

**Common Names:** Antiaris, False Iroko, False Iroko, Upas Tree; Mulundu (Kakamega); Mkunde (Swahili); Mnguunguo (Digo).

**Uses:** Superficial resemblance to *Milicia excelsa*; white cloth is produced from the bark.

**References:** Dale and Greenway, 1961.

*Bosqueia phoberos*

**Distribution:** North Nyanza (Kakamega and Nandi Forests), Lamu and Kwale Districts.

**Common Names:** Lubelakaya, Mballakaya (Kakamega); Mlandege, Mlanyuni (Swahili).

**Uses:** Timber.

**Other Comments:** The sap produces a red dye.

**References:** Dale and Greenway, 1961; Omollo, 1991b.

*Brachylaena huillensis*

**Distribution:** Coast Province; Central Province and mixed forest remnants from 5000 to 6000ft from Ngong to Nyeri; possibly in Nyanza Province. Also found in Uganda (S. Busoga)

**Common Names:** Muhugu (Kikuyu); Muhuhu (Swahili); Mvumo (Digo); Mshenzi, Watho (Sanya); Kipungupungu (Taita); Avud (Boni); Mubuubu (Kamba).

**Uses:** Wood carving; formerly used for furniture.

**Other Comments:** Patchy distribution.

**References:** Dale and Greenway, 1961; Kigomo, Savill and Woodell, 1991; Omollo, 1991a; Robertson and Luke, 1993; Thomson and Ochieng, 1993.

*Brachystegia spiciformis*

**Distribution:** Kwale and Kilifi Districts.

**Common Names:** Mrihi, Mriti (Swahili); Sorsor (Sanya); Mjombo (Giriama).

**Uses:** Furniture; joinery, timber.

**References:** Dale and Greenway, 1961; Omollo, 1991a; Thomson and Ochieng, 1993.

*Combretum schumannii*

**Distribution:** Coastal forests and Machakos District (Kibwezi).

**Common Names:** Mgurure, Mpera-Mwitu (Swahili); Mgurulu (Boni); Mungulule (Giriama); Mgongolo (Digo); Muranyani (Sanya); Mlanyika (Nyika).

**Uses:** Wood carving; poles; charcoal.

**Other Comments:** Use in wood carving has increased recently owing to depletion of preferred species.

**References:** Dale and Greenway, 1961; Omollo, 1991a; Thomson and Ochieng, 1993.

*Cordia abyssinica*

**Distribution:** In forest and savanna from 1200 to 2000 m; common in Central Province and Meru District, also in Kakamega Forest.

**Common Names:** Mukamari (Kakamega); Muringa (Kikuyu); Muzigio (Meru); Samut (Kamasia or Tugen); Samotet (Nandi); Mugengere, Mugunguret (Sebei); Muringaringa (Taveta and Taita); Chibulukwa (Samburu); Mukobokobo (Kisii).

**Uses:** Furniture.

**Other Comments:** Wood pinkish brown; moderately durable and resistant to termites.

**References:** Dale and Greenway, 1961; Noad and Birnie, 1992.

*Cynometra suaheliensis*

**Distribution:** Coastal forests.

**Common Names:** Mfunda (Swahili).

**Uses:** General sawn timber.

**References:** Robertson and Luke, 1993.

*Cynometra webberi*

**Distribution:** Coastal forests.

**Common Names:** Mutunga; Mfunda (Swahili); Sakucha (Sanya).

**Uses:** Wood carving; building poles.

**Other Comments:** Occurs in nearly pure stands.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

*Dalbergia melanoxylon*

**Distribution:** Coast, Southern and Northern Provinces below 4000ft.

**Common Names:** African Blackwood, Poyi, African Ebony; Mpingo, Kikwaju (Swahili); Mboranguluwe (Digo); Samachi (Boni); Mwengo (Meru).

**Uses:** Wood carving, musical instruments.

**Other Comments:** This timber is considered to be the most valuable in East Africa; recent prices are as high as US\$10 000 per cubic metre.

**References:** Dale and Greenway, 1961; Mpingo film; Omollo, 1991a; Thomson and Ochieng, 1993.

*Dombeya goetzenii*

**Distribution:** Highland forest 2100-2800 m.

**Common Names:** Mukeo; Ol Subukiai (Masai); Sibukuet (Nandi); Bordet (Elgoni); Borowa (Marakwet).

**Uses:** General timber.

**References:** Kenya Bureau of Standards, 1976.

*Fagara macrophylla* (also known as *Zanthoxylum gillettii*)

**Distribution:** Nadi, Nyanza and Kericho Districts and south Mount Kenya; 5000-6000ft.

**Common Names:** East African Satinwood, Olon; Sagawa, Sagawatiet, Sagawat, Sagawoita (Nandi, Lumbwa or Kipsigis); Shikuma (Kakamega); Muhoho (a language in Nyanza Province); Muchagasa (Kikuyu).

**Uses:** Furniture, construction.

**Other comments:** Heavily used locally; not in great demand.

**References:** Dale and Greenway, 1961; Thomson, 1993.

*Funtumia latifolia*

**Distribution:** Mombasa and Kwale Districts.

**Common Names:** Bastard Wild Rubber; Mutondo (Kakamega).

**Uses:** Furniture.

**References:** Dale and Greenway, 1961.

*Hagenia abyssinica*

**Distribution:** High altitude forest above 9000ft.

**Common Names:** Rosewood; Muhonde, Muriziku, Muinyeri, Mungagond, Mumondo, Kamonde (Kikuyu); Mujogajoja (Meru); Njororuet (Nandi), Bondet (Lumbwa or Kipsigis); Seweruwa (Marakwet); Sigurwa, Sokoruet (Sebei); Omokunakuna (Kisii).

**Uses:** Furniture, joinery, construction.

**Others:** Not highly sought after.

**References:** Dale and Greenway, 1961; Omollo, 1991b.

*Juniperus procera*

**Distribution:** Dry highland forests from 3500-9500ft.

**Common Names:** East African Pencil Cedar, Cedar; Torokio (Sebei); Mutarakwa (Kikuyu); Ndarakwa, Mukuu (Kamba); Ol-Tarakwa (Masai); Tarakwet (Nandi); Tarakit (Suk); Tarokwa (Marakwet, Kamasia or Tugen); Teet (Ndorobo); Murana (Meru); Ethaiteit (Turkana); Aru (Boran).

**Uses:** Posts, construction, joinery, flooring, furniture.

**Other Comments:** An excellent timber for construction as it is very durable and resistant to termites. It is now very depleted. Growth rate is slow and regeneration is dependent upon removal of the adult. Previously exported to Europe for the manufacture of pencils.

**References:** Dale and Greenway, 1961; Thomson, 1993.

*Khaya* spp. (*K. grandifolia* and *K. senegalensis*)

**Distribution:** West tropical Africa from the Guinea Coast to Cameroon and east through the Congo basin to Uganda and parts of Sudan.

**Common Names:** Mahogany.

**Uses:** Furniture, joinery, decorative veneers.

**Others:** All timber used in Kenya is imported.

**References:** Chudnoff, 1984; Constantine, 1975; Emerton, 1992.

*Maesopsis eminii*

**Distribution:** North Nyanza District, Kakamega forest, found around 5000ft.

**Common Names:** Musizi; Muhunya, Mutere (Kakamega).

**Uses:** Construction, joinery.

**Other Comments:** The wood is not resistant to termites or fungus and must be treated before use.

**References:** Dale and Greenway, 1961.

*Manilkara sansibarensis*

**Distribution:** Coast Province.

**Common Names:** Mngambo, Mguvi, Mwambom Mti-chuma (Swahili); Doka (Sanya).

**Uses:** Boat building, construction, large building poles.

**Other Comments:** Excellent for timber for bridges.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

*Milicia excelsa* (= *Chlorophora excelsa*)

**Distribution:** Tropical Africa, and in Kenya in the Coast, Central (Meru District), and Nyanza Provinces up to 4500ft.

**Common Names:** Iroko; Mvule (Swahili); Mururi (Meru); Minarui (Boni); Murie (Taveta); Olua (Luo).

**Uses:** Furniture, joinery.

**Other Comments:** Sparsely distributed owing to heavy exploitation. Most timber used in Kenya imported.

**References:** Dale and Greenway, 1961; Omollo, 1991a; Thomson and Ochieng, 1993.

*Nesogordonia parvifolia*

**Distribution:** Coast Province, Arabuko-Sokoke and Witu forests.

**Common Names:** Mrunza, Muheru (Swahili); Papan (Sanya).

**Uses:** Timber.

**Other Comments:** Wood is reddish; hard but not durable.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.



*Newtonia buchananii*

**Distribution:** Riparian and other moist forests in Eastern Kenya, 1200-1900 m, including Mount Kenya and Taita Hills.

**Common Names:** Mukui (Kikuyu and Meru); Makuruma mofu, Mwosi (Taita); Mseri (Taveta).

**Uses:** Timber.

**Other comments:** Can be a substitute for *Ocotea usambarensis*.

**References:** Kenya Bureau of Standards, 1976.

*Newtonia paucijuga*

**Distribution:** Kwale and Kilifi Districts.

**Common Names:** Mkunguni, Mche (Swahili); Mbagazembe (Giriama).

**Uses:** Timber.

**References:** Dale and Greenway, 1961; Thomson and Ochieng, 1993.

*Ocotea usambarensis*

**Distribution:** Rift Valley (south Kamasia), Central (Aberdares and Mount Kenya) and Coast Provinces (Taita hills); 4-8000ft.

**Common Names:** East African Camphor Wood, Camphor; Muzaiti, Muziti (Kikuyu); Muura (Meru & Mwimbe); Muzura (Embu); Manyoda Munganga, Mukongo (Taita).

**Uses:** Furniture, construction, joinery.

**Other comments:** The most widely used hardwood in Kenya.

**References:** Dale and Greenway, 1961; Omollo, 1991a; Omollo, 1991b; Thomson, 1993; Thomson and Ochieng, 1993.

*Oldfieldia somalensis*

**Distribution:** Coast Province.

**Common Names:** Mbauri, Mbambara (Swahili); Bauri, Babara, Barabara (Boni); Bora (Sanya); Borangi, Mbirandu (Giriama).

**Uses:** Timber.

**References:** Dale and Greenway, 1961.

*Olea africana*

**Distribution:** From northern Ethiopia to South Africa; from 750 to 3000 m.

**Common Names:** African Olive; Musharagi.

**Uses:** Carving; flooring.

**Others:** Heavily exploited in some areas for charcoal.

**References:** Noad and Birnie, 1992; Thomson and Ochieng, 1993.

*Olea welwitschii*

**Distribution:** Rainforests such as Elgon, Kakamega, Kamiosi; 4500-6500ft.

**Common Names:** Elgon Teak, Elgon Olive; Musharagi (Kikuyu); Ol-loliondo (Masai); Murguiwet (Nandi); Muruguguyet (Ndorobo); Bumondet (Elgeyo); Muukuru, Muriuntui (Meru).

**Uses:** Furniture, flooring, veneer.

**References:** Dale and Greenway, 1961; Omollo, 1991b.

*Pleurostylia africana*

**Distribution:** Coastal forests.

**Common Names:**

**Uses:** General timber.

**Other comments:** Not normally known as a timber species.

**References:** Robertson and Luke, 1993.

*Podocarpus gracilior*

**Distribution:** 1500 to 2400 m.

**Common Names:** Podo, East African Yellow-wood; Muthengera (Kikuyu).

**Uses:** Furniture.

**References:** Noad and Birnie, 1992; Thomson, 1993b.

*Podocarpus milanjianus*

**Distribution:** Widely distributed from 900 to 3150 m, also found from Central Africa down to South Africa.

**Common Names:** Podo, East African Yellow-wood; Muthengera (Kikuyu).

**Uses:** Furniture.

**References:** Noad and Birnie, 1992.

*Prunus africana*

**Distribution:** Above 1500m throughout East, Central and Southern Africa, also in Madagascar and several other islands.

**Common Names:** Red Stinkwood; Muiri (Kikuyu).

**Uses:** Furniture.

**Other Comments:** Also harvested extensively for its bark which is exported to Europe to treat prostate gland hyperatrophly.

**References:** Cunningham and Mbenkum, 1993; Noad and Birnie, 1992; Omollo, 1991b.

*Pterocarpus angolensis*

**Distribution:** South-central Africa.

**Common Names:** Mninga; Mtumbati (in Tanzania); Mutele (in Angola); Mukwa (in Zimbabwe); Kiatt, Kajat (in South Africa).

**Uses:** Timber.

**Other Comments:** Imported to Kenya from Tanzania.

**References:** Chudnoff, 1984; Emerton, 1992.

*Scorodophloeus fischeri*

**Distribution:** Coastal Forests.

**Common Names:** Mvande; Mugodoma (Swahili).

**Uses:** Timber.

**Other comments:** Not widely known as a timber species, apparently confused by sawmillers with *Cynometra suaheliensis*.

**References:** Robertson and Luke (1993).

*Strychnos usambarensis*

**Distribution:** Nairobi, Central Province, Kakamega Forest.

**Common Names:** Mutikani (Kikuyu).

**Uses:** Timber

**References:** Noad and Birnie, 1992; Omollo, 1991b.

*Tamarindus indica*

**Distribution:** Widely distributed in drier grassland from the coast to 1500 m.

**Common Names:** Tamarind; Mkwaju, Msisi (Swahili).

**Uses:** Fence posts.

**References:** Noad and Birnie, 1992.

*Terminalia spinosa*

**Distribution:** Coastal forests and dry areas.

**Common Names:**

**Uses:** Building poles.

**References:** Noad and Birnie, 1992; Thomson and Ochieng, 1993.

*Trichilia roka*

**Distribution:** Widely spread from sea level to 6000ft.

**Common Names:** Mururi (Kikuyu); Mutwati (Kikuyu and Meru); Munyama, Musinzi, Ivojo (Kakamega); Mnwamaji, Mnwamai, Mti-mai (Swahili); Mudi-madi (Digo); Anona (Boran).

**Uses:** Timber.

**Other Comments:** Soft wood that is easy to work but is perishable in the ground.

**References:** Dale and Greenway, 1961.

*Vitex keniensis*

**Distribution:** Mount Kenya, 5-6000ft.

**Common Names:** Meru Oak; Muhuru (Kikuyu); Muuru, Moru (Meru).

**Uses:** Furniture, veneer.

**References:** Dale and Greenway, 1961.

*Xymalos monospora*

**Distribution:** Wet highland forests from 4000 to 8500ft (such as Teita Hills and Kasigau).

**Common Names:** Lemon Wood; Murendetie, Mukuhokuho (Kikuyu); Muako (Meru); Serweriet (Lumbwa); Kipteldet (Sebei); Kiptassi (Markawet); Ndido-ya-kisaga, Mamasungu (Taita); Kalkaldet (Ndorobo).

**Uses:** Poles, posts.

**Other Comments:** Wood is greenish brown and easy to work.

**References:** Dale and Greenway, 1961.

**Exotic species**

*Acacia melanoxylon*

**Common Names:** Australian Blackwood.

**Uses:** Flooring, furniture, joinery.

**Other Comments:** Looks similar to *Olea welwitschii* and is quite hard, therefore is suitable for flooring. In Kenya was planted by Australian settlers along roads and in gardens. Supply is therefore limited yet this species grows quickly and should be promoted as an alternative to indigenous hardwoods.

*Azadirachta indica*

**Common Names:** Neem.

**Uses:** The Akamba Co-operative in Mombasa is experimenting with this species for use in wood carving; initial trials have proved satisfactory.

**Other Comments:** Planted in agroforestry systems in Kenya.

**References:** Omollo, 1991a; Thomson and Ochieng, 1993.

*Casuarina equisetifolia*

**Common Names:** Whistling Pine; Mvinje (Swahili).

**Uses:** Building poles.

**Other Comments:** Plantation establishment developing along the coast.

**References:** Noad and Birnie, 1992; Omollo, 1991a.

*Cupressus lusitanica*

**Common Names:** cypress.

**Uses:** Doors, panelling, furniture.

**Other Comments:** After 40 years, trees may suffer from heartrot, thus the species is conducive to a short rotation. Widely grown in plantations in Kenya.

*Eucalyptus spp.*

**Common Names:** blue gum; saligna; eucalyptus.

**Uses:** Furniture, flooring, construction, poles.

**Others:** Widely considered unsuitable for flooring as the wood warps after several years. However, some manufacturers have produced satisfactory flooring and this may be owing to higher quality treatment (drying and treatment). Increasingly used for furniture as indigenous timber supplies become irregular.

**References:** Omollo, 1991a; Omollo, 1991b.

*Fraxinus pennsylvanica*

**Common Names:** Green Ash.

**Uses:** Furniture, joinery.

**Other Comments:** This species has strong timber which in North America is frequently used for baseball bats and tool handles.

**References:** Constantine, 1975; Thomson, 1993.

*Grevillea robusta*

**Common Names:** Grevillea, Silky Oak; Mukima (Kikuyu).

**Uses:** All-purpose timber, carving.

**Other Comments:** Introduced as a shade tree and windbreak for coffee crops, but was found to harbour a fungus damaging to tea and coffee plants. Now useful as an agroforestry tree, for fuelwood, and for timber. Experimental wood carving is now taking place.

**References:** Noad and Birnie, 1992.

*Mangifera indica*

**Common Names:** mango.

**Uses:** Wood carving, dugout canoes.

**Others:** Furniture carvers in Lamu regard the species as an acceptable alternative to their usual carving species, as it is relatively easy to carve, yet still a sturdy timber. Even so, it is used only on a very small scale in Lamu; use is higher near Mombasa where indigenous timber supplies are depleted.

**References:** Thomson and Ochieng, 1993.

*Pinus patula*

**Common Names:** pine.

**Uses:** Construction, panelling, pre-fabricated houses, for the inner core of plywood.

**Other Comments:** Not a popular species. Needs to be treated to be termite-resistant, is generally a weak timber, and suffers from blue-staining. Blue-staining is the result of fungal attack; after felling, the fungus feeds on starch in the wood, and a blue stain develops. This necessitates treatment to hide stains. Is easy to peel, hence used as inner core of plywood.

**References:** Omollo, 1991a.

*Pinus radiata*

**Common Names:** pine.

**Other Comments:** This species forms large knots which make it weak and therefore unpopular. It has also experienced intense pest problems in Kenya and is no longer planted. Like all pines, it is susceptible to blue-staining.

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