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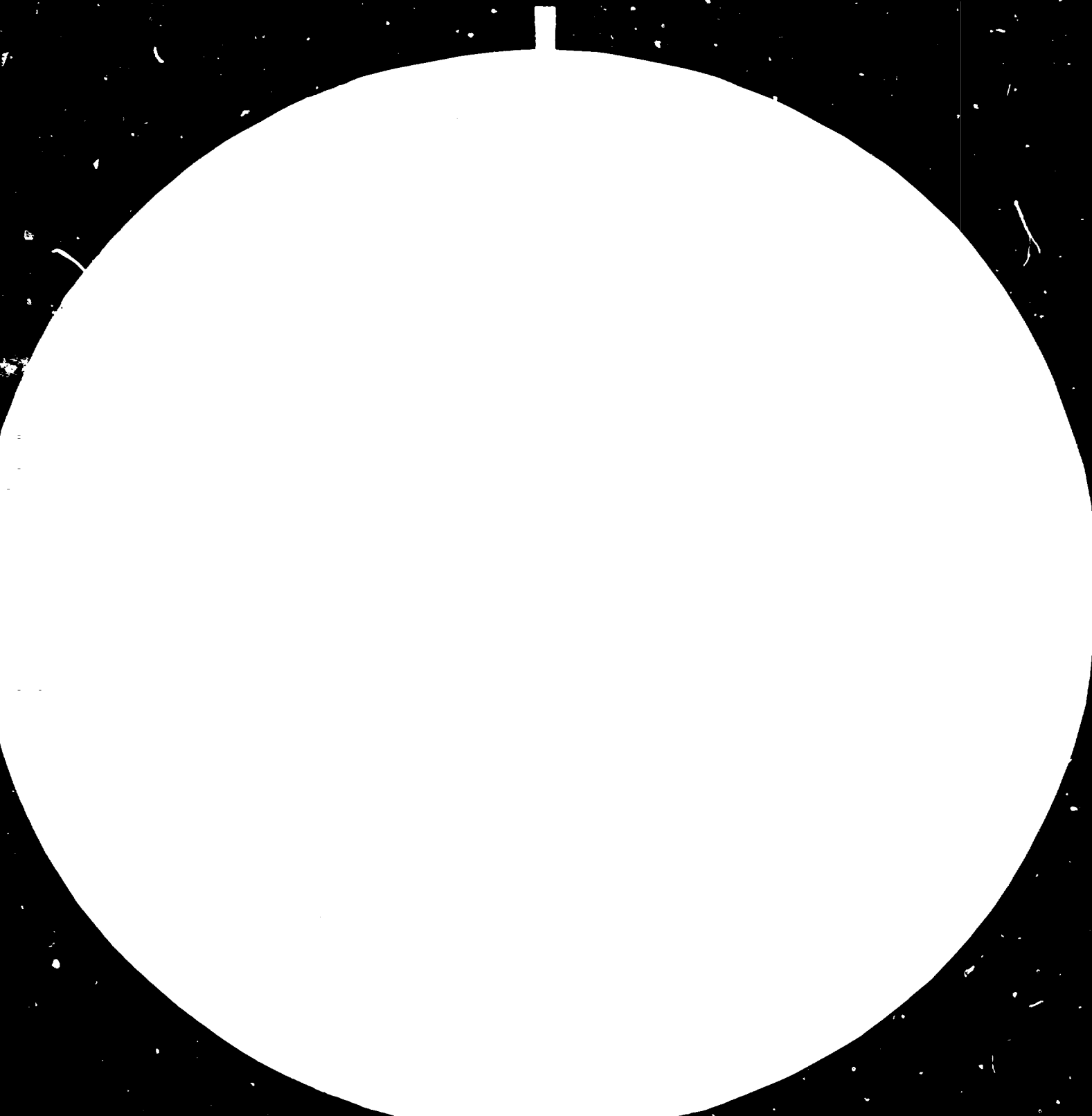

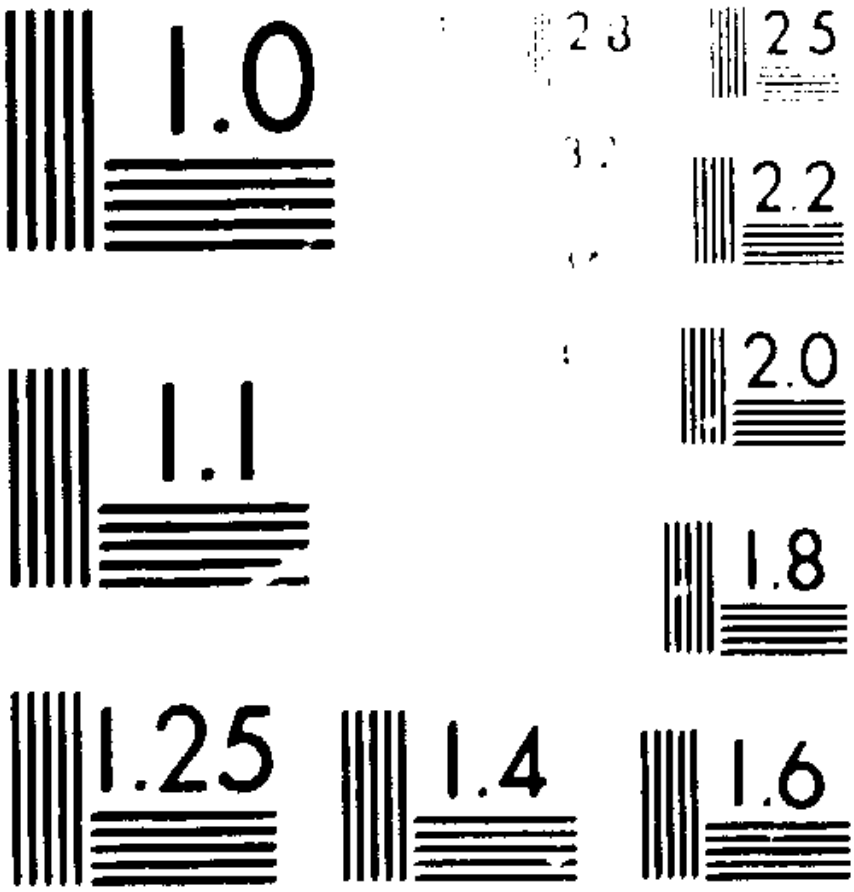
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ASSESSMENT OF FOREST RESOURCES AND WOOD PROCESSING INDUSTRIES IN SELECTED AFRICAN COUNTRIES *

by

Albert Mazel
UNIDO Consultant

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ACKNOWLEDGEMENTS

The Consultant wishes to express his appreciation for the invaluable assistance given him during the mission by the representatives of Governments, industries and other Organizations or individuals involved with the Forestry sector in the visited countries.

The Consultant is particularly indebted to the UNIDO - UNDP representatives for their programming during the field mission. The high level of understanding achieved with the government officials, the industrialists and other individuals, was to a large measure the result of the preparation work of UNIDO - UNDP representatives.

A.M.

SUMMARY OF FINDINGS

Commencing January 3, 1982 and continuing into February 28, 1982 the Consultant carried out a technical mission in seven selected African countries studying the forest resources and wood processing industry according to the mandate given him by the Negotiations Branch of the United Nations Industrial Development Organization in Vienna.

The general objective defined by the Industrial Development Board was to prepare a working paper on Wood and Wood Product Industry in selected African countries aiming particularly at the identification of major constraints to the development of the sector.

The findings discussed in this document are basically derived from:

- interpretation and assessment of the latest available information related to the Forest resources and Forest based industry in Africa.
- field visits undertaken in seven African countries, i.e. Ethiopia, Kenya, Zaire, Congo, Central African Republic, Cameroon and Ivory Coast.
- professional assessment of the present status and expected future development in the sector.

The major constraints affecting the Forest resources are identified as follows:

- considerable losses of forest land due to excessive fuelwood cutting, deforestation for agricultural purposes or other activities.

- the rate of replacing the above described losses by industrial and non-industrial plantations is far from being sufficient (with some exceptions) in terms of hectares of planted areas.

- insufficient knowledge on behalf of the forest services on forest resources (forest surveys covering mostly a part of the forested areas).

- in the absence of long term forest policy the proper management and administration of forest resources is generally poor and insufficient.

- shortage of professionals at the lower level (forest technicians, forest guards).

- lack of up-to-date forest statistics.

- complicated methods of forest taxation and techniques of tax collection.

Establishing and increasing of areas of industrial and non-industrial plantations in order to provide fuelwood - charcoal for rural and urban population and the roundwood for industrial purposes appears to be given priority at the present time. The cost of regeneration of tropical forests can not be charged to the producing countries only. External sources of financing will be needed.

Strengthening of forest services both in human resources and material requirements is needed in order to assure the full responsibility in forest survey undertakings, in allocation resources, in proper management and administration of the forest estate. It may be anticipated that financing could be provided through bilateral aids or other external sources.

Simplify the existing methods and techniques of taxation and tax collection in the forestry sector in order to get a clear picture as to the contribution of the sector to the country economy appears as an objective to be achieved shortly.

WOOD PROCESSING INDUSTRY (primary wood processing)

The wood processing industry presents a very complex picture. There is no general medication to be used or applied in dealing with the sector. The specifics identified in each country should be considered and respected.

The list of constraints affecting the sector would be long, however the main constraints would be as follows:

- it is hard to accept that, in principle, there is no economical or rational utilization of the existing forest resources. Selective and very selective cutting is common practice in the industry.

- in spite of government policy restrictions in most countries in regards to the export of logs, this activity is seen to be very attractive in many countries. As a result the rapid disappearance of some high quality species becomes reality.

- the production line is relatively short (poor), sawnwood remains the main product, processing in small or medium size sawmills is common. Few integrated complexes where better utilization of wood raw material in more elaborated products is done, operate in the region.

- raw material utilization factor is generally low due to losses in the felling areas and during the processing.

- with some exceptions, there is no utilization of solid wood residue either from forest exploitation or transformation at mills.

- options to use wood as a source of energy or to other purposes are either neglected or under studies.

- lack of infrastructures required for evacuation and transport of forest products (roads, river transport, railway) contributes in some countries to the poor performance of the sector.

- lack of capital to replace obsolete equipment and to acquire spare parts.

- due to increasing shortage of raw material, the expansion of the primary wood processing industry in the near future is likely not to be expected. (sawmilling particularly).

- relatively low production with regard to the installed capacity.

- need for co-ordinating and establishing production costs at country level followed by a comparative study at the regional level.

A clear government-policy should be formulated and come into effect in order to assure rational utilization of forest resources. The first step should be the use of secondary species and in developing at the same time the local market.

The increase in local processing to balance the reduction in log exports should be accompanied by a market analysis at the regional level and overseas markets.

Primary wood processing is a capital intensive activity hardly to be realized in small production units. Larger integrated wood processing complexes capable to use appropriate technology are expected to be implemented in the region.

The combined mechanical, semi-chemical and chemical processing of wood raw material is likely the most appropriate way to be followed.

Large amounts of investments mainly for infrastructure improvement projects should be provided from external sources.

Regional organizations like U.D.E.A.C. (Union douanière des Etats de l'Afrique Centrale) are called to play an important role in the near future as to the development of the sector.

The modernization of the industrial sector will be needed in order to cope with the requirements on external markets. Comparative study as to technology and equipment presently used in primary wood processing industry should be conducted at the regional level.

Training centers for skilled labour will be required according to specific needs of a country.

Secondary Wood Processing

By definition it may be understood that the secondary wood processing industry is performing by using raw material products coming from primary wood processing, such as lumber, veneer, all types of wood panels, etc.

On the African Continent, there is no precise line separating the primary and secondary wood processing industry. In many cases, and countries, these two industries merge and operate as integrated units.

However, the secondary wood processing industry keeps under African conditions some specific features.

First: there is a group of individuals or small producers making in an artisanal way mainly furniture and other household wood based articles. (called in this paper: artisanals)

Second: there exists a group of real industrialists specializing in manufacture of furniture, building and house components, prefab houses, etc., all this at the industrial level.

While there are no accurate statistics about the first group, with the exception of the number of undertakings eventually realized by gross revenue, data about production and performance of the second group are, in principle, available and seems to be more accurate. (called in this paper : industrialists)

The constraints affecting the group of artisanals are as follows:

- listing of members belonging to this group is inaccurate and in many cases hard to assess.
- performance is generally poor and depends largely of the individuals capabilities.
- there is no fixed pricing for the products manufactured by this group.
- manufactured products are for local market only

As to the group of industrialists the main constraints are as follows:

- shortage of raw material of acceptable quality
- lack and therefore a definite need for skilled labour (local training centers, priority given to training abroad,
- industry mainly in hands of expatriates.

The secondary wood processing industry being oriented in principle, to local market, it is anticipated that regroupment of small production units, followed by implementation of new ones will mark the future development. In fact, increased demand, mainly from government agencies calls in many cases for production in series.

Government incentives, promotion actions, and other measures will be needed to increase consumption of secondary wood processed products on the local market.

Adequate pricing should be introduced in order to make products available to local population.

The potential of regional markets should be studied.

The training of skilled labour, formation of managerial personnel should be given priority.

The replacement of old machinery and acquisition of new equipment is strongly recommended. Technical and financial assistance from bilateral sources is anticipated.

Taking into account the increasing demand of forest products on local markets it is believed that the secondary wood processing industry will have to be strengthened. The appropriate approach for developing this potential should be studied under specific conditions in each country.

Following topics should be given special consideration:

- rational utilization of the tropical forest resources, regeneration and improvement of forest management considering appropriate institutional and financial implications.
- up-grading of the existing wood processing industry in the producing countries in order to achieve better valorization of existing wood raw materials.

- increase the degree of wood processing in the producing countries in full respect of reliable marketing studies, consequently provide to governments clear basis for the consideration of specific measures to overcome the trade, investment and market access.

- establish and maintain a close and effective working relationship with regional and international organizations concerned with activities relating to tropical forest resources.

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Forestry Economist

Canmore, Alberta, Canada
March, 1982

ETHIOPIA

General Data

Total area	- 1,221,895 sq. km.
Estimated population	- 31,520,000 inhabitants
Population growth rate	- 2.5% per year

FOREST RESOURCES

According to F.A.C. Tropical Forest Evaluation Report (1981) the following description of the vegetation types is given in classifying the land area of Ethiopia:

	In Million Hectares
Mountain steppes	1.3
Mountain savannas	16.7
Mountain woodlands	0.8
Highland forests	4.2
Lowland woodlands	27.5
Lowland savannas	14.7
Lowland steppes	48.5

The above mentioned firgures are estimates only.

The total area of the Highland Forests, i.e. 4.2 million hectares may be compared with 2.74 million hectares of high forest identified in the reconnaissance inventory in 1979.

Most of the forest cover is located in the south-western and south-central part of the country. About 850,000 hectare of these forests are dominated by softwood, particularly the two all-purpose timber species, i.e. Zigba (Podocarpus Gracilor) and Tedh (Juniperus Procera). The rest of the area of closed forest contains many hardwood species, some of which are used for general construction work and plywood manufacturing.

The lowland woodlands estimated at close to 28 million hectare are dominated by Acacia species which provide an excellent firewood for local consumption and for the production of charcoal to outside markets, mostly to urban areas.

Consumption of fuelwood is estimated to be about 20 million cubic meters and consumption of charcoal about 150,000 tons per year

Lowland woodlands also provide large volumes of poles and other material for house building. According to "Report on the Volume of Species of Economic Importance (Oquist, 1979)" all the (physically) accessible dense forest areas have been estimated at 3.1 million hectares which represents approximately 3% of Ethiopian land area. Estimates on the total volume available from this area is given in the following table:

GROUPS OF SPECIES	MERCHANTABLE STEMS 30 cm DBH. M cu. m.
Coniferous	21
Commercial hardwood (presently used)	110
Potentially usable hardwood	49
Others	32
Total volume	212

Considering volumes of coniferous and commercial hardwood species only, i.e. 131 million cubic meters, it is anticipated that on a sustained yield basis the annual allowable cut would be in the order of 2.6 million cubic meters. (Kvarnback and Natvig Report, 1979, prepared for Forestry and Wildlife Development Authority (FAWDA)

Forest land belong to either state or local communities. In practice, forest areas larger than 800 hectare are considered State Forests, and those smaller, Peasant Forests controlled by the local Peasant Associations.

While the present forest utilization aims, in principle, at the needs for fuelwood and building material the commercial exploitation became of secondary importance. 110,000 cubic meters was the volume of industrial roundwood harvested for the season 1978/79.

It is believed that some 200,000 hectare of forest lands are lost annually as a result of grazing practices, clearing for pastureland and for agriculture. Excessive cutting for commercial purposes (fuelwood commerce and charcoal production) contribute also to deforestation. Areas affected are mainly woodlands and shrubland, to a lesser extent the closed forests.

About 1,200 hectare of industrial plantations, mostly of coniferous species are estimated to be established at the end of 1980. Areas of established non-industrial plantations to be used for fuelwood, building material and to a lesser degree as raw material for particle board and fibreboard consisting mainly of Eucalyptus and other fast-growing species is estimated at 1980 to be 97,000 hectares.

Under the Proclamation dated September 5, 1980 the forestry administration was established as an autonomous authority within the Ministry of Agriculture, the Forestry and Wildlife Conservation and Development Authority (FAWCDA).

WOOD PROCESSING INDUSTRY

Sawmilling in Ethiopia started in the middle of the 1920's. The big expansion came about in the 50's and the early 60's. Maximum production was probably reached around 1965 with a production of about 100,000 cubic meters of lumber and an additional 10 to 20,000 cubic meters from pitsawers.

The lumber production recorded in the 1971/72 ECA survey of woodworking industries was per region as follows:

AREA	No. OF MILLS	1,000 cu. m. LUMBER PRODUCTION
Addis Ababa	8	20
Shoa outside Addis	9	16
Sidamo	5	27
Hararge	7	11
Arussi	3	4
Bale	1	1
Kaffa	5	10
Eritrea	7	8
Total	45	97

It is believed that lumber production decreased considerably since that time.

Some estimates from recent years are as follows:

PERIOD	No. OF MILLS	PRODUCTION 1,000 cu. m.
1975	35	85
1977	41	88
1978/79	34	65

F.A.O. Statistics 1979 give a constant figure in lumber production of 75,000 cubic meters since 1972 which appears inaccurate.

Pitsawer illegal operations account for about 5,000 cubic meters of lumber at the present time.

A complete list of sawmills operating in Ethiopia as of February, 1979 is presented in Kvarnback and Natvig Report (1979). According to this source of information the number of operating mills, estimated production and ownership are as follows:

OWNERSHIP	No. OF MILLS	PRODUCTION 1,000 cu. m.
Government (FAWDA)	10 (3) *	15
Ministry of Industry	4 (7) *	6
Private	20	44
Total	34	65

Thus besides 34 mills currently in operation there are about 10 mills (3 under FAWDA) lying idle.
* state recorded for 1981

Considering an average recovery rate of 56% the input of uld be in the order of 116,000 cubic meters.

About 15 wood species processed in sawmills are known on the market, 4 of which represent 85% of the tota.., as indicated below:

SPECIES	% OF OUTPUT
Podocarpus (Zigba)	50
Juniperus (Tedh)	15
Aningeria (Kararo)	10
Eucalyptus	10
Others	15
	100

As observed the operations in a sawmill in Addis Ababa during the field visit (January 1982) the quality of lumber is relatively poor, in principle, due to a long period logs are kept in the felling areas prior to delivery to the sawmills. Grading is not practiced (with some exceptions) consequently lumber is attacked by fungi or insects, lumber shows warping and cracking (improper stacking) and non-uniformity in dimensions (techniques and equipment for processing).

There is no precise line separating the primary and secondary wood processing industry. Also the Ethiopian economy comprises of a public and private sector of wood based activities, i.e. sawmilling, plywood, particle board and fibre board manufacturing, furniture, joinery, wooden houses, prefabs.

Whereas the private sector is predominantly composed of many small scale joinery and furniture workshops (in Addis Ababa and Asmara mainly) the public sector covers comparatively few but relatively large scale production units, the majority of which are run by the Forestry and Wildlife Conservation Development Authority (FAWCDA) and the Ethiopian Woodworks Corporation under the Ministry of Industry. The latter Corporation is engaged in manufacture of three categories of products:

- construction and furniture materials, i.e. doors, windows, floors, particle board, fibreboard and plywood.
- particle board pre-fabs, wooden houses.
- household, office and school furniture.

Following table gives details on production structure of the Corporation. (Plants under the Ethiopian Woodworks Corporation)

NAME OF PLANT	TYPE OF PRODUCTS	PRODUCTION 80/81 in Birr
Ethiopian Chipwood and Furniture Co. (ECAFCO)	Particle board prefab products	6,109,479
Ethiopian Enterprises	Plywood lumber	2,975,299
Ethiopian hardboard and softboard factory (ETHASO)	Hardboard, Softboard	1,192,369
Wanza Woodworks	Doors, windows, wood houses	3,188,783
Warka Furniture Plant	Household, office and school furniture	3,358,994
Futura Furniture Factory	" "	2,073.272
Thomas Tellefsen	" "	1,348,064

Note: US $ = 2 Birr

The production capacity of the plants administered by the Corporation is limited as a result of some basic factors like:

- poor plant layout and obsolete equipment
- shortage of desirable technical manpower
- supply of raw materials such as logs, sawn lumber and wood based panels

FAWCDA controls 13 sawmills with nine joinery units and two independent joinery units including six parquet flooring units.

MARKET AND TRADE RELATIONS IN THE WOOD BASED INDUSTRY

Local Market

There is no new information about the lumber market, consequently figures and data reported below are mainly findings of the ECA study. The estimated use of lumber products is given in the following table:

USE	QUALITY 1,000 cu. m.	MAIN SPECIES
General Construction	30 - 40	Zigba
Furniture	20	Tedh, Kararo
Packaging (boxes, crates)	5 - 10	Eucalyptus
Miscellaneous	5 - 10	-
	70	

As to distribution channels several of the sawmills use mainly Tedh specie in integrated joinery or carpentry workshops. There is very little Tedh found on the lumber market. Some sawmills sell direct without intermediaries.

Addis Ababa accounts for the major consumption centre representing about 55 - 60% of the total lumber consumption.

The following table shows the lumber price increase during the last years. It refers to Zigba lumber of 4 meter lengths in Addis in Birr per cubic m.

YEAR	MARKET PRICE
1972	120
1974	128
1976	170
1978	330
1979	350

There seems to be little or no difference between retail and wholesale prices, probably depending on the general shortage of lumber.

A comparison of the Ethiopian price level with some neighboring countries is difficult because of the non-convertibility of Ethiopian currency.

External Market

The export probabilities of lumber products are limited, in principle, because of the local market requirements and availability of raw material (roundwood) for processing.

The possibility of importing logs for improving performance of the primary and secondary wood processing sector appears as one of possible solutions.

According to the information obtained from the Ministry of Foreign Trade the value of sawn wood exported to South Yemen and Djibuti was as follows:

YEAR	TOTAL VALUE BIRR
1977	16,000
1978	2,000
1979	1,000,000

The value of imported sawnwood in 1979 was 44.700 Birr while paper waste and pulp accounts for 6,258.000 Birr.

There is a tendency to replace to certain extent imports of pulp by establishing new pulp and paper factories as stated elsewhere in this document.

CONCLUSIONS AND RECOMMENDATIONS

The major constraints affecting the Ethiopian forest resources may be formulated as follows:

- insufficient knowledge of forest resources in general due mainly to severe shortage of trained manpower at all levels, particularly at the professional and lower technical levels.
- absence of clearcut policies related to forestry sub-sector.

The need for maintaining and expanding the forest resources of Ethiopia is of a vital importance in order to

- protect the land against continued degradation and soil loss.
- provide sufficient quantity of fuelwood and other construction materials both for rural population and wood processing industries.

Prior to implementation of large afforestation projects undertaken both by FAWCDA and Peasant Associations the starting point should be

- to change the attitude of the population with regard to the forest and its utilization (opinion expressed by General Manager for FAWCDA)
- strengthening of the forest services at the level of planning, management through material and human resources assistance.

The problems related to primary wood processing industry are basically as follows:

- low performance of the industrial sector owing to obsolete machinery, lack of machinery and tool maintenance.
- location of mills (sawmills particularly) in relation to resource and market.
- low degree of integration at the production level

Consequently, careful consideration should be given to the build-up of new production units, their location and technological level. A rational assessment of raw material availability should be undertaken prior to any decision making. Special attention should be paid to the wood residue utilization.

It is believed that rational utilization of existing forest resources can not be achieved in relatively small scale production units, thus larger integrated units should be considered to be implemented.

Taking into consideration observation and very positive conclusions drawn from two plants visited in Addis Ababa (furniture and joinery plant) it can be stated that both factories have developed fairly high standards. Nevertheless plant layout, machinery and equipment, supply of quality raw materials and shortage of skilled labor can be mentioned as major constraints affecting this industry.

Bearing in mind that the domestic demand for the products manufactured in the secondary wood processing industry is continually increasing as a result of extended development and expansion of socio-economic activities throughout the country, it is expected that further development of the industry will be given priority at the government level through allocation of required funds.

KENYA

General Data

Total area	-	596,042 sq. km.
Estimated population	-	15,322,000 inhabitants
Population growth rate	-	4% per year

FOREST RESOURCES

According to Progress Report 1973 - 1978 by the Forestry Department of Republic of Kenya prepared for the Eleventh Commonwealth Forestry Conference, 1980 the total area of the Forest Estate covers slightly less than 1.7 million hectares (1,661,840 ha as at January, 1979) of which 356,129 hectares are on Trust Land and the rest on state land. In addition there are ungazetted forests at various stages of gezettment that total 547,297 hectares. The whole of the Forest Estate is slightly less than 3% of the whole country area.

Area under Forests is classified as follows:

GAZZETTED FORESTS	HECTARES
Natural high forest	919,157.29
Man-made forest	156,592.37
Bush	164,308.16
Bamboo	160,303.42
Grass	127,012.43
Mangrove	45,068.00
Total	1,572,441.60

UNGAZETTED FORESTS

Managed by Forest Department	89,398,50 ha
Total area under Forest Department Management	1,661,840,10 ha
PRIVATE FOREST ON LARGE FARMS	144,000,00 ha

The total plantation area is just over 150,000 hectare but it is intended to continue increasing this area to 173,000 hectare by the end of the current development plan period in 1983.

The planned target of plantation development aimed at in the first phase of the project (a six year first phase 1970 - 75) at planting a total 28,700 hectares. Out of that 19,400 hectares were to be of sawlogs and 9,300 hectares pulpwood plantations.

The planned target by 1980 for the second phase include planting of 32,000 hectare of sawlogs, 8,000 hectares of pulpwood, replanting of 6,000 hectares of clearfelled plantations and to maintain about 125,000 hectares of already existing plantations.

A third phase plantation project is envisaged and scheduled to start on January 1, 1981 immediately after the termination of the second phase project.

The above mentioned plantation projects are financially supported by World Bank and IDA loans.

The main commercial species from natural forests are Podo (Podocaupus gracilior), East African pencil cedar (juniperus procera), camphor tree (ocotea) and elgon olive (olea). The proportion of timber extracted from plantations is increasing regularly. In 1965 plantations produced 53% of the total saw and veneer production of the country.

An additional 5,000 hectares of all types of trees in plantation areas were planted in 1980. This raised the total area of planted forests from 162.100 hectares in 1979 to 167.100 hectares in 1980. The plantation area now accounts for 10.7% of the total gazzetted forest land.

Details about plantations are given in the table below:

TYPE OF PLANTATIONS	1976	1977	1978	1979	1980
	(in 1,000 hectares)				
Indigenous softwoods	3.7	3.7	3.7	4.6	4.8
Indigenous hardwoods	6.4	5.4	5.4	5.3	5.4
Exotic softwoods:					
Cypress	59.5	62.8	66.5	68.1	70.6
Pines	64.1	68.4	70.4	71.5	73.8
Exotic hardwoods:					
Timber	1.8	1.8	2.2	2.8	2.8
Fuel	9.3	9.5	9.7	9.8	9.8
Total Area	147.8	151.6	157.9	162.1	167.1

As to industrial plantations only about 4% account for hardwood species (vitex Grevillea, Eucalyptus) the rest are the softwood species (juniperus, Pinus, cupressus). The species identified in the non-industrial plantations are mainly Eucalyptus and Accacia.

According to F.A.O. Tropical Forest Evaluation Report (1981), the annual log potential cut from plantations is estimated at 913,000 m^3 for the period 1980-84. The output of sawlogs and veneer logs from natural forest is likely to be in the order of 100,000 m^3.

The forest estate of Kenya is administered by the Forest Department which is one of the departments in the Ministry of Environment and Natural Resources (including Wildlife Conservation and Management Department, Fisheries, National Environment Secretariat, Mines and Geology).

The Forest policy formulated in 1968 determines basic principles under ten main headings:

- Reservation of Land for Forest Purposes
- Protection of the Forest Estate
- Management of the Forest Estate
- Industry
- Finance
- Employment
- Local Authority Forests
- Private Forests
- Public Amenity
- Research and Education

Although the forest policy has remained the same since 1968 there has been an emphasis towards encouragement of establishment of privately owned woodlots and planting of trees by farmers.

Licenses to the industry (concessions) are granted on a five-year basis. Prior to issue of a license inventory data is assessed.

Royalties are paid by licensees per volume and species as to the following example: Cypress 65 sh/m^3
Pine 51 sh/m^3
For pulp industry royalties are calculated at per hectare basis.

WOOD PROCESSING INDUSTRY

According to the report of the Forestry Department (1980) there are about 100 long-term licensed sawmills and a total of about 1,178 short-term licensees.

The recorded sawmill logs intake annually is in the order of 450,000 cu. m. which gives at the recovery of 40%, about 180,000 cu. m. of sawnwood.

There are three operating plywood mills in the country. Rai Plywood, Sokoro Plywood and Elgeyo Plywood. Two other plywood mills are under construction. Even if the country is not entirely self-sufficient in plywood, imports of this product are decreasing because of local production. The volume of veneer logs used in plywood manufacturing is recorded at 54,830 cu. m. One main feature of plywood is that some lesser known species (Mutati) are now being utilized. The tea industry is an important consummer of plywood material. Apparent domestic consumption of plywood is listed about 5,000 cu. m. The plywood industry has the highest end value per unit of raw material, its contribution to forestry development is therefore relatively great.

The Fibreboard plant located in Elburgon is using Eucalyptus species which would have been utilized only for woodfuel. One particleboard plant located in Nakuru and particleboard manufacturing at Rai Plywood in Eldoret are mainly using wood residue and other waste material to make fairly valuable end products.

There are several small industries producing wooden houses especially for rural areas. The houses are bought by individuals and have proven very popular to institutions such as schools and hospitals. The demand of wooden houses is quite high. The Forest Industrial Training Centre is producing about 440 units per month. There are other manufacturers such as Economic Housing Group, G.D. Brothers.

One match factory is currently operating at Mombasa. Production of the factory is likely to increase if suitable material becomes available.

Furniture manufacturing is done on a small scale mainly in urban areas. Project for implementation of a furniture plant in Kenya has been introduced to the Industrial and Commercial Corporation which is, in principle, a financing company. The company is ready to provide financing for the project if the study proves the project is feasible.

The corporation is involved in other wood processing industries.

DETAILS AND TRADE RELATIONS IN WOOD BASED INDUSTRY

Details of sales of forest products during the last five years are given in the table below:

SALES OF FOREST PRODUCTS	1976	1977	1978	1979	1980
Timber 1,000 cu. m. true -					
Softwood	350	350	383	396	438
Hardwood	54	84	83	72	76
Total	404	434	466	468	514 *
Fuel 1,000 stacked cu. m.					
Fuelwood	64	90	104	121	
Charcoal	115	59	38	12	
Power & Telegraph Poles					
Numbers	15,221	6,193	8,684	8,893	12,340

* Provisional

About 514,000 cubic meters of sawn timber were recorded as sold in 1980, a rise of 9.8% over 1979 and continuing upward trend apparent since 1975. Softwood sales rose by 10.1% and these sales at 438.000 per cubic meter in 1980 accounted for the vast bulk of recorded forest product sales. It must be kept in mind that most trees in Kenya are cut for fuelwood or to make charcoal. These two uses account for much more than 10 million tons annually.

A considerable increase in the production, consumption and exportation of forest based products is recorded in the statistics for the period 1973-1978.

Sawnwood Production and Consumption in m^3

DETAILS	1973	1978
LOGS		
Production	308,688	327,324
Imports and Transfers (from Uganda and Tanzania)	422	127
TOTAL	309,110	327,451
Exports, Re-Exports to Uganda and Tanzania	81	246
Apparent Domestic Consumption	309,029	327,205
SAWNWOOD		
Production (40% Recovery)	123,612	130,882
Imports and Transfers from Uganda and Tanzania	5,354	6,602
TOTAL	128,966	137,484
Exports, Re-Exports to Uganda and Tanzania	15,604	8,236
Apparent Domestic Consumption	113,362	129,248

Sources: Annual Trade Reports

Forest Department Statistical Reports (corrected)

Plywood Production and Consumption

DETAILS		1973	1978
Production in Logs	cu. m.	19,857	52,275
Production: 37% recovery	cu. m.	7,347	19,341
	sq. m.	1,632,678	4,298,002
Imports and Transfers from Uganda and Tanzania		1,394.500	1,138.009
TOTAL	sq. m.	3,027,187	5,436,011
Exports, Re-Exports and Transfers to Uganda and Tanzania	sq. m.	98,649	167,137
Apparent Domestic Consumption	sq. m.	2,928,538	5,268,874

Sources: Annual Trade Reports
Forest Department Statistical Records

Note: Common thickness of the sheets is 4.5 mm

Fibreboard Production and Consumption

DETAILS		1973	1978
Production	m^3	-	4,819
Production	m^2	-	988,000
Imports and Transfers from Uganda and Tanzania	"	820,442	1,278,321
TOTAL		820,442	2,266,321
Exports, Re - Exports and Transfers to Uganda and Tanzania	"	38,021	66,967
Apparent Domestic Consumption	"	782,421	2,199,354

Sources: Annual Trade Reports
Forest Department Statistical Records

Chipboard (particle board) Production and Consumption in m^3

DETAILS	1973	1978
Production	100,000	390,000
Imports and Transfers from Uganda and Tanzania	5,000	65,000
TOTAL	105,000	455,000
Exports, Re-Exports and Transfers to Uganda and Tanzania	10,000	30,000
Apparent Domestic Consumption	95,000	425,000

Note: Production figures are an estimate

Sources: Annual Trade Reports

CONCLUSIONS AND RECOMMENDATIONS

It is in the author's opinion that the foresty sector is performing well under present circumstances.

The need for skilled manpower to be used in forestry, need for technical equipment and transportation means and finally the need for air photographs of forest land (estimated cost US $500,000 per year) - these are the main problems affecting the Forestry Department, i.e. Forest Resources.

As to wood processing industry constraints identified during the mission are as follows:

- obsolete equipment which should be replaced shortly
- lack of capital
- relatively low recover in sawmilling
- low skill of manpower involved in operation
- marketing of final products not co-ordinated
- need for intensive utilization of solid wood residue both from natural forest and plantations for making charcoal and as a fuel

It is believed that no particular intervention will be undertaken in the near future as to primary wood processing industry. Only individual actions supported by industrialists are anticipated. (example: UTTAM SINGH BRAR Sawmill Project)

New development projects are likely to be oriented to the secondary wood processing industry, in principle, furniture and joinery manufacturing.

REPUBLIC OF ZAIRE

General Data

Total area	- 2,344,885 sq. km.
Estimated population (1980)	- 30,200,000 inhabitants
Population growth rate	- 3.4% per year

FOREST RESOURCES

According to F.A.O. Tropical Forest Evaluation Report (1981) the following description of the vegetation types is given in the Republic of Zaire:

VEGETATION TYPE	AREA (in 1,000 ha)
Closed broadleaved forests	105,750
Open broadleaved forests	71,840
Shrub formations	11,300
Grass	14,350
Other	23,520 *
Total	226,760

Note: * including National Parks accounting for about 5,390,000 ha.

Compared to the total area of African closed forests (1.74 million sq. km) the closed broadleaved forests of Zaire account for 60%. In this regard the Zaire Republic can be considered as leading country not only because of these immense resources but also as potentially important producer of forest products and strong partner in the international trade of these products.

The quasitotality of the forests is located in the centre part of the country, the Province of Equator. (Cuvette Centrale)

Considering the forest survey conducted in 1974-76 and covering about 5 million hectares it would be possible to assess the total potential of the forest in this location using data compiled in the survey as shown in the following table:

CATEGORY OF SPECIES	TOTAL VOLUME 1,000 cu. m.	%	AVERAGE VOLUME ha per cu. m.
Main red species	8,468	4.3	2.45
Secondary red species	83,531	42.9	24.21
White species (slicing and peeling)	27,754	14.3	8.04
Other White species	29,618	15.2	8.58
Other species	45,312	23.3	13.13
Total	194,683	100.0	56.41

Note: Only trees having a diameter of more than 62,5 cm have been considered in calculating these volumes.

The anticipated yield per hectare based on the survey data is given in the table below:

NUMBER OF SPECIES CONSIDERED	GROSS VOLUME cu. m. per ha	NET VOLUME cu. m. per ha
14 (presently exported)	22.4	11.2 *
27 (currently merchantable species)	57.4	28.0 *
55 (potentially merchantable)	80.0	40.0 *

Note: industrial roundwood

Assuming that only 75% of the forest area located in the Cuvette is economically accessible and could be harvested (about 75 million ha) the total potential of the industrial roundwood may be estimated at three levels as follows:

1. Average volume per hectare for 14 presently exported species, i.e. 11.2 cubic meter - estimated potential 840 million cubic meter.

2. Average volume per hectare for 27 presently merchantable species, i.e. 28.0 cubic meter - estimated potential 2,100 million cubic meter.

3. Average volume per hectare for 55 potentially merchantable species, i.e. 40.0 cubic meter - estimated potential 3,000 million cubic meter.

However, the average volume of all species, i.e. main species and secondary species is estimated at 250 cubic meters (gross volume. Considering this figure, the estimated potential (industrial roundwood only) would be 9,375 million cubic meters.

Considering rotation of 70 years, the allowable annual cut would be 12 - 30 - 43 million cubic meters.

Assuming that the added value for the products of primary and secondary wood processing would be in average US $40 per cubic meter production of only 3 million cubic meters per year would provide the country an economy contribution of 120 million US dollars in added value.

The main species harvested presently are those shown in the following table;

COMMON NAME	GROSS VOLUME M³ per Hectare	COMMON NAME	GROSS VOLUME M³ per Hectare
Abura	0,158	Ilomba	1,334
Acajou	0,774	Iroko	0,845
Ako	2,274	Kosipo	0,562
Angueuk	1,210	Limbali	18,126
Bilinga	0,323	Mukulungu	0,300
Bubinga	0,979	Musase	0,365
Bosse	2,631	Niove	1,872
Aiele	1,683	Padouk	2,105
Dabema	3,383	Sapelli	1,202
Dibetou	0,292	Sipo	0,212
Emien	1,876	Tahitola	6,345
Escessang	1,624	Tiama	1,543
Essia	2,419	Tola	2,897
Fromager	0,064	TOTAL	57,408

Main species exported from Zaire:

COMMON NAME	GROSS VOLUME M^3 per hectare
Acajou	0,774
Aoura	0,158
Bubinga	0,979
Bosse	2,631
Dibetou	0,292
Iroko	0,845
Kosipo	0,562
Niove	1,872
Padouk	2,105
Sapelli	1,202
Sipo	0,212
Tahitola	6,345
Tiama	1,543
Tola	2,897
TOTAL	22,417

Decreasing forest production (saw and veneer logs) is recorded in the F.A.O. Forest product statistics

PERIOD	1,000 cu. m.
1972	580 *
1973	565
1974	565 *
1975	334
1976	272
1977	303 *
1978	303 *
1979	303 *

Note: * estimates

WOOD PROCESSING INDUSTRY

There is very little information about the forest based industry. According to statistics compiled by the Department of Agriculture (1973) there were 321 licenses (harvesting activities mainly), only 91 industries were listed.

Since that time the number of industries operating in the country decreased considerably. The following wood processing industries are recorded in Conjuncture Economique 1980 - 1981:

COMPANY	LOG INPUT 1980 cubic meter
AGRIFOR	45,189
Compagnie des Bois	9,220
FORESCOM	7,343
I.Z.B.	64,268
SOKINEX	29,374
SOCOBELAM	25,735
SIFORZAL	152,200
LIGNAKIN (plywood)	3,500 *

Note: * estimate

Production recorded for 1980 is as follows:

Sawnwood	121,000 cu. m.	(23,978 m^3 exported)
Peeled veneer	7,884 cu. m.	(519 " exported)
Sliced veneer	1,031 cu. m.	(1,031 " exported)
Plywood	11,667 cu. m.	(2,108 " exported)

It is estimated that the above figures represent approximately 80% of the total real production.

Three of the above mentioned producers are to be given some explanation, i.e. AGRIFOR, FORESCOM and SIFORZAL companies.

The company AGRIFOR is one of the oldest established in the country. It has an integrated complex producing sawnwood, veneer and plywood. A few years ago a line of particleboard was in operation. However the physical location of the company's two plants in Bas-Zaire (a third in Haut Zaire at Libenge) caused problems in supply of raw material. In fact, there is not enough of the proper species to feed

the sawmill and plywood mill. A relocation of at least one of the plants was considered at certain points. However, at the present time the company continues their operation on a smaller scale with technical assistance from a Danish company.

The FORESCOM Company also has an integrated complex producting sawnwood, veneer and plywood, located in Nioki, close to Lake Mai-Ndombe takes advantage in raw material supply coming from consessions in the southern part of Cuvette. This was apparently the main reason why the company (still state owned) has been selected for a large scale modernization project undertaken presently through Canadian technical assistance. It is believe that final production capacity of 120,000 cubic meters round-wood equivalent could be achieved.

The company SIFORZAL has recently built a plant 80 km from Kinshasa on the river bank Zaire. The plant consists of a sawnwood line and well operated sliced veneer section. Because the mother company situated in West Germany is a long-time specialist in veneer and plywood products, emphasis at the Zaire plant is given to sliced veneer production using proper technology and equipment. The sliced veneer is of excellent quality and in high demand on the export market. However, negative factors related to the company production goals remains the fact of selective harvesting methods.

Considering the enormous potential of the forests in the Cuvette, the government is considering implementation of an integrated wood processingcomplex aiming at the most rational utilization of raw material through mechanical, semi-chemical and chemical conversion methods.

There was no information available at the time of the mission on secondary wood processing industry. Nevertheless, it is known that two furniture factories are operating in Kinshasa as well as a great number of small furniture and household article making shops in the capital and interior of the country.

MARKET AND TRADE RELATIONS IN WOOD BASED INDUSTRY

The average consumption of primary wood processed products on the local market during the period 1968 - 1977 was in the order of 322,000 cubic meters roundwood equivalent. This figure is still valid for the time being.

About 90% of the volume represents sawnwood, the rest accounts for panels and veneer.

The market in the capital (Kinshasa) remains the place where most of the forest products are absorbed. Very little information is available on consumption of forest products in the interior of the country. It is believed that shortages occur in certain regions due mainly to transportation problems, and to a certain extent to the low supply of forest products.

On the external market, 150,000 cubic meters roundwood equivalent has been exported during the period 1968 - 1977 in the proportion: 24% logs, 45% sawnwood and 31% veneer.

The traditional importers of Zaire forest products are West Germany, Belgium and Netherlands. However, the presence of Zaire in the international trade of tropical hardwood is less evident with 3% of the total imported by E.E.C.

According to F.A.O. projections the demand of tropical hardwood should increase by 50% for the period 1980 - 1990 and by 40% in 1990 - 2,000.

The Republic of Zaire being the richest African country as to forest resources, it is expected that its participation in the international trade of tropical forest products will increase considerably in the near future. Huge development of the forest resources in the Republic of Zaire is anticipated.

CONCLUSIONS AND RECOMMENDATIONS

The main constraints affecting the forestry sector may be formulated as follows:

- location of the forest resources in the central part of the country accessible by railway Matadi-Kinshasa and by river from Kinshasa reulting in time and cost consuming operations.

- disproportion between the forest resources and industrial wood processing sector in terms of quantity of harvested and processed species.

- low degree of utilization of forest resources reflected, in principle, by selective cutting.

- poor infrastructure in the educational, scientific and government bodies sectors.

- not co-ordinated policy in marketing on external markets.

- shortage of skilled labor both in forestry and forest based industries.

- poor physical infrastructure (roads, railways, harbours).

It is generally accepted at the government level that forest development should be undertaken shortly in order to diversify the economy and fundamentally improve the regional development.

Having experienced forest exploitation in the Mayumbe area where most of the forest based industries were concentrated, the forestry department seems to be hesitant to open new forest areas in the Cuvette for industrial exploitation prior to being assured of overall economic contributions of the new industries.

Consequently it appears to be wise to consider not only the traditional approach to the utilization of existing forest resources, but to analyse other options available, which could respond best to the national utilization of these resources.

As a logical step in such attempts would be the application of mechanical, semi-chemical and chemical conversion methods of wood raw materials. Utilization of solid wood residues either from harvested areas or from industrial processing account for one of the ways to be followed.

Existence of potential large local market opens the possibility of using much of secondary species by providing for local population a wider line of forest products. School furniture and wooden low cost houses were mentioned by government representatives to be given priority in the production.

New development projects are likely to be export oriented providing a great added value locally and generating foreign currency at the same time. (example: selected species for sliced veneer and plywood).

In order to cope with the complexity of tasks to be assumed by forest services in the development and management of forest resources a strengthening of Forest Department both in material and human resources is strongly recommended.

CONGO, POPULAR REPUBLIC OF

General Data

Total area	-	342,000 sq. km.
Estimated population	-	1,500,000 inhabitants
Population growth rate	-	2.7% per year

FOREST RESOURCES

According to F.A.O. Tropical Forest Evaluation Report (1981) the area of natural forest is estimated as follows:

TYPE OF WOODY VEGETATION	1,000 hectares
Natural forests non-harvested	10,000
Natural forests harvested	3,360
Unproductive forests	7,520
National Parks	130
Other	1,100
Total area	22,440

The total area, i.e. 224,000 square kilometers of woody vegetation accounts for about 66% of the total land area.

The five-year development plan (April, 1981) of "Ministère des Eaux et Forêts" divides the total forest area in three main zones of different importance and evaluation:

First Zone - about 1.2 millionhectares covering the Kouilou region and chain of mountains of Mayombe and offering best possibilities for log evacuation to Pointe-Noire.

Second Zone - about 3.3 million hectares located in the massive area of Chaillu and Niari. Presently assures the major part of forest production owing to the construction of a railroad.

The above described two zones of 4.5 million hectares located in the South of Congo were to a certain extent over-exploited and now shows a limited potential in certain species.

Third Zone - about 15.5 million hectares is located in the North of Congo. With limited possibilities of exploitation. In fact, only 4 million hectares could be harvested if proper infrastructure facilities, access roads particularly, are materialized.

Forest surveys of 4.1 million hectares were conducted during the period 1971 - 1975. Forest inventory in the South of Congo covering an area of 2.5 millionhectares is anticipated for the next years.

As to the artificial forest - plantations, 6,000 hectare of fast growing species from a projected total of 31,000 hectares were actually planned. These plantations are to be used for feeding a pulp and paper factory to be constructed close to Pointe-Noire.

The total area of industrial plantations is estimated by F.A.O. report at the end of 1980 to be 16,800 hectares. The main species planted are: Therminalia, Eucalyptus, and Pinus.

The concessions granted as of December 31, 1980 cover 1,708,628 hectares of natural forests located in the South of Congo where the conditions in harvesting are very favorable. However, very selective cutting, i.e. practised in this area concentrated on two species, i.e. Okoume and Limba.

A break-down of forest production in 1980 is given in the table below: (saw and veneer logs)

SPECIES (Common Name)	VOLUME cu. m.	%
Okoume	222,860	36.9
Sapelli	96,829	16.06
Sipo	20,333	3.37
Tiama	19,675	3.26
Moabi	19,544	3.24
Limba	15,696	2.6
Ayous	14,175	2.35
Niove	12,952	2.14
Douka	6,372	1.05
Tchitola	3,030	0.53
Bilinga	2,898	0.48
Kossipo	2,746	0.45
Dibetou	2,590	0.42
Khaya	2,377	0.39
Doussie	808	0.14
Padouk	697	0.11
Kambala	616	0.10
Afromosia	296	0.05
Aiele	257	0.04
Mululungat	244	0.04
Other	157,283	26.31
Total	602,641	100

Source: Statistics 1980

The saw and veneer logs production between 1975 and 1980 is presented as follows:

YEAR	PRODUCTION cu. m.	EXPORTS cu. m.	LOCALLY PROCESSED cu. m.
1975	310,000	119,000	191,000
1976	400,000	144,000	256,000
1977	414,000	155,000	259,000
1978	460,686	166,000	294,686
1979	476,000	173,000	303,000
1980	603,000	279,000	324,000

According to F.A.O. Report about 1,050,000 cubic meters of fuelwood were harvested in 1980.

Four groups of licensees (entrepreneurs) are involved in forest exploitation activities such as shown in the following summary:

GROUP	VOLUME LOGS 1980 - cu. m.	%
State sector	47,022	7.7
Private sector with State participation	86,499	14.3
Private sector - expatriates	349,617	58.2
Private sector - nationals	119,500	19.8
Total	602,642	100.0

The State sector is currently represented by three enterprises (one left the group recently). Low productivity, management problems, shortage of skilled labor and allocation of funds are the main constraints affecting the group.

The private sector with State participation group operates under two companies: SIDETRA and PLACONGO. Management and marketing problems are the present difficulties of the group.

The private sector - expatriate group performs well. The group supplies logs to local industry and for export. The forest concessions granted to this group account for 20,000 to 190,000 hectares. The partners are mainly German, French and of Portuguese origin.

The national private sector group is exceedingly important in the number of partners but contributes only about 20% to the total production. The main problems related to the group are shortage of capital, management, insufficient knowledge in operations, shortage of forest technicians. Attempts were undertaken to form a co-operative to overcome present difficulties, however without possitive results.

WOOD PROCESSING INDUSTRY

It is recorded that about 60% of the forest production (saw and veneer logs) is processed locally. In fact there are 15 sawmills, four peeled veneer plants, one plywood mill operating in the country. A section of sliced veneer is presently under construction.

Even if the country is considered at the international level quite important in the production of peeled veneer (74,800 cubic meters in 1980) with 10% on the world market, it is believed that the number of production units and the industrial structure of the wood processing industry is far from being adequate with regard to the social-economic development of the country.

The production figures for the wood processing industry are given below:

YEAR	SAWNWOOD cu. m.	VENEER cu. m.	PLYWOOD cu. m.	TOTAL cu. m.
1976	50,780	54,098	-	104,878
1977	48,500	72,400	1,172	122,072
1978	43,092	78,471	2,068	123,631
1979	53,258	70,124	2,373	125,755
1980	63,521	74,800	4,045	142,366

Using the volume of logs for local processing as a basis the recovery factor would be between 41 and 44%.

The industrial structure is similar to the forest exploitation activities involving four groups of partners. The share of each group in the production is as follows:

GROUP	SAWNWOOD cu. m.	VENEER cu. m.	PLYWOOD cu. m.
State sector	1,533	8,584	-
Private sector with State participation	10,347	48,646	4,045
Private sector - expatriate	51,641	17,569	-
Private sector - nationals	-	-	-
Total - Production 1980	63,521	74,799	4,045

Two sawmills listed under State sector, i.e. production unit SNEB and OCB produced 1,533 cubic meters of sawnwood in 1980 and 8,584 cubic meters of veneer at the mill of SONATRAB.

The Private Sector with State participation recorded the production of 10,347 cubic meters of sawnwood at the mill SIDETRA, 48,646 cubic meters of veneer at the mills PLACONGO and SIDETRA, 4,045 cubic meters of plywood at the mill SIDETRA

The private sector - expatriates produced at ten different saw mills, 51,641 cubic meters of sawnwood and 17,569 cubic meters of veneer at the mill SOCOBOIS.

The private sector - nationals did not participate in any industrial activity in 1980.

One furniture factory SOCOME listed under State sector accounts for total production evaluated at 104 million F.CFA in 1980. There was no information available on artisanal furniture manufacturing in the country.

MARKET AND TRADE RELATIONS

The local market consumes between 30,000 and 40,000 cubic meters of sawnwood annually, about 7,000 m³ of plywood. Supplies for both products being insufficient importation from CAR and Gabon are needed to fill the gap.

Fixed prices for certain forest products, particularly sawnwood are unfavorable with regard to the consumption. In fact, one cubic meter of sawnwood (red species) is priced at 75,000 F.C.F.A. in the Congo, while the price in the Centreafrican Republic is only 17,000 F.C.F.A. (prices for whitewood species are 48,000 F.C.F.A. in the Congo and 14,000 F.C.F.A. in CAR).

As to the export of forest products Western Europe remains the main consumer. Relatively weak in lumber export, Congo keeps its leading position in veneer exports which account for 40% of total imports in the above mentioned area.

The marketing of logs is controlled entirely by Office Congolais des Bois (O.C.B.). Portugal, Italy, West Germany and France are the main importers.

There are no restrictive measures or any taxation related to the marketing of the processed forest products.

Contribution of the Forestry Sector to National Economy

The royalties, tax on logs and other forest based transactions collected by the Forestry Department accounted for about 271 million F.C.F.A. in 1980.

Taxes and other fiscal duties related to forestry activities such as: duties of companies, special duties of companies, duties on gross revenues, taxes on transports, licenses, taxes on apprenticeship, taxes on registration, taxes on revenue of physical persons, taxes on land, taxes on vehicles were estimated at 6,2% of total Government revenues in 1977.

The contribution of Forestry sector to G.N.P. was evaluated at 17,363 million F.C.F.A., i.e. 8.6% of G.N.P.

The added value generated by the activities of the forestry sector is estimated at 11,100 million F.C.F.A. in 1980.

The number of employees in the forestry sector is estimated at 5,500, i.e. 23.3% of the total recorded for industrial sector. The amount of salaries and wages perceived in the sector in 1980 is evaluated at 6,060 million F.C.F.A.

CONCLUSIONS AND RECOMMENDATIONS

The main constraints affecting the Forestry sector may be formulated as follows:

- inadequate infrastructure (road network)
- lack of capital in the wood processing industry particularly in in the group of nationals.
- need for replacement of obsolete equipment both in logging and industry
- knowledge of forest resources partially surveyed only
- forest concessions granted in the not surveyed forests
- practice of selective cutting
- industrial structure does not correspond to the valuation of forest resources
- marketing problems with regard to long periods of stocking of forest products in Brazzaville prior to shipment to Pointe-Noire

Bearing in mind the high value of forest resources a clear forest policy should be formulated as to allocation of the concessions giving priority to local industries.

Implementation of large scale integrated wood processing complexes can be considered as a solution to correct the present industrial structure.

It appears to be necessary to provide to the national sector required material, human and financial assistance in order to keep the group competitive with other industrial partners.

Co-ordinated actions with the U.D.E.A.C. and Congo authorities are required for improving the present marketing situation both on local and external market.

The complexity of relations inside the Forestry sector calls for the establishing of one authority having complete control over the sector.

CENTRAL AFRICAN REPUBLIC

General Data

Total area	-	622,984 sq. km
Estimated population	-	2,000,000 inhabitants
Population growth rate	-	2.4% per year

FOREST RESOURCES

Data related to the area of forest land are basically issued from aero-photographs and maps belonging to the - Institut Geographique National Francais - the actualization of this data collected around 1960 in average, was done in 1980 considering the rate of deforestation.

The FAO Tropical Forest Evaluation Report (1981) compiles data as follows:

TYPE OF VEGETATION	AREA 1,000 ha.
Closed natural forests	3,590
Productive woodlands	15,900
Unproductive woodlands	16,400
Savannas	3,800
Shrub formation	17,000
Total	56,690

In the sense of the Central African Forest Code all natural vegetation formations, forested or not, exluding shrub formation belongs to State Forest Estate or to Communities having the right of the utilization. There is no private forest ownership.

The National Park area accounts for 1,270,000 hectare while Wildlife Reserves are estimated at 3,860,000 hectare.

The forest surveys (reconnaissance invetories) conducted between 1960 and 1968, covering the area of 1,325,000 hectare of tropical production closed forests, i.e. about 37% of the total natural forests were used in establishing estimates of the growing stock.

The average volume per hectare in the natural productive forest not exploited yet was estimated at 320 cubic meters. The average volume per hectare in the natural productive forest already exploited was estimated at 290 cubic meters.

Consequently the growing stock would be at the end of 1980 in the order of 1,102 million cubic meters.

A system of cc antions (agreements) between the Forest Department and industry established in 1966 - 77 determines the rules of forest exploitation for the granted concessions, i.e. minimal production, obligatory local conversion of part of logs harvested and the part of logs which may be exported.

It is estimated that 1,070,000 hectares of forest concessions were granted to the industry by 1976 (period 15 years renewable). The figure for 1980 would be 1,274,750 hectares.

The forest exploitation remains very selective at the present time as demonstrated in the following data:

SPECIES	PROPORTION IN % (1970)
Ayous	46.3
Sapelli	42.5
Sipo	5.5
Limba	1.0
others (Iroko and Doussie)	4.7

Fifteen cubic meters of logs are harvested presently in average per hectare. The volume 15 cubic meters is to be considered as volume net while the gross volume would be about 24 cubic meters in the cutting areas.

The annual production of fuelwood, charcoal is estimated at 2.5 million cubic meters.

The rate of annual deforestation accounts for about 5,000 hectare, the main reason being agriculture. These figures are likely to not increase according to FAO experts in the period 1981-85.

According to the Forest statistics following production of logs is listed for the period 1970 - 1980.

PERIOD	VOLUME OF LOGS in cu. m.
1970	280,220
1971	209,361
1972	376,094
1973	399,182
1974	330,899
1975	224,967
1976	319,607
1977	317,659
1978	350,012
1979	330,000
1980	325,082

WOOD PROCESSING INDUSTRY

Lumber, sliced and peeler veneer, plywood are the product line recorded in the forest statistics as follows:

PRODUCT	LOBAYE REGION	SANGHA REGION	TOTAL CAR-1980	TOTAL CAR-1979
Production in cu. m.				
Logs	209,984	115,098	325,082	296,174
Lumber	50,089	20,498	70,587	67,879
Peeled veneer	-	2,476	2,476	1,471
Sliced veneer	-	403	403	59
Plywood	4,252	-	4,252	2,897
Export in cu. m.				
Logs	75,742	51,864	127,606	122,130
Lumber	22,724	13,722	36,446	23,273
Peeled veneer	-	2,136	2,136	1,118
Sliced veneer	-	389	389	89
Plywood	3,494	-	3,494	2,987
Local cu. m.				
Lumber	27,739	4,127	31,866	25,481
Plywood	813	-	813	-

Nine companies are involved in forest exploitation and primary wood processing.

The list of the companies with their main characteristics is given below:

COMPANY	INCOR-PORATED	ACTIVITIES	CONCESSIONS Hectares	MILLIONS F.CFA GROSS REVENUE 1979
ETBACA	1970	Logs, lumber veneer, prefabs	227,750	1.150
LOROMBOIS	1974	Logs - lumber	100,000	618
CAROMBOIS	1976	Logs - lumber	400,000	1.156
SCIPLAC	1969	Logs - lumber	70,000	-
IFB - SITAC	1970	Logs - lumber	212,000	635
SCAD	1942 1972	Logs - veneer Plywood	59,000	1,864
SLOVENIA BOIS	1971	Logs - veneer	400,000	-
SICA LEROY	1967	Logs - lumber	100,000	1,612
SOCEFI	State Company	Logs - lumber pre-fabs	132,000	853

The forest production, exports and local consumption is recorded as follows: (1980)

	TOTAL VOLUME cu. m. ROUNDWOOD EQUIVALENT
Total production of logs	325,082
Less export of logs	127,606
Less export of lumber, veneer plywood in roundwood equivalent	106,163
Volume of logs locally processed basically in lumber	91,313

Consequently, 233.769 cubic meters roundwood equivalent were exported in 1980 which represents about 72% of the total production. 91,313 cubic meters roundwood equivalent were consumed on the local market, basically as lumber.

The wood processing units are located in the region of Lobaye and Sangha. The utilization factor is about 40% of logs while the installed capacity is presently used at about half.

The secondary wood processing industry is inexistant with the exception of artisanal manufacturing of household articles and simplie pieces of furniture.

Market and Trade Relations

The local market is limited and its consumption in forest products, basically lumber is estimated to be in the order of 90,000 cubic meters poundwood equivalent at the present time. Logically, the Capital Bangui remains the main consumption centre. Prices on the market (lumber) are fixed by the Government.

The export market of forest products is oriented to Europe. Lumber export to neighbouring countries like TCHAD and SOUDAN account for small quantities of lumber mainly.

CONCLUSIONS AND RECOMMENDATIONS

The Centreafrican Republic is the only African country where forest surveys were carried out prior to the allocation of the forest concessions on a large scale. It is also recognized that it was in this country first where the basic principles of forest management and sylviculture treatment were incorporated in agreements (conventions) between Forest Department and Industry.

However, there are some doubts about the respect of these principles in the Forest Policy.

The main constraints affecting the forestry sector are as follows:

- relatively low utilization of the forest resources as a result of very selective cutting.
- Low performance of the wood processing industry primarily oriented at log export. Insufficient capacity or poor utilization of existing facilities in production of more elaborated forest products.
- difficulties in the evacuation of forest products by means of road - water - rail transport systems.
- lack of trained personnel at all levels

The strengthening of Forest services in material and human resources appears the objective to be achieved shortly.

The existence and presence in Bangui of the U.D.E.A.C. (Union douanière des Etats de l'Afrique Centrale) may have very positive impacts on the forestry sector. In fact, this institution is presently charged with the problematics of transport - one of the constraints to be solved in order to improve performance of the forest sector.

It is believed that more efficient co-operation is needed with the Republic of Congo in marketing of forest products being shipped via Brazzaville to Pointe-Noire.

Technical and Financial assistance will be required for implementation of secondary wood processing industry (furniture and joinery plant)

Any expansion projects in primary wood processing industry should be limited prior to solving the problems of transport.

UNITED REPULIC OF CAMEROON

General Data

Total area	-	475,442 sq. km.
Estimated population	-	7,100,000 inhabitants
Population growth rate	-	2.1% per year

FOREST RESOURCES

According to F.A.O. Tropical Forest Evaluation Report (1981) areas of natural woody vegetation estimated at the end of 1980 are as follows:

VEGETATION TYPE	AREA in 1,000 Hectares
Closed natural forests	17,920 *
Productive woodlands	2,700
Unproductive woodlands (for physical and legal reasons)	5,000
Forest fallow area	4,900
Shrub formation	9,500
Others	1,200
Total	41,220

Note: * A forest map updated during the Fourth Plan showed that there were 17,400,000 hectares of exploitable forest in the country.

As recorded in the Forest Statistics, forest exploitation permits for 7.76 million hectare were granted to about 100 individuals or corporations:

Details about the distribution of permits and areas granted to various categories of forest exploitation are given below:

CATEGORY OF LICENSEES	NUMBER OF PERMITS	AREA IN HECTARES	%
Expatriates	56	5,603,849	72%
Nationals	34	1,028,503	13%
Semi-public corporations	7	1,128,940	15%
Total	97	7,761,292	

34 nationals control 13.26% of the areas granted, 56 expatriates control 72.20% and 7 semi-public corporations control 14.54% of the granted area for log harvesting.

About 700,000 hectares of natural forests were subject of a pre-investment survey while a reconnaissance inventory was carried out on about 2.200,000 hectares.

Selective cutting is practiced, however an increasing trend in the utilization of other species is observed during recent years.

SPECIES (Common name)	1966-67 %	1970-73 %
Azobe	24.3	22.0
Ilomba	20.4	8.5
Doussie	15.6	8.6
Ayous	2.8	12.3
Sapelli	9.7	10.2
Sipo	6.5	4.1
Acajous/Mahagony	6.1	
Dibetou	4.5	34,3
Iroko	2.7	
Other species	7.4	
	100	100

An average of 6 cubic meters per hectare is estimated to be harvested in saw and veneer logs.

The production of logs harvested annually is given in the following table:

YEAR	VOLUME (in cu. m.)
1975/76	1,300,000
1976/77	1,200,000
1977/78	1,379,151
1978/79	1,626,899
1979/80	1,613,207
1980/81	1,700,000

The target in the forest production established for 1980/81 at 2,500,000 was not attained, primarily because of road, railway and port transport difficulties. In fact, the projected highway leading to future Port of Rocher du Loup wasn't built.

At present, various types of forest produce are exploited by 22 holders of special permits (individuals and companies). 17.191 tons of medicinal plants are recorded to be harvested in the period 1979/80.

The total area of industrial plantations is estimated at the end of 1980 at 10,400 hectares (9,400 hectares of plantations in hardwood species and 1,000 hectares in softwood species).

The area of non-industrial plantations is estimated for the same period at 8,100 hectares.

Based on the statistics used for assessment of the agriculture areas it is estimated that about 80,000 hectares of forest estate are annully converted to be used for agriculture.

WOOD PROCESSING INDUSTRY

The local processing of logs is fixed at 60% of the total log production, nevertheless about only 50% was processed according to the statistics in 1980. The processing rate was 77.3% in the Littoral. The lowest processing rates were recorded in the East and South-East because of the small local demand for lumber.

The table below gives details about local processing between 1975 and 1980:

PERIOD	VOLUME cu. m.	PROCESSING %
1975/76	521,523	40%
1976/77	569,000	47%
1977/78	724,963	52%
1978/79	779,585	48%
1979/80	798,100	49%
1980/81	850,000	50%

According to Forest Statistics (document of Ecole Nationale Superieure Polytechnique - 1981) the primary wood processing industry accounts for:

- four integrated complexes (lumber, veneer, plywood manufacturing)
- 30 sawmills having a production capacity between8,000 and 40,000 cubic meters per year
- 45 sawmills with an average production under 8,000 cubic meters per year
- one sliced veneer plant

One match factory (UNALOR) and one pulp mill are listed under other processing sectors.

The total input for the afore mentioned mills (including the match factory) is given at 798,000 cubic meters in 1979/80 resulting in:

- 70 % of lumber products
- 20.4% of peeled veneer
- 9.0% of sliced veneer
- 0,6% of match manufacturing

The main species processed were Azobe (172,000 cubic meters) followed by Ayous (170,000 cubic meters) and Sapelli (86,000 cubic meters). The recovery factor in sawmilling is relatively low, in fact, about 40% if mills sell to local market and only about 20 - 25% if mills are export oriented. This last figure obviously requires some explanation.

It is believed that the present industrial structure in the primary wood processing industry is inadequate as to optimal utilization of raw wood material. More of integrated wood processing industries should be constructed in the country.

The secondary wood processing industry accounts for about ten furniture and joinery factories, parquets and moulding manufacturing.

MARKET AND TRADE RELATIONS

The local consumption of lumber products was evaluated in 1979/80 at 230,554 cubic meters.

The lumber consumption on the local market for the period of 1975 to 1980 is given in the table below:

PERIOD	LUMBER PRODUCTION (cu. m.)	LOCAL CONSUMPTION (cu. m.)
1975/76	234,685	102,968
1976/77	255,850	183,967
1977/78	326,233	146,233
1978/79	250,813	246,959
1979/80	359,145	230,555
1980/81	382,500	242,500

The figures of log and lumber export are compiled as follows:

PERIOD	LOGS cu. m.	%	LUMBER cu. m.	%
1975/76	778,477	85.5	131,717	14.5
1976/77	631,620	89.9	71,883	10.1
1977/78	654,973	89.1	80,000	10,9
1978/79	613,383	85.5	103,854	14.5
1979/80	740,616	85.2	128,590	15.8
1980/81	850,000	85.9	140,000	14.1

The Contribution of Forestry Sector in the Economy

The total of investments in the Forestry sector accounts for about 115 billion F.C.F.A. including investment for the pulp mill CELLUCAM which is about 75 billion F.C.F.A. (260 million US $)

About 20,930 persons are employed within the sector. 2.5 billion F.C.F.A. are collected annually in the Forest taxes, another 4,5 billion F.C.F.A. are perceived in taxes for exported forest products. The value of exportation is estimated between 25 - 30 billion F.C.F.A. (89 - 107 million U.S. $)

CONCLUSIONS AND RECOMMENDATIONS

The main constraints affecting the Forestry sector formulated in the Development Plan are as follows:

- absence of a forest survey at the national level
- inadequate methods of exploitation of the forest resources
- insufficient systems of evacuation of forest products
- limited means of control both in material and human resources
- difficulties in marketing of secondary species
- low degree of wood processing
- low degree of utilization of forest products in the construction industry
- high prices for the forest products on the local market.

It is recognized that Cameroon has important forest resources, nevertheless the Forest sector and Forest based industry does not contribute enough to the national economy.

The actions to be undertaken for improving the present situation may be formulated as follows:

- realization of a forest survey at the national level by allocation of required funds and human resources
- valorization of forest resources by improving performance and structure of existing industry, and by increasing part of national entrepreneurs. Bearing in mind very possitive impact resulting in implementation of CELLUCAM, other options in forest resources utilization should be considered, analysed and realized in economically soumd industrial projects.
- development of port, railway and road infrastructure should be given priority. Sources of financing are to be identified.
- sufficient funds are to be allocated for Forest Department in order to improve capability of all services.
- strengthening of the Wood Promotion Centre in order to increase the local use of wood mainly in furniture and construction field.

IVORY COAST

General Data

Total area	-	322,463 sq. km
Estimated population	-	8,500,000 inhabitants
Population growth rate	-	3.8% per year

FOREST RESOURCES

The estimates of the Forest estate areas are based according to the F.A.O. Tropical Forest Evaluation Report (1981) on two groups of information: the first group accounts for data collected during the period 1965 - 1966 by Orston (CTFT). The second group accounts for data collected by SODEFOR in 1974 - 1978.

The total Forest estate area is estimated as follows:

TYPE OF FOREST	In 1,000 Hectares
Closed natural forests (intact)	8,357
Other closed natural forests	626
Degraded Forests	5,701
Zones outside Forests	988
Total area	15,672

The Forest Code (Forest law) distinguishes the State, private and community ownership of the Forest Estate. The major part of the Forest Estate belongs to the State.

The area of the National Parks and Reserves accounts for 1,972,600 hectares.

The Forest Code which came into effect in 1965 determines right to forest exploitation under the following forms:

- temporary license valid for five years
- license valid 10 years for companies with sawmilling operations
- license valid 15 years for companies with integrated production, i.e. sliced and peeled veneer

The forest concessions of some companies account for areas more than 250,000 hectares.

Since 1978 the exportation of logs is permitted only to the companies having primary wood processing facilities installed in the country.

The production of saw and veneer logs, supplies to local industries and for export for the period of 1970 - 1978 is given as follows:

PERIOD	PRODUCTION in 1,000 m³	LOCAL INDUSTRIES in 1,000 m³	EXPORTS in 1,000 m³
1970	3,460	950	2,510
1971	3,883	950	2,933
1972	4,118	950	3,168
1973	5,191	1,594	3,497
1974	4,626	1,596	3,030
1975	4,031	1,553	2,478
1976	5,072	1,797	3,275
1977	5,238	1,983	3,255
1978	4,392	1,873	2,521
1979	4,540	1,751	2,789

In order to reduce selective cutting for certain species (Assamela, Sipo, Acajou, Makore) and to promote use of secondary or less known species the export taxes for logs were adjusted respectively. (traditional or selective species are subject to a tax of 44%, while the secondary species are charged only 18% tax).

Details on log exports by species during the period 1975 to 1978 are given as follows:

SPECIES Common Name	1975	1976	1977	1978
		(in 1,000 cubic m.)		
Samba	836	1,019	801	535
Aningueri	25	178	229	219
Ilomba	97	136	153	123
Iroko	86	118	134	111
Kotibe	86	130	170	102
Frake	26	72	85	100
Fromager	60	101	92	85
Framire	83	92	108	81
Tiama	77	95	115	77
Acajou	81	98	112	73
Niangon	45	77	74	72
Sipo	123	83	79	63
Aboudikro	62	71	82	52
Makore	68	63	74	53
Bete	62	88	78	60
Total	1,817	2,421	2,386	1,806
Proportion of the Total Exports	73.3%	73.9%	73.3%	71.6%

The estimates about the potential of 49 main merchantable species classified in 6 categories of use were recorded by Ministere dec Eaux et Forets in 1978 as follows:

CATEGORY OF USE	POTENTIAL in 1,000 cu. m.
1. Species of polyvalent use (high quality)	27,900
2. Species of polyvalent use	18,150
3. Species for furniture making (high quality	14,480
4. Species for furniture making	24,750
5. Species for veneer and mouldings	71,910
6. Species for framing, railway sleepers	9,230
Total - all categories	166,420

The estimates of the potential of 30 secondary species account for a 152,950,000 cubic meters.

The volumes recorded for the main species are commercial volumes derived from gross volume in the cutting areas using marketing conversion factors.

The area of industrial plantations is estimated at the end of 1980 at 37,800 hectares (37,500 hectares of hardwood species and 300 hectare of Pine).

The area of non-industrial plantations accounts for the same period for 7,100 hectares.

The average annual rate of deforestation during the period 1974 - 1980 is estimated at 315,000 hectares. The consequences of the activities of deforestation are evaluated in terms of wood raw material losses at 250 - 300 million cubic meters for the period 1966 - 1980.

WOOD PROCESSING INDUSTRY

According to the statistics of the Chamber of Commerce (1978 - 1979) the number of wood processing units is listed as follows:

TYPE OF PROCESSING	NUMBER OF UNITS
Sawmills	61
Veneer and plywood mills	8
Other industrial wood processing units	13
Industrial furniture making	35
Joinery plants	16
Total	133

Small artisanal type furniture and household article making shops are estimated in the UNIDO Report SI/IVC/77/802 at total of 1,073 units with 5,472 employees (1975). The following production is recorded for 1978/79 and 1979/80:

		VOLUME cu. m. 1978/79	VOLUME cu. m. 1979/80
Lumber	Exports	250,000	265,000
	Local	415,000	394,000
	Total	665,000	659,000
Peeled veneer	Exports	31,000	47,000
	Local	70,000	61,000
	Total	101,000	108,000
Sliced veneer	Exports	3,351	8,707
	Local	5,982	1,349
	Total	9,333	10,056
Plywood	Exports	17,000	21,100
	Local	33,000	28,700
	Total	50,000	49,800
Particle boards	Export	1,453	2,558
	Local	3,444	2,973
	Total	4,897	5,531

The total value of the production including furniture and other wood based products is recorded at 10,808 Million Francs for 1978/79 and at 11,391 Million Francs for 1979/80.

The total of 11,760 employees is listed within the sector. (Nationals - 7069, other Africans - 4,361, non-Africans - 330).

The total cumulated investments in the sector is estimated in 1979/80 at 38.5 billion F.C.F.A.

About 1.8 million cubic meters of logs were processed locally which accounts for about 37% of the total production.

Some new projects were implemented in 1979/80 such as:

- furniture manufacturing plant G.I.B.
- Expansion of parquet manufacturing (company F.I.P.)
- Integrated sawmill belonging to the national company I.T.S. (installed capacity 30,000 cubic meters of logs)

Other projects are under study, such as an integrated wood processing complex (GEBCI), waferboard plant CAMMURE, implementation of an integrated complex for pannels and prefab houses for the local market, manufacturing of posts (investment of 100 million F.C.F.A.).

MARKET AND TRADE RELATIONS

The Ivory Coast remains traditionally a leading African country in export of forest products, mainly saw and veneer logs.

According to the F.A.O. Forest product statistics (1979) almost 50% of the total African log exports account for Ivory Coast followed by Gabon (18%), Cameroon (13%) and Central African Republic (7%).

Referring to Custom Statistics in 1980 the following figures are recorded in forest product exports:

IMPORT COUNTRY (Continent)	EXPORTS 1979 Million F.C.F.A.	PROPORTION %
EUROPE	383,181	71.9
West Germany	31,254	5.9
France	127,659	23.9
Italy	45,045	8.4
NETHERLAND	93,371	17.5
England	24,007	4.5
Other Countries of E.E.C.	11,790	22.1
Total E.E.C.	333.125	62.4
Spain	17,608	3.3
U.S.S.R.	14,287	2.7
Other Countries outside E.E.C.	18,160	3.4
African Continent	77,204	14.3
American Continent	54,841	10.3
Others	19,621	3.7
TOTAL	534,847	100.0

France remains in leading position on imports of forest products coming from the Ivory Coast with 23.9% followed by Italy (8.4% and West Germany (5.9%).

An increasing trend is shown since 1976 within the African Continent in imports of forest products from the Ivory Coast (11.9% to 15.6%). About the same can be said for the American Continent.

There was no available information about the local market at the time of the mission. It is generally recognized that the local market should be developed by such actions as: limitation of the sawmilling capacity, increasing veneer and plywood manufacturing with extension of sliced veneer production, utilization of wood residues in panel and energy projects.

CONCLUSIONS AND RECOMMENDATIONS

The coffee, cocoa and forest products are in the order of importance to the countries economy. There are reasons to believe that forests became the losing partner in the present economic context.

The constraints affecting the forest resources are as follows:

- system of allocation of the forest resources and the link between the forestry sector and agriculture.
- annual rate of degradation of natural forest, utilization of the resources and the rate of harvesting.

Bearing in mind priority given to the agricultural sector a reasonable contemplation should be applied both to forest and agricultural land use. It seems logical to insist on replacing the annual loss of forest land by equal areas of plantations.

The Ivory Coast maintains one of lowest proportion in the locally processed wood raw material (38% in 1979). As a result the Forest Department decided to banish exports of two main species, starting December 1981 and to establish export quotas with regard to the total harvested volume.

As stated elsewhere in this paper, wood processing is, in principle, oriented to sawmilling. In order to achieve high valuation of existing forest resources, it is anticipated to limit sawmilling capacities and to increase the production of veneer and plywood, and to develop at the same time the secondary wood processing industry.

The realization of the above mentioned measures would correct the present situation in the primary wood processing.

The present situation in the Forest sector is conflicting. It is believed that closer co-ordination of activities will be needed etween many institutions having relations to the Forestry sector and professional organizations established in the country.

BIBLIOGRAPHY

Kvarnback, Natvig, 1979 - Sawmills (Ethiopia)

1981 Ethiopian Woodworks Corporation

1981 F.A.O. - Forestry Sub-sector Review and Programming Mission (Ethiopia)

1981 Economic Survey (Kenya)

1980 Forestry Department Progress Report (Kenya)

1980 Small Scale Industry (Kenya)

1981 Forestry Maps (Kenya)

1981 Industrial and Commercial Development Corporation (Kenya)

1980 Conjoncture Economique (Zaire)

1978 Etude de Prefaisabilite (Zaire)

1976 Etude Economique (Zaire)

1981 Plan 1982 - 1986 (Congo)

1981 Report UNIDO DP/CAF/78/008/ - C.A.R.

1981 U.D.E.A.C. - Plan General des Transport (Bangui)

1981 Preparation du V-e Plan (Yaoundé)

1981 Seminar sur les Bois (Yaoundé)

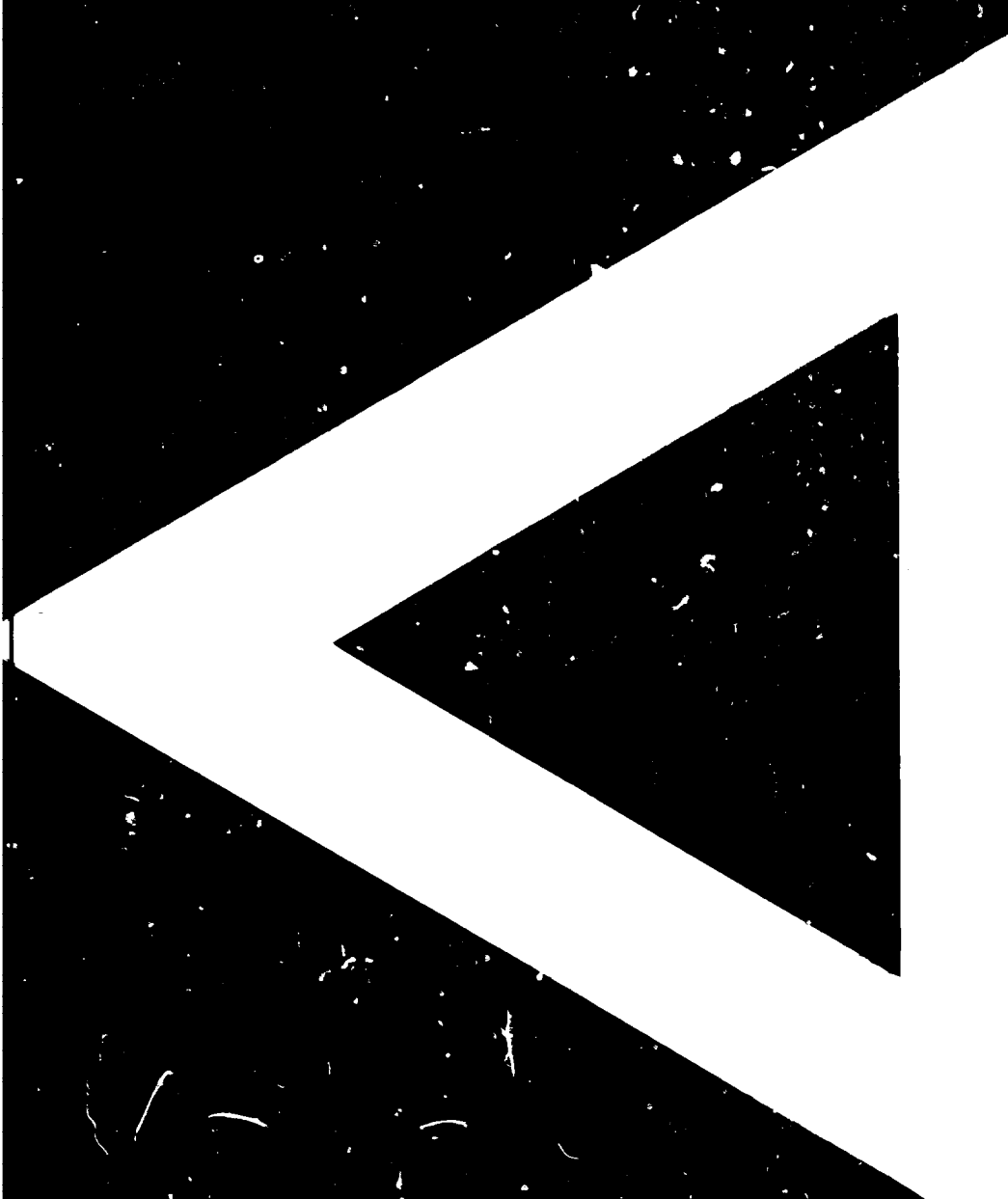
1981 Report of Banks Abidjan (Ivory Coast)

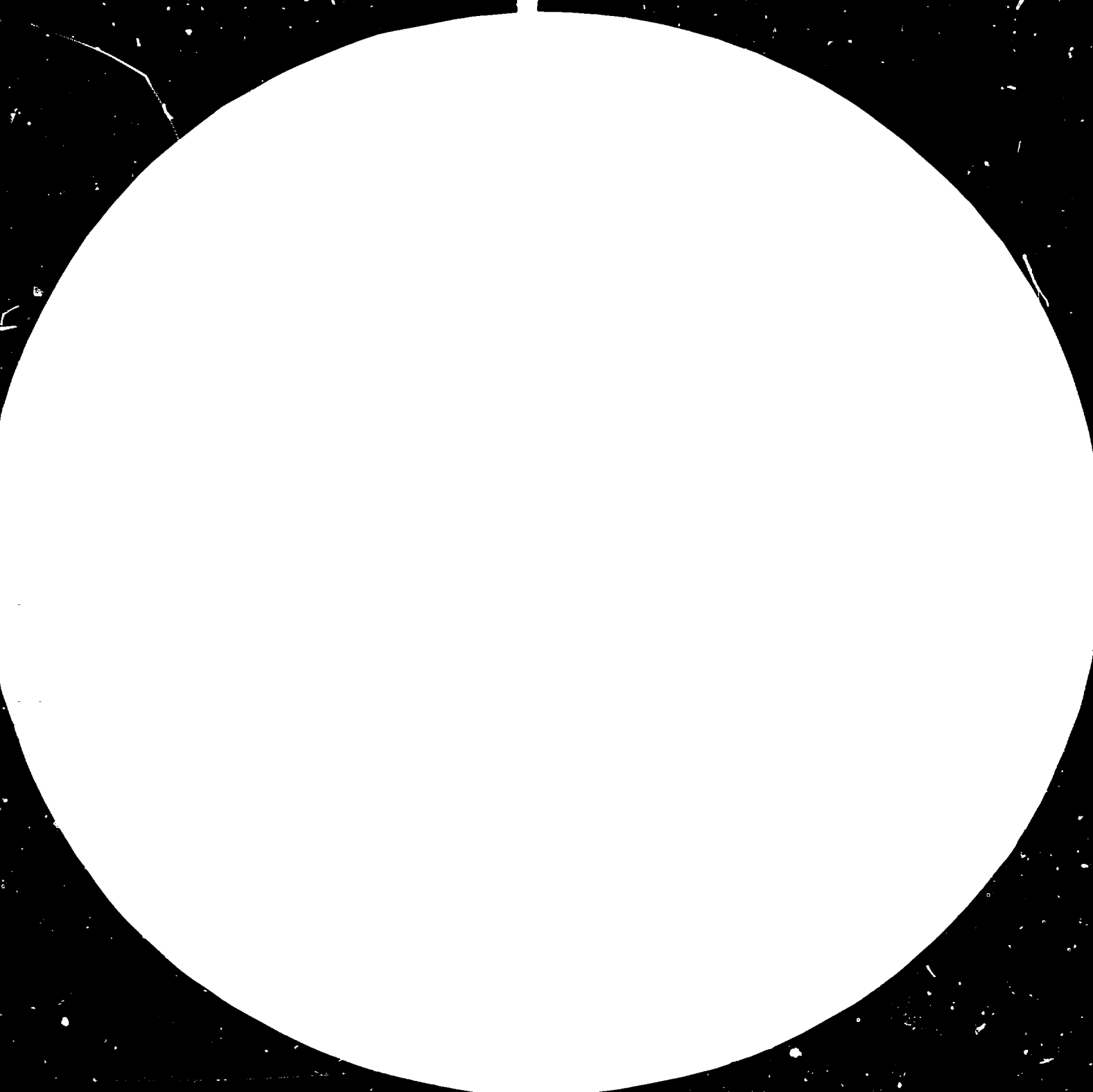
1980 Report S1/IVC/77/802 UNIDO (Ivory Coast)

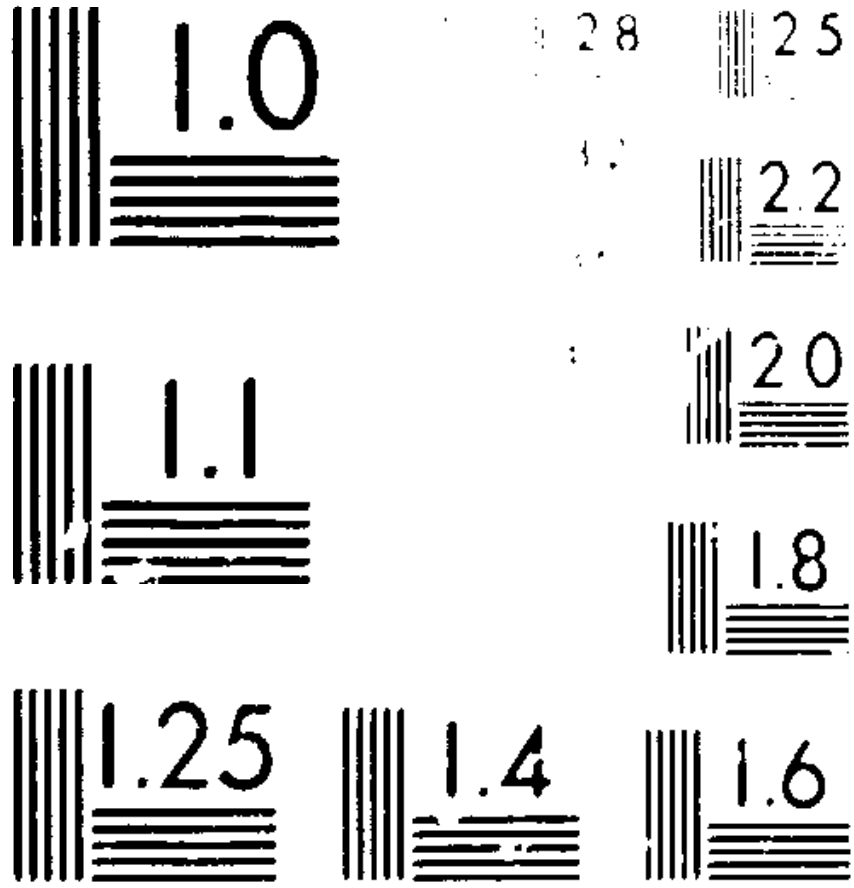
1980 Forestry Statistics (Ivory Coast)

1980 Chambre of Commerce (Ivory Coast)

1980 F.A.O. - Tropical Forest Evaluation Report



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ASSESSMENT OF FOREST RESOURCES AND WOOD PROCESSING INDUSTRIES IN SELECTED AFRICAN COUNTRIES - ADDENDUM

Technological level of the wood working industry in selected African countries *

by

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Dealing with the technology in the wood working industry, it appears more than appropriate to elaborate on the technological concept related to the utilization of existing forest resources first, and to the technics of wood conversion latterly.

Bearing in mind that half of Africa's original forests have disappeared and the tropical deforestation continues at an alarming rate, the present technological concept should be discussed first.

With exception of Kenya where industrial plantations proved to be economically feasible in supplying by increasing volumes the wood processing industry, the picture in countries with still relatively large natural forest resources became sombre.

As stated elsewhere in this paper, selective cutting is a common practice in the forest exploitation having at its origin, in principle the forest department policy in allocation of forest concessions, particularly as to the surface of the granted concession, the peripherical knowledge about the forest resources, a general acceptance by local government projections to be realized by the industry.

Few examples: granted concession (5,000 hectares) is traded in with other person in harvesting logs for export only and for other commercial advantages. The company being granted a forest concession provides primary first quality log supplies to the "maison-mere" overseas. Lumber manufacturing which is capital less intensive than more elaborated products is considered as a satisfactory solution to meet local government investment requirements.

The basic logging system in use in natural tropical forest is, in principle, the same in all of the visited countries: the trees are felled by power saw, bucked in short log lengths, hand-logged or winched to truck roads. In many cases, depending on topographic conditions, logs are moved to truck roads or to the river beds by skidders. Logs are either transported by trucks to the mill, river, river port or rafted and barged to the mills or ports.

Secondary road building for log evacuation is not common because of cost involved and again because of topographic conditions. The river transport presents in most of the countries the easiest means of log transport.

The logging equipment consists of: bulldozers, motor-graders, front-end-loaders, power saws, hand winches, wheeled or chain skidders, trucks, tugs and barges, loading cranes.

It has been mentioned that logging is generally coupled with industrial operations. In such cases and especially when large concessions are harvested good management and work organization takes place. Forest camps, maintenance and repair shop, landing strips for light aircrafts are built up.

In some countries forest exploitation is conducted by individual contractors (loggers). Only basic equipment and lots of hand-work is used in such cases.

In average only 50% to 60% of the volume of trees in the cutting area is used as industrial roundwood. Residues are left in the forest.

No sweeping changes are immediately forecast in existing system of harvesting in natural tropical forest.

Harvesting of limited number of highly desireable commercial species for expert purposes mainly, relatively low proportions in volume of roundwood for industrial use, degradation of natural forest - these are the main constraints affecting the existing forest exploitation.

Taking into account the rational utilization of the existing African natural forest resources, the technological approach described above is far from perfect. It is believed that apart from the correction to be applied in the near future by governments in formulating approximate forest policy, the decisive role to be accomplished in reversing the present trend might belong to the industrial sector as well as to further research on tropical species, especially the lesser known species, utilization of residues and the development of their commercial uses.

Referring to many forest survey reports as well as to the observations during the field visits, following approximative proportion has been found in considering the physical and mechanical proprieties of the commercial tropical hardwood species in natural forest:

About 50% of species are suitable for lumber manufacturing, 10% to 15% for sliced veneer, 30% to 35% for peeled veneer. The average diameter of harvested species is around 60 cm in most cases. Smaller diameters are accepted in some species.

The fast growing species, in principle, Pine, Cypress, Eucalyptus are supplied from industrial plantations (Kenya) for processing. The average diametre accounts for about 30 cm.

As a matter of fact, the best quality logs from natural forest (in principle, all veneer logs) are exported. The balance of logs is processed locally into lumber, partly sliced and peeled veneer and plywood, occasionally some wood residues from industrial operations are converted into particle and chipboards.

The lumber manufacturing remains the basic activity and the mill size ranges from small single machine units to modern industrial complexes (Cameroon, Nigeria, Zaire, Ivory Coast)

The basic equipment used in sawmilling is the carriage-band saw, edger and trimmer. It is common that the primary and secondary breakdown of logs is undertaken at the headsaw thus consumming more time than necessary and affecting productivity. Except for some modern mills, no resaws are in use. A few multiple-saw-edgers and a larger number of one-circular-saw-edgers are observed. A reasonable level of mechanization (live decks, belts, conveyors) is realized in some larger mills.

With a few exceptions, there are no dry kilns installed, lumber seasoning is done only.

Many small units equiped with horizontal bandsaws only used for primitive breakdown of logs with poor recovery are installed in Nigeria. The use of frame-multiple saws does not seem to have much success except for processing of low density species.

The saw doctoring doesn't appear to be a particular problem, provided that appropriate tools and equipment are available.

Relatively low lumber recovery factor is due, to certain extent, to the quality of logs, but the main reason remains the lack of equipment used for secondary processing.

As a general practice, sawmilling is considered a complimentary activity to log export. Both activities requiring low capital spending.

In order to get higher value from raw material few industrialists started with sliced veneer operations. In each of the visited countries, there is one or more sliced veneer plant, the production of which is mainly export oriented. Horizontal or vertical slicing machines are in use. In most of the cases, operations

are under the control of expatriates. Potential projects for sliced veneer are mentioned in the Congo, Central African Republic and Cameroon.

While there is no special comments on peeled veneer, some reserve has been observed as industrialists are concerned about plywood manufacturing. This may be due, to certain extent, to the lack of technical knowledge, need of imported raw materials, necessity to hire expatriates for running production and without doubt the funds to be spent in investment. Nevertheless, an example of excellent success may be mentioned at Piemont Plywood Company operating in Nigeria. Kenya is another successful undertaking in plywood manufacturing based on roundwood from industrial plantations.

Two factors may be mentioned having a close link to the technological level in the wood processing industry: the scale of operations and the degree of integration.

It would not be realistic to believe that a small production unit will spend additional funds investing in new technology (high strain band saw, resaw, green chain, etc.). The reason may be likely the uncertainty in wood supply, the lack of funds, the lack of skilled operators, etc.

Consequently, it is believed that aiming at rational utilization of African natural forest resources, integrated wood processing complexes using modern methods in processing are likely the most appropriate approach in the future development of the forestry sector. The African Timber and plywood Company in Nigeria may be still considered as one of the best integrated wood processing complexes in Western Africa.

Outline of main technological characteristics in the selected countries:

Ethiopia

There are about 34 sawmills scattered throughout the country, mostly old ones and with obsolete equipment. There is a definite need for a build up of new units, implemented in the right areas and reasonably integrated. The equipment of secondary wood processing industry concentrated mainly in Adis Ababa may be considered acceptable at the present circumstances.

Kenya

A mixture of old and recently implemented production units both in sawmilling and plywood manufacturing could provide a general picture about the sector. There is one excellent well operated large sawmill in the country built up by a Japanese Company. A reasonably moderate approach to wood residues utilization (particle-board and chipboard) is characteristic for the sector. Because of increasing volume of raw material from industrial plantations for processing, specific technics of conversion are likely to be gradually introduced. The possibility of the implementation of secondary wood processing industry should be studied.

Zaire

Potentially most important African country as to natural forest resources. Wood processing industry is, in principle, represented by one modern private owned sawmill - veneer plant, two public owned integrated complexes under reconstruction and modernization, few mostly depreciated sawmills, limited plywood manufacturing and one match factory. The wood working industry both primary and secondary is largely underdeveloped. Large capital spending is anticipated in the near future for the development of the sector. The most appropriate approach to natural forest resources utilization is still under study.

Congo

Mostly older and depreciated wood processing units in sawmilling, peeled veneer and plywood manufacturing. Complicated partnership in the sector - four groups of partners involved. Owing to large forest resources a major development in wood working industry is anticipated, consequently massive investment both in the industry and infrastructure will be needed. Heavy dependence on expatriates working within the sector.

Central African Republic

Excellent opportunity in wood supply. Most of wood working industry was recently implemented in the country. Two foreign state owned companies dealing in lumber and veneer manufacturing have at their disposal appropriate equipment and machinery, thus enabling them to operate at acceptable technological level. Other companies are mostly old and almost total replacement of equipment is required. The sector is still underdeveloped, a reasonable integration is needed.

Cameroon

The industrial structure related to the existing forest resources may be considered well balanced at the present time. The wood processing units, mainly in lumber manufacturing are generally well equiped and performing at an acceptable level. Even if the forest development is presently in process, the country may be seen as a leading African country in the sector. A scientific approach to natural forest resources utilization selected in the case of the CELLUCAM project reflects the attitude of the government and the forestry department toward the most economical use of the available resources.

Nigeria

Once a leading African country in the forest industry but has lost a lot of its importance due to rapidly depleted forest resources. A real mixture of machinery and equipment used in wood working industry ranging from primitive pieces to modern complexes features the sector. Two companies operating in the country, using well adapted technology under local conditions may be mentioned, i.e. The African Timber and Plywood Company and the Piemont Plywood Company (Nigeria).

Ivory Coast

In terms of volume of production and exports the country remains on the top of the list of African wood producing countries. Industrial structure appears to be well adapted to the raw material availability covering lumber, veneer, plywood and wood based panels manufacturing. However, with few exceptions, the technological level, mainly in lumber industry doesn't exceed the average in o other African countries. As to plywood manufacturing and to a certain extent other wood based panels, the sector is surprisingly less developed then in other countries. There are no possitive changes to be expected to occur as to major technological improvment in the industry. In fact, the cumulative investment in the sector during the last years, recorded by the Chamber of Commerce (1979) remains stable.

Maintenance and Spare Parts

The obs rvations in the field as well as the discussions held with the industrialists confirm that proper maintenance work can be carried out at an average mill by local maintenance men or in the case of major repairs under supervision of a foreman (millwright) in principle, an expatriate. In fact, there is a lot of equipment, fully depreciated yet, but still in relatively good working condition owing to proper maintenance.

However, the basic question to be answered would be as follows: should the worn out piece of equipment be repaired or replaced?

It is generally accepted that under specific working conditions prevailing in tropical countries the economic life or depreciation period of basic equipment used in forest exploitation and wood working industry would be as follows:

- rolling stock - maximum five years
- heavy wood working machinery and equipment - maximum 10 years
- structure (building) - generally 15 years or longer

Assuming that the accounting system in the company works, the funds accumulated in depreciation should be used for acquisition of new equipment to replace the one fully depreciated.

This system even theoretically right, doesn't work too well in the wood working industry in most of the African countries.

There are two factors that affect functioning of the system:

- the acquisition of new equipment is subject to government policy or regulation as to control of foreign exchange and the use of foreign currency.
- the willingness of the owner or company to replace a fully depreciated piece of equipment at the right time.

The conbined effect of these two factors proved to be harmful to the wood working industry. It is believed that in many cases the replacement of fully depreciated equipment has been delayed for speculative or other reasons.

The situation in the spare parts is identical - the provisions for acquisition are made but the purchase is delayed or never realized. However, in many good organized companies sufficient stock of spare parts is held in central depots and fast shipment, mostly by light aircraft, is carried out mainly for immediate need in forest exploitation.

Existing Research and Training Institutions

It was physically impossible to gather data about this point. Nevertheless, some of the information collected in the field is outlined below.

Ethiopia

A Forestry Research Institute is recorded within the University of Addis Ababa.

A silvicultural research undertaken in early 1950 through bilateral assistance of F.R.G., U.K., and F.A.O. continued in 1967 with SIDA technical assistance. The UNDP/FAC provided in 1975 assistance to the Forestry Research. UNDP project: Support to Forestry and Wildlife Development - is expected to start in October 1982 covering Forest management, Silviculture, Research, Training, Forest Industry Planning. The Ethiopian Woodwork Corporation requires technical management and manpower training assistance.

Kenya

Are listed within the sector following organizat ons.
Forest Industrial Training Centre in Nakuru, East African Agriculture and Forestry Research Organization in MUGUGA.
International Council for Research in Agro-Forestry in Nairobi.
The Forest research recently conducted was related to establish standard nursery techniques, study about fungi from U.S.A. and South America attacking Pinus species, ecological study aiming at the rational management of the natural forests on a sustained field basis.

The Government Forest Industrial Training Centre was involved in demonstration of modern logging methods and in logging operations for two private sawmills.

Other research works were mainly directed towards promotion and expansion of proper utilization of wood resources. The main research projects undertaken are:

- study in 30 different species
- study in timber grading rules
- study on various species for railway sleeper manufacturing

The Utilization Research Section has at its disposal a fully equiped experimental sawmill with a woodwork shop.

Zaire

The Research in Forestry and Forest Industry sector was conducted in previous years almost entirely by the Forestry Faculty at the Lovanium University in Kinshasa and the Agro-Forestry section in Yangambi, close to Kisangani. A reforestation project sponsored by F.A.O. is presently realized near Kinshasa. A research work directed to the establishment of annual increament in natural tropical forest has been recently entrusted to a parastatal organization associated with the Forestry Department.

There are no training institutions established in the country within the sector.

Congo

According to the agreement of technical assistance the research in forestry sector has been entrusted to the "Centre Technique Forestier Tropical". The present research work is directed toward the silviculture. There is no information about training institutions within the sector in the country.

Central African Republic

The former - Centre Forestier de Formation Professionnelle et de Demonstration - might be considered the only research institution in the country. At the present time, this organization doesn't work any more. However, the basic to forestry related research is conducted by C.T.F.T through the technical assistance. No data is available about the training facilities within the sector.

Cameroon

Are listed within the sector following organizations:

- National Forestry and Pisciculture Fund - directed toward forest regeneration, applied forestry research.
- National Forest Research Centre - aiming at forestry, genetic and technological research.
- Wood promotion Centre - part of the UNDP/FAO forestry project initiated in 1970 - responsible for promotion of forest species and development.
- Training of Forestry Personnel - Training of forestry engineers is carried out in Yaounde, assistant engineers are still trained abroad. The technicians and assistant technicians are trained at the Mbalmayo Forestry School.

Ivory Coast

Following organizations are listed within the sector:

- Centre Technique Forestier Tropical - responsible for scientific research on wood technology, grading rules of tropical lumber, promotion of less known species.
- Centre Forestier de Formation Technique - sponsored by the assistance of PNUD/FAO, responsible for training of technicians in sawmilling and furniture manufacturing.
- Bureau Ivoirien de Normalisation - sponsored by PNUD/ONUDI recently.
- Bureau de Development Industriel - in charge of industrial promotion, appraisal of industrial projects.

Regional and Subregional Industry and Trade Associations

There exists in each producing country a professional or trade association, at least such an organization is registered. It is impossible to produce complete lists of these associations because the necessary information could not be gathered during the field mission. Furthermore, it appears very difficult to assess their real contribution to the sector in this paper. It is regrettable that the subregional trade association U.D.E.A.C. (C.A.R., Cameroon, Gabon, Co go) couldn't produce any reliable records on commercial exchange for the last three years.