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PROSPECTS FOR INTEGRATION IN THE WOODWORKING
INDUSTRY OF THE CARIBBEAN COMMUNITY

UC/CAR/86/201

Technical report: The situation in Guyana*

Prepared for the CARICOM Secretariat
by the United Nations Industrial Development Organization

Based on the work of Pietro Borretti, woodworking consultant

Backstopping officer: A. V. Bassili
Industrial Management and Rehabilitation Branch

522

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TABLE OF CONTENTS

	<u>Page</u>
1. Introduction	4
2. Summary	6
3. Forest Resources	8
4. Guyana timber species	9
5. Primary wood products exports	12
5.1 General trends	12
5.2 Lumber export trends by destinations	13
5.3 Lumber export trends by timber species	15
6. The sawmilling industry	17
6.1 Demerara Wood Sawmill	19
6.2 Willems Timber Sawmill	19
6.3 Ameerally Sawmill	20
6.4 J and Z Sawmill	20
6.5 N. and N. Shaffeeullah Sawmill	20
7. Requirements for assistance to the sawmill industry	21
8. The furniture manufacturing sector and its export potential	22
9. Timber prices	24
10. Shipping links	25
11. Guyana timber exports potential to CARICOM destinations	26

Tables

1. Existing Forest Estate and overall land distribution	8
2. Standing timber volume by Region, Zone and Species/Species groups	9
3. Net merchantable extractable volume of timber in selected areas of Guyana - selected species	11
4. Geographical distribution of selected species	11
5. Log extraction of main species, 1983-1986	12
6. Exports of primary wood products, 1983-1986	13
7. Guyana Lumber exports by countries of destination, 1983-1986	15
8. Guyana's lumber exports by species, 1983-1986	16
9. Share of 1986 lumber exports by sawmills	17
10. Summary of annual sawmill production, 1975-1985	18
11. Summary of headrig types by region	18
12. Comparison of sawmilling capacity and output, 1982-1984 and 1986	21
13. Main lumber prices (ex mill), 1980 to 1987	24
14. CARICOM FOB prices for mixed Guyanese hardwoods	24
15. Freight rates from Guyana to CARICOM destinations (20 ft. containers)	25
16. Freight rates from Guyana to CARICOM destinations (per metric ton)	26

<u>ANNEXES</u>		Page
I	Persons met	28
II	Map of forest under exploitation and potentially accessible	30
III	Map of distribution of State forests	31
IV	Draft project document Assistance to the Sawmill industry	32
V	Draft project document Rehabilitation of the Guyana Timber Ltd.	36
VI	Specific opportunities for exchange of wood products within the Caribbean community	40
VII	Properties of Guyanese timber species suitable for furniture making	53
VIII	Check list of technical information available on main Guyanese wood species.	62

1. Introduction

1.1 Title and number of the project under which this country report has been prepared:

Development of integrated industry programme for the woodworking and furniture industry sector in CARICOM - UC/CAR/86/201

1.2 Cooperating Agency:

Caribbean Community Secretariat, Georgetown, Guyana

1.3 UNIDO consultant:

Pietro Borretti, Consultant in Woodworking Industry Sector.

1.4 CARICOM counterpart:

Ivor Carryl, Industrial Economist, Economics and Industry Division.

1.5 Main institutional contact in Guyana:

Ministry of Forestry and Guyana Forestry Commission

1.6 UNIDO Backstopping officer:

Antoine V. Bassili, Senior Industrial development Officer, Industrial Management and Rehabilitation Branch, IIS

1.7 Period of mission in Guyana:

First visit: 16 to 29 March 1987
Second visit: 28 May to 3 July 1987.

1.8 Terms of reference:

To assess the status and potential of the export of furniture-type lumber from Guyana to the timber deficit countries of the Caribbean Community.

1.9 Main activities:

- (a) Survey of selected sawmills to determine their capability to export furniture-grade lumber;
- (b) Review of shipping links with countries in the Community;
- (c) Review of lumber export trends;
- (d) Reporting to the Guyana Forestry Commission on specific requirements for furniture lumber by timber-deficit CARICOM islands.

1.10 Background

Among the primary aims of the Caribbean Community Secretariat (CARICOM), established in 1973, are the coordination of economic policies and development planning, and setting up of a special regime for its less developed members. In line with these aims, the CARICOM has developed an industrial programme for the industrial development of its 13 member states. The emphasis is on the production of goods and services for the regional market with a view to minimizing costly imports.

The development of the timber industries sector - and in particular the promotion of the supply of wood products from within the Region - has been assigned a priority role by the CARICOM secretariat, since the Caribbean Community as a whole is heavily dependent on extra regional sources of supply to meet its demand for lumber.

A regional project of assistance to CARICOM - entitled 'Development of Integrated Industry Programme for the Woodworking and Furniture Industry Sector in CARICOM' - was undertaken in this connection in 1987 by the UNIDO consultant Pietro Borretti who visited nine of the twelve CARICOM countries together with his counterpart Ivor Carryl.

As a result of the missions, the consultant prepared eleven reports to highlight to the CARICOM Secretariat and to the authorities of the member states the situation of the sector and its potential. He also recommended certain immediate measures for the development of the sector. This report concerns the mission undertaken by the consultant in Guyana.

1.11 Related reports prepared under project UC/CAR/86/201

The eleven reports prepared under the project include the following:

- (a) The project's terminal report (reference No. IO/R.52) entitled 'Prospects for Integration in the Woodworking Industry of the Caribbean Community' dealing with the situation in the region as a whole. The report proposes, inter alia, the implementation of three projects of a regional scope:
 - i Study on the establishment of a timber distribution centre in Barbados or Trinidad to facilitate the supply of lumber from within CARICOM;
 - ii Holding a regional WOODTECH course/exhibition of woodworking machinery in Barbados in order to promote the transfer of technology for the small-scale furniture and joinery industry in the Caribbean;
 - iii Intra-regional tool maintenance training programme for the furniture/joinery industry;

- (b) Nine country reports covering the CARICOM member states^{1/} visited by the consultant and his counterpart in the course of the project; and
- (c) A technical report on the 'Selection of woodworking equipment for the small-scale furniture/joinery industry in the Caribbean Community' (report No. IO/R.53).

2. Summary

Guyana has the largest area of tropical rain forest in the CARICOM region (16.3 million hectares or 76.5 percent of the total land area), and only ten percent of the country's forest is surveyed. Thus forest resources offer a considerable long-term potential in Guyana's economic development.

Guyana is, with Belize, one of the only two CARICOM countries who are net exporters of timber. Of the two countries Guyana is both the largest lumber exporter (8,676 m³ or 3.6 million BM exported by Guyana in 1985 as against 1,741 m³ or 737,835 BM by Belize). Guyana is also the largest lumber producer (53,298 m³ or 22.6 million BM as against Belize's 21,690 m³ or 9.2 million BM).

Over 59 percent (5.151 m³ or 2.2 million BM) of lumber exported in 1986 was shipped to Caribbean destinations while 36 percent was imported by the United Kingdom. The total volume of sawn or dressed lumber remained constant between 1983 and 1986 (8,998 m³ and 8,676 m³ in 1983 and 1986 respectively). However, the ratio of value added has considerably fallen since 1983 due to the decrease in the volume of dressed lumber exported from 4,507 m³ or 1.9 million BM to 1,448 m³ or 0.6 million BM in 1986.

A decline was also experienced in the utilization of the installed capacity of the sawmilling sector from 38.7 percent in the period 1982-1984 to 30 percent in 1985.

The sawmilling industry sector consists of about 79 mills most of which are small units employing as few as 10 workers and operate at a low level of efficiency due to obsolete equipment. At present, the capability of producing sawwood of export grade is limited to a few larger sawmills. However, only very few mills are equipped with the type of modern planing and moulding machinery enabling to increase the value added potential of lumber exports. Guyana operates what is possibly the largest and most modern band mill in CARICOM, the Demerara Woods plant which integrates sawmilling with planing and moulding facilities and drying kilns of large capacity. The mill has an annual output capability of over 10 million BM (26,600 m³).

A major constraint of the sawmilling sector as a whole is the difficulty in obtaining foreign exchange for the purchase of spare parts and replacement of run-down equipment. Whereas the main obstacle towards

^{1/} Antigua, Barbados, Belize, Dominica, Guyana, Jamaica, St. Lucia, St. Vincent, Trinidad and Tobago.

expanding lumber exports to CARICOM destinations is the shipping problem, namely that of serving at regular frequency highly fragmented small island markets.

Based on the response received from furniture manufacturers and timber imports in the course of project travel in CARICOM, Guyana stands a unique opportunity to promote lumber exports to CARICOM Member States by supplying Mahogany substitutes (such as Determa and Crabwood), in the wake of the increasing scarcity and higher costs in the supply of Brazilian Mahogany, the main and traditional type of furniture timber in the region.

The promotion of the export of Determa and Crabwood, as well as other attractive furniture timbers such as Hububalli, would not interfere with Guyana's efforts to increase its exports to hard-currency markets in that these species are not available in very large volumes, and hence of no interest to these hard currency markets; whereas CARICOM, with its overall limited size of market would enable Guyana to develop exports of furniture-type lumber.

Specific requests for quotation of lumber were handed to the consultant by potential buyers in the CARICOM countries visited and were submitted by the consultant to the Guyana Forestry Commission upon return to Guyana from field visits in June 1987. Details on lumber-supply requirements are given in Annex VI.

There are not significant prospects of promoting trade of wooden furniture and furniture parts with other CARICOM countries because the major regional market, Trinidad, has virtually dried up due to the post-oil-boom recession bringing about substantial non-tariff barriers designed to protect Trinidad's own battered furniture industry. Antigua, however, still offers a good potential in the import of selected types of furniture on account of its thriving tourism industry. Limited opportunities also exist to supply door frames dimension stock and turnings to Barbados and Jamaica. Details in this respect are given in Annex VI.

The following recommendations are made towards promoting Guyana's lumber export potential:

- (a) To provide short-term assistance to the sawmill industry, especially the export-oriented plants, so as to establish a rational basis for:
 - (i) upgrading the efficiency of the existing production equipment; and
 - (ii) renewing and expanding the existing sawmilling facilities.

A draft project document in this respect is given in Annex II.

- (b) To study the possibility of establishing a CARICOM timber distribution centre in Barbados or Trinidad in order to enable Guyana and Belize - the only two CARICOM net lumber exporters - to centralize market distribution, thus facilitating frequent and prompt lumber deliveries to the Windward and Leeward Islands in the Caribbean. A draft project document in this respect is Annex VII of the project's terminal report (reference No. IO/R.52).

- (c) To study the possibility of rehabilitating the Guyana Timber Limited Complex (GTC) in Georgetown to serve as a central lumber supply channel for the proposed timber distribution centre in Barbados (see draft project document in Annex IV).

As for the promotion of export furniture and furniture parts, it is recommended that the industry adopt the modern wood jointing techniques based on dowels and round-end tenons, and endeavour to remedy the existing bad investments in the purchase of new machinery. A separate technical report has been prepared in this respect by the consultant entitled "Guidelines for the Selection of Woodworking Equipment for the small-scale furniture/joinery industry in the Caribbean Community" (report reference no. IO/R.53).^{2/}

3. Forest Resources

Guyana has the largest area of tropical rain forest in the CARICOM region. It covers 16.29 million hectares representing 76.66 percent of the total land area. In comparison, the commercial forest area of the second ranking CARICOM country, Belize, covers only 1.7 million hectares. Details of the existing forest estate are given in the following table.

Table 1: Existing Forest Estate and Overall Land Distribution

Class	Area (Million ha)	Percentage of total Land Area
Tropical Rain Forest	16.29	76.66
-Exploitable (short-term)	(3.58)	(16.85)
-Potentially exploitable	(5.12)	(24.09)
-Not presently accessible	(7.59)	(35.72)
Savannah and Scrub	3.23	15.20
Coastal Mangrove	0.08	0.38
Agricultural Cultivations and Settlements	1.00	4.70
Rivers and Lakes	0.65	3.05
Total area of Guyana	21.25	100.00

Source: Guyana Forestry Commission.

^{2/} The report provides, among others, guidance on the selection of tool maintenance equipment suitable for various levels of woodworking plants as well as for tool maintenance service centres. Moreover, it includes specifications for tool maintenance and sawdoctoring equipment suitable for sawmills using circular saw blades with inserted teeth, gang saw blades, and bandsaw blades up to 5 inches wide. A particularly useful piece of equipment presented in the guidelines is a simple hand-operated device recommended for the proper sharpening of inserted teeth - an operation which is carried out inefficiently by hand filing in most Caribbean sawmills.

Large virgin forest areas are present in the country. In fact, only ten percent of the country's forest is surveyed. The limited rate of deforestation is favoured by the low population density of 4 per square kilometer - the lowest in the region. Thus, forest resources offer a considerable long-term potential in the economic development of the country. The forest areas' location is shown in the maps in Annexes II and III of this country report.

An overall view of timber standing volume per region, species and species group is given in the following table. The figures were compiled in 1975 on the basis of all available inventories. The table provides timber volumes according to the following species group:

Table 2: Standing Timber Volume by Region, Zone, and Species/Species Group

<u>Species Group</u>	<u>No. of Species in Group</u>
1	1 (Greenheart)
2	2 (Wallaba)
3	25 ("Merchantable")
4	16 ("Possibly merchantable")
5	27 ("Possibly useful")

Region Name	Region No.	Zone No.	Area km ²	Timber Volumes in m ³ /ha			
				Group 1 (Greenheart)	Group 2 (Wallaba)	Group 3	Groups 1 to 5
North West District	1	5	10,577	--	--	42.0	105.0
Waini/Cuyuni	2	2	4,155	2.6	0.1	22.6	168.8
Cuyuni/Mazaruni	3	3	4,740	10.0	10.0	48.6	159.5
Mazaruni/Kuriboug	4	1	3,381	4.1	27.6	31.4	176.3
Bartica Trinagle	5	--	3,193	0.5	8.0	6.0	89.7
North East Area	6	--	2,999	0.5	15.0	7.2	78.1
Essequibo/Coventryne Area	7	4	6,523	16.2	16.7	27.2	146.4
Total			35,528	4.9	12.3	30.8	131.8

Source: Regional Forestry Sector Study, CDB, 1983 (Revised by G.F.C. in 1987).

4. Guyana Lumber Species

As with most tropical forests, in Guyana there is a complex mix of species where hundreds of species are present but only a small number occur in large volumes.

Industrial wood is largely centered on the production of Greenheart (*Ocotea radiaei*) a timber which has dominated logging and sawmilling practices and, to a large extent, the marketing of Guyana timbers. In fact, it can be said that Greenheart is the only timber from Guyana widely known abroad, with the exception of the Caribbean Region where some familiarity also exists with Purpleheart (*Peltogyne*).

Greenheart has excellent technical properties as a construction timber, notably an exceptional strength and natural durability. In its major overseas destination, the United Kingdom, this species is utilized mostly for marine work, docks and harbours. In Guyana, it is utilized for a variety of end uses.

The group of the small number of species which occur in large volumes include, among others, the following:

<u>Species</u>	<u>Air dry density</u>	
	<u>kg/m³</u>	<u>Lbs/cu.ft</u>
Dukali	480	30
Baromalli	560	35
Haiariballi	560	35
Kurokai	560	35
Kakaralli	1120	70
Mora	1040	65
Morabukea	1040	65
Wallaba	960	60
Wamara	1200	75
Kabukalli	800	50
Tauroniro	880	55

In addition to these species, however, there are a number of timbers which, though not as common as the species listed above, are available in adequate quantities to meet the limited lumber requirements of the CARICOM markets for furniture manufacturing, particularly in the context of providing substitutes to Brazilian and Honduras Mahogany. The main species are:

- (a) Crabwood (*Caropa guianensis* Aube) also known as Andiroba - air dry density: 35 lbs/cu.ft; 560 kg/m³;
- (b) Determa (*Ocotea rubra*) - air dry density: 39 lbs/cu.ft; 624 kg/m³;
- (c) Locust (*Hymenea courbaril*) - air dry density: 57 lbs/cu.ft; 912 kg/m³;
- (d) Hububalli (*Loxopterygium sagotti*) - air dry density: 40 lbs/cu.ft; 627 kg/m³;
- (e) Kereti Silverballi (*Nectandra* and *Ocotea* spp.) - air dry density: 30 lbs/cu.ft; 480 kg/m³;
- (f) Simarupa (*Simaruba amara*) - air dry density: 30 lbs/cu.ft; 480 kg/m³;
- (g) Purpleheart (*Peltogyne* spp.) - air dry density: 60 lbs/cu.ft; 960 kg/m³.

Details on characteristics and properties of the above species are given in Annex VII: Properties of Guyanese Timber Species.

Of the above species, Crabwood and Determa have characteristics similar to those of Mahogany. Hububalli offers a pronounced attractive grain similar to Teakwood. Kereti Silverballi and Simarupa are suitable for internal furniture frames and components such as drawer sides. Purpleheart is the most valuable timber of Guyana for furniture manufacture.

Tables 3 to 5 hereunder provide data on the:

- net merchantable extractable volume of the above mentioned species;
- distribution by regions; and
- log extraction of the main timber species in the period 1983-1986, respectively.

Table 3: Net Merchantable Extractable Volume of Timber in Selected Areas of Guyana - Selected Species.

	<u>cu. ft.</u>
Crabwood	5,879,102
Determa	5,879,102
Hububalli	5,897,102
Kereti	8,818,653
Purpleheart	8,818,653
Simarupa	<u>14,697,755</u>
Total:	70,549,224

Source: Guyana Forestry Commission.

Table 4: Geographical Distribution of Selected Species

<u>Species</u>	<u>Located in Region</u>
1. Crabwood	1, 6, 7
2. Determa	5, 10
3. Hububalli	1, 6, 10
4. Kereti Silverballi	1, 6, 7, 10
5. Purpleheart	1, 2, 6, 7, 10
6. Simarupa	1, 6, 7, 10
7. Locust	2, 6, 7, 10
8. Kabukali	1, 2, 6, 7, 10
9. Tauroniro	2, 6, 7, 10
10. Tatabu	1, 2, 6, 7, 10
11. Mora	1, 2, 3, 5, 6, 7, 10

Source: Guyana Forestry Commission.

Table 5: Log Extraction of Main Species, 1983 - 1986

Production Species	1983 Vol. (cu.ft)	1984 Vol. (cu.ft)	1985 Vol. (cu.ft)	1986 Vol. (cu.ft)
Crabwood	38,783	74,688	71,913	94,767
Hububalli	82,782	112,090	80,743	73,016
Simarupa	90,281	86,162	90,391	78,348
Purpleheart	246,029	255,934	319,002	337,114
Kereti Silverballi	119,937	166,151	192,845	163,591
Wanara	38,853	35,625	18,726	27,892
Locust	62,179	67,793	62,703	79,350
Kabukalli	271,188	253,310	332,955	246,867
Determa	31,366	4,585	75,150	4,698
Shibadan	103,403	89,683	105,782	81,152
Tauroniro	85,942	99,857	119,358	108,454
Tatabu	103,310	54,045	92,591	63,126
Mora	382,990	289,421	251,644	441,367

Source: Guyana Forestry Commission

5. Primary Wood Products Exports

5.1 General Trends

Primary wood product exports include a wide variety of items which, however, only sawn and dressed lumber offer some degree of value added. Unprocessed products consist of logs, hewn logs, piles, poles and posts. The export of logs has substantially declined since 1984 when 3,306 m³ (116,734 cu.ft) of this unprocessed material was shipped abroad. In 1985, 2,696 m³ of logs were exported and only 87 m³ (3,085 cu.ft) in 1986. Details on the exports of the various primary wood products during the period 1983-1986 are given in the following table:

Table 6: Exports of primary wood products, 1983-1986.

		1983	1984	1985	1986
Sawn	m ³	4,491	4,155	5,953	7,228
	cu.ft	158,613	146,733	210,221	255,241
Dressed	m ³	4,507	2,733	2,594	1,448
	cu.ft	159,147	97,918	91,801	51,241
Total sawn & Dressed lumber	m ³	8,998	6,928	8,547	8,676
	cu.ft	317,760	244,651	301,822	306,482
Hewn	m ³	4,191	2,799	2,234	2,526
	cu.ft	147,999	98,864	78,912	89,209
Piles	m ³	1,677	2,342	2,434	2,182
	cu.ft	59,222	82,698	85,972	77,070
Poles	m ³	2,962	3,808	3,349	2,086
	cu.ft	104,622	135,669	118,283	73,685
Posts	m ³	458	131	327	173
	cu.ft	16,195	4,640	11,559	6,114
Shingles	m ³	26	104	115	272
	cu.ft	926	3,682	4,063	9,632
Logs	m ³	2,694	4,132	2,696	109
	cu.ft	95,120	145,918	95,195	3,856
Total volume of all primary wood products	m ³	21,006	20,284	19,703	16,026
	cu.ft	741,844	716,322	695,806	565,948
Total value US\$		5,868,630	3,679,488	8,195,501	4,182,264

Source: Compiled from Statistic Records of the Guyana Forestry Commission.

The share of sawn and dressed lumber in total wood exports was 54.2 percent in 1986. Only a slight decline was experienced in the period 1983 to 1986 in the exports of lumber (8,998 m³ in 1983 as against 8,679 m³ in 1986). However, a negative trend emerged in the same period with respect to the ratio between the export of rough-sawn lumber and dressed lumber. In fact, while in 1983 each of the two products shared 50 percent of the total lumber exports, in 1986 dressed lumber accounted for only 17 percent share.

Moreover, no dressed lumber is recorded as having been exported to Europe in the period 1983-1986 with the exception of a shipment of 16,367 ft.3 (463 m³) to the United Kingdom. In fact, in 1986 over 89 percent of the total dressed lumber exports (45,671 cu.ft or 1,293 m³) was shipped to CARICOM destinations - with Barbados absorbing 56.5 percent of it.

5.2 Lumber Export Trends by Destinations

Over 59 percent of lumber exported in 1986 (5,151 m³ or 181,882 cu.ft) was shipped to Caribbean sea destinations. The United Kingdom absorbed 36 percent (3,132 m³) in the form of rough sawn wood, whereas the only other overseas destinations, the USA and Canada, imported a share of only 4.2 percent equivalent to 365 m³ or 12,888 cu.ft.

A total of 2,013 m³ (71,133 cu.ft) of lumber was exported by Guyana to CARICOM Member States in 1986, amounting to a 23 percent share of the total lumber exports down from 49.4 percent or 4,442 m³ (156,893 cu.ft) in 1983.

During the period 1983-1986, Barbados has remained the main CARICOM destination for Guyana timbers, whereas the main CARICOM lumber importing country, Trinidad and Tobago, has constantly absorbed negligible amounts of lumber from Guyana, ranging from 10,412 cu.ft (295 m³) in 1983 to 3,272 cu.ft (93 m³) in 1986.

Besides Barbados, the other main CARICOM countries importing lumber from Guyana are St. Vincent and the Grenadines, Grenada, Antigua and Barbuda, Saint Lucia and Jamaica, in that order.

Of the extra-CARICOM destinations in the Caribbean, Cuba, Curacao and Panama were the leading importers of Guyana timbers in 1986. Cuba received its first supply of Guyana lumber in 1984 (53,655 cu.ft or 1,519 m³) on a barter arrangement which was also applied in 1986. A barter trade arrangement was also adopted in 1985 for the supply of poles and posts to Antigua and logs to Portugal.

Details of lumber export trends by countries of destination for the period 1983-1986 are given in the following table:

Table 7: Guyana Lumber Exports by Countries of Destination, 1983-1986.

		1983	1984	1985	1986
United Kingdom	m ³	2,732	2,053	2,272	3,132
	cu.ft	96,502	72,496	80,260	110,611
USA/Canada	m ³	1,813	793	1,891	365
	cu.ft	64,032	28,016	66,779	12,904
Barbados	m ³	1,379	906	1,665	1,116
	cu.ft	48,720	32,025	58,797	39,415
St.Vincent and the Grenadines	m ³	1,592	404	561	405
	cu.ft	56,218	14,281	19,872	14,303
Antigua and Barbuda	m ³	490	210	41	144
	cu.ft	17,312	7,420	1,454	5,113
Trinidad and Tobago	m ³	295	167	128	92
	cu.ft	10,412	5,918	4,538	3,272
Saint Lucia	m ³	92	119	254	60
	cu.ft	3,245	4,211	8,806	2,124
Dominica	m ³	13	261	8	7
	cu.ft	467	9,219	294	240
Grenada	m ³	581	436	54	189
	cu.ft	20,519	15,425	1,907	6,666
Jamaica	m ³	-	101	102	-
		-	3,565	3,602	-
Total Guyana	m ³	4,442	2,604	2,813	2,013
Exports to CARICOM		156,893	92,074	99,225	71,133
Percentage of Total Lumber Exports	%	49,4	37,6	33	23,2
Bermuda	m ³	-	-	49	6
	cu.ft	-	-	1,736	205
Cuba	m ³	-	-	1,519	1,616
	cu.ft	-	-	53,655	57,066
Panama	m ³	-	286	-	409
	cu.ft	-	10,100	-	14,436
Puerto Rico	m ³	-	5	-	-
	cu.ft	-	188	-	-
Curacao	m ³	-	122	-	1,107
	cu.ft	-	4,315	-	39,100

Source: Compiled from records of the Guyana Forestry Commission.

5.3 Lumber Export Trends by Timber Species

The bulk of lumber exported from Guyana has traditionally consisted of Greenheart. In 1986, Greenheart lumber accounted for about 66 percent (5,809 m³ or 205,137 BM) of the total lumber exports. Mixed species took a 23 percent share and Purpleheart 6.2 percent. Thus, with the exception of Greenheart and Purpleheart, the foreign markets have not been exposed so far to any other single species from Guyana in the form of sawn or dressed lumber.

The volume of Greenheart and Purpleheart lumber exports has, however, declined from 7,938 m³ (280,323 cu.ft) and 936 m³ (33,041 cu.ft) in 1983 to 5,809 m³ (205,137 cu.ft) and 541 m³ (19,128 cu.ft) in 1986 respectively.

Instead, a growth was attained in the export of mixed species from 347 m³ (12,255 cu.ft) in 1985 to 2,065 m³ (72,925 cu.ft) in 1986. Perhaps this development indicates that single species are no longer an absolute requirement for building construction end-uses in CARICOM. Trends in Guyana's lumber species exports during the period 1983-1986 are shown in the following table:

Table 8: Guyana's Lumber Exports by Species, 1983-1986.

		1983	1984	1985	1986
Greenheart	m ³	7,938	5,486	7,115	5,809
	cu.ft	280,323	193,709	251,256	205,137
Purpleheart	m ³	936	389	597	541
	cu.ft	33,041	13,735	21,104	19,128
Wamara	m ³	3	-	-	4.2
	cu.ft	97	-	-	149
Kereti Silverballi	m ³	22.6	31	-	6.8
	cu.ft	798	1,092	-	241
Mora	m ³	-	6	88	172
	cu.ft	-	200	3,116	6,091
Locust	m ³	8	2	63	-
	cu.ft	287	65	2,222	-
Kukaballi	m ³	13	-	-	38
	cu.ft	457	-	-	1,342
Crabwood	m ³	-	-	-	3.5
	cu.ft	-	-	-	125
Tatabu	m ³	3.4	6	-	35
	cu.ft	121	-	-	1,244
Tauroniro	m ³	-	-	-	20
	cu.ft	-	-	-	715
Hububalli	m ³	-	2.4	-	-
	cu.ft	-	84	-	-
Simarupa	m ³	-	1.44	-	-
	cu.ft	-	51	-	-
Others	m ³	-	1.44	-	-
	cu.ft	-	51	-	-
Mixed wood	m ³	-	-	347	2,065
	cu.ft	-	-	12,255	72,925

Source: Compiled from Statistic Records of the Guyana Forestry Commission.

The following table provides details on lumber exports in 1986 by each sawmill grouped under the headings of sawn and dressed lumber.

Table 9: Share of 1966 Lumber Exports by Sawmills

Sawmills		Sawn lumber	Dressed lumber	Total
Willems Timber and Trading Co. Ltd.	m ³	2,691	340	3,031
	cu.ft	95,035	11,997	107,032
Interior Forest Industries	m ³	2,013	466	2,480
	cu.ft	71,097	16,482	87,597
Toolsie Persaud Limited	m ³	743	139	882
	cu.ft	26,245	4,924	31,169
Guyana Sawmill	m ³	553	24	578
	cu.ft	19,550	869	20,419
Demerara Woods Ltd.	m ³	472	59	531
	cu.ft	16,674	2,107	18,781
A. Mazahrally & Co.	m ³	137	373	510
	cu.ft	4,841	13,191	18,032
Mondeen's Industries	m ³	158	-	158
	cu.ft	5,596	-	5,596
Nagasar Sawn Ltd.	m ³	43	7	50
	cu.ft	1,539	255	1,794
N. Sawh	m ³	3	-	3
	cu.ft	125	-	125
Other sawmills	m ³	411	40*	411
	cu.ft	14,539	1,416	14,539
Totals Lumber Exports	m ³	7,228	1,451	8,676
	cu.ft	255,241	51,241	306,482
	G\$	2,273,361	491,428	2,764,789
	US\$	9,593,586	2,073,829	11,667,415

* Exported by the Plywood Industry.

Source: Compiled from Statistics of the Guyana Forestry Commission.

6. The Sawmill Industry

The sawmill industry consists of about 80 mills with a total employment of about 1,000 workers (1982 data) representing a 3.4 percent share in the manufacturing sector, taking third place after the food products and tobacco sub-sectors (87 and 4 percent, respectively). Most mills are small-scale enterprises employing as few as 10 workers.

The output capacity of the 79 sawmills includes 24 mills with less than 3 m³ daily output and 24 with a capacity from 3 to 5 m³. There are six mills with a capacity ranging from 20 to 27 m³ per day. The largest mill, the Demerara Woods Ltd., has an installed capacity of 35,000 BM/day (82 m³).

The total installed capacity of the sawmill industry is estimated at over 74 million BM (aprox. 175,000 m³) per year. However, the actual output is only a fraction of such capacity. In fact, lumber production in the period 1982-1984 averaged 28.8 million BM (aprox. 68,036 m³) or 38.7 percent of the industry's capacity: whereas in the period 1971-1978, the sector had attained an average annual production of 34.7 million BM (aprox. 82,066 m³). A further decline in output was experienced in 1985 (22.5 million BM or 53,000 m³).

The trends in lumber output and log input of the sawmill industry for the period 1977 to 1985 are shown in the following table:

Table 10: Summary of Annual Sawmill Production, 1975-1985.

Year	No. of Mills	Production '000 BFM	Estimated Forest Roundwood Input (m ³)
1975	n.a.	70,426	266,000
1977	92	41,808	157,912
1978	97	35,822	135,303
1979	93	36,601	138,245
1980	89	37,212	140,553
1981	89	32,227	121,724
1982	72	29,635	111,934
1983	68	29,279	110,570
1984	79	22,585	83,305
1985	79	22,588	85,305

Source: FAO/85/001, 1985 and Guyana Forestry Commission Records

Unlike most other CARICOM countries where the circular saw type of headrig is the dominant sawmilling equipment, in Guyana gang saws are also widely used. The machinery of small-scale sawmills will normally include a circular headrig saw (with blades of inserted-teeth type), a multi-blade edger and a crosscut saw. Medium size sawmills will, in addition, be equipped with a gang saw and a thicknesser planer. There are mills, however, equipped only with gang saws, in which case when logs are of a diameter larger than 30" they are squared by hand at the site of felling or squared by chain saws. Only a few of the medium and larger size mills will include four side moulding machines for the production of dressed lumber, flooring boards, panelling boards, etc. Not all of the existing moulders, however, can provide lumber of export standard.

As in the other CARICOM Member States, only very few sawmills are equipped with bandsaw headrigs. In fact, out of the 79 sawmills in Guyana only six are provided with this type of modern sawmilling machinery. The breakdown of the various types of headrigs per region is given in the following table:

Table 11: Summary of Headrig Types by Region.

	Regions *	Band Headrigs	Gang Headrigs	Circular Headrigs	Total
Bartica/Waini	1	-	4	3	7
Supanaam/Pomeroon	2	-	7	7	14
West Demerara/Essequibo	3	-	15	4	19
Demerara/Mahaica	4	7	18	7	32
West Berbice	5	-	3	5	8
East Berbice/Corentyne	6	2	19	23	44
Bartica/Pataro	7	-	13	4	17
Upper Demerara/Berbice	10	-	7	6	13
Total:		9	86	59	154

Source: Guyana Forestry Commission.

* No sawmills are operating in Regions 8 and 9.

The following sawmills were visited in the course of the mission:

- (a) Demerara Woods Ltd.
- (b) Willens Timber and Trading Ltd.
- (c) Ameerally Sawmills
- (d) J and Z Sawh Sawmills
- (e) N and N Shaffeeulah Sawmill, and
- (f) Baijnauth and Sons Ltd.

6.1 Demerara Woods Sawmill

Demerara Woods is Guyana's most recent and modern sawmill. Located at Mabura, 145 miles south of Georgetown, the mill was set up with loans provided by the Inter American Development Bank (IDB) and the World Bank, and went into operation in 1985. Log supplies are provided from the Company's forest concession of approximately 12,655 hectares. The sawmill has an output capacity in excess of 10 million BM (23,600 m³) and is equipped with the following main machinery: two 7 ft. Canali band headrigs; two band resaws; two multi-blade edgers; two cross-cut saws and one Esterer gang saw. In addition, the mill includes facilities for kiln drying of timber as well as for the production of planed and moulded lumber. The equipment in this respect includes two kilns with 20,000 BM (47 m³) capacity each, one Wadkin moulder of 8 inch capacity and one Weining moulder of 12 inch capacity. Four additional moulders are expected to be installed.

The Demerara Woods has introduced an export programme based on the utilization of the following species: Greenheart (Ocotea Rodiaci), Purpleheart (Peltogyne spp.), Andiroba (Carapa guianensis), Courbaril (Hymenala), Kabukalli (Groupia glabra), Wellaba (Eperua spp.), Mora (Mora excelsis) and Wamara (Swartzia liocalycyna).

6.2 Willens Timber Sawmill

Located on Kaow Island, Willens is one of Guyana's oldest sawmills having been established in 1936. The mill has an output capacity of 13,000 BM (30 m³) per day and in 1985 attained an actual output of about 10,000 BM (23.5 m³). Willens is the leader in lumber exports from Guyana. In fact, 70 percent of its output is exported, amounting to 1.28 million BM (3,000 m³) lumber in 1986.

In 1986, Caribbean destinations took 50 percent of Willens exports, the main buyer in the area being Barbados; whereas the main overseas destination is the United Kingdom (513,134 BM or 1,210 m³) followed by the United States. Willens production of species suitable for furniture manufacture includes Purpleheart, Crabwood, Locust and Kereti Silverballi. Some 60 percent of the mill output consists of dressed lumber. Willens has recently obtained a loan from the Canadian Industrial Development Agency (CIDA) to renovate both sawmill and logging equipment. The mill is equipped with 5 gang saws.

6.3 Ameerally Sawmill

The mill was established in 1950 and is located at Strand, New Amsterdam. Its output capacity is 1.8 million BM (4,247 m³) per year. The mill is closely related to Mondeen Industries, Ltd., one of the largest logging operations in Guyana from which it obtains its raw material supply. It is also through Mondeen Industries that Ameerally exports lumber. At present, the mill is equipped with one circular headrig, three gang saws, an edger, a Kupfermuhle planer/moulder and a crosscut saw. However, a feasibility study is now being prepared by a Canadian consulting firm in order to upgrade and expand the existing facilities. Only 20 percent of the mill's output consists of dressed lumber. A main reason for this low level of value added is the difficulty in getting foreign currency for replacing parts and cutting tools so as to allow further processing of rough sawn timber.

Ameerally is one of the few mills engaged in the processing of all the main timber species identified by this project as being acceptable for furniture manufacture in CARICOM member states. Such species are Determa, Crabwood (Andiroba), Hububalli (*Loxopterygium sagotti*), Locust (Courbaril) and Kereti Silverballi (*Ocotea puberula*). Other species are Purpleheart, Simarupa, Tauroniro, Kabukalli and Greenheart.

6.4 J and Z Sawh Sawmill

The original mill was first established in 1953 and taken over by the present owner in 1984. It has a factory manpower of 60 while the logging unit employs 30 workers. The main mill equipment includes a Stenners bandsaw, gang saw and a White moulder, which, however, was idle at the time of the factory visit due to broken bearings. The mill is one of the few sawmills in Guyana, six in all, equipped with band headrigs. In addition, it is provided with a very efficient sawdoctoring shop. The mill has an output capacity of 8,000 to 10,000 BM (18.8 to 23.5 m³) lumber per day. However, in 1985, an average daily output of only about 3,000 BM (7.3 m³) was attained.

About 90 percent of lumber produced by the Sawmill consists of three particular species, namely, Kabukalli (*Coupiu glabra*), Tatabu (*Diploporis purpurea*) and Shibadan (*Aspidosperma album*). Other species include Crabwood, Hububalli, Kereti Silverballi, Samarupa, etc.

6.5 N and N Shaffeeulah Sawmill

The mill is located at Crabwood Creek and was established in 1951. It has a workforce of 40 workers and a daily production capacity of 6,000 to 7,000 BM. In 1985 it averaged an output of only around 3,300 BM (7.7 m³). The main production equipment consists of two gangsaws, a Deckaert bandsaw and an ancient four-side moulder. Although the mill is equipped with two Vollmer grinding machines for handling bandsaw, circular saws and framesaw blades, the quality of sawdoctoring is very poor, particularly with respect to wide bandsaw blades (which affect both the quality of cut and the wear of blades). The main species processed in the mill are Crabwood, Hububalli, Simarupa and Kereti Silverballi.

The Shaffeeulah mill, like the other visited in the same area (the Baignauth Sawmill) is possibly representative of Guyana sawmilling operations which do not offer even an initial export potential due to the overall low level of efficiency. However, these types of mills are not stimulated to upgrade working methods and equipment in that they appear to have no problem in marketing their products regardless of quality and species mix.

7. Requirements for Assistance to the Sawmill Industry

No other indicator can better illustrate the performance of the Guyana sawmill industry than the comparison between the installed capacity and the actual production. In the period 1982-1984 the annual lumber output averaged 28.8 million BM (68,013 m³) or 38.7 percent of the installed capacity (74.3 million BM or 175,553 m³). In 1985, the ratio further dropped to 30 percent. The following table provides details by region:

Table 12 Comparison of Sawmill Capacity and Output, 1982 - 1984 and 1985.

Region	Installed capacity	Production (BM)	
	BM per year	Average - 3 Years 1982 - 1984	1985
1	1,920,000	297,729	102,169
2	6,168,000	2,760,692	1,929,604
3	6,126,000	1,581,713	1,281,290
4	16,140,000	8,475,785	5,813,711
5	2,460,000	925,038	380,609
6	18,185,760	5,880,272	3,554,099
7	10,200,000	4,722,172	5,166,654
10	12,840,000	4,198,661	4,330,641
Total	74,399,000 (175,553 m ³)	28,824,062 (68,013 m ³)	22,558,777 (53,229 m ³)
% of Capacity		38.7%	30%

Source: Guyana Forestry Commission.

The drop in production has resulted among other things, in scarcity of lumber supply for the local market, as in the same period there was no corresponding drop in the volume of lumber exports (8,676 m³ in 1986 compared to 8,998 m³ in 1983).

The following main factors appear to have contributed to the drop in production of the sawmilling sector:

- a) Problems in the supply of logs due to a breakdown in logging and transportation equipment;
- b) Obsolete production equipment, especially in the smaller mills;
- c) Lack of systematic and regular maintenance of production equipment as well as of sawblades and cutters, resulting in their abnormal wear and reduced serviceable life;
- d) Lack of hard currency for the purchase of machine spare parts and production supplies; and
- e) Difficulty of access to credit facilities for the replacement of production, transportation and logging equipment.

The Guyana Forestry Commission has prepared a preliminary check list and cost estimate of the various equipment and spares required by the sawmill sector as a whole, which, however, needs to be validated by a sawmill maintenance engineer.

The transfer of know-how with respect to the maintenance of sawmilling blades and cutters is expected to be dealt with by a UNDP/UNIDO project carried out at the Development Unit of the Guyana Forestry Commission in Georgetown. The project will help to establish a sawdoctoring training and servicing centre for the benefit of the Guyana sawmilling sector. Assistance is also envisaged in the introduction of timber preservation techniques.

The following additional assistance (see draft project document in Annex IV) is recommended towards improving the efficiency of the sector:

- (a) Services of a Sawmill Maintenance Engineer (2 months) whose duties will be to:
 - (1) Survey needs for spares of the sawmill industry, with emphasis on export-oriented mills, and produce detailed purchase specifications;
 - (2) Review the status of typical circular headrigs and gang saws in the industry and prepare specific recommendations on steps to be taken to improve their performance; and
 - (3) Prepare data sheets on preventive maintenance of sawmilling equipment.

- (b) Services of a Sawmill Production Engineer (1.5 months) whose duties will be to:
 - (1) Review, in cooperation with the Maintenance Engineer, the need for replacement of sawmilling equipment (including production, material handling and logging equipment) as well as for the introduction of new type of equipment, including dry kilns;
 - (2) Prepare purchase specifications on alternative types of equipment; and
 - (3) Outline training requirements of the sawmilling sector towards increasing its export potential.

8. The Furniture Manufacturing Sector and its Export Potential

The assessment of this sector has been the subject of various reports prepared by the UNIDO Consultant Desmond Cody. As a result of his recommendations, a number of activities have been carried out by the Guyana Forestry Commission with the assistance of UNIDO to upgrade the efficiency of the sector, among these, the establishment of pilot solar kiln drying facilities, and recently a seminar was conducted by a number of UNIDO consultants in Georgetown on topics related to the efficient operation of the furniture industry. The establishment of a Tool Maintenance Training and Servicing Centre with provision for both equipment and the services of a UNIDO expert is foreseen for completion in 1988.

The furniture industry sector consists of some 200 production units scattered throughout the country -mostly small workshops. Some 21 of them were identified by Desmond Cody as being factory-type enterprises, with a total manpower of 700, a total domestic sale (in 1984) estimated at G\$ 10 million and a total export sale of about G\$ 0.9 million.

Of the 21 plants, however, only 6 could be regarded as being adequately mechanized for developing an export potential.

Due to the fact that the furniture industry had already been sufficiently surveyed, this consultant limited his visits only to the furniture factories of Kisson Company Ltd. and Precision Woodworking Ltd.

The Kisson Furniture plant is operated by the Kisson Group of Companies which are also the only producers of plywood and veneer in CARICOM. The furniture plant is equipped with a number of modern machinery which, however, were selected without a rational criteria, resulting in, among other things, an unbalanced flow of production. Little transfer of skills could be observed from men to machine in spite of the considerable investment in equipment.

A different situation is present at the plant of Precision Woodworking Ltd. Here production concentrates on a limited range of standard products -mainly sitting room furniture and beds. The company is managed by a dynamic team of three young brothers with a definite ambition to penetrate export markets in CARICOM. Production activities commenced in 1985. The plant provides employment to 41 workers and absorbs 500,000 EM (1,180 m³) of lumber per year. It is equipped with a wide range of machinery, representing an investment of US\$ 200,000 and including, among others, two semi-automatic copying lathes; a wide belt sander; a router with an automatic copying device; a double-end tenoner; a four-side moulder; a rod milling machine; a vertical hydraulic press for assembly of solid wood panels and frames; a dry kiln etc. However, one particular machine should be added: a multiboring machine (if the aim of the company is to export furniture in knock-down form).

Photos of furniture produced by Precision Woodworking were shown to potential buyers in Antigua -possibly the only CARICOM country with an open-door policy with respect to furniture imports. A very keen interest was expressed in those products on the part of a particular buyer in Antigua. Details of the buyer's requirements in this respect are listed in the Antigua country report as well as in Annex VI of this report.

Opportunities were also identified for export of furniture turnings to Barbados. Buyer's requirements are given in the Barbados section of this report under the same heading and in Annex VI of this report.

As indicated in the introductory part of this report (para. 1.11(a)), the consultant has prepared a separate technical report on the "Selection of Woodworking Equipment for the Small-scale Furniture and Joinery Industry" to help take sound equipment investment decisions when expanding existing plants or establishing new ones.

9. Timber Prices

The following two tables provide prices of main timber species ex. mills, and export prices F.O.B. for mixed hardwoods for CARICOM destinations.

Table 13: Main Lumber Price Ex. Mills, 1980 - 1987. (Gs/BM)

Species	1980	1981	1982	1983	1984	1985	1986	1987
Purpleheart	1.90	2.30	2.30	2.50	3.00	3.35	4.50	5.50
Crabwood	1.60	1.95	1.95	2.25	3.50	3.65	4.00	5.00
Brown Silverballi	1.65	2.25	2.20	2.50	3.25	3.80	4.25	5.25
Yellow Silverballi	1.65	2.25	2.25	2.30	3.25	3.30	4.25	5.25
Kakuballi	1.60	2.0	1.90	2.00	3.00	3.75	4.00	5.00
Locust	1.50	1.70	1.80	1.95	2.25	1.30	3.00	4.00
Simarupa	1.35	1.50	1.95	1.62	2.00	2.60	2.85	3.85
Tauroniro	1.70	1.70	1.80	1.70	2.50	2.80	3.25	4.25
Shibadan	1.60	1.60	1.65	1.80	2.25	2.80	3.25	4.25
Manni	1.35	1.45	1.65	1.88	2.25	2.80	3.25	9.25
Manniballi	1.35	1.45	1.80	1.80	2.25	2.85	3.25	4.25
Kereti	1.45	1.60	1.65	1.80	2.25	2.85	3.25	4.25
Dukali	1.50	1.70	1.70	1.75	2.00	2.30	2.82	4.00
Kurohai	1.20	1.00	1.20	1.60	2.00	2.50	3.00	4.00
Wamara	1.85	2.00	1.85	2.25	2.35	2.50	3.00	4.50
Hububalli	1.70	1.90	2.00	2.25	2.35	2.50	3.00	4.50
Tatabu	2.00	1.90	2.00	2.25	2.35	2.95	3.20	4.50

Source: Guyana Forestry Commission

Table 14: CARICOM FOB Prices for Mixed Hardwoods

Currency: US\$		Unit of measure: BM			
Specifications		Random Lengths 8'/18'		Lengths not exceeding 12'	
		Rough	Dressed	Rough	Dressed
BOARDS	1" x 2" - 4"	0.61	0.68	0.67	0.73
	1" x 5" - 8"	0.59	0.65	0.64	0.71
	1" x 9" - 12"	0.61	0.68	0.65	0.72
SCANTLINGS	2" x 2" - 6"	0.59	0.65	0.65	0.71
	2" x 7" - 12"	0.62	0.68	0.68	0.73
	3" x 3" - 6"	0.59	0.67	0.64	0.72
	3" x 7" - 12"	0.62	0.72	0.68	0.78
	4" x 4" - 6"	0.59	0.67	0.64	0.72
	4" x 7" - 12"	0.62	0.72	0.68	0.78

Source: Guyana Forestry Commission

REMARKS:

(1) The prices are given in United States Dollars. (2) Prices are in respect of mixed hardwoods only per unit of measure (Board Foot) FOB Liner Terms Georgetown. (3) Grade - The merchandise should meet the requirements of grade GRO 4M. (4) Bundling - Prices include the cost of compulsory handling. (5) Special quotes are required for - (i) Specifications not listed; (ii) other dressing, e.g. chamfering, counter-sinking splay cutting and panelling; and (iii) individual species. (6) Trade Discount - A trade discount of 5 percent will be given on random length stock orders in excess of 50,000 BM.

10. Shipping Links

Shipments of lumber to CARICOM/Caribbean States from Guyana are presently undertaken by WISCO vessels and a number of privately owned shipping lines. The latter is restricted to small vessels of about 500 tons g.r.t. operated by large sawmills such as Mazahrally and Sons. Extra-regionally-owned lines do not accept lumber for Caribbean discharge.

Originally the WISCO vessels operated fortnightly to most Leeward and Windward CARICOM Islands and Jamaica. However, due to the drastically reduced intra-CARICOM trade flow, WISCO has been obliged to cut down on its schedules and to restrict its service on the less profitable routes.

No alternative has emerged so far for ensuring regular and frequent shipping of lumber to the small and fragmented markets in the Community, thus preventing the Guyana timber industry to compete with overseas lumber suppliers who, through timber yards in Puerto Rico, are able to deliver lumber at two-week notice to most of the Leeward and Windward Islands.

The shipping problem is discussed in detail in Chapter C.6 of the main report, while possible corrective measures are outlined in Chapter D.1 of the same report.

The two following tables provide details on current Caribbean inter-island freight rates from Guyana, as applicable to 20 ft. containers and break bulk cargoes per metric ton.

Table 15: Freight Rates from Guyana (20 ft. containers)

T o :	Basic Rate US\$	DRY CARGO		Dest. L.S.D. US\$	Total US\$
		Guyana Handling US\$			
Trinidad	1,100	175		375	1,650
Grenada	1,125	175		370	1,670
Barbados	1,100	175		500	1,775
Jamaica	1,140	175		250	1,565
Saint Lucia	1,150	175		350	1,675
Antigua	1,175	175		450	1,800
Saint Vincent	1,150	175		300	1,625
Montserrat	1,175	175		675	2,025
St. Christopher	1,175	175		575	1,925
Dominica	1,175	175		475	1,825
Miami	1,100	175		450	1,725

Source: West Indies Shipping Co.

Table 16: Freight Rates from Guyana (per metric ton).

T o :	DRY CARGO			Total US\$
	Basic Rate US\$	Guyana Handling US\$	Dest/L.S.D. US\$	
Trinidad	75.00	10.00	25.00	110.00
Grenada	75.00	10.00	25.00	110.00
Barbados	75.00	10.00	30.00	115.00
Jamaica	95.00	10.00	18.00	123.00
Saint Lucia	80.00	10.00	25.00	115.00
Antigua	85.00	10.00	28.00	123.00
St. Vincent	80.00	10.00	30.00	120.00
Montserrat	85.00	10.00	40.00	135.00
St. Christopher	85.00	10.00	35.00	130.00
Dominica	80.00	10.00	30.00	120.00

Source: West Indies Shipping Co.

11. Guyana Timber Export Potential to CARICOM Destinations.

As a direct result of the project it has been possible to identify specific requirements for Guyana furniture-type timber in CARICOM Member States.

An overwhelming interest was expressed by furniture manufacturers and lumber importers in all the CARICOM timber importing countries visited, in importing from Guyana Determa lumber as a substitute for Brazilian Mahogany.

Crabwood was also considered an interesting substitute for Mahogany. However, reservations were expressed by some importers on this particular species because of warping problems experience with trial shipments, on account of the fact that Crabwood lumber had been delivered from Guyana in practically green condition.

A unanimous interest was identified in the Hububalli species on account of its pronounced attractive grain pattern similar to Teakwood.

The Locust species was also found to offer a good potential, particularly in Jamaica, although its high density compared with Mahogany might deter its widespread acceptance by the furniture industry.

Of the lighter Guyanese hardwoods, Simarupa and Kereti Silverballi were seen as good substitutes for White Pine in furniture applications such as drawer sides, internal cabinet framing and hidden upholstery framing. However, price-wise, these two species stand no chance of competing with Pine imported by CARICOM Member States from the USA, Canada and Honduras. In fact, current FOB prices in Georgetown for these species are higher than CIF prices offered for Pine to CARICOM (US\$ 0.50/EM in Jamaica and Trinidad and Tobago).

The potential for Guyana and Belize to export Mahogany substitutes to CARICOM islands is an opportunity which has developed recently due to the increasing scarcity of Mahogany supplies from Brazil. Mahogany has been the dominant traditional timber for furniture in the Caribbean Region since early colonial times.

One important aspect of the strategy of promoting the export of Mahogany substitutes to CARICOM is that these species (Determa, Crabwood, etc.) are not available in very large volumes and, therefore, would not be easily exported to overseas hard-currency markets, whereas CARICOM with its overall limited size of market (in 1985 total imports of Mahogany lumber by CARICOM amounted to 5,600 m³ (approximately 2.4 million BM) would offer Guyana a unique opportunity of developing exports of furniture-type lumber.

It should be said that should the concerned parties in Guyana fail to tap this fresh opportunity, the CARICOM Member States would seek alternative sources of Mahogany substitute supplies outside the Community.

Specific requests for CIF quotations for Guyanese timber species have been obtained as a result of this project and are given in Annex VI of this report as well as in the respective country reports under the heading "Specific Requests for Lumber Quotations". Copies of the specifications were handed to the Guyana Forestry Commission in early June 1987 on the return to Georgetown of the UNIDO consultant and his CARICOM counterpart from project travel to 8 of the 13 CARICOM countries.

ANNEX I

PERSONS MET

Ms. C. Davis	UNDP Resident Representative, Georgetown.
Mr. D. Sawh	Minister of Forestry, Georgetown
Mr. B. W. Blake	Director, Economic and Industry Division, CARICOM Secretariat, Georgetown.
Mr. K. Malik	UNDP Deputy Resident Representative, Georgetown.
Mr. E. Appiateng	UNDP Programme Officer
Mr. I. Carryl	Industrial Economist, Economics and Industry Division, CARICOM Secretariat.
Mr. G. H. Rohler	Chief Industry Technology Section, CARICOM Secretariat.
Ms. A. Watson-James	Officer-in-Charge Transportation Unit, CARICOM Secretariat.
Mr. B. Isaacs	Senior Trade and Traffic Officer, CARICOM Secretariat.
Mr. O. Gordon	Chief Statistics Section, CARICOM Secretariat.
Mr. C. A. Hall	Works Manager, Guyana Forestry Commission.
Mr. B. Udit	Forestry Commissioner, Guyana Forestry Commission.
Mr. H. E. Cort	Marketing Manager, Guyana Forestry Commission.
Mr. R. Greenville	Chief Forest Inspector, Guyana Forestry Commission.
Mr. V. H. Campbell	Manager, Demerara Woods Sawmill (Mabura), P.O.Box 10265, Georgetown. Telex 2296 DEMWOOD GY.
Mr. H. Seecharm	Sales Manager, Demerara Woods.
Mr. B. Ford	Marketing Manager, Demerara Woods.
Mr. J. Z. Sawh	Managing Director, J & Z Sawh Sawmill, Lot A Grant 1803 Crabwood Creek, Coventyne.
Mr. L.J.P. Willems	Housing Director, Willems Timber & Trading Co., Ltd. Sawmill (Kaow Island), P.O.Box 10443, Georgetown. Telex GY 3046 Willems.
Mr. H. Ameerally	Managing Director, Ameerally Sawmills, 29 Strand, New Amsterdam, Berbice.

Mr. N. Shaffeeulah Managing Director, Shaffeeulah Sawmill, Crab Wood
Creek, Coventyne, Bertice.

Mr. C. L. Baijnauth Managing Director, Baijanuth & Sons Ltd. Sawmill,
Crab Wood Creek, Coventyne.

Mr. C. Sawh Managing Director, Nagasar Sawh Sawmill Ltd.,
Byderabo Point, Bartica Ess., Head Office: P.O.Box
339, Georgetown.

Mr. H. Kisson Managing Director, A.H. & L. Kisson Ltd., 80 Camp &
Robb Streets, Georgetown. Telex: 2297 PARK GY.

Mr. H. Bulkan Managing Director, Precision Woodworking Ltd.,
P. O. Box 12242, Georgetown. Telex 30443 GY.

Mr. C.D.M. Duncan Executive Director, Guyana Manufacturing and
Industrial Development Agency (GUYMIDA), 237 Camp
St., Georgetown.

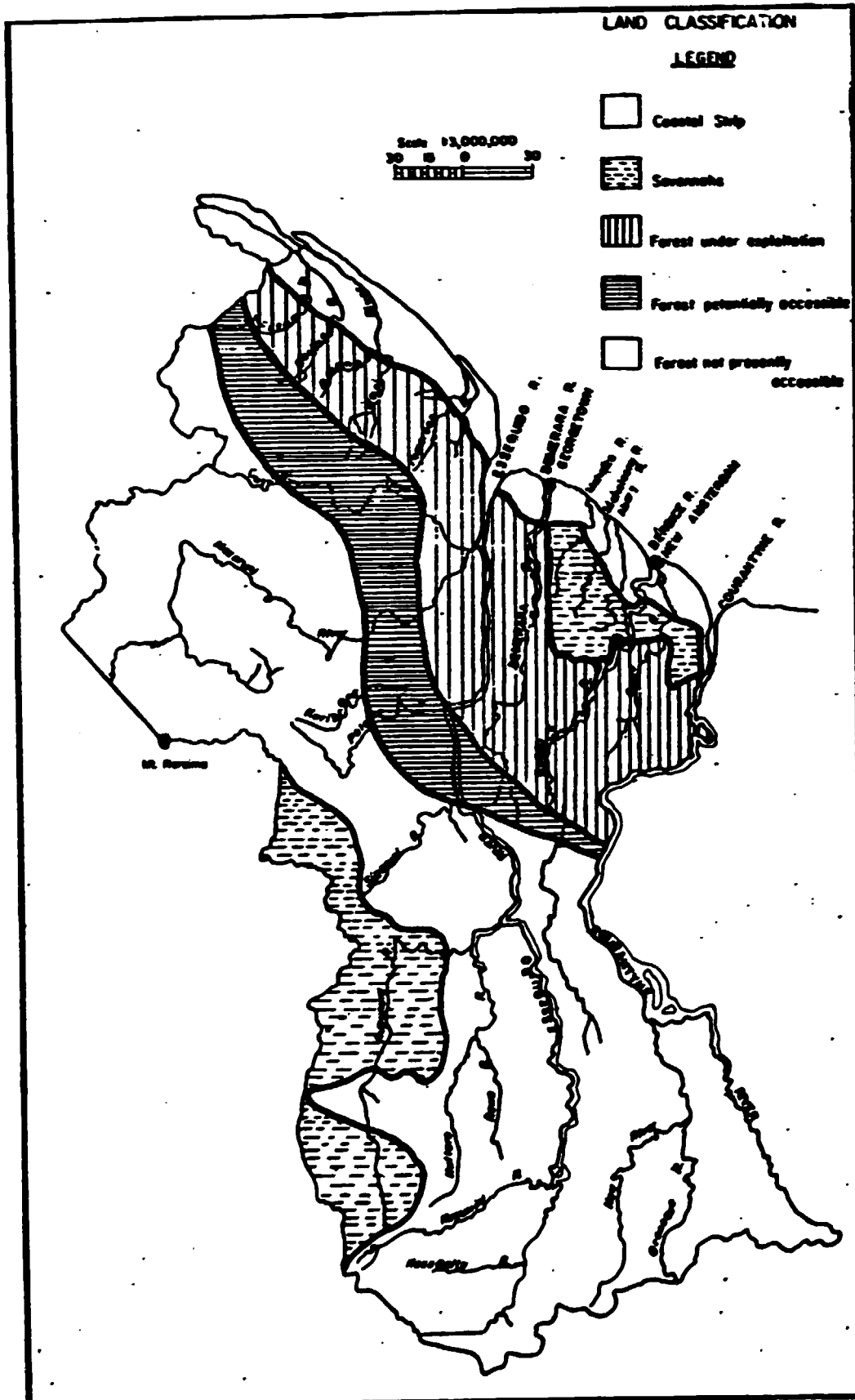
Mr. C. Fernandez Director, John Fernandez Ltd., Shipping Agents, 24
Water St., Georgetown. Telex GY 2226.

Mr. V. Williams Traffic Manager, Guyana National Engineering Corp.,
Shipping Agents, 3-9 Lombard Street, Georgetown.

Mr. Y. N. Gooding Manager Shipping Det., Guyana National Shipping
Corporation Ltd. (GNSC), 5-9 Lombard St.,
Georgetown. Telex 2232 GY.

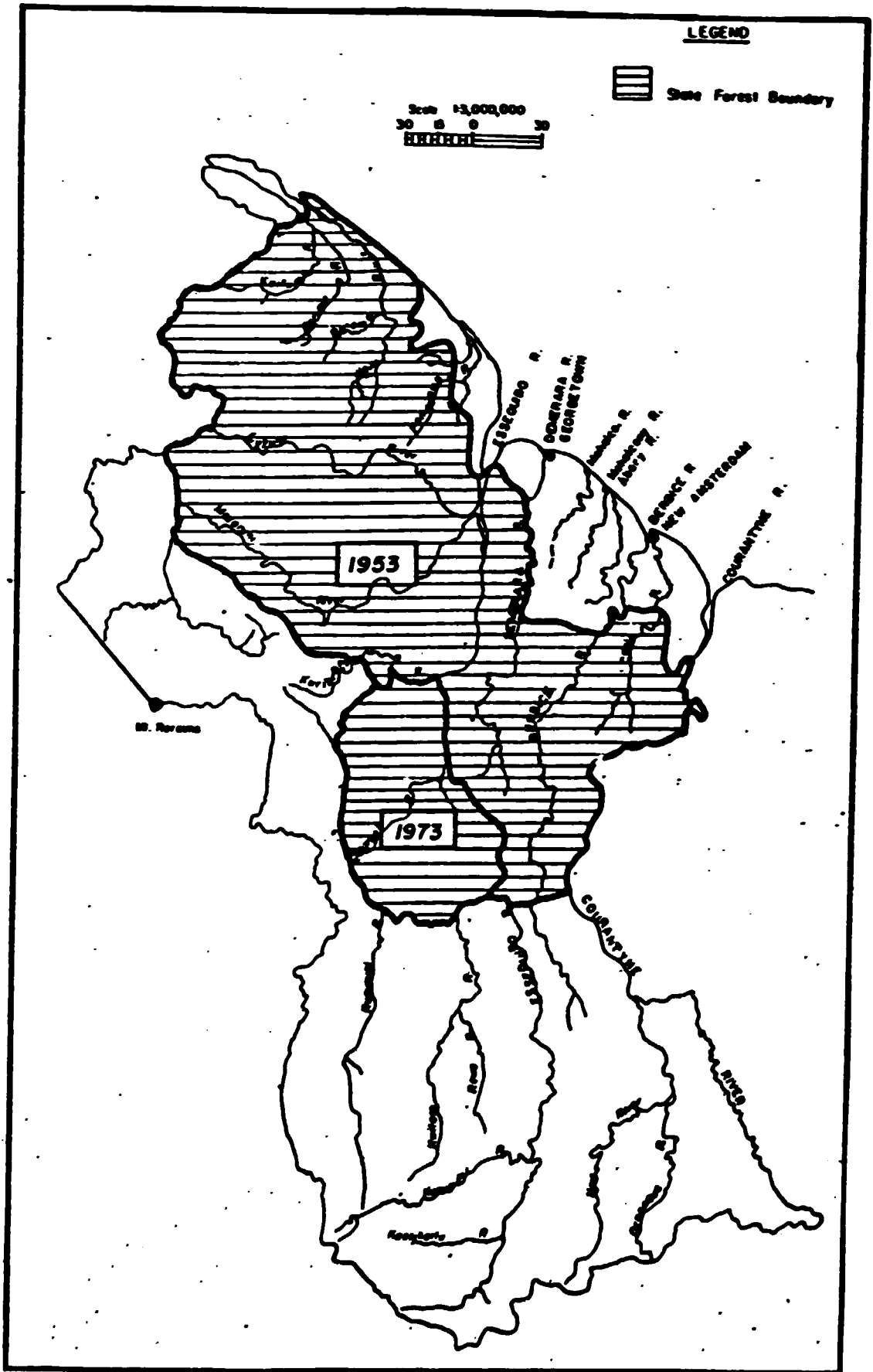
ANNEX II

Map of forest under exploitation and potentially accessible.



ANNEX III

Map of distribution of State Forests



ANNEX IV

DRAFT PROJECT DOCUMENT

Country: Guyana

Title of Project:	Assistance to the Sawmill Industry
Government Counterpart Agency:	Guyana Forestry Commission
Executing Agency:	United Nations Industrial Development Organization (UNIDO)
Duration:	Three months
Estimated Starting Date:	Three months after approval
Estimated Completion Date:	Six months after approval
External Inputs:	US\$ 32,000
Government Inputs:	In kind.

PART I - LEGAL CONTEXT

To be indicated in the final project document.

PART II - THE PROJECT

PART II A - Development Objectives

To promote the development of resource-based timber industries and in particular the export potential of the sawmilling sector.

PART II B - Immediate Objectives

To enable the sawmill industry, especially export oriented plants, to establish a rational basis for:

- (a) Upgrading the efficiency of the existing production machinery; and
- (b) Renewing and expanding the existing sawmilling facilities.

As a direct result of the project, the following main gains will have been obtained:

- (a) Justification for access to credit facilities towards purchase of spares and complementary new equipment; and
- (b) An increased capability to prevent equipment breakdown.

PART II C - Background and Justification

The sawmill industry consists of about 79 mills with a total employment of about 1,000 workers (1982 data) representing a 3.4 percent share in the manufacturing sector, taking third place after the food products and tobacco sub-sectors (87 and 4 percent, respectively). Most mills are small-scale enterprises employing as few as 10 workers.

The output capacity of 79 sawmills includes 24 mills with a daily output capacity of less than 3 m³ and 24 with a capacity from 3 to 5 m³. There are six mills with a capacity ranging from 20 to 27 m³ per day. The largest mill, the Demerara Woods Ltd., has an installed capacity of 35,000 BM/day. (83 m³/day).

The larger mills have a capability of exporting furniture timber of the grade required by the CARICOM markets. However, the sawmilling sector as a whole has yet to attain an adequate degree of efficiency.

The total installed capacity of the sawmill industry is estimated at over 74 million BM (approximately 175,000 m³) per year. However, the actual output is only a fraction of such capacity. In fact, lumber production in the period 1982-1984 averaged 28.8 million BM (approximately 68,036 m³) or 38.7 percent of the industry's capacity; whereas in the period 1971-1978, the sector had attained an average annual production of 34.7 million BM (approximately 82,066 m³). A further decline in output was experienced in 1985 (22.5 million BM or 53,000 m³).

The following main factors appear to have contributed to the drop in production of the sawmilling sector:

- (a) problems in the supply of logs due to a breakdown of logging and transportation equipment;
- (b) obsolete production equipment, especially in the smaller sawmills;
- (c) lack of systematic and regular maintenance of production equipment as well as of sawblades and cutters, resulting in their abnormal wear and reduced serviceable life;
- (d) lack of hard currency for the purchase of machine spare parts and production supplies; and
- (e) difficulty of access to credit facilities for the replacement of production, transportation and logging equipment.

The Guyana Forestry Commission has prepared a preliminary check list and cost estimate of the various equipment and spares required by the sawmill sector as a whole. An analytical survey needs, however, to be carried out in this respect.

The transfer of know-how with respect to the maintenance of sawmilling blades and cutters is expected to be dealt with by a UNDP/UNIDO project located at the Development Unit of the Guyana Forestry Commission in Georgetown. The project will help establish a sawdoctoring training and servicing centre for the benefit of the Guyana sawmilling sector. The project will also provide assistance in the introduction of timber preservation techniques.

This project proposes to provide a basis for improved performance of sawmilling equipment and for a rational expansion of the sector.

PART II D - Outputs

1. Detailed purchase specifications of spare parts required for the operation and maintenance equipment of sawmills engaged in export activities.
2. Set of detailed instructions on remedial steps to be taken to improve the performance of typical circular headrigs and gang saws currently in use in the sawmill industry.
3. Set of information sheets on preventive maintenance of sawmilling equipment.
4. Detailed purchase specifications for new sawmilling equipment aimed at expanding and renovating the sector.
5. Short-term training programme towards increasing the export potential of the sawmilling sector.

PART II E - Activities

1. Activities related to outputs 1, 2, and 3
 - 1.1 Survey of production and maintenance equipment of selected sawmills engaged in lumber export.
 - 1.2 Preparation of a list of parts which can be repaired locally and those to be imported.
 - 1.3 Identification of equipment beyond repair whose use should be discontinued.
 - 1.4 Identification of routine maintenance measures which should be adopted to ensure efficient performance of typical circular headrigs and gang saws.
2. Activities related to outputs 4 and 5
 - 2.1 Review of the standard of performance of production equipment in use in export-oriented sawmills.
 - 2.2 Identification of requirements for replacement of existing equipment and possible introduction of new type of machinery, including, but not limited to, band headrigs of appropriate design, modern moulders and drying kilns so as to increase the value added of lumber exports.
 - 2.3 Review manpower training requirements for the development of the sawmilling sector on the short and medium term.

PART II F - Inputs

1. External Inputs

	<u>m/m</u>	<u>US\$</u>
11 <u>Personnel</u>		
11-01 Sawmill maintenance engineer (responsible for outputs 1, 2 and 3).	2	16,000
11-02 Sawmill production engineer (responsible for outputs 4 and 5).	1.5	12,000
15-00 Local travel		2,000
51-00 <u>Miscellaneous expenses</u> (incl. reporting costs)		<u>2,000</u>
99 <u>Total external inputs</u>		<u>32,000</u>
2. Government Inputs
 - 2.1 Counterpart staff In kind
 - 2.2 Local travel
 - 2.3 Secretarial support

ANNEX V

DRAFT PROJECT DOCUMENT

Country: Guyana

Title of Project:	Rehabilitation of the Guyana Timber Limited (GTL) Woodworking Complex to serve as a Lumber Supply Centre for the CARICOM market.
Government Counterpart Agency:	Guyana Forestry Commission
Executing Agency:	United Nations Industrial Development Organization (UNIDO)
Duration:	Two months
Estimated starting date:	Two months after approval.
Estimated completion date:	Four months after approval of the project.
External inputs:	US\$ 25,000
Government inputs:	In kind

PART I - LEGAL CONTEXT

To be indicated in the final report.

PART II - THE PROJECT

PART II A - Development Objectives

To promote the development of resource-based timber industries and, in particular, the export potential of the sawmilling sector.

PART II B - Immediate Objectives

To enable Guyanese private sawmills to assess the viability of taking over the GTL woodworking complex and converting it into centralized facilities for seasoning, further processing and storing of lumber prior to shipping to Caribbean destinations.

PART II C - Background and Justification

The now closed down state-owned woodworking complex of the Guyana Timbers Ltd. (GTL) was privately owned before independence and the most important producer of prefabricated housing in the Caribbean area. After being damaged by a fire in 1976, the mill was rebuilt with financial assistance from CIDA and put back into operation in 1979.

The mill's main equipment consists of the following: two 2.4 meters (8') Swecan breakdown bandsaws; two 1.8 meters (6') Prescott band resaws; three edgers, three Robinson recovery bandsaws and five Wadkin planers/moulders. In 1980 and 1981 the mill averaged an output of 8,500 m³/year. In 1982 the output reached 15,000 m³ in a two shift operation. In 1982 GTL contracted a three year technical assistance team including a mill manager and a sawdoctor with a view of attaining a suitable degree of efficiency. However, the mill failed to become a profitable operation and the Government was compelled to close it down in 1985.

A group of Guyanese private sawmillers has recently expressed to the Forestry Commission its keen interest in taking over the plant from the Government. The Minister of Forestry has proposed that a pre-feasibility study be prepared in this context with the aim of servicing the plant towards supplying less-known furniture species to the Caribbean market.

Although the Caribbean is a traditional market for the shipment of Guyana timbers, this has been limited to the supply of Greenheart lumber for construction end-uses, transmission poles, and fencing posts. However, an opportunity is now developing in Guyana to supply the CARICOM Member States timber species, such as Crabwood and Determa, as substitutes to Brazilian Mahogany (the traditional predominant furniture timber in the region) whose supply is becoming increasingly scarce.

These substitute species are available in sufficient volumes to meet the relatively limited demand for Mahogany in CARICOM. However, for the market to develop regular supplies of well prepared, graded and bundled timber, this must be available to meet customers' requirements at a cost and in a condition matching those offered by traditional lumber suppliers.

PART II D - Output

A pre-feasibility study assessing the viability of utilizing the GTL complex as processing and depot centre for the supply of sawn, kiln-dried, planed and moulded timber to the CARICOM market.

PART II E - Activities

The following activities will be carried out by a specialized consulting firm:

1. Assessment of the condition of the existing sawmilling, planing/moulding and drying kiln facilities; as well as the remaining infrastructure and estimating its market value;
2. Identification of equipment which can be rehabilitated and that beyond repair;
3. Re-definition of the scope of the plant with emphasis on the possibility of serving as a central timber supply point for the Caribbean market;
4. Preparation of a cost estimate for the rehabilitation of the plant, including, but not limited to, purchasing of new equipment, overhaul of existing equipment, importing of spare parts, and repairing of plant facilities;
5. Estimation of the output capacity of the rehabilitation facilities;
6. Estimation of cost of material and manpower and other manufacturing costs based on two-shift operation of the rehabilitated plant;
7. Rough estimate of the profitability of the complex, taking also into account cost of shipping sawn wood to the proposed Timber Distribution Centre in Barbados.

PART II F - Inputs

1. <u>External Inputs</u>	US\$
-Team comprising experts in raw material assessment, sawmilling technology, mechanical and electrical engineering, and marketing of sawnwood. ^{1/}	24,600
-Miscellaneous	<u>400</u>
Total cost external inputs:	25,000

^{1/} Marketing information can be based from the country reports prepared under this project, and other existing reports.

- 2. Government's Inputs In kind
 - 2.1 Counterpart staff
 - 2.2 Local travel
 - 2.3 Secretarial support

ANNEX VI

Specific Opportunities for Exchange of Wood Products
Within the Caribbean Community

1. Antigua

1.1 Antigua's Lumber Imports Potential from Guyana and Belize

Of the nearly 25 million BM (about 59,000 m³) lumber imported by Antigua in 1984, only an insignificant fraction (61,365 BM or 143 m³) was supplied by Guyana, down from 383,962 BM (906m³) in 1981, while Antigua's total lumber imports had increased by about 393 percent in the same period. An even more drastic downtrend developed in the same period in: lumber imports from Belize (down to nil from 413,301 BM or 975 m³ in 1980) although minor quantities for lumber might have been imported through Puerto Rico from Belize, as is currently the case in 1987.

There is therefore a significant scope for promotion of lumber imports from both Belize and Guyana. In particular, imports from Belize could be made very attractive by the establishment by a lumber agent such as the Costel Commercial Corporation* of a lumber depot in Puerto Rico, thus taking advantage of the weekly frequency of the TMT's Shipping Service between Puerto Rico, Antigua and the other Leeward and Windward Islands. Perhaps a similar arrangement could be introduced with regards to lumber imports from Guyana, but with a depot in Barbados and utilizing the same TMT's weekly shipping service.

Keen interest was expressed in the course of the mission on the part of furniture manufacturers in utilizing the following timber species:

- Mahogany and Caribbean Pine from Belize;
- Mahogany substitutes, Hububalli and Pine substitutes from Guyana.

(Crabwood would not be suitable for use in Antigua unless properly dried before shipment, because warping problems have been experienced with sample shipments of this lumber.)

Pine and Pine substitutes would be required for use in hidden framework of upholstered living room chairs.

* Costel Commercial Corporation
65 Infanteria Etrade, Carolina
P.O.Box 899
Carolina
Puerto Rico 809
Tel.: 7267633.

1.2 Specific Requests for Quotations/Samples for Guyana and Belize Timber Species

Requirements of Benjamin Woodwork Shop,
Bennett Street, Villa Area, St. John's Antigua, Tel.: 23431

(a) Hububalli samples as follows:

5 pieces 2" x 10" x 6'

(b) CIF quotation for trial order of 200 BM of Hububalli as per above sizes;

(c) One set of small samples of main Guyana Timber Species suitable for furniture making.

Requirements of Renford Woodworking
Nevis Street, St. John's Antigua, Tel. (809) 46 24537

(a) Hububalli and Determa lumber, samples as follows:

5 pieces each specie, size 1" x 6" x 6'

5 pieces each specie, size 1" x 4" x 6'

5 pieces each specie, size 1" x 10" x 6'

(b) CIF quotation for trial order of Determa and Kereti Silverballi lumber as per above sizes for a total shipment of 13,985 BM (33 m³).

(c) Trial order: CIF quotation for one 20 ft. container (13,985 BM) of Mahogany from Belize as per sizes in (a) above.

Requirements fo Etinoff Enterprises Ltd.
Cassada Garden, Antigua, Tel.: 20193

(a) Trial order. CIF quotation for one 20 ft. container (13,985 BM or 33 m³) of Santa Maria lumber, sizes as follows:

1" x 6" x 6'

1" x 4" x 6'

1" x 10" x 6'

(b) Quotation as above for Caribbean Pine lumber.

1.3 Antigua's Potential for Importing Semi-finished Furniture from Timber-producing CARICOM countries

The very high wage rate for skilled woodworkers in Antigua - EC\$ 6.25 or US\$ 2,30 per hour, second only to Trinidad - prevents this sector from catering for the furniture needs of the low-income groups. In fact, the Plastic Foam and Furniture Company is presently importing badly-made, low-cost furniture from Brazil to fill this gap.

Thus there should be a good potential for Antigua to import low-cost furniture either in parts or in semi-assembled form from selected furniture plants in CARICOM countries such as Jamaica, Guyana and possibly Dominica who offer the advantage of lower wage rates and local timber resources. The following timber species could be utilized in this respect:

- Determa and Hububalli from Guyana;
- Spanish Elm from Jamaica; and
- Gommier from Dominica.

In view of Antigua's ongoing considerable tourism-related building activities, it might also be worth investigating the possibility of importing panel doors and flush doors from the following CARICOM sources:

- (a) E. H. Charles and Co. Ltd.
P. O. Box 213
Roseau, Dominica
- (b) Caribbean Woodcraft Manufacturing Co. Ltd.
P.O.Box 38
Kingston 10, Jamaica

1.4 Special Request for Import of Furniture Components by Buyers in Antigua

Requirements by Plastic Foam and Furniture Co.
(Furniture Manufacturer and Importer)
P.O.Box 1050, Antigua, Tel.: 4621452

CIF quotation for the following furniture items:

- (a) 5-piece dining room set (one square table and four chairs);
- (b) 7-piece dining room set (one rectangular table and six chairs);
- (c) 5-piece living room set (one three-seater settee, two easy chairs and one coffee table) excluding cushions;
- (d) beds of width 4'5" and 3'6" (head board, foot board and two side rails).

Quotations for the above should include the following alternatives:

- (a) furniture supplied in the form of machined parts;
- (b) furniture supplied in the form of parts and sub-assemblies such as individual parts of chairs (back rests, back rails and front rails) to be combined to pre-assembled side frames.

The furniture could be supplied either unfinished or lacquered. Some of the potential suppliers are listed hereunder:

- (a) Fairway Furniture Factory Ltd.
Nanse Pen, Weymouth Close
Washington Gardens
Saint Andrew, Jamaica
Tel.: 923 5419

- (b) Ogheden Industries Ltd.
Cockrane, Roseau
Dominica
Tel.: 91285

- (c) Precision Woodworking Ltd.
35 Industrial Estate
Ruimveldt, Georgetown
Republic of Guyana
Tel.: 56366
Telex: 3043 GY

2. Barbados

2. Barbados' Lumber Imports Potential from Guyana and Belize

Through the years Barbados has remained the main importer of Guyana lumber in CARICOM and the fifth main destination of total lumber exports from Guyana. The best known species from Guyana are Purpleheart and Greenheart which, however, are exclusively used in building construction, with Purpleheart being particularly utilized in various joinery work such as staircase components, window sills, etc.

Despite Purpleheart's attractive shade and the ease with which it can be finished, none of the furniture manufacturers contacted would use it as furniture timber because of its blunting effect on tools. This problem, however, could be minimized by using carbide-tipped tools.

Contrary to the situation in Trinidad, where local Crabwood is already in use in the furniture industry, Barbados furniture manufacturers are familiar neither with this species nor with the Determa species. Samples of these two timbers had been provided from Guyana to some furniture manufacturers but no follow-up ever materialized on the part of potential suppliers.

As in Trinidad, keen interest was shown on the part of furniture manufacturers as well as of lumber importers in placing orders for the following timber species: Hububalli, Determa, Crabwood, Locust and Kerti-Silverballi.

Hububalli was seen as having a good potential in furniture making on account of its attractive grain, easy finish and its high suitability for turned furniture components. A major lumber importer, Blades and Williams Ltd., saw a considerable potential in using Hububalli for panel door production. Panel doors are currently manufactured locally and are also imported from the Taiwan Province of China, Brazil and Costa Rica. The introduction of Hububalli in door production would offer the possibility of Guyana supplying dimension-stock components - rather than just sawn or dressed lumber.

A unanimous interest was shown for Determa and Crabwood in view of their potential for substituting Mahogany. One particular furniture plant, Kirton's Furniture Ltd. would consider purchasing actual machined parts and turnings made of either species.

A furniture and door manufacturer, Lashley and White Ltd., would consider utilizing the Kerti-Silverballi and Simarupa species as a substitute to Pine in flush-door manufacturing, provided these species from Guyana can compete in price with Pine supplied from the USA and Honduras. A particular plant, Hampden's Furniture, expressed interest in the Locust species in addition to Determa and Crabwood. According to test results provided by the Guyana Forestry Commission, Locust has mechanical and workability properties suitable for furniture making. However, further tests should be carried out to validate the original findings in view of the fact that some end-users have encountered difficulties in the utilization of this species. As for Crabwood, it is recommended that it be dried prior to shipment to about 15 percent moisture content in order to minimize warping problems encountered by some of the end users.

Imported panels of medium density fibreboard (MDF), faced with Mahogany veneer, are being introduced in furniture manufacture although not to the same extent as in Trinidad and Tobago and with a lower degree of finishing standard. The same result is expected to be brought about by the recent introduction of imported melamine-faced particle board in the manufacture of panel furniture. The introduction of these new wood based panels is bound to affect, in the long term, the demand for solid timber, and in particular, for lumber components of large widths.

Some furniture manufacturers are already familiar with the Gommier species from Dominica and Santa Maria from Belize, and it appears that both species would be well received for wide utilization in the furniture industry. Santa Maria is at present being exported to the USA by one of the largest Belizean sawmills.

2.2 Specific Requests for Lumber Quotations/Samples

(a) Requirements of Kirton's Furniture Ltd.

P.O.Box 486, Cluster Block
Harbour Industrial Park, Barbados
Tel.: 426 4594

- (i) CIF quotation for turned and sanded spindles of 12" length in Crabwood, Determa and Santa Maria as per samples. Quantity required: 6,000 pieces per year.
- (ii) CIF quotation for Crabwood, Determa and Santa Maria sawn lumber as follows:
 - thickness: 1", 2", 3", 4"
 - width: random 6" to 12"
 - grade: prime and standard

- length: 8' and up
- moisture content: 12 to 16 percent
- quantity required: 7,204 BM (17 m³)

(iii) CIF quotation for Crabwood, Determa and Santa Maria lumber with the following specifications:

- cross section: 2" x 2" and 3" x 3"
- length: 20"
- grade: prime
- moisture content: 12 to 16 percent
- quantity required: 4,238 BM (10 m³)

iv CIF quotation for Crabwood, Determa and Santa Maria sawn lumber as follows:

- cross section: 4" x 4"
- length: 6"
- grade and moisture content as above
- quantity required: 2,542 BM (6 m³)

(b) Requirements of Blades and Williams Ltd.
(Lumber importers), P.O.Box 279, Bridgetown, Barbados
Tel.: (809) 42-62691
Telex: 2320

(i) Trial order, CIF quotation for sawn lumber Hububalli, Determa and Santa Maria species for panel door construction. Assorted sizes as follows:

- 2" x 5 1/4" x 7' 3" (door slides)
- 2" x 8 1/4" x 3' (top and bottom rails)
- 2" x 3 3/4" x 3' (intermediate horizontal rails)
- 2" x 3 1/4" x 18" (central vertical lines)
- sizes of in-fill panels will be given later
- grade: prime
- quantity: 60,000 BM (141 m³)

(ii) Lumber samples of Determa, Hububalli, Crabwood and Santa Maria as follows:

- size: 2" x 6" x 12'
- quantity: 5 pieces of each species

(c) Requirements of Lashley and White Ltd.
(Furniture and door manufacturer)
Chelsea Gardens, Chelsea Road, St. Michael, Barbados
Tel.: 11959

(i) CIF quotation for supply of partly dressed lumber for flush-door construction, specifications as follows:

- size: 1 1/8" X 1 1/2" x 7' or 14' long
- wider faces to be planed to finish thickness of 1 1/2"
- narrower faces not to be planed
- species: Simarupa and Kereti Silverballi as a substitute to White Pine
- moisture content: 12 to 15 percent
- quantity required: 11,000 BM (approx. 26 m³) per month.

3. Jamaica

3.1 Potential for Lumber Imports from Guyana and Belize

Unlike the other major lumber importing countries in CARICOM, such as Trinidad and Tobago and Barbados, Jamaica has so far provided only a minor market outlet for Guyana timber products. In fact, no timber exports to Jamaica were recorded in 1986 by the Guyana Forestry Commission other than 183 m³ (77,555 BM) of shingles.

However, the increasing difficulty in obtaining a steady supply of Brazilian Mahogany and the inadequate supply of lumber from local forests seems to provide an incentive for a long-term lumber supply link between the two countries. In particular, both the industry and the JIDC looked favourably into the possibility of importing Mahogany substitutes - such as Determa and Crabwood (Andiroba) from Guyana and Santa Maria from Belize - so as to allow the scarce supplies of Brazilian Mahogany to be reserved for the production of furniture for export to the USA, a market which would resist the introduction of Mahogany substitutes.

As in the other two major regional markets, Trinidad and Barbados, the interest in Guyana species in Jamaica centered on two species seen as substitutes to Mahogany, that is Determa and Crabwood and, in addition Hububalli. However, the Fairway Furniture Company had obtained good results in testing the Guyana species Locust and expressed interest in experimenting with this species of lumber in actual production of furniture and utility wooden items, such as bowls, trays, etc.

Jamaica was also the only country of the eight visited in the course of the mission where two furniture manufacturers, the MW Furniture Ltd. and the Modern Furnishing Ltd., found the Purpleheart samples shown to them interesting and requested quotations for this particular species.

The potential for further developing lumber imports from Belize is highly enhanced by Jamaica's proximity to that country, the availability of direct shipping links and the familiarity of the market with Santa Maria - a main hardwood species exported by Belize.

3.2 Requests for quotations (lumber and dimension stock)

(a) Requirements of Kreative House

Mr. D. C. Orane
Managing Director
67 Waltham Park Road
Kingston 11, Jamaica
Telex: YP SEA 2211

CIF quotation for Mahogany, Determa, Crabwood and Santa Maria as follows:

- size: 1" and 2" thick, width 8" and up (8' minimum length)
- moisture content: 20 to 25 percent
- trial order quantity: 1,000 BM

(b) Requirements of the Caribbean Woodcraft Manufacturing Company

Mr. J. Reynolds
Managing Director
P.O.Box 38, Kingston 10
Jamaica
Telex: CARIWOOD 2207

- (i) CIF quotation Kingston for the supply of dimension stock in Mahogany, Determa, Crabwood and Santa Maria, for the manufacture of panel doors.

Each panel door consists of a set of dimension stock as follows:

		<u>Qty per door</u>	
1.	Stiles	1 7/8"x5 3/8"x85"	2 pieces
2.	Top rail	1 7/8"x4 5/8"x33"	1 piece
3.	Bottom rail	1 7/8"x8 3/8"x33"	1 piece
4.	Horizontal rail	1 7/8"x3 5/8"x30"	2 pieces
5.	Horizontal rail (central)	1 7/8"x3 5/8"x33"	1 piece
6.	Vertical rails	1 7/8"x3 1/8"x18"	4 pieces
7.	Panels	1 1/4"x12 1/2"x16"	8 pieces

The quotation should cover the supply of 10,000 sets of components to be delivered in one or two shipments*. Moisture content to be 8 percent to 10 percent maximum.

Should the supplier not be in a position to supply kiln dried stock, a quotation could be submitted instead for rough lumber air dried to 20 to 25 percent moisture content. The corresponding sizes are:

1.	Stiles	2"x5 1/2"x85"	2 pieces
2.	Top rail	2"x4 3/4"x35"	1 piece
3.	Bottom rail	2"x8 1/2"x35"	1 piece
4.	Horizontal rail	2"x3 3/4"x32"	2 pieces

* The component should be packed in such a way as to prevent damage and absorption of moisture in transit.

5.	Horizontal rail (central)	2"x3 3/4"x35"	1 piece
6.	Vertical rails	2"x3 1/4"x20"	4 pieces
7.	Panels	1 3/8"x12 5/8"x20"	8 pieces

(ii) CIF quotation Kingston for the supply of Caribbean Pine sawn lumber for furniture manufacture. Specifications are:

- sizes: current standard sizes
- Grade: firsts and seconds
- moisture content: 20 to 25 percent
- quantity: annual requirement 300,000 to 500,000 BM

(c) Requirements of Kingston Heirlooms Ltd.

(Furniture Manufacturers)

Mr. T. Smith, President

38 Red Hills Road

Kingston 10, Jamaica

CIF quotation Kingston for the supply of Mahogany, Determa, Crabwood and Santa Maria sawn lumber of the following specifications:

- size: 4" x 4" x 43" and 6" x 6" x 43"
- grade: clear four sides
- moisture content: 20 percent
- quantity: 30,000 pieces per year delivered in 3 shipments

4. Saint Lucia

4.1 Potential for Lumber Imports from Belize, Dominica and Guyana

Unlike most other CARICOM markets where Mahogany is a dominant hardwood species, Saint Lucia's yearly Mahogany imports are very limited (1985 figures: 44,923 BM or 103 m³), whereas the imports of other non-coniferous species have increased steadily from 378,029 BM (892 m³) in 1983 to 1.3 million BM (3,291 m³) in 1985. Therefore, there should be a good potential for importing hardwood species other than Mahogany, such as Determa from Guyana, Santa Maria from Belize and Gommier from Dominica.

As for developing the potential for importing Pitch and Yellow Pine substitutes such as Caribbean Pine from Belize and Simarupa from Guyana, a lot will depend on the capability on the part of the two CARICOM suppliers to match the current CIF price of imported Pitch and Yellow Pine (US\$ 0.50 to US\$ 0.65 BM).

Lumber importers to contact are:

- (a) Saint Lucia Furniture Manufacturers' Association
P. O. Box 744, 59 Brazil Street
Castries, Saint Lucia
Tel.: 22221
Cable: SLFMA

- (b) A. F. Vaimont & Co. Ltd.
(Importers of lumber, panels, doors and plywood)
P. O. Box 172, Castries, Saint Lucia

5. Saint Vincent

5.1 Potential for Lumber Imports from Guyana, Belize and Dominica

Contrary to the prevalent trend in other CARICOM countries, only 36 percent of St. Vincent's total lumber imports consist of coniferous species, whereas mixed hardwood takes 45 percent of the total. Moreover, one particular hardwood species from Guyana - Crabwood - has already found acceptance in the building industry. Thus, there seems to be a favourable climate for the introduction of Mahogany substitutes such as Determa from Guyana and Santa Maria from Belize. A very keen interest was expressed in Hububalli, both on the part of manufacturers and lumber importers. One particular furniture manufacturer, O. T. Mayers, was impressed with samples of Gommier and planned to visit Dominica to negotiate supplies of this species.

5.2 Specific Requirements for Lumber Quotations and Samples

- (a) Requirements of Builders' Mart Ltd.
(Lumber importers)
P. O. Box 362, St. Vincent, Tel.: 71248

Samples of Hububalli and Determa, CIF quotation, as follows:

- 5 pieces each species, size 1" x 6" x 6'
- 5 pieces each species, size 1" x 10" x 6'

- (b) Requirements of Sutherland Furniture
P.O.Box 1059, St. Vincent, Tel.: 61198

Samples of Hububalli, K-Silverballi and Santa Maria as follows:

- 6 pieces size 1" x 2" x 8'
- 3 pieces size 3" x 3" x 7'
- 3 pieces size 2" x 7" x 7'

- (c) Requirements of Corea's Trading Ltd.
(Lumber importers)
P. O. Box 122, Kingstown, Tel.: 61201

CIF quotation for Determa and Hububalli, as follows:

- thicknesses: 1", 1 1/2", 2" and 3"
- lengths: 8' to 16'
- widths: 6", 8", 10", 12"
- grade: prime
- moisture content: 15 to 20 percent
- quantity: one 20 ft. container (33 m³)

CIF quotation for Santa Maria species (same specification as above).

6. Trinidad

6.1 Lumber Import Potential from CARICOM Sources

The increased price and the scarcity of supply of Brazilian Mahogany provides a major opportunity for increased lumber imports from CARICOM sources such as Guyana, Dominica and Belize.

A keen interest was identified during the mission on the part of both furniture manufacturers and lumber importers in the introduction in the market of the following species from Guyana:

- Hububalli
- Determa
- Crabwood (to be dried to 20 percent moisture (content prior to shipment))
- Kereti Silverballi
- Simarupa

Hububalli seems to have the largest potential as a furniture timber and is seen as an attractive alternative to local Teakwood on account of its pronounced decorative grain and apparent ease of finish.

Determa and Crabwood are seen as possible alternatives to Brazilian Mahogany. Kereti Silverballi and Simarupa were considered by a major lumber importer, Dansteel Ltd., as possible alternatives to White Pine.

Practically all furniture manufacturers rejected the possibility of a wide use of Purpleheart as a furniture timber due to its hardness and resulting machinery difficulties, such as abnormal wear of cutting tools. However, limited quantities of Purpleheart spindles have been imported for use in staircase handrails. The possibility of producing knock-down bookshelves incorporating Purpleheart spindles - which are easy to machine - and shelf panels made of species of contrasting colour, such as local Pine should be advertised to furniture manufacturers.

6.2 Specific Requests for Lumber Quotations and Samples

- (a) Requirements of Specialist Furniture Ltd.
(Furniture manufacturer)
Lot 26A, O'Meara Industrial Estate
Arima, Trinidad, Tel.: 642 3183
Cable: SPECFUR

CIF quotations are required as follows for Determa, Crabwood, Hububalli, Simarupa and Kereti Silverballi species:

- thickness range: 7/8", 1", 1 1/2", 2", 3", 4" (square)
- width range: 8", 10", and 12"
- lengths: random starting from 6'
- moisture content: 12 to 15 percent
- grade: No. 1 common and better
- quantity: 150,000 BM (354 m³)

- (b) Requirements of Dansteel Ltd.
(Lumber importers)
2 1/2 Miles, South Trunk Road
La Romain, Via San Fernando, Trinidad
Tel.: 652 8562
Telex: 32337 DANSTEEL WG

CIF quotation required for Sinarupa and Kereti Silverballi (as possible substitutes to White Pine) as follows:

- should quote both rough and dressed lumber
- thickness range: 7/8", 1", 1 1/2", 2", 3" and 4" (squares)
- squares: 3" x 3" and 4" x 4"
- random widths
- random lengths 6' and up
- moisture content: 12 to 15 percent
- grade: No. 1 common

- (c) Requirements of Bwagwansingh's Ltd.
(Lumber importers)
1 Development Circular Road, Beetham Highway,
Sea Lots, Port of Spain, Trinidad, W.I.
Tel.: 62 36731

CIF quotation for Determa and Crabwood as follows:

- thickness range: 7/8", 1", 1 1/2", 2", 3", 4" (square)
- width range: 8", 10", and 12"
- lengths: random starting from 6'
- moisture content: 12 to 15 percent
- grade: No. 1 common and better
- quantity: 150,000 BM (354 m³)

- (d) Requirements of Trans Antilles Agencies
(Lumber Importers)
P. O. Box 1176, Trinidad
Tel.: 642 4404

CIF quotation required as follows:

- species: Determa in rough lumber form
- thickness: 1", 1 1/2", 2", 3"
- squares: 3" x 3" and 4" x 4"
- width: 8" and up
- length 6' and up
- quantity: 50000 BM (117 m³)

6.3 Furniture and Furniture Parts Import Potential

Despite the trade imbalance between Guyana and Trinidad and Tobago, Trinidad's current Government policy prevents the imports of finished wooden furniture from whatever source through non-tariff barriers. In fact, furniture is listed among the products in the import 'negative list'. Moreover, during discussions at the Industrial Development Corporation (IDC), it emerged that the Government would equally discourage the imports of furniture parts for assembly in Trinidad, as this would deprive the local furniture industry value-added opportunities in a situation of drastic decline in the capacity utilization of the sector.

The Government would give favourable consideration to the import of furniture stock - that is, of furniture parts dried, planed and trimmed to rough sizes - for further processing in Trinidad, as this would avoid incurring wastage normally associated with processing of rough lumber. However, of all the furniture manufacturers contacted, only one - the Specialist Furniture Ltd. - expressed interest in importing dimension stock on the longer term.

ANNEX VII

PROPERTIES OF SELECTED GUYANESE SPECIES
SUITABLE FOR FURNITURE/JOINERY MAKING*

Purpleheart

- Scientific name: Peltogyne pubescens (family: Caesalpiniaceae)
- A.T.I.B.T. standard name: Amarante
- Other names: Amaranth, Nazareno, Pau Roxo, Bois Violet, Barabu
- Wood appearance: Dull brown when freshly cut, rapidly oxidizes to violet-purple on exposure to light and gradually toning down in course of time to dark purplish-brown. Sapwood whitish or cream coloured. Grain generally straight, sometimes wavy or interlocked. Texture moderate to fine. Bole 50-90 feet long, cylindrical; diameter 20-44 inches.
- Physical and mechanical properties: Wood is very tough, strong and resilient. Weight about 860 kg/m^3 (54 lb/ft^3) seasoned. Movement small; bending strength 147 N/mm^2 (21399 lbf/in^2) modulus of elasticity 1600 N/mm^2 ($2420,00 \text{ lbf/in}^2$) compression parallel to grain 78.5 N/mm^2 (11380 lbf/in^2). Shock resistance medium.
- Natural: Highly resistant to decay, termites and fire. Heartwood very durable and extremely resistant to preservative treatment, but sapwood is permeable.
- Timber processing:
- Drying: dries well and fairly rapidly with little degrade. Kiln schedule E.
- Working: not difficult to work. Saws, planes and turns well, finishing smoothly; takes a high polish.
- Assembly: it takes glue well and holds nails and screws satisfactorily.
- Finishing: gives good results when lacquered or polished.
- Uses: Possesses high strength and very good durability and is an excellent structural timber suitable for heavy outdoor constructional work such as bridges, dock work and benches. As

* Source: Guyana Forestry Commission.

flooring it has high wearing qualities and is suitable for most conditions of traffic. Has been used successfully in chemical plants for vats, filter press plates and frames. Suitable for high-grade furniture and turnings. Also used for making billiard cue butts, tool handles, interior and exterior joinery. A valuable wood for its attractive appearance and its strength.

Supplies:

Regular supplies are available.

Andiroba (Crabwood)

- Scientific name: Carapa guianensis (family: Meliaceae)
- Other names: Krapa, Guino, Figueroa, Tangare, Carapa, Crappo
- Wood appearance: Heartwood varies from pale pink to rich red-brown when freshly sawn, darkening to a fairly uniform dull reddish-brown.
- Sapwood pale brown or oatmeal coloured, not always sharply defined. Wood resembles a plain mahogany in appearance, but lacks its natural lustre. Texture medium to coarse; grain generally straight but sometimes interlocked.
- Bole 50-80 feet tall; diameter 16-20 inches.
- Physical and mechanical properties: Comparable in strength to European Beech. Weight about 610 kg/m³ (39 lb/ft³) seasoned. Small movement. Moderately hard with good mechanical properties and is fairly stable in use.
- Natural durability: Heartwood is moderately durable and fire resistant. Logs liable to attack by ambrosia (pinhole-borer) beetles.
- Timber processing:
- Drying: Dries fairly well but rather slowly with a tendency to split in the initial stages. Kiln schedule C.
- Working: Saws without difficulty. Interlocked grain makes planing difficult. Works easily and turns well, finishing smoothly.
- Assembly: Glues and holds nails well. Tendency to split on nailing.
- Finishing: Takes stain and polishes satisfactorily.
- Uses: Suitable for general carpentry, furniture, cabinet work, turnery and interior joinery.
- Supplies: Occurs in reasonable quantities in Guyana. Regular supplies possible.

Determa

Scientific name: Ocotea rubra (family: Daumecae)

A.T.I.B.T. standard name: Louro Vermelho

Other names: Wana, Grignon Franc, Red Louro

Wood appearance: Pale reddish-brown with subdued golden lustre. Grain straight to irregular, texture rather coarse. Bears some similarity to a dense grade of African Mahogany. Bole 60-80 feet long, cylindrical; diameter 24-36 inches.

Physical and mechanical properties:

Average weight about 620 kg/m³ (39 lb/ft³). Hardness - soft to medium. Strength class 5/4, generally below the average for its density. Movement low to moderate. Determa responds extremely slowly to atmospheric changes and is, thus very stable in use.

Natural durability:

Determa heartwood is rated durable in graveyard and pure culture tests. The wood equals Honduras Mahogany in its resistance to termites, and is also fairly resistant to marine borers.

Determa is highly resistant to moisture absorption and has excellent weathering characteristics.

Timber processing

Drying: kiln schedule E. Because of the slow diffusion rate of the moisture in the wood Determa is difficult to season.

Working: saws well, works easily with all tools; turns and carves well.

Finishing: stains and polishes well after filling.

Uses:

A general utility timber, widely used for all kinds of indoor and outdoor work. Uses include boat and ship building (keelframe, planking and decking); carriage and waggon building; building construction both interior and exterior (framing, stairs, windows, sash frames, flooring strips, interior trim); cooperate, furniture and cabinet work. The wood is suitable for bending to a moderate radius of curvature.

Supplies:

Available in considerable quantities. Supplies adequate to meet all likely requirements, both in quality and quantity. The timber is available in large sizes.

Courbaril (Locust)

Scientific name: Hymenaea courbaril (family: Caesalpinaceae)

Other names: Copalier, Algarrob, Gaupinal, Jatoba.

Wood appearance: Heartwood light brown to brown often with dark streaks and with a subdued golden glow. Sapwood of whitish grey colour is sharply defined. Texture medium coarse.

Grain straight, lustre medium, uniform vessel lines distinct.

Bole 60-80 feet long, diameter 24-36 inches.

Physical and mechanical properties:

Very hard and strong. Weight varies from 910 to 1000 kg/m³ (57-62 lb/ft³) seasoned. Moderate shrinkage, relatively stable once dry. Good mechanical properties, especially elasticity.

Natural durability: Very resistant to decay.

Timber processing: Drying: dries readily without distortion or splitting.

Working: moderately difficult to work but finishes smoothly. Planes and turns without difficulty. Good bending to steaming process.

Assembly: glues well, but difficult to nail. Fastenings are held well.

Finishing: Finishes smoothly. Polishes and varnishes without difficulty

Uses: A wood of decorative appearance suitable for use in the manufacture of high grade furniture, cabinet work, decorative joinery and veneer. Also used for ship-building, general construction, and the making of tool handles and croquet mallets.

Supplies: Occurs widely but not abundantly in the Guyana forests. Regular supplies in modes quantities are available.

Hububalli

- Scientific name: Loxopterygium sagotii (family: Anacardiaceae)
- A.T.I.B.T. Standard name: Slangenhout
- Other names: Koika, Onotillo
- Wood appearance: The wood is brown to reddish-brown, attractively figured; contains numerous narrow to rather wide darker stripes and streaks. Lustre medium. Texture medium, uniform. Grain straight, sometimes interlocked or wavy.
- Physical and mechanical properties: Weight about 50 lb/ft³. Strength class 4, moderately hard; toughness medium to rather brittle. Movement rather low. Air dry Hububalli compares closely with Burma Teak in all strength properties except compression and tension perpendicular to grain.
- Natural durability: Resistant to decay; moderately resistant to termites. The wood is highly resistant to moisture absorption.
- Uses: Because of its attractive figuring and relative scarcity the wood is best suited for panelling, high-grade furniture and cabinet work.
- Supplies: The wood is frequently found in the far interior. Moderate quantities are available for export.

Silverballi (Group)

Family:

Lauraceae

Scientific names:

Brown: Licaria canella
Kereti: Ocotea puberula, Ocotea wachenheimii, Ocotea oblonga
Kurahara: Ocotea glomerata
Swizzlestick: Octotea schomburgkiana
White: Octoea canaliculata
Yellow: Aniba ovalifolia

A.T.I.B.T. standard name:

Canela

Other names:

Pisie, Caralou, Canelo, Louro Branco, Inamui, Preto

Wood appearance:

In Guyana the Silverballi group is divided into 'hard' and 'soft', with the dividing line being put at an air dry specific gravity of 37 lb/ft³.

The heartwood ranges from greyish through yellowish buff to light brown and darkens on exposure. Lustre medium to high. Texture rather fine to moderately coarse. Grain straight. The wood usually has a pleasant aromatic odor.

Bole 60-70 feet long; diameter 16-24 inches.

Physical and mechanical properties:

The 'hard' Silverballi is rather light to heavy with densities from 22 to 37 lb per cubic foot. The group is generally in strength class 2.

Movement rather low; the lighter species shrink less than the heavier types.

Natural durability:

Moderately resistant to insects and decay, but susceptible to termites. Highly resistant marine borers. Difficult to impregnate.

Timber processing:

Drying: kiln schedule G. Silverballi air dries well with little degrade.

Working: saws well and works easily.

Assembly: holds nails, screws and glue well.

Finishing: Finishes smoothly unless grain is severely interlocked. Paints well.

Uses:

'Hard' Silverballi: General carpentry, boat building (planking), suitable for both interior and exterior work in house building; furniture and cabinet work; suitable for veneer and plywood.

'Soft' Silverballi: general carpentry, interior work, light furniture; suitable for utility plywood.

Supplies:

Occurs frequently in the Guyana forests. Regular supplies are available for orders placed in the Silverballi group.

Simarupa

- Scientific name: Simaruba amara (family: Simarubaceae)
- A.T.I.B.T. Standard name: Yarupa
- Other names: Aceituno, Acajou blanc, Scemardoua, Bitterwood.
- Wood appearance: Heartwood whitish, not differentiated from the whitish or straw coloured sapwood. Wood has a slightly bitter taste, but is odourless. Grain straight. Texture is medium, uniform and lustrous. Bole 70-90 feet long; diameter 20-24 inches.
- Physical and mechanical properties: A very light, soft timber. Weights about 430 kg/m³ (27 lb/ft³) seasoned. In several respects very similar to Obeche (Triplochiton scleroxylon). Movement small. Low in bending strength stiffness, crushing strength and shock resistance.
- Natural durability: Timber of low durability, blue stains easily. Green converted timber can easily be treated by short dipping and diffusion.
- Timber processing: Drying: dries very rapidly and very well. Kiln schedule L
- Working qualities: Easy to work with both manual and machine tools.
- Assembly: glues well. Can be easily nailed with good holding qualities.
- Finishing: easy to paint, stain or varnish.
- Uses Suitable for use where a light, easily worked hardwood is required and where its lack of durability and low strength are not important. Examples are in furniture for interior use, drawer slides, and some types of cabinet framing; interior joinery and shoe heels. Excellent qualities for model making, utility wood ware and toy manufacture. Simarupa peels well and makes attractive plywood.
- Supplies: Adequate supplies available in commercial quantities.

ANNEX VIII

CHECK LIST OF INFORMATION SOURCES AVAILABLE ON MAIN GUYANESE WOODS*

The table on pages 64 to 68 provides a check list for the timber names mentioned in the report and indicates the technical information available on some Guyanese woods. It is not intended to be a comprehensive list of potentially useful timbers but shows:

- a) those which are particularly common (indicated by *) and for which a use or increased use is of special importance, and
- b) those in current use or potentially attractive woods but available in limited or uncertain supply.

The main programmes of test work on Guyanese woods or similar woods from adjacent territories have been carried out at the Princes Risborough Laboratory (PRL, formerly the Forest Products Research Laboratory) in the United Kingdom, the Centre Technique Forestier Tropical (CTFT) in France, and at the Yale School of Forestry as part of an extensive survey of Latin American Woods, carried out between 1947 and 1955. The following are the main sources of technical information from CTFT and PRL:

CTFT: CTFT: Fiche botanique forestiere, industrielle et commerciale.
CTFT: Information technique
Sallenave, P. Les proprietes physiques et mecaniques des bois tropicaux.
Revue: Bois et Forets des Tropiques

PRL A Handbook of Hardwoods, 1956 and 1972 editions
Reports of Overseas timbers - roneostyled series
Strength properties of timbers, FPR Bull 50, 2nd ed. 1969.
Laboratory tests of natural decay resistance of timbers.
Timberlab Paper No. 50, 1972.
Results of field tests on the natural durability of timbers
(1932-1975). BRE Current Paper 6/76.
Resistance of timbers to impregnation with creosote, FPR Bull 54.

The Yale tests were reported in five issues of 'Tropical Woods', viz:

- Yale I Tropical Woods, No. 95, June 1949
- Yale II Tropical Woods, No. 97, November 1950
- Yale III Tropical Woods No. 98, June 1952
- Yale IV Tropical Woods, No. 99, April 1954
- Yale V Tropical Woods, No. 103, December 1955

Much of the published information of a review nature is based on the above test work but the following reports are among those which include useful research data and are referred to in the tables below:

* Source: Report on a visit to Guyana to examine the need for timber research by J. D. Brazier, Princes Risborough Laboratory, UK, 1978.

Code: 1/

- Pt Rico Longwood, F. R. (1961) Puerto Rican Woods: their machining, seasoning and related characteristics.
US Agricultural Handbook No. 205. (includes information on termite resistance provided by G. N. Wolcott.)
- Mich Kynoch, W. and N. A. Norton (1938). Mechanical properties of certain tropical woods, chiefly from South America. Univ. Michigan, Bull No. 7.
- Wag. 'Surinam Timber'. 2nd ed (1955). Surinam Forest Service. (Strength data from tests at Landbouwhogeschool, Wageningen, Holland, and durability classes from Pfeiffer.)
- Trin Brooks, R. L. et al (1941). Durability tests on untreated timbers in Trinidad. Carib. For 2, 101-119.

It should be noted that in the following tables, although an entry is given against a test for a timber, it does not follow that the data can be considered adequate.

A most useful bibliography, which includes references to some timbers other than those listed here, has been compiled by Lloyd S. Harry of the Guyana Forest Department.

Work carried out at the Universidad de los Andes, Merida, Venezuela, is referred to in the text after the table.

1/ Code refers to source indicated under "Test Origin" in the Table.

Test Origin	Material/origin	D R Y I N G	M O V E M E N T	S T R E N G T H	D U R A B I L I T Y	P R E S E R V A T I O N	S A W I N G	M A C H I N I N G	P A I N T I N G	N A I L I N G
<u>FUKADI</u> , <i>Terminalia amazonia</i>										
PRL	3 logs: Trinidad	+	+	+	+	+	+	+		+
	4 logs: Belize									
CTFT	2 logs: French Guyana			+	+		+		+	+
Yale I/III	6 logs	+		+	+					
<u>*GREENHEART</u> , <i>Ocotea rodiaei</i>										
PRL	9 logs: Guyana	+	+	+	+	+	+	+		+
CTFT	1 log: Guyana			+	+		+			
Mich	2 logs: Guyana			+						
The Dutch (TNO) and Germans (Reinbek) have also derived strength data.										
<u>*HAIARIBALLI</u> , <i>Alexa leiopetala</i>										
PRL	2 logs: Guyana	+	+							
<u>HUBUBALLI</u> , <i>Loxopterygium sagotii</i>										
PRL	6 planks: Brazil			+	+		+	+		+
CTFT	1+ log: French Guyana			+	+		+			+
Yale IV	3 logs: Brazil/Surinam	+		+	+					
<u>*KAKARALLI</u> : <i>Eschweilera</i> spp.										
<u>*BLACK KAKARALLI</u> , <i>Eschweilera decolorans</i> , <i>E. odora</i> , <i>E. sagotiana</i> , <i>E. subglandulosa</i>										
<i>E. odora</i> (mata mata - Brazil)										
Yale IV	3 logs: Brazil	+		+	+					
<i>E. sagotiana</i>										
Yale I/III	2 logs: Guyana	+		+	+					
<i>E. subglandulosa</i> (manbarklak - Surinam)										
Yale IV	3 logs: Surinam	+		+	+					
Trin	Trinidad				+					
<u>KAROHORO</u> , <i>Didymopanax morototonii</i>										
Puerto Rico	5 logs: Puerto Rico	+			+					
Strength and durability data are given for <i>E. amara</i> and <i>E. corrugata</i> in 'Surinam Timbers'.										

Test Origin	Material/origin	D R Y I N G	M O V E M E N T	S T R E N G T H	D U R A B I L I T Y	P R E S E R V A T I O N	S A W I N G	M A C H I N I N G	P A I N T I N G	N A I L I N G
*KAUTA, Licania spp.										
*KAUTABALLI, Licania spp. (see also MARISHIBALLI)										
L. macrophylla										
Yale IV	6 logs: Surinam	+		+	+					
Licania spp.										
Wag.	Surinam			+	+					
<u>KUDIBIUSHI</u> , Micropholis melinoniana										
CTFT	3 logs: French Guyana			+			+	+	+	+
*KUNOKAI, Protium decandrum										
PRL	5 logs: Guyana	+	+	+	+	+	+	+		+
Mich	1 log: Guyana			+						
<u>LOCUST</u> , Hymenaea courbaril, H. davisii,										
H. courbaril:										
Yale I/III	6 logs: Surinam/Puerto Rico	+		+	+					
Puerto Rico	5 logs: Puerto Rico	+			+			+		
Wag	Surinam			+	+					
H. Davisii										
Yale I/III	3 logs: Guyana	+		+	+					
*MAHO, Sterculia pruriens										
PRL	4 logs: Guyana	+	+	+	+	+	+	+		+
Mich	1 log: Guyana			+						
<u>MANNI</u> , Symphonia globulifera										
PRL	5 logs: Belize	+		+	+	+	+	+		+
CTFT	5 logs: French Guyana			+	+		+		+	+
Yale V	?: Surinam/Guyana	+		+	+					
*MARISHIBALLI, Licania spp.										
L. buxifolia										
Yale IV	3 logs: Guyana	+		+	+					
*MORA, Mora excelsa										
PRL	60 logs: Trinidad	+		+	+	+	+	+		+
Mich.	2 logs: Guyana			+						
Wag.	Surinam			+	+					

Test Origin	Material/origin	D R Y I N G	M O V E M E N T	S T R E N G T H	D U R A B I L I T Y	P R E S E R V A T I O N	S A W I N G	M A C H I N I N G	P A I N T I N G	N A I L I N G
<u>PURPLEHEART</u> , <i>Peltogyne pubescens</i> , <i>P. venosa</i>										
PRL	3 logs: Guyana	+	+	+	+	+	+	+		+
CTFT	1 log: French Guyana			+					+	+
Yale V	3 logs: Surinam	+		+	+			+		+
Mich	1 log: Guyana			+						
<u>SHIBADAN</u> , <i>Aspidosperma album</i>										
CTFT	1 log: French Guyana			+			+			+
<u>SILVERBALLI</u> , various Lauraceae										
<p>Silverballi is the product of a number of species of <i>Ocotea</i> (<i>O. puberula</i>, <i>O. wachenheimii</i>, <i>O. glomerata</i>, <i>O. schomburgkiana</i>, <i>O. caniculata</i>), <i>Aniba ovalifolia</i>, <i>Licaria canella</i>, etc, but so far as is known, Guyana timber has not been subjected to a technical assessment. Similar wood from Brazil, <i>louro</i>, produced by species of <i>Ocotea</i> and <i>Aniba</i>, is reported on (strength, durability shrinkage) in Tropical Woods 97 and 98 (Yale II/III) and similar information is given for <i>O. schomburgkiana</i> from Surinam in Tropical Woods No. 103 (Yale V). Strength and durability data for <i>O. schomburgkiana</i> are given in 'Surinam Timber'. Limited information, mainly on strength, has been obtained by the CTFT, for <i>O. guianensis</i> and <i>O. oblonga</i>. A species of <i>Nectandra</i> with a similar wood (timbersweet from Belize) has been the subject of extensive tests at PRL. Drying and machining tests have been carried out for various species of <i>Ocotea</i> and <i>Nectandra</i> in Puerto Rico (longwood 1961).</p>										
<u>SIMARUPA</u> , <i>Simaruba amara</i>										
Yale II/III	2 logs: Surinam	+		+	+			+		
<u>TATABU</u> , <i>Diplotropis purpurea</i>										
Yale IV	4 logs: Surinam/Brazil	+		+	+					
<u>TAURONIRO</u> , <i>Humiria balsamifera</i>										
Yale V	3 logs: Surinam	+		+	+			+		
<u>*WALLABA</u> , <i>Eperua</i> spp.										
CTFT	5+ logs: French Guyana			+	+		+		+	+
PRL	3 logs+poles: Guyana	+		+	+		+	+		+
Mich.	2 logs: Guyana			+						

Test Origin	Material/origin	D R Y I N G	M O V E M E N T	S T R E N G T H	D U R A B I L I T Y	P R E S E R V A T I O N	S A W I N G	M A C H I N I N G	P A I N T I N G	N A I L I N G
*WAMARA, PRL	Swartzia leiocalycina 5 logs: Guyana	+	+	+	+	+	+	+		+
WHITE CEDAR, PRL	Tabebuia insignis Only strength tests appear to have been made on Guyana white cedar (Kynoch and Norton, 1938) but other tests (strength, durability, shrinkage) have been made on T. pentaphylla which has a similar wood (Yale I/III). Drying and machining trials on T. heterophylla in Puerto Rico are reported by Longwood (1961).									

Work carried out at the Universidad de los Andes, Merida, Venezuela.

Data on physical and technical properties (density, strength, nail and screw holding, machining, preservation and durability) are given for 144 Venezuelan species, including the following which are listed above or are similar to those listed above:

- Alexa imperatricis (haiariballi)
- Aspidosperma album (shibidan)
- Carapa guianensis (crabwood)
- Catostemma commune (baromalli)
- Cedrela angustifolia (cedar)
- Didymopanax morototeni (horohoro)
- Diploptropis purpurea (tatabu)
- Eschweilera spp. (kakaralli, black kakaralli)
- Goupia glabra (kabukalli)
- Hymenaea coubaril (locust)
- Licania spp. (kauta, kautaballi, marishiballi)
- Loxopterygium sagotii (hubiballi)
- Mora gougrijpii (morabukea)
- Nectandra sp. (silverballi)
- Peltogyne spp. (purpleheart)
- Protium decandrum (kurokai)
- Simaruba amara (simarupa)
- Sterculia pruriens (maho)
- Tabebuia stenocalyz (white cedar)
- Terminalia amazonia (fukadi)

The data is published in seven papers:

- Vol.1 Propiedades físicas y mecánicas de 127 maderas de la Guayana Venezolana, by J. Enrique Vilela.
- Vol.2 Ensayos de arrancamiento de clavos y tornillos de algunas maderas de la Guayana Venezolana, by J. Enrique Vilela.
- Vol.3 Ensayo de labrado de algunas maderas de la Guayana Venezolana, by J. Enrique Vilela.
- Vol.4 Maderas de Guyana producción y secado de chapas, by Adolfo Pivera.
- Vol.5 Características papeleras de 101 especies de la Guayana Venezolana, by J. R. R. Sanchez.
- Vol.6 Características de preservación de 127 maderas de la Guayana Venezolana, by Jesus Conejos.
- Vol.7 Duribilidad natural de 125 maderas de la Guayana Venezolana, by L. de Mayorca.

All were issued by: Ministerio de Agricultura y CERIA, Universidad de Los Andes, Laboratorio Nacional de Productos Forestales, Merida, Venezuela, in 1969.