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Industry Council for Development

THE DEVELOPMENT OF BRAZILIAN INDUSTRIES
BASED UPON AMAZON FOREST RESOURCES

REPORT OF THE ICD MISSION

November 1983

Project # 931-1121

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INTRODUCTION

Terms of Reference

At the request of the Government of Brazil and the United Nations Development Programme (UNDP), an Industry Council for Development (ICD) advisory mission visited Brazil from 21 November - 2 December 1983 to assess the development of the Amazon forest industry on an integrated basis. In this report, the mission provides recommendations for the commercially viable expansion of the wood industry, especially as regard the potential for increased exports, and import substitution of hardwood products utilizing lesser-known tropical species. The mission's recommendations should be considered as the basis for follow-up activities which may also involve ICD.

As agreed upon by the Government and UNDP, ICD mission objectives included the following:

1. Assess the existing Amazon forest industry on an integrated basis and within the context of a) objectives of the National Development Plan, b) development priorities for the Amazon region, and c) objectives for the development of forest industries on a national basis.
2. Assess the resource base for Amazon forest industries in relation to government priorities and regulations regarding the economically and environmentally sound exploitation of forest resources, and taking into account current management projects in the Tapajós National Forest and other regions.
3. Assess the technological and managerial status of the Amazon forest industry, with a view toward identifying opportunities for improvement and expansion of the industry.
4. Recommend marketing strategies to expand exports of products based on Amazon hardwood varieties with particular reference to sawnwood, furniture components, joinery products, veneer, plywood and specialty products, such as sporting goods and musical instruments. Such strategies will also consider the promotion of lesser-known species with a view toward increasing Brazil's share of the world market for tropical hardwood products. Particular attention will be given to species identification in relation

to market demand, appropriate processing equipment, transportation systems and costs, and marketing presentation. The role of the wood technology laboratories located in Brasília and Manaus will also be considered within this context.

5. Assess, in accordance with government objectives, existing policies and incentives for attracting domestic and foreign investment to Amazon forest industries.

Mission Composition and Program

The ICD mission was led by John Stokes, Vice President-International, Automated Building Components Inc., Australia, and assisted by Frank Nielsen, President of Naesby Tømmerhandel, Denmark, and formerly with the East Asiatic Company and past President of the Danish Timber Trade Federation and Association of Timber Trade Federations within the Common Market, and Julien Guiscafre, recently retired Director of the Centre Technique Forestier Tropical, France. The mission was further assisted by Walter W. Simons, Executive Director of the Industry Council for Development; Sara Growdon, ICD Program Officer; and Catherine Cruveillier, UNDP Program Officer. Peter Koenz, UNDP Resident Representative, and Luis Gomez, Deputy Resident Representative, provided additional mission support and accompanied the group on official visits in Brasília and Rio de Janeiro.

The mission itinerary included meetings with government officials, development agency representatives, individual entrepreneurs, regional wood industry associations, architects and corporate executives in Brasília, Manaus, Santarém, Belém and Rio de Janeiro. Visits to the Tapajós National Forest and wood research laboratories in Brasília and Manaus were also included. (Please see ANNEX II).

Mission Financing

The mission was financed on a cost-sharing basis between ICD and the UNDP according to "Guidelines on Relations between UNDP and External Cooperating Organizations". The services of Messrs. Stokes, Nielsen and Guiscafre were provided by ICD as its contribution to the mission; their travel and per diem costs were borne largely by UNDP. The costs of international travel and in-country expenses for ICD Secretariat members were covered by the Council and its Brazilian member company, Eucatex.

ICD Objectives and Activities

The Industry Council for Development is a non-profit, tax exempt, self-supporting membership organization which assists economic and social advancement in developing countries according to their national goals and at the request of their governments. Members are corporations from market and centrally-planned economies in developed and developing countries which support the objectives and principles of ICD and which are willing to make expertise available as a contribution to the development process.

SUMMARY

In accordance with its Terms of Reference, the ICD mission assessed Amazon forest industries in terms of the resource and its management, research, technology and marketing considerations. While the structure of this report corresponds with these four functional areas, the mission found that major problems of primary importance to the commercially viable expansion of the industry, especially as regard increased export sales of hardwood products, fell into five areas: marketing, transportation, resource management, technology and industry integration. The mission's assessment cut across both functional and problem areas to highlight issues of major importance in the short and longer term, and to provide recommendations for future growth of the tropical wood industry. By summarizing the mission's recommendations according to the five problem areas, a general "plan of action" emerges along the following lines:

Marketing

The mission strongly believes that marketing is the central priority issue for further development of the Amazon wood industry. Considering the extensive timber resources of Amazonia, all authorities agree that Brazil should be able to double its share of the world export market for tropical hardwoods within a decade. To accomplish this objective, however, an innovative and well coordinated strategy which takes into account all of the aforementioned problem areas must be implemented as soon as possible. The mission believes that with this strategy, aggressive marketing efforts will act as an "engine", pulling together all other elements for an integrated development of the tropical hardwood industry.

To achieve this objective, the marketing of Amazon hardwoods must be considered a national priority by both public and private sector authorities. To overcome the internal and external biases against greater utilization of Amazon hardwoods, particularly in construction, priority attention must be given to changing consumer perceptions of product quality and reliability of supply. These two issues represent the major obstacles to the increased acceptance of Amazon hardwoods in domestic and foreign markets.

The mission believes that the ultimate success of a marketing strategy will require close cooperation between Brazilian government and industry. The mission recommends that IBDF take the

initiative in building this relationship by acting as a catalyst for industry growth, a coordinator of marketing efforts and a controller of forest resources. By building a marketing partnership with industry and by encouraging its organization at the regional and national levels, government would help industry eventually move into a leadership role in all marketing efforts.

A successful marketing strategy based on increasing product quality and reliability of supply also demands major changes in current resource management practices as well as research, production, transportation and wood promotion activities. Greater cooperation between research organizations and industry must focus on market-oriented activities including the grouping of lesser-known species according to end-use and structural characteristics. New commercial names related to end-user preferences should also be considered. These are fundamental to any marketing strategy in order to encourage the acceptance of lesser-known species in foreign and local markets, particularly in housing, furniture and specialty products.

If concerted efforts are made at each stage of processing to reduce waste and improve product quality by utilizing appropriate technology and wood preservation techniques, product value and reliability of supply will be enhanced. The status of wood as a durable and predictable material can be successfully marketed to lending, building, approving authorities and end-users only if it has been properly kiln-dried, and preserved and machined where necessary. These are prerequisites for a successful marketing program and are further discussed in the Technology section. Stricter government licensing policies for Amazon sawmills will facilitate industry integration and greater economies of scale by encouraging existing producers to integrate into larger, more efficient multi-product operations.

An effective marketing strategy will require a fast and cost-effective system of moving wood to market. The mission supports the concept of the entreposto network, but believes it should be commercially operated, probably under management contract. In addition, intermodal transportation systems and containerization schemes should be promoted to help assure that larger volumes of Amazon products can be economically supplied to external markets on a reliable basis.

Market promotion efforts must be greatly expanded including the following measures recommended by the mission to stimulate demand for Amazon hardwood products in domestic and foreign markets:

- short-term log exportation of lesser-known species;
- government export incentives to encourage industry participation in the world hardwoods trade;
- activation of the Industry Wood Science Council to encourage industry-research-government cooperation;
- establishment of a Wood Promotional Board;

- expansion of promotional efforts including better utilization of Brazilian Trade Officers abroad and stronger participation of Brazilian wood companies in trade fairs;
- design competitions to encourage the use of lesser-known Amazon hardwoods in furniture and specialty products;
- governmental revision of building codes to encourage the use of wood as a structural material; in addition, campaigns should be planned which would promote wooden buildings including the attractive, well designed low-cost housing prototypes already available, which utilize appropriate wood preservation, joinery and gluing technologies;
- public relations and marketing assistance from IBDF.

Transportation

High freight rates for shipping Amazon hardwood products to foreign markets severely handicap the ability of Brazilian exporters to be competitive in international trade. Long and arduous overland truck shipments to markets in the south of Brazil are also impediments to increased internal trade. The mission recommends that such transportation problems be alleviated by increasing the number of larger shipments of higher quality wood products; encouraging the use of containers and ship charters; and greater use of intermodal systems such as the Companhia Vale do Rio Doce's (CVRD) rail and sea transport facilities for timber exports from the Eastern Amazon region. Besides these efforts, it will be important for government to assist negotiations for lower conference rates.

Resource Management

Based on the excellent inventory carried out in the Tapajós Forest and information from wood industry officials, the mission has confirmed, to its own satisfaction, that both dry and wet land forest areas contain commercially exploitable quantities of marketable species. It is believed that these species can be harvested without endangering the forest and replaced on an economically and ecologically sound basis through either natural regeneration and/or selective replanting.

In meeting these objectives however, the mission strongly recommends that the government impose much more effective management controls on the exploitation of Amazon forestry resources.

This would begin with the approval and activation of the 1979 Development Law which would clarify the proper use of forest lands for agriculture, energy and settlement projects. Stronger measures for the licensing and control of loggers and sawmills are also essential.

Of major concern to the mission in the area of resource management, is the prevailing attitude that timber resources are "free" and have no intrinsic value. Such perceptions inevitably lead to unnecessary resource waste and foster ecological degradation. To correct these misperceptions and establish a 'value' for Amazon hardwoods, the mission recommends that logging operations produce revenues--through the levying of stumpage fees on logs--which could finance the needed expansion of government forestry management services, through IBDF, including extension, training and marketing assistance. The expansion of forestry education is also essential in meeting Amazon training needs on technical and managerial issues.

Technology

Amazon forest industries remain historically oriented toward technologies developed in southern Brazil for softwood processing and are maladapted to the specific characteristics of Amazon hardwoods. The mission recommends that the government introduce licensing measures which would allow domestic manufacturers to design equipment for specific use in hardwoods.

The mission also recommends technological improvements in logging, sawing, drying, grading, gluing and general processing of Amazon hardwoods to increase product quality and eliminate unnecessary resource waste at all stages of production.

The adoption of kiln-drying techniques by Amazon producers is considered of priority importance for increasing product quality. The mission recommends that government credit incentives be extended to encourage the purchase of kilns which might be efficiently utilized on a cooperative basis and in conjunction with the entreposto network. Additionally, the transfer of technical know-how and training expertise can be facilitated through arrangements with international organizations, particularly agencies of the United Nations system.

The mission considers present raw material losses in logging, transport and storage to be unacceptable. They should be reduced in the following ways:

- improve or eliminate the use of steel dogs in logging rafts;

- increase the use of barges as well as explore the feasibility of using captive balloons, dirigibles and high cable systems to facilitate year-round log deliveries to mills and decrease losses from degeneration in the forest;
- increase the use of sprinkler systems in log yards to eliminate premature splitting.

Industry Integration

The mission strongly maintains that viable growth of the Amazon forest industry will require increased vertical integration of all stages of wood processing within individual enterprises. This will result in a reduction in the number of smaller, less economic units, particularly sawmills. Increasing support for the concept of integration is evidenced by stricter government licensing policies. Wood exporters are now required to have a licensed grader; and companies that do not export for one year risk the loss of their license. As a result, CACEX has estimated that the number of licensed exporters of Amazon wood products declined from approximately 1,700 in 1980, to 800 in 1983.

The mission recommends that industry integration be further encouraged through value-added incentives and closer cooperation among entrepreneurs, including the sharing of drying and storage facilities; financial incentives to purchase kilns and other equipment which can be used on a cooperative basis; and government-sponsored mill inspection and recovery audit programs to assure greater, more efficient resource utilization.

FOREST RESOURCE MANAGEMENT

The humid tropical forests of the Brazilian Amazon represent the single largest block of tropical forests in the world. The total area of the Amazon forest region varies according to the preferred definition of "humid tropical forests"; however, most recent statistics show that this area occupies some 280 million hectares and accounts for approximately 30 per cent of the world's tropical timber reserves.

Before the late 1960's, estimates of Brazilian hardwood resources were largely predicated on empirical information. Since then, more precise measurement of Amazon resources has resulted because of technological innovations, increased accessibility to Amazon forest areas and a shift in focus from the already well-developed forests of Southern Brazil to the less developed Amazon region. Results of the following studies have provided reliable information upon which to assess further development of the Amazon forest industry:

- Based on a radar survey of twelve states and territories, the RADAMBRASIL project provided maps and classified vegetation for an area of 455,775,000 hectares (approximately 53.5 per cent of the total area of Brazil and 79.2 per cent of the area defined as "Legal Amazonia").
- The "Carte Internationale du Tapis Vegetal" (CITV), which was carried out by a French institute under the auspices of UNESCO, supplemented the work performed by RADAMBRASIL by mapping the remaining 46.5 per cent of the country.
- Aerial photographs of the more inaccessible areas of the Amazon have made previous inventory studies more precise.
- The IBDF-sponsored inventory of the Tapajós National Forest in the Municipality of Santarém, Para state,¹ provides a reliable data base on the forest composition and volume of existing timber supplies in dryland areas.

¹The Tapajós National Forest is defined according to the following physical boundaries: North - parallel 3° 39' 30"; South - parallel 12° 45'; East - the Cuiabá - Santarém Highway; and West - the Tapajos River.

Forest Typology

Drylands

Also referred to as "terra firme" or "plan alto", these hardwood forests grow in areas of higher elevation and are protected from the seasonal floodings of the Amazon River and its tributaries. As they account for approximately 260 million hectares and represent nearly 95 per cent of the Amazon forest surface, the drylands are of primary importance to future forestry development in Brazil.

Given this importance, dryland forests have been studied more thoroughly than other forest regions, and information obtained from RADAM and aerial surveys is considered to be highly accurate. The Tapajós Forest in particular, is reasonably representative of dryland forest typology, and results of that inventory have been extrapolated to other dryland areas in order to facilitate their rational development.

Varzeas

Varzeas, or "wetlands" as they are more commonly known, are those tropical forests which are situated in alluvial soils, on or near river banks, and are subject to seasonal inundation. Due to their relative accessibility and proximity to river transport, these forests were the first to be exploited. Logs are felled at all times of the year in the varzeas but are floated down river to saw mills only during high water periods.

Varzeas forests have historically been considered less economically important than their dryland counterparts, as they represent only 5 - 10 per cent (approximately 8 million hectares) of the total Amazon forest.

Timber Volumes per Hectare

During the mission's stay in Brazil, data regarding the total volume of potentially exploitable Amazon hardwood were made available by government sources, wood industrialists and research centers in Brasília and Manaus. These data provide reliable information on present and future timber volumes, but are somewhat less precise in measuring the volume of wood presently being utilized. (It should be noted that some variations in total volume figures may occur and will reflect differences in specific end-use applications; depending upon the production of sawnwood, peeled or sliced timber).

The following table indicates different timber volumes per hectare, according to forest typology:

	<u>Drylands</u> ²	<u>Varzeas</u> ³
Total timber volume	250 m ³ /ha	Not measured
Potentially commercially utilizable	80 m ³ /ha	60 m ³ /ha
Presently commercially utilizable	45 m ³ /ha	5 - 10 m ³ /ha
Species: Total forest	2,000 - 4,000	2,000 - 4,000
Potentially Commercial	181	79
Presently Commercial	30 - 35	10 - 12

The question of log quality requires close attention on a species-by-species basis, as actual recovery is, of course, dependent on log quality.

The mission also notes that some foresters have expressed strong reservations about sustaining yields of the above orders. This is due to possible forest and ecological damage resulting from heavier cutting rates and the relatively low annual growth increment which is probably below 2M³/ha per year for indigenous species.

The mission also learned that higher felling rates have been maintained without apparent long-term impact in tropical forests elsewhere. Experimental work on minimum cutting sizes and yields in the Tapajós forest will provide further information on sustainable yields in this section of the closed dryland forest, as it is considered to be typical of the region.

²These volumes reflect the results of the Tapajós inventory carried out on 1,000 hectares, and takes into consideration only those trees with a diameter equal to or greater than 55 cm. This forest classified as "mata alta without bacacu palm", and is typical of the Tapajós typology.

³Based on a study carried out by an independent producer on 8,000 hectares, and including 79 tropical hardwood species with a minimum diameter of 45 cm.

Forest Ownership

Approximately 88 per cent of Brazil's forests are state-owned; the balance, some 12 per cent, are privately-owned. Whereas the majority of state-owned forests are located in the Amazon region, most of the private forests are typically found in Southern Brazil. It should also be noted that a majority of those forests currently being developed for timber purposes are located in the southern states, while federally-owned lands in the Amazon region are increasingly used for agricultural, livestock and energy uses and less for development of the timber industry. It is estimated that over 90 per cent of those forests undergoing commercial exploitation are in private hands (and thus, in the south), while less than 10 per cent of public forests are actively being so developed.

Considering this overall allocation of forest lands between the public and private sectors, sources generally agree that the most accurate figures on ownership distribution of the varzeas forests would be 70 per cent public, and 30 per cent private. No corresponding figures for dryland forests are yet available.

Resource Management

No discussion of the Amazon forest would be complete without an assessment of the government's resource management priorities and related policies. As one senior government official noted, "forestry management in Brazil is only 15 years old". In view of the forest's immensity and its ecological importance to the world environment, the mission gave priority attention to evaluating Brazil's present forest management policies.

There is a prevailing attitude in the Amazon that forest resources are "free" and therefore logs are not considered to have an intrinsic value. This leads to considerable waste of log resources in all stages of cutting, transportation and storage. In addition, an important source of potential revenue is being overlooked. On the other hand, the mission noted that there has recently been a dramatic increase in the attention given to the ecology of Amazonia. The mission believes that timber resources must be seen as having "value", and must be well-managed. The "value" ascribed to Amazon logs will provide the basis for financing forestry management.

Through meetings with government officials, foresters and research representatives, the mission learned that approximately 3 per cent of the dryland forests of Amazonia have been exploited on a largely "unmanaged" basis. However, the remaining areas (comprising nearly 27 per cent of the world's tropical forests), contain extensive hardwood resources which can, and should, be better utilized under carefully controlled "sustained yield" conditions while at the same time minimizing adverse effects which may result from such exploitation. The mission believes that commercially exploitable quantities of marketable species can be harvested without endangering the forest, and recommends that IBDF take the necessary steps to assure their replacement through either natural regeneration and/or selective replanting.

While information varies on the degree to which Amazon hardwood resources have been exploited, there is a general consensus that approximately 700,000 hectares per annum are being lost to agro-industry, energy and human settlement projects such as:

1. Construction of access roads;
2. Government supported hydro-electric schemes such as the Tucuruí and Balbina projects;
3. Cattle ranching schemes which until recently have been subsidized by government incentives;
4. Colonization programs aimed at resettling thousands of families annually on 100 hectare plots in areas previously uninhabited;
5. Shifting agriculture such as the "slash and burn" practices of indigenous inhabitants or settlers which tend to "modify" rather than destroy the forest;
6. Agricultural development schemes such as the increased production of soya beans;
7. Both legal and illegally operated mining projects;
8. Infusion of settlers into previously isolated Amazon regions along newly built roads.

The mission believes that IBDF should give the highest priority to reforestation in areas of the Amazon which have been severely degraded and abandoned by illegal settlers, agricultural projects and cattle-grazing. In this regard the mission noted the current obligation for industry to replant four trees for each tree felled in the Amazon region. There are several ways this can be accomplished, including the use of an agent. The mission believes that there is insufficient control over procedures for replanting trees. The mission also noted that the values of cut and replanted trees do not necessarily have to correspond. For example, there is no guarantee that high-value species such as mahogany, will be replanted following exploitation. In fact, lower-value, faster growing species are often replanted in such a situation. The mission believes that the administration of an effective replanting policy would be enhanced by a stronger IBDF.

The mission hopes that many of these controversial management issues will be covered by the 1979 Development Law which is now being considered for final government acceptance. With the passage and implementation of the Law, a much needed policy framework for integrated management of Amazon resources will be instituted. The Law should also help to resolve conflicts between agricultural, forestry, cattle and colonization interests. The mission recommends that adoption of the Development Law be expedited, so that Amazon forest resources can be developed according to long-term, social, economic and ecological objectives of the region.

Control and Licensing of Loggers and Sawmills

To help strengthen IBDF's role in instituting an effective management regime for the exploitation of Amazon forestry resources, the mission recommends that logging and milling operations be controlled through licensing arrangements as a basic component of Brazil's forest management policy. Licensing requirements for mills and loggers can contribute to industry integration in the long term, while protecting the Amazon forest from indiscriminate exploitation in the shorter term.

The mission also recommends that stumpage fees be established so that the real value of the forest can be measured and appropriate recovery programs established. Because there is extensive private ownership in the Amazon, it will be necessary to consider methods for harmonizing government and the private sector stumpage fees.

The mission also recommends that IBDF enter into forest management contracts--with Brazilian and foreign companies--as another means to assure managed development of the region's wood resources. This would provide a practical solution to IBDF's present handicap of limited size and authority and would extend management control to cover previously "uncontrolled" regions of Amazonia.

Forestry Services

The mission believes that IBDF should be given a well-defined mandate as well as the necessary funds and authority to protect and develop Amazon forest resources. To achieve these objectives, the mission recommends that IBDF have an independent budget and that its operations be decentralized from the federal capital in Brasilia with an appropriate regional base in Amazonia.

Based on successful experiences in other countries, the mission recommends that revenues earned from the licensing of loggers, the implementation of logging management contracts, the imposition of stumpage fees and the short-term exportation of logs of lesser known species (see Marketing section), be allocated to IBDF's budget as the basis for expansion of forestry management services.

Government officials and wood producers generally supported the need to increase IBDF staff and extend its functions so that it can effectively manage Brazil's vast forest wealth. With its present staff of only 3,000, IBDF is responsible for the control of all of Brazil's national parks, range lands, and flora and fauna. The mission agrees with government authorities that IBDF's professional staff should be substantially increased so that an adequate number of foresters will be available to enforce forest management policies. Foresters should also be given full authority to operate checkpoints on all forest access routes. The mission believes that an enlarged IBDF staff should include senior people with long and successful experience in tropical hardwood forestry with an emphasis on physical control and resource management, as well as researchers and a seasoned public relations and marketing team.

Extension Services and Forestry Education

While the government has established an agency to provide rural extension services in Brazil, one senior official noted that specific extension services for the forest industry are the "missing link" in the Amazon. The mission believes that extension services are fundamental to the development of the Amazon

wood industry and urges that the government, through IBDF, establish a strong technical assistance component as quickly as possible. In response to industry complaints that existing regional training courses are inadequate in training small sawmillers in appropriate sawing technologies, the mission recommends that IBDF initiate training courses which utilize international expertise in transferring skills to Amazon producers. The mission suggests that UN agencies, such as the United Nations Industrial Development Organization (UNIDO), or technical training institutes in tropical wood producing countries, be invited by IBRD to lead short-term training courses in forestry production, and management techniques.

The mission noted a lack of formal education in forestry and forest industry subjects. The training guidelines prepared by the National Council of Industries do not include the forestry industry. The mission recommends that government and industry encourage the Council to prepare such guidelines. The industrial and trade associations mentioned elsewhere in this report could provide assistance to the National Council in this respect. The mission also recommends that IBDF establish and sponsor a "forestry high school", distinct from other institutions, which would educate students in technical and commercial subjects related to the forest industry.

The mission was pleased to learn that CVRD provides technical assistance to sawmillers in need of specific training. The mission believes that such technical assistance efforts on the part of industry itself should be encouraged.

Industrial Integration

The mission believes that industrial integration is important for marketing and technology considerations; it is also important in terms of optimum resource utilization. Government licensing of mills can influence integration over a period of time. In addition, well formulated and enforced forest management policies including stumpage fee requirements on all logs will ensure more attention to recovery which is presently an area of weakness.

The mission believes that integrated forest product centers will necessitate better quality management, which is already evident in several existing integrated centers.

Apart from improved recovery, integration will also encourage improved marketing practices, including closer and more direct access to end markets. The process of integration should also attract new Amazonian entrepreneurs with aggressive interests in domestic and new export markets.

Mill inspection programs and recovery audit systems which ensure efficient log utilization will be necessary as the involvement of forestry and other authorities increases.

The mission recommends that the following incentives to stimulate integration be considered:

1. Government-funded and constructed wharf and storage facilities which will encourage producer cooperation, aggregate wood shipments and make transportation from the Amazon more economic. (See Marketing section).
2. Extend credits for the purchase of cooperative kiln facilities which will increase product worth in terms of value-added, raise demand on the world market for Brazilian exports, and encourage producer cooperation.

RESEARCH

Timber research in Brazil, initially oriented towards the study of species from the southern part of the country, has become increasingly concerned with tropical hardwoods from the Amazon region. This expansion of research efforts largely reflects the technological advances made in the mapping and classification of Amazon forest resources.

The timber research sector is well established in Brazil, as evidenced by the existence of several laboratories and research centers devoted to the study of tropical wood species. Some centers, such as the Technical Research Institute of the State of São Paulo (I.P.T.) have operated for some time and are well recognized internationally. Newer centers, such as the Forest Products Laboratory in Brasília and the National Research Institute for the Amazon (INPA), are concerned exclusively with the study of Amazonian timbers and are well-equipped in terms of the most modern equipment and well-staffed research teams to pursue innovative research further. The mission itinerary included visits to the research centers in both Brasília and Manaus (please see ANNEX II).

Strengthening Research/Industry Cooperation

One of the most recent research projects carried out by the Forest Products Laboratory and INPA was a jointly published study which classified 53 wood species from the Tapajós Forest in terms of their physical characteristics and commercial applications. While this work is important in familiarizing the Brazilian public with lesser known varieties of tropical timbers, it should be seen as the first step in working with industry in applying new processing technologies to the unique characteristics of Amazon hardwoods.

INPA has at its disposal a vast array of "state of the art" equipment for conducting industrial tests in the sawing, peeling, slicing and drying of tropical woods. This center has the capability, beyond the narrower confines of laboratory research, to study all stages of wood processing and commercial utilization. By including such practical studies in its work plan, INPA could be the means through which information on industrial applications of Amazon timbers and processing innovations could be channeled to industry and end-users, thereby encouraging the promotion of new hardwood varieties in domestic and foreign markets. This would also elevate INPA's status as a world-renown center for the study of tropical woods.

The mission recommends that permanent links between the wood research and industry sectors be expanded so that both sectors will realize mutually beneficial goals, thus contributing to the overall development of the industry. Research objectives are likely to be more clearly focused on the practical needs of the wood industry, while entrepreneurs will benefit from better information on wood technologies and utilization.

While an "Industry Wood Science Council" composed of researchers, government officials and wood industrialists was created under the auspices of INPA, this group has little structure or resolve, and has thus far been unsuccessful in its attempts to establish research priorities which will take into account industrial market demands. In order that the Council function as effectively as possible, while at the same time strengthening research-industry relations, INPA should take the lead in setting an agenda around which more formalized meetings would occur on a regular basis. Membership in the Council should also be expanded to reflect the diversity of interests involved in the wood industry; including representatives from research, finance, government, trade organizations, and possibly academia. (See Marketing section for elaboration on this recommendation.)

The mission was pleased to learn that a few Brazilian companies conduct their own private research activities on a variety of wood-related issues. CVRD, for example, is involved in research on both plantation and natural regeneration approaches to forest management in the Carajás region. The mission believes that a well-functioning "Industry Wood Science Council" could encourage the growth of private research, and the sharing of information to help promote the most effective management practices.

Grouping of Lesser-Known Species

The mission found through its visits with representatives of business and research institutions, that the present utilization of Amazon timber in foreign markets does not adequately reflect the extensive resources of the Amazon forests. To counteract this, and stimulate market demand for lesser known species, the mission recommends that INPA, with the assistance of specialists from wood importing countries and Brazilian industrialists, create new groupings for species with similar characteristics and end-uses. The mission made this recommendation to INPA staff who agreed to consider taking the initiative for follow-up action.

The grouping of similar species should be based upon the following characteristics which are critical criteria in the export trade:

- physical and mechanical properties including wood durability;
- production qualities such as the response of wood to drying, gluing and other stages of processing and product assembly;
- physical characteristics such as wood color, texture and grain;
- wood supply actually available in forest.

Efforts to establish groupings of new species should be paralleled by botanical and anatomical research which would aim at identifying commercially appropriate nomenclature for the new categories. The matter of commercial names for marketing efforts is reviewed in the Marketing section.

New Products Development

The mission recommends that research institutions and Brazilian industry coordinate efforts to develop new products utilizing Amazon hardwoods for both domestic and foreign markets. Research on new product development should be undertaken with a view toward increasing the use of known timber varieties, as well as for finding new applications for lesser-known hardwood species. Such efforts should also aim at improving product manufacturing techniques currently employed.

The mission believes that additional research should be undertaken on the use of wood in the production of specialty products such as musical instruments and, to a lesser degree, sporting goods. INPA's recent success in substituting Amazon species for imported wood in tennis racquet manufacturing is a good case in point. Additional research efforts might be carried out by research organizations under contract to industry.

Relations with Other Research Centers

To assure the most efficient and effective use of research expertise, it is imperative that Brazilian research centers, such as INPA and the Brasília laboratory, develop working relationships with centers specializing in tropical timber research in other countries. While there is some liaison between Brazilian research institutions and similar organizations in industrialized countries (such as the collaboration between INPA and the French Centre Technique du Bois Tropical), contacts with institutions in developing countries are practically non-existent. The mission recommends that Brazil establish relations with the following research bodies studying tropical wood species:

- Philippines Wood Research Institute, The Philippines
- Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia
- The Netherlands Organization for Applied Scientific Research (TNO), The Netherlands
- Asian Institute of Technology (AIT), Thailand
- Timber Research and Development Association (TRADA), United Kingdom
- Japanese Forest Products Research Institute, Japan
- Malaysian Institute Penyelidikan Perhutanan (Forest Research Institute), Malaysia

Brazilian research installations are so well equipped, particularly the world-class Manaus wood laboratory, that Brazil could eventually be host to developing country trainees there- by strengthening Brazil's role and reputation as a leader in tropical hardwood research.

TECHNOLOGY

The mission looked predominantly at the hardwood logging, sawing, plywood and veneer industries in the Amazon region of Brazil. It did not investigate the particle board or paper industries, which are believed to require little assistance, due to their already well-developed international associations and resources.

The Amazon forests are primarily composed of tropical hardwoods and, as such, require equipment, such as saws and knives, kilns, pressure treatment facilities and technological know-how appropriate to the unique physical characteristics of hardwood species. Most of the mills visited by the mission, with two or three notable exceptions, did not have such appropriate equipment, technology or know-how.

Equipment

Unfortunately, much of the equipment currently utilized in the Amazon region was originally developed in Southern Brazil and intended for use on softwood species and is maladapted to the needs of the Amazon hardwoods industry. This point was reiterated by Amazon industrialists, who stressed that Brazilian sawmilling equipment was too light for hardwoods, thus causing lower rates of production and unnecessarily high maintenance costs. Inspection of many mills substantiated these comments.

The mission was informed by government and industry officials that the concept of "similarity" forms the basis for government decisions regarding the importation of sawmilling equipment into Brazil. The recent application of more stringent foreign exchange and import controls by the government thus directly affects the growth of the hardwood industry, as its economic performance is largely dependent upon the utilization of "appropriate" equipment. Equipment which is considered "similar" in function but insufficiently durable for hardwoods is, of course, not "appropriate" for an economically viable Amazon wood industry.

The mission, therefore, believes that there is a clear need for licensing arrangements which would enable Brazilian machinery manufacturers to produce technology and equipment designs appropriate to the hardwoods industry. This might be coupled with a short-term easing of import restrictions on equipment suitable for hardwood sawmilling, kiln and air drying, and machinery for the secondary processing of such woods. Providing it is accompanied by a creative and

aggressive marketing plan, an easing of import restrictions could result in a rapid and favorable improvement in the balance of trade due to increased exports of forest products.

Appropriate Technology

In regard to the licensing of technology, it is felt that appropriate technology has been developed in some Asian and Western countries which have indigenous hardwood industries, as well as countries with an historical relationship with developing countries rich in tropical hardwood resources. Typical of the latter category would be France and its association with West Africa and Belgium and countries in the Congo region of Africa. However, tropical hardwoods cannot always be adapted to equipment specifically designed for European and North American hardwood industries, and it is felt that Brazil might look to those countries where indigenous modern hardwood processing machinery industries have been successfully developed. Such countries might include Malaya, Australia and certain African countries.

The mission noted with particular interest that there exist a number of areas in wood processing where well-proven foreign technology could be introduced to the great advantage of the Amazon timber industry. The mission believes that the Industry Council for Development could facilitate the transfer of such skills and technology to appropriate Brazilian industry and governmental agencies in cooperation with multilateral organizations, such as the UN. The mission recommends that the Government of Brazil give the highest priority to the introduction of appropriate technology and know-how in the following areas of hardwood processing:

1. Hardwood Air and Kiln Drying Technology
Including Reconditioning Techniques

While a few of the larger mills in the more populated areas of the Amazon have modern kiln drying plants, there was little evidence of the application of modern air drying or kiln drying techniques at the majority of mills visited.

There appears to be a definite need to extend the already well developed Brazilian veneer kiln industry into the Amazon hardwood industry. This might, in turn, lead to the exportation of Brazilian hardware kiln packages to adjacent South American markets in need of equipment suited to the physical properties of tropical hardwoods. The mission believes that further expert evaluation should be given to current air drying techniques, as well as to the potential for licensing the manufacture of timber kilns in Brazil.

2. Integration of Hardwood Processing Operations

Mill layout handling and its general practice in Amonzia are generally not competitive by international standards.

The mission believes there are far too many small, uneconomic mills operating in the Amazon region today. Licensing policies should be modified so that existing operators are encouraged to integrate into larger, more economic units, thereby enabling the more effective use of available equipment, technology and personnel. The existence of fewer large mills would increase the possibilities for integrated timber operations in all processing functions, including sawmilling; kiln drying; machining and pressure treatment; machine grading; and ultimately, the production of higher value wood items, such as knock-down furniture components, doors, brush backs, paint brush handles and dowel picture frame materials. Such higher-value products could be sold in the large domestic market.

3. Hardwood Sawtooth Design and Saw Doctoring Technology

The mission observed that sawing speeds employed in Amazon mills were slower and, sawn sizes more variable than normally prescribed by world hardwood standards. These observations indicate a clear need for improved tooth and knife profiles and saw doctoring techniques. Subsequent discussions with saw mill operators and managers and senior staff members at I.N.P.A., confirmed that this was, indeed, a problem and that foreign expertise in specific technical areas such as tropical hardwood saw doctoring would be welcomed.

It was noted that the UNDP might be in a position to coordinate intergovernmental efforts to initiate appropriate technological transfers, using international experts in areas such as saw doctoring to run regional workshops and training programs. This would also encourage the expanded use of appropriate Amazon centers, such as the extensive facilities at INPA for practical training directly related to industry's needs.

4. Veneer Knife Re-surfacing and Sharpening Know-how and Related Technology

While modern equipment was available in several of the mills visited by the mission, the quality of veneer produced was of a varying standard.

Knife damage is also a frequent occurrence at Amazon mills. Because logs are generally not debarked prior to sawing, abrasive materials such as stones are brought into contact with knife surfaces, and metal detection devices are not commonly used to locate remnants of metal rafting dogs remaining in the logs. The mission was also informed that the high silica content in some species enhanced the need for improved procedures for refacing veneer knives.

Additionally, it was apparent that expanded research on appropriate knife "bevels" and angle of attack for individual species would add to the quality of veneer produced. Similar comments apply to tipped saws and their maintenance. In addition, saw tooth design was clearly in need of reappraisal as profiles appeared to be more suitable to the characteristics of softwoods than of hardwoods.

5. Visual and Machine Grading Know-how for Hardwoods, Including the Planning and Establishment of Facilities for the Training of Graders and the Maintenance of Appropriate Quality Control Standards

Effective grading is a prerequisite for expanding both the domestic and export markets for Amazon hardwoods. The mission confirmed that there are graders with an extensive knowledge of the export market's requirements for well established nonstructural species, such as mahogany, but that there is a definite need for improved courses in the grading of lesser-known species. In view of Brazil's emphasis on the U. S. as a potentially large import market for tropical hardwoods, the mission believes that a study of American visual and machine stress grading techniques would be well warranted.

6. Utilization of Amazon Woods in Construction With Emphasis on Their Structural Use in Residential Building Within Brazil

The mission believes that this market offers possibly the greatest potential for development and utilization of Amazon timber resources. The mission is confident that a sound, technologically-based marketing plan to encourage the use of wood in construction - based in part on the following recommendations - could be successfully achieved.

- Design standards and codes for residential wood housing;
- Introduce appropriate strength groups of mixed species of Amazon hardwoods based on machine stress grading tests;

- Expand the "Brazilian Grading Rules for Sawn Hardwood Timber" (see Bibliography) in terms of the structural aspects of grading and the specific requirements of "Machine Stress Grading Codes" and standards;
- Develop a ready means of identification for sawn wood so that only those hardwood species which will accept preservative treatment or are naturally resistant are included within the structural grades;
- All of the above steps must be harmonized with an effective and aggressive marketing program aimed at winning the acceptance of wood as a durable and energy efficient structural material. Such acceptance must be won from the wide range of entities concerned with housing, including:
 - the public
 - lending authorities
 - architects, designers and consultants
 - housing approval authorities
 - builders and developers

Please refer to the chapter on Marketing for an in-depth discussion on appropriate marketing strategies.

7. Low Cost Housing Technology Which Uses an Increasing Content of Appropriate Pressure - Impregnated Amazonian Hardwood With Emphasis on the Use of the Lesser Known Species

The mission is familiar with Brazilian developments in low cost wooden housing prototypes which utilize both durable and treated, non-durable hardwood species. To best promote the use of wood in housing, a comprehensive program given high priority by the government must be developed to overcome present consumer bias and to win the support of lending authorities. This view has been advanced by several organizations studying this topic, including FAO at the Vancouver Wood in Housing Conference and the 1969 UNIDC Conference in Vienna.

The combination of efficient and attractive design, a regular supply of durable woods and proper construction techniques are important factors in promoting the use of wood in housing. Display homes and other wooden structures of quality design will provide tangible support and focal points for such promotional efforts. An example of innovation in housing industry techniques is the "Canadian System" which uses brick or stone "veneer" based on wood framing. This has won widespread acceptance in many countries and, with it, a vast increase in the use of wood in housing.

8. Wood Preservation Technology With Emphasis on Joinery, Millwork Mouldings and Similar Usages With a Parallel Marketing Plan to Build Confidence in Treated Wood as a House Cladding and Structural Material

The structural and exposed usage of wood depend on durability as a first priority. Durability, in turn, depends upon species characteristics. If natural durability does not exist in a particular species, this can normally be attained through a variety of impregnation processes.

While the wood preservation industry is well established in Southern Brazil, it is not commonly understood in Amazonia. Such work in wood preservation must rank high on the INPA agenda and should, we believe, focus on those commercial species not yet widely marketed.

9. Fastening Technology for Tropical Hardwoods and the Use of Spiked Metal Connector Plates for Timber Structures with Emphasis on Housing or Agricultural Buildings Within Brazil

The use of modern fastenings has been a major contributor to the more widespread use of wood as an engineered structural material throughout the world. These plates have revolutionized the economics of wood construction in many countries, by overcoming the widespread problem of finding a market for sawn wood of shorter lengths. At the time of the mission's visit to the Amazon, there was no evidence of their use.

In this regard, the Vienna UNIDO Conference on Wood in Housing recommended that mass low cost housing projects use gang-nail type spiked metal connector plates for the factory fabrication of roof trusses.

Today, this is even more valid in areas such as Amazonia, where the use of appropriate labor intensive technology, including low-cost hand impact application techniques requiring minimal capital investment, are now able to produce engineered components in more remote areas with relatively small markets. While testing of this type of construction has been carried out in Southern Brazil, there appears to be a need for similar testing in the Manaus laboratory with Amazon hardwoods. A facility for the full scale testing of gang-nail type trusses and glued laminated beams, full wall panels, and other such structures, could be installed at INPA.

10. Gluing Technology for Tropical Hardwoods,
Including Lamination and Finger Jointing

There is little evidence of the use of glue lamination technology in Amazonia.

The first requisite for a glue lamination industry is the existence of drying kilns. In actuality, controlled environment factories may prove to be mandatory for further development of the industry. In view of the relative absence of kilns in the Amazon region, it is unlikely that this type of construction will be employed in the near term.

Nevertheless, newly constructed public buildings, such as the Entrepoto at Santarém, should embody construction techniques, such as the "glulam" or "gang nail" system; this would serve as a permanent display of structurally good timber practice and encourage development of an indigenous glue lamination industry.

To avoid duplication of effort in the use of lignin as a plywood glue and experimentation in the field of prefabricated wooden housing, the mission believes that Brazil might benefit from better liaison with the large number of wood promotional bodies and research laboratories which have been actively involved in these areas for some time. Obversely, in the case of high density charcoal briquette manufacture, Brazilian work appears to be quite innovative and well developed and this expertise is likely to be of interest to other countries seeking ways to utilize wood for this purpose.

11. Logging and Log Storage Operations and
Low Cost Debarking Techniques

The need for innovation in Amazon logging technology was evident to the mission when it learned that approximately 20% of all timber felled in the Varzeas is annually lost to rot, splitting and other forms of natural deterioration during storage, and log losses incurred during raft transport. These figures are unacceptably high and represent a tremendous resource loss.

Present logging methods from the Varzeas forests to nearby sawmills depend upon the depth of the Amazon River, which may vary up to 15 meters annually. Log transport via raft is only possible when river levels are high. In view of the seasonal fluctuations in the depth of the river, sawmill production also varies.

Log storage at mills could be vastly improved by installing simple and inexpensive sprinkler systems which would add to moisture content and reduce splitting. Continuity of production would also be achieved if log storage was more extensive and if the supplementary barging of sinking logs could help to ensure a continuous log supply.

The need for improved rafting techniques is evident, as is the need for improved or alternative steel rafting spikes which now frequently break off during rafting transport, leaving steel embedded in the logs. As pointed out in a previous section of this report, this can have a disastrous effect on saws, cutters and knives during wood processing operations. The mission recommends that Brazilian officials investigate the availability of inexpensive technology to eliminate or at least minimize these easily surmountable problems.

It was noted that logging crews are only seasonally employed in the Varzeas, resulting in serious labor shortages for some loggers. The mission believes that by using barges in addition to rafts, job continuity for loggers would be assured. This would also result in the continuity of log supply to the mills with a substantial reduction in log deterioration.

The Brazilian Government is, therefore, likely to benefit from studying the feasibility of providing low cost loans for barges which, under Amazon conditions, could be more energy efficient than the rafting techniques presently employed. The use of captive balloons, dirigibles and towers connected to high cable systems are suggested as possible ways to load barges in the Varzeas during periods of low river depth and otherwise facilitate log transport.

Training

While various training programs exist within Brazil in some of these areas, they do not adequately meet the total needs of the industry. The mission, therefore, recommends that ICD and similar organizations facilitate the transfer of appropriate technology and know-how between foreign public and private sector tropical hardwood equipment experts, designers and manufacturers, and appropriate recipients, such as UN organizations, the Brazilian Government, and manufacturers of Brazilian machinery. This might facilitate the importation or manufacture under license of technology appropriate to the needs of the Brazilian forest industry. The mission believes that the Council can be an important catalyst in such transfer activities, including contacts with potentially interested bilateral aid agencies.

In the general field of technology transfer and training, the well equipped INPA laboratory in Manaus might well become a focal point for such activities in future years. For the laboratory to occupy a position of leadership in these areas, however, the mission reiterates the need for increased dialogue between wood researchers, local producers, exporters and Brazilian wood industry and promotional organizations, such as the Fundação Para Desenvolvimento da Aplicação da Madeira (DAM) in Rio. (Please refer to the chapters on Research and Marketing for further elaboration on this point.)

Clearly, the use of Amazonian hardwoods as a structural material within Brazil presents a unique opportunity for Brazilian wood producers. This is particularly important because of the declining supply of softwood resources in Southern Brazil. A substantial technological and marketing effort will be necessary to win a greater share of both domestic and foreign markets for Amazonian hardwoods.

MARKETING

Amazon hardwoods are processed in a few large and medium-sized sawmills and a great number of smaller units dispersed over a vast geographic area, far removed from the most important domestic and international markets. According to official government sources, approximately 2,000 sawmills operate in the Amazon region. This number varies according to the definition of "sawmill" and, in this case, is liberally interpreted to include both large and small, full and part-time operations.

Amazon hardwoods are generally converted into sawn timber, plywood and a variety of finished and semi-finished products. Based on the mission's visits to various Amazon mills, it was concluded that the quality of plywood produced was up to world standards, while the quality of finished and semi-finished products was substandard. These products utilize very few of the many species considered actually or potentially commercial.

Because mills are located throughout the region and tend to be far from consumption centers, transportation costs are an important consideration in assessing the economic viability of the industry. Unfortunately, the costs of transporting wood to both domestic and export markets, whether via overland or water routes, are extremely high, thus making small shipments uneconomical.

Coordination of industry activities, especially in regard to the timber trade, is almost non-existent. That which does exist is poorly organized. Coordinated efforts to promote Amazon hardwoods in Brazil and abroad suffer from a lack of activity on the part of wood associations and poor lines of communication between Brasilia and producing regions of the Amazon.

Brazil has a very low per capita consumption of wood, considering its size. This is largely due to the widespread belief that wood is "inferior" as a structural material to concrete or other building materials. This "myth" is prevalent throughout Brazil and is largely based upon social and psychological factors, such as the perceived threat of fire to homes and the low economic status equated with wooden structures. This bias is often reinforced by lending authorities and insurance companies, which, through their discriminatory policies, tend to discourage Brazilians from using wood in housing construction.

Potential for Expanding Market Share

It is a paradox that Brazil, with the world's largest tropical hardwood reserves, accounts for only 4 per cent of the total world market in hardwood products. This relatively weak trade position reflects the Brazilian attitude toward hardwood exports: namely, that exports are more often a result of the importer's desire to buy, than of initiatives on the part of Brazilian trade officials, producers or exporters to promote export sales. Export of sawn timber has become a question of 'selective buying' in the sense that, until recently Brazilian exports have concentrated on a few rather highly-priced species, such as Brazilian Rosewood (Jacaranda), Mahogany (Mogno), Cedar, Sucupira, Virola and a few other well-known species. The problem today is that none of the major importing markets look to Brazil for their regular supply of hardwood products, or as an alternative to the relatively less expensive, quality woods of the Far East.

The mission believes that the promotion of lesser-known Amazon hardwood species in both domestic and foreign markets should be seen by government and industry officials as a national priority.

The mission found that "marketing," in contemporary terms, is seldom practiced by the Amazon timber industry. With the exception of a few of the more advanced companies, some of them subsidiaries of American or European firms, marketing was generally inadequate or non-existent.

Based on discussions held with industry and trade representatives, the mission believes that Brazil is capable of increasing its share of the world export market for tropical hardwoods from the present 3.5-4 per cent to 8-10 per cent in the next seven years. It should also be possible to increase the domestic consumption of products utilizing Amazon hardwoods.

Production Technology

The fact that half the 2,000 sawmills in the Amazon are "small" creates serious problems for the industry as a whole. First, there is the problem of small uneconomic quantities of mixed specie products which vary in quality and dimension. A second problem is the lack of more advanced equipment to kiln-dry and impregnate wood, so as to increase its durability and strength. Such technical problems are impediments to increasing the demand for Brazilian hardwoods on the domestic and export markets.

Entrepuestos

These problems have been acknowledged by IBDF, who have sought to rectify the situation by establishing a chain of timber terminals, or "entrepuestos", at strategic points along the Amazon. The mission visited the entreposto in Santarém in order to evaluate its potential contribution to development of the timber industry. This installation represents the first step in implementing the Amazon timber terminal scheme.

The terminal is situated on Santarém's main road close to the Tapajós River. This location is important for easy access to both land and water transportation routes. The buildings are placed in what appears to be a very functional layout, with storage facilities constructed of light and modern materials. When completed, the masterplan will include the installation of equipment for grading, dip-impregnation, and adjustment of wood size to standard dimensions. The drying of timber is expected to be done according to the traditional air seasoning method with a storage period of 4-8 weeks. This will assure that wood is "shipping dry" with a moisture content of approximately 24-25 per cent.

At the time of the mission's visit to Santarém, the entreposto had reached a stage of near completion and was prepared to receive timber from the small sawmillers in the surrounding area. It was unclear to the mission, however, whether the terminal would eventually purchase timber directly from individual sawmillers or whether it would service sawmillers by accumulating, storing, grading and preparing their wood prior to sale, on domestic or foreign markets. From its discussions with entreposto staff members and local sawmillers, the mission assumed that the terminal's major purpose at the present time would be to provide the latter services.

The mission considered the terminal scheme an innovative and potentially useful concept; but believes it might operate more effectively if run by an independent company through a management contract with IBDF. Another possible alternative would be for IBDF to lease terminals to a company which is formed either as a joint venture enterprise or as a saw-miller's cooperative. The underlying argument favoring such recommendations is that the timber terminals should purchase wood supplies from individual producers, thereby taking full responsibility for further processing operations and final sales and fully utilizing terminal facilities. Considering the financial obstacles facing small wood industries, such as cash flow management and high interest rates, consolidation of the industry at this stage would facilitate realistic solutions to these important problems.

The mission agreed with government authorities that there is a definite demand for timber terminal services; but it believes they will be better equipped to meet that demand quickly and cost-effectively if they are operated as business enterprises. In this way, the entreposto network would create an important link between producers and their markets. While this linkage does not presently exist, it is considered a fundamental prerequisite to further development of the industry.

In this regard, the mission recommends that governmental initiatives be designed to encourage this development and suggests that minimum sawmill production requirements be established prior to issuing operating licenses. The process of consolidating the industry into larger and more modern sawmills will require substantial investment and might be the basis for future cooperation between the World Bank group, IBDF and foreign companies, following a joint venture arrangement.

Marketing of Hardwood Products

Logs

Brazil's official position is to forbid all log exports except for very special situations. However, in view of the present status of the Amazon hardwood industry with regard to resource supply, species variation and market potential, the mission believes that this embargo should be temporarily lifted as a marketing incentive to help introduce lesser-known species in new markets. Well-accepted species such as Jacaranda, Mahogany, Cedar, Sucupira and Virola should not be included in any such log export scheme. Considering the extensive forest resource base of the Amazon region and planned hydroelectric developments which will necessitate the clear cutting of vast tracts of hardwood forests, the mission estimates that several hundred thousand cubic meters of wood will be available for export purposes in the next few years.

The mission recommends that the export of logs should be carefully planned and strictly controlled so as to avoid possible abuse by companies who might try to augment shipments of lesser-known species with well-known, high value timber.

This issue of control is critical if a log export policy is to be successful. To help assure that it is not abused, wood scalers, inspectors and others overseeing this function must be seen as occupying positions of status and should be compensated accordingly. It follows that special training courses for graders, to familiarize them with export regulations and to gain their assistance in enforcing a controlled

policy, should be established. If job responsibilities are abused, strict measures--such as the permanent loss of job--must be enforced without hesitation.

The mission also believes that this controlled log export program should be limited to a maximum of five years, so that the introduction of new hardwood species abroad can be translated into orders for sawnwood and other semi-finished and finished products as quickly as possible.

In view of the special circumstances and conditions surrounding the exportation of logs, the mission recommends that the highest consideration be given to the marketing and financial capabilities of Brazilian exporters and foreign importers prior to the implementation of any such scheme. Log exportation should be part of a very carefully planned and executed marketing operation involving promotional timber organizations, both in Brazil and in foreign markets. Both government and industry authorities must be satisfied that such exports are adequately controlled and effectively administered to introduce new species in foreign markets.

Sawnwood

Sawnwood is the most important hardwood product in both domestic and foreign markets. As previously mentioned, sawnwood has historically been limited to relatively higher-priced and better-known species, many of which are now in scarce supply.

With fewer commercially exploitable species available, wood research and industry bodies should increase their efforts to establish new groupings for species with similar technical and botanical characteristics (see Research section). A commercially acceptable nomenclature based on the work of research institutions and industry will be essential to any efforts to establish the image of quality and reliability for Amazon hardwood products. Case histories of successful marketing efforts in other developing countries also confirm the importance of commercially attractive, market-related names for the grouping of species. The mission gives this recommendation a high priority for overall development of the industry.

The considerable efforts on the part of research and government organizations to study and inventory Amazon hardwoods over the years have not resulted in their gaining a greater share of either the U. S. or European markets. The mission believes that this is in large part due to the current market system whereby shipping companies sell only what Brazilian wood producers

have available, regardless of market demand. The introduction of new species or groups of species to potential consumers can be a costly undertaking for importers if they cannot be assured of reliability of product supply. The mission believes that efforts to achieve reliable product supply will be increasingly successful if marketing techniques such as the grouping of species are implemented quickly and promoted strongly.

In regard to trading channels, the export of Amazonian sawn timber has historically been carried out through well-established networks of agents operating in the importing countries. This mode of trade has worked well as long as Brazilian exports consisted of the better-known hardwood species. However, when considering the introduction and promotion of "new" species, the mission believes that a more effective approach might be to enter into exclusive arrangements with reputable importers, granting the importing company various trade advantages in a specific market in return for stocking and promoting the new species.

Plywood

Amazon plywood has successfully earned a good reputation in the world market, and, like sawn wood, is generally sold through established trading channels. All indicators point to continued growth of the market for Brazilian plywood in the coming years.

With a large quantity of logs suitable for the production of veneer, the mission believes that greater investments should be made in equipping plywood factories, as veneer production tends to increase the overall rates of recovery from logs.

Brazilian plywood production would be more economic if domestic standards were the same as the widely accepted international standards of 122 x 244 cm. The mission recommends that standards for domestically produced plywood be changed in accordance with these world standards.

Semi-Finished and Finished Products

The export levels for semi-finished and finished products are unnecessarily low. Having visited a factory in Belem which produced high quality hardwood flooring, paneling and parquet, the mission questioned why the export of such products has not met with more success.

Experience has shown that, as products become more advanced in stages of processing, accompanying promotional techniques must be more focused on specific consumer groups. Thus, as the quantity of semi-finished and finished products or components is increased, the Amazon wood industry will have to be more aggressive in penetrating importing country markets in terms of the needs of specific "end users."

Transportation

High freight rates for wood products shipped to foreign markets from Amazon ports are a critical factor in the overall development of the industry. The mission strongly believes this problem must be solved before Amazon hardwood products can become competitive on the international market.

The current Brazilian conference rate for shipments of sawn timber from Belem to destinations in Northern Europe is equivalent to US\$92.00 per cubic meter. Corresponding rates for shipments originating in Asia and terminating in Northern Europe are as follows: from the Philippines US\$55.00; from Malaysia/Singapore US\$55.00; and from Burma US\$81.00. It should be noted that shipping distances between Far Eastern ports and those in Northern Europe are nearly twice the distance from Belém. To find an equitable and economic solution to the transportation problem, the mission recommends that Brazilian government and industry officials address the issue in the following ways:

1. Brazilian authorities should take the initiative in negotiating reductions in freight rates for timber shipments with appropriate conference representatives.
2. In the Eastern Amazon region, the Companhia Vale do Rio Doce (CVRD) has developed an intermodal system of transport which can accommodate both iron ore and timber exports. This involves the utilization of railroad facilities to transport timber from mills along the line for shipment on the company's ore carriers through CVRD port facilities at San Luís. The Brazilian government should encourage extension of this intermodal system and its emulation by other enterprises.
3. Following mission recommendations that expanded wood supplies be aggregated through integration of the industry and full utilization of the entreposto network, wood shipments should be increased according to "chartered tonnage" requirements.
4. The use of containers would lower sea freight rates by reducing the number of export destinations. As an example of this practice, nearly all shipments of pine from the southeastern U.S., and plywood from the Far East, are transported via containers to Hamburg for delivery to markets throughout Northern Europe.

Promotional Techniques

Industry and Trade Associations

A successful promotion for Amazon hardwoods will ultimately depend upon determined and coordinated efforts by industry representatives and government trade officials.

The mission recommends that the government, through IBDF, take the necessary steps to accelerate the consolidation of the industry by creating an Amazon association of sawmillers, plywood manufacturers and producers of other wood products which would also be part of a national industry association. The formation of such a large and diverse body may initially encounter some logistical problems as well as perceived conflicts of interest. However, in the long run a strong, coordinated industry will be more effective in promoting the use of wood than the fragmented structure of small individualistic groups which now exists. The establishment of a national wood industry association would also help to assure that financing is made available for a national wood promotion office. The mission believes that in the long term industry must take over as the driving force behind Brazilian export promotion activities.

The mission recommends that a neutral, non-profit Promotional Board be established independently of the "Industry Wood Science Council". By dealing exclusively with the promotion of Amazon timber in domestic and export markets, the Board's activities would supplement those of the Council. The mission believes that the Brazilian government, through IBDF, should be responsible for guaranteeing the Board's economic viability for at least the first three years. Eventually, Board expenses should be covered from industry contributions.

The mission suggests that the Promotional Board be governed by a board of directors which is functionally, as well as geographically representative of its membership. The Board's success in promotional efforts will also be dependent upon the leadership's level of competence, innovation, and understanding of the international business world. Beyond aggressive marketing efforts, these new vertical and horizontal organizations would help give the wood industry a voice in Brasilia where its representational and lobbying efforts have up until now been ineffective.

Export Market

The mission recommends that marketing efforts to promote the export of Amazon hardwoods be initially directed toward expanding trade with those countries already importing some

Brazilian woods. This would include the United Kingdom (35% of current Brazilian exports), the U.S. (20% of Brazilian exports) and the Federal Republic of Germany (5% of Brazilian exports). The percentages represent 1982 figures on the importation of sawn and surfaced wood from Brazil. The inclusion of West Germany as a potentially large export market is especially important, as increased trade with other members of the European Common Market would grow from this relationship. It is estimated that the EEC - including West Germany - accounts for approximately 12% of Brazilian exports.

The mission also believes that the following techniques to help increase foreign market demand for Amazon hardwoods are fundamental to any promotional campaign:

1. Greater participation by Amazon wood producers in international trade fairs; with government support and subsidy if necessary.
2. Better utilization of the 60 Trade Officers in Brazilian embassies abroad. These representatives of Brazilian industry should be prepared to promote Amazon hardwood exports through the increased use of audiovisual programs, informational brochures, hardwood samples and briefings of potential importers.
3. Government-industry sponsored design competitions which aim at promoting the use of Amazon woods for architectural and interior design uses, particularly high quality furniture, flooring, etc.

Minimum Price Policy and Procedures

During mission meetings with Amazon industrialists, some dissatisfaction was expressed regarding the flexibility of the pricing mechanism for wood exports. The mission was repeatedly told that while Brazil is a "free market" economy, the existence of a price minimum frequently inhibits the export of Brazilian products as it lacks sufficient flexibility in relation to world price levels. However, based on further discussions with representatives from the Carteira de Comércio Exterior (CACEX), the mission learned that industry federations take the initiative and recommend minimum prices which are generally based on lower quality products. Although CACEX theoretically has the authority to set prices, it prefers to do so on the basis of consensus with industry.

This procedure also allows for periodic price review on a product-by-product basis by CACEX and specific industry groups, should the latter claim that Brazilian prices are uncompetitive in the international market. This review usually results in the establishment of a new minimum price which goes into effect within two weeks of its inception.

The mission believes that realistic minimum export prices are advisable as they tend to discourage small, inefficient producers from undercutting the market by exporting wood products below cost. Such activities can also lead to the creation of illegal offshore funds. While the mission believes that minimum prices are needed, it recommends that the mechanism for assuring their flexibility--namely, closer liaison between CACEX and industry in relation to the world market--be improved so that legitimate, efficient producers are encouraged to participate in trade activities.

Export Incentives

There are presently few incentives for the export of Amazon wood products, especially as regard sawnwood. However, as products increase in the value-added at each stage of processing, so do the incentives for export. The mission was informed that regional authorities such as SUDAM, offer processing incentives in the form of tax credits to veneer producers in the north and northwestern regions of Amazonia. While CACEX does make credit available for promotional purposes such as demonstrations, publicity, trade fair participation and wood sample distribution, these incentives are rarely utilized as mahogany--which needs no promotion--tends to dominate the Brazilian wood export trade.

Domestic Market

The domestic market offers vast potential for increased consumption of Amazon hardwood products including the substitution of imports from other South American countries. As previously mentioned, Brazilian government and industry representatives must make concerted efforts to overcome the public's traditional prejudice against the use of wood in housing. This consumer bias is accentuated by the reluctance of lending authorities and insurance companies to engage in financing schemes for the construction of wooden dwellings. (Please refer to the chapter on Technology for elaboration on this point.) The mission recommends that the use of wood as a structural material be supported by governmental legislation, revised building codes and standards which encourage its utilization to the greatest extent possible. In addition, the mission cited several case histories where government/industry campaigns have overcome this bias and created a strong local market for wood-based housing. ICD and other organizations could assist Brazilian groups such as the Industry Wood Science Council and the Fundação Para Desenvolvimento da Aplicação da Madeira (DAM) in adapting this experience to a marketing strategy for Brazil.

POSSIBLE FOLLOW-UP ACTIVITIES

Assuming that there is general agreement with the mission's recommendations, ICD would be willing to consider further cooperation with the Government and UNDP, particularly on ways to implement the marketing strategy.

Such cooperation could be facilitated by setting up two informal working groups. ICD would establish a small group of international wood industry experts, including members of the ICD mission, who would guide the Council's involvement in follow-up activities. A counterpart group would be set up in Brazil and could include representatives from UNDP, the Government (IBDF and the Ministry of Foreign Affairs), CACEX, and the Amazon wood industry. The UNDP Resident Representative and the Executive Director of ICD would be responsible for routine liaison between the two groups and for the implementation of agreed cooperative activities.

Market Development

In implementing the marketing strategy, ICD could play a catalytic role in channeling practical advice and assistance from international industry, bilateral and other organizations to the Amazon timber industry in the areas of market and enterprise development. The ICD group would be able to draw on experience gained in other countries with similar problems to provide advice on resource management, marketing, technology and industrial integration.

In the priority area of market development, ICD follow-up advisory expertise might address the following issues:

- techniques for the promotion of lesser-known species, including advice on promotional campaigns, trade fair participation and better utilization of Brazilian Trade Officers abroad;
- methods for extending and strengthening wood industry organizations on both regional and national levels;
- ways to encourage institution-building, including the establishment of a Wood Promotional Board and the expansion of IBDF activities in public relations and promotion;
- linkages with research and industry organizations in other countries;
- provision of specific market information where needed.

Enterprise Development

Secondarily, ICD could facilitate the transfer of knowledge

from international industry and forest industry organizations to the Brazilian wood sector. In addition, it could be possible to gain assistance from the Senior Expert Services now established in many developed countries. This idea has already been discussed with the International Executive Service Corps of the U.S.A. who are interested and have substantial expertise in the areas of plant management and new product development, particularly specialty items such as musical instruments, sporting goods and furniture components.

International assistance for other enterprise development activities might include:

- short-term training in all areas of wood processing, especially as regards sawing technologies;
- technology transfer and adaptation;
- management workshops and internships;

Investment Promotion

It was generally agreed that the ICD mission occurred at an opportune time in terms of both the government's increasing desire to expand hardwood forest industries and exports, and possible interest by The World Bank Group and the Inter-American Development Bank to finance such industrial expansion. UNDP has already had positive preliminary discussions with The World Bank on this matter. Should investment financing be conditional upon the implementation of sound management and marketing strategies, recommendations such as those made by the mission would take on an added importance. The Council has cooperated with IBRD and IFC in several preinvestment-type projects and might be able to further contribute to the development of projects for Amazon forest industries.

Brasília, 17 de novembro de 1983

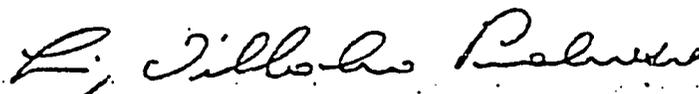
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Ilustríssimo Senhor
Dr. PETER KOENZ
Representante-Residente do
Programa das Nações Unidas para o Desenvolvimen
to - PNUD
SCN - Quadra 2 - Lote B
70285 - Brasília - DF

Tenho o prazer de, confirmando nossos entendimentos anteriores, demonstrar nosso interesse em receber missão do Conselho Industrial para o Desenvolvimento, voltada para a busca de possibilidades de incremento das exportações de madeiras tropicais brasileiras.

Seria de nosso interesse que, durante a estada no Brasil, a missão contactasse os diversos setores envolvidos com a matéria, seja na área governamental - IBDF, Itamaraty - seja na área privada - empresários localizados, principalmente, nas regiões de Manaus, Belém e Santarém.

Aproveito a oportunidade para renovar os protestos de estima e consideração com que me subscrevo de Vossa Senhoria,



(Luiz Villarinho Pedrosa)
Chefe, substituto, do Departamento de
Promoção Comercial do Ministério das
Relações Exteriores

MISSION ITINERARY AND CONTACTS

- 21 November 1983 Brasilia
- United Nations Development Programme (UNDP)
 Mr. Peter Koenz, Resident Representative
 Mr. Luis Gomez Echevarri, Deputy Resident Representative
 Ms. Catherine Cruveillier, Program Officer
- Brazilian Institute for Forestry Development (IBDF)
Ministry of Agriculture
 Mr. Hamilton Martins Silveira, Secretary-General
 Mr. Evaristo Francisco de Moura Terezo, Director,
 Department of Industrialization and Commercialization
 Dr. Carlos Marx Ribeiro Carniero, Director,
 UNDP/FAO/BRA-82 Project
 Mr. Joesio Siqueira, Director of the
 Department of Forestry Economy
- 22 November 1983 Brasilia
- Ministry of External Relations (ITAMARATY)
 Mr. Luiz Villarinho Pedroso, Chief, Division of Programs
 for Commercial Promotion
 Mr. Paulo de Mello Vidal, Officer, Division of Programs
 for Commercial Promotion
- Brazilian Institute for Forestry Development (IBDF)
Ministry of Agriculture
 Mr. Evaristo Francisco de Moura Terezo, Director,
 Department of Industrialization and Commercialization
 Mr. Peter Koenz, Resident Representative, UNDP
- Forest Products Laboratory/IBDF
 Mr. Floriano Pastore, Coordinator
- 23 November 1983 Brasilia
- Brazilian Institute for Forestry Development (IBDF)
Ministry of Agriculture
 Mr. Evaristo Francisco de Moura Terezo, Director,
 Department of Industrialization and Commercialization
- Manaus
- Forest Products Research Center
National Research Institute for the Amazon (INPA)
 Mr. Herbert Otto Schubart, Deputy Director
 Mr. Paul A. Vantomme, Wood Technologist
 Mr. Alfredo de Souza Mendes, Wood Preservation
 and Biodegradation

24 Nov ber 1983 Manaus Forest Products Research Center
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Mr. Herbert Otto Schubart, Deputy Director
Mr. Paul A. Vantomme, Wood Technologist
Mr. Richard W. Bruce, Atlantic Veneer of Amazonia
Mr. Moyses B. Israel,
Mr. Youssef K. El Jamal, Director, AMAPLAC
Mr. Martin Klenke, Director of Exports, Amazonas Timber, S.A.
Mr. Carl Otto Oesterle, Director and President,
Amazonas Timber, S.A.

25 November 1983 Manaus Wagons-Lits Turismo
Mr. Pedro Mendonca Neto, Manager

Santarem IBDF Entrepoto

26 November 1983 Santarem Tapajos National Forest
Dr. Reynaldo, Manager

Santarem Wood Association
12 participants - Names and addresses on file

28 November 1983 Belem Amazonex-Industrial Exportadora, S.A.
Mr. Ovidio Gasparetto, President

Tres Rios
Mr. Osorio Sales Parreira, Manager

Industria Trevo
Mr. Pierre Jacques Reydams, Manager of Production

CIMATRO - Companhia Internacional de Madeiras Tropicais
Mr. Natalino, Production Manager

Maginco-Madeira Araguaia, S.A.
Mr. Danilo Olivo Remor, Director and President

East Asiatic Company
Mr. Erik Svane-Knudsen, Representative

AIMEX - Association of Industrial Wood Exporters of Para State
Participants included:

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Mr. Danilo Olivo Remor, Director and President

Industria Madeireira Pau D'Arco
Mr. Laudelino Hanamann, Director

Aripauana Madeiras Ltda.
Mr. Alcides Fontana, Director

IMPAR - Industria Madeireira Paraense Agropecuaria Ltda.
Mr. Alsoni Jose Malinski, Director

Norte Madeiras Importacao e Exportacao Ltda.
Mr. Jose Severino Filho, Director

Eidai do Brasil Madeiras S.A.
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International Exportacao e Importacao Ltda. - INTEREX
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Mr. Ovidio Gasparetto, President

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Mr. Irapuana Sales, Director

Industria Trevo
Mr. Franz Michael, Director

Brazilian Institute for Forestry Development (IBDF)
Ministry of Agriculture
Mr. Evaristo Francisco de Moura Terezo, Director,
Department of Industrialization and Commercialization

29 November 1983 Rio de Janeiro

Companhia Vale do Rio Doce (CVRD)
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Dr. Agripino Viana, Special Representative
Mr. Mario de Matos Mengarelli, Assistant Representative, FAO

Fundacao Para Desenvolvimento da Aplicacao da Madeira (DAM)
Dr. Zanini, Architect
Mr. Sergio Rodrigues, Architect
Mr. Luso Soares da Costa, Civil Engineer
Mr. Jose A. Baranek, Director, TransBrasileira de Madeiras Ltda.

30 Nov ber 1983 Rio de Janeiro

Commercial Report Section
Bank of Brazil (CACEX)

Dr. Luiz Antonio Roberti, Chief, Department of Vegetal Materials
Mr. Wagner Eustaquio Aguiar Batalha, Division of Natural
and Synthetic Products

TERMS/ACRONYMS

- CACEX - Carteira de Comercio Exterior (Commercial Export Section,
Bank of Brazil)
- CVRD - Companhia Vale do Rio Doce
- IBDF - Instituto Brasileiro de Desenvolvimento Florestal
(Brazilian Institute for Forestry Development)
- INPA - Instituto Nacional de Pesquisa da Amazonia
(National Research Institute for Amazonia)
- SUDAM - Superintendencia do Desenvolvimento da Amazonia
(Superintendency for the Development of Amazonia)

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