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UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

Distr.
LIMITED

UNIDO/TCD.50
18 June 1971

Original: ENGLISH

REPORT OF MISSION TO THE GOVERNMENT OF COSTA RICA

by

IAN S. HUNT,

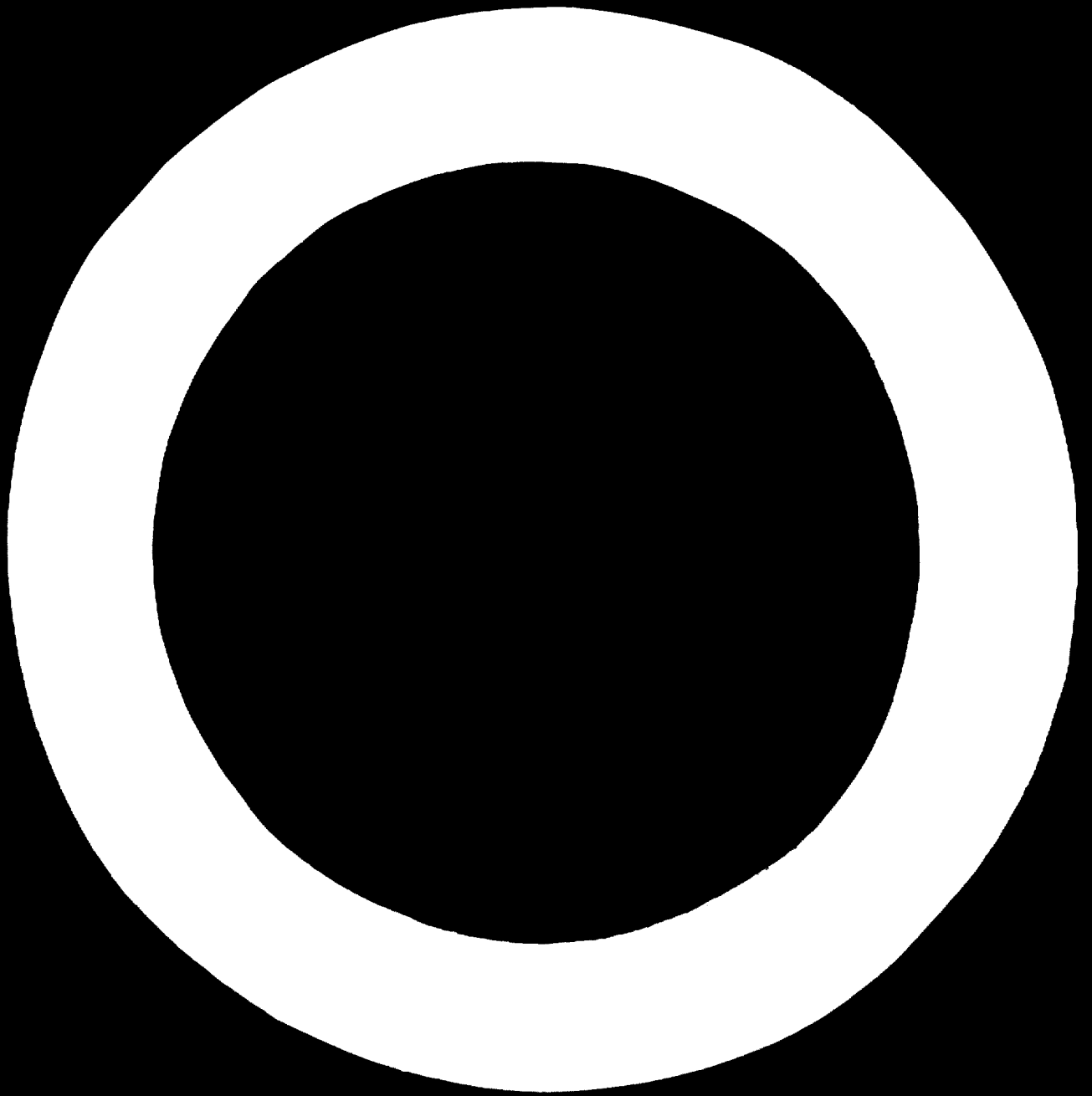
UNIDO Consultant on Wood Industries

21 October to 7 November 1970

PROJECT: 70/COS-3

1d.71-3233

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.



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SUMMARY

In agreement with the conclusions and recommendations of the mission of Mr. Ian S. Hunt, Wood Industry Consultant, the United Nations Industrial Development Organization will offer the Government of Costa Rica, through the United Nations Development Programme, a technical assistance programme based upon the following main points.

The programme will be oriented towards the three main fields of assistance which are:

- a) Existing timber industries;
- b) New wood products industries, and
- c) Wood technology investigations.

It is proposed to offer the services of a consultant on programming and planning of timber industries with the purpose of managing and supervising the programmes of the different experts and advisers and of linking counterpart national institutions in the different phases of the programme. It is suggested that this consultant should work in close co-operation with the National Planning Bureau of the Presidency and the Centre for Promotion of Exports and Investment.

Existing Timber Industries

The purpose of this assistance will be to promote export-oriented production, to improve the quality of the products and to reduce production costs.

For these objectives this proposal offers technical assistance during 1971 and 1972 in two of the main branches of the timber industry, those of sawmilling and the manufacture of furniture and related products. This should take the following form:

- One adviser on sawing of tropical woods,
- One adviser on production, marketing and quality control of furniture and related products, and
- One adviser on timber seasoning for furniture and related products.

New Industries

The possibility of promoting new industries based upon the forest resources of the country will be studied in a comprehensive and rational manner.

New Industries (Con.)

It is intended in the first place to carry out a pre-feasibility study on the nature and composition of new, export-oriented industries. This study will be made by a team of three experts specialized in different branches of timber industry. Subsequently direct feasibility studies will be made of specific new industries, reaching the point where projects for detailed factory and forest industry complexes will be presented.

It is understood that the establishment of forest areas as reserves of raw materials for a continuous operation will be indispensable before commitments on large production new industries are made. The control, management and renewal of the forests so as to assure perpetual availability of prime materials to industry should also be established previously.

An industry of great importance but oriented towards local markets shall be studied, that of low cost wooden houses. This study will be carried out in three stages: the first will be devoted to gathering all the technical data, including physical and mechanical properties, processing techniques, selection of convenient timber species. This study is already in process under the direction of the Wood Technology Laboratory of the University of Costa Rica.

The second stage will consist of the services of a consulting engineering firm in the design and construction of wooden houses. The firm will prepare plans and detailed drawings for the houses based upon the results of the first stage.

For the third and last stage UNIDO will offer a project for the installation and initial operation of a pilot plant for the manufacture of low cost wooden houses.

The pilot plant's objectives will be to demonstrate the necessary techniques and procedures to the Government, to industry and to the public, as well as to investigate the acceptance to potential buyers of the different designs and kinds of houses available. Undoubtedly these studies and the project itself should be carried out in close cooperation with the National Institute for Housing and Urbanization, the National Institute for Apprenticeship, the Centre for the Promotion of Exports and Investment and the University of Costa Rica.

Wood Technology Investigations

The third field of assistance will be that of technology offered to industry. The valuable work being carried out by the Timber Laboratory of the Faculty of Engineering, University of Costa Rica will be complemented by the services of UNIDO experts on the commercial aspects of the application of new techniques and processes.

A sawmilling technologist for taking over the continuation of the work of the short-term consultant in this same field, an expert in commercial timber drying and an expert in commercial wood preservation are foreseen.

These experts will provide a service of technical advice, practical instruction and demonstrations to industries concerned. Their services will be available particularly for the project study and initial operation of the wooden houses factory. They will also consult with the National Institute for Apprenticeship on the industries' requirements of trained labour.

The wood Technology Laboratory, with the assistance of the UNIDO experts and of those of FAO and of bilateral agreements, will supply a flow of information, testing services and technical advice to each branch of the existing and new industries, according to their requirements.

Expenditures

The estimated UNDP expenditures on experts and advisers are the following:

1971	105,000 US dollars
1972	74,000 US dollars

The 1972 total does not include the expenditure for feasibility studies, which may be carried out by consulting firms, nor the cost of the pilot production unit of the wooden houses project. The former could be estimated at US\$40,000 while the total equipment costs for the latter would be of the order of US\$500,000.

We wish to draw the attention that the latter costs would depend to a large extent on the equipment existing in the sawmill to which the proposed pilot production unit is to be annexed. The above figure is therefore to be considered as a maximum. It is most likely that in implementing the project it will be considerably reduced.

1. Introduction

At the request of the Government of Costa Rica, Project 70/COS-3 was established with the object of assisting the Government in preparing a programme of technical assistance to the Wood processing industries sector (Appendix 1).

The writer was commissioned to undertake the mission of two weeks duration, and to carry out the following tasks:

- 1.1 Assess the present situation of the sector.
- 1.2 Establish priorities and prepare a programme of technical assistance for the wood processing industries.
- 1.3 Assist in drafting the requests to be submitted.
- 1.4 Compile relevant background information.

These tasks were to be carried out wherever practicable, in collaboration with the Government authorities concerned.

2. Mission Itinerary and Programme

The mission, including travelling time, lasted from 21 October to 7 November 1970. Of this, from 24 October to 4 November were spent in Costa Rica and the day of 4 November in San Salvador for de-briefing.

Conversations were held with the Minister of National Planning, and officials of the following Ministries and Government and national institutions.

- National Planning Office of the Presidency.
- Centre of Promotion of Exports and Investments.
- Ministry of Industries and Commerce.
- Forest Service of the Ministry of Agriculture and Livestock.
- Wood Technology Laboratory of the Engineering Faculty of the University of Costa Rica.
- National Institute of Apprenticeship.
- (Appendix 14 - List of persons interviewed).

On the last day of the mission, the writer had an audience of three quarters of an hour with the President of Costa Rica, Don José FIGUERES, in the company of the Minister of National Planning, Don Marco Antonio LOPEZ, two economists of the National Planning Office, Mr. George BLANCO, UNIDO Export Promotion Expert, and the two principals of the Tropical Science Centre Drs. L.R. HOLDRIDGE and J.A. TOSI.

During the visit the writer outlined to the President his findings and the nature of the technical assistance he was proposing. Drs. Holdridge and Tosi also briefly described the functions of their Centre and the kind of services they could provide in the surveying and classification of forest areas suitable for industrial use.

Extensive discussions were held with the principals of the Tropical Science Centre, a private research institute, who placed their library facilities at the writer's disposal.

A selection of the more important wood processing industries in and around San José were visited. Due to the unfavourable weather conditions and the short time available no attempt was made to carry out flights over forested areas or to travel in the interior over unpaved roads.

Visits were made to four furniture factories, one parquet, moldings and door factory, three sawmills, and two plywood and veneer plants. (Appendix 15 - List of factories visited).

The UNIDO export Promotion Expert Mr. George Blanco gave valuable assistance to the mission by placing himself at the writer's disposal, providing transport, arranging meetings with members of governments and industry, and providing secretarial facilities through the courtesy of the Export and Investment Promotion Centre.

3. Assessment of the Present State of the Industry

The three major branches of the wood processing industry which were studied during the mission were the sawmills, the furniture, parquet and related products factories and the veneer and plywood plants.

3.1 Sawmills

The mills visited in the San José area produce around 6,000 cubic meters (2,400,000 board feet) sawnwood each per year and are classed amongst the minority of larger sawmills in the country.

Sawing techniques and sawing rates appeared to be somewhat better at the mills visited than they were in Paraguay before the Antoine mission. Parrot beak tooth form was in use and the relationship between horsepower and flywheel diameter reasonable but not optimal.

3.1 Sawmills (Con.)

Extremes between saws as great as 5 and 30 meters per minute were observed when sawing medium density logs (ca. 0.50 S.G. air dry) of average size (60 cm diameter). Timber flow, handling and machine layout all left much to be desired and there is room for improvement in uniformity of board dimensions and quality of cut.

Species commonly sawn are listed in Appendix 16.

3.2 Furniture and related products industry

The outstanding feature of the Costa Rican furniture industry is the combination of local wood species and highly skilled workmanship to produce high quality products which find ready sales on the local market and contribute half a million dollars annually to the export earnings of the country. The quality of wood and workmanship is such that various classes of furniture are in demand in neighbouring Central American countries, Miami and Panamá. Shipments to the two latter destinations are made by air freight. It is understood that some of the furniture sent to Panamá eventually is sold in Europe.

A parquet factory exports 20 per cent of its production to Panamá and is now entering the Miami and European markets. One factory manufactures 6,800 TV and radio console units per year (US\$ 80,000) for the Costa Rican, Guatemala and El Salvador markets. There is a keen awareness of unsatisfied export markets. Factors inhibiting expansion are those generally present in the transition from relatively small artisan type operations to those requiring efficient production planning, machine layout, raw material flow, quality control of raw material and products, and the increased use of modern techniques such as kiln drying, dust extraction systems, polyester and other synthetic coating finishes. Availability of working capital would also be a factor in some cases.

The needs of the industry are well illustrated by a letter received from one furniture factory following a visit from the mission, in which the needs are described in production management, technical advice on kiln drying, dust collection, polyester finishing techniques, and in design drawing (Appendix 17).

3.3 Veneer and Plywood Industry

Plywood production in 1968 amounted to some 32,000 cubic meters of which 60% came from one mill. Exports were 25% of total production and earned US\$ 1.4 million. Exports increased from 3,800 m³ in 1967 to 8,900 m³ in 1969. In 1967 there were also 1,860 m³ of veneer sheets exported.

The largest mill currently exports veneer and plywood to the value of US\$ 2.3 million per year to other Central American countries.

Most of the plywood and veneer is being produced under highly efficient conditions with modern machinery and with good management. Twenty-five per cent of the production of the largest mill is graded "C". The largest demand is for this lowest grade and there is no difficulty selling all that is produced. This mill has plans for installing a third production line but will not proceed with this until there is a greater assurance of a continuous and adequate supply of logs. The export market could reportedly absorb considerably more than the present level. Limiting factors to increased exports thus appear to be a guaranteed supply of logs rather than the absence of technological or production know-how.

Log supply is involved with the implementation of the recently promulgated Forestry Law through the newly formed Forest Service.

3.4 Low Cost Housing

The history of low cost wooden houses goes back to 1958 when the National Housing Institute (INVU; Instituto Nacional de Vivienda y Urbanización) set up a prefabricated house factory. Due apparently to inefficient operation the use of wood was superseded by concrete blocks and after a few years the wooden house factory was closed down.

There is undoubtedly a large deficit in houses, mainly for the low income bracket, currently estimated at some 140,000 units and this is increasing at the rate of some 13,000 units per year. Efforts to date by INVU with financial aid from IDB to meet this increasing demand have been inadequate, a total of only 6,200 houses having been built since 1961. With an average cost of US\$ 2,600 these houses are more suited to the middle class rather than to the low income group which constitutes 90% of the demand. New house construction from all sources amount to 8,000 units per year.

This need is recognized by the present Government which is giving high priority to a low cost housing program and is keenly interested in utilizing the country's wood resources for this purpose.

This need has also been recognized by FAO which has included a preliminary study of low cost wooden houses in the duties of its Wood Technologist at present assigned to the Wood Technology Laboratory of the Engineering Faculty of the University of Costa Rica.

This study is under way and will cover the physical housing requirements of the low income group, engineering design and stresses data on Costa Rican wood species, the selection of species most suitable, and of conversion and processing techniques appropriate to the woods recommended. The study is expected to be completed by February or March 1971.

Any housing program using wood as the main raw material and on a scale sufficiently large to make a worthwhile impact on the shortage would have to be planned as a completely new operation. It must of necessity be based on factory prefabricated modular units and must utilize the most modern concepts of wood processing, engineering design, and finishing techniques. Such an operation, with a target of 12,000 units per year would require a 50 per cent increase in production of saw logs from the forest. If the back-log is to be eliminated in a reasonable time, say 10 years, the annual requirements would be 26,000 units. This would mean a doubling of the present log extractions from the forest. Thus a national housing program of this scale would have to be synchronized with an adequate forest management, utilization and conservation program to avoid depletion of the forest resources available for industrial use. It is estimated that between 50,000 and 100,000 hectares of mixed tropical forest would have to be intensively managed on a sustained yield basis in order to supply the raw material for a housing project of this magnitude. Such an operation does not at present exist but would be a pre-requisite for a housing scheme of this nature.

3.5 Wood Imports

Costa Rica is almost self sufficient in wood and wood products and is a net wood exporter. Imports for 1967 totalled US\$675,000 (Appendix 18), while exports including furniture amounted to US\$ 1,700,000 (Appendix 19). It was noted that the furniture industry uses a small quantity of Honduras' Pine. This is preferred to local hardwood

3.5 Wood Imports (Con.)

species where special effects are required such as grain raising (selective abrasion of spring wood zones) to give an artificial aged appearance. This would represent part of the US\$ 21,000 spent on imported sawn coniferous wood.

3.6 Raw Material Supplies

No assessment of the state of the wood processing industry would be complete without considering the nature and abundance of the raw material on which the industry is based, the forest resources of the country.

In the absence of a national forest inventory and of quantitative information on the nature, composition and merchantable log volume of existing forests which it would provide, information appearing in this section was obtained from the ministries concerned, from industry, and especially from conversations with the principals of the Tropical Science Centre and from consulting reports and documents in the archives of that institute.

It is evident that uncontrolled felling from un-managed forests by private concessionaires and through the colonization activities of the land and Colonization Institute (ITCO - Instituto de Tierras y Colonización, a dependency of the Ministry of Agriculture and Livestock) will be able to continue supplying the industry with adequate logs at its present scale of operations. It could possibly, apart from the requirement of the plywood industry, provide also for a small increase in production.

This situation is expected to continue until such time as the Forest Service has sufficient financial and human resources to exercise its full powers as established by law (Appendix 20) for the designation, control and management of forest reserves to be set aside for industrial use.

Until such time, and there is no reliable forecast available as to when this might be, the rapid depletion of the forest resources of the country will continue. That the situation is now serious is exemplified by the estimates that relatively unexploited mixed tropical

3.6 Raw Material Supplies

forests in areas large enough for economic management and exploitation probably do not now exceed 500,000 hectares. The rate of dismination of these areas is not accurately known but from the rate at which such forest areas are being sold and given under concession for agricultural and livestock uses it is considered to be such that urgent action is necessary to conserve the remaining forest areas for industrial use.

This aspect has been dealt with in some detail and will be enlarged further in section 5.5, since the continued availability of raw materials from the forests, on a scale much greater than at present must be guaranteed before UNDP is committed to participation in a large scale housing program.

4. Priorities

There is no doubt that from the socio-economic point of view the housing programme for Costa Rica should have the highest priority. However, a new industry with a multimillion dollar annual product value cannot be set up overnight and it is imperative that the preliminary studies be well conceived and planned, and effectively carried out.

The areas where immediate financial returns can be obtained are in the increase in production and efficiency of sawmills and the increase in furniture, etc., production for export. These would not require very large capital investments, and availability of raw material (within reasonable limits) would not be a limiting factor.

In all of these areas a considerable input of technological skills and know-how will be required, some of which will be common to all three operations.

It is proposed therefore that priority be given to a three pronged technical assistance programme. This will consist of aid to existing industries, studies of new industries (of which the housing project will have first priority) and implementation of those which the studies indicate are viable, and of building up adequate facilities in technological research, information, test data and testing facilities which this industrial expansion will need.

4. Priorities (Con.)

For reasons given in section 3.3 it is considered that aid to the plywood industry should not be given priority in the earlier part of the programme.

5. Development of the Programme

The organogram of Appendix 2 illustrates the development of the programme and shows the inter-relationship between the different sectors.

5.1 Sectorial Planning

The coordinating link between the three sectors, existing industries, new industries and technological research is a post in Sectorial Programming and Planning. This should be filled by a senior adviser who would be responsible for supervising and coordinating all the expert services, counterpart services and training, feasibility studies and sub-contracts provided in the programme. A draft job description for the Wood Industries Planning and Programming Adviser (Post U.N.1) appears in Appendix 4.

It should be noted that two classes of expert assistance are shown in the organogram. That designated "U.N." covers key areas where it is considered desirable that the expert should be United Nations appointee. The designation "I.A." on the other hand represents expert assistance which could come from any international aid source. In this way the programme is coordinated with aid from the O.A.S., international banks, Alliance for Progress and other bilateral aid programmes.

The items appearing within broken line rectangles represent national institutions which will provide counterpart facilities.

5.2 Existing Industries

The aim of technical aid to existing industries is to increase production for exports, to improve the quality of the products and to reduce costs. The two branches programmed to receive aid are sawmilling and furniture and related products manufacture.

5.2 Existing Industries (Con.)

Three short term advisers are provided for this sector, one for sawmilling (Post U.N.2) and two for the furniture and related products industries covering the fields of production and wood drying (Posts U.N.3 and U.N.4). Draft Job Descriptions for these three posts appear in Appendices 5, 6 and 7.

In the existing industries sector there is also provision for international aid in apprenticeship and skilled worker training, for which the National Institute of Apprenticeship (I.N.A.) would be the counterpart organization. These posts are shown as I.A. 10 and I.A. 11.

5.3 New Industries

As stated in Section 3.6 new industry developments on a large scale would require the fulfillment of certain conditions concerning the availability and control of raw material by the Government as prerequisites for undertaking this program.

These would be, as already discussed, the implementation of existing forestry legislation by providing the Forest Service with the financial and man-power facilities necessary to fulfill all its responsibilities. This would entail the putting into operation of institutional, operational and organizational measures for the management, control and continuous supply of raw materials from the forest resources. Infrastructural needs in financing, credit and transport systems would also be required.

Implicit in this is the adoption by the Government of a reliable and effective system of land-use classification on which may be based the designation of forest reserves and land areas for the exclusive production of wood for the projected new industries. This, according to the Tropical Science Centre, can be done at a fraction of the cost of a national forest inventory, and could be followed up by inventories on selected areas for specific purposes.

5.3.1 Pre-feasibility studies

These would be basic studies to determine the nature and composition of projected new industries whose principal objective would be to increase the exportation of wood products. From these studies would come a list of specific industries considered to be viable. The studies would be made by a team of perhaps three specialists, one engineer in wood products, one economist and one market specialist. Alternatively they could be carried out under contract by private consultants.

Draft terms of reference for this study team are given in Appendix 12.

Housing Project

The study to be given highest priority under this heading should be the low cost wooden housing project. In this case the preliminary basic data study described under Section 3.4 would be followed by the provision of a consulting firm in the design and construction of wooden houses which would prepare design specifications and working plans for a series of houses suited to the low income bracket. It would also prepare a proposal for a pilot scale commercial production unit with a capacity of say 1000 houses per year. Appendix 11 contains the terms of reference for carrying out the study.

The third phase of the housing project would consist in the design, construction and initial operation of this pilot prefabricated house factory. It is proposed that this be designated a UNIDO new industry development project which has as its object the demonstration of low cost wooden house building on a commercial scale and the training of counterpart staff who will be later incorporated in a full scale commercial operation designed to meet the housing shortage of the nation. The pilot production unit could also be incorporated in the full scale operation at a later date.

A draft project summary for this project appears in Appendix 13.

5.3.2 Other New Projects

Specific feasibility studies on a series of well defined new industries are expected to arise from the Pre-feasibility studies (U.N.7). These should in general be integrated forest products industries covering a wide range of products and they are expected to be located in or near the forest areas rather than in the larger population centres.

Since the nature and extent of these will not be known until the pre-feasibility studies are completed data sheets have not been prepared.

The last stage will be new industry projects, either with or without international technical aid, but almost certainly with financial aid from international lending institutions and investors from other countries.

5.4 Wood Technology Research and Development

The third prong of the programme provides the technical liaison and services needed to link the other two together and to make possible the smooth and continuous development envisaged.

The nucleus of this source of technological information already exists in the form of the Wood Technology Laboratory of the Engineering Faculty of the University of Costa Rica. This was established in 1967 as part of a FAO/IICA (Inter-american Institute of Agriculture Sciences - an O.A.S. dependency) Special Fund project with the cooperation of the University of Costa Rica.

The Laboratory is jointly financed by the Universities, IICA and the Ministry of Transport, which together with income from contracts for wood testing from a number of UNDP/FAO contracts in Central America and the Caribbean has enabled it to be self supporting up to the present time.

It is proposed that the existing basic facilities in mechanical and physical properties testing, seasoning and preservation behavior tests, wood anatomy and durability tests be extended to provide a full technical assistance to the existing and new wood industries of Costa Rica. To achieve this purpose some new equipment and more working

space will be needed, but the main requirement will be for the expert services of a number of wood technologists and engineers experienced in the commercial application of special techniques and processes.

Under the UNIDO contributions are listed a Sawmilling Technologist (U.N. 5A) to follow up the work and apply the findings of the Sawmilling Adviser (U.N.2); a Technologist in Commercial Wood Drying (U.N. 5B); and a Technologist in Commercial Wood Preservation (U.N. 5C). Draft Job descriptions for these three post appear in Appendices 8, 9 and 10.

Additional expert services which may be required can be supplied at a later date when the specific requirements are known, either by UNIDO, FAO or other international aid sources.

It is understood that any expert requirements for wood technology staff needed to continue with existing commitments will be provided by FAO.

With this structure the University, through the Laboratory, will provide a continuous feed - back of technical information, advice and services according to the needs of the newly developing and expanding industries.

5.5 Pre-requisites for the Development of the New Industries Programme

Those conditions which should be complied with in order that the UNIDO program of technical assistance to new industries might be effective are summarized below. Some of these have been mentioned in preceding sections. They are:

- 5.5.1 The putting into operation of the provisions of the Forestry Law (Ley Forestal: Decree Nº 4465, La Gaceta, Diario Oficial Nº 274, 2 December, 1969) with respect to the designation of areas as forest reserves for industrial use, their production, control and management. Appendix 8 contains an English version of pertinent parts of the Forestry Law
- 5.5.2 The implementation of a system of land-use classification of forests and potential forest lands, with priority over the national forest inventory as a means of carrying out a more rapid and

5.5.2 (Con.)

economical method of defining forest reserves and of introducing a practical means of policing and control of these areas.

It is strongly recommended that a competent and experienced organization such as the Tropical Science Centre of San José, Costa Rica, be contracted to make a land-use classification of forest areas and potential forest lands and to define and delineate those areas which according to their studies should be designated forest reserves for industrial use.

The Centre over the last twenty years has made detailed ecological and land-use studies in many parts of Costa Rica and has a wealth of data and experience on which to draw. Appendix 21 consists of an ecological map of Costa Rica drawn and published by the Tropical Science Centre. Appendix 22 contains excerpts of interest from reports and publications resulting from studies made by the Centre.

5.5.3 As a corollary to the above and to the designation of forests for exclusive industrial use, provision should be made for the establishment of industries within or near the forest zones in accordance with the conclusions of the pre-feasibility studies, and for the establishment of adequate transport facilities to the areas, electricity supply and communications, and for port facilities for the bulk handling of export products where needed.

5.6 Proposed Program of Technical Assistance

The program of assistance to the wood processing industry which the mission suggests is set out in Appendix 3 and contains detailed proposals for 1971 and 1972.

It contains the following elements:

- Expert services amounting to 46 man/months for 1971, commencing in April, and estimated to cost US\$110,000.
- Expert services of 33 man-months for 1972 costing an estimated US\$69,000, plus an estimated US\$40,000 for feasibility studies for commencing the housing projects.

5.6 Proposed Program of Technical Assistance (Con.)

Tentative figures of US\$100,000 for feasibility studies and of US\$500,000 to commence the pilot housing factory project are included in the 1972 estimate, making a total approximate commitment of US\$669,000 for 1972. Government counterpart contributions in respect to expert salaries amount to US\$16,500 for 1971; the corresponding figure for 1972 would be US\$10,400 for the various counterpart experts referred to in this report, with the exception of those attached to the proposed demonstration plants for low cost housing.

The expert assistance proposed includes six short-term contracts and five long-term contracts.

It is recommended that urgency be given to the appointment of the consulting firm which is to prepare the feasibility study for the production of wooden houses so that work on the housing programme can proceed.

The appointment of the Furniture and Related Industries Adviser (post UN3) could be brought forward in to the first half of 1971 if a suitable candidate is available; but it would be desirable for the Wood Industries Planning and Programming Adviser (post UN1) to be on the job when the other experts arrive.

With regard to the organization of the programme it is suggested that the expert staff be operationally responsible to the Wood Industries Planning and Programming Adviser and that the UNIDO Export Promotion Expert be administratively responsible for the team in this UNIDO programme. Full advantage should also be taken of this expert's extensive knowledge of the Costa Rican scene with respect to liaison with ministries, government organizations and industry. For those aspects of the program concerned with export promotion and investment, and financing of new wood industries, this expert's knowledge and his close relations with the Export and Investment Promotion Centre will be particularly valuable.

6. Background Information

6.1 Counterpart facilities and institutions

The following notes on government and national institutions which would have an interest in some aspect of this technical assistance program will give some idea of what counterpart facilities the government could offer.

- Wood Technology Laboratory, Faculty of Engineering, University of Costa Rica. Established in 1967 with aid from a FAO/IICA project the laboratory has had the services of a FAO Wood Technologist and two FAO Associate Experts. It has trained local counterpart staff and fellowship holders from Latin American countries, as well as carried out under contract a large volume of wood properties testing for UNDP/FAO projects in Central America and the Caribbean. It has also provided some technical service and advice to Costa Rican industry.

It is financed jointly by the University of Costa Rica, the Ministry of Transport, IICA and fees for consulting services. Total operating costs amount to US\$ 20,000 per year. It is understood there is US\$ 23,000 available for 1970/71 and an estimated US\$ 22,000 for 1971/72.
- Centre of Computation, University of Costa Rica. This has IBM 1622, 1623 and 1644 computers, with magnetic disc memory. Programs are in use for processing wood properties test data.
- Export and Investment Promotion Centre. An autonomous body responsible directly to the Presidency, it was set up with help from USAID and is financed from the national budget, from USAID grants and from donations from private enterprise. A recent publication is entitled "General orientation of a development program for exports and investment in Costa Rica" - October, 1970. UNIDO has an Export Promotion Expert attached to the Centre in an advisory capacity.
- National Housing Institute. (INVU). Builds houses, up to the present mainly for the middle income group, with finance provided by the Interamerican Development Bank, the Combined Social Aid Institute and INVU. IDB funds provided since 1961 amount to US\$ 6,000,000 with which 6,196 housing units have been constructed.
- The Forest Service. Recently created as a result of Forestry Law No 4465 of December 1969, is in the early stages of organization of its functions.

- The National Planning Office, of the Presidency headed by the Minister of National Planning is carrying out a revision of the National Development Plan of August 1969 to bring it into line with the policy of the new government.
- The Ministry of Industries and Commerce, is actively interested in all aspects of expansion of existing wood processing industries and the establishment of new ones.
- The National Institute of Apprenticeship, with extensive modern workshop and teaching facilities on the outskirts of San José counts on an annual income of US\$ 1.5 million derived from a 1 per cent tax on industrial wages and salaries. The Institute is at present benefitting from a US\$ 1,250,000 five year UNDP Special Fund project being executed by the International Labour Office. The direction of the Institute is keenly interested in wood industry developments and would be disposed to enlarge and extend its courses to provide for the skilled manpower needs of the new industries. The Institute has a total of 3,000 students and provides full time day and part time evening courses.
- Tropical Science Centre. Studies carried out and reports published as a result of the work of the Centre in Costa Rica include the following:
 - Forest Environment in Tropical Life Zones
 - Holdridge, Grenke, Hatheway, Liang and Tosi. Permagon Press, London (Book in press)
 - Un estudio de reconocimiento de los recursos naturales y potenciales de la reserva indígena de Salitre, El valle del General, Costa Rica. Informe preparado para la FAO, Proyecto de Desarrollo Forestal en Zonas Selectas - J. A. Tosi - Informe Nº 1, 1967.
 - Capacidad de uso de la tierra determinada por las condiciones de clima, fisiografía y suelos en la parte noreste de la provincia de Guanacoste, Costa Rica. Informe preparado para la FAO, Proyecto de Desarrollo Forestal en Zonas Selectas. J.A. Tosi, Informe Nº 2, 1967.

- A methodology for forest resource and forest industry planning in developing countries in tropical areas with a case study in Costa Rica.
- A.T. Joyce. Thesis for Ph.D., State University College of Forestry, Syracuse University, June 1969.
- Investigación preliminar de la zona norte de las provincias de ALAJUELA y HEREDIA, Centro Científico Tropical.
- Mapa ecológico, según la clasificación de zonas de vida del mundo de L.R. Holdridge, por Joseph A. Tosi Jr. Centro Científico Tropical, San José, Costa Rica, 1969 (Appendix 21).

The region where major area of remaining mixed tropical forest exists and where the Tropical Science Centre recommends that industrial forest reserves be established is in the northern part of the country and is outlined by the broken black line.

6.2 Statistical Information

Summarized statistical information arranged by industry for Costa Rica was not readily available. Published export and import data is arranged according to customs designation and would require considerable work to summarize according to industries.

Appendix 18 gives some wood products import and export figures derived from various sources, while Appendix 19 contains some statistics of interest to the industrial economy of the country.

6.3 Data on Costa Rica Wood Species

Work carried out by the Wood Technology Laboratory under an agreement with FAO Project 192 "Survey and Development of Selected Forest Areas" resulted in the properties of 32 species being published (Report on a Wood Testing Program carried out for UNDP Project 192, "Survey and Development of Selected Forest Areas, Costa Rica", by the Wood Technology Laboratory, of the Instituto Interamericano de Ciencias Agrícolas (IICA) Turrialba, Costa Rica - Report prepared for the FAO, March 1968).

Most of those species came from one area, the Rio Macho, and due to the Project being terminated in May 1967 other areas were not studied. This Rio Macho area is outside the northern forest zone shown in the Map, has a different association of species and is not reputed to be an area of major potential industrial importance. A further publication of the Wood Technology Laboratory describing 25 Costa Rican woods from the Rio Macho forest reserve is:

"Descripción anatómica, propiedades físicas y algunos usos de 25 maderas de Costa Rica", by

- Israel Acosta Contreras, Instituto Interamericano de Ciencias Agrícolas de la OEA - Centro de Enseñanza e Investigación Turrialba, Costa Rica, octubre, 1967

APPENDIX No. 1

A.V. Bassili/mic

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
UNITED NATIONS DEVELOPMENT PROGRAMME

Project Data Sheet

Reference No.: 70/

COS-3

Country: COSTA RICA

Project title: Exploratory mission for the establishment of a programme of technical assistance to the Wood Processing Industries.

Date formal request recorded: 28 July, 1970.

Government Department submitting request:
Ministry of Foreign Affairs

Specific Government Agency concerned with the project: None

Purpose of the project:

To assist the Government in establishing a programme of technical assistance to the Wood Processing Industries Sector.

Description of the project:

The services of a consultant will be provided for two weeks to assist the Government in establishing a programme of technical assistance for the wood processing industries sector of Costa Rica.

The consultant will assess the present situation of this sector, and, in collaboration with the Government authorities concerned, establish priorities and prepare a programme of technical assistance for the wood processing industries, assisting in drafting the requests to be submitted and in compiling the relevant background information.

Background Information:

The country's forest area is about 3 million ha. Primary forest industries consist of 183 sawmills that produced in 1966 332,000 m³ sawnwood and two plywood mills that produced 12,600 m³ in 1966.

The country is practically self sufficient in sawnwood and plywood. Potential export markets exist in neighbouring countries, but the quality of the sawnwood would have to improve.

Appendix No. 1
Page 2

4. Relationship with other technical assistance projects or requests:

Nil.

5. Project components, duration and estimated costs:

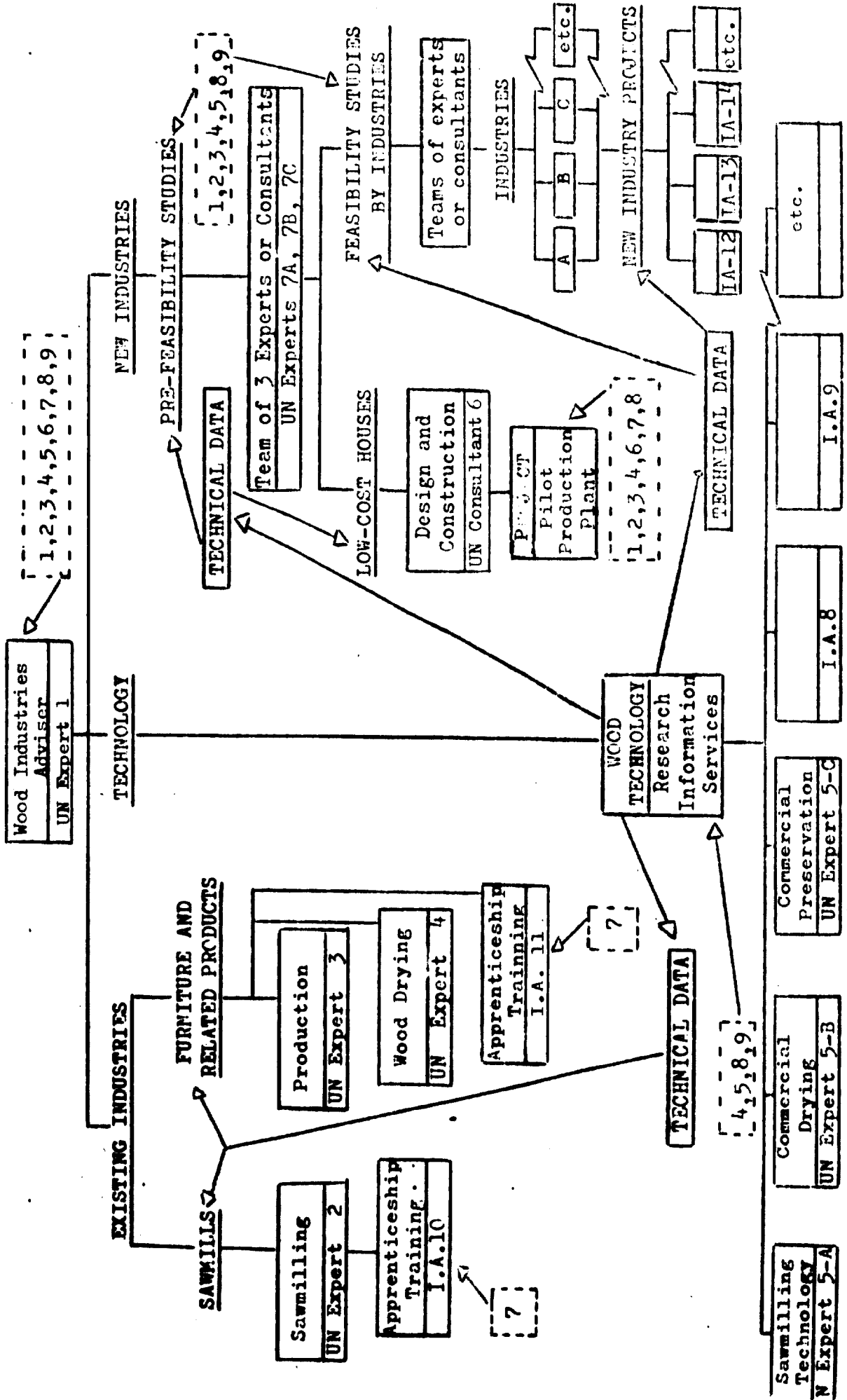
<u>Field of activity:</u>	<u>Duration:</u>	<u>Cost:</u>
Consultant (Wood Technologist) (Mr. Ian S. HUNT, Project Manager, SF Project in Paraguay)	2 weeks	\$1,000

6. Request approved:

- . -

PROPOSED PROGRAMME OF TECHNICAL ASSISTANCE BY UNIDO TO THE WOOD PROCESSING INDUSTRIES OF COSTA RICA

SECTORIAL PLANNING



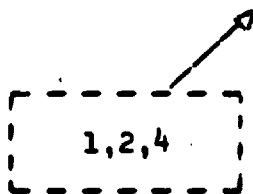
Appendix No 2
Page 2

ORGANOGRAM

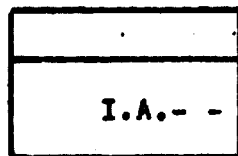
KEY TO NATIONAL COUNTERPART INSTITUTIONS

1. National Planning Office
2. Export and Investment Promotion Centre
3. Ministry of Industry and Commerce
4. Forest Service
5. Tropical Science Centre
6. National Housing Institute
7. National Apprenticeship Training Institute
8. Wood Technology Laboratory, Engineering Faculty, University of Costa Rica.
9. Computation Centre, University of Costa Rica

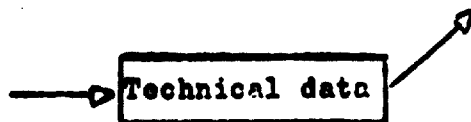
KEY TO SYMBOLS



National Counterpart Institutions, reference to numbers as above.



Adviser, Expert or aid from international sources



Flow of information and technological assistance

APPENDIX No 3

PROPOSED PROGRAMME OF TECHNICAL ASSISTANCE TO THE WOOD PROCESSING INDUSTRIES
OF COSTA RICA BY THE UNITED NATIONS DEVELOPMENT PROGRAMME FOR THE YEARS:

1971-72

Field of Assistance	Subject	Ref. Organ. Chart	Duration		Expenditure	
			man/months	1971 - 1972	US\$	1971 1972
Sectorial Planning, existing and new industries	Wood Industries Planning and Programming Adviser	1	6	6	18,000	18,000
Sawmilling	Sawmilling Adviser	2	2	-	5,000	-
Furniture and Related Products	Furniture and Related Industries Adviser	3	6	-	15,000	-
Furniture and Related Products	Adviser in Wood Drying	4	2	-	5,000	-
Wood Technology	Sawmilling Technologist	5 A	6	6	10,000	10,000
Wood Technology	Technologist in Commercial Drying of Wood	5 B	3	9	6,000	18,000
Wood Technology	Technologist in Commercial Preservation of Wood	5 C	3	9	6,000	18,000
Low Cost Housing	Consulting engineering firm for a feasibility study for industrial production of low cost wooden houses	6	9	3	40,000	-
Pre-feasibility studies of new industries	Nature and location of new, integrated, export-oriented industries; 3-expert team	7 A,B,C	9	-	30,000	-
			46	33	135,000	64,000

Appendix N^o 3
Page 2

	<u>1971</u>	<u>1972</u>
Government's counterpart (15% of experts' salaries) US\$	20,250	9,600
Equivalent in Colones about	134,000	64,000

APPENDIX No. 4

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 1)

- TITLE: Wood Industries Planning and Programming Adviser.
- DURATION: One year, with possibility of extension.
- DATE REQUIRED: 1 June, 1971.
- DUTY STATION: San José, with travel within the country.
- DUTIES:
- The expert will advise the Government of Costa Rica on the development of the wood processing industries of the country. He will supervise United Nations experts assigned to their fields under the UNDP program of technical assistance to the wood industry and will assist them in the execution of their duties.
- He will cooperate with the National Planning Office of the Presidency, the Export and Investment Promotion Center, the Forest Service, the Ministry of Industry and Commerce and the University of Costa Rica, in the carrying out of his duties.
- He will be expected, inter alia, to:
1. Make a survey of the wood processing industries of Costa Rica;
 2. Review all existing information on the nature and extent of the forest resources of Costa Rica, relate the availability of raw material to the needs of the industry and identify areas where further information is required for the needs of specific sectors of the industry.
 3. Plan and coordinate the development of the UNDP technical assistance program in accordance with the availability and supply of raw material and with the essential infra-structure to be provided by the Government.
 4. Ensure that adequate technical backstopping and counterpart facilities are available for experts and consultants recruited for this program.

Appendix No. 4
Page 2

DUTIES (Con.):

5. Make proposals, as deemed advisable, in terms of experts, consultants and specific projects, for the continuation and enlargement of this UNDP program.

QUALIFICATIONS:

University degree in engineering, economics or wood technology with practical experience in the wood processing industries and in the field of industrial development. Experience in new industry planning in developing countries would be an advantage.

LANGUAGE:

Spanish.

APPENDIX No. 5

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 2)

TITLE: Industrial Engineer (Sawmilling advisor).

DURATION: Two months.

DATE REQUIRED: 1 July, 1971.

DUTY STATION: San José, with travel within the country.

DUTIES: The expert will advise on the present state of the sawmilling industry and the measures needed to improve its efficiency of operation and increase production to meet the requirements of industry expansion which is expected to result from the UNDP program of technical assistance to the wood processing industry.

To this end he will, inter alia,

1. Survey the sawmilling industry and identify the areas where improvement is needed;
2. Recommend the measures that should be taken to increase production, improve quality and reduce costs;
 - a) utilizing existing installations with a minimum of additional capital investment,
 - b) with the installation of new machinery and facilities where deemed necessary.
3. Hold seminars and give instruction on new techniques of saw sharpening and maintenance, sawmill layout and selection of machinery.

QUALIFICATIONS:

University degree in wood technology or engineering with extensive practical and/or research experience in the sawing of tropical hardwoods and in sawmill design and layout.

LANGUAGE:

Spanish.

APPENDIX No. 6

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 3)

TITLE: Furniture and related industries advisor.

DURATION: Six months.

DATE REQUIRED: June 1, 1971.

DUTY STATION: San José, with travel within the country.

DUTIES: The expert will advise on the present state of the industries of wooden furniture, parquet, joinery, mouldings and related products and the measures needed to increase production, improve efficiency of operation and reduce costs, with particular emphasis on exports.

Specifically the expert will be expected to:

1. Collaborate with the management of the main furniture, parquet, etc. factories in making studies of production facilities and procedures, and with their cooperation put into practice the measures he considers necessary to eliminate defects.
2. He will advise on, demonstrate and put into practice wherever possible modern production methods, including scheduling for mass production, factory layout, quality control of raw material and products, stock control and seasoning.
3. He will survey existing and potential export markets and advise on measures necessary to increase production capacity to supply those markets, and on new product lines.

QUALIFICATIONS: University degree in economics, engineering or wood technology with extensive experience in the furniture and wood processing industry and practical experience in industrial development, with emphasis on production.

LANGUAGE: Spanish.

APPENDIX No. 7

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 4)

- TITLE:** Adviser in Wood Drying.
- DURATION:** Two months.
- DUTY STATION:** San José, with travel within the country.
- DUTIES:** The expert will advise on current practices in the natural and artificial drying of wood for the wood processing industry and on measures needed to improve the efficiency of operation of the processes and to increase production in order to meet the expansion which is expected to result from the UNDP program of technical assistance.
- To this end he will, inter alia:
1. Survey the furniture and related products industries, identify the principal problems in the natural and artificial drying of stock and propose remedies.
 2. Where new dry kiln installations are needed, provide technical advice and assistance in determining the best system or combination of drying systems, assist in the selection of suitable machinery and in the preparation of purchasing specifications.
 3. Give in-plant demonstrations and seminars to factory personnel on the correct techniques for the control of moisture content and wood quality, the maintenance and operation of kiln instruments, and on preferred techniques for the natural drying of timber in the open air.
- The expert will work under the general direction of the Wood Industries Planning and Programming Adviser and in close cooperation with the Furniture and Related Industries Adviser.
- Under counterpart facilities he will have access to the Wood Technology Laboratory of the Faculty of Engineering of the University of Costa Rica, whose technical staff will assist him in laboratory testing and field work.
- For liaison with trade associations and Government institutions he will have the assistance of the Export and Investment Promotion Centre and the National Planning Office of the Presidency.

Appendix No. 7

Page 2

QUALIFICATIONS:

University degree or diploma in wood technology, engineering, or applied science together with extensive practical experience in commercial wood drying operations, and a knowledge of commercial dry kiln machinery and instruments.

Experience in the natural and artificial drying of tropical hardwoods would be an advantage.

LANGUAGE:

Preferably Spanish, but English only would be acceptable.

APPENDIX No. 8

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 5A)

TITLE: Sawmilling Technologist.

DURATION: One year.

DATE REQUIRED: 1 July 1971

DUTY STATION: San José, with travel within the country.

DUTIES:

The Sawmilling Technologist will be a member of a team of United Nations experts participating in a program of technical assistance to the wood processing industries of Costa Rica.

He will work under the general direction of the Wood Industries Planning and Programming Adviser.

He will follow up the work of the Sawmilling Adviser and wherever practicable will put into effect his recommendations in the sawmills throughout the country.

Specifically he will be required to advise and assist the industry in making the best possible use of existing machinery and facilities to achieve maximum production to an acceptable quality.

He will also advise on the selection of machinery and purchasing specifications for new installations and on new plant layout.

He will work in close cooperation with the Wood Technology Laboratory of the Faculty of Engineering of the University of Costa Rica, the national institutions concerned with the wood industry development and export and investment promotion, and with the Costa Rican Association of Wood Industries.

QUALIFICATIONS: University degree in engineering or wood technology, or technological institute diploma, together with experience in the practical aspects of sawmilling technology and practice.

LANGUAGE: Spanish.

APPENDIX No. 9

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 5B)

- TITLE:** Technologist in Commercial Drying of Wood.
- DURATION:** One year with possibility of extension.
- DATE REQUIRED:** 1 October, 1971
- DUTY STATION:** San José, with travel within the country.
- DUTIES:** The expert will be a member of a team of United Nations experts participating in a program of technical assistance to the wood processing industries of Costa Rica.
- He will work under the general direction of the Wood Industries Planning and Programming Adviser.
- He will be attached to the Wood Technology Laboratory, located in the Engineering Faculty of the University of Costa Rica where he will have access to laboratory facilities and the help of Costa Rican professionals.
- Specifically he will be required to:
1. Follow up the work of the Wood Drying Adviser to the Furniture Industry, assist in the implementation of the Adviser's recommendations and provide whatever other technical assistance the industry may need to improve and expand its wood drying facilities.
 2. Through the Wood Technology Laboratory provide advice and assistance to the new industries pro- feasibility and feasibility studies on wood drying requirements.
 3. Within the sphere of activity of Item 2 high priority will be given to the Low Cost Housing Project. The expert will be required to advise on drying processes for components of the houses and on the selection, specifying, layout, installation . operation and control of the equipment to be used.

Appendix No. 9

Page 2

QUALIFICATIONS:

University degree or diploma in wood technology, engineering or applied science, or an equivalent basic knowledge and practical experience.

The candidate should be thoroughly familiar with the design and operation of commercial dry kilns and drying systems, and should have had experience in commercial drying practice.

Experience also in research and development in wood drying and in the drying of tropical hardwood species would be advantageous.

LANGUAGE:

Preferable Spanish, but English only would be acceptable.

APPENDIX NO 10

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT JOB DESCRIPTION (U.N. 5 C)

- TITLE:** Technologist in Commercial Wood Preservation
- DURATION:** One year with possibility of extension.
- DATE REQUIRED:** 1 October, 1971.
- DUTY STATION:** San José, with travel within the country.
- DUTIES:** The Expert will be a member of a team of United Nations Experts participating in a program of technical assistance to the wood processing industries of Costa Rica.
- He will work under the general direction of the Wood Industries Planning and Programming Adviser.
- He will be attached to the Wood Technology Laboratory, located in the Engineering Faculty of the University of Costa Rica where he will have access to laboratory facilities and the help of Costa Rican professionals.
- Specifically he will be required to:
1. Provide advice and assistance to the wood processing industries of Costa Rica with respect to their needs in the field of wood protection.
 2. Assist the industry in the selection of the most suitable preservation processes, plant and machinery and in the installation, initial operation and control of the processes.
 3. Provide advice and assistance to the pre-feasibility and feasibility studies on new industries in regard to preservation requirements.
 4. In particular advice and assist to Low Cost Housing Project in the selection of appropriate preservation processes, and in the specifying of plant and machinery, its layout, installation, operation and control of the processes.
- QUALIFICATIONS:** University degree or diploma in wood technology, engineering or applied science, or an equivalent basic knowledge and practical experience.

Appendix No. 10
Page 2

QUALIFICATIONS: (Con.)

The candidate should be thoroughly familiar with the various commercial wood preservation processes and with the design and operation of commercial treatment plants, and should have had experience in commercial treatment practice.

Experience also in research and development in wood preservation and in the preservation treatment of tropical hardwood species would be advantageous.

LANGUAGE:

Preferably Spanish, but English only would be acceptable.

Appendix No. 11

Request from the Government of Costa Rica for Technical Assistance

Draft terms of reference for a feasibility study for a plant for the production of low cost wooden houses

I. Introduction

Under its Special Industrial Service programme of technical assistance, the United Nations Industrial Development Organization is to assist the Government of Costa Rica by providing it with technical assistance in the form of a complete techno-economic feasibility study for the establishment of a plant for the production of low cost wooden houses.

The project is to be implemented using the services of a firm of consulting engineers specialized in such studies referred to hereafter as the "Contractor".

II. Duties of the Contractor

The feasibility study is to be implemented in three phases and is to cover the following main topics:

Phase I: -assessment of the demand for low cost units;
-availability of raw materials;
-local climatic conditions and local living habits;
-local building bye laws, and local building methods;
-financing of housing construction.

Based on the above a feasibility study will be prepared that will cover:

- design of buildings to be manufactured;
- location of factory and its capacity;
- production programme;
- materials to be used;
- specification of equipment;
- training needs: for personnel in plant and on site;
- cost analysis, capital requirements and profitability.

Phase II: Evaluation of bids.

Phase III: Advice and assistance upon the reception of the plant and running in.

In particular the contractor will:

Phase I: (Tentative duration of field work: 2 - 3 man/months)

1. assess the local demand for various types of low cost housing and institutional buildings (schools, hospitals, barracks, etc.) and project demands; identifying these types of houses and buildings which could conveniently be constructed utilising wood; and establish the price ranges for each type.
2. assess the local availability of sawnwood, plywood and/or other wood based panels, insulation material (if required), hardware, roofing materials, and all other inputs, quantitatively, qualitatively and cost-wise.
3. recommend the tests that have to be carried out in the Wood Technology laboratory of the Faculty of Engineering of the University of Costa Rica to assess the suitability of hitherto untested local species for use in housing.
4. study the local building methods and the local building bye laws with particular emphasis on the implications of utilizing wood and wood products.
5. study the local financing available for the home owners; and establish the prejudices (if any) that the building societies and insurance companies might have against wooden houses.

Based on the findings concerning the above points, the Contractor will prepare a detailed techno-economic feasibility study that will cover in depth the following aspects:

1. recommend a production programme for the factory to be erected, justifying his choice of types of houses;
2. prepare detailed architectural drawings and production plans for the various types of wooden houses that he proposes to manufacture on an industrial scale; and enumerate the changes in the local building laws (if any); that would have to be introduced to implement the proposed project;
3. establish the specifications of the various raw materials to be utilized in the construction of these houses;
4. prepare detailed specifications of the equipment to be installed in the industrial plant. These specifications must be detailed enough for use in the call for tenders;
5. indicate the proposed plant layout and prepare preliminary specifications for the buildings;
6. enumerate the training needs for key personnel both of the plant as well as of the erection crews;
7. on the basis of the above considerations determine cost analysis, the capital requirements and the profitability of the project,

Phase II: (Tentative duration of field work: one man/month).

After submission of the report of Phase I to UNIDO the Contractor is to delegate the team leader (and possibly other experts) to assist the Costa Rican authorities in the evaluation of bids and in the drafting of the contract with the successful bidder.

In evaluating the bids the contractor shall pay due notice to the proposed technological process for the production of each bidder and shall select that process best adapted to the Costa Rican conditions. Detailed explanations on the relative merits and deficiencies of each process are to be supplied.

Phase III: (Tentative duration of the field work: $\frac{1}{2}$ man/month).

Upon the request of UNIDO the contractor shall delegate the team leader to Costa Rica to advise the authorities on whether the equipment that has been delivered is according to the stipulations of the contract and to be present at the final running in of the plant.

III. Proposed implementation

Phase I:

The contractor is to delegate a team of experts to Costa Rica to implement Phase I within two weeks of the signature of the contract. On his way to Costa Rica the team leader shall visit UNIDO Headquarters in Vienna for discussions and exchange of views. This team shall comprise, but not be limited to, experts in the following fields: wood technology, architecture, civil engineering, specialised in wood construction, industrial engineering, economics. They shall submit to UNIDO a draft report in English of their findings on Phase I within two months of their return from the field. The final report is to be submitted in 30 copies in Spanish within one month of receipt of UNIDO's comments.

Phase II:

Within one week of UNIDO's notification to proceed with Phase II, the contractor shall delegate the team leader to Costa Rica. On his way to Costa Rica he will stop over in Vienna for discussions and exchange of views. Within one month of the return of the team leader from the field, the Contractor shall submit a draft of his report for Phase II in five copies in English. Thirty copies in Spanish are to be submitted within one month of receipt of UNIDO's comments.

Phase III:

Within one week of UNIDO's notification to proceed with the implementation of Phase III, the contractor shall delegate the team leader to Costa Rica.

He will submit a report in five copies in English to UNIDO of the execution of the contract within two weeks of his return from the field.

APPENDIX No. 12

REQUEST FROM THE GOVERNMENT OF COSTA RICA FOR TECHNICAL ASSISTANCE

DRAFT PROJECT SUMMARY

TITLE:

Pre-feasibility studies in new forest products industries.

PURPOSE OF PROJECT:

To carry out pre-feasibility studies of a general nature on new wood processing and manufacturing industries based on the forest resources of the country.

DESCRIPTION OF PROJECT:

The pre-feasibility studies will constitute the first step in that part of the UNIDO wood industries technical assistance program assigned to the development of new industries.

The studies will examine the possibility of developing new integrated large scale, export oriented industries based on the optimum utilization of forest reserves dedicated exclusively for industrial exploitation on a sustained yield bases.

The studies should indicate the nature and composition of the industries recommended as well as preferred location with respect to raw material suppliers, infrastructural needs in terms of transport, port facilities, labour force, social amenities, communications, etc.

They should also present data on the existence of markets for the products proposed, limiting conditions of price, transport costs, quality and packaging standards.

In addition to export oriented conditions the project should give high priority to a study of the proposed low cost wooden houses industry. The terms of reference for this will be the same, where applicable, as for the export oriented industries.

EXECUTION OF THE PROJECT:

This project may be carried out by a team of UNIDO consultants or under contract to a private consultancy firm.

Appendix No. 12
Page 2

EXECUTION OF THE PROJECT (Con.)

In the first case a suitable team would consist of three experienced consultants, an industrial project engineer, an industrial economist and a wood technologist. If the circumstances warrant it, a marketing specialist could be added.

It is proposed that a period of three months be allocated for the studies.

In the event of their being undertaken by a consulting firm the determination of the terms of the contract would be the subject of a separate proposal.

APPENDIX No. 13

Demonstration Centre for the Production of Low Cost Wooden Houses

Introduction

The present housing deficit in Costa Rica is reportedly 140,000 houses, indicating that almost 50 per cent of the population is inadequately housed. The annual housing requirements, without reducing the deficit is said to be of the order of 13,000 per year. Of these it is estimated that 90 per cent, or 12,000 per year are needed by the lowest income bracket which at present is not being provided for.

Since 1971 INVU with financial aid from BID has constructed some 6,000 houses with an average cost of ₡ 17,000 (US \$2,600) per unit. This is well beyond the reach of the lowest ("Campesino" or peasant) income group.

Preliminary studies are being carried out by the Wood Technology Laboratory of the University of Costa Rica and indicate that with the appropriate selection of raw materials, processing techniques and suitable design and construction methods, an all wooden house built of durable material and suitable for the lowest income group may be possible for less than half the average cost of houses built by INVU to date.

The government is giving a high priority to its national housing programme.

Assuming that something of the order of 6 cubic meters of finished wood components are required for each house the gross raw material required per unit would be about 12 cubic meters log volume. An annual production of 12,000 houses would thus consume 144,000 cubic meters of logs from the forest. This would represent a 50 per cent increase in the present total forest cut.

Since labour costs using conventional construction methods for houses account for some 30 per cent of the total cost, factory production of modular units and prefabrication will make substantial economies in the overall cost.

Outline of the project:

It is envisaged to establish "demonstration plant for the production of low cost wooden houses" in Costa Rica. This plant will be established with the assistance of the UNDP/SF, and would be attached to an existing sawmill (preferably one in which the Government or an autonomous governmental body has a financial stake); so as to reduce the administrative costs and to obtain regular supplies of high quality sawnwood and wood based boards. This, however, is merely a suggestion and not a prerequisite, for the demonstration plant could be independent and purchase its inputs from the local market.

The UNDP/SF would provide experts to train local counterparts in the production of wooden houses, utilizing local resources, and would also provide part of the equipment needed to start industrial production of low cost wooden houses. The Costa Rican authorities would provide for land, building, raw materials, counterparts as well as part of the operating costs. The duration of the project would be three years.

The products manufactured would consist of wooden dwellings, schools, hospitals and administrative buildings for the rural development, as well as joinery (doors and windows) for the concrete and stone houses in other regions of the country.

Implementation of the project:

The project as outlined would serve as a demonstration centre for the wooden houses industry.

It would have the following aims:

- a) establish sound design for low cost wooden houses thus leading to the overcoming of resistance to this type of dwelling by the various local bodies.

It is envisaged that UNDP provide a designer for two years to design houses and public buildings to satisfy local requirements. He will work in close collaboration with the architects of the National Housing Corporation, and will train them in the modern timber engineering practices.

b) establish a demonstration plant to produce these low cost houses in small series for the rural development areas as well as for the urban housing projects of the National Housing Institute.

UNDP would provide the equipment and an expert in production of houses and joinery. This expert would be assigned for the entire duration of the project and would serve as project manager.

He will start production and train counterparts in sound wood processing techniques, costing, tool maintenance, safety in industry, production planning, wood technology, etc.

It is also intended that once the local counterparts have been trained, courses on specific aspects of wood processing will be carried out. These would be accessible to staff of all wood processing plants in Costa Rica.

c) as an ancillary measure to the production of these wooden dwellings, UNDP would also provide an expert in the erection of these houses to train the local craftsmen in the erection of these houses. As eventually it is envisaged that these houses would be sold ex-factory, this expert would only be needed for 18 months, the time it takes to erect a few "demonstration" houses and to train the technical sales personnel of the plant. Subsequently, it is planned to erect the houses on site by affiliated local contractors.

d) the UNDP is also to provide for about 48 man-months of consultants to cover specific aspects of wood processing not covered by the experts, such as, but not necessarily limited to: drying of timber, standardization, grading, testing of hitherto unutilized species (to be contracted to specialized laboratories), wood technology, wood preservation, etc.

Duration of the project: three years

First year: purchase of equipment, design of low cost wooden houses, testing of species to be utilized, erection of plant. Second year: production, erection of "demonstration" houses, training of the plant's personnel, consultancy work to overcome production problems. Third year: training of local staff of wood processing plants from all over Costa Rica, consultancy work to help them overcome their production problems. Feasibility studies for similar commercial plants to be established in other regions of the country.

Project components and costs

A. UNIDO contribution

A) Experts:

Production expert	36 man/months	US \$72,000
Design expert	24 man/months	US \$48,000
Erection expert	18 man/months	US \$36,000
Consultants (Timber drying, wood properties, etc.)	48 man/months	US \$96,000

b) Fellowships:

Six fellowships for a duration of 6 months each to be provided for counterparts

US \$36,000

c) Equipment:

Demonstration equipment for producing low cost wooden houses (starting with sawwood and wood based panels produced in local mills)
Transport vehicles: one landrover and one 5 ton lorry
Testing equipment, miscellaneous

US \$90,000
US \$15,000
US \$17,000

Total a), b) and c)

US\$410,000

B. Costa Rican Government's contribution^{1/}

Professional staff 180 man/months
Non-professional staff 400 man/months
Land, building and equipment
Cash contribution to cover local operating costs
Miscellaneous

US \$.....
US \$.....
US \$.....
US \$.....
US \$.....

Total:

1/ It must be borne in mind that the Costa Rican authorities will recuperate a substantial portion of their contribution through the sales of low cost wooden houses produced.

APPENDIX No. 14

LIST OF MINISTRIES AND INSTITUTIONS VISITED AND PERSONS INTERVIEWED

- Don José Figueres - President of the Republic of Costa Rica.
- Minister Don Marco Antonio López - Minister of National Planning.
- National Planning Office - Dr. Mario Córdoba - Economist.
- Dr. Ogontrillo - Economist.
- Dr. Juan Luis Valle - Director of Projects and Development.
- Sra. Edith López - Economist.
- Export and Investment Promotion Centre - Architect Rodrigo Nasis - Executive Director.
- Ministry of Industries and Commerce - Eng. Mario López
- Forest Service, Ministry of Agriculture and Livestock - Eng. Madriz - Director
- Eng. Arturo Trejos Núñez - Officer in Charge Forest Utilization
- National Apprenticeship Training Institute - Eng. Fernando Lizano - Sub Director
- Wood Technology Laboratory, Faculty of Engineering, University of Costa Rica - Eng. H.J. van der Slooten, FAO Technologist.
- Eng. Luis Llach - Counterpart Director
- Tropical Science Centre - Dr. Leslie R. Holdridge
- Dr. Joseph A. Tosi

APPENDIX NO 15

LIST OF FACTORIES VISITED

Furniture Factories

- Urgelles y Penon Ltda.
- Perdomo Muebles
- Invar Industries
- Muebles Castro

**Parquet, mouldings, panel
and door factory**

- Pisos S.A.

Sawmills

- Aserradero Vargas Corinado
- Aserradero Vargas Tibas
- Plywood Costarricense

Veneer and Plywood factory

- Caribbean Veneer Co.
- Plywood Costarricense S.A.

APPENDIX No 16

LIST OF SPECIES COMMONLY SAWN IN SAN JOSE SAWMILLS

<u>COMMON NAME</u>	<u>BOTANICAL NAME</u>	<u>FAMILY</u>
AMARILLON	Bucida buceras (?)	COBRETACEAE
BALSAKO	Hyroxylon balsamun pereirae (Royal)	LEGUMINOSAE
CAOBA	Swietenia macrophylla King	MELIACEAE
CAOBILLO O CEDRO MACHO (CEDRILLO MACHO?)	Carapa Spp.	MELIACEAE
CEDRO ATLANTICO	Cedrella sp.	MELIACEAE
COCOBOLO	Dalbergia spp.	LEGUMINOSAE
CRISTOBAL	Platymiscium sp.	LEGUMINOSAE
ESPAVEL (ESPAVE)	Anacardium excelsa	ANACARDIACEAE
GENICERO (CENICERO)	Samanea Saman (Pithecolobium saman)	LEGUMINOSAE
GUAYACAN	Tabebuia guayacan	BIGNONIACEAE
SURA	Terminalia sp.	COMBRETACEAE
LAUREL	Cordia alliodora (R & P)	BORAGINACEAE
NAZARENO	Peltogyne purpurea	LEGUMINOSAE
PILON	Hieronyma sp.	EUPHORBIACEAE
POCHOTE	Bombax (?)	BOMBACACEAE

APPENDIX No. 17

URGELLES Y PENON, Ltda.

Fábrica:
Tel. 21-86-96: APDO.79
Calle Morenos, Sabana Sur
Cable: URNON

San Jose, Costa Rica, A.C. October 31, 1970

Ing. Jorge Blanco
Center for Promotion
of Export and Investment
Apartado No. 5418
SAN JOSE

Dear Sir,

Thanking you in advance for your kind visit to our factory together with Mr. Ian HUNT, and according with our conversation on this matter, we enumerate our problems and requirements as follow:

Plant Manager.

Due to the lack of a person with a technical or practical knowledge of systems of production, we have not been able to put production line into operation during the three years our factory has been functioning.

Wood drying technician.

For six years we have wanted to have a kiln, but the lack of advice on drying and yard movement has always stopped us.

Technician in waste removal.

We would like to have adequate equipment for the suction removal of sanding dust, shavings, sawdust, etc. from our machines. We need somebody to make the plans in Costa Rica since the imported equipment is too expensive due to its size, ducts, filters, etc.

Draftsman specialized in furniture construction plans.

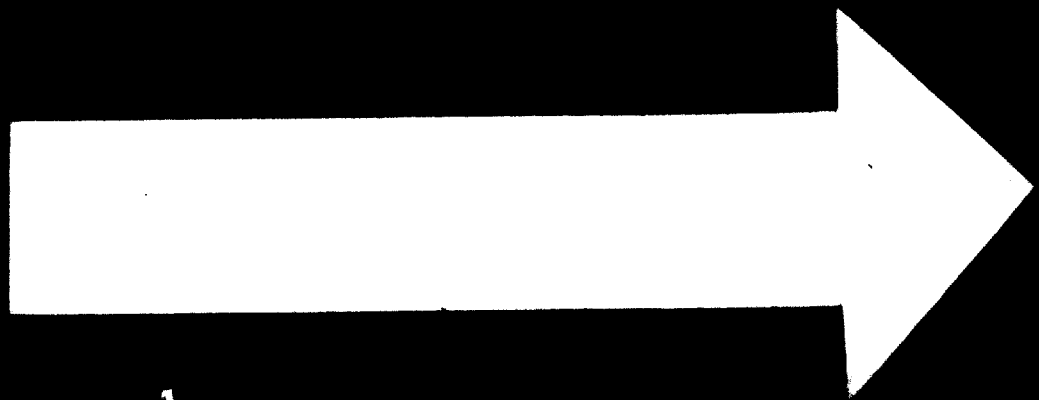
For our drafting and designs section.

Person experienced in application of polyester finishes.

We need him for our line of consoles and television where we want to apply it.

We are pleased by your interest in giving assistance to the timber industry, which will undoubtedly be of great benefit for the national economy, and with our congratulations and expecting pleasant news from you, we remain.

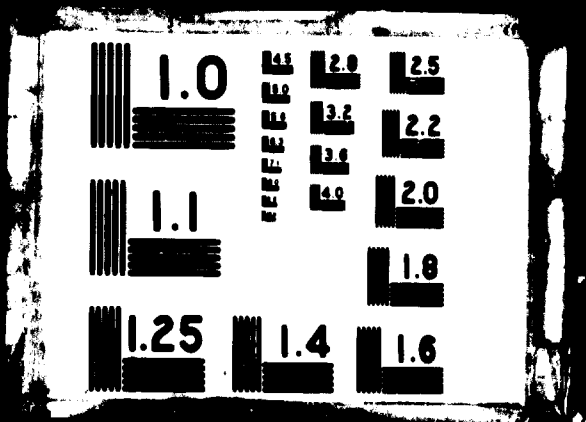
Eugenio Penón F.
Gerente



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APPENDIX No. 18

Imports - Costa Rica

	<u>US\$</u>
Total Goods and Services 1968	236,900,000
1969	258,200,000

Wood Products Imports (other than paper) 1967

	<u>675,000</u>
Poles piling and posts	
Sleepers	288,000
Sawn wood, coniferous	221,000
Veneer sheets	21,000
Plywood	1,000
Particle board	120,000
Compressed fibre board	15,000
	9,000

Exports - Costa Rica

Total Goods and Services 1968	205,800,000
1969	229,100,000

Wood Products Exports (other than paper) 1967

	1,669,000
Charcoal	
Saw logs, veneer, logs and logs for sleepers	8,000
Poles, piling and posts	90,000
Sawn wood	2,000
Veneer sheets	83,000
Plywood	70,000
Particle board	866,000
Furniture	42,000
	508,000

US\$
1968

US\$
1969

Wood Products, Exports

Sawn wood	122,498	79,129
Plywood	1,161,078	1,357,581
Furniture	533,746	313,724
Barrel staves (Roblo)	1,344	18,538

Total Exports - Goods only 1967
1968

US\$
143,780,000
170,821,000

Balance of Payments 1968
1969

+9,000,000
+21,100,000

Sources:

Yearbook of Forest Products FAO, 1969.
Notas sobre la economía y el desarrollo de América Latina.
CEPAL No. 40, Abril, 1970.
Data supplied by the Export and Investment Promotion Centre, Costa Rica.

APPENDIX NO 19

SOME RELEVANT STATISTICS OF COSTA RICA

Area		51,000 square kilometers	
Population (1967)		1,540,000	
Density per sq. km.		30	
Rate of growth p.a. 1960-67		3.9 per cent	
Gross National Product		<u>U.S. \$.</u> (equivalent)	
(current prices)	1967	700,000,000.	
	1968	770,000,000.	
GNP per capita	1967	436.	
	1968	450.	
Real growth, per cent	1967	6.8	
	1968	6.7	
Annual growth rate of Gross Inter- nal Product per cent.	1960-65	<u>Costa Rica</u>	<u>Latin America</u>
	1966	6.3	5.1
	1967	8.2	4.5
	1968	6.7	4.3
	1969	7.8	6.1
		7.6	6.4
<u>Growth of the principal sectors of economic activity</u>			
1969 (Per cent variation with respect to 1968)			
		<u>Costa Rica</u>	<u>Latin America</u>
Agriculture and Livestock		+ 7.6	+ 4.4
Mining		+ 8.2	+ 3.8
Manufacturing Industries		+ 8.2	+ 7.7
Construction		+ 9.7	+ 7.9
Basic services		+ 8.9	+ 8.0
Other services		+ 6.9	+ 6.3
GNP Total		+ 7.6	+ 6.4

Appendix No. 19
Page 2

Distribution of income 1965

	<u>Per cent of total income received by the different income group</u>				
	20%	30%	30%	15%	5%
	<u>Lowest</u>	<u>lower</u>	<u>higher</u>	<u>lower</u>	<u>highest</u>
Costa Rica	6.0	12.0	21.8	25.0	35.0
Latin America	3.1	10.3	24.1	29.2	33.4

Average per capita income by groups, 1960

	Average per capita income <u>1960</u>	<u>US\$ at 1960 value Average income by group</u>				
		20%	30%	30%	15%	5%
		<u>Lowest</u>	<u>lower</u>	<u>higher</u>	<u>lower</u>	<u>highest</u>
Costa Rica	380	114	155	276	633	2,660
Latin America	330	51	114	265	643	2,204

Estimated Value of Gross Industrial Products, Costa Rica

(US\$ equivalent of Colones at 1962 value
- millions of dollars)

	1967	1968	1969	Per cent increase <u>1968-69</u>
	<u>270.0</u>	<u>315.0</u>	<u>346.0</u>	<u>10.0</u>
<u>Total</u>				
Wood	17.2	18.7	25.5	36.3
Furniture	6.7	7.1	7.6	7.0
Paper and paper products	5.5	6.0	9.5	58.2
<u>Total Wood and paper products</u>	<u>29.4</u>	<u>31.8</u>	<u>42.6</u>	<u>34.0</u>
Wood and Furniture as percentage of the Total %	8.9	8.2	9.6	-

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Sources: Export and Investment Promotion Centre, Costa Rica.
Notas sobre la economía y el desarrollo de América Latina, CEPAL Nos. 40, 44 and 46, 1970.
Plan Operativo Industrial para 1970. Oficina de Planificación, Ministerio de la Presidencia, Costa Rica, Agosto, 1969.

APPENDIX No. 20

No. 4465

THE LEGISLATIVE ASSEMBLY OF THE REPUBLIC OF COSTA RICA
DECREES

the following

FORESTRY LAW
CHAPTER I
GENERAL PROVISIONS

- Art. 19. The present Law establishes that it is an essential duty of the State to look after the protection, utilization, conservation and promotion of the forestry resources of the country, in agreement with the principle of multiple use of renewable (replenishable) natural resources.
- Art. 20. Compliance with this function shall be the responsibility of the Ministry of Agriculture and Livestock, which shall:
- a) Maintain the renewable forest resources of the country by means of technical systems of forest management, and increase them to a maximum by means of the modern techniques which can be applied to this matter;
 - b) Establish, for the purpose of the preceding paragraph, protective areas, forest reserves, national parks and biological reserves. The definition of each of these areas and the procedure to be followed for their establishment shall be made by way of Rules; (Regulations);
 - c) Prevent and fight soil deterioration and erosion in the upper regions of river or stream basins;
 - d) Guide and control the rational utilization of the forest resources by means of establishing adequate systems for the exploitation and renewal of those resources;
 - e) Gradually incorporate to the national economy, by means of adequate plans, the lands that are unfit for agriculture and livestock and that may be dedicated to forest utilization;
 - f) Encourage the establishment of colonies for the exploitation of the forest resources, and promote stable industries based upon said resources;
 - g) Promote technical and scientific research programs which may allow the establishment of a serious and responsible policy for the management of the forest resources of the country;
 - h) Maintain and increase wild life;
 - i) Select, train and promote, in accordance with the respective merits, a competent professional staff to dutifully exercise the management of the forest resources of the country, and

- j) Establish, by means of a continuing process of education and divulgation, a clear understanding of the importance and significance that forests have as a part of the renewable natural resources for the welfare of the inhabitants of the country, and promote at different levels of education the interest in the maintenance of these resources.
- Art. 39. The forest and forest lands that may be necessary for the compliance with the purposes to which the preceding article refers are declared of public utility and subject to expropriation by the State.
- Art. 40. Forest lands are those that in a permanent way provide greater economic, protective or scenic usefulness under forest coverage than if exploited in technically executed agricultural activities.
- Art. 50. Forests are all lands covered by plant associations predominantly formed by trees and other woody vegetation.
- Art. 60. Known as Forest Management is the group of legal, economic and technical provisions established by this Law and by the regulations, decrees and decisions originated by its application, which regulates the conservation (maintenance), protection and rational utilization of the forests and forest lands listed below:
- a) The protective areas;
 - b) The national parks and forest reserves, and
 - c) The privately owned forests and forest lands to which articles 63, 71 and 88 of this Law refer.

CHAPTER II

FOREST MANAGEMENT

- Art. 70. The Ministry of Agriculture and Livestock shall carry out its duties through the Forest Service; the officers and employees of the Forest Service shall be appointed in agreement with the provisions of the Civil Service Statute (Rules).
- Art. 80. Collaboration with the Ministry of Agriculture and Livestock on the part of the other national, provincial and local administrative organizations shall be obligatory when required or when the regulations of this Law so establish.
- Art. 90. The organization of the Forest Service shall be established by the regulations of this Law. A corps of forest rangers and park attendants which will contribute towards the enforcement of this Law shall be established as a fundamental part of the Department.

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Page 3

Art. 10°. The rights and duties of the Forest Service shall be the following:

- a) To advise the Ministry of Agriculture and Livestock with regard to all the decisions on forestry policy, legislation and management most suitable for the country;
- b) To promote and carry out all the plans, projects and programmes which may result from the application of the Forest Policy of the State;
- c) To manage the Forest Patrimony of the State according to the provisions and principles established in this Law and in its regulations;
- d) To carry out the national forest inventory;
- e) To make the necessary studies and to propose the creation of the Protective Areas, National Parks, Forest Reserves and Biological Reserves;
- f) To manage the Forestry Fund;
- g) To establish the duties that correspond to the utilization (of resources) within the Forest Patrimony of the State's property;
- h) Negotiate cooperative agreements with owners of forests and forest lands for the execution of forest protection plans;
- i) To give technical assistance to the owners of forests and forest lands for the execution of forest management plans and to make scientific studies on forest resources, wild life, timber production and water resources;
- j) To carry out the technical and economical studies related to the utilization and to forest industrial processes;
- k) To promote cooperative agreements with national or international organizations which are deemed suitable for the best implementation of this Law, and
- l) All other matters determined by this Law and by the regulations, decrees and decisions which the application of this Law may originate.

Art. 11°. For the purposes of this Law, the country shall be divided into forest regions, in accordance with the particular nature of its resources and as deemed most suitable by the Forest Service.

Art. 12°. Members of the Forest Service shall be vested with police authority and as such shall be compelled to denounce to competent authorities the transgressions and crimes specified by this Law.

Art. 13°. For the proper execution of their duties, Forest Service officials have the right to visit and inspect any rural property with the exception of dwellings, and the owners of such properties are compelled to give the necessary cooperation. The officers are also authorized to confiscate (seize) vehicles, instruments, arms and utensils used in activities that this Law prohibits, as well as the timbers and other forest products illegally exploited. In all these cases a denunciation must be made to competent authorities and if any goods were confiscated they must be placed at their disposal.

Art. 14°. A National Forest Council shall function within the Ministry of Agriculture and Livestock as an advising body for the Executive Authority on matters related to the protection, utilization, conservation (maintenance) and promotion of forest resources.

Art. 15°. The National Forest Council shall be formed by:

- a) The Minister of Agriculture and Livestock or his designate;
- b) One representative from the Ministry of Industry and Commerce;
- c) One representative from the Institute of Lands and Colonization;
- d) One representative from the National Power Service;
- e) One representative from the Costarrican Institute of Tourism;
- f) One representative from the Association of Timber Industrialists, and
- g) One representative from the University of Costa Rica.

Art. 16°. The National Forest Council may invite other representatives from public or private organizations whose activities are related to the protection, utilization and conservation (maintenance) of forest resources, to its meetings.

Art. 17°. The regulations of this Law shall determine the provisions which will govern the rights and functioning of the National Forest Council.

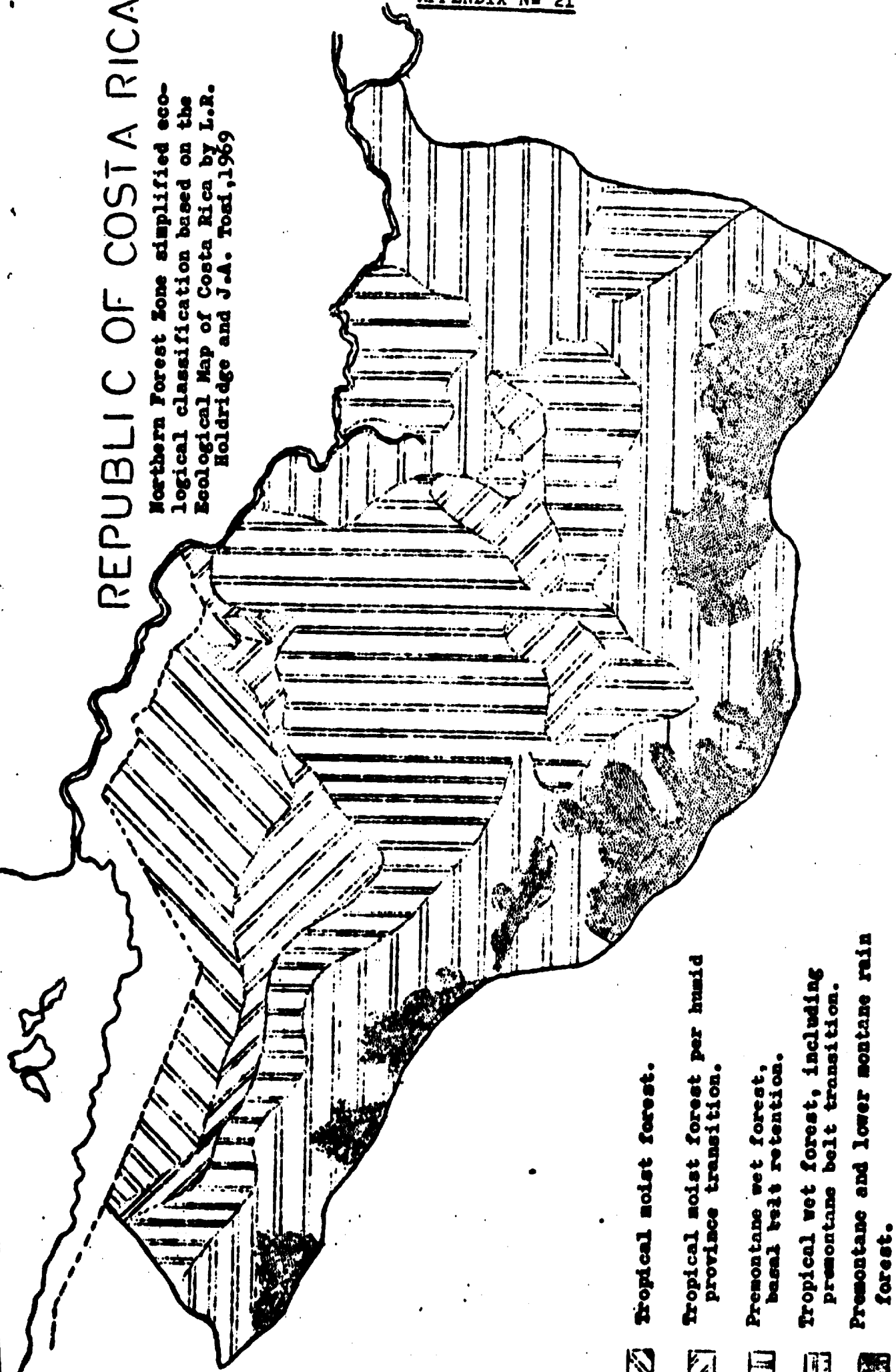
Appendix No. 20
Page 5




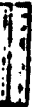

REMAINING CHAPTER HEADINGS ARE:

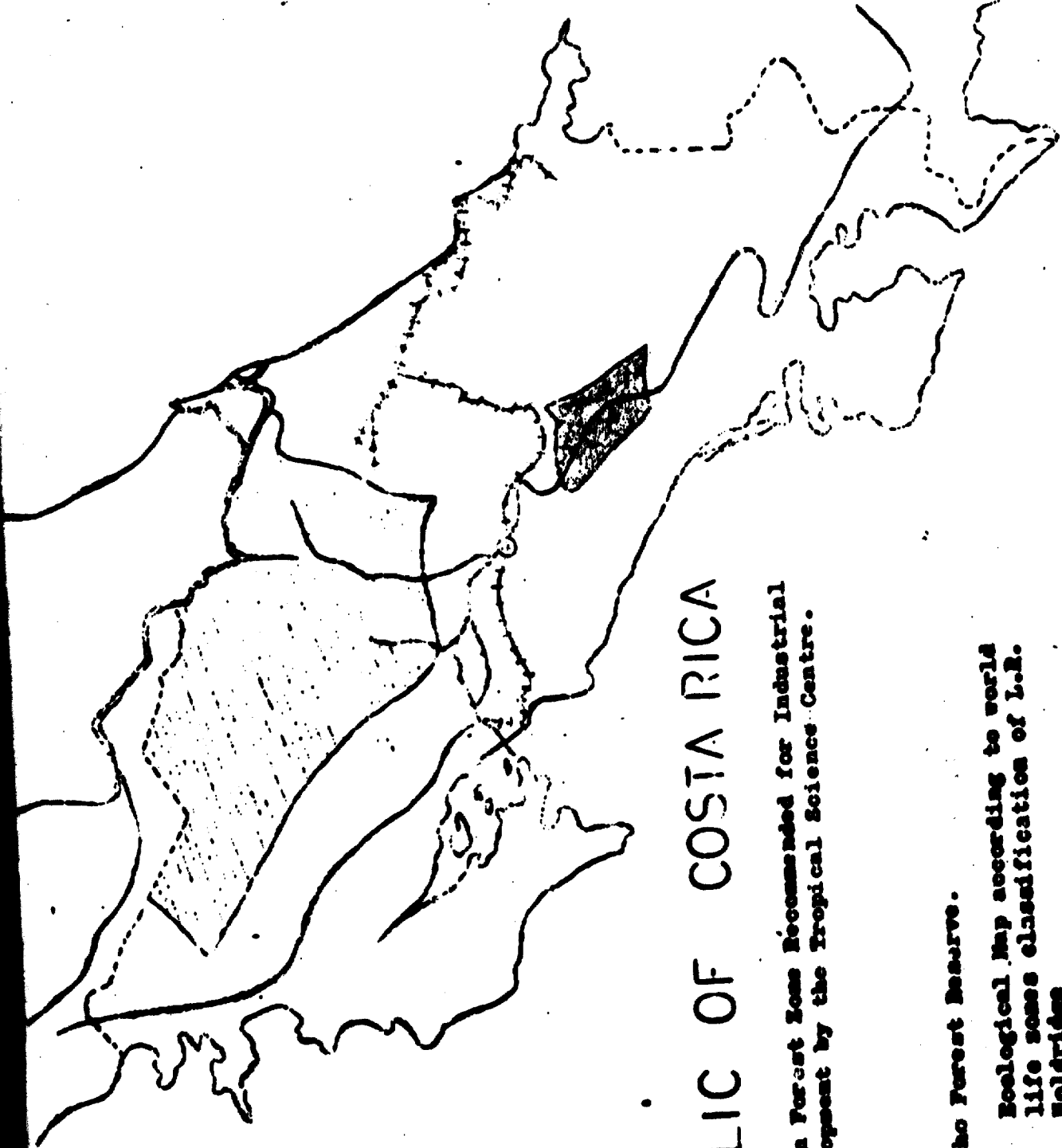
Chapter	III	-	The Forest Patrimony of the State.
Chapter	IV	-	Forest Exploitation in Lands of the Forest Patrimony of the State.
Chapter	V	-	Forest Exploitation in privately owned Lands.
Chapter	VI	-	The National Parks.
Chapter	VII	-	Forest Protection
Chapter	VIII	-	The transport and commercialization of forest products.
Chapter	IX	-	The transgressions, penalties, and procedures.
Chapter	X	-	Final dispositions.

REPUBLIC OF COSTA RICA


Northern Forest Zone simplified ecological classification based on the Ecological Map of Costa Rica by L.R. Holdridge and J.A. Tosi, 1969



-  Tropical moist forest.
-  Tropical moist forest per humid province transition.
-  Premontane wet forest, basal belt retention.
-  Tropical wet forest, including premontane belt transition.
-  Premontane and lower montane rain forest.



REPUBLIC OF COSTA RICA

 Northern Forest Zone Recommended for Industrial Development by the Tropical Science Centre.

 Rio Macho Forest Reserve.

SOURCE: Ecological Map according to world life zones classification of L.R. Holdridge
By: J.A. Fosti, 1969

APPENDIX No. 22

The following excerpts from publications of the Tropical Science Centre refer to land use classification, and planning the development of the forest resources of Costa Rica.

1. "A methodology for Forest Resource and Forest Industry planning in developing countries in tropical areas - with a case study of Costa Rica" - A. F. Joyce, June, 1969 - Syracuse University.

- 1.1 Chapter on Land Capability Studies and Potential Land Use Classification - P. 296.

"A reconnaissance level survey of potential land use and a report with recommendations for specific land resource development projects for an area in northern Costa Rica was made under the leadership of J.A. Tosi of the Tropical Science Centre with the assistance of technical personnel employed by ITCO (National Land and Colonization Institute) and in collaboration with the soil laboratory of the University of Costa Rica. This report (Investigación Preliminar de la Zona Norte de las Provincias de ALAJUELA y HEREDIA - Centro Científico Tropical) was made for the Central Planning Office and marks the first time that the central planning agency has engaged in land use studies and the first time that the planning agency has drawn on technical personnel employed by a national land managing agency.

In view of the studies and maps relevant to land use classification that have been made in Costa Rica, it is thought that a reconnaissance level classification could be accomplished for the entire country quite rapidly with the only delay centering on the need for studies of soils in some low-land areas."

- 1.2 Chapter on Planning the Development of Forest Industry in Costa Rica - P. 311.

"... it is obvious that most Costa Rican sawnwood could not compete in foreign markets without stricter control of dimension standards and the drying process."

- 1.3 Chapter on Planning the Development of the Forest Resources of Costa Rica - P. 329.

"It was estimated that 2.5 million cubic metres of round wood would be needed to satisfy internal requirements of forest products (of Costa Rica) in the year 1990. At an average annual increment of 10 cubic metres per hectare per year on a rotation of 25 years, which is a conservative estimate of the potential productivity of Site F₁ Production Forest, 2.5 million cubic meters of round wood could be produced in 25 years on 10,000 hectares of intensively managed Site F₁ Production Forest land. At this rate, 250,000 ha. of Site F₁ Production Forest Land would be needed to produce 2.5 million cubic metres of round wood per year throughout 25 years rotation period".

Appendix No. 22
Page 2

2. "Investigación Preliminar de la Zona Norte de las Provincias de ALAJUELA y HEREDIA" Centro Científico Tropical.

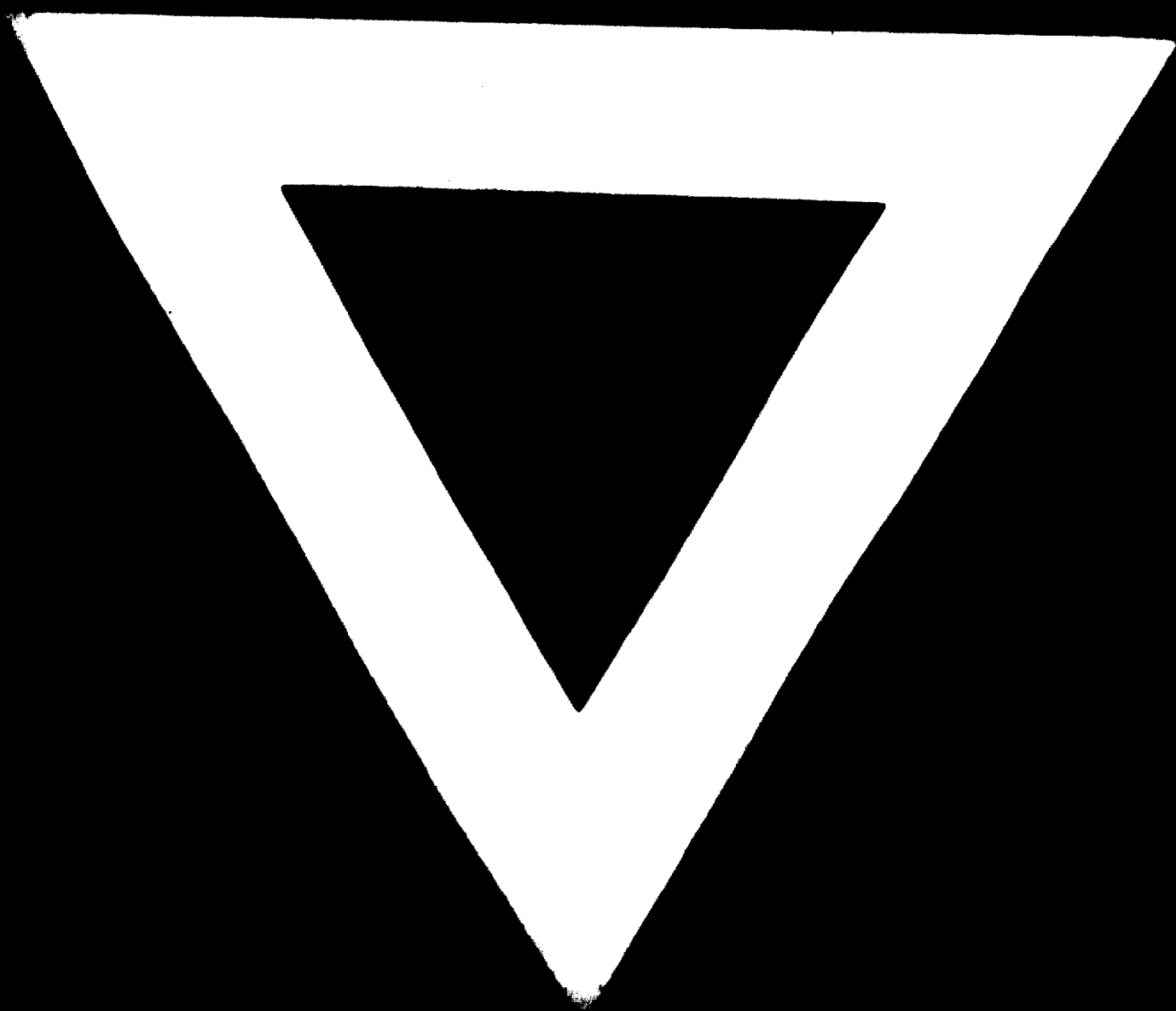
2.1 Inventory Data Summary

Volume of trees 30 cm and greater DBH in forest lands Class IV of the Classification of the Inventory and Forest Demonstration Project (FAO).

Total area	692,485 ha.
Total log volume	160,180,100 m ³
Average volume per ha.	231.3 m ³

Principal species

CAOBILLO	Carapa sp.
LAUREL	Cordia alliodora
SURÁ	Terminalia sp.
LAGARTO	Zanthoxylum spp.
COCOBOLO DE SAN CARLOS	-
CEDRO AMARGO	Cedrela sp.
GAVILAN	Pontederathra sp.
TITORA	Hicronyma spp.
CORTEZA	Tabebuia spp.
DANTO AMARILLO	Roupala sp.



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