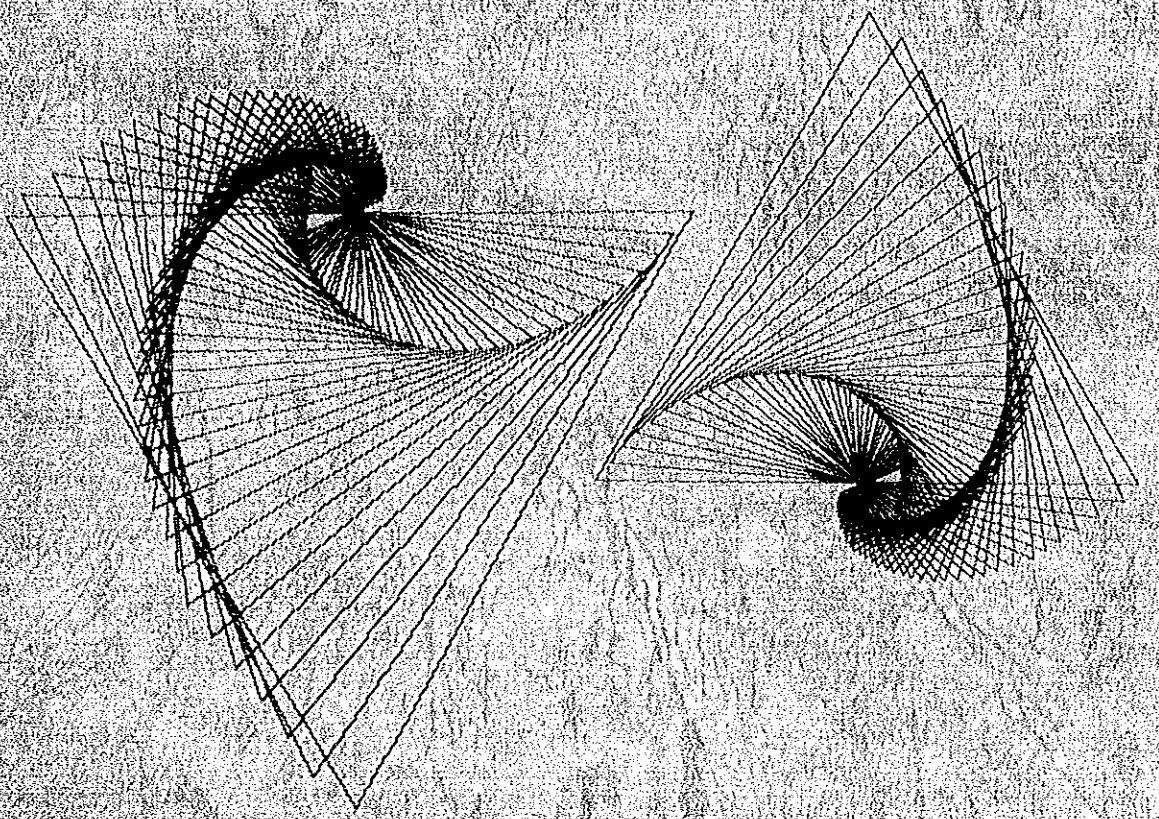
FORESTRY DEVELOPMENT PROJECT

(REPUBLIC OF PARAGUAY)



March 1989

Institute for International Cooperation
Japan International Cooperation Agency (JICA)

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PREFACE

The Project-type Technical Cooperation is an integrated form of cooperation whose aim is to realize technology transfer to relevant personnel of the project in the recipient country, by effectively combining such assistances as dispatch of experts, training of counterparts in Japan, and supply of equipment as required. It is intended to assure smooth and systematic implementation of technical cooperation program through planning, implementation and evaluation.

The duration of cooperation is usually about five years. When the project is actually commenced, a variety of survey teams and experts are dispatched to the recipient country, preparing work reports.

This case study of Project-type Technical Cooperation has been compiled originally in Japanese, then translated into English, based upon a number of these reports prepared at each stage of planning, implementation and evaluation of the project.

We would be pleased if it would be of some usefulness as reference material for those who are interested in our technical cooperation.

March 1989

Director
Institute for International Cooperation
Japan International Cooperation Agency (JICA)

CONTENTS

Outline of the Project

In March 1979, the Government of Japan signed the Record of Discussions with the Government of the Republic of Paraguay, thus starting the Japan-Paraguay Technical Cooperation for the Agriculture and Forestry Development Project in Southern Paraguay. The period of technical cooperation, five years in the original plan, was extended by two years in accordance with the Record of Discussions signed in January 1984. The objective of the Project was contribution to the development of agriculture and forestry in southern Paraguay, especially in Itapua District.

The reasons the Project was aimed at southern Paraguay, Itapua in particular, were as follows: first, having been an undeveloped remote region until the 1950s (despite its fertile terra roxa soil and natural forests in abundance), the region underwent rapid development in agriculture and forestry in the 1960s; secondly, as one of the important production areas of agriculture and forestry in Paraguay, the region had great potential. There were a number of problems to be solved and the supporting system for agriculture and forestry was insufficient in the region; thirdly, the region had three large-scale Japanese settlements, and immigrants from Japan were playing a leading role in agricultural development in the region, through the mechanized large-scale farming of soybeans and wheat.

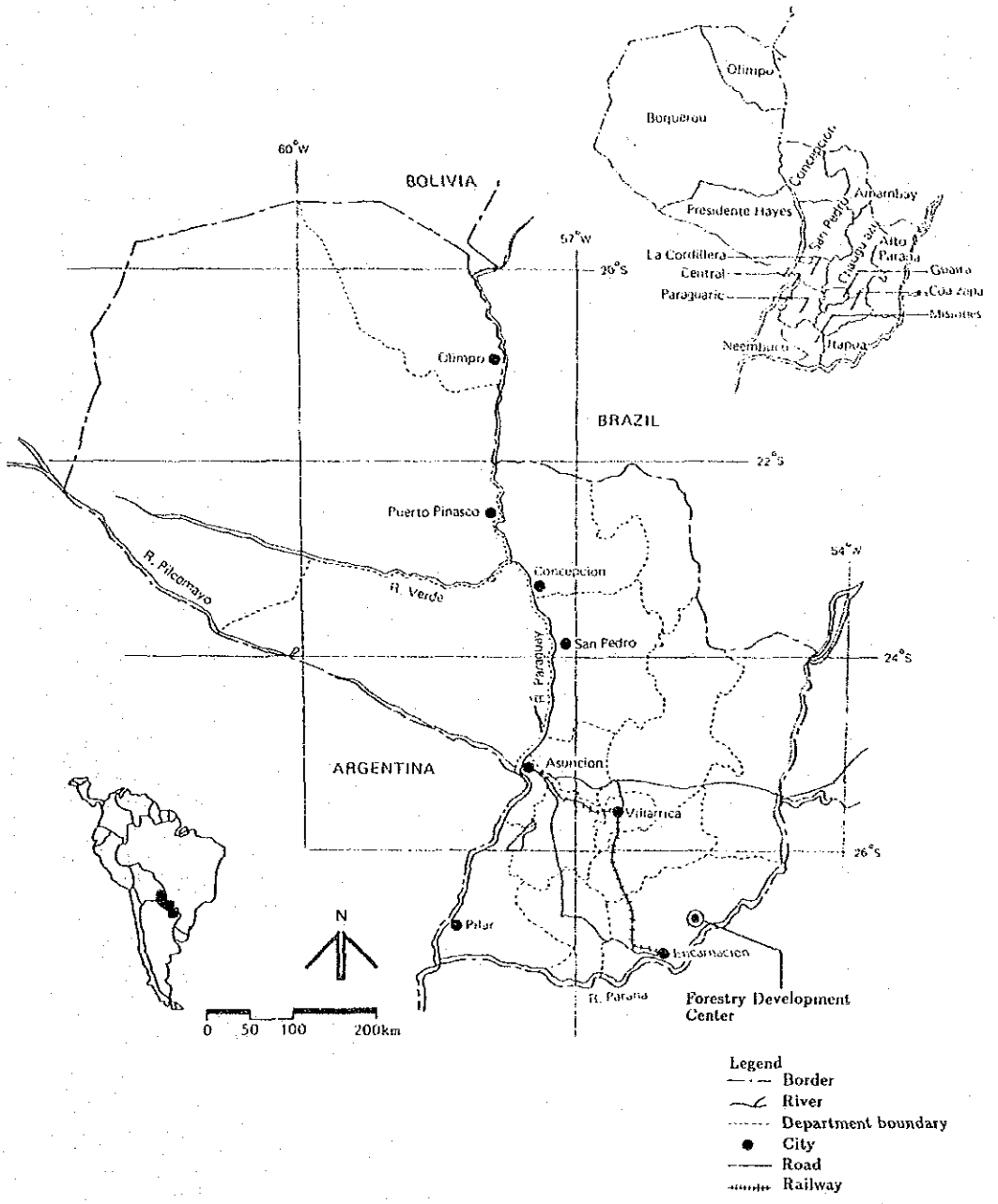
In response to a request from the Government of the Republic of Paraguay, the Government of Japan decided to extend technical cooperation in order to reinforce the technology supporting system which was aimed at developing agriculture and forestry of the region. The technical cooperation included the following three sub-projects.

(1) Strengthening of agricultural experimental research: Reinforcement and expansion of the Capitan Miranda Agricultural Experiment Station (CRIA).
(2) Mechanized agricultural development:
Establishment of an agricultural mechanization center (CEMA) and management of it.
(3) Training in forestry development:
Establishment of a forestry development training center (CEDEFO) and management of it.

For the three sub-projects, the Government of Japan dispatched leaders and experts (long-term and short-term assignment), and furnished the Government of the Republic of Paraguay with the necessary equipment and machinery. The Japan International Cooperation Agency (JICA) dispatched a coordinator, too. The Government of Japan gave training in Japan to Paraguayan technical personnel from the centers every year during the period of cooperation. The government also provided the Government of Paraguay with about three billion yen, under its grant aid program, for construction of building and facilities for the centers.

As one of the reports on project-type technical cooperation, this report examines forestry development undertaken under the Japan-Paraguay Technical Cooperation for Agriculture and Forestry Development Project in Southern Paraguay.

Map of the Project Site



Outlined Schedule of the Project

Country: the Republic of Paraguay
Project: Japan-Paraguay Technical Cooperation for the Agriculture and Forestry Development Project in Southern Paraguay
Date of request: 26 December 1976
Signing of the Record of Discussions: 16 March 1979
Period covered by the Record of Discussions: 16 March 1979 through 15 March 1986
Period of extension: 16 March 1986 through 15 March 1987

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Connection with grant aid cooperation Linked	Yes										
Dispatch of survey teams	Preliminary Survey Team	First party of Implementation Survey Team, Basic Design Team	Second party of Implementation Survey Team, Forestry Implementation Design Team	Mutual Consultation Team, Technical Guidance Team	Evaluation Team	Operation Guidance Team, Forestry Technical Guidance Team	Technical Guidance Team	Mutual Consultation Team	Technical Guidance Team		
Dispatch of experts											
1) Long-term survey Forestry development planning		10/3 11/30									
2) Long-term experts											
(1) Leader and nursing			9/14		9/14						
					8/17			3/18			
								3/5		3/18	
			8/1		7/31						
(2) Afforestation					7/3		7/2				
								3/5			3/4
(3) Forestry machinery					1/23			3/18			
(4) Woodworking					1/23		1/24				
(5) Sawing							1/31				9/9
					6/15			9/18			
								9/10		3/18	
3) Short-term experts											
(1) Forestry, civil engineering				1/23 6/20							
(2) Forest tree breeding				3/28 4/26							
(3) Nursery work					11/13 12/12						
(4) Natural regeneration					1/22 3/22						
(5) Wood preservation					3/19 5/17						
(6) Audio visual aids					8/30 10/29						
					8/30 10/29						
(7) Woodworking					10/8 11/15						
(8) Afforestation							7/8 3/18				
(9) Forestry machinery							10/24 12/20				
(10) Wood examination							10/24 12/20				
(11) Forest pathology							11/18 12/20				
(12) Saw teeth setting							11/16 12/25				
(13) Nursing									11/12 12/20		
(14) Research									11/12 12/20		
(15) Wood painting									11/8 12/17		
(16) Construction										3/21 7/20	
(17) Plant pathology									1/18 3/18		
(18) Analysis of collected date											9/12 10/26
(19) Operation of audio visual aids											1/24 3/3
Training of Paraguayan participants											
(1) Nursing			Training in nursery 11	8							
(2) Sawing			Training in sawing 11	11							
(3) Afforestation			Chief of Afforestation Sec. 10	11							
(4) Afforestation			Training in afforestation 9	9							
(5) Woodworking				Training in woodworking 11/26	11/29						
(6) Inspection of the situation				Director of CEDEFO 1/21 2/9							
(7) Inspection of the situation						Director of Forestry Agency 10/23 11/1					
(8) Woodworking					Training in afforestation research & experimentation 1/13	12/12					
(9) Research on forest produce					Training in woodworking 1/13	4/12					
(10) Forest production							Training in afforestation 1/12	12/26			
(11) Saw teeth setting							Training in saw teeth setting 1/12	12/26			
(12) Forestry machinery							Training in forestry machinery 1/12	9/30			
(13) Furniture designing								Training in woodworking 2/28		2/19	
(14) Afforestation								Training in sawing 1/24		12/18	
(15) Forestry machinery								Training in forestry machinery 3/7		9/18	

Brief History of the Project

December 1976	An economic and technical cooperation mission from Japan was informed that the Government of the Republic of Paraguay wanted cooperation from Japan concerning the project for forestry development in Capitan Miranda CRIA.
June 1977	The Minister of Agriculture and Livestock requested cooperation from Japan.
October 1977	The Government of Japan dispatched a preliminary survey team to the Republic of Paraguay.
June 1978	The Government of Japan dispatched a long-term researcher to Paraguay.
August 1978	The Government dispatched the first party of an implementation survey team.
October 1978	The Government dispatched a basic design team for the Capitan Miranda Center.
February 1979	The Governments of Japan and the Republic of Paraguay concluded the technical cooperation agreement.
March 1979	The Government of Japan dispatched the second party of the implementation survey team.
March 1979	The Government of Japan and the Government of the Republic of Paraguay signed the Record of Discussions.
August 1979	Mr. Tsuboi arrived in the Republic of Paraguay as the general coordinator.
September 1979	Mr. Aoyama arrived in the Republic of Paraguay as the leader of CEDEFO.
September 1979	The Government of Japan dispatched a forestry implementation design team to Paraguay.
October 1979	First two Paraguayan trainees visited Japan.
November 1979	Ing Meza, Director General, visited Japan to conclude the general grant aid agreement with the Government of Japan.
December 1979	The Minister, the Undersecretary, and the Director General of the Ministry of Agriculture and Livestock visited Japan.
February 1980	The ground-breaking ceremony was held for CEDEFO.
March 1980	The Government of Japan dispatched the mutual consultation team to Paraguay.
November 1980	The government dispatched to Paraguay the technical guidance team for agriculture and forestry development.
May 1981	The building of CEDEFO was completed.
August 1981	Training was started for the first group of Paraguayan trainees (nine persons).
November 1981	The Government of Japan dispatched the technical guidance team to Paraguay.

February 1982	The government dispatched operational guidance teams to the three centers in Paraguay and to Brazil.
March 1982	Training was started for the second group of Paraguayan trainees (nine persons).
July 1982	The Government of Japan dispatched the technical guidance team to Paraguay.
July 1982	The Governments of Japan and the Republic of Paraguay signed the additional Record of Discussions for the training of middle level Paraguayan engineers.
November 1982	The first Japan-Paraguay joint committee was called into session.
December 1982	The second Japan-Paraguay joint committee was called into session.
March 1983	Training was started for the third group of Paraguayan trainees (11 persons).
April 1983	A Japan-Paraguay subcommittee was called into session.
June 1983	The third Japan-Paraguay joint committee was called into session.
July 1983	The fourth Japan-Paraguay joint committee was called into session.
September 1983	The Government of Japan dispatched the evaluation team to Paraguay.
January 1984	The Governments of Japan and the Republic of Paraguay signed the Record of Discussions for extending the period of technical cooperation.
March 1984	The Japan-Paraguay subcommittee was called into session.
March 1984	Training was started for the fourth group of Paraguayan trainees (16 persons).
June 1984	The fifth Japan-Paraguay joint committee was called into session.
July 1984	The Government of Japan dispatched the mutual consultation team (forestry).
September 1984	The Japan-Paraguay subcommittee was called into session.
December 1984	The sixth Japan-Paraguay joint committee was called into session.
March 1985	The Japan-Paraguay subcommittee was called into session.
March 1985	Training was started for the fifth group of Paraguayan trainees (30 persons).
July 1985	The Government of Japan dispatched the technical guidance team.
August 1985	The seventh Japan-Paraguay joint committee was called into session.

1. REQUEST FOR COOPERATION

1-1 Background of the Request

In the 1970s, the Government of the Republic of Paraguay vigorously promoted its forestry policy. Enacting the Forest Act in 1973, the government was making efforts to cultivate forests and improve forestry production. The government also laid the foundation of its forestry administration by establishing the Forestry Agency.

The Forestry Agency came to be responsible for the entire range of forestry activities, including forestry policy planning, management of a forest fund, forest surveying, research on forestry technology, management of the standardization of forestry products, forest preservation, wildlife protection, the fostering of forestry associations, and the strengthening of forestry education. Budgets for the agency and financing from the forest fund rapidly increased.

The Forestry Agency created a forest development plan as part of the country's socioeconomic development. In the prospectus of the plan, the agency declared that it would promote the following: early-maturing tree planting, rationalized utilization of forests, protection of the natural environment, modernized forestry, demarcation of forests, forest resource surveying, training of forestry technical experts, securing of forestry development funds, and so forth. The agency expected that, in addition to its budget and private investment, foreign aid would account for nearly 20% of the necessary money for forestry development.

In November 1976, the Government of the Republic of Paraguay made a verbal request for technical cooperation concerning Capitan Miranda CRIA to the economic cooperation survey team (headed by Councilor Tanita of the Consular and Emigration Affairs Department, the Ministry of Foreign Affairs) dispatched to Paraguay from Japan. At that time, the government also made a written request (in a letter dated 26 November of that year addressed to the survey team) for Japan's cooperation in forestry activities. The contents of the request were as follows.

First, the Government of the Republic of Paraguay requested technical and financial cooperation from Japan regarding the planting of trees over a 5,000 hectare area on a pilot basis. The government intended the area to be a base for the extension of forestry technology among settlers, making it the first phase of afforestation of conifers, such as Pinus elliottii and Araucaria from which pulp was made, in Itapua District.

Secondly, the Government of the Republic of Paraguay requested technical guidance from Japan in woodworking (including exploitation of nonutilized trees), modernization of the lumber industry, management of subtropical and tropical forests, and preservation of the valley below the Itaipu dam; these were especially important and urgent plans in the country's "Five-Year Forest Development Plan". The government also requested technical cooperation from Japan regarding implementation of forest resource surveying in the northeast part of Itapua District.

1-2 Contents of the Request

The concrete contents of the request were as follows:

1-2-1 Afforestation

(1) Purpose

1) Establishment of a 5,000 hectare pilot conifer plantation in seven years, with the participation of settlers, in order to extend afforestation technology to them.

2) Increased job opportunities and promotion of local industries through the growth of forestry.

(2) Target area

A 7,000 hectare area for planned settlement in Itapua Department. Five thousand hectares of the area os intended as a training area for forestry development, the remaining 2,000 hectares for training in agriculture and stock-farming.

(3) Contents of work

1) Afforestation of the 5,000 hectare area, management of the plantation, and production and distribution of seeds and seedlings

2) Forest surveying and forestry experiments

3) Training of forestry technical experts

4) Training of operators and repairmen of forestry machinery

5) Preparation of 2,000 hectare farmland

(4) Schedule of work

	Afforestation	Farmland preparation
First year	100 ha	100 ha
Second year	300 ha	100 ha
Third year	500 ha	300 ha
Forth year ~ seventh year	1000 to 1100 ha	300 to 500 ha
Total	5000 ha	2000 ha

(5) Necessary facilities and personnel

Land	7000 ha
Personnel	Experts
Nursery	

Roads within the target area

Houses, a repair shop, a warehouse, office machinery, vehicles, and laboratory equipment

1-2-2 Woodworking center

(1) Purpose

Establishment of a woodworking center, in order to appropriately exploit forests in Itapua District.

(2) Location

The neighborhood of Capitan Meza in Itapua District

(3) Contents of work

1) Training of forestry workers in cutting, transportation, storage, sawing, treatment, and working of wood.
2) Exploitation of those kinds of tree which has been desposed of without being utilized, despite their usefulness as proven through research.
3) Demonstration of the intensive utilization of virgin forests and wood.
4) Experiments on and extension of artificial drying, utilization of waste wood, and other ways of utilizing wood.
5) Furnishing of new settlements with materials such as those for constructing buildings.

(4) Scale

The center is planned to have the following capacity, with eight working hours per day and 280 to 300 working days per year.

1) A capacity of 5000 m^3 for sawing
2) A capacity of 2500 m^3 for wood drying
3) A capacity of 2500 m^3 for production of housing materials

(5) Necessary facilities and machinery

Facilities such as a sawmill, a woodworking shop, a setting shop, and a repair shop, as well as machinery such a a generator, a sawing machine, a woodworking machine, a pressurized injector, and a drier.

1-2-3 Other request for economic and technical cooperation

(1) Technical guidance in the maintenance of the catchment areas of the Itaipu and other dams

Purpose: To give technical guidance in forest arrangement, such as investigating the roles of the forests in the catchment areas and examining various ways of utilizing these roles.

Period of cooperation: One year

(2) Survey of forest resources in the northeast regions

Purpose: To identify the real value of the existing forests and to establish appropriate uses for them. A survey of forest resources had been conducted from 1968 through 1971 in a six million hectare area of the Alto Parana District. A five million hectare area was added this time (extending into Amambay, San Pedro, and Chaco Departments).

Period of cooperation: Two years

(3) Technical guidance in managing subtropical and tropical forests
Purpose: Training of experts in charge of planning technical and financial management; implementing and examining the plan, with a view to maximizing productivity of forests of while conserving them; establishing an industrial park for efficient utilization of forests and to promote the lumber industry.
Period of cooperation: Two years

(4) Technical guidance regarding modernization of the lumber industry
Purpose: In response to the Paraguayan government's efforts to promote and modernize the lumber industry, technical training is given regarding a mechanized system, and the extension of technology is examined.
Period of cooperation: One year

(5) Financial cooperation as a counter fund necessary for cooperation in afforestation and woodworking technology
The Government of the Republic of Paraguay requested the dispatch of experts from Japan, provision of the necessary machinery and equipment, and training of Paraguayan personnel in Japan, concerning (1) to (4) above.

2. DISCUSSION ON THE PROJECT'S IMPLEMENTATION

2-1 Dispatch of a Preliminary Survey Team

In response to the request for cooperation in forestry, as well as to the request for cooperation in agriculture (which the Government of the Republic of Paraguay made in June 1977), the Government of Japan dispatched a preliminary survey team for agriculture and forestry development in the Republic of Paraguay from 11 October to 4 November 1977, in order to determine whether cooperation from Japan was possible. The team, headed by Mr. Mitsuo Kashima (chief of the Second Technical Cooperation Section, the Economic Cooperation Bureau of the Ministry of Foreign Affairs), comprised 11 persons, including two subleaders who took charge of forestry development and agriculture development as well as experts from various fields.

The team made a survey of the following and held discussions in order to determine whether cooperation from Japan was possible.

(1) Basic objectives of the forestry policy of the Government of the Republic of Paraguay
(2) The status of forestry technology such as wood production, afforestation, and woodworking
(3) The status of forestry development in Itapua District
(4) Possibilities for technical cooperation and a basic plan for forestry development in Itapua District

2-2 Grant Aid Cooperation

2-2-1 Dispatch of a basic design study team for constructing facilities and a forestry implementation design team

In addition to the request for technical cooperation, the Government of the Republic of Paraguay requested grant aid cooperation from Japan regarding construction of the necessary facilities.

In response to this request, the Government of Japan dispatched a basic design team in October 1978, to construct a forestry development training center and the facilities of the Capitan Miranda Agricultural Experiment Station (CRIA). The Government dispatched the forestry implementation design team in September 1979, to prepare a nursery and an experimental plantation which were for the outdoor training activities of the forestry development training center.

The basic design team planned the facilities based on the Government of Paraguay's request regarding construction planning. They studied the condition of both the construction sites and construction costs. The task of the team was to draft a basic design. The team estimated construction costs at 1,500 million yen, of which construction costs for the forestry development training center accounted for 745 million yen.

The task of the forestry implementation design team included designing a nursery and related facilities, survey of the experimental plantation, designing facilities and creating both facility and outdoor training plans.

2-2-2 Project site

(1) Sites for the forestry development training center and nursery

The construction sites for the center and the nursery were in Itapua, a south-eastern district of the Republic of Paraguay. They were in a block facing National Highway No. 6, nearly at the center of Pirapo Settlement (a Japanese settlement in Alto Parana), about 60 kilometers northeast of the city of Encarnacion. The settlement had a total area of 84,217 hectares, with a thick layer of fertile terra roxa soil. The settlement was already inhabited by 1668 persons (290 households). They mainly raised soybeans (a secondry crop was wheat), silk worms, oil paulownia, and corn. For forestry, they were involved in the Itapua forestry association, a rare Japan-Paraguay joint establishment in the Republic of Paraguay. The association was active in forestry including the planting Taiwanese paulownia.

The site for the center had an area of 39.20 hectares. The space necessary for the construction site was about eight hectares for the building and three hectares for the nursery. In view of terrain conditions, the building was planned for the west-southwest ridge-like portion of the site, and the nursery for the east-northeast portion of the site.

(2) Proposed experimental plantation

The proposed experimental plantation was located 18 kilometers southeast of the urban part of the Alto Parana settlement. It had an area of 403 hectares, about two kilometers long and two kilometers wide.

Construction of facilities such as forestry roads, footpaths, and buildings were planned, since the experimental plantation was intended not only for practical training but alsofor management of sawing, removal, planting, and nursing trees. The plantation was divided into nine zones by these roads nd footpaths including a seed farm, a density experiment farm, an arboretum, an exhibition forest, a normal forest creation zone, a natural forest regeneration zone, a natural forest growth survey zone, a preservation zone, and a facilities zone.

2-3 Signing of the Record of Discussions

Having been considering the technical cooperation agreement, the Government of Japan and the Government of the Republic of Paraguay decided to sign the Record of Discussions after the technical cooperation agreement was concluded. After the agreement was concluded on 9 February 1979, the Government of Japan dispatched the second party of the implementation survey team from 9 through 22 March of that year. The purpose of this team was to sign the Record of Discussions and to discuss a cooperation schedule with those concerned from the Government of the Republic of Paraguay. The party signed the Record of Discussions on 16 March that year, and the Japan-Paraguay cooperation project which lasted five years had begun.

2-4 Record of Discussions

The Record of Discussions was signed by the leader of the implementation survey team from Japan and the Undersecretary of the Ministry of Agriculture and Livestock of the Government of the Republic of Paraguay.

The Record of Discussions appears in "Appendices" at the end of this report. The Project, comprising the following three categories of undertakings, is outlined as follows in accordance with the master plan.

1) Expansion and strengthening of CRIA
2) Agricultural mechanization
3) Training in forestry development

3. IMPLEMENTATION OF THE FIRST HALF OF THE PROJECT

This chapter describes the status of the Project's implementation in the first two years. This time was mainly devoted to constructing buildings and facilities. This period included the period until May 1981 when the CEDEFO building was completed, the period from August 1981 until July 1982 during which training was started and completed for the first group of Paraguayan trainees and the beginning of training for the second group (March 1982).

3-1 Policy of Forestry Promotion in the Republic of Paraguay

The forest industry of the Republic of Paraguay had played an important role in the domestic industries and the export industries. However, utilization of wood from natural forests was extremely limited. Natural forests were rapidly being lost due to agricultural development. A great number of cut trees were burned or left to rot as they were cut. Continued use of limited kinds of wood could exhaust the country's natural forests resulting in the death of the forest products industry.

In order to prevent such a situation, it was necessary to exploit under-utilized trees and to plan more efficient utilization of valuable wood. It was also necessary to promote urgent afforestation in order to secure resources and to maintain and cultivate existing forests. Rapid loss of forests made preservation of soil and utilization of water difficult, causing problems in managing river valleys. Promotion of afforestation and adequate forest management were urgent.

The Republic of Paraguay was in good condition regarding weather, soil, etc. The counter had many regions suitable for afforestation from which satisfactory effects could be expected. There were a great number of nonutilized trees in the natural forests, though the country depended entirely on foreign nations for paper and pulp. Under the circumstances, expansion of forestry and the forest industry could be attained through afforestation and effective maintenance of forest resources.

It was recommended that the Government of the Republic of Paraguay consider the measures mentioned below, in order to contribute to the promotion of forestry and the forest industry of the country. Promotion of these measures was important to enhance the functions of CEDEFO.

(1) Measures for forest maintenance and afforestation
   1) Creation of a forest planning system in the national economic plan, and the extension of assistance to those insolved in proper forest planning
   2) Implementation of felling control, and creation of a felling adjustment funds system
   3) Aid for afforestation
      a) Afforestation subsidy (aid for land preparation, planting, and nursing, and aid for purchasing nursery stock)
      b) Low-interest long-term financing (financing for expenses as mentioned in a) above)

4) Promotion of combined management of agriculture, stock-farming, and forestry
5) Afforestation on a pilot basis by the government
   a) Increase in a loan from Inter-American Development Bank, the World Bank, etc.
   b) Promotion of harvest-sharing afforestation

(2) Measures for growth of forestry
1) Establishment of a policy to utilize high-quality broadleaf trees in order to enhance their value (broadleaf trees then in use were valuable wood verieties in the Republic of Paraguay.)
2) Development and extension of techniques for creating demand for nonutilized trees
3) Guidance in and extension of techniques for modernizing sawing and woodworking, and aid for improvement
4) Aid for establishing a chip mill and a pulp mill (intended to meet domestic demand for some time)

3-2 Outline of the Project

The CEDEFO building was completed in May 1981 with grant aid cooperation from Japan. Training was started for the first group of nine Paraguayan trainees in August of that year. Training for another nine Paraguayan trainees was started in March of the following year, in compliance with the Paraguayan educational system. Development and improvement of technology had not been very satisfactory so far because emphasis was laid on the implementation of training. It was expected to gain momentum soon.

Five people including the team leader were dispatched as long-term experts from Japan. Short-term experts were dispatched any time they were requested by the Government of the Republic of Paraguay. Materials and equipment necessary for training Paraguayan trainees were purchased and sent. They were used in everyday work and properly maintained.

After an additional Record of Discussions was signed in 1982, a cooperation project for cultivating middle-level engineers and a project for creating audiovisual aids (production of films) were implemented. Training in the field of forestry machinery was started in 1982 at CEMA near CEDEFO.

3-3 Training

3-3-1 Purpose and policy of training

CEDEFO was giving a year's practical training divided into two courses, one on seedling raising and afforestation, and the other on sawing and woodworking. These courses were intended for training middle-level technicians (foremen) who had practical skill in these fields and were in charge of instructing and supervising workers in the field.

In the Republic of Paraguay, education and training in forestry was given at the three institutions as mentioned below.

(1) Faculty of Forestry, National Asuncion University (for cultivating Ingeniero)
It offered technical education of the highest level available in the country for a period of five years.

(2) Alto Parana Forestry Technical School (for cultivating Tecnico)
It cultivated middle-level technicians having knowledge of forestry for a period of two years.

(3) Woodworking Department, the Vocational Training Center
It cultivated highly skilled workers through practical training for a period of one year.

Training at CEDEFO was expected to be at the same level as that of Alto Parana Technical School, in spite of the fact that its training period was one year, the same as that of the Vocational Training Center for skilled workers.

With regards to this situation, the authorities concerned of the Government of the Republic of Paraguay proposed the third guidance team that CEDEFO attempt to cultivate engineers equal to or higher than Tecnico in level, over an extended period of time. The team recommended that the authorities concerned expedite that improvement, in due consideration of the purpose and level of training at CEDEFO and the utilization of those who received training.

3-3-2 Opening period of courses and application of trainee

Training for the first group (five in the seedling raising and afforestation course and four in the woodworking course) was started in August 1981 and completed in July 1982. It was decided that training for the second and other subsequent groups should be started in March, in compliance with the Paraguayan educational system. Though advertisement for the second group (16 trainees) was actively conducted through broadcasts, newspapers, and explanation meetings, only nine persons applied (five for seedling raising and afforestation, and four for woodworking).

Reasons for so few applicants might include: (1) the down turn in forestry and the forest industry in the Republic of Paraguay, (2) the fact that afforestation business was almost nonexistent, and hence there was little demand for forestry technicians in either public or private sectors, (3) the rate of operation at sawmills was low, (4) the period of one year for training provided no temporary exemption from military service, and (5) results of training were not yet given. In order for CEDEFO, (which was able to train 25 persons), to fulfill its function, it was necessary to promote forestry nd the forest industry of the Republic of Paraguay, placing emphasis on afforestation. It was recommended that an extended training period be considered (two years), with the number of trainees being 12 or 13 each year and that the existence of CEDEFO and its object of training technicians of the Tecnico level be publicized.

3-3-3 Training hours and curriculum

(1) Training for the first group consisted of theory and practice in a ratio of 3:7, in due consideration of training hours and practical training. Training for the second and subsequent groups was conducted in a ratio of 2:8, with increased emphasis on practical training. Mechanical training was reinforced, and an operation-in-optimum-time system was introduced. The first term of the year (March through July) consisted of a combination of lectures and practice; the second term (August through December) was mainly practice. Training was given 40 weeks per year, 39 hours per week, seven hours per day on the average, and four hours on Saturdays. Hour assignment for training was as follows. In both tables, training hours per day were regarded as 6.5 hours (39 hours ÷ 6 days = 6.5 hours).

A. Course for Seedling Raising and Afforestation

Hours / Subject	Per year	Days a year	Share
Afforestation, nursing (incl. breeding, soil, human work in natural forests)	595	91.5	40%
Dendrology (incl. wood utilization)	220	33.8	15
Lumber collecting and transporting	175	27	12
Forest mensuration (incl. surveying)	100	15.4	7
Forestry machinery	395	60.8	26
Total	1485	228.5	100

B. Course for Woodworking

Hours / Subject	Per year			Days a year	Share
	First term	Second term	Total		
Property of wood	81		81	12.5	5%
Lumbering	230	Selective	592	198.7	87
Woodworking	221	Lumbering 700		198.7	87
		Woodworking 700	+		
Setting (cutting)	141	Setting 700			700
Preservation, drying	60	60	120	18.5	8
Total	733	760	1493	229.5	100

(2) Curriculum of the course for seedling raising and afforestation

Training was given in the following order: basic knowledge of raising seedlings and afforestation, the property of wood, training in machinery handling, and forest mensuration. Trainees had a stronger desire to practice using machines and instruments than to attend lectures. In addition to providing training, CEDEFO encouraged afforestation, furnished farmers and forest managers with nursery stock, gave explanation meetings for agricultural cooperative associations, and conducted extension of village development utilizing Forestry Agency bulletins.

(3) Curriculum of the woodworking course

Training placed emphasis on handling, maintenance, inspection, repair, and operation of machines. The center undertook sawing at a charge, in order to ensure material wood for practical training. Trainees made furniture in woodworking practice. The yield of sawing was 60%, while it was 40% outside the center. CEDEFO was highly estimated especially in such techniques as band saw welding by means of oxygen-acetylene gas, stellite welding, and band saw setting. CEDEFO gave guidance in these techniques to sawmills in and around Encarnacion.

Insufficient local funds sometimes caused shortages of fuel necessary for operating machinery, thereby limiting operation of machines for woodworking. This constituted a hindrance to smooth implementation of training.

(4) Training regarding forestry machinery

The basic policy was to handle forestry machinery safely and carefully. The concept of a "new training system" was introduced under which trainees would conduct the everyday inspection of machines without fail and so that they would become familiar with proper action in handling and operating machines. Training was given regarding thoughtful use of machinery to maintain the forest ecosystem taking into consideration tree and soil preservation. Training was also given regarding machine-aided work which should e conducted in due consideration of forest conservation. The experts from Japan instructed the trainees, since Paraguayan counterparts had no experience in providing instruction on forestry machinery. A special instruction manual was prepared for Paraguayan counterparts.

Training mainly consisted of the fundamental knowledge necessary for proper use of machines. It covered mechanisms, functions, inspection, handling, structure, and disassembly and assembly of engines. Training was given on the premises of CEDEFO, in the experimental plantation, and at the nursery.

Training that could not be given in the CEDEFO facilities, such as studying the structure and function of two-cycle or four-cycle engines and the maintenance and repair of chain saws and vehicles, was given at CEMA.

3-4 Technical Development

Until July 1982, the activities of CEDEFO were concentrated on preparation, implementation, and improvement of training. Less progress was made in research and the development and improvement of techniques than had been planned. Paraguayan counterparts depended on experts from Japan for technical development.
Regarding technical development at CEDEFO, important issues facing forestry and the forest industry of Paraguay had to be considered. These included early growth of forest resources through afforestation, conservation and cultivation of existing forests through human work in natural forests and planting of local trees (that is, broadleaf trees), exploitation of nonutilized trees, and introduction of large machines. The Government of the Republic of Paraguay expected much from CEDEFO regarding exploitation of nonutilized trees.

In general, technical development advances through repetition of a series of activities consisting of research and experiments, experiments for practical use, and review for improvement. It takes a long time for these activities to produce results. Because of the limited period of cooperation, development and consolidation of techniques in such fields as results could be obtained in a short period were pursued in this project.

The situation of technical development as of July 1982 was as follows, according to CEDEFO.

(1) Afforestation
1) Research on forest raising system
   a) Creation of density examination sites
   b) Creation of columnar planting sites
   c) Creation of controlled forest
   d) Experiment on mechanized afforestation
   e) Creation of an arboretum
2) Research in natural forests
   a) Examination of the structure of stands and volume of growth
   b) Examination of effects of natural regeneration

(2) Nursing
1) Review of seeding, density, and standard of nursery stock
2) Review of work system
3) Examination of soil, and damage from diseases and insects
4) Experiment on breeding

(3) Woodworking
1) Experiment on natural drying
2) Experiment on preservation of wood
3) Tissue examination to identify wood
4) Making into furniture materials

3-5 Facilities

(1) Building
The necessary construction for training was completed in May 1981 through grant aid cooperation from Japan, two years and two months after the Record of Discussions was signed in March 1979. Training for the first group was not started until August 1981. Since the building was completed long after the Project's beginning, actual operation of the Project was way behind schedule, making it difficult to finish the expected undertakings within the period of cooperation.

(2) Nursery
A 1.4 hectare nursery was prepared under a project for developing a model infrastructure. Twenty-five thousand seedlings were produced in 1981, and 120 thousand in 1982. The Government of Paraguay prepared a two hectare nursery at its own expense, to satisfy an increased demand for seedlings. A seed farm in the nursery was prepared in parallel with experiments on breeding.

(3) Experimental plantation
An experimental plantation was undertaken with a planned area of 420 hectares (actual area was 403 hectares). A 2.4 kilometer main road was completed in 1980, and a 5.5 kilometer forestry road was opened at the Paraguayan government's expense. As for the normal forest which was to be created with an area of 25 hectares every year, a record was maintained of undertakings and damage from diseases or insects.

3-6 Cooperation in Training Middle-Level Technicians

3-6-1 Training of middle-standing technicians

Technology transfer through technical cooperation from Japan had not been designed for middle-level technicians of target countries based on the view that governments of target countries should themselves be in charge of transfer and extension of technology from senior experts to those who are lower in skill.

It was been pointed out, however, that technology transferred through technical cooperation from Japan has not been extended to the full possible level in target countries, on account of shortages in middle-level technicians. To be more effective, technical cooperation should be designed to also cultivate middle-level technicians, such as extension workers, who were to play an important role in helping the effects of a technology transfer reach general farmers.

Training of middle-level technicians requires large expenditures as local costs: ordinary working expenses (for training, maintenance and management f training facilities, and ensuring of instructors) and expenses for preparing materials and conducting training. The ratio of local costs was usually much higher than that of projects for hardware development. Since training of middle-level technicians such as extension workers was a comparatively new issue for developing countries, governments find it difficult to appropriate sufficient funds for such as undertaking, though they were well aware of the importance of it.

The Government of Japan began this project in 1979 to cooperate with the Government of the Republic of Paraguay in training middle-level technicians. By bearing part of local costs Japan sought to remove financial difficulties on the Paraguayan side in implementing the Project.

3-6-2 Signing of additional Record of Discussions

In response to the Paraguayan government's request for implementing a cooperation project for training middle-level technicians, the Government of Japan decided to start the Project in 1982, discussed necessary matters, and made a record of the discussions. This additional Record of Discussions included Item X "Training in the Republic of Paraguay", which was added to the original Record of Discussions after Item IX. The additional Record of Discusions was signed by the leader of the temporary survey team, Akira Ino, and by Undersecretary Luis Pampliega Caballero at the Undersecretary's office in the Ministry of Agriculture and Livestock. The following was the added item in the additional Record of Discussions, which appears in "Appendices" of this report.

"X Training in the Republic of Paraguay

In order to smoothly implement the Project, the Government of Japan will take necessary measures in accordance with Japanese laws and regulations, through the Japan International Cooperation Agency, for paying part of the local costs including expenses for preparing teaching materials in Paraguay, traveling expenses for outdoor training, remunerations to special instructors, expenses for procuring training materials, etc."

3-6-3 Implementation schedule and budgets

The Government of the Republic of Paraguay considered it important and urgent to spread forestry technology among farmers and forest managers in the northern part of the country and sought to train middle-level technicians to promote the extension of such technology. The fact was, however, that the government did not have enough funds and was having difficulty in ensuring the working expenses indispensable for training and technical development which had already been started at CEDEFO. Thus it was very difficult to ensure a budget for the training of middle-level technicians. The Government of the Republic of Paraguay requested cooperation from Japan in training such technicians in the fields of afforestation and woodworking. Being sure that to answer the request would greatly contribute to the extension of technology in afforestation and woodworking in the Republic of Paraguay and that it would enhance the effects of CEDEFO projects, the Government of Japan decided to cooperate in a five-year plan beginning in 1982. Estimated yearly budgets to be borne by the Japanese government in accordance with an implementation plan over five years were as follows:

Year	1982	1983	1984	1985	1986
Expenses (thou. Gs)	4,639	4,397	4,057	4,057	4,057
Expenses (thou. yen)	9,000	8,530	7,871	7,871	7,871

Rate of conversion: 1 Gs = 1.94 yen

The budget in the implementation plan for fiscal 1982 and contents of undertakings were as follows:

Budget for Fiscal 1982

Course, expenses		Participation fee	Teaching materials	Traveling expenses	Training materials	Traveling expenses for instructors	Remuneration to special instructors	Total
Afforestation	thou. yen	563	1,009	1,307	2,328	99	468	5,774
	thou. Gs	290	520	674	1,200	51	241	2,976
Woodworking	thou. yen	194	1,668	223	1,071	—	70	3,226
	thou. Gs	100	860	115	552	—	36	1,663
Total	thou. yen	757	2,667	1,530	3,399	99	538	9,000
	thou. Gs	390	1,380	789	1,752	51	277	4,639

Contents of Undertakings for Fiscal 1982

Course	Afforestation		Woodworking
Name of training	Training for Forestry Agency personnel	Training for agricultural extension workers	Training of private woodworking technicians
Period	End October to end November 1982	Middle to end of January 1983	Middle to end of March 1983
Training days	20	14	14
	General forestry: 2 days Nursing: 4 days Afforestation ' forestry machine: 10 days Inspection and practice: 4 days	Nursing: 4 days Afforestation & forestry machinery: 10 days Saw teeth setting: 6 days	Basic knowledge (use according to property): 2 days Lumbering: 6 days
Remarks	Retraining of middle-level technicians of the Forestry Agency	Training of extension workers who instruct agriculture and forestry workers to undertake forestry in private forests	Training for those holding responsible posts in sawmills and other organizations but who have had few opportunities to receive long-term training.

The curriculum and teaching materials necessary to implement the project for training middle-level technicians were prepared by Paraguayan counterparts including the director of CEDEFO, with the cooperation of experts from Japan. In order to make the effects of the technology transfer reach farmers and forest managers, it was necessary to actively and effectively cultivate middle-level technicians. CEFEFO's role was to establish and strengthen such cultivation.

3-7 Preparation of Audio-visual Aids

It was decided in fiscal 1982 to prepare audio-visual aids with a view towards enhancing the effects of training and technical development at CEDEFO. Making necessary surveys in the southeastern part of the Republic of Paraguay, the implementation planning team made arrangements with the director general of the Forestry Agency, the director of CEDEFO, and experts from Japan. It was difficult to produce one film that covered the fields of nursing, afforestation, and woodworking. In Paraguay, people were felling natural forests to convert them into pastureland and farmland; an enormous number of trees thus felled were burned without being utilized; no afforestation was conducted resulting in increased destruction of forests. This was because of the financial difficulties facing the Paraguayan government and the people's being unaware of the importance and necessity of afforestation.

Hence, the persons concerned decided to make a film that served as a guide to afforestation, explaining the importance of forestry and the forest industry. They decided to use the film for orientation of trainees who had no knowledge of forestry, in order to help them understand the big picture of forestry including the functions and social roles of forests. The film was intended also as a teaching aid that could be used for training middle-level technicians and for extending knowledge and techniques to farmers and forest managers. Filming was started in the end of August 1982 in Paraguay.

4. RESULTS AND EVALUATION OF THE PROJECT

In this project, the period of cooperation was five years until 15 March 1984, based on the Record of Discussions signed on 16 March 1979 at Asuncion. The Government of Japan dispatched an evaluation team to study the status, and evaluate the results, of the Project's implementation as of September 1983, six months before expiration of technical cooperation under the Project. The team was also to discuss measures to be taken regarding the Project with the Paraguayan persons concerned. Examining the results as of 1 September 1983 and evaluating them, the team recommended to the Governments of Japan and the Republic of Paraguay that the period of technical cooperation under the Project be extended two years. This time was needed to successfully complete the Project because there were some problems yet to be solved. The governments signed an additional Record of Discussions on 20 January 1984, and the period of cooperation was extended up to 15 January 1986. This chapter describes results and evaluation of the Project's implementation, based on the report of the team.

4-1 Results of Activities and Degree of Attaining Objectives

4-1-1 Technical development

(1) Seedling raising

A nursery was prepared in 1980 as the key facility for seedling raising and afforestation, under the project for preparing a model infrastructure. An area of 1.4 hectares of the planned four hectares was prepared as a nursery.

The seedling raising section was mained early with Paraguayan counterparts starting the first raising in 1980. They produced 35,000 seedlings in 1981, 133,000 in 1982, and 107,000 in 1983.

Seedlings were mainly conifers such as Pinus elliottii, Pinus taeda, Araucaria, and Pinus caribea. They also included of broadleaf trees such as lapacho, gatambu, and paraiso on an experimental basis.

Experiments on raising seedlings were43 conducted using the pot raising and loose raising methods. Pot raising was more effective in terms of the time needed for planting and rooting, while loose raising was more advantageous in view of producing and transporting seedlings in large quantities for large-scale undertakings. It was adequate to have made experiments on both methods, so that future conditions would be satisfied.

The period o raising was about 10 months for seedlings of each kind of tree. Some kinds of tree had an optimum length for their seedlings to be planted, thus affecting the period of raising. It was necessary to set standards for each kind and make clear this relation to the period of raising, in parallel with experiments in the afforestation section.

Transfer of basic nursing technology was proceeding smoothly for conifers such as pines and araucaria, especially for Pinus elliottii, for which the largest number of seedlings were produced. A technical system had to be established to include transportation of loose seedlings and temporary planting at a mountain foot, because large-scale afforestation was probable with expension of the undertaking. As for broadleaf trees, experiments were made on seedlings of such trees as lapacho and cedro, but a number of unknown matters kept the level of technology lower than that regarding conifers. Nursing technology had to be developed for seedlings of local trees including useful trees.

Lowered fertility resulting from continuous seeding in the nursery may pose a problem. To solve it, it may be necessary to develop and transfer techniques of manuring and compost production. It may also be necessary to establish a technique of protecting seedlings from diseases and insects.

(2) Afforestation

A 400 hectare experimental plantation was created for technical development and practical training. There, a 2.4 kilometer forestry road was constructed in 1980 under the project for preparing model infrastructure. A 1.7 kilometer loop road and a work road were opened in 1982.

A density experiment zone was created every year for each kind of tree; an area of three hectares was afforested with Pinus elliottii in 1981, an area of 2.8 hectares with Pinus caribea in 1982, and an area of 2.3 hectares with Pinus taeda in 1983.

Creation of controlled forest was started at the same time; an area of one hectare was afforested with Pinus elliottii in 1981, three areas of three hectares in total with Pinus eliottii, Pinus taeda, and Pinus caribea in 1982, and two areas of two hectares in total with Araucaria and Pinus taeda in 1983.

Since areas of afforestation and the kinds of trees were not uniform, it was necessary to plant trees of a kind whose total growth volume was as uniform as possible, in a fixed area. Creation of controlled forest was to be continued until the condition of controlled forest was obtained.

The arboretum was afforested in 1982 over an area of 0.6 hectare with local trees and exotic trees, and over an area of 0.5 hectare in 1983, and subsequent planting was continued.

As for a natural forest treatment zone, an examination zone was selected in 1982, and direct seeding and planting of Araucaria and paraiso were conducted over an area of 0.25 hectare. Examination was conducted also in 1983; assistance work for natural regeneration such as cutting cedro was conducted over an area of 0.125 hectare.

As for technical development in the afforestation section, big issues were the establishment of an afforestation system through cutting all trees of a forest at one time and making clear the techniques of natural forest treatment. A field, therefore, had to be prepared first in order to conduct surveys and experiments, and instruction had to be given in such experiment. It took long time to produce results.

As for forestry machinery, technology was transferred to a certain level regarding regular maintenance and repairing, opening workroads and land preparation by means of machinery. It would be more effective to establish a land preparation method suitable for local circumstances, and to implement nursing by means of machinery, as part of the technical development in the afforestation section.

(3) Woodworking

Technical development in the woodworking section was aimed at working and exploitation of nonutilized trees. Technology was transferred regarding analysis of the properties of wood, sawing, woodworking, methods and procedures of experiments, measurement and analysis of data, etc.

As for sawing and saw teeth setting, the Paraguayan counterparts who manned the section in 1979, were dispatched to Japan as participants while the CEDEFO mills were under construction. Upon returning to Paraguay, they received instruction from Japanese experts in May 1981 when trial runs were executed. This section especially, required skilled techniques and so greatly depended on experts from Japan. In saw teeth setting for sawing nonutilized trees most of which were hard wood, saw teeth had to undergo super hard stellite processing. It took a long time for Paraguayan counterparts to master this processing technique. Traditional sawing had been intended for lapacho and cedro. As for nonutilized trees, only experimental sawing was conducted since lumbering conditions had to be settled upon making clear the properties of the lumber. It was necessary to establish proper sawing techniques for nonutilized trees of several varieties, including thin conifers such as Araucaria.

In the woodworking section, technology was transferred mainly for cutting and grinding of edged tools and basic working techniques, by doing various woodwork. Technical development in this section, however, was falling behind schedule due to delayed technology transfers and the delayed participation of Paraguayan counterparts and long-term experts not being dispatched from Japan until 1983. Technical development had yet to be furthered concerning a higher-level working of useful trees and the proper use of nonutilized trees. Continuous research and experiments were necessary.

In order to establish techniques for working and exploiting nonutilized trees, experiments had to be first made to make clear the basic properties of these trees and test their suitability for working. For these purposes, experts dispatched from Japan in 1981 transferred technology over two years mainly concerning the identification of wood. The transfer was completed after 32 kinds of experiments were carried out.

As for experiments regarding wood drying, wood strength, preservation of wood from decay, and treatment against damage from diseases and insects for the purpose of knowing the suitability of trees for working, only part of the experiments have been made so far. These experiments had to be made in conjunction with those in the sawing and woodworking sections.

Technology transfers were conducted in 1982 on wood drying using four types of natural drying processes. Paraguayan counterparts, however, were not fully capable of analyzing the experimental data. As for the preservation of wood from decay, short-term experts transferred basic and general techniques, though only a small number of experiments were made due to the difficulty of obtaining chemicals and the insufficiency of funds for equipment operation.

Technical development in the woodworking section did not produce satisfactory results on account of the many problems in utilizing nonutilized trees. In addition to the low technical level of woodworking in Paraguay, many counterparts were not familiar with woodworking at all, and hence much time was devoted to their obtaining basic knowledge and techniques. One cause of delayed technology transfer in woodworking was an insufficient level of local funding on the Paraguayan side. Woodworking especially required a great deal of power for operating the machinery and experimental instruments, which caused an increase in fuel costs. A large sum of money was necessary for reagents and the small equipment for experiments. Financing was not sufficient.

4-1-2 Training

One problem of training was that practical training could be given only once a year because practical training in the seedlings raising and afforestation course was subject to the seasons. A problem of training in the woodworking course was that technicians were not immediately capable of doing woodwork without first gaining higher expertise. In addition, these courses required elementary mathematical ability. It was difficult, however, to register only those who were above a certain level in math ability, in light of the apllication process for training. Hence, a period of one year was insufficient to cultivate responsible field technicians (foremen). In order for CEDEFO to function to its fullest, it was necessary to strengthen the basic educational levels of the trainees, and to cultivate high-level technicians over an extended period of training. This would contribute to the society of the Republic of Paraguay in general.

4-1-3 Degree of attainment

The following table shows an evaluation of degrees of attained in each subject. The evaluation was made as of 1 September 1983.

A. Technical development

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
			Technical cooperation is aimed at developing a forestry technology which will be suitable to the region, through activities mentioned below. They will be carried out in liaison with the afforestation, nursing, and woodworking sections.			
1. Afforestation (1) Establishment of afforestation system						
a) Creation of the density experiment zone and experiments	B	Started in 1981. An 8 ha. zone has been created for Pinus elliottii, caribea and taeda. The creation of the experimental zone is going smoothly. Density experiments are being furthered, though they are still in their first stages.	1. Creation of a density experiment zone and continued experiments	←	→	Afforestation
			2. Creation of a fixed survey zone and survey and analysis of growth volume	←	→	Afforestation
			3. Evaluation of results of density experiments, and examination of the optimum planting density of each kind of tree		← →	Afforestation
b) Creation of the planting experiment zone and experiments	C	An area of 0.25 ha. was created in 1982. It is necessary to improve the experimental zone and continue experiments.	1. Continued experiments in assisting work such as direct seeding, planting and natural regeneration of each kind of tree	←	→	Afforestation
			2. Creation of a fixed survey zone and survey and analysis of growth volume	←	→	Afforestation
			3. Evaluation of results of planting experiment		← →	Afforestation
c) Creation of normal forest	B	Started in 1981. Steady treatment is necessary since it takes about 20 years to complete the plans for improvement.	1. Evaluations conducted in the same areas regarding minimum kinds of existing trees	←	→	Afforestation
			2. Creation of fixed survey zones and survey and analysis of growth volume	←	→	Afforestation
			3. Establishment of nursing and management techniques (for at least five years of nursing)	←	→	Afforestation
			4. Afforestation after cooperation period has been over– selection of land and location mapping		← →	Afforestation
			5. Preparation of a forestry road and footpaths	←	→	Afforestation

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
d) Creation of arboretum and an exhibition forest and experiments	B	In addition to local trees, exotic trees such as sugi and hinoki have been planted. Their growth is being observed.	1. Improvement and extension of the arboretum (replanting and complementary planting)	←	→	Afforestation
			2. Creation and evaluation of an exhibition forest under a series of work systems, that would include sawing, land preparation, planting, and utilization of afforested land	←	→	Afforestation
e) Mechanized afforestation	B	Mechanized work, mainly land preparation, was implemented. Mechanization of nursing such as weeding is necessary in the future.	1. Establishment of a sawing system–based on the conditions of regeneration	←		Afforestation
			2. Establishment of a mechanized land preparation system– rooting up, disposal of juvenile trees and branches, first plowing, survey of the timing of breaking soil and frequency of breaking	←		Afforestation
			3. Repair and maintenance of machines and instruments– including maintenance of history cards of machines and registers of spare parts management	←	→	Afforestation
(2) Human work in natural forests						
a) Survey of forest structure and growth volume	C	Survey zones for each experiment have been created and basic surveys have been implemented. It is necessary to continue to extend the survey zone and accumulate data.	1. Demarcation and display of experiment zones	←		Afforestation
			2. Survey and analysis of growth volume of each kind of tree in the experiment zones	←	→	Afforestation
			3. Survey of forest ecology such as the development of saplings and prosperity or decay	←	→	Afforestation
b) Survey of methods and effects of natural regeneration	C	A survey zone for natural regeneration has been selected. It is not yet possible to evaluate the effects of natural regeneration. It is necessary to extend the survey zone and accumulate more data.	1. Examination of the method of planting in columns for each kind of tree	←	→	Afforestation
			2. Examination of the breadth of row clearing in accordance with the form of the part of the upper trees	←	→	Afforestation

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
			3. Creation of fixed survey zones, and survey and analysis	←	→	Afforestation
			4. Evaluation of the effects of natural regeneration		← →	Afforestation
2. Seedling raising						
(1) Examination of the seeding, density, and standard of seedlings	B	Technology transfer has been completed regarding basic and general nursing. Further experiments are necessary regarding the seeding of each tree and density of seeding. It is necessary to set optimum standards of seedlings, in relation to afforestation.	1. Elucidation of the timing of seed production and the optimum time for seeding for each kind of tree	←	→	Nursing
			2. Seeding and management of seedling density for each kind of tree–unit seeding volume, pricking timing, number of seedlings prepared in the nursery	←	→	Nursing
			3. Evaluation of standardization of seedlings from the forest	←	→	Nursing, Afforestation
			4. Survey of the rate of germination and plant percent	←	→	Nursing
			5. Costing of seedlings production (for each kind of tree, pot seedlings and loose seedlings)	←	→	Nursing
			6. Improvement of techniques such as cutting and selection of suitable kinds of trees (regarding the timing, position of collecting scions, and treatment with chemicals)	←	→	Nursing
			7. Preparation of manuals for seedling production for each kind of tree	←	→	Nursing
(2) Examination of working system	C	Seedlings are produced for afforestation only on an experimental basis at present. A nursing system needs to be established for commercialization of afforestation in the future.	1. Improvement in potting soil preparation	←	→	Nursing
			2. Examination of loose seedlings production system– selection of suitable trees, survey of suitable time for planting, transportation, temporary planting in the forest, etc.	←	→	Nursing, Afforestation
			3. Shortening the period of seedling production	←	→	Nursing
			4. Examination of the work system for producing seedlings in large quantities	←	→	Nursing

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
			5. Establishment of nursery facilities for maintenance and management	←	→	Nursing
(3) Survey of soil and damage from diseases and insects	C	It is necessary to develop manuring techniques in order to offset the decreased fertility due to continuous seeding. It is also necessary to further research on preventing damage from diseases and insects. Establishment of a method to protect cedro against damage from insects is urgent.	1. Establishment of fertilizer production techniques, especially for loose seedlings	←	→	Nursing
			2. Measures for preventing damage from diseases and insects	←	→	Nursing
			3. Study and survey of codlin moths	←	→	Nursing, Afforestation
(4) Breeding experiments	D	There is a plan to create a seed collecting forest for breeding forest trees in the future, but the plan has not been started.	(The following areas of training will be given to Paraguayan counterparts in Japan.)	←	→	
3. Woodworking						
(1) Sawing						
a) Establishment of lumbering for each kind of tree and by use	B	Instruction has been given in efficient lumbering of the trees mainly used as construction material wood. As for nonutilized trees, we must establish a lumbering method, upon making clear the basic properties of the wood, and after taking into consideration the uses of this wood. Work toward establishing such a method has only partially been started. Further examination of lumbering methods is necessary for each kind of tree. A lumbering method for thin conifers has yet to be examined.	1. Survey of the basic properties of nonutilized trees	←	→	Lumbering
			2. Developing the use of nonutilized trees (including thin conifers)	←	→	Lumbering, Woodworking
			3. Examination of the uses for each kind of tree and a standardization of lumbering techniques	←	→	Lumbering

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
b) Processing of saw teeth	C	Since the lumbering of heavy and hard trees must be done with saws that have hardened teeth, instruction has been given in the stellite processing of band saws. The technique requires practice, so instruction should be given over a longer period. Instruction in circular saw teeth setting has not been started.	1. Stellite processing and teeth setting of band saws	←	→	Lumbering
			2. Teeth setting of super hard circular saws	←	→	Lumbering
c) Quality control of lumber	C	In using lumber for construction materials, standardization of dimentions and quality is necessary to some extent. Technology transfer is necessary regarding quality control in each of the lumbering processes, in order to examine the relation among the properties of the wood, the adjustment of machinery, and selection of wood.	1. Quality control for each lumbering process	←	→	Lumbering
			2. Storage and management of lumber	←	→	Lumbering
			3. Examination of standards for construction-material wood	←	→	Lumbering
			4. Trial construction of a wooden house as a model		← →	Lumbering, Woodworking
(2) Wood drying						
a) Experiments on natural drying processes	B	Technology was transferred regarding methods of drying wood, through four kinds of experiment. However, trainees have not acquired a full understanding of the necessary data processing.	1. Establishment of a schedule for natural drying for each kind of tree	←	→	Lumbering
			2. Instruction in relevant data processing	←	→	Lumbering
b) Experiments on artificial drying	D	Not even a trial run has been carried out on account of a shortage of funds for handling fuel costs, the delayed dispatch of experts from Japan, and the delayed participation of Paraguayan counterparts.	1. Instruction in operation of artificial drying equipment and its maintenance	←	→	Lumbering, Woodworking
		A drying method utilizing solar heat should be considered as an artificial drying method so that energy costs can be kept as low as possible.	2. Development of a simplified solar-head-aided drying facility (A simplified drying house is necessary.)	←	→	Lumbering, Woodworking

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
(3) Preservation of wood from decay						
a) Simplified methods of preserving wood from decay	C	Instruction has been given by short-term experts from Japan in fundamental techniques of preserving wood from decay. However, experiments have not been made because of the difficulty in the domestic procurement of chemicals.	Examination of simplified methods of preservation of wood from decay and protection from insects	←	→	Lumbering, Woodworking
b) Experiments in pressurized	C	Short-term experts from Japan have given instruction in the handling of instruments and in carrying out experiments. This instruction has been suspended on account of an insufficiency of necessary chemicals.	1. Instruction in machines operation and experiments	←	→	Lumbering
			2. Exposure tests for wood used in pressurized injection experiments	←	→	Lumbering
(4) The identification of wood and examinations of quality of wood						
a) Examination of basic quality	B	Identification has been completed for 32 kinds of trees. It is still necessary to make clear the basic quality of wood.	Continued experiments on the basic properties and data collection	←	→	Lumbering, Woodworking
b) Experiments on the mechanical properties of the wood	D	Not even a trial run has been carried out on account of insufficient electricity and the delayed participation of Paraguayan counterparts. It is necessary to make clear properties of materials regarding nonutilized trees (bending, tensile strength, and shearing stress) and accumulate the necessary data.	Development of uses through property testing for each kind of tree–development of uses of nonutilized trees	←	→	Lumbering, Woodworking
(5) Woodworking						
a) Cutting and grinding of edged tools	C	Technology has yet to be transferred, since experts were not dispatched until 1983 because of delayed participation of Paraguayan counterparts and also the delayed provision of equipment.	Instruction in techniques related to 1, 2, and 3 below will be given step by step.			
b) Surface finishing	C	The same as above.	1. Cutting and grinding of edged tools	←	→	Woodworking
c) Commercialization	D	The same as above. (Has not been started)	2. Adhesion and connection	←	→	Woodworking

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	*Rating*	*Comments*		84/85	15 Mar. 85/86	
			3. Surface finishing such as painting and coloring	←	→	Woodworking
			4. Commercialization of woodwork (development of designs)	←	→	Woodworking
(6) Structure, handling maintenance, and inspection of wood-working machinery						
a) Lumbering machine	B	Basic technology has been transferred. Further instruction is necessary to raise the levels of expertise.	Technical instruction in the structure and handling of the power plant of the sawing machine, along with maintenance, inspection, and management of the machine	←	→	Lumbering, Woodworking
b) Wood drying equipment	D	(Has not been started)	Ditto	←	→	Lumbering, Woodworking
c) Equipment for preserving wood from decay	C	Only elementary technology has been transferred. It is necessary for Paraguayan counterparts to fully master techniques through further experiments.	Ditto	←	→	Lumbering, Woodworking
d) Woodworking machine	C	The same as above.	Ditto	←	→	Lumbering, Woodworking
e) Saw teeth setting machine	B	Further instruction is necessary in order to raise the levels of expertise.	Ditto	←	→	Lumbering, Woodworking

B. Training

An Evaluation by an Evaluation Team (September 1983)			Tentative Schedule of Cooperation Implementation	Period		Section
Subject	Rating	Comments		84/85	15 Mar. 85/86	
			Training to be implemented should meet the regional needs.			
1. Instructor training	B	Delayed prticipation of some Paraguayan counterparts resulted in insufficient training. The training system is being gradually completed. Further training is necessary regarding practical techniques.	Classroom training should be reinforced through on-the-job training.	←	→	All the members
2. Preparation of a curriculum and implementation of training	B	Though the curriculum already includes the necessary subjects, mathematics and some other basic subjects should be focused on longer.	1. Adjustments to the curriculum that are suited to the extended training period of two years, and a strengthening of the practical aspects of training	←	→	All the members
		A period of one year is an insufficient amount of time for cultivating competent foremen. It is necessary to extend the period for another year in order to strengthen training.	2. Review and improvement of existing teaching materials	←	→	All the members
			3. Strengthening of training for middle-level technicians	←	→	All the members
3. Results of training	B	Trainees have acquired a reasonable degree of knowledge and capability given the limited period and contents of training. However, they can not be fully utilized on account of an immature infrastructure for forestry and the forest industry in Paraguay. As for nursing and afforestation, all forestry undertakings should be implemented according to the government's initiative. Utilization of the training course is necessary in order to extend forestry technology to general farmers and forest managers.	1. Technical instruction in accordance with trainees' capabilities	←	→	All the members
		As for woodworking, there is a demand for practical technicians in the field. Technical training will be necessary for these technicians over a period of at least two years.	2. Examination of methods of evaluating the training program	←	→	All the members
			3. Strengthening of training system	←	→	All the members
			4. Collection and maintenance of books, theses, and specimens	←	→	All the members
			5. Exhibition of trainees' work, and release of results of technical development, theses, etc.	←	→	All the members

4-2 Appropriateness of the Project's Management and Implementation

(1) Yearly program

A yearly program for the Project's implementation was made based on the master plan, in accordance with the Record of Discussions, the program of dispatching experts from Japan, and the Tentative Schedule of Implementation, which was signed simultaneously with the Record of Discussions. Upon completion of the CDEFO building, a training and research and development plan was made in March 1981, which became the basis of yearly implementation programs. The seedling raising and afforestation sections undertakings were carried out every year in accordance with these programs.

(2) Management of the Project's implementation

Delayed participation of Paraguayan counterparts and insufficient local funds caused delays in technology transfers from Japanese experts. The delay was considerable for basic experiments in the woodworking section, and in surveys and experiments in the seedling raising and afforestation sections.

(3) Understanding of counterparts

The understanding between experts from Japan and their Paraguayan counterparts was somewhat hindered by the language barrier. This was a problem particularly in the first stages of technical cooperation. Two Paraguayans of Japanese parentage intermediated between Paraguayan counterparts and experts from Japan. It can be said that eventually communication between them improved, if not entirely, to the extent that there was no hindrance any more in the Project's implementation, The Paraguayan counterparts learned Japanese during their training in Japan, and the Japanese experts learned the local language.

Paraguayan counterpart' awareness of the significance of the Project was well perceived while the evaluation team was measuring the results of the Project's implementation. The way experts from Japan gave instruction in teams, and tried to answer to the best of their ability was highly appreciated. This appreciation resulted from the Japanese experts giving fine instruction, taking the lead in doing field work, saying, "Excellent technicians combine knowledge with skills." It seemed that the CEDEFO counterparts could not draw a line between the Ingeniero who were to focus on learning and Tecnico who were to acquire practical skills, which is a common situation in Paraguay.

(4) Experts recruiting

Experts in sections other than the seedling raising and afforestation sections, were dispatched one or two years behind schedule, because they had to wait for the completion of facilities to be constructed under Japan's grant aid program. This delay in their dispatch did not, however, affect the Project's implementation. An overlapping of half a month to several months for the changing of experts seemed appropriate for continuous implementation of the Project.

(5) Assisting system in Japan

The Government of Japan strengthened the system of assistance in Japan and dispatched short-term experts by 1982 in six sections except the breeding section, in order to widen the scope of the technology transferred. As for the reception of the Paraguayan participants, national and public forestry experiment stations and private corporations in Japan provided them with attentive cooperation.

In 1982, a film for enlightenment was produced at JICA. The film whose title was "Plantemos Arboles (Let's plant trees)" evoked public response in the Republic of Paraguay, making Paraguayan people aware of the importance of forests and forestry. The film also publicized the presence of CEDEFO.

5. EXTENSION OF THE PERIOD OF COOPERATION AND PROGRAM AND RESULTS AFTER EXTENTION

5-1 Reason that the Extension is Necessary

The evaluation team recommended two years extension because of the following reasons:

5-1-1 Issue of the Republic of Paraguay

Three major exports of the Republic of Paraguay are cotton, soybeans, and lumber. Increasing in production of soybeans and wheat, stabilization of agricultural management, utilization of trees, and afforestation constituted large issues for the country.

5-1-2 Local needs

Local needs regarding woodworking, utilization of nonutilized trees, development and improvement of afforestation technology, and obtaining of such technology are all growing.

5-1-3 Change in local problems and people's awareness

Problems waiting to be solved includes the prevention of erosion, the conservation of fertility, and the prevention of damage from diseases and insects. Especially regarding the prevention of erosion, people become increasingly aware of the importance of establishing a connection between agriculture and forestry. This can be pointed out with the example of afforesting the slopes of farmland and planting perennial crops, in order to prevent erosion.

5-1-4 Necessity of longer-term training

Technical training in how to use agricultural machinery and forestry has to be given over a longer period that extends for two and sometime to three years so that the trainees' skill levels can be improved to a satisfactory level.

5-2 Preparation of Tentative Schedule of Implementation

The Government of Japan dispatched the mutual consultation team in June and July 1984, in order to discuss the program for the Project's implementation such as the dispatch of expert, the acceptance of counterpart as trainee, and the provision of equipment and materials, with the Government of the Republic of Paraguay.

A tentative schedule of implementation was presented for CEDEFO, and for other experiment stations and centers. It was signed by the team leader and the Undersecretary of Agriculture and Livestock, after deliberation and approval by the joint committee on the 23 July of that year.

The main topic the joint committee discussed was related to finalizing the budget to be provided by Paraguay. The committee expected that the importance of the Project's implementation would be borne out because of the ongoing conditions in

the country including: soil erosion and declined fertility resulting from simultaneous deforestation, unstable agricultural management in short-term crops such as wheat and soybeans, and environmental changes resulting from pollution of rivers. All of these subjects were regional problems common in the country and concerning both agriculture and forestry.

The implementation planning team gave guidance and recommendations to the Ministry of Agriculture and Livestock regarding the establishment of a cooperation system. The recommended cooperative would allow for all the organizations concerned to utilize each other's technology, expertise, and facilities. This would enable CEDEFO to extend assistance with regard to the conservation of soil in agricultural fields, for CRIA to extend asistance in soil analysis of the nursery, fertilizer development, and also to assist with a survey of the ecology of harmful insects. CEMA would be able to extend assistance in the maintenance, repair, and operation of machines.

The following were activities for the Project's implementation listed in the Tentative Schedule of Implementation.

(1) Technical development

1) Afforestation section
   a) Development of forestry technology for each kind of tree through examination of planting
   b) Research nd experiments on nursing and management technology for each kind of tree
   c) Research and development of mechanized afforestation
2) Seedling raising section
   a) Establishment of a nursing system for local and l exotic trees
   b) Development of a method for the prevention of damage from disease and insects
   c) Manuring and management of the nursery
3) Woodworking section
   a) Lumbering
   b) Drying and preservation from decay
   c) Testing of the properties of wood
   d) Woodworking
   e) Diagnosis, maintenance, and repaire of lumbering machines and woodworking machines

(2) Training

1) Transfer of practical technology to instructors (these instructors to be Paraguayan counterparts)
2) Preparation of a curriculum

5-3 Actual Program of Implementation

The mutual consultation team made an "actual program" of implementation based on the Tentative Schedule of Implementation, so that the "actual program" would serve as a guide to advise the experts from Japan and their Paraguayan counterparts.

The team recommended that the Project be implemented in accordance with the following three points.

(1) The program should be able to be completed over extended period of two years and be based on an evaluation to be outlined by the evaluation team. In principle, therefore, new undertakings that will not produce results within this period are not to be started.

(2) Existing data is to be reviewed so that results of technical development can be numerically expressed as much as possible. Complementary surveys are to be conducted in order to make up for insufficient data. Creation of new experiment zones, surveys, and analysis are to be carried out as necessary.

(3) Training was to be given over a period of two years, placing emphasis on practical training, in order to cultivate local practical technicians.

5-4 Results of Undertakings

5-4-1 Technical development

(1) Seedling raising

The main kinds of trees whose seedlings had been raised so far included Pinus elliottii, Pinus taeda, Araucaria angustifolia (these were conifers), Eucaliptus cinered, and Paraiso gigante (these were broadleaf trees). These seedlings were used in the creation of controlled forest on the experimental plantation, density experiments, and in the creation of an exhibition forest. Also, they were distributed to the administrative organizations concerned and used to meet the demand from local people. In the summer of 1985, the raising of mate seedlings was started.

Yearly outputs of seedlings are shown in the following table. These outputs increased six times over the figures for the outputs of the beginning of the Project. This shows that the undertaking of seedling raising was well under way, evidence of the integration of the preparation of an infrastructure with the technology transfer.

Yearly Output of Seedlings

Year / Kind of tree	1980/81	81/82	1982/83	83/84	84/85
Pinus eliottii	35,600	48,000	60,000	94,000	123,650
Pinus taeda		74,200	48,500	60,215	33,600
Pinus caribea		5,000	2,000	8,000	30,000
Araucaria angustifolia		300	1,000	1,800	7,000
Eucalyptus Sp.			10,000	3,000	33,050
Paraiso gigante			2,500	800	5,000
Especies nativas	1,500	4,500			5,000
Other kinds			6,400	14,400	5,000
Total	37,100	132,000	130,400	182,215	245,000

Raising was conducted using two methods–pot raising and loose raising. Experiments were made on the unit number of seedlings to be raised, proper density of seedlings, promotion of root system growth, standardization of seedlings, the period of nursing, etc. It was necessary o continue these experiments, accumulate, and analyze data.

As for the nursery, the area was extended and the sprinkling equipment was automated.

Being increasingly interested in forestry, local people sometimes requested instruction in seedling raising and technical guidance in preventing damage from various causes. To meet the increased demand for seedlings, the personnel concerned tried to operate facilities as efficiently as possible and began tackling the systematic production of seedlings in large quantites, manure production, and technical development in preventing damage from disease and insects.

(2) Afforestation

1) Experimental plantation

In a 403 hectare experimental plantation, controlled forest zone, planting density experiment zones, an exhibition forest, and an arboretum were created. Experiments on columnar planting, planting density, and natural regeneration were undertaken on this site.

As for preparation of the experimental plantation, a 2.4 kilometer forestry road was opened in 1980 as part of the project for preparing a model infrastructure implemented by the Government of Japan; a 1.7 kilometer loop road was opened in 1982. In 1985, the two roads were widened and the road surface was graded. Footpaths were created as needed from 1982, totaling 1.7 kilometers as of July 1985.

It was planned to create a density experiment zone for each kind of tree. Planted were Pinus elliottii (1981), Pinus caribea (1982), Pinus taeda (1983), and Araucaria (1984). Paraiso was planted in 1985.

Creation of the controlled forest zone was started simultaneously with the density experiment zone. The zone was afforested with Pinus elliotti, Pinus taeda, etc. over an area of four hectares; it was afforested with lapacho etc. over an area of two hectares in 1985. Since the creation of controlled forest required a long time until the condition of controlled forest was realized, it was necessary to give guidance so that maintenance of the controlled forest would be conducted even after the cooperation period under the Project was over.

A 1.5 hectare agroforestry site was created in 1984, and another one hectare was created in 1985.

Technical development in the afforestation section was aimed at establishing an afforestation system first through cutting of natural forests and then using new planting. The technical aspects of human work in natural forests which aids in natural regeneration were emphasized. As for future undertakings in afforestation, early execution of large-scale commercial afforestation was difficult whereas afforestation for soil conservation of farmland was urgent. Local people's awareness of the importance of forestry, and promotion and extension of afforestation by the Ministry of Agriculture and Livestock were be coming priorities.

It was also necessary to do research on a technical system for afforestation in due consideration of soil conservation, and on land preparation after the natural forest was deforested.

In general, technical development in the forest raising section required a long time to produce results; a conclusion could not be reached using data collected over a short period. Since afforestation in the experimental plantation occurred not long after it was started, it was too early to draw a conclusion. It was necessary, therefore, to continue research in order to accumulate further data.

In the winter of 1984, an unusual cold wave hit the region, causing damage to several kinds of newly planted trees. Though the damaged lapacho trees could be restored by sprouting on root stocks, it was necessary to select the right trees for the right place in due consideration of the cold resistance of the trees, as well as to find additional measures for preventing damage from cold weather.

As local people became increasingly interested in afforestation, experts from Japan provided technical instruction and guidance in planting, weeding, etc. in various parts of the region as extra activities.

2) Exhibition forest

In order to meet the hightened interest of local people in afforestation, it became necessary to ensure meeting places (wherein everyday education in forestry was given) within CEDEFO and somewhere near the public road. In 1985, an area of 18.14 hectares was rented from the Pirap Agricultural Cooperative adjacent to the premises of CEMA several hundred meters away from CEDEFO. A two hectare area of this land was afforested first; subsequent afforestation was to be conducted gradually. The purposes for the exhibition forest included exhibition of trees usefull for afforestation, technical development training in soil conservation, utilization of land, etc.

(3) Lumbering and woodworking

The main techniques utilized in the lumbering and woodworking sections included conversion of timber from each kind of tree and by use, saw teeth setting, cutting and grinding of edged tools, wood drying, and preservation of wood from decay. Power was generated by the independent power plant to power the machinery necessary for this work. Unfortunately, a shortage in the budget for fuel costs prevented full operation of the machines. Power transmission from the Itapua power station was started in October 1984, however, enabling full operation of the research equipment, lumbering and woodworking machines, and the proper accumulation of data.

As for conversion of timber, technology was transferred regarding useful broadleaf trees such as lapacho and cedro, aimed at increasing yields. In 1985, development of the methods of conversion was furthered, in parallel with development of the use of nonutilized trees. Effects of technology transfer regarding saw teeth setting and the cutting and grinding of edged tools were considerable; saw teeth setting (of band saws) was done at a charge, upon request from people outside CEDEFO. Grinding and setting of the edged tools of woodworking machines were satisfactory, and the machines were operated without hindrance.

In wood drying, there were two methods–natural drying and artificial drying. Regarding artificial drying, only instruction in operating the artificial drying equipment was given, since a shortage in the budget for fuel costs prevented full operation of the equipment. Natural drying was started in 1982, and data were accumulated. There was a plan to conduct drying in a simplified drying house using labundant solar heat. Further improvement in wood drying was expected.
In preserving wood from decay, there were two methods–pressure treatment and immersion treatment. As for pressure treatment, only instruction in operating the machine was provided on account of difficulties with the selection and obtaining of chemicals. Regarding immersion treatment wherein wood was treated with chemicals, the technology transfer was satisfactory. In order to improve technology in this section, it was necessary to consider measures to meet an anticipated increase in the demand for pine trees.
In the woodworking section, the major purpose was to develop the use of nonutilized trees. For this purpose, it was necessary to establish technology regarding lumbering, wood drying, preservation of wood from decay, and prevention of damage from insects, as well as to elucidate the properties of the wood from each kind of tree. Technical development in woodworking, therefore, would proceed simultaneously with or after technical development in lumbering and wood drying as well as research and experimentation on the basic properties of wood.
Construction material wood, furniture, and woodwork were produced on an experimental basis, in order to illustrate the results of the technology transfer. They were made in response to requests from outside CEDEFO for the manufacture of chairs, tables, and other pieces of furniture. Regular exhibition in the center of craftwork made of nonutilized trees and samples of 32 kinds of tree contributed to the spread of woodworking among local people.
Paraguayan houses were usually made of brick, though wood was used for roofing. Paraguayan people thus had little experience in utilizing wood, and knew little about woodworking. Construction of a model house on an experimental basis, in the process of developing use of lumber from thinned or nonutilized trees, and exhibition of it were very significant in showing the results of development in the lumbering and woodworking sections. In response to hightened interest of local people in wood utilization, a craftwork course was opened in Fram and Chaves, to extend technology to local people and to make them aware of the importance of forestry. The craftwork course was contributing to local people's obtaining technology.
The temporary guidance team of 1984 recommended that a lumber mill, a warehouse, and a simplified drying house be prepared as early as possible. These facilities were completed, excepting for the drying house, enabling work on rainy days. The simplified drying house was planned to be finished and to have undergone a trial run by the time the Project was completed. There was a plan to build a woodwoking room in which a flooring processing machine was to be installed.

5-4-2 Training

(1) Change in the period of training and the situation of application for training

Training was one of CEDEFO's major undertakings. It opened two courses–one on seedling raising and afforestation, the other on woodworking–and provided training, placing emphasis on practical skills. The first three groups comprising 29 trainees have already completed the courses (15 trainees completed the afforestation course and 14 trainees completed the woodworking course) in a training period of one year (actually nine months) beginning in August 1981. However, training produced no noticeable results in terms of the utilization of those who completed the courses, except for five persons who became assistant engineers at CEDEFO. The training system was therefore reviewed, and the period of training was changed to two years in 1984 for the fourth and subsequent groups of trainees.

Entrance requirements for the courses were also changed; those who had completed lower secondary school and men of 16 years and upward could apply for the training course. In addition, those who had completed the course were to be qualified as Practico Forestal (practical forestry engineer) and exempted from military service. As a result of this improvement, the number of applicants for the fourth group (1984) jumped to a record 53, 3.3 times as large as the planned number, making it very hard for applicants to be accepted to the courses. The number of applicants for the fifth group (1985) also exceeded the number limit. Planned and actual numbers of trainees between the opening of the courses and July 1985 were as follows:

Planned and Actual Numbers of Trainees

Year / Course / Class.	1981		1982		1983		1984		1985	
	Plan	Act.	Plan	Act.	Plan	Act.	Plan	Act.	Plan	Act.
Seedling raising and afforestation	8	5	8	5	10	5	1	8	15	7 8
Woodworking	8	4	8	4	10	6	13	8	15	7 8
Total	16	9	16	9	20	11	26	16	30	30

Notes:

1. The planned numbers are based on the 1981 plan.
2. The actual numbers are initial numbers of trainees.
3. Two from the fourth group and one from the fifth group left before completing the course.
4. The upper figure in the column for 1985 is the number of fourth group trainees, the lower figure is the number of fifth group trainees.

(2) Preparation of curriculum and teaching materials

A curriculum was prepared with training to be given in this manner: the period of two years was divided into four terms; in the first term of the first year, two courses were combined for general education and fundamental studies in forestry and the forest industry; from the second term of the first year onward, training was given with emphasis on practical training in specific techniques.

The curriculum was revised in 1984, as shown in the following table. The period of training was changed to two years.

Curriculum for 1984

Term / Course	First term of the first year		Second term of the first year	
	Subject	Hour	Subject	Hour
			Afforestation II	133
Afforestation	Mathematics	95	Dendrology	75
			Forest mensuration	95
	Botany	95	Forestry machinery	133
			Surveyng	95
	Afforestation I	95	Physical training	133
			Total	664
Woodworking	Drafting	76	Property of wood	114
			Saw teeth setting I	125
	Spanish	76	Lumbering I	125
			Woodworking I	134
	Physical training	133	Physical training	133
	Total	570	Total	631

Term / Course	Second term of the second year Subject	Hour	Second term of the second year Subject	Hour
Afforestation	Afforestation III	147	Afforestation III	203
	Dendrology	63	Dendrology	63
	Forest mensuration	119	Forest mensuration	91
	Forestry machinery	147	Forestry machinery	91
	Surveying I	91	Surveying II	63
	Physical training	133	Physical training	119
	Total	700	Total	630
Woodworking	Saw teeth setting II		Saw teeth setting II	
	Lumbering II	560	Lumbering II	476
	Woodworking II		Woodworking II	
	Physical training	140	Physical training	119
	Total	700	Total	595

This curriculum was evaluated while it was being implemented, and was revised again in 1985. The total hours of each term were made more equal; the teaching schedule was changed so that intensive training could be given in each subject; and a new subject was introduced concering the nursery.

Curriculum for 1985

Term / Course	First term of the first year Subject	Hour	Second term of the first year Subject	Hour
			Afforestation II	76
			Nursery	76
Afforestation	Mathematics	95	Dendrology	70
			Forest mensuration	95
	Botany	95	Forestry machinery	133
			Surveyng	76
	Afforestation I	95	Physical training	133
			Total	669
Woodworking	Drafting	76	Property of wood	114
			Saw teeth setting I	136
	Spanish	76	Lumbering I	136
			Woodworking I	146
	Physical training	133	Physical training	133
	Total	570	Total	665

Term / Course	Second term of the second year		Second term of the second year	
	Subject	Hour	Subject	Hour
Afforestation	Afforestation III	232	Nursery	210
	Forest mensuration	150	Dendrology	112
	Forestry machinery	150	Forestry machinery	210
	Physical training	133	Physical training	133
	Total	665	Total	665
Woodworking	Saw teeth setting II		Saw teeth setting II	
	Lumbering II	532	Lumbering II	532
	Woodworking II		Woodworking II	
	Physical training	133	Physical training	133
	Total	665	Total	665

Examinations were given three times per term, in order to evaluate the results of training and improve the capabilities of the trainees.

Some teaching materials were not satisfactory. Improvement of them was necessary to make them characteristic of CEDEFO. Improvement was also necessary in the classroom facilities, including provision of desks that facilitated taking notes.

(3) Training of middle-level engineers

The following table shows the implementation of training for middle-level engineers from 1982, when the Project was started, until 1985.

Year	Course	Period	Days	Persons	Target persons
1982	Afforestation	25 Oct. to 13 Nov.	20	12	Extension workers of Min. of Agric. and Livestock, Forestry Agency, etc.
	Afforestation	7 Mar. '83 to 12 Mar.	6	15	ditto
	Woodworking	4 Mar. '83 to 12 Mar.	9	15	Private woodworking technicians
1983	Afforestation	25 Jul. to 30 Jul.	6	17	Local managers of agric., forestry & stock-farming
	Afforestation	3 Oct. to 11 Oct.	9	16	Extension workers of Min. of Agric. and Livestock, Forestry Agency, etc.
	Afforestation	14 Nov. to 19 Nov.	6	23	Persons involved in the Project
	Woodworking	19 Oct. to 24 Oct.	6	12	Local leaders in forestry and forest industry
	Woodworking	20 Feb. '84 to 25 Feb.	6	6	Local leaders in forestry and forest industry
1984	Afforestation	23 Jul to 28 Jul.	6	15	Local leaders in forestry and forest industry
	Afforestation	4 Mar. to 8 Mar.	6	17	Extension workers of Min. of Agric. and Livestock, Forestry Agency, etc.
	Woodworking	15 Oct. to 20 Oct.	6	11	Local leaders in forestry and forest industry
1985	Afforestation	Jul. to Aug.	14	16	Local leaders in forestry and forest industry
(plan)	Afforestation	Dec.	14	16	Extension workers of Min. of Agric. and Livestock, Forestry Agency, etc.
	Woodworking	Oct.	14	16	Local leaders in forestry and forest industry

The expenses to be borne by the Government of Japan were to be decreased by 20% every year; this decrease was to be offset by the Government of the Republic of Paraguay is increased financial participation. It was especially recommended that the Paraguayan government take measures to ensure budgets for the Project, in due consideration of this.

APPENDICES

1. The Record of Discussions (R/D)

The Record of Discussions between the Japanese
Implementation Survey Team and the Authorities Concerned
of the Government of the Republic of Paraguay
on the Japan-Paraguay Technical Cooperation
for the Agriculture and Forestry Development Project
in the Southern Paraguay

The Japanese Implementation Survey Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Akira ARIMATSU, Executive Director, JICA, visited the Republic of Paraguay from March 11, 1979, to March 18, 1979, for the purpose of working out the details of the technical cooperation program concerning the Agriculture and Forestry Development Project in the Southern Paraguay.

During its stay in the Republic of Paraguay, the Team exchanged views and had series of discussions with the Paraguayan authorities concerned in respect, of he desirable measures to be taken by both Governments for the success implementation of the above-mentioned Project.

As a result o the discussions, the Team and the Paraguayan authorities concerned agreed to recommend to their respective Government the matters referred to in the document attached hereto based on "ACUERDO SOBRE COOPERACION TECNICA ENTRE EL GOBIERNO DEL JAPON Y EL GOVIERNO DE LA REPUBLICA DEL PARAGUAY (AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF THE REPUBLIC OF PARAGUAY)", signed at Asunción on February 9, 1979.

Asunción, March 16, 1979

Mr. Akira ARIMATSU
Head of the Japanese Implementation
Survey Team (Executive Director,
Japan International Cooperation Agency)

Ing. Luis PAMPLIEGA C.
Director General
Ministry of Agriculture and
Live-Stock The Republic of Paraguay

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Governments of Japan and the Governments of the Republic of Paraguay will cooperate with each other in implementing the Agriculture and Forestry Development Project in the Southern Paraguay (hereinafter referred to as "the Project") for the purpose of contributing to the agriculture and forestry development in the Southern Paraguay, mainly in Itapua Department.
2. The Project will be implemented in accordance with the Master Plan which is given in Annex 1.

II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in fore in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense services of the Japanese experts as listed in Annex II through the normal procedures under the Technical Cooperation Scheme of Japan.
2. The Japanese experts referred to in 1. above and their families will be granted in the Republic of Paraguay the privileges, exemptions and benefits as listed in Annex III and will be granted privileges, exemptions and benefits no less favorable than those granted to experts of third countries or international organizations performing similar missions.

III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense such machinery, equipment and other materials necessary for the implementation of the Project as listed in Annex IX, through the normal procedures under the Technical Cooperation Scheme of Japan.
2. The article referred to in 1. above will become the property of the Government of the Republic of Paraguay upon being delivered c.i.f. to the Paraguayan authorities concerned at the ports and/or airports of disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese experts referred to in Annex II.

IV. TRAINING OF PARAGUAYAN PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive at its own expense the Paraguayan personnel connected with the Project for technical training in Japan through the normal procedures under the Technical Cooperation Scheme of Japan.
2. The Government of the Republic of Paraguay will take necessary measures to ensure that the knowledge and experience acquired by he Paraguayan personnel from technical training in Japan will be utilized effectively for the implementation of the Project.

V. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF PARAGUAY

1. In accordance with the laws and regulations in force in the Republic of Paraguay, the Government of the Republic of Paraguay will take necessary measures to provide at its own expense:
   (1) Services of the Paraguayan counterpart personnel and administrative personnel as listed in Annex V;
   (2) Land, building and facilities as listed in Annex VI;
   (3) Supply or replacement of machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than these provided through JICA under III-1, above;
   (4) Transportation facilities and travel allowance for the Japanese experts for the official travel within the Republic of Paraguay;
   (5) Suitably furnished accommodations for the Japanese experts and their families.
2. In accordance with the laws and regulations in force in the Republic of Paraguay, the Government of the Republic of Paraguay will take necessary measures to meet:
   (1) Expenses necessary for the transportation within the Republic of Paraguay of the articles referred to in III-1 above as well as for the installation, operation and maintenance thereof;
   (2) Customs duties, internal taxes and any other charges, imposed in the Republic of Paraguay on the articles referred to in III-1 above;
   (3) All running expenses necessary for the implementation of the Project.

VI. ADMINISTRATION OF THE PROJECT

1. The Ministry of Agriculture and Livestock of the Republic of Paraguay will be responsible for the administration and implementation of the Project, and the Japanese experts will provide necessary technical guidance and advice for the implementation of the Project.

2. For the successful implementation of the Project, a Joint- Committee will be established as specified in Annex VII and meet more than once a year. The Joint-Committee will formulate the details of the Master Plan referred to in Annex 1 and annual operational work plan of the Project. The details of the Master Plan and the annual operational work plan will be submitted to the authorities concerned of the two Governments for he approval.
   Under the Joint-Committee, Agriculture, Agricultural Machinery and Forestry Sub-Committees may be established to discuss specific matters when necessity arises.
3. For the close cooperation between the Ministry of Agriculture and Livestock and other agencies concerned of the Republic of Paraguay and Japanese experts the Project Central Office will be established at Asunción and the Japanese General Coordinator will be assigned there. The General Coordinator will support the successful implementation of the three Programs through advice and coordination.
4. The Project will be implemented in contact with agricultural and forestry research stations concerned in the Republic of Paraguay.

VII. CLAIMS AGAINST JAPANESE EXPERTS

The Government of the Republic of Paraguay undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Paraguay except for those arising from the willful misconduct or gross negligence on the Japanese experts.

VIII. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or connection with this Attached Document.

IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be five year from March 16, 1979, to March 15, 1984. The authorities concerned will hold mutual consultation concerning the necessity of extending he terms of cooperation with a view to the progress of the Project and may recommend to their respective Governments the extension of the duration.

ANNEX I. MASTER PLAN OF THE PROJECT

1. The Project consists of the following three programs.
   (1) Centro Regional de Investigación y Extensión Agricola (hereinafter referred to as "CRIA") Strengthening Program;
   (2) Agriculture Mechanization Program;
   (3) Forestry Development and Training Program.
2. The objectives and activities of the three Programs are as follows.
   (1) CRIA Strengthening Program:
   For the purpose of strengthening the experimental and extension activities at CRIA, Capitan Miranda, Itapua Department, the following activities will be implemented at CRIA.
   1) Breeding of upland crops including wheat and soybean for improvement of their stability and productivity;
   2) Experiment on new crop productivity;
   3) Adaptability trial and demonstration of the new varieties and cultivation techniques developed at CRIA;
   4) Multiplication of elite seeds;
   5) Development of techniques to conserve the soil;
   6) Development of techniques to control disease and pest insects;
   7) Supporting extension activity to disseminate the developed techniques to the farmers.
   (2) Agriculture Mechanization Program:
   For the betterment of the operation, maintenance and repairing techniques for cultivation and reclamation machines and tools, Centro de Mecanización Agricola (hereinafter referred to as "CEMA") will be established in Pirapo, Itapua Department, and the following activities will be implemented.
   1) Fostering the operators and the mechanics for the improved agricultural mechanization;
   2) Technical training on operation of the cultivation and reclamation machines;
   3) Technical training on repair and maintenance of the machines and tools.
   (3) Forestry Development and Training Program:
   For the purpose of developing forestry in the Southern Paraguay, mainly in Itapua Department, the Centro de Desarrollo Forestal (hereinafter referred to as "CEDEFO") will be established in Pirapo, Itapua Department, which consists of two departments, namely Wood Processing Guidance Department and Afforestation Guidance Department.
   1) Wood Processing Guidance Department will conduct the technical training and development of sawmilling, wood working, wood preservation and utilization of non-commercial wood;
   2) Afforestation Guidance Department will conduct the technical training and development of logging, nursery practice, mechanical afforestation and afforestation practice.

ANNEX II. LIST OF JAPANESE EXPERTS

	Category	Field
1. Project Central Office	(1) General Coordinator	
	(2) Liaison Officer	
2. CRIA	(1) Expert	Agronomy
3. CEMA	(1) Expert	Mechanics Operation
4. CEDEFO	(1) Expert	Sawmilling Wood working Nursery practice Afforestation Forestry machinery

Note:

(1) A team Leader, will be assigned among the experts of 2., 3. and 4. above respectively.

(2) Experts in the above-mentioned fields are long-term ones, and short-term experts in the fields mentioned above as well as others may be dispatched when necessity arises.

ANNEX III. PRIVILEGES, EXEMPTIONS AND BENEFITS

1. Exemptions from income tax and charges of any kind imposed on or in connection with the living allowances remitted from abroad;
2. Exemptions from import and export duties and any other charge in respect of personal and household effects, including one motor vehicles per family, which may be brought into the Republic of Paraguay from abroad;
3. Free medical services and facilities to the Japanese experts and their families.

ANNEX IV. LIST OF THE ARTICLES

1. The Agriculture Sector:
   (1) Agriculture and reclamation machines and equipment, and their spare parts;
   (2) Machines and tools for repair work;
   (3) Equipment, instruments, tools and their spare parts for laboratory and field experiments;
   (4) Fertilizers, agricultural chemicals and other materials;
   (5) Teaching and extension materials including audio-visual aids;
   (6) Vehicles and their spare parts;
   (7) Radio communication equipment and its spare parts;
   (8) Other necessary equipment, tools and materials to be mutually agreed upon for the effective implementation of the Project.

2. The Forestry Sector:
   (1) Forestry machines and equipment, and their spare parts;
   (2) Machines and tools for repair work;
   (3) Equipment, instruments, and their spare parts for experiments;
   (4) Fertilizers, agricultural chemicals and other materials;
   (5) Teaching material including audio-visual aids;
   (6) Vehicles and their parts;
   (7) Radio communication equipment and its spare parts;
   (8) Other necessary equipment, tools and materials to be mutually agreed upon for the effective implementation of the Project.

ANNEX V. LIST OF PARAGUAYAN STAFF

	Category	Field
1. Project Central Office	(1) Project Coordinator	
	(2) Clerk	
2. CRIA	(1) Project Manager	
	(2) Expert	Agronomy
	(3) Clerical and service employee	
3. CEMA	(1) Project Manager	
	(2) Expert	Mechanics Operation
	(3) Clerical and service employee	
4. CEDEFO	(1) Project Manager	
	(2) Expert	Sawmilling Wood working Nursery practice Afforestation Forestry Machinery
	(3) Clerical and service employee	

Note:
In addition to the above-mentioned, necessary labores are included in 2., 3 and 4. respectively.

ANNEX VI. LIST OF LAND, BUILDINGS AND FACILITIES

1. Project Central Office
   (1) Rooms for General Coordinator and Liaison Officer
   (2) Parking Lot
2. CRIA
   (1) Land
   1) Land for buildings
   2) Land for the experimental field
   (2) Buildings and facilities
   1) Main office (laboratory, seed-storage room, lecture room, library, meeting room, etc.)
   2) Storage for farming materials
   3) Storage for machinery and equipment
   4) Management office for the experimental field
   5) Green house and glass house
   6) Generator house
   7) Garage
   8) Dormitory
   9) Houses for Paraguayan staff
   10) Guest house
   11) Others
3. CEMA
   (1) Land
   1) Land for buildings
   2) Field for operation training of cultivation and reclamation machines
   (2) Buildings and facilities
   1) Main office (Team leader's room, expert's rooms, meeting room, lecture room, etc.)
   2) Workshop for training
   3) Storage for equipment and tools
   4) Generator house
   5) Dormitory for trainees
   6) Houses for Paraguayan staff
   7) Workshop for repair and maintenance of machines
   8) Storage for materials
   9) Pump house
   10) Garage
   11) Storage for machinery and equipment
   12) Others

4. CEDEFO

(1) Land

1) Land for buildings
2) Land for nursery and practical forest

(2) Buildings and facilities

1) Main Office (administration office, training rooms, etc.)
2) Sawmill and wood factory
3) Wood testing rooms
4) Garages
5) Warehouses for equipment
6) Dormitory for trainees
7) Guest house
8) Generator house
9) Pump house
10) Office for nursery (including garage, warehouse, generator house and pump house)
11) Office for practical training forest (ditto)
12) Houses for Paraguayan staff
13) Others

ANNEX VII. THE COMPOSITION OF THE JOINT-COMMITTEE

1. Chairman
   Director General of Ministry of Agriculture and Livestock
2. Member

Japanese side	Paraguayan side
(1) General Coordinator	(1) Director of Technical Cabinet (Project Coordinator)
(2) Team Leaders	(2) Director of Research and Extension for Agriculture and Forestry
(3) Experts	(3) Director of Education for Agriculture and Forestry
(4) Liaison Officer	(4) Director of National Forestry Service
(5) Representative of JICA	(5) Director of Administration

Note:

Representatives of other Ministries concerned and the Embassy of Japan, including Project Managers of the three Programs, may attend the meeting as observers.

TENTATIVE IMPLEMENTATION PROGRAMME OF
THE AGRICULTURE AND FORESTRY DEVELOPMENT
PROJECT IN THE SOUTHERN PARAGUAY

The Japanese Implementation Survey Team and Director General of the Ministry of Agriculture and Livestock of the Republic of Paraguay have jointly formulated the Tentative Implementation Programme of the Project as annexed hereto. These have been formulated in connection with 1-2, of the Attached Document of the Record of Discussions between the Japanese Implementation Survey Team and Director General of the Ministry of Agriculture and Livestock of the Republic of Paraguay on the Agriculture and Forestry Development Project in the Southern Paraguay for its reference on such condition that necessary budget will be allocated for the implementation of the Project, and are subject to change within the framework of the Record of Discussions when necessity arises in the course of implementation of the Project.

Asunción, March 16, 1979

Mr. AKIRA ARIMATSU
Head of
the Japanese Implementation
Survey Team (Executive Director,
Japan International Cooperation Agency)

Ing. LUIS PAMPLIEGA C.
Director General
Ministry of Agriculture
and Livestock
The Republic of Paraguay

ANNEX 1. TENTATIVE SCHEDULE OF IMPLEMENTATION

		1979	1980	1981	1982	1983	1984
Japanese Experts	General Coordinator	←		1 person			→
	Liaison Officer	←		1 person			→
	Experts for CRIA		←	1 person (Breeding)			→
			←	1 to 2 persons (Pathology, Entomology)			→
	Experts for CEDEFO	←		2 persons (Nursery, Afforestation)			→
			←	2 persons (Sawmilling, Machinery)			→
				← 1 person (Woodworking)			→
	Experts for CEMA		←	3 persons (Machinery, Operation)			→
				← 3 persons (Machinery, Operation)			→
Training in Japan		←		Several persons			→
Articles, materials, etc.		X	X	X	X	X	X
Dispatching Survey Team		↔ implementation design team	↔ implementation planning team	↔ guidance team	↔ implementation planning team	↔ guidance team	↔ evaluation team

THE RECORD OF DISCUSSIONS ON THE JAPAN-PARAGUAY TECHNICAL COOPERATION FOR THE AGRICULTURE AND FORESTRY DEVELOPMENT PROJECT IN THE SOUTHERN PARAGUAY

The Japanese Consultation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as JICA) and headed by Mr. Hiroshi Ino, visited the Republic of Paraguay from 6 to 20 July 1982.

During its stay in the Republic of Paraguay, the Team had series of discussions with the authorities concerned of the Government of the Republic of Paraguay on the provision of Special Measures by the Government of Japan in the Japan-Paraguay Technical Cooperation for the Agriculture and Forestry Development Project in the Southern Paraguay.

As the result of the discussions, both sides agreed to recommend to their respective governments to put an additional provision to the Record of Discussions on the Japan-Paraguay Technical Cooperation for the Agriculture and Forestry Development Project in the Southern Paraguay which was signed on 16 March 1979 between the Japanese Implementation survey Team organized by JICA and the authorities concerned of the Government of the Republic of Paraguay. The new provision shall be indicated as Chapter X to read as follows:

"X - Training in the Republic of Paraguay

In order to enhance the smooth promotion of the Project the Government of Japan will, in accordance with the laws and regulations in force in Japan, take necessary measures through JICA to supplement a portion of the local cost expenditure such as production cost for teaching materials, travel allowances related to field training, special instructors fees, supply cost of training materials etc. within the Republic of Paraguay."

15 July, 1982

Astncion, Paraguay

Mr. HIROSHI INO
Head
The Japanese Consultation Team

Ing. LUIS PAMPLIEGA C.
Director General
Ministry of Agriculture and Livesteck
The Republic of Paraguay

THE RECORD OF DISCUSSIONS ON EXTENSION OF THE PERIOD OF THE JAPAN-PARAGUAY TECHNICAL COOPERATION FOR THE AGRICULTURE AND FORESTRY DEVELOPMENT PROJECT IN SOUTHERN PARAGUAY"

The Japan International Cooperation Agency (hereinafter referred to as the "JICA"), with regard to the recommendation made by the Japanese-Paraguayan Joint Evaluation Meeting which was held at Asuncion on October 6, 1983, through Mr. Toshiro Ojima, the Resident Representative of JICA in Paraguay, had a series of discussions with the authorities concerned of the Government of the Republic of Paraguay on extension of the period of the technical cooperation for the Agriculture and Forestry Development Project in Southern Paraguay (hereinafter referred to as "the Project") based on the Record of Discussions which was signed at Asuncion on March 16, 1979.

As a result of the discussions, both parties agreed to recommend to their respective governments to extend the period of the technical cooperation of the Project until March 15, 1986, in order to achieve the initial objectives of the Project. However, before he termination of the extended Project, both parties will review the progress of the Project for the purpose of studying the further extension.

The term of the technical cooperation for some programmes of the Project may be extended for one more year, based upon the above-mentioned review.

Asuncion, Paraguay

January 20, 1984

Mr. TOSHIRO OJIMA
Resident Representative
JICA

Ing. Agr. LUIS PAMPLIEGA C.
General Director, Ministry
of Agriculture and Livestock

MINUTES FOR THE JOINT EVALUATION ON THE JAPAN-PARAGUAY TECHNICAL COOPERATION FOR THE AGRICULTURE AND FORESTRY DEVELOPMENT PROJECT IN SOUTHERN PARAGUAY

Both the Evaluation Teams of Japan and Paraguay of the Project agreed on the results of evaluation and recommendations, which are given in the summary report attached herewith.

Asunción, Paraguay
6 October, 1983

Mr. Akira ARIMATSU
Head of
The Japanese Evaluation Team
(Special Assistant to the President,
Japan International Cooperation Agency)

Ing. Agr. LUIS PAMPLIEGA C.
Head of
The Paraguayan Evaluation Team
(General Director,
Ministry of
Agriculture and Livestock)

2. List of Main Machinery and Equipment Granted

[1979]

	Specifications	Quantity
1.	Komatsu D31A-16 bulldozer	1
2.	Komatus D80AH-18 bulldozer	1
3.	Toyota Land Cruiser Hard Top	2
4.	Mitsubishi Fuso diesel truck	1
5.	Generator output: 3 kVA, single phase, 200 V, 50 Hz diesel engine	1
6.	Motorcycle displacement: 123 cc, with lug tires	2
	[Nursery]	
7.	Small-sized agrimotor 24 h.p. with a rotary tiller (standard attachment)	1 set
	Other attachments	
	1. Culti Pocker	1
	2. Botlom Plow	1
	3. Trailer	
	4. Front Bumper Weight	
8.	Portable mower displacement: 23 cc	1
9.	Sprinkling equipment	1 set
	1. Pump 15 h.p.	
	Pumping volume 1000 l/min.	
	Lift 30~35 m	
	2. Prefabricated water thank	1 set
	Round-shaped, capacity: 3000	1
	3. Small pump	1
	Total lift: 36 m	
	Volume of discharge: 650 l/min.	
	4. Sprinkler set (2 sets)	1

[Equipment for experimental plantation]

	Specifications	Quantity
10.	Bush cutter Displacement: 33 cc	3
11.	Chain saw	
	1. Large-size chain saw	2
	Displacement: 85~90 cc	
	Guide bar: 28 in.	
	2. Medium-size chain saw	2
	Displacement: 68~70 cc	
	Guide bar: 23 in.	
	3. Small-size chain saw	2
	Displacement: 48~51 cc	
	Guide bar: 17 in.	
12.	Sling set choker hook	15
13.	Copying machine	1
14.	Electric typewriter	1
15.	Refrigerator	1

[1980]

	Specifications	Quantity
1.	Sprinkler	58 sets
2.	Sprinkler hose	5 sets
3.	Rotary harrow for tractor 24 h.p.	1
4.	Seeding machine for tractor 24 h.p.	1
5.	Cultirator for tractor 24 h.p.	1
6.	Sprayer for tractor 24 h.p.	1
7.	Excavator for tractor 24 h.p.	1
8.	Bush cutter Displacement: 33 cc Circular edge, mowing edge 5 each/with stand	3
9.	Seedling pot PH615 1/3L type 6 cm across × 15 cm deep	30,000 sets
10.	Cargo-passenger car (light van)	1
11.	Forestry tractor (crawler type) Komatsu D60A-6-angle bulldozer 140 h.p.	1
12.	Truck 8 ton capacity, diesel engine	1
13.	Chain saw (large-size) 85 cc displacement	2
14.	Chain saw (medium-size) 70 cc displacement	3
15.	Chain saw (small-size) 51 cc displacement	1
16.	Saw chain setting machine (electric-powered)	1
17.	File set for saw chain setting	3 sets
18.	Circular saw setting machine (electric-powered)	1
19.	Winch with 3 ton capacity	3
20.	Video system	1
21.	8-mm filming equipment	1 set
22.	Overhead projector	1 set
23.	Slide projector	1 set

[1981]

	Specifications	Quantity
1.	Crane truck	1
2.	Wheel-type tractor for nursery 66 h.p.	1
3.	Forest vehicle	1
4.	Rake for tractor	1
5.	Light truck	1
6.	Front-fork loader	
7.	Mower	1
8.	Hydraulic branch cutter	2
9.	Forklift	
10.	Slender band saw setting machine	1
11.	Crosscut deck saw	1
12.	Pulley for motor	1
13.	Heat-tension blast reducion gear	1
14.	Circular saw grinding machine	1
15.	Three-side plane	1
16.	Automatic band saw	1
17.	Automatic band saw setting machine	1
18.	Desk-top grinder	1
19.	Gas welder	1
20.	Electric welder	1