50－65
F 1

REPORT OF
PRE-FEASIBILITY SURVEY ON SILVICULTURE PROJECT IN INDONESIA

NOVEMBER, 1975

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
受入月日 '84. 3. 22	108
	88.3
登録No. 01746	FD

Preface

The recent circumstances of forestry in Japan have been closely related to the world-wide trend of timber supply and demand, and also to the tendency of forest resources in the world.

According to the statistics of Japan's timber supply in I974, the share of imported timbers amounts to 65%. Above all tropical woods account for nearly half of imported timbers, and the sources of these tropical woods are located in developing areas of South East Asia, mainly Indonesia,, Oceania, South America and Africa.

Meanwhile, the tendency of forest resources is an important problem which has been paid as much attention as resources of energy and foods since the event so-called " oil shock". Particulary, it is of urgent necessity to implement appropriate development of tropical rain forests and afforestation on the vast grass lands existing in South East Asia including Indonesia, Philippines and so on. In the above-mentioned situation, Japan International Cooperation Agency (JICA) sent the survey team which was conducted by Ir. Niro Namura, the director of Forestry Development Cooperation Department J.I.C.A to the Republic of Indonesia for 2I days from June Ist till 20th, I975 to carry out the pre-feasibility survey necessary for realizing the afforestation

JICA LIBRARY
1056400[3]

project as a cooperative development project.

The afforestaion project in question surveyed is very significant in that it aims at changing the grass lands and secondary forests which are left in extensive land use in spite of their favourable climatic and other natural conditions into the valuable forests both in quality and in quantity. This project should not only contribute to the industrial development in Indonesia and Japan but also be appriciated from the point of view that it will build up valuable natural resources and environment.

I wish this report will come in handy as a useful datum for the persons concerned, and will be helpful to realize the project smoothly.

At the end of the preface, I would like to express my sincere appreciation for the most generous support and cooperation afforded from the Directorate General of Forestry and other agencies concerned in Indonesia as well as the Ministry of Foreign Affairs, the Ministry of Agriculture and Forestry and other agencies concerned in Japan.

November 1975

Japan International Cooperation Agency

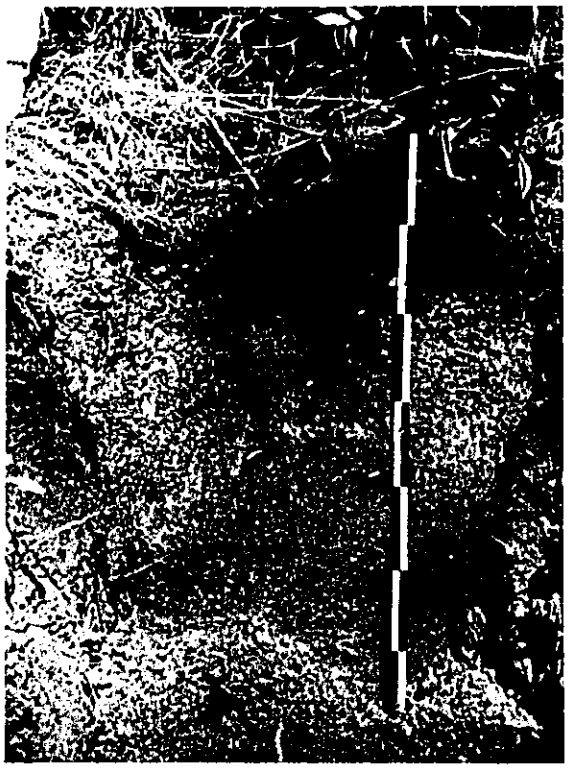
President Shinsaku Hogen

トバ湖岸台地上のメルクシマツ人工林・北スマトラ

Pinus merkusii forests' planted on the upland plateau around the Lake Toba. North Sumatera

上掲のメルクシマツ人工林（35年生）

Pinus merkusii man-made forest same as above-mentioned. (35years old)



同上人工林の土壌断面（試孔点No.2）
Lithosol型

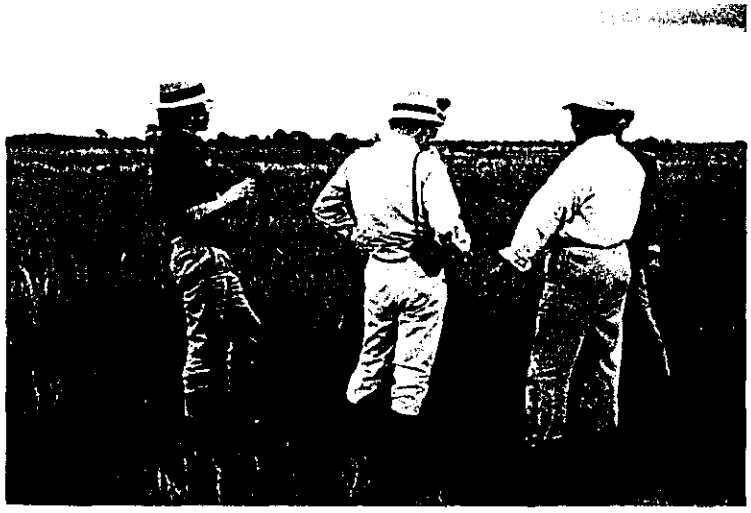
Soil profile (No.2) in the same stand above-metioned. Lithosol type

トバ湖岸台地上のメルクシマツ新植地（１年目）と草原地帯・北スマトラ

Young plantation of Pinus merkusii (1year) and grass land on the upland plateau around the Lake Toba. North Sumatera

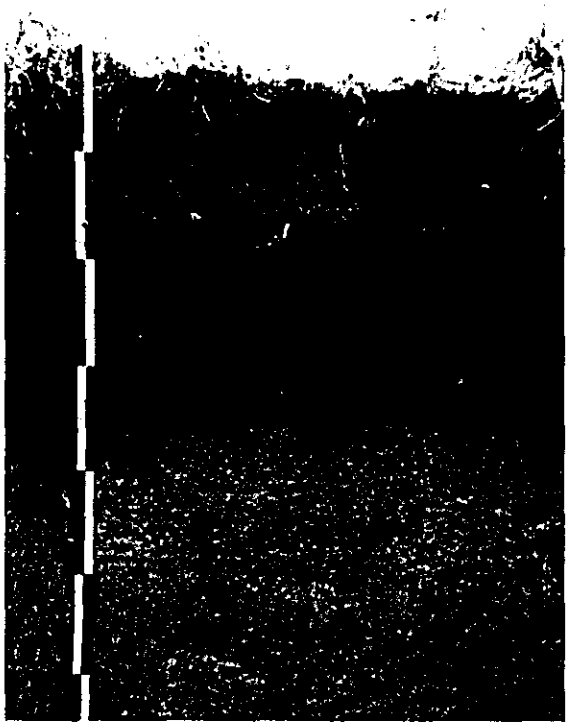
同左の草原地帯の土壌断面（試孔点No.４）Andosol型

Soil profile (No.4) in the grass land left-mentioned. Andsol type.



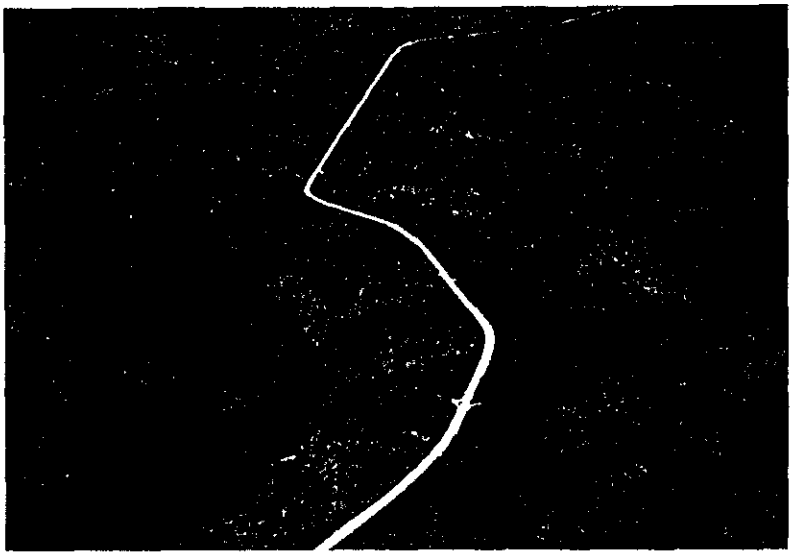
グヌントアーコタピナン間の草原地帯・北スマトラ

Grass land between Gnungtua and Kotapinang. North Sumatera



同左の土壌断面（試孔点No.５）
地下水位の高いRed-yellow podzolic型

Soil profile (No.5) in the grass land left-mentioned.
Red-yellow podzolic and hydromorphic soil type.



航空機から見た草原地帯

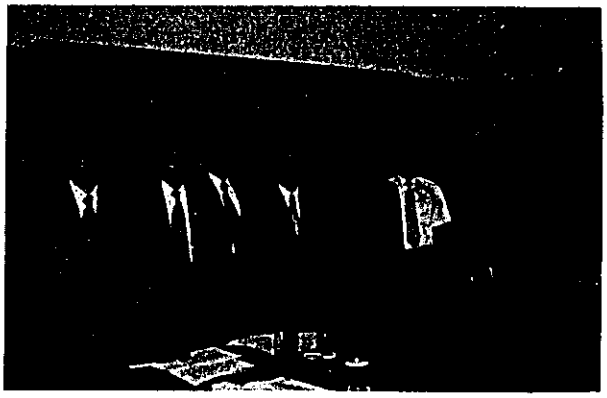
View of grass land from aircraft.

シュバンジェリジ近傍の草原

Grass land near Subanjeriji.

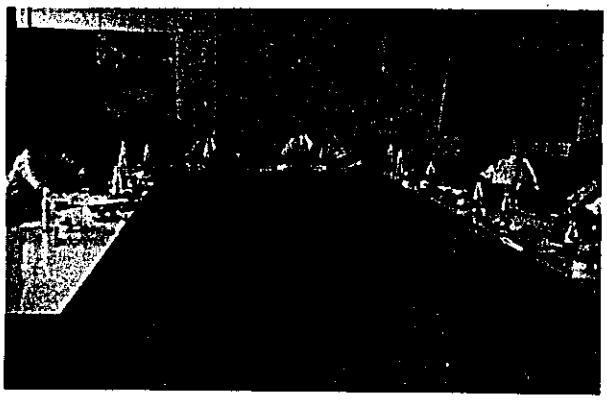
同左の土壌断面（試孔点No.8）
Red-yellow Podzolic soil型

Soil profile (No.8) in the grass land left-mentioned.
Red-yellow Podzolic soil type



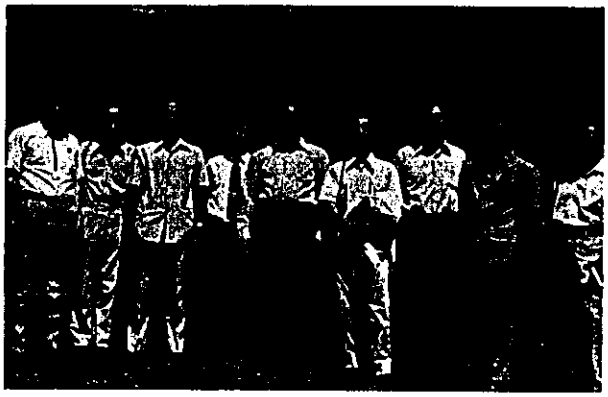
林業総局長に表敬訪問

Courtesy call to the Director General of Forestry.



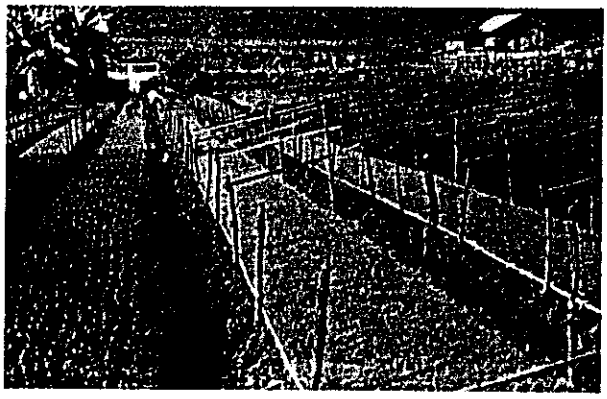
造林局長等との会議

Meeting with the Director and officials of Reforestation & Rehabilitation.



北スマトラ営林局長と

With the Director of North Sumatera Regional Forest Office.



北スマトラ・プラパット近傍の苗畑

Nursery near Prapat in North Sumatera.

メルクシマツの苗床
北スマトラ・バラカ苗畑

Seedling of Pinus merkusii on the nursery bed in Balakka nursery. North Sumatera

メルクシマツを原料とする割箸製造の合弁工場、北スマトラ　ブラスタギ

Joint venture factory making chopsticks from Pinus merkusii in Berastagi. North Sumatera

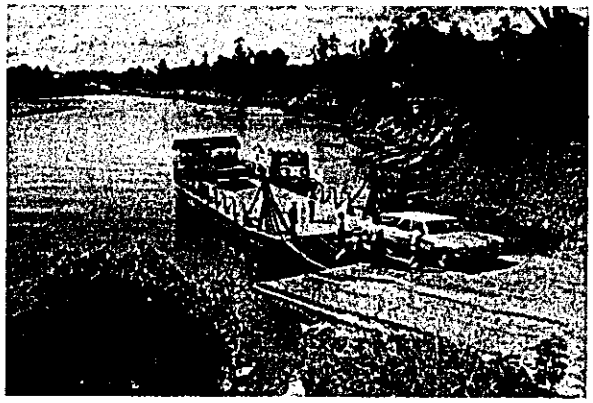
南スマトラ営林局の前で

at the entrance of the DINAS KEHUTANAN South Sumatera province

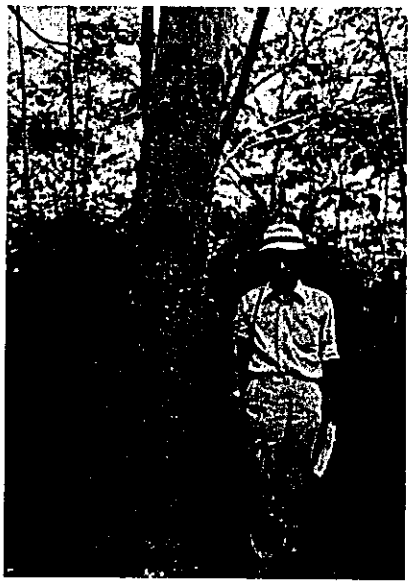
パレンバン～タンジュンエニム間の幹線道路

Trunk road between Palembang and Tanjunenim.

パレンバン～タンジュンエニム間の鉄道
Rail way between Palembang and Tanjunenim. South Sumatera



南スマトラ・レマタン河を渡るフェリーボート
Ferry—boat crossing the River Lematang. South Sumatera



アルビジア・ファルカタの植栽木（８年生）
Planted Albizzia falcata. (8years old)

スンカイ（Personema canescens）の植栽木（４年生）
Planted SUNGKAI. (Personema canescens)(4years old)

CONTENTS

	Page
Purpose of Survey	1
Members of Survey Team	3
Itinerary of Survey Team	4
1. Outlook for Forestry in Indonesia	8
(1) Forest Resources	8
(2) Forestry Administration and Policy	10
(3) Silviculture Administration and Techniques	13
2. Outlook for Surveyed Area	18
(1) Circumstances Leading to Selection of Surveyed Area	18
(2) North Sumatera Province	19
a. Area Around Lake Toba	19
b. Gunungtud-Kotapinang Area	27
(3) South Sumatera Province	31
3. Means of Cooperation	38
(1) Indonesian Side's Views on Forestry Development Cooperation	38
(2) Japanese Side's Views on Re-afforestation Cooperation	42
(a) Re-afforestation Cooperation by Private Enterprises	42
(i) North Sumatera Province	42
(ii) South Sumatera Province	44
(b) Other Means of Technical Cooperation in Forestry	46

Purpose of Survey

Republic of Indonesia has rich forest resources in its expansive territory stretching from Sumatera to Irian Jaya, and the development and utilization of forest resources have been accelerated in the last few years. While the development and utilization of forest resources are being stepped up, the vast grass lands developed as a result of shifting cultivation have for many years existed in many areas. From the standpoint of land use, soil conservation and watershed management, Indonesia has been taking a growingly high interest in the necessity of reafforestation.

With this situation aganist the background, Mr. Soedjarwo, Director General of Forestry, and high officials of the Directorate General of Forestry visited Japan in 1972, and their visit paved the way for exploring the possibility of cooperation between Republic of Indonesia and Japan in an Indonesian reafforestation program. In the meantime, the Japan International Cooperation Agency was founded and its line of business was subsequently expanded. It has now been decided to conduct a pre-feasibility survey on cooperation in a silviculture project. The terms of references of the mission are as follows:

To explain the orgenization and functions of JICA (Japan International Cooperation Agency) to the authorities concerned of the Indonesian Government and exchange views with them on Japan's possible cooperation through JICA with Indonesia especially in the field of forestry;

To exchange views on the possibility of afforestation through cooperation between a private sector of Indonesia and a Japanese private enterprise, which will be financed and technically supported by JICA, and also to make a preliminary field survey to select a suitable area for this type of cooperation; and

To exchange views on inter-governmental technical cooperation for forestry activity in general, especially for the implementation of the afforestation mentioned above.

Members of Survey Team

Assignment	Name	Organization	Items Surveyed
Leader	Niro Namura	Director, Forestry Development Cooperation Department, JICA	Planning, institution, means of cooperation, etc.
Forest economy	Kazuo Oka	Assistant-Chief, Planning Division, Forestry Agency	Economic location and forest administration
Forest management	Dr. Kazuto Arimitsu	Head, Soil Survey Section, Forestry Research Institute	Natural location and re-afforestation
Coordination	Yoshiro Mine	Agriculture and Forestry Planning and Survey Department, JICA	Clerical work

Persons accompanying the survey team: Yoshio Hironaka, Senior Officer, International Cooperation Devision, Ministry of Agriculture and Forestry; and Tunemichi Hirata, Economic Attache, Japanese Embassy in Jakarta (assigned to an on-the-spot survey in North Sumatera Province).

Itinerary of Survey

Date	Trip	Items Surveyed
1 June 1975 (Sun.)	Tokyo - Jakarta	Preliminary talk on the survey purpose and schedule with Director and officials of Reforestation and Rehabilitation, officials of the Japanese Embassy and Director of the JICA Office in Jarkata.
2 June 1975 (Mon.)		Courtesy call to the Director General of Forestry and the Japanese Ambassador. Talk with the Director of Reforestation and Rehabilitation and other officials concerned (JICA operations and the objective of Survey Team explained; Indonesian side expressed views.)
3 June 1975 (Tues.)	Jarkarta - Bogor	Visit to the Forest Research Institute and the Forest Product Research Institute.
4 June 1975 (Wednes.)		Talk with officials of the Directorate General of Forestry 1. Indonesian side's views on forestry policy and re-afforestation 2. Selection of, and talk on, the areas to be surveyed 3. Collection of data
5 June 1975 (Thurs.)	Jarkarta - Bogor	Talk with Vice-director of Planning, Directorate General of Forestry, and officials in charge of planning. Visit to the Soil Research Institute (by Arimitsu)

Date	Trip	Items Surveyed
	Bogor - Jakarta	Exchange of views with officials in charge of exploitation and industry at the Directorate General of Forestry on forestry development co-operation.
6 June 1975 (Fri.)	Jakarta - Medan	Courtesy call to the Japanese Consul-General Briefing by the Director of the North Sumatera Regional Forest Office and other officials concerned on forests and forestry within its jurisdiction.
	Medan - Pematang Siantar - Prapat (Lake Toba)	
7 June 1975 (Sat.)		Survey in the periphery of Prapat; soil profiles No. 1 ∿ 4 1. Survey on bare land (grassland) 2. Survey on a man-made Pinus merkusii (35 years old) forest 3. Survey on two nurseries in Prapat 4. Survey on a man-made Pinus merkusii forest in bare land 5. Fire break tree belt
8 June 1975 (Sun.)	Prapat - Tartung - Gunungtua Kotapinang-Padansidempuan	Survey on bare land in the Gunungtua-Kotapinang area; soil profile No. 5
9 June 1975 (Mon.)	Padansidempuan - Prapat	Survey on bare land near Balakka's nusery; soil profile No. 6. Survey on two nurseries near Balakka Vist to the Tarutung District Forest Office

Date	Trip	Items Surveyed
10 June 1975 (Tues.)	Prapat - Berastagi - Medan	1. Survey on the Shorea spp. man-made forest (23 years old) in Tinguarunggu 2. Visit to an Indonesian-Japanese splittable chopstick plant in Berastagi 3. Exchange of views with the Chairman of the Regional Planning and Development Board of North Sumatera on forestry development
11 June 1975 (Wednes.)	Medan - Jakarta	Report on the outline of the survey results to the Director of the North Sumatera Regional Forest Office for an exchange of views, and collection of data.
12 June 1975 (Thurs.)	Jakarta - Palembang	Aerial survey on bare land in Benakat, Lahat and Subanjeriji Talk with officials of the South Sumatera Regional forest Office and a briefing on forests and forestry within its jurisdiction Exchange of views with members of the Sourth Sumatera Branch of the Indonesian Timber Society
13 June 1975 (Fri.)	Palembang - Pendopo	Survey on bare land in the Benakat area and a man-made Peronema canescens (sungkai) forest (24 years old); soil profile No. 7.
14 June 1975 (Sat.)	Pendopo - Muaraenim - Subanjeriji - Palembang	Survey on bare land and a man-made Melaleuca leucadendron forest in the Subanjeriji area; soil profile No. 8
15 June 1975 (Sun.)	Palembang - Jakarta	

Date	Trip	Items Surveyed
16 June 1975 (Mon.)		Sorting of survey results and collected data, and preparation of the draft of an interim report to the Director General of Forestry on the survey results
17 June 1975 (Thues.)		Talk with officials of the Japanese Embassy on the draft and collection of supplemental data.
18 June 1975 (Wednes.)		Negotiation with the Director of Reforestations & Rehabilitation, the Vice-director of Planning and other officials concerned at the Directorate General of Forestry on the draft. Presentation of the interim report to the Director General of Forestry on the survey results.
19 June 1975 (Thurs.)	Jakarta - Bogor	Talk with the President, Director of Production and Director of Marketing of P.T. Inhutani on forestry development cooperation. Visit to Bogor Botanical Garden; arrangement of soil samples; and report to the Ambassador on the completion of survey.
20 June 1975 (Fri.)	Jakarta - Tokyo	Return to Japan

1. Outlook for Forestry in Indonesia

(1) Forest Resources

The national land of Indonesia covers an area of 227,000,000 hectares, about 5.6 times that of Japan. Of this total area, forests cover an area of 122,000,000 hectares, or about 60 percent, which is five times as big as those in Japan. The forests are classified into protection forests (57,000,000 hectares or 47 percent), production forests (38,000,000 hectares or 31 percent) and reserved forests (27,000,000 hectares or 22 percent). Of this classification, how to utilize the reserved forests is still unknown. From the standpoint of working for a legitimate and effective utilization of the national land, it is to be hoped that a forest inventory and a land use plan be formulated without delay.

As classified by the ecological forest type, rain forests account for 73 percent, and they are followed by secondary forests and bare land with 13 percent, swamp forests with 11 percent, mangrove forests with one percent, and deciduous, coastal or peat forests and others with the remaining percentage.

The total area of grassland (Alang-Alang) in Indonesia measures 16,000,000 hectares, whereas degraded young natural

forests in this nation total 23,000,000 hectares in area. In normal circumstances, these two types of areas which measure a total of 39,000,000 hectares are in need of re-afforestation. This area of 39,000,000 hectares to be re-afforested is equivalent to the total area of Japan's national land. When this requirement is compared with Japan's existing man-made forests totaling 9,000,000 hectares in area, it is ovious that there is a need to prepare solid foundations for a reafforestation of these areas in Indonesia.

As regards the information of Indonesia's standing stock, the information gained on the 45,000,000 hectares of forests which have more of less been surveyed reveals that among the forests which account for 70 percent of the surveyed area, there exist at least 25 cubic meters of standing stock per hectare, which are over 50 centimeters in diameter and worth as merchandise.

From these data, the capacity of ensuring a sustained yield of timber from the productive and reserved forests which total 65,000,000 hectares may be estimated at 45,000,000 cubic meters a year. This productivity is smaller than the planned production of 49,700,000 cubic meters* from Japan's 24,270,000-hectare forests. The reason is that whereas timber is produced mainly in a

selective cut method from natural forests in Indonesia, the man-made coniferous forests which account for 37 percent of all types of forests in Japan constitute the main production source and the productivity of these man-made forests per hectare is high in Japan.

* The capacity of round wood supply for 1981 according to the "Basic Plan of Forest Resources and Prospects for Demand and Supply of Forest Products in Japan" approved by the Cabinet in 1973.

(2) Forestry Administration and Policy

Indonesia's forestry administration and policy, as is the case with the policies of all other industries, is based on a five years' development program (PELITA). The Second Five-Years Plan extending from 1974 through 1978 is underway at present.

The projects contained in the Pelita include national projects (APBN), provincial projects (APBD) and special projects. The forestry development based on the PELITA encompasses production of timber, reforestation and rehabilitation, research, and forestry inventory.

In most of timber production, private enterprises are is invested with the right of logging (HPH), but semi-

governmental sections, such as Perum Perhutani, P.T. Perhutani and P.T. Inhutani, are also engaged in timber production.

Table 1: Timber Output and Export

Year	1969	1970	1971	1972	1973
Output	6,206*	10,899	13,706	17,717	26,297
Export Volume	3,703	7,350	10,761	13,891	19,488
Value	26**	101	169	230	579

* In 1,000 cubic meters
** In 1,000,000 U.S. dollars

(Source: Statistical Pocketbook Indonesia, 1972)

HPH's logging projects are conducted in accordance with the Foreign Capital Investment Act No. 1 of 1967, Domestic Capital Investment Act No. 6 of 1968 and other ordinances. Reflecting the policy of nationalizing the production means and promoting of agriculture, forestry and fisheries, Indonesia has in recent years aimed at raising the local processing capacity, employing technicians, expanding man-made forests (designed specifically to reserve pulp wood), and reducing the ratio of foreign capital investment. This year, the Indonesian

Government has decided to limit the investment of the right of logging to domestic businesses in the future.

With respect to silviculture, most of the reforestation and afforestation projects are governmental. They have been carried out mainly by the Government or semi-governmental sections, such as Perum Perhutani. Besides them the re-afforestation has been carried out with subsidiary seedlings provided free of charge by the Government to inhabitants. In another aspect, natural regeneration is a method of silviculture which is widely put to use in the logging concession areas where selective cutting constitutes the main working system. In these areas, therefore, few man-made forests under clear cutting are observed.

It is worthy to mention here that the Indonesian Government is studying ways of allowing private enterprises to develop man-made forests in parcels of land possessed by the State. This idea is to encourage domestic and foreign investment in reforestation and afforestation projects by awarding a concession (the right of planting known as HPTH) to planters. The Directorate General of Forestry is studying the possibility of legislating this program.

Next, a check of the forestry budget earmarked under the existing Five-Years Development Plan (PELITA) shows that

1,572 million Rupiah (approximately ¥1,100 million) was set aside in 1973. As against this annual budget, the earnings from forestry products and royalties from the right of logging totaled 13,388 million Rupiah, suggesting that the revenue derived from forestry is not fully* reverted to the development of forestry.

(* A check of the budget of Japan National Forest earmarked for the same year reveals that the outlays totaled about ¥195,100 million and the earnings ¥188,100 million. In addition, a sum of ¥135,800 million was set aside as a budget for the development of civil forests.)

(3) Silviculture Administration and Techniques

Of all the problems faced by the Indonesian Directorate General of Forestry, the afforestation and reforestation of about 39,000,000 hectares of bare land are a very urgent task. This bare land consists of about 16,000,000 hectares of grassland (Alang-Alang) and about 23,000,000 hectares of degraded young natural forests known as Belukar. These parcels of bare land have been generated as a result of burning of shifting cultivation for many years.

The existence of these parcels of bare land is not desirable from the standpoint of efficient land use and

watershed management. Their liquidation is an important task.

Placing special emphasis on reforestation and afforestation in bare land -- particularly in grassland, the Indonesian Government conducted about 107,000 hectares of reforestation and about 531,000 hectares of afforestation with its budget (APBN) based on the First Five-Years Development Plan (PELITA) extending from 1969 through 1973.

As against the targets of reforestation and afforestation envisaged in the APBN, the rate of realization stands at 84 percent for reforestation and 87 percent for afforestation.

Both in Central and East Java, the reforestation of 50,000 to 60,000 hectares of cut-over areas is conducted a year by Perm Perhutani.

The re-afforestation projects financed by local governments (in accordance with APBD) and sustained by other financial sources were downwards of 10 percent of those sustained by the national budget.

Under the aforementioned projects, the acreage of the areas re-afforested a year measure 190,000 to 200,000 hectares on the average*.

(* The acreage of the areas re-afforested a year in Japan was approximately 340,000 hectares on the average, including about 260,000 hectares of civil forests and about 80,000 hectares of National Forest, and all were reforestation on the just logged over areas. Presently, in Japan, afforestation is scarcely applied to bare land such as grass land.)

Under the Second Five-Years Development Plan from 1974 through 1978, the target of reforestation and afforestation is set at 3,400,000 hectares, up 3.5 times from the First Five-Years Development Plan. This is in expectation of an increase in the revenue scale.

In addition to the governmental re-afforestation above-mentioned, the Government recognizes the necessity of re-afforestation by domestic civil capital as well as foreign capital for industrial planting. Thus, as described in the section on forestry policy, a system of legislation concerning the right of planting (HPTH) is being promoted.

With respect to the technology of silviculture in Indonesia, man-made reforestation has been done is the Java Island and selective cutting and natural regeneration has been done in the territory outside Java. When the

re-afforestation projects are to be implemented in the territory outside Java on a systematic business basis, there improve the working system, machinery and research and training system.

From the latest survey, it has been clarified that it is necessary to place emphasis on the following points associated with the technology of reforestation and afforestation:

1. Research and survey of forest soil closely tied in with forestry technology;

2. Experiments to find suitable tree species (clarification of the planting species fitted to local characteristics);

3. Establishment of a technical system for mechanical planting;

4. Seed management (the management techniques associated with the acquisition, collection, storing and supply of seeds, including those of foreign species, must be improve as the supplying of seeds turns out to be inadequate for the promption of reforestation and afforestation);

5. Techniques in nurseries (nusery development and

nursing practices); and

6. Protection against forest fires (Improvement of the fire prevention system, including the organizations and facilities, and resarch on fire prevention belts).

2. Outlook for Surveyed Area

(1) Circumstances Leading to Selection of Surveyed Area

In view of the developments since the visit to Japan of Mr. Soedjarwo, Director General of Forestry, in 1972, the grassland area near Kotapinang in North Sumatera was to be surveyed in the beginning. During the subsequent talks at the Directorate General of Forestry in Jakarta, it was proposed that South Sumatera (Palembang), South Kalimantan (Banjarmasin) and South Sulawesi be included in addition to North Sumatera.

In response to this proposal, the survey team decided to include one of the three aforementioned areas in the survey in addition to North Sumatera. The area thus selected was South Sumatera where there is the highest possibility of carrying out reforestation and afforestation with loans at least according to the explanations given by the Indonesian side.

In North Sumatera Province, the distribution of grasslands is such that they may roughly be classified into those of the area around the Lake Toba and the Gunungtua-Kotapinang area according to the explanations given by the Indonesian side. In South Sumatera, the grasslands may also roughly be classified into those of the Benakat area (along the left bank of the Lematang River) and the Subanjeriji area

(along the right bank of the Lematang River). Given this situation, surveys and feasibility assessments were conducted in these four areas.

(2) North Sumatera Province

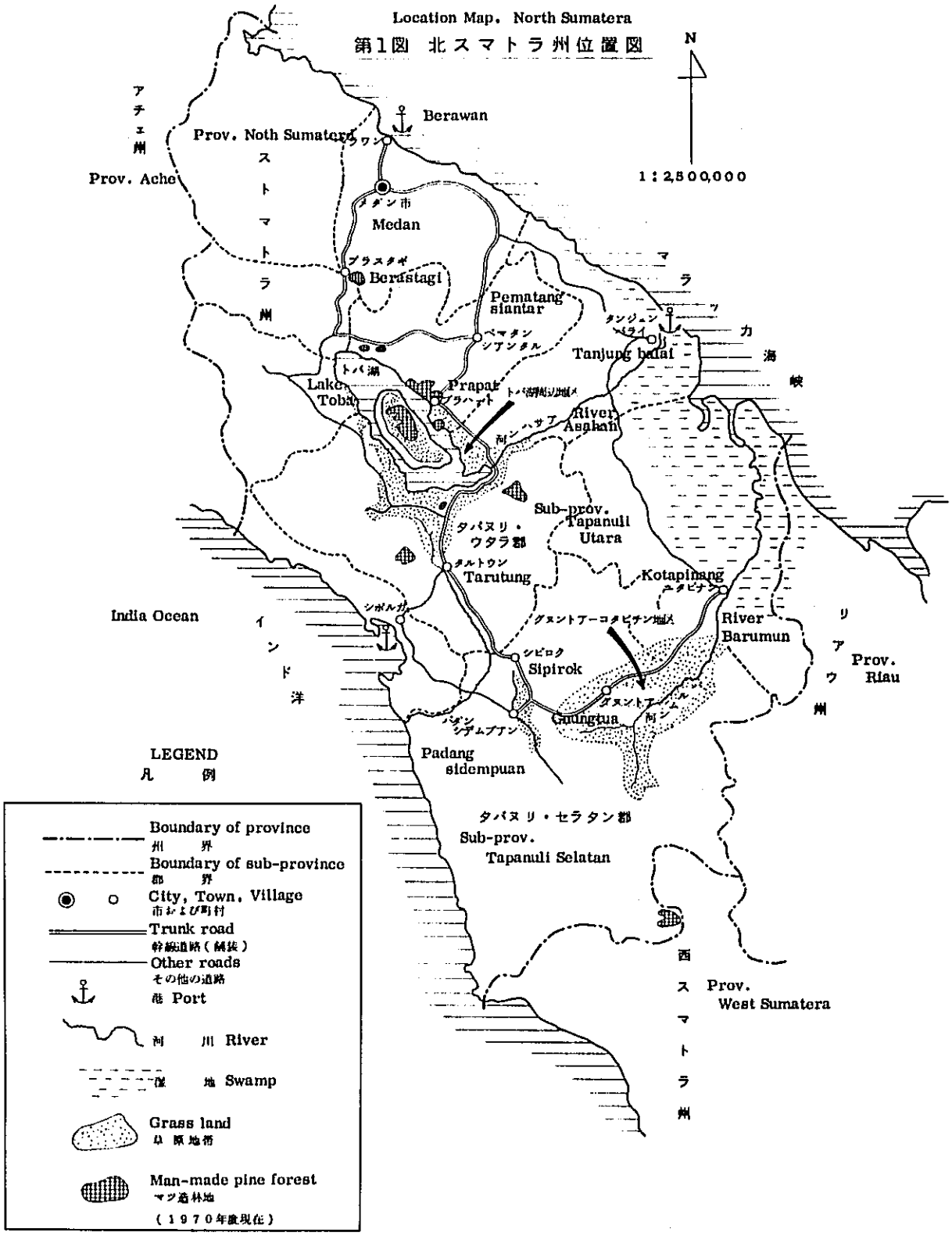
a. Area Around Lake Toba

Forest Conditions:

According to the statistics available from Tapanuli Utara Sub-province which occupies most of the area around the Lake Toba, the ordinary natural forests in this area are relatively small as the total area of these forests measures 180,000 hectares, but there are 310,000 hectares of secondary forests, 50,000 hectares of man-made forests and 210,000 hectares of grassland. The fact that the secondary forests, man-made forests and grassland are relatively large in area suggests that extensive land utilization around the Lake Toba has been conducted for a long time.

Socioeconomic Conditions:

The population density of the North Sumatera Province stands at 97.9 persons per square kilometer, higher than the averaged population density of the outer territory of Indonesia which is registered at 25.5 persons per square kilometer. Of the provinces on the Sumatera Island (with its averaged population density


Location Map. North Sumatera
第1図 北スマトラ州位置図
N
1:2,500,000
アチェ州
Prov. Acheh
Prov. Noth Sumatera
スマトラ州
Berawan
ブラワン
メダン市
Medan
ブラスタギ
Berastagi
Pematang siantar
ペマタン シアンタル
タンジュン バライ
Tanjung balai
マラッカ海峡
トバ湖
Lake Toba
Prapat
プラハット
トバ湖周辺地区
River Asahan
ハサア河
Sub-prov. Tapanuli Utara
タパヌリ・ウタラ郡
タルトウン
Tarutung
Kotapinang
コタピナン
India Ocean
インド洋
シボルガ
グヌントアーコタピナン地区
River Barumun
リアウ州
Prov. Riau
シピロク
Sipirok
グヌントアーム
Gunungtua
パダン シダムプアン
Padang sidempuan
タパヌリ・セラタン郡
Sub-prov. Tapanuli Selatan
西スマトラ州
Prov. West Sumatera
LEGEND
凡 例
Boundary of province
州 界
Boundary of sub-province
郡 界
City, Town, Village
市および町村
Trunk road
幹線道路(舗装)
Other roads
その他の道路
港 Port
河 川 River
湿 地 Swamp
Grass land
草 原 地 帯
Man-made pine forest
マツ造林地
(1970年度現在)

standing at 46.2 persons per square kilometer), the North Sumatera Province features the highest population density. In Tapanuli Utara Sub-province which encompasses the area around the Lake Toba, rice plantation is done in the alluvial plain along the lake and dry-field cultivation on the diluvial upland. There are many hamlets in this Sub-province, whose population density stands at 65.1 persons per square kilometers, a heavily populated Sub-province as compared with others in the North Sumatera Province.

With respect to the conditions of transportation in this area, the trunk roads are paved and kept in a favorable condition, but Medan, a lumber market, and Belawan, its outport, are situated 200 to 250 kilometers away from this area. The branch roads in this area are deficient in terms of density and maintenance.

Most of the community in this area possesses the right of common use of grasslands. The Government purchases those parcels of land which are associated with this right, when it intends to carry out a reforestation or afforestation project. The shifting cultivation entails the danger of a spread of fire, so that there is a need to pay heed to the protection of man-made forests from a fire.

Circumstances of man power are such that there are a relatively large number of hamlets engaged in farm work, so it is possible to hire planting workers many enough to take care of the present scale of reforestation and afforestation. When a large-scale re-afforestation project is to be carried out, it will be necessary to mechanize planting work. There is also a need to possess elements of mobility to the attendance and transportation of workers, such as by assuring the availability of vehicles.

With respect to the situation of workers' wage, the average wage daily paid on estates (male) was 362 Rupiah in the North Sumatera Province in the latter half of 1973, relatively higher than the national average wage of 247 Rupiah in Indonesia.

As to the activities of businesses, a Japanese enterprise felled and exported planted Pinus merkusii in 1960 through 1961, but no large-scale felling projects are underway at present. With respect to the small-scale projects, there is a factory operated in a joint venture in the Berastagi area to produce splittable chopsticks from planted Pinus merkusii. At this factory, about 6,000 cubic meters of wood have been felled a year from a 700-hectare concession area and finished products have been exported to Japan.

Description of Natural Conditions:

The area around the Lake Toba is made up with uplands 700 to 1,300 meters above the sea level, but the slopes facing the lake are generally steep.

The geological layer of this area is distinguishedly liparite. Locally, the palaeogene and the triassic, permian and carboniferous systems in the mesozoic era are observed. In general, the distribution of volcanic ashes is widespread.

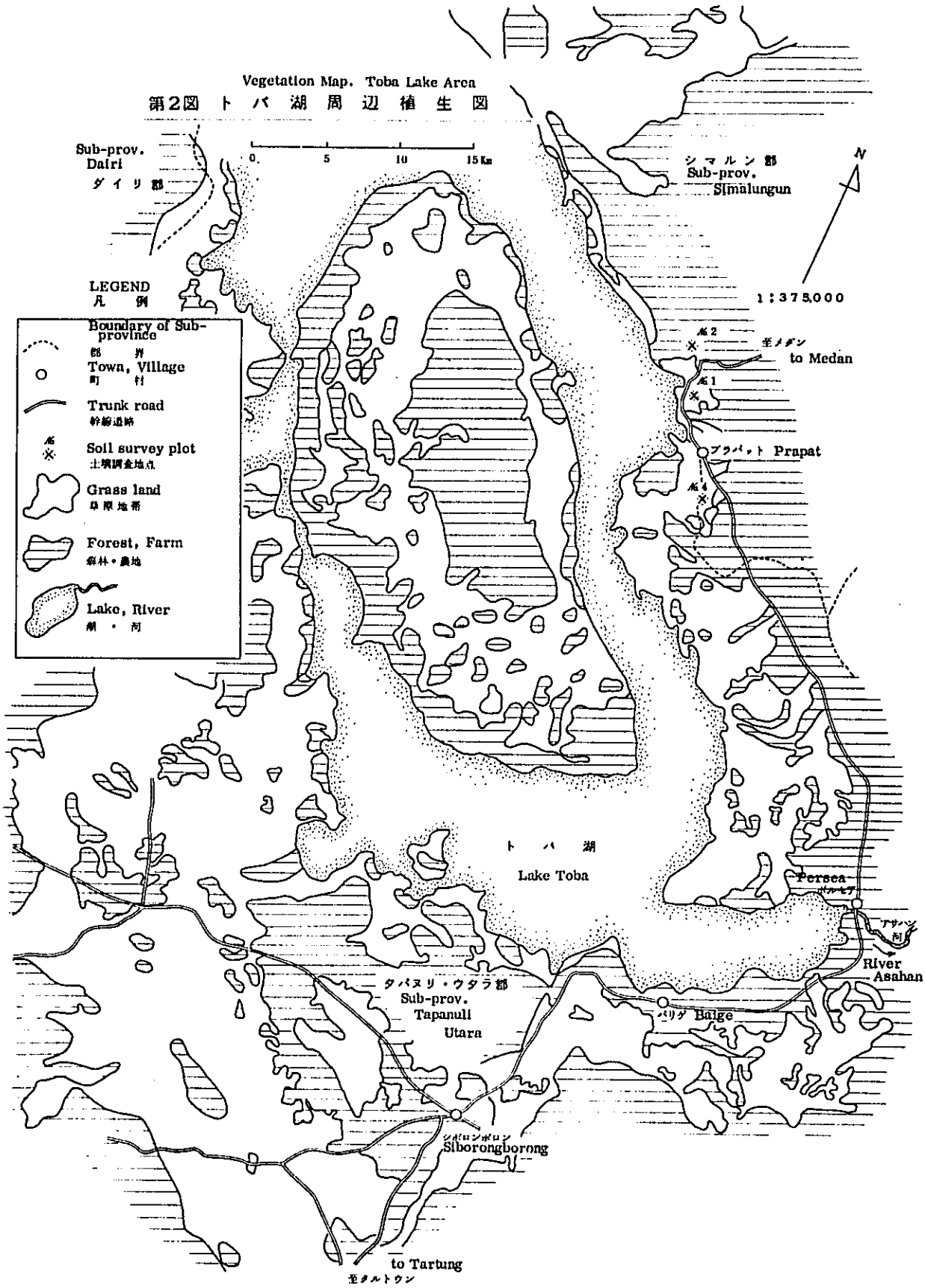
As regards to the soil, an eminently yellowish lithosol is observed in the fringes and slopes of uplands, where as andosol (black in color) and a red-yellow podsolic soil are distributed on the uplands.

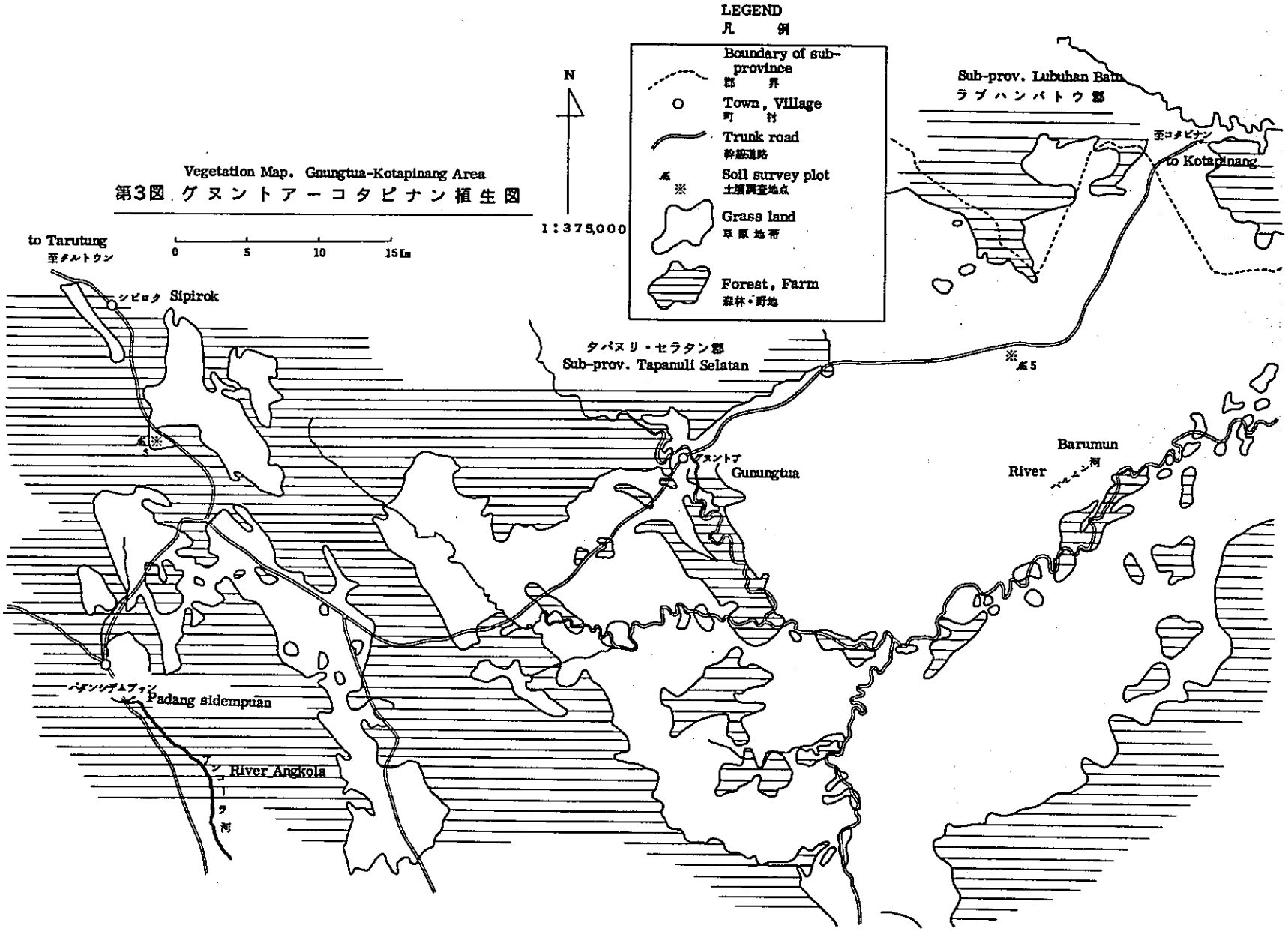
The temperature is cool. Although accurate data are unavailable on the precipitation, it is surmisable that this area features a greater annual precpitation than Medan (whose averaged annual precpitation stood at 1,959 mm in 1969 and 1970).

A total of upwards of 200,000 hectares of grassland stretch over the slopes of the Lake Toba and its peripheral uplands. In this area, about 2,000 hectares of afforestation a year, including the planting of Pinus merkusii in State-owned lands by the North Sumatera Province Forest Office and in communal lands

Vegetation Map. Toba Lake Area

第2図 トバ湖周辺植生図

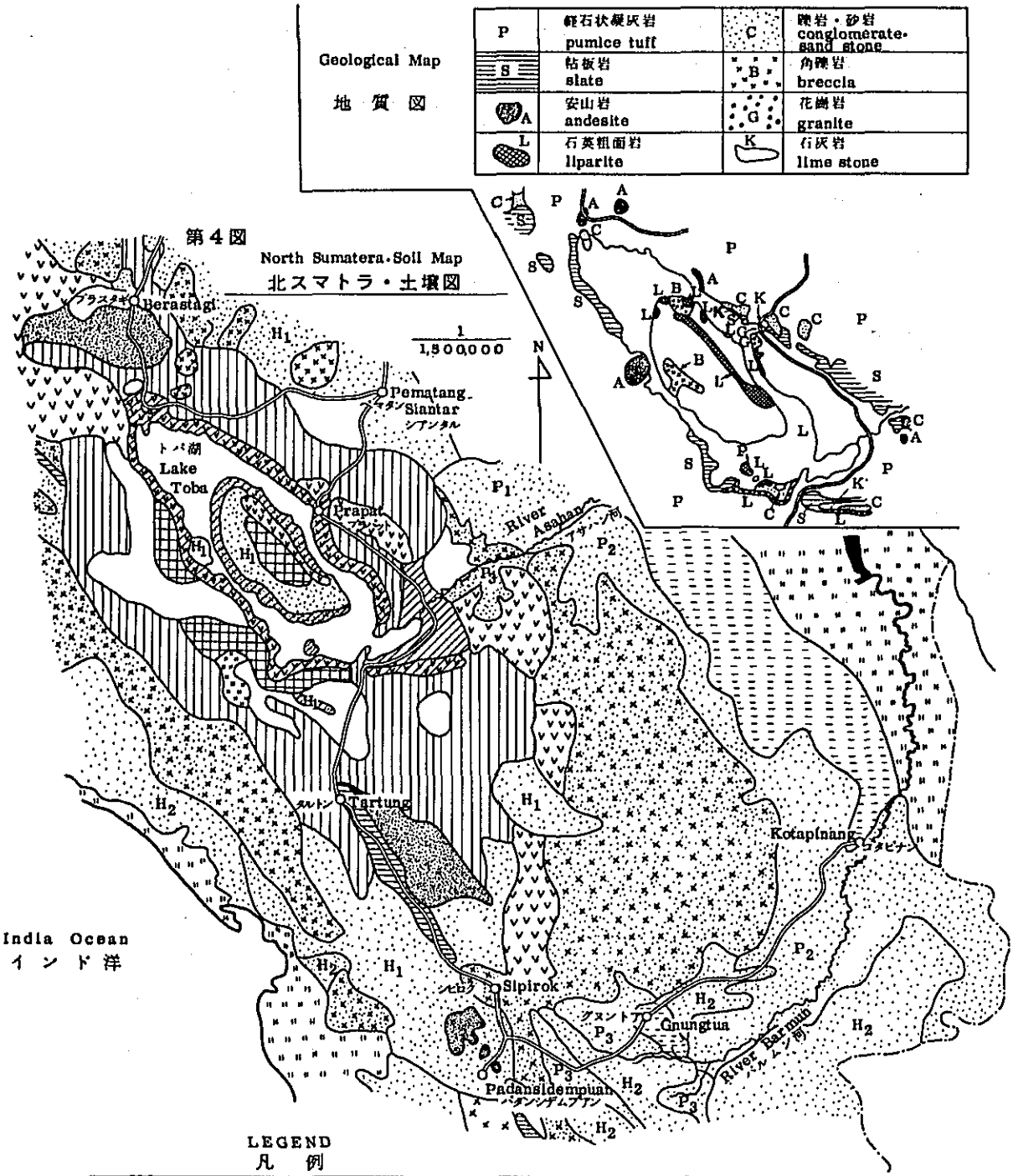



LEGEND
凡　例
Boundary of sub-province
郡　界
Town, Village
町　村
Trunk road
幹線道路
Soil survey plot
土壌調査地点
Grass land
草原地帯
Forest, Farm
森林・畑地
N
1:375,000
0
5
10
15Km
Vegetation Map. Gnungtua-Kotapinang Area
第3図 グヌントアーコタピナン植生図
to Tarutung
至タルトウン
シピロク Sipirok
タパヌリ・セラタン郡
Sub-prov. Tapanuli Selatan
Sub-prov. Lubuhan Batu
ラブハンバトウ郡
至コタピナン
to Kotapinang
※5
※5
グヌントア
Gunungtua
Barumun
River
パダンシダムプアン
Padang sidempuan
River Angkola
ラ河

第４図

North Sumatera-Soil Map

北スマトラ・土壌図



LEGEND

凡 例

P_1	plain type, red-yellow (congulated & sedimental) podsolik soil		regosol		podsol
P_2	plain type R.Y.P.soil (sedimental)		regosol & R.Y.P. soil		chocolate podsolic soil
P_3	plain type R.Y.P.soil (alluvial)		litosol & regosol		chocolate podsol & litosol
H_1	Hilly type R.Y.P.soil (congulated)		R.Y.P. soil, latosol & litosol		giei hums
H_2	Hilly type R.Y.P.soil (congulated & sedimental)		andosol		aluviol
	latosol & andosol		brown forest soil		hidromorfic soil

by communities with seedlings supplied from the Forest Office, is conducted. In addition, tens of thousands of hectares of man-made Pinus merkusii forests, 30 to 35 years old, exist and their growth is satisfactory in this area.

To sum up, a problem may be posed as to the shallow lithosol, but the andosol and red-yellow podzolic soil which are extensively distributed in this area may be looked upon as being suitable for the planting of Pinus merkusii.

b. Gunungtua-Kotapinang Area

Forest Conditions:

The data available from the Tapanuli Selatan Sub-province which contains the Gungtua-Kotapinang area indicate that this Sub-province has many ordinary natural forests mantling its mountains, as they measure 930,000 hectares in area. Also many are grasslands (320,000 hectares) and second growths (280,000 hectares). The man-made forests in the Tapanuli Selatan sub-province area measures a mere 3,000 hectares in area. In comparison with the area around the Lake Toba, the extensive forest use and the retardation in the regeneration of forest resources are more conspicuous in this area.

Socioeconomic Conditions:

The Gunungtua-Kotapinang area features a lower population density than the area around the Lake Toba. The population density of the Tapanuli Selatan Subprovince containing this area stands at 41.7 persons per square kilometer. Farm work and grazing are conducted by the inhabitants of hillside hamlets, and the lower plains are sparsely populated.

The Gunungtua-Kotapinang area is situated about 500 kilometers along a mountain route, or about 400 kilometers along a route on the plains, from the aforementioned Medan or Belawan port, which constitutes a lumber market. On the other hand, the distance from this area to Sibolga Port which faces the Indian Ocean is about 150 kilometers, but berthing facilities have yet to be developed for this port. Given this situation, the locality of this area is inferior to that of the area around the Lake Toba.

As the grassland in this area are owned by the State, no problems will be posed as to the rights of land use , when an attempt is to be made to carry out a reforestation or afforestation project, but the danger of a forest fire from a shifting cultivation is just as great as in the case of the area around the Lake Toba.

With respect to the manpower situation, the population of this area is so sparse, and the number of hamlets is so small, that there is a need to incorporate elements of mechanization and to have mobility in any reforestation or afforestation project.

No activities worthy of special mentioning are being done by enterprises in this area.

Description of Natural Conditions:

Situated 100 to 200 meters above the sea level, this area is constituted by gently wavy or flat uplands, and its periphery stretches toward the mountains.

The geological layer of this area is the neogene.

The soil of this area comes in the category of a red-yellow podzolic soil, but an interpretation of the aerophotographs taken by a NASA ERTS satellite reveals that a fairly large section of this area is swampy in particular season of a year. The results of a field survey on this area also disclose that this area is constituted by the hydromorphic soil containing a gley horizon (an example of the Tamusu Bayangan area).

The mean temperature is 26 degrees in centigrade, whereas the annual precipitation stands at 2.225 millimeters.

This area is made up with about 300,000 hectares of grassland. The grasses are generally low in height and the soil conditions are presumably poor. Of all the grasslands, Fragrea fragans sporadically grow in the swampy land. Practically no reforestation and afforestation project has been carried out in this area. Judging from its soil conditions and its height above the sea level, it can hardly be said that this area is suitable for the planting of Pinus merkusii. The primary task would be to study the planting species which may be grown under the poor soil conditions of this area and also their planting method.

Incidentally, the results of a survey on the Sipirok area situated between the Gunungtua-Kotapinang area and the area around the Lake Toba reveal that the Sipirok area is situated 650 meters above the sea level and presented a configuration fairly large in waviness, and that its geological layer is made up with tuffs. The soil is red-yellow podsolic, but the brown color of the B horizon is so dark that the soil of this area is Presumably different from the red-yellow podzolic soil to which reference has earlier mentioned. The afforest ation of Pinus merkusii has been conducted in grasslands of this area, and the results of these man-made forests indicate that this area is suitable for the planting of Pinus merkusii.

(3) South Sumatera Province

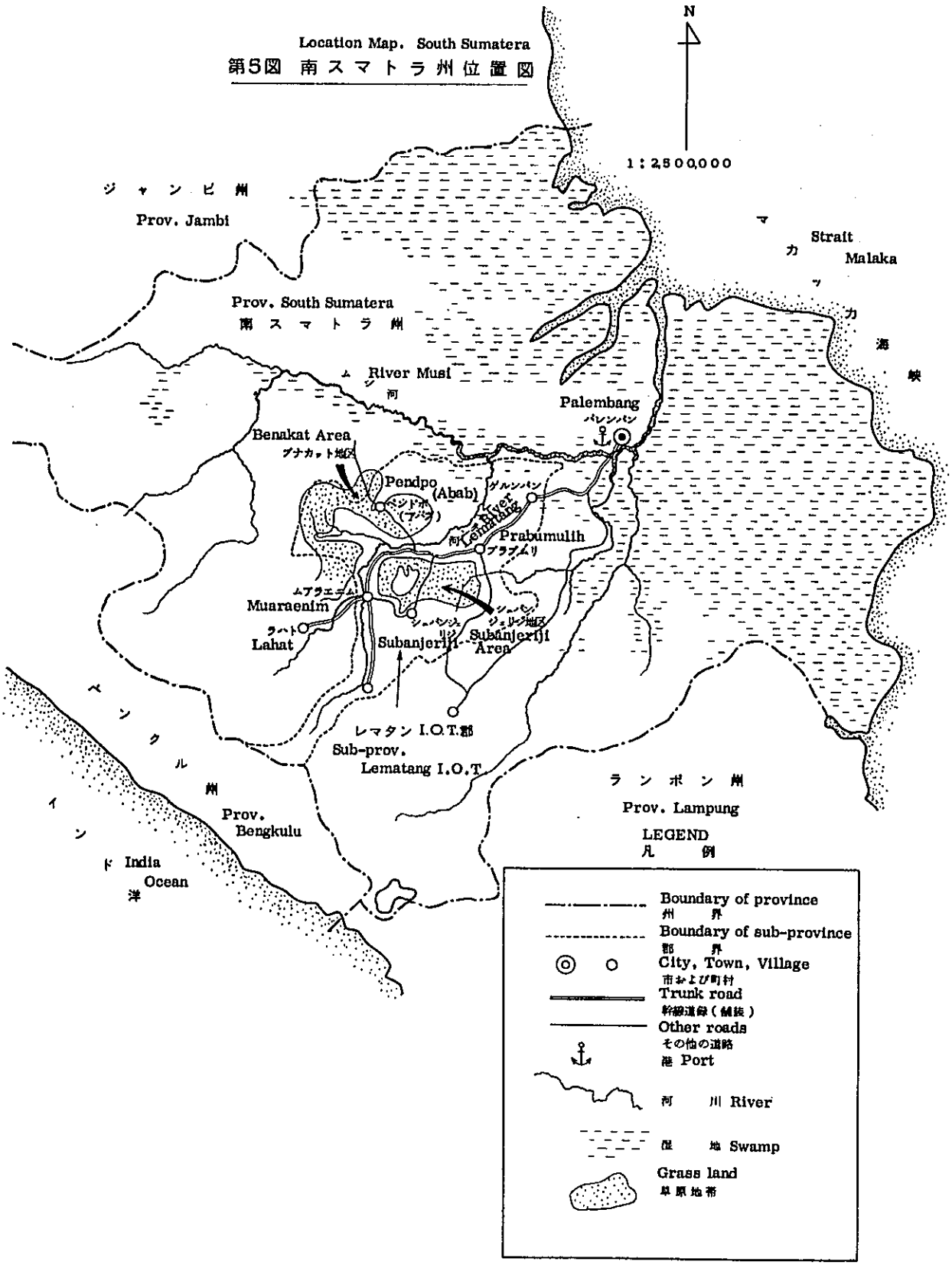
In the following, an attempt is to be made to make an elucidation on both Benakat and Subanjeriji areas (which belong to the Lematang Ilir Ogan Tengah Sub-province).

Forest Conditions:

The Lematung Ilir Ogan Tengah Sub-province containing both Benakat and Subanjeriji areas measure 957,000 hectares in area, which consists of 55,000 hectares of ordinary natural forests, 48,000 hectares of secondary growths, 492,000 hectares of degraded young natural forests (Belukar) and grasslands, 314,000 hectares of estates and farms, and 50,000 hectares of paddy fields and arable lands. 400 to 500 hectares of man-made forests of broad-leaf trees, consisting mainly of Peronem canescens (Sungkai), have been planted a year, but they still are of the young stand and small in acreage. The man-made forests in these areas, therefore, still remain in their initial phase.

Socioeconomic Conditions:

The population density of the South Sumatera Province stands at 35 persons per square kilometer, which is large in the outer territory of Indonesia. The paddy fields and arable lands available in both Benakat and Subanjeriji areas are small in number, and hamlets are situated along a main route. The population of the Lematang Ilir Ogan Tengah


Location Map. South Sumatera
第5図 南スマトラ州位置図
N
1 : 2,500,000
ジャンビ州
Prov. Jambi
Strait
Malaka
マラッカ海峡
Prov. South Sumatera
南スマトラ州
River Musi
ムシ河
Palembang
パレンバン
Benakat Area
ブナカット地区
Pendpo
(Abab)
ペンドポ
(アバブ)
River
Lematang
レマタン河
Prabumulih
プラブムリ
Muaraenim
ムアラエニム
Lahat
ラハト
Subanjeriji
Subanjeriji
Area
シューバンジェリジ地区
レマタン I.O.T.部
Sub-prov.
Lematang I.O.T.
ベンクル州
Prov.
Bengkulu
India
Ocean
インド洋
ランポン州
Prov. Lampung
LEGEND
凡例
Boundary of province
州界
Boundary of sub-province
郡界
City, Town, Village
市および町村
Trunk road
幹線道路(舗装)
Other roads
その他の道路
港 Port
河川 River
湿地 Swamp
Grass land
草原地帯

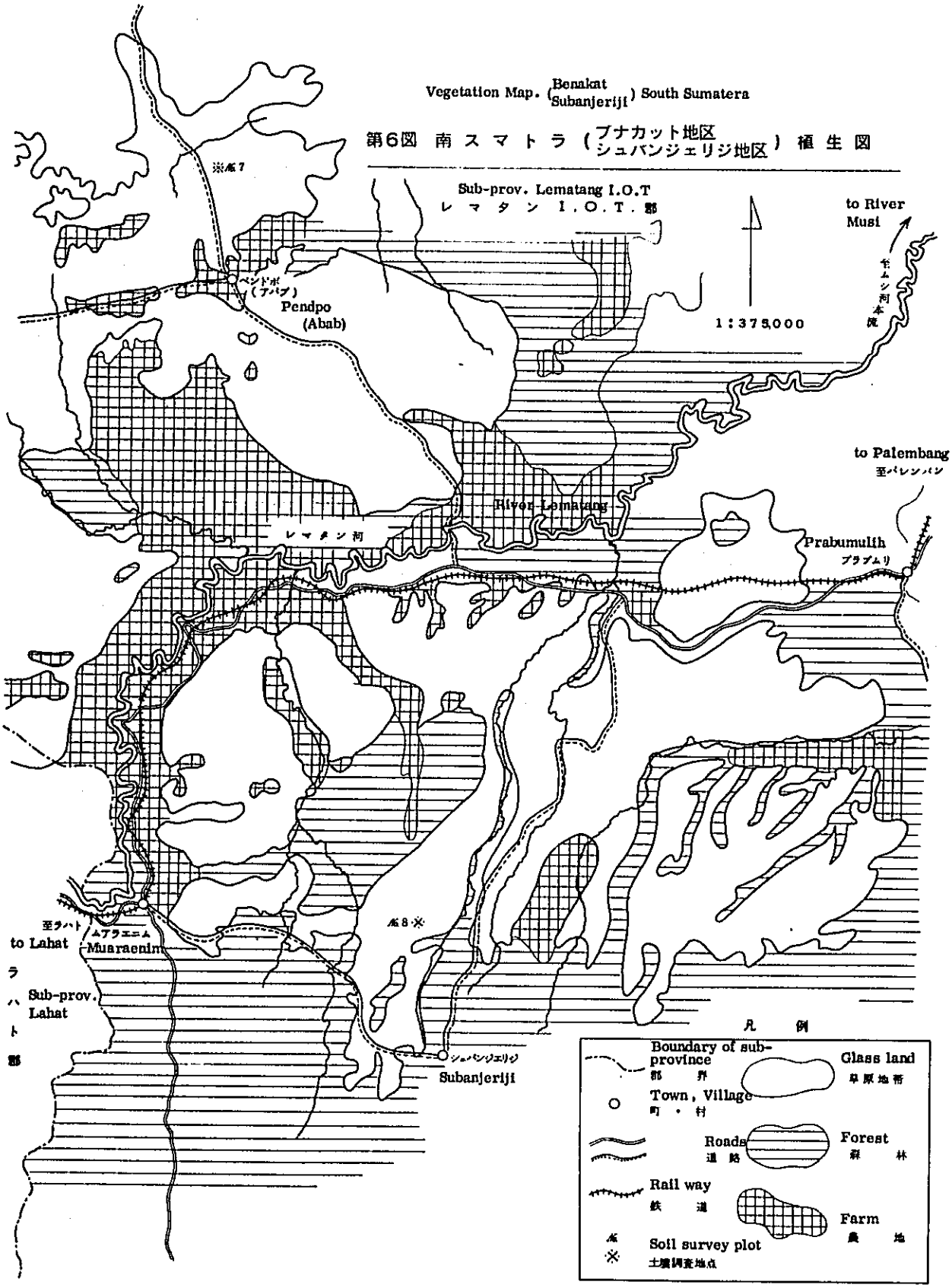
Sub-province containing both areas is 373,000 persons and its population density stands at 38.0 persons per square kilometer, slightly larger than the averaged population density of the South Sumatera Province.

With respect to the conditions of transportation, both areas are situated along both sides of the paved trunk road linking Palembang to Muaraenim. The Benakat area stretches on the north side across the Lematang River, whereas the Subanjeriji area is situated on the south side of the Lemdtang River.

Both areas are situated about 150 kilometers away from Palembang Port (capable of accepting carriers of the 8,000-ton class). It takes about five hours by car to the Benakat are a across the river and about four hours to the Subanjeriji area not across the river. Broad roads linking oil fields run through both areas, and a considerably large number of such roads are available particularly in the Subanjeriji area.

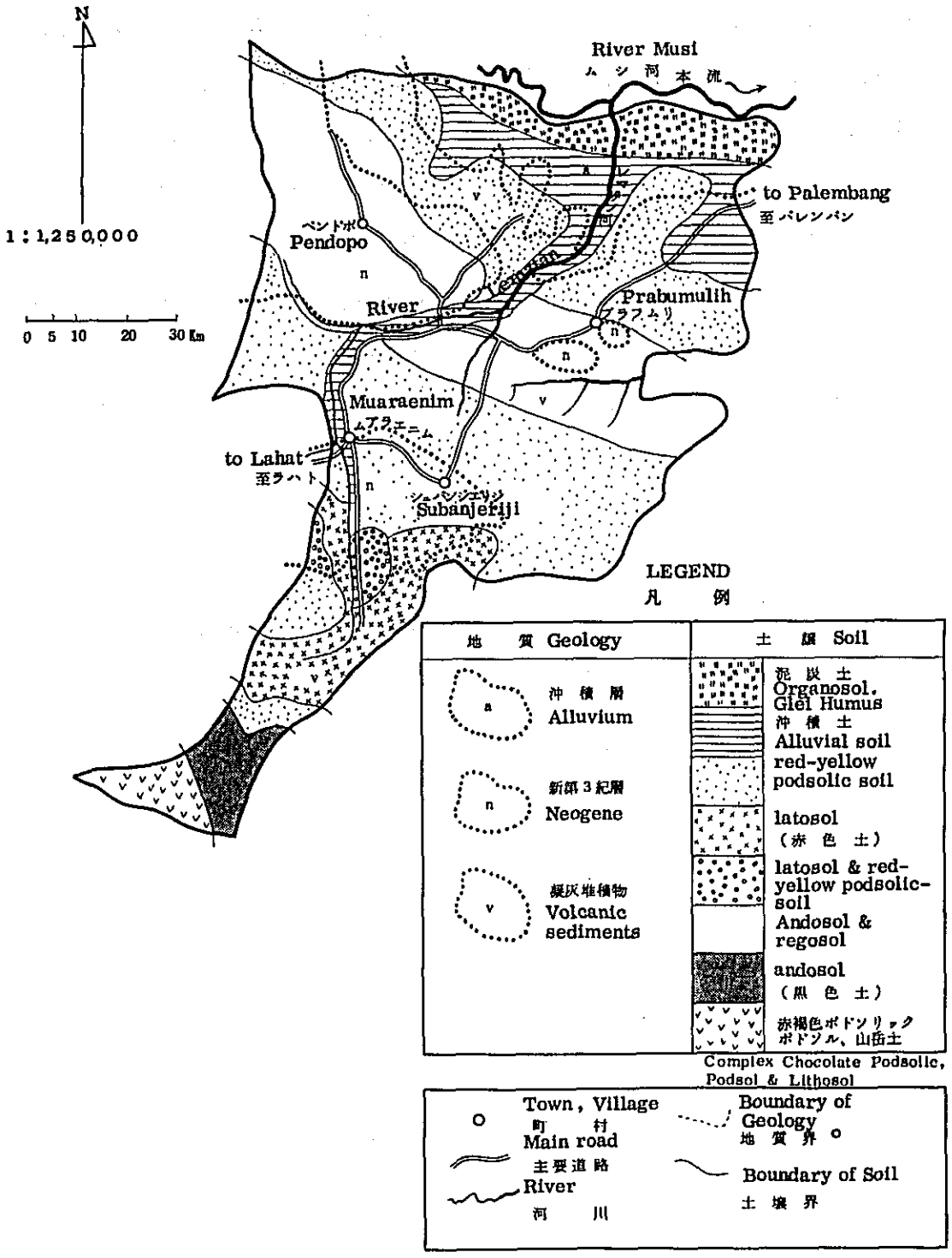
Consequently, the conditions of transportation in both areas are favorable.

The grasslands available in both areas are State-owned, with the consequence that there will be no problems for re-afforestation in these areas. However, the danger of spread of a forest fire is just as great as in the case of the North Sumatera Province.


Vegetation Map. (Benakat / Subanjeriji) South Sumatera
第6図 南スマトラ（ブナカット地区 シュバンジェリジ地区）植生図
※点7
Sub-prov. Lematang I.O.T
レマタン I.O.T. 郡
to River Musi
至ムシ河本流
ペンドポ（アバブ）
Pendpo (Abab)
1:375,000
to Palembang
至パレンバン
River Lematang
レマタン河
Prabumulih
プラブムリ
至ラハト
to Lahat
ムアラエニム
Muaraenim
Sub-prov. Lahat
ラハト郡
点8※
シュバンジェリジ
Subanjeriji
凡例
Boundary of sub-province 郡界
Town, Village 町・村
Roads 道路
Rail way 鉄道
Soil survey plot 土壌調査地点
Glass land 草原地帯
Forest 森林
Farm 農地

Geological Map. Soil Map. South Sumatera (Sub-prov. Lematang I.O.T)

7図 南スマトラ（レマタン I.O.T.郡）地質図・土壌図



As to the activities of businesses, there are three logging concession areas near the Benakat area, and logging is being carried out by Indonesian-Japanese joint enterprises in the hinterlands of this area. Incidentally, the local timber society has taken a great interest in the re-afforestation project, and welcomed our survey mission.

In regard to the manpower situation, the population of the grassland area is relatively samll, so is the number of hamlets. Therefore, there will be a need to possess elements of mechanization and mobility for a large scale planting.

Concerning the workers' wage, the average wage daily paid on estates (male) was 311 Rupiah in the latter half of 1973, lower than in the North Sumatera Province.

Description of Natural Conditions:

Both Benakat and Subanjeriji areas, situated about 130 meters above the sea level, present a wavy configuration. The geological layer is diluvial and more or less influenced by volcanic ashes.

The soil is red-yellow podzolic. In some areas, the ferruginous and gley spots resulting presumably from a seasonal rise in ground water are observed.

The mean temperature is 26 degrees in centigrade, and the annual precipitation stands at 2,612 milimeters, greater than in the North Sumatera Province.

Both areas have upwards of 100,000 hectares of grassland each, in which secondary growths, small in area, exist. Small-scale afforestation of Albizzia falcata, Peronema canescens (Sungkai), Hopea spp., etc. has been conducted by the Forest Office.

In the light of the height of these areas above the sea level, the feasibility of planting Pinus merkusii is doubtful, but their growth in their already planted forest is moderate. In regard to the tree species for re-afforestation, there is a need to study the feasibility of planting with foreign species, such as Pinus caribaea, Eucalyptus spp., etc.

3. Means of Cooperation

(1) Indonesian Side's Views on Forestry Development Cooperation

This survey, which constituted the basic one (first) for a development cooperation project, was designed primarily to select places suitable for a silviculture project. The survey team turned out to be the first such Japanese mission organized on a governmental basis for forestry development cooperation. Consequently, in the negotiations with the staffs of the Directorate General of Forestry, briefings were conducted on the organization and the business of the Japan International Cooperation Agency (JICA), and views exchanged on cooperation in all aspects of forestry.

In association with cooperation in silviculture, a brochure entitled "Man-Made Forests -- A Challenge of Investment in Indonesia" had been prepared to introduce the actual status of Indonesian silviculture. It also suggests the establishment of a right of planting (HPTH) as a new appeal in conjunction with silviculture policy and intends to develop man-made forests through the encouragement of Indonesian and foreign investment in silviculture.

In the chapter on "Expected Cooperation,"which is the concluding section of this brochure, the Indonesian Directorate General of Forestry is looking forward to multiphasic

cooperation from both Indonesian and foreign investors -- particularly to a variety of cooperation from the Japan International Cooperation Agency (JICA).

As is discernible from the foregoing, the posture taken by the Indonesian side in silviculture cooperation is exceedingly constructive. The following points were made clear through the negotiation process:

(1) As regards the form of cooperation in silviculture, financial cooperation through private sectors (tersely called "business cooperation" by the Indonesian side) will be highly welcome.

(2) Grasslands in the outer Java are considered suitable for afforestation.

(3) For this purpose, a right of planting (HPTH) has been established, and the regulation for this concession is under study at present.

(4) The Indonesian side clarified that it would take the following steps before the acceptance of financial cooperation through private sectors for re-afforestation.

In response to the visits to Indonesia of a series of three survey mission (I. pre-feasibility survey, II. feasibility survey and III. assignment), the execution of (1) legal activity, (2) direction or policy, and (3)

planning is conceivable. In conjunction with legal activity in (1), above, a pre-feasibility survey has been underway, so that a study on the laws and regulations associated with the right of planting (MPTH) plus elaborate surveying and planning will probably be conducted in the phase II. (feasibility survey). The Indonesian side added that it would be necessary for them to get in touch with Japan (or visit Japan) in the meantime, when they would be able to incorporate views of the Japan International Cooperation Agency (JICA) in the legislation on the right of planting (HPTH).

Next, in regard to technical cooperation in silviculture, the Directorate General of Forestry is of the view that the most urgent task is to conduct a field research for the promotion of silviculture. It has in mind the Directorate of Reforestation and Rehabilitation, the Forestry Product Research Institute and the Faculty of Forestry as the receiving agencies of technical cooperation.

The Directorate General of Forestry, the Faculty of Forestry and private sectors possessed of the right of logging are considered qualified for dispatching counterparts and trainees to Japan. Concerning the acceptance of experts, the Indonesian side expressed its readiness to study its possibility along with the supplying of facilities and equipment.

The foregoing is what has been made clear as to the Indonesian side's posture for the technical cooperation in silviculture at the level of the Directorate General of Forestry. In a subsequent talk with the North Sumatera Regional Forest Office, introduction of techniques in mechnaical afforestation for expanding re-afforestation, improvement of nursery facilities and nursing techniques (including seed orchard and techniques in breeding), and clarification of the species suitable for afforestation in grasslands in poor soil conditions and of the methods of their afforestation, were pointed out as concrete themes associated with technical cooperation in silviculture.

In the foregoing, reference has been made to cooperation in silviculture. In addition, the Indonesian side showed a strong interest in aerophotographic forest surveys as one phase of technical cooperation during a meeting with the Directorate General of Forestry (Directorate of Planning). Views were expressed on (1) the feasibility of cooperation with the Japan International Cooperation Agency (JICA) in the field of research and training for aerophotographic forest surveys with the granting of machinery and materials, and (2) the feasbility of conducting aerophotographic forest surveys in cooperation with the Japan International Cooperation Agency (JICA).

Furthermore, the Forestry Corporation (P.T.Inhutani) expressed at a meeting that it looks forward to JICA's cooperation in the forest surveys required for its projects and also in its afforestation.

In conjunction with the business procedure, the Directorate General of Forestry expressed its hope that a report on the survey be provided to them as soon as possible, that the second survey team be dispatched in an early phase until January), and that a responsible officer of the Directorate General of Forestry be sent to Japan to discuss about forestry cooperation.

(2) Japanese Side's Views on Re-afforestation Cooperation

In regard to the views expressed by the Indonesian side in the foregoing, the survey team maintains the following views on the present phase of cooperation:

(a) Re-afforestation Cooperation by Private Enterprises

(i) North Sumatera Province (the Area around the Lake Toba and the Gunungutua-Kotapinang Area)
The area around the Lake Toba, as elucidated in the chapter "Outlook for Surveyed Areas," is suitable for re-afforestation, mainly of Pinus merkusii, due to its favorable topographical conditions, such as those of the soil, but some difficulties will have to be surmounted

with respect to its locality, such as its being situated upwards of 200 kilometers from Medan which is looked up as a timber market, and its less developed branch roads. As inhabitants possess the right of common on grasslands in the area which is to be afforested, there will be a need to do something about their right, when an afforestation project is to be implemented.

Given these points, it is difficult to name areas suitable for cooperation in silviculture through private sectors (what the Indonesian side calls "business cooperation) at once.

When industrial planting in this area is assessed in a long-range perspective, however, studies will have to be conducted on such important matters as the prospects for a future development of roads and other elements of the infrastructure and also for an adjustment of the rights associated with lands in the area to be afforested.

Next, the soil conditions of the Gunungtua Kotapinang area are fairly inferior as earlier described. For any attempt to afforest a

hydromorphic soil grassland, there is a need to start it with an experiment and a research on the species suitable for this area and its afforesting method.

In terms of economic locality, it is to be noted that this area is situated more than 400 kilometers away from Medan, a timber market. The possibility of what the Indonesian sides calls "business cooperation" appears to be extremely slim, when consideration is given to the fact that the normal radius within which pulp wood and wood chips are collected in Japan is 200 kilometers or may be covered by truck on a day return drive.

ii) South Sumatera Province

The surveyed Benakat and Subanjeriji areas are included in the Lematang Ilir Ogan Tengah Sub-province (L.I.O.T. Sub-province) of South Sumatera, and an outline on these areas has earlier been given in this report. The basic soil of these areas is the red-yellow podzolic soil. Judging from the soil, configuration, height above the sea level, weather, vegetation and other topographical conditions, application of re-afforestation to the grassland in

these areas is promising. But, from the point of view of the height of being only about 130 m, the areas can hardly be described as being suitable for the planting of Pinus merkusii, and the areas planted with Pinus merkusii are small in acreage. For this reason, it would be advisable to start afforestation with the planting of other tropical pine species (Pinus caribaea, Pinus oocarpa, etc.), Eucalyptus spp.
(Eucalyptus deglupta, Eucalyptus saligna, Eucalyptus tereticornis, etc.) and other broad leaf trees. After the trial planting of some hundreds hectares shift gradually,to large-scale industrial planting.

When the existing conditions associated with the economic locality of both Benakat and Subanjeriji areas are compared, the Subanjeriji area, which stretches along the trunk road running along the right bank of the Lematang River, is superior to the Benakat area in terms of road conditions.

To sum up, Benakat and the Subanjeriji area may be considered suitable for cooperation in reafforestation through private sectors in the

light of its favorable topographical and socioeconomic conditions. The important matters to be solved in the future are (1) that the Indonesian side will prepare legislation on the right of planting (HPTH), to which reference has earlier been made, to clarify rights on planted trees; (2) the Japanese side will look for a private enterprise to render cooperation in re-afforestation on the basis of HPTH; (3) that the Indonesian side will prepare an appropriate body which may serve as partner in this cooperation, and (4) that to solve the aforementioned three problems, the second survey team be dispatched to Indonesia for more eleborate surveys and discussions.

(b) Other Means of Technical Cooperation in Forestry

In regard to technical cooperation in re-afforestation, an interest was shown, during the discussions with the Directorate General of Forestry and other agencies, in the kind of technical cooperation which will be rendered on a governmental basis for an expansion and replenishment of governmental afforestation. Within the scope of the latest survey, it has been found

that (1) mechanized and mobilized afforestation, (2) improved nursing techniques and nursery facilities, and (3) the establishment of species suitable for given areas and their planting methods are the matters on which concrete technical cooperation may be extended in the field of cooperation in re-afforestation.

With reference to technical cooperation in sectors of forestry other than re-afforestation, the aerophotographic forest survey is one of the matters in which the Indonesian side (Directorate General of Forestry and P.T. Inhutani) took an interest. This cooperation comes in two types; one which concerns personnel and material cooperation for the research and training associated with techniques of aerial photo interpretation, and the other is the cooperative implementation of forest inventories. The acquisition of accurate information about forest resources with aerial photos constitutes the basis to reasonably carry out forest production, forest land use, natural regeneration of forest and other measures in terms of forestry policy and technology. The aerophotographic forest survey is indispensable for the future development of forestry in Indonesia.

In Japan, aerophotographic surveys were already conducted before World War II and promptly resumed after

the war. In the light of its technological level and past achievements, Japan's preparedness for cooperation in this sector is such that Indonesia's requirements may be satisfied to the full extent.

In addition, the other themes of cooperation which were taken up in the talks with the Directorate General of Forestry, P.T. Inhutani and other agencies included (1) cooperation in terms of personnel, equipment and materials for the training of logging techniques in conformity with the policy of Indonesianization in the field of logging operation, and (2) cooperation in timber demand forecast and marketing research for stable timber production and sales.

As regards technical cooperation in re-afforestation and other sectors of forestry, it is desirable that a survey team as well as long-term surveyers (experts) be accepted by the Indonesian side to conduct studies on the specific fields of cooperation and its substance and also on the areas to which such technical cooperation is to be extended, in case the Directorate General of Forestry sees this necessity and intends to promote the personnel cooperation.

Table 1 List of Soil Survey Results (Soil Profile)

Number of Soil Profile	Location	Height above sea level Direction Slant	Topography	Geological Layer (Parent Material)	Vegetation (* in local name)	Horizon	Horizon Thickness cm	Transition	Soil Color	Texture	Soil structure	Remarks
No. 1 lithosol	Batuloting Complex near Prapat in North Sumatera	1,060m N60°W 26°	Volcanic upland Steep fringe slopes	Liparite	Imperate cylindrica Melastoma sp. Eupatorium parium	L	2-3					
						A_1	15	Clear	10YR2/2	SL	Cr	
						A_2	8	Distinct - Clear	10YR5/6	SL	-	
						B_1	26	Gentle	10YR4/6	CL	-	
						B_2	30+		10YR4/6	CL	-	
No. 2 lithosol	Jalan Japang near Prapat in North Sumatera	1,130m Flat	Volcanic upland Plateau	Liparite	35-years-old planted Pinus merkusii Eupatrium parium Martisa* Anpu*	L	2-3					
						F	4	Mycelial				
						A	10	Clear	10YR3/2	CL	Nu	
						B_1	10	Gentle	10YR5/6	CL	Nu	
						B_2	10	Gentle	2.5Y5/4	SL		
						BC	40+		2.5Y5/3.5	SL		
No.4 Andosol	Sibisa near Prapat in North Sumatera	1,280m Flat	Volcanic upland Plateau	Volcanic ash	Imperata cylindrica Eupatorium paleceus Sampilpil*	L	5-10					
						A_1	15	Clear	7.5YR3/2	L	Cr	
						A_2	30	Clear	7.5YR2/1	L	-	
						IIA_1	7	Clear	7.5YR1.7/1	L	Massive	
						IIA_2	8	Clear	10YR2/2	L	Massive	
						$IIIA_1$	10	Gentle	10-7.5YR2/1	L	Massive	
						$IIIA_2$	10-12	Gentle	10YR2/3	L	Massive	
						$IIIB_1$	8-10	Gentle	10YR4/5	CL	Massive	
						$IIIB_2$	40^+	Gentle	10-7.5YR4/8	CL	Massive	
No.5 red-yellow podzolic	Gunugtua-Kotaoi-nang. Tamusbayangan. in North Sumatera	160m Flat	Flat plain	Neogine	Imperata cylindrica Fragrea fragans	L	Extremely thin					
						A_1	10	Gentle	10YR2.5/2	CL	Cr	
						A_2	10	Gentle	10YR3.5/2	CL	Massive	
						IIA	15	Clear	7.5YR2/1.5	CL	Massive	
						IIB	15	Gentle	7.5YR0/4	C	Massive	
						II BG	40^+		2.5Y7/4	C	Massive	
No.6 red-yellow podzolic	Pandansidempuan-sipirok. Baraka. in North Sumatera	650m N 55° E 5°	Hilly land Wavy configuration	Permian system and Carboniferous system	Man-made Pinus Merkusii forests	L	3-4					
						A	10		7.5YR2/1	C	Nu	
					Imperata cylindrica	B_1	30	Clear	7.5YR3/3	hc	Nu	
						B_2	20	Gentle	7.5YR3.5/6	L	(Nu)	
						B_3	30+	Gentle	7.5YR5/8	L		
No.7 red-yellow podzolic	Benakat in South Sumatera	130m Flat	Wavy plain	Successive deposits	Imperata cylindrica Eupatroium palecens Lautara camera	L	2-3					
						A(g)	20	Gentle	7.5YR3.5/3 (7.5YR5/3)	hc	Nu Colu	
						B(g)	15-20	Distinct-clear	7.5YR4/4 (5YR4/8)	hc	Nu	

Number of Soil Profile	Location	Height above sea level Direction Slant	Topography	Geological Layer (Parent Material)	Vegetation (* in local name)	Horizon Thickness cm	Horison Thickness	Transition	Soil Color	Soil structure	Texture	Remarks
No.8 red-yellow podzolic	Subanjeriji in South Sumatera	130m	Wavy plain	Successive deposits	Harendong*	BC	30+		10YR7/2	hc	-	
					Imperata cylindrica	L	2-3					
					Eupatorium palecens	A_{1g}	5		10YR4/4 (2.5Y5/4, 5YR4/8)	C	SBk	
		Flat			Alstonia sp.	A_{2g}	15	Gentle	7.5YR5/7 (2.5Y5/4)	C	Bk	
					Diospyros Sp.	B_{1g}	20-25	Gentle	7.5YR4/8 (2.5Y4/8)	hc	Massive	
						B_2	35-40	Gentle	5YR5/7	hc	Massive	
						Bc	30+	Clear	5YR5/8	hc	Massive	

中間報告書
Interim Report

Jakarta, June 18, 1975.-

Mr. Soedjarwo,
Director General of Forestry
Department of Agriculture

The Pre-Feasibility Survey for Afforestation Project in the Republic of Indonesia. (Preliminary Findings by the Mission of Japan International Cooperation Agency).

Dear Sir,

We would like to submit herewith our preliminary findings of our pre-feasibility survey for afforestation projects in the Republic of Indonesia, which was conducted from June 1 to June 17, 1975 including field survey for ten days at several potential areas for afforestation in North Sumatera and South Sumetera.

The terms of references of the mission are :

To explain the organization and functions of JICA (Japan International Cooperation Agency) to the authorities concerned of the Indonesian Government and to exchange views with them on the possible Japanese cooperation through JICA with Indonesia especialy in the field of forestry.

To exchange views on the possibility of afforestation through cooperation between a private sector of Indonesia and a Japanese private enterprise, which is financed and technically supported by JICA, and also to make preliminary field survey to select a suitable area for this type of the cooperation, and

To exchange views on inter-governmental technical cooperation for forestry activity in general, especially for the implementation of the afforestation mentioned above.

In accordance with those objectives, our mission has exchanged views with the authorities concerned in Jakarta as well as in the field and has made field survey on four areas, namely, Lake Toba area and Gunung Tua - Kotal Pinang area in North Sumatera, and Subanjeriji area and Bunakat area in South Sumatera.

General descriptions of the result of the field survey are as follows :

1. Lake Toba area, North Sumatera.

   a. Natural circumstances.

   Altitude is more than 1,000 m, topography is volcanic highland including steep slopes facing Lake Toba. Red Yellow Podzolic soils are dominant, but is also found Lithosol on steep slopes and Andosol on volcanic ash deposit.

   Although alang-alang field extends widely in this area, the physical condition of the area is suitable for the afforestation of Pinus merkusii in general. The afforestation has been done extensively by the provincial forestry office and the results are found remarkable.

   b. Economic circumstances.

   Although roads are well maintained, the area is very remote from Belawan port, which is the major timber distributing center of North Sumatera.

   Necessary labor force can be obtained if the unit planting area does not exceed the acreage of the area on which North Sumatera Provincial Forestry office is now planting. However, when the planting area is extensively enlarged, machinery needs to be introduced.

2. Gunung Tua - Kota Pinang area, North Sumatera.

   a. Natural circumstances.

   Altitude is 100 to 200 m and topography is rather flat. Soils are mainly Red Yellow Podzolic soils and most of these soils are considered to be influenced by high groundwater table. Those soils have leyed

horizons underneath. Alang-alang grass widely covers this area and the poor growth of the grass indicates poor soil conditions.

The selection of suitable tree species is most essential for the afforestation of this area.

b. Economic circumstances.

Although road network is now being consolidated in this area, the area does not have the desirable conditions for introducing the industrial planting at this time because the well maintained road network is still partial and the area is remote from the timber distributing center.

3. Bunakat area, South Sumatera.

a. Natural circumstances.

Altitude is between 100 m to 150 m, topography is rolling gently, and soils are mainly Red Yellow Podzolic soils. Alangalang, along with secondary forest and swamps, widely covers this area. In the light if the relatively low altitude, calibian pine and other hard wood trees such as Sungkai (Verbenacese) are considered to be suitable planting tree species besides Pinus merkusii. The soil condition is good enough for planting these tree species.

b. Economic circumstances.

This area is located across Lemajang river from the trunk road leading to Palembang. Therefore the access to the area is a major difficulty.

Sufficient labor force may not be obtained for a large scale planting. Machinery needs to be introduced for implementing such planting.

4. Subanjerji area, South Sumatera.

a. Natural circumstances.

This area has the similar natural conditions as Bunakat area mentioned above.

b. Economic circumstances.

Road networks are considerably consolidated and so far as infrustructure is concerned, this area is the best among the four surveyed areas.

Sufficient labor force may not be obained for a large scale planting project in this area. Machinery needs to be introduced for implementation of such planting.

On the basis of the exchange of views with the authorities concerned of the Indonesian Government and its field survey, this mission is of the view that the cooperation between Indonesia and Japan concerning forestry is possible in the near future. Especially, it is considered that afforestation project by the cooperation between Indonesian private enterprise and Japanese enterprise, which is financed and technically supported by JICA, should be promoted by thorough consultations between the Indonesian and Japanese Governments after the regulations on HPTH※ of Indonesian Government have been enacted. If the agreement of your Government can be obtained, JICA is prepared to send the second survey mission during this fiscal year (1975/1976) to the area which will be selected by this mission in it's final report in order to undertake more detailed survey regarding the said cooperation.

We also consider that inter-governmental technical cooperation is possible in the field of mechanical planting, selection of suitable tree species, and nursery facilities. Furthermore, it is considered that consultations between both Governments should be made on technical cooperation for forest inventory, especially that by aerial photogrametry.

Respectfully yours,

NIRO NAMURA
Chief of Japanese Survey Mission
For Afforestation Projects in Indonesia

※造林のコンセッション
のこと

DATA OF ANALYSIS

ON THE SOIL SAMPLES

国際協力事業団

160／東京都新宿区西新宿2丁目1番地

新宿三井ビル内私書箱216号

（45～48階・9階）

電話（03）346－5311～4（受付台）