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REPORT
ON
FIRST PRELIMINARY SURVEY
FOR
FORESTRY DEVELOPMENT PROJECT IN INDONESIA
(CENTRAL SULAWESI)

MAY, 1976

JAPAN INTERNATIONAL COOPERATION AGENCY

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FOREWORD

The tropical rain forests in Southeast Asia are said to embrace some three thousand different tree species, but only several tens of them belonging chiefly to Dipterocarpaceae enjoy an active demand on the global market.

Trees of Dipterocarpaceae account for the greater part of the tropical woods which are heavily demanded on the world market today. It leaves no doubt, however, that the growing demand for lumber can never be met by these trees alone because of the limits set on their resources. In this connection, an attempt to make effective use of the trees of unexploited tropical forests which are, despite their abundance, still left intact on account of the lack of marketability, and to promote the conservation and regeneration of forest resources, is quite meaningful and certain to contribute towards the forestry development policies of both Indonesia and Japan.

From this viewpoint, The Japan International Cooperation Agency organized a survey team headed by Mr. Tadao Mishina, President of The Japan Federation of Logging Associations, and dispatched it to Indonesia for 18 days from March 25 to April 11, 1976 for a prefeasibility survey required for regional development aimed primarily at forestry development.

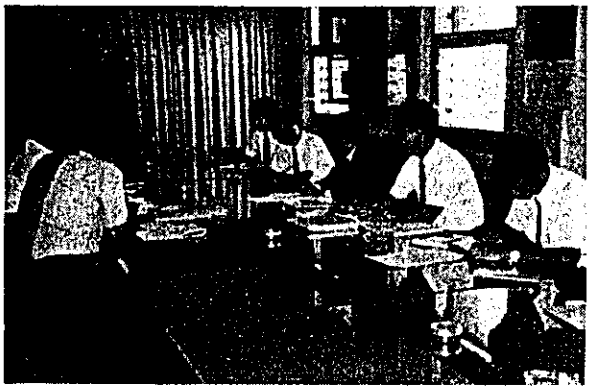
The Forestry Development Project for which the prefeasibility survey was conducted is intended to make effective use of unexploited forest resources, to improve the livelihood of local in habitants through forestry development, and to carry out forest cultivation for conservation and increase of regenerative forest resources.

I am convinced that the project is both significant and conductive to the development of Indonesia and Japan, and hope that this report, which contains the findings of the prefeasibility survey, will be found useful by all quarters concerned and pave the way for early implementation of the project.

Finally, I take this opportunity to express my deep gratitude to The Directorate-General of Forestry of The Indonesian Ministry of Agriculture, The Governor of Central Sulawesi Province and other relevant Indonesian authorities for their unlimited assistance and cooperation offered to the team.

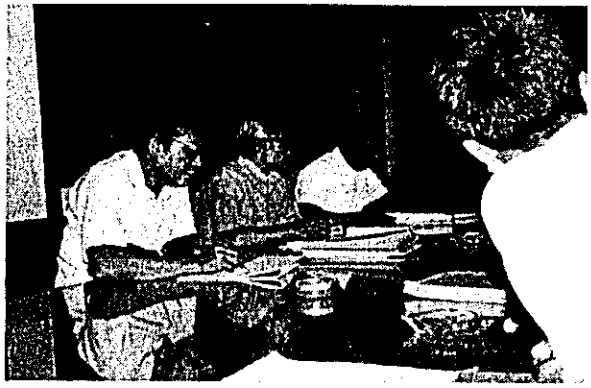
May 1976

Japan International Cooperation Agency
President Shinsaku Hogan



Meeting with officials the Departments of Program, and Reforestation & Rehabilitation

At the entrance of Central Sulawesi Regional Forest Office



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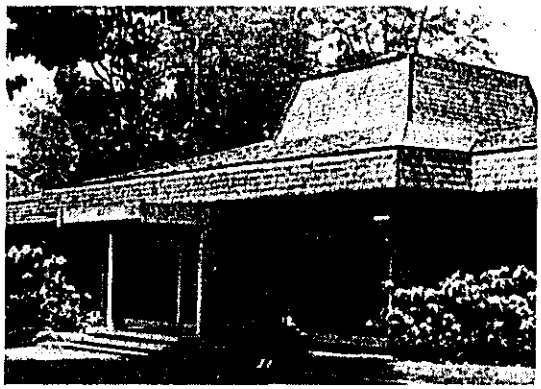
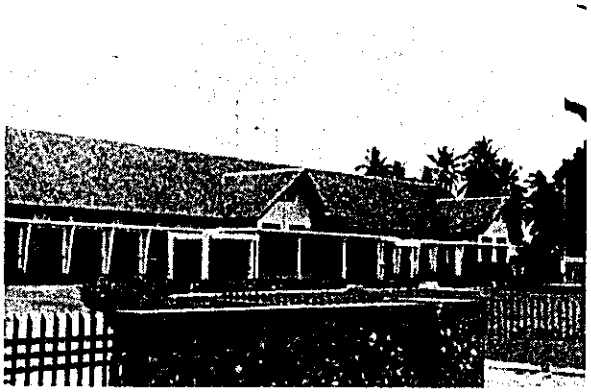


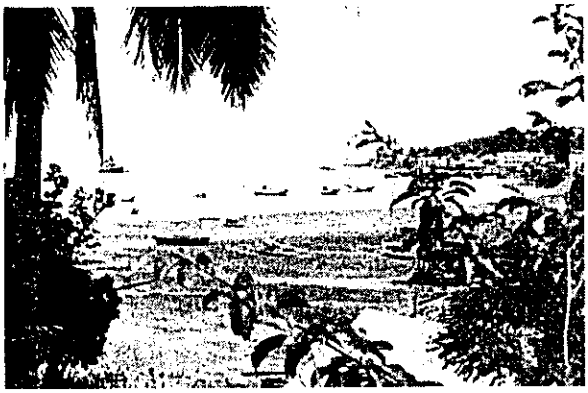
Central Sulawesi Regional For[illegible]



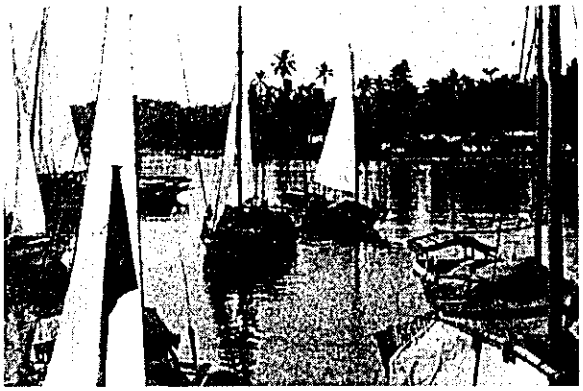
Provincial Office of Central Sulawesi

Poso District Office

Port of Bitung



Port of Donggla



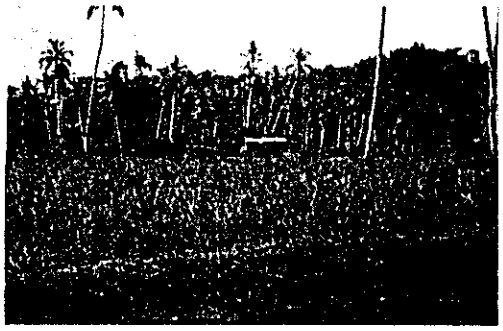
Boats for Bazaar

Pier at Wakai

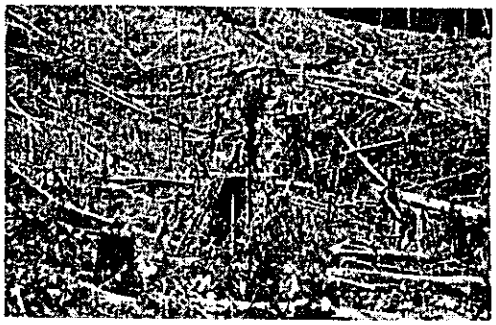
Bazaar at Wakai

Mosque

Wakai



Rice field near Wakai



Shifting cultivation

Left:
Dama-Dama
Canarium sp.

Right:
Palapi
Tarrietia
javanica

Felled tree
in the shifting cultivation area

Swamp in the forest

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1. PURPOSE OF SURVEY

The Togian Islands, the object area of the present survey, belong to the Province of Central Sulawesi of the Republic of Indonesia and are located in the Gulf of Tomini north of the Sulawesi Island. The tropical rain forest of 70,000 ha in this area is left untapped, since it is composed of broad-leaved trees, the utilization method of which has not yet been established. It is earnestly expected by the Government of Indonesia as well as the local authorities concerned to increase the employment opportunities and to improve the standard of living of local dwellers by making efficient use of these forest resources and materializing the regional development centered on the forestry.

Aiming to contribute to the development of the area, the Survey Team conducted the survey of general conditions of the area, collected and analyzed the relevant data and information and exchanged views with the authorities concerned of the Government of Indonesia in order to study the possibility of regional development centered on the forestry including the utilization and development of non-commercial tree species (less marketability in world market), the afforestation at a cutover area and the improvement of infrastructure, making a tropical rain forest an object.

2. MEMBERS OF THE TEAM

In-Charge	Name	Occupation
Leader	Tadao Mishina	President, Japan Federation of Logging Association
Forest Economy	Chugoro Ishido	Assistant Driector, Research and Extension Division, Forestry Agency
Wood Utilization	Ken Ogata	Senior Research Official, Wood Technology Division, Forest Experiment Station
Coordination	Katsuro Takagi	Officer, Agricultural and Forestry Planning and Survey Dept., JICA

3. ITINERARY OF SURVEY

Date	Route	Activity
March 25 (Thu.) 1976	Tokyo → Jakarta	
26 (Fri)		Courtesy Call on Japanese Ambassador Meeting at JICA Office
		Courtesy Call on Mr. Gobel, Chairman of Indonesian-Japanese Joint Ventures Association and Exchange of Views on Development Plan of Togian Islands
27 (Sat.)		Observation of Bogor Forest Products Experiment Station
		Collection of Data
28 (Sun.)	Jakarta → Palu	Trip
29 (Mon.)		Courtesy Call on Administrator of Central Sulawesi Province and on Palu Regional Forest Office, and Explanation of Purpose of Survey as well as Exchange of Views on Development of Togian Islands
		Collection of Data
30 (Tue.)		- ditto -
31 (Wed.)	Palu → Poso	Courtesy Call on Governor of Poso County, and Explanation of Purpose of survey as well as Exchange of Views on Development of Togian Islands
	Leave Poso (by night)	

	Date	Route	Activity
April	1 (Thu.)	Arrive in Wakai	Courtesy Call on Head of Una-Una District
	2 (Fri.)		Reconnaissance
			Courtesy Call on Head of Dolong District
	3 (Sat.)		Reconnaissance
	4 (Sun.)	Leave Wakai (in the afternoon)	- ditto -
	5 (Mon.)	Arrive in Gorontalo	Market Research
	6 (Tue.) 7 (Wed.)	Gorontalo → Menado	Data Rearrangement and Observation of Chenque-Planted Land and Port of Bitung
	8 (Thu.)	Menado → Jakarta	Data rearrangement and Interim Report Making
	9 (Fri.)		Meeting at Embassy
			Courtesy Call on Forestry Directorate-General and Explanation of Interim Report
	10 (Sat.)		Courtesy Call on Planning Bureau and Explanation of Interim Report
	11 (Sun.)	Jakarta → Tokyo	

4. OUTLINE OF SURVEY RESULT

4-1 Natural Conditions

4-1-1 Location

The Togian Islands, the object area of the present survey, and the adjacent Puah Island (hereinafter referred to as the Togian Islands) belong to the Province of Central Sulawesi, and are located almost in the center of the Gulf of Tomini. Their location is between Long. 14°50' E and Long. 15°35' E, and in Lat. 0°10' S to Lat. 0°35' S, being more or less directly under the equator.

4-1-2 Topography

(1) Seven islands constitute mainly the Togian Islands, of which area is as tabulated below, respectively:

Name of Island	Area	
Una-Una	approx.	6,300 ha
Batudaka	approx.	24,000 ha
Togian	approx.	17,200 ha
Talatakoh	approx.	9,000 ha
Waleakodi	approx.	4,300 ha
Waleabahi	approx.	7,700 ha
Puah	approx.	1,500 ha
Total	approx.	70,000 ha

(2) Those islands are generally flat due to the natural erosion and show the topographic appearance of old era without any high mountain. Major mountains of the Togian Islands are as follows.

Name of Mountain	Height	
Kalema	above sea-level	292 m
Laluangan	above sea-level	300 m
Munde	above sea-level	200 m

Name of Mountain	Height	
Benteng	above sea-level	542 m
Doliminon	above sea-level	491 m
Bilabila	above sea-level	458 m
Tenoloan	above sea-level	494 m

(3) All the rivers are quite small and water therein is used only for drinking and bathing by the inhabitants. In some places, irrigation water is taken from the rivers, none of which, however, is large enough in scale to be utilizable for the rafting of lumber. In the lower reaches, river bed consists of sand and silt containing a small quantity of gravel, while in the upper reaches rock bed is exposed in many places.

There exists no dry river. Villages are formed at the mouth of a river in consideration of the water utilization.

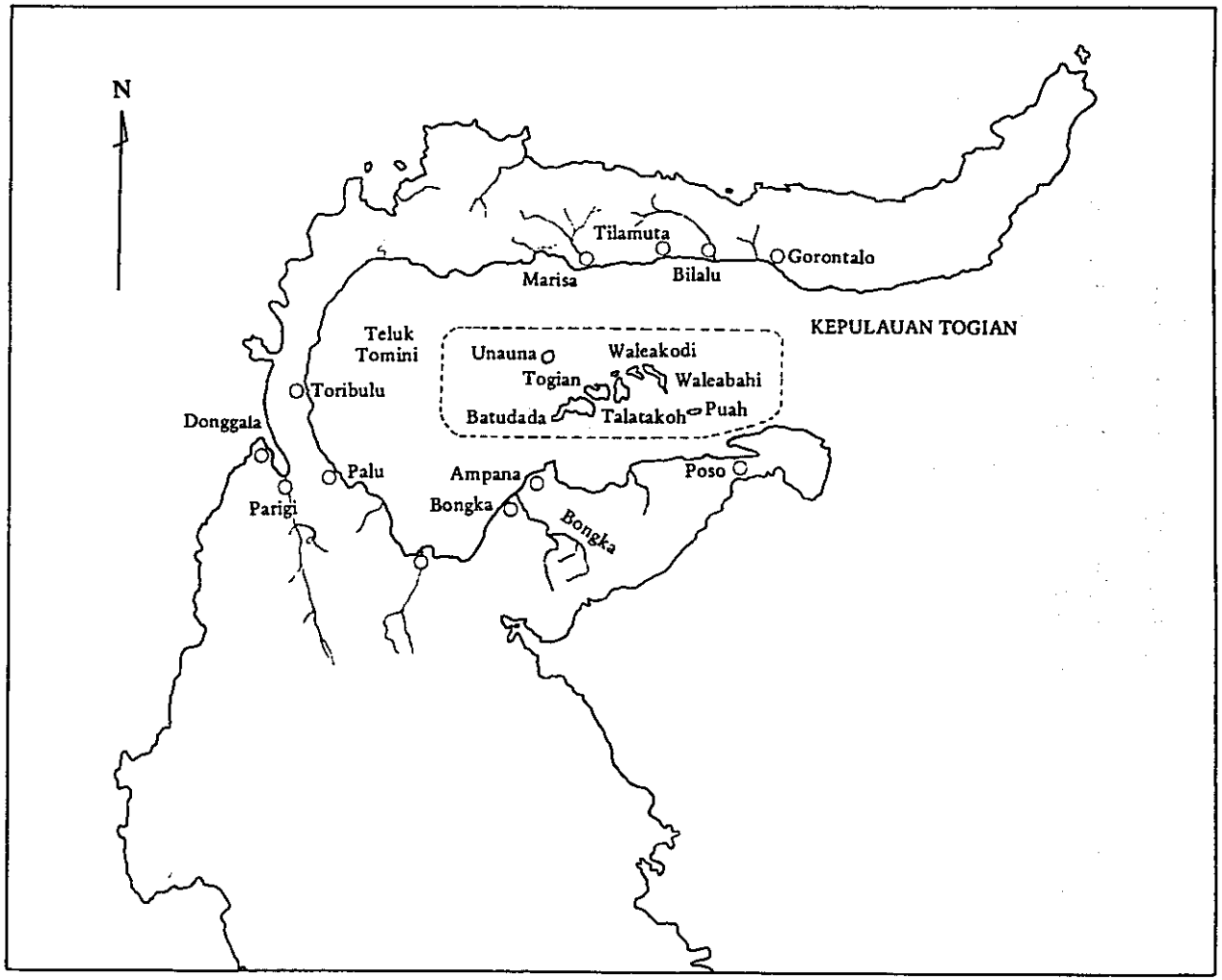
(4) Each island has equally a much indented coastline, and accordingly inlets and bays are formed in various places on the islands. With the depth of water being enough, places suitable for a harbor are everywhere to be found. A topographic difference is recognizable between the northern coast and the southern coast throughout the islands as a whole. In the case of northern coast, the effect of the erosion by waves is intense and there are many cliffy places where rocks are exposed. Islets are scattered offshore and shoals formed by a coral-reef are many. Further, a steep slope starts from the coastline and continues until it reaches the mountainous area.

The southern coast is characterized by that a flat topography is formed as far as 1 to 2 km from the coastline, and the coast abounds in mangrove forests and is dotted with sandy beaches. Islets are a few and the water is deep even up to the strand line.

4-1-3 Geology and Soil

A result of reconnaissance indicates that the lowland about 1 km far from the coast consists of clayey Red soils. Also in the mountainous area, relatively soft limestone is exposed in some parts and there are places where sandstony gravel is mixed in 40 to 50 cm underground from the surface. In general, however, each island is composed of shallow clayey soil and of acidic Red soils containing less organic matter.

TOMINI BAY NEIGHBOURHOOD AREAS



4-1-4 Climate

(1) Mean monthly rainfall is as shown in the following figure.

METEOROLOGICAL OBSERVATION

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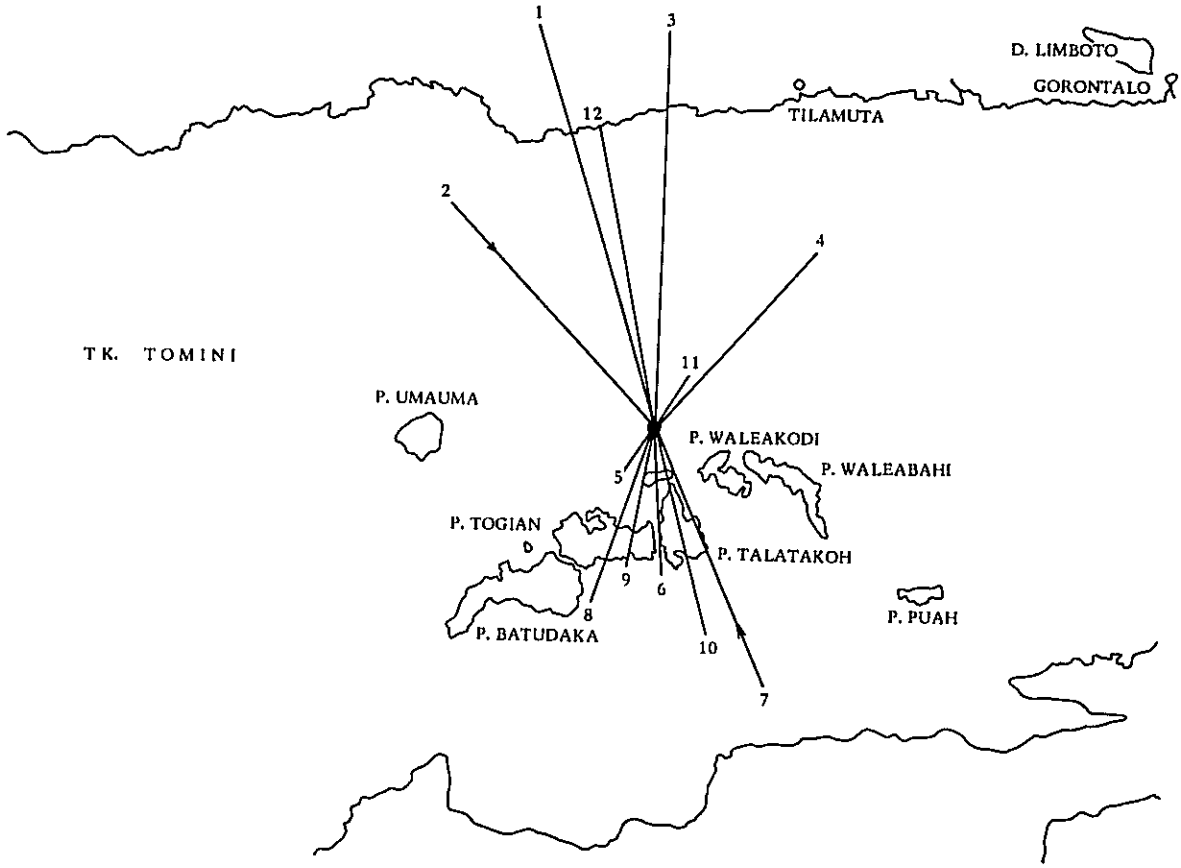
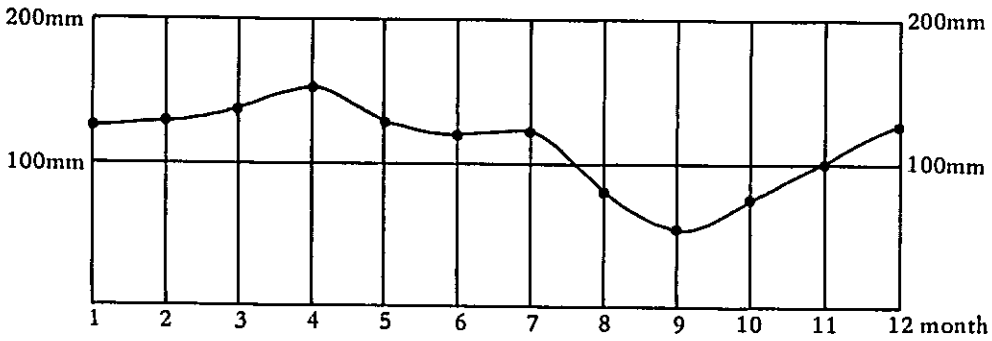


Rainfall Types in Togian Islands



(2) The sun rises at 6 o'clock in the morning and sets at 6 o'clock in the afternoon all the year round, and there is almost no change in the duration of sunshine. The temperature is 30° to 35° C at daytime and about 25° to 30° C at night, while the humidity stands at 60 to 70%. The stand humidity amounts to 90 to 100%.

(3) As for the tidal height, the difference between the rise and fall of the tide at and around Wakai Village on the Batudaka Island amounts to a little more than 1.2 m, and is estimated at more or less 1.3 m even at the time of the highest tide.

The tidal current is also relatively slow and there seems to be no hindrance whatsoever to the towing work, for instance, of crude wood by a tugboat or the like.

4-2 Socio-economic Conditions

4-2-1 Administrative Division

The Togian Islands fall under the jurisdiction of the Province of Central Sulawesi. Those administrative offices that are related to undertakings are located in Palu City, while on the other hand most of their subordinate offices are all present in Poso City which is the seat of the county office and is relatively easy of access from those islands. The Port of Donggola is a port of entry for the foreign cargo in the Central Sulawesi. Donggola is quite inconvenient to be called at, since it is located on the west coast of the main island, thus necessitating a long detour around the island before vessels can reach it. Judging from the route between those islands and Japan, it is most ocnvenient to pass customs entry at the Port of Bitung in the North Sulawesi.

4-2-2 Population

According to the statistics of the Indonesian Statistical Bureau based on the census-taking in 1973, the population of the Togian Islands is as follows.

Una-Una District	13,913
Walea Island District	7,891
Total	21,804

The rate of population growth in Indonesia is as high as 2.5% annually, and therefore the present population is estimable at approximately 25,000.

4-2-3 Industry and Economy

Industrial statistics only of those islands are not available, but the 1973 statistics of the Province of Central Sulawesi show the following outline of industries in the said province.

(1) Industries in the Central Sulawesi

a. Agriculture in General

Farm Products	Annual Production (ton)	Production Per Hectare (ton)
Paddy Rice	202,568	2.10
Upland Rice	39,000	1.03
Onion	29,142	0.79
Tapioca	98,543	8.62
Sweet Potato	11,663	4.82
Peanut	2,223	0.75
Soy Bean	502	0.52
Red Bean	816	0.46
Vegetables	974	0.34
Fruits	2,947	0.42

b. Palm Trees Plantation

Name of County	Cultivated Area (ha)	Annual Production of Copra (ton)
Donggola	16,742	23,880
Poso	12,380	20,400
Banggai	15,193	19,800
Buol Tolitoli	9,944	45,600
Total	54,259	109,680

c. Fishery (1972 - statistics)

Name of County	General Catch (ton)	Cultured Catch	Total
Donggola	736	423	1,159
Poso	210	11	221
Buol Tolitoli	1,124	156	1,280
Banggai	(No Report)		

d. Forestry (1971 - statistics)

Name of Product	Production
Ebony (ton)	8,864
General Use Lumber (log) (m^3)	33,309
Lumber for Fixture and Furniture (m^3)	47
Rattan (ton)	2,027
Resin (ton)	591

e. Mining

Although deposits of underground resources such as gold, silver, copper, nickel, sulfur and others have been confirmed in the Central Sulawesi as a whole, the commercialization is not in practice.

f. Manufacturing Industry

According to our observation, the manufacture of brick, cement tile, furniture, bedding and so forth is in operation in the form of cottage industry of about two to five workers. Oil mills of palm oil are relatively many and attempts to manufacture the activated carbon from palm shell are recognizable recently. Both facilities and scale are generally old and small. As regards the wood processing, the sawing by hand is still in common use.

(2) Industry and Economy on the Togian Islands

It is obvious even from the result of reconnaissance and observation that the agriculture, especially the copra production, is a key industry. Palm fields have already been built

up at every suitable place along the seashore where the human power is fully applicable and the clearing of inner land is also under way. Yet, the reclamation of hinterland has not obtained so much result, as the human power is the only means available. Only on the Una-Una Island, however, the reclamation of palm forest is under way halfway up the Una-Una Mountain in the center.

Paddy field and dry field are partially observed in the rear part of Wakai Village, but are small in area and many of the cultivation method applied are still primitive such as that of burnt field. As a matter of course, the production is insufficient to satisfy the self-supply and most of the staple foods like rice depend on the shipping-in from the main island. Those daily necessities like salt, soap and coffee are also shipped in from the main island.

As to the fishery, fishing boats of canoe are in operation, but the catch is no more than just to meet the self-supply.

Each village has more or less one small sotre where several articles of daily use are on show, but such articles as clothing and foodstuffs are marketed at a pasar to be held by those peddlers who come once a week by boat.

(3) Prices of Commodities

For the convenience of shipping service, the Togian Islands are closely connected economically with Gorontalo City in the North Sulawesi. Various goods are mainly transported from Gorontalo. Prices of commodities on those islands exceed those on the main island by 20 to 30%, as they are in an out-of-the-way place, raising the cost of transportation and so on.

(4) Traffics, Communication and Others

The traffic base to reach the Togian Islands is either Gorontalo City or Poso City. The Togian Islands and Gorontalo City are connected by shipping service of a regular liner which cruises over the Gulf of Tomini more or less twice a month. In addition to this, small sailing-vessels or boats equipped with an outboard engine are generally used for the comings and goings. It takes 15 to 18 hours to reach the Togian Islands either from Poso City or from Gorontalo City.

As for the inland traffic, roads were constructed to about 80% along the outer circumference in the case of the Una-Una Island and several jeeps, motorcycles and so forth are possessed. However, there are no other roads than footpaths on the other islands.

With respect to the communication, aside from the one called a radiogram which is transmitted one-sidedly from Gorontalo City at fixed times, there is a subsidiary post office at Una-Una and messages are telegraphed by wireless regularly to those satellite cities like Palu and Poso.

There is an elementary school of 6-year duration at each of the major villages of the island and Una-Una and Dolong have a junior high school, respectively. Senior high schools exist in the major cities of the main island and a branch of the university is located in Palu City.

4-3 Use of Non-Commercial Tree Species

4-3-1 Outline

It is a well-known fact that the eastern and western flora and fauna differ greatly with the Strait of Macassar between the Borneo Island and the Sulawesi Island as a boundary. This has an important meaning from the viewpoint of forestry in that on the westward side of this boundary, those lowland rain forests in the Malay Peninsula, Sumatra, Borneo, the Philippines and so forth are the so-called Dipterocarpus forests and are mainly composed of those tree species of Dipterocarpaceae including Meranti, Keruing and Kapur, while, on the contrary, in the region ranging from Sulawesi to New Guinea the species of Dipterocarpaceae are quite scarce. For intance, there exist in Borneo 9 genera and about 250 species of Dipterocarpaceae, but in Celebes, just across the strait, trees of this family number only 4 genera and 8 species without playing an important role generally even as a constituent element of forest stand. Just like in Japan, the development of tropical woods has been exclusively focussed on those tree species of Dipterocarpaceae so far. However, since the development area of the Dipterocarpus forests has gradually been extended deeper into the inland in recent years, and also from the standpoint of effective utilization of resources, the utilization of those species that have been without marketability so far, or in short, of those non-commercial tree species has become an important problem ot be solved.

According to the forest survey on the Togian Islands conducted by the Indonesian Forestry Directorate-General in 1971, out of the forest complex of 70,000 ha, 40,000 ha is the forested area. As the forests include 4,000 ha of mangrove forest and some area of water source protection forest and steep land, exploitable forest is about 30,000 ha. Others are palm field, farm land and unstocked land and so on.

In the above-mentioned survey of the Forestry Directorate-General, recorded are 127 species of trees with diameter over 35 cm. The species of Dipterocarpaceae is not found at all, and some are the species somewhat known to the Japanese market. As a whole, however, those forests can be said to be composed of the so-called non-commercial tree species of various families. What has the largest growing stock is Palapi of Sterculiaceae and the remaining 30 species or so mentioned below are the main constituent species of those islands. As to the coniferous trees, only those species of Podocarpaceae are to be found.

The above-mentioned survey of the Forestry Directorate-General shows that the average growing stock of trees of which diameter is more than 50 cm is about 114 m^3 /ha, 77% of which is accounted for by floaters. Although the thorough examination of this figure seems necessary

furthermore, it can be considered as an extremely favorable condition for the forestry development of those islands that there contained many floaters easy to be handled and quite marketable. The question will be how to enable to classify such mixed species well and moreover to put each species together in large quantities. In case woods are shipped as M.L.H. (Mixed Light Hardwoods) without any classification, the market value goes low and, what is worse, the future progress could not be expected from the viewpoints of the development of non-commercial tree species and the effective utilization of wood. In the course of the present field survey, it was confirmed that inhabitants on those islands are well-acquainted with each tree and come are so excellent as to be able to identify considerably many of the species accurately. A full-scale botanical survey on the Togian Islands has not yet been conducted and for the present, the aboved-explained survey of the Indonesian Forestry Directorate-General is the only kind referable on the names of the tree in this region. During this survey, a strip survey coming up to 69 km in total was conducted to check the volume of major tree species to be encountered after having selected 12 areas within those islands. But we have some question about species name, for example, that, Palapi, tle most important tree species of the Togian Islands, is in reality Tarrietia javanica of Sterculiaceae, but Palaquium javense of Sapotaceae is used as the scientific name of Palapi in the said survey, and also is lumped under the commercial name of Balan together with other two species of Palaquium. Therefore, the growing stock of Palapi in question is not available precisely. Those inhabitants on toe Togian Islands are divided into several clans, and since how to call tree species seems to vary slightly according to each clan, it appears that some points are still left to be made clear in the future with respect to the names of species, both scientific and common. The following contrast between local name and scientific name is based, in outline, on the survey of the Forestry Directorate-General, but the correction was made on several points that were ascertained through other literatures.

4-3-2 Major Tree Species of the Togian Islands

As has been explained above, about 127 species of trees which are utilizable as lumber and of which diameter exceeds 35 cm have been identified on the Togian Islands. Major species among them from tohe standpoint of growing stock are as follows.

(1) Floater (ordinary air-dried specific gravity is approximately 0.75 or less)

Palapi:	Tarrietia javanica	(Sterculiaceae)
Tea:	Artocarpus sericicarpus	(Moraceae)
Dama-Dama:	Canarium asperum	(Burseraceae)
Kenari:	Canarium balsamiferum	(Burseraceae)
Kume:	Palaquium obovatum	(Sapotaceae)
Nantu:	Palaquium obtusifolium	(Sapolaceae)

Bintangoro:	Calophyllum soulattri	(Guttiferae)
Loyo:	Dracontomelon mangiferum	(Anacardiaceae)
Makakata Merah:	Santiria sp.	(Burseraceae)
Benuang:	Octomeles sumatrana	(Datiscaceae)
Ula:	Diospyros spp.	(Ebenaceae)
Bawan:	Elaeocarpus sphaericus	(Elaeocarpaceae)
Makakata:	Terminalia edulis	(Combretaceae)
Tawan:	Pometia sp.	(Sapindacede)
Bengkele:	Duabanga moluccana	(Sonneratiaceae)
Polusu:	Celtis sp.	(Ulmaceae)
Sugimanai:	Anthocephalus chinensis	(Rubiacede)
Pia:	Litsea spp., etc.	(Lauraceae)
Bayu:	Pterospermum celebicum	(Sterculiaceae)
Kayu China:	Podocarpus blumei	(Podocarpaceae)

(2) Sinker (ordinary air-dried specific gravity is approximately 0.75 or more)

Siuri:	Koordersiodendron pinnatum	(Anacardiaceae)
Nane:	Mimusops elengi	(Sapotaceae)
Bone:	Parinari sp.	(Rosaceae)
Kayu Besi:	Metrosideros vera	(Myrtaceae)
Lungulo:	Heritiera littoralis	(Sterculiaceae)
Bakang:	Quercus celebica	(Fagaceae)
Putat:	Planchonia valida	(Lecythidaceae)

4-3-3 Outline of Major Species

Palapi Scientific Name: Tarrietia javanica Bl. (Sterculiaceae)

The sientific name of Heritiera javanica Kosterm is used more often recently, integrating Tarrietia into Heritiera. This species is distributed from Malaya, Sumatra, Borneo, Java, the Philippines to Sulawesi, and grows high, reaching 45 m in height and 1 m in diameter. Its buttress develops much. The bark is light-brown, rather smooth, peeled in patches.

As for its lumber, the distinction between sapwood and heartwood is obvious, and the former assumes a light yellowish-white color while the latter is rosy-brown to reddish-brown. The air-dried specific gravity stands at 0.50 to 0.75. The weight and hardness are medium. Its texture is coarse and the grain is straight or slightly interlocked. It has ripple marks and contains silica.

It has the largest growing stock in the Togian Region, having been quite noticeable

even in the course of the present field survey. The name of Palopotanduk is given to this species in the survey of the Indonesian Forestry Directorate-General, but we did not hear the name in the present survey. As names of wood of Tarrietia, relatively well-known are such as Mengkulang (Malaysia), Teraling (Indonesia) and Lumbayau (the Philippines), and wood of this genus is sometime imported to Japan from Borneo or Sumatra, mixed with Red Meranti. Plywood, furnitures of medium quality and materials of interior fixtures are conceivable as some of its uses.

Tea alias Toop or Topeo

Scientific Name: Artocarpus sericicarpus Jarrett (Moraceae)

Although the scientific name of A. elasticus Bl. is adopted in the said survey of the Forestry Directorate-General, A. elasticus is not supposed to be distributed in Sulawesi according to the recent research and therefore Tea seems to coincide with A. sericicarpus. This species is distributed in the Malay Peninsula, Sumatra, Borneo, Java, the Philippines and Sulawesi, growing as high as 40 m. It has a low buttress stretching sideways. Its bark is dark grey and smooth. A considerably large quantity of milk-white liquid drains out of the bark when its trunk is cut by a hatchet. The latex gradually turns to brown in some degree through the exposure to the air.

Its wood is light yellowish-white without distinction between sapwood and heartwood, being light and soft with the airdried specific gravity standing at 0.20 to 0.55. Its texture is between rather coarse to coarse, and the grain is more or less interlocked. Silica is not contained in its wood.

Artocarpus consists of about 50 species distributed in Southeast Asia and the Pacific Region, and among them bread fruit, A. communis J.R. et G. Foster, and Jack Fruit, A. heterophyllus Lam, in particular, are known well for their edible fruits. Lumbers of this genus are classifiable into two groups; the one whose heartwood is light yellowish-white and light and soft, while the other whose heartwood is dark brown and slightly heavy and hard. Tea belongs to the former which is generally called Tarap in Malaysia and Indonesia. In Papua New Guinea, its scientific name, Artocarpus, is normally used also as trade name, and sometimes Japan imports the wood. Plywood (corestock), packing materials, interior materials of furnitures and padding of sandals are conceivable as some of its uses.

Dama-Dama alias Damar, Panjit or Simbuya

Scientific Name: Canarium asperum Benth. (Burseraceae)

This species grows high and big, reaching 35 to 40 m in height and 1 m in diameter, and is distributed in wide range covering Borneo, the Philippines, Sulawesi, the Molucca Isalnds, New Guinea and the Solomon Islands. The buttress hardly develops and the bark is dark grey and smooth. When its trunk is cut by a hatchet, the viscous resin drains out of the kerf. Leaves are

compound and consist of several conjugates of folioles.

Its wood assumes a light yellowish-white color or the greyish white color without distinction between sapwood and heartwood being medium in both weight and hardness with its air-dried specific gravity amounting more or less to 0.6. The texture is moderately fire and the grain is generally interlocked to a great extent. Silica is contained in its ray and fiber.

Canarium consists of about 100 species, distributed in Africa, Southeast Asia and the Pacific Region, but few are well-known as timber species. Many have the resin canal in the wood and secrete the resin. The resin of C. luzonicum A. Gray in the Philippines gives out fragrance, being called Manila elemi, and is used for perfume, medical purposes, printing and paints, etc. The word Damar means the resin in the Indonesian language, and the local name of Dama-Dama seems to be derived from this. In fact, the bark containing the resin is easy to burn and is used for a torch or kindlings by the local people. Trees of Canarium are, in many cases, called Kedongdong or Merdongdong in Malaysia and Indonesia, and the wood is sometimes imported to Japan.

Kenari Scientific Name: Canarium balasamiferum Willd. (Burseraceae)

This species is distributed in the range limited to Sulawesi and the Molucca Islands, and seems to be smaller in both height and diameter than the species mentioned right above. It is a question how clearly both species are distinguished on the spot, since the properties of wood of those two resemble closely, but there is no problem in treating them equally from the standpoint of utilization. Similarly to the above-mentioned species, it is used for furnitures of medium quality, materials of interior fixtures and of general utensils, etc. Those of large diameter are possibly used for plywood.

Kume Scientific Name: Palaquium abovatum Engl. (Sapotaceae)

This species has a wide distribution throughout Southeast Asia and the Pacific Region, ranging from India to New Guinea, and reaches 40 m in height and 1 m in diameter. The buttress develops well. When the bark is cut, the viscous white latex drains out little by little from the kerf.

Its wood is light-brown or rosy-brown without clear boundary between sapwood and heartwood, but the former has a lighter color. The texture is moderately fine, and the grain is slightly interlocked. Its air-dired specific gravity is approximately between 0.55 and 0.75. Silica is contained in its ray.

Sapotaceae, consisting of about 50 genera and 800 species, is widely distributed over the world centering in the tropical region. However, there is still some difficulties in distinguishing genera and species of this family and many problems still remain unresolved taxonomically. Woods of this family are usually treated under the classification into two groups; those extremely heavy and hard generally with the specific gravity of 1.0 or more and those moderate with the specific gravity

of less than 0.5 to 0.8. It is the latter that Japan imports, and the name Njatuh is given in Indonesia and Malaysia and Nato in the Philippines. The wood quality is also variable, since the number of genus and species is numerous, but on the whole their heartwood assumes a rosy-brown or reddish-brown color. It may be better if they are used for materials of furnitures of medium quality, materials of interior fixtures or of cabinet than for plywood.

Nantu alias Tonutu

Scientific Name: Palacuium obtusifolium Burck (Sapotaceae)

This species is distributed extending from Sulawesi over to the Molucca Islands. Since the properties of its wood resemble those of Kume, it does not seem needful from the aspect of utilization to distinguish them. In addition, as mentioned previously, in the said survey of the Forestry Directorate-General those three species of Palaquium including the one called P. javense Burck aside from Kume and Nantu are lumped under one name, Balan, and are explained as the biggest in the growing stock. In fact, however, Palapi (Tarrietia javanica) of Sterculiaceae seems to be included among them in large quantities.

Bintangoro Scientific Name: Calophyllum soulattri Burm. f. (Guttiferae)

This species is widely distributed in Southeast Asia and the Pacific Islands ranging from India, Ceylon (Sri Lanka) to the Solomon Islands, and grows about 30 m in height and 60 m in diameter. The buttress does not develop, and the bark is smooth and is yellow green or yellowish grey. When the bark is cut, the opaque and light yellowish-white resin oozes out of the cut. Leaves are opposite and have closely parallel and fine veins.

As regards wood, the distinction is obvious between sapwood and heartwood, and the former shows a light yellowish-white color or a light-brown color while the latter being brown or reddish-brown. The texture is coarse and the grain is remarkably interlocked. It is one of the characteristics of woods of this genus that their vessels are arranged zigzag on the transverse surface. Silica is not contained in its wood.

There exists another species of Calophyllum on the Togian Islands which seems to coincide with C. waworoentii Kds. Unlike the above species, this has the brown bark of which surface is checked in fine flakes. This seems to be also called Bintangoro. There is no necessity of treating them distinctively when utilizing, as both of htem are similar to each other in the properties of wood. There found about 100 species of Calophyllum all over the tropics of the world, but most of them are distributed in Southeast Asia to the Pacific Region. In Indonesia and Malaysia they are generally called Bintangor, and in Papua New Guines are called Calophyllum, originated from the scientific name of their genus. They are known to the timber market of Japan under both names. As to their uses, being reddish in color, those of large diameter are possibly used for plywood, furni-

tures of medium quality, materials of interior fixtures and so forth, similarly to Red Meranti.

Loyo alias Rau or Loppi

Scientific Name: Dracontomelon mangiferum Bl. (Anacardiaceae)

This species is widely distributed all over Southeast Asia ranging from India to New Guinea and in the Pacific Region, and grows as high as 40 m. It has a large buttress and its bark assumes a bright greyish-brown color, being smooth while young but peeled in fine flakes when over-matured. Leaves are compound with 5 to 11 conjugates of foliole.

As regards the wood, the sapwood is light greyish-yellow or light rosy-yellow while the heartwood being greyish-brown or rosy-brown. Blackish-brown stripes often appear on the latter. Its weight and hardness are medium, with the air-dried specific gravity of 0.45 to 0.75. The texture is slightly coarse and the grain is straight or interlocked. Silica is not contained in its wood.

There found on the Togian Islands another species, namely D. dao Merr. et Rolfe, which is called Dewu or Kaili and is the species to be distributed in the Philippines, Celebes and the Molucca Islands, being relatively well-known under its Philippine name, Dao. D. mangiferum is called New Guinea Walnut in Papua New Guinea, and as the name imparts its heartwood with blackish-brown stripes, in common with D. dao., assumes the color tone rather similar to Black Walnut (Juglans nigra L., Juglandaceae) of North America and is sometimes used for furnitures. Among all the species of the Togian Islands this is the one whose value as a precious wood can be more or less expected, but the question will be to what extent such blackish-brown stripes appear on its heartwood.

Makakata Merah Scientific Name: Santiria sp. (Burseraceae)

The scientific name of this tres is not clear yet. According to the islanders, there exist both Makakata (explained later on) and Makakata Merah on the Togian Islands. The Team sampled a piece of wood of what is called Makakata Merah during the present survey, and brought it back to Japan for the identification. As a result, it was found to be a species of Santiria of Burseraceae. However, no species of Santiria is mentioned in the survey of the Forestry Directorate-General. Since those islanders seem to call it simply Makakata sometimes, omitting Merah, due attention is needful not to mix it up with another Makakata which belongs to a different genus. The proper solution has to depend on a future survey.

On the condition that Makakata Merah is truly a species of Santiria, we can explain that its sapwood is light yellowish-white while its heartwood being light-borwn and the air-dried specific gravity concerned is about 0.68. The texture is rather fine and the grain is straight or slightly interlocked. Woods of this genus, together with those of Canarium of the same Burseraceae, are

sometimes imported to Japan as M.L.N. It can be used for furnitures of medium quality, interior fixtures, general utnesils and so on.

Benuang Scientific Name: Octomeles sumatrana Mig. (Datiscaceae)

This species is distributed in Sumatra, Borneo, the Philippines, Celebes to New Guinea, and the Solomon Islands. It is a quite large tree, reaching more than 60 m in height and 2 m in diameter. Its buttress develops very much. Being a fast-growing intolerant tree, it often grows in groups in a riparian forest of second growth rather than in a virgin forest. The bark is grey and almost smooth.

Its wood has a vague distinction between sapwood and heartwood and is light yellowish-white or light-brown and looks a little filthy. The heartwood sometimes wears a light reddish-brown color. Its grain is interlocked and the texture is rather coarse to coarse. It is a light and soft wood with the air-dried specific gravity of 0.22 to 0.45 and does not contain silica.

This species is known well in Malaysia, Indonesia and the Philippines under the name of Binuang or Benuang, and Erima in New Guinea. Being light and soft with unattractive appearance, its wood is possibly good for corestock of plywood, packing materials, internal materials of low-quality furnitures and so forth.

Ula alias Maroula or Maraula
Scientific Name: Diospyros macrophylla Bl. (Ebenaceae)

This species is distributed in Sumatra, Borneo, Java and Sulawesi, and grows as high as 45 m. The buttress hardly develops, and the bark is checked in fine flakes. The bark being almost black in color, the tree is easy to be distinguished from other trees.

Its wood has an obscure distinction between sapwood and heartwood, and assumes a light brownish-yellow color, being moderate in weight and hardness with the air-dried specific gravity of 0.50 to 0.70. The texture is moderately fine and the grain is straight or a little interlocked. Silica is not contained.

Those wood of Diospyros whose heartwood is black are Ebony. There found considerably many species of Diospyros in Southeast Asia and the Pacific Region, but those with black heartwood are limited in number. Several species of Diospyros with black heartwood are known on the main island of Sulawesi and in effect Sulawesi is one of the principal Ebony-producing areas in Indonesia. However, though Ula which is being mentioned herein is a large tree reaching almost 1 m in diameter, the black portion is almost negligible, or even if any, is limited only near the center, and as such is valueless as an Ebony. In the survey of the Forest Driectorate-General, two other species of Diospyros are mentioned; namely, Kayango (D. buxifolia Hiern.) and Oliotoma (D. hebecarpa A. Cunn.). Judging from its scientific name, the former is considered to be a principal

species of Ebony in the Indo-China Peninsula, but according to not only the result of the present survey but also the information given by the islanders, there seems to be a limited possibility of producing Ebony on the Togian Islands.

Those species of Diospyros in the tropics are generally black in their bark and because of this are called Kayu malam in Indonesia and Malaysia which means the tree of darkness. Since those of large diameter are few, almost none of them is imported to Japan except Ebony. They can be used for materials of interior fixtures, furnitures of medium quality and utensils, etc.

Bawan alias Pongo

Scientific Name: Elaeocarpus sphaericus K. schum. (Elaeocarpaccae)

This species is distributed in India, Burma, Borneo, Java and Sulawesi, and reaches 35 m in height and 50 cm in diameter. The bark is greyish-brown and almost smooth. It has buttress near the base of the trunk.

Its wood has an obscure distinction between sapwood and heartwood, and assumes a light yellowish-white color or a light rosy-brown color, being moderate in weight and hardness with the air-dried specific gravity of 0.55 to 0.75. The texture is rather fine while the grain is straight or a little interlocked.

Trees of Elaeocarpus are usually small in size in South-east Asia and the value as a commercial timber is scanty, but in the Pacific Region there grown those of large diameter and sometimes are imported to Japan as M.L.H. They seem good for materials of interior fixtures and the like.

Makakata Scientific Name: Terminalia microcarpa Decne. (Syn. T. edulis Blco.) (Combretaceae)

This species is distributed in the Philippines, Borneo, Java, Sulawesi, the Molucca Islands and New Guinea, and reaches 40 m in height and 2 m in diameter. Its fruits look like a plum and are edible.

Its sapwood is light yellowish-white and its heartwood is greyish-brown or light-brown. The air-dried specific gravity usually stands at about 0.60 to 0.70. The texture is rather coarse and the grain is interlocked. Silica is not contained in its wood.

Terminalia consists of about 200 species and is widely distributed over the tropics of the world. Much of tannin is contained in their bark, fruits and wood, and is used for raw material of tannin, dyestuffs, medicine and so on. The wood of Afara (T. superba Engl. et Diels) and Idigbo (T. ivorensis A. chev.) both in West Africa are very famous, being in wide use for plywood, for example, in Europe. In those tropical rain forests in Southeast Asia, particularly in Malaya, Sumatra, Borneo and the Philippines, few species grow so large in diameter. Those being imported to Japan now under the name of Terminalia are mostly from the Pacific Region including New

Guinea, and are often classified according to the color of heartwood into three groups; namely, Yellow Terminalia, Brown Terminalia and Reddish-brown Terminalia. According to this classification, woods of T. microcarpa belong to Brown Terminalia or Reddish-brown Terminalia. Plywood, materials of interior fixtures, furnitures of medium quality, materials of utensils and of packing are conceivable as some of their uses.

Tawan Scientific Name: Pometia sp. (Sapindaceae)

Pometia consists of only one species, P. pinnata Forst., in a wide view, and is distributed widely from Ceylon (Sri Lanka) to all over Southeast Asia (including Taiwan) and the Pacific Region (including the Fiji Islands). However, as the morphological variation is outstanding, it sometimes is classified into several species. It is one of the most important timber species in the Pacific Region inclusive of New Guinea and is being imported into Japan under the name of Taun (Papua New Giunean name) or Matoa (West Irian name). Also it is called Kasai in Malaysia and Indonesia and Malugai in the Philippines, but does not grow much in those areas.

It reaches 45 m in height and 1 m in diameter and bears the buttress. The bark is light-brown or reddish-brown and drains out red sap when cut by a hatchet. Leaves are pinnated compound ones with 5 to 13 conjugates of foliole.

Its sapwood is light yellowish-brown and the heartwood is rosy-brown or reddish brown. Its wood belongs to those rather heavy and hard with the air-dried specific gravity of 0.6 to 0.8.

The texture is moderately fine and the grain is straight or slightly interlocked. Silica is not contained in its wood. Furnitures of medium quality and materials of interior fixtures would be their uses.

Andolia Scientific Name: Cananga odorata Hook. f. et Thoms. (Annonaceae)

This species is widely distributed in Southeast Asia and the Pacific Islands ranging from India to the Fiji Islands and Northern Australia, and grows as high as 40 m without the buttress. The bark is grey or silver-grey and almost smooth.

Its wood has no distinction between sapwood and heartwood and is light yellowish-white, being light and soft with the air-dried specific gravity of about 0.30 to 0.40. The texture is rather coarse and the grain is almost straight, being characterized by broad rays.

It is known in Malaysia and Indonesia under the name of Kenangs and Ilang-Ilang in the Philippines, and this is because the perfumery (Ilang-Ilang oil, Kenanga oil) can be produced from its flower. It is used for a perfume and is cultivated in many places of the tropics. Its wood is mostly small in diameter, and light and soft, thus being only suitable for internal materials of furnitures, packing materials and so on. It is sometimes imported into Japan as M.L.H. togher with other

species of Annonaceae.

Bengkele Scientific Name: Duabanga moluccana Bl. (Sonneratiaceae)

This species is distributed in the Philippines, Borneo, Sulawesi, the Molucca Islands and New Guinea, and reaches 45 m in height and 1 m in diameter. Its buttress does not develop much. It often grows in a cutover area or along a roadside.

Its sapwood is greyish-white or light yellowish-white while the heartwood being yellowish-brown. Wood is light and soft with the air-dried specific gravity of 0.25 to 0.51. The texture is coarse and the grain is interlocked. Silica is not contained in its wood.

It has no well-known commercial name in particular, and is sometimes imported into Japan under the scientific name of its genus, Duabanga, as it is, but the quantity is not much. Being light and soft with rather unfavorable appearance, it has limited uses such as corestock of plywood and packing materials.

Polusu Scientific Name: Celtis sp. (Ulmaceae)

About 80 species mainly in the Northern hemisphere are included in Celtis. In the Southeast Asian tropics those of large diameter are not so much to be found, but their woods are sometimes imported into Japan as M.L.H. recently from the New Guinean area. Those of the Togian Islands are for the present remain unaccounted for in respect to the name of species, but among those distributed in Sulawesi there found C. rigescens Planch. as a species to grow large in diameter. This is distributed widely in Southeast Asia and the Pacific Region, and reaches 40 m in height and 90 cm in diameter. Its bark is grey and smooth.

Many of the woods of this genus are generally light yellowish-white in their sapwood and are slightly blackish light yellowish-brown in the heartwood. Usually, the air-dried specific gravity is between 0.60 and 0.85, and the wood is rather heavy and hard.. The texture is moderately fine and the grain is interlocked. It is suitable for materials of interior fixtures or utensil materials.

Sugimanai Scientific Name: Anthocephalus chinensis Walp. (Syn. A. cadamba Mig.) (Rubiaceae)

This species is distributed in a wide range of Southeast Asia and the Pacific Region covering from India to New Guinea. It is a typical second-growth tree and comes first to grow in a cutover area or a roadside, but even in a virgin forest a large tree sometimes is found to remain growing. It reaches 40 m in height and 1 m in diameter, and its bark is yellowish-brown and the buttress hardly develops. Leaves are opposite and 5 to 10 conjugates of large leaves come out on a twig reaching out sidelong.

Its wood has no distinction between sapwood and heartwood and assumes a light yellowish-white color (turning gradually into a light yellowish-brown color), being light and soft with the air-dried specific gravity of 0.35 to 0.45. The fineness or coarseness of texture stands moderately to rather fine, and the grain is straight. No silica is contained in its wood.

This species is known well under the names of Kelempayan in Indonesia and Malaysia, Laran in Sabah, Kaatoan Bangkal in the Philippines, Labula in New Guinea and Kadam in India. Since it grows fast, it has been watched with keen interest recently as a fast-growing planting species of the tropics. Because of its relatively long fiber and a light color, some of the possible uses are interior materials of furnitures, padding materials of sandals and toys in addition to pulp. Further, there exists another species in Anthocephalus by the name of A. macrophyllus Hav., of which wood bears a close resemblance.

Pia alias Bia (Lauraceae)

In the survey of Forestry Directorate-General, as species of Lauraceae there mentioned five species: namely, Pia or Bia (Dehansia sp.), Dalid (Cryptocarya sp.), Pai (Cryptocarya sp.), Ponto (Litsea firma Hock. f.) and Waka (Litsea mappacea Boer.). However, as there are quite many genera and species in Lauraceae, and moreover the classification is difficult, it is doubtful to distinguish each species by the local name as explained above. As a matter of fact, in Indonesia and Malaysia most of the species of this family are often lumped under the standard name, Medang. Since the name of Pia was the only one heard during the present survey, we let it represent others tentatively. Its wood varies in color, from a light yellowish-white color, a yellowish-brown color, a brown color to a reddish-brown color according to the species, but is usually not so heavy and hard with the air-dried specific gravity of about 0.45 to 0.65. Few are of large diameter and some are imported into Japan from New Guinea and so forth as M.L.H. Materials of interior fixtures, furnitures of medium quality, utensil materials and others are its possible uses.

Bayu alias Yaru

Scientific Name: Pterospermum celebicum Mig. (Sterculiaceae)

This species is distributed in Sulawesi and the Molucca Islands, but the form of tree is not known clearly.

Pterospermum consists of about 40 species and is distributed mainly in Southeast Asia ranging from India to the Moluces Islands. Woods of this genus have not much difference between species and generally are greyish-white or light rosy-grey in sapwood and rosy-grey or rosy-brown or brown in heartwood, being medium in weight and hardness with the air-dried specific gravity of 0.45 to 0.75. The texture is rather fine and the grain is straight or slightly interlocked. Silica is not contained in the wood.

It is known in Indonesia and Malaysia under the general name of Bayur, and its growing stock is not much. It sometimes is imported into Japan from Sumatra or Borneo. With rather favorable appearance and workability, it seems suitable for furnitures of medium quality, materials of interior fixtures, flooring board, utensil materials and so forth.

Kayu China Scientific Name: Podocarpus blumei Endl. (Podocarpaceae)

This is only one conifer found in the Togian Islands and is distributed in Malaya, Sumatra, Borneo, Java, the Philippines, Sulawesi and New Guinea. It reaches 45 m in height, and the bark is blackish-brown and is torn off in fine flakes. The buttress does not develop. Leaves are narrow oval with sharp point, being 8 to 20 cm in length and 2 to 5 cm in width unlike those leaves of ordinary conifers.

Its wood has a little distinction between sapwood and heartwood, and is light-brown. It is medium in weight and hardness with the air-dried specific gravity of 0.45 to 0.60. Unlike those conifers of the temperate zone, its annual ring is not clear. It looks like Agathis spp. (Araucriaceae) which are tropical conifers and often imported into Japan.

The survey of the Forestry Directorate-General mentions P. neriifolius D. Don under the name of Kayu China or Marisa, but this is a species whose leaves are narrower (0.5 to 3 cm in width). In addition to this, another species, P. imbricatus Bl., is mentioned under the name of Siora, but this is a species whose leaves are much smaller and come out on a twig in parallel and in a large number. What was called Kayu China by the islanders during the present survey seems to conincide with P. blumei due to its large leaves, and the other two species mentioned above were not observed. The name of Kayu China is often used for the species of Podocarpus widely in South-east Asia.

Those that have been explained so far are major species of the so-called floater of which specific gravity of wood is relatively low. What will come next is the sinker, but this type requires more time and labor in the logging than the floater. Besides, its use is limited in Japan and the workability is generally unfavorable. So, its marketability is scanty except those with a special value such as a precious wood. When we consider the development of non-commercial timbers, the development of an effective utilization method of this kind of heavy and hard timbers seems to be an important problem. A brief explanation will be given below on the major species of sinker.

Siuri alias Bugis

Scientific Name: Koordersiodendron pinnatum Merr. (Anacardiaceae)

This species is distributed in Borneo, the Philippines, Sulawesi, the Molucca Islands and New Guinea. Its wood is light rosy-grey in sapwood and is rosy-brown or reddish-brown in heart-wood, being heavy and hard with the air-dreid specific gravity of 0.80 (0.70 to 1.00). The texture

is rather fine and the grain is interlocked. Its wood contains no silica. Such names as Ranggu (in Indonesia and Malaysia), Amugis (in the Philippines) and Bugis (in Sulawesi) are used as a standard name. Flooring board and utensils are conceivable as some of its uses.

Nane Scientific Name: Mimusops elengi L. (Sapotaceae)

This species is widely distributed in Southeast Asia and the Pacific Region and is also planted in many places of the tropics. Its bark, leave, flower, fruit, seed and root are used for various folklore medicine. Its wood is light rosy-grey in sapwood and is dark-brown in heartwood, being extremely heavy and hard with the air-dried specific gravity of 0.92 to 1.12. Silica is contained in its wood. Those whose wood is heavy and hard among Sapotaceae are called Nyatoh Batu (in Indonessia and Malaysia) and Bitis (in Malaya). Handles of utensils, materials of machines like a shaft and stakes are conceivable as some of its uses.

Bone Scientific Name: Parinari sp. (Rosaceae)

There exists about 60 species of Parinari all over the tropics of the world and their woods are generally heavy and hard. The heartwood of this species is rosy-brown, brown or yellowish-brown and its air-dried specific gravity is 0.73 to 1.10. The texture is not so fine and not so coarse, and the grain is straight or a little interlocked. Due attention must be paid to the sawing, since its wood usually contains much silica. Flooring board, utensils and stakes are conceivable as some of its uses.

Kayu Besi Scientific Name: Metrosideros vera. Roxb. (Myrtaceae)

This species is distributed in Sulawesi, Timber and so forth. Its wood is greyish-rose in sapwood and is quite darkish-brown in heartwood, being extremely heavy and hard with the air-dried specific gravity amounting to 1.20. The texture is fine and the grain is almost straight. Its wood is so heavy and hard that the uses will be limited to handles of utensils, stakes and so on.

Lungulo alias Wangulo or Mangulo
Scientific Name: Heritiera littoralis Dry. (Sterculiaceae)

This species grows on the seashore in Southeast Asia and the Pacific Region, and its seeds are said to propagate themselves while being wafted by sea-water. Its wood assumes a light-brown color or a light rosy-brown color in sapwood, and a darkish-brown color or a dark reddish-brown color in corestock, being heavy and hard with the air-dried specific gravity of 1.00 to 1.17. The texture is fine or slightly finve and the grain is interlocked. Its wood contains silica. It is

known in Malaysia and Indonesia under the name of Dungun. Since it is durable, being heavy and hard, and also its wood is easy to obtain near the seashore, the local people use it for construction materials such as stakes, pillars and foundation, but in general the height is short and the form is poor.

Bakang alias Poli or Poluli

Scientific Name: Lithocarpus celebicus Rehd. (Syn. Quercus celebica Mig.) (Fagaceae)

This species is distributed in the Philippines, Sulawesi, the Molucca Islands and New Guinea. Its wood has an obscure distinction between sapwood and heartwood, and assumes a light greyish-brown color or a light yellowish-brown color, being rather heavy and hard with the air-dried specific gravity of 0.82 to 0.94. The texture is slightly coarse and the grain is almost straight. Its wood contains no silica. This species belongs to the same genus as Lithocarpus edulis Nakai of Japan, and there found the similarity also in the wood. Like evergreen oaks, handles of utensils, materials of machines and materials of vehicle are conceivable as some of its uses. There exist many species of Quercus and Lithocarpus in Southeast Asia, but most of their woods have not yet been imported to Japan so far.

Putat Scientific Name: Planchonia valida Bl. (Lecythidaceae)

This species is distributed in Malaya, Sumatra, Borneo, Java and Sulawesi. Its wood is light yellowish-brown in sapwood and is dark-brown in heartwood, being slightly heavy and hard with the air-dried specific gravity of 0.70 to 0.90. The texture is moderately fine and the grain is interlocked. Its wood 9ntains no silica. It is sometimes imported into Japan as M.L.H. Flooring board and materials of vehicle are some of its possible uses.

4-3-4 Utilization and Workability of Species of the Togian Islands

(1) As for the non-commercial tree species produced on the Togian Islands, a series of tests was conducted from January, 1976 by the Federation of Japan Plywood Manufacturers Association, entrusted by the Forestry Agency, of which result has just come out lately. Those tests covered as far as the basic wood quality of each species and the workability as plywood and sawnwood, under the guidance and supervision of the Forest Experiment Station. Crude woods used for the test are of those 16 species collected from a forest about 3 km south of Wakai Village on the Batudaka Island.

Further, when tested, after having observed the appearance of test samples of the crude wood those with characteristics in hardness, color tone, stripes and so on were used for a sawnwood test while the remaining was used for a plywood test.

(a) Evaluation in Plywood Processing by Species

The specification of processing machines used for the test, the processing conditions and the numerical values obtained therefrom by each test item are omitted herein. However, those results brought about were evaluated into three grades.

According to this grading, those given (A) rank as the species which is satisfactory in every point including the veneer cutting, the veneer drying, the adhesion of prepared veneer and the alkalinity-proof, thus being utilizable for plywood, numbered three; namely, Palapi, Dama-Dama and Tawan. As to Palapi in particular, a satisfactory result was fully obtained also in further-detailed test points (such as workability, yield percentage of veneer and quality of veneer in the case of veneer cutting test) of the above-mentioned test items. Although this species has still a long way before getting popularized within the circle of plywood industry, we can expect its future possibilities to the full.

Given (B) rank are those species which contain some problem or other in such test items as the cutting, the drying and the adhesion, thus being unsuitable for a face veneer yet utilizable for an inner ply. This group (B), though with some defects, still remains utilizable for plywood. With the improvement of treatment method in the processing or of processing technology to make up for such defects, species of this group will be quite fit for use. Nine species including Kume, Kenari, Makakata Merah, Bintangoro, Ula, Andolia, Sugimanai and Benuang were rated (B).

The remaining two species, that is, Nantu and Tea were proved unsuitable for plywood due to the defects proper to them. It was found that an entirely different processing method needs to be applied, or the development of a different use needs to be studied.

Further, since the crude woods used for the test were hauled manually, they are short and small in diameter. Accordingly, there exist many defects such as the veneer check, and the quality of their cutting face is on the whole inferior. This respect, however, is expected to be greatly improved by the bucking of a long lumber whose diameter exceeds 60 cm to be hauled mechanically.

(b) Sawing Workability

No general evaluation was made on this respect. Omitting those values obtained from the test, an evaluation classified into several grades by each test item is summarized below. Only 5 species were used for the sawing workability test.

No.	Name of Species	Saw Ability	Condition of Sawn Face	Hardness of Drying	Cutting Ability of Disc Planer
21	Palapi	Fine	Fine	Medium	Fine
22	Nantu	Fine	Fine	Medium	Fine
24	Dama-Dama	Fine	Fine	Medium	Fine
35	Nane	Bad	Fine	Hard	Fine
36	Bone	Rather Bad	Fine	Hard	Fine

Those three species, i.e., Palapi, Nantu and Dama-Dama, show a satisfactory result in all the tests, but Nane and Bone have some difficulty in the saw ability and the drying.

Clients of the wood processing industry are generally conservative in choosing raw materials and tend to hesitate to change species in use. Much efforts are needful in order to put those non-commercial tree species into circulation channels under the present marketing environment where the species of Dipterocarpaceae such as Meranti play a leading role. Enterprisers are required for the present to make efforts to acquire more clients by cutting down the production cost as much as possible to supply at lower prices as well as improving the processing techniques. On the other hand, those public organizations related to the forestry are also needed to strive for the requisite enlightenment and further to extend assistance so as to promote the utilization of those non-commercial tree species. Joint efforts in both private and public sectors seem necessary to set the utilization in the right direction.

The remaining 100 or more species are facing the problem of utilization all the more because their growing stock is quite limited. The right way of approaching is, after the introduction of processing facilities into those producing areas, to set forth the test and research to study the development of use of those species by utilizing such facilities.

(Note)

In consideration of the convenience of the future survey or execution of felling, names in actual use on the spot are adopted as common names of trees in this report, but in the report of the Federation of Japan Plywood Manufacturers Association more popular names (those considered standard names all over Indonesia or those scientific names of genus) are adopted instead of local names. Difference will be explained below to avoid the confusion.

This Report	Report of F.J.P.M.A.
Palapi	Teraling

This Report	Report of F.J.P.M.A.
Nantu	Njatuh
Kume	Njatuh
Dama-Dama	Canarium
Kenari	Canarium
Makakata Merah	Santiria
Tea	Artocarpus
Bintangoro	Bintangor
Tawan	Matoa
Ula	Ebony
Andolia	Kenanga
Sugimanai	Piaung
Benuang	Binuang
Makakata	Terminalia
Nane	Nane
Bone	Parinar

4-4 Logging Operation

The following conditions should be taken into consideration in planning the logging operation.

(1) Topography of Togian Islands resembles that of Sulawesi in that it is steep and has many reliefs despite of the low elevation. The route of the forest road should therefore be determined after a careful survey so as to attain the highest possible transport efficiency. The steep topography of the islands and so on will make aerial photogrammetry a very important means of such survey.

The length of the logging route per ha is expected to become somewhat larger than usual, and availability of labourers skilled in cutting and skidding is considered essential.

(2) Swamps (not mangrove forests) are found within 1 – 1.5 km from the beach. Such swamps will be found in the forest area, but will not exert any detrimental effect on the logging operation because they are small in both area and depth.

(3) Rivers are small and gravels are found in small quantities, so that road construction with river gravels is not feasible. It is confirmed, however, gravels can be quarried at a depth of about 50 cm below the ground in the neighbourhood of Ligoki, Togian Island. Accordingly, pit gravels of this type and crushed lumps of coral reefs on land will have to be used. Since clayey soils prevail in most of the project area, prime consideration should be given to the supply of gravels for smooth road construction.

(4) The coastline is indented and embraces many inlets and bays with a suitable water depth for establishment of log ponds and loading work. The seabed configuration should be carefully investigated because of the presence of many coral reefs. Nevertheless, if the waterway is adequately set, it will be easy to find a point for loading onto the carrier at a very short distance from the coast.

(5) At the outset of the project implementation, skilled labourers will have to be recruited from outside the project area. However, since the project area abounds in labour force, it is considered that the problem of labour force can be eventually solved by training local labourers.

(6) As the project area is on an island, facilities for smooth communication and marine transportation between the project area and Sulawesi should be consolidated to ensure quick arrangement and supply of the parts required for maintenance services of machines and equipment.

(7) Most clusters are found along river banks or near river mouths, so that the daily lives of local inhabitants are inseparable from rivers. The project should therefore be executed with utmost care taken to prevent contamination of rivers or destruction of water sources.

4-5 Regeneration of Forest

(1) In the total forest area of 70,000 ha, the forestland covers an acreage of 40,000 ha, from which 4,000 ha mangrove forest is to be excluded. If the area to be further excluded for water source conservation or by reason of steep topography is taken into account, the exploitable forestland area turns out to be about 30,000 ha. In the remaining forest area are found unstocked land, palm forests, farm land and secondary stands, but the greater part of the area is covered by secondary stands and unstocked land.

(2) Permanent conservation of the forest resources of Togian Islands is an essential prerequite to the socio-economic development of the islands. Regeneration of cut-over area should tehrefore be conducted in the surest and elaborate manner in parallel with afforestation of the existing unstocked land.

(3) From the results of a plot sampling survey conducted by Directorate-General of Forestry, it is known that young growth can be observed in about 55% of plots, which suggests the possibility of natural regeneration.

However, suitable regeneration measures should be taken for the remaining forestland as well as for the forestland which will be subjected to clear cutting.

(4) In order to assure that the regeneration of cut-over area, afforestation of unstocked land, and laternation of species in secondary stands will be carried out in a satisfactory manner, an experimental plot should be established for selection of planting species and regeneration method so as to be able to conduct test planting without delay.

(5) If it is found that any area in the prospective planted land can be utilized for agricultural development, cultivation of palm forests and reclamation of paddy fields or other farmland

should be planned for such area to accelerate the pace of economic development of Togian Islands.

(6) To study the possibilities described above and ascertain their practibility, it is essential to conduct forest analysis and inventory resorting to aerial photogrammetry.

4-6 Regional Development

It is expected that the implementation of the project will produce various direct and indirect benefits for local inhabitants, such as increased employment opportunities and income and improvement of repeletion of welfare facilities – medical and educational facilities. Of a number of benefits derivable from the project, basic social overhead capital such as roads, marine transportation facilities, and telecommunication facilities, offers the basis for future industrial and economic development of Togian Islands. To find the most effective way of investment for repletion of such social overhead capital, scrupulous further studies should be made after a detailed field survey to be conducted in future.

Insofar as can be deduced from the findings of the present survey, it is probable that the project will contribute to the consolidation of the regional social overhead capital in the following sectors.

4-6-1 Marine Transportation

(1) It takes more than 15 hours for locally available boats to cover the distance between Togian Islands and any of the main cities in Sulawesi, and it is not always possible to charter such boats. If a speed boat capable of covering the said distance in 3 – 4 hours is made available for the project, local inhabitants will be greatly benefited as it can be used for transportation of persons who have been injured or seized with a sudden illness as well as for quick supply of emergency goods.

(2) Wooden piers are found in relatively large Desas like Wakai and Dolong but all are superannuated. No efficient cargo handling work can be expected unless improvement or additional construction of such piers is undertaken with account taken of the volume of incoming and outgoing cargoes and the class and berthing frequency of calling boats. Construction of new piers at well-conductioned ports of fishing villages having a large population and many fishing boats will also be planned after studying its need and feasibility.

(3) Togian Islands will remain secluded from other parts of the archipelago with what marine transportation facilities now available. However, implementation of the project will bring about marked improvement to the marine transportation in Tomini bay and surrounding waters.

4-6-2 Land Transportation

(1) It is planned that an arterial transport road and forest roads will be constructed for the project execution. If the arterial road is so constructed as will be rigid enough to be used even after completion of the project, it will become an important asset of the islands and offer great convenience to local inhabitants.

(2) Due consideration should be given to the desires and requests of local inhabitants in designing the alignment of the arterial road to give it the highest possible function of a public road. The alighment should so determined as will link as many clusters as possible in order to open up the way to accelerated interchange and trade between clusters and to active reclamation and development along the road.

(3) The pace of regional development will be greatly accelerated if the developing company gives positive support by supplying, within the capacity of construction machinery, gravels for surface improvement of existing foothpaths and logs for repair of bridges.

4-6-3 Telecommunication

Smooth project implementation presupposes the installation of radio apparatus for communication between the project centre and either of the two cities in Sulawesi which are close to the project area, i.e., Gorontalo and Poso. There should also be provided communication equipment for connecting the project centre with Jakarta and the speed boat. These facilities will serve for important and emergency communications of local inhabitants.

4-6-4 Employment

(1) As the project reaches the stage of afforestation and wood processing with the progress of the logging operation, the number of labourers employed for the project will increase sharply. It is expected that a sizable number of people will depend on the project to make a living.

(2) It is desirable that the inhabitants of the islands be employed preferentially under the project, and that skilled labourers alone be recruited from outside.

At the initial stage of project implementation, Japanese supervisors and technicians will provide the necessary guidance. These Japanese instructors are expected to engage in the training and education of Indonesian employees in a positive manner to improve their capacity. If the quality and technical level of Indonesian employees is improved by such training to the extent that they can operate on their own the whole project inclusive of management work, it will be in perfect conformity with the policy of Indonesian government.

4-6-5 Electricity and Water Supply

The project centre should be equipped with power generation and water supply facilities.

Power generated at the centre will be supplied to public facilities such as piers, mosques and schools which are in the centre's area. It is desirable that water be also supplied at cost to houses of local inhabitants if they so wish.

As for water supply in the centre's area, a drinking water faucet and a bath using non-drinking water will be provided.

4-6-6 Education and Medical Service

(1) It is considered that additional or new construction of the existing schools and employment of new teachers will be required depending on the number of local inhabitants' children of school age.

(2) It is considered possible to supply, either without or at cost, processed timber required for the manufacture of school buildings, desks and chairs at the request of clusters in the neighbourhood or other areas.

It can be expected that the body of developing project will, with the improvement of its financial capability ensued from the project operation, offer assistance in the improvement of educational facilities including the supply of teaching materials such as books, sporting outfits, audio-visual aids, and experimental equipment and apparatus.

(3) It is an imperative for satisfactory project implementation to establish a clinic and provide medical services such as examination, initial-stage treatment, health administration and counselling in order to maintain and promote the health of the employees and their children. The clinic should have a consultation room, treatment room, office and waiting room, and be equipped with the necessary medicines and medical appliances and supplies. The clinic will be open to local inhabitants.

(4) It is desirable that a physician or physicians be stationed at the clinic for full-time service. If this is not practicable, the developing company will conclude a contract with a nearby hospital for regular itinerant medical service. In this case, full-time service of a nurse or nurses should be made available.

4-6-7 Others

(1) Construction of buildings for public use such as mosques and public halls, and supply of processed timber.

(2) In case need arises for public interests, leasing out of civil engineering and construction

machinery with operators or provision of similar assistance within the limits of time allowable for project implementation.

(3) Construction of a kiosk at the project centre where local inhabitants can purchase various commodities at reduced price.

(4) Guidance service including the introduction of the new farming implements which are compatible with the technical level of local inhabitants.

It can be expected that the services described in Items (1) – (4) above will be offered by the developing company as part of its cooperation with local inhabitants.

5. THE WAY OF COOPERATION

5-1 Fundamental Approach to Project Cooperation

In elucidation of the fundamental attitude of The Japanese Government towards the project cooperation, the following two subjects are discussed separately below.

(1) Significance of the project.

(2) Characteristics of the project.

5-1-1 Significance of the Project

In the following two items, the significance of the project will be explained from the standpoint of the two factors enumerated below.

(1) Contribution towards the policy of The Indonesian Government.

(2) Efficiency of economic cooperation.

(1) Contribution towards the Policy of The Indonesian Government

For reasons given below, it can be said with confidence that the project will promote the development of The Togian Islands in a manner which is desirable and consistent with the policy of The Indonesian Government.

- o Farmers currently engaged in the cultivation of coconut palms and shifting cultivation can be induced to settle themselves.
- o Forest development will give an impetus to the growth of industries such as wood processing and silviculture and thereby contribute towards regional development.
- o By the exploitation of tree species which are now in poor demand on the world market, efficient utilization of natural resources can be assured.

(2) Efficiency of Economic Cooperation

- o At present, the 25 thousand inhabitants of The Togian Islands subsist by production of copra and a few other crops. If the development of the existing forest resources is directed to improve the islands' economy and eventually lead to the settlement of inhabitants, elevation of educational and technical levels, industrial development, and socio-economic development, the effect of economic cooperation under the project will be clearly exhibited specially because the islands are served from other parts of the archipelago.

5-1-2 Characteristics of the Project

In most cases, forest development can be carried out solely for economic development. The present project, however, involves a number of factors which are rather disadvantageous and

must be coped with in the course of its implementation.

- o In the first place, unlike ordinary forest development schemes, the project must be implemented in perfect harmony with the socio-economic development of local inhabitants.
- o In the second place, trees of Dipterocarpaceae such as Meranti, Keruing and Kapur which enjoy stable demand on the world market are not found on the islands. Success of the project therefore depends on the effort for creating a stable and large demand for the main tree species growing on the islands.
- o In the third place, the islands are close to Sulawesi where forest development is less advanced than in other parts of the country, and application of high forestry techniques is required for the construction of forest roads and cutting and skidding work on account of the islands' complex topography. Hence, endeavors must be made to cope with the anticipated shortage of skilled laborers.

  Further, since the project must provide increased employment opportunities for local inhabitants, laborers should be recruited from among them with the exception of a limited number of skilled workers, and the resultant decline of labor productivity should be endured to fill the need for rearing skilled local workers and technicians.
- o In the fourth place, for the purpose of elevating the living standards of local inhabitants scattered on all islands, the forest road construction work should be so planned as to be conducive to the islands' economic development, not merely to seek the economic efficiency of forest development.
- o In the fifth and last place, afforestation work must be preceded by careful technical studies because the islands' future industrial progress depends heavily upon the regeneration of cut-over areas and afforestation of unstocked land.

5-1-3 Conclusion

For successful implementation of the project, the Japanese side considers it essential to take due account of the following three points.

(1) As an overseas cooperation scheme to be carried out by a private concern, the project is expected to produce a very high cooperation effect. It is therefore considered necessary to conduct a second survey in the nearest possible future.

(2) It admits of no argument that the project is quite significant from the point of view of regional development. Nevertheless, it involves a number of disadvantageous factors and its smooth progress cannot be expected without the close mutual cooperation of the governments of Indonesia and Japan.

It is therefore hoped that Japanese government will contribute to the project by:-

(In the survey stage)

a. dispatching survey teams of highly qualified experts to conduct necessary surveys and investigations, and
b. promoting the utilization and marketability of the unexploited tree species available in the islands;

(In the implementation stage)

c. providing long-term credit at low interest rate,
d. offering technical assistance and cooperation, and
e. conducting training of local workers.

It is hoped that The Indonesian Government will also contribute to the project by:-

a. conducting experiments of the unexploited tree species at The Forestry Experiment Station, Bogor,
b. enlightening the local inhabitants on the significance of the project and inducing them to cooperate in its implementation, and,
c. promoting smooth progress of the project by flexible application of relevant laws and regulations so that
   i. procedure for permitting aerial photogrammetry will be completed quickly,
   ii. vessels, equipment and materials required for the survey will be brought to Indonesia free of duty,
   iii. procedure for permitting the members of survey teams sent by Japan International Cooperation Agency to travel in Indonesia will be simplified and expedited, and
   iv. approval for establishing a joint venture will be granted without delay after completion of surveys.

5-2 Cautions in Planning the Second Survey

The forthcoming second survey should be conducted with account taken of the following points.

(1) Aerial photogrammetry should be given prime importance in the forthcoming second survey because it produces the data for grasping the stock of forest resources, determining the scale of project operation, passing final judgement on the feasibility of the cutting work, drawing a clear distinction between unstocked land and stocked land, and planning the network of forest roads. The aerial photogrammetric data are thus indispensable for the formulation of the fundamental development plan.

Attention should be given to the time of aerial photogrammetry. It is known from nephological observation that the period from July to September is best suited to air-photo taking. The survey should therefore be so planned that air photos will be taken in this period.

(2) To promote the utilization of unexploited tree species, studies should be made by classifying these species into the following two groups.

a. Tree species which have poor marketability in the world (specially in Japan) but have already been put to basic experiments of their characteristics and utilization method and consequently call for endeavors to accelerate their export thorugh the global distribution network.

b. Tree species which await future effort for promoting utilization.

For the former species, the product quality should be improved by providing the existing plywood factories with the necessary technical assistance, and positive publicity activities should be conducted to promote their export. For the latter, on the other hand, an experimental processing plant should be established to develop their utility value.

(3) Afforestation work should be preceded by test planting which calls for various prior surveys and experiments.

(4) Related infrastructural improvement should also be studied.

(Interim Report)

Jakarta, April 9, 1976

Mr. SOEDJARWO
Director General of Forestry
Department of Agriculture
The Republic of Indonesia

Re: The Feasibility Survey for Forest Development in the Togian Islands of the Republic of Indonesia. (Interim Report by the Mission of Japan International Cooperation Agency)

Dear Sir,

We would like to present herewith the interim report of our pre-feasibility survey for forest development in the Togian Islands of Province of Central Sulawesi, which has been conducted for 16 days from March 25 to April 9, 1976.

The intention of our survey is as follows:

In order to contribute to the local development of the Togian Islands, we investigate feasibility of a project mainly about forest development, which includes effective utilization of so-called 'non-commercial timber species' in a sense of international markets, forest afforestation with plantation projects in cut-over areas, and establishment of infrastructural facilities.

We met and exchanged opinions with the following persons concerned to this development project of the islands, that is, Governor of Province of Central Sulawesi, Bupati of County of Poso, Camats of both Districts of Una-Una and Dolong, authorities of Forest Agency of Palu and Drs. Th. Muhammad Gobel who is a concession holder of the forest, and confirmed that they all had been expecting strongly urgent realization of forest development of the islands. Successively, we performed a field-survey of the islands and the results are outlined as follows:

1. Natural conditions for forest development

The Togian Islands are located in Tomini Bay about 170 km distant from the nearest port of the main land of Sulawesi. Taking it into consideration that it takes more than 15 hours from the mainland of Sulawesi to the islands by ordinary ships available at present, improvement of facilities for correspondence and of marine transportation will be inevitable to promote smoothly the development project.

The Islands are not very high with maximum height of about 500 m above sea level, but the topography is fairly complex with steep and intricate small hills and valleys. The soils are mostly red-clayish soils. Therefore, a deliverate plan based on detailed investigations must be made for route alignment of forestry road. As there is only poor amount of gravels in rivers generally, crashed materials of coral must be used as substitute for them.

Coast lines are much indented forming many creeks here and there. The creeks are so deep that there is some advantage in utilizing them as log-pond or shipping place after

deliverate survey of coral-reef.

2. Economic conditions

The industry of the islands is almost limited to copra product and the amount of the other agricultural and marine products meet only their own demand of the islanders. There is almost nothing of road inside the islands, except for Una-Una, that can be used for industrial purpose. Inspite of rather dense population, social facilities are very poorly equipted. Necessary articles for living are generally more expensive in this islands than in the main land of Sulawesi, due to that they depend mostly on introduction from the other regions.

Skilled laborers required for the development project will have to be brought from the other regions, up to the time when islanders are trained and learn skill.

The seven main islands constituting the Togian islands are rather compactly arranged so that establishment of infrastructural facilities is expected to extend some noticeable economic effects to this region in a short time. There are found many palm plantations in good sites near the coast, even in small area, the fact of which shows that the peoples have vigorous spirit for development. Accordingly, road construction accompanied by forest exploitation will stimulate development sporit of the peoples and more development will be expected to go on spontaneously along the road.

3. Processing of non-commercial timbers

From a trend of timber resources and their demand, utilization of so-called non commercial timbers with considerable stock but without international markets is an important problem for forest products industries of the world. Trees found in the Togian islands are mostly those included in this category, so that to establish utilization of these non-commercial timbers is most essential problem to the development project of this region. On this matter, cooperation of official organs concerned and industrial efforts of companies participating in the project are much required.

Some equipment of wood processing must be introduced for establishment of timber utilization. This accords with the policy of promoting wood processing of the Indonesian General Agency of Forestry. On the grounds of

a) rather small annual timber production caused from the forest conditions that the forest of the islands is separated into rather small areas,

b) shortage of skilled laborers and

c) insufficient supply of industrial water, introduction of equipments should be made in the following conception:

equipments requiring much amount of industrial water and many skilled laborers as well as large scale industries are not suitable here. Factories should be such small scale ones as sawing and veneer slicing with equipments workable with intensive labor.

4. Regeneration of forest

Selective cutting is adopted as logging condition in the island. But there is already a considerable area of unstocked lands. To improve these unstocked lands and to regenerate cut-over areas, an afforestation project should be considered. Firstly, the soil must be investigated. And then, small scale of trial planting should be started, in which selection of fast growing species suited to the

soil and study of planting method are made.

On utilization of these unstocked lands and cut-over areas, it must be considered that they may be applied for general agricultural use or palm plantation. To make most effective use according to land conditions such as size of the land, altitudinal range and water condition, various uses of the lands outside afforestation should be also taken into account.

5. Conclusion.

The population of the Togian Islands is about 25,000, who live over the islands forming small villages. They usually find a means of living in copra product. But their lives are rather miserable and the social capital is so poor that social and economic development in the islands is not to be expected in such conditions as they are. Improvement of economic conditions of the peoples will result successively in settlement of the peoples, rise of educational and technical standard of the peoples and development of industry and then more development of economic and social conditions. We expect that such a good circulation for general development of the islands starts from this forest development project.

Apart from other general cases in which economic development may be only the purpose, however, there are found many disadvantageous factors in operation of the forest development project of the islands.

One problem is how forest development is harmonized with rise of social and economic standard of the peoples.

Another more important problem is that there are no dipterocarp species including merantis, keruing and kapur, which have established the inernational markettability. The key point for success or failure of the project is how main species growing in the islands come to establish their markettability.

To solve these problems, it is considered that strong support of both Indonesian and Japanese Government will be also necessary, not only efforts of a certain private company participating with the project.

As regards forest development of the islands, some ground surveys have been performed since 1970 by General Agency of Forestry of Indonesia and a private company. In 1974, P.T. Pablik Diesel Dan Tractor acquired the forest concession. The company is now in preparation to start early the forest development project in cooperation with a Japanese enterprise, Matsushita Electric Works, Ltd. Early realization of the forest development project is much expected by Indonesian Government Organs concerned and also the peoples of this region. To meet with the expectation, the first thing to be done is to take air photos, which is essential for making development plans. Through the air photos, precise recognition of forest stock and the distribution, proper settlement of route alignment for road construction, selection of effective logging and proper assignment for forest area and agricultural area are to be made. Then, a full scale development will start on the lines of these proceedings.

Greatest attention must be paid to regeneration of cut-over areas, with a prospective view on future industrial development of the islands.

When the forest development project starts in a full scale, the peoples of the islands will get a means of cash income, and also acquire good skill, which will be useful also for some other industries.

We now believe firmly that a good circulation of social and economic development of this region will start from the forest development project as the starting point.

Lastly, we wish to extend our heartfelt gratitude to your government for the various helps and kindness shown to us. We would like to expect that goodwill between the peoples of Indonesia and Japan is promoted more and more through this project.

Sincerely yours,

Tadao MISHINA

Chief of the Survey Mission by Japan International Cooperation Agency for the Development Project of the Togian Islands, the Republic of Indonesia