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OF
Celebes Sea Area

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CHAPTER IX

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JOINT ARMY-NAVY INTELLIGENCE STUDY

OF

CELEBES SEA AREA

RESOURCES AND TRADE

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Note: This chapter is based on material available in Washington, D. C., on 25 April 1944.

RESOURCES AND TRADE

90. General Description

A. Food resources.

Nowhere in the Celebes Sea Area will an occupying army find a surplus of food. Production of foods throughout the area has been barely sufficient to feed the local population. Food has been imported from other parts of Southern Asia.

The Japanese shortage of shipping has cut off any large imports of food to this area, and local Japanese authorities have consequently encouraged increased production of rice and vegetables. Despite some increase in local production, supplies are still inadequate and rationing has been introduced.

The staples of the native diet are rice, corn, sago, tuberous roots, and fish, supplemented by coconuts and a large variety of tropical fruits, vegetables and nuts, some of which grow wild.

(1) Agriculture.

Food crops were grown by natives on small plots of land. Before the war, the few large plantations in the area were devoted to crops for export. The principal agricultural foods were rice, sago, camotes, onions (in Halmahera), bananas, mangoes, mandarins, and lanzones. There was a moderate amount of livestock throughout the area. Most cattle were used as beasts of burden. Meat was a less important item of diet than fish. Only in the centers of European population were any cattle used for dairy products. In general, goats were common in Mohammedan villages, and pigs in non-Mohammedan ones. Domestic fowl were kept in small numbers. In Mindanao, the carabao was important both for meat and as a beast of burden. The Sulus and North Borneo exported cattle before the war. The other areas were barely self-sufficient.

(2) Fisheries.

Fish were plentiful in the waters of the Celebes Sea Area, and were the chief animal food for local populations. Next to rice, corn and sago, it was the most important item of diet.

Natives caught fish along the coasts, while the Japanese engaged in deep sea fishing. There was a Japanese fishing company operating from Ternate in Halmahera, one operating from North Borneo, others from Manado in Northern Celebes, and others from Mindanao. Fish was exported from Northern Celebes, North Borneo, the Sulus, and Mindanao.

(3) Food processing, refrigeration, and storage.

Little information is available on food processing, refrigeration or storage facilities. The only known installation in the Sulus was an ice plant on Jolo Island. One Japanese fish cannery at Manado and a number of ice factories, coffee hulling and roasting plants, and mineral water plants were scattered through Northern Celebes. British Borneo had a number of ice factories and rice mills, while Mindanao had the most extensive food processing facilities, including a Japanese tunafish cannery, a pineapple cannery at Bugo, and several small plants for making desiccated coconut. No facilities were known on Halmahera, Sangihe, Talaud, or Dutch Borneo, although it must be presumed that very small and primitive rice mills existed.

B. Water supply.

Generally no serious water shortage occurs in the Celebes Sea Area, since the rainfall is heavy and fairly evenly distributed, and there are many rivers and streams. Shallow wells and small streams are the main sources of water supply for a large part of the area. In Mindanao, and Sulu, however, a number of artesian wells have been drilled in recent years to gain new and safe sources of water, and in Borneo, small rain water catchment basins supplement supplies from springs and shallow wells.

The surface wells are generally open, have no casing to prevent washing in of debris, and should therefore be considered polluted. They are the source of much disease. All water in the area, regardless of its source, should be boiled or chemically purified. Stream water should be taken from a point near the headwaters, since the water in many of the lower stream courses is silt-laden and polluted.

C. Construction materials.

(1) Wood.

There is a fairly good supply of wood for construction in all parts of the Celebes Sea Area and an excellent supply on Halmaherea and Mindanao (Topic 90, D, (3), (a), 1). In addition, a number of other forest products, such as rattan, and the leaves of various palms, are used for roofing native huts.

(2) Cement.

This area had no cement plants before the war. The Japanese have recently claimed to be constructing one in Northern Celebes.

(3) Sand, gravel, and crushed rock.

Little is known about the availability of these materials. Coral from the shores of the entire area and basalt rock from the interior of Mindanao and the Sulus can be used to build roads and airfields.

D. Industrial raw materials and primary processing.

(1) Minerals.

No large amounts of important industrial raw materials were mined in any part of the Celebes Sea Area before the war, except those detailed below. Large parts of the area had not been adequately surveyed for mineral deposits and deposits in other sections had not been exploited. Japanese propaganda has emphasized discovery and development of a variety of minerals, particularly in Borneo.

(*a*) *Iron ore.* There was 1 large unexploited deposit of iron ore in the northern tip of Surigao province on Mindanao. Much smaller deposits were reported in British Borneo. Whether the Japanese are continuing to mine iron in either area is unknown.

(*b*) *Chromite.* A small amount of chromite has been mined on Dinagat Island off Mindanao. Deposits also occur in British Borneo.

(*c*) *Gold and silver.* Mindanao has important gold mines.

Silver was mined as a by-product. Both metals were mined primitively and to a smaller extent in Northern Celebes.

(*d*) *Sulphur.* Some sulphur was produced in Northern Celebes. The Japanese are reported to be exploiting these deposits.

(2) Fuels.

(*a*) *Wood.* Ample wood for fuel exists throughout the area.

(*b*) *Coal.* Bituminous coal mines were operated in British Borneo, Dutch East Borneo, and Mindanao. Production in Dutch Borneo was around 300,000 tons annually, 5 or 6 times larger than that of either of the other 2 areas.

(*c*) *Petroleum.* There was one outstandingly important source of petroleum in the Celebes Sea Area, Tarakan Island, off Dutch East Borneo. The Tarakan oil wells were capable of producing some 4,000,000 barrels of crude oil annually before the war. Crude oil could be piped directly to ships lying at the piers and used as under-boiler fuel without refining. The Japanese have restored and are using the field and a large part of the installations on Tarakan.

No other oil wells were in the Celebes Sea Area. The only oil known on Mindanao was one seepage at Banasilan in eastern Cotabato province. Seepages have been noted in a number of places in North Borneo. Explorations have been undertaken and concessions granted but the quantity of oil has not been sufficient to encourage operations.

(*d*) *Coconut oil.* In several parts of the area, notably Halmahera, Sangihe, and Talaud, coconut oil is used by the natives for cooking and lighting.

(3) Agricultural and marine materials.

(*a*) *Forest products.*

1. Lumber. Timber is one of the principal resources of the area. A variety of hard and soft woods have been logged and exported, particularly in Mindanao, and British and Dutch Borneo. Mindanao had a number of large sawmills producing 20,000 or more board feed daily. Four or five sawmills of unknown capacity were operated in British Borneo, and one in the Sulus. Information on sawmills in other sections of the area is incomplete.

2. Gums and resins. The collection of gums and resins from the forests was an important occupation in British and Dutch Borneo, the Sulus, Mindanao, and Halmahera.

(*b*) *Plantation products.*

1. Rubber. Rubber was an important export from British and Dutch Borneo. It was produced on a few plantations in both areas as well as being grown on a very small scale by Chinese and natives. Production was considerably below capacity because of international restrictive agreements. Small amounts of rubber were grown on Mindanao and nearby Basilan Island.

2. Coconuts. A few coconut plantations were in Davao province of Mindanao, in British Borneo and in Celebes. However, the major proportion of coconuts were grown on small native farms. Small coconut crushing mills were scattered through many areas. Coconuts were an important food and export product from this whole region. Exports were in the form of copra and coconut oil.

3. Fibers. The most important fiber produced in the area was Manila hemp. Large amounts of especially good hemp were grown on large, scientifically run plantations in Davao province of Mindanao, and in other parts of Mindanao and in the Sulus. A Japanese estate had undertaken hemp cultivation on a small scale in British Borneo.

4. Cinchona. There was 1 experimental cinchona plantation in Mindanao.

E. Manufacturing plants.

The only manufacturing plants in the Celebes Sea Area were those connected with the primary processing of foods and agricultural and mineral products for export. These were small installations. Some of the larger towns in Mindanao, Celebes, and North Borneo had small machine repair shops, the largest being in Mindanao.

The Japanese claim to be building wooden ships in Mindanao, Northern Celebes, and British Borneo.

Production of small consumer goods for local use was carried on as village handicraft industries.

F. Electric power.

Information on power plants, especially private plants, is incomplete. There were 20 public plants in Mindanao (total capacity 2,146 kilowatts). In addition, numerous small private plants were connected with mines, sawmills, etc. The Sulus had only 1 small power plant, at Jolo; Halmahera had 1 on Ternate Island. There were none on Sangihe and Talaud. British Borneo had 2 plants, at Sandakan and Jesselton. Northern Celebes had at least 2, at Manado and Gorontalo. Information on power in Dutch East Borneo is inadequate. No public plants are known, although small private plants connected with mines, oil fields, and sawmills existed.

G. Commerce.

The same types of commodities were imported in all parts of the Celebes Sea Area, mainly cotton goods, small iron and steel manufacturers, medicines, and some canned foods. Exports, however, differed from area to area. Petroleum, coal, and timber were important exports from Dutch Borneo; rubber, timber, and copra from British Borneo; Manila hemp, copra, and gold from Mindanao; copra, and small amounts of coffee and rubber from Northern Celebes; copra and hemp from the Sulus; copra and spices from Halmahera, Sangihe, and Talaud.

H. Finance.

Barter is a common form of trade throughout the area. The Japanese have introduced currencies designated by the same names as the pre-war currencies of the occupied territories. These are Japanese scrip. An attempt has been made to enforce their use for all transactions, but the people are probably hoarding pre-war Philippine pesos and Netherlands East Indies guilders.

91. *Halmahera Sector*

A. Food resources.

Halmahera did not normally produce a surplus of many foods which could be used by occupying troops. The land is fertile and the climate favorable to the growing of a variety of fruits and vegetables, but much of the land which could have

been used for that purpose had not been cleared before the war. Such action would increase the agricultural output considerably, and the Japanese are known to be encouraging food production. Fowl and domestic animals were sufficient for only the needs of the natives. Fish, which was one of the principal exports of the island, is abundant.

(1) Agriculture.

(*a*) *Types of farms.* There were a few large plantations growing coconuts, tobacco and resins. Food crops were not grown on plantations before the war but were produced on small farms and consumed by the farmers' families. The Japanese claim to be encouraging the cultivation of food crops and of fiber on Halmahera. It is probable that plantations now produce foods, cotton, and kapok, as well as coconuts.

(*b*) *Principal food crops.*

1. Fruits. Bananas, papayas, durians, jackfruit, and mangoes are the fruits in greatest supply. Java plums, langsats, guavas, mangosteen, soursops, pumeloes, and other citrus fruits also exist. Ternate is foremost in fruit production.

2. Vegetables. Onions were the only vegetable grown in larger quantity than individual needs demanded. Tidore Island was the center of onion cultivation. Other vegetables included potatoes, yams, manioc, maize, cucumbers, Indian spinach, pepper, eggplant, and groundnuts. These grow more abundantly on Ternate than on the other islands.

3. Sago. The starch of the sago palms furnished the principal food of the natives. The trees grow wild and abundantly throughout the island. Although no attention has been paid to their cultivation, a native usually claimed reparation if a tree was cut down. Very crude methods of extracting the starch were employed.

4. Rice. Small amounts of rice were grown on dry land for local consumption. There is ample water for the cultivation of wet rice, but the inhabitants of the islands had not taken up this method of cultivation. Rice was formerly imported from Makassar.

5. Other agricultural foods. Small patches of sugar cane appeared in almost every garden.

The soil and climate of Halmahera are exceptionally well suited to the cultivation of nutmeg, cloves, and vanilla. Cocoa, coffee, and chilis are also grown. Ternate, Tidore, and Batjan were the islands most successful in cultivating these crops.

(*c*) *Meats.* Goats were numerous in Mohammedan villages, and pigs in non-Mohammedan ones. Domestic fowl were kept, but only in small numbers. Wild deer and jungle pig, both of which provide excellent meat, are common in Halmahera and Morotai, but less common in the outer islands.

(2) Fish.

Fish are abundant. The export of dried and smoked fish (known locally as "Ngoewaro") was an important coastal industry. The principal centers were Kaoe and Paniti on the east coast and Sidangoli on the west coast of Halmahera and Ternate. There was a Japanese fishing colony on Ternate before the war. (FIGURE IX - 1 shows a group of native craft at Buli.)

(3) Food processing, refrigeration, and storage.

There are no known facilities.

B. Water supply.

(1) General.

(*a*) *Natural availability.* Throughout Halmahera, drinking water is plentiful. Villages, with few exceptions, obtain

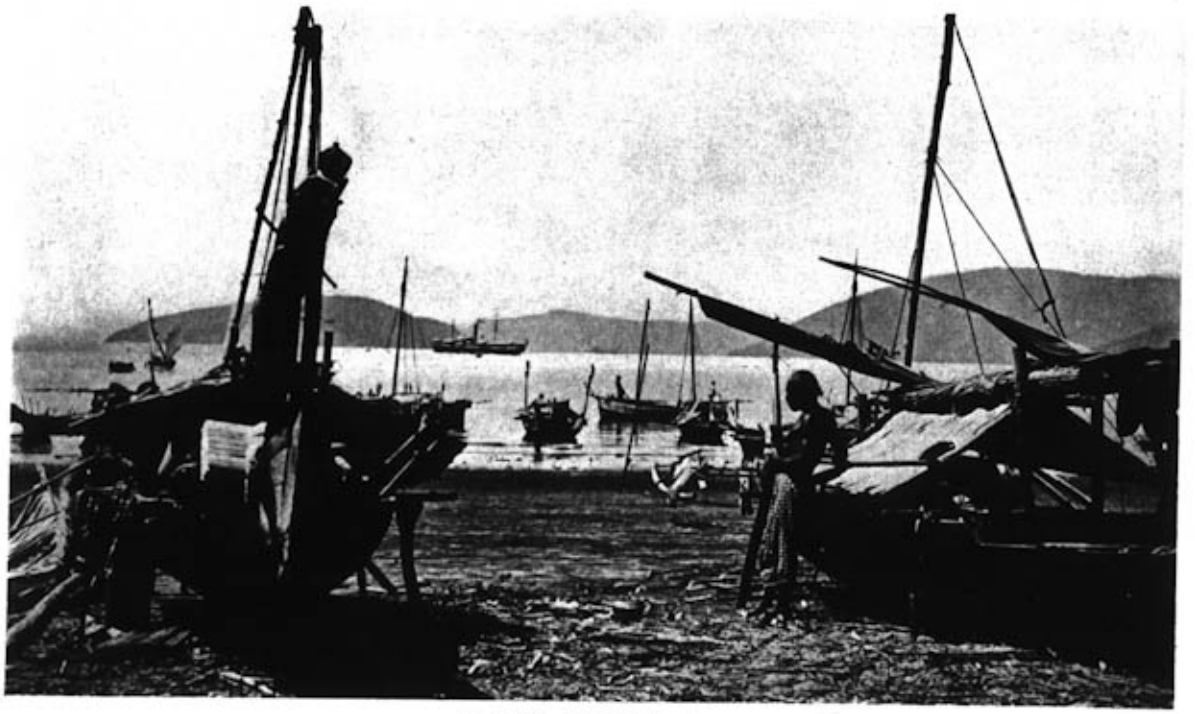

FIGURE IX - 1. *Buli, Halmahera.*
Native craft.

drinking water from wells, but in quantities adequate only for local requirements. Water supply can be increased in most localities by digging additional wells. Mountain streams are numerous, although there are no important rivers on the northeastern volcanic peninsula.

The dry season is not pronounced; no month averages less than about 4 inches of rainfall, and the annual average fall is between 80 and 100 inches. The driest month is October.

(*b*) *Developed sources.* Ternate has a public water system with a limited supply.

(*c*) *Use.* To ensure maintenance of health, all water in the vicinity of inhabited regions should be boiled or chemically purified before it is used.

(2) Specific.

(*a*) *Towns.*

1. Akelamo. Good water can be obtained from a small river south of the village.

2. Bobaneigoe. East of the village of Bobaneigoe there is a small creek with a primitive bamboo water supply system from which water can be obtained.

3. Dodinga. Good drinking water can be obtained from a small river south of the village.

4. Galela. Fresh water is obtainable from the Tiabo River about 3 miles north of Galela, and from Galela Lake.

5. Ganedidalem. Fresh water is obtainable from a well in the village.

6. Ganediloear. Fresh water is obtainable.

7. Kaoe. Fresh water can be obtained from the Kaoe River and from wells.

8. Tobelo. Drinking water is obtainable from wells up to 15 meters deep, but it should be boiled before use. There was a serious epidemic of dysentery in November 1938.

9. Toetoemaloleo. Several small rivers are in the vicinity and water may be obtained from wells.

10. Weda. Drinking water can be obtained from a small stream south of the village.

(*b*) *Off-lying islands.*

1. Batjan Island. There are numerous streams on Batjan. Near Babang on the eastern side of the island there is a well lined with bricks which provides good, fresh drinking water. Excellent drinking water can be obtained from the Ake Mendawong, 1 mile to the south of the village of Laboeha. Hot springs are located on the west shore of Lapan Bay.

2. Gebe Island. No drinking water is available on the northwest end of the island.

3. Miti Island. Water may be obtainable from wells.

4. Morotai Island. Excellent drinking water may be obtained from a well at Boesoboeso. Drinking water can also be obtained at Wajaboela Roads, but it is brackish and dirty.

5. Obit Islands. No fresh water is available.

6. Ternate Island. There is a public water system with limited supply at the town; otherwise, well water is used. A pipe line with a capacity of 40 tons daily has been laid on the pier to supply ships. A motor pump is connected with the pipe line. Much of the town depends upon wells for its drinking water. A well near the coal shed, which in turn is located near the southern pier, may be the source of water for the pipe line. There have been times when the water supply in the wells became low. European houses were fitted with septic tanks.

All the lakes on the island are fresh water, but because of superstition the natives will not make use of these supplies. There are 2 small lakes on the northwest side of the island, not far from the coast, and called Toliretetjil and Toliredjaha respectively. The latter is in the center of a fairly high hill. On the southern side of the island, about 4 miles from the town of Ternate, there is a similar lake, Meer Lagoena, in the crater of an old volcano. There are minor pools of little importance.

The average annual rainfall, based upon records taken over a period of 44 years, is about 85 inches.

7. Tidore Island. Drinking water is available from a well in the village of Balibi on the northeast side of Tidore.

8. Widi Islands. No drinking water.

(*c*) *Bays.*

1. Bobane Bay. Drinking water is obtainable, but should be boiled.

2. Kaoe Bay. Good water is available; boiling is advisable, however, if the water is to be used for drinking purposes.

3. Sololo Bay. Drinking water is available.

4. Weda Bay. Drinking water is obtainable.

(*d*) *Lakes.*

1. Boekorondo Lake. Drinking water is obtainable from the lake.

2. Galela Lake. The water from the lake may be used for drinking after boiling.

3. Rano Lake. Rano Lake is situated on the Sahoe range, 3½ miles north of Sahoe Bay, and is ½ mile in diameter. It occupies a small crater, and the water could probably be used for drinking.

4. Sagea Lake. Sagea Lake, on the northern coast of Weda Bay, is salt water.

C. Construction materials.

Timber was used for construction (Topic 91, D, (3), (b)). Cement was brought from Padang in Sumatra. It was mixed with coral and broken stone and used to make house walls.

D. Industrial raw materials.

(1) Minerals.

There was no known commercially exploited mineral deposit.

(2) Fuel.

Excellent firewood in unlimited quantities is available everywhere. Mangrove wood is used for fuel in small steam vessels. The only coal is some brown coal of inferior quality on Batjan. There is no petroleum. Coconut oil is used by the natives for cooking and lighting.

(3) Agricultural and marine materials.

(*a*) *Plantation crops.*

1. Coconuts. Coconuts were grown not only on the large plantations, but also near every village. Copra was formerly the chief export of the islands. The oil extracted from it was used locally for cooking and lighting. Before the Japanese occupation, the government of the island had begun scientific cultivation of coconut palms on experimental plantations at Tobelo, Djailolo, and Galela Lake. The government established regulations to prevent the spread of disease and pests among the coconut trees of the island. Since Japanese occupation, it is believed that foods, cotton, and kapok, as well as coconuts, have been produced on plantations.

2. Resins. Resins are collected on plantations as well as in the forest.

3. Tobacco. Tobacco was grown in large plots only at Galela. In other areas small patches were grown for local consumption.

TABLE IX - 1
PRINCIPAL AGRICULTURAL PROPERTIES, HALMAHERA

COMPANY'S OR OWNER'S NAME	TYPE OF CULTIVATION	LOCATION
W. K. O. (Wari Klapper Ondeneming)	Coconuts	Tobelo
Morotai Klapper Cultuur My. (M. K. C. My.)	Coconuts; a small area of rubber and cotton	Tobelo
Syndicaat Klapper Cultuur My.	Coconuts	Tobelo
Moluksche Handel Venootschap	Coconuts; kapok	Tobelo, Morotai, etc.
T. K. Ong	Coconuts	Tobelo
Van Reinisse van Duivenbode	Coconuts	At Ake Selaka, east side Kaoe Bay
Tiloppe My.	Coconuts	Tilope, Weda Bay
Cultuur My. "Akelamo"	Coconuts	Oba
Thiam Hak Dei H. Q. Ternate	Coconuts	Morotai
Batjan Archipelago My.	Coconuts, and various spices	Batjan Island

(*b*) *Forest products.*

1. Resin. Dammar and gum copal constituted the second most valuable export. The government endeavored to increase the output of these products, and scientific cultivation was undertaken. Modern methods of tapping and collection improved the quality of the resins to such an extent that certain grades which had formerly been discarded became marketable. Batjan, and, to a lesser extent, Kaoe and Morotai, were the principal centers for collection of dammar and gum copal.

2. Lumber. The forests abound in softwoods and hardwoods which can be used for construction. Ironwood is plentiful in Morotai, North Halmahera, North Loloda Islands, Batjan, and the Obi Groups. Ebony used to be plentiful around Wajaboela on Morotai Island and Akelamo Island. These islands formerly exported wood to Amboina, but the ebony has been largely exhausted. Bamboo is abundant, particularly in Kaoe and Loloda. Rattan grows in profusion in Obi, Morotai, Maba, and Northern Halmahera. Mangrove, which is found in large quantities around river mouths, is excellent both as building material and as firewood. The natives use the nipa palm for thatching.

(*c*) *Marine materials.* Mother of pearl was exported.

E. Manufacturing plants.

There were no manufacturing plants in Halmahera.

F. Electric power.

There was 1 privately-owned electric power plant on Ternate Island. Its capacity was 244 kilowatts and it produced current at 6,000 volts, 50 cycles. Current was stepped down to 127/220 volts for distribution.

G. Commerce.

(1) Imports.

The islands imported rice, flour, salt, cotton and woolen goods, cotton thread, glassware, crockery, and small iron and steel manufactures.

(2) Exports.

The exports were copra, resins and gums, dried and smoked fish, sago, spices, onions, timber, and mother of pearl.

H. Finance.

Much of the trade of Halmahera was normally carried on by barter. Money in circulation was Netherlands Indies currency.

(1) Currency under the Netherlands Government.

The monetary unit in the Netherlands Indies was the florin or guilder. The official pre-war exchange rate was U. S. $0.53½ to 1 guilder, or U. S. $1.00 to 1.87 guilders. Bank notes were issued by the Bank of Java in denominations of 1,000, 500, 300, 200, 100, 50, 40, 30, 25, 20, 10, and 5 guilders. Coinage in circulation, based on the guilder at 100 cents, was as follows:

	FLORIN OR GUILDER	NAME
Gold	10	
	5	
Silver	2½	Rijksdaalder.
	1	Florin, guilder.
	½	Half guilder.
	¼	Quarter guilder.
	1/10	Dubbeltje.
Nickel	5c (1/20 guilder)	
Copper	1c (1/100 guilder)	Cent
	2½ (1/40 guilder)	
	½ (1/200 guilder)	Half cent.

(2) Currency under the Japanese occupation.

Soon after the Japanese occupation, a Japanese military note with denominations in guilders was introduced (FIGURE IX - 2).

In February 1943, the value of the yen was announced by the Japanese to be 100 guilder cents, as against 44 before the war.

Regulations of 1943 forbade travellers to take yen from Japan to the Netherlands East Indies. They were permitted to carry only notes of the "Southern Regions Development Bank." These restrictions were later somewhat relaxed.

FIGURE IX - 2. *Halmahera.*
Japanese military note in use in the Netherlands East Indies

Japanese broadcasts from the Netherlands East Indies in 1944 stressed the measures being taken to suppress hoarding and inflation, revealing that both had become serious.

(3) Barter.

Products most desired by the natives are quinine, salt, gaily colored textiles, and simple mechanical objects, especially flashlights.

92. Sangihe–Talaud Sector

A. Food resources.

The production of export crops, such as coconuts and nutmegs, was emphasized in Sangihe and Talaud at the expense of food for domestic consumption, as in Halmahera. Food production was far from sufficient to support the population. It is unlikely that occupying troops could obtain any food from this region.

(1) Agriculture.

(*a*) *Nature of farming areas.* Except for coconut, sago, and nutmeg plantations, farms on the islands were very small and were cultivated by primitive methods involving the use of only the most simple wooden tools. The land is very fertile because of volcanic deposits; the climate is excellent for agriculture.

(*b*) *Foods.* The staples of the native diet were rice, corn, sago, and coconuts. Although some rice was grown by the wet method, considerable quantities were imported.

Bananas were cultivated and much used by the natives. They were formerly exported. Papayas were grown. The common vegetables were yams and a kind of pea.

Spices, and nutmeg in particular, were one of the most profitable exports.

(*c*) *Meats.* Pigs, goats, and chickens were fairly common. Cattle were rare and were used as draft animals rather than for meat.

(2) Fish.

Although fishing was formerly one of the chief occupations of the natives, their wants were not satisfied by domestic supply, and considerable quantities of dried and smoked fish were imported.

(3) Food processing, refrigeration, and storage.

There were no known food processing, refrigeration, or storage plants on the islands.

B. Water supply.

(1) General.

(*a*) *Natural availability.* Sangihe Island (not the group) has a large number of small brooks and springs, and the Talaud Islands have many small streams. The other islands depend upon a few short streams, open pits, and wells. A heavy rainfall replenishes the supplies.

(*b*) *Developed sources.* Merampi and Tamako have small water-supply systems unknown in detail.

(*c*) *Use.* All water should be purified before use.

(2) Specific.

(*a*) *Lebessan.* Drinkable water may be had from the river.

(*b*) *Manganitoe.* Good water is available.

(*c*) *Merampi.* There is an abundant supply of good water from wells, piped to nearly every plot. Elsewhere in the Nanoesa Islands, water comes from pits and is poor.

(*d*) *Tahoena.* Drinking water is available.

(*e*) *Tamako.* Tamako has a water-supply system concerning which no details are known.

C. Construction materials.

The forests of the islands are similar to those of Halmahera (Topic 91, D, (3), (b)) and Celebes (Topic 96, D, (3), (b)). Tahoelandang Island formerly specialized in building boats from native timber. Much rattan grows and was formerly exported in quantity. There is no other construction material of any importance.

D. Industrial raw materials and primary processing.

(1) Minerals.

There were no exploited mineral deposits.

(2) Fuel.

Timber and coconut oil, both of which can be had in considerable quantities, are the only fuels.

(3) Agricultural and marine materials.

The production of *kofo,* a fiber resembling Manila hemp and obtained from the wild banana tree, was the chief industry after agriculture and fishing. The women weave this fiber into a kind of cloth.

E. Manufacturing plants.

There were no manufacturing plants. The only form of manufacturing in the area was the building of boats at Tahoelandang, the weaving of cloth and embroidery, and filigree work done by the women.

F. Electric power.

There was no known installed electric power.

G. Commerce.

The principal import was rice. Copra, rattan, and nutmeg were the most important exports.

H. Finance.

Barter was the usual form of exchange. Insofar as currency is used, it is the same as that used in Halmahera (Topic 91, H).

93. Mindanao Sector

A. Food resources.

(1) Agriculture.

(*a*) *General.* Forces occupying Mindanao should not expect to find any large amount or great variety of foods. They will find rice in some quantity in the provinces of Cotabato and

Lanao, and corn in a number of provinces, with the largest amounts in Misamis Occidental and Lanao. In addition, they will find an assortment, in small quantities, of native fruits and vegetables. There may be some animals for meat. There were moderate numbers of carabao, hogs, cattle, and chickens in Mindanao before the Japanese occupation. Fish are plentiful along all the coasts and rivers.

In spite of the fertile land and favorable climate of Mindanao, food crops were not extensively produced before the war for several reasons: the land was sparsely populated; agriculture was pursued in only a few areas; and, even in agricultural areas, production of food crops was on a smaller scale than production of such profitable export crops as abaca and coconuts. Plantation agriculture was devoted to export crops. The natives raised food for themselves on small plots of land. Local production of food, even of rice, was barely sufficient to supply the needs of the local population and had to be supplemented by imports. Laborers on hemp plantations, urban groups, and the Japanese population of Davao province were especially dependent on imported foods.

It is not possible to state precisely what effect Japanese occupation has had upon local production of food in Mindanao. Mindanao's markets for export crops have been largely cut off. Japan has not had sufficient ships to spare either to carry away exports in large quantities or to bring in any sizeable amount of imports. This means that laborers, urban groups, and the Japanese population of Davao, as well as Japanese troops stationed in Mindanao, now depend largely upon local sources for their food. The Japanese administration has encouraged the expansion of food production and it is probable that there has been some increase in production. Intensive and scientific cultivation could greatly increase the output of food crops. Mindanao at present is probably far from self-sufficient in food.

(*b*) *Type and location of farming areas.* With few exceptions, farms were small patches of land cultivated by native families for themselves. There was no particular farming area, but there were more farms growing food along the heavily populated northern shore of the island than in the wild mountainous interior. The tables of rice and corn production (TABLES IX-2 and IX-3) give a general picture of the location of principal producing areas for the 2 major food crops of Mindanao.

It has already been stated that plantations on Mindanao, before the war, were devoted to the production of export crops rather than to foods for domestic consumption. Among the few large farms raising food crops were two which should be mentioned: an experimental farm on the Agusan River near Patrocinio where vegetables could be obtained in fairly large quantities; and a garden near the Davao gold mine which provided food for the miners.

(*c*) *Principal foods.* Following is a list of the principal foods available on Mindanao:

Grains: Rice and corn.

Vegetables: Camotes, cassava, eggplant, beans, cabbage, onions, and carrots.

Fruits: Bananas, mangoes, mandarins (tangerines), papayas, lanzones, native oranges, pumelo, jackfruit, pineapples, and durians.

Nuts: Peanuts and pili nuts.

Other foods: Coconuts and sugar.

Meats: Carabao, Hindu cattle, horses, hogs, wild deer, sheep, goats, chicken, and wild boar.

Fish and sea foods.

1. Rice and corn. Rice and corn were the most important food crops in Mindanao. They were grown in every province. However, production was insufficient to meet local needs. Production of the 2 crops was about equal, that of corn exceeding rice by a few thousand tons annually. These 2 grains were the basis of native diet. In general, the poorest groups in the population ate corn. Those who could afford it preferred a rice diet. The Moros, concentrated in Mindanao's northern provinces, ate a greater proportion of corn to rice than did other natives, but even they used rice as the principal item of their diet when they could afford it.

TABLE IX-2
PRODUCTION OF RICE ON MINDANAO, 1938
(metric tons of cleaned rice)

PROVINCE	LOWLAND 1ST CROP	LOWLAND 2ND CROP	UPLAND	TOTAL
Agusan	981	255	2,390	3,626
Bukidnon	468	——	1,137	1,605
Cotabato	25,446	400	5,602	31,448
Davao	2,020	——	4,033	6,053
Lanao	13,261	325	15,426	29,012
Misamis Occidental	4,522	——	2,293	6,815
Misamis Oriental	1,610	119	1,312	3,041
Surigao	12,032	94	1,787	13,913
Zamboanga	8,493	28	5,598	14,119
Grand Total				109,632

TABLE IX-3
PRODUCTION OF CORN ON MINDANAO, 1938
(metric tons of shelled corn)

PROVINCE	1ST CROP	2ND CROP	3RD CROP	TOTAL
Agusan	5,153	1,669	581	7,403
Bukidnon	5,443	2,397	109	7,949
Cotabato	10,749	4,735	3,362	18,846
Davao	8,679	5,590	3,457	17,726
Lanao	10,526	6,964	4,090	21,580
Misamis Occidental	11,927	8,328	2,195	22,450
Misamis Oriental	8,909	4,281	389	13,579
Surigao	2,600	282	8	2,890
Zamboanga	11,857	5,837	1,436	19,130
Grand Total				131,553

Since the Japanese occupation of Mindanao, the supply of rice, especially for town people, has been inadequate. The collection of rice from the rural areas has been under the supervision of the National Rice and Corn Corporation, at present a Japanese-controlled organization. Rationing has been in the hands of local neighborhood associations, which are also under Japanese control through their political association known as the *Kalibapi*. The ration permitted early in 1944 was 120 grams of rice per person daily, priced at 40 centavos a kilogram. In 1943, there was frequently not enough rice in the legal market to supply everyone who had a ration card. It is probable that the proposed ration for 1944 will not be filled. The opposition of Mindanao and Sulu natives to the Japanese doubtless hinders efficient rice collection and thus contributes to the scarcity in the towns.

2. Vegetables. The principal vegetables produced on farms were camotes (native sweet potatoes), cassava, eggplant, beans, cabbages, onions, and carrots. Camotes ranked next to rice and corn in making up the Filipino diet. Consumption of camotes increased when rice was scarce.

Cassava was eaten as a vegetable or ground into flour. Before the war much of the cassava was made into starch and exported. With the cessation of exports of starch and imports of flour, it is probable that considerable amounts of cassava flour are now used. The natives also derived an excellent starch from the stem

of the sago palm which flourishes in the swampy districts of Mindanao. This was an important item of their diet.

3. Fruits. Bananas, mangoes, pineapples, mandarins, papayas, native oranges, pummelo, jackfruit, and lanzones occur most abundantly. Other fruits which occur in smaller amounts are soursops, breadfruit, atis (sugar apples), guavas, lemons, limes, pomegranates, and mangosteen.

4. Nuts. Peanuts, cashews, and pili nuts exist in great quantity. Smaller amounts of other varieties are to be found.

There are no figures available for the amounts of vegetables, fruits, or nuts produced in Mindanao. With the exception of pineapples, these were grown on a very small scale and traded in village markets.

5. Other agricultural foods. Although coconuts were available in every province of Mindanao, the natives made little use of them for food, but sold them for copra. Since Japanese occupation, however, cessation of trade with other countries has increased the use of coconuts as a food. The Philippine Bureau of Science developed a process for producing a substitute milk, called "nacoco," from coconuts, which was said to have substantially the same food value as cows' milk but not quite the same taste. Fluid was extracted by moderate pressure from the ground meat of ripe coconuts, the excess oil removed centrifugally and calcium added. The Japanese have encouraged the use of coconut milk and meat in the Philippine Islands, but it is not known whether any plants on Mindanao have been equipped to make "nacoco."

Small patches of sugar cane were to be found on native farms. Most of the sugar was not fully refined but was used in the form of "muscovado" or other low grade sugars.

6. Meats and dairy products. The natives of the Philippines did not eat much meat but relied largely on fish. The average family had a sow, a few pigs, and some fowl. Hogs and chickens provided the principal sources of meat for those who desired it. There were several other sources of meat available.

Carabao were used for meat; they are also the principal beasts of burden. The number of carabao in Mindanao has been so seriously reduced since Japanese occupation that the authorities have prohibited killing the animals without special permission.

An imported (Australian) strain of cattle, much larger than the native cattle, was raised for beef in the Basilan and Sibuguey districts of Zamboanga province and in Bukidon province. Native cattle were used for light draft and riding, and occasionally horse meat was eaten. There were several herds of goats, but very few sheep.

Dairy products of all kinds were extremely scarce. Animals were not usually milked; what milk was used came from goats or carabao.

There were wild deer, boar, ducks, and pigeons. The boar are savage and dangerous to hunt. Most of the wild game has now disappeared from the vicinities of native settlements.

(2) Fisheries.

The coastal waters of Mindanao abound in salt water fish, and there are fresh water fish in the streams of the interior. The natives rely on local fish for their principal animal food. Before the war, large quantities of canned fish were imported.

Most of Mindanao's fish were caught by natives fishing in shore with primitive implements. Deep-water commercial fishing was done by Japanese, who used power trawlers. At present, the absence of former imports of canned fish and Japanese use of their fishing boats for other purposes makes it probable that the amount of fish available in urban centers has been sharply reduced.

(3) Food processing, refrigeration, and storage.

There is a tuna fish cannery in Baliwasan, Zamboanga province, with a reported capacity of 4,800 cans a day.

The Philippine Packing Corporation had a cannery at Bugo, Misamis Oriental, which was used for pineapple canning and, to a smaller extent, for fish canning. This plant was built with American capital at a cost of $1,000,000. FIGURE IX-3 is a pre-war picture of the cannery and plantation. Recent reports state that the Bugo cannery has been completely destroyed.

There are desiccated coconut factories at the Furakawa plantation in Davao province and in Zamboanga city.

There are no known large-scale commercial storage and refrigerating facilities. Some of the plantations had small buildings, cooled by diesel motor or water power, in which food was stored for the people living on the plantation. Most of the cities probably had similar installations. Since all of them were small, no data on their size or location are available.

B. Water supply.

(1) General (Mindanao).

(a) Natural availability.

1. The rainfall of Mindanao is generally plentiful. On coasts fully exposed to the northeast monsoon, the annual rainfall averages between 120 and 150 inches. On such coasts, most rain falls in the "winter," while coasts sheltered from the northeast monsoon have dry "winters" and most rain in summer. The actual number of rainy days varies from more than 170 per year on the coasts exposed to the northeast monsoon to less than 170 on unexposed coasts.

Many of the averages, however, are between 100 and 120 inches. The average annual rainfall is large enough so that, with proper storage systems, entire communities could be readily supplied with drinking water. However, faulty methods of collection and storage have made rain water a doubtful and often dangerous source of supply.

2. Rivers. Tables of the discharge measurements (in second-liters) of rivers in Mindanao are given below for each province. There are 2 large river systems on the island of Mindanao, the Cotabato River system and the Agusan River system.

Water from a well-safeguarded watershed is very desirable for domestic use, but the comparative density of population along the main watercourses in Mindanao and the lack of sanitary improvements make a high degree of pollution inevitable. Rivers frequently constitute a grave menace to health, since they represent the only sewage system in many towns and at the same time furnish water for washing, drinking, and other household purposes. However, by means of the protection of watersheds and the construction of storage and distribution systems, rivers may be made the basis of satisfactory municipal water supplies. Zamboanga city, for example, has a system using river water.

3. Wells. Surface wells, which are generally open and have no casing to prevent the washing in of debris, are frequently polluted and a source of much disease. Water from deep sources, however, has been of great importance in improving health conditions among the Filipinos, and, in recent years, a number of wells have been drilled in Mindanao. The rock formations most suitable for this type of well are porous sands and

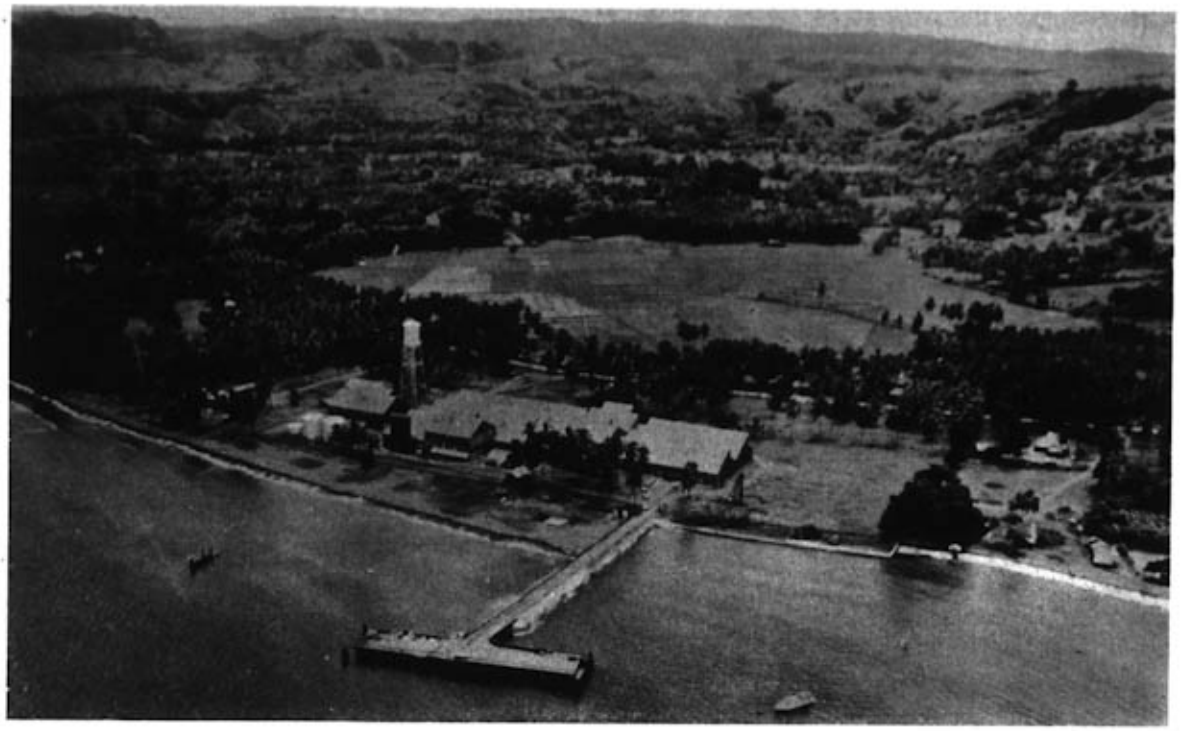

FIGURE IX - 3. *Bugo, Misamis Oriental, Mindanao.*
Airview of plantation, buildings, and wharf of Philippine Packing Company. 1936.

tuffs in monoclinal and synolinal structures confined by impervious beds. Littoral and alluvial deposits on seacoasts, low-lying plains, coastal plains, and in river valleys such as the Agusan and Cotabato are also good sources of artesian water. Salt water, however, is almost always found close to the surface in wells near the coast.

Tertiary shales and limestones are fine-grained and carry little water. Sandstones and conglomerates of Miocene and Pliocene age contain water in some quantity. The sedimentary rocks are found flanking cordilleras and dipping away from them, so that a basal limestone may be exposed in a region of heavy rainfall lying at an angle which accelerates the percolation of water along it. If a limestone in this structural relationship which is also overlain by a pervious formation were penetrated by a well, it should yield copiously. The difficulty is that the basal limestone is thin and broken by faulting and its stratigraphic position is such that it is commonly too deeply buried, except in mountainous, uninhabited regions, to be accessible by drilling.

(*b*) *Developed sources.* In recent years there has been great development of the natural sources of water in Mindanao. The water supply for municipalities is generally provided by distillation or, in some cases, by artesian wells. Zamboanga and Davao are exceptional in having excellent filtration facilities which provide clean, fresh water.

(*c*) *Distribution, use, and storage.* There are, in general, 12 methods of distribution commonly in use. When the source is not distant, the water is conveyed to the distribution point by means of a bamboo "pipe line." As a rule, it is only the wealthier families who can afford running water in their houses. Those who cannot afford it may obtain water free of charge at public hydrants or wells.

(2) Specific.

(*a*) *Agusan province.*

1. Natural availability. The Agusan valley, an area of about 300 square miles, bounded approximately by the barrios of Los Martires, Novele, Bunawan, Veruela, and Gracia, is a vast network of canals connecting lakes, and marshes. The southern part of the Agusan-Davao region is mountainous, with swift, precipitous streams, while the northern part is a low plain, with large, more or less sluggish streams and few rock exposures, bounded on the east and west by high mountains.

TABLE IX - 4

DISCHARGE MEASUREMENTS OF RIVERS IN AGUSAN (1921)

		Discharge (second-liter) per diem	
RIVER	STATION	MAXIMUM	MINIMUM
Adgaoan	Sagunto	528,000	16,230
Agusan	Talacogon	2,080,560	199,240
Agusan	Sta. Josefa	472,680	11,724
Gibong	Ebro	88,920	3,280
Simulao	Libertad	589,200	5,700
Ojot	Remedios	526,800	21,800
Umayam	Loreto	460,320	11,280

Lake Mainit is surrounded by high mountains abounding in hot springs.

Water may be obtained in limited quantities from growing rattan, and is said to be safe to drink after boiling. The plant should be cut off in pieces 4 or 5 feet long and held up on end. A stream of pure sap water will issue from it.

2. Developed sources. There is a waterworks at the

Butuan Army Cadre. It was started in 1936 and has a pumping system serving 400 people.

(*b*) *Bukidnon province.* There are no large rivers worthy of consideration in Bukidnon province. A few small rivers, the Iponan, Cagayan, and Tagoloan Rivers, flow from the mountainous interior into Macajalar Bay. The spring water in Bukidnon is usually safe for drinking when it is not found near well-populated places. It is difficult to obtain water from wells because of the problem of digging through volcanic rocks which cap the plateau.

The following waterworks projects were under consideration in Bukidnon in 1935:

TABLE IX - 5

WATERWORKS PROJECTS, BUKIDNON (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Impasugong	36,000	1,600	gravity	no data
Impasugong	7,000	500	pumping	no data
Dalirig	no data	600	pumping	4,320
Malaybalay	11,641.16	1,300	pumping	20,160
Malaybalay Improvement	9,761.84	1,000	pumping	75,000
San Luis	650	500	pumping	no data

(*c*) *Cotabato Province.*

1. Natural availability. The great Cotabato River overflows its banks periodically, thus irrigating and enriching an already fertile soil. Terraces, partly marine, partly fluvial, and partly resulting from the elevation of reefs, line the Cotabato valley.

TABLE IX - 6

DISCHARGE MEASUREMENTS OF RIVERS IN COTABATO (1921)

RIVER	STATION	MAXIMUM	MINIMUM
Awang	Awang	73,264	668
Kabakan	Kabakan	156,100	9,300
Karingauan	Bual	2,593	8
Libungan	Libungan	118,930	13,940
Maganoy	Maganoy	383,250	18,760
Nituan	Parang	168,750	15,000
Malitbog	Bau	311,000	4,750
Salimbao	Salimbao	9,840	12
Pulangi	Kabakan	795,450	110,150

The alluvial deposits in the valley of the Cotabato River are suitable as a source of artesian water and most of the shallow wells that have been drilled yield some water. Ground water circulation appears to be most vigorous at depths less than 180 meters (591 feet). Lakes Linguasan and Vuluan are both very shallow, being little more than swamps. Rain furnishes a large part of the water supply.

2. Developed sources. The following waterworks projects were under consideration in Cotabato in 1935:

TABLE IX - 7

WATERWORKS PROJECTS, COTABATO (1935)

MUNICIPALITY	ESTIMATED COST—PESOS	POPULATION SERVED	SYSTEM
Cotabato	62,000	1,250	pumping
Cotabato	150,000	4,000	gravity

3. Distribution. Fresh water may be obtained alongside the pier at Port Lebak and at Milbuk.

(d) *Davao province.*

1. Natural availability. Davao is well supplied with water from natural sources. On the west side of Davao Gulf it comes from artesian wells, although many of the natives drink rain water, which should be boiled before drinking. On the west side of Davao Gulf, there are numerous mountain streams which supply fresh water. At Mati, there are wells which yield abundantly. There are several hot springs along the Marout River near the Davao Gold Mine landing field. The main hot spring is said to be about 1 kilometer (16 miles) from the landing field.

Rain furnishes the water supply at Baganga, on the west coast of the Davao Gulf; at Caraga, which is not far south of Baganga, fresh water is obtainable from a flowing spring on the beach. The many rivers in the vicinity of Digos furnish ample fresh water for the town. The Talomo River is the only river in Davao province for which discharge measurement data is available. The station for this river is at Davao city. In 1921, the maximum gauge height of the Talomo River was 1.15 meters (3.8 feet) and the minimum was .15 meter (.5 foot).

2. Developed sources. Waterworks projects were under consideration at the following places in Davao province in 1935:

TABLE IX - 8

WATERWORKS PROJECTS, DAVAO (1935)

MUNICIPALITY	ESTIMATED COST PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Davao	137,195.14	6,000	gravity	86,400
Davao Metropolitan	290,007.44	7,000	gravity	820,800
Santa Cruz	31,187.64	1,500	gravity	64,800

3. Distribution. At Daliao and at Davao (Santa Ana) fresh water is piped to the pier. At Davao, treatment before drinking is recommended.

(*e*) *Lanao province.*

1. Natural availability. Malabang, a town on the east coast of Illana Bay, is famous for its large springs. Just below the old Spanish Fort in this town, there is reported to be an unlimited supply of cold refreshing water, suitable either for bathing or drinking. There are a number of rivers in Lanao province, for which the discharge measurements (information as of 1921) are as follows:

TABLE IX - 9

DISCHARGE MEASUREMENTS OF RIVERS IN LANAO (1921)

		Discharge (second-liters) per day	
RIVER	STATION	MAXIMUM DAILY DISCHARGE	MINIMUM DAILY DISCHARGE
Agus	Momungan	233,400	70,900
Gata	Tamparan	45,360	5,600
Iligan	Iligan	26,350	905
Kayai	Kapai	70,250	6,090
Malaig	Tamparan	79,400	14,260
Mataling	Malabang	106,100	7,690
Ramain	Ramain	45,130	3,010
Rumayos	Tamparan	13,375	854
Taraca	Tamparan	93,460	6,810

2. Developed sources. The following waterworks projects were under consideration in Lanao in 1935:

TABLE IX - 10

WATERWORKS PROJECTS, LANAO (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Iligan east to Tibanga	4,000	500	gravity	no data
Iligan	30,381.42	4,000	gravity	200,000
Dansalan	10,600.67	1,000	pumping	no data

3. Distribution. Fresh water may be secured at Iligan from a pipe connection at the outer end of the pier. The Lum-

ber Company at Kolambugan has a wharf at Migcaniguing Point where fresh water is obtainable at a cost of 50 centavos per 200 gallons.

(*f*) *Misamis Occidental province.* Most of the water supply in this province is obtained from artesian wells. At the town of Misamis both rain water and artesian well water are used for drinking and cooking purposes. There was a prominent water tank at the lumber mill 150 yards northwest of the fort at Misamis. Artesian water was obtainable from the pipe line on the pier at a cost of 20 centavos per ton.

The following waterworks projects were under consideration in Misamis Occidental in 1935:

TABLE IX - 11

WATERWORKS PROJECTS, MISAMIS OCCIDENTAL (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM
Misamis	66,000	3,450	pumping
Misamis-Clarin			
Tudela	230,000	9,500	gravity
Jimenez	no data	4,000	gravity

(*g*) *Misamis Oriental province.*

1. Natural availability. Springs in great variety and abundance are found on Camiguin Island, Misamis Oriental.

2. Developed sources. The following waterworks projects were under consideration in Misamis Oriental province in 1935:

TABLE IX - 12

WATERWORKS PROJECTS, MISAMIS ORIENTAL (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Cagayan Ext.	16,500	3,000	gravity	no data
Catarman Ext.	8,000	400	gravity	no data
Lagonglong	7,500	2,000	gravity	no data
Sagay	30,000	3,700	gravity	no data
Salay Ext. to	3,000	800	gravity	no data
Balingasag	8,924.14	1,514	gravity	57,600
Cagayan	50,408.82	3,000	pumping	86,400
Cagayan				
Improvement	43,351.10	5,000	gravity	158,400
Catarman	18,862.22	4,000	gravity	144,000
Jasaan Balingasag	20,000	2,500	gravity	172,800
Mahinog	6,000	5,727	gravity	no data
Mambajao	30,000	14,446	gravity	no data
Sagay	800	6,321	gravity	no data
Salay	9,731.89	2,000	gravity	43,200
Talisayan	22,885.80	2,800	gravity	86,400
Kinogitan	24,000	3,000	gravity	no data
Gingoog	33,000	3,000	gravity	no data

3. Distribution. Fresh water suitable for boiler purposes is piped to the pier of the Anakan Lumber Company at Odiongan, at the head of Gingoog Bay and to the pier at Mambajao, on Camiguin Island. At Bugo, the Philippine Packing Company had a wharf at which fresh water was available through a pipe connection.

(*h*) *Surigao province.*

1. Natural availability. The possibility of obtaining artesian well water from limestone lying at an angle upon older rock, in an area of plentiful rains, has already been mentioned (TOPIC 93, B, (1)). This condition prevails along the eastern slopes of the Dinata Mountain range which forms the backbone of Surigao province.

2. Developed sources. The following waterworks projects were under consideration in Surigao in 1935:

TABLE IX - 13

WATER WORKS PROJECTS, SURIGAO (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM
Lianga	10,000	900	gravity
Mainit	12,000	3,000	gravity
Bacuag, Gigaquit	7,500	2,405	gravity
Lianga	1,924.58	1,290	gravity
Placer	13,133.95	870	gravity
Surigao	42,497.85	4,000	gravity

(*i*) *Zamboanga province.*

1. Natural availability. The province of Zamboanga is characterized by its rugged topography and indented coastline, lack of considerable coastal plain, numerous reefs, short, shallow, swift rivers, heavy forests, and few important settlements. The coastal plain, where present, is narrow and has a foundation of coral reef covered by a veneer of piedmont deposits not well suited to water accumulation in large quantities.

The rainfall at Zamboanga averages annually 46 inches, the lowest annual average in Mindanao. At times, however, the province is flooded by heavy rains which do great damage to roads and bridges.

At Sindangao, on the north coast of Zamboanga province, the water supply is satisfactory in the neighborhood of the mountain streams but not in the coastal area.

The following are the discharge measurements of the rivers in Zamboanga, as of 1921:

TABLE IX - 14

DISCHARGE MEASUREMENTS OF RIVERS IN ZAMBOANGA (1921)

RIVER	STATION	DISCHARGE (SECOND-LITRES) PER DAY MAXIMUM	MINIMUM
Ayala	Ayala	35,754	186
Bolong	Zamboanga	38,420	15
Curuan	Zamboanga	49,730	175
Layawan	Dipolog	189,680	8,340
Manicahan	Zamboanga	26,425	440
Mercedes	Zamboanga	20,950	115
Tumaga	Zamboanga	140,110	800

2. Developed sources. The following are the waterworks projects under consideration in Zamboanga in 1935:

TABLE IX - 15

WATER WORKS PROJECTS, ZAMBOANGA (1935)

MUNICIPALITY	ESTIMATED COST PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Zamboanga				
Improvement	90,000	7,000	gravity	no data
Zamboanga	305,561.30	20,000	gravity	504,000

The municipal system at Zamboanga derives its water from the Tumaga River, about 6 miles north of the city. From here the water is led through a 30-inch reinforced concrete pipe to the reservoir which is situated on the Santa Maria Heights, 3½ miles from the departmental capital. The reservoir is 159 feet deep, and the top of the water in the reservoir is 170 feet above sea level. The reservoir has a capacity of 600,000 gallons and is built entirely of reinforced concrete. The main pipeline, which conducts the water to the city, has a 16-inch diameter when it leaves the reservoir, but is gradually reduced to a diameter of 10 inches as it reaches the city. The intake is cleaned once every 5 days; the reservoir once every 10 days. There are 270 house connections and 53 public hydrants in the city. In this way about 5,000 people are supplied, or about 20% of the entire population of the entire municipality.

3. Distribution, use, and storage. Fresh water is trans-

ported by pipe line to wharves at the following places: Zamboanga city, where it is suitable for drinking purposes; Naga Naga, the site of the sawmill and wharf of the Mindanao Lumber Company, where water, piped from mountain springs is suitable only for boiler purposes; and at the pier on the north side of the bight to which Igai Point is the northeast entrance point.

The 2 following irrigation systems were in operation in Zamboanga province in 1931: The Ayala System, opened in February 1924, serves an area of 180 hectares; the Santa Maria System, opened in February 1924, serves 430 hectares.

Storage on a relatively large scale is practiced at Zamboanga city, where 2 types of reservoir are used: an impounding reservoir, in which water is stored by means of a dam thrown across the Tumaga River, and a service reservoir, in which the water is kept prior to its entrance into the distribution system.

Basilan Island has only 2 points where fresh water can be obtained easily: Isabela, where water is available from the ice plant in drums; and Port Holland, where small quantities of water are piped to the main wharf.

The following are the discharge measurements of the rivers on Basilan Island (1935):

TABLE IX - 16
DISCHARGE MEASUREMENTS OF RIVERS ON BASILAN ISLAND (1935)

River	Station	Discharge (second-litres) per day Maximum	Minimum
Balobo	Lamitan	6,980	46
Gubauan	Lamitan	92,620	444
Maluso	Maluso	155,740	1,350

A waterworks project in Isabela was under consideration in 1935. The estimated cost was 40,000 pesos. It was designed to serve a population of 3,000 by gravity.

C. Construction materials.

(1) Wood.

Large quantities of wood, much of it suitable for construction, are found on Mindanao. Types of woods, and location and capacity of Mindanao sawmills are listed in TABLE IX - 17.

(2) Sand, gravel, and crushed rock.

The coral found along the shoreline and the hard basalt rock of the interior can be used to build roads and airfields. The basalt rock must first be quarried by blasting, then broken by hand labor.

TABLE IX - 17 shows the amount of sand, gravel, and crushed rock produced on Mindanao in 1938.

TABLE IX - 17
PRODUCTION OF SAND, GRAVEL, AND CRUSHED ROCK MINDANAO, 1938
(cubic meters)

Province	Total
Agusan	1,025
Bukidnon	1,842
Cotabato	3,380
Davao	17,513
Lanao	16,806
Misamis Occidental	1,246
Misamis Oriental	17,232
Surigao	10,518
Zamboanga	198
Grand Total	69,760

There were no cement plants on Mindanao. Cement was imported from Cebu, Luzon, or the United States.

D. Industrial raw materials and primary processing.

(1) Minerals.

No important industrial raw materials, were mined in large amounts on Mindanao before the war. There was known to be 1 very large deposit of iron ore, and deposits of coal had been found. Small amounts of chromite were mined on Dinagat Island. The principal commercial mining activity of Mindanao centered in the production of the precious metals, gold and silver. The location of mineral deposits on Mindanao are shown on FIGURE VII - 15.

(*a*) *Iron ore.* The largest known deposit of iron ore in the Philippines is situated in the northern tip of Surigao just south of Placer. After prospecting the ores, the Philippine Commonwealth set aside an area in that district as a government reservation which was to be developed for iron mining. There are several reasons why the intensive development of these ores was not practical before the war. First, they are laterite ores. Although Cuban laterite ores have been used in blast furnaces, most blast furnaces have used ores of different origin and character. Second, they are very hygroscopic and therefore not economical to ship. Third, the separation of the nickel from the iron ore is difficult.

(*b*) *Coal.* Mindanao coal is a good grade bituminous. Production before the war was small, amounting to perhaps 35,000 tons a year. The National Development Company of the Philippine Government controlled coal reservations near Malangas in Zamboanga province. In 1941, about 100 tons a day were secured from 2 mines in this area: 60 tons from the Lalat mine, and 40 from the Lumbog strip mine. There were undeveloped coal deposits in Surigao province. FIGURES IX - 4 and IX - 5 show the coal loading station at the reservation, the wharf, and shipping facilities at Malangas.

(*c*) *Chromite.* Chromite has been found on the north and east coasts of Dinagat Island. The northern areas proved to be the more important and 2 companies operated mines on the west coast, the Dinagat Mines Company near the village of Loreto, and the Tagobomar Development Company, near Omasadang. In 1940, the known reserves of the Dinagat mines were estimated at 20,000 metric tons of chromite containing 47.44 per cent Cr_2O_3; 1,700 tons of ore had been mined during the first 6 months of operation.

Small isolated deposits of chromite were also discovered in Misamis Oriental and Surigao provinces of Mindanao, but had not been developed before the war. In view of the Japanese need for chromite, it is likely that the mines on Dinagat Island are being operated.

(*d*) *Gold and silver.* There were important gold mines in 3 provinces of Mindanao: Surigao, Davao, and Zamboanga. Silver was mined as a by-product of gold. The larger mines are indicated FIGURE VII - 15. FIGURE IX - 6 is a detailed map of the Surigao gold mining area.

There is no information on Japanese operation of the Mindanao gold mines, but it seems unlikely that they are being worked. Gold mines in other parts of the Philippines, notably Luzon, were flooded just before Japanese occupation, and the Japanese are reported to have stripped many of them of such equipment as mills and power houses. While it is not knowr

FIGURE IX - 4. *Malangas, Zamboanga, Mindanao.*
Coal loading station of National Development Company near Malangas. Looking SE. May 1941.

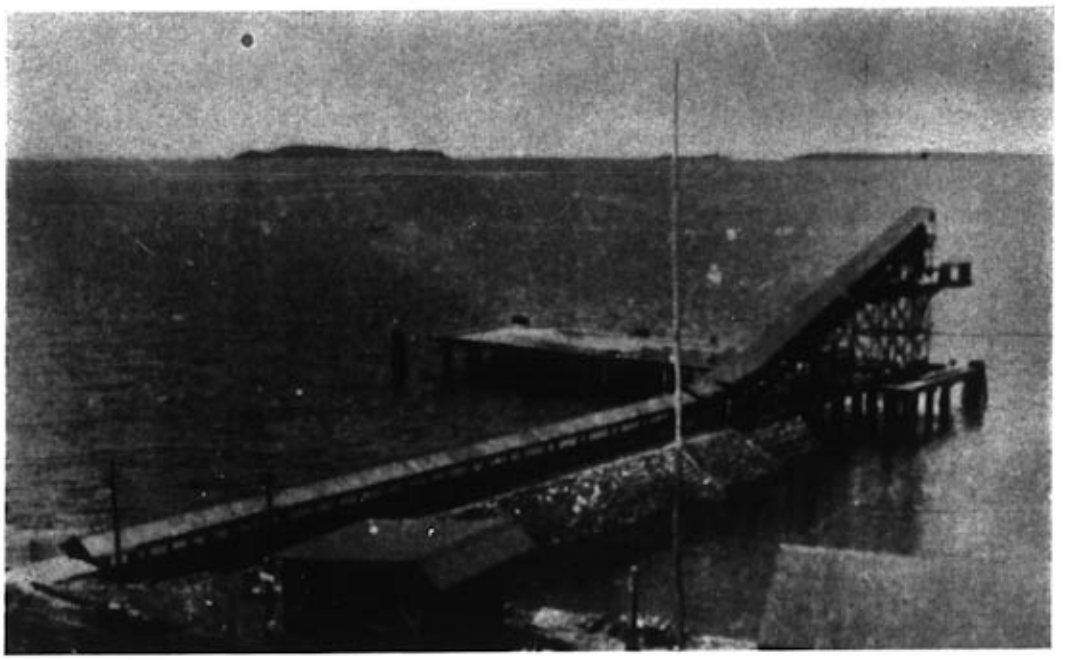

FIGURE IX - 5. *Malangas, Zamboanga, Mindanao.*
Wharf and belt loader at Malangas used to ship coal mined at National Development Company's reservation nearby. Looking S. May 1941.

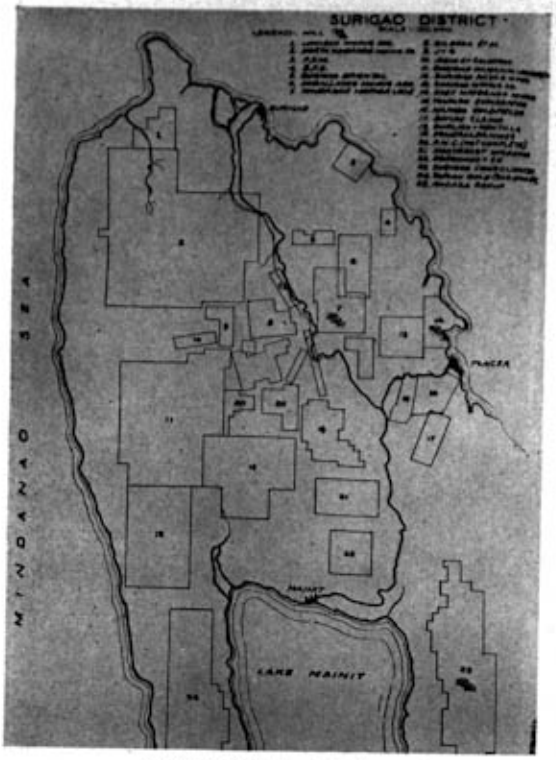

FIGURE IX - 6. *Surigao, Mindanao.*
Map of Surigao gold district showing important claims. 1939.

that this has occurred in Mindanao, the Japanese have shown a general indifference to gold production.

TABLE IX - 18 lists the principal gold mines in Mindanao and their equipment.

(2) Fuels.

The only fuel available in large quantities on Mindanao is wood, of which there are ample amounts (TOPIC 93, D, (3), (a), 1). Coal has been mined on a small scale. (TOPIC 93, D, (1), (b)).

The only oil known on Mindanao was one seepage at Banisilan in eastern Cotabato province. No drilling exploration was ever attempted. The seep was explored by the National Development Company of the Philippines in 1941, and it was decided that there was not sufficient oil to warrant drilling.

(3) Agricultural and marine materials.

(a) Forest products.

1. Lumber. Lumber is one of the principal resources of Mindanao. Woods suitable for construction are available in every province and there are many saw mills, particularly along the coasts.

There are about 60 types of trees in the Philippines which attain a diameter of 1 foot or more and are ordinarily marketed. The trees occur in heavy stands, which lend themselves well to modern lumbering methods. Philippine woods are usually spoken of as being divided into 2 classes, "Philippine mahogany" and hardwoods. The "Philippine mahogany," moderately soft woods which were highly valued for their beauty, formerly made up 85 to 90% of the lumber exports of the Philippines. As a class they are large trees, some attaining a diameter of 7½ feet. They are durable for interior work, but only moderately so when in contact with the ground or exposed to the weather. They are suitable for boat planking, plywood, and interiors. The species to be found are red lauan, tangile, tiaong, almon, bagtikan, mayapis, and white lauan.

Of the hardwoods, the following are suitable for either indoor or outdoor construction: tindalo, ipil, molave, narra, and yakal. Other hardwoods, suitable for interior construction but not highly suitable for exterior work, are amugis, apitong, banuyo, dao, guijo, kalantas, lumbayau, malugai, manggachapui, maranggo, palosapis, and supa. Tindalo is very abundant on Mindanao. Fair amounts of the other wood exist.

The larger known sawmills (those capable of producing 20,000 board feet or more daily) are listed in TABLE IX - 10 and shown in FIGURE VII - 15. There are also small sawmills and logging establishments scattered over the island.

2. Other forest products. Among the other forest products which were formerly marketed are palm products, cutch, fibers, resins, gums and oils, rubber, and gutta-percha. Of these, coconuts and rubber were more profitably marketed from plantations, and will be discussed as plantation products.

Rattan palms are found in all forests of the Philippines. They range in size from 4 millimeters to 5 centimeters (0.15—19.6 inches) in diameter. Another valuable palm is "kaong," or cabo negro, which grows in low and medium altitudes in dense stands. Properly laid thatch roofs of this fiber last well.

Cutch, or tanning extract, was produced from several trees of the mangrove family. Resins, gums and oils, for use in the manufacture of paint and varnish were pre-war exports of Mindanao. Among the most important were Manila elemi from the pili tree, Manila copal from the almaciga tree, and lumbang oils from the lumbang tree. Gutta-percha, a gum produced from the gutta-percha tree which grows on Mindanao, was exported for use in insulating cables and in the manufacture of dental and surgical appliances and acid-proof containers.

(b) Plantation products. Manila hemp (abaca) was Mindanao's most valuable export, with copra in second place. The cultivation of both products on plantations has been considerable. Cotton, other fibers, and rubber were grown to a much smaller extent. One cinchona plantation had been started before the war near Malaybalay in central Bukidnon. There was a very large pineapple plantation in Bukidnon province.

1. Manila hemp. The great commercial importance of Manila hemp (abaca) arises from the fact that it is the only rope fiber which will not swell in contact with salt water. The Philippine Islands were the only large-scale producers of Manila hemp in the world. Hemp from Davao province was of singularly high quality. Davao's hemp production was slightly more in value than half of the production of the Philippines as a whole. It made up about ¾ of the hemp produced on Mindanao.

The "stripping" of the hemp, that is, the separation of the desired fibers from the pith, is done by pulling lengths of the stalk between a stationary block and a knife-edged instrument. About 1925, American and Japanese plantation owners began mechanization of this process on some of the largest and best-developed plantations. FIGURE IX - 11 shows mechanized stripping of hemp in the Ohta Company's Talamo plantation.

TABLE IX - 18
GOLD MINES, MINDANAO
(1939)

PROVINCE	COMPANY	LOCATION AND ACCESSIBILITY	EQUIPMENT, ETC.
Surigao	East Mindanao Mining	Near Placer, about 30 kilometers south of Surigao on coast. Improved road from mine to highway. Pier to which supplies can be lightered at high tide.	Mill preparing ores for cyanidation. Total installed kw.-450, from Diesel engines. About 500 workers employed on 3 shifts. (FIGURE IX - 6, Number 14)
	Lacondola	East central part of Masapelid Island. Pier which accommodates vessels drawing 11 feet.	Small flotation mill construction under way, scheduled for completion in June or July 1941. Total installed kw.-300. 200 men to be employed.
	Mapaso Goldfields, Inc.	32 kilometers southeast of Surigao, near provincial highway to Placer. Readily accessible by road.	No mill (1939) Two diesel engines of 200 kw. and 58 kw. About 90 men employed January 1939. (FIGURE IX - 6, Numbers 15 and 16)
	Mindanao Mother Lode, Inc.	17 kilometers from Surigao on the provincial highway. Connected by private road to highway.	Flotation—cyanidation mill. Three diesel engines of 190 kw. each connected to A.C. generators. About 500 men employed.
	Nabago Gold and Silver Mining Company	Near village of Arellano, 15 kilometers from Surigao along coast. Reached by road and trail or launch and trail.	One 80 kw. Buda diesel engine connected to an air compressor. No mill.
	North Mindanao Mining Company	14 kilometers southwest of Surigao, 7 miles from provincial highway at Kilometer 7. Access to mine from highway by carabao trail only.	Hydraulic mining. Two No. 2 Hendy giants (?). Headlights for illuminating night work (FIGURE IX - 6, Number 2).
	Surigao Consolidated Mining Company	Near village of Magupang, south of Surigao, 2 kilometers east of Kilometer 45 of provincial highway from Surigao.	Flotation—cyanidation mill. Three Atlas diesel engines totalling 1100 kw. (FIGURE IX - 6, Number 23)
	Tambas Gold Dredging Co., Inc.	30 kilometers from Port Lamon and from Lianga.	7 cubic foot dredge. 75 kw. steam engine plus a 79 kw. Ruston—diesel engine.
	Tapian Surigao Gold Mines, Inc.	On west side of Lake Mainit. Good 3-kilometer road from west side of lake to mill.	Cyanidation mill. A 190 kw. diesel engine. Two to three hundred men employed. (FIGURE IX - 6, Number 24)
Zamboanga	Mindanao Mining Company	In village of Curuan. 50 miles northeast of Zamboanga city. Connected with Curuan by private road.	"Doodlebug" dredge.
Davao	Elizalde & Company	East side of Davao Gulf near headwaters of Hijo River. Private landing field for planes 4 kilometers north of camp (FIGURE IX - 7) to which it is connected by a good road along river.	10-kilometer aerial tramline to transport ore from mine to mill, which is located at Mampasing (FIGURE IX - 8) on Davao Gulf near the beach. It is believed to have been in operation at the outbreak of the war. Flotation-cyanidation mill (FIGURE IX - 9). 3 diesel engines totalling 480 kw. directly connected to generators. 500 men employed. Silver also obtained, and unprofitably small amounts of copper, lead, and zinc.

2. Coconut products. Mindanao was one of the most important coconut producing regions of the Philippines. Ten per cent of the coconuts produced in the islands were consumed domestically. The remainder was exported, 50% as copra, 40% as coconut oil, and 10% as desiccated coconut. Coconut products were used principally before the war for vegetable oils and soaps. Their most important war use is as a source of glycerine for the manufacture of explosives.

3. Cotton and other fibers. At the time of the establishment of the Philippine Commonwealth, in 1935, a program for growing cotton commercially on the islands was instituted. One of the areas chosen for planting cotton consisted of the provinces of Oriental and Occidental Misamis on Mindanao. It is probable that the Japanese have expanded the acreage under this crop. Ramie cultivation was also under way before the war, and the Japanese are said to be pushing its production.

4. Cinchona. In 1941, there was a cinchona plantation near Malaybalay in Bukidnon province under the direction of Col. Arthur Fischer, USA. The plantation covered 850 acres and contained about 1,300,000 cinchona trees. Cinchona bark was sent to Manila for processing. Before Col. Fischer evacuated Mindanao, he supervised the stripping of the bark from the cinchona trees. It is believed that as a result the Japanese were unable to obtain any quinine from Mindanao at least during 1942. Scattered plantings of cinchona trees were also made in isolated areas where the Japanese would be unlikely to find them. TABLE IX - 20 shows the principal plantations on which information is available.

TABLE IX - 19

SAW MILLS CUTTING 20,000 BOARD FEET DAILY OR OVER

Mindanao, 1940

PROVINCE	NAME OF COMPANY	LOCATION	DAILY CAPACITY IN THOUSAND BOARD FEET	TYPE L—LOGGING B—BAND SAW C—CIRCULAR	REMARKS
Agusan	North Mindanao Trading Lumber Company	Butuan	20	L	
Bukidnon	None				
Cotabato	Santa Clara Lumber Company	Port Lebak	25	C	Said to be backed by Japanese. Logs sent to Davao by road.
	Malasila Lumber Company	Malasila Km. 139 on Cotabato-Davao road near Malasila			
Davao	Tibungko Lumber Company	12 to 15 kilometers NE of Davao on coast	45	B	Part of Japanese-owned Furakawa Plantation Company (TABLE IX - 20) to which it furnishes wood for making of plywood. Modern, well-equipped mill.
	Gulf Lumber Co. Inc.	Pantukan and Dakun	22	L	
Lanao	Findlay Millar	Kolambugan	120	B	(FIGURE IX - 10) Has loading facilities, pier, 10 to 20 miles of narrow gauge railroad tracks, and possibly 3 locomotives (FIGURE VII - 11).
	Asiatic Philippine Timber Company (Linamon Sawmill)	Maguing, Iligan	20	B	
Occidental Misamis	Misamis Lumber Co.	Misamis	20	C	
Oriental Misamis	Anakan Lumber Co.	Southeast corner of Gingoog Bay at Anakan on East side of river	30	C	Built by an American engineer. Product was sold in Japan. Large Pacific and coast type logging and steam donkey operation. Sawmill built 1939. 300-foot wharf. Heavy equipment can be transported by rail inland for fifteen or twenty miles. (FIGURE VII - 10)
	Santa Clara Lumber Co., Inc.	Gingoog and Talisayan. Opposite Anakan Company on West side of river	60	L	Steam, donkeys and trucks. Gravelled roads extending inland 12-15 miles from Gingoong.
Surigao	Port Lamon Lumber Company	Port Lamon, Hinatuan	45	B	Has two or three tubular boilers generating about 250 HP. Some machine shop equipment—2 lathes, a drill press and a welding outfit.
Zamboanga	Hercules Lumber Co.	Lumarao	25		
	Mindanao Lumber Company (Chinkang Sawmill)	Naga-Naga	35	B	
	Mindanao Lumber Company (Dumanquilas Sawmill)	Margosatubig	25	C	
	Basilan Lumber Co.	Port Holland	60	L	

TABLE IX - 20

PLANTATIONS, MINDANAO

PROVINCE	PLANTATION—LOCATION	PRODUCTS	REMARKS
Agusan	None		
Bukidnon	Philippine Packing Company Del Monte	Pineapples	Had 60,000,000 pineapple plants. Plantation damaged or destroyed at time of Japanese invasion.
Cotabato	Rio Grande Rubber Company Kabakan	Coconuts Rubber	1,000 hectares of which ½ were planted to coconut and rubber.
	American Land & Commercial Company Near Port Lebak, 12 miles from Kalamansig	Coconuts	1,000 hectares, of which half were planted to coconuts.
Davao	Ohta Developement Company		Japanese ownership, possibly with army backing. Founded by Col. Ohta. Several thousand acres.
	Talamo	Hemp; coconuts	Private wharf. Big storehouses.
	Mintal	Hemp; coconuts	Small hydro-electric plant which lights buildings, and manufactures ice. Hospital.
	Culaman Plantation Company Malita	Hemp; coconuts	
	Furakawa Plantation Company On Davao road in vicinity of Daliao. Fronts on Davao Gulf 30 miles from Mt. Apo.		Japanese-owned and operated. A remarkably well developed estate, considered a model. Represented General Motors in Davao. Imported trucks, automobiles, spare parts. Large well equipped machine shop with complete tools for repair and partial assembly of trucks and other motor vehicles. At least 2 diesel generators of 375 to 450 HP each. Large warehouses. Hemp warehouses possibly used as barracks or barricade. Smaller houses and buildings. Plywood factory.
Lanao			Many plantations between Malabang and Baras, most of them having cattle.
Misamis Occidental	None		
Misamis Oriental	None		
Surigao	None		
Zamboanga	Basilan Plantation Company (owned by American Rubber Company)	Rubber	1,000 hectares. 100,000 Para rubber trees.
	Patalon Plantation North of San Ramon	Coconuts Coffee	
	Atkins Kroll & Company On mainland east Zamboanga coast across from Basilan Island	Coconuts	Has a fair-sized wharf.
	Goodyear Rubber Company Kabasalan	Rubber	

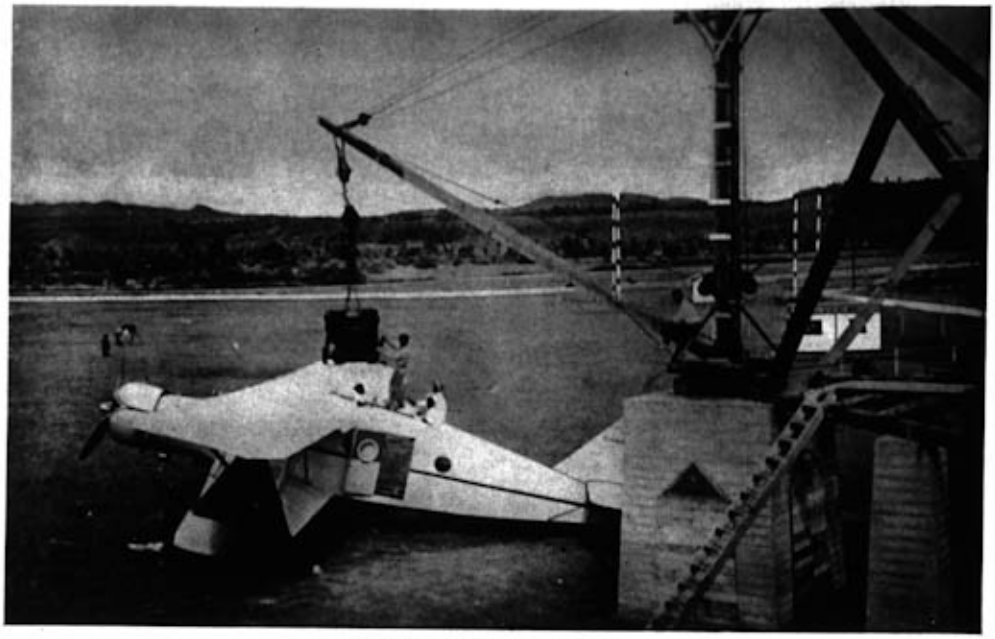

FIGURE IX - 7. *Near Davao, Mindanao.*
Airport at Elizalde and Company's gold mining site north of Davao city, Mindanao (Location shown on Figure VII - 15). Loader in right foreground. Weather station between striped poles, right middle ground.

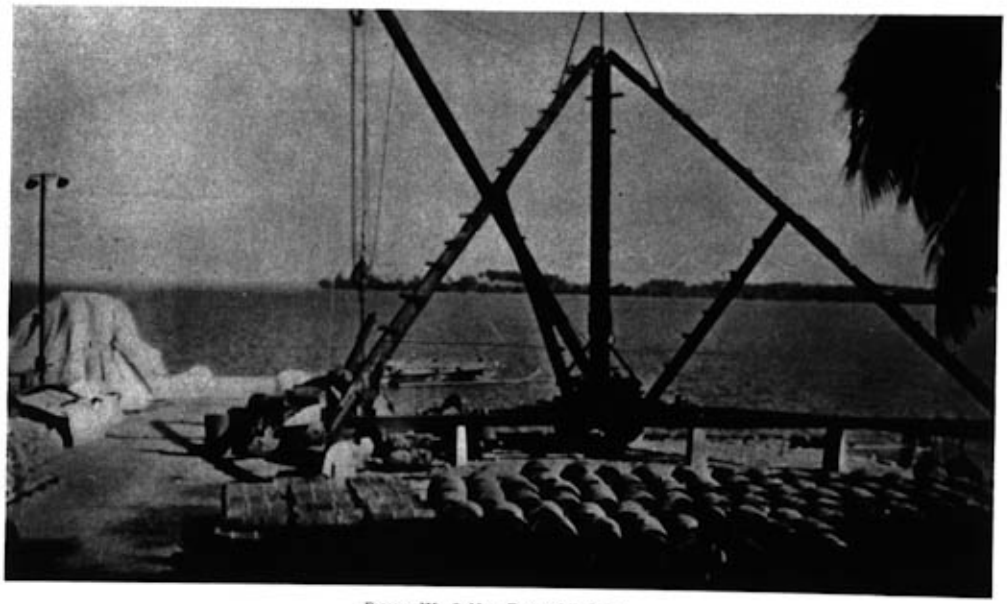

FIGURE IX - 8. *Near Davao, Mindanao.*
Loading dock at Mampising near Davao, Mindanao, terminus of aerial tramline from Elizalde and Company's gold mining site (Location shown on Figure VII - 15.)

FIGURE IX - 9. *Near Davao, Mindanao.*
Gold mine of Elizalde and Company near Davao, Mindanao (Location shown on Figure VII - 15). Mill shown in photograph is connected by aerial tramline with loading dock at Mampising shown in Figure IX - 8.

TABLE IX - 21
PRINCIPAL ELECTRIC POWER PLANTS
Mindanao, 1941

PROVINCE AND NAME OF OPERATOR	LOCATION	MUNICIPALITIES SERVED	CAPACITY (IN KW UNLESS OTHERWISE DESIGNATED)	PRIME MOVERS DIESEL, HYDRO, OR STEAM
AGUSAN				
Butuan Saw Mill	Butuan	Butuan	45	diesel
Butuan Saw Mill	Cabadbaran	Cabadbaran	37.5	diesel
BUKIDNON				
	Malaybalay		50 HP	diesel
COTABATO				
Cotabato Light & Power Co. Inc.	Cotabato	Cotabato	122	diesel
	Dulawan		26.25	diesel
			35 HP	
DAVAO				
Davao Light & Power Co. Inc.	Davao	Davao	551.5	diesel
Davao Light & Power Co. Inc.	Guianga	Guianga	19	diesel
Davao Light & Power Co. Inc.	Sta. Cruz	Sta. Cruz	12.4	diesel
Philippine Power & Development Co.	Talamo R. near Mintal		60 HP	Hydro
LANAO				
Lanao Elec. Light & Power Supply Co.	Dansalan	Dansalan	105	diesel
Consuelo Borja	Iligan	Iligan	55	diesel
MISAMIS OCCIDENTAL				
Natalio Digal	Oroquieta	Oroquieta	30	diesel
Misamis Lumber Co.	Misamis	Misamis, Clarin, Tudela	125	diesel
Teofilo M. Pereyra	Tangub) (Tangub	Tangub	17	

TABLE IX - 21 (Continued)

MISAMIS ORIENTAL				
Cagayan Elec. Power & Light Co. Inc.	Cagayan	Cagayan	160	diesel
Leon Borromeo	Mambajao	Mambajao, Camigin	26.5	diesel
SURIGAO				
Surigao Electric Co.	Surigao	Surigao	40	diesel
ZAMBOANGA				
Visayan Electric Co.	Dipolog	Dipolog	34	diesel
Province of Zamboanga	Zamboanga	Zamboanga	300	Hydro
			456	diesel
J. C. Trota	Lamitan	Lamitan	10	diesel

(*c*) *Marine materials.* Marine products produced in Zamboanga province included perals, shells, bêche-de-mer (sea cucumbers or trepang), shark fins, coral sponges. A small amount of salt was produced in Talon-talon near Zamboanga for local consumption.

E. Manufacturing plants.

The only manufacturing plants of any importance on Mindanao were those connected with the primary processing of foods, and of agricultural and mineral commodities for export. They have already been discussed under other topics:

Food processing plants—Topic 94, A, (3).
Cyanidation mills connected with gold mines—Topic 94, D, (1), (d).
Lumber mills—Topic 94, D, (3), (a).
Small plants on plantations—Topic 94, D, (3), (b), and TABLE IX - 20.

Special mention may be made of 2 machine shops: one connected with the sawmill of the Port Lamon Lumber Company which was equipped with 2 lathes, a drill press, and a welding outfit; and the large, well-equipped machine shop of the Furakawa Plantation which had complete tools for the repair and partial assembly of trucks and other motor vehicles. The Furakawa Plantation also had a plywood factory.

The Japanese claim to be building wooden ships of 70 to 200 tons near Davao. If this is true, it is possible that building materials and some tools, as well as carpenters and other workmen, will be found in that vicinity.

Production of small consumer goods was carried out by village handcraft industries. Simple metal knives and weapons were made using a hammer, anvil, and bamboo bellows.

F. Electric power.

The principal electric power plants, as of 1941, are given in TABLE IX - 21 below, and their locations appear on FIGURE VII - 15. Only 6 plants had a capacity of over 100 kilowatts. Eleven other plants serving the public had capacities of 10 to 55 kilowatts.

In addition to the plants serving the public which are listed above, some mining companies, sawmills, and rice mills had small private diesel plants producing power for their own use and sometimes furnishing electricity to the homes of plant employees. Few details are available concerning these private power plants, but a list of the known installations is given in TABLE IX - 22.

TABLE IX - 22
PRIVATE POWER PLANTS, MINDANAO

PROVINCE	NAME OF COMPANY	CAPACITY	TYPE
Surigao	East Mindanao Mining Company	450 kw.	diesel
	Lacondola	300 kw.	Probably diesel
	Mapao Goldfields	200 kw. 58 kw.	2 diesels
	Mindanao Mother Lode, Inc.	570 kw.	Three 250 HP diesels connected to AC generator.
	Nabago Gold and Silver Mining Co.	80 kw.	diesel connected to air compressor
	Surigao Consolidated Mining Co.	1100 kw.	3 Atlas diesels
	Tambis Gold Dredging Co. Inc.	154 kw.	One 100 HP steam engine; One 105 HP Ruston diesel.
	Tapian Surigao Gold Mines Inc.	190 kw.	diesel
	Port Lamon Lumber Co.		Steam
Davao	Elizalde & Co. Ohta Development Co's Mintal Plantation	480 kw.	3 diesels small hydro plant for lighting
	Furakawa Plantation	(approx.) 2 diesels	

G. Commerce.

(1) Ports.

The chief ports of Mindanao were Davao and Zamboanga; lesser ports were Cotabato, on the south coast, and Cagayan, on the north. None of these ports was used by large ocean-going vessels. They were ports of call for small inter-island vessels. Many cargoes to and from Mindanao were trans-shipped at Manila.

(2) Imports and exports.

Exports consisted largely of hemp, coconuts, and gold; imports of cotton goods, small iron and steel manufactures, petroleum products, small machinery, and parts. Official export and import figures for the Philippines did not list Mindanao's trade separately.

(3) Weights and measures.

The metric system of weights and measures was official in the Philippines.

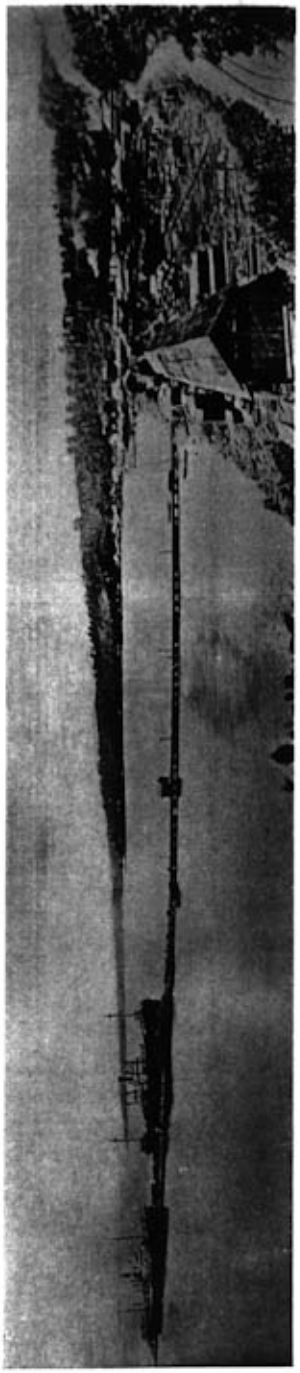

FIGURE IX - 10. *Kolambugan, Lanao, Mindanao.*
Wharf of Findlay Millar Lumber Company.

FIGURE IX - 11. *Davao province, Mindanao.*
Manila hemp being stripped by machine at Ohta Company's Talamo plantation.

H. Finance.

(1) Currency under the Philippine Commonwealth.

Under the Philippine government, bank notes were issued by 2 banks: the Bank of the Philippine Islands, which was controlled by the Archbishop of Manila, and the Government-owned Philippine National Bank. Bank notes were issued in denominations of 1, 2, 5, 10, 20, 50, and 100 pesos. Philippine treasury certificates were also issued in the same denominations and in a denomination of 500 pesos.

The coins were as follows:

TABLE	CENTAVOS
Silver	
Peso	100
Half peso	50
Peseta	20
Nickel	
Half peseta	10
Quarter peseta	5
Bronze	
Centavo	1
Half centavo	½

The peso was legally tied to the United States dollar at a rate of 2 pesos to the dollar.

(2) Currency under the Japanese occupation.

From the beginning of the Japanese occupation until December 1943, the circulation of 2 kinds of currency at par was permitted: Commonwealth currency and the Japanese military currency, called *apa*. This system resulted in considerable hoarding of Commonwealth currency, particularly coins. The Japanese attempted to force the acceptance of *apa* in all transactions, but were not completely successful. In early 1944, a bill was signed by Laurel which provided for the exchange of all other

currencies for a new kind of peso legally fixed to the yen. The new peso is to be the only one in use.

(3) Barter.

Barter is a common form of trade on Mindanao, particularly in the interior. The items most desired in trade by the natives are canned foods, soap, quinine, matches, and salt.

94. *Sulu Archipelago*

A. Food resources.

The food resources of the Sulu Archipelago are similar in kind to those of Mindanao. They are sufficient only for the needs of the natives.

(1) Agriculture.

The agriculture of the Sulus is like that of Mindanao (TOPIC 93, A, (1)). Natives grow foods on small patches of land for themselves. Jolo Island produces various fruits which are not found elsewhere in the Philippines. These are baunos, marangs, huanis, durian, and rambutans.

Production of rice and corn in 1938 is shown in TABLE IX - 23.

TABLE IX - 23

CORN AND RICE PRODUCTION, SULUS (1938)

(Metric tons)

RICE		CORN	
Lowland — 1st crop	374	First Crop	3,664
Lowland — 2nd crop	——	Second Crop	124
Upland	11,292	Third Crop	33
Total	11,666	Total	3,821

The domestic animals of the Sulus are similar to those of Mindanao. Cattle are, however, proportionally more abundant and were formerly exported.

(2) Fisheries.

Fish are very plentiful in the waters around the Sulu Archipelago. Fishing was formerly a principal occupation, and dried fish were exported.

(3) Food processing, refrigeration, and storage.

The only facility of this kind was an ice plant on Jolo Island.

B. Water supply.

(1) General.

Like Mindanao, the Sulu Archipelago enjoys an abundant rainfall. However, there are no rivers worthy of consideration. The native population depends on springs, streams, waterfalls, and rain water, which are frequently inadequate in the dry season. When these sources are not nearby, shallow wells are dug somewhat behind the shoreline and seepage provides a brackish water adequate and satisfactory for most purposes. Exploration of the natural sources of water supply is not always easy as the dense vegetative cover frequently hinders passage overland or upstream. The digging of deep wells is made difficult by dense volcanic rock or low-relief coral formation. Native sources of water supply are usually adequate for local consumption, but in unusually dry seasons an acute shortage may develop.

(2) Specific.

(a) Jolo group.

1. Jolo Island. The only good watering place is at the city of Jolo. On the eastern half of the island the supply is inadequate, especially during the summer months. Some useful sources on Jolo Island, tested and found satisfactory, are: Crater Lake, 8,600,000 square feet, apparently very deep, 500 feet above sea level; Seit Lake, 5,800,000 square feet, 25 feet above sea level; Bilaan or Gingan and Hasan Rivers, 2 small streams near Kabungkul on the north shore of Tutu Bay, and the large Bual spring, the only source in Dalrymple Harbor area, 2 miles west of Tandu Batu.

Jolo city has a good supply system which was completed in October 1918. It consists of a small impounding dam at the Gandasuli Spring about 2 miles east of the town. From the spring, the water is pumped by hydraulic rams to a 130,000 gallon reservoir. A 6 inch main at 45-pound pressure distributes the water to consumers. The spring flow of 1,500,000 gallons a day is considered ample for the future growth of the city. Fresh water suitable for drinking purposes is piped to the dock and was available at 50 centavos per cubic meter.

The following waterworks projects were under consideration on Jolo Island in 1935:

TABLE IX - 24

WATERWORKS PROJECTS, JOLO ISLAND (1935)

MUNICIPALITY	ESTIMATED COST IN PESOS	POPULATION SERVED	SYSTEM	GALLONS PER DAY
Bangkal	9,416.87	3,000	gravity	26,000
Jolo	76,974.29	no data	pumping	115,200
Jolo Improvement	39,256.58	6,800	gravity	316,000
Lanao Dakula (Jolo Ext.)	no data	300	gravity	13,800
Lanao Dakula to Parang	no data	450	gravity	10,000
Lanao Dakula to Pasil	no data	3,000	gravity	57,600
Panamaw	no data	1,200	pumping	43,200
Talipaw	no data	2,000	gravity	57,600

2. Tapul Islands. These islands are situated south and southeast of Jolo. They are rugged, fertile and have well-cultivated areas.

LUGAS ISLAND. There are several crocodile-infested, brackish lakes on this island.

SIASI ISLAND. At Siasi, water may be purchased at a Chinese store on the main street about ½ block east of the wharf. The water is sold by the can and has to be carried to the wharf by hand. Two or three hundred gallons of water may be obtained here at a time.

LAPAC ISLAND. There are few rivers and no surface water worthy of mention. The run-off occasioned by heavy rains is handled by short streams.

3. Pangutaran Islands. There is no fresh water on any of these islands. The Moros dig holes well back from the high water mark and use the brackish water that seeps in.

(b) Tawitawi and adjacent islands.

1. Tambiluanga Island. On the southeast part there are 3 wells of good water but the supply is not great.

2. Tandubatu Island. Fresh water may be obtained from a spring on the northeast slope of the island, opposite Tarue Point.

3. Dundangan Island. Fresh water is obtainable from wells on the southeast side of the island.

4. Calupag and Pasegan Guimba Islands. There are slightly brackish wells on these islands.

5. Buan Island. Fresh water is plentifully supplied by a spring on the north side of the island.

6. Banaran, Sasa, and Mantabuan Islands. Brackish water may be obtained from holes dug in coral rock or sand.

7. Bilatan Island. The only fresh water available here is from a few puddles in the interior of the island where there is some cultivation.

8. Bongao Island. The water supply here depends on rainfall and 3 Moro wells. The constabulary post has cisterns and small amounts of water may be purchased.

9. Sanga Sanga Island. Some water is available near Sinabon Cove but is very poor and hardly fit to drink. Moreover, the supply is limited, since many natives from Bongao and vicinity depend on this source of supply during the dry months.

10. Tawitawi Island.

TATAAN. Fresh water is obtainable here from a small stream. There is a waterfall 1 mile east of Tataan, which dries up for part of the year.

BATU BATU. A well and pump were installed here but in March 1941 went dry and created a serious problem. There were, however, several well-supplied private cisterns. Water to be used by boats had to be collected in cans and carried at least 1 mile to the pier. There were no other available supplies on the south coast of Tawitawi Island.

PORT LANGUYAN. There is a stream and waterfall here but they are dry during part of the year.

The Baoung River and Port Dos Amigos are other reported sources of supply.

(*c*) *Sibutu Islands and Reefs.*

1. Sitankai Island. Fresh water, which is scarce, is secured from rain water cisterns or brought in jars from wells on Sibutu Island.

(*d*) *Cagayan Sulu Island.* There are 3 small crater lakes on the south edge of the island, one of which opens to the sea. The water in these lakes extends to depths of at least 75 feet below the craters edges. No handling facilities exist.

C. Construction materials.

Lumber is abundant, and adequate timber can be obtained for all purposes (TOPIC 94, D, (3)). No sand, gravel, or crushed rock were produced on a commercial scale in Sulu, but the local coastal limestone and the basalt rock of the interiors could be used for building roads and airstrips. No cement production is known.

D. Industrial raw materials and primary processing.

(1) Minerals.

There were no mining operations in progress at the outbreak of war. A copper deposit on a small island near Jolo had been worked, but was abandoned several years before the war. Manganese exists on several islands, but the quantities are too small to warrant exploitation.

(2) Fuel.

Timber is the only fuel available. No oil, gas, or coal exists.

(3) Agricultural and marine materials.

(*a*) *Forest products.*

1. Lumber. The Sulus are heavily wooded with tall deciduous trees. Hardwoods suitable for exterior construction are ipil, yakal, narra, and molave. Hardwoods, which are not suitable for exteriors, but can be used for interiors, boat planking, and plywood, are kalantas, lumbayau, and guigo.

2. Sawmill. The only known lumber mill in the area, the Bungao Timber Company, at Magsaggac, Batu Batu, Tawitawi, had a circular saw and cut approximately 3,000 board feet daily.

3. The other forest products of the Sulus are the same as those of Mindanao: rattan, cutch, resins, and gutta-percha (TOPIC 93, D, (3), (b)).

(*b*) *Plantation products* (TOPIC 93, D, (3), (b)). Manila hemp, the principal export of the Sulus, is grown chiefly on the Island of Jolo. Copra, which constituted the second largest export, is also grown chiefly on Jolo. Smaller amounts, largely consumed as food, are grown on the other islands.

(*c*) *Marine materials.* Pearling was an important industry. Pearl, tortoise shells, and sponges were also exported.

E. Manufacturing plants.

The only known manufacturing plants were the sawmill on Tawitawi and the small refrigerating plant on Jolo.

F. Electric power.

Jolo had a central power plant with a capacity of 240 kilowatts, generating power at 2300 volts A. C. by means of diesel-driven generators, at least 2 of which were 100 hp. each. A transformer at the plant stepped down current to 220 volts for use in light and power within the city limits.

G. Commerce.

(1) Ports.

Jolo, the principal port, had regular ship connection with Zamboanga and Manila.

(2) Imports and exports.

Cloth and food staples were formerly imported. Hemp, copra, and a few cattle were exported. There was local trade in fish, rice, corn, and coconut oil.

H. Finance.

Philippine currency was official in the Sulus as it was in Mindanao (TOPIC 93, H). Barter was widespread. The same commodities were desired in trade by the Sulu natives as by the natives of the interior of Mindanao.

95. *Borneo*

A. British North Borneo.

(1) Food resources.

(*a*) *Agriculture.*

1. Rice. Rice was the staple food of British North Borneo. It was cultivated almost entirely by natives. Production was not sufficient to supply local requirements and it was necessary to import some 8,000 to 15,000 tons of rice each year from Burma, Indo-China, and Thailand. Since Japanese occupation of Southern Asia disrupted the rice trade of the area, it is unlikely that any quantity of rice is being imported to British

North Borneo. An occupying army would find a rice deficiency in the area.

Rice was planted during July, August, and September of each year and harvested in January, February, and March. Both the "wet" and "dry" methods of cultivation were practised. Wet rice was grown on the plains, especially those near the coast; dry rice was cultivated in hilly districts. In 1938, local production of rice amounted to some 94,550 long tons (TABLE IX - 25) and was consumed largely by the natives. The Chinese preferred polished white Thai rice; the Indians, Rangoon rice.

2. Other food crops. The natives of British Borneo grew a number of food crops to supplement their rice and fish diet. Sago, though less nutritious, was often substituted for rice. Maize, peanuts, sweet potatoes, and cassavas were grown by Chinese and natives for local markets. The natives cultivated sugar cane for their own consumption. All kinds of tropical vegetables were raised in well-kept Chinese gardens near the towns. Tomatoes grew very well even near sea level. In 1939, the total area of cultivated land was estimated at 303,828 acres (about 1.6% of the total land area). TABLE IX - 25 shows acreage and production of food crops in North Borneo in 1938.

TABLE IX - 25

PRODUCTION OF FOOD CROPS IN BRITISH BORNEO

District	Wet Rice (Padi)		Upland Rice (Padi)		Sago		Maize (Indian Corn)		Root Crops (Sweet Potatoes, Tapioca, etc.)		Vegetables	
East Coast Residency	Crop 1938 Metric Tons	Planted 1938-39 Acres	Crops 1938 Metric Tons	Planted 1938-39 Acres	Area Acres	Crop Harvested 1938 Metric Tons	Area Acres	Prod. Metric Tons	Area Acres	Prod. Metric Tons	Area Acres	Prod. Metric Tons
Tawau	11	—	12	33	—	—	82	60	—	—	—	—
Lahad Datu	—	—	501	380	—	—	250	2,128	455	861	—	—
Sandakan	—	—	20	37	—	—	—	—	—	—	—	—
Kinabatangan	—	—	2,714	2,183	15	0	40	6	1,295	10	—	—
Labuk & Sugut	2,892	1,750	2,961	3,500	10	2	850	2	760	7	—	—
Kudat & Marudu	69	230	24,059	17,614	—	—	1,000	91	—	—	—	—
	2,972	1,980	30,267	23,747	25	2	2,222	2,287	2,510	878	—	—
WEST COAST RESIDENCY												
Mempakul	227	912	103	255	7,806	5,564	—	—	—	—	—	—
Sipitong	771	500	324	2,500	—	—	—	—	—	—	—	—
Kota Belud	6,169	7,200	2,082	2,300	58	50	100	12	—	—	—	—
Beaufort	1,521	2,631	244	465	4,184	494	13	11	21	15	14	4
Papar	11,039	5,727	401	520	837	340	60	0	—	—	—	—
Jesselton, Inanam, and Menggatal	4,318	3,000	197	190	350	1,512	—	—	—	—	—	—
Penampang (Putatan)	4,249	5,200	55	120	672	6	—	—	—	—	—	—
Tuaran	2,252	8,900	1,349	2,300	31	1	—	—	—	—	—	—
Tenom	541	250	578	750	—	—	—	—	—	—	—	—
Keningau	7,248	2,464	1,272	900	60	—	—	—	—	—	—	—
Pensiangan	—	—	1,696	4,400	—	—	—	—	1,170	26	—	—
Tambunan	11,567	5,300	4,627	5,500	—	—	—	—	—	—	—	—
TOTAL	49,901	42,084	12,929	20,200	13,998	7,967	173	23	1,191	41	14	4
GRAND TOTAL	52,873	44,064	43,196	43,947	14,023	7,969	2,395	2,310	3,701	919	14	4

3. Fruits. British Borneo was well supplied with fruit. Excellent oranges of 2 or 3 varieties were grown, as well as pineapples, mangoes, durians, limes, pumeloes, bananas, and other tropical fruits. Papar Town was particularly well known for its excellent fruit.

Fruit growing had received careful attention in recent years. In 1922, the Government of North Borneo opened an "Experimental Station," covering 100 acres, 8 miles from the town of Sandakan. Numerous tropical products were cultivated experimentally and a great deal of valuable data accumulated.

4. Livestock. North Borneo was self-supporting in meat and exported livestock to neighboring countries. Exports in 1939 consisted of cattle, pigs, and poultry totaling 7,223 head. Herds of cattle, buffalo, and ponies were kept on the west coast. Goats were found in most villages and Chinese and non-Mohammedan tribes reared domestic pigs. TABLE IX - 26 shows the estimated number of livestock in British North Borneo as of 31 December 1938.

TABLE IX - 26

NUMBER OF LIVESTOCK IN BRITISH BORNEO
31 DECEMBER 1938

	Water Buffaloes	Cattle	Pigs	Goats	Sheep
East Coast Residency	1,781	5,479	5,783	1,389	63
West Coast Residency	45,178	17,632	29,174	8,224	4
Total	46,959	23,111	34,957	9,613	67

(*b*) *Fisheries.* (FIGURE IX - 12). Fish abound in the waters surrounding North Borneo. Dried and salted fish ranked next to timber and rubber in the list of exports. Fishing gave employment to large numbers of natives and Chinese; the former caught and sold fresh fish in local markets; the latter collected, salted and cured fish for export, chiefly to Hongkong.

The Borneo Fishing Company, a Japanese Company with its headquarters at Tawau, operated from Si-Amil and Banguey Islands, the latter station having been established in 1938. The company exported tinned and dried tunny fish, principally to Japan.

(*c*) *Food processing, refrigeration, and storage.* There were no large-scale facilities for processing, refrigerating, or storing foods. Information on small installations is meager, but it is known that there were ice factories at both Sandakan and Jesselton. In 1937, there were 19 rice mills operating intermittently. The largest mills were reportedly located at Jesselton, Papar, and Penampang (FIGURE VII - 39). The Borneo Milling Company operated at Jesselton. During 1937, about 88,027,982 pounds of unmilled rice were processed, the equivalent of about 14,200 long tons of milled rice.

(2) Water supply (Northeastern Borneo).

(*a*) *General.*

1. Natural availability. No water shortage normally occurs in northeastern Borneo, since the rainfall is fairly evenly distributed and there are many rivers and streams. However,

FIGURE IX - 12. *Sandakan, British North Borneo.*
Small fishing village. 1938.

there are occasional periods when the rainfall is below normal in some places, with a consequent decrease in the supplies in the wells on which many people depend.

Water for domestic purposes is obtained from rivers, springs, shallow wells, and small rain water catchment basins. It is usually taken from a stream each morning in a bamboo vessel, or sometimes piped to the house from the nearest spring by means of a split bamboo aqueduct. Coastal villages generally obtain their supply of water from unprotected surface wells.

2. Developed sources. Some of the port towns, Jesselton and Sandakan, for instance, have municipal water supplies which are sufficient for the normal population and the ships which occasionally call. The supply might be inadequate for a large number of troops. At some ports ships can not obtain water, as there is said to be only enough for shore use.

3. Use. As late as 1937, there were no water purification facilities; it is doubtful whether any have been provided since that time. All water supplies, therefore, regardless of their source, should be considered unsafe, and should be consumed or used for bathing only after proper treatment or after repeated bacteriological tests have proved their safety.

(*b*) *Specific.*

1. Towns.

JESSELTON. According to the latest reports (1933), the water supply for Jesselton comes from a reservoir 4 miles from the town. Water suitable for boiler purposes is laid on to the pier and can be taken from any berth. The flow during the days is weak, but after dark 1,000 to 1,500 gallons per hour can be taken. Drinking water should be boiled before use.

The mean annual rainfall is 102.5 inches. October is the wettest month, with an average of 13.2 inches, and February and March are the driest months, with 2.9 inches and 3.0 inches respectively.

KUDAT. Water of rather poor quality is laid on to the jetty. On the eastern shore of Marudu Bay, at Mempakad and the Bengkoka River, excellent water can be obtained. The average annual rainfall is 96.7 inches, nearly half of which falls from November to January.

LAHAD DATU. There are many streams which intersect the lowland in the vicinity of Lahad Datu. Water is supplied to the village by a pipe line from a small creek about ¼ mile away. The pipe line is not extended onto the pier. The water must be boiled before use.

SANDAKAN. A new waterworks was built in 1921. It was designed to give a minimum daily supply of 180,000 gallons of filtered and sterilized water. The water should nevertheless be tested before use. Water for drinking purposes is obtainable from a hydrant on the government pier.

SESAJAP LAMA. The population drinks the water from the Sesajap River. Near the resthouse there is a small concrete tank used for rain-water catchment.

SEMPORNA. Good water is obtainable from wells about ½ mile from the pier.

TANDJOENG REDEB. Drinking water is available.

TANDJOENG SELOR. Drinking water is available.

TARAKAN. There are water pipes on wharves, but the drinking water is of poor quality.

TAWAU. Well water is usually available. It is not, however, suitable for drinking purposes.

TELOEKBA JOER. There are large quantities of good water.

2. Off lying islands.

BALAMBANGAN ISLAND. There is good drinking water on the east side of Balambangan at 2 inlets known as North and South Harbors.

TATAGAN ISLAND. The natives of Tatagan Island, on the south side of Darvel Bay, obtain their water from a spring close to the beach near the southwest point of Pulo Gaya.

TIMBU MATA ISLAND. Water can be obtained from a small spring near the southern extremity of Tanjong Timbu Mata, close to the sea. This is apparently the favorite watering place of the natives.

3. Bays.

KIMANIS BAY. The water of Kuala Penyu (Kapela), is stated to be fresh near its source.

TAGASSAN BAY. Good water can be obtained from a well close to the beach near the village of Pakalangan.

USUKAN BAY. Water is obtainable from the streams at the head of the bay, except following a long drought.

(3) Construction materials.

(*a*) *Wood.* Timber is one of the principal natural resources of British North Borneo. There is ample timber for construction (Topic 95, A, (4), (c), 1).

(*b*) *Other forest products.* The stems, leafstalks, and leaves of sago palms are employed in the construction of buildings. Other forest products have also been used. The Nipa Palm is utilized for thatching roofs. Rattan is used for certain types of furniture, and in mat and basket making.

Information concerning deposits of clay, sand, and gravel is not available.

(4) Industrial raw materials and primary processing.

(*a*) *Minerals.* Copper, antimony, chromite, gold, iron, manganese, cinnabar (mercury ore), platinum, and tin are known to exist in British North Borneo but have not been exploited to any extent.

(*b*) *Fuel.*

1. Coal. Small quantities of coal were produced and exported until 1935. Besides petroleum, coal is the only mineral known to exist in workable amounts. Coal seams occur near Weston on the west coast, in Marudu and Sandakan Bays, and in the Selimpopon valley behind Cowie Harbor. Fifty-eight outcrops of coal are reported to have been found near Cowie Harbor, (FIGURE VII - 39), including one called the King seam, which contained a pure bituminous coal. The total supply in this area was estimated at 98,000,000 tons. Mining in the Cowie Harbor area ceased temporarily in 1931, a year in which 29,000 tons of coal were produced. It was evidently resumed later, for it has been reported that a modern plant was installed and coal towed to Sebatik Island where it was picked up by ocean-going steamers. In view of the Japanese need for coal in Southern Asia, it is believed that Japan has been developing coal mining in British Borneo.

2. Wood. There is abundant wood available for fuel in British North Borneo (Topic 95, A, (4), (c), 1).

3. Petroleum. Petroleum seepages have been noted in many places, particularly in the Klias peninsula and in the neighborhood of Kudat and Cowie Harbor. A concession covering 10 square miles on the Klias peninsula was leased in 1922 to the Kuhara Mining Company (Mitsui interests) of Tokyo. Deep boring revealed oil of good quality but not in commercial quantities and subsequently the lease was surrendered. A sublease for 400 square miles on the Klias peninsula was granted in 1924 to Singapore Oil Syndicate (Royal Dutch Shell). Prospecting operations have been carried on by the Anglo-Saxon Petroleum Company, Ltd., throughout the state since 1934, and a general reconnaissance of British North Borneo by aerial photography was conducted in 1937. Although the oil in this area is of good quality, it does not exist in sufficient quantity to encourage extensive operations.

(*c*) *Agricultural and marine materials.*

1. Lumber (FIGURES IX - 13 and IX - 14). The timber resources of British North Borneo are extensive, and timber was an important export. The principal varieties of timber are as follows:

Seriah, or Borneo cedar, a soft light wood, which is the most abundant. Some of the species of this cedar produce resin in considerable quantities.

Kruin, a moderately hard timber and the second most abundant wood in the country.

Urat Mata, or white cedar, is plentiful.

Camphor, or Borneo Camphor wood, a moderately hard and heavy grain timber, good for all classes of construction and abundant.

Selangan Kacha, a moderately strong straight-grain wood, is widely distributed over large areas.

Billian, or Borneo iron wood is very hard and durable and is the best known and most highly regarded Borneo timber.

Selanga Batu, a very hard and heavy wood.

Mirabau, a cross-grain, durable and attractive wood, is available in moderate quantities.

Mangaras, a very hard, heavy, and cross-grained wood, from one of the largest trees of the forests, not particularly durable, but burns readily.

Prian, an iron wood, is found in abundance in Borneo. The Japanese claim to have recently succeeded in utilizing this wood for making rivets, nails, hoes, spades, and other farming implements.

The principal companies engaged in the timber industry were the British Borneo Timber Company and the North Borneo Trading Company. There were smaller Japanese and Chinese interests. There were 2 Chinese timber companies operating from Sandakan, the Yong Soon Company, and the Shing Kee Company. A Chinese firm ran the Jesselton Sawmill. At Sandakan, there were 2 large steam-driven sawmills which have been in operation for a number of years. In 1940, a new modern band sawmill and an electrically driven sawmill were reported.

2. Other forest products. Dammar, used in preparing varnishes, drying oils, and cutch used in tanning, and dyeing, were exported. Cutch or mangrove extract was prepared at Sandakan by the Bakau and Kenya Extract Co., Ltd. (FIGURE VII - 39). Small quantities of gambier had been produced on an experimental scale.

3. Rubber (FIGURE IX - 15). In common with the rest of the Malay archipelago, British North Borneo was a rubber-producing country. Along with the lumber and fishing industries, the rubber industry was one of the main employers of labor. In 1940, rubber accounted for more than 70% of total exports with some 18,000 tons produced. This amount could have been much greater had there been no international restriction on rubber production.

FIGURE IX - 13. *Sandakan, British North Borneo.*
Britist Borneo Timber Co. Sawmill.

FIGURE IX - 14. *Sandakan, British North Borneo.*
North Borneo Trading Log Pagar.

FIGURE IX - 15. *Sandakan, British North Borneo.*
Man Woo Loong's rubber plantation.

Most of the rubber companies were British; a few were Japanese. The Chinese and natives cultivated some rubber on a small scale. The principal rubber areas were around Sandakan, Jesselton, Paper, Lahad Datu, and Tenom. Near Tenom were 2 large rubber estates, the Melalap and Sapong. Beaufort, 56 miles from Jesselton, was a rubber and sago center, and at Tawau large areas of land had been devoted to the cultivation of rubber and coconuts.

4. Fibers (FIGURE IX - 16). Small amounts of cotton have been cultivated experimentally. The Japanese Kuhara Estate at Tawau undertook the cultivation of manila hemp as well as indigo, cocaine, and other tropical products. The area devoted to hemp and production of hemp increased in the years immediately preceding the war. In 1939, about 532 pounds of rope were exported.

Some sisal has been cultivated in the vicinity of Sandakan and a little kapok has been produced and exported.

5. Tobacco. Tobacco cultivation used to be the leading industry of North Borneo. Wrapper leaf tobacco for cigars has been grown in North Borneo since 1883. The industry collapsed some years ago because of adverse market conditions, but planting on a smaller scale was resumed after 1937 in Darvel Bay. In 1939, there was only 1 tobacco estate in operation, the Darvel Tobacco Plantations, Ltd. Some 479 acres were planted to tobacco and 433,553 pounds were produced. Natives of the Ranau district in the interior were engaged in tobacco cultivation quite extensively. They had grown their own tobacco long before Europeans introduced wrapper leaf tobacco.

6. Coconut products. Coconuts were grown both for domestic food and for export as copra and coconut oil. (FIGURE IX - 17). The area under coconut plantation has expanded in recent years. Coconuts grow best in the east coast and Marudu Bay regions. The principal market for copra and coconut oil was Singapore.

TABLE IX - 27 shows the acreage and production of the principal agricultural products for 1938.

(5) Manufacturing plants.

There was only 1 small manufacturing plant in British North Borneo, a cutch factory at Sandakan. The British Borneo Timber Company engaged in shipbuilding on a very small scale. The Japanese have claimed that a "certain shipbuilding yard" somewhere in North Borneo is producing a large number of standard wartime wooden ships. It is possible that the sawmills previously mentioned contribute to this industry.

(6) Electric power.

There are only 2 electric power plants known to have existed in British North Borneo prior to Japanese occupation. TABLE IX - 28 shows the characteristics of these plants.

TABLE IX - 27

ACREAGE AND PRODUCTION OF AGRICULTURAL CROPS

DISTRICT	RUBBER		ABACA (MANILA HEMP)		RAMIE		KAPOK		TOBACCO		COCONUTS—PRODUCTION			
EAST COAST RESIDENCY	TOTAL AREA PLANTED ACRES	EXPORTS IN 1938 & STOCK AT END OF 1938 METRIC TONS	AREA ACRES	PROD. METRIC TONS	AREA ACRES	PROD. METRIC TONS	AREA ACRES	PROD. METRIC TONS	AREA ACRES	PROD. METRIC TONS	AREA ACRES	COPRA IN METRIC TONS	OIL IN METRIC TONS	NUTS IN PIECES
Tawau	14,450	2,381	4,787	1,281	20	4	—	—	—	—	11,881	2,801	130	11,994,451
Lahad Datu	3,160	249	—	—	—	—	—	—	416	138	8,852	1,292	39	4,360,083
Sandakan	—	—	—	—	—	—	—	—	* —	—	5,445	815	14	4,028,336
Kinabatangan	12,184	942	22	—	—	—	—	—	—	—	308	30	—	—
Labuk & Sugut	—	—	3	—	—	—	—	—	—	—	900	28	—	94,750
Kudat & Marudu	5,287	657	—	—	—	—	—	—	70	11	16,357	2,861	—	5,676,778
TOTAL	35,081	4,229	4,812	1,281	20	4	—	—	486	149	43,743	7,827	183	26,154,378
WEST COAST RESIDENCY														
Mempakul	3,037	61	—	—	—	—	—	—	—	—	3,721	105	30	9,500
Sipitong	6,227	160	—	—	—	—	—	—	—	—	480	—	1	20,000
Beaufort	23,745		—	—	—	—	—	—	—	—	1,226	—	—	46,968
Papar	17,965		—	—	—	—	—	—	—	—	1,427	85	60	2,200
Jesselton, Inanam & Menggatal	17,716		—	—	—	—	5	1	20	7	673	32	54	2,500
Penampang (Putatan)	5,200	7,626	—	—	—	—	—	—	—	—	546	1	—	1,000
Tuaran	7,303*		—	—	—	—	300	1	250	8	604	151	—	62,500
Kota Belud	404		—	—	—	—	100	1	4	—	587	3	—	—
Tenom	9,370		—	—	—	—	—	—	—	—	—	—	—	—
Keningau	504		—	—	—	—	—	—	55	3	12	—	—	—
Pensiangan	88		—	—	—	—	—	—	—	—	10	3	1	10,000
Tambunan	—		—	—	—	—	—	—	350	20	—	—	—	—
TOTAL	91,559	7,847	—	—	—	—	405	3	679	38	9,286	380	146	154,668
GRAND TOTAL	126,640	12,076	4,812	1,281	20	4	405	3	1,165	187	53,029	8,207	329	26,309,046

*This figure is not included in the total exports.

TABLE IX - 28

ELECTRIC POWER PLANTS, BRITISH NORTH BORNEO

Characteristics of System

LOCATION	NAME OF PLANT	OWNERSHIP	KW CAPACITY	TYPE	PHASE	CYCLE	CONSUMERS' VOLTAGE	CLASS OF PLANT
Jesselton	The Jesselton Ice & Power Co., Ltd.	Private	366	D.C. A.C.	— 3	50	230 230	Diesel
Sandakan	Sandakan Light & Power Co.	Private	700	A.C.	3	60	110-220	Steam

(7) Commerce.

The principal item in British North Borneo's export trade was rubber. Other commodities were timber, cutch, hemp, dried and salted fish, tobacco, firewood, copra, coconuts, and dammar. The principal imports were rice and various small manufactured goods such as textiles, metal wares, machinery, medicines, and chemicals (TABLE IX - 29). Exports went largely to Singapore and Hong Kong for trans-shipment to European countries. The prosperity of northern Borneo, insofar as the European population was concerned, depended upon the volume and value of the export trade. Only a small section of the native population derived any benefits in the form of money income from the foreign trade.

TABLE IX - 29

IMPORTS AND EXPORTS, BRITISH NORTH BORNEO (1940)

ARTICLE	UNIT	IMPORTS QUANTITIES 1940	IMPORTS VALUES (SS$) * 1940
Rice, paddy, and bran	Metric tons	18,790.3	1,520,678
Textiles and apparel	Metric tons	——	1,201,211
Provisions	Metric tons	3,796.1	998,104
Iron and metal ware	Metric tons	1,594.0	708,985
Sundries	Metric tons	——	598,518
Tobacco, cigars, and cigarettes	Metric tons	132.4	413,825

EXPORTS			
Rubber	Metric tons	17,904.9	14,444,749
Timber	Cu. Ft.	4,910,028	2,220,892
Cutch	Metric tons	5,430.4	629,908
Hemp	Metric tons	2,885.3	570,547
Fish (dried and salted)	Metric tons	1,896.9	551,528
Tobacco	Metric tons	197.3	435,242
Firewood	Metric tons	79,218.0	392,960
Copra	Metric tons	8,394.3	308,344
Dammar	Metric tons	1,842.9	75,509
Coconuts, fresh	Nos.	751,420	15,050

*SS$1.00 was equivalent to U. S. $0.5678 in 1937-38.

(8) Finance.

The finances of British North Borneo, prior to Japanese occupation, were under the control of the British North Borneo Chartered Company. In 1937, the chief sources of the company's revenues were customs, 43.46%; excise, 13.41%; land revenue, 11.64%; and miscellaneous revenues, 14.61%. Of the actual expenditure for 1937, administration costs took 73.87%; social, medical, and educational services, 14.74%; and economic development, 5.83%.

Prior to Japanese occupation, the unit of currency was the Straits Settlements dollar, which had a fixed value of 2s.4d. (about U. S. $.47 in 1941) and was divided into 100 cents. North Borneo treasury notes were issued in denominations of $25, $10, $5, $1, 50c, and 25c. There was a silver coin of 25c, a nickel subsidiary coinage of 5c, 2½c, and 1c, and a copper subsidiary coinage of 1c and ½c. Banking facilities were provided by the State Bank, with offices in Sandakan and Jesselton.

B. Dutch East Borneo.

(1) Food resources.

(*a*) *Agriculture.* There was little organized agriculture in Dutch East Borneo. The natives depended on rice and natural jungle products for food, both of which were produced and consumed locally. Figures on acreage and production of rice have

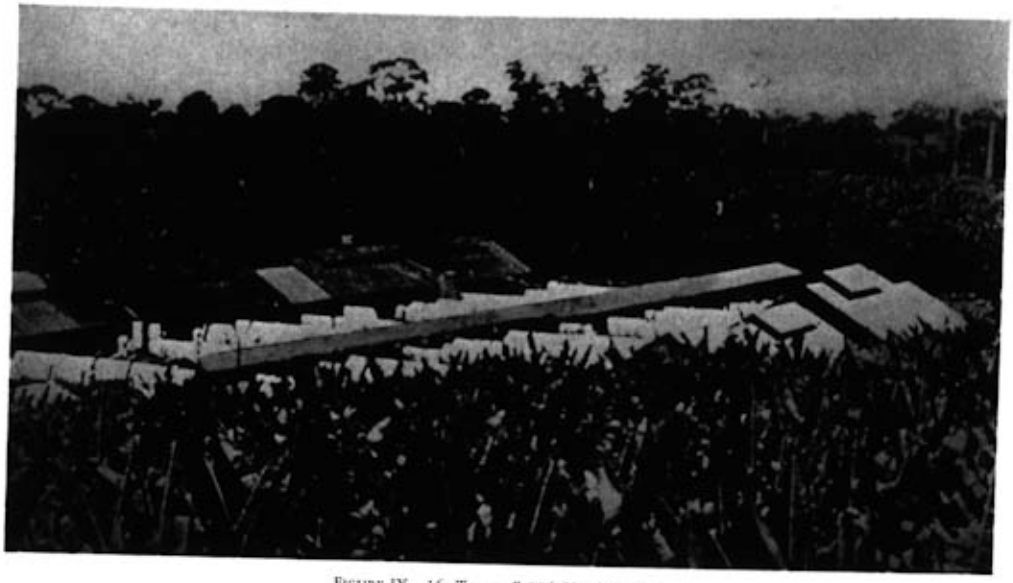

FIGURE IX - 16. *Tawau, British North Borneo.*
Hemp factory.

FIGURE IX - 17. *Labad Datu, British North Borneo.*
Drying copra.

not been obtained, but information concerning the whole of Dutch Borneo indicates that rice paddies covered much of the lowlands in the coastal areas. The dry method of cultivating rice was used. It is believed that the natives also engaged in small-scale cultivation of cassava, sugar cane, sago, areca nuts, peanuts, tengkawang nuts, peppers, mace, nutmegs, and nipa palms, from which vinegar was made.

Dutch Borneo, as a whole, was not self-sufficient in the production of its staple food, rice, before the war. Rice was imported from Java. No definite statement can be made about the adequacy of local food production in the section of Dutch East Borneo covered by this study. An occupying army would certainly find no surplus of rice or other foods.

(*b*) *Fisheries.* The shallow coastal waters and the numerous rivers, lakes, and marshes of the interior provided a great variety of fish. In addition there were pearl fisheries on the east coast along the Strait of Makassar and the Celebes Sea.

(*c*) *Food processing,* refrigeration, and storage. There is no information available concerning the processing, refrigeration, and storage facilities of this area. It may be assumed that small village rice mills existed, probably run by animal or water power.

(2) Water supply.

Information concerning water supply in Dutch East Borneo is given in Topic 95, A, (2).

(3) Construction materials.

(*a*) *Wood.* There is ample wood in Dutch Borneo for construction purposes. Bamboo is the chief building material used by the natives. Chinese and Japanese lumbermen have exported a variety of softwoods in the past. In addition, Borneo ironwood has been used for the construction of marine and other pilings, railway sleepers, and shingles. Borneo teak has been used for very heavy construction work (Topic 95, B, (4), (c)).

(*b*) *Sand, gravel, and rock.* A small sandstone deposit is known to be located in the area of Kongkemoel a little southwest of Tandjoeng Redeb. In the valley of Moearawahau there is a large deposit of tuff, a rock formation sometimes used in the manufacture of cement. It is not known whether either of these deposits was exploited before the Japanese occupation or whether there are any other deposits of stone or of clay, gravel, or lime.

(4) Industrial raw materials and primary processing.

(*a*) *Minerals.* The mineral deposits of Dutch East Borneo have never been thoroughly surveyed or exploited. A small deposit of lead and zinc was known to be located in the vicinity of Seapoen but it was unexploited. The Japanese have claimed the discovery of minerals in Borneo as a whole, mentioning deposits of mercury, manganese, bauxite, molybdenite, iron, lead, and gold. They state that Borneo natives are developing sources of lead, mica, and bauxite. It is not known whether these alleged developments are in the area covered by this study.

(*b*) *Fuels.*

1. Coal (FIGURE IX - 18) and petroleum were the only minerals mined commercially in Dutch East Borneo before the Japanese occupation. One coal mine was operated at Rantaupandjang (FIGURE VII - 39), 16 miles west of Tandjoeng Redeb on the Beraoe river. The coal was suitable for bunkering ships but could not be used for coke. The mine was reported to be well equipped with machinery, and in 1939, the output totalled 303,000 tons.

FIGURE IX - 18. *Tandojoeng Redeb, Dutch East Borneo.* Loading station for coal mines.

2. There was ample wood for fuel (Topic 95, B, (3), (a) and (4), (c)).

3. Petroleum (FIGURES VI - 10 and VII - 39). The most important raw material and fuel produced in Dutch East Borneo is crude oil from the island of Tarakan (FIGURES IX - 19 to IX - 23). About 4,000,000 barrels of crude oil were produced annually before the war. A very small amount of oil was also produced from a small field on the island of Boenjoe (Tanahmerah), but its quantity is negligible from a military standpoint.

Tarakan crude is heavy, containing little gasoline and no kerosene distillate. After salt water has been settled out, it may be used directly as under-boiler fuel oil. Before the war, some Tarakan crude was refined elsewhere to obtain low-quality lubricating oils.

The main Tarakan oil field was located at the village of Pamoesian (also known as Tarakan Village), about 2½ miles from the loading port of Lingkas. Both Lingkas and Pamoesian existed solely for the exploitation of the oil fields. A subsidiary field (Djoewata) was being developed about 6 miles northwest of the main field. In 1941, there were some 600 oil wells in operation and production was at a rate of 16,000 barrels a day. The older wells were pumped; some of the newer ones were self-flowing. About 30 new wells had been scheduled for drilling.

FIGURE IX - 19. *Tarakan Island, Dutch East Borneo.*
Airview of Lingkas. Southern pier and tank farm.

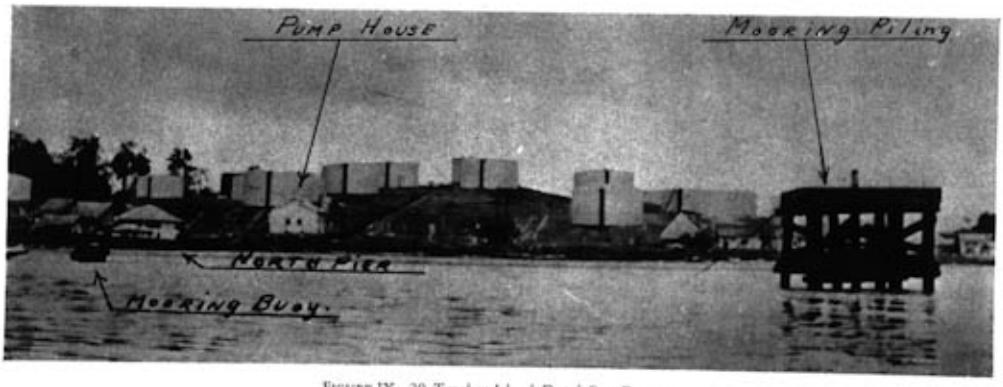

FIGURE IX - 20. *Tarakan Island, Dutch East Borneo.*
Oil installations near north pier at port of Lingkas.

Drilling depths at Tarakan are shallow. Four or 5 producing sands are encountered at depths of from 350 to 1500 feet. The technical problems of producing from 4 or 5 loose sand horizons are numerous, the commonest of which are production of salt water with the crude oil, and frequent sanding of the wells. The field has reached an advanced stage of depletion. Initial production from new wells would vary from 30 to 175 barrels per day, thereafter declining at about 2% a month. Water can be separated out of the oil from all but the wettest wells by simple chemical dehydration in storge tanks or reservoirs.

Installations at Pamoesian consisted of 15 tanks, electrical and separating reservoir, and a pumping station. Lingkas had about 25 storage tanks with a total capacity of about 1,120,000 barrels. Total bulk storage on Tarakan Island was estimated at 1,480,000 barrels. The pipeline ran along the railroad from Lingkas to Pamoesian. There were control valves at the point

FIGURE IX - 21. *Tarakan Island, Dutch East Borneo.*
Airview of Pamoesian oil field.

FIGURE IX - 22. *Tarakan Island, Dutch East Borneo.*
Oil well of Bataafsche Petroleum Company. 1926.

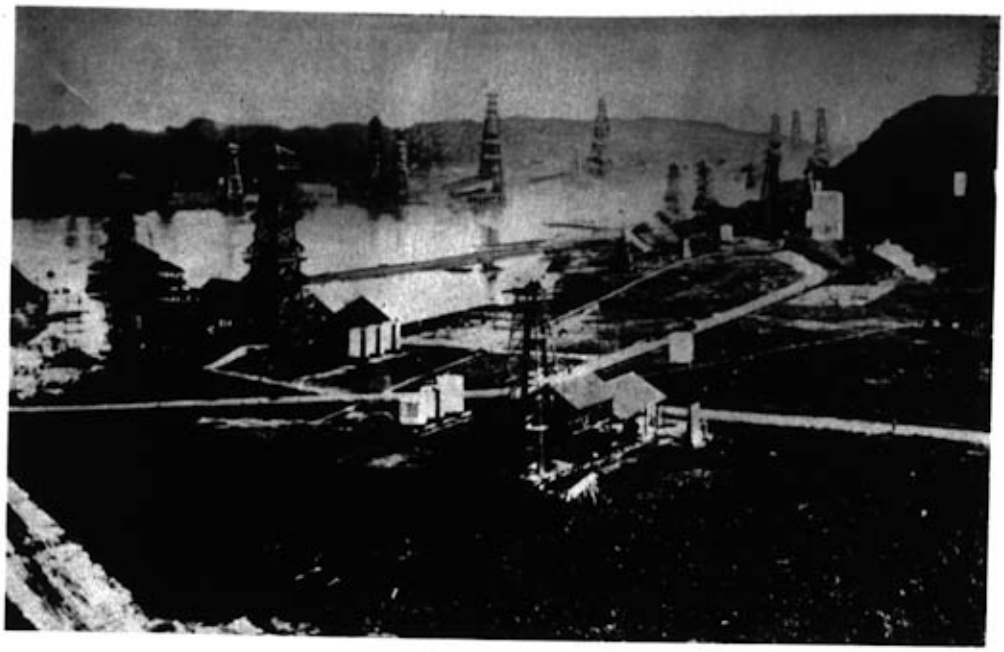

FIGURE IX - 23. *Tarakan Island, Dutch East Borneo.*
Oil wells, probably located at Pamoesian.

where pipes branched off to the 2 loading piers. The southern pier had hose connections and was capable of delivering 2,000 barrels a day.

Tarakan fell to the Japanese in the first half of January 1942. The wells had been completely destroyed and required redrilling. It has been estimated that, in 1944, the Japanese may produce 3,600,000 barrels of crude oil at Tarakan. To carry out the oil production program attributed to the Japanese, it has been estimated that the following amount of material would have been required for installations at Tarakan:

Oilfield equipment and facilities	1,610 metric tons
Tanks	2,340 metric tons
Tubular goods	2,460 metric tons
Cement	2,190 metric tons
Total	8,600 metric tons

(c) Agriculture and marine materials.

1. Rubber. Rubber was the most important agricultural commodity produced in Dutch Borneo. There are no figures on production or acreage of trees which show the amount coming from the northeast area. Only relatively small amounts were probably produced in this region.

2. Miscellaneous forest products. There was no plantation agriculture in Dutch East Borneo. Natives gathered various products from the forests to sell to Chinese dealers who processed them crudely for export. The forest products included gums and resins, such as dammar and jelutong; palm and wood oils, various nuts, cutch, and gambier.

3. Lumber. Timber, with petroleum, is the greatest natural resource of Dutch East Borneo. Behind the coastal areas of Borneo the forests are vast and largely unexploited (Topic 95, B, (3), (a)). Sangkoelirang and Lingkas have been the main ports through which timber has been exported. A number of firms were interested in the felling and export of timber before the war.

Botex (Borneo Teak Exploitation Company), with its headquarters in Balikpapan, handled the exploitation of Borneo teak. The Noenoekan Timber and Trading Company of Noenoekan Island had a staff of 500 lumberjacks (1938). The Nanyo Ringyo Kabushiki Kaisha, a Japanese forest exploitation concern, became interested in Dutch East Borneo in 1934. At first, it purchased timber from the natives in the Tarakan area; it later energetically exploited its own concession in the southern river basin of the Sangkoelirang river. About 10,000,000 cubic metres of lumber were believed to be available for felling in the Sangkoelirang area. At one time, 3,000 natives, including local and immigrant Javanese, Malay, Boetonese, and Makassaran coolies, were employed.

The only available figures on timber production are for 1934, when 23,661 cubic metres were exported from Sangkoelirang, and 18,470 from Lingkas.

(5) Manufacturing plants.

There were no large manufacturing plants in Dutch East Borneo. It is not known what small rice mills, saw mills, ice factories, or similar facilities existed.

(6) Electric power.

No large electric power plants existed in the study area. Small

plants were established by the following companies (FIGURE VII - 39): the N. V. De Bataafsche Petroleum Mij. at Tarakan; Moelia Bioscoop at Tandjoeng Redeb; N. V. Houtaankap Mij. at Noenoekan and Tarakan, and N. V. Steenkolen Mij. at Parapattan and Teloekbajoer (Rantaupandjang).

(7) Commerce.

Before the war, Dutch East Borneo exported valuable quantities of petroleum, coal, timber, and rubber. In addition, a lively trade in jungle produce (gums, resins, etc.) was carried on at Tandjoeng Redeb and other ports.

Dutch Borneo's imports were far less important than exports and consisted of rice and small amounts of textiles and other small manufactures.

(8) Finance.

Pre-war Netherland Indies currency and the Japanese-imposed currency have been discussed in Topic 91, H.

96. Northern Celebes Sector

A. Food resources.

(1) Agriculture.

Northern Celebes concentrated on the production of copra to such an extent that it was deficient in food crops. Since the Japanese occupation, vigorous efforts have been made to achieve self-sufficiency in food. In spite of these efforts, Northern Celebes' food supply probably remains insufficient for the present population.

(*a*) *Nature of farming areas.* In addition to many native farms, there were some large plantations owned by Europeans, which specialized in the growing of sugar and spices. Coffee, tea, and coconuts were cultivated both on plantations and on small peasant farms. Rice and other native food products were grown only on native farms.

(*b*) *Grains.* The staple food of the natives is rice. Northern Celebes formerly imported rice, chiefly from Southern Celebes and Java. The Japanese have tried to make Northern Celebes self-sufficient in rice and other foods and have said that they were turning over former rubber lands to rice cultivation. Rice has nevertheless had to be rationed by the Rice Board, and recent broadcasts have urged the people to replace 20% of the rice they would normally consume by "sweet potatoes and other vegetables." It is not believed that enough rice is being produced for the present population.

Corn is the second most important grain, and is grown chiefly in the hilly districts. Wheat was formerly of minor importance, but the Japanese are encouraging its production.

(*c*) *Fruits and vegetables.* A considerable variety of fruits and vegetables exists, but in small quantities. Bananas and durians are the most common fruits. Smaller quantities of pineapples, mangosteens, and other fruits exist. The most plentiful vegetables are cassava, sweet potatoes, soy beans, tomatoes, and carrots.

(*d*) *Other food crops.* The starch derived from the sago palm is an important item in the native diet, as are coconuts. Minahasa produces fine spices, especially mace and nutmeg, which formerly were exported. This district was known for the fine quality of its coffee, although the quantity exported was far smaller than that from other portions of the Indies.

Northern Celebes produces about enough sugar for the needs of the population, but is unable to produce salt because of the lack of a fixed dry season. Salt was formerly imported from Madura via Southern Celebes.

(*e*) *Livestock, meat, and dairy products.* In 1939, there were roughly 140,000 cattle in the residency of Manado, used mostly as draft animals, and approximately 25,000 horses, which are small but sturdy and were used as beasts of burden. A certain number of horses were exported to other islands. (FIGURE IX - 24).

Pigs and chickens are the usual sources of meat. Sheep and goats are rare. Although meat is much less important than fish in the native diet, canned meat and milk were imported from Australia and the United States before the war.

(2) Fish.

Fish is second only to rice among native foods. Many varieties can be found in abundance along the shore line. The natives catch them by means of nets or fence-like traps made of bamboo which are shown in FIGURE IX - 25.

The Japanese have used Manado as a fishing base for many years, specializing in tuna and bonito. Mitsui and other Japanese firms had power boats, warehouses and 1 cannery there. Since occupying the Netherlands East Indies, the Japanese have expanded their fishing enterprises in Manado.

(3) Food processing, refrigeration, and storage.

As mentioned above, the Japanese had 1 cannery in Manado before the war. In 1939, there were 9 ice factories, 2 coffee-hulling and roasting plants, 3 coffee processing plants, and 3 mineral water plants in the residency of Manado. In view of the importance of Manado and Gorontalo as ports for the whole area, it is probable that some of the above mentioned plants are in these 2 cities.

B. Water supply.

(1) General.

(*a*) *Natural availability.* Surface water supplies in North Celebes are generally abundant, but the quality of the water is doubtful. The numerous short streams which descend from the interior mountain range have clean drinkable water near their sources, but in the lower courses the water is often brackish or too silt-laden to be used for drinking. Artesian water is not found in large quantities, but there are several springs in the volcanic sections of the area.

(*b*) *Developed sources.* In 1939, Manado had a waterworks system, operated by the municipality, which provided drinking water. There were 22 kilometers of pipe supplying 1,491 private consumers, 113 services to plants, and 40 public hydrants. The total water distribution for that year was 317,000 cubic meters. The reservoirs for the city water supply were located in the mountains and were fed by springs and rain.

(*c*) *Use.* In addition to its use for human consumption, water is widely used for irrigation of rice and sugar fields in north Celebes. Great demands upon water supplies are made by the ricefields during the dry season. Runoff from the fields is laden with silt, and therefore the water is of little use for anything but irrigation. All water should be checked for purity regardless of the source.

FIGURE IX - 24. *Near Gorontalo, Northern Celebes.*
Scene along shore of small lake inland.

FIGURE IX - 25. *Near Gorontalo, Northern Celebes.*
Natives using fish traps made of bamboo in stream between lake and Gorontalo.

(2) Specific.

(a) Towns.

1. Boeol. Good water can be obtained from the Boeol River.

2. Gorontalo. Water is bad and difficult to obtain. No facilities exist for supplying it to vessels; however, in emergencies, the ships sent their boats to the river and collected boiler water. This method can not be relied upon, as the river often runs dry during the east monsoon.

The annual rainfall is 47 inches, and September is the driest month.

3. Kema. The water from the river is fit for use.

4. Koeandang. Water is not mentioned in the discussion of supplies in various sources.

5. Likoepang. The water in the river is good.

6. Manado. In addition to supplies from the waterworks (Topic 96, B, (1), (b)), water can be taken from the Manado river, but boats must go upstream beyond the first bend to obtain good quality water. A water conduit from which vessels could supply themselves with washing and boiling water was provided, free of charge, from a well in the vicinity. Drinking water was brought alongside in a steam tug (18 tons capacity), but this operation is difficult with any sea running, and is said to be impossible in the west monsoon.

The annual rainfall is 105 inches. The wettest part of the year is the period from December to February, and the driest months are August and September.

7. Moëetong. Moëetong village is on the bank of a small fresh water stream.

8. Santigi. Drinking water is available.

9. Taipa. Fresh water is obtainable from the little Salo Taipan.

10. Tinombo. Fresh water may be obtained from a small river.

11. Tilamoeta. Water is not mentioned in the discussion of supplies in various sources.

12. Kampoengbaroe. In 1939, the government drinking-water works supplied 8 persons, 3 services to plants, and 1

public hydrant through 1.1 kilometers of pipe. The water is taken unpurified from the river.

13. Tondano. Water from Tondano Lake is probably the source of supply for the 10,000 inhabitants of this town.

14. Totok. Water is not mentioned in the discussion of supplies in various sources.

(*b*) *Off lying islands.*

1. Mapoeti Island. There is no fresh water.
2. Pangalasiang Island. There is no fresh water.
3. Talise Island. Drinking water is scarce.

(*c*) *Bays.*

1. Djiko Bilangan. Owing to the absence of streams of any size, water is not obtainable.

2. Limba Bay. No rivers discharge into the bay, but water can be obtained from a spring, and good drinking water from a well as the *kampong* on the north side of the bay.

3. Talise Road. Good water is obtainable from a spring.

(*d*) *Lakes and Rivers.*

1. Dampelas Lake. Fresh water.
2. Limboto Lake. Drinking water is available.
3. Moiniet River. Near the mouth of the Moiniet River warm water flows from the earth at several places. It is clear and hot, tastes bitter, and smells of sulphur.
4. Tondano Lake. Drinking water is available.

C. Construction materials.

The principal construction material available is lumber, of which there is a moderate supply (Topic 96, D, (3), (b)). There were formerly no brick or cement factories in Northern Celebes, but the Japanese have recently claimed to be constructing some. They also say that they are building wooden ships and docks which will be able to accommodate and repair large vessels. This work is proceeding in Northern as well as Southern Celebes.

D. Industrial raw materials and primary processing.

(1) Minerals.

(*a*) *Gold and silver.* The most valuable mineral in Northern Celebes is gold. The same ores usually contain both gold and silver. Deposits are found in the vicinity of Totok, Paleleh, Soemelata, and Kombot. The gold was extracted in primitive fashion by placer methods.

(*b*) *Other minerals.* Copper and small amounts of nickel and tin are found near Gorontalo, but are not known to have been exploited before the war.

Sulphur is found in Minahasa, and 2,000 metric tons were exported in 1939. The Japanese claimed in late 1943 to have installed modern machinery for mining crude sulphur in Northern Celebes.

(2) Fuel.

Lumber is the only fuel in the area. There are no known deposits of coal, gas or petroleum.

(3) Agricultural and marine materials.

(*a*) *Plantation products.* Copra is by far the most important export of the area. In 1939, 24,000 metric tons of copra were exported from Manado and 7,000 metric tons from Gorontalo. The Japanese and Germans as well as other Europeans and Indonesians were interested in the copra export industry. Because the Manado peninsula has no definite dry season, the successful curing of copra requires care. Some of the copra produced in the region under scientific supervision was of good quality, but most of it was poorly cured.

Small amounts of tobacco and rubber were exported from the Minahasa area.

Kapok and cotton have been grown and exported in small quantities for many years. The Japanese are believed to be making energetic attempts to increase the production of kapok, cotton, jute, flax, and other fibers in the Celebes.

(*b*) *Forest products.* Northern Celebes is fairly densely forested. There are moderate supplies of hardwoods, among them ironwood, teak, and some ebony. Rattan is found in the hills. Gums and resins were collected in the forests and exported.

E. Manufacturing plants.

Before the war, Northern Celebes had almost no manufacturing industry other than the food processing plants mentioned under Topic 96, A, (3). There was a small machine shop in Gorontalo and a few plants for the preparation of coconut oil. The Japanese claim to be installing large scale coconut oil plants in Northern Celebes, and to be building docks and wooden ships.

F. Electric power.

There were 4 generating plants, at Gorontalo, Manado, Totok, and Airmadidi (possibly only a transformer substation); and 4 transformer substations, at Tomohon, Tondano, Kema, and Kakas.

Data on the generating plants are given in TABLE IX - 28.

The 3 transformer sub-stations at Tomohon, Tondano, and Kema purchased all their electricity from Manado. If the Airmadidi plant does not have its own generating station, it also gets its electricity from Manado. The Kakas station also evidently purchases electricity, also possibly from Manado.

The entire system operates on 3-phase, 50-cycle AC. Power is transmitted at 15,000 kilowatts except in Manado, where it is transmitted at the generating voltage.

G. Commerce.

The chief exports were copra, coffee, rubber, gums and resins, ebony, gold, mace, nutmeg, and smaller amounts of coffee, cocoa, vanilla, rattan, and hardwoods.

Principal imports were earthenware, glass, flour, iron and steel products, machinery, rice, and foods.

H. Finance.

A description of the currency of the Netherlands East Indies is given in Topic 91, H.

TABLE IX - 31

GENERATING PLANTS, NORTHERN CELEBES

PLANT	TYPE	CAPACITY	ANNUAL OUTPUT	GENERATING VOLTAGE	FACILITIES AND REMARKS
Gorontalo	Diesel	400 hp. 270 kw.	310,000 (1938)	6,000 V.	15,000 V. 3-phase, 50 cycle, 127-220 V. Privately-owned plant offering electric service at night only.
Manado	Diesel	540 kw.	2,141,000 (1939)	Three 300 hp. 6,000 V. units—Manado's electric supply not being stepped-up in voltage.	15,000 V. 3-phase, 50 cycle, 127-220 V. line runs from Manado plant along a highway and by-path to Tondano, Tomohon, Airmadidi, Kema and many smaller hamlets. Privately-owned plant; this plant also supplies Kema, Tomohon and Tondano and possibly Airmadidi.
Totok	?	308 kw.			This station has been reported under construction. It is possible that it is already in operation.
Airmadidi	?				15,000 V. 3-phase, 50 cycle, 127-220 V. Privately owned plant serving the mountain resort of same name; all electricity said to be secured wholesale from Manado plant; possible that Airmadidi now has its own generating plant.

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CHAPTER X

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JOINT ARMY-NAVY INTELLIGENCE STUDY

OF

CELEBES SEA AREA

PEOPLE AND GOVERNMENT

MAY 1944

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PEOPLE AND GOVERNMENT

100. General Description

A. Cultural.

The native inhabitants of the islands of the Celebes Sea area belong to 3 distinct political entities: the Philippine Islands, the Netherlands East Indies, and British North Borneo. They are divided into about 60 to 70 ethnic groups (tribes), each with traditions and linguistic peculiarities. Nevertheless, certain unifying factors make it possible to give the area a general characterization.

(1) Ethnic.

The native inhabitants of the various islands, irrespective of their political affiliation, all belong to Malay-Indonesian stock, with varying degrees of intermixture with Negrito, Melanesian, or other blood.

(2) Religious.

The natives fall into 3 important categories: (a) pagan, (b) Mohammedan, and (c) Christian. The most irreconcilable on religious grounds are the Mohammedans, who can practically never be converted. Pagans are susceptible to conversion either to Christianity or Mohammedanism. Among the Christianized groups, especially in the interior parts of the islands, there still survive many traces of animistic beliefs* and a number of superstitions.

(*a*) *Pagans.* The pagans, whose animistic beliefs largely direct their actions and view of life, have little perspective and understanding of the outside world. Their world is limited by the boundaries of their village or district or by the mountains around them. Logical reasoning and scientific thinking in our sense are not developed. They are, however, practical and logical in their own ways and terms. But their logic is tied up with conceptions of magic and supernatural powers which control the world.

Supernatural forces are envisaged in the shape of deities, spirits, and ancestor souls. Magical power, benevolent as well as destructive, which can also be acquired by human beings (various kinds of priests and medicine men) is still something very concrete. Religious ritual is thus something very practical, since only through proper ritual and appropriate offerings can the welfare of a community or of an individual be assured. Many religious rites, including death rites, call for dances; evil spirits can be chased away through display of arms in war dances; all important events in the people's life, such as birth, death, marriage, planting harvest, hunting, and building a new house, call for different religious ceremonies and offerings, sometimes involving the slaughter of animals. In all the ceremonies the local priests (medicine men) play a leading rôle. Their names vary with locality, but one of their most common designations is *balian* (*ballian, walian*), found in Mindanao as well as in Borneo and some of the Moluccas.

(*b*) *Mohammedans.* The Mohammedan congregation is headed by a priest who officiates at the mosque (*masdjid*, in the Netherlands East Indies). In the towns of the Netherlands East Indies the priests are called *penghulu*, and in the larger centers of Mindanao, *imam*. In the smaller places are Mohammedan clergy of minor rank.

Islam in the Netherlands East Indies is different from the orthodox forms of Mohammedanism as followed in Arabia. Throughout the Mohammedan world of the Netherlands East Indies there is still a strong survival of former beliefs on which the practice of Mohammedan religious worship is superimposed.

Everywhere in the islands covered by this study, *hadjis*, i.e., persons who have made a pilgrimage to the tomb of the Prophet Mohammed at Mecca, enjoy respect and are often influential figures among the adherents of Islam. In the Netherlands East Indies they can be recognized by their white turbans, which only they have a right to wear.

On the whole, the most fanatical, aggressive groups in the regions here studied are found among the Mohammedans. They are also politically minded. In Halmahera government officials considered them "untrustworthy" as regards loyalty to the Netherlands East Indies government.

(*c*) *Christians.* Missionaries have been active in the Archipelago for centuries. Catholic as well as Protestant Missions established churches and schools, and changed the religion as well as the living habits of the native population converted to Christianity. Introduction of "proper" (European) clothing was one of the results. The abolition of native forms of music and dancing, especially in areas influenced by the Protestant mission, was another.

Minahasa, in the northern part of Celebes, with Manado as center, is one of the strongholds of Christianity in Indonesia. Amboina is another. It is from here that most of the Netherlands East Indies police force and army was recruited.

Christianized Indonesians are more pliable and compromising than the Mohammedans. They aspire to white-collar positions, make good clerks, policemen, and supervisors. A number of them become school and mission teachers. They are inclined to be meticulous in the performance of their duties.

(3) Social.

A typical social stratification exists: a native aristocracy; a middle class composed mainly of descendants of mixed marriages (Eurasians or Indo-Europeans in the Netherlands Indies, and Mestizos in the Philippine Islands); an important section of the Chinese (mostly engaged in trade); Arabs and other immigrant Asiatics; a large body of land cultivators (indigenous villagers); a number of fishing and seafaring people; and laborers and coolies who are relatively few and, in the Netherlands East Indies, largely imported from elsewhere.

(4) Cultural.

The inhabitants of the whole region can be viewed in terms of their geographic location, i.e., whether they live on the coast or inland. The most advanced, educated, enterprising, commercially-minded, and politically conscious people are found along the coasts, especially in the more important ports and coastal

*Beliefs that animals and inanimate objects, as well as human beings, have consciousness or souls.

towns. Throughout history they have had contact with the outside world, first, through inter-insular trade, which continues to the present day. Later, they were exposed to influences which came with Chinese, Arab, and other Asiatic traders, and their religion and cultural institutions were changed (as in the case of Mohammedanism). Finally, after the first contact with the West at the beginning of the sixteenth century, these coastal centers bore the brunt of every conquest and then were gradually drawn into international commerce. Owing to their strategic and commercial significance, these places were most exposed to Western influences brought mainly by Portuguese, Spaniards, and the Dutch; they adopted to some degree elements of our technical civilization and had contact with European ideology. In this respect, Manado (Menado) in north Celebes, which is almost wholly Christianized, is one of the most "acculturated" places in the Netherlands East Indies, and is sometimes called the "twelfth province of Holland."

In contrast with the inhabitants of coastal centers, the native population of the inland areas is usually predominantly pagan, and sometimes nomadic. These people are largely uneducated and primitive in agricultural methods as well as in living habits.

Western modes of thought, to which the Mohammedans are much closer than the pagans, do not apply at all to the islanders. The people are not "ambitious" in our sense. They have no concept of progress, and being still in a pre-industrial and sometimes even pre-agricultural stage, are rather "backward-looking" than "forward-looking." Their eyes, figuratively speaking, are turned more toward the past than to the future, and that is why tradition is important to them. The forward-looking elements among them, if still pagan, are exceptional.

(5) Administration in relation to local customs.

In dealing with the local population, it is important to be aware of the most vulnerable points in the people's religious and cultural traditions.

Under Netherlands rule, meticulous attention, founded on far-reaching and profound studies, was paid to local traditions, customary law (*adat*), and religious institutions. Whether the Japanese, knowingly or unwittingly, have infringed upon the local mores and customs, and to what extent, cannot be established with certainty. One may be sure, however, that such violations would provoke animosity.

Throughout the Archipelago there are sacred places, burial places, places of worship, sacred objects, and holy heirlooms kept in houses, of varying shape and location, depending on the particular ritual practises of a given pagan tribe. Trespassing on sacred grounds, and touching or handling holy objects may be the cause of vengeance, not necessarily open. The offender or offenders may perish by the "wrath of spirits or gods."

Mohammedan mosques and prayer houses, Chinese temples and cemeteries, holy graves of Mohammedan kings and saints, and burial grounds in general, all belong to the category of places to be treated with care.

(a) Some key persons in the native population. Any extraordinary measures during military operations and in emergency when the cooperation of the local population is essential, could perhaps be best effected through the mediation of local "key" people whose loyalty to the Allies has been established beyond doubt. "Key" persons in inland areas are tribal chiefs, village heads, priests, and teachers. In urban communities the Mohammedan priests and *hadjis* (ex-pilgrims to Mecca) are influential in the Mohammedan community and among the Arabs; Chinese communities are organized, as a rule, and in the Netherlands East Indies their leaders are known as "captain" or "major" (*kabp-teyn, miah-yobr*) of the Chinese.

Since it may be assumed that European missionaries were all interned by the Japanese, the next most influential person in Christianized communities would be the native mission teacher, if left unmolested.

(6) Linguistic.

The various ethnic groups are separated linguistically, even though their languages often belong to the same family. Yet for all purposes of communication in the sphere of business, work, and administration, there is a common language. In the islands of the Netherlands East Indies and in British North Borneo it is Malay. In the Philippine Islands it is English. This does not mean that everyone in the Netherlands East Indies islands speaks or even understands Malay, although most of the people along the coasts do. Inland, one will always find someone who speaks or understands; key people in this respect are teachers (*guru*), officials, police, and often heads of villages (*kapala kampong*). Similarly one will always find people who speak or understand English (or Spanish) in the islands of the Philippines.

Yet, for effective first-hand contact with any group anywhere, it is most desirable that some linguistically gifted persons be assigned to acquire knowledge of the local language. This is especially important for long-range programs.

Official proclamations, announcements, and regulations should be edited by trustworthy translators or interpreters in the local language, and also in Malay and English in the Netherlands East Indies and Philippine Islands respectively. But since, even if literally translated, the proclamations remain essentially American in concept and wording, it would be advisable to have immediately under the official text a short summary, interpreting for the benefit of each individual local inhabitant in simple terms what precisely he is expected to do and not to do. Thus, in Mindanao, orders, proclamations, etc., should, if possible, be issued in Cebu-Visayan and Magindanao-Maranao; in Sulu, in Tao-Sug; in the islands of the Netherlands East Indies, most of the literate population can read Malay, and it might be advisable to have the texts published both in Dutch-Romanized as well as in Arabic (Djawi) script. In sections where the population is predominantly illiterate, orders may be given to announce the regulations orally in the local language, through village heads, chieftains, or district officials.

B. Government.

The pre-occupation systems of government in the islands of the Philippines, the Netherlands East Indies, and in the part of British Borneo covered here differ.

(1) Mindanao and Sulu.

Mindanao and Sulu were largely administered by a Commissioner appointed by the President of the Commonwealth and responsible to the Secretary of the Interior.

Mindanao was divided into 9 provinces, and Sulu constituted 1 province. These provinces were in turn presided over by governors and deputy governors who enforced their authority over the municipal or local units within their respective provinces.

The Mayors or Presidents served as the main means of transmitting government regulations and orders down to the people themselves in the more populated areas. In the less civilized areas the governing authorities made their contacts with the tribal chieftain, headman, or *datu*, and held him responsible for the enforcement of the law and the carrying out of government orders.

(2) British North Borneo.

British North Borneo was ruled by a chartered company, the British North Borneo Company, under the jurisdiction of the High Commissioner of Malaya. Before the occupation, it was administered by a governor, and divided into 4 residencies, each headed by a resident. These were subdivided into districts, each controlled by a district officer or an assistant district officer. In some cases, Asiatics were used as deputy assistant district officers. Local native chiefs were supervised by European officers.

Details of the administration are given in Topic 105, E.

(3) Netherlands East Indies.

The islands of the Netherlands East Indies were administered by *Binnenlandsch Bestuur* (literally: interior administration, known in the Netherlands East Indies as BB (*bay-bay*), which hereafter will be referred to as "civil administration") with the Governor-General at the head.

(*a*) *Direct and indirect rule.* Throughout the Netherlands East Indies, including the regions covered here, a distinction is made between *directly* and *indirectly* ruled territories.

Directly ruled territories were under direct jurisdiction of the Netherlands East Indies Central Government. Indirectly ruled territories are native states or principalities subject to government control, but headed by native rulers (sultans, radjas). In theory, native states are free in the regulation of their own affairs, but in practise self-government is largely a fiction. (Self-government is designated in Dutch by *Zelfbestuur*, and this term is always found in official publications in connection with indirectly ruled areas). So-called "long contracts" and "short declarations" signed by the Central Government and the rulers of the native states regulated their rights and obligations. In neither case did native states have control over foreign affairs and military defense.

In the Outer Territories, to which the regions studied here belong, the majority of native states were under "short declaration" which removed from their control, among other important matters, harbor police and administration, telegraph and telephones, and prospecting and exploiting of minerals.

Thus the limited rights and strict obligations are carefully set down in the contracts which also provide for the rulers' yearly allowances. Unreliable rulers could be, and were, ousted by the Netherlands Indies Government and dependable radjas appointed in their stead.

Nevertheless, these native rulers, especially direct descendants of ruling lineage, enjoy high prestige and respect on the part of the native population. It is possible that their prestige has even been enhanced during Japanese occupation. It is an open question, however, whether the Japanese have not found it expedient in some cases to remove a native radja who was installed by the Dutch. In cases where a descendant of the ruling house was removed as untrustworthy and a substitute without hereditary title installed by the Dutch, such Japanese action might have proven particularly advantageous for securing the loyalty of a whole group of nobility.

(*b*) *Hierarchy in civil service (Binnenlandsch Bestuur).* In order to visualize the hierarchy within the administrative system of the Netherlands Indies areas covered here, the following list may be of use. It shows the main outline of territorial divisions with the corresponding Dutch civil service officers in charge.

Province, Governor;
Residency, Resident;
Division, Assistant Resident;
Subdivision, *Controleur* (or *Gezaghebber*, i.e., a sort of Commandant);
District, *Demang* (native; other titles are found in different areas);
Sub-district, Assistant *Demang* (native);
Village, Village Chief (in Malay: *kapala kampong*).

The *Controleur* was thus the lowest European civil-service officer and had the greatest share in immediate contact with the native population.

(The Resident, Assistant Resident, and *Controleur* also presided over some local councils).

The basic homogenous unit in native society is the village. The village usually has, in addition to an elected village chief and council, its own elected functionaries, who take care of all aspects of communal village life. Towns have mayors (*Burgomaster*) with a municipal council.

In the territories directly ruled, the Japanese have removed all the government officials except the native chiefs. In indirectly ruled states, the Japanese have left the sultans or radjas and the native chiefs. If the power and influence of native chiefs and local heads has increased in consequence, their fear of losing these may be a factor worth taking into consideration.

(*c*) *Administrative divisions of territories covered.* The Netherlands East Indies areas covered here belong to: Borneo, where the northeastern part of Dutch Borneo, belongs administratively, to Residency "South and East Borneo"; and the Great East province (*Groote Oosten*), which includes all islands east of Sumatra, Java, Madoera, and Borneo. Herein the north arm of Celebes, with the adjoining Sangihe and Talaud Islands, forms a part of the Residency Manado, which extends further south beyond the equator, while Halmahera, with adjacent islands, belongs to the Residency of the Moluccas. Both Borneo and the "Great East" are classified among the "Outer Territories," which include all islands except Java and Madura.

The administrative capitals for these areas are: Makassar, for the "Great East"; Manado, for the Residency Manado; Amboina, for the Residency of the Moluccas; and Bandjermasin, for the Residency "South and East Borneo."

(*d*) *Administration of native states.* In indirectly ruled territory there is also a hierarchy of native officials headed by the ruler. If the ruler is of high rank, like the Susuhunan of Surakarta in Central Java, he is parallelled by a Governor. Less important Sultans will be dealt with by the Resident, which is the case in the "Outer Territories" to which the area studied here belongs. Minor radjas are sometimes dealt with by Assistant-Residents or even *Controleurs*. Native states vary in importance. Some are sizable provinces, some no more than a small district with a dozen villages or more.

A number of native states or principalities are scattered through the area. Of these, the most important historically as well as from the point of view of territory and wealth, is the sultanate of Ternate.

C. Judiciary.

(1) General.

Wherever one may speak of a court (some of the radjas are not much more imposing than a district chief) the question of etiquette deserves attention. Native aristocracy is very conscious of rank and standing and it is always insulting if they are placed in a position of having to deal on equal terms with someone they consider inferior.

For purposes of judicial administration, all people in the Netherlands East Indies are divided into 3 categories: Europeans, natives, and non-indigenous or foreign Asiatics. Japanese were classed with the Europeans. Chinese were in a category by themselves. Eurasians usually were classed with Europeans, unless they were first generation, in which case the wife and children came under the category of the husband. Christian natives were taken care of by separate regulations. Filipinos were also not included in the category of Foreign Asiatics.

Two systems of jurisprudence prevail: Government and Native Jurisprudence. Native Customary Law (*Adat*) has its own crimes, procedure, and penalties.

There are also Mohammedan courts presided over by Mohammedan priests. They handled all family affairs, inheritance, and divorce, according to Mohammedan law.

(2) Native customary law.

By far the most important law for the native population is their own *Adat* (Arabic for "custom"). Under the Netherlands Government the great importance of preserving *Adat* and permitting it to function was recognized and many volumes with extensive detailed studies of the subject were written by expert Dutch scholars. *Adat* law is not uniform and varies from locality to locality. Students have divided the East Indies into 20 *Adat* areas, each with customs different from those of other areas, but in which, nevertheless, van Vollenhoven, the outstanding scholar in this field, discerned certain common elements. *Adat* law is not codified and is administered on principles of fairness and justice. Natives may withdraw themselves from their customary law and submit themselves in whole or in part to European law.

(3) Courts.

Apart from the *Adat* judicial organs and from the religious Mohammedan courts for the native population, there are 3 categories of government courts in the Netherlands East Indies: government courts for Europeans, government courts for Indonesians, and government courts dealing with all population groups. Local justice also exists in the villages, presided over by the head of the village, and may be considered an indigenous court where most petty cases are settled. Cities have municipal courts similar to our police court. Minor cases which cannot be settled in the village are taken to the district chief, who may settle it or await the visit of the *Controleur*, who will administer justice jointly with the native head, and sometimes with the local Mohammedan priest as third, if a Mohammedan is involved.

The most important court for the natives is the *Landraad*, with a prosecutor known as *djaksa*. In the Outer Territories, the chairman is not always a jurist, but frequently a member of the civil administration. The *Landraad* is the general court for civil cases involving natives and criminal cases involving natives and foreign Asiatics. *Landraads* also deal with labor agreements, regardless of the nationality of the parties. In civil cases they have jurisdiction involving amounts of not more than 1,500 Guilders. In a few places in the Outer Territories there are district councils and magistrate courts of the same rank and function as the *Landraad*.

Appeals from *Landraad* decisions were carried to a Council of Justice at Makassar, which had both original and appellate jurisdiction in civil cases involving Europeans and those subject to European and civil and commercial law. Their appellate jurisdiction extended over Europeans as well as natives in civil cases. In criminal cases their appellate jurisdiction extended over Europeans, foreign Asiatics, and natives as well. The Council of Justice could also deal with appeals from *Adat* law cases.

The highest court, situated in Batavia, was the *Hooggerechtshof*, or High Court, which was also charged with the supervision of the lower courts.

The whole judiciary system in the Netherlands East Indies was extremely complex and in a constant state of slow adaptation to the great diversity of ethnic, religious, and national groups.

Offenses among the natives range from petty theft, assault and battery, acts of spite or revenge, divorce cases (the latter would often be handled by *Adat* procedure or by Mohammedan religious courts in case of a Mohammedan), and embezzlement of public or government money to murder. On the whole, however, the native population is law-abiding, though in some regions argumentative. *Adat* provides a solid base for socially ethical behavior, and unless passions are aroused where revenge is desired, whether on account of a woman or of hurt pride ("loss of face"), assault with weapons or magic will not be resorted to freely.

(4) Police and security.

For the maintenance of law and order there were in the Netherlands East Indies under Netherlands rule 4 kinds of police: general police, including government and city police; local police, who were the village police under the control of the village head; field police, a mobile force of well trained and armed men using motorcycles and horses and functioning in rural districts; and armed police, with functions midway between those of the army and those of general police, and usually used in newly pacified areas.

Native states had their own police, who, however, had jurisdiction only over subjects of the native states.

A well-organized and effective secret service, known as *Recherche*, which was under direct supervision of the Solicitor General, worked in close coöperation with the police.

The subordinate personnel of the general police force was largely composed of Menadonese and Ambonese. The hierarchy of the general police was as follows:

> Chief commissary with adjunct commissaries; Commissary first, second, and third class; Under-commissaries; Head superintendents and superintendents; Head agents and head secret service agents; Native district administrators, who had jurisdiction over *Mantris* (*Mantri-politie* is a policeman with subordinate *Opas-politie*, which is the lowest status).

A number of agents and secret service agents and commandants of police posts complemented the force.

The field police, commanded by a commissary with under-

commissaries, included head superintendents and superintendents, agents and secret agents, commandants of police posts, native district administrators, and *Mantris*.

In the divisions of the armed police the ranks were military. On the whole, law and order were maintained most effectively by the general and local police. Field police, while usually patrolling rural districts, were called in to suppress disturbances. Armed police were moved into newly pacified areas, but their function was solely to maintain order. (The function of police in Mindanao and Sulu is treated in Topic 103, G.)

The rural native population may be regarded as armed in the sense that the male population has different kinds of native weapons which are often used for work and their own protection. Chopping knives, sabres, daggers, and lances are valued possessions of the native people in the islands.

D. Political attitudes.

The political sympathies and aspirations of the native peoples in the region covered here cannot be characterized in general terms.

(1) Mindanao and Sulu.

The peoples of Mindanao and Sulu were once under the control of Spain, as was the rest of the Philippines. During this period, the most difficult problem for the Spanish in Mindanao and Sulu was that of dealing effectively with the Mohammedan or Moro population. Moro pirates roamed the seas, striking at will, and on land Moro krisses and bolos were wielded often and fiercely against Spanish garrisons. With the collapse of Spanish rule in the Islands at the turn of the century, the United States succeeded in dealing effectively with the peoples of Mindanao and Sulu.

Military action, combined with shrewd, peaceful persuasion of the peoples, gradually brought about coöperation with American administration in Mindanao and Sulu. Convinced that the Americans were not intent on destroying their own individualistic cultures or interfering with the Mohammedan religion, the Moros, by the 1930's, had come to the point where they were demanding as a matter of choice that American administration of their territory be continued indefinitely. They resent the idea of rule by Filipinos.

(2) Netherlands East Indies.

(a) Japanese activities before the war. Japanese penetration into the area began long before this war. It is known that ever since the first World War, Japanese fishermen, traders, and timber sawers persevered in poor circumstances at various locations in the Indies, especially around the inlets of strategic importance, road junctions, and mountain passes. Photographers, barbers, and employees of commercial firms took part in the general scheme of preparing the invasion. In the area here studied, Manado and the adjacent countryside in Celebes, Tarakan, and Ternate were centers of concentrated Japanese work.

Psychological propaganda was directed at different sections of the population. Well-to-do families were approached with ideas of better and cheaper higher education for their sons in Japan; a trip to Japan cost less than one to Batavia, not to mention the Netherlands. Scholarships for studies in Japan were offered to students; and, in later years as the war drew nearer, even humble families were approached with suggestions to have their children educated in Japan.

The inland villager and coastal fisherman was told that Japan was the benefactor of the Indonesians, supplying cheap Japanese goods. They could not afford textiles produced in Europe, but could easily buy a new jacket for themselves, wife and children from the cheap piece goods Japan brought. Gaily printed cottons from 4 to 12 guilder-cents an *elo*, sneakers at 30 cents a pair, handkerchieves, and shirts, all at a fraction of the prices of goods imported from Europe, were the best proofs of their friendship.

Cheap toys were also good pretexts for propaganda. Metal gadgets in the shape of planes, tanks, submarines, trains, and engines were sold with quiet comments: "You don't know how to make these machines. They are very important. But the Dutch will never teach you. We will."

A Japanese edition of the Koran was published to prove that Japan was an admirer and protector of Islam.

Directives were received from the Japanese Naval staff as to where fishermen should establish themselves. The northeast corner of Celebes was one of the important points.

In Manado, the South Seas Development Company (*Nanyo Takushoku Kabushiki*) began by buying up a Japanese firm. In Bitoeng, a settlement near Tondano lake where hydroplanes alighted, Tounehachi Kobayashi started a kapok plantation; and on the heights of Tomohon, overlooking Manado and the bay, a silk plantation was established. Shunji Egawa settled in Ternate as a shopkeeper and agriculturist. Japanese vessels landing at Manado carried intelligence reports to Palau and Tokyo. Egawa showed particular interest in naval and strategic subjects at Halmahera. The Japanese consul in Manado, Masaji Nonomura, actively participated in the preparation of plans for taking over authority.

There is no doubt that large numbers of Indonesians were aware of or had direct knowledge of Japanese activities. Yet acts of outright denunciation were rare. They listened, sometimes helped, knowingly or unwittingly, and for the most part kept quiet.

E. The reaction of native population to the Japanese.

(1) Mindanao and Sulu.

Since the Japanese occupation, it is unlikely that the Moro groups as a whole have strongly resisted the Japanese or, on the other hand, given them very much coöperation. The attitude of the Moro toward the Japanese has undoubtedly depended upon the degree to which the occupation has affected him. If the Japanese have threatened or destroyed a particular Moro village, that village is likely to be hostile to the Japanese; if another village has been left relatively untouched, it will probably have little feeling about the occupation and the Japanese. The whole question of Moro attitudes seems to revolve largely around the question of self-interest.

There has been some evidence, as time passed, that more of the Moros are beginning to enter into active resistance against the Japanese. The Japanese double-crossed, intimidated, and publicly humiliated too many of the Moros, and word of this began to spread. Japanese garrisons stirred uneasily in their camps, knowing well that with an invasion the Moros would probably miss no opportunity to butcher them to get their weapons, if for nothing else. These Moros will probably welcome an American invasion, particularly if men well versed in Moro customs and attitudes accompany the invading forces and are able to communicate directly with the top Moro leaders at

the outset of the invasion. No general, widespread form of assistance can be depended upon, but material assistance can be lent by numerous Moro groups who remain loyal to the United States and hostile to the invader.

(2) Netherlands East Indies and British Borneo.

The effect of Japanese domination upon the Indonesians of the Netherlands East Indies area cannot be fully evaluated at this time. Much will depend on their standard of welfare and the measure to which it declined.

Of the more important centers, Manado offers a peculiar problem: on the one hand, it is almost wholly Christian, and always known to be among the staunchest supporters of Netherlands rule. On the other hand, a long and systematic preparation of the ground by the Japanese may have resulted in firmly consolidated pro-Japanese centers. The Manadonese and Chinese were among the most politically conscious elements in the region, and should there be resistance or non-coöperation with the Allies there, it would be based more on long-range political considerations than on local belligerency.

In the opinion of representatives of the Netherlands East Indies in this country, Netherlands rule will be welcomed with joy. They offer in support of this opinion reports obtained from natives who escaped to Australia in an American plane, whose pilot was downed but remained undiscovered.

The more general rule, however, among the bulk of Indonesians may well prove to be a policy of "sitting on the fence," waiting to see which side is definitely stronger.

Unless definitely converted to pro-Japanese sympathies and willing to continue working for their benefit even in face of danger, which would not seem possible to any great extent, the predominant attitude may well be one of collaborating with the Allies once they are there, not so much out of positive and convinced sympathy but because it is safer "to keep out of trouble." This does not apply to nationalist-minded intellectuals, such as Mohammedans and Chinese in urban centers, who have more perspective and political consciousness. It may also not apply to some native officials.

It is difficult to judge to what extent Japanese propaganda may have succeeded in persuading Indonesians that in fighting the Allies they would be "defending their own freedom," or how strongly the general anti-white propaganda has affected the natives.

It would seem that, in this respect, special precautions are needed. An intensive psychological warfare campaign with convincing arguments designed to undermine these two principal points may be advisable wherever the good will and active coöperation of the native population is definitely wanted.

A point not to be overlooked is the concentration of the Japanese on the training of youth. The young people may have experienced a thrill in Boy Scout-type organizations where they were being indoctrinated. Boys in adolescent age, especially in urban centers, will be less naïve after Japanese training in military operations and installations. Sharp-eyed local youths might become valuable aids, as well as enemies to watch.

As for Japanese training schools, their concentration on shipbuilding centers, for which they claim to have mobilized large numbers of natives (who were themselves excellent boat builders in the area here studied) may prove helpful to some extent in the problems of skilled labor.

F. Labor.

Only a small percentage of labor was recruited before the war from the local native population. The bulk of laborers was imported. Chinese and Indians were the main sources for immigrant labor in the oil fields, after the Javanese. Plantation workers were also predominantly Chinese and Javanese. In the shipping business, crews, dock-workers, and stevedores, were usually men from the south of the Makassar peninsula, Buginese, Makassars, and people from Boetoeng. Gorontalo is another center of labor supply.

Personnel of the Royal Packet Navigation Company (K.P.M), which was most active in inter-insular traffic and commerce, referred to its crews as composed of *Badjaus,* who are the well-known "sea gypsies" of the Flores Sea regions. The *Badjaus* (probably also intermixed with Boeginese and Makassars) are sturdy and strong, and make excellent stevedores.

As a general characteristic, one may say that Chinese laborers are steady and persevering. Their chief aim is to earn money. Javanese are very accurate, even meticulous and trustworthy, and with proper treatment and understanding can be made into most valuable friends and assistants or foremen. Boeginese and Makassars are more dynamic, forceful, and physically strong. Temperamentally they are more explosive.

The local population, while pursuing its own business and agriculture, is not much interested in earning laborers' wages, and will always have a tendency to return home to its own village. Nevertheless, a certain proportion of them could be induced to work, if pay is satisfactory. Patience will be needed to train them in efficient methods and in organized steady work. Quantity of help will sometimes have to make up for the quality of individual workers.

Evidence of immediate material advantages will probably have the strongest appeal. From this point of view, gold and silver will be most eloquent. The use of silver coins for paying the local population will probably result in greater coöperation. A supply of small presents, such as flashlights, pocket-knives, cigarette-lighters, bright cloth, colored handkerchiefs, mirror disks, aromatic soap or scented water, cigarettes, may also prove very useful for transacting business or securing favors. In some regions, salt is scarce and can be used for barter.

101. Halmahera.

The earliest European power to control the Moluccas, or Spice Islands, was Portugal. The Dutch drove them out of Tidore in 1605, and signed a treaty with the native rulers by which a monopoly was obtained for the whole of the spice trade. The treaty was implemented by the landing of reinforcements, and, in due course, the Netherlanders were accepted offically as the protectors of Ternate. Dutch power increased, and economic reasons drove the Spanish from the Moluccas for good.

In the years after 1866, the Moluccas reached the zenith of their prosperity and attained a splendor unparallelled in the Netherlands East Indies. Prosperity declined as the importance of the spice trade dwindled.

Today Halmahera is primitive and unexploited. The only

"civilization" is found in coastal villages, and the center of culture is on the small island of Ternate. There the court is significant, and Ternate Sultanate controls most of the larger island of Halmahera. In Halmahera there are a number of languages intelligible only locally, but Malay can be used almost anywhere. Most Halmaherans are pagan, fewer are Christians, and Mohammedans are fewest in number. In Halmahera, Ternate, Tidore, and the other offlying islands together, however, it is reported that about 45% are Christian, 35% pagan, and 20% Mohammedan.

A. Population—physical characteristics.

(1) Halmahera.

The Alfoer tribes of northern Halmahera are exceptionally tall and strong. They are the result of a mixture of Malays and Papua-Melanesians. Their physique is robust and well-developed, and the average height of the men is about 5 feet 5 inches. The men are thinner than the women. Skin color varies from a light brown in the Galela area to dark brown in the Kaoe Baai region. Hair ranges in color from a light brown to black, may be straight, wavy, or crisply curled, and is worn long by both sexes. Women roll it at the back of the head, men at the side under colored headcloths. Children's hair is generally shaved off. Many men have moustaches, and the mountain folk are often bearded. The head is round. The face is broad, and cheekbones do not protrude. (FIGURE X - 1). The southern groups are less robust, and closely resemble the Papuans of New Guinea.

FIGURE X - 1.
Halmahera. Native taking raw starch out of a sago palm tree.

(2) Morotai Island.

A large section of the people are Alfoers, similar to the population of northern Halmahera.

(3) Ternate, Tidore, Makian Islands.

These peoples are basically of the same racial stock as the northern Halmaherans, but are so mixed with outsiders that the original type has largely been lost (FIGURE X - 2).

FIGURE X - 2.
Ternate. Native children on beach of northeast coast.

(4) Batjan group.

These people are similar to the south Halmaherans, but now much intermixture is evident. Most of the population has come in from Ternate, Tidore, and elsewhere.

B. Population—cultural characteristics.

(1) General.

The inhabitants of Halmahera are of 3 distinct races: Alfourese, Malays, and Papuans, but in some of the islands they have become so intermixed that it is difficult to distinguish between the races. In addition, there are a number of descendants of the early Portuguese settlers ("orang serani," or Nazarenes) in all the principal towns and villages.

Although little is known about the natives, they are believed to be grouped into at least 30 distinct tribes, differing but slightly in culture and mode of life, though they retain a distinct tribal consciousness.

(2) Distribution.

(a) Halmahera. Halmahera's sparse and primitive population is distributed largely along the coast and lower reaches of the rivers. Inland there are practically no settlements. Villages are clustered chiefly in the western half of the north and central peninsulas, in the east on the plain of Galela, and south from Galela to the Kaoe River. In the northeast the people are principally Tobelos and Galelarese, while on the western shores are Lolodas, Iboes, Sahoes, Waiolis, and Djailolos. The inhabitants of Kaoe Baai are divided into 2 clans, the Kaoe Oetan and the Kaoe Pantai. In the mountains of the east central region

are the Madoe and the Tigoetil. There are many Ternateans along the northwest and eastern coasts. Tidorese are concentrated in southern Halmahera. There are numerous Malay settlements along the coast.

(*b*) *Off lying islands.* Off lying islands are discussed in Table X-1, below.

(3) Numerical data.

(*a*) *Halmahera Island.* The total population is about 56,000, or an average of approximately eight persons per square mile. Sub-districts are populated as follows: Galela, 6,200; Kaoe, 6,700; Tobelo, 8,700; Wasile, 3,300; Djailolo, 6,900; Iboe, 6,900; Loloda, 7,300; Oba, 3,700; Sahoe, 7,200. (FIGURE X - 3)

(*b*) *Off lying islands.*

TABLE X - 1.
POPULATION ON ISLANDS LYING OFF HALMAHERA
(NORTH TO SOUTH)

ISLAND	ESTIMATED TOTAL POPULATION	DISTRIBUTION	REMARKS
Morotai	4,000	Coastal settlements.	Northern half are Tobelorese. Southern half are Galelarese.
North Loloda			4 islands, well populated. Natives known as Lolodas.
South Loloda			3 uninhabited islands.
Majoe			Uninhabited
Hiri	Thickly populated		Hiri is close north of Ternate. Mostly Ternateans.
Ternate	10,000	Coastal settlements. Densest in and around town of Ternate.	Nearly 6,000 in Ternate town.
Tidore	15,000	Coastal settlements.	Scattered villages. Tidore is the principal one.
Moti	No permanent inhabitants.	Kota, on the north coast, is a fairly steady settlement.	Temporary habitation for people from other islands who come to cultivate its fertile soil.
Makian	8,000	Settlements on northeast, northwest, and southeast coasts.	4 large and 12 small settlements. People similar to Tidorese.
Kajoa	300	Main settlement on west coast.	Among the population is a group of *Badjaus* ("Sea Gypsies"), a maritime, boat-dwelling people.
Goraitji Eilanden	Sparsely inhabited.		
Batjan	10,000	Batjan major—coastal settlements, interior uninhabited. Mandioli — coastal villages. Visited by damar collectors and fishermen. Kasiroeta—Palamea is largest village. Interior is uninhabited. Latalata—sparsely inhabited.	About 1,300 are native Batjanese. Present population mostly Alfourese from Halmahera, Tidore, Ternate, etc. There is a group of *Badjaus*.
Damar			Natives live in small villages. They are a mixed race; some are *Badjaus*.
Widi Eilanden	No permanent population.		Visited by fishermen.

(4) Language.

(*a*) *Halmahera.* The northern tribes speak at least 13 mutually unintelligible languages of non-Malayan stock, related to the Papuan tongues of New Guinea. Throughout the remainder of the island, the 7 or more languages are of Malayan stock, belonging to the Nuforese group which spread over the islands between Halmahera and New Guinea. Ternatean is used as a *lingua franca* in much of the northern and extreme southern sections. Although Ternatean belongs to the unfamiliar northern group of languages, many of the Ternateans speak Malay and could therefore be used as interpreters in much of the island, using Malay and their own widely known language. This solution would be useless unless there were men trained in Malay among the Allied forces.

Tidorese, another north Halmahera language, is fairly familiar in the coastal districts of the central part of the island, and interpreters from Tidore could be used here. Actually, standard Malay is little known in Halmahera, except in the largest harbor towns.

(*b*) *Off lying islands.*

1. Ternate. The language is written in Arabic characters. Malay is increasingly used in Ternate, so that linguistic contact with the natives is not difficult.

2. Tidore. The language is closely related to Ternatean, but Malay is well known, especially in the larger towns.

3. Makian and Kajoa. The language is apparently related to the south Halmahera group of Malayan stock.

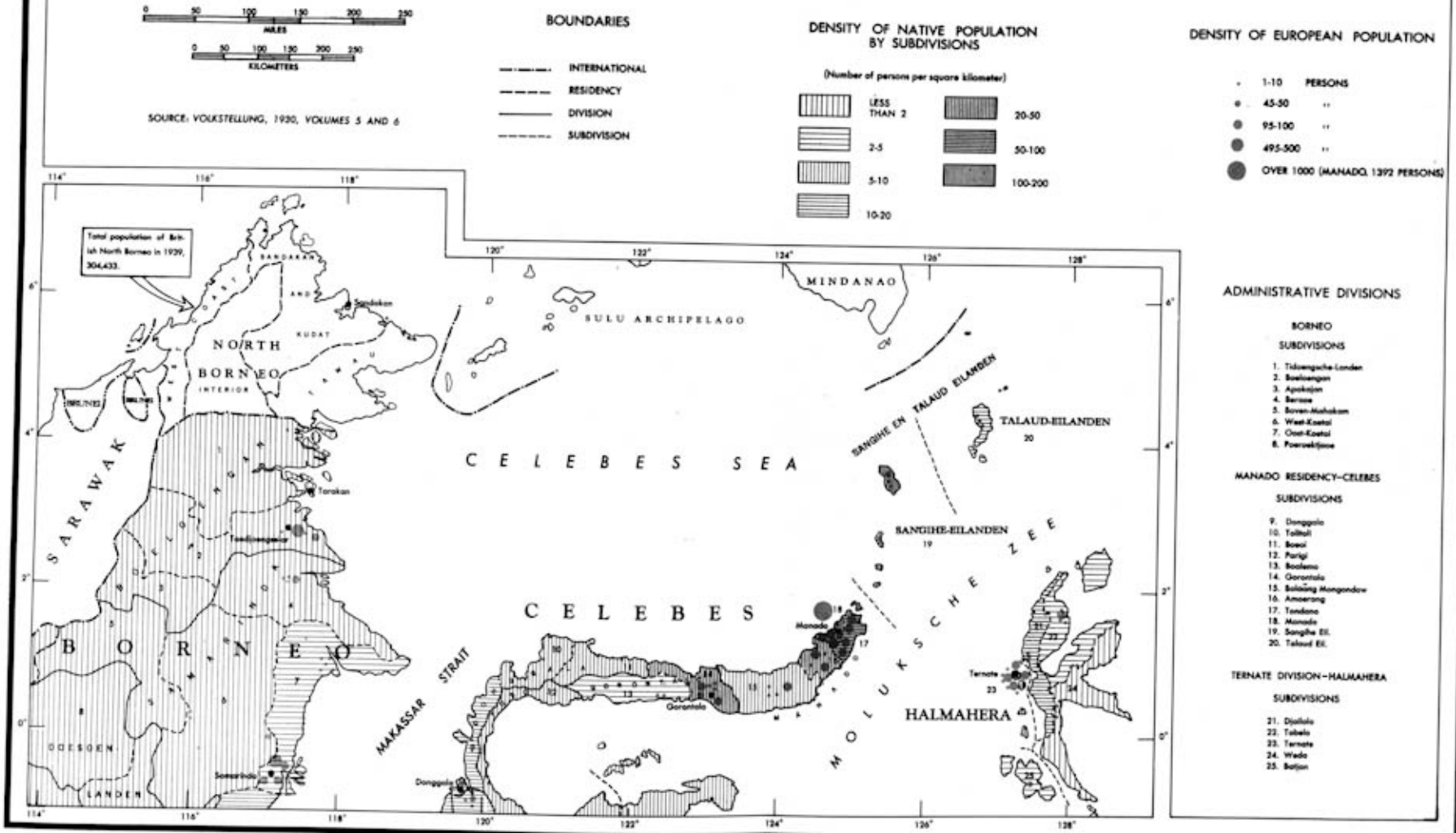
4. Batjan Eilanden. The language is mixed with Malay and is rapidly disappearing as a separate tongue. Even though there is a special local variety of Malay with infusion of words borrowed from Portuguese, old-Dutch, and from dialects of local tribes, especially Celebes slang, ordinary Malay is usable with most natives.

(5) Education.

Schools are government- and mission-supported. In Ternate Residency[1] about 9% of the males and 3% of the females are literate in a language other than Dutch; about 0.13 % are literate in Dutch; approximately 93% of the population is illiterate. Schools are teaching Malay to replace the many dialects.

[1]Figures exclusively for Halmahera and off-lying islands are not available.

BORNEO, CELEBES AND HALMAHERA
POPULATION DENSITY
1930



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18 APRIL 1944
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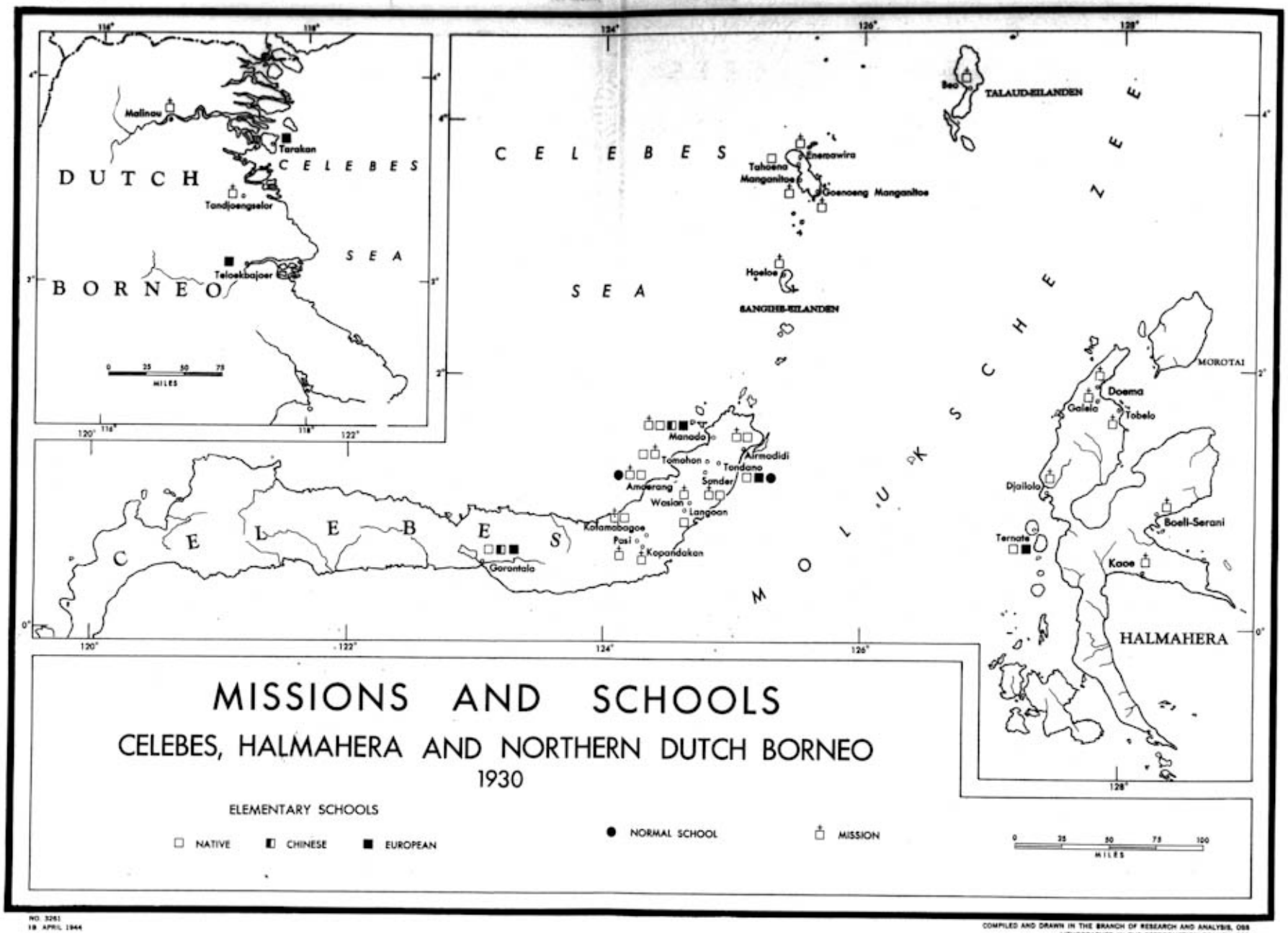
FIGURE X - 4

JANIS 155



MISSIONS AND SCHOOLS

CELEBES, HALMAHERA AND NORTHERN DUTCH BORNEO

1930

ELEMENTARY SCHOOLS

□ NATIVE ◧ CHINESE ■ EUROPEAN

● NORMAL SCHOOL

MISSION

MILES

NO. 3261
18 APRIL 1944

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(6) Religion. (FIGURE X - 4)

(*a*) *Halmahera Island.* Missionaries have been in Halmahera for a long time. The Dutch set up numerous Protestant mission stations. Today many villages, such as Doema and Oepa, and the tribes of Kaoe-baai, are entirely Christian. Converts are estimated at almost 10,000, which may be an exaggeration.

Many villages, such as Ganediloear at the south tip of Halmahera, are Mohammedan. The overall number of Mohammedans is not known but it is probably smaller than the number of Christians.

The great majority of the Halmaherans have remained pagans. Their beliefs are animistic, based upon worship of spirits and ancestor souls, and rituals dealing with benevolent and evil powers. Superstitions play an important part in the lives of all natives.

Generally, the Mohammedans and Christians are located along the coast, and the heathen tribes inland. Many of the coastal villages are mixed with Christian, Mohammedan, and pagan inhabitants. Important villages of this type are Kaoe (principally Mohammedan), and Boeli (Boeli-serani is the Christian section of the village; Boeli-islam is the Mohammedan and pagan division).

(*b*) *Off lying islands.*

1. Morotai. Reports conflict, but a reliable estimate reports 3,000 pagans, about 700 Mohammedans, and 300 Christians. The Christians live in 4 communities, one of which, Boesoboeso on the east coast, has a mission station. There is a mission house and a mosque at Tg. Wajaboela.

2. Ternate, Tidore, Makian, Kajao. Mohammedanism is predominant.

3. Goraitji. Mostly Mohammedans.

4. Batjan. The population is mostly Mohammedan; there are about 700 Christians.

5. Damar. Mohammedans.

(7) Temperament.

Unlike the average Indonesian, Halmaherans are inclined to be surly, touchy, noisy, and irritable. Feuds and strife are constant among the Galelarese and Tobelorese, and the Ternateans, Tidorese, and part of the Batjan group. Their nomadic tendencies have an effect on the culture, which is relatively undeveloped. They have no sedentary agriculture, and the way of life is primitive. According to European standards, the natives are lazy; local Christians are spoken of as laziest of all.

The natives of Lelilef village, near Weda Baai, are said to be especially troublesome. Some of the Kaoe villagers are reported to be the offspring of exiled Ternateans with a turbulent reputation.

C. Suitability of natives for labor.

Some of the coastal villagers are capable fishermen and carpenters, able to build and repair praus (native boats) and houses. The maritime Badjaus are accustomed to handling native craft. All villages can supply able-bodied male carriers who are satisfied with pay varying from 30 to 50 cents (Dutch) per day, depending upon conditions of travel. Rowers and seafaring folk expect 30 cents a day plus food. Praus are hired from 50 to 100 cents per day.

At Sidangoli village there are about 600 Ternatean fishermen and many expert boat builders who repair Ternatean traders' shallow draught praus.

Tidorese and Ternateans are particularly skilled at boatbuilding and fishing. The Tidorese are noted for their endurance and capacity for hard work.

Javanese and Talauders (Talaud Islands) work as coolies in the Batjan islands.

D. Social organizations and social conditions.

(1) Natives.

(*a*) *General.* The Halmaherans have not developed a sedentary village life because of their strong inclination to wander. They live principally on sago and other forest products, and move frequently to locations where sago is easily gathered. Hunting occupies a prominent place in the native economy, for deer, wild pigs, marsupials, and birds are abundant. The most common weapons are wooden or bamboo lances. Agricultural methods are primitive, and crops such as dry rice are rarely grown. Few domestic animals are raised. Villages are small and scattered, and temporary in character.

(*b*) *Property.* In the villages property is largely communal. The Sultan is the acknowledged owner of the land, but rights to the produce of the sea and land are gained by payment of taxes. The privilege to use such things as trees, e.g., gum copal, is given the first tapper, who affixes his "sign." Such rights are inherited. Among the Galelarese, each village's boundaries in the bush are recognized and not trespassed upon.

(*c*) *Mutilation.* The natives are not tattooed in Halmahera. Teeth are filed and blackened. The hair is usually plucked off the upper lip; few men have a full beard. Many shave the hair off their legs, leaving only a band about 2 inches wide.

(*d*) *Marriage customs.* Marriage ties are not very binding, and divorces are frequent. The male is excused for adultery by payment of a fine, but he has cause for divorce if he says he has tired of his wife. Divorce is accomplished by the breaking of a bent piece of bamboo. If the man had given payment for his bride, the children are his; otherwise they belong to the woman. Pre-marital freedom is usual.

(*e*) *Off lying islands.* Fish and sago are the principal foods. Makian islanders go to Halmahera for sago. Agriculture is practiced to some extent, and such foods as yams, potatoes, and a little dry rice are produced on Morotai, Makian, and Kajoa. Spices are produced as a commercial product on Ternate.

In Ternate, as might be expected in the capital of a former empire, class lines are strict and rigid, and the chiefs of the old villages and districts are graded in rank. In the Batjan group, although the sultanate is now decadent, a rigidly stratified class system also survives.

(2) Other groups.

(*a*) *Europeans.* On Halmahera, in 1930, about 140 Europeans lived in Djailolo, Tobelo, and Weda districts. About 440, or the majority of Europeans in the Halmahera area, were concentrated in Ternate. Less than 50 lived in the Batjan group. About half of them were males, and of that group probably the great majority were classed either as government or missionary workers. Most of them lived in the coastal areas, and maintained European standards of living.

(*b*) *Chinese.* The Chinese on Halmahera lived mainly in the Kaoe-baai area and the Tobelo district. About 1,000, or the great majority of Chinese in the general area, lived in Ternate. There were nearly 300 in the Batjan group. The Chinese form an important part of the society, and are, for the most part, not integrated with the native groups. They live in the coastal areas, and many of them are traders and small shopkeepers. They control the economic life of the region.

(*c*) *Others.* There are slightly more than 500 other "non-indigenous" Orientals, in the area. Most of these are Arabs. They also live in the coastal settlements. There were a few Japanese fishermen (classified in the 1930 census as Europeans) on Ternate.

E. Governmental organization.

(1) Authority.

Administration of Halmahera and the off lying islands was vested in the Assistant Resident living at Ternate town. He was responsible to the Resident of the Moluccas, at Amboina, who in turn was responsible to the Governor of the Great East, whose administrative seat was at Makassar.

(2) Organization.

The territory of the North Moluccas was divided into 2 areas, one under direct rule of the Netherlands Indies Government, and the other under the rule of the Sultans. The latter administration, nominally self-governing, coöperated with the Netherlands Indies Government. Although the natives had the right of appeal from all decisions of the Sultans and their subordinate officials, actually the Sultans' power is considerable. Indirect rule by Sultan was granted only to territories which surrendered to the Dutch in reasonable time during the days of conquest. There are Sultans of Ternate and Batjan, but up to the Japanese invasion there was no Sultan of Tidore. This native state was governed by a council presided over by a native official called *Djogoegoe.* Each Sultan had also a *Djogoegoe* who acted as deputy when necessary.

The following were the territories under direct and indirect rule. Direct rule (*Rechtstreeksch Bestuur*): the southern portion of Ternate island, including Ternate town, and Castella village; and the village of Laboeha, on Batjan island, with the adjacent ground of Fort Barneveld. Indirect rule (*Zelfbestuur*): The Sultanate of Ternate comprises the northern portion of the islands of Ternate and Hiri; Moti, Makian, Kajoa, and Goraitji islands; the northern peninsula of Halmahera, with adjacent islands up to the Ternate-Tidore boundary; Morotai and Raoë islands; the southern peninsula of Halmahera, with adjacent islands, south of the boundary of territory governed by the native state of Tidore; the islands at the south of Halmahera; and the Majoe and Tifore islands, situated half-way between Ternate and eastern Celebes.

Batjan Sultanate includes the Batjan group of islands. Tidore State included Tidore, P. Pillonga (a rock), Maitara Island, Mare Island, the central part of the 2 eastern peninsulas of Halmahera, and islands and coral reefs adjacent to the west coast of central Halmahera.

(3) Administrative officers.

In the territories under direct rule, under the Assistant Resident at Ternate, *Controleurs* and *Gezaghebbers* are appointed as administrative officers of subdivisions.

FIGURE X - 5.
Halmahera. The Sangadji and village chiefs of Galela.

(4) Native chiefs.

The native chiefs of districts administered by the Sultans are called Sengadji (FIGURE X - 5). These men are specially chosen from regions away from where they are to operate, and are, therefore, regarded as foreigners. They receive up to florines (Dutch) 60 per month. Village headmen, known as *K(g)imalaha,* receive as pay 8% of taxes collected, plus a small basic wage. Last in the scale are the headmens' assistants, called *Mahino,* who draw no pay but are exempt from taxation and enforced labor.

(5) Personalities.

In 1939 a *Gezaghebber* was posted at Djailolo and Tobelo. There was an Acting *Controleur* at Weda. A native chief (*Sengadji*) lives at Boeli-serani village.

Morotai Island is under the rule of Galelarese and Tobelorese suzerains on Halmahera, but a Sengadji lives at Wajaboela on Morotai.

The Assistant Resident, J. W. J. van Zwel, was at Ternate Island in 1939.

The ruler of Tidore Island lives at Tidore. He has been in office since 1909, and retains little wealth or power.

On Makian Island, the chiefs of 3 of the large villages recognize the headman of the fourth, Ngotakiaha, as their head. Guruapin settlement on Kajoa Island has a chief. The ruling Sultan of the Batjan group is Prince Moehsin, who lived at Laboeha. A *Gezaghebber* was posted there also. The Sultan's father, the former Sultan, is still living but has no authority.

F. Security and public order.

(1) Courts.

Native courts (*Adat Rechtspraak*) adjudicated most cases in accordance with custom. The courts were constituted by village headmen and 5 or 6 of the older men of the settlement. If a case could not be decided in the local court, it was sent to Tobelo, and if beyond the jurisdiction of the *Controleur* at this center, Ternate decided the question at issue.

Local courts deal usually with domestic disagreements or with cases of pilfering and similar petty trouble.

(2) Military and police.

Before the invasion there were small military garrisons at:

(*a*) *Ternate.* A small garrison under a Captain.

(*b*) *Tobelo.* About 45 men under a Lieutenant. Civil police under a *Mantri* numbered about five or six.

(*c*) *Djailolo.* About 40 men under a Lieutenant, who acted as *Controleur.* Civil police under a *Mantri* numbered about five.

(*d*) *Weda.* About 20 men under a Lieutenant who acted as *Gezaghebber.* Civil police did not exceed 3 or 4 under a *Mantri.* From Ternate and Tobelo constant patrols visited at regular intervals all the more important centres or wherever they were needed.

G. Political factors.

(1) Halmahera.

Even in the port towns there has been little contact with Dutch government and business. In short, Halmahera is unexploited and primitive. Aside from the few Dutch business men and government officers, the men who know the island best are the missionaries, and most of the information comes from their reports. For that reason they would be very valuable informants and guides if contact could be made with them. There were 3 European missionaries at Tobelo, 1 at Boeli, and 1 at Kaoe. Many Tidorese and Ternateans also know the island well, and could be used as interpreters.

About 2 kilometers (1.2 miles) west of the beach village of Kaoe, there was an agricultural property owned by the Japanese, of whom there were said to be four. They grew vegetables and rented sago areas. Rumor was rife among the native population concerning secret visits of Japanese submarines, but nothing could be confirmed.

(2) Ternate.

Chances are that members of the old nobility still harbor resentment against the Dutch for their lost power, and would therefore be open to any suggestions offering a return to their former imperial prosperity. However, conditions have been peaceful for a long time, and the large majority of natives are probably neutral in their attitude.

Before the war there were 2 small Japanese colonies on Ternate. Fishing was their ostensible occupation. They numbered less than 100, and their headquarters were situated a little south of the town proper and included a repair shop, fish factory, jetty, and living quarters.

(3) Batjan Islands.

Prince Moehsin is not considered trustworthy.

(4) General.

The *Badjaus* (Sea Gypsies) sail long distances in their native praus. The Tidorese and Ternateans are also expert sailors, and transport dried and salted fish in their own boats as far as Celebes.

102. Sangihe and Talaud

Administratively, the Sangihe and Talaud Islands form a division under Manado (Celebes) Residency. The history of these islands is closely connected with that of Manado, and physically the population is similar to the Minahasans.

The islands are overpopulated, and Dutch policy has favored the emigration of some of the inhabitants to north Celebes. The people depend mainly on agriculture and fishing for their livelihood.

Because these islands really belong with the Celebes in a discussion of people and government, much of the detailed data omitted from this chapter appears in Topic 105.

A. Population—physical characteristics.

(1) Sangihe.

Sangirese are similar to the Minahasans, with strong light-skinned bodies, and regular features.

(2) Talaud.

Talauders differ in some respects from the Sangirese, frequently having wavy hair, thin noses, and fine lips, in contradistinction to the straight hair, broad noses and thick lips of the latter.

The sparse physical data available seems to indicate that the whole area is inhabited by peoples of mixed ancestry. Nevertheless, the natives are generally taller, lighter, and handsomer than the average Indonesian.

B. Population—cultural characteristics.

(1) General.

The inhabitants are described as a timid, inoffensive race. Nearly 85% of them are classified as Sangirese, and almost 15% as Talauders. About 0.3% are listed as Minahasans. There are a few other minor groups in the population, including Gorontaleze, Bolaang Mongondowers, and Toradjas.

(2) Numbers and distribution.

The islands are overpopulated (FIGURE X - 3), and the lack of land has made emigation necessary, which the Dutch administration formerly sponsored. The Siaoe islanders are known to have gone in considerable numbers to Bolaang Mongondow, in north Celebes.

In 1930 the population was distributed among the political districts as shown in TABLE X - 2, Page 12.

(3) Language.

The languages of Sangihe and Talaud islands preserve many Philippine linguistic characteristics. Malay is spoken widely in the Sangihe region, although few of the Talaud inhabitants speak it. Interpreters skilled in Malay would be most useful.

Besides the native language, the inhabitants are said to use a special "secret" language whenever they are on the ocean, as a means of keeping their plans from evil spirits. This is usual in Indonesia; nearly every group employs many taboo words. "Sasahara," or secret terminology, is also the courteous form to be used in the royal courts.

(4) Education.

Education has been spread by the Protestant missions. (FIGURE X-8) There were 165 schools and 11,840 students in 1935. Five per cent of the people's taxes are used for education. About 24% of the children, 54% of the adult males, and 37% of the adult females are literate in languages other than Dutch. Less than 0.7% of the people are literate in Dutch.

(5) Religion.

Although some missionary work was carried on under the East India Company, it really began in 1887. At that time, the

TABLE X - 2.

SANGIHE AND TALAUD, DISTRIBUTION AND NATIONALITY OF POPULATION, 1930

DISTRICT	NATIVE	EUROPEAN	CHINESE	OTHER ASIATICS	TOTAL	REMARKS
Sangihe Islands						
Taboekan District	37,910	15	417	19	38,361	
Kendahe-Tahoena	15,248	34	529	74	15,885	
Manganitoe	36,520	2	450	—	36,972	
Siaoe	32,515	14	715	3	33,247	Nenoeng, Sanggeloehang, Bawondeke and Batoe Kohia were uninhabited.
Tahoelandang	10,967	—	433	1	11,401	Pasige and Roeang islands were uninhabited.
Talaud Islands (including Nenoesa Islands)	23,566	31	225	16	23,838	
TOTAL					159,704	

Sangihe and Talaud Committee was organized and developed mission work in the islands. The Committee established missions at Manganitoe, Enemawira, and Goenoeng in the Sangihe Islands, and at Beo on Talaud. In 1935, about 70% of the population were classified as Christians; most of the remainder were pagans, and a few villages were predominantly Mohammedan. In 1935 European workers included 15 male and 3 female missionaries, and 12 wives; there were 375 native workers.

The New Testament has been translated into the Siaoe form of the Sangihe language. The Gospels and Acts are published in another dialect, known as Great Sangihe. By 1933, nearly 23,000 Bibles or portions of them had been issued in the Sangihe Islands. The native church in the Sangihe and Talaud Islands is not yet independent, but it bears the greater part of its own expenses.

C. Suitability of natives for labor.

While the inhabitants of the Sangihe group pursue their own occupations to provide their livelihood, be it as farmers, fishermen, or craftsmen, it is reported that the natives are not eager to serve as hired labor, and are described by a European in the shipping business as "lazy."

D. Social structure and social conditions.

(1) General.

The natives are largely engaged in agriculture and fishing to provide for their own needs. Many of the natives are skilled builders of native craft (prau) for which timber is plentiful in their islands.

(*a*) *Food.* The people rely on yams, maize, sago, and beans for their daily rations, and rice, an imported staple, is reserved for special occasions because local supply is limited.

(*b*) *Clothing.* Fashion usually conforms to the typical Indonesian sarong and trousers, jacket and headcloth, all made of foreign textiles. In the interior of some islands, long smocks of hemp cloth are still worn. The length depends on the wearer's rank. Under the smocks the women wear skirts, the men trousers.

(*c*) *Shelter.* The large long-house, formerly built by Talaud islanders and accommodating as many as 500 persons, is now giving way to single dwellings. Radjas' and chiefs' houses and those of the wealthy class are built in European style. Others live in bamboo houses.

(*d*) *Mutilation.* Tattooing is practised only in the Nenoesa Islands.

(*e*) *Crafts.* Sangihe and Talaud people are still in a "Wooden Age" as far as native craftsmanship is concerned.

(*f*) *Social classes.* Rigid class stratification exists in this area. There is a nobility and a class of "ordinaries"; the latter were formerly slaves.

(2) Other racial groups.

(*a*) *Europeans.* Most of the 96 Europeans present in 1930 were government or mission workers.

(*b*) *Chinese.* There were less than 3,000 Chinese in the Sangihe and Talaud islands in 1930. A large proportion of the group were traders and were regarded as an integral part of local life.

E. Governmental organization.

(1) Authority.

The Sangihe and Talaud Islands together form a division under Manado Residency, which is in turn under the jurisdiction of the Government of the Groote Oost (Great East). Separately, the Sangihe Islands and the Talaud Islands are each a subdivision.

Both the Sangihe and Talaud subdivisions are native states, i.e., indirectly ruled. The subdivision of the Nenoesa Islands is directly ruled, and is under the jurisdiction of the Manado Residency.

The Sangihe archipelago, with its 3 main islands of Tahoelandang, Siaoe, and Sangihe, together with the many small adjacent islands, is divided into 5 administrative districts: Tahoelandang; Siaoe; Manganitoe (comprising the southwest sector of P. Sangihe and islets south of P. Sangihe); Kendahe-Tahoena (comprising the northwest sector of P. Sangihe); and Taboekan (made up of the eastern half of P. Sangihe, the Toade Islands, and the Kawio Islands). The Talaud Islands form the sixth administrative district.

FIGURE X - 6
[redacted]
JANIS 155

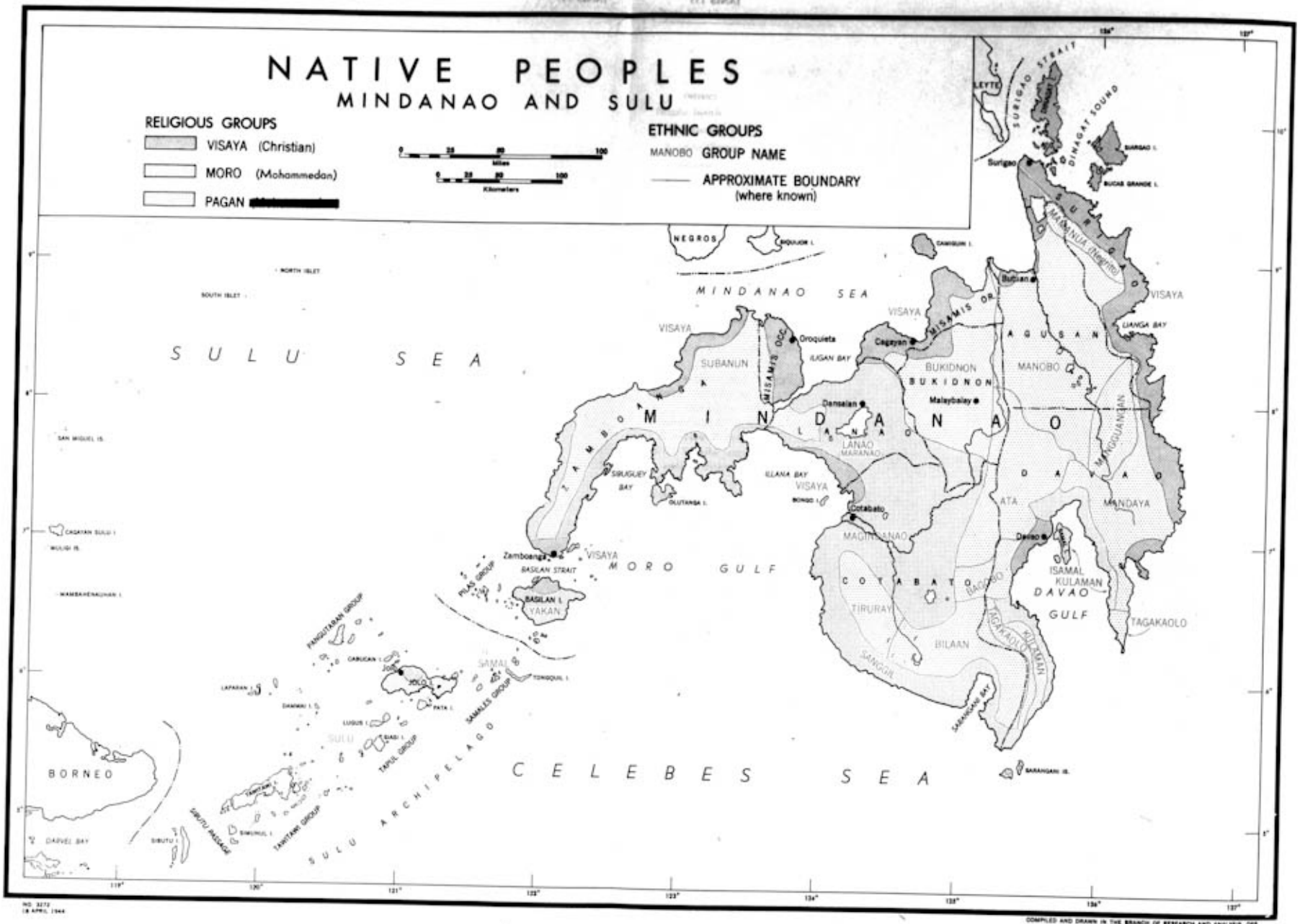

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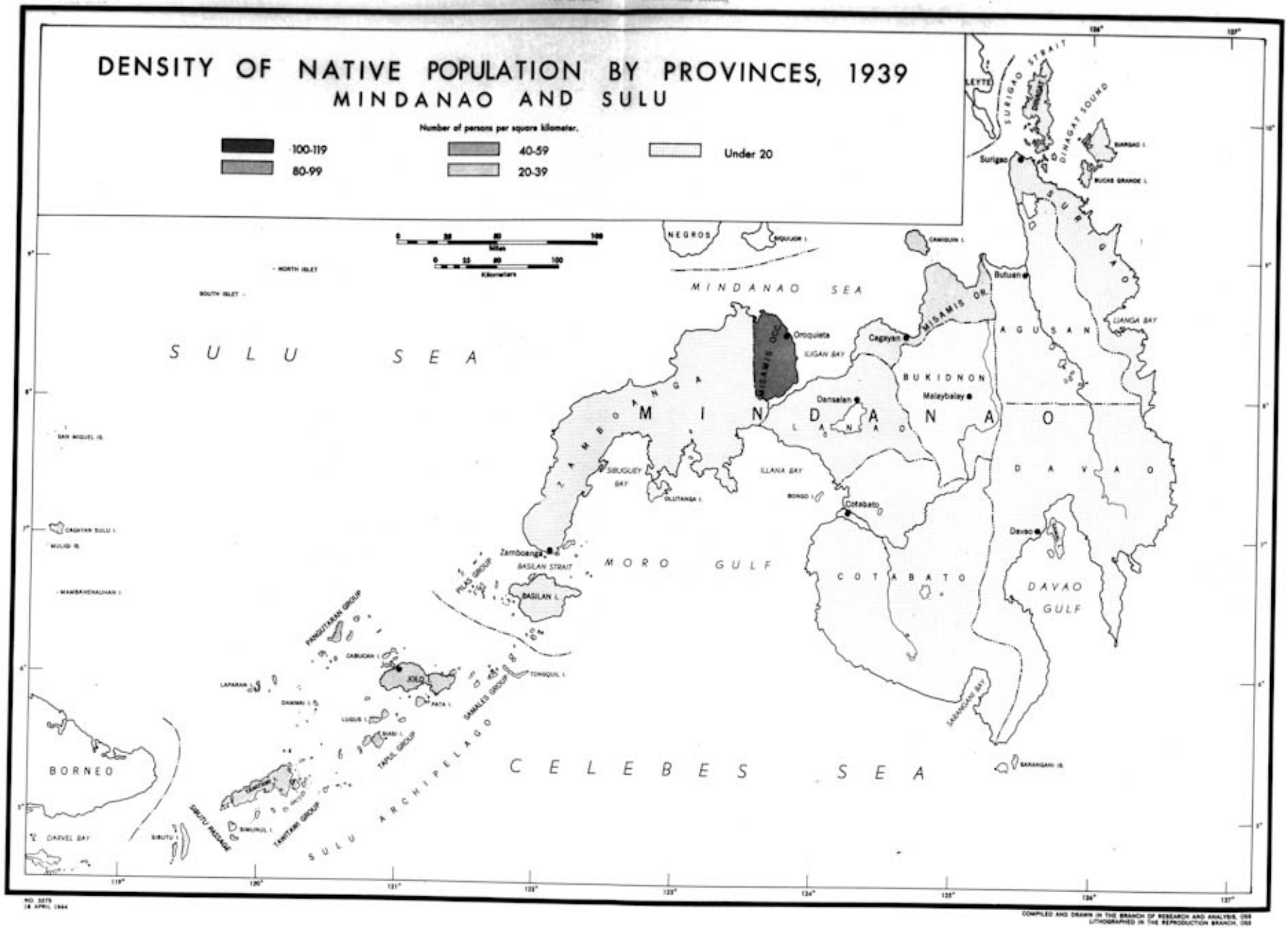
FIGURE X-7
CONFIDENTIAL
JANIS 155



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(2) Income.

Sources of administrative income were income and personal taxes, licenses for vehicles, slaughtering, and the corvée system whereby adult males were liable either to a number of days of labor for the government, or payment of a tax.

(3) Dutch officials.

Until at least 1940 a Dutch administrative officer for Sangihe and Talaud was resident at Tahoena.

(4) Local government.

(*a*) *Taboelandang.* The Tahoelandang group was administered from Tahoelandang, where the radja lived in 1936. Radjas are government appointees.

(*b*) *Siaoe.* The radja lived in Hoeloe in 1936, and one *djogoegoe* or administrator lived in Ondong and another in Hoeloe. Village chiefs are known as *Kapitein laoet* ("Le Capitaine"). In 1930 the radja was a man by the name of A. Janis.

(*c*) *Manganitoe.* A native official, probably the *djogoegoe,* resided at Tamako.

(*d*) *Kendahe-Tahoena.* A native official, probably the *djogoegoe,* lived at Tahoena. A. Bastians held this position in 1930. He also administered a group of small islands belonging to this territory, only 3 of which were populated.

(*e*) *Taboekan.* Radja Marpal, appointed in 1930, lived at Enemawira (Peta). He had 2 *djogoegoe,* probably (*c*) and (*d*) above. It was reported that in the late 1930's the radja was a poor man and had little influence.

(*f*) *Talaud.* The radja lives at Beo. In 1921, J. S. Tamawiwi was the radja. A visitor to Talaud observed that in the late 1930's the radja was poor and had little influence. A native ruler, the *djogoegoe,* resides at Liroeng on the island of Salebaboe; formerly he was subject to the radja of Sangihe.

(*g*) *Nenoesa.* A *djogoegoe* lived at Merampi.

(5) Palmas (Miangas) Island.

Palmas Island, situated east of the south tip of Mindanao, is under the jurisdiction of the Residency of Manado. A dispute regarding ownership between the United States and the Netherlands Government was settled in 1938 in favor of the latter.

It is estimated that the population in 1940 was about 1,000. The people were concentrated in Miangas village. Most of the inhabitants are Christian.

A *kapitein laoet* elected from their number by the natives is the chief authority on the island. His election is subject to approval by the Resident of Manado. Theoretically he is under the *djogoegoe* of Nenoesa and the radja of Talaud at Beo.

F. Political factors.

In the late 1930's there was 1 Japanese at Tehoena; it is believed that he had a coconut concession.

A Japanese fishing boat with a Japanese crew of about 30 was anchored in waters near Nenoesa. The boat was supposedly on its way from Taiwan to Palau.

Natives and Japanese seemed to be mutually afraid of each other.

103. Mindanao and Sulu

A. General description.

There are at least 20 different ethnic groups in the Mindanao-Sulu area. (FIGURES X - 6 and X - 7). These groups are usually classified by religious affilation as pagan, Mohammedan, or Christian. Thirteen of these groups, or the majority, belong to the pagan group; 6 belong to the Mohammedan group; and 1, the important Visaya group, represents the Christian religion.

A summary of the Mindanao-Sulu ethnic groups classified according to religion with an estimate of the population of each group and its location follows:

(1) Pagan groups.

(*a*) *Ata.* Located west and northwest of Mt. Apo in the province of Davao occupying the headwaters of the rivers Davao, Lasang, Tuganay, and Libuganon, in Davao, and the Pulangi in Cotabato. Around 8,000.

(*b*) *Bagobos.* Located along the northwestern coast of the Gulf of Davao, and the eastern and southern slopes of Mt. Apo and its tributary peaks in Davao. Around 9,000. (FIGURE X - 8).

FIGURE X - 8.
Mindanao. Old photograph of Bagobos in native dress.

(*c*) *Bilaan.* Located in the interior of the Sarangani Islands and down the center of the Sarangani peninsula extending north to the headwaters of the Padada River and northwestward as far as Lake Buluan. Around 10,000.

(*d*) *Bukidnon*, Located in Province of Bukidnon mainly, a few in Misamis, Agusan, and Cotabato. Around 50,000.

(*e*) *Itamal*. Located on the Samal Islands in the Gulf of Davao. Around 1,000.

(*f*) *Kulaman*. Located along the coast of the Sarangani peninsula and on the west side of the Gulf of Davao, from Noing north to the Padada River. Around 4,000.

(*g*) *Mandaya*. Located over about a third of Davao to the east and north of Davao Gulf principally in the valleys of the Tagum and Hijo Rivers on the Gulf side and from Cateel southward to Matri. Around 35,000.

(*h*) *Mangguangan*. Located in the vicinity of the Agusan River in central Mindanao near the towns of Tagusab and Pilar and along the range between the Salug and the Agusan, the headwaters of the Manat River, and the water-shed between the Manat. Around 3,000.

(*i*) *Manobo*. Located throughout the whole of the Agusan River valley and scattered about the provinces of Surigao, Bukidnon, Davao, and Cotabato. Around 45,000.

(*j*) *Mamanua*. Located in the interior of the Surigao peninsula in northeastern Mindanao particularly around Lake Mainit and in the mountains back of the coast towns from Cantilan to Tandag. Around 4,000.

(*k*) *Subanum*. Located throughout the interior of the whole Zamboanga peninsula. Around 35,000.

(*l*) *Tagakaolo*. Located in the interior of the Sarangani peninsula and along the west coast of the Gulf of Davao from Noing north to the border of the Bagobo territory occupying a long, narrow strip between the Kulumans on the east and the Bilaans on the west within the province of Davao. Around 7,500. (FIGURE X - 9).

(*m*) *Tirurai*. Located along the west coast of the province of Cotabato from the town of Cotabato south to the Tran Masla River. Around 7,200.

(2) Mohammedan (Moro) groups.

(*a*) *Lanao or Maranao*. Located around Lake Lanao in the province of Lanao. Aaround 65,000.

(*b*) *Magindanao*. Located mainly in the province of Cotabato and somewhat in the provinces of Lanao and Zamboanga. Around 85,000.

(*c*) *Samal*. Located along both sides of the Zamboanga peninsula and along the coasts of all the larger islands throughout the Sulu Archipelago. Around 80,000.

(*d*) *Sanggil*. Located along the south coast of Mindanao from Kulut to Sarangani Bay and along some parts of the Davao Gulf. Around 2,200.

(*e*) *Sulu*. Located on the island of Jolo, most of the other larger islands of the Sulu Archipelago, and Cagayan Sulu. Around 88,000.

(*f*) *Yakan*. Located in the interior of the island of Basilan Island at the tip of the Zamboanga peninsula. Around 8,000.

(3) Christian group.

(*a*) *V(B)isayas*. Located along the north and east coasts of Mindanao and in other scattered parts of Mindanao. This group is part of the general Visaya group which inhabits the central Philippines and is the largest population group in the Islands.

FIGURE X - 9.
Mindanao. Old print of a Tagakaolo.

Although these are the main ethnic groups usually recognized in Mindanao and Sulu, certain reservations should be kept in mind with respect to their religious affiliations, their locations, and their population. In the first place, there is no clear-cut line of division between these different groups; one group may be considerably intermixed with another, as in the case of the Manobos and Mandayas. In the second place, the various ethnic groups are often well split up among themselves. In the third place, the religious lines are often considerably blurred. Numerous segments of pagan tribes will be found to have been Christianized, and other pagan groups such as the Subanum of western Mindanao will be found to have come under strong Mohammedan influence. In the fourth place, most of these peoples move about rather freely and cannot be found within any rigidly defined area. In the fifth place, accurate population figures for these ethnic groups are lacking, and the population figures given here are only general.

In addition to the native ethnic groups in Mindanao and Sulu, numerous foreign populations have entered the area. Americans, Spanish, Japanese, Chinese, and a few British, Dutch, and Germans have settled in Mindanao and Sulu. Except for a few who may have escaped, most of the Americans and British found there at the outbreak of war have been interned. The Chinese, who acted as traders and shop-keepers before the war, have probably been restricted, but it is reasonable to expect that they have somehow managed to carry on. The most active and vigorous of the foreign populations today is, of course, the Japanese. Since the last war the Japanese have been pouring into Mindanao, particularly into the Davao sector. In 1939 the Census reported 17,888 Japanese in Davao;

the Japanese now claim substantial additions to that total. Such other foreign elements as may be found in the area will probably be insignificant in number and influence.

(4) Government in Mindanao and Sulu.

Because of the diversity of ethnic groups, the fundamental differences in religion between the Christian, Moro and pagan groups, and the relative backwardness of the peoples of the area as a whole, the governance of Mindanao and Sulu has always presented peculiar and distinct problems. Both Spain and the United States found the problem of governing these areas most challenging and difficult. The problem of establishing satisfactory government among the Moro populations presented particularly vexing problems. The Spanish were never able to subdue the Moros completely, and the United States was able to do so only after a long series of punitive military expeditions against the Moros. The gradual withdrawal of military government and the extension of civil government constitute a notable phase in American colonial history. During the period of civil administration in Mindanao and Sulu great progress was made.

Mindanao and Sulu are today divided into 10 provinces varying in size and population. These provinces are: Agusan, Bukidnon, Cotabato, Davao, Lanao, Misamis Occidental, Misamis Oriental, Sulu, Surigao, and Zamboanga (FIGURE X - 6 shows provincial boundaries). These provinces, in turn, are divided up into municipalities and barrios stretching down to native tribal governing jurisdictions. Over these provinces, and responsible directly to the Secretary of the Interior in Manila, was a Commissioner for Mindanao and Sulu. The present Commissioner is a long-time provincial administrator, Gen. Paulino Santos.

B. Population-physical characteristics (natives only).

Although the Filipinos are split up into various ethnic groups and these in turn are divided into Christians, Mohammedans, and pagans, most of them belong to the same general Malayan-Indonesian racial strain. They are brown-skinned, straight-haired, and of small and wiry build with general Mongoloid features. The pure Indonesian tends to be more slender, and usually gives the impression of being taller and better proportioned. Another distinct racial type found in the Philippines is the negrito type; these are little negroid types who are believed to have been the original inhabitants of the Islands. With one exception, all the ethnic groups in Mindanao and Sulu belong to the Malayan-Indonesian group described above and have the same general physical characteristics. The exception is the Mamanua tribe in northeastern Mindanao, which is a negrito group.

In addition to the general racial characteristics of all Malayan-Indonesian types, there are numerous physical variations which occur from group to group. A summary of some of these individual physical traits follows:

(1) Pagan groups.

(*a*) *Ata.* Mixed physical type of Indonesia, Papuan, and Negrito stock.

(*b*) *Bagobo.* Strong, robust, and relatively tall, with some of them reaching a height of 5 feet 9 inches. Some of them quite noticeably light-colored. Hair often wavy or curled. Bagobo men remarkable for their effeminate profile; in some cases distinguished with difficulty from women.

(*c*) *Bilaan.* Extensively mixed physical type.

(*d*) *Bukidnon.* Mixed physical type. Many tall and prepossessing in appearance. Bukidnon women have very small and often very slender hands and feet.

(*e*) *Isamal.* They are remarkable as they are almost the only Philippine people who are predominantly of the tall Caucasic type. Mixed Malayan-Indonesian.

(*f*) *Kuluman.* Indonesian type dominant.

(*g*) *Mandaya.* Almost pure Indonesian with the Caucasic element predominant. Fair complexion, brown hair, diminutive hands and feet, and large eyes with long lashes. Physically strong.

(*h*) *Mangguangan.* Of the short Mongol type, with probably some slight intermixture with the other primitive types—especially the Negrito. Physically weak. Subject to enslavement by Manobos and Mandayas.

(*i*) *Manobo.* Of athletic build and strong constitution though often short of stature. Muscular development denotes activity, speed, and endurance rather than great strength. Skin is of a reddish-brown color that turns to a somewhat dark brown. Hair abundant, long, black, straight and coarse.

(*j*) *Mamanua.* Full-blooded negritos. Very small, broad-nosed, curley-haired "little blacks," as the Spanish called them. Mamanuas are a few inches taller than the other negrito groups but still are pygmy in height being less than 5 feet tall. Many half-breeds.

(*k*) *Subanum.* Very mixed type with the Indonesian element dominant. Both short and tall Mongol types fairly numerous. Teeth filed to points.

(*l*) *Tagakaolo.* Malay-Indonesian blend.

(*m*) *Tirurai.* Indonesian-Malay blend. A few negroid types.

(2) Mohammedan groups.

(*a*) *Lanao.* Malay blend with the Indonesian element predominating.

(*b*) *Magindanaos.* Malay-Indonesian blend.

(*c*) *Samal.* A Malay blend, but many other racial types appear. Samals as pirates imported many foreign women.

(*d*) *Sanggil.* Of predominating Indonesian blood with a complicated blending of other types from diverse sources.

(*e*) *Sulu.* A Malay blend of complicated character. As with the Samals, importation of numerous foreign women was responsible for mixed blood strain.

(*f*) *Yakan.* A much mixed Malay blend.

(3) Christian group.

(*a*) *Visaya.* Of Malay-Indonesian blend.

C. Population-cultural characteristics and social conditions.

While physical characteristics among the Mindanao-Sulu peoples are basically the same, the cultural characteristics among these people are more varied. There are distinct pagan cultures, a distinct Moro culture, and the more advanced Christian Visaya culture.

A summary of some of the more important cultural characteristics and the social conditions among the various ethnic groups follows:

(1) Pagan groups.

(*a*) *Ata.* There are several different types of culture and a number of little known dialects. The Atas are one of the least known of the pagan groups.

(*b*) *Bagobos.*

1. Dress. The dress of the Bagobos is particularly striking. It is made of carefully selected and dyed fibers of Manila hemp treated in such a way as to make it smooth and durable. It is ornamented with elaborate bead and mother-of-pearl work. The men wear short, long-sleeved jackets, highly ornamented, and trousers reaching to the knee with beadwork around the bottom, and kerchiefs or turbans about their heads. The Bagobo man usually wears a sash around his waist in which his war knife is sheathed. In the past, a Bagobo who had killed others wore a kerchief of reddish-chocolate color ornamented with rectangular white markings.

The Bagobos are said to be a music-loving people and to fashion beautifully, ornamented stringed instruments.

2. Occupations. The Bagobos are considered to be relatively industrious agriculturalists. They raise maize, rice, and a very fine quality of hemp.

3. War-like capacities. Not considered to be an aggressive, war-like tribe, the Bagobos nevertheless have at times been motivated to certain bloodthirsty acts. In former days of warfare they took not only the head of the enemy but the hands and heart as well. They also practiced human sacrifice regularly and some report that they even ate of their victims; the ceremonies of human sacrifice were usually reported to have occurred at the annual festival of their God Diwata.

4. Communal life. The Bagobos live in small villages ruled over by chiefs who are called datos.

(*c*) *Bilaan.* The Bilaan culture is somewhat similar to the Bagobo.

1. Dress. They dress like the Bagobos with the men wearing short trousers, jackets, and the usual turbans.

2. Timidity. Dean Worcester describes the Bilaans as an especially timid people who will flee inland to the mountains at the approach of strangers.

3. Weaving of hemp cloth. The Bilaans weave hemp cloth beautifully embroidered with intricate designs which is said to excel all others found in the Philippines and to constitute the most unique feature of Bilaan culture.

(*d*) *Bukidnon.*

1. Dress. The men usually wear long trousers reaching to the ankle and long shirts with full sleeves hanging over the trousers. Many different colors are employed with the patterns usually being striking in appearance. Most of the women wear long-sleeved upper garments of scarlet, blue, and white patchwork, and long skirts. Large silver ornaments are "buttoned" into great holes in the lobes of their ears; rings of brass or silver are worn on the fingers or ankles.

2. Music and dances. The Bukidnons love music and dances. In their dances a peculiar gliding step is to be noted which is wholly different from anything to be seen among other Philippine peoples.

3. Communal life. Though many of the wilder members of the group still live in tree houses or in houses built on platforms high above the ground back in the mountains, more of the Bukidnons today live in villages on the fertile plains where they have built good houses. Under American guidance these Bukidnon villages made much progress. They were well-kept, clean, and had good streets. The Bukidnons occupied themselves as farmers raising chiefly maize and mountain rice. Only under pressure from other more war-like tribes of the interior were the Bukidnons inclined to revert to the more aggressive life. Ordinarily they were content to lead a peaceful life. They took on many of the usual Filipino customs.

(*e*) *Itamal.* Very little material is available on the culture, social structure, and social conditions of this very small ethnic group. They are said, among other things, to have the custom of preserving their dead in caves which are visited at stated times. Their chief foods are sweet potatoes and beche-de-mer; practically no rice is raised.

(*f*) *Kuluman.* Accurate information on the small Kuluman group is also scanty. Among other things, they are said to practice dry agriculture. The principal foods are fish, bêche-de-mer, and sweet potatoes. A special type of ornamentation not found elsewhere is also said to exist among them.

(*g*) *Mandaya.* Garvan terms the Mandayas "the greatest and best tribe in eastern Mindanao." He states that they are a brave, intelligent, clean, frank, people that "with proper handling might be brought to a high state of civilization." They are said to be looked up to by Manobos, Mangguangans, and the Visayas of the Agusan Valley as a superior and more ancient race. Garvan describes them as a shrewd and diplomatic but affectionate, good-natured and straightforward people, with little of the timidity and cautiousness of the Manobo.

1. Dress. The Mandayas usually go fully-clothed, the men wearing long trousers and jackets and the women jackets and skirts. The hemp cloth skirts of the women are said to be the best in Mindanao. The women usually cover their arms with ornaments of brass and shell.

2. Religious characteristics. The pagan religious instincts of the Mandayas are so highly developed as to cause them to be fanatical at times. Their priests, called *ballyan,* exercise much influence in the councils of the tribe.

3. Skills. The Mandayas are noted for their skill with the bow and arrow. The men of the group are also reputed to be very skillful in working metals. They are adept at making silver bands and inlaying steel blades with silver. They also work and temper steel with much success.

4. Communal life. The Mandayas live in well-built wooden structures, roofed with shingles made out of flattened bamboo. A few still live in tree shelters.

For many years the Mandayas were among the most war-like of the Mindanao groups, but their activities in this regard have been considerably suppressed of late years. They also took many slaves.

(*h*) *Mangguangan.* This small group occupying the headwaters of the Agusan River is one of the least developed of the Mindanao peoples. Their culture is very primitive and the people are timid and wild. They have inter-married with the negrito Mamanuas and have, in some cases, acquired a higher culture from contact with the Manobos and Mandayas.

(*i*) *Manobo.* Garvan's exhaustive study of the Manobos reveals more about this group than we know about the other Mindanao groups.

1. Dress. Both sexes of the Manobos wear a closed, square-cut upper garment with sleeves. The men wear trousers, generally of native cotton and abaka fiber, reaching somewhat below the knees, with cotton embroidery in red and black on the sides and at the bottom. The lower garment of the women

consists of a doubled sacklike skirt of abaka fiber, usually of a reddish color. The men wear long, narrow bamboo hats and the women necklaces of seeds, beads, shells, and crocodile teeth or sea-shell bracelets, circlets of black coral, or of copper wire.

2. Religious characteristics. The religious observances of the Manobos center around their fear of the deities of evil spirits, "of the dead—of all that is unintelligible, unusual, somber." The Manobo always carries with him religious charms. He picks a site for his home in consultation with these charms and omens. He cooks his meals according to religious rules. He hunts or goes into battle only after appropriate offerings. He sows and harvests his rice only under favorable signs. Among the gods and goddesses to whom appeal is constantly made are *Hakiadon* and *Taphagan,* who take care of the rice during sowing and harvest time, respectively; *Tagamaling,* who attends to other crops; *Libtakan,* the god of sunshine; and *Sugujun,* the god of the chase. In all their religious practices the Manobos are under the guidance of priests of 2 classes—*balian* or ordinary priests, and *bagani* or war priests.

3. Communal life. Manoboland is divided up into districts under the control of different clans. These clans consist of a chief and a number of his relatives varying from 20 to 200 people. Inter-clan warfare was once constant, but of late years this has progressively diminished. The Manobos observe definite customs in the matter of justice. Among these customs are those demanding as a duty the payment of one's debts, the taking of revenge, and the observance of religious customs and practices. Violations of the religious taboos and interdictions lead to serious consequences.

4. Manobo homes. These homes are built only after proper consultation with the appropriate religious spirits. They consist of unpretentious, square, one-roomed buildings at a height of from 1.5 meters to 8 meters (4.8 to 26.2 feet) from the ground. Light posts, varying from 4 to 16, usually support the house. The house is built of materials all rattan-lashed and taken from the immediate neighborhood. Under the house is usually a pigpen. In general, the houses are filthy.

5. Dealing with the Manobos. Strangers visiting Manobo settlements may find that the women and children have all fled at his approach leaving only armed warriors; the sight of these arms is no cause for alarm as the wearing of arms is as much a custom with Manobos as the wearing of a watch is with us. The Manobos are also a very curious people and will ask many questions. Sometimes the chief of the settlement will claim a fee for trespassing on his territory but he will usually accept some small gift instead or even a diplomatic excuse. Manobos, especially chiefs, do not like to be asked their names at the outset. Care must be taken not to take any liberties with the person of a Manobo, such as touching him on the arm, until better understanding is established. These are some of the guides to dealing with the Manobo.

6. Occupations. Farming, fishing, hunting, and trapping represent the main ways in which the Manobo makes his living. They sow broadcast a little rice, plant camotes, some taro, maize, and sugarcane in patches of land they have cleared from the forest. Some canoe-making, mining, and basket-making is done. Usually the bulk of the daily labor is done by the women while the man hunts, fishes, traps, and fights.

(*j*) *Mamanua.* The culture of this small negrito group of northeastern Mindanao is the most primitive of all ethnic groups in Mindanao. These people live an unsettled life, supporting themselves largely by hunting and gathering wild foods, especially roots, tubers, and honey. What little culture the negrito may have has been borrowed from his neighbors, the Manobos or Visayas. From them he has been able to procure some cloth, knives, and ornaments. At the same time, however, the Mamanua have been subject to constant intimidation from stronger tribes such as the Manobos.

(*k*) *Subanum.* The Subanos have taken on much of the neighboring Moro culture wearing much the same dress and the same sort of ornaments. Their culture, in general, is a mixed pagan-Moro culture. They are normally an agricultural and very peaceful people and are subject to attack from their more war-like neighbors. They raise rice, camotes, squashes, peppers, tomatoes, egg-plant, bananas, and papayas.

(*l*) *Tagakaolo.* The material available on the Tagakaolo is very sketchy with regard to cultural characteristics and social conditions. They are known to have a culture somewhat like the neighboring Kulumans and to practice dry agriculture. They were formerly very war-like and practiced human sacrifice.

(*m*) *Tirurai.*

1. Dress. The dress of the Tirurais is fairly similar to that of the Moros. The women wear anklets and armlets of coiled brass wire. Clothing, in general, is made of imported cloth as little weaving is done.

2. Dwellings. The Tirurai houses have no sidewalls and are built high above the ground. Access to these houses is had by means of a notched pole which is drawn up at night.

3. Occupations. The Tirurai practice dry agriculture, raising maize, mountain rice, tobacco, and fruits.

(2) Moro groups.

Although the different Moro groups are far from united politically and lack any real consciousness as a national group, they do have numerous close cultural bonds stemming mainly from their attachment to the Mohammedan religion. The general cultural and social outlines of these Moro groups—the Lanaos (Maranaos), Magindanaos, the Samals, the Sanggils, the Sulus, and the Yakans—follows:

(*a*) *Dress.* Most of the Moros dress in gaudy, brilliant colors. The men generally dress in very tightly fitting jackets of cotton or silk with wide, skirt-like sarongs caught up at the waist by a belt, or bright trousers, loose at the waist, held up by a kind of kummerbund. On their heads are worn red fezzes or bright-colored, twisted turbans. The women wear similar loose trousers and cover the upper part of the body with tightly fitting jackets.

(*b*) *Religious influence.* The most important cultural influence in the life of the Moro is his religion. This attachment to his religion is far greater than any attachment to the government. The actual methods of religious worship and degree of attachment to the various tenets of the religion vary from the Cotabato Moros to the Sulu Moros. But in all these Moro areas three officials commonly play important roles in the religious life of their communities. These are the *datu,* who enjoys not only temporal power over many hundreds of people in a given area (FIGURE X - 10) but also wide religious powers by virtue of his noble inheritance; the *iman,* who collects fines for religious defalcations; and the *hadjis,* who occupy special roles in the religious life of their communities because they have made the pilgrimage to Mecca.

The Moro has established a reputation for fanaticism through

FIGURE X - 10.
Mindanao and Sulu. A Moro Datu.

the years. This fanaticism has to a great extent sprung from his religion. The Moro has especially resented any efforts to interfere with, suppress, or even modify his religion. The Spanish were years in warring with the Moros of North Africa and carried this feud over to the Malay Moros of the Philippines. For years the Spanish and Moros of the Philippines carried on intermittent warfare. When pitched battles or ambushes were not occurring, individual Moros were running amok or going juramentado. Going juramentado had a special religious significance with a Moro taking a solemn vow to kill as many Christians as possible and then running wild with his kris in the closest settlement or street. Under American administration the religious warfare died out but occasional cases of juramentado continued to flare up even as late as 1941.

(*c*) *Social classes.* The Moro community usually consists of 4 classes. These are the *datu* or noble class, the privileged class or free citizens, the subjects of the *datu*, and the slave class. These classes are recognized by Moro law, which also differentiates between crimes committed against one class or another. Much has been done to eliminate the conditions of slavery, but it still exists, particularly in Sulu.

(*d*) *Occupations.* The Moros are usually said to be most at home near the water though there are numerous exceptions to this. The Sulus, Samals, and *Badjaus* ("sea gypsies" who are mixed pagan-Moro: FIGURE X - 11) of the Sulu Archipelago

FIGURE X - 11.
Sulu. Badjaus in a loaded vinta.

FIGURE X - 12.
Mindanao and Sulu. Natives with traditional Moro weapons, now seldom seen.

are the most sea-faring of the Moros. The Samals in years past were notorious as pirates plundering the coasts of the northern Philippines, Borneo, and other adjacent lands.

The interior Moros of Lanao and Cotabato are farmers as are most of the Moros on Jolo Island in the Sulu group (these Moros known as *Joloanos*). Corn, rice, sugar cane, coconuts, hemp, cocoa, ubi, peanuts, and sweet potatoes are raised.

The Moros also do excellent weaving and do expert work in iron, brass, silver, and gold, making bolos, barongs, spears, and krisses (FIGURE X - 12).

(*e*) *Language.* Three main languages exist among the Moros. These are Sulu-Samal, Lanao, and Magindanao. Like all Philippine languages, they are grammatically related to each other as well as to the languages spoken in Borneo, Celebes, and elsewhere in Indonesia. It is possible thus for the different Moro groups to understand each other in general terms though any detailed conversation would be impossible.

Through the school systems many of the Moros also have some knowledge of either Spanish or English.

(*f*) *Education.* Spain made little effort to educate the Sulu Moros. Such efforts as were made were actively resisted. American administration, on the other hand, has made every effort to bring the Moros into active cooperation with the educational program for the Islands. In the more thickly populated areas the response to this educational program has been encouraging, but back in the country away from the larger towns the degree of success attained has been slight. Many of the Moros refuse to see the need for attending school on a regular basis, and many complain that not enough Moro teachers are employed in the school system. These handicaps were beginning to be met satisfactorily, however, and signs pointed to increasing Moro receptiveness to the educational program. The school system has taught hundreds of Moros to speak a little English.

(3) Christian group.

(*a*) *Visaya.* The Visayas of Mindanao belong to the general Visaya group of the central Philippines, which is the largest population group in the Islands. The Visayas, with the Tagalog group, make up the most powerful cultural and political group in the Islands. This particular group of the Visayas is the most westernized of any of the peoples of Mindanao. Most of them are familiar with American customs and methods and speak a few words or more of English.

The Visayas live in the villages along the coast of northern and eastern Mindanao. They are engaged as farmers, fishermen, traders, and laborers. They compete with the Tagalogs for such government positions as are available. They have often been accused of taking advantage of or exploiting the wild tribes about them, but the government has effectively discouraged such practices in later years. Some of the Visayas have intermarried with the tribal peoples about them and reverted to a wilder life. This is true of the Visayas of Talakogon in the Agusan valley who have intermarried with the Mandayas.

D. Suitability of labor.

Most of the natives near the coasts have had contact with foreigners, and many of them have been employed as ordinary laborers on coconut, hemp, and other plantations. Among the native groups capable of rendering labor services are the Bagobos, Bilaans, Bukidnons, Lanaos, Samals, Subanos, and Sulus. The Visayas on the north and east coasts are probably the best labor source. In almost all the larger towns and cities in Mindanao and Sulu some Tagalog or Visayan laborers can be found.

Though labor is not lacking in quantity, it is sometimes inferior in quality. Many laborers are indifferent, unreliable, and ignorant of method; others, such as the Moros, have religious beliefs which interfere with their doing certain types of work or working at set hours.

In addition to the normal unskilled labor, numerous skilled laborers are available. There are also many natives, such as native plantation superintendents, who have held positions involving the direction of other natives.

Consultation with the headman of a tribe, the town mayor, or members of municipal governments, should serve to provide the names of sufficient labor personnel. There is probably a surplus of labor anxious to fill any gaps that may arise.

E. The Japanese population in Mindanao.

One of the most important population groups in Mindanao is the Japanese civilian population clustered around the city of Davao in Davao Province. Around the beginning of the century, Japanese traders, farmers, and businessmen entered the area and began to settle down. These Japanese settlers showed remarkable initiative and enterprise, and gradually the colony grew until it became the most influential unit of the community. By 1939, the census showed that the Japanese population in Davao totalled 17,888. In the few years since 1939, and particularly since the outbreak of war, the Japanese have poured additional settlers into the area; they now claim a total of 30,000 settlers in Davao. This civilian population is said by the Japanese also to have been rigidly conscripted into civilian defense battalions directly under the control of the Japanese Army.

The Japanese have not been popular in this area, and the natives have massacred many Japanese groups. Walter Robb, writing in 1930, expressed it bluntly when he said, "Potting Japanese has become a Davao sport, and a score of over 100 has been chalked up. A Japanese bent over his hemp-stripping suddenly feels a crick in his back, an arrow from ambush or a spear—then he doesn't feel anything, not even the hemp rubbish piled over him." The Japanese have always demanded protection for their settlers, and attempts were made to give them this protection. Their best protection, however, came to rest in their numbers. In late years the Japanese were establishing themselves very firmly in this area.

Most of these Japanese probably face internment at a future date. Some of them will probably attempt to flee and to seek refuge among the neighboring tribes, though it is unlikely that they will be given much encouragement.

F. Governmental organization (local).

(1) General.

Because of the relative backwardness of the Mindanao and Sulu peoples and the diversity of religious belief, the government of Mindanao and Sulu has always presented special problems. The Spanish waged intermittent warfare with the Moros for years; after American sovereignty was proclaimed, it took two of America's best generals, Generals Wood and Pershing, to bring a satisfactory recognition of that sovereignty.

Many of the Mindanao-Sulu provinces remained under military rule up to 1914 or later. Civil government only gradually entered the area, replacing military government. After the establishment of the Department of Mindanao and Sulu under Governor Frank W. Carpenter in 1913, much progress was made in restoring normal government to these areas.

The Secretary of the Interior in the Philippine Cabinet is responsible for the supervision of all provincial and local governments in the Philippines. Since 1936 Mindanao and Sulu have been largely governed through this office by a Commissioner for Mindanao and Sulu enjoying the rank of an Under-Secretary of Department. This official has his headquarters in Dansalan in Lanao Province. He exercises general supervisory powers over the 7 "special" Mindanao-Sulu provinces, subject to the control of the Secretary of the Interior. At the time of the Japanese invasion, the Commissioner for Mindanao and Sulu was Teopista Guingona, former Acting Governor of the Department of Mindanao and Sulu and former Chief of the Bureau of Non-Christian Tribes. Closely associated with him as Director of the National Land Settlement Administration was Major General Paulino Santos, former Constabulary officer and Governor of Lanao, who was considered an efficient administrator. Guingona has apparently played a minor role since the Japanese invasion while Gen. Santos was reported early in February 1944 to have been appointed Commissioner for Mindanao and Sulu under the Japanese-sponsored puppet Philippine government.

The 10 provinces of Agusan, Bukidnon, Cotabato, Davao, Lanao, Misamis Occidental, Misamis Oriental, Surigao, Sulu, and Zamboanga are classed either as regular or "special" provinces depending upon the degree to which provincial government and life have been organized in each province. Most of the provinces in this area are "special provinces." These include Agusan, Bukidnon, Cotabato, Davao, Lanao, Sulu, and Zamboanga. The three remaining, Misamis Occidental, Misamis Oriental, and Surigao, are regular provinces. The special provinces are much more subject to the close and direct scrutiny of the central government and less entitled to the suffrage and the election of their own officers. Agusan, Davao, and Zamboanga, like the regular provinces, have a governor and 2 members of the provincial board elected by the people, while Bukidnon, Cotabato, Lanao, and Sulu have appointive governors and board members. The ultimate aim is to transform all the special provinces into regular provinces, though this is a slow process in many cases.

The government of each province is in turn divided into municipalities and barrios with their officials, both appointive and elective. The *barrios*, which stem from the ancient Tagalog *barangay*, are in many respects the most important of the governmental units, for it is here in these smallest units of government that the impact of laws and regulations are most directly felt. Sometimes the barrio consists of several adjoining settlements known as *sitios*. Typically the barrios are separated from each other by rice fields. The most centrally located of the barrios and the one in which the municipal building stands is known as the *población*. The government or city hall itself is known as the *presidencia*. From these smallest units of government the next step is to tribal political organization, such as it is. The government has in all cases sought to discourage the wandering of tribal groups and has sought to persuade them to settle down in established village life. Some have responded to this campaign, but it has been impossible to get all the tribes to coöperate.

A list of all the municipalities and recognized barrios in Mindanao and Sulu is to be found in the 1939 Philippine Census. The Manila City Directory for 1941 also gives most of the important provincial and local officials in Mindanao and Sulu.

(2) Political influence of the Moro datus.

Several hundred Moro chieftains, known as *datus*, exercise not only religious authority over the Moro population but also exercise almost absolute political control over their people. Each is extremely jealous of the rights and prerogatives of the others and anxious to obtain more power for himself at the expense of the others. There is very little coöperation among them. Because of their great influence among their people the provincial governors and other officers have been compelled to seek their coöperation in most matters.

(3) The government of Sulu.

Special attention is due the province of Sulu, for it is here that the traditionally most powerful of the Moro leaders, the Sultan of Sulu, resides. In the old days, the Sultan had jurisdiction over not only the Sulu Archipelago but parts of Mindanao and British North Borneo as well. When the United States assumed its responsibilities in the Philippines, an unofficial treaty, the Bates "Treaty," was made with the Sultan of Sulu. We thereby guaranteed to pay the Sultan a sizeable annual salary and to give him other concessions in return for which he was to coöperate with the United States in establishing law and order in Sulu. Later on, however, we repudiated most of the Bates Treaty, and the Sultan was gradually shorn of his civil powers.

In 1936 the old Sultan died without leaving an heir, throwing the question of succession into turmoil. The Sultan's niece, the Dayang-Dayang Piando, first thought of assuming the succession herself, but inasmuch as custom did not favor the idea of a Sultana, threw her influence behind her husband, Datu Ombra Amilbangsa, a man of common blood. Another candidate also presented himself in the person of Jainal Abirin II, an older Moro who had fought against General Pershing. The actual question of the succession was never settled, though for all practical purposes Datu Ombra Amilbangsa won out. He was appointed to the Philippine National Assembly and then later appointed by President Quezón as the first Moro governor of Sulu. The pay usually given to one of Sultan rank was dropped, however, and the sultanate in general lost most of its ancient power.

Throughout the period of American administration of Sulu, American and Filipino administrators and teachers in Sulu found their task especially challenging. A few gifted administrators, such as Governor James R. Fugate, made great strides with the Sulu Moros, but others were just as conspicuously unsuccessful. Fugate's policy was based on "trust in the Moro public and local Moro officials qualified by constant vigilance and practically continuous personal leadership in the field."

The factor of "continuous personal leadership in the field" is one of the most important in the governance of the Sulu Moros. Most successful Governors and Deputy Governors have usually found it important to get out and to work closely with the municipal presidentes, concejales, and justices of the peace. During Governor Fugate's regime, "office days" were held 1 day each week in the 6 municipal districts of Jolo and indi-

vidual Moros were encouraged to bring their troubles to the town hall for adjustment, where the Governor or Deputy Governor with the Moro Presidente and concejales meted out justice and advice in accordance with Moro custom and law. This method of bringing the government more directly to the individual Moros helped greatly to bring about general Moro cooperation with American administration.

At the time of the Japanese invasion, Datu Ombra Amilbangsa was still Governor. He has continued to act as Governor under the Japanese and puppet government. Japanese propaganda occasionally refers to him, but there is no evidence to suggest that he has given the Japanese more than nominal cooperation.

G. Security and public order.

One of the main reasons why the government of Mindanao and Sulu has always been regarded as a special problem is that so much strife and disorder have occurred there. The chief center of these disputes has been the Moro. He bitterly resisted Spanish arms, fought fiercely for years against American arms, and is probably now making it difficult for the Japanese. The Moro is famed as a fierce warrior who holds his own life as lightly as that of the person he attacks; in his wild amoks or juramentados death is the only end. Dean Worcester, the great American Secretary of the Interior from 1901 to 1913, gives many examples of the great courage and fierceness of the Moro.

The main law enforcement agency in the Philippines is the Philippine Constabulary. Constabulary outposts were scattered throughout Mindanao and Sulu before the war. Usually they were manned by Filipinos. The Constabulary personified only too well to many Moros the average Filipino, and Moro dislike of the Filipino stems partially from many encounters with the Constabulary. Some Constabulary officers were unnecessarily harsh, brutal, and narrow in their dealings with the Moros, but most of them did a good job under very difficult conditions. The Japanese have during the past year been laying great emphasis upon the expansion of the Constabulary and the indoctrination of its personnel, and it may be possible that more Constabulary units than ever are now in this region.

It has been necessary to temper the more formal civil code of law of the Philippines with native customary law as it has developed over many centuries. Knowledge of this native customary law can be gained only after long, first-hand study of the various peoples. In the Moro provinces, in particular, it has been necessary to adjust the law to accord with Mohammedan custom and laws. The *Koran* has been the basis for much of the Moro law everywhere. In Sulu the civil laws are embodied in the *Pakibia;* the criminal and military law, in the *Puruul.*

H. Political factors.

There are numerous important political factors, which center mainly around the Moros and can be summarized as follows:

The Filipino groups, chief of which are the Visaya and Tagalogs, have held most of the important official posts in the government of Mindanao and Sulu. This has been resented by Moro leaders, and they have increasingly demanded that their own people be given similarly important government posts. Unfortunately, the Moro's desire in this matter has been retarded by the comparative lack of education of the Moro people, and much more

FIGURE X - 13.
Mindanao. Moro group at Zamboanga protests independence.

needs to be accomplished along educational lines before his desire can be adequately satisfied.

There has been and still is considerable friction between the Moros and Filipinos on general matters of pride. The Moros refuse to admit that they were ever subdued by Filipino arms though they are ready to acknowledge that Wood and Pershing and the Americans did suppress their uprisings.

Many of the Moros openly proclaimed their opposition to American withdrawal from the Islands and asked that American rule be continued (FIGURE X - 13). They contended that, although they had once opposed that rule, they had since learned to respect its wisdom. Many of them were contemptuous of the idea of Filipino rule. Many authorities, among them Dean Worcester, have insisted that the Moros would never submit to complete Filipino rule. Worcester goes so far as to say: "No serious-minded person familiar with the facts, with whom I have ever talked, believes for a moment that the Filipinos could establish an effective government over the Moros or keep them at home." President Quezón and other Filipino leaders have, however, vigorously denied such assertions, labeling them "nonsense" and insisting that Filipino-Moro cooperation can be achieved with independence.

Despite their close attachment to the Mohammedan religion, there is no close sense of political consciousness among the Moros. Dr. J. R. Hayden states that "the three great Moro groups, the Maranaos (Lanaos), the Magindanaos, and the inhabitants of the Sulu Archipelago, are as separate from each other as are Germany, France, and Spain—they have never achieved either the consciousness or the machinery of national unity." Thus, the idea that the Moro represents a fundamentally united political unit is utterly false.

Even among the great divisions of the Moros, there are many splits. Each *datu* considers himself independent of the other, though some have risen to positions of recognized general leadership by virtue of superior talents or wealth. For the most part, however, great jealousy and distrust exists among the *datus*, and each is intent mainly on preserving his own power.

It is altogether unlikely that the Moros in any great numbers have submitted to the Japanese. The Japanese have claimed successes among them but nothing like the successes they claim to have achieved among the peoples of the Visayas and Luzon. Moro raiding parties have undoubtedly struck at Japanese communications lines and Japanese scouting parties with effect. But this resistance presumably is largely unorganized and on a hit-and-run basis. Moros, properly cultivated before D-day, might be of considerable value to an invading force.

(1) Government personnel in Mindanao and Sulu.

(a) Provincial Governors and members of the Provincial Board in 1940.

Agusan-Governor, Agustin Casenas; Jose Azote; and Jorge Satorre.
Davao-Governor, Romualdo Quimpo; Apolinario Cabigon; and Ricardo D. Miranda.
Misamis Oriental-Pedro Baculio, Governor; Paciencio Ysalina; and Vicente B. de Lara.
Misamis Occidental-Governor, Porfirio Villarin; Angel Medina; and Federico Apao.
Surigao-Governor, Fernando Silvosa; Vicente Pimentel; and Protolico Egay.
Zamboanga-Governor, Matias C. Ranillo; Felipe B. Azcuna; and Guadalupe Adaza.

(b) Japanese-reported Provincial Governors in Mindanao and Sulu, 1943-44.

Agusan—Agustin Casenas.
Bukidnon—Antonio Rubin.
Cotabato—Alfonso A. Pablo.
Davao—Romualdo C. Quimpo.
Lanao—Ciricaco B. Raval (reported transferred to Bukidnon).
Misamis Occidental—Porfirio Villarin.
Misamis Oriental—Jose Artadi.
Sulu—Ombra Amilbangsa.
Surigao—Fernando Silvosa.
Zamboanga—Agustin Alvarez.

(c) Members of the National Assembly from Mindanao and Sulu in 1940.

Agusan-Apolonio D. Curato.
Bukidnon-Manuel Fortich.
Cotabato-Datu Ugalingan Piang.
Misamis Occidental-Jose Ozamis.
Misamis Oriental-Isidro Vamenta.
Lanao-Tomas L. Cabili.
Davao-Cesar M. Sotto.
Surigao-Ricardo Navarro.
Sulu-Hadju Gulamu Rasul.
Zamboanga-Juan S. Alano.

(d) Provincial and Deputy Sheriffs in 1940.

Agusan-Ernesto R. Trillo; Buenaventura S. Nielo.
Bukidnon-Ramon Castillo; Pedro V. Capistrano.
Cotabato-Eugeniano P. LaRosa; Romualado C. Adanza; Gavino A. Villa.
Davao-Aproniano G. Castillo; Jose Villanueva; Bernardino Bolcan; Sancho C. Canoy.
Misamis Occ.-Simplicio J. Apao; Teofilo P. Campos; Jose F. Mutia.
Misamis Or.-Daniel Galarrita; Petronilo A. Fernandez; Zenon G. Murillo; and Jose P. Sabido.
Sulu-Jose C. Valbuena; Felicisimo Sulit; Salih Yusah.
Surigao-Rustico S. Gochoco; Florencio Cervantes; Ponciano G. Ortojan.
Zamboanga-Jose C. Bucoy; Jose S. Perez; Santiago Alfaro; and Vicente R. Binghay.

(e) Officials of the cities of Davao and Zamboanga in 1941.

Davao City-Mayor, Pantaleon A. Pelayo; Placido Lorenzana, Secretary to the Mayor; Ruperto Lizada, Deputy to the Mayor; Alfonso G. Oboza, City Engineer; N. R. Tolentino, City Treasurer; Lt. Manuel D. Jaldon, Chief of Police; Guillermo N. Teves, Chief, Secret Service; Zamboanga City-Pablo Lorenzo, City Mayor; B. C. Guerrero, City Engineer; Jose Desa, City Auditor; Jose Elayda, City Treasurer; Adolfo Jaldon, Chief of Police; Adolfo Grafilo, City Attorney.

(f) Governors of Sulu from 1936 *to present.*

Gov. James R. Fugate-one of the greatest of American Governors.
Col. Silvino Gallardo-close to Gulamu Rasul.
Lt. Col. Leon Angeles-noted for his ruthless tactics against the Moros.
Datu Ombra Amilbangsa-claimant of the Sultanate and first Moro Governor of Sulu—still Governor under Japanese—considered to have done fairly effective job as Governor.

104. Northeastern Borneo

The history of Borneo is largely obscure. Many centuries ago, it was recognized by the Arabs as a land rich in precious stones, gold, and spices. The island was invaded by Kublai Khan in the fourteenth century, and a Chinese province was established in the north, extending over the islands of the Sulu archipelago. The first European visitors to Borneo were the Spanish and Portuguese, who left almost no trace of their culture. A Dutchman visited Brunei, Northwest Borneo, in 1600, and founded a Dutch establishment. Sixty-five years later the English came to

FIGURE X - 14

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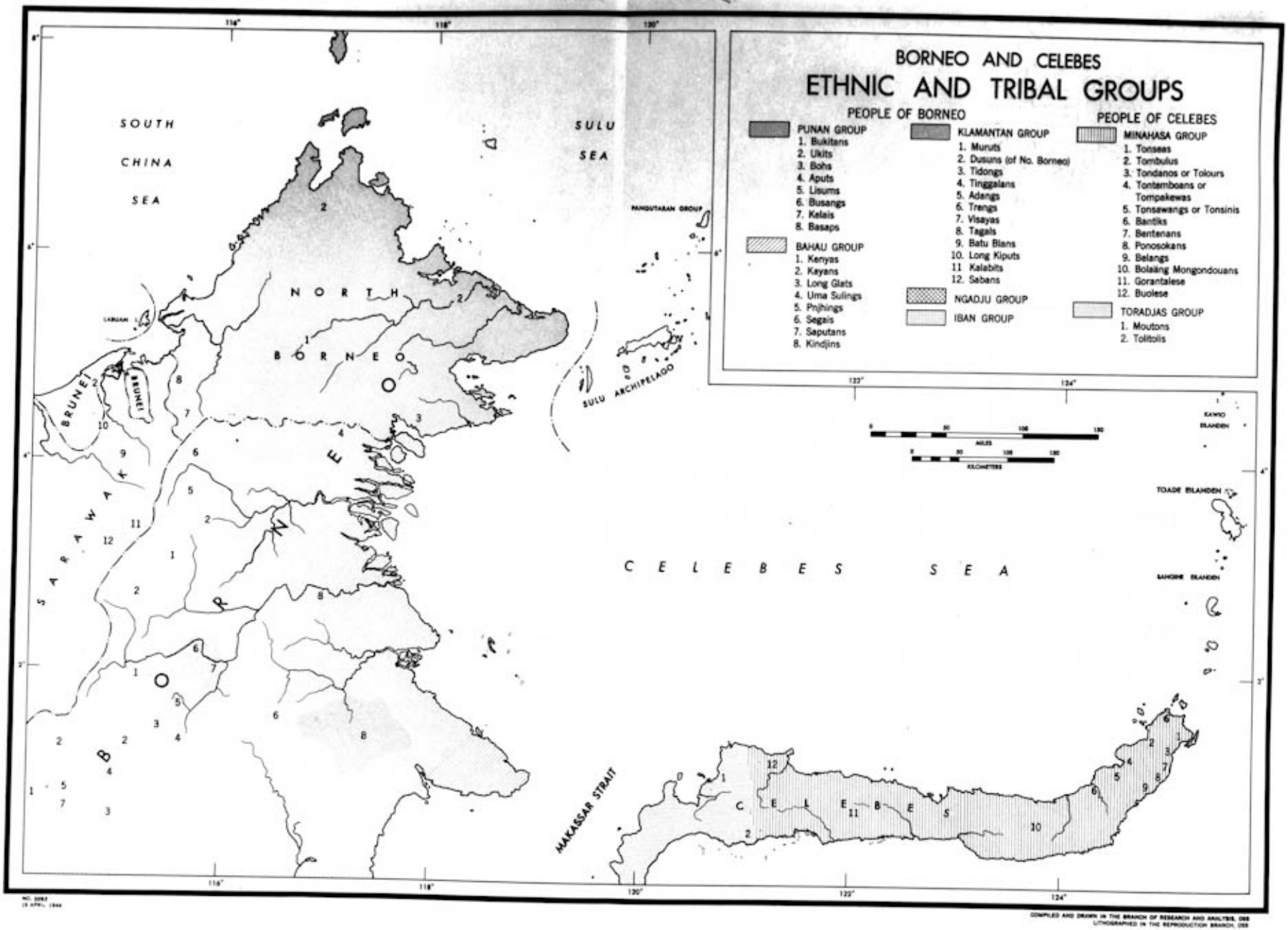

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Borneo and, by 1773, the East India Company had established a trading station at Balambangan on the northwest coast.

During the eighteenth century, the Dutch extended their influence and acquired control of the south and east portions of the island, and northwest Borneo relapsed into a condition of lawlessness and decay. Her Sultans of Brunei and Sulu exercised nominal control and farmed out the rights of collecting revenue to natives of rank; these settled at the mouths of rivers, levied taxes on passing traders, and plundered the inhabitants. On the coast there was a loose system of Mohammedan law; in the interior, natives settled their own disputes according to tribal custom. Head-hunting was rife, disease ravaged the country, and pirates ranged the seas.

In 1841 James Brooke was made Radja and Governor of Sarawak; foremost in his work was the suppression of pirates. The principal pirates were the Ilunans, the Balanini, the Badjaus, and the Sulus, all of whom lived near the north of the island. With the aid of government warships and the establishment of a government by the Chartered Company in 1881, piracy virtually ceased.

Borneo is one of the least developed parts of the Indies. Most of the coastland consists of vast, impenetrable swamps which extend inland to the central highlands. The population is sparse, with Malays, Javanese, Boeginese, and Chinese along the coast, and native Dyaks in the interior. The natives are divided into 3 groups: the Klamantan in British North Borneo, the Bahau in central east Dutch Borneo, and the Punan in central Dutch Borneo. The coast people speak Malay, the predominant language taught in schools. Though both Catholic and Protestant missions are active, most of the natives are pagan. The Chinese, the most industrious of the alien population, are the traders, and it is through them that the Dyaks transact their business.

FIGURE X - 15.
Borneo. A Dyak family.

A. Population—physical characteristics.

(1) General.

The inhabitants of Northeastern Borneo fall into 2 large divisions: the coastal population, a mixture of Malays, Javanese, Boeginese, and local Dyaks; and the interior native Dyak tribes (FIGURE X - 14).

The native population is divided into 3 main groups. The Klamantan are found mainly in British North Borneo. Most important sub-tribes within this group are the Murut in the interior and the Dusun along the coast.

Along the rivers in central and east Dutch Borneo live the Bahau of whom the Kenya, in the Apo Kayan region, and the Kayan are the 2 principal sub-tribes.

In the mountains and deep forest of central Borneo, mainly at the sources of the Kapuas, Maharan, and Barito Rivers, there are nomadic tribes, made up of small groups of not more than 20 or 30 members, known as Punan.

The people of these groups average from 5 feet 2 inches to 5 feet 3 inches in height, and are of varying degrees of darkness (FIGURE X - 15).

(2) Klamantan.

Characteristic of the Klamantan is their dark brown skin and broad nose. Usually they are long-headed, and some have obliquely set eyes. The Dusun have a lighter skin color (FIGURE X - 16). On the north and northeast coasts of Borneo, the various tribes have inter-mixed to such an extent that a more uniform race is developing.

FIGURE X - 16.
British North Borneo. Dusuns from Lewan bringing tobacco to the coast.

(3) Bahau.

The Bahau are Mongoloid in appearance (FIGURE X - 17). Most have fair coloring, broad noses, and moderately thin lips. Filing and blackening the teeth, and removing all hair from the face and body are practiced by both sexes. (FIGURE X - 18)

FIGURE X - 17.
Dutch Borneo. Bahau Dyaks. In the center rear are panther-tooth ear ornaments which may be worn only by successful head-hunters.

FIGURE X - 18.
Dutch Borneo. Kayan man and woman of the Bahau group, now living in British Borneo.

(4) Punan.

The Punan are sturdily built with large bones and well-developed musculature (FIGURE X - 19). Their skin is light yellow, which may be due to the fact that they dislike sunlight and remain as much as possible in the shade of the forests; they are said to resemble Chinese. Characteristically the Punan have sparse facial and body hair, although many men of the Kelai sub-tribe have moustaches and beards. The Basap are smaller and less developed than the average Punan, probably because of their malaria-infested habitat.

FIGURE X - 19.
Punans.

B. Population—cultural characteristics.

(1) Numerical data.

(a) Numbers and distribution. Of the 530,000 people in Northeastern Borneo, about 84% (450,000) are natives, 11% are Chinese, and 5% other Asiatics and Europeans.

The sparse population, averaging no more than 3 persons per square mile, may be due to the rugged mountains and thick jungle. Population is densest in the more fertile areas along the rivers and on the coast (FIGURE X - 3).

TABLE X-3.
POPULATION DISTRIBUTION IN BRITISH NORTH BORNEO AND DUTCH BORNEO (1930).

Area	Natives	Chinese	Europeans	Others	Total
BRITISH NORTH BORNEO	206,000	48,000	570	15,000	269,570
DUTCH BORNEO					
Boelangan	71,000	3,600	600	900	76,100
Samarinda*	157,000	5,300	1,000	1,200	164,500

*These numbers include the whole Division of Samarinda. As the town of Samarinda, numbering about 11,000 inhabitants, and the southern part of Oost-Koetai and West-Koetai are not included, the figures here will naturally be smaller.

In Dutch Borneo much of the population of the Samarinda Division is located near and in Tarakan. Oost-Koetai and West-Koetai are the most thickly populated sub-divisions of this Division. The Malays in British North Borneo live chiefly along the west coast but are also found a short distance inland on the big rivers. Most of the Chinese are in Sandakan, where they comprise almost 77% of that population. About 6,000 Sulus from Sulu Archipelago have settled on the coast between Sandakan and the Dutch border.

(2) Language.

(*a*) *Malay.* The business language in the coastal towns is Malay. It is also the chief language taught in schools. Interpreters competent in Malay could probably manage even in remote districts of the interior although it is not generally known by the Murut or the Dusun hill tribes. In order to establish communication, it will be necessary to contact key people, such as teachers or government employees. The tribes still speak their own languages. The Bahau languages of central Borneo are related to North Borneo dialects; the tribes could understand each other, although with difficulty. There has been no evidence of native writing. The Punan dialects are similar and are probably mutually intelligible. They are related to the Kenya (Bahau) and possibly to the Klamantan group in North Borneo.

(*b*) *Chinese languages.* The most common Chinese languages are Hakka and Cantonese among the labouring classes, and Hokkien among the shopkeepers. While the traders and shopkeepers speak Chinese among themselves, they also know Malay.

(3) Education.

(*a*) *British North Borneo.* Most of the schools, including mission schools, are state-aided (FIGURE X - 4). The average attendance is about 2,200. In addition to these schools, there are about 56 Chinese schools, unaided by the government, with about 2,000 pupils; Chinese is the medium of instruction. Eight village schools are maintained by the government.

(*b*) *Dutch Borneo.* Nearly all the schools in the inland sections of Borneo are mission schools, located in Tg. Selor and Malinau. Not more than about 4.5% of the population, however, is literate in Malay and less than one-third can read Dutch.

(*c*) *Japanese education.* In conformity with the present policy of Japanization of Borneo and Celebes, Japanese schools have probably been established in the major towns. In addition to teaching the Japanese language, schools for technical skills may have been introduced.

(4) Religion.

(*a*) *Natives.* The majority of natives are pagan, adhering to their tribal customs and taboos, which vary with each tribe. In the Bahau tribe, the head-hunting cult occupied a central position in the ritual system; the practice was almost completely stamped out by the Dutch administration. Controls may have been removed under Japanese regime, however, and Dutch officials believe that the tribes, left alone, would return to head-hunting.

(*b*) *Missions.* The most important mission work in Borneo has been the establishment of schools. In British North Borneo, the Roman Catholic Mission, the Society for the Propagation of the Gospel, and the Borneo Basel Self-Established Church have established missions and schools.

The Chinese have their own places of worship (Chinese temples) and Mohammedan villages of any size have their mosques and priests.

In Dutch Borneo, the Christian Missionary Alliance centers its activities in Malinau and Tg. Selor, and the Basel Missionary Society is located in Poeroektjaoe and Poedjoen. The latter society has taken over the work of the Rhenish Mission in Borneo and has expanded it considerably along the great rivers into the interior (Inset, FIGURE X - 4).

(5) Temperament and attitudes.

The people of Borneo are usually peaceable, and have cooperated with the Europeans. The natives like to be left alone, although they are interested in trading forest products for knives, tools, and weapons from the coastal towns. The Dusun in the north and the Bahau in Dutch Borneo mix with alien groups, and get along especially well with the Chinese. It is difficult to foresee what the events of the war and the witnessing of destruction and violence coupled with Japanese propaganda will have done to affect native attitudes.

C. Suitability of natives for labor.

(1) British North Borneo.

(*a*) *Numbers.* It has been necessary in the past to rely on imported Chinese and Javanese laborers for work on rubber and tobacco plantations. Of the 15,500 laborers in 1939, 7,000 were natives, 6,000 were Chinese and 2,300 were Javanese.

(*b*) *Occupations.* Natives were employed as unskilled laborers on rubber estates, oil fields, and at cutting lumber. Since most of the work is seasonal, it does not supply the laborer's livelihood, but only supplements his income. Other natives were engaged in small-scale agriculture. From July through November, the natives are engaged in preparing the ground in their own holdings, and for that reason the labor supply would be short during those months.

(*c*) *Tractability of labor.* It has been reported that the Dusun work well although they are not so tractable as the Chinese coolies. The Dusun does not adapt himself readily to skilled tobacco work, but is considered a good tapper on rubber plantations. He is not likely to stick to a job very long since he does not like to remain away from his home for long periods.

(*d*) *Wages.* No detailed wage rates are available. A 1937 report states that in Jesselton a porter received from 35c to 50c Straits Settlements dollars (U.S. 20c to 28c) per day. Workers on rubber plantations rarely earned more than 50c Straits Settlements dollars per day; in some cases, rations were furnished in addition to wages.

(2) Dutch Borneo.

(*a*) *Numbers.* In 1939, about 30,000 males were available in the South and East Divisions residency for statute labor; the figure includes Bandjermasin and a part of Samarinda division which included in the area studied. Large labor needs must be met by imported labor.

(*b*) *Occupations.* The natives stay close to tribal centers, and are unwilling to remain away from their homes for more than 6 months at a time. Since the Dyaks of various tribes bring some of their produce to the coastal centers, and many come down the river in their boats, they know the streams and how to manage their craft. Among the inland tribes, therefore, will be found the most willful men navigating the rivers up and down stream.

(c) *Wages.* In the years immediately preceding the war, the K.P.M. shipping line paid natives wages of 85c Netherlands East Indies (U.S. 40c) a day plus food. Some groups of natives like wages in the form of food and payment in kind.

(3) Chinese.

The Chinese are the most industrious of the non-indigenous laborers. They are more productive and efficient than Malays. Many are small agriculturalists; in towns they are shopkeepers and artisans and some become quite wealthy. Chinese do the skilled work on tobacco estates.

(4) Japanese developments.

In recent years the Japanese have leased an increasing number of plantations, and employed imported Japanese laborers. Since occupation the Japanese have encouraged native labor, but in October 1943 they reported: "The first batch of Javanese laborers as well as some skilled laborers from China are expected to arrive in Kuching shortly." The Japanese hope these groups will settle down as farmers.

D. Social structures and social conditions.

(1) Natives.

All of the indigenous tribes, except the Punan, are settled agriculturalists, who, for the most part, cultivate dry rice. Hunting and fishing are subsidiary. The 3 tribal groups are generally primitive in culture and formerly were ranked among the most notorious head hunters in the world. Except in the most primitive Punan tribes, the natives are skilled in making and handling boats, usually dugout canoes.

(a) *Klamantan.* The Dusun are the most advanced tribe within this group. Their agriculture system is well developed and they are the only tribe of the Klamantan to cultivate wet rice. Irrigation is practiced with a system of bamboo conduits, and they are the only native people in Borneo who use the plow, drawn by water-buffalo. These people have adopted many Chinese techniques of agriculture and customs, because of close association with the Chinese, who are well liked and with whom the Dusun frequently intermarry. The Besayas, a sub-tribe found near the Padas river, are dirty in their habits. The Klamantan hunt with swords, spears, and sometimes small blowguns. They probably use poisoned darts.

Marriage practices vary within different tribal groups. The Klamantan are usually monogomous. Polygamy exists where there is Mohammedan influence. Divorce is practiced; premarital chastity is neither desired nor expected.

Clothing consists of cotton goods which have largely supplanted bark cloth. The men wear a loin cloth, a head cloth, and sometimes a jacket. In the interior they attach seat cloths to the rear of their loin cloths. Women wear a skirt, head cloth, and on special occasions, a blouse. Embroidery, colored beads, feathers and shells decorate their festive garments. Both sexes wear rattan hats as a protection from the sun, and earrings. In some Dusun tribes, the women wear heavy brass rings on their ankles and coils of brass wire around their legs, arms and necks. Tattooing is practiced only by Dusun men.

(b) *Bahau.* The Bahau are a semi-nomadic people who move from place to place seeking new areas of cultivation. Their techniques of cultivation are primitive; therefore the land is soon exhausted. If the rice crop fails, sago is an important substitute. These people are good fishermen; they can catch as many as 2 tons of fish in a couple of hours by use of a mild poison. Rice beer is a favorite beverage, and the men drink it to the point of intoxication. Tobacco and betelnut are indulged in freely. In hunting, the Bahau use swords or spears. The blowgun is rarely used.

According to Dutch law, slavery no longer exists. In the Bahau society, there is a group, originally alien, which feels strongly outcast, although the members are well treated and may rise to the position of priest or war leader.

Men's clothing consists of a loin cloth, sometimes more than 30 feet long, and a headcloth or strip of rattan for the brow. Women wear ankle length skirts open on the side, and cloth or rattan tied around their heads (FIGURE X - 20). When working

FIGURE X - 20.
Dutch Borneo, Kayan girls of the Bahau group, now living in British Borneo.

in the field, they wear enormous plaited-fiber hats. Festive clothes are richly embroidered. Common materials are bark cloth, woven cloth, or cotton of thin liana fibers. Much of the cloth is now imported. Innumerable metal rings are hung on ear lobes, which are sometimes distended 2 inches below the shoulder (FIGURE X - 21). Hornbill feathers are ornaments reserved for chiefs. Tattooing is universal.

(c) *Punan.* The Punan hunt deer, wild pigs, and birds. Sago and jungle fruits are important subsidiary foods. Wild

FIGURE X - 21.
Dutch Borneo. A Bahau Dyak, showing distended ear lobes.

honey is regarded as a delicacy. The Punan barter wild rubber and camphor with other native groups in exchange for knives and cloth. Only 1 sub-tribe, the Basap, have settled down to permanent dwellings and a sedentary agriculture. They grow principally dry rice.

The Punan hunt with a hard-wood blowgun, 6 to 9 feet long and about 2 inches in diameter. Iron drills are needed to make them; the Punan secure these by bartering forest products with the Bahau, who in turn deal with the coastal Chinese traders. Each man carries a sword, a small knife and a bamboo quiver for poisoned darts. The Punan dislike water, and no boats are found among these natives.

Loin cloths, the women's short skirts, and head cloths are made from beaten bark cloth. Basap women wear sleeveless jackets, open at the sides. Strings of beads are sometimes worn, and most Punan wear earrings. Tattooing is rare.

(2) Chinese.

The Chinese population form the tradesmen, artisan and gardener sections of the community. They own shops in the coastal towns and also in the more remote sections of the island. External trade is controlled by the Chinese, the Arabs and Europeans. The Chinese peasant settlers have introduced their agricultural methods of intensive cultivation. They get along well with the pagan tribes and are respected by them. Sandakan is almost 77% Chinese and Tarakan is 25% Chinese.

E. Government organization.

(1) British North Borneo.

The administration of British North Borneo was vested in the British North Borneo Company with a Governor of the island, acting under the authority of a Court of Directors in London, and assisted by a Government Secretary and Civil Service of 60 men. As of 1934, the state was divided into 4 residencies with a Resident in charge of each. The Residencies were:

(*a*) *Sandakan and Kudat Residency.* Headquarters were at Sandakan. Government stations were located at Sandakan, Kudat, Langkon, Lamag (Kinabatangan), and Beluran (Labuk and Sugut). British officers were in charge, although in some cases there were competent Asiatics.

(*b*) *West Coast Residency.* Headquarters were at Jesselton. Government stations were located at Jesselton, Tuaran, Kota Belud, Paper, Beaufort, Mempakul and Sipitong.

(*c*) *Interior Residency.* Headquarters were at Keningau. Government stations were located at Keningau, Tenom, Tambunan, and Pensiangan.

(*d*) *Tawau Residency.* Headquarters were at Tawau, with government stations at Tawau and Lahad Datu.

The executive power is carried on by Departments under the direction of the Commandant of the Constabulary, the principal Medical Officer, the Financial Controller, the Commissioner of Customs and Excise, the Commissioner of Lands, the Protector of Labor and Secretary for Chinese Affairs, the Director of Public Works, the General Manager of Railways, the Surveyor General, the Conservator of Forests and Director of Agriculture, and the Postmaster General. Ordinances are enacted by the Governor with the advice of a Legislative council which the Court of Directors has the right to veto. The governor and executive heads of most of the government departments are stationed in Sandakan, the remainder at Jesselton. Chinese personnel has been much used by the government offices.

(2) Dutch Borneo.

Within the Netherlands East Indies Administrative scheme Borneo is one of the Outer Territories. It is divided into the Residency of the West Division and the Residency South and East Division. The area included in this study is the northwest part of the Residency of the South and East Division. It includes the Boeloengan division, parts of the Samarinda and a very small part of the Kapoeas-Barito division. (Since 1930, reorganization of the administration has caused the incorporation of the Doesoen-landen division with the Kapoeas-Barito division.) (FIGURE X - 3). Each division is divided into sub-divisions. Three of the 8 sub-divisions included in this study are native-ruled: the Boeloengan sub-division in Boeloengan division, the Beraoe sub-division and the Oost Koetai sub-division in Samarinda division. In each of these sub-divisions, however, the capital is administrated by direct rule. Tg. Selor is the capitol of the Boeloengan sub-division, Tg. Redeb is the capitol of Beraoe sub-division, and Samarinda is the capitol of the Oost Koetai. Tarakan, in the Boeloengan sub-division, and Bontong and Sanga-Sanga in the Oost Koetai sub-division are independent sub-districts.

(3) Japanese administration.

The Japanese have followed a general policy of using the former Administrative Districts in marking out new Administrative Areas. British North Borneo has been divided into the

west coast residency and the east coast residency. Sultans and radjas have been used in civil administration posts.

F. Security and police.

(1) British North Borneo.

(a) Judiciary. The Governor of North Borneo is President of the High Court, which is comprised of a chief justice and other Sessions Judges. Sessions courts are presided over by Sessions Judges. There are also subsidiary courts. Some Indian statutes have been adapted with slight variations. Native law is administered by native courts with appeal to the District officer to the Resident and to the Governor. Native chiefs have limited judicial power under codes. Among the Klamantans in the Dusun and Murut tribes, a council of elders advises each chief on important questions. Their courts are supervised by European officers.

(b) Police. An armed constabulary is maintained with 5 British officers, 5 native and Indian officers, and 500 non-commissioned officers and men, mostly natives and some Indians. There also existed a native Military Platoon, a semi-military striking force, capable of dealing with any insurrectionary movement.

(2) Dutch Borneo.

The basic principle in Dutch policy has been to keep intact native societies and institutions, and to allow them to develop along their own lines insofar as there was no interference with law and order. Petty crimes were settled as much as possible by natives according to their *Adat* law. When disputes could not be settled locally they were taken to the *Controleur* (local civil officer) who sat in court with the local *Adat* chief, and a Mohammedan of high standing, a priest for instance, if a Mohammedan was involved.

(a) Police. The police system in Dutch Borneo follows a general Netherlands East Indies police system. It includes the local general, field, and armed police. The local police, generally called *desa*-police (village police), is under the control of the village head and the Central Government has no direct concern with it. The general police, mostly Manadonese and Amboinese with a strong military tradition, and Dutch loyalty, is a semi-military organization. The field police, established to aid village police, is a group of trained, mobile police force largely using motorcycles. The armed police is used in the Outer Territories and performs a function between the general police and the army. Native states have their own police.

Because of the political nature of much of its work, the police is directed by the Solicitor General, who, though attached to the "High Court," is subject to orders from the Governor General. A school for training of police personnel was located at Soekeboemi in Java.

G. Belligerency.

Under the protecting aegis of the British and Dutch governments, the Klamantan have been rescued from the constant incursions of the Iban and the piratical Malays, who were, until the advent of European rule, gradually reducing the less warlike tribes. The Bahau were also striking at the up-river settlements until punitive expeditions by government forces stopped the constant bloodshed. The Kenya were the most warlike in this group. They were hated and feared and never left their strongholds, even on trading trips, except in large fully armed parties. It is suspected that some of these tribes are still resisting the Japanese.

105. Celebes

The northern peninsula of Celebes formerly contained 2 large confederations and a powerful, independent state, Bolaäng Mongondow. Against the constant attacks of this kingdom, the 4 largest tribes of the northeastern peninsula, the Tombulus, Tonseas, Tontemboans, and Tondanos, allied themselves in a confederation called the "Minahasa" ("become one").

In 1679 the Minahasans called on the Dutch for aid against the Spanish, who were trying to incorporate them with the Philippines. Following expulsion of the Spanish forces, the Minahasans settled down to long years of friendly relations with the Dutch, which have lasted as far as is known until the present time.

A "league of the 5 brothers," formed in Gorontalo, waged war intermittently with Minhasa. These wars, complicated by the frequent invasions of the Ternateans and Sanginese, kept the entire peninsula in a state of intermittent strife until the beginning of the twentieth century when the Dutch Colonial Administration finally succeeded in integrating the whole area under an efficient governmental system.

Except for the eastern end of the peninsula, north Celebes is sparsely populated. Villages are rare, and jungle is extensive. The few settlements are far apart, and communication between them is usually possible only by water. Most of the coast tribes are learning Malay, which forms the only means of verbal communication between Celebes and the other islands of the Netherlands East Indies.

The most important center, from the cultural, commercial, and administrative point of view, is Manado, which is also the seat of the Manado Provincial Council inaugurated by the Japanese in March 1944. Formerly, under Netherlands East Indies government, there was the Minahasa Council, the first autonomous council for the Outer Provinces.

Gorontalo, at the southern coast of the peninsula, is the capital of a native state and used to be a central station for a brigade of armed police, the former fort having been converted into police barracks.

A. Population—physical characteristics.

(1) General.

The sparse physical data available seem to indicate that the whole area is inhabited by peoples of mixed ancestry. Generally, however, the natives seem to average about 65 inches in height, with light brown skin, sometimes ruddy lips and cheeks, broad and flat noses, thick lips, straight black hair, and sparse beards. Variations from one district to another are wide, and in some places short, ugly, dark-skinned types are common.

(2) Minahasa group.

This group inhabits the northern peninsula of Celebes as well as the Sangihe and Taland Islands (FIGURE X - 22). The population of Minahasa is composed of 5 principal tribal divisions; namely, the Tonseas, Tombulus, Tondanos, Tontemboans, and the Tonsawangs, and four smaller ones: namely, the Bantiks, Bentenans, Ponosokans, and Belangs (FIGURE X - 14).

FIGURE X - 22.
Natives of Manado washing clothes.

FIGURE X - 23.
Fishermen of Gorontalo. 1937.

The groups are distinct from the other tribes of Celebes, and are said to have a strain of Javanese and a fair amount of European blood. Characteristic of the group are their high noses, widely-separated eyes, and stiff short hair. The number of albinos is unusually large. The people are tall and strong, but have short legs. Observers have remarked that the adults are decidedly Japanese in appearance. The Bolaang Mongondows, divided into 5 sections, resemble the Minahasans very closely, except that in the interior there are many individuals with wavy hair. The Corontaleze are of the same general physical type as the Minahasans (FIGURE X - 23). The Buolese are light-skinned like the Minahasans, but have broad flat noses and moderately thin lips.

(3) Toradja group.

The Toradjas inhabit the western part of the north peninsula, and central Celebes (FIGURES X - 24 and X - 25). Only 2 small sub-tribes are located within area limits of the present study; the Moutons and the Toli Tolis. Generally speaking, the Toradjas are small in stature (male average 63 inches), brown-skinned, with straight, black hair that is sparse on face and body, moderately broad noses, and lips of medium thickness. Little is known about the Moutons and Toli Tolis because they are so remote and inaccessible.

FIGURE X - 24.
Toradja. Natives selling tobacco. 1937.

B. Population—cultural characteristics.

(1) General.

The tribal groups covered within the area studied vary markedly in degrees of cultural development. The differences between widely separated districts such as Minahasa and Go-

FIGURE X - 25.
Toradja. Native off to market with a pair of pigs.

rontalo are striking; less so but still apparent are divergences between sub-groups within the same region. The Minahasans are an intelligent race and have assimilated to a great degree the culture and religion of western civilization. They have a rich literature of prose and poetry orally transmitted. This group is scattered throughout the Indies as soldiers and government employees. On the other hand, interior tribes such as the Moutons and Toli Tolis are primitive, as yet scarcely touched by Western influences.

(2) Numbers and distribution.

It is impossible to state definite population figures for the area, because only a part of Parigi subdivision in Poso division, and approximately 3 of the 4 subdivisions in Donggala division are included in the area studied. Manado and Gorontalo divisions are completely within the area (FIGURE X - 3). The total number of inhabitants is estimated to be under 700,000. Generally speaking, the coasts are fairly well populated; villages in the interior are few and far between.

(a) Manado division. In 1930 there were some 365,000 natives; 68% were Minahasans, 13% Mongondous, and the remainder Gorontaleze, Ambonese, Ternateans, etc. The division was the most densely inhabited portion of all Celebes, averaging about 105 people to the square mile. By far the heaviest concentration of population was in and near Manado.

(b) Gorontalo division. There were about 183,000 natives in 1930. A small number was made up of Minahasans, Javanese, Boeginese, etc.; 97% were Gorontaleze. Gorontalo district was the most densely populated of the division; Limboto district was second. Boalemo district was sparsely settled.

(c) Donggala division. Probably few of its 169,000 natives are included within the limits of this study. North of the town of Donggala the population is sparse. About 60% of the people are West Toradjas, 11% Gorontaleze, and 10% Boeginese. In the Tolitoli areas, the coastal towns are largely composed of alien groups, and few of the original natives remain. Boeginese, Gorontaleze, and Arabs have become a typical part of the social scene.

(d) Poso division. Although the population of 237,000 natives is fairly evenly distributed throughout the division, such a small section of it is included in the area studied that it is impossible to estimate the population.

(3) Language.

(a) Minahasa. The language of north Celebes, as far west as Gorontalo, has strong connections with Philippine languages. The majority of natives, about 150,000, speak Gorontaleze in the Gorontalo region. Gorontaleze is recognized by the word "no" (diida). The languages are, however, gradually being replaced by Malay; an interpreter competent in Malay could certainly be understood throughout most of this area. High-school educated natives can understand Dutch; probably a few know English.

(b) Toradjas. All the Toradja languages are closely interrelated, though not mutually comprehensible except between neighboring tribes. Most of them show a similarity to the Boeginese and Macassar language. Malay would be understood wherever there are schools, and along the coast.

(c) Japanese. In March 1944, the Japanese reported that the study of their language was "amazingly" popular throughout Celebes.

(4) Education.

(a) General. Education is more widespread in Minahasa than in any other area covered in this study. (FIGURE X - 4). There are private normal schools for native teachers, public native schools of the second class (fourth and fifth grades), private Dutch-native schools, subsidized and unsubsidized district schools (third and fourth grades), and sectarian schools (third and fourth grades). About 3 boys to 2 girls receive a primary education. Schools are run by the government and by missions. In 1935 there were 230 Protestant mission schools in Minahasa, and nearly 17,500 students. Although Protestant schools far outnumber Roman Catholic schools, it is reported that the latter offers by far the more practical and useful education. Only non-denominational schools receive a subsidy. Literate natives could understand orders written in simple Malay.

(b) Literacy rates by division. In Manado division about 36% of the population is literate in a language other than Dutch, and slightly more than 2% in Dutch. In Gorontalo division the corresponding percentages are 9% and 0.5%; Donggala division 7.7% and 0.2%; Poso division, 11% and 0.2%.

(c) Japanese. The Japanese report that in Celebes 810 public schools have been opened, at which over 105,000 pupils are receiving instruction from 2,000 teachers. Two secondary schools, agricultural schools, teachers' training schools, and others have been started.

(5) Religion.

(a) General. There are 3 fairly distinct belts of religious belief in the north peninsula of Celebes. The Minahasans are Christian; the area between Minahasa and east of Gorontalo is

mixed with pagan, Mohammedan, and Christian elements; the Gorontalo section is Mohammedan; and the Toradja section is largely pagan. In 1939, about one-third of the total number of ministers in all the Outer Provinces were concentrated in the northern peninsula. Sections of the Bible have been published in dialects spoken in the north peninsula.

(*b*) *Christianity.* Christian missionaries have worked in Minahasa for more than a century. Figures for 1935 indicate that of a population of about 292,000, 266,000 natives were Christians. About 15,000 of the Christians were Catholics, the remainder Protestant. There were less than 5,000 Mohammedans. Despite the fact that Protestants far outnumber Catholics, a bitter fight wages between them in Minahasa, so that Catholic and Protestant clergy have been forbidden by law to baptize any native already baptized in the other persuasion.

(*c*) *Paganism.* The pagan cult still survives in remote districts, where old village temples can still be found. It is apparent that the various local cults follow a general pattern, including ancestor worship, belief in innumerable supernatural beings both good and evil, the concept of a supreme god and numerous lesser deities, and the power of periodic communal sacrifices to deal with the unseen powers. The Bolaang Mongondow tribes are mostly pagans; only about one-tenth are Christian.

C. Suitability of natives for labor.

The sturdiest, most enterprising, and aggressive laborers within this general area are the Boeginese and South Makassarese. They work as long as 24 hours at a stretch, if necessary, requiring only a little food. These groups do not like to remain away from home longer than 6 or 8 months. They cannot be recruited from north Celebes, but are usually at Makassar, and southward about 50 miles. Boeginese are also excellent seamen.

Large numbers of Minahasan boys become clerks or join the army. In the past, most contract coolies in Manado Residency have been Javanese or Gorontaleze; Manadonese and Amoerang-baai natives are weak and inefficient laborers. A dearth of labor has been felt in Minahasa, but apparently Gorontalo is a good potential source from which to draw. Gorontaleze will work if encouraged to do so by the government.

The K.P.M. shipping line paid daily wages of 85 cents, plus food. Double pay is given for overtime work. Agricultural wages are lower. The Dutch government demanded statute labor, unless a ransom on tax was paid, at the rate of 1 day out of 7, or no more than 32 days a year. For such labor a daily wage of about 15 cents, plus food, was paid.

Minahasa natives have worked successfully among themselves by a communal system of agriculture. Each village has one or more mutual aid societies, called *mapalus.* On appointed days the whole *mapalus,* including women and children, meets early in the morning and marches in procession to the particular field where they are to work that day. The work is turned into play as much as possible by rhythmic singing, joking, and impromptu contests to see which team can outwork the other. The person receiving the aid must feed the members at noon and provide a feast for them in the evening. These organizations are often large, running into the hundreds. There is an elected leader and other officers as well. Usually the group is concerned with agriculture; sometimes house-building, or, on occasion, they may even lend money.

The Kaili people, a Mohammedan group originally from Donggola, are situated in coastal villages in the Tolitoli region. They are belligerent and aggressive by nature, and are very diligent workers.

On P. Simatang in Tolitoli Baai is a group of Mohammedan Badjaus. They are a sturdy and industrious people, and live by agriculture and fishing. They make excellent praus.

In Minahasa, the *kapala djaga* (police) are especially charged with getting coolie labor for plantations.

In Celebes, the opium monopoly has an important bearing on the problem of labor, for while opium does not appear to affect the industry of the Chinese, it utterly demoralizes natives who become addicted to its use. The monopoly was applied to the whole of Celebes in 1907, and in Manado it has been absolutely forbidden to the natives. It is not known what the Japanese have done in regard to this situation.

D. Social structure and social conditions.

(*1*) *Customs.*

(*a*) *General.* The Minahasans are more civilized, according to western standards, than are the tribes of Borneo or Halmahera. In the towns the people have adopted western housing and clothes. Outside the Minahasa area, the social scene changes quickly and even coastal villages a short distance westward are less accustomed to European ways and standards. Interior tribes are extremely primitive, and cling to their old habits and customs. Although cheap imported cloth has largely replaced native fabrics in north Celebes, some tribes wear beaten cloth garments for work, and certain interior tribes may know only bark clothes.

Social stratification is more rigid in some places than others. Minahasans draw the line between nobles and freemen, but do not attach so much importance to hereditary status as do the people of Bolaäng Mongondow, who distinguish minute gradations of rank within the above. Gorontalo, like Minahasa, is more democratic in character. In Donggala division, an aristocracy, an upper middle class (clergy, mosque personnel, etc.), and the masses are recognized in the Tolitoli subdivision area.

Headhunting flourished in ancient times, and until as late as 1860 interior tribes went on secret forays to secure trophies for deceased chiefs.

(*b*) *Property.* In North Celebes, except in Gorontalo, the members of each village have rights to the possession of portions of the community territory, and each family holds its particular land in perpetuity as long as they use it. If the land lies idle, it reverts to the category of undivided village property and becomes eligible for redistribution to other families. Nowadays, the concept of private property in land is gaining strength in the Minahasa region, and the old communal idea is on its way to extinction. In Gorontalo, communal property does not exist. Division of family land is in accordance with Mohammedan law. A large part of the land is under the control of nobles.

(*c*) *Agriculture.* Minahasans cultivate wet and dry rice, the principal crop; they depend on natural flooding of low-lying ground for wet rice cultivation. Simple cattle-drawn plows are used. Maize and sago are eaten if rice is scarce. The Bolaäng Mongondow people depend mainly on sago, but cultivate rice, maize, and yams also.

(*d*) *Hunting and fishing.* The Minahasans are enthusiastic hunters. Wild pigs, the principal game, are stalked with dogs. Fishing is common with them and with the people of Gorontalo. Swords, clubs, and spears are the chief weapons.

Blowguns are used in some districts. Hunting and fishing are of minor importance to the Bolaang Mongondows.

(*e*) *Domestic animals.* Domesticated pigs occur in great numbers in Minahasa and Bolaang Mongondow, but the Mohammedan Gorontaleze lack them entirely. Houses, cattle, buffaloes, goats, and chickens are raised in Minahasa. Some Minahasans eat dogs, and many find rats and snakes palatable.

(*f*) *Crafts.* Pottery, mat-making, basketry, weaving, and carving of wood, bone, and horn are all widespread material arts in North Celebes.

(*g*) *Marriage.* Monogamy is the rule, except where Mohammedanism has altered it, but divorce is easily obtained. Premarital chastity and moral standards are generally higher in the Minahasa than elsewhere in the Netherlands East Indies, because of the strong Christian influence.

(*h*) *Mutilation.* Tooth filing and supercision of boys are widespread forms of mutilation in the region. True circumcision occurs rarely in Minahasa, but more frequently in the Gorontalo area, particularly among the nobility.

(2) Other racial groups.

(*a*) *Chinese.* In the Residency of Manado there were more than 20,000 Chinese in 1930. About ¼ of the group lived in the city of Manado. Elsewhere they lived principally in coastal settlements, and functioned as traders and small shopkeepers. The Chinese in Donggala division, especially Tolitoli subdivision, are Hakka Chinese, and speak Malay, Boeginese, and other languages besides Chinese. They rarely intermarry. The head of the Chinese community is located in Kampoeng Baroe.

(*b*) *Europeans.* Almost all the Europeans were located in Minahasa; less than 2,500 were in Manado division in 1930, and of that number about 1,400 lived in the city of Manado. The Europeans, principally Dutch, functioned as government officials, business men, and missionaries.

(*c*) *Arabs.* Most of the several thousand Arabs in Celebes lived in the northern peninsula. In 1930 there were about 1,100 in the division of Donggala (their center was Kampoengbaroe, in the Tolitoli subdivision), 1,100 in Gorontalo division, and 2,400 in Manado division. The Arabs are usually poor; they mix well with the local population. Most influential are the *Hadjis,* a group with prestige because they have made the pilgrimage to Mecca.

(*d*) *Japanese.* The number of Japanese is not known because the census classifies them as "European." It is known that there was a strong group in Manado division and that they mixed well with the Manado city population. Many were fishermen.

(3) Current.

The Japanese have established a neighborhood association system (Tonari Gumi Soshiki) similar to that in the homeland of Japan, throughout Manado city in order to "solidify the defense activities of citizens, disseminate order to the subjects, smooth the distribution of surplus commodities and operation of the commodity rationing system."

This neighborhood association system will divide the city into groups of from 10 to 15 families per group, "without racial discrimination." They are reported to have begun the utilization of vacant lots to increase foodstuffs.

E. Governmental organization.

(1) Authority.

The North Celebes area is included within the Territory of De Groote Oost, whose capital is at Makassar. Manado Residency is one of six within the Territory. In Manado Residency, which includes much of Central Celebes as well as the north peninsula, there are 5 divisions and 12 subdivisions. The area of the north peninsula of Manado Residency included in this study is broken down as follows:

Division	Subdivisions
1. Manado	Tondano; Manado; Amoerang; Bolaäng Mongondow.
2. Gorontalo	Boalemo; Gorontalo.
3. Donggala[1]	Donggala; Tolitoli; Boeol.
4. Poso[2]	Parigi.

[1]Only 3 of 4 subdivisions fall within the area studied.
[2]Only part of 1 of 5 subdivisions is included in the area studied.

Subdivisions are further broken down into districts and subdistricts.

A large part of Manado Residency is under indirect rule of the Dutch Government. In 1939 there were 26 self-governing native states in the Residency, 71 districts and 16 sub-districts. The territory under direct rule included only 11 districts, 32 subdistricts, and the municipality of Manado. Most of Gorontalo division is governed directly; Bolaang Mongondow has self-government.

(2) Minahasa and Gorontalo districts.

In Minahasa and Gorontalo the present district organization developed out of the old localized sub-tribe system, each district (*pekasaan*) being founded on the base of an old sub-tribe (*balak*). In Minahasa, district rulers, usually lineal male descendants of the old sub-tribal chiefs, (designated *hukum besar, ukung besar,* or mayor), are elected by the local population. The franchise belongs to men 20 years of age or older. Each district chief has an assistant, charged with the execution of the chief's orders. Villages also have chiefs elected to office by popular vote. The Minahasan chiefs attended a special school at Tondano; because of this they all speak Dutch.

In Gorontalo, where there is direct government, there are 2 rival noble families left, both of whom would like to regain authority. They have governmental positions in the districts and sub-districts.

(3) Bolaang Mongondow district.

The 5 principal districts of Gorontalo each developed an internal state organization, and were ruled by councils of the foremost district chiefs. Bolaang Mongondow still has its own ruler, restricted in his administration by the Dutch Government. The district chiefs elect the ruler from the members of the royal family. The principal district chiefs, like the sectional rulers of Minahasa and Gorontalo, are the successors of the ancient chiefs of the localized sub-tribes.

(4) Donggala division.

In Tolitoli subdivision a Boeginese ruler, who represented the majority of the natives, was appointed in 1929, and was ruling in 1935. His name is Matata Daeng Masesee. He lived in Kampoengbaroe, and drew a salary of 180 guilders per month (roughly U.S. $17.)

(5) Assemblies.

Japan opened the "Manado Provincial Assembly" on 8 March 1944. A Japanese is President (reportedly Shiino of the Civil Administration and the Director of Civil Administration). The Vice-Chiefs' seat was taken by the former governor. Under Dutch rule a similar council was started in 1919. Natives, Europeans, and foreign orientals elected their own representatives. Originally the council had 36 native, 4 European, and 1 foreign oriental representatives. The franchise belongs to all men over 23 years of age. There was agitation for woman's suffrage.

A municipal assembly was created by the Japanese in Manado, and is supposed to meet 6 times annually. With the exception of the President, all 15 assemblymen will be natives, either appointed or recommended for election. Prior to the extraordinary meeting on about 10 March 1944, the Japanese announced the official appointment, on 25 February, of 6 council members, including 2 agriculturists, 2 business men, 1 technician, and 1 journalist. Two overseas Chinese were among the new members. A Manado City Council also functioned under the Dutch, but lacked importance and power.

F. Security and public order.

The police in north Celebes are divided into municipal and field police. They are well-organized and receive a semi-military training. The high officials were Dutch, and the constables were natives.

The municipal police directed traffic, preserved the peace and arrested disturbers. The constable in rural areas often used a bicycle. Usually several small villages had 1 policeman, and large villages each had 1 or more.

The courts conformed in general to the court system throughout the Netherlands East Indies, employing native customary (*Adat*) law.

G. Political factors.

(1) The Japanese.

Prior to the war the Japanese paid considerable attention to Manado. They followed the efforts of the Dutch to develop it, establishing the South Pacific Trading Company, and gaining concessions for klapper (coconut) plantations well situated in the neighborhood of Kema and elsewhere on the coast. They established a settlement on the shore of Tondano Lake, across from the Dutch settlement. It is reliably reported that the Japanese Consul had a complete scheme for organization of a local government under his leadership, with the help of Japanese residents and pro-Japanese natives as officials. Japan went to great lengths to gain support from the native group.

(2) Newspapers.

In 1939 there were published within the Residency of Manado 1 European daily, 9 weekly or fortnightly publications, and 20 monthlies or other periodicals.

(3) Natives.

Interior natives would be useless as guides beyond a 15-mile radius from their villages. On the coast a few Arabs and Malays have boats, travel up and down the coast, and are quite familiar with it.

Among the natives in Minahasa there are probably many pro-Japanese, as well as pro-Dutch natives. The Minahasan, democratic in nature, likes assemblies and wants the right of discussion.

In 1930, Johan Caffin was one of the most influential people in the Gorontalo region. He belonged to a tribe of Kisar, and was regarded highly by the people and the government. He has ground north of Gorontalo, and a company, with branches and interests throughout the region, has been named after him.

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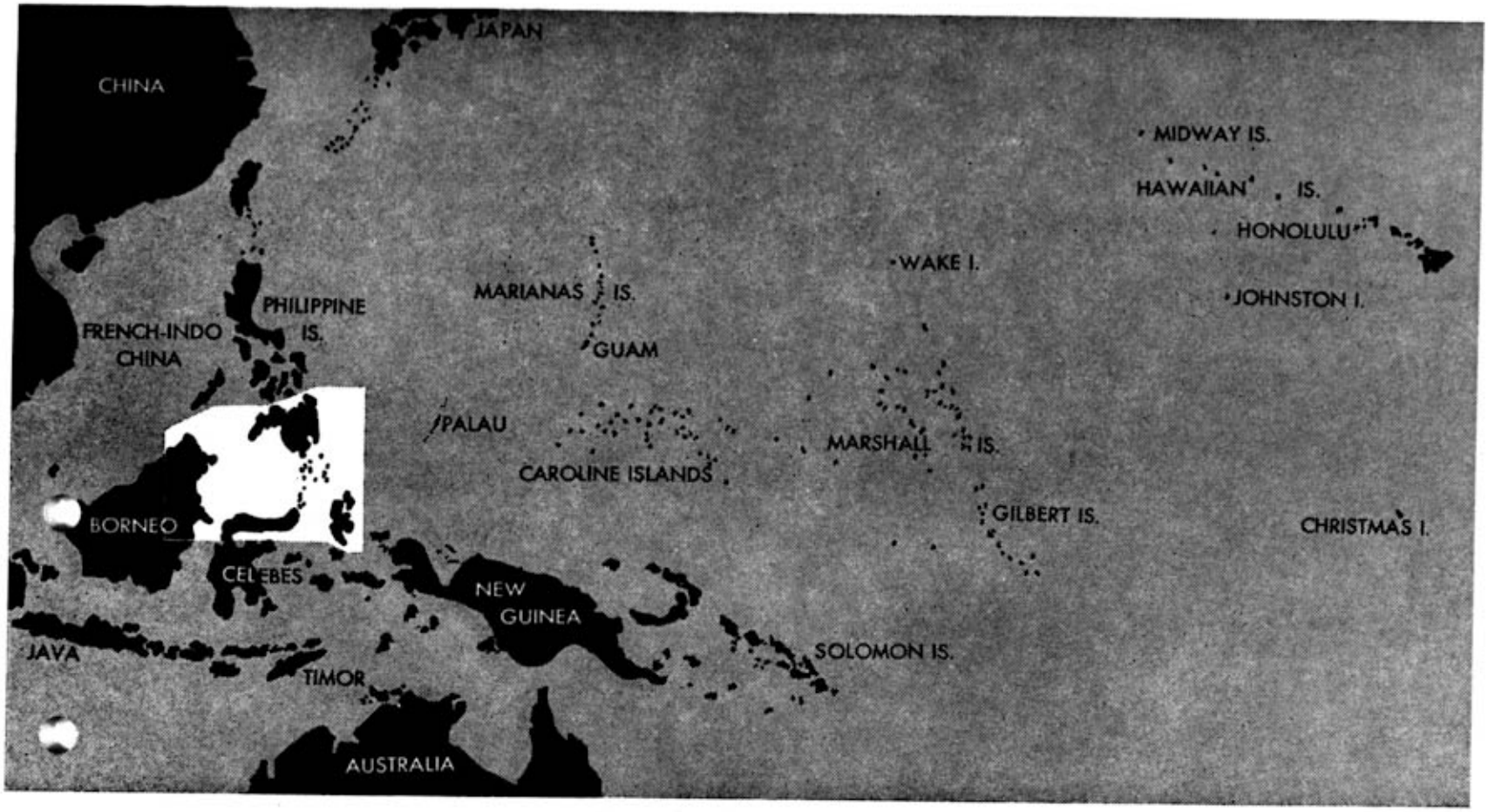

JOINT ARMY-NAVY INTELLIGENCE STUDY

OF

CELEBES SEA AREA

HEALTH AND SANITATION

MAY 1944

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Note: This chapter is based on material available in Washington, D.C. on 25 April 1944

HEALTH AND SANITATION

110. General Description

Mosquitoes capable of transmitting malaria, filariasis, dengue, and yellow fever are widely distributed in the territories which impinge upon the Celebes Sea. Less important in this area are lice, mites, flies, and fleas. Malaria will be the principal health problem. Malaria outbreaks occur at any season. In Borneo and Celebes, the annual peak usually coincides with the end of the rainy season. This does not hold true in Halmahera, which lies north of the equator. In the western districts of the Philippine Islands, the disease is transmitted especially during the change of seasons which takes place twice each year. The factors which govern the occurrence of malaria are extremely complicated and are apt to be distinctly different in the various areas. Control measures must therefore be worked out under the direction of competent malariologists. Typhoid fever, bacillary and amebic dysentery, filariasis, dengue, fungus infections, and respiratory infections will constitute major health problems. Rickettsial diseases including mite-borne typhus are of secondary importance in the area under consideration. Cholera and plague are regarded as potentially important.

111. Environment

A. Water.

In general there is an adequate quantity of water available in all parts of this area except the eastern part of the Jolo Island group of the Sulu Archipelago where the supply is sometimes inadequate. There are many sources as yet untapped such as streams and, in the Jolos, lakes in the craters of extinct volcanoes which could supply a large population. Natives obtain their water from shallow wells, springs, streams, lakes, and rain water catchment basins. Artesian wells are an important source in some parts of the Philippines where dug wells, springs, and rain water sources are also used. In some places such as Borneo, the natives often pipe water to the house from the nearest spring through a split bamboo aqueduct. In a few places the natives dig shallow wells somewhat back from the shore and obtain a small quantity of brackish water which is sufficient for their needs.

Piped supplies are available at a number of places including the following:

Borneo:
Samarinda, Balikpapan
Celebes:
Tondano, Manado
Sulu Archipelago:
Port Holland, Jolo City, Siasi

Usually only the houses in the European quarter are served with piped water, although taps may be available in other parts of the town from which the natives can obtain their supply. In most of these places, water from shallow wells and rain water catchments is also used. Treatment is provided at only a few places including Zamboanga and Davao on Mindanao, in Borneo at Balikpapan, and possibly at Samarinda.

The soil cover is often quite thin on the volcanic and coral islands and provides little purification of the surface water which seeps down through it. Hence, in inhabited areas, the native custom of disposing of excreta to the soil, which is practiced where running water is not available, is responsible for large quantities of pollution being carried into the underlying rock formations by the rain. Volcanic formations, while dense, are often broken by crevices and channels through which the ground water travels rapidly to a lower point where it may emerge as a spring, carrying with it the pollution introduced into the soil some distance away. On the coral islands, water sinks rapidly through the permeable coral formation to mix with the salt water below, receiving little purification en route.

Where the water is obtained from springs high in the mountains or from impounded streams in areas where the population is sparse, the water may usually be of good quality and free from contamination, but spring supplies which usually appear free from contamination when examined bacteriologically, will show evidences of contamination during rainy periods.

Reservoirs, rain water catchments, storage tanks, etc., most frequently are constructed in such a way that contamination can easily get into the water contained in them. The shallow wells are generally constructed in a primitive manner with little or no effort to protect the water from contamination. At times of rain many of these wells are grossly contaminated by surface water and may even be inundated. All surface water in the inhabited areas is contaminated, sometimes grossly so. All water in this area, therefore, should be considered unsafe for drinking without adequate purification.

Even piped supplies obtained from satisfactory sources or adequately purified before distribution are likely to be contaminated at the distal end of the system. Corrosion taking place in the pipe as a result of the high CO_2 content, which is found in many warm artesian waters in this area, opens the system to contamination from the soil. Lowering of the pressure, resulting from leakage, from stopping the pumps, or from other causes, makes it easy for such contamination to get into the pipes. In some places with piped supplies, sea water or unpurified surface water is used for industrial purposes and for flushing or even operating sewerage systems. Interconnections between such water supply systems and otherwise safe water supplies provide another way for contamination to enter the drinking water, particularly when the pressure is lowered.

B. Waste disposal.

Excreta are disposed of most commonly directly to a stream, to the ocean, or to the soil. In many areas including most of those in the Sulu Archipelago, the houses are built on stilts over the water and garbage and human excreta are simply dropped through holes in the floor into the water below. In the interior areas garbage and other refuse are disposed of to the ground below the house in the same manner, but shallow pit latrines may be used for excreta disposal. Pail collection with disposal of the excreta to streams or to the soil, is sometimes practiced and a few places including Kuching, where there is a sewage farm, and Jolo City, where the sewage is discharged to

the ocean, have sewerage systems for the collection of water-carried waste. Even in these places other more primitive methods of excreta disposal are also used. In the Philippines bored-hole latrines are used extensively. Where the ground-water level is close to the surface of the ground, the hole is often extended above ground by a length of tile pipe which is surrounded by a mound of earth. A 5-year improvement campaign had resulted in 1937 in the provision of at least one such latrine, of satisfactory construction, for each 8 persons. However, many pit latrines and septic tank installations were also in use.

C. Animals.

(1) Vectors of disease.

(a) Mosquitoes.

Anopheles. Of the 29 species of *Anopheles* mosquitoes known to occur in the Philippines only 4 can be incriminated in the transmission of malaria. The most important of these is the dangerous *Anopheles minimus var. flavirostris.* Next in importance is *A. maculatus.* Of less significance are *A. mangyanus* and *A. filipinae.* It is necessary to recognize that *A. minimus,* unlike the principal malaria mosquito of the continental United States, breeds in hill streams. The eggs are deposited in clean, fresh, flowing water, unshaded or slightly shaded from sunlight. Consequently malaria in the Philippines is a disease of the foothills. The disease is not transmitted in the coastal swamps, lowlands, or rice fields, nor does it occur at altitudes exceeding 2,000 feet. These facts were unknown in the early days of the American regime; the result was greatly damaging to American military strength in the area. In the Philippines, mosquito breeding tends to be greatest in transitional seasons.

In Borneo approximately 20 anopheline species and varieties have been described. The most important malaria vectors are *Anopheles sundaicus, A. maculatus maculatus, A. leucosphyrus leucosphyrus,* and *A. hyrcanus nigerrimus* in the order named. The principal vectors in Celebes are *A. subpictus subpictus, A. maculatus maculatus, A. leucosphyrus leucosphyrus,* and *A. hyrcanus nigerrimus.* In Halmahera, *A. punctulatus punctulatus, A. punctulatus moluccensis, A. barbumbrosus, A. kochi,* and *A. subpictus* are possible vectors, although the exact importance of each is uncertain. Four other anophelines are reported from Halmahera but are not of medical importance. *A. barbirostris barbirostris, A. parangensis, A. minimus minimus, A. leucosphyrus hackeri,* and *A. tesselatus* are found in Sangihe, and *A. barbumbrosis,* and *A. leucosphyrus leucosphyrus* on Talaud. There importance is not known.

In Borneo and Celebes, *A. barbirostris barbirostris* is the chief vector of filariasis due to *Wuchereria malaya.* Although this mosquito is also common in Mindanao and Sulu, it does not transmit filariasis there. *A. hyrcanus sinensis* has been reported to be naturally infected in Java, and *A. hyrcanus X* which is widely distributed in Borneo and Celebes, is a vector of filariasis at Martapoera in Borneo, and possibly elsewhere.

A. barbirostris barbirostris is most commonly found in rice fields, but is also present near the banks of slowly flowing rivers and creeks, in marshes, ditches, springs, and buffalo wallows. They are found in clear or turbid water. Sunlight and shade do not appear to be factors influencing their breeding habits. The species occurs both in the mountains and near the coast. In Celebes, adults are frequently found near buildings, although this mosquito is usually not domestic.

A. barbumrosus deposits its larvae in stagnant, partially shaded water.

A. hyrcanus nigerrimus occurs in Borneo and Celebes. The differentiation of the variety *nigerrimus* from other varieties of *A. hyrcanus* is responsible for certain difficulties in evaluation. *A. hyrcanus* is a swamp mosquito. When present in large numbers, it can be a dangerous vector. It breeds in marshes, rice fields, and vegetated waters. In the Netherlands Indies *A. hyrcanus* readily enters houses and strongly prefers the blood of man. Infected specimens of *A. hyrcanus* have been found in the Boentok area of southeastern Borneo.

A. hyrcanus sinensis is essentially a rice field and swamp breeder, although larvae have been reported from a variety of other fresh water habitats. The breeding habits of *A. hyrcanus X,* which has not yet been described as a separate taxonomic entity, are similar.

A. kochi breeds in small, muddy pools during the rainy season, in unplanted rice fields, in shaded or exposed streams and flowing irrigation ditches, and sometimes in artificial containers. The adults are moderately domestic, and may be found in houses and stables.

A. leucosphyrus hackeri breeds in dead, hollow bamboos.

A. leucosphyrus leucosphyrus is a shade-loving species which occurs in Borneo and Celebes. Its ordinary breeding places are pools, springs, and puddles in deep forests and jungles, and in the hoofprints of animals. Infected specimens have been captured near the Celebes Sea in northeastern Dutch Borneo and in the Bontang area near Makassar Strait.

A. maculatus maculatus, the vector of "coastal hill malaria," occurs in eastern Borneo and the Celebes. This species breeds in mountain districts up to altitudes of 4,500 feet, most commonly in running brooks and sunlit wells. Larvae are also found in rice fields in hilly districts. They rarely occur in stagnant water. The adults show no constant preference for human blood and have no great tendency to enter houses. Despite this the species is important as a transmitter of malaria. No infected specimens have been captured in Borneo or Celebes.

A. punctulatus moluccensis deposits its larvae in clear or turbid, stagnant or flowing water. It is found in small artificial and natural collections, and also in rapidly flowing streams. Like *A. punctulatus punctulatus,* it requires exposure to direct sunlight, and is never found in deep forests, although it is present in moderate numbers in open ones. It invades houses during the night, and feeds exclusively on human blood.

A. punctulatus punctulatus deposits its larvae in small collections of stagnant water such as accumulate in foot-prints, gutters, water tanks, ditches, and tin cans. It breeds in muddy as well as in clear water, but is not found in flowing water nor beside streams. Since it prefers artificial collections of water, it is dependent on abundant rains for its existence. This mosquito requires direct sunlight for its development. It is therefore found most often in settlements recently cleared of forests. It is a nocturnal flier, biting most frequently around 9 p. m. As it attacks silently and produces no pain, its bite is usually unnoticed.

A. sundaicus, also known as *A. ludlowi,* the most important vector in the Netherlands Indies, is found in eastern Borneo and has recently penetrated into Celebes. It breeds in stagnant brackish coastal waters, especially lagoons and fish ponds which are not freely connected with the sea. The larvae prefer sunlit waters and are seldom found in the absence of surface vegeta-

tion. *A. sundaicus* is a house-haunting mosquito with a strong preference for human blood. It has been found infected in proportions as high as 39% and is a dangerous vector of malaria. Although *A. sundaicus* has been found in eastern Borneo none of the specimens captured in that region were infected with plasmodia. Infected specimens have been captured in the Makassar areas.

A. subpictus subpictus occurs in both Borneo and Celebes. This species is not fastidious in its choice of breeding places. It is found in dirty pools of rain water, and in temporary and permanent collections of water near houses and villages, both along the coast and for short distances in the interior. It tolerates moderately high concentrations of salt. The adults are found in houses and stables quite frequently, but show no marked preference for human blood. The species has a low rate of infection, but is important because it is numerous. No infected specimens of *A. subpictus subpictus* have been found in districts surrounding the Celebes sea, but some have been captured at Makassar.

A. umbrosus is believed to be important in Borneo, both along the coast and in the interior. As the name indicates, this species prefers to breed in shaded waters, but is sometimes found in sunlit collections. In Borneo, it occurs in clear water, vegetated or unvegetated, and in old overgrown water tanks. The adults frequently enter houses. The importance of *A. umbrosus* can only be inferred, and has not yet been established by dissection of infected specimens.

Aedes. Aedes aegypti and *A. albopictus* occur in the Philippines, Borneo, and Celebes, and probably in Talaud and Sangihe. *A. aegypti* is present on Halmahera, but *A. albopictus* is not reported there. Both species transmit dengue fever in these islands. *A. aegypti* is the principal vector of yellow fever, which has not yet occurred in any Asiatic region. *A. scutellaris,* a vector of *Wuchereria bancrofti* in Fiji, and *A. vigilax,* a possible vector in Australia are distributed throughout the East Indies, but do not act as disease vectors. Numerous other *Aedes* species are found, but are important only as pests. *A. albolineatus* and *A. scutellaris* are reported from Sangihe.

A. aegypti is a domestic mosquito, breeding in small, artificial pools of water such as collect in gutters, tin cans, cisterns, and various small depressions. It prefers rain water, but will breed in brackish wells. The first blood meal of this mosquito is always taken by day, following which it becomes a nocturnal biter. Its flight range probably does not exceed 200 yards.

A. albopictus breeds in tree holes, bamboo stumps and leaf axils. Larvae are rarely found in artificial receptacles.

Culex. Seventeen species of *Culex* mosquitoes are found in the Philippines, but *C. fatigans* is the only species which transmits disease. It is a vector of the microfilaria, *Wuchereria bancrofti.*

The number of *Culex* species in Borneo and Celebes is very large. *C. fatigans,* the most important vector of filariasis in many countries, has a lower infection rate here than certain other mosquitoes. *C. vishnui* has been found naturally infected in the Kabaena Island in the Celebes, and is known to be present on Celebes. *C. fuscocephalus, C. whitmori* and *C. sitiens* have been infected experimentally. *C. fatigans* is not reported in Halmahera, but is probably present, at least along the coast. *C. halifaxii, C. squamosus* and *C. pullus* are present, but are not of medical importance. All the *Culex* species of Sangihe and Talaud are not known. *C. fatigans* is apparently not a vector of filariasis on those islands, although it is present on Talaud. *C. vishnui* occurs on Sangihe.

C. fatigans breeds in domestic utensils and other artificial containers, near houses. It also breeds in permanent ground water having little vegetable content. It feeds almost exclusively at night.

C. vishnui breeds in both still and flowing water, but never in brackish water. Its larvae are found in small pools and puddles, in drainage ditches, in lakes, and along river banks.

Others. Mansonia annulata and *M. annulifera,* vectors of the filaria, *W. malayi,* occur on Celebes. *M. annulifera* is also found on Sangihe and Talaud.

(*b*) *Lice.* The head louse, *Pediculus humanus capitis* is common throughout the area under consideration. The body louse, *P. humanus corporis* and the crab louse, *Phthirus pubis* occur in the Philippines, but are not abundant in Borneo, Celebes, and Halmahera.

(*c*) *Flies.* Seventeen species of *Calliphoridae,* 22 *Muscidae* species, 14 *Sarcophagidae* species, and 24 *Tabanidae* are known in the Philippines. Most of them are present in Mindanao and Sulu. *Calliphoridae* and *Sarcophigidae* breed in carrion and excrement, and are important mechanical transmitters of enteric diseases. *S. dux, S. ruficornis, S. hirtipes,* and *Chrysomia megacephala* produce myiasis. The most troublesome *Muscidae* species in Mindanao and Sulu are *Musca nebulo, M. sorbens,* and *M. vicina. M. domestica* is rare, except, perhaps, in coastal areas. In Borneo, Talaud, Sangihe, Celebes, and Halmahera the same *Muscidae* are numerous. *M. vetustissima* is also common. Five *Calliphora* species are reported in the Netherlands East Indies. The bottle flies, *Lucilia papuensis* and *L. porphyruni* have the habits of houseflies, and spread enteric diseases. The same myiasis-producing species noted in the Philippines are present throughout the Netherlands East Indies.

(*d*) *Sandflies.* Eight phlebotomus species are reported from the Philippines. They are: *P. bigtii, P. davapensis, P. heiseri, P. hitchensi, P. manganus, P. philippinensis* and *P. torrechantei.* Several species are known in Borneo, Celebes, and Halmahera. In none of these areas do they transmit disease.

(*e*) *Ticks.* The brown dog tick, *Rhipicephalus sanguineus,* probably occurs in the Philippines but apparently does not act as a disease vector. *R. haemaphysiloides* is found in Celebes. *Boophilus annulatus australis* reported from Halmahera is not of medical importance.

(*f*) *Mites.* The dangerous Japanese mite, *Trombicula akamushi,* vector of scrub typhus (tsutsugamushi) occurs in the Philippines. The common itch mite *Sarcoptes scabiei* is encountered throughout the area. Various *Trombidiidae* are found in Borneo, Celebes, and Halmahera, but no exact information is available.

(*g*) *Fleas. Xenopsylla cheopis,* the oriental rat flea, is the principal vector of plague, and occurs throughout the area under consideration, as does the less important *X. astia. Ctenocephalis canis* is found in the Philippines, and *C. felis* is probably common wherever there are cats. Neither is of especial medical importance.

(*h*) *Spiders. Lactrodectus hasselti* is found in Mindanao and Sulu. In Australia, 7 out of 100 individuals bitten by this spider died. Cockroaches and centipedes occur, but are not important.

(*i*) *Rodents.* Sixteen genera of the family *Muridae* are found in the Philippines, and most of these are present on Mindanao and Sulu. They are *Crateromys schodenbergi, Celaenomys*

silaeus, Rybchomys soricoides, Chrotomys whiteheadi, Crunomys fallax, Rattus luzonicus, Rattus norvegicus, R. rattus, R. mindanensis mindanensis, R. benguetensis and *R. datae. R. norvegicus* and *R. rattus* are the most common hosts of the rat flea, *Xenopsylla cheopis.*

In Celebes, *R. mindanensis* is the common house rat, and *R. rattus argentiventer* is frequently found. The latter also occurs in Borneo. *R. rattus diardii* was the chief reservoir of plague in Celebes between 1922 and 1930. No cases have been reported from there since then.

R. hoffmani is reported from Halmahera. *Rattus rattus* and *Rattus* concolor are common throughout all of the islands under consideration.

(2) Dangerous animals.

(a) Snakes. Three cobras, *Naja naja* (the spectacled cobra), *N. hannah* (the king cobra), and *N. samarensis* (the Philippine cobra) are found in Mindanao and Sulu. *N. hannah* may reach a length of 18 feet. It is diurnal in habit, and lives in dense jungles near streams. Sometimes it climbs trees. *N. naja* is possibly the most deadly of the poisonous snakes of Asia. It grows to be 6 feet long. It is very excitable, and when it bites, retains its hold so that a large amount of poison enters the wound. It feeds on rats, and therefore frequently enters houses, where it lives in dark corners. Kraits are known to be present in the Philippines, and probably Bungarus candidus, the common krait, is the species most frequently found. It lives near houses as well as in fields, in scrub jungles near water, and probably in rice paddies. It is nocturnal in habit and will not attack readily; its poison is four or five times as deadly as that of the cobras. Other poisonous Philippine snakes are the coral snakes, *Doliophis bilineatus* and *D. philippinus;* the "dahon palay," or arrow-headed rice snakes, and several *Hologerrhan* species. Posionous sea snakes (*Hydrophidae*) are common. Their bite is often fatal, but they rarely attack man unless caught in nets.

The poisonous snakes of the Netherlands Indies belong to the *Hydrophidae, Elapidae,* and *Viperidae* families. A number of species of sea snakes are present throughout these waters. *Elapidae* are found all over the Netherlands Indies and in North Borneo. The following have been described: *Bungarus fasciatus,* the banded cobra; *B. candidus, B. flaviceps, B. javanicus, Naja tripudians sputatrix,* the Indian cobra; *N. bungarus,* the king cobra, *Doliophis intestinalis, D. bivergatus,* and *Callophis gracilis.* On Celebes, *B. candidus, N. bungarus,* and *D. intestinalis* occur. On Halmahera, poisonous snakes are rare, which is surprising in view of their prevalence on other islands of this group. The only dangerous snake reported from this island is *Acanthopis antarcticus.* A viper, *Lachesis wagleri,* is found on Sangihe.

(b) Dangerous land and river animals. Wild pigs are found in the Philippines, but are usually not dangerous. On Borneo and Celebes, wild boar and the babiroesa are found. On Borneo, there are Malayan bears, elephants, wild boar, and rhinoceros. On Halmahera, no dangerous jungle animals are found. Crocodiles abound throughout the area in question.

(c) Dangerous fish. Puff-fish of the family *Tetraodontidae,* should not be eaten, as their ovaries and testicles contain a deadly poison. Fatalities resulting from eating these fish have occasionally been reported from this area.

Many fish are found in these waters which may attack bathers with spines attached to poison glands. These include the lump fish, *Synanceia horrida,* and *S. verrucosa,* which lie concealed on sand and coral bottoms; *Pterois volitans,* the zebra fish; the silurides, *Calias batrachus,* and various sting rays. The latter are much dreaded by natives. They are rounded fish which lie sluggishly in the sand, and if inadvertently stepped on, inflict severe lacerating wounds with their strong, heavily-barbed tails. Sharks are found in coastal waters throughout this area.

(d) Snails. Of the genus Melania, snails, which are hosts of the lung fluke, *Paragonimus westermanii,* are distributed throughout the Philippines. The snail host of *Schistosoma japonicum* in Celebes has not been identified, although certain *Lymnaea* species may possibly be implicated.

(3) Pests.

Many species of mosquitoes and flies are severe pests. Ants are numerous throughout the area. In Mindanao, the Sulu Archipelago, Borneo, and Celebes, the tailor ant, *Oceophylla smaragdina,* is an aggressive and vicious biter. *Solenopsis geminata rufa,* the fire ant, which inflicts extremely painful bites is common in the Philippines and Borneo. Midges, bedbugs, termites, and cockroaches are found in all areas. Wasps are numerous in Mindanao and Sulu. Blood-sucking leeches are common throughout this region; at least 8 species have been described in the Netherlands Indies. They are extremely troublesome along jungle trails, and will crawl beneath shoes and stockings. Their bites are very prone to become infected. Chiggers are generally distributed throughout the East Indies.

D. Plants.

(1) Poisonous.

Many kinds of trees belonging to the *Anacardiaceae* produce black viscous sap which irritates the skin. The wood of these trees is used for furniture; the sap for lacquer. Many persons who come in contact with these materials develop an extensive itching dermatitis (renghas poisoning). These trees are found throughout this area. Some of them are *Gluta renghas, Anacardia occidentale, Melanorrhoea curtisii, Semecarpus anacardium, Semecarpus heterophylla.* Certain *Jatropha* species are also dangerous in Mindanao and Sulu. The seeds of *J. curcus* have strong purgative properties and have caused fatalities. *Derris elliptica* is found throughout this region, with the possible exception of Halmahera. It is a leguminous plant, whose root is used for suicidal purposes. In Celebes and Borneo the dried fruits of *Anamoita paniculata* are used as poison (*kokkel korrels*). Also the fruits of *Sarcolobus narcoticus* are boiled and pounded and used as poison (*Wali kambing*). The seeds of *Datura fastuosa* and of *Cycas circinalis* cause serious excitation followed by loss of consciousness. *Antiaris toxicaria* produces a juice used as arrow-poison by the Dyaks of Borneo. The native population of the Netherlands Indies prepares special dishes by fermentation with moulds. One of these (bongkrek) is prepared from copra press cake (ampas). Sometimes the latter fermentation goes wrong, and special Gram negative, mobile bacteria (*B. cocovenenans*) develop, causing the formation of highly poisonous substances, one of which is known as bongkrek acid, another as toxoflavine.

Opium smoking is common in Borneo, Celebes, and Halmahera, and it is possible for addicts to obtain licenses.

(2) Pollen-producing.

Throughout this area the pollens of rice, sugar cane, and

bamboo are important allergens. Corn is grown in small amounts. Copra dust may produce allergic symptoms in susceptible individuals.

E. Food.

As a rule, Filipino natives are better nourished than natives of other Far Eastern countries, although there is no doubt that they also suffer from the effects of inadequate nutrition, due either to poverty or to ignorance. Conditions improved considerably in the last few years, largely because the Bureau of Health had taught practical nutrition in the public schools. The native diet is made up of fish, rice, leafy vegetables, and fruit, plus some meat obtained from such domestic animals as hogs, sheep, cattle, and carabao. In some areas there is also a supply of native corn quite similar to that grown in the United States. As a general rule, Americans and Europeans, especially in the Manila area, used foods obtained from abroad since cold storage facilities were adequate in the city. Locally grown vegetables were sometimes used to supplement imported foods but these must be considered unsafe when uncooked. Fertilization with night soil is common, and ditch or drainage water is used freely to keep these vegetables wet and fresh on the way to market. These practices are all much more common among Chinese farmers than among the Filipinos. Attempts have been made in recent years to encourage the raising of cattle and other domestic live stock under conditions suitable for marketing, but so far there has been little progress.

Little can be said concerning the dairy industry in the Philippines. Milk supplies are inadequate, and with the exception of one or two dairies in Manila where pasteurization was carried out, the milk was unsafe. Evaporated or dried milk imported from the United States or Australia was in wide use. Butter also was imported. Inspection of dairy herds is not mentioned, but with the high incidence of enteric infections and tuberculosis, it must be assumed that proper supervision was not present.

There had been no food shortage up to the time of the onset of hostilities, but it is certain that all surpluses and present crops have been appropriated since the Japanese gained control of the islands.

In the Celebes and Halmahera, as well as in the Netherlands Indies in general, a wide variety of leafy vegetables, young leguminous plants, and fruits are eaten; over 400 species of plants are known to be used by the Indonesians for food. Of the fruits commonly used, mangoes, bananas, avocados, and durians are of importance not only because of their vitamin and mineral content but also because they have a relatively high caloric value. Indian chickens are thin and lay only small eggs. There are however, large flocks of ducks and a continuous supply of duck eggs is available Oxen and buffalo are used almost exclusively for draft purposes and only about 10% are slaughtered. The large demand for milk by the European population has to be met by the importation of evaporated milk in amounts equal to or greater than the total annual local milk production. Most of the fresh milk is boiled for the only plant in the Netherlands Indies with facilities for pasteurization is located at Bandoeng.

The use of meat and meat products is also largely limited to the European and Chinese population. Locally slaughtered meats are reported to be subjected to careful inspection by veterinarians or specially trained overseers. The incidence of tuberculosis among dairy cattle which are imported is very high. Although the native draft cattle have not become infected with tuberculosis, other diseases commonly occur, especially surra, glanders hemolytic septicemia, piroplasmosis, anthrax emphysematous gangrene, foot and mouth disease, and saccharomycosis (pseudomalleus). Pestis bovina has not been observed since 1911. Parasitic diseases are common.

Under ordinary circumstances, there is a sufficient supply and variety of foods to provide the native population with an adequate diet if the distribution were ideal. This not being the case, there is great variation in the quantity and quality of foods available in different localities, and the occurence of deficiency diseases is not uncommon. The adequacy or inadequacy of the natives' diet is governed by many factors, the most important of which are the kind of crops that are or can be cultivated in a particular locality, the dietary habits of the native population, the lack of even a rudimentary understanding of the principles of nutrition, overpopulation, and poverty. Generally speaking, the areas in which rice and corn are raised do not overlap nor do they extend into the localities where the tuberous vegetables are grown. Within each region the principal crop is the staple item of diet, and is consumed to the virtual exclusion of other grains or roots. In localities where cassava or sago is the principal item, deficiency diseases due to the lack of vitamin B may easily occur. Vitamin deficiencies, particularly those of the B complex, also occur among those who use polished rice and washed corn flour, but are not encountered among natives who eat unpolished rice or unwashed corn flour. The protein and fat content of the Indonesian diet is dangerously low, and deficiency states due to the lack of these elements are not uncommon.

The rural population lives almost exclusively upon local produce. With the exception of dried fish, salted fish, and fermented fish products, foods imported from other areas of the Netherlands Indies play no significant role in the nutrition of a large proportion of the native population. About 80% of the caloric value of the diet of the Indonesian population is derived from carbohydrates. Practically all the proteins and fats are from vegetable sources. The principal sources of carbohydrates in these islands are rice, corn, cassava (manoic or tapioca), sago, and sweet potatoes. No wheat is grown. Throughout the Archipelago, but especially in large areas of Celebes and Borneo, rice is the principal item of diet, but in other localities corn and rice or cassava are the staple items of diet.

112. Public health and medical facilities

A. Public health organization.

(1) Structure.

The public health organization of Mindanao is not an independent entity and must be discussed as part of the general public health organization of the Philippine Islands. After the formation of the Commonwealth in 1935, the Philippine Government took over all public health activities, and centralized them under the Bureau of Health located in Manila, to which all provincial and municipal organizations are responsible. The last Director of the Bureau was Dr. Eusebio D. Agular, who was appointed to this post in 1938. The Bureau was composed of 5 Divisions: Administration, Hospitals, Maternal and Child Hygiene, Epidemiology, and Sanitation, each with a separate chief. In the provinces, at the head of each health district (usually 1 province) was a district health officer and under him were "presi-

dents" of sanitary divisions, who were regarded as field officers. Under them were sanitary inspectors, disinfectors, and vaccinators. A corps of nurses were also assigned to duty in the provinces. In all, in the year 1938, the medical personnel of the Bureau of Health throughout the Archipelago numbered 680, and for the same year there were 5,177 non-medical employees. Up to this date the medical personnel had shown a steady annual increase. Since the distribution of personnel by provinces is not available, the total number of these government-employed physicians stationed in Mindanao and the Sulu Archipelago cannot be accurately given.

Prior to the war, North Borneo was a British Protected State and the only part of the Empire still administered by a company, the British North Borneo Company, under a charter granted in 1888. The Governor, appointed by this company, was responsible to the Colonial Office. The Principal Medical Officer of the Medical Department was responsible to the Governor through the Government Secretary.

In 1937 the supporting staff of the Medical Department consisted of 3 district surgeons, 2 European nurses, 7 locally-trained nurses, 2 village nurses, who were certified midwives, and 45 male dressers. Some of these were in charge of dispensaries; others travelled from village to village. In 1939, there were 3 district surgeons mentioned. The number of midwives had increased to 22. In addition there was a health visitor in charge of maternal and child welfare work at Penampang, near Jesselton. She also supervised the village nurses in Tuaran, Jesselton, Papar, Membakut, and Beaufort. In addition, there were, in 1939, 6 native health inspectors, whose duty was to inspect sanitary facilities in various areas.

The officers of the Medical Department performed both public health and curative duties. They cared for patients in the government hospitals, and each year the district surgeons travelled for 3 months through their districts, holding clinics and inspecting the government dispensaries. In addition, they advised the European district officers, assistant district officers, and the village chiefs and headmen as to various sanitary matters. In theory, each large town had a Sanitary Board, responsible for supervising local sanitation, but these boards seldom functioned effectively.

Inasmuch as Halmahera lies within the administrative domain of the Netherlands East Indies the public health organization cannot be described apart from a general description of the health organization of the entire area.

From 1827 until 1911 the civil and military medical services of the Netherlands Indies were jointly administered. In 1911 the Civil Medical Service (Burgerlijke Geneeskundige Dienst) was organized, which, however, was supplanted in 1925 by the Public Health Service (Dienst der Volksgezondheid). The change in title indicated that in the future less attention would be concentrated on the individual care of the sick and more on the prevention of disease.

The central direction of the Public Health Service is now exercised by the Head of the Public Health Service from his main office at Batavia. He is a medical man who is assisted by medical and legal experts, engineers, a pharmaceutical expert, and administrative personnel.

The work is divided into the following divisions:

1. Medical Affairs—medical examination and inspection, sick leave, etc.
2. Statistics and Publicity—supervision of the medical library; interchange of epidemiological data with the Eastern Bureau of the League of Nations at Singapore; correspondence with foreign institutions and individuals in connection with medico-hygienic legislation.
3. General and Legal Affairs—preparation and application of medico-hygienic legislation.
4. Hospital Service.
5. Asylums for the Insane.
6. Pharmaceutical—supervision over all pharmaceutical establishments; distribution of drugs, etc.
7. Sanitation and Housing—projects for and technical advice on the laying of water conduits and on drainage works; campaigns against malaria; the promotion of housing.
8. Personnel.
9. Medical hygienic propaganda—designs, manufacturers, and distributes propaganda material, such as demonstration charts, photographs, films, slides, etc.; distributes forms for field work.
10. Anti-plague campaign—all central matters having reference to control of plague.
11. Administration.
12. Files, records, forwarding, stenography, and inter-office affairs.

In addition, the Head of the Public Health Service ("Dienst der Volksgezondheid") has at his disposal 5 special advisers—the Medical Adviser on Quarantine Affairs and Infectious Diseases, the Adviser for the Organization of Hygiene and Educational Activities, and the leaders of the campaigns against malaria, plague, and leprosy.

Concentration on the preventive part of the public health program has been facilitated by a Public Health Service reorganization, which is part of the general "decentralization program" of the Netherlands Indies. This decentralization affects all departments. Since 1936 most of the local government has been delegated to the municipal councils, to the Regency councils, and to the Provincial councils. The mainly Indonesian members of the former 2 bodies are for the greater part elected by the population. The Provincial councils are also elected, but by indirect suffrage. As part of this general decentralization scheme, much of the curative and part of the preventive work, formerly done by the Public Health Service, has since 1937 been taken over by the local councils. The latter are now mainly responsible for the soil sanitation, water supply, sewerage, and hospital care.

This means, for instance, that practically all the government's civil hospitals no longer belong to the Public Health Service but have been turned over to the local bodies. The government dispensaries were also transferred to the local authorities. This decentralization has enabled the Public Health Service to concentrate more on its preventive activities.

In some areas in the Outer Provinces the Military Medical Service conducts preventive measures for the Public Health Service, while on the other hand Public Health Service physicians lend their assistance—mainly curative—to the Military Medical Service.

An important part of the public health work in the Netherlands Indies has been done by large estates and industrial companies, which, according to the coolie ordinance, are charged with the care of their laborers. Thus there is in the Netherlands Indies a close collaboration between the Public Health Service, Provincial, Regency and Township authorities, Military Medical Service, Missionary bodies, the Salvation Army, and medical services of the large plantations.

In 1938 the Public Health Service of the government em-

ployed about 400 physicians, 276 of whom were Indonesian physicians, 47 European nurses, 841 native nurses, 425 vaccinators, 103 midwives, and 156 public health propagandists. Provincial, Regency, and Municipal health services had 53 physicians (28 of whom were Indonesian physicians), 15 European nurses, 234 native nurses, 45 vaccinators, and 55 midwives. The antimalaria services had 160 mantris (lay assistants); the antiplague service, about 350. The distribution of this staff on each island is not known.

(2) Effectiveness.

The efforts of the Philippine Government to improve health conditions were remarkable for their scope, and for the degree of success they attained in the face of great difficulties. The original stimulus was furnished by the medical work of United States authorities following our occupation of the islands at the beginning of the century. Since 1935, public health work has been carried on with vigor and intelligence by the Philippine Government. The task of the Bureau of Health has been made doubly difficult by the physical geography of the islands. There are 7,083 islands with a total area of 115,600 square miles and a population of 15,356,000 spread out over a territory approximately equivalent in size to the eastern third of the United States. The comparatively effective application of public health and sanitary principles to these islands has been an achievement equalled in that part of the world only by the Netherlands East Indies.

At the end of 1938 there were 16 government hospitals on Mindanao and the Sulu Archipelago (TABLE XI-1) and 2 semi-government hospitals, supervised by the Bureau of Health. A considerable part of the curative medical work was undertaken by mission hospitals, and some by industrial hospitals, cooperating with the Bureau of Health. In addition to hospitals, the government maintained special clinics for the treatment of tropical ulcers, scabies, trachoma, and yaws in areas where these diseases were prevalent.

The Bureau maintained 4 travelling x-ray units for use in tuberculosis control work, and there was also a tuberculosis research laboratory in Manila. Facilities for special training in tuberculosis were supplied for qualified physicians at the Quezon Institute.

A Malaria Control Field Laboratory had headquarters in Bulacan Province, and Malaria Control units were located in the provinces of Laguna, Pangasinan, and Isabela, with subunits in other provinces.

Immunization programs were constantly in operation, embracing smallpox, typhoid and paratyphoid fevers, dysentery, and cholera. Control and inspection of water supplies were most effective in Manila. There were 11 Public Health Laboratories in the provinces (unnamed), and it was planned to establish an additional 20 during 1939. Rapid strides had been made in industrial hygiene, culminating in the passage of an act requiring employers to furnish free emergency medical treatment to laborers under certain conditions.

There was a very active Division of Maternal and Child Hygiene which maintained a hospital in Manila serving approximately 7,600 patients a year, and a number of puericulture centers, 9 in Manila alone. In addition, the Department supplied home nursing service and outside obstetrical care, and conducted various educational programs.

There were also a Board of Food Inspection, a Biologic Products Board, and Public Health Nursing and education services.

The medical facilities and the public health program of North Borneo were inadequate. This was due in part to limited funds and personnel, to the difficulties of transportation, and to the ignorance of the natives. There were no safe water supplies, and in spite of efforts in some of the towns to introduce modern methods of waste disposal, these remained unsatisfactory. Many communicable diseases flourished, although the incidence of hookworm had been greatly reduced by inspection and treatment of certain groups of individuals; campaigns

TABLE XI-1

HOSPITALS IN MINDANAO AND SULU IN 1940

NAME OF HOSPITAL	LOCATION	CLASS	BED CAPACITY
Government hospitals under the Bureau of Health			
Butuan Public	Butuan, Agusan	General	12
Cotabato Public	Cotabato, Cotabato	General	6
Davao Public	Davao, Davao	General	40
Lanao Public	Dansalan, Lanao	General	50
Margosatubig Emergency	Margosatubig, Zamboanga	General	12
Mati Emergency	Mati, Davao	General	6
Misamis Oriental	Cagayan, Misamis Oriental	General	25
Pikit Emergency	Pikit, Cotabato	General	8
Rizal Memorial	Dapitan, Zamboanga	General	30
Sulu Public	Jolo, Sulu	General	46
Zamboanga General	Zamboanga, Zamboanga	General	100
Leprosaria and Leper Treatment Stations			
Lanao Treatment Station	Dansalan, Lanao		35
Mindanao Central Treatment Station	Santa Cruz, Zamboanga		50
Sulu Treatment Station	Jolo, Sulu		40
Hospitals under other Bureaus or Departments			
Davao Penal Colony	Davao, Davao		72
San Ramon Penal Colony	Zamboanga, Zamboanga		42
Total Commonwealth Government Hospitals		16	
Total Bed Capacity			574
Semi-government hospitals—under Bureau of Health			
Cantilan Maternity House	Cantilan, Surigao	Maternity	4
Surigao Maternity House	Surigao, Surigao	Maternity	8
Total Semi-Government Hospitals		2	
Total Bed Capacity			12
United States Government Hospital (Military and Naval)			
Pettit Barracks	Zamboanga, Zamboanga	General	26
Mission Hospitals			
Brent Mission	Zamboanga, Zamboanga	General	40
Davao Mission	Davao, Davao	General	34
Milwaukee	Cagayan, Misamis Oriental	General	29
Misamis Mission	Cagayan, Misamis Oriental	General	52
Total Mission Hospitals		4	
Total Bed Capacity			155
Private Society Hospitals			
Davao Oriental, inc.	Davao, Davao	General	30
Industrial Hospitals			
Japanese (Mintal)	Davao, Davao	Special	100
Kolambugan	Kolambugan, Lanao	Special	24
Total Industrial Hospitals		2	
Total Bed Capacity			124
RECAPITULATION			
Total Hospitals, All Classes			26
Total Beds, All Classes			921

against yaws had been carried on, smallpox inoculations given, and a special clinic for venereal disease control had been established at Sandakan. In 1938, a grant of $20,000 from the Colonial Development Fund for malaria research in the interior resulted in the establishment of a malaria research unit at Tambunan. A small amount of malaria control had also been carried out at Jesselton, Tawau, Sandakan, Tenom, and Keningau. Maternal and child welfare work in the larger towns was carried out by midwives under the supervision of the Health Visitor. Clinics had been established at several places, and there was a training school for midwives at the welfare center at Penampang. School children were inspected by the Medical Department, and rather unsuccessful efforts had been made to educate the natives in rudimentary sanitary principles. In spite of these programs, however, an almost limitless amount of health work remains to be done in North Borneo before satisfactory results are achieved. Since Japanese occupation, such work as had been initiated has probably been discontinued.

The work undertaken by the Dutch Government in the Netherlands Indies is characterized by its wide scope and originality, and has led to important results in many fields. This is the more remarkable, because the number of physicians working in this large territory is surprisingly small. At first view it seems wholly inadequate, even for routine public health work, yet the following successes indicate the efficiency of this service. Prior to the war, cholera and smallpox had practically disappeared. The plague epidemic in Java was well in hand, the typhoid morbidity was not high, the malaria situation was much improved, and studies in the field of nutrition had given practical results. Excellent regional laboratories were located in Java, Sumatra, and Celebes, and much excellent and original medical research was accomplished. The small body of medical pioneers was able to improve sanitary conditions to a point where life in the Netherlands Indies offers few special health dangers for the foreign resident.

B. Hospitals and medical institutions.

(1) Hospitals.

At the end of 1938 there were 25 hospitals in Mindanao and Sulu Province, exclusive of United States military and naval hospitals. These civilian hospitals possessed a total of 894 beds. There was one military and navel hospital at Zamboanga, Mindanao, which had a capacity of 26 beds. Sixteen hospitals with 620 beds were directly under the jurisdiction of the Commonwealth Government and included general hospitals, university hospitals, leprosaria, and penal hospitals. There were 2 semi-governmental hospitals with 12 beds, devoted to maternity services. Mission hospitals totaled 4, with a capacity of 155 beds. One private hospital at Davao had 30 beds. Two additional private hospitals with 124 beds were operated by large industrial concerns. Full details are given in TABLE XI-1. In general, hospitals were fairly well equipped and able to offer a variety of services. Public health laboratories were maintained in the provinces with their facilities available free of charge. In addition there were throughout the Philippine archipelago 1,375 public dispensaries and special treatment stations. In every instance the hospitals and clinics were utilized fully, and increased capacity was a constant need. The outstanding deficiency was a notable lack of isolation facilities for communicable diseases.

In addition to the facilities already mentioned, there were approximately 58 gold mines in the Philippines which had dispensaries or more elaborate installations for the medical care of their employees. The number of beds available in these institutions was not given. Nine base metal mines had similar installations.

No information is available on the type, amount, or cost of equipment utilized in Philippine hospitals. Adequate medical and surgical laboratory facilities were available only in the larger urban centers and at special hospitals and institutions controlled by the government. Almost all medical supplies were imported, and it can be assumed that existing surpluses have now been confiscated. The only medicinal produce available locally was totaquinine, a new quinine preparation which was supposed to be very effective. Efforts to produce this material in quantity had just begun.

In North Borneo in 1939 there were 4 general government hospitals: the Sandakan Civil Hospital, the Jesselton Civil Hospital, the Beaufort Civil Hospital, and the Tawau Civil Hospital. In addition the Government supported the Jesselton Police Hospital, the mental hospital at Sandakan, a leper colony at Berhala near Sandakan, and 2 institutions for paupers, the Jesselton Goal Hospital and the Sandakan Goal Hospital. In 1939 there were 70 lepers at Berhala. The number of beds in the various hospitals is not known; however, it was not large, for the yearly hospital population of the entire group in 1936 was only 3,472. The Jesselton Civil hospital had an operating room which was enlarged and improved in 1939. No other details concerning the equipment or supplies of the other hospitals are known.

The Medical Department maintained a system of dispensaries operated by native dressers, scattered throughout the rural areas. In 1939 there were 14 dispensaries and 2 sub-dispensaries. Ten of these had small "sick rest houses" for the treatment of natives who could not be cared for in their homes. District surgeons made a 3-months tour of their districts each year, during which the majority of sick natives were seen at prearranged clinics.

A special clinic for the treatment of venereal diseases was established at Sandakan, and there were maternal and child welfare centers or clinics at Penampang near Jesselton, at Inanam, and at Menggattal.

The hospitals of Dutch Borneo, Celebes, and Halmahera are listed in TABLE XI-2. The hospitals in the larger cities of Borneo and Celebes and on the plantations were completely equipped with x-ray apparatus, surgical instruments, and laboratory facilities. In general, the equipment and facilities compared favorably with those of the good hospitals in Europe. Some of the hospitals in small towns as well as some of the small privately-operated hospitals on plantations and in the oil fields are less well equipped. The hospitals at Tobelo and Weda, on Halmahera were badly built and poorly organized. The sanitary conditions at the Tobelo mission hospital were especially unsatisfactory. The Weda hospital was completed in 1937. A third hospital was completed at Djailolo in 1938, but no details of its organization and equipment are known. At Wajaboela near Tobelo there was a dispensary in charge of a practical nurse, and at Kaoe there was one in charge of a more highly trained Ambonese nurse. No information as to hospital facilities on Talaud and Sangihe is available.

TABLE XI-2
HOSPITALS IN DUTCH BORNEO, CELEBES, AND HALMAHERA

Borneo

1. WESTERN BORNEO (total 520 beds)
   - (a) Pontianak
     - (1) Mission — 84 beds
     - (2) Military Infirmary — 16 beds
   - (b) Benoea Martinoes — 6 beds (Mission)
   - (c) Ketapang — 16 beds (District)
   - (d) Nangapinoh (Sintang) — Private
   - (e) Nangahsedjiran — 4 beds
   - (f) Pamangkat — 5 beds (Mission)
   - (g) Poetoes Siboe — 26 beds (Private)
   - (h) Sambas — 23 beds (Mission)
   - (i) Sanggau — 60 beds (District)
   - (j) Sintang
     - (1) District Hospital — 66 beds
     - (2) Military Infirmary
   - (k) Sinkawang
     - (1) Mission Hospital — 62 beds
     - (2) Military Infirmary — 8 beds
   - (l) Tamiang — 12 beds (Private)

2. SOUTH AND EAST BORNEO (total 1,915 beds)
   - (a) Bandjermasin
     - (1) District — 20 beds
     - (2) Military Infirmary — 16 beds
   - (b) Amoentai — 15 beds (District)
   - (c) Balikpapan
     - (1) District Hosp. — 342 beds
     - (2) Oil
     - (3) Military Infirmary — 8 beds
   - (d) Barabai — 16 beds (District)
   - (e) Samarinda (Batoeng Panggol) — Estate
   - (f) Benoa Baroe — 150 beds (Estate)
   - (g) Danau Salak — 53 beds (Estate)
   - (h) Hajoep — 50 beds (Estate)
   - (i) Kandangan
     - (1) District — 20 beds
     - (2) Military Infirmary — 12 beds
   - (j) Koealapoeas — 20 beds (Mission)
   - (k) Kotabaroe — 35 beds (District, Auxil. Hosp.)
   - (l) Lok Tabat — 16 beds (Estate)
   - (m) Loa Boeah — Estate
   - (n) Longiram — 15 beds (District)
   - (o) Longnawan — 8 beds (Military Infirmary)
   - (p) Malinau — 40 beds (District)
   - (q) Maloeka — 10 beds (Estate)
   - (r) Martapoera — 12 beds (District)
   - (s) Maoeratewe — 25 beds (Government)
   - (t) Oeloe Karangmoemoes — Oil
   - (u) Pengioeran — 12 beds (Estate)
   - (v) Poeroektjaoe
     - (1) District — 10 beds
     - (2) Military Infirmary — 8 beds
   - (w) Samarinda — 244 beds (District)
   - (x) Sanga Sanga (Louise Sei Mariam) — 130 beds (Oil)
   - (y) Sambodja — 126 beds (Oil)
   - (z) Sampit (Tanah Hevea) — 10 beds (Estate)
   - (aa) Tabalong-Kiwa — 30 beds (Estate)
   - (bb) Tolok — 100 beds (Estate)
   - (cc) Tanah Amboengan — 28 beds (Estate)
   - (dd) Tanahgrogot — Military Infirmary
   - (ee) Tanah Intan — 20 beds (Estate)
   - (ff) Tanah Seilor — 32 beds (District)
   - (gg) Tarakan
     - (1) Oil — 119 beds
     - (2) Military Infirmary — 12 beds
   - (hh) Tenggarong — 40 beds (District)

Celebes

1. GOVERNMENT OF CELEBES (total 1,015 beds)
   - (a) Makassar
     - (1) Military Hospital — 160 beds
     - (2) Salvation Army — 14 beds
     - (3) Private
     - (4) Mission
   - (b) Benteng — 18 beds (Private)
   - (c) Bonthain — 50 beds (Government)
   - (d) Enrekang — 24 beds (District)
   - (e) Kaboengka — 30 beds (Estate)
   - (f) Kendari — 30 beds (District)
   - (g) Kolaka — 20 beds (District)
   - (h) Madjene — 150 beds (District)
   - (i) Malili — 20 beds (District, Auxil. Hosp.)
   - (j) Mara — 10 beds (District)
   - (k) Maros — 13 beds (Private)
   - (l) Masamba — 30 beds (District)
   - (m) Mamoedjoe
     - (1) District Hosp. — 20 beds
     - (2) Military Infirmary
   - (n) Palopo
     - (1) District Hosp. — 40 beds
     - (2) Military Infirmary — 12 beds
   - (o) Pangkadjene — 15 beds (Private)
   - (p) Parepare
     - (1) District Hosp. — 40 beds
     - (2) Military Infirmary — 8 beds
   - (q) Raha — 32 beds (District)
   - (r) Rantepao — 52 beds (Mission)
   - (s) Sekang — 45 beds (District)
   - (t) Watansoppeng — 20 beds (District)
   - (u) Watampone
     - (1) District Hospital — 60 beds
     - (2) Military Infirmary — 8 beds
   - (v) Wawotobi — 24 beds (District)

2. GOVERNMENT OF MENADO (total 1,040 beds)
   - (a) Manado
     - (1) Government Hospital — 124 beds
     - (2) Mission
     - (3) Military Infirmary — 8 beds
   - (b) Ambang — 14 beds (Estate)
   - (c) Amoerang — 16 beds (Mission)
   - (d) Biontong — Estate
   - (e) Gorontalo — 44 beds (Government)
   - (f) Kaloewatoe — Mission
   - (g) Kolonodale
     - (1) District Hospital — 32 beds
     - (2) Military Infirmary — 8 beds
   - (h) Kolongan — 44 beds (Mission)
   - (i) Kotamobagoe — 35 beds (District)
   - (j) Loewoek
     - (1) Estate — 58 beds
     - (2) Military Infirmary — 12 beds
   - (k) Malinso — 8 beds (Estate)
   - (l) Mengganitoe — Mission
   - (m) Modajak — 80 beds (Estate)
   - (n) Paloe
     - (1) District Hospital — 50 beds
     - (2) Military Infirmary — 8 beds
   - (o) Poigar — 20 beds (Estate)
   - (p) Poso
     - (1) District Hospital — 50 beds
     - (2) Military Infirmary — 8 beds
   - (q) Tahoena — 50 beds (Mission)
   - (r) Talawaan — 40 beds (Estate)
   - (s) Talise — 8 beds (Estate)
   - (t) Tanahwangko — 25 beds (Estate)
   - (u) Tenteno — 22 beds (Mission)
   - (v) Tobelombang — 12 beds (Estate)

TABLE XI - 2 (*continued*)

(w) Kampoengbaroe	
(1) District Hospital	18 beds
(2) Military Infirmary	
(x) Tomohon	130 beds (Mission)
(y) Tondano	56 beds (Mission)
Halmahera	
(a) Djailolo	Capacity unknown (District)
(b) Tobelo	60 beds (Mission)
(c) Weda	12 beds (District)
(d) Ternate	55 beds (Civil)
	13 beds (Military—Fort Oranje)

Prior to the Japanese occupation, medical, surgical, and dental supplies and equipment were readily available in the larger hospitals of the Netherlands Indies even though there was no local production of dental and surgical equipment, and medicinals were produced on a very limited scale. It is estimated that about 90% of all medicinals and pharmaceuticals were imported. Quinine was the leading medicinal produced in the Netherlands Indies; until March 1942 this area produced nearly all the world supply of this drug. The Government laboratories and the Pasteur Institute prepared an adequate supply of serums and vaccine.

A wide range of proprietary preparations was produced by private concerns, but they were not widely distributed and for the most part were used in the locality where manufactured. It is reported that there were no branch plants of foreign pharmaceutical houses. Most of the medicinals and proprietary preparations were imported already packaged for retail trade. The sale of medicines was controlled by the Pharmaceutical Control Act and the Packing Ordinance of 1935. The Netherlands Pharmacopoeia and the Netherlands Medicamentorum Codex (1936) were standard. Germany was the leading foreign source of medical and surgical instruments, apparatus, and equipment, as well as of drugs, but dental equipment was chiefly of American make. Supplies from the Netherlands were next in demand.

On the basis of available information, it is believed that the forces now occupying the Netherlands Indies have commandeered or control virtually the complete stock of medical supplies and equipment and that Allied forces entering this area will be required to supply all materials.

(2) Medical institutions.

There was no medical college in Mindanao. Elsewhere in the Philippines there were 4 medical colleges. These were the College of Medicine and Surgery of the University of Santo Tomas, the College of Medicine of the University of the Philippines, the Graduate School of Hygiene and Public Health of the University of the Philippines, and the Afable College of Medicine. Examinations were conducted by a Board of Medical Examiners, and successful candidates were licensed to practice. The Philippine Islands Medical Association had 1,127 members and was affiliated with the American Medical Association. The standards of medical practice were fairly high.

The chief medical institutions which served Dutch Borneo and Celebes were those situated in Java. The Netherlands Indian School for Physicians, situated at Soerabaya in Java, gave an 8-year course which led to qualification for the practice of all branches of medicine in the Netherlands Indies. The graduates bore the title of "Indian physician." The School of Medicine of Batavia gave a course comparable to that given in the Netherlands and leading to substantially the same privileges. In 1939 this school had 543 students, and in the same year it awarded 39 diplomas. Other institutions were as follows: School for Training of Netherlands Indian Dentists, Smallpox Pasteur Institute at Bandoeng, Eijkman Institute, which served as the central laboratory of the Public Health Service, Regional Laboratory for Celebes in Makassar.

C. Medical personnel.

There were 4,909 licensed physicians in the Philippines as of 1 January 1940, or 1 physician for every 3,216 inhabitants. It is not known how many physicians were in practice in Mindanao. About 90% of these physicians were Filipinos and a great majority were graduates of the 4 local medical colleges. In the beginning of 1940 there were 5,030 registered nurses in the Philippine Islands. With few exceptions, they were trained in the 8 nurses' training schools operated by various hospitals. Six of these schools were in Manila, 1 in Capiz, and 1 in Iloilo. There were 2,699 dentists, 3,920 pharmacists, and 234 veterinarians scattered throughout the islands. There were 1,748 licensed midwives, located chiefly in the provinces.

The medical staff of North Borneo in 1937 consisted of 6 European medical officers, and an auxiliary staff of 2 European nursing sisters, 7 locally-trained nurses, 2 certified midwives, and 45 male dressers. In 1939 only 4 medical officers are mentioned in available reports. There were a European health visitor, 22 midwives, and 6 native health inspectors.

In Dutch Borneo in 1938 there were 14 physicians in private practice, 7 of whom had European certificates while 7 had Indonesian certificates. In the public health services there were 2 regular government physicians, 23 Indonesian doctors, 8 military physicians on part-time duty. The total was thus 47. There were 70 nurses, 49 vaccinators, 1 dentist, and 1 pharmacist. In the important little island of Tarakan there were 4 physicians. In Celebes there were 41 physicians. In Halmahera, prior to the war, there were 3 "public health physicians," stationed at Djailolo, Tobelo, and Weda. There were 4 Indonesian nurses ("mantris") at Djailolo, Tobelo, Weda, and Kaoe. The nurse at Kaoe had charge of a dispensary. There were also 3 vaccinators, stationed at Djailolo, Tobelo, and Weda. The number of trained medical personnel on Talaud and Sangihe is not known.

113. *Diseases*

A. Diseases of military importance.

(1) Malaria.

Malaria is a chronic febrile disease transmitted by mosquitoes. It is more important to troops than any other disease, since it can totally incapacitate large numbers of men simultaneously. One or two out of every 200 will die of the disease. It is of utmost importance that mosquito control measures be rigidly enforced.

In the Philippine Islands malaria causes 10,000 to 20,000 deaths each year in a population of approximately 13,000,000. It is probable that there are at least 2,000,000 cases of malaria each year throughout these islands, and Mindanao and Sulu are especially malarious. This estimate is confirmed by the studies of Barber, who found a spleen index of 13% in 5,000 persons examined. Another survey included 8,791 persons and

yielded a spleen index of 19%. Recorded malaria mortality rates have fallen sharply. In 1905 there were 662 recorded malaria deaths per 100,000 of population. In 1932 there were only 77. Because of the special breeding habits of *A. minimus* var. *flavirostris*, and other less important members of the funestus minimus sub-group, which are described in a previous paragraph of this report, malaria in the Philippines is a disease of foothill regions and is not transmitted either in the coastal plains or in the mountains. The infection is acquired predominantly in the transitional period which occurs twice each year when the seasons change. Blackwater fever occurs in Mindanao and Sulu, but is known to be rare.

Malaria control prior to the war was greatly limited by lack of funds. Many of the smaller communities could not afford more than 5% per capita for this work, and the Government was able to finance a control program only in selected areas. In 1927 Mindanao and Sulu were surveyed by their district health officers, and divided into 42 areas for control purposes. Twenty were in Davao, 2 in Agusan, 2 in Cotabato, 4 in Zamboanga, and 7 in Sulu. Control programs included free distribution of anti-malarial drugs to the indigent, the treatment of cases, educational programs designed to teach Filipinos the importance of bed nets and screens, and attempts to eliminate breeding places of the mosquitoes. This was simplified by the fact that these mosquitoes breed by preference in streams. Most bodies of stagnant water could, therefore, be ignored. Various naturalistic methods were tried such as periodic damming of streams, sluicing, and shading. Due to lack of funds these programs were never effectively carried out in Mindanao and Sulu, but Paris green was largely used as a larvicide. Since the malarial mosquitoes in these islands are streambreeders, oiling is ineffective. In 1927 a large cinchona nursery was established in Impalutao, Bukidnon, Mindanao, using seeds imported from Java. Prior to the war, totaquina, a cheap and effective substitute for quinine was being manufactured from their bark. At present all available anti-malarial drugs are, of course, controlled by the Japanese.

In North Borneo malaria is likewise a serious problem. It appears to occur in almost all parts of the territory, but on the basis of meagre studies is said to be most prevalent along the coast. Splenic indices have ranged from 2% to 70%. Blackwater fever has been reported. In some areas efforts have been made to eliminate breeding places of malarial vectors, but they have not been very successful.

In Dutch Borneo and the Celebes, as in other parts of the Netherlands Indies, malaria constitutes a major problem. In 1924 a Central Malaria Bureau was established as a separate agency of the Public Health Service. In 1939 a subsidiary was organized with principal offices at Makassar in Celebes. Celebes is notoriously malarious; the same is true of both the coast and the interior of Borneo. In Borneo, the disease is carried by *Anopheles sundaicus, A. maculatus maculatus, B. hyrcanus nigerrimus, A. subpictus subpictus, A. umbrosus,* and possibly by *A. leucosphyrus leucosphyrus.* The habits of these mosquitoes have been discussed in a previous paragraph. The principal towns of western and eastern Borneo and also Martapoera in southern Borneo are relatively free from the disease. This is attributed to tidal effects and to the presence of mangrove forests, which in Borneo are salubrious as long as they are uncut. In North Borneo, 1,112 cases of malaria were hospitalized in 1939. In general, malaria due to *Plasmodium vivax* is approximately as common as malaria due to *P. falciparum.* Quartan malaria is uncommon in Celebes and Borneo. Blackwater fever is likewise uncommon.

Control in Dutch Borneo and Celebes is somewhat simplified by the fact that the malaria vectors are ground breeders and do not deposit their larvae in plants, coconut shells, or small artificial containers. Prior to the war an earnest anti-malaria campaign was in progress. Measures were adapted to the habits of the species found in each area. Most of the effort was concentrated in the larger cities and harbors. In the rural areas systematic quinine distribution during epidemics was the chief control measures used. In addition certain general measures such as care of gutters and ditches, draining of marshes and sometimes oiling or the application of Paris green, have been used.

In Sangihe, malaria is common. No details are available. In Talaud there is "fever which yields to quinine." This is undoubtedly malaria.

In Halmahera malaria is extremely prevalent throughout the island. No exact information concerning its vectors is obtainable, although *Anopheles punctulatus punctulatus, A. punctulatus moluccensis, A. barbunbrosus, A. kochi,* and *A. subpictus* are viewed with suspicion. In areas where the first 2 are vectors, control is made difficult by the fact that both of these mosquitoes breed in direct sunlight. Areas cleared for settlements therefore become endemic foci of malaria unless they are promptly drained and oiled. Probably very little malaria control has been undertaken in Halmahera. Blackwater fever is said to be rarely if ever seen. It is an occasional sequel of malaria and is characterized by hematuria jaundice and anemia. In Asiatic and Pacific areas its reported case fatality rate is usually between 20 and 30%.

(2) Typhoid fever and other intestinal infections (including paratyphoid fever, amebic and bacillary dysentery, and the diarrheas).

These are among the most important of all infections from the point of view of military medicine. They are easily contracted under poor sanitary conditions, and can totally incapacitate large numbers of men, unless proper precautions are taken to prevent epidemics.

Typhoid fever is prevalent in Mindanao as in other parts of the Philippine islands. There were 2,236 cases reported in 1938, with 1,050 deaths. Paratyphoid fever accounted for only 6 of these fatalities. The number of cases of typhoid has decreased from 3,162 in 1924 to the present figure, but the disease remains a public health problem.

Few cases of typhoid fever are reported from North Borneo. Because of the inadequacy of laboratory services it is probable that many cases occur but escape recognition. In Dutch Borneo and Celebes the disease is definitely common. Indeed it has been estimated that in the Netherlands Indies the morbidity from typhoid fever among Europeans is 20 to 25 times as high as that in the Netherlands. This is largely attributable to inadequacies in the drinking water supplies and sewerage systems. Paratyphoid fever and numerous varieties of salmonella infection have been reported from many areas in the Netherlands Indies.

Bacillary dysentery is by far the most important enteric infection in the Philippines and the incidence is notably greater in the provinces than in Manila. It is said that these cases are largely sporadic, but unsafe water and food supplies enhance the possibility of outbreaks. In 1938 there were 8,867 cases re-

ported with 2,336 deaths. Amebic dysentery occurs much less commonly but causes much illness. Balantidial dysentery is uncommon.

Bacillary and amebic dysentery are common in all parts of North Borneo, Dutch Borneo, Celebes, and Halmahera. In North Borneo 549 cases of both types were hospitalized in 1939. Severe epidemics of dysentery, probably of the bacillary form, occurred in Tuaran, Kota Belud, Tenom, Keningau, and Tambunan districts during that year. In Celebes more than 8,000 cases of bacillary dysentery were reported in 1937-1938. The proportions of the various types in Celebes are not known, but in the neighboring island of Java in 1931 to 1939 the types were found to be as follows: Flexner 70%, Sonne 14%, Shiga 14%, Schmitz 2%. In southern Celebes in 1938 the proportions were Shiga 69%, Flexner 27%, Sonne 3%, Schmitz 1%. In Djailolo, in the northwestern part of Halmahera, a severe epidemic of bacillary dysentery occurred in 1937. During this outbreak, 775 cases were reported. From here the disease spread over southern Halmahera and 3,000 cases with 500 to 600 deaths resulted. At the same time dysentery was epidemic at Weda. The disease gradually diminished in intensity, but in the first 3 months of 1938, there were 72 more cases in Topoleo in the Weda area and 30 deaths. In August of the same year 20 cases were reported from Sagea in the same neighborhood. Believing that the natives were too ignorant to adopt fundamental sanitary precautions, the Dutch authorities relied on mass innoculation against dysentery to control these outbreaks. They found it impossible to persuade the people to use latrines. Amebic dysentery is also common in Halmahera. Acute outbreaks of amebiasis were reported from Tobelo and from Djailolo at the end of 1937. Dysentery is common on Sangihe and Talaud. In 1912 there was a large epidemic around Tahoena, Sangihe.

In the army of the Netherlands Indies the incidence of amebic dysentery is 3 times as great in European soldiers as in native soldiers. In view of the extremely high incidence of amebiasis it is not surprising that complications of all kinds are common. Incidental amebiasis is frequently encountered at autopsy. Balantidaisis is rare, giardiasis is common.

(3) Venereal diseases.

Venereal diseases of all types are extremely frequent in this area, and will be a serious menace to troops unless proper precautions are taken.

In the Philippine Islands gonorrhea is the most prevalent of the venereal diseases. There were 2,112 new cases reported in 1938. There were also 541 new cases of syphilis and 44 cases of chancroid. It is not believed that these figures give anything like a true picture of these diseases in the islands. Supervision and control of the sources of venereal infection have been impossible. Venereal diseases will prove to be a serious problem for military forces in the Philippines. The Surgeon of the Philippine Department of the United States Army in the Philippines reported that in 1940 the hospital admission rate for venereal diseases was 62.33 per thousand and was exceeded only by the admission rate for common respiratory infections.

In North Borneo gonorrhea rates as high as 80% have been reported in some areas. Syphilis is said to be a new disease in North Borneo and is thought to have been introduced by Chinese coolies. It is spreading rapidly. Occasional cases of chancroid and granuloma inguinale are encountered. There is little prostitution but promiscuity is prevalent. Before the war there was a venereal disease clinic at Sandakan.

In Dutch Borneo and Celebes, as in many other parts of the Netherlands Indies, venereal diseases abound. In the cities the rates are higher than in rural areas. In many cases the differentiation of syphilis from old frambesia presents difficulties; probably more often syphilis is diagnosed as frambesia than the reverse. The greater part of the patients with venereal disease in the Netherlands Indies never come to treatment, and by far the greater part of the patients who submit to first treatment do not complete the cure. Complete treatment is possible in only about 10% of cases.

In Halmahera, syphilis and gonorrhea are not frequent, since most of its inhabitants have never left the island and the influx of other nationalities is small.

The army statistics for venereal disease in the entire Netherlands Indies are as follows:

VENEREAL DISEASES PER 1000 SOLDIERS

	Gonorrhea		Syphilis		Soft Chancre		Lympho. Venereum	
Year	Europ.	Native	Europ.	Native	Europ.	Native	Europ.	Native
1930	114	57	43	20	42	9		
1931	134	53	48	21	40	10		
1932	118	52	45	17	53	8		
1933	100	45	34	14	41	7		
1934	79.4	49	31.2	16	27	7	9.7	3.8
1935	69.1	53.2	40.0	18.8	22	7.4	11.0	5.0

(4) Rickettsial diseases.

Endemic typhus fever, where it occurs, is a serious and frequently fatal disease transmitted by rat fleas which may affect a large number of troops. The death rate from these diseases is high, and individuals who recover will convalesce slowly. Tsutsugamushi fever (scrub typhus) is transmitted by mites. It is also apt to affect many troops; is very serious, and may be fatal.

The usual rat control measures are important in preventing flea-borne typhus. Measures for control of scrub typhus are discussed in Topic 104. Epidemic louse-borne typhus fever has not been encountered in the Philippines. Flea-borne murine typhus and tick-borne scrub typhus (tsutsugamushi) are known to occur, but precise information is not available. Epidemic louse-borne typhus and endemic typhus have not been reported in North Borneo. The occurrence of tick-borne scrub typhus in North Borneo is uncertain; the disease has, however, been observed in the nearby territory of Brunei. In Dutch Borneo and Celebes and Halmahera louse-borne epidemic typhus has not been reported and probably does not occur. Flea-borne endemic typhus is known in the Netherlands Indies as shop typhus or urban typhus. It occurs in Sumatra and perhaps occurs in Dutch Borneo, Halmahera, and Celebes also. Mite-borne scrub typhus (tsutsugamushi) likewise occurs chiefly in Sumatra. Its occurrence in Dutch Borneo and Celebes and Halmahera is uncertain.

(5) Dengue fever.

A mosquito-borne disease which is rarely fatal, dengue fever may temporarily incapacitate large numbers of troops.

This disease occurs abundantly in all parts of the area under consideration. There are no specific data as to its occurrence in the separate parts of the area. It produces a low mortality rate but a high non-effective rate and readily disables an entire army. Since the disease produces no permanent immunity it is possible for a given individual to have the disease more than once. The so-called "5-day fever of Van der Scheer" and the "knokkel

koorts" are believed to be dengue; both conditions are often reported in the Netherlands Indies. The last severe pandemic in the Netherlands Indies, which temporarily incapacitated a large part of the population, occurred in 1901. Since then the disease has remained endemic. In 1930 nearly 5% of the European soldiers were affected.

INCIDENCE OF DENGUE IN THE ARMY OF THE NETHERLANDS INDIES PER 1,000 SOLDIERS

	European Soldiers	Native Soldiers
1930	48	21
1931	18	15
1932	13	11
1933	12	8
1934	9	7
1935	16	9

(6) Respiratory infections.

All types are common, and may affect troops in much the same way that they do in this country. They are most apt to occur at the change of seasons.

These are an important source of trouble throughout the Philippine Islands. Influenza, bronchitis, bronchopneumonia, and lobar pneumonia are all quite prominent. The combined annual rate for all respiratory infections in the Philippine Department of the United States Army in 1940 was 162 per thousand. These diseases are expected to prove similarly difficult for other forces entering the area. Influenza is quite common. Many physicians feel that not a few cases recorded as dengue are actually influenza. Major General Valdes described a peculiar type of febrile illness occurring during the campaign on Bataan, which might have been dengue or influenza.

Throughout the various parts of the Netherlands Indies lobar pneumonia is a common and dangerous disease; statistics indicate that it is one of the most frequent causes of death among the native population. It often occurs in epidemic outbreaks, especially in institutions where many persons sleep together in large wards. Careful hygienic measures have not been able to stamp out the dangers of pneumonia on the large plantations. As cholera, dysentery, and beri-beri have practically disappeared from these plantations, an increasingly high percentage of the total deaths is now due to pneumonia. The number of deaths caused by pneumonia exceeded the combined mortality from typhoid fever, bacillary and amebic dysentery. In the hospitals, where the serious cases are admitted, the case fatality of pneumonia ranges around 30%. In 1938 pneumonia was the most frequent cause of death in 167 hospitals of the Netherlands Indies, the rate being 11.5% of all hospital deaths. In the Army pneumonia is an important problem, the morbidity and mortality rates being much higher among natives than among Europeans. Approximately one-third of all deaths among native troops are due to lobar pneumonia. Newly drafted soldiers more often had pneumonia than veterans.

Although Java and Sumatra are outside the area under consideration, useful guidance may be obtained by attention to the following facts. In 763 cases of lobar pneumonia observed in nearby Java and Sumatra between 1929 and 1936 the following pneumococcus types were found: 38.6% Type I; 11.2% Type II; 1.5% Type III; 48.7% Type IV. In Batavia in 1941 the findings in 195 cases were 33.8% Type I; 8.2% Type II; 7.7% Type V; 5.6% Type VII; 5.1% Type VIII; 2.6% Type XXV; 20% unclassified. Type I is found in the cases with complications, Type II in uncomplicated lobar pneumonia. All investigators comment upon the rarity or absence of Type III pneumococcus. The incidence of bronchopneumonia is not high and is about the same among European and native soldiers.

(7) Skin diseases.

In this climate skin diseases are readily acquired, scabies and ringworm can be a considerable annoyance to troops. Minor injuries can develop into serious abscesses, or chronic, debilitating ulcers unless they are promptly treated.

In the Philippines as in other tropical countries skin diseases are a major affliction. Scabies, Dhobie itch, and common fungus infections are prevalent. In 1938 alone 19,431 cases of tropical ulcer were reported. Tinea imbricata, epidermophytosis, and Madura foot occur in North Borneo. Skin infections of all types are probably common on Sangihe and Talaud.

In the Borneo, Celebes, and Halmahera, diseases of the skin constitute one of the chief causes for the admission of Indonesian patients to dispensaries and hospitals. In 1938 it was reported that 12.2% of the admissions in 167 of the larger hospitals of the Netherlands Indies were due to diseases of the skin whereas only 9.7% were due to malaria. In the dispensaries the percentage is much higher. Secondary infection of all skin lesions is of great importance. For example, scabies is frequent, but the clinical picture, especially in the native population, is dominated by the frequent secondary infections. Impetigo is often seen in Halmahera. Furunculosis is another common trouble, affecting foreigners especially. Tropical phagedenic ulcer, practically always on the anterior side of the legs, is common all over the Netherlands Indies. However it occurs most among people who go barefoot. Tinea infections abound. Special mention must be made of Tinea imbricata (Tokelau ringworm) spread all over the Netherlands Indies. Tinea albigena is frequent and is localized in the palms and soles. After the lesion is healed, permanent pigment atrophy remains. Epidermophytosis (Hongkong foot, Dhobie itch) usually in the groins, occasional in the axillae and often between the toes, is highly communicable. Prickly heat bothers newcomers to the tropics more than old-timers. Bullous tropical impetigo or "monkeypox" mostly attacks children, but also occurs in adults. Redbug dermatitis, caused by the hexapod larva of *Trombicula irritans* (chigger) is often an intolerable annoyance; newcomers are frequently afflicted. Cutaneous myiasis is common.

Filariasis is a mosquito-borne infection which may affect a large number of troops. It is often a symptomatic and is not usually totally incapacitating. It is therefore not as serious as malaria and the enteric diseases, but a few cases in a military unit can have a depressing effect on morale.

Filariasis due to *Wuchereria bancrofti* has been observed in the Philippine Islands. Both *Wuchereria bancrofti* and *W. malayi* occur in North Borneo. *A. barbirostris barbirostris* is the chief vector of *W. malayi* infections. *A. hyrcanus X* is also a vector of filariasis in Borneo. Filariasis in Sangihe and Talaud is probably due exclusively to *W. malayi*. It is possible that its vector is *Mansonia annulifera*. No information is available as to filariasis in the districts of Dutch Borneo and Celebes which border on the Celebes Sea. Immediately to the south lie the Makassar Straits, both shores of which are filarious. Most of the cases here are due to *W. malayi;* in a few limited areas both *W. malayi* and *W. bancrofti* are present. In Celebes, the vector of *W. malayi* is *Anopheles barbirostris barbirostris*, a species which breeds in rice fields, and still water. Filariasis is probably common in Halmahera, although the only data obtainable are reports of several cases of elephantiasis. It is uncertain which type

of infection predominates, and we know nothing of the vectors which carry the disease.

Dracunculus medinensis occurs chiefly in Arabs living in the Netherlands possessions.

B. Diseases of potential military importance.

(1) Endemic diseases.

(*a*) *Cholera.* Where it occurs, cholera is the most serious and fatal of all enteric diseases. It is apt to cause extensive epidemics among both troops and civilians. No cases of cholera have occurred in any part of the Philippine Islands since 1937. Despite subsequent outbreaks in the Orient, the Islands have remained free of the disease. Excellent port quarantine facilities have been responsible for this record. Cholera has not been reported from North Borneo in the last 10 years.

Between 1921 and 1937 no cases occurred anywhere in the Netherlands Indies except towards the end of 1927 when a small outbreak of 9 cases occurred at Batavia; the cases were imported from Singapore. Strict quarantine regulations and compulsory vaccination of all immigrants helped to stamp out the disease. In the Army no cholera cases have been observed since 1920. The large numbers of pilgrims who travel every year from the Netherlands Indies to Mecca and back constitute a special danger. All these pilgrims are, however, inoculated against cholera, typhoid, and smallpox before they are allowed to leave the Netherlands Indies. The number of pilgrims from the Netherlands Indies gradually diminished after the record year 1926 but increased again in 1938.

In September and October 1937 a small cholera epidemic developed in some native hamlets situated in southwest Celebes. Cases also occurred on one of the small islands of the Spermonde Archipelago off that coast, about 40 miles north of Makassar. The hypothesis that the cases had been imported was checked carefully but could not be substantiated. In January, February, and March 1938, cases occurred inland about 6 miles south of Makassar and in 2 other islands of the Spermonde Archipelago. One case occurred in the harbor town of Makassar in January and April 1938 respectively. Altogether 48 cases were observed. In October and November 1939 about 25 more were found. In June and July 1940 eight new cases were reported from Celebes. The case fatality was 65%, the clinical picture typical. Wells and water jars used by cholera patients in S. Celebes were examined and found to be contaminated, whereas wells belonging to the neighboring houses were uncontaminated. Of 217 contacts of 40 cholera cases, 29 were found infected. In only a few cases did these contacts show cholera symptoms later and in no case did a positive contact die. Of 183 probable contacts examined in 1937 and 1938 not one was infected. In 1940 some healthy non-contacts were found to be carriers. In one village where there had not been even 1 suspected case, 1.3% of the inhabitants were found to be carriers. Of 17 carriers, 11 were under the age of 16 years. These findings refute the original conclusion that spreading of vibrios was limited to individuals in contact with patients and to wells and jars in the immediate vicinity of the patient.

Epidemiologically and bacteriologically this cholera outbreak in Celebes showed some remarkable points. There was hardly any tendency to epidemic spread. In each of the 14 villages only 1 case occurred; in each of 4 villages there were 2 cases; in 1 village there were 5 cases. With few exceptions there was never more than 1 case per family.

Bacteriologic examination of the cases showed the presence of cholera-like vibrios which in the opinion of most Dutch bacteriologists must be identified with the so-called El Tor vibrio, a hemolytic organism recognized in 1905, closely related to the cholera vibrio. In view of extensive studies of this organism, there seems hardly any reason to distinguish the disease in South Celebes as "enteritis choleriformis Tor," as has been proposed. The conclusion seems justified that in South Celebes cholera occurs, probably endemically. As a matter of fact the 2 cases discovered in the harbor town of Makassar were reported as cholera and have been mentioned as such in the "Bulletin Office International d'Hygiene Publique." The harbor was however not officially declared contaminated. The question why weakly hemolytic cholera strains have been recovered in South Celebes and not in other areas may well be connected with the widespread interest which for 25 years has existed in the Netherlands regarding the problem of the El Tor vibrios; the Dutch bacteriologists were conditioned for the finding of hemolytic cholera strains. Cholera is not reported in Dutch Borneo and Celebes, nor in available reports from North Borneo. In 1886 there was a serious epidemic in Talaud. The disease has not been reported from there recently.

(*b*) *Plague.* Where it occurs, plague is one of the most deadly communicable diseases. It is spread by rat fleas, and is likely to become epidemic among both troops and civilians. It has a high mortality rate.

Plague has not occurred in the Philippine Islands since 1914. In 1920 there was a small outbreak at Sandakan in North Borneo. It is important to remember that the disease has prevailed extensively in Java in recent years although the rates have shown a marked tendency to decline under the influence of control measures. In 1939 there were 1,541 cases reported from Java. *Rattus rattus diardi* is the rodent reservoir of the disease. In Makassar, a port of southern Celebes, 115 cases of plague were reported between 1922 and 1930; no cases have been reported from other parts of Celebes, Talaud, Sangihe, Dutch Borneo, or Halmahera. In Celebes, *R. rattus diardi, R. norvegicus,* and *R. concolor* served as reservoirs of infection.

In the Netherlands Indies plague has been combatted mainly by the application of 2 methods:

1. Extensive schemes for the improvement of houses and careful supervision of the buildings of new houses in order to prevent the breeding of rats.
2. Vaccination with Otten's live plague vaccine.

For the improvement of the houses the following principles were followed:

1. All thatched roofing was replaced with tiles or corrugated iron.
2. All unsplit bamboo was replaced with wood; where wood was scarce the ends of the bamboos were closed with wooden stoppers.
3. All parts which could not be seen easily (e.g. spaces between 2 layers of open bamboo) were eliminated.

In plague areas, compulsory house improvement was ordered and definite time limits were set. The materials were supplied by the anti-plague service, and the personnel of that service gave instruction and assistance during the progress of reconstruction. The value of material supplied was regarded as a loan to the people who were required to repay gradually, according to their financial ability, over a period of years.

In addition to the scheme for compulsory house improvement in plague areas, a voluntary house improvement scheme was carried out in certain areas. It was essential in the latter

scheme that the work should be done under the direct control of an assistant (mantri), on whom developed the duty of giving precise instructions regarding the methods to be followed.

It is the general opinion that this improvement of houses is the most powerful means of suppression of plague because it prevents contact between rat and man. It works slowly however, and has often been followed by severe outbreaks of malaria. A satisfactory explanation of this occurrence has not been given. For quick results in an anti-plague campaign, vaccination is used. About 10,000,000 vaccinations and revaccinations were performed with Otten's live vaccine without untoward results. This method, therefore, can no longer be considered a hazardous venture. It is difficult to obtain a definite opinion about the efficiency of this vaccine. The Public Health Service of the Netherlands Indies feels that it is very valuable.

The Netherlands Army has always been virtually free from plague although often considerable numbers of soldiers have camped in plague territory. One case of plague in a soldier occurred in 1923, 1924, 1925, 1930, and 1933 respectively.

(2) Diseases which may be introduced.

(*a*) *Yellow fever.* Where it occurs, yellow fever is extremely dangerous to troops and civilians alike. It spreads rapidly in a community and causes many deaths. It is carried by the *Aedes aegypti* and a few other mosquitoes. *Aedes aegypti,* the vector of this dreaded disease, is found in all territories bordering on the Celebes Sea and Sulu. Yellow fever, however, has never occurred in any of these territories or in any Oriental country.

(*b*) *Kala-azar.* This is a chronic infectious disease characterized by persistent fever of alternating, remittent or intermittent type, characterized by gradual emaciation and enlargement of the liver and spleen. In untreated cases the mortality may range from 80-90%. The malady is due to a protozoan, *Leishmania donovani,* and is probably transmitted by *Phlebotomus* flies (sandflies). It has not been reported in any part of the area under discussion, except for rare imported cases.

C. Diseases of minor military importance.

(1) Intestinal helminthiasis.

Parasitic worms of various types are extremely prevalent among the natives, and can be readily acquired by troops unless proper precautions are taken (Topic 104). This disease is usually not serious, but will lower the efficiency and resistence of individuals who are affected.

Worm infestations are extremely common throughout the Philippines in general, ascariasis and trichuriasis being the most prevalent forms. Hookworm diseases are endemic; all 3 varieties of parasite, *Ancylostoma duodenale, Ancylostoma braziliense,* and *Necator americanus* are present. Four tapeworms are known: *Taenia saginata, Taenia solium, Sparganus mansoni,* and *Hymonolopis nana.* In North Borneo *Ancylostoma duodanale* and *Hymenolopsis nana* are frequently observed.

In the Netherlands Indies intestinal helminths are extremely common. In some rural areas more than 50% of the population harbor hookworms; in some areas 90% of these infections are due to *Necator americanus.* The combination of hookworm and malaria is dreaded especially because of the resultant severe anemia. Ascaris lumbricoides infection occurs in at least 80% of the rural population. *Trichuris trichiura, Enterobius vermicularis, Taenia solium, Hymenolepis nana,* are all common.

(2) Schistosomiasis.

Due to *Schistosoma japonicum,* this is a chronic disease characterized by dysentery and gradual enlargement of the liver and spleen, and later of the whole abdomen. The hosts of *S. japonicum* are fresh-water snails, and the infection is acquired by wading or swimming in infected water, or by drinking it. Although mild cases may occur, the disease is often severe and even fatal.

Schistosomiasis due to *Schistosoma japonicum* occurs in Northern Mindanao, but is not present in the southern provinces which border on the Celebes Sea. It has not been reported from the Sulu Archipelago. In northeastern Mindanao, the molluscan host is the fresh water snail, *Blanfordia quadrai.* This snail has been found in mountain creeks, irrigation canals, and rice paddies. In 1941, 15 individuals out of 33 examined at Mainit and Tungao near Surigao had the disease. Schistosomiasis also occurs in Agusan Province.

In Celebes, *Schistosoma japonicum* infections are found only near the isolated Danau Lindoe at an altitude of 2,700 feet. Its molluscan host has not been definitely determined, although in another mountain lake on the island, Lymnaea snails have been found shedding furcocercous cercariae.

D. Diseases common among civil population.

(1) Tuberculosis.

Although tuberculosis is extremely common among natives in this area, it will probably be no more of a problem among troops than it is at home. Tuberculosis of all forms is prevalent in the Philippines and ranks as the single greatest cause of death. In 1938 there were 44,560 new cases. Of the total number of cases, new and old, there were 34,693 deaths in the same year. The death rate in 1938 was given as 2.8 per thousand. A recent report indicates that these are incomplete figures, and that as a rough estimate, almost 1,000,000 people in the islands are afflicted with some form of tuberculosis. Regardless of the relative accuracy of these statements, the importance of the disease to the Philippines cannot be minimized. The Philippine Department Surgeon's Report for 1940 showed a yearly admission rate of 8.5 per thousand for tuberculosis, probably mostly among native soldiers. It is not believed that this disease will be of great military significance for well selected white personnel.

Almost nothing is known of tuberculosis in North Borneo. The disease is common among Chinese residents of the colony. The physician is not ordinarily consulted until the case is far advanced.

Tuberculosis is extremely common in the Netherlands Indies, and is especially prevalent in Halmahera. In Celebes, the Residency of Manado on the northern peninsula has a high tuberculosis rate. It is generally estimated that about 10% of all deaths in any part of the Netherlands Indies are caused by tuberculosis. The statistics are not too reliable, since in most instances the diagnosis is made post mortem by the native mantri (lay assistant) who must inspect the body before permission for burial is given. In the Minahasa peninsula of Celebes, the tuberculosis mortality rate was 177 per 100,000 of population before the war.

At the end of 1938, eleven tuberculosis sanitaria with 956 beds were operating in the Netherlands Indies. During 1939 and 1940, nine more sanitaria under government management were opened.

Bovine tuberculosis occurs frequently among the stock of milch cows imported from the Netherlands and Australia. The

native cattle stock of 4,000,000 head fortunately has not caught the infection and has remained free from tuberculosis.

(2) Yaws.

This is a spirochoetal infection which is very common among natives but rarely occurs in whites. Unhygienic living conditions and contact with infected individuals are important factors in its spread. It is most frequently acquired in childhood. For these reasons, it is not important to troops.

In the Philippine Islands there were 31,647 cases of yaws under treatment in 1938, and the disease is common throughout Mindanao and Sulu. It is also prevalent in North Borneo, and the Netherlands Indies. The incidence in Halmahera is said to be high. Yaws is more common in lowland than in mountain districts.

(3) Eye diseases.

Trachoma, a serious and readily communicable disease, is common and may affect a few troops. It frequently leads to blindness. Other less important infections are also found. Strict personal hygiene is important in preventing these diseases. In 1938, there were 32,695 reported cases of trachoma in the Philippine Archipelago, and the disease is common on both Mindanao and Sulu. Diseases of the eyes are extremely prevalent in the Netherlands Indies. It is estimated that at least 10,000 persons are blind or nearly blind in Celebes alone. Much of this loss of vision is due to trachoma. Other common causes are gonococcal ophthalmia and syphilitic uveitis. In Tobelo, Halmahera, among 3,910 patients examined in recent years, 108 were trachomatous. Only 13 out of 47 villages surveyed were free of the disease. These were isolated, and had little communication with other parts of the island.

(4) Leprosy.

Leprosy is not an important military medical problem as it is not, apparently, very contagious. Infections can usually be traced to contact with infected members of the same family, or close friends. A few men may, however, contract the disease. Symptoms may not appear for many years after the infection is acquired.

In the Philippine Islands, leprosy is a fairly common affliction. At the end of 1938 there were 8,582 lepers, including 920 new cases recognized during the year. The Bureau of Health had excellent facilities for the isolation and treatment of these patients, the largest institution being the Culion Leper Colony on Culion Island. Every province had its temporary detention camp for suspected lepers, and on Mindanao there was a treatment station at Zamboanga. In North Borneo there was a leper colony at Berhala, an island about 3 miles from Sandakan. In 1930, 70 lepers were under treatment there. Leprosy is extremely common in the Netherlands Indies. In the southern and eastern districts of Borneo there were, in 1937, 2 leprosaria with a total capacity of 95 beds. In Celebes, there were 6 leprosaria with 882 lepers, and at a colony in Tobelo on Halmahera in 1938, there were 70 lepers.

E. Miscellaneous diseases.

(1) Smallpox.

Smallpox has not been reported in the Philippines since 1822, except for a few cases among Moros in the far south. Two cases were recorded in 1938 in passengers on British ships docked in the islands. In 1939, 1 case of smallpox occurred in an individual who arrived in North Borneo from Hong Kong, but no other cases followed. In that year, 13,421 persons were vaccinated in North Borneo. Extensive vaccination has been employed throughout the Netherlands Indies, and consequently smallpox is rare. In 1939, however, there were 3 cases in Celebes.

(2) Leptospirosis.

Due to *Leptospira bataviae*, this is a febrile spirochetal infection spread by rats, and characterized by fever, vomiting, headache and in about 10% of cases, by jaundice. Human infection results from the ingestion of food or water contaminated with the urine of infected rats. It may affect moderate numbers of troops, but is rarely fatal. Leptospirosis occurs in Celebes, Borneo, and Tarakan. In these the causative organism is *Leptospira bataviae*. The Norway rat is the mammalian reservoir.

(3) Diphtheria.

Diphtheria is common in Borneo and Celebes, and probably in Halmahera. Tetanus shows the same distribution. *Cerebrospinal meningitis*, brucellosis, and anthrax occur sporadically. *Measles* is very common on Talaud, and probably on the other islands in this area. Diphtheria may affect a few troops. It presents the same problem that it does at home.

(4) Others.

Tetanus is probably more frequent in the tropics than at home. Small, penetrating wounds should be promptly treated to prevent its occurrence. If it develops, it is apt to be fatal unless treated promptly.

Cerebrospinal meningitis is a severe communicable disease prone to cause large epidemics with some fatalities among troops.

Brucellosis is a chronic disease which is rarely fatal, often debilitating, and sometimes as mild as to be asymptomatic. It is acquired by drinking unpasteurized milk or by handling infected animals. It should not break out among troops if they are warned of the danger of drinking milk from local herds.

Anthrax is a disease acquired from contact with infected cattle or sheep, or from contact with their hides. It is characterized by ulceration and swelling at the point of innoculation. Rapid collapse, and death usually ensue. It will affect few, if any troops.

Goitre is endemic in scattered areas in eastern and southern Borneo and in western Celebes.

Nutritional diseases. Malnutrition and beriberi are common in the Philippines, while pellagra, scurvy, and rickets are uncommon. Beriberi is rare in those parts of the Netherlands Indies included in this survey. Xerophthalmia is rare in Celebes and Borneo. In Halmahera, however, it is seen quite frequently. The people of Sangihe were very poorly fed in 1934, due to the low price of coconuts. This caused great poverty.

Rabies is common in Borneo and Celebes. It is always fatal unless treated promptly. Any contact with a rabid dog should be reported to the surgeon at once.

114. Recommendations

In addition to these precautions ordinarily carried out for military forces, the following precautions are considered of special importance in the territories surrounding the Celebes Sea.

A. Water.

Although before the war water from the few available public supplies could be consumed without additional treatment, it is doubtful whether normal supervision has continued during Japanese occupation. Even safe water may be contaminated through distribution in unsanitary containers. Therefore all water should be regarded as potentially dangerous, and should be boiled or chlorinated before use. Containers should be kept clean. Ice made from local water supplies should be considered unsafe for drinks.

B. Sewage.

No reliance should be placed on the availability of any sewage disposal facilities. Plans must therefore be made for the local disposal of sewage and other wastes. In view of the prevalence of enteric diseases, special attention must be paid to the careful disposal of sewage by approved methods, in order to guard against pollution of water and soil, and against access by flies. Native employees must be provided with their own toilets, and compelled to use them.

C. Malaria control.

Because of the vital importance of malaria (and secondary importance of dengue and filariasis), careful plans for mosquito control should be made before troops embark for any part of this area. Such preliminary plans should include provision for specialized personnel, antimalaria supplies and indoctrination of all troops in preventive measures. Specific control measures should include:

1. Use of bed nets issued as individual equipment at the port of embarkation, and thus available for use immediately upon arrival until proper screening of buildings and barracks has been accomplished.
2. Use of head nets, gloves, and other protective clothing where indicated.
3. Liberal use of insect repellents.
4. Proper selection of camp sites. Location on high ground affords no absolute protection because in all of these areas malaria often occurs in the hills. In the Philippine Islands the transmission of malaria is limited to the region between elevations of 1,000 to 2,000 feet. Camp sites should be chosen preferably one or two miles from important breeding places and from native habitations, barns, and cowsheds, so as to be beyond the effective flight range of mosquitoes. Stream banks should also be considered as possible storehouses of infected malaria carriers. Sites should be selected so that native villages are not on the windward side of the camp and doors of all buildings should open away from the wind, if possible. If for military reasons it is necessary to make permanent camp sites in areas in close proximity to native villages, consideration should be given to moving these villages to other locations.
5. Thorough screening of all quarters, not merely of those to be occupied in the evenings or at night. Entrance vestibules with a screened door at each side (mosquito lock) will be necessary to exclude the mosquitoes. Strict avoidance of outdoor moving picture shows is essential.
6. Use of pyrethrum sprays in native habitations within mosquito flight range of camps (one or two miles) and in all tents, barracks, mess halls, recreational and other buildings. The new insecticide spray (QM Insecticide, aerosol) is especially suitable.
7. Although antimalarial measures may have to be varied according to the specific area and the vector that is locally important, careful clearing and draining of ditches and gutters is necessary in *all* malarious districts. Fishponds are dangerous breeding places in Borneo and Celebes. Salt water fishponds and saltwater lagoons must be drained or connected with the ocean in order that the tide may enter freely. Fresh water fishponds must be cleaned or drained. The same must be done to fishponds on rice fields. Rice fields should not be in continuous cultivation. Sufficient time should elapse between crops to permit complete drying of the fields. Oiling of the saltwater lagoons is usually unsatisfactory because of the prevailing winds. The results with Paris green are somewhat better but the material must be applied once every week.

   Measures like clearing, draining, and filling of potential breeding areas should be used with discretion. Clearing has a favorable effect in areas where a shade-breeding mosquito such as *A. umbrosus* acts as sole vector (e.g. northwest Borneo in the Pontianak area, and the interior of Borneo). Unless competent entomological advice is available, clearing should not be used in Celebes, Halmahera, or Borneo. Clearing is followed by man-made malaria in the mangrove forests of Borneo and is dangerous in the areas where *A. sundaicus* acts as vector (coastal zones of South Celebes). Clearing is very dangerous in the hills and mountains of the coastal areas of eastern Borneo and Celebes where *A. maculatus* is an important vector, and in Halmahera where *A. punctulatus punctulatus* and *A. punctulatus moluccensis* are vectors. Apart from the *A. umbrosus* regions in limited areas of Borneo and the southern Philippines where *A. minimus flavirostris* is the chief vector, clearing of forests entails the danger of producing man-made malaria. When such clearing is necessary, special mosquito-control measures must be initiated at once and vigorously maintained. Drainage of stagnant water, although always advisable, may not be sufficient; running brooks are habitats of *A. maculatus* and of *A. minimus flavirostris* larvae, and it is often necessary in the maculatus-infested areas mentioned above to transform brooks into subterranean passages. The filling of marshes in areas where *A. maculatus* acts as vector is an excellent measure, but requires special precautions. It is quite possible to dig away enough of a hill to expose the ground water and thus produce an area of seepage eminently suitable for *A. maculatus*. In the Philippine Islands, *A. minimus flavirostris* breeds in hill streams at altitudes between 1,000 and 2,000 feet. The most effective single method for the control of this species is the use of Paris green. Success may also be obtained in occasional instances by the construction of small dams so arranged that water can be released suddenly once or twice each week; this procedure damages the larvae by alternate stagnation and flushing.
8. Adequate supplies of antimalaria drugs sufficient for 100% suppressive treatment should be available for use everywhere in this area, and should be employed at the discretion of the surgeon.

D. Dengue.

Under ordinary conditions the mosquito-control measures recommended in Paragraph C will be of assistance in the control of dengue. In addition, the policing of buildings and grounds and the regular inspection of water containers will be necessary. It will be remembered that *Aedes aegypti* frequents small collections of water such as vessels and gutters in and around human habitations.

E. Venereal disease control.

Venereal diseases are prevalent, sexual contacts easily made, and the native population little disturbed if signs of these ailments develop. Venereal disease programs with comprehensive educational campaigns and adequate recreational facilities for troops are urgently necessary. Large supplies of approved prophylactic materials should be provided and prophylactic stations should be easily accessible to all troops. Contacts with the local health authorities aiming to increase the opportunities for treatment of the civilians may sometimes be advisable.

F. Food.

If local eating establishments are used by military personnel,

thorough inspection of these places, including those vending soft drinks and dairy products, should be carried out. Even in these establishments, however, raw fruits and vegetables should be avoided. Troops should be cautioned as to the dangers of eating in unapproved establishments or in native homes. Because of the high incidence of intestinal infections, unusual care must be exercised in the collection, storage, and preparation of food in Army mess and post exchanges. Kitchens and mess halls should be carefully screened. The presence of native food handlers about Army messes should be considered as a potential danger. If their help cannot be avoided, their number should be maintained at a minimum, those so employed should be carefully selected by physical and bacteriological examination in accordance with Army regulations, and strict discipline maintained as to cleanliness of person.

G. Control of Rickettsioses.

Although specific data as to the presence of scrub typhus are lacking, the presence of the disease in this area should be strongly suspected. As seen in New Guinea the disease occurs especially in workmen and soldiers who have been clearing grassy areas (kunai grass), since mites live in the moist area at the base of the grass stalks. All prospective camp sites should be thoroughly cleared of grass and the areas burned over before they are occupied. As far as possible native laborers should be used for clearing. In New Guinea infection has not been found in the deep jungle. Liberal use should be made of available insect repellents. The current Army typhus vaccine does not protect against scrub typhus. Special attention should be given to bathing and to inspection of the lower parts of the body, especially after men have been in grassy land. Troops in these areas should be cautioned as to the importance of protective clothing —i.e. trouser legs should be tucked into boots and long sleeves should be worn.

H. Cholera.

Although cholera has not occurred in this area for several years, under present conditions the disease would spread rapidly if introduced. In neighboring areas a few cases have occurred. In the fall of 1943 approximately 150 cases occurred in Japanese troops in Manila; a choleral-like disease is endemic in southern Celebes. The procedures outlined in previous paragraphs for the protection of food and water are applicable. Immunization is required and in areas where cholera cases occur stimulating doses may be necessary periodically.

I. Diseases of the skin.

Serious infections often follow minor wounds. All personnel should be impressed with the necessity for giving immediate first-aid treatment to all wounds, burns, abrasions, and insect bites regardless of size and apparent harmlessness. Daily bathing is highly desirable where water supplies make this possible. Thorough drying of all skin folds (toes, crotch, scrotum, armpits, groin) is imperative for the prevention of fungus infections. Army issue foot powder should always be applied after the bath.

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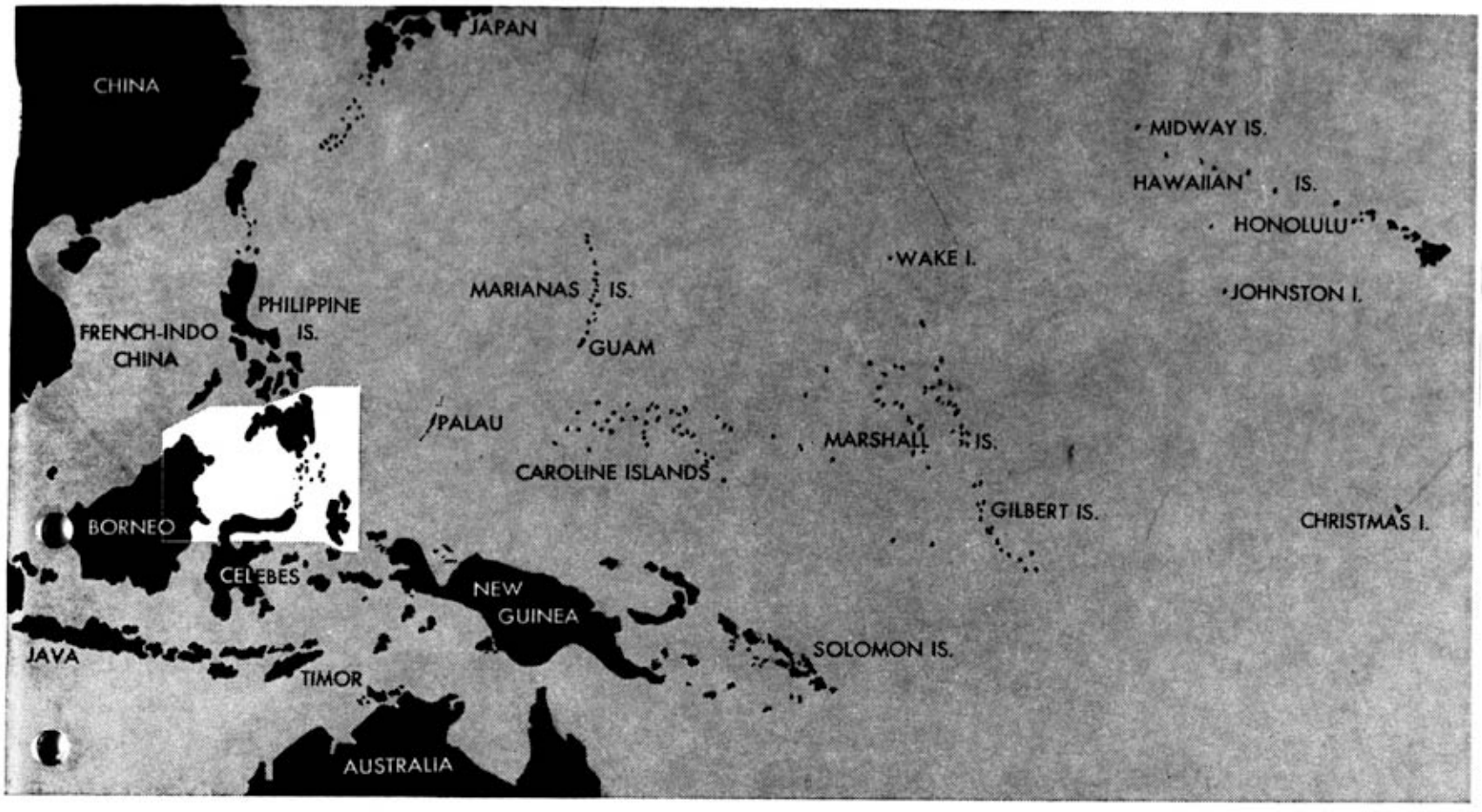

JOINT ARMY-NAVY INTELLIGENCE STUDY

OF

CELEBES SEA AREA

NAVAL AND AIR FACILITIES

MAY 1944

List of Effective Pages, Chapter XII

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Note: This chapter is based on material available in Washington, D. C., on 25 April 1944.

NAVAL AND AIR FACILITIES

120. General Description

A. Position and importance in Japanese strategy.

(1) Naval facilities.

The Celebes Sea Area has become one of the most important Japanese defense zones. Loss of control of this territory would make Japanese shipping south and southwest of Hong Kong and Taiwan more vulnerable to Allied sea and air attacks. Should the Japanese be forced to evacuate this area, valuable commodities and resources essential to the Japanese war machine would be cut off. Consequently a concentration of enemy effort to develop further the naval installations in the Celebes Sea Area may be expected.

(2) Air facilities.

The airfields on the islands bordering the Celebes Sea are integral factors in Japanese plans for defense of the area, and probably are important in strategic plans for overall defense of Greater East Asia. These islands include Mindanao and the Sulu Archipelago in the Philippines, North Borneo, the northern isthmus of Celebes Island, and the Halmahera group.

These islands are well situated to base defensive air cover for naval and merchant vessels moving through the Celebes Sea on the most direct shipping route from the Netherlands Indies to Japan.

Airfields on these islands can support fighter interception of Allied bombing missions against the Philippines and the Netherlands Indies west of New Guinea. In addition, there are enough large fields to mount enemy bombing attacks on any operations the Allies may undertake in western Netherlands New Guinea or the eastern Netherlands Indies. Reconnaissance and bomber aircraft, for use against Allied naval forces operating in the area, can likewise be based on these airfields.

A summation of the known fields in the area is presented below.

TABLE XII - 1

SUMMATION OF KNOWN AIRFIELDS IN CELEBES SEA AREA*

SECTOR	HAD	MAD	FAD	HLG	MLG	FLG	ELG	TOTAL
A. Halmahera	0	3	0	0	1	2	1	7
B. Sangihe-Talaud	0	0	0	0	0	0	0	0
C. Mindanao	0	0	2	9	9	12	14	46
D. Sulu Archipelago	0	0	0	0	0	1	0	1
E. North Borneo	0	0	0	1	1	0	7	9
F. Northern Celebes	0	1	0	0	1	0	0	2
Total	0	4	2	10	12	15	22	65

*NOTE: Throughout this Chapter the designations and symbols listed below are used in reference to various types of air facilities.

"Airfield" signifies the existence of paved runways or extensive facilities or both.

"HAD" signifies Heavy Bomber Airfield, implying a run of nearly 6,000 feet or more, where surface conditions, altitude, obstructions, etc., will permit the use of heavy bombers.

"MAD" signifies Medium Bomber Airfield implying a run of about 4,500 feet suitable for medium bombers.

"FAD" signifies Fighter Airfield with a run of about 3,000 feet suitable for fighter operation.

"Landing Ground" signifies a suitable landing area without extensive facilities or paved runways.

"HLG" stands for Heavy Bomber Landing Ground implying a run of nearly 6,000 feet or more where surface conditions, altitude, obstructions, etc., will permit the use of heavy bombers.

"MLG" signifies Medium Bomber Landing Ground with a run of about 4,500 feet suitable for medium bombers.

"FLG" indicates Fighter Landing Ground with a run of about 3,000 feet suitable for fighter operations.

"ELG" designates Emergency Landing Ground.

Seaplane facilities are classified in three ways.

"SS" signifies a fully equipped seaplane station.

"SAA" indicates a seaplane alighting area having limited facilities for anchorage, refueling, or repairs.

"ESAA" indicates a suitable emergency seaplane alighting area, implying no available facilities.

B. History and development.

(1) Naval activity.

Neither the United States nor the Netherlands developed any important naval installations in the Celebes Sea Area under their respective jurisdictions. This territory was invested with comparative ease by the superior forces of the Japanese fleet when Hong Kong and Manila fell, and the Netherlands and United States surface forces were forced to withdraw to the defense of Java.

The occupation of British North Borneo was begun on 24 December, 1941; Davao and Jolo were taken during the first week of January 1942, and with these bases of operation, the Japanese launched their first attack on the Netherlands East Indies on 11 January 1942. Manado and Tarakan were reported captured the same day.

The Japanese advance into the Netherlands East Indies proceeded so rapidly that no particular effort was made to develop naval installations in Mindanao, Northeast Borneo, Northern Celebes, and Halmahera. The Singapore and Soerabaya naval bases, which were captured 15 February and 9 March 1942, respectively, fulfilled Japanese needs for advance naval bases, and the development of other bases was almost entirely confined to the most forward areas along the fighting front.

Even after the Japanese drive into New Guinea and the Solomons was halted, the enemy continued attempts to supply and develop their advance bases. In the Celebes Sea Area comparatively small garrisons were maintained, existing facilities were repaired if necessary, and the ports were used for staging bases and supply depots. Not until Rabaul became virtually isolated, Truk subject to frequent attack, and the Allied forces had succeeded in drives into New Guinea and New Britain did the Japanese commence to construct bases and develop positions in this strategic rear area. Of particular significance is the recent emphasis on the military development of Halmahera, which was almost neglected until 1 January 1944 but which has since become a center of Japanese activity.

It is likely that the Celebes Sea Area may become the scene of increased naval activity, and possibly the location of new and important advance naval bases.

(2) Air activity.

Most of the airfields in the Celebes Sea Area were developed by commercial enterprise under the respective governments of the islands involved. During the period from September 1941 through April 1942, when they were abandoned to the enemy, many of these fields were enlarged for use by military aircraft.

A number of new fields were built, particularly in the Del

Monte district on Mindanao Island, to accommodate our heavy bombers. This district, on the Bukidnon plateau, affording many sites for large, well drained airfields, is easily accessible by roads and inland waterways. (FIGURES XII - 26 and XII - 27)

The Japanese have further improved a number of airfields, notably in the Davao district, and it may be expected that they have developed others concerning which information is not yet available. Intense airfield construction and expansion activity have been progressing in the Halmahera group since January 1944.

121. Organization

A. Administration.

(1) Naval.

In order to understand fully the Japanese naval organization in the Celebes Sea Area, some consideration should be given the administration of the Japanese naval establishment in general. The Japanese naval establishment is divided into fleets and districts. The districts represent the home forces based in Japan or its adjacent areas, while the fleets are responsible for the outlying areas of conquest. The fleets are again divided into Mobile Fleets and Area Fleets. The Mobile or Mission Fleets can operate anywhere, whereas the Area Fleets are responsible for particular geographical areas. Mobile Fleets constitute the main striking force of the navy while the Area Fleets are defensive in character.

The Celebes Sea Area is under the Southwest Area Fleet with headquarters at Singapore. This fleet, in turn, is divided into 4 Southern Expeditionary Fleets and 1 Air Fleet. Each of the Southern Expeditionary Fleets covers a defined area within the Philippines-Indies-Malaysia region, while the Thirteenth Air Fleet is the naval air arm of the Southwest Area Fleet.

The Second Southern Expeditionary Fleet, covering Java and Borneo, is based on Soerabaya, headquarters of the Twenty-first Base Force, and Balikpapan, headquarters of the Twenty-second Base Force. Thus Sector E, Northeast Borneo, would come under the jurisdiction of the Twenty-second Base Force at Balikpapan.

The Third Southern Expeditionary Fleet, covering the Philippines, is based on Manila, headquarters of the Thirty-first Base Force, and Davao, headquarters of the Thirty-second Base Force. Thus Sectors C and D, Mindanao and the Sulu Archipelago, would be within the jurisdiction of the Thirty-second Base Force at Davao.

The Fourth Southern Expeditionary Fleet has been recently organized to cover the Banda, Flores, Timor, and Arafura Sea area. It is based on Amboina, headquarters of the Twenty-fourth Base Force, Manokwari, headquarters of the Twenty-fifth Base Force, and Kaoe, headquarters of the Twenty-sixth Base Force. Sectors A, B, and F, Halmahera, Sangihe-Talaud Islands, and Northern Celebes, are administered by the Twenty-sixth Base Force at Kaoe.

(2) Air.

It is believed that the administrative control of the Japanese Army Air Service in the Celebes Sea Area emanates from Manila, while that of the Naval Air Service is exercised by either Singapore or Penang. Specific details are not available.

B. Tactical.

(1) Air services.

The Japanese Army Air Service is responsible for direct support of ground forces and for the bombing of forward Allied bases, in addition to local air defense. Its employment is controlled by the senior Japanese field commander in the area. At the present time in the Philippines and Netherlands East Indies, excluding Sumatra, the Fourth Air Army is thought to be exercising command over probably 2 air divisions, 2 air brigades, approximately 5 air regiments, and possibly 5 independent air squadrons.

The Naval Air Service, executing long range reconnaissance, anti-submarine patrol, shipping escort, attacks on Allied surface vessels, and local air defense, operates under the control of the senior fleet commander in the area. It is believed that the Thirteenth Air Fleet now exercises command over 1 air flotilla and approximately 7 or 8 air groups in the Philippines and Netherlands East Indies excluding Sumatra.

C. Disposition of forces.

(1) Naval.

The base forces controlling the Celebes Sea Area comprise land, sea, and air units and are commanded by a Rear Admiral. The normal strength of these base forces is weak. Their sea forces include only a few patrol and mine craft, and miscellaneous small coastal vessels. Their land forces are small naval garrisons consisting of antiaircraft battalions, supply, maintenance, and repair units, pioneer detachments, administrative sections, and similar units.

In recent months, however, a large portion of the Japanese Navy has been transferred to the Singapore area, headquarters of the Southwest Area Fleet, and presents a formidable counter-threat to Allied encroachment from the east. It appears that Japan intends to defend the Celebes Sea Area not only with naval landing parties, but with fleet units as well.

(2) Air.

Because of continued development of air facilities in the Celebes Sea Area, as well as the inherent and frequently demonstrated mobility of the Japanese Air Force, it is difficult to arrive at figures which would indicate distribution of aircraft.

During the first quarter of 1944, however, the estimated enemy operational air strength in the Philippines and Netherlands East Indies, excluding Sumatra, fluctuated between a high of 498 and a low of 270 aircraft, a differential of 84%. Any future disposition of strength will naturally be limited by such factors as airfield capacities, logistics, and Allied pressure on other fronts.

D. Labor battalions.

No information concerning labor battalions in the Celebes Sea Area has been supplied. However, reports of accelerated construction activity would imply the presence of substantial labor units.

122. Supply and Maintenance

A. Depots.

The principal naval depots of fuel and other supplies in the

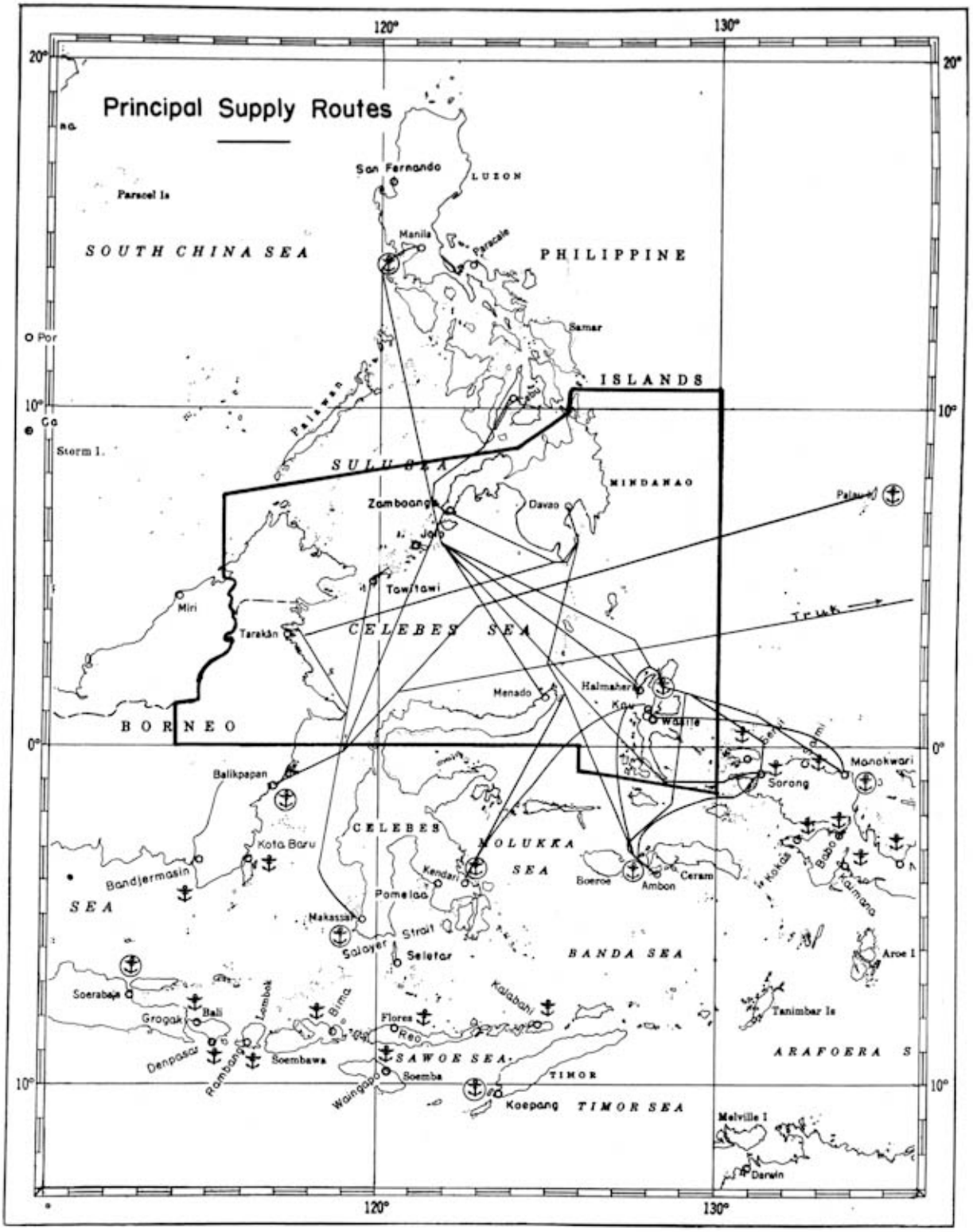

FIGURE XII - 1. *Celebes Sea Area.*
Principal supply routes.

Celebes Sea Area are located at Davao, headquarters of the Thirty-second Base Force, and Kaoe, headquarters of the Twenty-sixth Base Force. All major repairs to Japanese surface vessels are performed at Singapore or at major naval bases in Japan. Only minor repairs could be accomplished at the headquarters of the base forces at Davao and Kaoe.

No information is available on the location of aircraft supply and maintenance depots in the area.

B. Supply routes.

(1) Shipping (FIGURE XII - 1).

As shown on the accompanying map, the Celebes Sea is the crossroads of a number of supply routes to and from the north and east and between the islands surrounding it. The principal routes as shown on the map, may be described as follows:

Manila to south past Zamboanga on the southwest tip of Mindanao to a point east of Jolo. From there branches lead south-southeast to Menado; southeast by way of southern tip of Halmahera Island to Sorong; by way of Halmahera and around northern tip of Halmahera Island thence branching east-southeast to Manokwari, southeast past east side of Waigeo Island to Sorong, and south to Ambon; and directly past the northern tip of Halmahera Island to Manokwari, Sorong, and Amboina.

Cebu south to Zamboanga, branching there to the east and around to the southern tip of Mindanao Island to Davao, and south-southwest to Balikpapan.

Davao to the south, branching at the south tip of Mindanao Island west-southwest to Tarakan and south to a point east of Manado where this route in turn branches south to Amboina and south-southwest to Kendari.

From Palau, west-southwest to Balikpapan.

From central Carolines west-southwest to Balikpapan, joining the Palau to Balikpapan route north of Celebes Island.

From Tawitawi south to Makassar.

From Tarakan south to Makassar, joining the Tawitawi to Makassar route just northeast of Cape Mangkaliat, Borneo.

From Kaoe, Halmahera Island, south-southwest to Kendari.

From Kaoe, south to Amboina.

From Wasile, Halmahera Island, east-southeast to Manokwari.

From Sorong southwest to Amboina.

(2) Air routes.

The air ferry route from Japan leads southwest by way of Formosa and the northern Philippines to Del Monte and Davao on Mindanao Island, thence to Manado on Celebes Island and from there to delivery points in the Netherlands Indies.

123. Naval Facilities

Within the Celebes Sea Area there are no naval bases or stations properly so-called. Kaoe and Davao are headquarters of Japanese base forces. For facilities at these locations and for a description of anchorages throughout the area reference should be made to Chapter VI, Port Facilities. Discussion under this topic, therefore, is restricted to potential facilities.

In Sectors B, Sangihe-Talaud; E, Northeast Borneo; and F, Northern Celebes, there are no recommended harbors or locations for the development of naval bases. Most of the harbors in these 3 sectors are exposed to strong winds during certain seasons of the year, which would render them unsatisfactory for all year naval operations.

FIGURE XII - 2. *Kaoe Bay.*
Ports on Kaoe Bay.

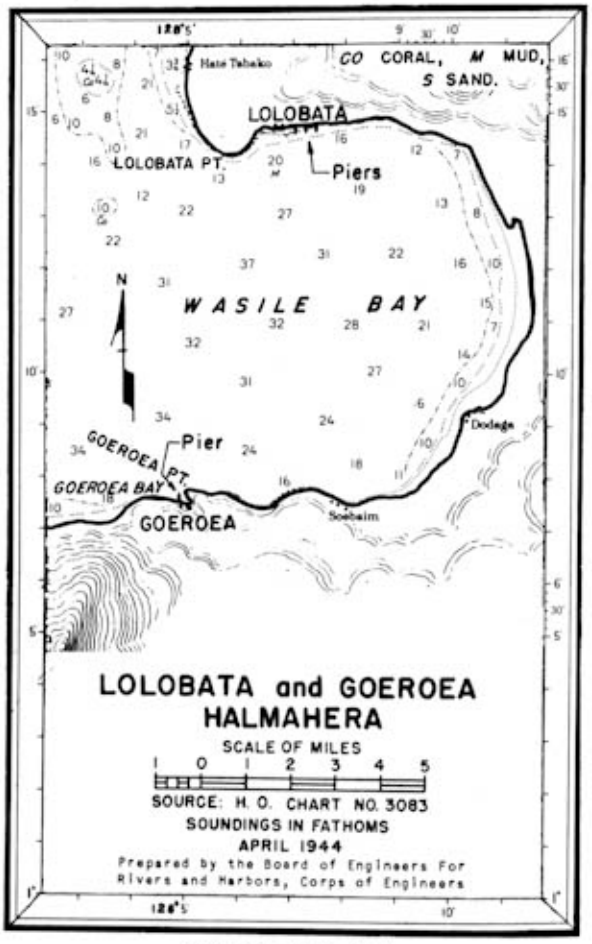

FIGURE XII - 3. *Wasile Bay.*
Lolobata and Goeroea Ports.

A. Halmahera sector.

(1) Wasile-Kaoe Bay.

Although relatively undeveloped, this bay presents one of the world's finest natural locations for a major naval base. There is sheltered anchorage there suitable for an extremely large fleet (FIGURE XII - 2 to XII - 5). This anchorage is virtually land-locked, and is surrounded by very high mountains on all sides. There are numerous locations along the coast, notably on the Wasile side of the bay, where docking facilities may be installed without great difficulty. The entrance to the bay appears to be adaptable to the installation of nets and booms for the protection of vessels anchored within.

The Japanese have already established airfields in the vicinity and development of additional airfields along the coast of the bay is possible. (Topic 124, A, (4))

There is ample flat land available for the construction of shore establishments on reasonably well drained and easily cleared terrain. The area along the east coast of Wasile Bay is particularly adaptable to this purpose. The high, mountainous terrain which surrounds it offers considerable protection from low-level bombing and overland attack by ground forces.

The southwest portion of Kaoe Bay, although too deep for anchorage, could be very useful as a practice area for gunnery exercises, submarine trials, and similar operations, well sheltered from enemy submarines and surface craft.

C. Mindanao sector.

(1) Dumanquilas Bay.

The northern portion of Dumanquilas Bay, particularly Igat Bay, offers the best large anchorage on the south coast of Mindanao Island (FIGURE XII - 6). This very large, land-locked anchorage offers suitable space for a major fleet. There are a number of locations where docks may be installed along the shore of this bay. There is also suitable terrain adjoining it for development of airfields and shore establishments. The shore area is almost entirely undeveloped; that fact may be unfavorable to its use as a naval base.

The extremely rugged, mountainous terrain surrounding the anchorage offers protection from low level air attack and ground attack. Nets and booms could be installed to protect the entrance to the bay from enemy surface vessels and submarines.

(2) Polloc Harbor.

This harbor provides a reasonably large and sheltered anchorage for a large task force (FIGURE XII - 6). Docking facilities may be installed at several points along the shore. Space is available for the development of airfields and shore establishments, but considerable clearing and road building would be necessary. The deep water is probably not suitable for mining, but nets and other defenses could be installed.

(3) Davao Gulf.

Sometimes mentioned as a potential naval base, Davao Gulf is inferior to Dumanquilas Bay, because of the limited and unprotected nature of the anchorage (FIGURE XII - 8). Great depths in the middle waters of the gulf would compel vessels to seek anchorage near the shores. A fleet based here would be extremely vulnerable to enemy attack.

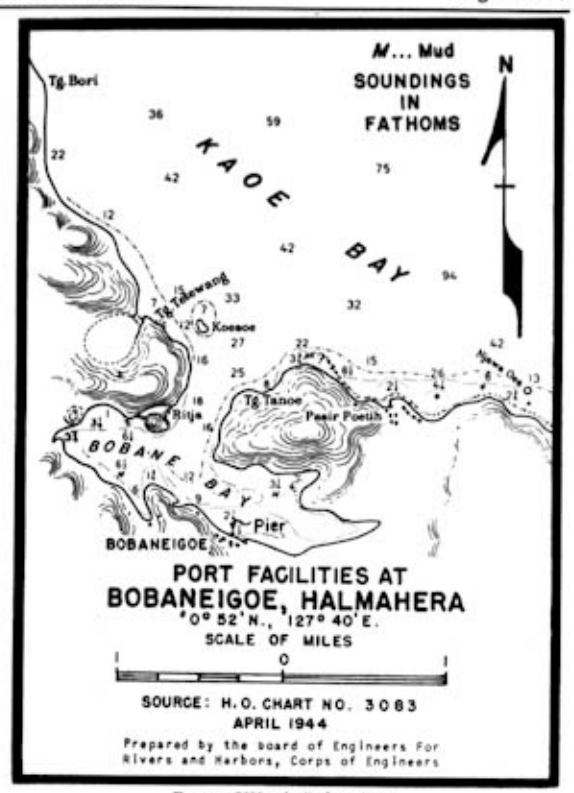

FIGURE XII - 4. *Bobaneigoe.*
Port facilities.

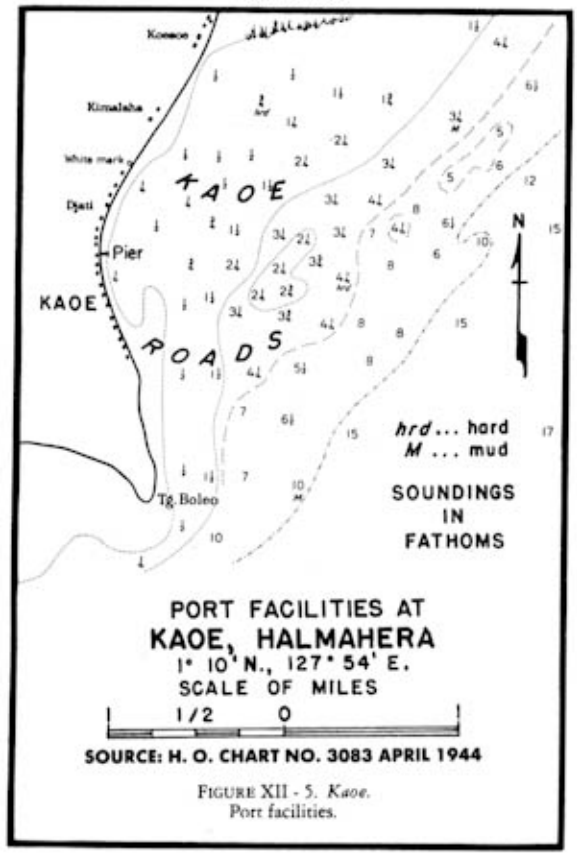

FIGURE XII - 5. *Kaoe.*
Port facilities.

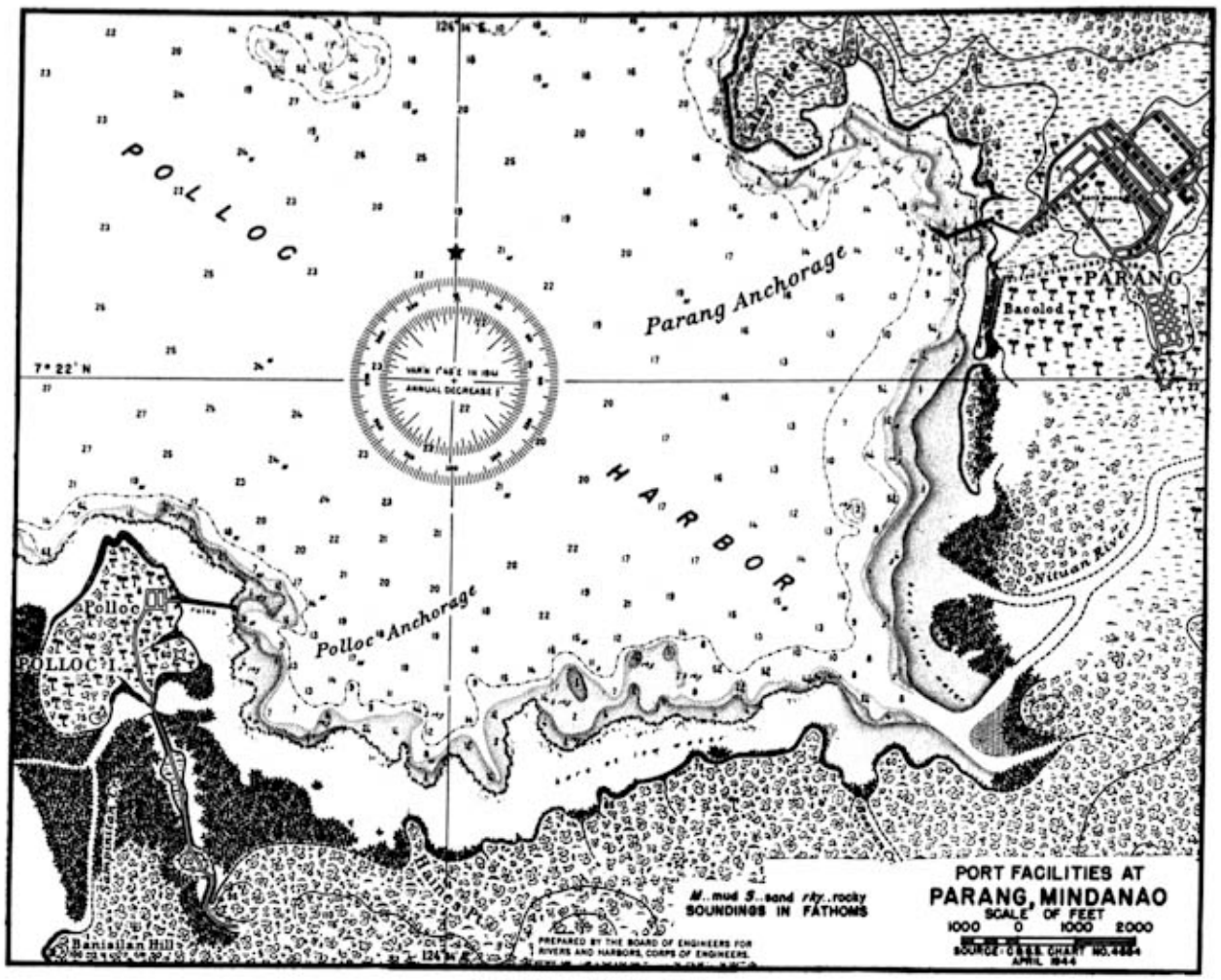

FIGURE XII - 6. *Polloc Harbor.*
Port facilities at Parang.

The advantage of Davao as a major naval base lies in the fact that the area has already been well developed and is suitable for extensive further development. (FIGURE XII - 9) A number of airfields have been established in the area, and there are possibilities for the construction of more (Topic 124, C, (4)).

D. Sulu Archipelago sector.

(1) West Tawitawi Bay.

This bay, situated on southern Tawitawi Island, offers a sheltered anchorage in suitable depth for a large fleet. Along the south shores of Tawitawi and Sangasanga Islands are a number of locations where docking facilities may be installed without great difficulty. Although this area has never been developed, there is sufficient level ground ashore for the construction of airfields and buildings on parts of southwest Tawitawi Island, over the entire area of Sanga Sanga Island and on other islands south and west of Tawitawi Bay (Topic 124, D, (4)).

Because of the swift tidal currents and hydrographic irregularities, underwater defense measures would be difficult but it is believed that nets could be installed.

(2) Tutu Bay.

Located on the south coast of Jolo Island, this bay offers one of the best locations for a major naval base in the southern Philippine Islands. The bay is well sheltered and the space and anchorage depths are suitable for a large fleet. Several locations along the shore are available for construction of docking facilities. Airfields and shore installations could be constructed without great difficulty on the well-drained, cultivated land bordering the bay. Mining in this area would be difficult due to swift tidal currents and great depths, but other defenses such as nets and booms would be possible.

The fact that this area is already highly developed and well populated improves its general possibilities as a major naval base.

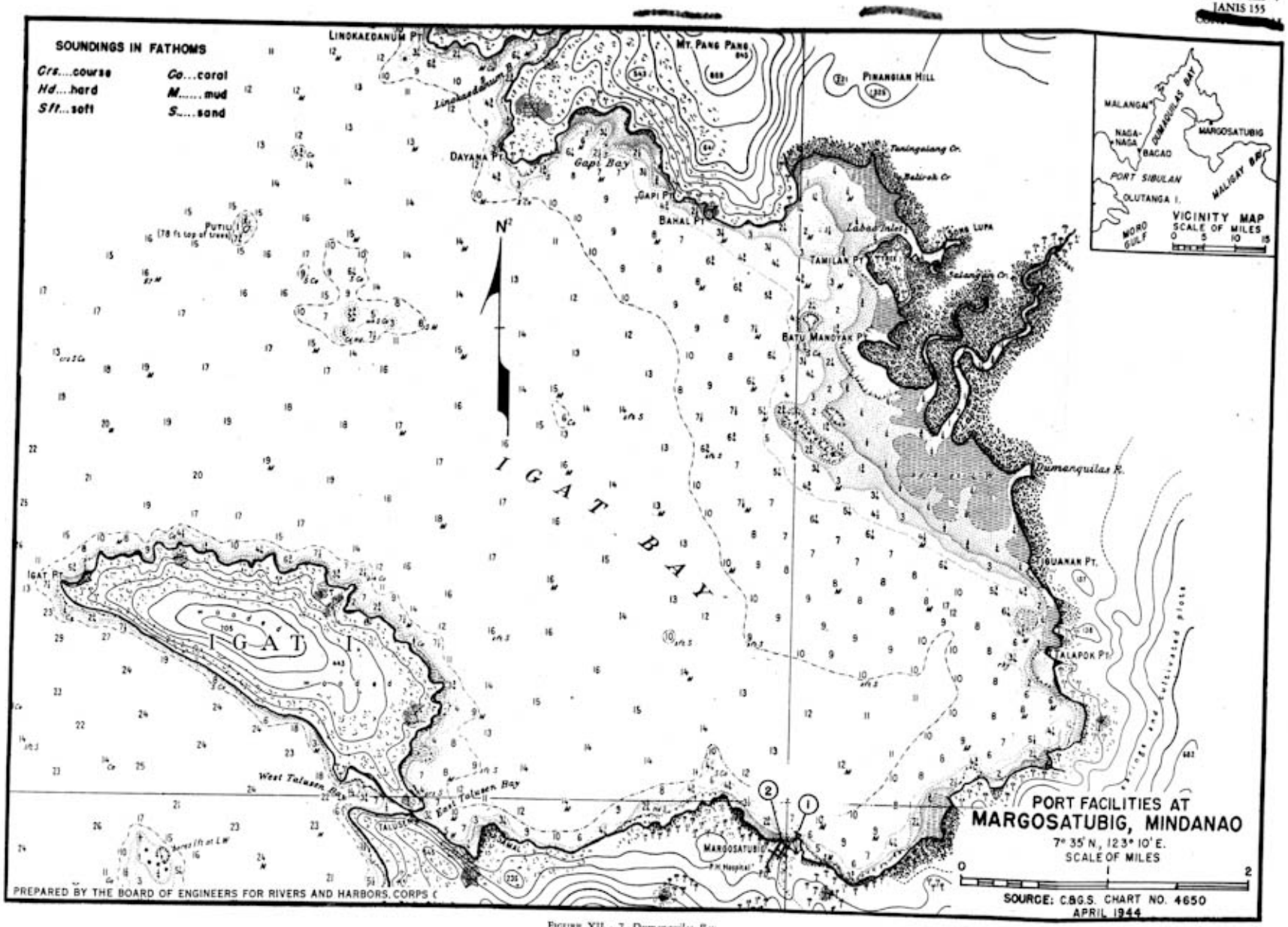

FIGURE XII - 7. *Dumanquilas Bay.*
Igat Bay.

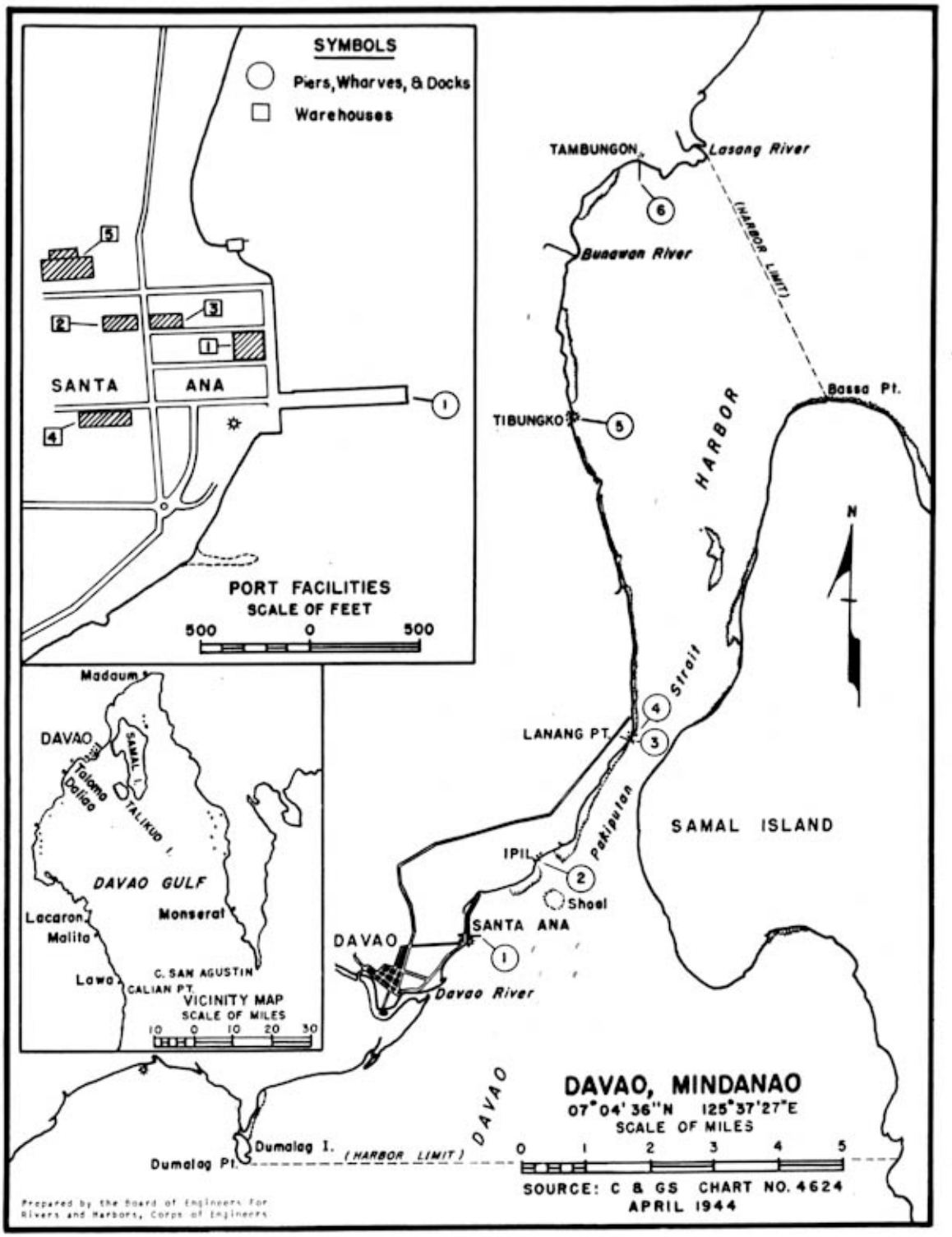

FIGURE XII - 8. *Davao Gulf.*
Davao Harbor and port facilities at Davao.

FIGURE XII - 9. *Mindanao. Davao and Santa Ana.*
1. Theatre. 2. Davao Lumber Company. 3. Fiber Company. 4. Luzon Stevedoring Company. 5. Lighthouse. 6. Japanese customs office. 7. Philippine customhouse. 8. Chinese store. 9. Hanson, Orth, and Stevenson Company. 10. Columbia Rope Company.

*124. Air Facilities (by sectors)**

A. Halmahera sector.

(1) Seaplane stations.

No seaplane stations are reported in the Halmahera group.

(2) Seaplane alighting areas.

(a) Ternate (0° 46′ N, 127° 23′ E). This area is located just east of Ternate, which lies off the west central coast of Halmahera Island, in Gamme Lamo Channel. It is 4½ miles east-southeast of Ternate Mountain, an active volcano rising abruptly out of the sea to an elevation of 5,646 feet, and 2¼ miles north-northwest of the north end of Tidore Island. (FIGURE XII - 10 and XII - 11)

The alighting area affords unlimited runs north to south and northeast to southwest. Fair shelter is available in the open roadstead of Ternate, where swells are prevalent from December to April. During the northwest monsoon from November to March, winds prevail west and northwest to northeast. During

FIGURE XII - 10. *Ternate.*
Part of roadstead. 17 October 1943.

*NOTE: The nature of the Celebes Sea Area is such that seaplanes may be operated from almost any part of the ocean surrounding the various islands. Consequently no attempt is made to discuss emergency seaplane alighting areas under this topic heading. However, areas possibly used for this purpose are listed in TABLE XII - 2.

the southeast monsoon from April to October, the prevailing wind direction is southeast to south-southwest. Currents in the roadstead are occasionally strong, setting north at high tide and south at low tide. Anchorage is available in a depth of 13 feet over a sandy bottom. Four mooring buoys are reported in the area.

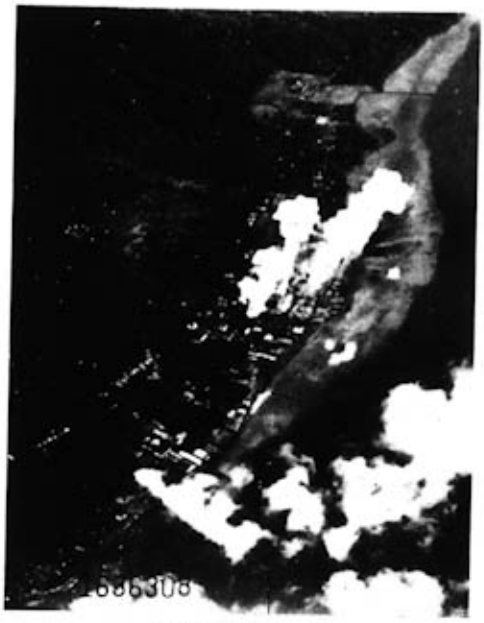

FIGURE XII - 11. *Ternate.*
Waterfront. 17 October 1943.

There is one slipway where seaplanes may be beached. A motor launch jetty and a boat pier are located at Ternate. The facilities at the harbor include water and food supplies, electric power, shops for minor repairs, and barracks. It is estimated that facilities are available for 20 seaplanes.

(3) Airfields and landing grounds.

(a) Galela medium bomber airfield (under construction) (1° 52′ N, 127° 49′ E). This airfield, reported as still under construction, is situated on Galela Plain 3¾ miles northwest of Galela on the northernmost peninsula of Halmahera Island (FIGURE XII - 12). It is ¾ mile southeast of the Tiabo River, 1½ miles north-northwest of Little Tarakana Mountain, 1¾ miles north of Ngidiho Lake, and 2¼ miles north-northeast of the north tip of Galela Lake.

There are 2 northeast to southwest runways approximately 560 feet apart (FIGURE XII - 13). The Number 1 or easternmost runway is 4,500 by 250 feet. The Number 2 runway is 4,700 by 290 feet. A system of dispersal lanes totalling 22,000 feet leads off the northwest side of the runways. Fifty-eight dispersal points, all of bomber dimension, have been identified. Five thousand five hundred feet of dispersal lane adjoining Number 2 runway will probably carry a further 18 dispersal points when completed. The capacity of the field is estimated to be 158 bombers and 100 fighters.

There is no information on fuel storage, servicing facilities, or equipment for night operation. There are 6 large barracks-type buildings 3,000 feet southeast of runway Number 1, and 3 others of the same type about 200 feet to the northwest. With the exception that one of the runways is still under construction there is no information as to the condition, surfacing, or drainage of the field. Little Tarakana Mountain, elevation 917 feet, lying to the east of the field, constitutes the only hazard. It is reported that both runways are extensible to 9,000 feet.

(b) Lolobata medium bomber airfield (1° 17′ N, 128° 06′ E). This airfield is located on the northwest coast of Lolobata Cape, on the west side of the northeast peninsula of Halmahera Island (FIGURE XII - 14). It is on the east side of Kaoe Bay, about 1 mile west of Foeao, 1½ miles north of Hatetabako, and 2½ miles north of Lolobata.

The single runway is 4,600 by 500 feet extending in a north-northeast to south-southwest direction. One large dispersal loop, running from end to end of the runway, has been completed and surfaced, and several short dispersal lanes, branching off the loop, have been constructed. Nineteen dispersal points, all of bomber dimensions, have been identified in the area.

No other information regarding facilities or the field is available except that the latter is reported in excellent condition. New motor transport roads have been constructed east and west from the runway. These probably serve substantial dump and bivouac areas.

(c) Miti medium bomber airfield (1° 34′ N, 128° 04′ E). The Miti airfield is located on the northwest side of Miti Island close off the east coast of the north peninsula of Halmahera Island (FIGURE XII - 15). It is 1½ miles east-northeast of and across the strait from Mawea, 2 miles southeast of Rangorango Point on Halmahera Island and 22½ miles southeast of Galela.

The single runway extends north and south with dimensions of 4,600 by 350 feet. A large dispersal area including 35 unprotected bomber dispersal points, lies to the east of the runway. The operational capacity of the field is reported to be 95 bomber and 40 fighter aircraft.

The field is reported all-weather and serviceable. A patch of tall timber on the south end of the island, which is 2½ miles long, constitutes a hazard. It is not possible to extend the present runway since both extremities terminate at the shoreline. A second runway, 7,000 feet long from northwest to southeast could be constructed through the present dispersal area. No further information as to facilities or field condition is available.

(d) Kaoe fighter landing ground (1° 11′ N, 127° 53′ E). This landing ground on the northern peninsula of Halmahera Island is located 1½ miles west of Kaoe, just east of the Kaoe River, 1 mile inland from the north coast of Kaoe Bay (FIGURE XII - 16). It is 1¾ miles west-southwest of Djati 2 (Town No. 2), and 2¾ miles east-northeast of Kapita.

There are 2 runways, the first reported as 4,500 feet in length from north to south. Another report dated October, 1943, indicates that 2,000 feet of this runway have been graded and surfaced, although later it appears to have been abandoned (FIGURE XII - 17). Runway Number 2, lying 4,000 feet northeast of Number 1, has dimensions of 3,600 by 300 feet north to south. A recent intelligence summary estimates the capacity of the field as 50 bombers and 80 fighter aircraft.

It is reported that the field surface tends to become waterlogged and that extensive additional drainage and surfacing is

FIGURE XII - 12. *Galela.*
Medium bomber airfield and surrounding area. 23 March 1944.

necessary. Landings are feasible only on the runways. Number 2 runway has been graded and is probably serviceable except after prolonged rains. Approach gaps have been cleared for a distance of 700 feet at each end of Number 1 runway and for a long distance at each end of Number 2 runway. Extension to 8,000 feet is possible.

A good motor transport road runs east to west between the strips and Kaoe (FIGURES XII - 16 and XII - 17). There are several large, barracks-type buildings near the field. No other information concerning facilities is available.

(*e*) *Laboeha emergency landing ground* (0° 38' S, 127° 29' E). This southernmost air facility in the area is situated on Batjan Island which lies west of the south end of the south peninsula of Halmahera Island. It is approximately 1 mile east-southeast of Labohea, about 1 mile inland from Labohea Bay on the west central coast of Batjan Island, and about 7 miles northwest of a mountain area which rises to 3,000 feet elevation.

The length of the runway is unknown but it extends in an approximate northeast to southwest direction. The site is fairly open and may offer possibilities for considerable extension. It also may offer possibilities for wide dispersal. If work on a dispersal system has commenced it is in a relatively early stage of development. The runway appears to be almost completely graded and may therefore already be serviceable. Approach conditions are good. No other information is available. (FIGURE XII - 18).

(*f*) *Oba fighter landing ground* (0° 45' N, 127° 34' E). Located just east of Sofifi on the west central coast of Halmahera Island, this landing ground is 1½ miles northeast of Obadoedoe, 1 mile north-northwest of the Sofifi River, 1 mile east-northeast of Njaolao, 2 miles southwest of Goerocaping, on the south side of Dodinga Bay (FIGURE XII - 19). Another unconfirmed site, also called Oba, is reported near the coast 1 mile to the south-southwest.

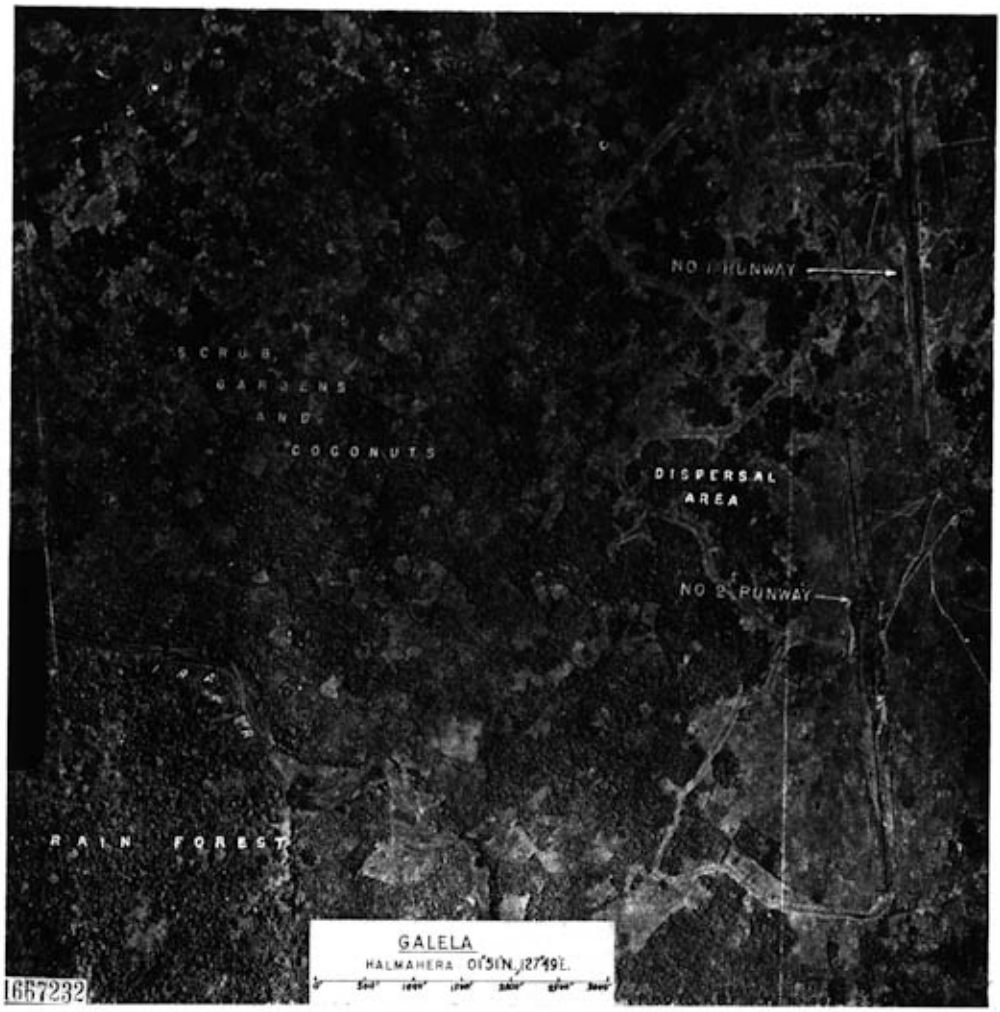

FIGURE XII - 13. *Galela.*
Medium bomber airfield showing runways. 23 March 1944.

The runway is 3,400 feet long, northeast to southwest, with no flight gaps. It is reported readily extensible to 5,200 feet and possibly 6,000 feet without great difficulty. Further extension is limited by the sea at one end and by a river at the other. Dispersal is possible along the edge of the runway and there is ample space for construction of dispersal lanes. The estimated capacity of the field is 10 bomber and 15 fighter aircraft.

The field has been graded at one time but is now covered with grass and apparently not in use. There appear to be no great difficulties with regard to drainage. There is no information as to facilities.

(g) *Pitoe (Doroeba) medium bomber landing ground* (2° 03'N, 128° 18'E). Reported still under construction, the Pitoe landing ground is situated just east of Doroeba on the southernmost tip of Morotai Island which lies 10 miles east of the north end of the north peninsula of Halmahera Island (FIGURE XII - 20). It is about 2 miles north of Pitoe on the southwest coast of Morotai Island, 4 miles south-southeast of Dowongikokotoe and the Dowongikokotoe to Sabatai road, and 5½ miles north-northeast of Cape Gila.

The unfinished runway has an approximate length of 5,000 feet northeast to southwest. It has been fully cleared but not surfaced. Extension for a substantial distance appears possible, but the limits cannot be estimated on the basis of present photographic intelligence.

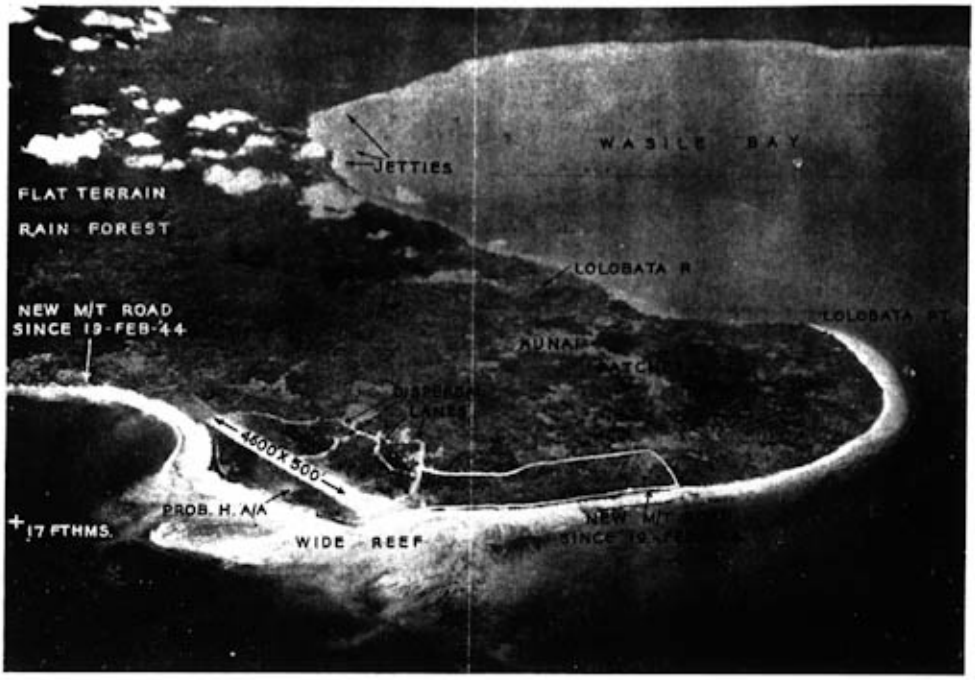

FIGURE XII - 14. *Lolobata.*
Medium bomber airfield and surrounding area. 23 March 1944.

(4) Possible airfield sites (in alphabetical order).

(a) Akelamo (1° 28′ N, 128° 40′ E). This is the site of a small plantation of 62 acres near Akelamo. The ground is flat and dry with sandy soil.

(b) Belangbelang Island (1° 19′ S, 127° 24′ E). There is a possible site, 1 mile long, northwest to southeast, on the northeast side of the island.

(c) Bisa Island (1° 15′ S, 127° 28′ E). A possible strip is reported at the southwest end of Bisa Island which lies 13 miles north of the west end of Obi Major Island.

(d) Boeli-Serani (0° 52′ N, 128° 17′ E). A clearing for a possible strip is reported inland from Boeli-Serani on the north coast of Boeli Bay.

(e) Djailolo North (1° 09′ N, 127° 28′ E). This site, 5 miles north-northeast of Djailolo, was cleared for 1,650 feet by the Dutch in 1941 but was not developed. Extensions are possible in all directions. It is reported that extensive grading would be required at this location.

(f) Djailolo South (1° 07′ N, 127° 28′ E). Located 3¼ miles north-northeast of Djailolo this is another site which was cleared by the Dutch in 1941 to a length of 5,280 feet. However, it was not developed. Extension of the site east and west is possible.

(g) Galela East (1° 48′ N, 127° 53′ E). A possible clearing for a landing strip has been reported 7 miles east-southeast of the Galela medium bomber airfield, 3 miles east-southeast of Galela. This has not been confirmed.

(h) Morotai Island (2° 06′ N, 128° 31′ E). A possible landing strip on the southeast end of this island has been reported but not confirmed.

(i) Sidangoli (0° 54′ N, 127° 31′ E). A possible site with the length of runway limited to approximately 4,000 feet northeast to southwest, is reported near Sidangoli at the northwest end of Dodinga Bay.

(j) Sofifi (0° 44′ N, 127° 33′ E). A clearing for a landing strip 1 mile south of Sofifi is reported but not confirmed.

(k) Tilope (0° 13′ N, 127° 55′ E). This is a possible site on the coastal plain near Tilope village, on the east coast of the south peninsula of Halmahera Island. The land is flat, dry, and sandy near the shore.

(l) Tobelo (1° 39′ N, 128° 00′ E). This possible site is on the coastal plain 5 miles south of Tobelo, 15 miles southeast of Galela on the east coast of Halmahera Island. The ground here is reported flat, firm, and well drained.

(m) Wajaoea (0° 45′ S, 127° 39′ E). A possible site, dimensions not reported, is located about 1 mile northeast of Wajaoea village, on the south side of the isthmus of Batjan Island.

(n) Wasile (1° 04′ N, 127° 59′ E). The coordinates given above are those of the town. The possible site is probably just north of Wasile Town on the northeast coast of Kaoe Bay. A "serviceable strip" has been reported but not confirmed.

FIGURE XII - 15. *Miti Island.*
Medium bomber airfield and dispersal area. 23 March 1944.

B. Sangihe-Talaud sector

(1) Seaplane stations.

None.

(2) Seaplane alighting areas.

None.

(3) Airfields and landing grounds.

None.

(4) Possible airfield sites.

(*a*) *Karakelong Island* (4° 00′ - 4° 35′ N, 126° 33′ - 126° 55′ E approx.). There are a few areas along the coast of this island. No detailed information is available.

(*b*) *Tamako* (3° 28′ N, 125° 30′ E). Some possible airfield sites are reported near Tamako on the southwest coast of Sangihe Island.

C. Mindanao sector.

(1) Seaplane stations.

None.

(2) Seaplane alighting areas.

(*a*) *Malalag Bay* (6° 36′ N, 125° 25′ E). Malalag Bay is in the southwest part of Davao Gulf at the southeast end of Mindanao Island. The east entrance is at Colapsin Point (FIGURE XII - 21). The bay lies 2 miles north of the Baculing Hills, which have an average elevation of 2,900 feet, 19 miles northwest of the town of Malita, 41 miles east of inland Lake Buluan, and 58 miles northwest of Cape Agustin, the eastern entrance to Davao Gulf.

The alighting area is 4 miles long, northwest to southeast, and 1½ miles wide. Bolton reef at the middle of the bay entrance constitutes an obstruction. This reef was marked by a 17-foot concrete beacon.

The open bay is unsuitable during north winds and sometimes even during south winds. Depths range from 6 to 30 feet and there is a tidal range of 4.1 feet. Shelter is available 1 mile east from the town of Malalag (or Bolton) on the southwest shore of the bay just around a bluff, rocky point, where there is a fine sandy beach. Mooring for 4 PBY's is reported. There are several other sandy beaches, suitable for hauling out, on the bay. (FIGURE XII - 22)

No facilities are reported at the bay. Water for drinking, which must be boiled before use, is obtainable in limited quantity from

FIGURE XII - 16. *Kaoe.*
Fighter landing ground and nearby area. 23 March 1944.

FIGURE XII - 17. *Kaoe.*
Fighter landing ground showing surface on runway No. 1. 17 October 1943.

mountain streams. There are probably some personnel accommodations at Malalag.

(*b*) *Zamboanga Harbor* (6° 54′ N, 122° 05′ E). The harbor is situated just south of Zamboanga town on the southwest tip of Mindanao Island. It is just north of Little Santa Cruz Island and Great Santa Cruz Island, 6 miles south of Mount Pulunbato, 6 miles west of Tictavan Island, 6 miles north of Basilan Strait which separates Mindanao from Basilan Island, and 50 miles south-southwest of Sibuguey Bay.

The harbor is subject to southeast wind squalls during the month of June, and to rain and foul weather during July, August, and September, when southwest winds prevail. There is good shelter from northeast monsoons but no protection from southwest monsoons. Currents have little effect on planes anchored close inshore. Depths range from 6 to 30 feet. Good anchorage is available near a wharf with a depth of 28 feet alongside (FIGURE XII - 23). The bottom is hard and uneven. A beach nearby is suitable for hauling out planes.

Minor repairs can be accomplished at Zamboanga. Food and personnel accommodations are also available at the town. The harbor was surveyed with a view to establishing an operating base for seaplanes and was classed as good.

(3) Airfields and landing grounds.

(*a*) *Davao fighter airfield* (7° 07′ N, 125° 39′ E). This airfield is situated 6 miles north of Davao which is on the west side of Davao Gulf at the North entrance to Pakiputan Strait. It is 7 miles south of Bunawan on the west side of the Davao to Bunawan highway. (FIGURE XII - 24).

There are 2 runways on the field which has an elevation of 76 feet. The north to south runway is reported to be 3,346 by 164 feet while the other, extending northeast to southwest is 2,624 by 656 feet. There appears to be ample area for cover and dispersal at the field. One hangar is reported but there is no information as to other facilities.

The north to south runway is paved while the other is sodded. It is classed as an all-weather field on sandy loam soil, although reported soft on the shoulders during the rainy season and the quality of the drainage is doubtful. The north to south runway has a 2½% hump in the center. Trees growing 50 feet tall around the field constitute a hazard. It is believed the field could be extended.

(*b*) *Davao-Cabaguio fighter airfield* (7° 06′ N, 125° 37′ E). This field is located 3 miles north-northeast of Davao on the south side of the Davao to Bunawan highway, 1 mile north of Santa Ana, and 1 mile inland from the harbor entrance to Pakiputan Strait in Davao Gulf.

There is 1 north to south runway 2,650 by 360 feet. It is reported to have a paved surface 2,640 by 66 feet. Aerial photographs indicate ample cover for dispersal nearby. One hangar is reported but there is no information as to other facilities.

The runway, laid on decomposed coral rock, is believed to be in good condition. A telephone line and trees constitute hazards. Aerial photographs indicate that extension of the field is possible.

(*c*) *Alah River emergency landing ground* (6° 16′ N, 124° 44′ E approx.). There is little information concerning this landing ground which is located just south of Sapali barrio on the east bank of the Alah River, 27 miles south of Buluan at the northwest edge of Lake Buluan, and 73 miles southeast of Cotabato. It lies at an elevation of approximately 1,200 feet.

The dimensions of the field are approximately 1,250 by 125

FIGURE XII - 18. *Batjan Island.*
Part of Batjan Island with Laboeha emergency landing ground in distance. 23 March 1944.

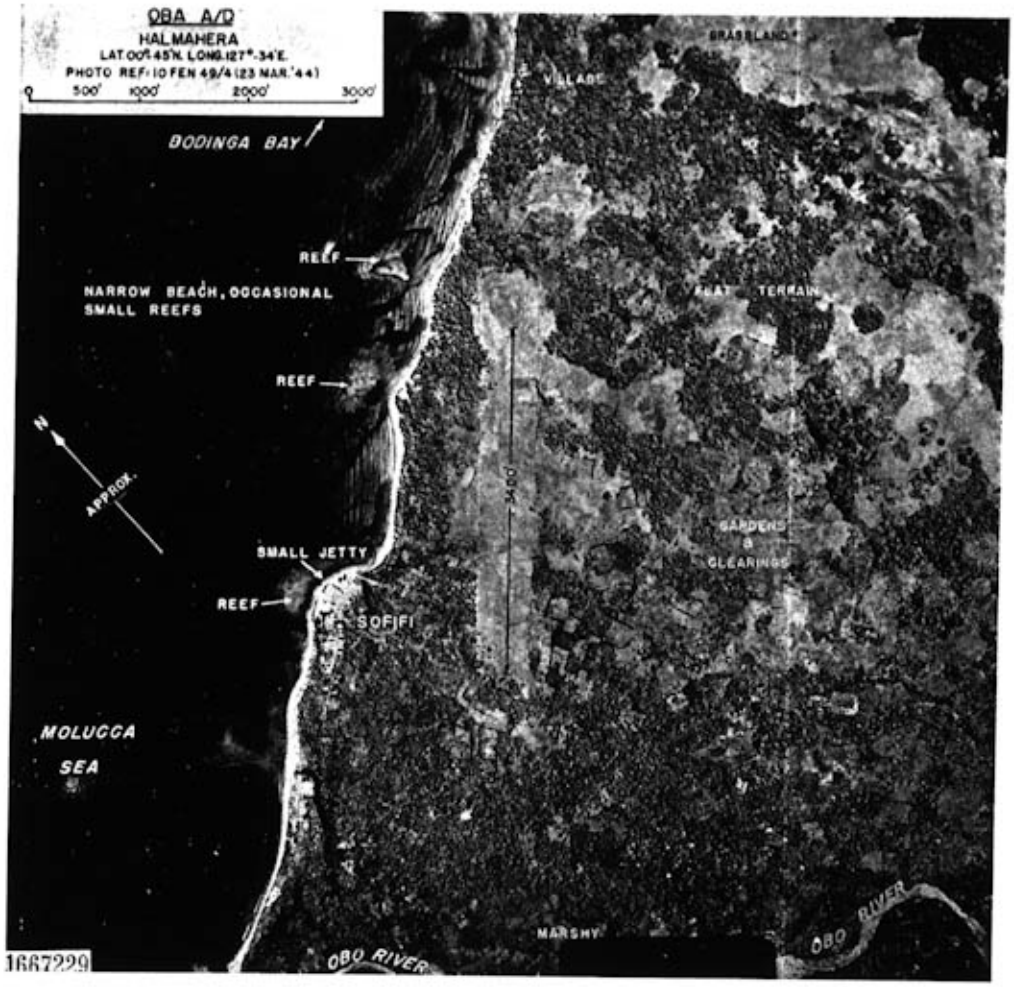

FIGURE XII - 19. *Oba.*
Fighter landing ground. 23 March 1944.

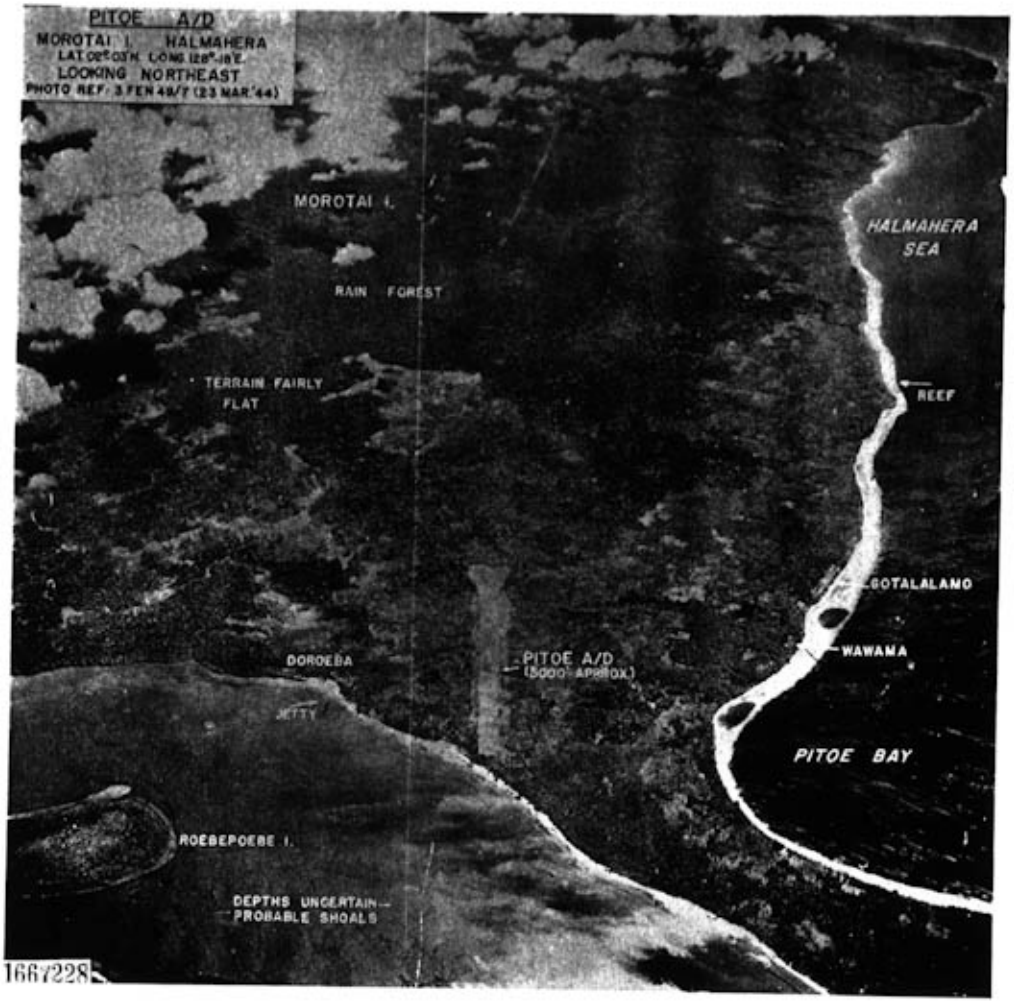

FIGURE XII - 20. *Pitoe.*
Medium bomber landing ground and surrounding area. 23 March 1944.

FIGURE XII - 21. *Malalag.*
Entrance to Malalag Bay at Colapsin Point. 1935.

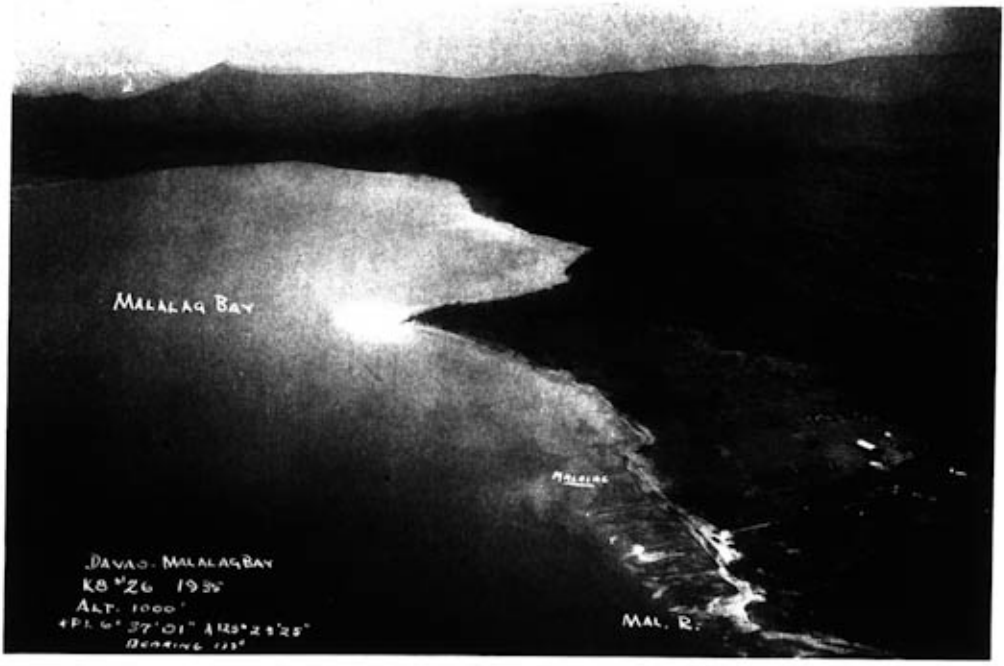

FIGURE XII - 22. *Malalag.*
Malalag town and Bay. 1935.

FIGURE XII - 23. *Zamboanga.*
Concrete wharf and environs. 1939.

FIGURE XII - 24. *Mindanao.*
Old view of airfield near Davao. 1938.

feet, extensible, with good cover for dispersal nearby. No other information is available.

(*d*) *Barobo fighter landing ground* (8° 32′ N, 126° 05′ E). This field is located on the east coast of Surigao Province, 4 miles west of Barobo barrio, 7½ miles south of Lianga, near the southwest shore of Lianga Bay. The elevation is approximately 65 feet.

The single east to west runway is 3,328 by 197 feet and has what appears to be ample room for dispersal nearby. The field is reported to be soft after rains but has good drainage.

A road leads from Barobo to Tambis where personnel accommodations are available at the Tambis Mining Company. No other information is available.

(*e*) *Bassa Point emergency landing ground* (7° 10′ N, 125° 44° E approx.). Located near Bassa Point on the north tip of Samal Island in Davao Gulf, 6 miles northeast of Davao Airfield, and 11 miles northeast of Davao and the Davao River mouth, this field has reported dimensions of 2,000 by 500 feet. No other information concerning it is available. (FIGURE XII - 25)

(*f*) *Bual emergency landing ground* (6° 04′ N, 125° 08′ E approx.). This field is located 2½ miles south of the Makar River mouth near the west shore of Sarangani Bay, 25 miles southeast of Cotabato, and 78 miles southwest of Davao. The elevation is approximately 50 feet. Dimensions are estimated from an oblique photograph to be 750 by 50 feet. There is some cover for dispersal of aircraft nearby. Nothing more is known about the field.

(*g*) *Buenavista* (*San Jose de Buenavista*) *medium bomber landing ground* (8° 56′ N, 125° 23′ E). Buenavista field is situated at Risal barrio, 2½ miles south of Buenavista on Butuan Bay, 10 miles west of Butuan, and 59 miles northeast of Del Monte field No. 1. The elevation is approximately 50 feet.

The field extends in a north-northeast to south-southwest direction 5,249 by 328 feet. The soil is clay with a central gravelled strip 2 inches thick and 75 feet wide. Drainage is reported poor and the field is soft in wet weather. Some natural cover nearby may facilitate dispersal. No other information is available.

(*h*) *Buluan heavy bomber landing ground* (6° 42′ N, 124° 47′ E). This, one of the largest inland fields, is situated at the east edge of the town of Buluan, just northwest of Lake Buluan, 53 miles southeast of the Mindanao River mouth on Illana Bay. It lies at an elevation of 165 feet.

Reported as an all-weather field with a surface of sodded, sandy loam, it extends 5,249 by 328 feet in an east to west direction. Extensive cover is available for dispersal. Camouflage nets and pens were constructed there early in 1942. A Philippine Constabulary barracks is located nearby. No other information on the present status of the field is available.

(*i*) *Butuan emergency landing ground* (8° 57′ N, 125° 31′ E). Located east of Buenavista landing ground this field is on the west edge of the town of Butuan in Agusan Province, near the west bank of the Agusan River, 5 miles from its en-

FIGURE XII - 25. *Bassa Point;* 1935.

trance to Butuan Bay, and 61 miles northeast of Del Monte Field No. 1. The elevation is estimated to be 50 feet.

With a surface of sodded clay loam the field extends 1,950 feet in a north to south direction. It is 195 feet wide, and possible extensible. There is ample cover for dispersal nearby. Access to the field is by road and river. There are telephone and telegraph facilities in the town. No other information is available.

(*j*) *Butuan-Bancase fighter landing ground* (8° 57′ N, 125° 28′ E). This field is situated 3 miles south of Butuan Bay at the barrio of Bancase, 4 miles west of Butuan. It adjoins the Butuan-Nasipit Road 5 miles southwest of the Agusan River mouth. The elevation is 60 feet.

The northwest to southeast runway, reported paved, is 2,427 by 98 feet. Access is by road and water transportation. A Philippine military reservation with barracks is adjacent.

(*k*) *Cagayan medium bomber landing ground* (8° 29′ N, 124° 38′ E). This field is located 2 miles west of Cagayan on the Cagayan-El Salvador highway, 2½ miles south of Macajalar Bay on the north coast of Mindanao Island. It is 15 miles northwest of Del Monte field No. 1. The elevation is 50 feet.

There are 2 runways, the first 4,265 by 328 feet, extending northwest to southeast. The second, running north to south, is 3,609 by 328 feet. There is a taxiway to abundant cover for dispersal nearby. It is considered an all-weather field for fighter aircraft.

There are 2 large barracks and 4 smaller buildings at the field. A road gives access to the dock at Cagayan. No other information is available.

(*l*) *Cotabato fighter landing ground* (7° 12′ N, 124° 14′ E). Reported enlarged and in active use this landing ground is located at the barrio of Kakar, 2 miles south of Cotobato, 5 miles south-southeast of the Mindanao River mouth on Illana Bay. It is 15 miles west of Lake Labas and 16 miles southeast of Bongo Island in Illana Bay. The elevation is 200 feet.

The reported dimensions are 2,625 by 164 feet in a northwest to southeast direction. The ground is sodded, hard, and slightly rolling. The field is reported all-weather but is probably soft during the rainy season. There is ample cover for dispersal nearby.

Two large barracks and other smaller buildings are near the field. There is no information on other facilities.

(*m*) *Dadiañgas emergency landing ground* (6° 08′ N, 125° 10′ E). This field is located at Dadiañgas barrio between the mouths of the Siluay and Makar Rivers. It is 1 mile north of Sarangani Bay near the south end of Mindanao Island, and 72 miles south-southwest of Davao. The elevation is 10 feet.

The dimensions are reported as 1,969 by 164 feet northwest to southeast. However, in 1941 two new runways, each 3,281 by 328 feet, were under construction. The field is reported all-weather, level and sandy. No other information is available.

(*n*) *Davao-Ipil emergency landing ground* (7° 06′ N, 125° 38′ E). Situated almost at sea level this landing ground is 3 miles northeast of Davao on the west shore of Davao Gulf at the south entrance to Pakiputan Strait. It is 3 miles northeast of the mouth of the Davao River.

The north to south runway is reported to be 1,626 feet by 189 feet with a grass surface. There is ample cover nearby. No other information is available.

(*o*) *Del Monte No. 1 heavy bomber landing ground* (8° 21′ N, 124° 49′ E). One of 8 fields in the highly developed Del Monte area, Number 1 is located 15 miles southeast of Cagayan on the west bank and near the headwaters of the second south tributary to the Tagoloan River. Its elevation is estimated to be 1,500 feet.

Described as a sodded, all-weather field, suitable for all types

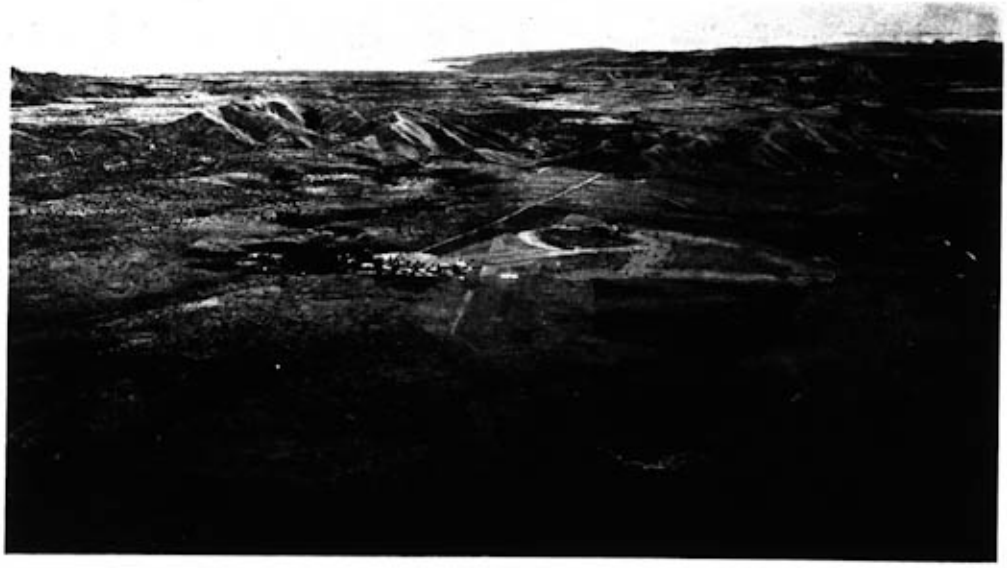

FIGURE XII - 26. *Del Monte.*
Old view of area around Del Monte on Bukidnon Plateau. 1938.

of aircraft, its dimensions are 7,000 by 600 feet northeast to southwest. There is ample room for dispersal but little cover is available.

(*p*) *Del Monte No. 2 fighter landing ground* (8° 20′ N, 124° 47′ E). This field is located at the Del Monte Club, 2 miles west of Tankulan, 2 miles southwest of Del Monte No. 1, and 14 miles southeast of Cagayan on Macajalar Bay. The elevation is 1,200 feet.

Two runways are reported. The longest, north to south, is 3,300 by 300 feet. The east to west runway is 2,200 by 300 feet. There is ample room for dispersal but the cover is limited. The field is on sodded, hard ground and is reported serviceable in all weather.

(*q*) *Del Monte No. 3 heavy bomber landing ground* (8° 20′ N, 124° 54′ E approx.). This field is located ½ mile west of Dalirig barrio, 8 miles east of Del Monte No. 1, and 20 miles southwest of Cagayan. The elevation is estimated to be 1,500 feet.

Laid out in a north to south direction the field is 6,000 by 200 feet. It is described as sodded and serviceable in all weather for all types of aircraft. It has a slope to southward. Good cover is available for dispersal of small aircraft. A good road provides access to the field.

(*r*) *Del Monte No. 4 heavy bomber landing ground* (8° 16′ N, 124° 59′ E approx.). Situated near Impasugong barrio, 15 miles southeast of Del Monte No. 1, and 27 miles southeast of Cagayan, this field lies at an estimated elevation of 1,800 feet.

The north to south runway is 6,200 by 300 feet. It has a sodded surface and is suitable in all weather for all types of aircraft. There is limited cover for dispersal. No information on facilities is available.

(*s*) *Del Monte No. 5 (Palais) medium bomber landing ground* (8° 21′ N, 124° 49′ E approx.). Located on the west bank and near the headwaters of the second south tributary to the Tagoloan River, this field is 1 mile south of Del Monte No. 1, and 15 miles southeast of Cagayan. The elevation is estimated at 1,500 feet.

There are 2 runways, each east to west and each 5,000 by 300 feet, adjacent. Good cover for dispersal is available. There is no other information.

(*t*) *Del Monte No. 6 (Tigiptip) medium bomber landing ground* (8° 21′ N, 124° 47′ E approx.). This field is located near the Del Monte Club, 2½ miles southwest of Del Monte No. 1, and 13 miles southeast of Cagayan. The estimated elevation is 1,500 feet.

FIGURE XII - 27. *Bukindon.*
Looking southward over Bukindon Plateau showing nature of the area. No date.

The runway extends in a north to south direction and is 5,000 by 300 feet. It is reported to have a turf surface and is suitable in all weather. Good cover is available for dispersal. There is no other information.

(*u*) *Del Monte No. 7 heavy bomber landing ground* (8° 21′ N, 124° 49′ E approx.). This field is located 1 mile south of Del Monte No. 1, on the west bank near the headwaters of the second south tributary of the Tagoloan River, and 15 miles southeast of Cagayan. It lies at an estimated elevation of 1,500 feet.

The northeast to southwest runway is 6,200 by 300 feet. The surface is of turf and the field is reported suitable in all weather for all types of aircraft. There is ample area but limited cover for dispersal. At least one bombproof hangar in a mountain at the south end of the field is reported. No other information is available.

(*v*) *Del Monte No. 8 fighter landing ground* (8° 21′ N, 124° 54′ E approx.). Located 1 mile northeast of Dalirig this landing ground is near the Agusan to Impasugong Road. It is on the southwest side of Tagoloan River tributary, 8 miles east of Del Monte No. 1, and 20 miles southeast of Cagayan. It lies at an elevation of 1,500 feet.

The north to south runway is 4,000 by 300 feet. The field is on a plateau covered with grassy sod and drainage is presumably good. It is reported suitable in all weather. There is good cover for fighter aircraft dispersal nearby. Road and telephone communication is available but there is no information as to other facilities.

(*w*) *Dipolog heavy bomber landing ground* (8° 36′ N, 123° 21′ E). This field is situated 1 mile north of Dipolog on the north coast of Mindanao Island. It is 9 miles south-southwest of Tagolo Point, and 33 miles west-northwest of Oroquieta on Iligan Bay. The elevation is reported as 6 feet.

The runway extends northeast to southwest and its dimensions are 6,562 by 197 feet. The soil is sodded and sandy with good drainage. The field is considered suitable for all types of aircraft in all weather. There are dispersal facilities ample for 9 heavy bombers and 25 fighters in a nearby coconut grove.

There is a paved road connecting the field with Port Puluan 6 miles to the north, where ships up to 29-foot draft can be accommodated. There is no other information on facilities at the field.

(*x*) *Gingoog fighter landing ground* (8° 49′ N, 125° 06′ E). Situated 3½ miles south of Gingoog which is on Gingoog Bay on the north coast of Mindanao Island, this landing ground is 36 miles northeast of Del Monte No. 1 airfield. It lies at an elevation of 805 feet.

The 3,400 by 150-foot runway extends northeast to southwest. It is laid out on sodded ground reported soft after rains. There are dispersal facilities for 25 fighter aircraft.

A railroad connects the field with the lumber port of Anakan. There is no other information concerning facilities.

(*y*) *Iligan fighter landing ground* (8° 15′ N, 124° 15′ E). There appears to be some doubt as to the exact location of this landing ground. It is described as being 1,000 feet north of the Mandulog River mouth on Iligan Bay, 1 mile north of Iligan, and 38 miles west-southwest of Del Monte No. 1 airfield. It has also been reported 8 miles south of Iligan.

Dimensions of the field are 4,000 by 300 feet. It has a grass surface, soft in wet weather. There is ample cover for dispersal nearby. No other information is available.

(*z*) *Kabacan emergency landing ground* (7° 09′ N, 124° 49′ E approx.). This clearing is located 1½ miles south of the junction of the Pulangi and Kabacan Rivers, 30 miles north of Lake Buluan, and 40 miles east of Cotabato. This elevation is estimated at 650 feet. Dimensions are approximately 750 by 150 feet with ample cover nearby. The field is believed to be wet and dangerous. No other information is available.

(*aa*) *Kibawe emergency landing ground* (7° 30′ N, 124° 59′ E). Located in the central part of Mindanao Island, this landing ground is at Kibawe, 51 miles southeast of Lake Lanao, 52 miles northwest of Davao, and 60 miles south-southeast of Del Monte No. 1 airfield. The elevation is 930 feet.

There is a north to south runway 2,624 by 246 feet. The surface is sodded clay loam, serviceable in all weather. Ample cover for dispersal is available. There are no facilities at the field.

(*bb*) *Labo medium bomber landing ground* (8° 11′ N, 123° 49′ E approx.). This field is located near Labo barrio, 4 miles northwest of Misamis at the southwest end of Iligan Bay, and 72 miles west of Del Monte No. 1 airfield. The estimated elevation is 1,000 feet.

The field has dimensions of 4,642 by 328 feet, direction of runway unreported. The surface is grass sod on sandy loam, suitable in all weather for all types of aircraft. There is cover nearby suitable for dispersal of at least 100 fighter aircraft. A paved road gives access to Port Misamis, 4⅓ miles to the southeast. No other information is available.

(*cc*) *Maguire (Dansalan-Maguire) fighter landing ground* (8° 01′ N, 124° 17′ E). This field is located at Camp Keithley ½ mile northwest of Lake Lanao, 2 miles west of Dansalan, and 14 miles south-southeast of Camp Overton at the south end of Iligan Bay. The elevation at this point is 2,455 feet.

Two runways are reported. The first, north to south, is 2,297 by 180 feet; the second extends northwest to southeast 2,297 by 164 feet. The field is sodded and drainage is good. It is reported serviceable in all weather. It is slightly rolling with a 2.2% down grade to the south.

Military barracks and other buildings are available at Camp Keithley nearby. No other information on facilities is available.

(*dd*) *Makar emergency landing ground* (6° 06′ N, 125° 09′ E). This landing ground is situated on the west shore and near the north end of Sarangani Bay, near the mouth of the Makar River and Makar barrio, 79 miles southwest of Davao. The elevation is approximately 20 feet.

The dimensions of the field are reported as 1,950 by 651 feet with a surface of smooth, sandy turf. There is limited cover nearby. No other information is available.

(*ee*) *Malabang heavy bomber landing ground* (7° 38′ N, 124° 04′ E). Located 3 miles north of Malabang on the north shore of Illana Bay in the southern part of Mindanao Island, this field is 16 miles southwest of Lake Lanao and 19 miles north of Bongo Island in Illana Bay. The elevation is 112 feet.

There are 2 runways, the longest extending east to west 7,500 by 300 feet. The north to south runway is 4,500 by 300 feet. Reports differ as to the surface, one describing it as smooth sand, others as grass on a coral base. It is believed serviceable in all weather. Extensive natural cover for dispersal is available. There is no other information.

(*ff*) *Malangas emergency landing ground* (7° 36′ N, 123° 02′ E approx.). This field is situated near Malangas Barrio in Zamboanga Province, on the west shore of Dumanquilas

FIGURE XII - 28. *Dansalan.* (Dansalan and vicinity.)
1. Municipal building. 2. Provincial Jail and Dispensary. 3. Catholic Dispensary and School. 4. Provincial Hospital. 5. Leprosarium 6. Former Barracks: Schools and government buildings. 7. Catholic Church. 8. Governor's Residence. 9. Camp Keithley landing ground.

FIGURE XII - 29. *Malaugas.*
Old view of emergency landing ground. 1931.

Bay, 10 miles west of Margosatubig, and 71 miles due west of Malabang airfield. The elevation is estimated as 20 feet. (FIGURE XII - 29)

The field is approximately 1,500 by 200 feet, possibly extensible. It has a sodded surface. There is ample cover for dispersal nearby. There are radio and telegraph installations in Malangas. No other information as to facilities is available.

(*gg*) *Malaybalay fighter landing ground* (8° 02′ N, 125° 06′ E). Situated at Mamala Barrio, 2 miles west of Malaybalay this landing ground is 36 miles south of Cagayan and 22 miles southeast of Del Monte No. 1 field. The elevation is 2,050 feet.

Two runways at the field are described. The first, northwest to southeast, is 2,370 by 300 feet. The second, northeast to southwest, is 3,400 by 300 feet. The surface is of sodded loam with excellent drainage. The field is believed suitable for light aircraft in all weather.

A nearby road gives access to Davao, Del Monte, and Cagayan. There is no information as to other facilities.

(*hh*) *Maramag No. 1 fighter landing ground* (7° 44′ N, 125° 00′ E). This field is located just south of Maramag, 53 miles east-southeast of Maguire Field on Lake Lanao, and 44 miles south-southeast of Del Monte No. 1 field. The estimated elevation is 1,550 feet. (FIGURE XII - 30)

The east to west runway, which is possibly extensible, is 3,000 by 300 feet. The surface is grass. The field is soft after a heavy rain but the drainage is good. There is cover nearby for dispersal. The field was used in 1942 by P-40s and B-25s.

(*ii*) *Maramag No. 2 medium bomber airfield* (7° 44′ N, 125° 00′ E approx.). This field adjoins Maramag No. 1 which lies about 500 feet to the west. It is 44 miles south-southeast of Del Monte No. 1, and 53 miles east-southeast of Maguire Field on Lake Lanao. The elevation is estimated to be 1,550 feet.

The runway extends north-northwest to south-southeast and is 5,000 by 250 feet. It is reported to have a grass surface, soft after heavy rains, but with good drainage. Like Maramag No. 1 it was used in 1942 by P-40s and B-25s. No other information is available.

(*jj*) *Maramag No. 3 heavy bomber landing ground* (7° 43′ N, 125° 01′ E approx.). This large field is 2 miles south of Maramag and of Maramag No. 1 field. It is 45 miles south-southeast of Del Monte No. 1 and 53 miles east-southeast of Maguire Field on Lake Lanao. It is also at an elevation of about 1,550 feet.

One runway, east-northeast to west-southwest, is 6,000 by 500 feet. A second, north to south runway is 4,000 by 250 feet. In April, 1942, a 3-inch gravel surface was being laid on the north to south runway. No other information concerning the field is available.

(*kk*) *Maraut River* (*Pantukan*) *emergency landing ground* (7° 19′ N, 125° 57′ E). This field is situated in a wooded canyon on the bank of the Maraut River near Pantukan. It is 20 miles northeast of Bassa Point on Samal Island in

FIGURE XII - 30. *Maramag.*
Old view of Maramag and vicinity showing landing ground. 1935.

Davao Gulf, and 30 miles northeast of Davao. It lies at an elevation of 1,600 feet.

The dimensions are reported as 3,000 by 197 feet in an east to west direction. The surface is of sodded clay loam. The field has an upgrade to the east of 5½% for 2,250 feet, 12% for 390 feet, and 6% for 360 feet. Only landings from the west and take-offs from the east are feasible. There is good cover for dispersal but the canyon limits the area.

(*ll*) *Midsayap fighter landing ground* (7° 10' N, 124° 32' E approx.). Located 3 miles south of Midsayap this field is 5 miles southeast of Lake Labas and 25 miles east of the mouth of the Mindanao River. The estimated elevation is 200 feet.

The reported dimensions of the east to west runway are 5,249 by 328 feet. There is good cover for dispersal. Drainage is believed to be poor. No other information is available.

(*mm*) *Mount Matutum medium bomber landing ground* (6° 26' N, 124° 58' E approx.). This field is located 7 miles northwest of Mount Matutum in Cotabato Province. It is 18 miles southeast of Lake Buluan, and 63 miles southwest of Davao. The estimated elevation is 1,500 feet.

The runway extends north and south and is 4,921 by 262 feet. It is reported level and rolled with gravel surface, soft when wet. Hills to the south constitute a hazard. The best approach is from the north. The only available cover for dispersal is off the north end of the field.

(*nn*) *Pikit emergency landing ground* (7° 04' N, 124° 40' E approx.). Little is known about this clearing which lies 1 mile north of Pikit-Pagalungan barrio, 36 miles east-southeast of the mouth of the Mindanao River in Illana Bay, and 87 miles south of Del Monte No. 1. The elevation is estimated to be 300 feet. (FIGURE XII - 31)

The approximate dimensions are 700 by 200 feet north to south, possibly extensible. There is limited cover for dispersal. Due to lack of agreement between oblique photographs and existing maps, the coordinates given above are only approximate.

(*oo*) *Placer-Badas emergency landing ground* (9° 38' N, 125° 33' E). The field is located near the barrio of Badas, 2½ miles west of Placer in Surigao Province on the north tip of Mindanao Island. It is 10 miles south-southeast of Surigao on the south side of the Surigao-Placer highway, and 10 miles north of Mainit lake. The elevation is 33 feet.

There are 2 runways, the longest of which is 2,625 by 164 feet east to west. The second is 2,297 by 98 feet northeast to southwest. The latter runway is reported paved, the former is soft when wet. The field is serviceable in all weather. Coconut palms nearby presumably offer ample cover for dispersal.

FIGURE XII - 31. *Pikit.*
Old view of emergency landing ground. 1935.

Two large barracks and a small radio building are located near the field. Access to the field may be had by both road and water transportation. No other information as to facilities is available.

(*pp*) *Santa Cruz emergency landing ground* (6° 56′ N, 125° 25′ E). This field is described as being 8 miles north-northeast of Santa Cruz, 14 miles southwest of Davao, and 20 miles west of the south tip of Samal Island in Davao Gulf. The elevation is estimated to be 20 feet. The dimensions are reported as 2,600 by 650 feet. Little else is known about this field which has also been reported at 7° 50′ N, 126° 33′ E.

(*qq*) *Valencia No. 1 medium bomber landing ground* (7° 50′ N, 125° 05′ E). Located 2 miles north of Valencia barrio on the west side of a road, this field is 14 miles south of Malaybalay. It is 41 miles southeast of Del Monte No. 1, 51 miles east of the east shore of Lake Lanao, and 64 miles northwest of Davao. The elevation is 1,032 feet.

The field extends north and south with dimensions of 5,280 by 900 feet. The surface is sodded clay loam, reported serviceable in all weather. There is good cover for dispersal nearby. There is no information as to facilities.

(*rr*) *Valencia No. 2 medium bomber landing ground* (7° 53′ N, 125° 06′ E approx.). Near Mailag this field is situated 4 miles north of Valencia on the east side of the Valencia to Malaybalay highway. It is 53 miles east of Lake Lanao and lies at an estimated elevation of 1,850 feet.

The field is laid out in a northeast to southeast direction with dimensions of 5,249 by 328 feet. The surface is Cogon grass turf and the drainage is good. It is believed serviceable in all weather for all types of aircraft.

Aside from the good road giving access to the field there is no information available concerning facilities.

(*ss*) *Wolfe Field fighter landing ground* (6° 56′ N, 122° 02′ E). This field is located at Calarian Barrio, 4 miles west of Zamboanga on the southwest tip of Mindanao Island. The elevation at the field is 53 feet.

Extending in an east to west direction, the dimensions of the landing ground are reported to be 2,296 by 197 feet. It is described as serviceable in all weather and has a sodded surface. There is good cover for dispersal nearby. No other information is available.

(*tt*) *Zamboanga heavy bomber landing ground* (6° 55′ N, 122° 07′ E). The existence of this new large landing ground has not been confirmed. It is reported to be just east of the town of Zamboanga on the southwest tip of Zamboanga Province, Mindanao Island. Three runways, 7,000 by 400 feet, 7,000 by 400 feet, and 4,000 by 400 feet have been reported. There are no details.

(4) Possible airfield sites (in alphabetical order).

(*a*) *Camp Overton* (8° 12′ N, 124° 12′ E approx.). A possible site is reported at Camp Overton at the head of Illigan Bay where a flat, cleared area adjoins the coast.

(*b*) *Dalwangan* (8° 06′ N, 125° 04′ E approx.). An area possible suitable for an airfield site is just outside the town of Dalwangan parallel to a road.

(*c*) *Davao Japanese Colony* (7° 17′ N, 125° 41′ E approx.). What is described as a natural landing field 6,000 by 7,000 feet is located in the midst of the Japanese colony approximately 15 miles north-northeast of Davao.

(*d*) *Davao Gulf* (6° 30′ N, 126° 07′ E approx.). There is a large amount of flat land which could be cleared and used as a landing ground, on the east coast of Davao Gulf in the general vicinity of Madtuka Point.

(*e*) *Dapitan* (8° 39′ N, 123° 26′ E). A potential airfield site, 1,200 by 1,500 feet, lies just in front of the church at Dapitan on the northwest coast of Mindanao.

(*f*) *Dayana Point* (7° 39′ N, 123° 08′ E approx.). Dayana Point on the northeast shore of Dumanquilas Bay on the south coast of Zamboanga Province is reported as a potential airfield site. The land slopes gently back from the end of the point for a distance of about 1 mile.

(*g*) *Dumanquilas Bay* (7° 04′ N, 123° 01′ E approx.). A potential site 3,000 by 1,500 feet lies northwest of Bacao and southwest of Boton, near the entrance to Dumanquilas Bay. The ground here is nearly level but needs clearing. Approaches are good.

(*h*) *Igai Point* (7° 38′ N, 123° 03′ E approx.). Igai Point on the west side of Dumanquilas Bay is reported as a potential airfield site. A plateau at an elevation of 100 feet on the point is relatively flat but needs clearing. Drainage here is considered excellent.

(*i*) *Malalag* (6° 36′ N, 125° 23′ E approx.). A flat area of unspecified size is reported southwest of Malalag on the southwest coast of Malalag Bay east of Davao Gulf. This potential site needs to be cleared.

(*j*) *Malamaui Island* (6° 43′ N, 121° 58′ E approx.). A potential site is reported on Malamaui Island just northwest of Basilan Island off the southwest tip of Zamboanga Province. A landing field could be cleared at a neighboring rubber plantation but would necessitate considerable work.

(*k*) *Murcielagos Bay* (8° 35′ N, 123° 34′ E approx.). Possible sites are located in the vicinity of the cultivated areas on the Diuyu River at the south end of Murcielagos Bay.

(*l*) *Nasipit Harbor* (8° 59′ N, 125° 26′ E approx.). A potential site is reported at Nasipit Harbor on the northwest coast of Mindanao Island. There is sufficient level terrain to permit clearing and grading for a landing ground.

(*m*) *Polloc Harbor* (7° 23′ N, 124° 16′ E approx.). The parade ground on the constabulary post at Parang could be converted to a small emergency landing ground by removing the radio masts. Parang is located on the east shore of Polloc Harbor.

(*n*) *Port Holland* (6° 33′ N, 121° 52′ E approx.). A potential site is reported at Port Holland on the west coast of Basilan Island. It is described as a large area filled and packed with sawdust.

(*o*) *Port Misamis* (8° 10′ N, 123° 51′ E approx.). Two excellent sites are reported on the road between Misamis and Clarin at the southwest end of Iligan Bay.

(*p*) *Port Sibulan* (7° 33′ N, 122° 54′ E approx.). A potential site is reported at the head of Port Sibulan on the south coast of Mindanao Island. A landing ground could be prepared by clearing the necessary area.

(*q*) *Sapali* (6° 18′ N, 124° 43′ E approx.). A reported possible site is located at Sapali ½ mile northeast of Alah River, 6 miles northwest of Lake Sultan, and about 23 miles south-southwest of Lake Buluan.

(r) *Sindangan* (8° 14' N, 123° 00' E approx.). A potential landing field is reported at Sindangan on the northeast shore of Sindangan Bay, 1½ miles north of the mouth of the Sindangan River. It is also reported as a landing ground, 4,000 by 600 feet, with a surface of sodded black loam.

(s) *Sumilao* (8° 17' N, 124° 56' E approx.). A potential site is reported at Sumilao which is 20 miles southwest of the head of Macajalar Bay. No details are available.

D. Sulu Archipelago sector.

(1) Seaplane stations.

None.

(2) Seaplane alighting areas.

None.

(3) Airfields and landing grounds.

(a) *Zettle Field (Jolo) fighter landing ground* (6° 03' N, 121° 01' E). This landing ground is located 1 mile east of the town of Jolo on the northwest coast of Jolo Island, Sulu Province. The elevation is 70 feet.

The field is 3,960 by 459 feet extending in an east to west direction. The surface is of sodded clay loam and the field is reported serviceable in all weather. Cover for dispersal is nearby. No other information is available.

(4) Possible airfield sites.

(a) *Banaran Island* (5° 01' N, 120° 08' E approx.). An area on Banaran Island in the Tawitawi group is well-cleared and could be easily prepared as a landing ground.

(b) *Bubuan Island* (5° 25' N, 120° 35' E approx.). There is a potential site on Bubuan Island in the Tawitawi group. The best cleared areas are on the north side of the island.

(c) *Carmen Point* (5° 25' N, 119° 50' E approx.). An area which could be leveled is situated 1 mile east of Carmen Point on the west coast of Tawitawi Island. This is reported as the best spot in the Tawitawi Islands group for building and maintaining a landing field.

(d) *Manalik Channel* (5° 05' N, 119° 50' E approx.). A landing ground could possibly be constructed on the east side of Manalik Channel between Carmen Point and Lapidlapid. The area is approximately 75% cleared.

(e) *Papahag Island* (5° 02' N, 119° 48' E approx.). A potential site is reported at the center of Papahag Island at the south end of the Tawitawi group. The area is flat and could easily be cleared.

(f) *Sanga Sanga Island* (5° 04' N, 119° 48' E approx.). North of Malasa Point a site about 1 mile square might be prepared in less time than any other point in the Tawitawi group. Sanga Sanga is one of the southernmost of the Tawitawi Islands.

FIGURE XII - 52. *Jolo.* (Date unknown).

1. Provincial Building. 2. Custom House and Post Office. 3. Military Headquarters. 4. Military Stables. 5. Grammar School. 6. High School. 7. Catholic Church and Convent. 8. Sultan's Palace. 9. Ice and Electric Plant. 10 Sulu Public Hospital. 11. Overseas Club. 12. Public Market. 13. Storage for Ice. 14. Warehouses. 15. Governors Residence. 16. Government Officials' Residences. 17. Superintendent of Schools Residence.

(g) *Secubun Island* (5° 06′ N, 120° 18′ E approx.). The east central side of this island could easily be cleared to prepare a landing field 1 mile by ½ to ¾ mile in size. The soil is coarse loam with chalky sub-soil at about 18 inches. Secubun Island is 4½ miles southeast of Tawitawi Island.

(h) *Simunul Island* (4° 53′ N, 119° 51′ E approx.). Cleared spaces are available on both the east and west sides of the island which is 9 miles south of Tawitawi Island. In 1929 a naval reconnaissance estimated that in 3 weeks, with local Simunuli labor, a large sized landing field could be cleared.

(i) *South Ubian Island* (5° 10′ N, 120° 30′ E approx.). A potential site which could be levelled in a short time, is situated on South Ubian Island which is 17 miles east of Tawitawi Island. The soil is rich loam with a tendency to fine coral and sand toward the shore. Cleared spaces are firm.

(j) *Tabawan Island* (5° 13′ N, 120° 35′ E approx.). Tabawan is reported to be the flattest island in the Tawitawi group. There are areas on both north and south shores where small planes could land and take off.

E. Northeast Borneo sector.

(1) Seaplane stations.

None.

(2) Seaplane alighting areas.

None.

(3) Airfields and landing grounds.

(a) *Jesselton heavy bomber landing ground* (5° 57′ N, 116° 04′ E). On the northwest coast of North Borneo this field is 3 miles southwest of Jesselton. It is situated in the "V" formed by a railroad on the west and a road on the east, ½ mile southwest of the railroad workshops and about ½ mile from the coast. The elevation is 5 to 10 feet above sea level.

Varying reports state that 3 runways are sited but not actually constructed; that the landing area does not exceed 2,400 feet in any direction; and that there are two 7,000 foot runways. The surface is believed hard, sandy earth with some grass.

Fuel, oil, water, and some repair facilities are available. Telephone and radio installations and accommodations for personnel are located in Jesselton. It is also reported that repair facilities and fuel are available at the railroad workshop ½ mile to the northeast, with telephone, telegraph, and radio installations at the wireless station adjoining the site.

On the basis of recent reconnaisance, when 2 aircraft were seen at the site, the field is considered operational. No other information is available.

(b) *Keningau emergency landing ground* (5° 21′ N, 116° 12′ E). The exact location of this field is unknown, the coordinates given above being those of the town of Keningau. The field is reported to lie between 2 spurs of low hills running north, east, and south about 100 feet high. The town of Keningau is on a northeast to southwest road, 1 mile northwest of Pegalan River, 2½ miles north of the confluence of the Pampang River with the Pegalan River, 16 miles northeast of Melalap, and 24 miles northeast of Tehom.

The exact dimensions are unknown but the site is reported to be 3,300 feet square. The soil of the area is sandy and covered with alang, a heavy grass. On the basis of recent reports the field is considered operational but no other information is available.

(c) *Kudat emergency landing ground* (6° 56′ N, 116° 50′ E). This field is located 3½ miles north of the town of Kudat on the northwest coast of Marudu Bay and at the north end of the west peninsula of North Borneo. It is just north of Pangaraban and 1¼ mile south of Agong Agong Point. The exact elevation is unknown but is believed to be less than 50 feet.

No other information is available but this is reported as a military field and considered operational.

(d) *Labuan Island fighter landing ground* (5° 20′ N, 115° 13′ E approx.). The exact location of this field is unknown but it is reported on Labuan Island which lies off the west coast of British North Borneo, and 11½ miles west of the mouth of the Klias River. The elevation is unknown.

Varying reports indicate 2 runways at the field, the longest 6,000 feet. Another report states that each runway is 6,000 feet long. According to recent intelligence 2 aircraft were seen at the field which is considered operational. No other information is available.

(e) *Lahad Datu emergency landing ground* (5° 02′ N, 118° 20′ E). The exact location of this field is not known. It is reported at Lahad Datu, in the west corner of the northernmost reach of Darvel Bay on the southeast coast of North Borneo, at the mouth of Sapangana River. It is the southern terminus of a northwest to southeast railroad 8 miles long. It is just south of Tabanac Estate, and 2½ miles north-northeast of the north tip of Sakar Island. No other information is available but reports indicate the field is operational.

(f) *Ranau emergency landing ground* (5° 58′ N, 116° 42′ E). There are varying reports on the existence of this landing ground and its exact location is unknown. Ranau is reported to be in the West Coast Residency, just northeast of the Liwagu River, and 1 mile east of the confluence of the Berambang and Ligwau Rivers. It is ¾ mile north-northwest of Kituntol, 1½ miles southeast of Aka, 4 miles north-northeast of Mengau, 13 miles southeast of Mount Kinabalu, elevation 13,455 feet, and 42 miles south of the head of Marudu Bay. One report states that a landing ground development here was unlikely while others indicate an emergency landing ground, probably operational. No other information is available.

(g) *Sandakan emergency landing ground* (5° 51′ N, 118° 07′ E). The exact location of this field is unknown. It is reported at Sandakan on the west side of Sandakan Harbor on the northeast coast of Borneo. It is just south of a forest reserve, 1 mile south of Beatrice Estates, 3 miles west-northwest and across the harbor from Cape Aru. A radio station is located at Sandakan. Further details are lacking but reports indicate that the field is operational and its development into a major base is expected.

(h) *Tarakan emergency landing ground* (3° 20′ N, 117°, 34′ E).

This field, developed by the Dutch prior to Japanese occupation, is located in the central part of the southwest coast of Tarakan Island, 5 miles north-northwest of Tarakan. It is 1 mile northeast of the coast and just west of a north to south road, 9 miles north-northwest of Batoe Cape. The elevation is 5 feet.

Reports indicate the existence of 4 landing strips, 2,850 feet northeast to southwest; 2,520 feet east to west; 2,430 feet northwest to southeast; and 2,310 feet north to south. It is said that extension to 4,000 feet is planned. The surface is firm earth

and grass, usually serviceable except after heavy rains. Hills in the center of the island lie approximately 4 miles to the northeast and rise to 360 feet.

Fuel and oil were available with refueling by pump. Minor repairs were also possible. The Dutch had constructed 4 fighter and 4 bomber revetments but there was no other organized dispersal. Aircraft could be parked off the landing area all around the boundary of the field. The Dutch had several pill box defenses. The field is considered operational but no other information is available.

(i) Tawau emergency landing ground (4° 15′ N, 117° 53′ E). The exact location is unknown but this landing ground is reported at the town of Tawau, the coordinates of which are given above. Tawau is on the north shore at the entrance to Cowie Harbor on the southeast coast of North Borneo. It is 1½ miles northwest of the mouth of the Tawao River, 4 miles southwest of Kubota estate, 8 miles west-northwest of Cape Tinagat, 4½ miles south-southeast of Mount Gemok, and 8 miles southwest of Mount Andrassy. Details are unknown but it is now considered probable that this field is used for operational purposes.

(4) Possible airfield sites.
None.

F. Northern Celebes sector.

(1) Seaplane stations.
None.

(2) Seaplane alighting areas.
None.

(3) Airfields and landing grounds.
(a) Langoan fighter airfield (1° 09′ N, 124° 50′ E).

FIGURE XII - 33. *Lake Tondano.*
Looking SEly with Langoan fighter airfield in distance. 20 January 1945.

This field is located 1 mile east-northeast of Langoan with the north end of the landing strip adjacent to Kalawiran. It is just west of the Popo River and just south of the Langoan to Kakas Road, 3 miles west-southwest of Kakas at the south end of Lake Tondano, and 25 miles south-southwest of Mount Klabat, north of Lake Tondano, which rises to a 6,544 foot elevation. Mountains with elevations of from 3,000 to 4,000 feet, are situated to the north, south, and west of Lake Tondano (FIGURE XII - 33). The field lies at an elevation of 1,126 feet.

The runway, with dimensions of 4,200 by 300 feet, extends in a north-northeast to south-southwest direction. The field is an irregular area, 4,800 by 3,750 feet, built on reclaimed paddy land which has been cleared and drained. The runway is surfaced with either coral or limestone and is probably serviceable in all weather. It could be extended to the north and south and new runways could be built to the east of the existing runway. Mount Klabat, elevation 6,544 feet, 25 miles to the north-northeast; Mount Oemeh, elevation 2,728 feet, 1½ miles west-northwest; and Mount Sopoetan, elevation 5,448 feet, 13 miles southwest of the field, constitute hazards. (FIGURE XII - 34, XII - 36).

There is no organized dispersal but hardstandings in the cleared area parallel to the runway will accommodate 40 fighter and 30 bomber aircraft. These are counted as the operational capacity of the field.

A building area west of the north end of the runway is suspected of housing a supply dump, some of the buildings being situated under trees. There are 2 servicing aprons west of the runway. No other information as to facilities is available.

(*b*) *Mapanget fighter landing ground* (1° 31′ N, 124° 54′ E). This landing ground is located on a small plateau sloping gently downward to the north, south, and west but rising to the east. It is 1¾ miles west of Mapanget, just north of the Mapanget River and south of the Kima River, about ½ mile north of the Menado to Tateloe Road, 6 miles east-northeast of Manado, 17 miles due north of Lake Tondano, and 9 miles northwest of Mount Klabat, elevation 6,544 feet. The field is at an elevation of 230 feet.

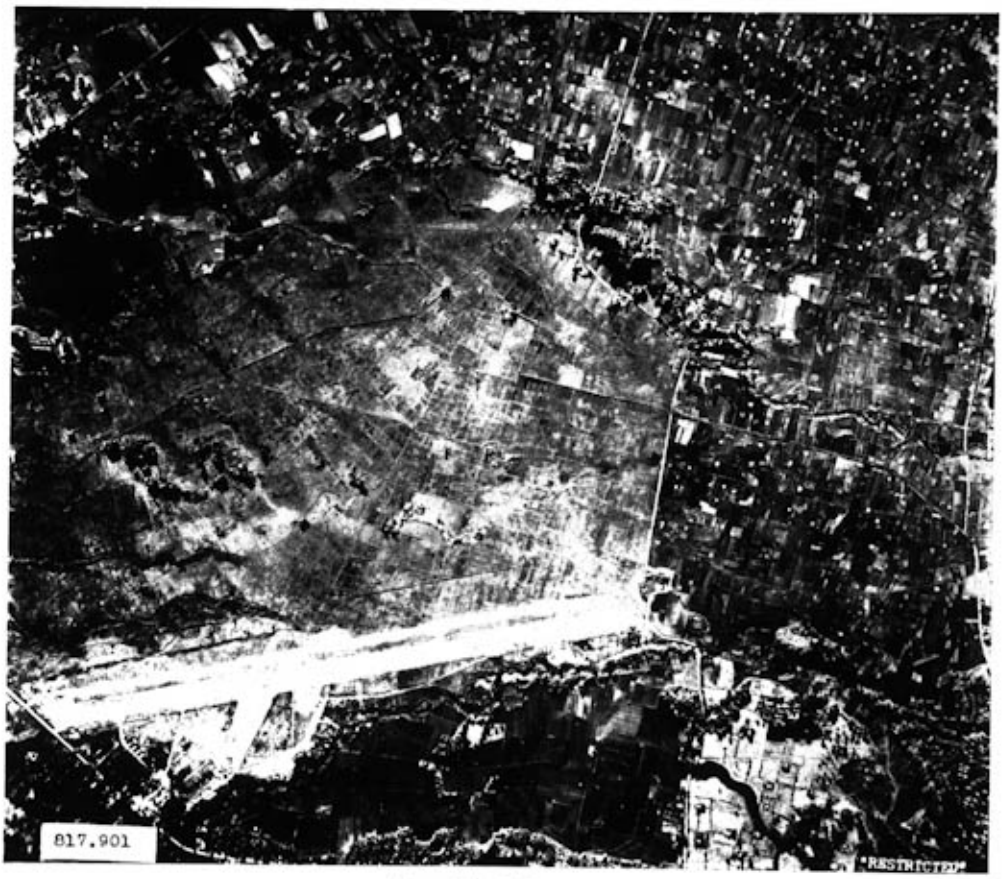

FIGURE XII - 34. *Langoan.*
Fighter airfield. Date Unknown.

FIGURE XII - 35. *Lake Tondano*
Langoan fighter airfield in foreground, 20 January 1943.

FIGURE XII - 36. *Langoan.*
Fighter airfield.

The use of the field by Japanese bombers would indicate that it is a medium bomber landing ground. Other information limits the field to an emergency landing ground, 3,210 by 260 feet north-northwest to south-southeast with extension possible to 4,200 feet northeast to southwest. The operational capacity has been estimated to be 20 fighters and 40 bombers. No other information is available.

(4) Possible airfield sites.

(*a*) *Amoerang* (1° 11′ N, 124° 33′ E, town). Possible airfield sites are reported around Amoerang Bay to the west of and along the coast from Amoerang.

(*b*) *Belang* (0° 56′ N, 124° 47′ E). A possible site is reported at Belang on the south side of the northern peninsula of Celebes Island. Coconut plantations are situated along the shore at this point.

(*c*) *Bongo* (0° 42′ N, 122° 30′ E). Possible sites are reported on low, flat areas along the coast. These are in the valley of the Pagoejaman River near Bongo.

(*d*) *Dondo Bay* (0° 52′ N, 120° 22′ E). There is a possible airfield site on a low, flat shore covered with mangroves and coconut plantations on the south side of an inlet on the west side of Dondo Bay.

(*e*) *Gorontalo* (0° 30′ N, 123° 03′ E). This possible site is in the Pagoejaman River Valley about 30 to 40 miles from Gorontalo.

(*f*) *Kema* (1° 22′ N, 125° 05′ E, town). A possible airfield site is reported at Kema on the east side of the north tip of Celebes Island. It is on a low plain covered with coconut plantations and scattered mangroves.

(*g*) *Kotaboena* (0° 48′ N, 124° 39′ E, town). This may be the same as Kotaboenan, for which the above coordinates are given. It is described as low ground fronting a protected anchorage behind islands.

(*h*) *Limba* (0° 29′ N, 122° 32′ E). Existence of a possible site here is doubtful and unconfirmed.

(*i*) *Leok* (1° 09′ N, 121° 25′ E). A possible site exists about 3 miles southeast of Leok on the southwest side of Bilang Bay. The shore here is flat but the area is rather marshy.

(*j*) *Tamboe Gulf* (0° 01′ N, 119° 54′ E). Possible sites may be found on the low sandy shores of Tamboe Gulf now planted with coconuts.

(*k*) *Toeladenggi* (0° 45′ E, 121° 52′ E). Possible sites may be found west of this location in the direction of Cape Santigi. There are some flat stretches of coast with a scattered cover of coconut plantations.

TABLE XII - 2

SEAPLANE FACILITIES

Sector A: Halmahera

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
1. Ternate 0° 46′ N, 127° 23′ E	S.A.A.	Just east of Ternate I. off west coast of Halmahera.	Unlimited runs north to south and northeast to southwest.	Fair shelter and anchorage; 4 mooring buoys and a slipway reported; dispersal for 20 aircraft; other facilities.
2. Berri Berri 2° 23′ N, 128° 40′ E	E.S.A.A.	Off northeast coast of Morotai I.	No data.	Sheltered by reefs and Tabailengi Island.
3. Bobane Bay 0° 52′ N, 127° 41′ E	E.S.A.A.	At the head of Kaoe Bay.	No data.	Sheltered anchorage for several seaplanes.
4. Bori Island 0° 35′ N, 127° 36′ E	E.S.A.A.	Between a small island and the mainland of Batjan Island.	No data.	Reported as a good concealment area.
5. Galela Lake 1° 49′ N, 127° 49′ E	E.S.A.A.	Near town of Galela on northern peninsula of Halmahera Island.	No data.	Invisible from sea. Best anchorage on east side of lake. Use of buoys is advised.
6. Groot Geelmulder Atoll 1° 04′ S, 128° 15′ E	E.S.A.A.	Across Obi Strait, 35½ miles northeast of Obi Major.	No data.	Anchorage at north end of atoll.
7. Labohea 0° 39′ N, 127° 28′ E	E.S.A.A.	In Awanggo Bay, at head of Laboeha Bay, just southwest of the town.	No data.	No details.
8. Lebessan Island 3° 29′ N, 125° 39′ E	E.S.A.A.	In a small bay off the east coast of Sangihe Island, 128 miles north-northeast of the northeast tip of Celebes Island.	No data.	No details.
9. Moeilijk 0° 34′ N, 128° 22′ E	E.S.A.A.	Atoll, 15 miles east of Halmahera Island.	No data.	A hiding place on west side of Moeilijk Atoll.
10. Sololo Bay 0° 48′ N, 128° 13′ E	E.S.A.A.	At head of Boeli Bay.	No data.	Reported hiding place.
11. Tahoena 3° 36′ N, 125° 29′ E	E.S.A.A.	Off west coast of Sangihe Island.	No data.	Open to northwest monsoon. Pier and radio station available.
12. Talawide 2° 41′ N, 125° 24′ E	E.S.A.A.	Reported in a lake on Siaoe Island at center of Sangihe Islands.	No data.	No details.

TABLE XII - 2 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
13. Tifore Island 0° 58′ N, 126° 09′ E	E.S.A.A.	In Laboehan Bay on east coast of Tifore Island.	No data.	Maneuvering in bay not possible. Planes can be beached.
14. Tobelo 1° 44′ N, 128° 01′ E	E.S.A.A.	Just north-northeast of Tobelo; between Tobelo Island and Halmahera Island.	No data.	Two landing stages. Planes can be beached.
15. Wasile Bay 1° 12′ N, 128° 08′ E	E.S.A.A.	In northern part of Kaoe Bay, on northeast peninsula of Halmahera Island.	No data.	Mooring area adjacent to north or south shore according to prevailing monsoon.
16. Weda Bay 0° 19′ N, 127° 52′ E	E.S.A.A.	Just south of Weda at head of Weda Bay.	No data.	No details.
		Sector C: Mindanao		
17. Malalag Bay 6° 36′ N, 125° 25′ E.	S.A.A.	In southwest part of Davao Gulf, 2 miles north of Baculing Hills, 58 miles northwest of Cape Agustin.	Four miles long, northwest to southeast; 1½ miles wide.	Bolton reef at middle of entrance to bay an obstruction; depths 6 to 30 feet; mooring for 4 PBYs; several sandy beaches suitable for hauling out.
18. Zamboanga Harbor 6° 54′ N, 122° 05′ E	S.A.A.	Just south of town of Zamboanga at southwest tip of Mindanao Island.	No data.	Sheltered from northeast monsoons; depths 6 to 30 feet; good anchorage near wharf in 28 feet; minor repairs and accommodations at Zamboanga.
19. Bugo 8° 30′ N, 124° 45′ E	E.S.A.A.	In Macajalar Bay.	No data.	Small craft available.
20. Davao Gulf 7° 06′ N, 125° 39′ E	E.S.A.A.	In Davao Gulf, 4 miles east of Samal Island.	Runs of 5¾ miles in any direction.	Limited shelter; minor repairs and fuel.
21. Dapitan Bay 8° 39′ N, 123° 24′ E	E.S.A.A.	West of Dapitan town in the bay off north end of west peninsula of Mindanao Island.	Runs of 2¼ miles in any direction.	No details.
22. Hinatuan Bay 8° 21′ N, 126° 21′ E	E.S.A.A.	In the bay west of Hinatuan Village on west side of Mindanao Island.	Two and one-half miles east to west; 1½ miles north to south.	No other details.
23. Igat Bay 7° 35′ N, 123° 10′ E	E.S.A.A.	On south side of west peninsula of Mindanao; on east arm of Dumanquilas Bay.	Three miles north to south; 3 miles east to west.	No details.
24. Isabela 6° 42′ N, 121° 58′ E	E.S.A.A.	In Isabela Channel between Malamaui and Basilan Islands.	No data.	No details.
25. Lake Buluan 6° 41′ N, 124° 48′ E	E.S.A.A.	About 38 miles west of Davao Gulf and 45 miles north of Sarangani Bay.	No data.	No details.
26. Lake Lanao 7° 59′ N, 124° 21′ E	E.S.A.A.	Near the center of Mindanao Island.	Runs of over 5 miles in any direction.	No other details.
27. Masinloc Anchorage 6° 55′ N, 122° 10′ E	E.S.A.A.	In the channel between Sacol and Mindanao Islands.	Run of 3 miles northeast to southwest.	No other details.
28. Murcielagos Bay 8° 35′ N, 123° 34′ E	E.S.A.A.	In Casul Bay, the south arm of Murcielagos Bay, off the north tip of the west peninsula of Mindanao.	Runs 12,000 feet north to south; 8,000 feet north-northeast to south-southwest.	No other details.
29. Nasipit Harbor 8° 59′ N, 125° 20′ E	E.S.A.A.	In Nasipit Harbor west and southwest of Nasipit town, 10 miles southeast of Diuata Point.	One mile north to south; 3,000 feet northeast to southwest.	No other details.
30. Polloc Harbor 7° 22′ N, 124° 14′ E	E.S.A.A.	On the west side of Mindanao Island, just west of Parang.	Two miles north to south, 3 miles east to west.	No other details.

TABLE XII - 2 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
31. Port Banga 7° 32′ N, 122° 27′ E	E.S.A.A.	On east side of the southwest peninsula of Mindanao Island; separated from Sibuguey Bay by Linguisan Point.	Three miles northeast to southwest.	No other details.
32. Port Holland 6° 33′ N, 121° 52′ E	E.S.A.A.	Just northeast of Port Holland in Malusu Bay, 4 miles southeast of Pangasahan Hill, 929 feet elevation.	Long runs available.	No other details.
33. Port Lamon 8° 28′ N, 126° 23′ E	E.S.A.A.	West of the wharf on north side of the bay.	Two miles east to west.	No other details.
34. Port Lebak 6° 32′ N, 124° 03′ E	E.S.A.A.	In Port Lebak on southwest part of Mindanao Island.	Over 1 mile east to west and north to south.	No other details.
35. Port Misamis 8° 08′ N, 123° 50′ E	E.S.A.A.	In Port Misamis on north central part of Mindanao, 12 miles southeast of Mount Malindang, elevation 8,950 feet.	No data.	No details.
36. Port Santa Maria 7° 46′ N, 122° 06′ E	E.S.A.A.	On west coast of Zamboanga Peninsula, northeast of Mount Santa Maria, elevation 646 feet.	No data.	No details.
37. Port Sibulan 7° 31′ N, 122° 55′ E	E.S.A.A.	In Tantalang Bay at the head of Port Sibulan, east of Naga Naga, on south side of the west peninsula of Mindanao Island.	Three miles east to west and north to south.	No other details.
38. Taba Bay 7° 32′ N, 122° 49′ E	E.S.A.A.	In Taba Bay north of Lumaro, about 2 miles southwest of Mount Sibuguey, elevation 1,050 feet.	One mile northeast to southwest; 2½ miles northwest to southeast.	No details.
		Sector D: Sulu Archipelago		
39. Banaran Island 5° 01′ N, 120° 08′ E	E.S.A.A.	Off northeast side of island which is in Tawitawi group.	No data.	Good shelter from nearly all weather.
40. Batu Batu Bay 5° 04′ N, 119° 53′ E	E.S.A.A.	Off the south coast of Tawitawi Island on east side of bay at New Batu Batu.	No data.	No details.
41. Capual Channel 6° 01′ N, 121° 24′ E	E.S.A.A.	In Capual Channel north of Liangliang on Jolo Island.	Three miles east-southeast to west-northwest.	Open to the southwest.
42. Jolo Harbor 6° 04′ N, 121° 00′ E	E.S.A.A.	Near the wharf in Jolo Harbor on the northwest coast of Jolo Island.	Three thousand feet in all directions.	Facilities for minor repairs.
43. Luuk Sula Bay 5° 03′ N, 119° 52′ E	E.S.A.A.	At the head of Luuk Sula Bay on south coast of Tawitawi Island, about 1 mile north of Patong Point.	One mile east to west and 1 mile east-northeast to west-southwest.	No other details.
44. Maraning Bay 5° 15′ N, 120° 02′ E	E.S.A.A.	Off northwest coast of Tawitawi Island, 3¼ miles southwest of Languyan Point.	No data.	No details.
45. Port Bongao 5° 02′ N, 119° 46′ E	E.S.A.A.	North of Bongao Island, south of Sanga Sanga Island, west of Papahag Island.	One mile east-northeast to west-southwest.	Run could extend 2 miles into Chongos Bay. Radio station at Bongao.
46. Port Languyan 5° 16′ N, 120° 04′ E	E.S.A.A.	In Port Languyan on the central northwest coast of Tawitawi Island.	No data.	Reported an excellent alighting area; bordered by a mangrove swamp, with some beach frontage.
47. Sibutu Island 4° 48′ N, 119° 22′ E	E.S.A.A.	In the north lagoon of the island.	No data.	Ample room for landings and take-offs reported.

TABLE XII - 2 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
48. Tataan Pass 5° 11′ N, 119° 55′ E	E.S.A.A.	Between Tataan Island and Tawitawi Island.	Two miles north to south, 3 miles northeast to southwest.	There are two reefs in the pass about ⅓ mile offshore.
		Sector E: Northeast Borneo		
49. Abai River 6° 22′ N, 116° 21′ E	E.S.A.A.	On the Abai River about 1½ miles inland and about 5 miles west-northwest of Kota Belud, on north side of east-west reach.	No data.	No details.
50. Ambong Bay 6° 19′ N, 116° 18′ E	E.S.A.A.	Five miles southwest of the Abai River on northwest coast of British North Borneo.	No data.	Well-sheltered.
51. Balambangan Island 7° 17′ N, 117° 01′ E	E.S.A.A.	In Lung Bay on east coast of island which is west of Banguey Island.	No data.	No details.
52. Balung River 4° 18′ N, 118° 11′ E	E.S.A.A.	Nineteen miles east of Tawao, 15 miles due west of Cowie Harbor.	Two reaches 1¼ miles by 600 feet lying east to west and north to south.	No details.
53. Boeaja 1° 26′ N, 118° 27′ E	E.S.A.A.	Off the northeast coast of a large headland on the east coast of Borneo.	No data.	No details.
54. Cowie Harbor 4° 15′ N, 117° 50′ E	E.S.A.A.	In Coal Mine Reach, on east coast of Borneo.	Area unlimited.	Well-sheltered.
55. Jesselton 5° 59′ N, 116° 05′ E	E.S.A.A.	Between Gaya Island and Jesselton Harbor on northwest coast of British North Borneo.	No data.	Some repair facilities, a pier, and a crane. Occasionally used by both civil and military aircraft prior to Japanese invasion.
56. Kinabatagen River 5° 37′ N, 118° 35′ E	E.S.A.A.	Thirty-six miles east of Sandakan and 2½ miles southwest of Driftwood Point.	No data.	No details.
57. Kudat 6° 53′ N, 116° 51′ E	E.S.A.A.	About ½ mile west of Kudat wharf on west side of an inlet on north end of the west arm of North Borneo.	No data.	Two mooring buoys. No evidence of use by Japanese since occupation in January 1942.
58. Kalumpang River 4° 20′ N, 118° 21′ E	E.S.A.A.	Thirty-two miles east of Tawau, 1 mile north of Kalumpang and in the river east of Mangrove Island where the stream divides.	No data.	No details.
59. Labuan 5° 17′ N, 115° 15′ E	E.S.A.A.	In Victoria Harbor on southeast coast of Labuan Island.	Approximately 6,000 feet in all directions.	Two moorings, 1 pier. Fuel and oil storage facilities. RAF flying boats operated from here. No evidence of Japanese use or development.
60. Lahad Datu 5° 02′ N, 118° 20′ E	E.S.A.A.	West of Jetty at Lahad Datu in Darvel Bay on southeast coast of North Borneo.	No data.	Good anchorage.
61. Maruap River 5° 25′ N, 118° 16′ E	E.S.A.A.	Northwest of Evans Island off extreme northeast coast of Borneo.	Described as ample alighting area.	No details.
62. Mitford Harbor 7° 08′ N, 117° 07′ E	E.S.A.A.	Near south coast of Banggi Island off the north coast of Borneo. Exact location unknown.	No data.	No details.
63. Papar 5° 45′ N, 115° 55′ E	E.S.A.A.	In the lower reach of Papar River, about 20 miles south-southwest of Jesselton on the northwest coast of Borneo. Near the Jesselton-Linkungan Railroad.	No data.	No details.

TABLE XII - 2 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
64. Sandakan 5° 49′ N, 118° 07′ E	E.S.A.A.	In the harbor ¾ mile west-southwest of the government pier.	No data.	No moorings. Limited repair facilities. Slipway available but unsuitable for large aircraft. Fuel and oil available but location of storage unknown.
65. Tarakan 3° 16′ N, 117° 36′ E	E.S.A.A.	Off the southwest coast of Tarakan Island just east of the town.	No data.	Sheltered. Gasoline and oil available. Facilities for minor repairs.
66. Timbu Nata 4° 34′ N, 118° 32′ E	E.S.A.A.	Off the south coast of Timbu Mata Island just south of Darvel Bay.	No data.	No details.
		Sector F: Northern Celebes		
67. Amoerang Bay 1° 12′ N, 124° 34′ E	E.S.A.A.	In southwest part of Amoerang Bay, just north of Amoerang on the northeast coast of Celebes Island.	Three and one-half miles in any direction.	No other details.
68. Bangka Strait 1° 41′ N, 125° 03′ E	E.S.A.A.	In southwest part of Bangka Strait, just north of Likoepang.	Reported unlimited.	Well-sheltered.
69. Belang Harbor 0° 57′ N, 124° 47′ E	E.S.A.A.	In Belang Harbor just northeast of Belang.	No data.	Sheltered anchorage.
70. Dampelas Lake 0° 11′ N, 119° 52′ E	E.S.A.A.	In Dampelas Lake on Dampelas Cape, southeast of Makassar Strait, just southeast of Sabang village.	No data.	No details.
71. Danau Lake 0° 46′ N, 124° 28′ E	E.S.A.A.	In southwest corner of Danau Lake, just south of Kotamobagoe.	No data.	Surrounded by mountains.
72. Gorontalo Bay 0° 28′ N, 123° 03′ E	E.S.A.A.	In Gorontalo Bay just south of Gorontalo on the south coast of Menado Peninsula.	No data.	No details.
73. Kakas 1° 11′ N, 124° 53′ E	E.S.A.A.	In the southwest corner of Lake Tondano, 4 miles northeast of Langoan.	No data.	Fuel and oil available. Mooring buoys believed present.
74. Koeandang Bay 0° 51′ N, 122° 54′ E	E.S.A.A.	On the east side of Koeandang Bay on the north shore of Manado Residency.	No data.	No details.
75. Lembeh Strait 1° 26′ N, 125° 11′ E	E.S.A.A.	In the south part of Lembeh Strait between the northeast coast of Celebes and Lembeh Island.	Three miles northeast to southwest and ¼ to ¾ mile wide.	No details.
76. Limboto Lake 0° 35′ N, 122° 58′ E	E.S.A.A.	On the south side of Limboto Lake on the south central part of the north peninsula of Celebes Island.	No data.	No details.
77. Manado Bay 1° 30′ N, 124° 50′ E	E.S.A.A.	In Manado Bay just north of Manado.	No data.	Four mooring buoys. Unprotected.
78. Santigi Bay 1° 20′ N, 120° 55′ E	E.S.A.A.	In Santigi Bay on north coast of Celebes.	No data.	Alighting area is east to west.
79. Talise Island 1° 52′ N, 125° 05′ E	E.S.A.A.	Reported at Talise Island, 10 miles north of north tip of Celebes Island.	No data.	No details.
80. Tasoeka 1°,11′ N, 124° 54′ E	E.S.A.A.	Also in southwest corner of Lake Tondano.	No data.	Fuel and oil available. Moorings believed present.

TABLE XII - 2 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
81. Telok Pagalongian 0° 50′ N, 120° 34′ E	E.S.A.A.	On the south side of Dondo Bay about 2 miles north of Boeloetong.	No data.	No details.
82. Tolitoli Bay 1° 03′ N, 120° 48′ E	E.S.A.A.	Just north of Kampoengbaroe town, northeast of Dondo Bay.	No data.	Small jetty, beaching facilities, 3 mooring buoys, and a radio station formerly available.
83. Tondano Lake 1° 17′ N, 124° 55′ E	E.S.A.A.	On Tondano Lake which lies near the tip of Manado peninsula.	No data.	Anchorages at Tasoeka, Kakas, and Tondano.

TABLE XII - 3.

AIRFIELDS AND LANDING GROUNDS

Sector A: Halmahera

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
1. Galela 1° 52′ N, 127° 49′ E	MAD	On Galela Plain, 3¼ miles northwest of Galela on northern peninsula of Halmahera Island.	No. 1 runway, 4,500 by 250 feet northeast to southwest. No. 2 runway 4,700 by 290 feet, northeast to southwest.	Extensive dispersal system. Capacity, 158 bombers, 100 fighters. Field still under construction. Buildings nearby. Extensible.
2. Lolobata 1° 17′ N, 128° 06′ E	MAD	On the north coast of Lolobata Cape on west side of northeast peninsula of Halmahera I., 2½ miles northwest of Lolobata.	Runway 4,600 by 500 feet north-northeast to south-southwest.	Ample dispersal. Capacity, 34 bombers, 10 fighters. Field reported in excellent condition.
3. Miti 1° 34′ N, 128° 04′ E	MAD	On the northwest side of Miti Island close off the east coast of the north peninsula of Halmahera Island.	Runway 4,600 by 350 feet north to south.	Capacity, 95 bombers, 40 fighters. Thirty-five unprotected bomber dispersal points. Reported serviceable in all weather.
4. Kaoe 1° 11′ N, 127° 53′ E	FLG	One and one-half miles west of Kaoe, just east of Kaoe River, on the north coast of Kaoe Bay.	Runway No. 1, 4,500 feet north to south; No. 2, 3,600 by 300 feet north to south, 4,000 feet northeast of No. 1.	Capacity, 50 bombers, 80 fighters. Field tends to become water-logged, landings possible only on runways. Several buildings near runway.
5. Laboeha 0° 38′ S, 127° 29′ E	ELG	Approximately 1 mile east-southeast of Laboeha on Batjan Island, west of the south end of the south peninsula of Halmahera Island.	Length of runway, northeast to southwest, unknown.	Estimated capacity reported as 25 bombers, 25 fighters. Site may offer possibilities of expansion and further development.
6. Oba 0° 45′ N, 127° 34′ E	FLG	Just east of Sofifi on west central coast of Halmahera Island.	Runway 3,400 feet northwest to southwest with no flight gaps.	Estimated capacity, 10 bombers, 15 fighters. Ample room for construction of dispersal facilities. Runway extensible to possibly 6,000 feet.
7. Pitoe (Doroeba) 2° 03′ N, 128° 18′ E	MLG	Just east of Doroeba on southernmost tip of Morotai Island, 10 miles east of north end of the northern peninsula of Halmahera Island.	Approximately 5,000 feet northeast to southwest.	Reported still under construction. Dispersal for 5 bombers, 5 fighters observed.

Sector C: Mindanao

8. Davao 7° 07′ N, 125° 39′ E	FAD	Six miles north of Davao, 7 miles south of Bunawan on west side of Davao-Bunawan highway.	Runways 3,346 by 164 feet north to south; 2,624 feet northeast to southwest.	North-south runway paved. Serviceable in all-weather. One hangar reported. Ample area and cover for dispersal.
9. Davao-Cabaguio 7° 06′ N, 125° 37′ E	FAD	Three miles north-northeast of Davao, on south side of the Davao to Bunawan highway.	Runway 2,850 feet north to south.	Ample cover for dispersal; 1 hangar. Strip 2,640 by 66 feet reported paved.
10. Alah River 6° 16′ N, 124° 44′ E (approx.)	ELG	Just south of Sapali Barrio on east bank of Alah River. Estimated elevation 1,200 feet.	Runway approximately 1,250 by 125 feet, extensible.	Good cover nearby. No other details.

TABLE XII - 3 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
11. Barobo 8° 32′ N, 126° 05′ E	FLG	Four miles west of Barobo barrio; 7½ miles south of Lianga near southwest shore of Lianga Bay.	Runway 3,328 by 197 feet east to west.	Field soft after rains but drainage good. Near road from Barobo to Tambis. Accommodations at Tambis Mining Company.
12. Bassa Point 7° 10′ N, 125° 44′ E (approx.)	ELG	Near Bassa Point on north tip of Samal Island in Davao Gulf.	Approximately 2,000 by 500 feet.	No details.
13. Bual 6° 04′ N, 125° 08′ E (approx.)	ELG	Two and one-half miles south of Makar River mouth near west shore of Sarangani Bay.	Estimated 750 by 50 feet.	Some cover nearby. No other details.
14. Buenavista (San Jose de Buenavista) 8° 56′ N, 125° 23′ E	MLG	At Risal barrio 2½ miles south of Buenavista on Butuan Bay; 10 miles west of Butuan.	Reported 5,249 by 328 feet north-northeast to south-southwest.	Field has clay surface with a central gravelled strip 2 inches thick and 75 feet wide. Drainage poor. Soft in wet weather.
15. Buluan 6° 42′ N, 124° 47′ E	HLG	At east edge of town of Buluan just northwest of Lake Buluan.	Reported 5,249 by 328 feet east to west.	Field sodded, sandy loam, all-weather. Cover available. Camouflage nets and pens built in 1942. Philippine Constabulary barracks nearby.
16. Butuan 8° 57′ N, 125° 31′ E	ELG	On west edge of town of Butuan in Agusan Province near west bank of Agusan River.	North to south 1,950 by 195 feet.	Surface is sodded clay loam. Possibly extensible. Ample cover. Access by road and waterway. Telephone and telegraph in town.
17. Butuan-Bancase 8° 57′ N, 125° 28′ E	FLG	Three miles south of Butuan Bay at barrio of Bancase, 4 miles west of Butuan.	Reported 2,427 by 98 feet northwest to southeast.	Reported paved. Access by road and waterway. Barracks at adjacent Philippine military reservation.
18. Cagayan 8° 29′ N, 124° 38′ E	MLG	Two miles west of Cagayan on the Cagayan to El Salvador highway, 2½ miles south of Macajalar Bay.	Runways 4,265 by 328 northwest to southeast, 3,609 by 328 feet north to south.	Considered an all-weather field for fighter aircraft. Abundant cover nearby. Road transportation to dock at Cagayan. Buildings available.
19. Cotabato 7° 12′ N, 124° 14′ E	FLG	At barrio of Kakar 2 miles south of Cotabato.	Runway 2,625 by 164 feet northwest to southeast.	Reported enlarged and in active use. Sodded hard ground, slightly rolling. Reported all-weather. Ample cover nearby. Buildings available.
20. Dadiañgas 6° 08′ N, 125° 10′ E	ELG	At barrio of Dadiañgas between Silvay and Makar river mouths, 1 mile north of Sarangani Bay.	Reported 1,969 by 164 feet northwest to southeast.	Level and sandy, all-weather. Two new runways, each 3,281 by 328 feet, were under construction in 1941.
21. Davao-Ipil 7° 06′ N, 125° 38′ E	ELG	Three miles northeast of Davao at the south entrance to Pakiputan Strait.	Reported 1,626 by 189′ north to south.	Grass surface. Ample cover nearby.
22. Del Monte No. 1 8° 21′ N, 124° 49′ E (approx.)	HLG	Fifteen miles southeast of Cagayan, on west bank near headquarters of second south tributary to Tagoloan River.	Reported 7,000 by 600 feet northeast to southwest. Elevation estimated 1,500 feet.	All-weather, suitable for all types of aircraft. Ample area for dispersal but with little cover.
23. Del Monte No. 2 8° 20′ N, 124° 47′ E	FLG	At Del Monte Club 2 miles west of Tankulan, 2 miles southwest of Del Monte No. 1. Eleveation 1,200 feet.	Runways 3,300 by 300 feet north to south, 2,200 by 300 feet east to west.	Sodded hard ground. All-weather. Ample dispersal area with limited cover.
24. Del Monte No. 3 8° 20′ N, 124° 54′ E (approx.)	HLG	One-half mile west of Daling Barrio, 8 miles east of Del Monte No. 1. Elevation estimated 1,500 feet.	Reported 6,000 by 200 feet north to south.	Surface of sod, all-weather for all types. Slope to south. Good cover for small aircraft.
25. Del Monte No. 4 8° 16′ N, 124° 59′ E (approx.)	HLG	Near Impasugong barrio, 15 miles southeast of Del Monte No. 1. Estimated elevation 1,800 feet.	Reported 6,200 by 300 feet north to south.	Sodded. Suitable in all-weather for all types of aircraft. Limited cover for dispersal.
26. Del Monte No. 5 (Palais) 8° 21′ N, 124° 49′ E (approx.)	MLG	On west bank near headwaters of second south tributary to Tagoloan River, 1 mile south of Del Monte No. 1.	Two east to west runways, adjacent, each 5,000 by 300 feet.	Good cover available for dispersal. No other information.

TABLE XII - 3 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
27. Del Monte No. 6 (Tigiptip) 8° 21′ N, 124° 47′ E (approx.)	MLG	Near Del Monte Club, 2½ miles southwest of Del Monte No. 1. Estimated elevation 1,500 feet.	Reported 5,000 by 300 feet north to south.	Turf, all-weather. Good cover for dispersal.
28. Del Monte No. 7 8° 21′ N, 124° 49′ E (approx.)	HLG	One mile south of Del Monte No. 1. Estimated elevation 1,500 feet.	Reported 6,200 by 300 feet northeast to southwest.	Turf, all-weather, for all types of aircraft. At least 1 bombproof hangar in mountain at south end of field.
29. Del Monte No. 8 8° 21′ N, 124° 54′ E (approx.)	FLG	One mile northeast of Dalirig near Agusan-Impasugong Road; 8 miles east of Del Monte No. 1.	Reported 4,000 by 300 feet north to south.	Grassy sod, all-weather, drainage presumably good. Good cover for fighter aircraft nearby. Road and telephone communication.
30. Dipolog 8° 36′ N, 123° 21′ E	HLG	One mile north of Dipolog; 9 miles south-southwest of Tagolo Point.	Reported 6,562 by 197 feet northeast to southwest.	Sodded, all-weather for all types of aircraft. Good drainage. Dispersal for 9 heavy bombers, 25 fighters. Paved road to Puluan port.
31. Gingoog 8° 49′ N, 125° 06′ E	FLG	Three and one-half miles south of Gingoog on Gingoog Bay on north coast of Mindanao Island.	Runway 3,400 by 150 feet northeast to southwest.	Sodded ground, soft after rain. Dispersal for 25 fighter aircraft. Standard gauge railroad to deep water port at Anakan.
32. Iligan 8° 15′ N, 124° 15′ E	FLG	About 1,000 feet north of Mandulug River mouth on Iligan Bay, 1 mile north of Iligan.	Runway 4,000 by 300 feet east to west.	Grass surface, soft in wet weather. Ample cover nearby.
33. Kabacan 7° 09′ N, 124° 49′ E (approx.)	ELG	One and one-half miles south of Pulangi and Kabacan River junctions near Kabacan.	Approximately 750 by 150 feet.	Believed wet and dangerous. Ample cover nearby.
34. Kibawe 7° 30′ N, 124° 59′ E	ELG	At Kibawe, 51 miles southeast of Lake Lanao, 52 miles northwest of Davao.	Runway 2,624 by 246 feet north to south.	Sodded clay loam, all-weather. Ample cover nearby.
35. Labo 8° 11′ N, 123° 49′ E (approx.)	MLG	Near Labo barrio, 4 miles northwest of Misamis at the southwest end of Iligan Bay.	Reported 4,642 by 328 feet.	Grass sod on sandy loam. All-weather. Suitable for all types of aircraft. Ample cover. Paved road to Port Misamis.
36. Dansalan-Maguire 8° 01′ N, 124° 17′ E	FLG	At Camp Keithley, ½ mile northwest of Lake Lanao, 2 miles west of Dansalan. Elevation 2,455 feet.	Runways 2,297 by 180 feet north to south; 2,297 by 164 feet northwest to southeast.	Sodded, all-weather, good drainage, 2.2% down-grade to south. Military barracks and other buildings at Camp Keithley.
37. Makar 6° 06′ N, 125° 09′ E	ELG	On west shore near north end of Sarangani Bay, near Makar River mouth and Makar Barrio.	Reported 1,950 by 651 feet.	Smooth, sandy turf. Limited cover nearby.
38. Malabang 7° 38′ N, 124° 04′ E	HLG	Three miles north of Malabang on north shore of Illana Bay in south Mindanao Island.	Runways 7,500 by 300 feet east to west, 4,500 by 300 feet north to south.	Smooth sand, all-weather. Also reported as grass on coral base. Extensive natural cover.
39. Malangas 7° 36′ N, 123° 02′ E (approx.)	ELG	Near Malangas barrio in Zamboanga Province, on west shore of Dumanquilas Bay.	Approximately 1,500 by 200 feet.	Sodded, possibly extensible. Ample cover nearby. Waterway and roads to Zamboanga. Radio and telegraph in Malangas.
40. Malaybalay 8° 02′ N, 125° 06′ E	FLG	At Mamala barrio, 2 miles west of Malaybalay; elevation 2,050 feet.	Runways, 2,370 by 300 feet northwest to southeast; 3,400 by 300 feet northeast to southwest.	Sodded loam, all-weather, excellent drainage. Suitable for light aircraft. Near road to Davao, Del Monte, and Cagayan.
41. Maramag No. 1 7° 44′ N, 125° 00′ E	FLG	Just south of Maramag, 53 miles east-southeast of Maguire Field on Lake Lanao. Elevation 1,550 feet.	Reported 3,000 by 300 feet east to west.	Grass surface, soft after heavy rain but drainage good. Used in 1942 by P-40s and B-25s.
42. Maramag No. 2 7° 44′ N, 125° 00′ E (approx.)	MLG	Near Maramag about 500 feet east of Maramag No. 1.	Reported 5,000 by 250 feet north-northwest to south-southeast.	Grass surface, soft after heavy rain but drainage good. Used in 1942 by P-40s and B-25s.

TABLE XII - 3 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
43. Maramag No. 3 7° 43′ N, 125° 01′ E (approx.)	HLG	Two miles south of Maramag No. 1.	Runways 6,000 by 500 feet east-northeast, 4,000 by 500 feet north to south.	During April, 1943, a 3-inch gravel surface was being laid on the north to south runway.
44. Maraut River (Pantukan) 7° 19′ N, 125° 57′ E	ELG	In wooded canyon on bank of Maraut River near Pantukan, 20 miles northeast of Bassa Point on Samal Island in Davao Gulf.	Reported 3,003 by 197 feet east to west.	Area limited by canyon. Upgrade to east, landings from west and take offs from east only. Sodded clay loam. Good cover.
45. Midsayap 7° 10′ N, 124° 32′ E (approx.)	FLG	Three miles south of Midsayap, 5 miles southeast of Lake Labas. Estimated elevation 200 feet.	Reported 5,249 by 328 feet east to west.	Drainage poor. Good cover available.
46. Mount Matutum 6° 26′ N, 124° 58′ E (approx.)	MLG	Seven miles northwest of Mount Matutum in Cotabato Province, 18 miles southeast of Lake Buluan. Estimated elevation 1,500 feet.	Reported 4,921 by 262 feet north to south.	Level and rolled with gravel. Soft when wet. Hills to south. Best approach from north. Only cover at north end of field.
47. Pikit 7° 04′ N, 124° 40′ E (approx.)	ELG	One mile north of Pikit-Pagalungan barrio, 35 miles east-southeast of the mouth of Mindanao River.	Approximately 700 by 200 feet north to south.	Possibly extensible. Limited cover.
48. Placer-Badas 9° 38′ N, 125° 33′ E	ELG	Near barrio of Basas, 2½ miles west of Plaur, 7 miles north of Mainit Lake.	Runways, 2,625 by 164 feet east to west, 2,297 by 98 feet northeast to southwest.	All-weather. Northeast to southwest runway paved, east to west runway soft when wet. Ample cover. Buildings. Access by road and waterway.
49. Santa Cruz 6° 56′ N, 125° 25′ E	ELG	Eight miles north-northeast of Santa Cruz, 14 miles southwest of Davao.	Reported 2,600 by 650 feet.	Limited cover nearby. No other details.
50. Valencia No. 1. 7° 50′ N, 125° 05′ E, (Based on AAF chart 855 AI)	MLG	Two miles north of Valencia Barrio, 14 miles south of Malaybalay. Elevation 1,032 feet.	Reported 5,280 by 900 feet north to south.	Sodded clay loam. Serviceable in all-weather. Good cover nearby.
51. Valencia No. 2 7° 53′ N, 125° 06′ E (approx.)	MLG	Near Mailag, 4 miles north of Valencia on east side of Valencia-Malaybalay highway. Estimated elevation 1,850 feet.	Reported 5,249 by 328 feet northeast to southwest.	Cogon grass turf. Good drainage. Serviceable in all-weather for all types of aircraft.
52. Wolfe Field 6° 56′ N, 122° 02′ E	FLG	At Calarian barrio 4 miles west of Zamboanga on southwest tip of Mindanao Island.	Runway 2,296 by 197 feet.	Sodded ground, serviceable in all-weather. Good cover nearby.
53. Zamboanga 6° 55′ N, 122° 07′ E	HLG	Just east of the town of Zamboanga on southwest tip of Mindanao Island.	Three strips reported 7,000 by 400 feet, 7,000 by 400 feet, 4,000 by 400 feet.	The existence of this new large landing ground has not been confirmed.
		Sector D: Sulu Archipelago		
54. Zettel Field (Jolo) 6° 03′ N, 121° 01′ E	FLG	On northwest coast of Jolo Island, 1 mile east of town of Jolo.	Reported 3,960 by 459 feet east to west.	Sodded clay loam. Serviceable in all-weather. Cover nearby.
		Sector E: Northeast Borneo		
55. Jesselton 5° 57′ N, 116° 04′ E	HLG	On northwest coast of North Borneo, 3 miles west of Jesselton.	Various reports. May not be actually constructed. Also two 7,000 foot runways reported.	Fuel, oil, water and some repair facilities available. Radio station and accommodations at Jesselton.
56. Kenigau 5° 21′ N, 116° 12′ E (town)	ELG	Exact location unknown; reported to lie between 2 spurs of low hills.	Reported 3,300 feet square, exact dimensions unknown.	Sandy soil covered with alang (heavy grass). No other details.
57. Kudat 6° 56′ N, 116° 50′ E	ELG	Three and one-half miles north of Kudat on the northwest coast of Marudu Bay at north end of west arm of North Borneo.	Unknown.	Details unknown. Reported a military field and considered operational.

TABLE XII - 3 (Continued)

NAME AND COORDINATES	CLASSIFICATION	LOCATION	DIMENSIONS	REMARKS
58. Labuan Island 5° 20′ N, 115° 13′ E (approx.)	FLG	Reported on Labuan Island which lies off the west coast of British North Borneo.	Varying reports of 2 runways, longest 6,000 feet; also that both are 6,000 feet.	Two aircraft observed here according to recent intelligence. No other details.
59. Lahad Datu 5° 02′ N, 118° 20′ E (town)	ELG	Reported at Lahad Datu in west corner of northernmost reach of Darvel Bay on the Southeast coast of Borneo.	Unknown.	No other details but field is considered operational.
60. Ranau 5° 58′ N, 116° 42′ E (town)	ELG	Exact location unknown. Ranau is reported in West Coast Residency 1 mile east of confluence of Ligwau and Berambang Rivers.	Unknown.	Reported that development was unlikely. Also reported that it is now considered operational.
61. Sandakan 5° 51′ N, 118° 07′ E (town)	ELG	Reported at Sandakan on the west side of the entrance to Sandakan Harbor on the northeast coast of Borneo.	Unknown.	Details unknown; development into a major base expected; considered operational.
62. Tarakan 3° 20′ N, 117° 34′ E	ELG	In central part of southwest coast of Tarakan Island, 5 miles north-northwest of Tarakan.	Runways 2,850 ft. northeast to southwest, 2,520 feet east to west, 2,430 feet northwest to southeast, 2,310 feet north to south.	Firm earth and grass usually serviceable; fuel and oil available; facilities for minor repairs. Dutch had 4 fighter and 4 bomber revetments here.
63. Tawau 4° 15′ N, 117° 53′ E (town)	ELG	Reported at Tawau on north shore of entrance to Cowie Harbor on the southeast coast of North Borneo.	Unknown.	Details unknown but it is considered now to be used for operational purposes.
		Sector F: Northern Celebes		
64. Langoan 1° 09′ N, 124° 50′ E	FAD	One mile east-northeast of Langoan, 3 miles west-southwest of Kokas at the south end of Lake Tondano.	Reported 4,200 by 300 feet north-northeast to south-southwest.	Surface coral or limestone, probably all-weather. Extensible. Dispersal for 40 fighters, 30 bombers. Buildings nearby. Mountains in area.
65. Mapanget 1° 31′ N, 124° 54′ E	FLG	One and three-fourths miles west of Mapanget, just north of Mapanget River and south of Kima River, 6 miles east-southeast of Manado.	Information varied, (Topic 124, F, (3), (b))	Grass surface. Reported capacity 20 fighters, 40 bombers.

TABLE XII - 4

POSSIBLE AIRFIELD SITES

Sector A. Halmahera

NAME	APPROXIMATE COORDINATES	REMARKS
1. Akelamo	1° 28′ N. 128° 40′ E.	Small coconut plantation, 62 acres near Akelamo; ground flat and dry; soil, sandy.
2. Belangbelang I.	1° 19′ S. 127° 24′ E.	Possible site a mile long northwest to southeast on northeast side of the island.
3. Bisa I.	1° 15′ S. 127° 28′ E.	Possible strip reported at southwest end of Bisa Island, which is 13 miles north of west end of Obi Major Island.
4. Boeli-Serani	0° 52′ N. 128° 17′ E.	Clearing for possible strip reported inland from Boeli-Serani, north coast of Boeli Bay.
5. Djailolo North	1° 09′ N. 127° 28′ E.	Five miles north-northeast of Djailolo; cleared for 1650 feet by the Dutch in 1941; not developed; extension possible in all directions; a good deal of levelling required on this strip.
6. Djailolo South	1° 07′ N. 127° 28′ E.	Three and one-fourth miles north-northeast of Djailolo; cleared for 5280 feet by the Dutch in 1941; not developed; extension possible east-west.
7. Galela East	1° 48′ N. 127° 53′ E.	Possible clearing for strip reported 7 miles east-southeast of Galela medium bomber airfield, 3 miles east-southeast of Galela; unconfirmed.
8. Morotai I.	2° 06′ N. 128° 31′ E.	Possible strip reported on southeast end of Morotai Island; unconfirmed.
9. Sidangoli	0° 54′ N. 127° 31′ E.	Possible site, runway limited to 4000 feet (approximately) northeast-southwest; near Sidangoli at northwest end of Dodinga Bay.

TABLE XII - 4 (Continued)

NAME	APPROXIMATE COORDINATES	REMARKS
10. Sofifi	0° 44′ N. 127° 33′ E. (town)	Clearing for strip reported but not confirmed, 1 mile south of Sofifi.
11. Tilope	0° 13′ N. 127° 55′ E.	Possible site on coastal plain near Tilope village, on the east coast of south arm of Halmahera Island. Land is flat, dry, and sandy near the shore.
12. Tobelo	1° 39′ N. 128° 00′ E.	Possible site on coastal plain 5 miles south of Tobelo, 15 miles southeast of Galela, on east coast of Halmahera Island. Ground reported flat, firm, and well drained.
13. Wajaoea	0° 45′ S. 127° 39′ E.	Possible site about 1 mile northeast of Wajaoea village, on south side of isthmus on Batjan Island.
14. Wasile	1° 04′ N. 127° 59′ E. (town)	Probably just north of Wasile town, on northeast coast of Kaoe Bay; "serviceable strip" reported but not confirmed.
		Sector B. Sangihe-Talaud
15. Karakelong I.	4° 00′ - 4° 35′ N. 126° 33′ - 126° 55′ E.	A few flat areas along the coast; no detailed information.
16. Tamako	3° 28′ N. 125° 30′ E.	Possible sites reported near Tamako on the southwest coast of Sangihe Island.
		Sector C. Mindanao
17. Camp Overton	8° 12′ N. 124° 12′ E. (town)	Possible site reported at Camp Overton at the head of Iligan Bay; flat, cleared area on the coast.
18. Dalwangan	8° 06′ N. 125° 04′ E.	Possible site reported at Dalwangan; outside of town parallel to a road.
19. Davao (Japanese Colony)	7° 17′ N. 125° 41′ E.	Approximately 15 miles north-northeast of Davao in the midst of a Japanese Colony, a natural landing field 6000 feet by 7000 feet.
20. Davao Gulf	6° 30′ N. 126° 07′ E.	Any amount of flat land which could be cleared and used as a landing ground; on the east coast of Davao Gulf, in the general vicinity of Madtuka Point.
21. Dapitan	8° 39′ N. 123° 26′ E. (town)	Potential site just in front of the church at Dapitan, on the north end of Mindanao Island, about 1200 feet by 1500 feet, running down to the water, could be made into a small field.
22. Dayana Point	7° 39′ N. 123° 08′ E.	Potential site reported on Dayana Point on the south central coast of Mindanao; on the northeast coast of Dumanquilas Bay; the land slopes gently back from the end of the point for a distance of about 1 mile.
23. Dumanquilas Bay	7° 04′ N. 123° 01′ E.	Potential site just northwest of Bacao, just southwest of Boton; 3000 feet by 1500 feet nearly level but needs clearing; good approaches.
24. Igai Point	7° 38′ N. 123° 03′ E.	Potential site reported on Igai Point on west side of Dumanquilas Bay on south side of Mindanao Island; on a 100 foot plateau which tops the point; reasonably flat, needs clearing; drainage considered excellent.
25. Malalag	6° 36′ N. 125° 23′ E.	Flat area to the southwest of Malalag which is on the southwest coast of Malalag Bay, east of Davao Gulf; needs to be cleared.
26. Malamaui I.	6° 43′ N. 121° 58′ E.	Potential site reported on Malamaui Island, just northwest of Basilan Island; landing field could be cleared at a neighboring rubber plantation but would entail considerable work.
27. Murcielagos Bay	8° 35′ N. 123° 34′ E.	Sites are located in the vicinity of the cultivated areas on Diuyu River; at the South end of Murcielagos Bay.
28. Nasipit Harbor	8° 59′ N. 125° 26′ E. (town)	Potential site reported at Nasipit Harbor on the northwest coast of Mindanao Island; sufficient level ground to permit clearing and levelling for a landing ground.
29. Polloc Harbor	7° 23′ N. 124° 16′ E. (town)	Small emergency landing ground could be made from the parade ground at the constabulary post at Parang by removing the radio poles; on the central east coast of Polloc Harbor.
30. Port Holland	6° 33′ N. 121° 52′ E.	Potential site reported at Port Holland in a large area filled and packed with sawdust; on the west coast of Basilan Island.
31. Port Misamis	8° 10′ N. 123° 51′ E.	Two excellent sites about ½ to 2 miles in area reported on the road between Misamis and Clarin; at the southwest end of Iligan Bay.
32. Port Sibulan	7° 33′ N. 122° 54′ E.	Potential site reported at the head of Port Sibulan on the south coast of Mindanao Island; could be prepared at considerable cost by clearing the necessary land.

TABLE XII - 4 (Continued)

NAME	APPROXIMATE COORDINATES	REMARKS
33. Sapali	6° 18′ N. 124° 43′ E. (town)	Possible site reported at Sapali which is ½ mile northeast of Alah River; 6 miles northwest of Lake Sultan; about 23 miles south-southwest of Lake Buluan.
34. Sindangan	8° 14′ N. 123° 00′ E. (town)	Potential landing field reported at Sindangan; in the northeast corner of Sindangan Bay; 1½ miles north of mouth of Sindangan River.
35. Sumilao	8° 17′ N. 124° 56′ E. (town)	Potential site reported at Sumilao which is 20 miles southwest of the head of Macajalar Bay.
		Sector D. Sulu Archipelago
36. Banaran I.	5° 01′ N. 120° 08′ E.	Area is well cleared and could be prepared easily on Banaran Island in the Tawitawi Island Group.
37. Bubuan I.	5° 25′ N. 125° 35′ E.	Potential site on Bubuan Island in Tawitawi Group; best cleared areas are on the north side of the island.
38. Carmen Point	5° 05′ N. 119° 50′ E.	One mile east of Carmen Point, on the west coast of Tawitawi Island, an area which could be levelled. Reported as the best spot in the Tawitawi Islands for building and maintaining a landing field.
39. Manalik Channel	5° 05′ N. 119° 50′ E.	A landing ground could possibly be constructed on the east side of Manalik Channel between Carmen Point and Lapidlapid; area only 75% cleared.
40. Papahag I.	5° 02′ N. 119° 48′ E.	Potential site reported in the center of Papahag Island, at the south end of the Tawitawi Group; area is flat and could easily be cleared.
41. Sanga Sanga I.	5° 04′ N. 119° 48′ E.	North of Malasa Point, site about 1 mile square may be prepared in less time than any other point in the Tawitawi Group; Sanga Sanga Island is one of the southernmost in the Tawitawi Group.
42. Secubun I.	5° 06′ N. 120° 18′ E.	The east central side of the island can easily be cleared to form a landing field 1 mile by ½ to ¾ mile. The soil is coarse loam with chalky sub-soil at about 18 inches. Secubun Island is 4½ miles southeast of Tawitawi Island.
43. Simunul I.	4° 53′ N. 119° 51′ E.	Cleared spaces are available on both east and west sides of the island which is 9 miles south of Tawitawi Island. In 1929 a naval reconnaissance estimated that in three weeks with local Simunul labor a large-sized landing field could be cleared.
44. South Ubian I.	5° 10′ N. 120° 30′ E.	Potential site which could be levelled in a reasonably short time, rich loam soil with a tendency to fine coral and sand toward the shore. Cleared spaces are firm. About 17 miles east of Tawitawi Island.
45. Tabawan I.	5° 13′ N. 120° 35′ E.	Reported probably the flattest island in the Tawitawi Group, areas on both north and south shores where a small plane could take off.
		Sector F. Northern Celebes
46. Amoerang	1° 11′ N. 124° 33′ E. (town)	Possible site reported around Amoerang Bay to the west and along the coast from Amoerang.
47. Belang	0° 56′ N. 124° 47′ E.	Possible site reported at Belang on the south side of the north arm of the Celebes; coconut plantations along the shore.
48. Bongo	0° 42′ N. 122° 30′ E.	Possible sites reported in low flat areas along the coast; in valley of Pagoejaman River near Bongo.
49. Dondo Bay	0° 52′ N. 120° 22′ E.	Possible site on a low flat shore covered with mangroves and coconut plantations on south side of inlet on west side of Dondo Bay.
50. Gorontalo	0° 30′ N. 123° 03′ E.	Possible site in Pagoejaman valley about 30-40 miles from Gorontalo.
51. Kema	1° 22′ N. 125° 05′ E. (town)	Possible site reported at Kema on east side of north tip of the Celebes; on a low plain covered with coconut plantations and scattered mangrove.
52. Kotaboena	0° 48′ N. 124° 39′ E. (town)	May be same as Kotaboenan (coordinates given); low ground with protected anchorage behind islands.
53. Limba	0° 29′ N. 122° 32′ E.	Existence doubtful, unconfirmed.
54. Leok (Bilang Bay)	1° 09′ N. 121° 25′ E.	Possible site about 3 miles southeast of Leok on southwest side of Bilang Bay; flat shore but area is rather marshy.
55. Tamboe Gulf	0° 01′ N. 119° 54′ E.	Low sandy shores planted with coconuts on Tamboe Gulf.
56. Toeladenggi	0° 45′ N. 121° 52′ E.	West in the direction of Cape Santigi some flat stretches of coast line with scattered jungle of coconut plantations.

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