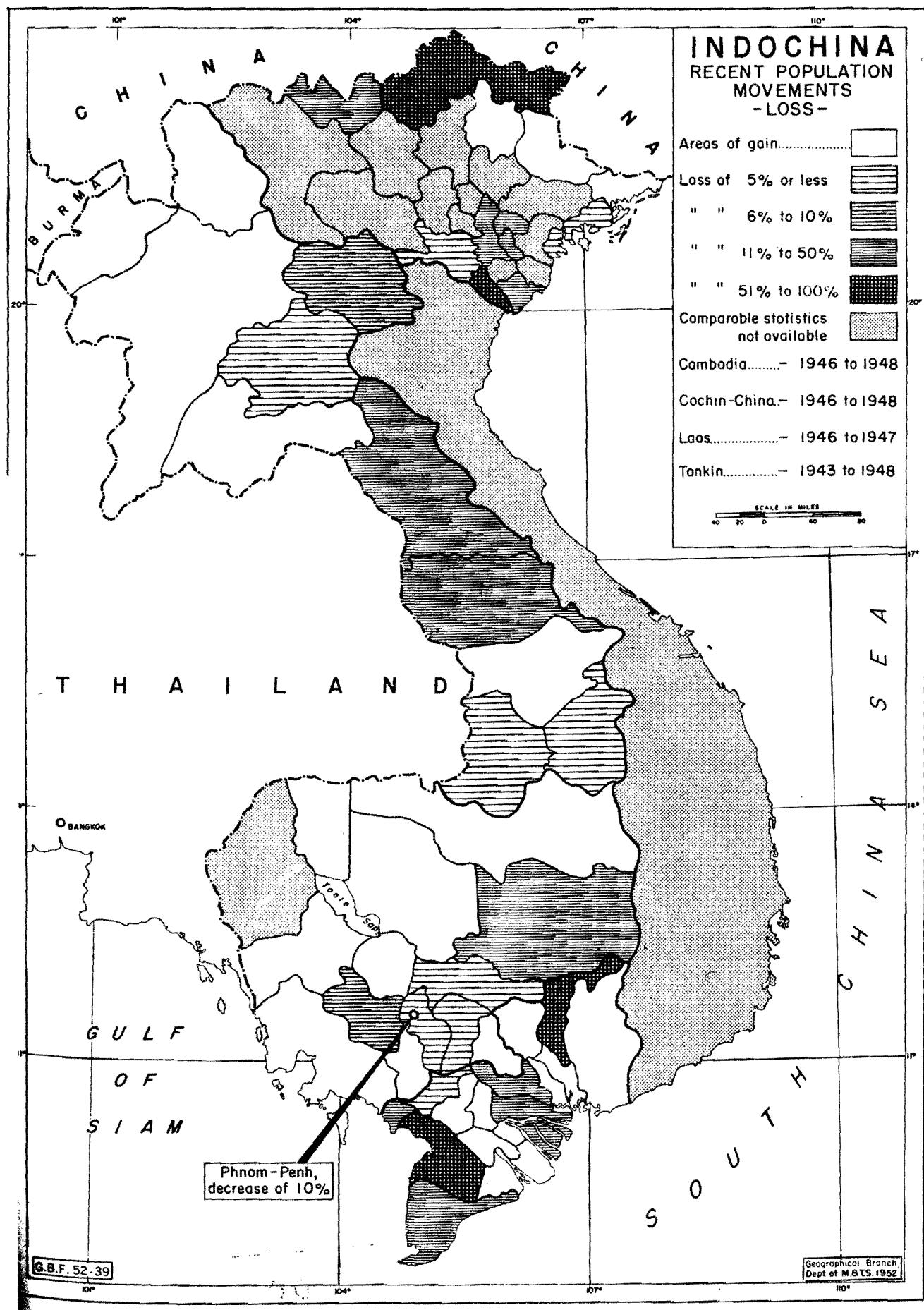


FIG. 21 (A)



CHAPTER III
ECONOMIC GEOGRAPHY

Europeans in Indo-China, the French in particular, have made considerable progress in the production of plantation crops and in the development of mining. Manufacturing industries, either in the hands of Europeans or Chinese, have also attained some prominence within the country during the last fifty years. However, agriculture is still the most important industry in the country, both from the number it employs and from the volume of its produce. Here again, European plantation agriculture as opposed to native cultivation of rice is of only minor importance. The greatest single economic activity in the country is rice cultivation as practised by the lowland peasants.

AGRICULTURE

No statistics regarding the number of Indo-Chinese people engaged in agriculture can be quoted, but the proportion is known to be extremely high. Nearly every member of peasant families is engaged in some aspect of agriculture at some time of the year.

The total area of cultivated land in Indo-China, in 1936, was probably about 13 million acres, or about 20,000 square miles (Table 1). Comparable figures are not available for Laos. The lowland area of this state is restricted in size, and it is probably difficult to estimate with accuracy the area of land under shifting cultivation.

TABLE 1 - CULTIVATED LAND IN FOUR STATES OF INDO-CHINA, 1936

<u>State</u>	<u>Cultivated Area (acres)</u>
Tonkin	2,915,000
Annam	1,878,000
Cambodia	1,947,000
Cochin-China	5,579,000

Source: International Labour Office. Labour conditions in Indo-China. Studies and Reports, Series B, No. 26. Geneva, 1938, p. 217.

The importance of the cultivated land in each state can be judged by its nutritional density; that is, the number of persons supported by each square mile of cultivated land. In 1936, the average nutritional density in Tonkin and Annam was almost 2,000. In Cambodia and Cochin-China, where the population was comparatively low, the nutritional densities were about one-half and one-quarter as great, respectively. These are the areas from which surplus crops, particularly rice, can be obtained. The gravity of the population problem in parts of Tonkin can be seen by the nutritional densities

obtaining in some of the provinces (Table 2). In the province of Quang Yen, nearly 6,000 persons were supported by each square mile of cultivated land. In this area, of course, coal-mining and dependent industries supported part of the population. However, in several other provinces the nutritional densities were between two and three thousand. Although nutritional densities have not been calculated for 1943, comparison of the population figures for 1936 and 1943 gives some conception of the growing seriousness of the problem. These provinces are all located in the Red River and adjoining deltas where areal expansion of agriculture is approaching its limits.

TABLE 2 - NUTRITIONAL DENSITIES AND POPULATIONS OF SOME TONKIN PROVINCES, 1936 and 1943

Province	1936	1936	1943
	<u>Nutritional Density</u>	<u>Population</u>	<u>Population</u>
Quang Yen	5,957	100,000	188,500
Yenbay	2,960	76,000	107,600
Hadong	2,916	807,000	964,400
Backan	2,136	53,000	69,500
Nam Dinh	2,033	1,013,000	1,233,400
Thai Binh	2,033	960,000	1,139,800

Source: Labour conditions in Indo-China. p. 217. Annuaire Statistique de l'Indochine, 1931-1932 and 1943-1946.

The problem of rural over-population is further complicated by the system of land tenure. In Annamite communities, it is customary for property to be divided equally among all children of the family.¹ In densely populated areas, such as the Tonkin delta, this custom leads to the development of minute farms. Over 60 per cent of the farms in Tonkin are considerably less than one acre in extent, and another 30 per cent are less than five acres (Table 3). Not even the most intensive and efficient utilization of such farms could produce an adequate standard of nutrition for many people. In Annam itself, nearly 70 per cent of all farms are of about 1.2 acres in extent, or less. In Cochin-China and Cambodia, most of the newly developed rice lands are bought in fairly large blocks, and the average farm size is larger. The proportion of small-size farms appears to increase with the proportion of the Annamite population in a state, a reflection both of the proprietary customs and of the prevailing high birth rates of these people.

Although individual land holdings in Cochin-China are relatively large, most farms of more than 25 acres are subdivided into lots of from 12.5

¹ Pelzer, K.J. Economic survey of the Pacific area. Part 1, Population and land utilization. International Secretariat, Institute of Pacific Relations, New York. 1941. p. 136.

TABLE 3 - SIZE OF LAND HOLDINGS AND NUMBER OF FARMS

	No. of Farms	%
<u>Tonkin</u>		
Less than .89 A. (approx.)	594,000	61.6
.89 to 4.45 A.	288,000	29.9
4.45 to 8.9 A.	60,000	6.2
8.9 to 44.5 A.	21,000	2.2
44.5 to 89 A	800	.1
Over 89 A.	200	--
<u>Annam</u>		
Less than 1.2 A.	450,000	68.7
1.2 to 6 A.	165,000	25.2
6 to 12 A.	31,000	4.7
12 to 60 A	8,500	1.3
60 to 120 A.	300	.1
Over 120 A.	50	--
<u>Cochin-China</u>		
Less than 2.5 A.	86,000	33.7
2.5 to 12.5 A.	97,000	38.0
12.5 to 25 A.	38,000	14.9
25 to 125 A.	28,000	11.0
125 to 250 A.	3,600	1.4
250 to 1250 A.	2,400	.9
Over 1250 A.	200	.1
<u>Three Provinces of Cambodia</u>		
Less than 2.5 A.	25,000	20.9
2.5 to 12.5 A.	72,000	60.2
12.5 to 25 A.	18,000	15.0
25 to 125 A.	4,400	3.7
125 to 250 A.	100	.1
250 to 1250 A.	40	--
Over 1250 A.	10	--

Source: Annuaire Statistique de l'Indochine, 1931-1932.

to 25 acres in size and leased to tenants.¹ Thus, over 35 per cent of the farms in Cochin-China are operated by tenants.² These tenants, or ta dien, are expected to clear the land themselves, to dig the necessary ditches for drainage and irrigation, to erect the farm buildings and to supply all implements. As rent, the landlord receives 40 to 50 per cent of the harvest.

¹ Pelzer. Op. cit., p. 137.

² Annuaire Statistique de l'Indochine, 1931-1932.

The tenants are usually forced to borrow money from the landlord, against the harvest, at high rates of interest. These circumstances cause widespread poverty and perpetual indebtedness among the tenant farmers.¹

The proportion of farms operated by tenants is much lower in the other states. However, even in Tonkin, where less than two per cent of the farms are recognized as being tenant-operated, many of the peasant proprietors are actually tenants. The peasants are constantly in arrears, and have to make annual payments to the money-lenders. Furthermore, many farms are registered as the property of the operators which are actually controlled by large land-owners.² The necessity for contracting debt results from the small size of the farms and, in turn, from the population pressure within the area.

The economic difficulties of the peasant farmers constitute one of the greatest problems in Indo-China and, at the same time, present the greatest obstacles to any satisfactory solution of that problem.

Rice: About 86 per cent of the cultivated land is devoted to rice.³ Apart from areas where plantation crops are grown, it seems probable that cultivated lands and rice lands are almost co-extensive.

There are two main rice-growing areas: the deltas of Tonkin and northern Annam, and the delta and plain of the lower Mekong (Fig. 22). In the latter area, cultivation does not extend below the high-water level of Tonlé Sap. Smaller areas lie along the Mekong and its tributaries, and on the discontinuous delta lands of the Annam coast. Within these areas, not all the land surface is cultivated, and the intensity of cultivation varies greatly from region to region. The proportion of rice lands within each state is similar to that of cultivated lands as a whole (Table 4).

TABLE 4 - AREAS OF RICE CULTIVATION IN INDO-CHINA
(thousands of acres)

State	An Average Year ¹	1942- ²	1943-44 ³	1945-46 ³
Annam	1,977	2,337	2,581	2,831
Cambodia	1,977	2,939	2,125	2,330
Cochin-China	5,683	5,690	5,446	4,910
Laos	988	1,102	—	—
Tonkin	2,965	3,674	3,424	4,526
Approx. Total	13,590	15,242	—	—

¹ From Annuaire Statistique de l'Indochine, 1931-1932.

² From Annuaire Statistique de l'Indochine, 1941-1942.

³ From Annuaire Statistique de l'Indochine, 1943-1946.

¹ Pelzer. *Op. cit.*, p. 137.

² Jacoby, E.H. *Agrarian unrest in southeast Asia*. Columbia University Press, New York, 1949. p. 143.

³ Wickizer, V.D., and M.K. Bennett. *The Rice Economy of Monsoon Asia*. Food Research Institute, Stanford University, California, 1941. p. 31.

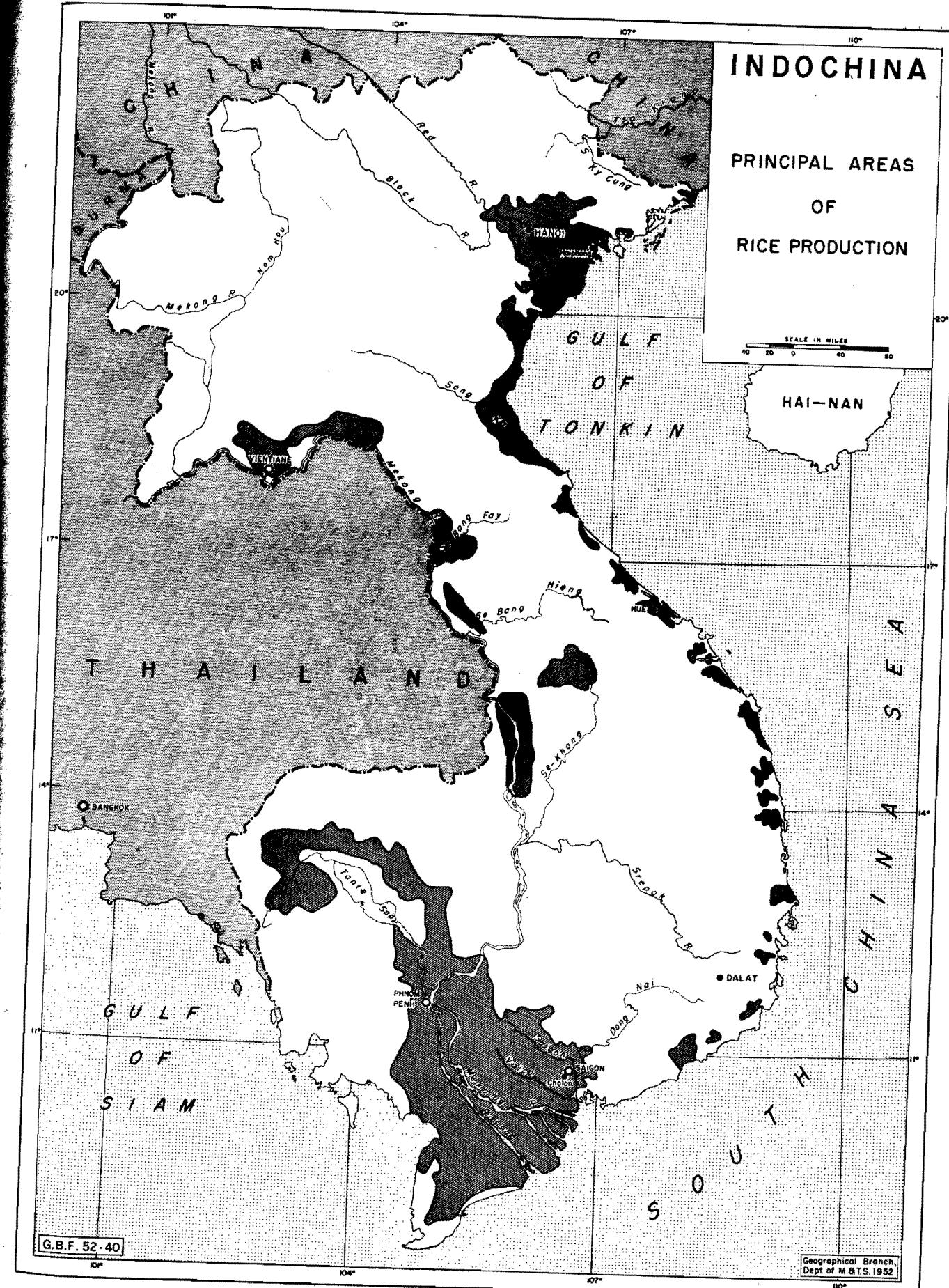


FIG. 22

Throughout Indo-China, as in all Asia, many varieties of rice have been developed to meet the varied conditions of climate and soil. Some varieties are known as "upland" or "mountain" rice, and are grown by dry-farming methods. Most rice, however, is grown in irrigated lowlands, by methods which vary only in detail in different localities.

Rice cultivation requires a great deal of exhausting hand labour. Sowing, transplanting, and harvesting are all performed by the peasant and his family, assisted by neighbours or hired helpers at transplanting and harvesting times. In most parts of Indo-China, scoops are used to flood the fields and to drain them again before harvesting. Oxen or buffalo may be used in ploughing and cultivating the land, but in over-populated areas the food requirements of these animals may make their employment prohibitive.

The climatic requirements of the rice plant are exacting. Flooding of the seed-beds and fields retards sowing and transplanting. Droughts may prevent the maintenance of a sufficient water-level during the growing period. A period of dry weather is necessary at harvest time, and rains can ruin the crop. The periods for sowing and harvesting, and the number of crops grown in a year, are adapted to the climatic regime of each region.

Indo-China is not one of the great rice-producing nations of Asia. Since 1947, production of rice in Indo-China has ranked about eighth among Asiatic countries.¹ Gross annual production appears to vary between four and eight million tons. The importance of Indo-China as a rice-producing country, however, lies in the volume of its surplus crop which enters into foreign trade.

Within Indo-China itself, the state of Cochin-China leads in production, followed by Tonkin, Annam, Cambodia, and Laos, in that order (Table 5). Because of lower population requirements, surplus rice crops are produced in Cochin-China and Cambodia.

TABLE 5 - PRODUCTION OF RICE IN INDO-CHINA

(thousands of metric tons)

State	An Average Year ¹	1942-43 ²	1943-44 ³	1945-46 ³
Annam	900	983	1,178	1,011
Cambodia	800	838	651	1,054
Cochin-China	2,700	3,179	2,612	2,214
Laos	300	386	—	—
Tonkin	1,600	1,882	1,762	1,680
TOTAL	6,300	7,268	—	—

¹ Annuaire Statistique de l'Indochine, 1931-1932.

² Annuaire Statistique de l'Indochine, 1941-1942.

³ Annuaire Statistique de l'Indochine, 1943-1946.

¹ United Nations. Economic Survey of Asia and the Far East, 1948.

Crop yields in Indo-China are among the lowest of Asia, and are apparently declining.¹ Within Indo-China itself, yields appear to increase with intensity of cultivation (Table 6). The highest yields are obtained in Tonkin, and the lowest yields in Laos, where a greater proportion of rice is grown by extensive methods.

TABLE 6 - YIELDS OF RICE IN INDO-CHINA
(metric tons per acre)

State	An Average Year ¹	1942-43 ²	1943-44 ³	1944-45 ³
Annam	.48	.40	.44	.36
Cambodia	.40	.32	.32	.44
Cochin-China	.48	.56	.48	.44
Laos	.28	.36	—	—
Tonkin	.52	.52	.52	.48
TOTAL	.48	.48	.44	.44

1 Annuaire Statistique de l'Indochine, 1931-1932.

2 Annuaire Statistique de l'Indochine, 1941-1942.

3 Annuaire Statistique de l'Indochine, 1943-1946.

Other Food Crops: Rice forms about 90 per cent of the diet of the Indo-Chinese peasants, but other crops are grown as supplementary food sources and as cash crops.

Maize or corn is the chief supplementary crop grown by the peasants. In 1936, the area devoted to corn totalled 1,235,000 acres, but by 1944 it had declined to about half that area, and production had declined from about 600,000 tons to about 200,000 tons. The area used for growing corn varies greatly from year to year within each region, depending upon the volume of the rice harvest. Usually, about 50 per cent of the corn acreage is in Cambodia, along the Mekong, and about 30 per cent in the Tonkin delta. None of the other states has large areas devoted to corn. In recent years, corn has constituted a cash crop for the natives, and a fairly important item of export.

Other food crops grown by the natives include sweet potatoes, haricot beans, soya beans, taro, manioc, yams, and millet. Few are produced in quantities sufficient for export, but are used as subsistence food crops. Vegetables are grown in the vicinity of Dalat for the Saigon-Cho-lon market. Citrus fruits are grown in Cochin-China, and bananas in Annam.

Cash Crops: Certain crops are grown in Indo-China to supplement the farmers' income from rice, but few are of great importance, or are cultivated as successfully as they might be.

¹ Wickizer and Bennett. Op. cit., Table III, p. 318-9.

After the failure of cotton as a plantation crop, encouragement was given to native growers in an attempt to supply the French demand for cotton.¹ However, cotton is grown by the natives as an off-season crop during the dry months. Its quality is poor, and it cannot compete with imported fibres.

In Annam, Cambodia, and parts of the Tonkin delta, some families grow mulberry trees either to feed their own silk-worms or to supply leaves to neighbouring villages. The government has provided experimental stations and supervisory personnel for the industry, but the silk is produced under poor conditions and remains of low quality.

Coconuts are grown on the coastal plains as far north as Tourane. In Anna, typhoons damage the groves, and the most important producing area is in central Cochin-China. The fall in prices of copra during the depression halted the development of new plantations, so that most trees are now over age. Both copra and coconut-oil are produced, but the quality is poor.

The Indo-Chinese natives prefer a dark, strong tobacco which is grown locally. The soil requirements for this type of plant and the large labour force needed to grow tobacco are both found in the lowland areas. The light tobacco preferred by Europeans grows best in the upland regions, where the Moi produce some low-quality leaf.

Between 80,000 and 90,000 acres of sugar are grown in Indo-China annually,² but the yield is very low, averaging about two tons per acre. Little sugar is used by the natives, but even so some has to be imported.

Other cash crops include peanuts, sesame, and anise, grown for oil, lac and tung used in varnish, kapok, and jute. Natives also grow coffee, tea, and rubber, but these crops are chiefly produced on European plantations.

Livestock

Livestock do not form an important part of the agricultural economy of French Indo-China. The hot, moist summers are not well suited to the healthy development of domestic animals, and also encourage the spread of many diseases. Natural grassland is rare, and the grass which grows in savanna areas is too coarse for pasture. Most important of all is the need for land to produce food crops rather than fodder and pasture. Only pigs and fowls are much used in the native diet. There were about five million pigs in the country in 1942, over twice the number in 1931 (Table 7). Cattle also were more common in 1942 than in 1931, but the number of buffalo declined.

Cattle and buffalo are used as draught animals in the rice fields, and are less important as food. Annam and Cambodia have the greatest number of cattle and Tonkin has the greatest number of buffalo. Pigs, the chief food source, were reared in greatest numbers in Tonkin and the other lowland areas.

¹ Robequain. Economic development. p. 232.

² Annuaire Statistique de l'Indochine, 1943-1946.

TABLE 7 - LIVESTOCK IN INDO-CHINA, 1942.¹

Country	Cattle	Buffaloes	Horses	Pigs	Goats	Sheep	Elephants
Annam	630	320	13	1,000	22	9.5	.7
Cambodia	850	300	40	1,000	20	—	.4
Cochin-China	230	280	10	750	7	.4	—
Laos	130	175	6	250	3	.4	.9
Tonkin	185	455	21	2,000	23	.9	—
TOTAL	<u>2,025</u>	<u>1,530</u>	<u>90</u>	<u>5,000</u>	<u>74</u>	<u>11.2</u>	<u>2.0</u>
TOTAL 1931	<u>2,1850</u>	<u>2,070</u>	<u>90</u>	<u>2,040</u>	<u>47</u>	<u>8.9</u>	<u>1.6</u>

¹ Annuaire Statistique de l'Indochine, 1943-1946.

² Annuaire Statistique de l'Indochine, 1931-1932.

Plantation Crops

The term "plantation agriculture" implies large-scale production of a single commodity for sale, and usually for export. In Indo-China, plantations are generally financed and managed by the French, employing Annamite labour. Only one crop, pepper, is almost exclusively produced on Chinese, rather than French plantations.

Although the earliest plantations were on the margins of the Tonkin delta, most are now in the southern parts of the country. The prevailing narrow annual temperature range favours the growth of the tropical plants usually cultivated on plantations. Furthermore, the soil conditions are also more favourable. The grey soils of northeastern Cochin-China were first used for plantation purposes, but it was not until the red basaltic lands were opened up that plantation agriculture developed greatly (Fig. 13).

The advantages of soil and climate found in southern Indo-China are partially offset by the greater difficulty of obtaining labour. The newer plantations were located on the sparsely populated Moi plateaux, whose people were unaccustomed to working long hours for wages; this necessitated the importation of Annamite labourers from Tonkin.¹ The workers were recruited under contract, usually for a period of three years. Although living conditions on the plantations were sometimes superior to those of their homes, the Annamites disliked being absent from their homes, and desertions were common, sometimes when the workers were in receipt of wages in advance. Most of the plantations were developed in upland areas, where the prevalence of malaria added to the difficulties of the planters and the misery of the labourers.²

¹ Robequain. Op. cit., p. 213.

² Labour Conditions in Indo-China. pp. 300-309.

For the protection of both owners and workers, government regulations have been introduced from time to time. These regulations govern the recruiting of labourers, medical inspection and preventive measures, living and working conditions, and the fulfilment, by the natives, of their contract obligations. These regulations have helped to improve conditions under the contract labour system.

Rubber: Rubber has become the most successful plantation crop in Indo-China. The soils of the red lands are particularly suitable for the cultivation of rubber, and the dry season appears to save the trees from some of the diseases prevalent in more humid climates. Furthermore, France has generally provided a good market for Indo-Chinese rubber. The comparatively late development of the industry in Indo-China has allowed it to take advantage of previous research carried out in other rubber-producing countries.

Rubber was first produced in Indo-China by natives who collected it from a variety of species and sold it to Europeans; the methods used were destructive of the plants exploited. In 1897 Hevea brasiliensis from Malaya was planted in the Saigon Botanical Garden. Interest in Hevea grew slowly, and it was not until 1915 that rubber from this plant out-ranked the production of wild rubber.¹

The earliest rubber plantations were established on the "grey lands", the ancient alluvial terraces of northeast Cochin-China. These lands were close to the populous Saigon area, and were covered only with light brush. For these reasons, little capital was needed. The first plantations were, therefore, small and were usually operated by persons who had some other occupation. The more southerly red lands, those in Cochin-China (Fig. 13), were used for rubber plantations before the First World War,² but those in the vicinity of Dalat were not opened up until 1924. The world demand for rubber encouraged the development of the new areas to the north until 1928. In that year, the Stevenson Plan, an international agreement regulating rubber production, broke down, and prices fell abruptly. The Indo-Chinese government assisted the planters with subsidies and other financial concessions. The London Agreement of 1934 allowed Indo-China a production quota in excess of her output at that time. As the output increased, world demand permitted the upward revision of the Indo-Chinese quota, and the industry enjoyed a fairly prosperous period prior to the Second World War.

Since 1934, few new areas have been planted, but grafted or budded trees are used to re-stock the old plantations. The new stock is from superior strains, and has returned the highest yield per unit area of any country in the Far East.³ However, the grafted trees are not resistant to wind damage, and may be shorter-lived than non-budded varieties.⁴

¹ Robequain. Op. cit., p. 202.

² Ibid., p. 187.

³ Miller. Industrial Resources of Indochina. p. 406.

⁴ Robequain. Op. cit., p. 210.

Methods of cultivation have been changed in order to protect the soil from erosion after clearing. The trees themselves are subjected to less destructive tapping than formerly, and are allowed to rest during the dry season. On the large plantations, especially, the most modern methods of processing and handling the rubber are employed. The quality of rubber produced is good.

The industry in Indo-China is almost entirely in the hands of a few large companies. In 1937, there were 1,005 rubber plantations; of these, 701 were of less than 100 acres, their total area amounting to six per cent of the land planted to rubber. The remaining 304 occupied 94 per cent of the area, and of these, 27 controlled 68 per cent of the total land in rubber plantations. Each of the large rubber companies owned many plantations.¹

Of some 300,000 acres of rubber plantations, over two-thirds are in Cochinchina and about one-fifth in Cambodia. There are a few thousand acres in Annam and a few hundred in Laos. Until 1938, international agreements prevented any great increase in acreage, but a steady increase took place both before and during the Japanese occupation. Although new areas were not always planted, the stock was rejuvenated through the introduction of budded and grafted trees.

Production of rubber amounted to over 10,000 tons in 1930, but increased rapidly after the signing of the London Agreement in 1934. In 1941, production totalled more than 76,000 tons. Production declined to 12,000 tons in 1945 and increased slightly in the years following.² In 1949, it was still less than 45,000 tons.³

Tea: Tea is indigenous to Indo-China, and was cultivated in their gardens by the natives before the arrival of Europeans. Since 1924, tea plantations have been developed on the red lands of Annam. In 1943, there were about 40,000 acres of plantations in Indo-China, and production amounted to about 10,000 tons of tea; this figure included both plantations and gardens.⁴

Coffee: Coffee has been less successful as a plantation crop in Indo-China. Difficult natural conditions have had to be overcome, and the product has to compete for the French market with that of other French colonies.

The first coffee plantations were begun on the borders of the Tonkin delta but did not spread to the Annam red lands plateaux until after 1924. Towards the south, coffee can be grown at greater elevations.

Coffee exhausts the soil so rapidly that it is usually grown in conjunction with cattle-rearing; a supply of manure is thus ensured. All the

difficulties of the latter industry, therefore, limit coffee-planting.¹ In addition, typhoons on the Annam coast and hot, dry winds in the interior further restrict and hamper the cultivation of coffee.

In 1937, about 2,500 tons of coffee were produced from 25,000 acres. In 1943, about 4,200 tons were produced from 30,000 acres.

Pepper: Pepper is cultivated as a plantation crop on the Gulf of Siam coast of Cambodia. Sloping lands well protected from winds are used. The vines require constant and careful cultivation, so that pepper-growing has been left almost entirely to skilled Chinese. However, excessive production has led to marketing difficulties both on the French market and in competition with pepper from other countries.² In 1943, about 2,500 tons were produced from an area of approximately 5,000 acres.

FORESTRY

Forest industries in Indo-China include the cutting of wood for constructional purposes and for fuel, the manufacture of charcoal, and the collection of some wild forest products. Nearly all these activities are in the hands of natives or Chinese, for there are few European lumbering companies.

Lumbering for export is not a profitable activity in Indo-China. The forests have been replaced by secondary growth in which there are few valuable species, and the virgin stands are in inaccessible areas. Some plantation companies engage in lumbering to defray the costs of clearing, and to provide work for their employees in off seasons,³ but this is not a large-scale activity.

The deterioration of the forest cover, which has been accelerated in recent years, has led to the establishment of government forest reserves where cutting is prohibited except under government supervision. In sections of Cambodia, the natives are permitted to cut or burn the poor species in the process of shifting cultivation. This adaptation of traditional agricultural practice to the needs of forest conservation appears to be fairly successful.

All wood-cutting in Indo-China is done with axes, and because many of the species have very broad bases, stumps of about $4\frac{1}{2}$ to 6 feet in height are left. The wood is rough-hewn, cut into lengths of about 5 to 25 feet, and hauled to the nearest river or surfaced road. For large logs, trucks hauled by great teams of buffalo are employed. Smaller logs are carried in two-wheeled carts drawn by oxen or buffalo. On some of the Annam plateaux and in parts of Cambodia elephants are used.

The cheapest method of transporting logs to market centres is by water. On small streams, the wood is allowed to drift with the current,

¹ Robequain. Op. cit., p. 207.

² Annuaire Statistique de l'Indochine.

³ Bulletin Economique de l'Indochine. 1950.

⁴ Annuaire Statistique, 1943-1946.

¹ Robequain. Op. cit., p. 195.

² Thompson. French Indo-China. p. 142.

³ Robequain. Op. cit., p. 274.

but on larger rivers, rafts are built of the logs. On the Mekong and Red Rivers tow boats are used to prevent the rafts from interfering with navigation. The periods of the year when logs are floated downstream vary considerably. On the Red River, logs are floated all year, but the periods of greatest traffic are in September and May. On the Mekong, the logs move during the high water period, from July until December. Logs launched on the upper Mekong in July reach Saigon in October.¹ On the main tributaries, the logs are moved just after the period of maximum rainfall.

Where no rivers are accessible, the logs must be transported by road or railway, making necessary the building of roads and bridges. Commercial forest exploitation is limited by accessibility to road, rail, or water transport facilities.

A variety of tree species are utilized. The more valuable woods cut include rosewood, (Dalbergia cochinchinensis), mahogany (Melanorrhoea laccifera and Sandoricum indicum), ebony (Diospyrus mun), and sandalwood (Dysoxylon Laureiri). The species used for common construction are known by native names, such as Sao (Hopea odorata), lim (Erythrophlaeum fordii), and dau (Dipterocarpus). Some native woods are particularly useful in ship construction, but most are used for charcoal, the manufacture of matches, and as firewood. Mangroves provide a great supply of firewood, and are extensively used in Cochinchina for charcoal. Rattans are used in making furniture and other articles, and bamboo is used extensively for house construction.

Various other forest products are collected, most of which are used locally for food and to supply home industries. Cinnamon is both cultivated and gathered from the wild plants. The wild product is of better quality, but is scarce. Spices such as cardamoms are collected, but cultivated aniseed is of greater importance than the wild variety. The lac tree is also utilized. Sticklac, from which shellac is refined, is the excretion of certain insects. Both products, collected in Indo-China, are used in the manufacture of varnish, as is oil from the abrasin tree (Aleurites montana), which resembles tung oil. Quinine, nux vomica, strychnine, and other medicinal products are gathered. The nut of the Areca palm and betel leaf are collected for preparation into a chewing mixture. The tuber of cunau is collected for use as a source of brown dye. Rubber from wild lianas and other plants is no longer gathered. In the swamps of the Mekong delta, honey and beeswax is collected by the natives.²

The most important use of wood in Indo-China is for fuel. The quantity cut for this purpose usually exceeds that cut for lumber (Table 8), and in some years is nearly three times the volume cut for construction. During the period of the Japanese occupation, 1941 to 1945, the quantities of wood cut increased very rapidly. Since that time, however, wood cutting has been disrupted, and the annual volume cut has been less than in the depression years (Table 8). This latest trend has been more noticeable in the cutting of construction wood than in the cutting of firewood.

TABLE 8 - FOREST PRODUCTION¹

Year	Construction Wood (thousands of cubic feet)	Firewood (thousands of cubic feet)	Charcoal (tons)
1930	29,100	67,800	— ²
1931	19,600	42,600	59,300
1932	16,000	41,300	61,200
1933	13,000	37,800	61,000
1934	16,000	45,000	65,000
1935	18,200	48,200	65,900
1936	21,200	51,500	65,700
1937	24,800	59,500	86,200
1941	31,600	73,000	89,400
1942	30,400	90,600	89,100
1943	42,900	115,700	97,100
1944	35,800	111,000	— ¹
1946	8,100	36,100	29,100
1947	7,200	33,600	19,400
1948	9,700	37,000	20,100

¹ Adapted from *Annuaire Statistique de l'Indochine* for various years.

² Not available.

FISHERIES

The fisheries of Indo-China are of great value to the country. Fish supply proteins and vitamins otherwise lacking in the native diet, and comprise one of the exports of the country. However, the greatest proportion of the fish caught does not enter trade, and no statistics are available on production, apart from the quantities of fish products exported.

Fresh-water and inshore fisheries are most important. Although both the Gulf of Tonkin and the Gulf of Siam contain considerable quantities of fish, the people lack the equipment to exploit them and are not maritime by inclination. The most important coastal fisheries are in southern Annam, where less violent monsoons, salt manufacturing plants, and fairly dry winter weather encourage the industry.¹ During the winter and spring fishing season, about 30,000 people, Annamites and Cambodians, congregate on the banks of the Tonle Sap. Fish are caught by nets on the lake, and in weirs on the tributary rivers. The fishing is done at night by the men, who rest during the day while the women and children prepare the catch for sale. Other fishing communities are found along the Mekong, such as those established at the base of the cliffs in the Kemmarat rapids.

The buying and selling of fish is almost entirely in Chinese hands. Fish is sold fresh, dried, or smoked, or in the form of various sauces to be eaten with rice. Because of the difficulty of transportation across the mud

¹ Miller. *Industrial resources of Indochina*. p. 406.

² Sion. *Asie des Moussons*. p. 452.

¹ Sion. *Op. cit.*, p. 460.

flats at the mouth of Tonlé Sap all fish from this source is sold in dried or smoked form. Lower down the Mekong, the fish is sold fresh on the Saigon-Cho-lon market. The products exported are chiefly dried, salted, or smoked.

Other marine products utilized include shrimps, sea-salt, and various marine plants.

MINING

The mining industry of Indo-China is concentrated in French hands, through the operation of a few large companies. The natives seldom have the capital available to undertake the great financial risks involved. Foreigners may invest capital, but are prohibited from owning or operating mines. Many mining companies have obtained concessions, but few have been successful in overcoming the many difficulties which beset the industry.

Mining is regulated by the Service des Mines located at Hanoi. The granting of concessions to prospect is in the hands of local authorities. If the necessary regulations are fulfilled, permanent possession of the concession is obtained, and the state takes a small proportion of the mining profits. Since 1937, heavy penalties have been exacted for the holding of concessions without active exploitation.

Most of the mining activity is confined to Tonkin, although tin mining is now of greatest importance in Laos. Tonkin has the most favourable geological conditions; both metals and coal are located comparatively close to the sea-coast, and to the labour source in the Tonkin delta.

Coal-mining is the most stable activity. Metal mining has been sporadic in character, because of the many natural and financial difficulties and the price fluctuations on the world metal market.

From about 1938 to 1941, employment in the mines totalled about 50,000 persons, of whom only about 250 were Europeans. From 1941 to 1944 employment dropped steadily, and in 1945 political unrest caused many mining operations to be abandoned. In that year, only about 4,000 persons were employed in the mines, and by 1948 the total labour force had only increased to about 8,000.¹

Coal: The coal output until 1942 fluctuated between one million and $2\frac{1}{2}$ million tons annually (Table 9), of which over 90 per cent was produced by two large companies in Tonkin. Both in quantity and value, coal is the most important mining product in the country.

Open-pit mines now produce less than the shaft mines, but even in these latter there is little mechanization, and most of the coal is cut by hand. Narrow-gauge railway lines run from the larger mines to Hon Gay and other ports, where screening and washing facilities are located near the coal wharves. From some of the smaller mines, the coal is loaded into junks for transportation downstream to the Tonkin delta.

¹ Employment statistics from Annuaire Statistique de l'Indochine for various years.

TABLE 9 - PRODUCTION OF COAL, IRON ORE, AND NON-METALLICS¹

Year	Coal (thousands of metric tons)	Iron Ore (metric tons)	Crushed Phosphate (metric tons)	Salt (metric tons)
1930	1,955	—	26,565	237,335
1931	1,726	—	3,858	249,749
1932	1,713	—	6,500	251,178
1933	1,591	—	30	145,493
1934	1,592	600	4,060	160,457
1935	1,775	275	5,900	206,778
1936	2,186	4,870	10,336	192,209
1937	2,308	16,368	20,252	179,981
1938	2,335	71,881	37,341	179,968
1940	2,500	17,255	22,270	189,356
1941	2,329	27,920	40,310	316,624
1942	1,243	34,009	29,050	275,910
1943	—	43,787	19,888	205,127
1944	—	14,117	6,845	148,139
1945	230	5,450	—	—
1946	262	—	—	—
1947	260	—	—	41,788 ³
1948	355 ²	—	—	65,352 ³
1949	378 ²	—	—	113,575 ³
1950	503 ³	—	—	75,721 ³

¹ Annuaire Statistique de l'Indochine.

² Bulletin Economique, 1950.

³ Annuaire Statistique du Vietnam 1949-1950. Identical figures for coal production are given in Bulletin Economique de l'Indochine 1950, and in Annuaire Statistique du Vietnam 1949-1950, for the years 1946 to 1949, inclusive.

Given favourable marketing conditions, the coal companies, on the basis of their reserves and of their present equipment, could greatly expand their output.

Other Minerals: The output of zinc has been consistently of the greatest volume among the metallic minerals (Table 10). However, recent production has fallen far short of the 1926 peak, owing to the decline of prices on the world market. One company produces all the zinc, lead, and silver, the last two metals being found in association with the zinc ores.

Although the volume of tin produced annually is much less than that of zinc, tin is much the most valuable metal produced in Indo-China.² The

¹ Robequain. Op. cit., p. 256.

² In 1942, it comprised 63 per cent of the total value of metals produced. Annuaire Statistique de l'Indochine, 1941-1942.

TABLE 10 - PRODUCTION OF METAL CONCENTRATES¹
(metric tons)

<u>Year</u>	<u>Zinc</u>	<u>Lead</u>	<u>Tin</u>	<u>Tungsten</u>
1930	15,891	20	1,009	132
1932	5,000	—	1,017	147
1934	4,967	—	1,152	182
1936	5,221	32	1,403	302
1938	5,162	—	1,625	327
1940	6,900	—	1,496	234
1941	7,600	110	1,316	200
1942	6,167	92	1,046	128
1943	4,908	199	663	64
1944	1,405	7	363	50
1945	360	5	97	5
1948	—	—	32 ²	—
1949	—	—	4 ³	—
1950	—	—	54 ⁴	—
• • • • •	• • • • •	• • • • •	• • • • •	• • • • •
<u>Year</u>	<u>Chrome</u>	<u>Manganese</u>	<u>Antimony</u>	<u>Bauxite</u>
1930	740	—	—	—
1932	—	—	—	—
1934	—	—	—	—
1936	—	1,613	47	—
1938	—	1,114	104	2,800
1940	—	320	11	—
1941	—	462	4	5,092
1942	1,607	644	1	6,352
1943	2,930	620	11	—
1944	1,033	3,444	23	11
1945	—	—	—	—

¹ Annuaire Statistique de l'Indochine.

² Bulletin Economique de l'Indochine, 1949.

³ Annuaire Statistique du Vietnam 1949-1950.

⁴ Annuaire Statistique du Laos 1949-1950.

cassiterite ores of Tonkin are associated with wolfram, and tungsten also is produced by the tin mining company. Concentrating was formerly done in Cao Bang, Tonkin, but some ore is now washed and sent to Singapore for mixing with lower-grade Malayan tin.¹ The ore is moved by truck and railway to the seaport of Haiphong. The cassiterite deposits of Laos, from which the major part of the Indo-Chinese output comes, contain no wolfram and require more complex

¹ Robequain. Op. cit., p. 260.

smelting processes. Washing and concentrating is done in Laos, but lack of coal prohibits smelting on the spot. The ore is taken either by road to the Annam coast or down the Mekong, from which points it is exported.

Antimony and chromium ores, both intermittently extracted, are found in northern Annam. Chromium was produced during the period of the Japanese occupation after a lapse of ten years (Table 10).

Iron is produced in two mining areas in Tonkin, one of which is operated by a large coal company. The manganese produced originates from the northern Annam iron mines.

Bauxite production was stimulated during the Japanese occupation, but has not been continued. Crushed phosphate (18%-25% P₂O₅) is produced for fertilizer. This industry, also, was expanded during the Japanese occupation, but has since declined (Table 9).

Mining has been seriously hindered by the shortage of labour and supplies and the disruption of communications resulting from the internal disturbances in the country. Re-establishment of greater mining activity must await the restoration of stable political conditions.

MANUFACTURING

On the basis of numbers employed, the traditional industries as a whole comprise the greatest manufacturing activity in the country. In 1937, it was estimated that 1,350,000 people were engaged in such industries.¹ This is a much greater number than the comparable total for modern manufacturing industries.

The traditional industries are carried on in the homes of peasants and supply the local needs for food, clothing, implements, buildings, and many other things. Although some have arisen because of the availability of raw materials, others are carried on, often under difficulty, in traditional sites where the original locating motivation has been forgotten.² Such manufacturing only supplements agriculture. There are few villages composed entirely of landless artisans. The crafts are usually pursued in the off-seasons for rice growing and during the scanty leisure time of the peasants. Most require elementary skills and little capital. Simple tools are used, and small reserves of raw materials are maintained.

In Tonkin and northern Annam, specialization in certain crafts has developed in many villages, and even specialization in some processes of a given craft. However, the Annamites have no conception of caste in relation to occupations pursued. The crafts of the lower Annam coast are of similar type, with the addition of certain industries based on products more readily available in this region. In Cochinchina and Cambodia native industries as a supplement to agriculture have not been so long established, and have lost ground in competition with modern industry. Village specialization is lacking in both Cambodia and Laos, for each community makes most

¹ Robequain. Op. cit., p. 248.

² Ibid., p. 245.

of the articles it needs. Throughout the country, labour for traditional industries is supplied by the family, not by hired workers.

The preparation of foodstuffs is one of the major traditional industries, including such processes as the husking of rice, and the preparation of various types of food from rice. The distillation of alcohol is an important industry in spite of governmental efforts to control manufacture and sale. Sugar, molasses, and various oils, such as coconut oil, are prepared in Annam. On the southeast Annam coast, the preparation of fish sauce, nuoc mam, engages a labour force which raises the industry to the scale of modern manufacturing activity. At various points along the coast, salt is recovered for the fishing industry and general household use.

Textile-making employs one of the largest groups of artisans. In Tonkin, little spinning is done. Factory-made cotton thread is woven into coarse cloth for clothing. In northern Annam, both spinning as well as weaving are done by artisans. Silk is less important than cotton, but among the Indo-Chinese states, Annam has the greatest proportion of silk workers. Ropes and mats are prepared from coconut fibres on the Annam coast. In Tonkin, lace and embroidery are produced; these are bought by European merchants, some for export.

Basket-work has a variety of uses in Indo-China, and is an important craft in most parts of the country. Hats and capes to protect the rice-field workers from the rain, receptacles of all kinds, implements for irrigation and for fishing, are all woven of reeds, rattans, bamboo, or latania leaves.

A considerable body of artisans is engaged in the construction industries. In parts of the Tonkin delta where only one annual rice harvest is possible, wood-workers travel to many parts of the country and return to their homes in summer. The larger village buildings are all erected by specialists in various types of wood-work. Other craftsmen concerned with construction include masons, stone-cutters, and brick-makers.

Many workers produce jewellery, paper articles for religious ceremonies, and pottery. Some of their products are sold in small shops in the towns and cities, but the greater proportion is for use in the villages. Although little metal is used by the peasants, there are some workers in brass and copper. Primitive agricultural implements are forged from iron.

In such a predominantly agricultural country as Indo-China, industrial activity is of minor importance. Commercial manufacturing had not developed to any great extent before the arrival of the French. Today, the handling and processing of foodstuffs and other items of local consumption are still partly in the hands of the Chinese, who developed these industries. Processing of products for export, apart from rice, the production of electric power, and similar activities, are largely controlled by the French.

Indo-China is the most highly industrialized of the French overseas colonies,¹ and has considerable possibilities for future industrial develop-

ment. Many of the natural resources and the raw materials which could provide a basis for industry are present. The power resources, still largely undeveloped, are capable of considerable development. In addition, the dense lowland population provides a large potential labour supply. The industrial future of Indo-China is related to that of Southeast Asia as a whole, and depends upon the raising of standards of living and purchasing power of the people.

In 1948, there were 255 industrial enterprises in Indo-China; of which 125 were located in Saigon-Cho-lon and 50 in Hanoi and Haiphong. These figures include plantations but exclude mines. The approximate number of labourers and skilled workers employed totalled 21,500; of whom 12,600 were employed in Saigon-Cho-lon and 3,700 in Hanoi-Haiphong.¹ In June, 1950, there were 245 enterprises in Saigon-Cho-lon and 46 in Hanoi-Haiphong.² The number of workers employed totalled 11,043 and 5,311, respectively.

Electric Power:

Virtually all electrical energy in Indo-China is produced in thermal-electric stations from Tonkin coal. The hydro-electric resources of the streams and rivers are thought to have great potential production, but the irregularity of the river regimes and the absence of large mountain lakes suitable for reservoirs will present obstacles to their exploitation.

The state of Tonkin and Cochinchina lead in output of electrical energy. Most of the power produced is used for transportation and domestic use in the larger cities, but some is privately generated, particularly in Tonkin, for use in mines and factories.

The capacity of electrical installations increased from 80,100 horse-power in 1935 to 105,900 in 1948.³ In 1949 and 1950, the total installed capacity in Vietnam and Laos was approximately 90,000 horse-power.⁴

Mine Products:

Nearly all the metallic ores of Indo-China are concentrated within the country, but exported for smelting. The zinc output of Tonkin is smelted in the vicinity of the Quang Yen coalfield. However, some of the tin produced in Yunnan is smelted near Haiphong.

Some of the local anthracite is mixed with bituminous coal and tar, imported from Japan, in the production of briquettes and other fuel products. The largest factory of this kind is located at Hon Gay.⁵

¹ Annuaire Statistique de l'Union Francaise Outre-Mer, 1939-1946. Paris, 1948.

² Annuaire Statistique du Vietnam, 1949-1950.

³ Annuaire Statistique de l'Indochine.

⁴ Annuaire Statistique du Vietnam 1949-1950 and Annuaire Statistique du Laos, 1949-1950.

⁵ Robequain. Op. cit., p. 256.

The processing of various non-metallic mineral products is an important industrial activity in Indo-China. Most of these industries are located in Tonkin, where raw materials, such as limestone, clay, and sand, are found in proximity to labour and fuel supplies, and to cheap water transport.

Cement is one of the most important manufactured products. One large French company dominates the industry. Its main plant is at Haiphong, where the company also operates a power plant and a variety of equipment shops. The cement produced is of high quality, and a considerable quantity is normally exported. This industry was severely disrupted during and following the Second World War. Pre-war annual production was about 200,000 to 300,000 tons. In 1944, there was no production at all, but in 1949 about 150,000 tons were manufactured.¹

The sands and clays of the Mekong and Tonkin deltas are used as raw materials by brick, tile, and glass plants situated in the vicinity of the large cities. Goods are produced for general construction, irrigation and drainage projects, and plantation requirements. Chinese and native proprietors operate many small glass factories within the larger cities, but the only large factory manufacturing bottles is located at Haiphong.

Crockery and insulators are manufactured at two plants in Tonkin. The natives manufacture their own supplies of household crockery.

Apart from small-scale factories operated by Chinese and natives, therefore, almost all the mineral processing industry is located in Tonkin and northern Annam.

Forest Products:

Considering the deterioration of the forest cover, and the proportion of the annual cut consumed as firewood, it is not surprising that the forest products industries of Indo-China lack great importance.

Lumber and charcoal are the most important products of wood processing in Indo-China. Sawmills and charcoal kilns are usually operated by Chinese and Annamites. Cochin-China has a large output of charcoal, much of which is used in Saigon and Cho-lon. Small sawmills are located throughout the country.

Paper-making is a common native industry, but only one French firm produces paper. Two plants are operated in the Tonkin delta area, using bamboo as raw material. Various qualities are produced, but the output in 1937 totalled only about 3,500 tons.²

There are three match factories in the country, two of which, in northern Annam, are operated in conjunction with sawmills. The third factory is located at Hanoi. The chemical raw materials required are imported from Europe.

¹ Bulletin Economique, 1950. p. 15.

² Robequain. Op. cit., p. 275.

Agricultural Products:

Processing of rice and rice products dominates the industries based on agricultural commodities as greatly as rice-growing dominates agriculture itself.

In order to save transportation costs, rice is husked and polished before being exported or sold within the country. Rice mills are located principally in the areas of surplus production, particularly in the Saigon-Cho-lon region. Until 1940, the number of rice mills using more than 100 horse-power in their plants averaged about 27 per month,¹ all of which were located in the region of those cities.² The number of large rice mills in operation declined slightly after 1940. In 1945 the monthly average was only three and by 1948 had increased to sixteen only. This represents a serious decline in the preparation of the principal food and export commodity.³

Rice-milling is almost exclusively in Chinese hands, and is carried on in conjunction with the trading and inland transportation of rice. Four rice mills, two of which were in Cho-lon, were operated by French companies.

The number of rice mills in operation and the output of processed rice fluctuate seasonally. Normally, the period of greatest activity is from December to June, but this trend has not been noticeable during the post-war years.

Small Annamite mills operate to prepare rice for local consumption. They are in production during the transplanting and harvesting seasons, when the peasants do not have time to prepare their own rice.⁴

One of the principal industrial uses of rice is in the manufacture of alcohol. When the manufacture and sale of alcohol was regulated for taxation purposes, one French company became the chief producer. Alcohol may now be manufactured by anyone who pays the necessary taxes, and there are now many small firms, but the French company still dominates the industry. Three factories of this firm are located in Tonkin, one in Cho-lon, and one in Phnom Penh. Besides producing alcohol from rice, the company makes rum from sugar cane.

Some alcohol is prepared for mixing with gasoline. Fuel alcohol and other by-products are prepared, but the major part of the output is produced for human consumption.

¹ Annuaire Statistique de l'Indochine.

² Robequain. Op. cit., p. 275.

³ Saigon had "60 large, fairly efficient rice mills in 1940". The mills were targets for destruction, and in April, 1948, there were only 12 of the original 60 left. Efferson, J.N. The market outlook and prospective competition for United States rice in Asia, the Near East, and Europe. Foreign Agricultural Report. Office of Foreign Agricultural Relations, U.S. Department of Agriculture, Washington. 1949. p. 18.

⁴ Robequain. Op. cit., p. 276.

The output of alcohol increased steadily until the war years. In 1942, over 15 million gallons were produced. However, in 1946 production dropped to less than two million gallons, but by 1948 had increased to slightly over three million gallons.

Sugar refineries are located in the southern parts of the country, where the commercial production of cane is more common. It is only since the First World War that French capital has been invested in this industry. The imposition of a protective tariff enabled the industry eventually to become established.¹ Production of refined sugar exceeded 20,000 tons in 1941, declining slightly until 1944. In 1945, no sugar was produced in the factories of the country; in 1948 the annual output was just over 100 tons.²

Processing of tobacco in factories has developed only since 1930. There are four factories, all located in Saigon-Cho-lon. The finished product is chiefly in the form of cigarettes. In 1941 and 1942, annual production was almost 5,200 tons, but the output declined to about 700 tons in 1946. This industry has made a fairly rapid recovery, and in 1948 the annual production was over 3,100 tons. The amount of imported tobacco used varies greatly from year to year. In 1934, only two per cent of the supplies were imported, in 1945 about 20 per cent; but in 1947 and 1948 over 90 per cent of the tobacco used came from outside sources.

Various other agricultural products are processed, none of which are of great importance. The oil-bearing plant products are processed for vegetable oils and soap, mostly in factories operated by Chinese or Annamites. Many products such as beer, ice cream, and other luxury items are manufactured from imported raw materials. Originally, these were sold only to the European inhabitants, but they are now finding a market among the Asiatic inhabitants as well.

The textile trade has always depended upon outside sources. Even before the French occupation, European textiles were imported into Indo-China.³ A French company now has two factories; one at Haiphong, and a larger one at Nam Dinh on the Red River delta. The latter mill is the largest factory in Indo-China.⁴ The raw cotton for the mills is imported from India, China, or the United States. These plants supply yarn for the native weavers, and produce some fabric as well.

There are two silk factories. One is at Nam Dinh, the other is in Annam, where raw silk was at one time produced; this is now obtained from spinning mills in China. The fabrics produced are not exported. Other textile manufactures include rugs, and coconut fibre products.

Small factories produce a variety of industrial products. Hanoi and Saigon have rubber factories, and there is a French-owned leather factory at Hanoi. Buttons, candles, oxygen, paint and varnish, explosives, and fire-works are some of the products made.

¹ Robequain. Op. cit., p. 278.

² Annuaire Statistique de l'Indochine, 1947-1948.

³ Robequain. Op. cit., p. 279.

⁴ Ibid., p. 280.

Industry is an important activity in only two regions of Indo-China. The textile and mineral-processing industries are almost all located on the Tonkin delta, from Hon Gay to Hanoi and south to Nam Dinh. The food-processing industries are concentrated in and around Saigon and Cho-lon. The location of the industrial areas is determined by the availability of power and labour, and the proximity of urban markets. The type of industry in each region has been determined by the accessible resources and products.

TRANSPORTATION

Transportation difficulties have always hindered the development of Indo-China. Before the coming of the French, the waterways provided the principal means of inland transportation, in spite of all the obstacles which still hinder their full exploitation. Roads were primitive, and sea transportation was limited by the violence of typhoons and monsoons, and by the inadequacy of the vessels used. Attempts to improve transportation facilities have proved to be among the most costly projects undertaken by the French.

Terrain, climate, and malaria are the great natural obstacles which continue to hinder the development of transportation. In the populated lowlands, the prevalence of rivers and streams and the extent of marshy ground have necessitated bridging and building up road-beds. In the mountainous areas, deep gorges, steep slopes, and landslides have made penetration and maintenance difficult. Along the coasts, violent windstorms and torrential rains destroy road-beds and bridges. Flooding of inland rivers is a serious problem. Conditions are also unfavourable for the heavy work involved because the humid climate of summer is enervating. More serious is malaria, which has killed many workers on transportation projects and reduced the efficiency of others.

The period of early colonization in Indo-China coincided with that of great railway-building in many parts of the world. Railway lines were constructed through areas of Indo-China which were sparsely populated and not greatly productive. The great expense of construction could not be repaid, owing to the lack of traffic in the areas tapped. The greatest obstacle to inter-regional traffic has been the existence of rice culture in nearly all parts of the country, so that exchange of goods on a large scale has not developed.

The natural difficulties of railway construction, and the lack of traffic on the railways, have placed a great burden of debt on Indo-China. Similar difficulties beset the later road-building projects.¹

Railways: Before the colonies were united, a line was built from Saigon to My Tho in Cochin-China. This line has not been extended to Phnom-Penh (Fig. 23). The first railway built after the union of the states in 1887, was a narrow-gauge line from Phu Long Thuong to Langson, in Tonkin (Fig. 23).

The Transindochinois project was begun in the late 1890's. This line was expected to link the two deltas, with lines running into China and to

¹ Thompson. Indo-China. pp. 205-211.

the Siamese border via Phnom-Penh. Branch lines were to run from the Annam coast to the middle Mekong, and from Haiphong to Yunnan. This system, it was felt, would facilitate defence, give cohesion to the Union, increase the exchange of products, and encourage the spread of Annamite settlement beyond the Tonkin delta.¹

The Phu Long Thuong-Langson line was widened and extended to Hanoi and Vinh by 1905 (Fig. 23). Construction along the Annam coast was slowed by the frequent necessity of building bridges and tunneling through mountain spurs. The line between Vinh and Saigon was built in sections, and it was not until 1936 that Hanoi and Saigon were connected by railway.

After incredible difficulties, the Haiphong-Yunnan line was opened to traffic in 1910. Because this line ran partly through Chinese territory, it was operated by a private company. All other railway lines are under government control.

The other branch lines of the system, as originally planned, have not yet been completed. The branch to Dalat, on the Annam plateau, was completed in 1933 (Fig. 23), but the steepness of the escarpment has made necessary the use of rack railways in two sections.² Phnom-Penh and Mongkol Borey were linked by rail in 1935 (Fig. 23). The line from Saigon to Loc Ninh, in the red lands, was completed in 1933. The projected railway to Laos has only been completed between Tan Ap and Xom Cuc (Fig. 23). An aerial tramway and a service road have been built beyond Xom Cuc to Ban Na Phao (Fig. 23).

The railways of Indo-China are of one metre gauge, narrower than the standard 1.44 metre ($4' 8\frac{1}{2}''$) width. The rail-lines of China are of a broader gauge, which would prove a hindrance to any eventual linking of the systems. Except in stations and sidings, all lines in Indo-China are single-tracked. In the vicinity of the large cities, gasoline-powered engines are in use (Fig. 23).

In the earlier days of operation, passenger traffic provided the major part of railway revenue, but since competition from automobiles has developed, passenger traffic, although showing a numerical increase, has produced less than half of railway revenue. The fourth-class accommodation used by the natives, has attracted many, but is used for short trips rather than for mass migration movements, as had been hoped.

Freight traffic is not great in volume, owing to the competition of roads and waterways for traffic. Lack of such competition, and the high relative value of products carried, made the operations of the Yunnan railway more profitable than those of the government lines. The volume of freight on the Indo-Chinese lines varies seasonally. In the north it is greatest during December to January and June to July, following the rice harvests. In Cambodia, rice is moved from the Battambang area in March, April, and May.

¹ Rotequain. *Op. cit.*, p. 91.

² *Ibid.*, p. 94.

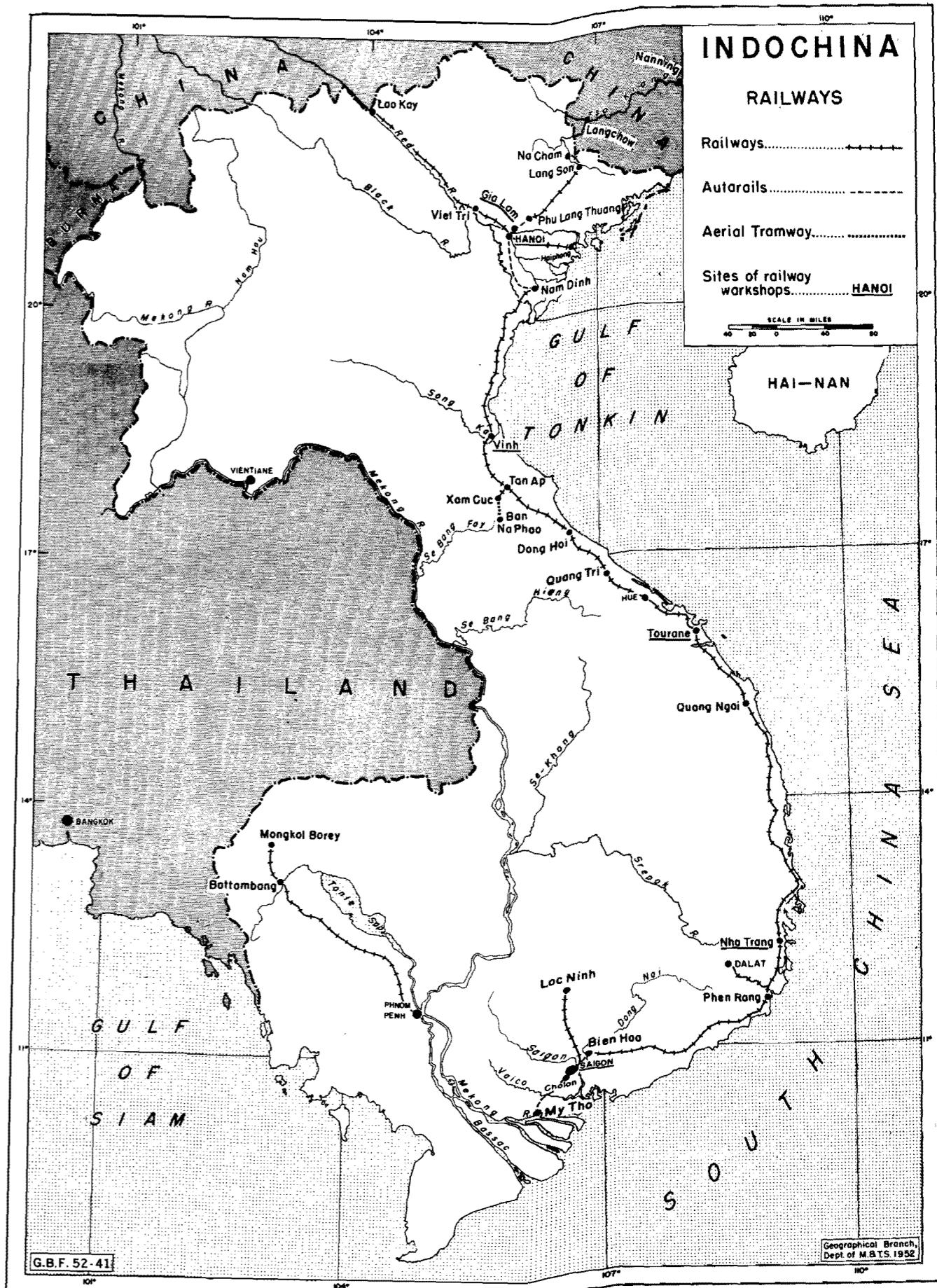


FIG. 23

Railway operation has been severely hampered by recent conditions. In 1947-48, only 1,236 miles of track were in use, as compared to 3,016 in 1938. Although the number of freight cars in the country is slightly more than in pre-war years, the number of passenger cars has been reduced by about 54 per cent, and the number of locomotives by about 42 per cent.¹

Roads: Before the First World War, road-building received less attention than railway construction in Indo-China. After automobile traffic began to increase rapidly, it was realized that the aims of the railway-building program could be achieved by one of road construction. In 1918, the more important routes were classified as "colonial" roads, and their construction and maintenance was undertaken by the Public Works Department. By the time of the Second World War, Indo-China had nearly 28,000 miles of highway, of which about 26,000 were in use in 1947.²

The pattern of the main roads repeats that of the railway lines, with the addition of many branches and a system running parallel to the course of the lower Mekong (Fig. 24). Roads are more closely spaced in the delta areas. In the Tonkin delta, many of the roads run on the tops of the dykes. The road system in Cochin-China is interrupted by ferries over the Mekong. South of Camau in Cochin-China, all traffic is by boat (Fig. 24). Main roads in Cambodia run on either side of Tonlé Sap, above the flood level of the lake (Fig. 24). A road runs across the Siamese frontier to Aronya, whence a railway gives connection with Bangkok (Fig. 24). From Hanoi, four roads run toward the Chinese frontier (Fig. 24). Two secondary roads run across the frontier to Longchow, but only trails cross the border at other points. Few roads have been built in the rugged country between the Red and the upper Mekong Rivers. Several roads cross the narrowest part of the Annam Range to Laos. At Ban Na Phao, a road from Thakhek connects with the head of the aerial tramway which runs from Xom Cuc (Figs. 23 and 24). The road system along the Mekong into Laos has been developed to divert the flow of traffic from that area into Siam. Because of the inadequacy of the river as a transportation route, much of the export traffic of Laos has been routed over the Siamese railways. The opening up of the Annam red lands has been accompanied by the construction of roads on the plateaux, and of branches connecting with the coastal route. The road along the Annam coast, known as the "Mandarin Road", is forced to follow the Transindochinois closely. Like the railway, it suffers from flash floods and typhoons, but is more easily re-opened.

About half of the road mileage of Indo-China is surfaced. The main roads are less than 20 feet in width, and the costly mountain roads are, in many places, about 15 feet wide. Most bridges are about ten feet wide, so that automobiles cannot pass on them. Road foundations are built of the available rock materials, and firm surfaces exist only in the vicinity of cities. During the wet season, many of the roads become impassable, and wood or bamboo bridges are frequently washed out. Beyond the network of primary and secondary roads, communication is maintained by native trails along the upland ridges.

¹ Economic Survey, 1948. p. 96.

² Ibid., Table 35, p. 102.

Methods of road transportation vary: pack animals are used in remote areas; elephants in the Cardamome Mountains of Cambodia and in the Annam Plateaux, oxen in upper Laos, mules and small native ponies in the north. Draught animals are used on the roads of the south and in upper Tonkin. In the mountains, and especially on the Tonkin delta, a great deal of freight is still carried by humans. Automobile traffic has increased greatly. The natives make use of the bus lines and commercial automobiles. By 1933, there were 17,800 motor vehicles in the country,¹ and in 1948 there were nearly 21,000.²

Trucking and bus lines compete in many places with the railway, but in others they are used to supplement the railway service. Both ends of the Phnom-Penh to Mongkol Borey railway are served in this manner (Figs. 23 and 24).

Waterways: Internal traffic, and the transportation of export commodities, are both conducted over inland waterways. Climatic and topographic factors limit the regional importance of water transportation, and the lack of communication between river systems prevents its greater development as a country-wide network.

Transportation on the Red River is rendered difficult by the irregularity of the river regime. The summer volume is ten or eleven times that in March. Silt brought down in the flood season forms unstable sand-bars and shoals in the river. However, dyking has stabilized the bed of the river to some extent. Sampans, junks, and launches carry traffic. Bulky and cheap, or fragile commodities are usually carried on the river, as well as a large number of passengers. The river and its tributaries are navigable by steam launch as far as Yen Bay, Tuyen Quang, and Cho Bo. Above these points, only sampans and junks can proceed (Fig. 25).

The short, steep valleys of the Annam coast are unsuitable for much steamer navigation. Only on the Song Ca is there any significant stretch of navigable water (Fig. 25), and the total length for the whole state during the summer months is less than 200 miles.³ The coastal lagoons, which were formerly utilized in preference to the pirate-infested seas, are now little used, owing to safer ocean navigation and rail and road competition.

The Mekong below Kratie (Fig. 25) is more widely used as a waterway than is the Red River. Differences in water level are less extreme. The influence of the tide extends for some distance inland, helping to keep channels clear of sediment. However, the opposing forces of the tide and current build ridges on the river bed which must be cleared by dredging.

Vessels used on the lower Mekong include junks, towed by coolies on the banks, motor barges, and small steam launches. Bulky cargoes, such as rice, corn, charcoal, and fish usually destined for Cho-lon, are carried. In 1937, the total tonnage of river traffic on some of the Cochinchinese

¹ Robequain. *Op. cit.*, p. 105.

² *Annuaire Statistique de l'Indochine, 1947-1948.*

³ Robequain. *Op. cit.*, p. 108.

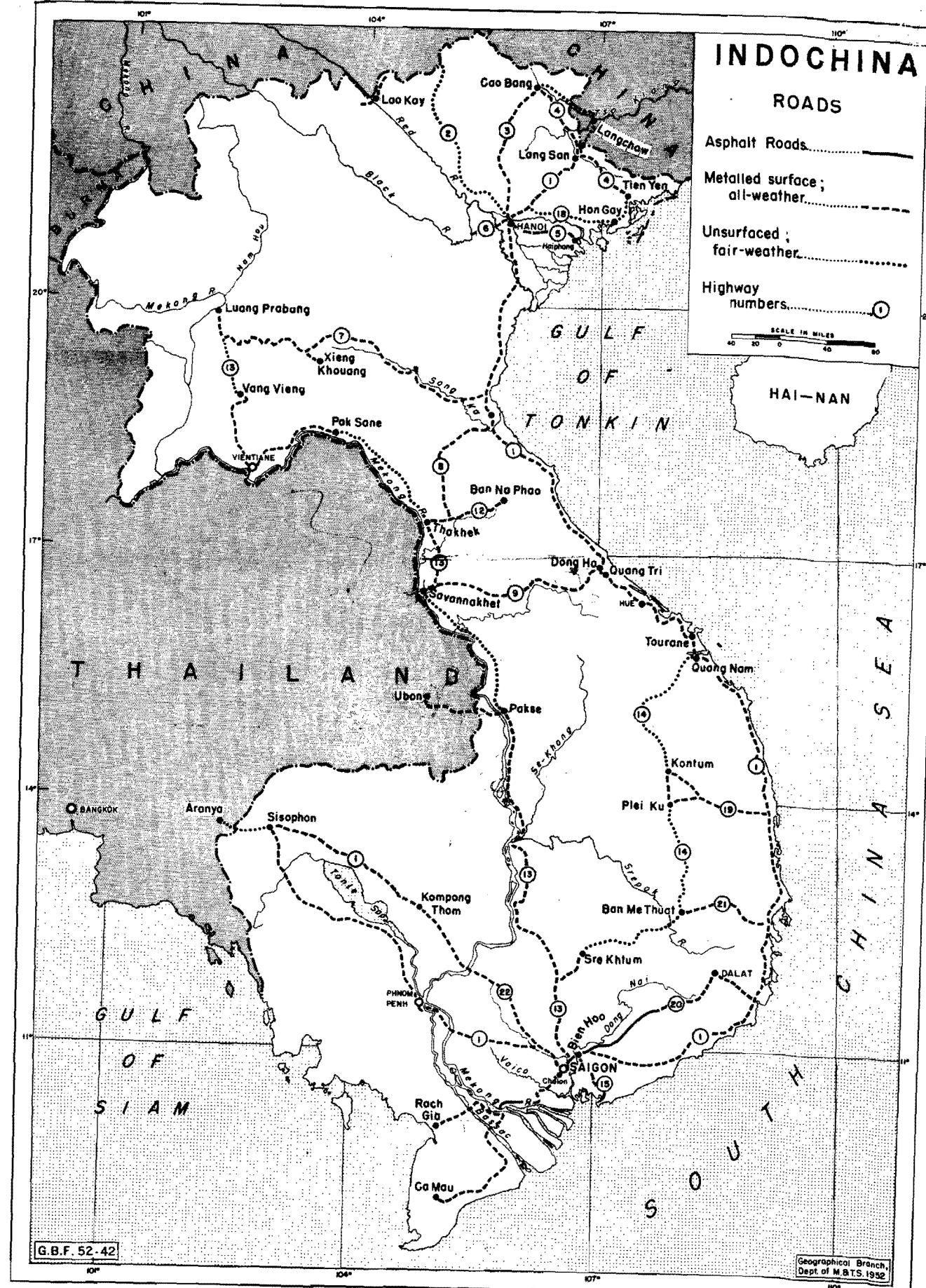


FIG. 24

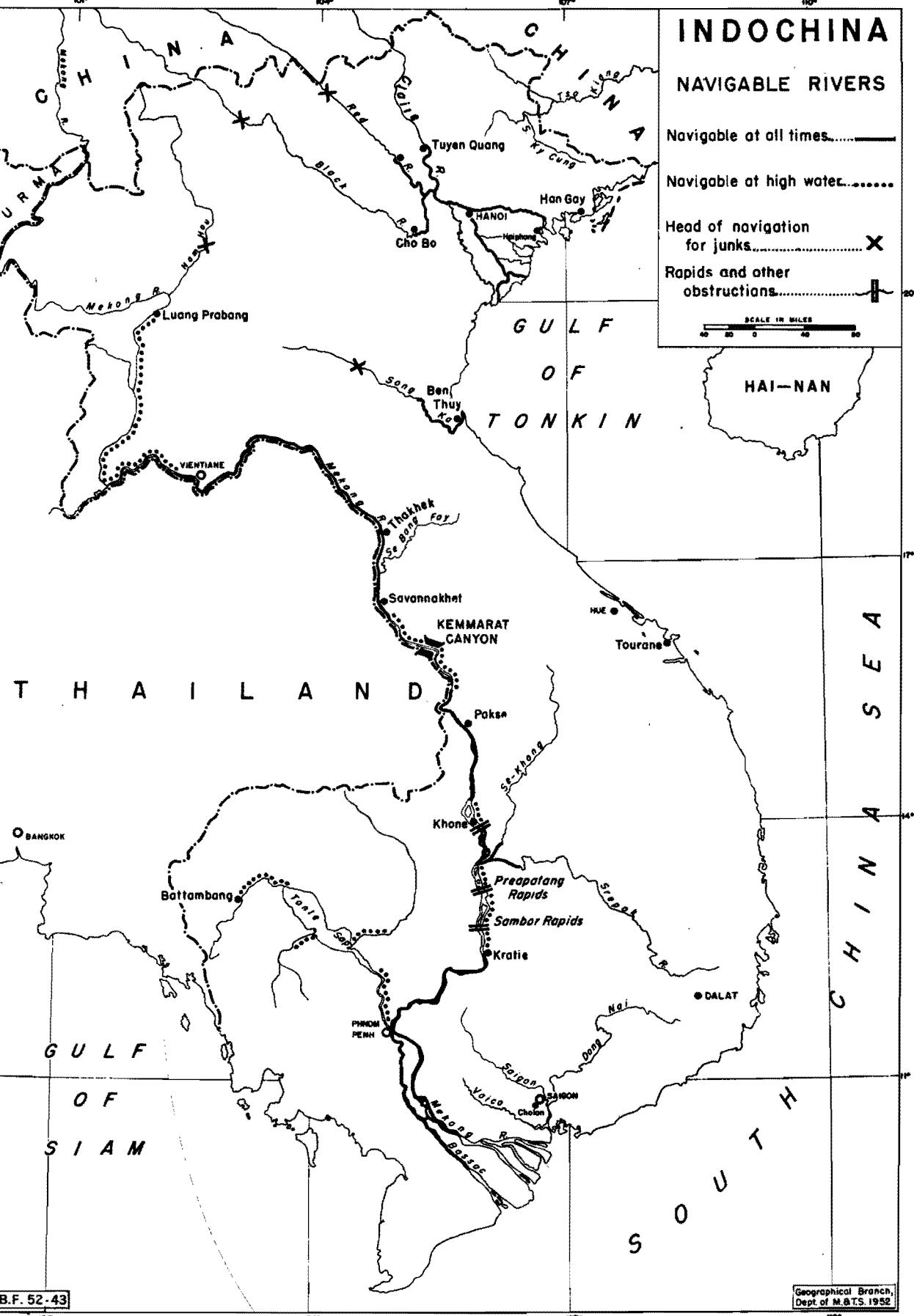
INDOCHINA

NAVIGABLE RIVERS

- Navigable at all times.....
- Navigable at high water.....
- Head of navigation for junks..... 
- Rapids and other obstructions..... 

SCALE IN MILES

40 80 0 40 80



G.B.F. 52-43

Geographical Branch,
Dept. of M.B.T.S. 1952

FIG. 25

waterways exceeded four million tons.¹ Phnom-Penh is a river port, handling mainly agricultural produce in transit from the interior of Cambodia to Cholon.

Between the Mekong and Tonlé Sap flows the river of Tonlé Sap. The accumulation of sediments in this stream, and in the lake tributaries, is so great that navigation is only feasible during high water. At low water, even the smallest boats must be carried over the mud-flats at the south-eastern end of the lake.

The Mekong above Kratie is interrupted by belts of rapids or falls where the river is actively cutting through obstructions in its bed. Thus, the Mekong is not the great inter-regional route it might be. Rapids at Sambour and Preapatang, above Kratie, prohibit the passage of small steam launches except during high water (Fig. 25). Transshipment into small boats is necessary at other times. At Khone, the river widens and runs between small islands, dropping a distance of about 50 feet (Fig. 25). This section is always impassable, and is skirted by a short railway. Above the falls of Khone, the river is calm until, near Pakse, the Kemmarat rapids commence (Fig. 25). Here the river flows for some distance in a canyon, further interrupting traffic.

From Savannakhet to Vientiane, a distance of over 300 miles, the river is always navigable for small steamers (Fig. 25). Above Vientiane, the river is completely navigable only by motor canoes and native boats, but traffic in this area has never required more adequate facilities.

Traffic on the upper Mekong is of small volume. In 1936, the amount of freight passing Khone upstream totalled 5,286 tons, and that moving downstream, 4,644 tons.² Some teak logs from Siam are floated down the river to Saigon. The French have expended considerable sums on aids to navigation on the river, and have built vessels suited to the particular requirements of Mekong navigation.

Only on the lower reaches of the Srepok and Se-Khong is navigation possible at all seasons (Fig. 25). On the upper reaches, as on other Mekong tributaries, navigation for all but native boats is only feasible at high water.

Seaports: Indo-China has only two great ports, Haiphong and Saigon. Both are essentially regional in function, operating as import and export centres for the two deltas. Local conditions and regional factors in their hinterlands have combined to make Saigon the greater port of the two.

From the volume of traffic it handles, Hon Gay also ranks as a major port. It is not an important regional centre, however, but the main shipping point for a single commodity, coal.

Saigon. Although Saigon is about 50 miles from the sea, it has natural advantages not possessed by Haiphong. The sediments from the Mekong

¹ Robequain. Op. cit., p. 112.

² Ibid., p. 115.

outlets nearby are carried southward by ocean currents. Two tides each day help to scour the river approaches. The main requirement for maintenance of the port is dredging in order to straighten the twisting river channels. Fog is seldom a hindrance to navigation.

Saigon is primarily an export centre, handling a great volume of outward-bound commodities, chiefly rice. The dominance of Saigon has become possible through the development of the lower Mekong as an area producing surplus crops of this cereal.

The port extends along the Saigon River for three or four miles. In addition to the river-bank quays and wharves, dolphins and buoys in mid-stream allow vessels to be moored and loaded on both sides from lighters. Thus, a total of about 40 ships can be accommodated at any one time.¹ The port has three functional areas. Downstream are the facilities for overseas shipping, with the naval dockyard farther upstream. On the canals between Saigon and Cho-lon are facilities for local and regional river traffic. Other port facilities include a variety of harbour craft, coaling and oiling depots, two government dry docks and small repair workshops. Warehouses on the river banks provide over 300,000 square feet of storage space, and there is adequate dockside equipment for the handling of cargoes.

More deep-sea vessels enter and leave Saigon than the other ports, although the number of coastal vessels using the port is normally lower (Table 11). Before the Second World War, Saigon, like the others, was most important as an export centre. In recent years, the volume of outgoing cargoes has been slightly exceeded by the volume of incoming cargoes.

Haiphong. The second port of Indo-China, Haiphong, suffers from certain natural disadvantages. Silting from the nearby Red River is a problem, especially as the port has only one tide each day. Constant dredging is required, as well as dykes to maintain the width of the channel. Large ships which miss high tide must wait several hours before proceeding in or out of the port. At times, tidal and river currents produce changing sand-bars in the river bed, so that ships become stranded. When this happens, larger ships must be partially unloaded in Along Bay before entering the port. Haiphong is affected by the early typhoons in July and August. During the crachin period of early spring, fog also is a hindrance to navigation. Furthermore, the port is poorly located for construction purposes. Heavy buildings must be erected on mud over 160 feet deep,² making much piling necessary.

In spite of such natural deficiencies, the activity of the Tonkin region has enabled Haiphong to develop as a port. In years of good harvest, it may export rice, but this traffic may be reversed in poor years. Haiphong also exports cement and some coal. It is also the outlet for northern Anna, and the port for the Yunnan area of China. Haiphong is both a river and sea-port. It has been suggested that a new port, more advantageously sited, should be developed to replace Haiphong. The firms now located there, however, tend to stabilize the port in its present situation.³

¹ Robequain. Op. cit., p. 122.

² Ibid., p. 119.

³ Ibid., p. 120.

TABLE 11 - TRAFFIC OF THREE PRINCIPAL PORTS¹

Year	Number of Deep-sea Ships							
	SAIGON		HAIPHONG		HON GAY		Arrivals	Departures
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures		
1931	571	528	253	300	235	236		
1938	576	559	360	380	240	238		
1941	270	298	318	296	287	280		
1948	430	411	117	110	11	18		
1949	650 ²	664 ²	3	3	3	3		
1950	749 ²	731 ²	3	3	3	3		
.								
Year	Number of Coastal Ships							
	SAIGON		HAIPHONG		HON GAY		Arrivals	Departures
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures		
1931	2,615	2,771	8,670	8,772	1,881	1,885		
1938	2,134	2,231	9,946	9,913	3,440	3,130		
1941	2,069	1,927	10,476	10,479	7,541	7,519		
1948	1,182	1,233	89	89	4,562	4,570		
.								
Year	Total Tonnage of Deep-sea and Coastal Cargoes (1,000 metric tons)							
	SAIGON		HAIPHONG		HON GAY		In	Out
	In	Out	In	Out	In	Out		
1931	484	1,208	458	674	40	1,071		
1938	555	1,762	528	1,168	27	1,452		
1941	398	1,375	403	854	32	1,614		
1948	715	571	137	103	16	177		
1949	833 ²	503 ²	3	3	3	3		
1950	892 ²	554 ²	3	3	3	3		

¹ Annuaire Statistique de l'Indochine.

² Annuaire Statistique du Vietnam; total of deep-sea and coastal vessels.

³ Not available.

Haiphong is situated on the Cua Cam, but, because of silting, is approached by way of the Cua Nam Trieu and a narrow canal connecting the two waterways. The port extends for about three miles along the right bank of the Cua Cam, nearly ten miles from the sea. Its facilities include wharves

for the handling of goods in transit. Immediately upstream are the wharves for large commercial ships, and beyond those, where the river is shallower, are facilities for barges and native boats. Oil depots are located on the same bank, upstream from the city. The adjacent warehouses are more capacious than those of Saigon. Railway lines from the warehouses connect with the main routes to Hanoi and other points. Haiphong possesses the usual harbour craft, cranes, floating docks and dry docks, as well as shipbuilding and ship-repair yards.

Haiphong was the principal centre for coastal shipping, but this traffic has been greatly reduced in recent years (Table 11). As the port of populous Tonkin, Haiphong is less important than Saigon as an export centre, and may serve as an importing point for rice, in poor crop years.

Hon Gay. The coal port of Hon Gay lies about 22 miles northeast of Haiphong at the entrance to a landlocked bay. It is approached through channels between the limestone islets of Along Bay. The port is connected by rail with the coalfields, and ships can load directly from railway cars. The only cargoes brought in are for local use, but the volume of coal normally exported gave Hon Gay a high place, in volume of total trade, among the ports of Indo-China. Deep-sea vessels loaded most of the coal, although considerable quantities were taken by coastal vessels. Recently, Hon Gay has become the chief port for coastal shipping, but the total volume of traffic through the port in 1948 was about one-sixth that of 1938 (Table 11).

A number of small ports lie along the Annam coast, of which Tourane is the most important. Ben Thuy is the port for the area around Vinh in northern Annam, and Qui Nhon is an outlet for southern Annam. Their limited hinterlands restrict the expansion of these ports, and road and rail competition hinder the development of coastal shipping. Cam Ranh Bay in southern Annam is an excellent harbour in a strategic military position, but has never been developed.

Air Lines: The establishment of airports in Indo-China has been made difficult by the lack of level sites in the interior, the swampy, canalized surface of the deltas, and the violence of monsoons and typhoons. In spite of these factors, there were in 1950, six airports in operation in Laos, and ten in Vietnam. Saigon is linked to the principal air routes of southeast Asia.

International passenger air traffic grew slowly before the war, but since 1946 about 20,000 passengers have arrived and departed annually by air, increasing in 1950 to 30,000.¹ Domestic air traffic has increased rapidly since the end of the Second World War. In 1949, there were 221,730 arrivals and departures on domestic flights in Laos and Vietnam; in 1950, 313,865.²

¹ Annuaire Statistique de l'Indochine and Annuaire Statistique du Vietnam, 1949-1950.

² Annuaire Statistique du Vietnam, Annuaire Statistique du Laos, 1949-1950.

FOREIGN TRADE

The value of foreign trade has increased greatly during the French administration, the average value for 1933 to 1937 being nearly double that of 1899 to 1903.¹ Until 1906, owing to the railway-building and other public works projects, Indo-China had an unfavourable balance with France, but this has been reversed in most of the succeeding years. However, Indo-China has had many "invisible" imports in the form of transfers of commercial profits, repatriation of bank savings, and interest and amortization on government loans.² The per capita value of foreign trade is very low. In 1937 it was higher than that of China and India, equal to that of Siam, but much lower than that of Malaya, the Netherlands Indies, and the Philippine Islands.³

Import Commodities: There have been some changes in the major import commodities since the Second World War. Petroleum products, and iron and steel continue to form the largest items, by volume, of imports. Fairly large quantities of foodstuffs are imported. Wheat flour, and liquors and wines, continue to be major import commodities, but in recent years sugar, fruits and vegetables, and milk products, have been imported in increased quantities. Whereas, before the war, wood and wood products and jute sacks were important items, they have been replaced in importance by paper and paper products, and a variety of metal goods. Other items which have been imported in greater quantities since the war include construction materials, asphalt and bitumen, raw calcium phosphate, various chemical products, and glass and china wares. Cotton, particularly in fabric form, continue to be imported in considerable quantities.

Export Commodities:⁴ The great export items from Indo-China, by volume, are rice and rice products (rice flour, etc.), coal, corn, rubber, and iron ore. Export items of smaller volume include fish, hides, and such vegetable products as oilseeds and oilcake. Since the Second World War, the volume of most of these items has declined greatly, in some cases as much as 90 per cent. Because of such decreases, other items, such as limestone and cement, have gained in relative importance as exports.

¹ Robequain. Op. cit., p. 305.

² In 1937, these were as follows: Transfer of commercial profits 781,000,000 francs - Repatriation of savings by banks - 134,000,000 francs. Interest and amortization on government loans - 105,000,000 francs. Ibid., note, p. 307.

³ Loc. cit.

⁴ For the years 1949 and 1950, statistics are available for Laos and Vietnam, only. Lack of statistics for Cambodia does not make possible comparison with the total volume of exports for earlier years. In addition, corn, which is exported from Cambodia, does not appear as an important item.

Import-Export Markets:¹ France is Indo-China's chief source of supply and best customer, but since 1947 the value of goods imported from France has exceeded the value of goods exported to that country. About 75 per cent of the goods imported into Laos and Vietnam in 1949 and 1950 originated in France, whereas about 40 to 50 per cent of the goods exported by these states were destined for France. The rest of the French Union accounts for less than 5 per cent of the imports to these states, but takes from 10 to 15 per cent of their exports. In some years, these transactions have provided a favourable balance for Laos and Vietnam.

Trade with the other parts of Asia has declined in volume. In 1949 and 1950, other Asiatic countries supplied about 8 per cent of the imports of Laos and Vietnam, and took about 20 to 35 per cent of their exports. Chief among Asiatic customers are the entrepôts of Hong Kong and Singapore, with which Laos and Vietnam usually have a favourable trade balance. The decline in the movements of coal and rice is the chief reason for the lowered volume of trade with other parts of Asia.

Trade between Laos and Vietnam and European countries usually involves the importation of manufactured articles and the exportation of raw materials, particularly rubber, and results in a deficit for the Indo-Chinese states. The value of this trade is not usually more than 5 per cent of the total imports or exports of Laos and Cambodia.

The value of trade with the United States fluctuates rather widely. In 1949, about 9 per cent, by value, of the imports of Laos and Vietnam came from the United States, but in 1950 this declined to 6 per cent. Exports to the United States in 1949 were valued at less than 2 per cent of the total, but in 1950 rose to 19 per cent of the total value of exports. Most of the imports are manufactured goods, and rubber forms the chief export. Both states had an unfavourable balance of trade with the United States which was reversed in 1950.

Geographical and historical factors have given Indo-China an agricultural, rather than an industrial economy and have had a determining influence upon her foreign trade. Indo-China exports heavy, cheap, raw materials, which can be sold profitably in the countries of Southeast Asia. She must import light, high-priced manufactured articles, which are most readily available in Europe and North America, but which can bear the higher transportation costs.

Rice, it is probable, will always find its market in Southeast Asia, but two other export commodities, coal and rubber, are in a different position. Both are required by industrialized countries, but the scarcity of coal in Southeast Asia ensures Indo-China a market in such places as Japan, Hong Kong, and Singapore. Rubber is a more expensive item, able to

stand long-distance shipping costs. Before the development of synthetic rubber, also, it was available in extra-tropical countries only as an import. Rubber, therefore, formed the chief item of export to those countries from which Indo-China drew large imports. Finding alternate markets for rubber may prove to be a more lasting problem than the temporary decline in the rice trade.

CHAPTER IV

REGIONAL GEOGRAPHY

A country can be divided into regions according to the factors of its physical environment as they affect present and potential human settlement and development. Each region has a group of significant characteristics which prevail throughout its extent, and which distinguish it from adjoining regions. Within some regions, minor differences in the environment may occasion different human adaptations, so that sub-regions can be distinguished.

Regions are not usually separated by well-defined boundaries, but by transitional zones. If, however, many important factors such as topography, climate, and soils are superimposed upon a map, patterns of coinciding boundaries will emerge. After evaluation of the significance of such coincidental limits, the regional boundaries can be defined. This so-called "girdle" system¹ has been used to determine the regional divisions of Indo-China (Fig. 26).

FACTORS OF REGIONAL SIGNIFICANCETopography

Because of its effect on climate, soils, and the distribution of population, topography is a basic factor in determining the regions of Indo-China. The chief distinction has been made between lowland, plateau, and mountain regions.

Hydrography

The varying character of inland water bodies affects the development of some regions. The necessity for flood control on the Red River as opposed to that for drainage and irrigation projects on the lower Mekong is an example. The seasonal change in the level of Tonlé Sap is an important factor in the development of the surrounding region.

Climate

Climatic elements help to define regional boundaries. They include heavy or light precipitation, the crachin rains, and autumn, rather than summer, rainfall maxima; cool winter temperatures, and the narrow annual temperature range characteristic of tropical climates.

Soils

The availability of useful soils is an important factor in limiting present and potential human exploitation of Indo-China. Major soil regions

¹ Shu-Tan Lee. Delimitation of the Geographic Regions of China. Annals of the Association of American Geographers, Vol. 37, pp. 156-168. 1947.

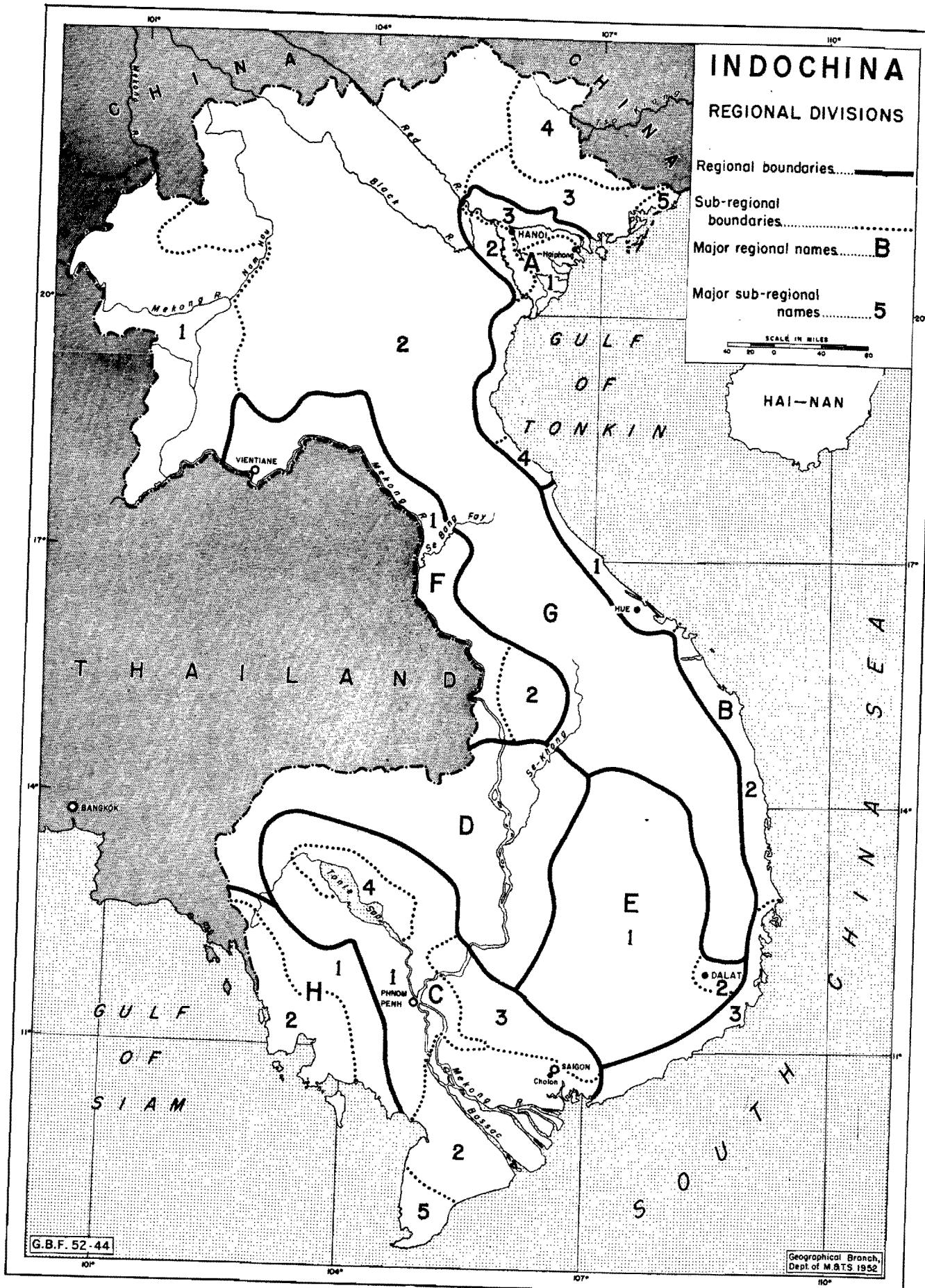


FIG. 26

are those of the recent alluvia, and of the red soils or laterized alluvia where plantation crops may be grown.

Vegetation

Vegetation types have not been given great significance in this regional classification. The present vegetation cover reflects the effects of human exploitation rather than the operation of environmental factors. Forests are, in themselves, an important factor chiefly in those areas where a combination of other obstacles has discouraged human settlement.

Distribution of Malaria

The prevalence of malaria is an overriding factor in determining the regional possibilities of many parts of Indo-China. In general, malaria is almost absent from the lowlands; there is little on the western plateaux, and it is of only seasonal significance on the flanks of upland areas. On the high plateaux and in the mountains, malaria is prevalent at all seasons. There, the disease is a determining factor in all regions save those where the attraction of certain resources is very great.

Land Use

The limit of agricultural land is a major regional boundary because it defines a distinct change in human adaptation to environmental conditions. Changes in agricultural practice define the boundaries between subdivisions of a region possessing general similarity. Non-agricultural land use in Indo-China is significant in defining sub-regions.

LOWLAND REGIONS

The Tonkin-Annam Deltas:

On the basis of topography, soils, and climate, this is a well-defined region. It is bounded by the limits of the deltaic lowlands with their alluvial soil, and by the distribution of the crachin rains. The limits of land under rice cultivation closely follow the natural boundaries. In the south, it is bounded by the topographic barrier of the Porte d'Annam (Fig. 26).

The double-harvest sub-region: Near the mouths of the Song Ma, Song Ca, and Red River, a well-developed system of embankments has been established, and modern hydraulic projects are common. In this sub-region, two crops of rice are harvested annually.

The June harvest sub-region: This area is affected by summer floods. It is not possible for the peasants to drain their fields for planting of a crop which would give them a winter harvest.

The November harvest sub-region: In the northern part of the delta, the land is slightly higher and is easier to drain (Fig. 26). Summer planting for November harvesting is practised, but there is no spring harvest.

The irrigated sub-region: This area is transitional in character between the Tonkin delta and the Annam coast. It is beyond the dyked area and the influence of the crachin rains, but, on the basis of local topography, it is linked with the former region (Fig. 26).

The great problem of the Tonkin delta region is the rapidly growing pressure on land already taxed to supply its cultivators. The extent of available uncultivated soil is extremely limited. Better drainage might enable two crops to be harvested in the single-crop areas, but the soil is so deficient in minerals that it needs to lie fallow part of the year. Improvement of yields through the use of fertilizers and improved farming practices would be valuable. The other alternative, removal of the excess population to other areas, depends upon solution of a variety of problems both within and beyond the Tonkin delta.

The Annam Coast:

Each delta along the Annam coast might really be considered a separate region, well defined by soil and topography. Human use has been adapted to the annual southward progression of the typhoon belt during the autumn and winter. For the purposes of this general discussion, the whole coastal fringe has been classed as one region, distinguished by the similar topographical character of each delta, warm winters, an autumn rainfall maximum, and prevalent typhoons during the autumn months.

The June and November harvest sub-region: Double harvests are reaped all along the Annam coast, but the harvest times are adjusted to the progression of the typhoon season. In the north, one harvest is in June, and the other in November, when the worst typhoon period has passed (Fig. 26).

The April and September harvest sub-region: The autumn harvest in this region takes place before the onset of the typhoons, so the spring harvest also takes place earlier than farther north.

The September and January harvest sub-region: This area in its southern half includes the driest portion of Indo-China. One rice harvest is gathered in January just after the close of the rainy season, the other in September just before its onset. This area is the most scantily populated part of the Annam coast.

Lack of space has caused local population problems as serious as those of Tonkin, and has also precluded the development of large urban centres which might absorb some of the population. Rice yields are low because of soil poverty, the extreme irregularity of the rainfall, and damage from tropical storms.

The Mekong Lowlands:

Although conditions on the Mekong plains are different from those of the delta, they are more similar than those on the outer plain, beyond the limits of recent alluvial soil (Fig. 26). The Mekong lowlands are characterized by freedom from malaria, fairly low precipitation but available water for irrigation, alluvial soils, and, consequently, rice cultivation.

Cambodian rice-lands sub-region: In this area, irrigation is carried on by primitive methods. Rice is harvested in the autumn, at the end of the dry season. Only one annual harvest is necessary, although a dry season crop may be produced in poor years.

Mekong delta sub-region: The Mekong delta lands are marked by the extent of drainage projects to bring land into cultivation, and by special practices to overcome the difficulties of the marshy ground (Fig. 26). Early-maturing varieties of rice are grown during the dry season, or "floating" rice is planted. In some areas, rice is twice transplanted to develop long stems for growth in deep water. In the eastern delta, farms are fairly small, but in the outlying areas of newly drained land, large farms operated by tenants are more common.

Lowland plantation sub-region: This area, topographically, belongs to the lowland, but is composed of ancient alluvial, or "grey" lands. Part of the area has red basaltic soils (Fig. 26). Although it receives more rain, it is well drained. Its soils, lack of dense forest, and accessibility to Saigon made it the first southern plantation area, and it is still used for that purpose in spite of its relative inferiority.

Tonlé Sap flood plain: Below the flood level of the lake, rice cultivation and permanent settlement are impossible (Fig. 26). Fishing is the principal occupation, but the area will become similar to the surrounding rice-lands when the lake fills up.

Bac Lieu marshes: A large part of the province of Bac Lieu is covered by undrained swamps supporting dense mangrove forests (Fig. 26). There are no roads in the southern part, and malaria is prevalent at certain seasons. Development of this area depends upon modern hydraulic projects.

Population pressure is not a problem in the Mekong lowland, but the region is not utilized to its full capabilities. Although many main canals have been dug in the delta, secondary waterways are not common, and settlement has not spread over all the areas between. Tenant farming is reducing many of the people to the living standards of Tonkin. In Cambodia, general improvement of farming methods would raise the yields, but, in this respect, the limitations of the Cambodians as rice-farmers would have to be overcome.

Cambodian plain: Beyond the central core of rice-lands, the Cambodian plain is level and monotonous, covered chiefly with savanna growth. The soil is principally that of laterized alluvial terraces and, although the region receives slightly more rain, there are few rivers for irrigation (Fig. 26). Malaria is slightly more prevalent, and it is a seasonal hazard on the inland margins of the plain. This region, therefore, supports little agriculture and few people. It might be used for plantations, in the manner of the Cochinchinese plantation lowlands, but it lacks the accessibility which is the chief attraction of that area.

PLATEAU REGIONS

The Red Land Plateaux:

The sloping red land plateaux have extensive areas of basaltic soils, higher rainfall than the lowlands, good drainage, and uniformly high temperatures. In spite of dense forests, lack of a local labour force, and the danger of malaria at all seasons, they have been utilized as plantation lands. The Dalat sub-region (Fig. 26) has a uniform yearly temperature also, but, because of its increased elevation, it is cool at all seasons. For this reason, it has been used as a resort area. The local type of malaria is not serious, and has been controlled by drainage projects. Market gardening is a feature of this sub-region.

The problem of overcoming malarial conditions is the greatest hindrance to the development of the red lands. Were this problem solved, the problem of a labour supply would have a much easier solution.

Central Mekong Plateau:

This region comprises the lower slopes of the western plateaux (Fig. 26). It is distinguished from the upper plateaux by its comparatively low rainfall, the better quality of its soils, the more open character of its vegetation, and its greater freedom from malaria.

Alluvial sub-region: In this area there are considerable deposits of alluvial soil along the Mekong, and rainfall generally exceeds 80 inches annually. Rice is cultivated, but by less intensive methods than on the lowlands.

Bolovens Plateau: This is a basaltic plateau which receives a heavy annual rainfall (Fig. 26). Some parts are marshy, but there are some natural grasslands in the area. The native Moi people rear cattle and grow coffee. There are also European coffee plantations.

The Mekong plateaux could support a greater population than at present, on the basis of their natural resources. Soil poverty and irregular, light rainfalls are natural obstacles in some areas, but the volume of yields might nevertheless be improved. The Bolovens plateau is seriously infested with malaria.

UPLAND REGIONS

Central Uplands:

This region includes the mountainous areas of Tonkin, Annam, and Laos, and those high plateaux where cool climate, the prevalence of malaria, the lack of good soils, and dense forests restrict human settlement (Fig. 26). Land use generally takes the form of shifting agriculture for the production of mountain rice and other crops, although small alluvial areas in river valleys may be used for irrigated rice cultivation. European penetration of the region is limited to mining, transportation, and defence.

Upper Mekong sub-region: This plateau area west of the Mekong (Fig. 26) has warm winters but a rather light rainfall. It contains some alluvial lands, and is fairly free from malaria, but its general lack of resources and its inaccessibility have discouraged exploitation.

Tonkin-Annam-Laos Mountains: The chief mountain ranges of Indo-China comprise this sub-region (Fig. 26). It is an area of rugged relief, generally dense forests, and constant danger of malaria, inhabited by less advanced peoples who practise shifting cultivation. There is little opportunity in this vast area for more intensive exploitation or for further settlement.

The Tonkin mining sub-region: In this foothills sub-region (Fig. 26), relief is less rugged, and malaria, on the lower slopes, is less of a menace. The valleys are broader and support greater agricultural activity than in any other upland area. In addition, the exploitation of coal, tin, zinc, and other mining resources has enabled the area to support a relatively dense population.

The Si-kiang drainage sub-region: This is an area of relatively low, arcuate mountain ranges, and valleys drained by rivers flowing into the Si-kiang, in China (Fig. 26). There is some cultivation in the valleys, but the rainfall is fairly light. Malaria is prevalent. Mining activity is limited to the western part, but it has been penetrated by Europeans, chiefly for defensive purposes only.

Northern rice lands: In spite of seasonal malaria, the narrow alluvial lands along the coast have been utilized as rice lands by the immigrant Hakka from China (Fig. 26). Fishing is subsidiary to rice-growing.

Coal or mineral resources will probably continue to be the chief attraction for European settlement in this region. Native exploitation is hindered by the effects of malaria. The practice of shifting cultivation causes forest deterioration, with effects on the river regimes which are detrimental to the lowland areas. In the mountains, shifting cultivation is, in itself, only harmful when increased population shortens the length of time that the land may lie fallow. In order to restrict the practice, satisfactory alternative methods of cultivation will have to be developed. Among some mountain tribes, smuggling and the opium trade can be suppressed only by the development of alternative means of subsistence.

Cambodian Uplands:

The coastal uplands of Cambodia consist of plateaux sloping steeply to the sea and more gently to the interior plain (Fig. 26). In the higher parts near the coast, extreme dissection has produced rugged relief. Throughout the region extremely heavy rainfall and the prevalence of malaria have discouraged settlement. Dense primary forests are found in the more remote sections.

Cambodian plateau sub-region: The less rugged slopes have a somewhat lighter rainfall. The plateaux nearest the Mekong are covered with ancient alluvial deposits (Fig. 26), and on some of their lower slopes orchards

are cultivated. From the point of view of human use and settlement, however, this area can be classed as a mountain region.

Cambodian mountains: Small alluvial deposits between the coastal spurs of this area have been cultivated, pepper being the principal product. The major part of the uplands is isolated and inhabited by a few elephant-hunting tribes.

At present, there is little prospect of much development in the Cambodian upland region. However, some use of the lower plateau as a plantation area might be made. The isolation of the small coastal deltas has restricted their settlement, because the Cambodians are not a maritime people. There are possibilities for greater development of the fishing industry in the coastal waters.

CHAPTER V

ECONOMIC AND POLITICAL RELATIONSHIPS

The three states of Indo-China, in common with other Asiatic lands, are passing through a period of profound change. Cause and effect relationships are difficult to separate; the geographic, economic, and social circumstances which have provoked political disturbances cannot themselves be improved until the political difficulties are resolved. Similarly, progress in Indo-China depends upon that in the other Asiatic lands, which may, in turn, reduce the opportunities for the Indo-Chinese to improve their position.

INTERNAL RELATIONSHIPS

The area known as Indo-China has two great problems arising, to a considerable degree, from its geographic background: they are the lack of economic and demographic balance on the one hand and social divergence.

Economic and Demographic Balance:

The two great lowland regions of Indo-China, at either end of the Annam Range, have often been compared to two rice-baskets suspended at either end of a native carrying pole, or *ganh*. Such an analogy is not merely over-simplified, it is completely misleading. The concept implicit in the illustration is one of balance. It is precisely the lack of balance between the two "rice-baskets" that has caused many of the difficulties besetting Indo-China today. A similar disequilibrium exists between the upland and lowland regions.

The physical and social factors which have produced the inequalities between the population and resources of the lowlands and the uplands are still operative.

Mountains and plateaux cover about 80 per cent of the area of Indo-China, but they support only about 10 per cent of the people. In contrast, the lowlands, covering 20 per cent of the area, support 90 per cent of the population and produce 90 per cent of the rice crop.¹ Furthermore, the actual inhabited and cultivated area of the lowlands is even less than 20 per cent of the total surface. The poor soil, inaccessibility, and unhealthy conditions of the uplands which have produced this lack of balance, and the overcrowding and malnutrition on the lowlands which have resulted from it, remain the fundamental problems in Indo-China.

Further inequality exists in the distribution of population and resources within the lowlands. Table 12 gives the approximate areas, rural populations, and rice production of the Red River delta and the Mekong rice-lands in 1943.²

¹ Calculated from statistics, by provinces, on area, population, and rice harvests, as given in *Annuaire Statistique* for various years.

² *Annuaire Statistique*, 1943-1946.

TABLE 12 -

REGIONAL RICE PRODUCTION

	Rural Area (1,000 sq.mi.)	Population (millions)	Total (millions of metric tons)	Per Capita (metric tons)	Per Sq. Mile (metric tons)
Red River delta	15	7.4	1.5	.20	100
Mekong rice- lands	44	7.5	3.0	.40	68

Source: *Annuaire Statistique de l'Indochine* for various years.

Thus, although the populations of the two regions were nearly equal, the people of Tonkin were crowded within an area one-third the size of the Mekong rice-lands, and produced a rice crop only one-half as large. The dense population of the Red River delta made intensive cultivation both necessary and possible, so that the yield was about one-third greater per unit area than in Cochin-China and Cambodia.

The lower agricultural resources of Tonkin are partially compensated by the presence of coal and mineral resources, but it is likely to be some considerable time before industrial activity will be great enough to support a significant proportion of the population.

The total area of the Annam lowlands is approximately equal to that of the Red River delta. The 1943 population was about 6,500,000 and the yield of rice about 1,200,000 tons. Thus, although the yields were greater than in the Mekong region, they were lower than in Tonkin, and the per capita production was slightly lower than in Tonkin.

The average rice production per capita for the whole upland area is probably even lower than that of Annam, although the per capita rice production in some provinces may, in some years, be fairly high. However, the upland people depend on other crops to a greater extent than do the lowland peoples.

Thus, there arises the question of the redistribution of the Tonkin population. The red lands of the Annam plateau are accessible to the overpopulated coastal deltas, and some moderately successful small colonies of coastal people¹ have already been established there. Traditional Annamite colonization was a slow process into contiguous areas, so that there was no sudden break with the original community. This resulted from the social, economic, and religious structure of Annamite civilization. The necessity for maintaining contact with Tonkin has prevented much permanent settlement among Annamite contract labourers, and has been an important factor in the

¹ Robequain. *Economic development.* p. 68.

failure of certain colonization attempts. Improved communications were expected to foster Annamite migration, but have facilitated the return of migrants to Tonkin as well as their original emigration. It has been suggested that a modern adaptation of the traditional migration might prove successful; groups of families from the same village moving to new locations, perhaps under individual leadership.¹

Further obstacles to Annamite migration must be considered. The Annamite fear of the uplands is a powerful force. Malaria is more prevalent in these regions because the surface conditions are favourable to some dangerous species of carrier mosquitoes and the climate lowers bodily resistance to the disease. Annamites are not acclimatized to the uplands and their susceptibility to malaria is further increased if they are undernourished.

The expense of colonization is high. Irrigation and drainage projects are required, as well as preliminary surveys of the soil, drainage, and drinking-water supplies. Provision must be made for support of the people before they become established.

The effects of Annamite colonization on the existing population of areas colonized must also be considered. The valley bottoms, in mountain areas, are already occupied and, although the upper slopes might appear to be unused and suitable for terrace cultivation, they are usually the fallow lands of the *ray* cultivators. It is said that in Cochin-China there is resentment against Tonkinese colonization, because it is felt that the lands now unused will soon be occupied by the increasing Cochin-Chinese population itself.²

This is but a brief outline of some of the complicated problems which must be solved before any satisfactory progress can be made in restoring the economic and demographic balance of Indo-China.

Social Divergence

The lack of unity which exists between the various ethnic groups of Indo-China is likewise a result of the combined influence of the geographic background and the history of the country. This problem is inextricably linked with that of population distribution.

The mountainous interior of Indo-China has prevented free communication and mingling of the inhabitants and has restricted Annamite expansion to the coasts and deltas. Furthermore, the general slope of the plateaux, and the trend of some of the river valleys has promoted closer relations with neighbouring countries than with the other states of Indo-China.

Within the Annamite lands themselves, there has always been a considerable consciousness of unity, but there appears to be little feeling of unity with neighbouring groups.³ The prevailing attitude of their neigh-

¹ Robequain. *Op. cit.*, p. 73.

² *Ibid.*, p. 72.

³ Thompson. *French Indo-China.* p. 494.

bours towards the Annamites appears to be one of resentment against Annamite expansion and infiltration.

In the mountains, the tribes have little contact with each other, including those living at different altitudes in the same area, nor is there more than the most rudimentary tribal organization. In the northeast, contact with China is perhaps more influential than contact with the lowlands.

The natural barriers between Laos and the rest of Indo-China are greater than those between Laos and Siam. Road and railway communications give Laos an outlet to Bangkok; the French highway-building program will provide an alternative route. The Laotians are a Thai sub-group, and Laos was one of the areas claimed by the followers of "Pan-Thaiism" before the Second World War.¹ Since the defeat of the Japanese, Laotian territory ceded to Siam has been returned, and the Free Laos movement has been abandoned.

The Cambodians have always feared the encroachment of both Annamites and Thai, and have turned toward France for assistance in the maintenance of their identity.

Laos, Cambodia, and Viet-Nam have reached agreements with France regarding their status as independent states within the French Union. Both Laos and Cambodia are anxious to maintain their independence of Viet-Nam, and to remain independent of each other.

EXTERNAL RELATIONSHIPS

It is impossible to foretell what the future economic and political relationships of the three states of Indo-China with the rest of the world will be. Production within the country is at a low level, with a consequent decline in foreign trade. The pattern of future trade relationships will not be established until political stability is reached in Indo-China and the whole of the Far East and Southeast Asia.

Relations with the French Union:

Laos, Cambodia, and Viet-Nam are independent states within the French Union. As such, they have control over most aspects of their own government, although French assistance and advice is still provided in several fields. The status of all three has been recognized by the United Kingdom, the United States, and some other governments. The Soviet Union, the European satellites of the Soviet Union, and the Central People's Government of the People's Republic of China, have extended recognition to the communist authorities headed by Ho-Chi-Minh. Ho-Chi-Minh's forces, known as the Viet-Minh, control parts of the territory of Viet-Nam, especially near the Chinese border, and carry on guerrilla activities in other areas. The forces of Viet-Nam, with French assistance, are engaged in military operations against Viet-Minh.

Relations With Other Asiatic Countries:

The political relationships of the three states of Indo-China with other Asiatic countries are more difficult to define than the economic relationships. Future trends remain in doubt.

In the years immediately preceding the Second World War, Indo-Chinese exports to Far East countries declined as a partial result of increased sales to France. In 1938, the Far Eastern countries, exclusive of Japan, took less than 25 per cent by value of Indo-Chinese exports. In 1946, owing to large exports of rubber to France and the United States, the value of exports to the Far East, again exclusive of Japan, dropped to about 15 per cent of the total. However, these Asiatic countries in 1947 imported goods totalling more than one-third of the value of Indo-China's exports. Over half of the Far Eastern exports of Indo-China go to Hong Kong and China. Whether with the revival of export trade, the recent emphasis on Far Eastern markets will continue remains to be seen.

There is a possibility that Indo-China may attain a position of industrial importance in the Far East. This would depend partly upon an increase in purchasing power among her Far Eastern customers. However, as these countries themselves develop, they may become industrial rivals, rather than customers of Indo-China.

In the past, Indo-Chinese political relations with the Far East were associated with those of France. During the Second World War, Indo-China came under Japanese domination, but this relationship ceased with the defeat of Japan. Most of the countries of the Far East have not yet indicated their support for either the government of Viet-Nam or the rival regime of Viet-Minh.

Relations With Other Parts of the World:

Indo-China usually had a favourable balance of trade with most European and North American countries as a result of her rubber exports. Since the Second World War, and since 1947, in particular, the flow of equipment and supplies from these countries has given them a favourable balance of trade with Indo-China. Future economic relations between Indo-China and Europe, North America, and the Commonwealth countries, are likely to be more important. Indo-China is in the operational region of the United Nations Economic Commission for Asia and the Far East, from which body she has already received assistance.

There are few political contacts between the states of Indo-China and non-Asian countries.

¹ Levy. French Far Eastern Affairs. p. 65.

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