

Ogasawara (The Bonin Islands) - Industrial Development, Temporary Devastation, and Restoration Program

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雑誌名	The science reports of the Tohoku University. 7th series, Geography
巻	21
号	2
ページ	195-222
発行年	1972-02
URL	http://hdl.handle.net/10097/44947

Ogasawara (The Bonin Islands)—Industrial Development, Temporary Devastation, and Restoration Program

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The conclusion of the authors' analyses is that the geographical character of Ogasawara is mainly controlled by the following six conditions: (1) The islands are far from the Japanese main islands. (2) They enjoy a subtropical and oceanic climate. (3) They have a short-term history of human occupation after the discovery of the islands. (4) The islanders abandoned their economic activities due to the evacuation to the Japanese main islands in 1944 to get out dangerous conditions of World War II. (5) Since then, the islands have been uninhabited except for the occupation of U.S. Army, and a small population of European and Hawaiian origin who returned in 1946. (6) It has been only four years since the withdrawal of the U.S. Army and the return of the islands to Japan in 1968.

There is no doubt that these conditions have largely affected the social and economic structure and the landscape of the islands, and also have given the islands some special characteristics. Therefore, the authors laid the focus of the study upon the change of population and the development of agriculture and fishery. The physical environment as the foundation of economic activities is very important. Accordingly, they briefly describe the geomorphology, climate, soils and vegetation. The geographic circumstances involving physical and cultural factors may be basic in relation to planning for the industrial restoration of the islands. Thus, through the study, the authors intend to make clear the problems essential to the development program of islands remote from the Japanese main islands.

1 Ogasawara Shotō

Ogasawara Shotō comprises about 30 tiny volcanic islands scattered in the western Pacific Ocean, and occupy an land area of about 106 km^2 , lying roughly about 1,000–1,200 km southeast of the Japanese main islands. The archipelago includes four distinct clusters, named, respectively, from north to south, Mukojima Rettō (Parry Islands), Chichijima Rettō (Beechey Islands), Hahajima Rettō (Bailey Islands) and Kazan Rettō (Volcano Islands), and other tiny island groups such as Okinoshima (Parece Vela), Nishinoshima and Minami-torishima (Marcus Island). The first three are part of Ogasawara Guntō (the Bonin Islands proper), and Kazan Rettō, Minami-torishima, Okinoshima, and Nishinotorishima

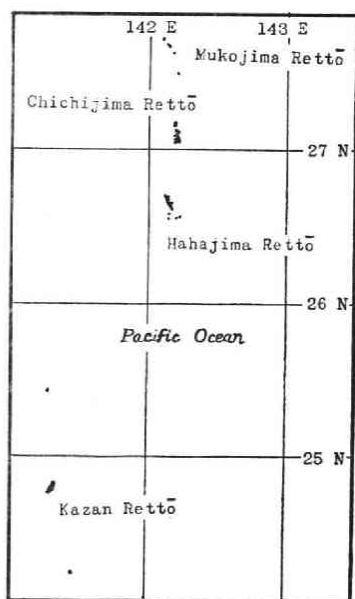
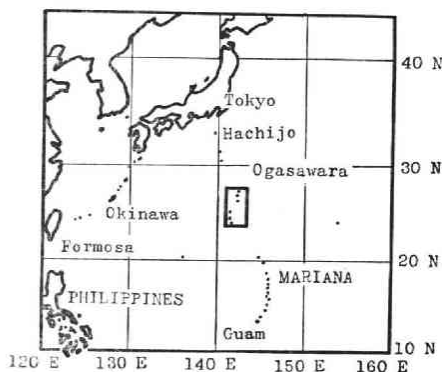


Fig. 1 Index Map

are placed within the group for administrative purposes.

Chichijima Rettō, the central group of Ogasawara Guntō, includes Chichijima (Peel Island), Anijima (Buckland Island), Otōtojima (Stapleton Island), Nishijima, Higashijima and Minamijima. The principal island is Chichijima with good deep-water anchorage at Futami Bay. Hahajima Rettō, the southern group, comprises Hahajima (Bailey Island, South Island or Coffin Island), lying about 50 km south of Chichijima, Mukaijima, Anejima, Imōtojima and Meijima. Mukojima Rettō, the northern cluster, consists of Mukojima about 70 km north of Chichijima, Kitanoshima, Yomejima and others. Kazan Rettō comprises of Iwōjima (Sulphur Island), about 275 km south of Chichijima, Kita-Iwōjima and Minami-Iwōjima.

The islands belonging to Ogasawara Guntō are scattered between latitudes of 26°33'N and 27°44'N and longitudes of 142°06'E and 142°14'E. Ogasawara Shotō extends between latitudes of 20°25'N and 27°44'N and longitudes of 136°05'E and 153°38'E. Ogasawara Shotō lies far away from the Japanese main islands, and it

takes 50 hours by ship to arrive at Chichijima from Tokyo. This location leads the economic activities to unfavourable conditions, for it adds expensive shipping costs for the import of daily necessities and the export of agricultural and fishing products. At the same time, the smallness of land area compels the islanders to restrain from areally extending their settlements and developing the industries, especially agriculture.

Ogasawara forms a part of an outer festoon which stretches from the central

volcanic zone of Japan through Kazan Rettō, the Mariana, and Palau Islands to Moluccas, and was formed by successive lava flows from submarine volcanoes beginning in the Eocene epoch and ending before the Miocene, and is still unstable. Each island of Ogasawara is surrounded with sea cliffs by marine erosion, and the coasts are also the shorelines of submergence and fault-line scarp shorelines. Sandy beaches are rarely seen in the islands. For example, 45 *km* of the shoreline of Chichijima includes only 3 *km* of sandy beaches. Old marine abrasion surfaces develop in five steps, which are dissected by some small streams. The drainage system is poorly developed in each island, and only 5 small streams are seen in Chichijima and 3 in Hahajima.

In Chichijima and Mukojima, the base rocks consist of "Boninite" which is the name of a kind of agglomerate-lava of bronzite-andesite, and in Hahajima and Anijima they are pyroxene-andesite and basaltic andesite. In Chichijima and Anijima, oxidational illuvial horizons of iron and alumina with red-coloured and massive structure cover the flat lands of the mountain ridges and slopes, and form red-coloured lateritoid soils with thickness of 2 or 3 meters over the weathered crust of agglomerate and andesite base rocks.

Chichijima is the largest in Ogasawara, but even it is 24 square kilometers large. In the central part of the island, the top of the hilly land rises to Mt. Chūō with a height of 321 *m*, from which mountain ridges run in several directions. There are small plains of Ōmura and Ōgiura, and small beaches of Kominato, Hatsuneura and Miyano-hama. In inland area there are small flat lands such as Futago and Komagari, but most parts of the island are hilly and rocks are exposed in places.

Hahajima is about 21 square kilometers large. From Mt. Chibusa (426 *m*) at the central part of the island, the mountain ridge runs from south to north with an average height of 400 *m*, and at the southern part, the land gradually decreases in height. Except for Kitakō, Higashikō and Okikō, the island is surrounded by steep cliffs.

Anijima and Otōtojima are surrounded by steep sea cliffs, and in inland area rocks are exposed without vegetation.

Ogasawara Guntō is subtropical in climate. The northern part of the North Equatorial Current as a warm current flows near the islands, and the Subtropical Convergent Line shifts on the adjacent seas to north or south by seasons. Owing to the influence of the ocean current, the islands have higher temperature than that in other areas of the same latitude, varying between 17.3 °C and 27.3°C. The temperature averages 22.6° C at Chichijima. As the annual variation of the temperature is very small, vegetation of the islands is rather full of tropical characteristics. It blows calmly, but sometimes strong winds caused by low

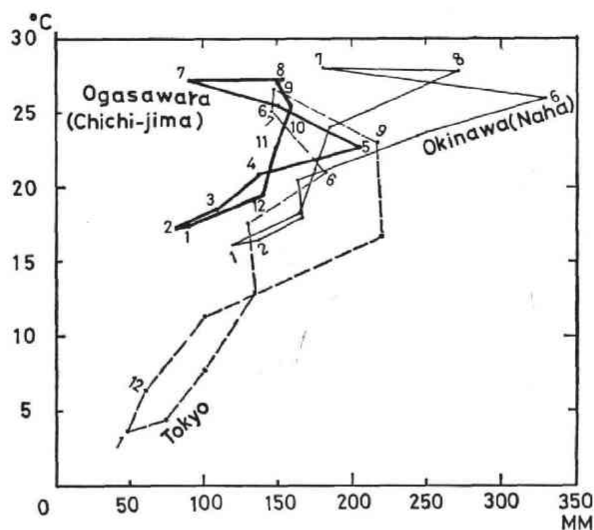


Fig. 2 Hythergraphs of Chichijima, Ryūkyū and Tokyō

atmospheric pressure such as typhoon and front call on the islands. In winter, the northwest monsoon prevails in the islands, and it occasionally takes the islanders by surprise with damages to fishing equipment. Cyclonic storms with salt frequently damage the crops of the tiny islands, and old farmlands are surrounded by the wind-breaks of Terihaboku (*Calophyllum inophyllum*) in some places of the islands. Rainfall is not excessive, but is generally showery. It averages about 1612.7 mm in Chichijima. It is somewhat more than the 1563.4 mm of Tokyo, but much less than the Izu Islands or Hachijōjima (3,000 mm and over). Sometimes, heavy rains are caused by the typhoons.

2 Population growth and industrial development before World War II

There are many studies of the history of Ogasawara, of which the most recent in English is by Kublin Hyman (1953).

Although known to several explorers, each of whom gave the islands a different name, these islands, conventionally called the Bonin, were not permanently settled until 1830. Etymologically, the term "Bonin" is a corruption of the Japanese "Munin" or "Mujin" meaning "empty of men", but the Japanese themselves term them "Ogasawara Shotō" after Sadayori Ogasawara, a local feudal lord, who allegedly discovered them in 1583. The islands were first colonized in 1830 by a small group of about 30 Europeans and Hawaiians, including English, American, Italian and the Kanaka peoples. In 1853, Commodore Perry called at Chichijima

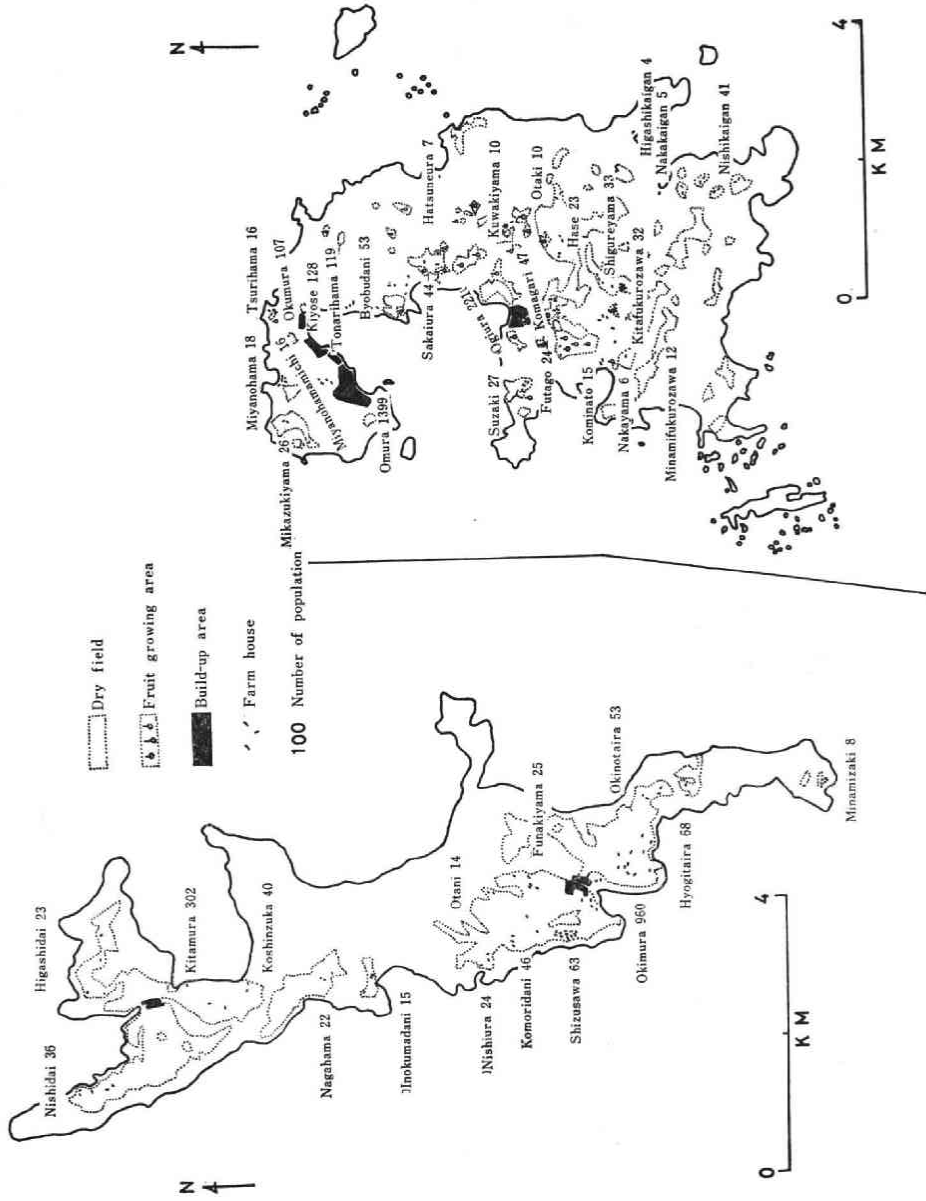


Fig. 3 Distribution of Agricultural Lands and Population in 1930 (Right: Chichijima, Left: Hahajima)

Table 1 Percentage of Output Classified by Industrial Groups

	Agriculture	Stock-raising	Forestry	Fishery	Manufacturing	Total (in yen)
1919	29.52%	2.32%	0.24%	14.80%	53.66%	1,574,100
1925	37.10	4.20	0.69	45.30	12.61	1,003,250
1930	30.10	5.80	0.51	55.02	8.57	495,790
1931	33.20	5.02	0.27	37.98	23.53	575,950
1934	45.33	4.23	0.42	30.95	19.07	1,012,550
1935	44.23	3.99	0.24	35.58	15.96	1,196,200
1940	23.85	2.55	0.24	48.86	22.51	3,987,240

Table 2 Distribution of Workers

	Chichijima		Otōtojima	Yomejima	Mukojima
	Ōmura	Ōgiura Fukurozawa			
Total Workers	1012	264	19	7	48
Agriculture	95	173	15	3	7
Fishery	305	15	1	4	29
Mining	4	—	—	—	—
Manufacturing	173	24	2	—	12
Commerce	158	13	—	—	—
Transportation	101	7	—	—	—
Government	157	31	1	—	—
Housekeeping	17	1	—	—	—
Others	2	—	—	—	—
Un-employed	1,134	319	18	1	5

to conclude an agreement with the settlers, and established a coal-yard at Futami Bay. Vague claims by Great Britain and the United States were not pursued, and in 1862 the islands were occupied by Japanese, and Japan formally annexed them in 1876.

In 1862 when Japanese began to settle in the islands, there were about 30 Europeans and Hawaiians, and by 1875 they had increased to 71 persons. All of them were naturalized as Japanese in 1882. They amounted to about 120 persons in 1910.

The Japanese immigration in 1876 brought new settlers of 37 persons to the islands, and after that, immigrants from Hachijōjima, Izu-Ōshima and the Japanese main islands were rapidly increased. The population increased to about 4,000 in 1894 and 5,500 in 1900. After a decrease in the decade between 1921 and 1930, the islands experienced again a remarkable increase of population rising to 7,711 persons in 1944. Population growth in Chichijima was especially rapid with an

increase from 2,415 in 1920 to 4,348 in 1944.

Main support of the islands consisted of agriculture and fishery since the beginning of colonization, and this trend continued to the middle of 1930's. After that, a sugar processing industry was added to the two main elements, keeping step with the development of sugar cane culture. As is shown in Table 2, in 1930, 950 persons were engaged in agriculture, which occupied 39.1% of the total persons employed, followed by 511 (21.0%) in fishing, 337 (13.9%) in manufacturing and 206 (8.5%) in commerce.

The constitution of industrial groups with respect to the yield of products in

Classified by Occupation in 1930

Hahajima		Iwōjima	Kita-Iwōjima	Minami-Torishima	Total
Okimura	Kitamura				
489	176	358	40	15	2,428
236	112	275	34	—	950
113	33	11	—	—	511
—	—	—	—	—	4
52	16	40	3	15	337
29	1	5	—	—	206
14	—	12	—	—	134
34	13	11	2	—	249
11	1	4	1	—	35
—	—	—	—	—	2
810	256	670	84	17	3,314

selected years is shown in the Table 1. In 1919 when sugar cane culture and the sugar industry were at their zenith, agriculture and manufacturing had high weights of 29.5% and 53.7%, respectively. However, in the period of economic depression, as shown in the figures of 1925 and 1930, manufacturing declined markedly, and the amount of total products was also decreased to two-thirds and one-third of those in 1919, respectively. But the weight of fishing production was raised to about half of the total production owing to the development of coral collecting and pelagic fishing.

The economic activity was not uniformly conducted in each island (Table 2). With regard to the principal islands in 1930, there were 2,428 working persons in Ogasawara, including 1,012 persons at Ōmura in Chichijima, 264 at Ōgiura and Fukurozawa in Chichijima, 665 persons in Hahajima and 358 in Iwōjima. Agriculture was the most important in Hahajima. At Ōmura, the largest settlement on Chichijima, there were many establishments, as this was the center of

administration, education, transportation and commerce. The main fishing bases were Ōmura in Chichijima and Okimura in Hahajima. Agricultural production was also areally differentiated by islands, as discussed in another section. The figures in Table 2 also reflect the once important position of the islands as advancing bases and relay stations for the Pacific approaches to the Far East and the South Sea Islands, with regard to industry and transportation.

However, the outbreak of World War II forced 6,868 persons of inhabitants to return to the Japanese main islands in order to avoid the danger from frequent bombardment by U.S. planes, and only Japanese naval forces and 825 civilians attached to the navy remained in the islands. The islands were attacked by U.S. forces in September 1944, and were placed under U.S. administration. In 1946, 129 former islanders of European and Hawaiian origin were allowed to return to the islands, but the circumstances of the islands bore a close resemblance to "Munin". In 1968, the islands were returned to Japan, and Ogasawara-Mura was administratively established as part of Tokyo.

(1) Agricultural development

The locational, geomorphological, and climate conditions have specifically influenced the agriculture which was the main industry before World War II. The rugged terrain directly draws near the coasts, and streams are extremely short with very small drainage areas. Soils are thin and have low capacity of keeping water. The smallness of flat lands and strong winds in winter are also unfavourable conditions for agriculture. Therefore, the islanders could only introduce farming types with such factors as follows: (1) farming possible on slope land, (2) crops and livestock resistant to strong wind, dry weather and high temperature, and (3) products for processing or products suitable for keeping in storage. In fact, the only agriculture in Ogasawara before World War II had been such as was adaptable to these conditions.

European and Hawaiian settlers in early days depended on crop farming and fishery for their living. They cultured cotton, corn, sweet potatoes and vegetables, but the area of the arable land was not so extensive. In 1876 when Japanese colonization started, the Industrial Bureau sent agricultural tools, seeds and young plants to the islands. Since 1887, instead of the crops which had been cultured up to this time, sugar cane culture was rapidly developed in Chichijima and Hahajima. The development of sugar cane culture and the sugar industry should be attributed partly to the favourable selling price of products and partly to the high land-productivity. The production of sugar cane per 10 *a* was 11,250 *kg* in 1890, which was very much in comparison with an average of 2,674 *kg* over

the four years between 1930 and 1933. However, as the development of sugar manufacture created a big demand for wood and charcoal, forests of the islands had gradually been destroyed, and deforestation of forest land was forbidden in 1899. As sugar cane culture was a typical despoliation-agriculture, its succession inevitably led to low productivity of soils, and the products have been remarkably decreased after 1902. However, owing to the rise of the price of sugar after 1904, sugar cane culture was not so unfavourable farming, and the cropped area increased after 1909. The area of sugar cane fields was 129.1 *ha* in 1907, and 35% of export of the islands was occupied by sugar in 1911.

Banana growing also increased after about 1906, and it came to be important agriculturally, next to sugar production. But the outbreak of a noxious disease brought about its decline after 1912, and the farming system of the islands was converted again to the monoculture of sugar cane. Banana production was restored after about 1917, and its cropped area amounted to 110 *ha* in 1923. However, the export of bananas trod a downward path, suppressed by the extensive marketability of bananas produced in Formosa.

Sugar cane culture declined again by the outbreak of a noxious disease in 1925. However, with the aftermath of World War I, the price of sugar rose, and Ogasawara was in a boom of sugar cane culture. In 1919 sugar cane fields in Ogasawara occupied 1,134 *ha* in area, which corresponded to 77% of total arable lands. The sugar industry became prosperous keeping step with the development of sugar cane culture, and the output of the sugar industry amounted to more than 800,000 *yen* which occupied the majority of that in food-stuff industry.

However, economic depression brought a heavy fall in sugar prices, and sugar cane fields in the islands began to decrease after 1925. For the purpose of coping with the decline of sugar cane culture, production of sweet potatoes, pumpkins, taros, bananas, tomatoes and others was heavily promoted, but these crops failed

Table 3 Ogasawara's Principal Exports and Imports (in *yen*)

Exports		(1919)	Imports	
1	Sugar	833,151	Rice	248,325 <i>yen</i>
2	Dried bonito	40,330	Petroleum	54,434
3	Fresh fish	31,019	Wheat & barley	45,015
4	Cattle	28,500	Candy & sugar	32,608
5	Vegetables	23,017	Wood & lumber	32,397
6	Grayish green sand	22,372	Cask	29,426
7	Salted & dried fish	10,678	Dry goods	29,085
8	Wood & lumber	9,605	Cattle	28,294
9	Shark fin	8,476	Tobacco	21,427
10	Canned food	7,021	Soy	19,794
Total		1,060,300	Total	825,480

Table 3 *Continued*

Exports		(1927)	Imports	
1	Coral	427,577	Rice	202,251
2	Sugar	350,259	Woven goods	105,048
3	Dried bonito	105,572	Wood	64,020
4	Whale meat	73,887	Petroleum	55,862
5	Fresh fish	64,728	Tobacco	39,354
6	Vegetables	17,033	Coal	34,675
7	Whale oil	12,019	Machine	21,600
8	Whale bone	7,893	Foreign wine	21,012
9	Grayish green sand	4,840	Wheat & barley	20,545
10	Ornamental plants	4,122	Candy	17,596
Total		1,144,631	Total	992,923

Exports		(1933)	Imports	
1	Vegetables	283,449	Rice	171,363
2	Sugar	84,782	Wood	98,528
3	Whale meat	57,840	Tobacco	67,829
4	Coca	57,057	Petroleum	55,234
5	Fresh fish	39,475	Cement	54,067
6	Salted & dried fish	26,132	Foreign wine	40,497
7	Dried bonito	20,951	Woven goods	31,940
8	Canned food	17,826	Candy	23,062
9	Whale oil	16,120	<i>Sake</i>	18,413
10	Machine	3,600	Sugar	17,846
Total		702,200	Total	906,814

Exports		(1939)	Imports	
1	Vegetables	776,772	Wood	860,565
2	Machine	174,199	Rice	391,183
3	Hardware	165,184	Coal	333,424
4	Sugar	163,497	Machine	218,638
5	Medicine	64,400	Hardware	210,969
6	Raw sugar	57,861	Petroleum & other oil	175,594
7	Candy	40,334	Tobacco	114,969
8	Salted & dried fish	38,884	Rubber & rubber good	104,135
9	Fresh fish	29,138	Foreign wine	103,374
10	Seed	17,860	<i>Sake</i>	101,962
Total		2,278,260	Total	4,735,042

to substitute for the decline of sugar cane. Consequently, the agriculture in Ogasawara fell into a depression, and deadly blow on the sugar industry markedly dropped the weight in manufacturing from 53.7% in 1916 to 8.6% in 1930.

In the next period, sugar cane culture declined, and fruit, ornamental plants,

and vegetables became important as subsidiary farming crops. The production of tropical fruits such as bananas, pine-apples, papayas, oranges and date-palms increased from 29,105 *yen* in 1919 to 41,754 *yen* in 1923.

Ornamental plants such as *Trachycarpus*, *Rhapis flabelliformis*, *Codiaem variegatum*, *Opuntia ficus-indica*, *Freesia reflecta* and orchids can be raised without use of green houses in the islands. After an experimental period, this part of horticulture was developed as subsidiary farming, and the products shipped to the Japanese main islands increased from 370 *yen* in 1920 to 4,547 *yen* in 1924.

Vegetable horticulture developed after about 1910. In the islands, as the vegetables could be favourably grown in off-crops season in the Japanese main islands, the islands experienced a successive prosperity in vegetable growing. The development of vegetable growing owed much to the improvement of farming techniques, the opening of a regular shipping service and the improvement of transportation facilities. In the four years from 1931 to 1934, pumpkin and tomato culture became popular as a principal crops in the islands, replacing sugar cane culture. Cucumbers, French-beans and white gourd-melons also increased. Thus, the total output of vegetables increased from 191,000 *yen* to 459,000 *yen* in this period. This trend was reflected in the exports of Ogasawara, and vegetables occupied the first position with the decline of the sugar.

Tomato production reached its peak as early as 1935, on the one hand, but pumpkin culture rapidly developed, increasing from 134,000 *yen* in 1934 to 601,000 *yen* in 1940, and established itself on firm ground as the principal crop. The production of cucumbers, French-beans and white gourd-melons fell into stagnation in 1935, but taro, radishes, egg-plants, cabbages and ginger still increased in the period from 1935 to 1940. Thus, agricultural production increased to 1,030,000 *yen* in 1939. This trend owed much to the growth of consumption caused by the increased population in the islands, as the population increased from 5,742 persons in 1930 to 7,361 in 1940. The character of the islands as a consuming area also appeared in the unfavourable balance of trade, as shown in Table 3.

According to rumour, Commodore Perry brought the first cattle, goats, hogs and domestic fowls to the islands in 1853. But it was after the introduction of 30 cattle by an American in 1869 that cattle raising was started in earnest. According to the statistics, there were 9 stock-farms, 107 *ha* of pasture land in 1884. At that time, cattle were raised for beef for islanders and whale-boat crews. However, the rapid development of sugar cane culture acted as a factor to control the expansion of grazing area for cattle, on the one hand, but the demand for cattle increased as carriers of sugar cane and as power for compressors in sugar manufacturing process, on the other hand. Consequently, cattle had to be imported from the Japanese main islands and Hachijōjima. Thus, the number of cattle raised

reached a peak in the period of several years after World War I when the sugar industry was most prosperous. But cattle were soon decreased keeping step with decline of sugar industry beginning in about 1920. In addition to the economic depression, the introduction of mechanized compressors shut out cattle as the power for compressors, and cattle were exclusively used as carriers thereafter. Therefore, since 1930, cattle raising stagnated until beef consumption became more important owing to the increased population of the islands.

The areal specialization of agriculture progressed keeping step with the development of agriculture. As shown in Table 4, which shows the agricultural production in 1939, Hahajima was the most important in respect to agriculture, and agriculture in Iwojima and Chichijima was specialized into the production of medicinal plants and fruits, and horticulture and vegetable growing, respectively.

Table 4 Distribution of Ogasawara's Agricultural Production by Island Groups (1939)

	Chichijima	Hahajima	Iwojima	Total output (in yen)
Pumpkin	5.5%	93.2%	1.3%	387,654
Tomato	26.9	73.1	—	135,765
Medicinal plant	—	1.0	99.0	40,183
Cucumber	34.3	63.7	2.1	30,058
Foliage plant	78.4	21.6	—	18,120
Celery	98.3	1.7	—	12,819
White gourd-melon	2.5	86.8	10.7	12,004
Sugar cane	40.3	15.2	44.5	11,532
Banana	74.2	11.0	14.8	10,912
Fruit (except banana)	9.1	8.0	82.9	8,554
Taro	18.0	82.0	—	7,995
Kidney bean	72.7	27.3	—	6,589
Radish	78.9	8.6	12.5	5,762
Egg-plant	50.5	43.3	6.2	5,623
Water-melon	35.5	19.8	44.7	3,988
Total	18.1	69.7	8.8	738,417

In general, on the basis of adaption to the physical environment, agriculture in Ogasawara has changed under the social and economic conditions as follows; (1) Under the special conditions of its location and climate, agriculture in Ogasawara could not compete with the Japanese main islands in ordinary crop farming, but could compete with Ryūkyū, Formosa and other foreign colonies in the subtropical commercial crop farming.

(2) Most of the islanders who immigrated from the Japanese main islands, Izu-shichitō and Hachijōjima after the Meiji Revolution were more speculative and more free spirited individuals.

(3) It was impossible to self-support rice and barley as the principal foods for

the inhabitants, who inevitably depended on the Japanese main islands for the supply of living necessities. Therefore, the farmers in the islands were closely connected with commercialized economy, and managed their farming more commercially, the products of which were always on a competitive basis with the commodities produced in the domestic and international agricultural regions.

(2) Fishery

Before the Meiji Era, the principal fishery of the islands was coastal fishing, whaling, and sea-turtles. At that time, the whaling industry in the northern Pacific was operated by whalers from the United States, and catching of sea-turtles was conducted by new settlers in the islands. In the period between 1876 and about 1920, the fishery was in a preparatory stage with administrative measures for its development. Owing to governmental policies and guidance, fishery had been gradually developed. The principal fishery was tunny, bonito and shark fishery, and processing of marine products also developed. In 1919, the fishermen numbered 188 persons, and fishing products amounted to 233,000 *yen*, which occupied 14.8% of total production in the islands. Thus, fishery became the second industry in importance after the sugar industry.

In 1918, coral was discovered offshore Chichijima, and the coral fishery developed after that. The yield of coral was about 126,000 *yen* in 1922. Owing to the discovery of new coastal coral grounds in 1923 and in the last half of the 1920's, the yield of coral took long strides with 396,500 *yen* which occupied about 45% of marine products in 1923, and in 1926 with output of 1,060,000 *yen* it replaced the first position of exports from sugar.

After 1918, ice-making plants, refrigeration plants and whaling industry plants were established at Chichijima and Hahajima, and then so-called capitalistic fishery began to develop.

According to a 1930' report, whaling was operated by 3 whalers with catch of about 100 whales in a year. Tunny and bonito fishing was operated as inshore and offshore fishery by small-scale fishermen. Tunny fishing was conducted within about 30 kilometers from the coast by about 50 fishing boats, and the catch was about 100,000 *yen*. Bonito fishing was operated by small boats of 10-20 tons. Coral gathering was operated by small boats of 5-15 tons, but it was the most important industry in the islands. Processing of marine products was also an important industry, which included dried bonito, dried tunny, canned fish and whale, and fertilizer.

Thus, in the period between 1918 and 1930, the two forms of fishery, minor fishery such as tunny, bonito and coral fisheries, and capitalistic whaling and manufacturing of marine products were differentially developed, and the value of

marine products rose rapidly from 233,000 *yen* in 1919 to 454,500 *yen* (45.3%) in 1925, and to 272,800 *yen* (55.0%) in 1930. Fishermen increased to 572 persons in 1927.

The development of fishery was reflected in the exports to the Japanese main islands. In 1919, the export of marine products occupied only one-tenth of the total export, and main items were dried bonito and fresh fish. In 1927, marine products occupied more than half of the total export, in which coral occupied two-thirds of exported marine products. Products from whales also increased.

However, the economic depression in the 1930's heavily influenced fishery in the islands. The catch decreased to 218,700 *yen* in 1931. The decline owed largely to the decrease of coral caused by indiscriminate exploitation. The weight of fresh fish, dried bonito and salted fish also decreased, whereas whaling took a high export rank.

After 1934, marine products increased again to 426,000 *yen* in 1935, and 1,948,000 *yen* in 1940. The rapid increase owed to the development of pelagic fishery and to the increasing demand of the islanders themselves. In spite of the increasing yield, the export of marine products in 1939 occupied only 3.6% of the total. Probably, it was partly because the pelagic fishing boats did not enter the port of Ōmura, but directly landed the catch at the ports of the Japanese main islands, and partly because the increasing consumption of fresh fish in the islands resulted in the decrease in the exports.

Thus, the fishery in Ogasawara developed under unfavourable transportation conditions, and, in the development process, the differentiation between small and large scale fishery became more marked. The fishermen numbered 589 persons in 1931, but decreased to 497 persons in 1935 when coral declined, and increased again to 584 persons in 1939 including many workers in pelagic fishery.

According to statistics, fishing products were estimated to be 2,430,000 *yen* for the average of three years between 1941 and 1943. But the outbreak of World

Table 5 Number of Households Classified by Occupations for Island Groups in 1944

	Chichijima	Hahajima	Iwōjima	Total
Agriculture	139	129	102	370
Fishery	116	54	15	185
Commerce	62	12	7	81
Construction	48	14	6	68
Government	128	36	15	179
Company worker	64	6	13	83
Stevedore	170	70	68	308
Others	72	20	7	99
Total	799	341	233	1,373

War II drew a veil of confidentiality over the islands.

3 Reversion of Ogasawara to Japan and restoration program

(1) Population and living conditions

129 persons of former European and Hawaiian origin returned in 1946 from the Japanese main islands to Chichijima. 65 of them were employed by the U.S. Army, and a few people were engaged in fishery. In June 1968, Ogasawara were returned to Japan based on the agreement for their reversion between the United States and Japan. By April 1970, population increased to 599, including 191 short-time visitors and 408 registered inhabitants. 172 persons are former European and Hawaiian islanders and their descendants, and 100 persons are former Japanese islanders and their descendants. As a large number of workers are male, the sex composition of population shows the contrast with 491 male to 108 female. The total workers amount to 483, among whom 456 are employed in government offices and public services, schools, a fishery association and construction works; and only 27 were engaged in individual businesses, among whom 21 are concerned fishing and processing of marine products. Thus, the islanders tend to depend on employment in the particular industries for their livelihood. And Ogasawara had not yet developed a stabilized economy, but is in the stage of administrative preparation for economic development and the promotion of public welfare, through the improvement of public utilities such as electricity and water supply, and construction of schools, roads, and other establishments.

The people live in individual zinc-roofed wooden houses, western style lodgings, modern apartments, or temporary prefabricated houses. They depend upon electricity as a source of heat and fuel, and recently propane gas has been introduced. The consumption of electricity amounts to 364 *kWh* per capita, which is very high compared to the 116 *kWh* in Tokyo. Water consumption is also high at 270 liters per capita a day. However, water resources are limited in the islands, and a serious water shortage occurred in Chichijima in the summer of 1971.

Under the U.S. administration, the Commodore Radford School carried out the education of children, but to get a high school education, children had to go to Guam Island. After the return to Japan, the Japanese government established a primary-and-junior high school and a senior high school in Chichijima, and began to teach the children in Japanese.

All of the daily necessities are imported from the Japanese main islands. Therefore, marine transportation is most important for their living. A regular liner chartered by Tokyo Metropolitan government operates 2 times a month from

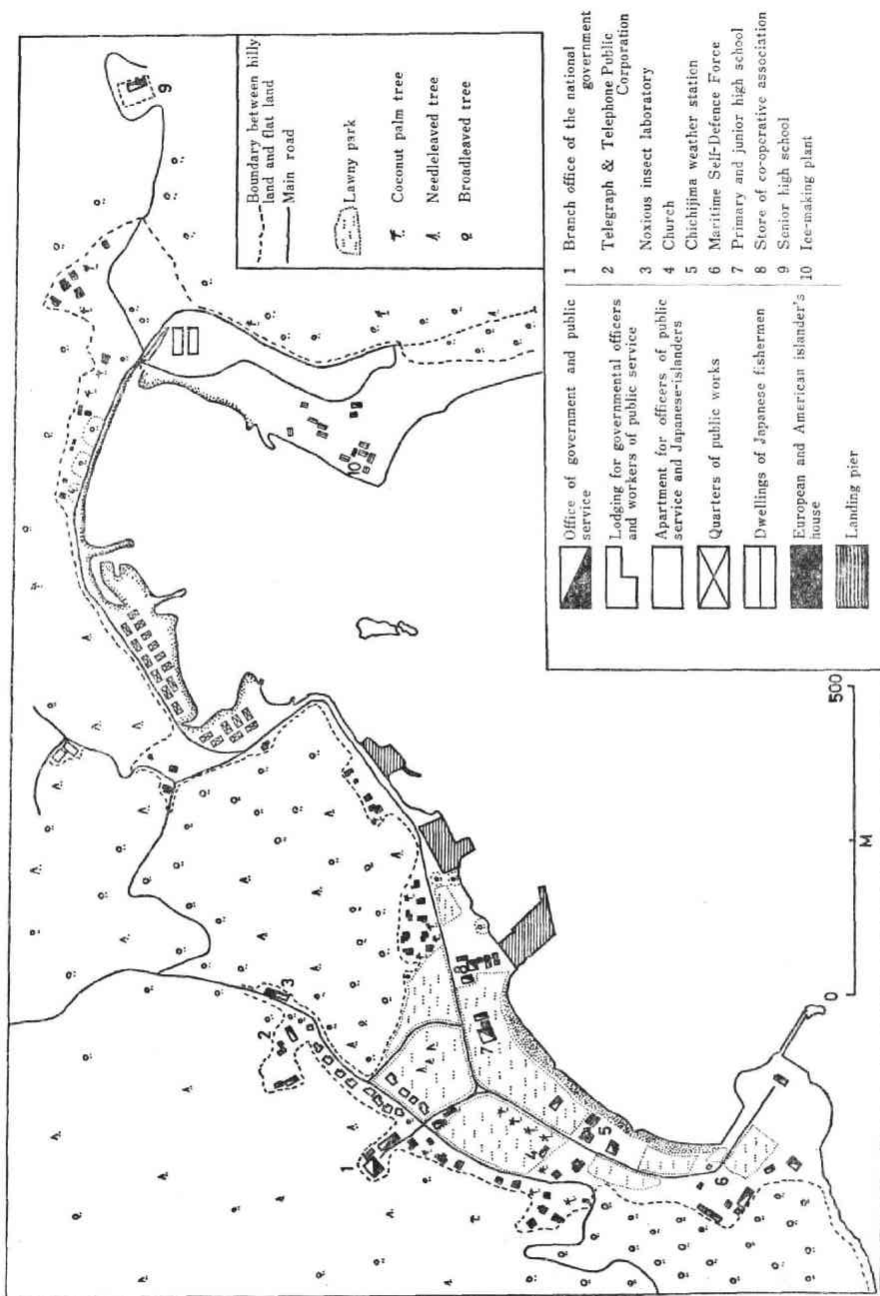


Fig. 4 Present Land-Use around Futami Bay, Chichijima

Tokyo to Ōmura. In 1969, landing weight of cargo amounted to 15,422 tons, which include 6,700 tons of cement and cement products, 2,944 tons of heavy machines and metal goods, 720 tons of wood and 5,058 tons of foodstuffs and other necessities for living. Two-thirds of the cargo were occupied by building materials for the preparation of economic restoration. About 50 hours is necessary to voyage from Tokyo to Ōmura, and it is desirable to shorten the time required. At present, an old air-field is not usable because of growing *Casuarina* trees and destruction by marine erosion, and it is in the step of technical testing with regard to the construction of an aviation ground in Anijima. The daily necessities are supplied to the islanders through a store of the consumers' cooperative society founded in 1968. It is the only store supplying daily necessities in the islands.

(2) Agriculture and fishery

In 26 years after World War II, the arable lands are destroyed, and replaced by jungle; the boundary-lines of arable lands become indistinguishable; sugar canes grow wild; and roads and irrigation facilities in farmland are destroyed. Under these conditions, the development of agriculture means the reclamation of virgin land. Vegetable growing for off-crop season in the Japanese main islands was characteristic in Ogasawara at one time. But it meets unfavourable circumstances today, because the off-crop season of vegetables disappears in the Japanese main islands, and vegetables are brought to the markets all year round. Accordingly, the old farming system can not be applied to Ogasawara today. Therefore, the government considers that the agriculture in the islands should aim at a combination of growing of bulbs, flowers and ornamental plants, and the culture of fruits and vegetables, with the agriculture of Hachijōjima as a model. Nowadays, there are no islanders exclusively engaged in farming.

There is a serious problem of noxious insects in the islands, some of which are never seen in the Japanese main islands. Therefore, such measures as quarantine of plants, and prohibition of shipment of some agricultural products to the Japanese main islands, are taken to protect against breeding of the insects, which include *Dacus dorsalis* and African snails (*Achatina fulica*).

In the islands, 78 fishermen organized the Ogasawara Fishery Association in 1968, and they are engaged in small-scale fishery of tunny, sea-bream, *Cybiium nipponium*, lobster, horse mackerel, sea-turtle, coral and seaweed. The catch in 1969 amounted to 517, 450,000 *yen*. The scale of fishing is so small that 59 fishing boats include 44 boats smaller than 1 ton. The association has an ice-making plant and a refrigeration plant, and exports frozen and fresh fish to the Japanese main islands by chartered transport ship.

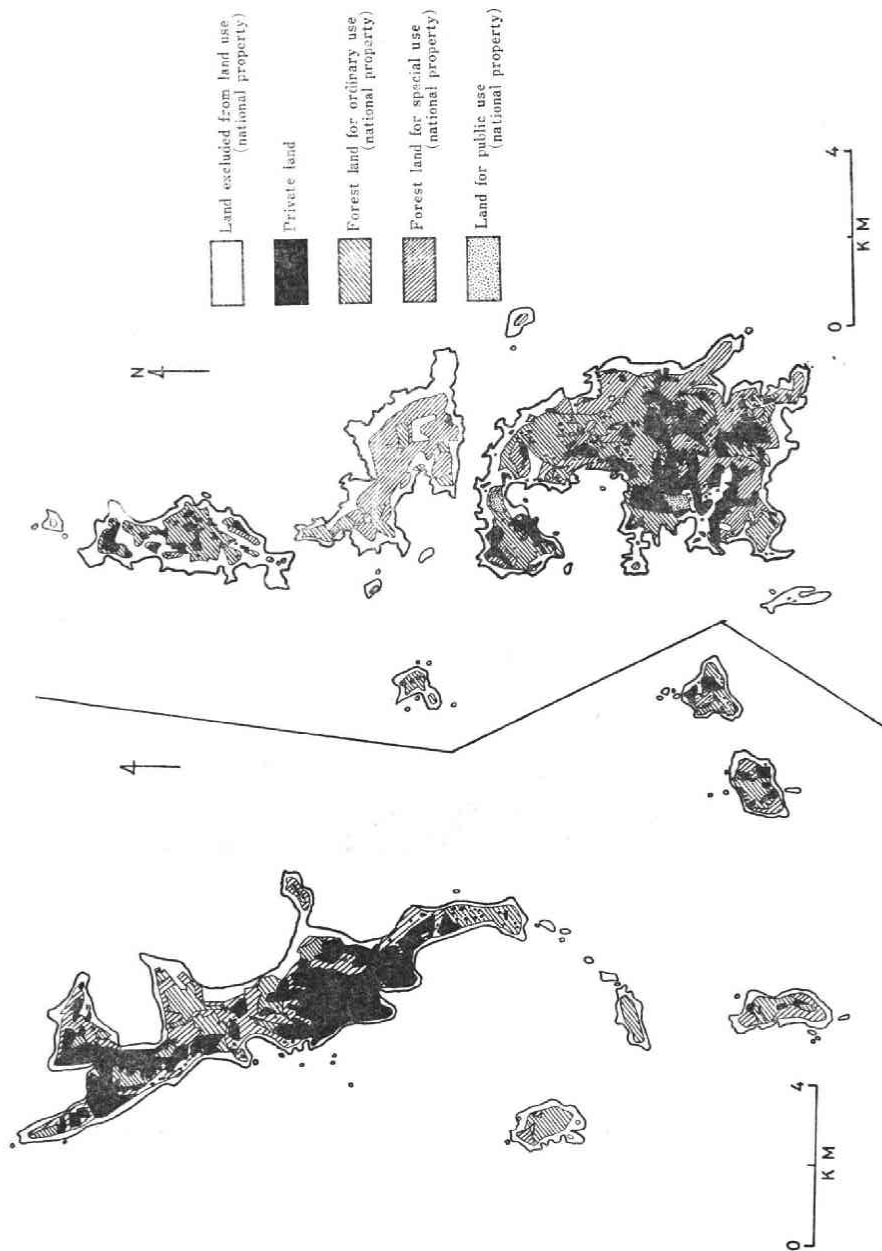


Fig. 5 Landownership of Ogasawara in 1929 (Right: Chichijima Rettō, Left: Habajima Rettō)

(3) Land ownership

With regard to ownership, land in Ogasawara is classified into three forms: land as national property, national forest, and private land which includes residential sites, dry-fields, forests, waste land and land for miscellaneous use. The agricultural land and forests in 1944 were left to change into jungles after the evacuation of islanders. Under the U.S. administration after World War II, the coastal area of Futami Bay of Chichijima was leveled and its foreshore was reclaimed, without consideration to the boundary-lines of the land as objects of "legal right of lease". This made the boundary-lines of individual lands indistinguishable. The European and Hawaiian islanders who returned in 1946 were allowed to use the land without lease contracts. After the return of the islands to Japan in 1968, the government decided to recognize the "right of lease" of the land for these people with a limit of ten years. However, the relation between the land owners and the leaseholders is indistinct, and the government is surveying the relation and the boundary-lines of the land.

Before the war, about 75% of the arable land was leased land, but it is not agricultural land in the present state. Accordingly, the land is not subject to application of the Agricultural Land Law, and the government intends to practically revive the "right to till", through the application of a provisional law to the land in compliance with the proposal from leaseholders.

With the exceptional cases of public use by the government and the municipality, law forbids the building of new institutes and facilities or to change land form with a time limit of 3 years. It aims to insure the livelihood of early returned inhabitants, and to promote smoothly the projects for economic development and land use. But the term of validity of the law expired on 26th June in 1971, and the government is administratively taking proper steps to carry out the project of the land use.

(4) Restoration program

After the return of the islands to Japan, the government investigated the islands, and officially announced a restoration program as a 5-year-plan, starting from 1969, which includes the following policies:

- (1) For the purposes of the rehabilitating former islanders as soon as possible, the government should improve the devastated circumstances, and endeavor to develop economic activities adjusted to the physical environment.
- (2) Measures should be taken for the development of a tourist industry and related industry as an important item.
- (3) A comprehensive plan of land use should be drawn.

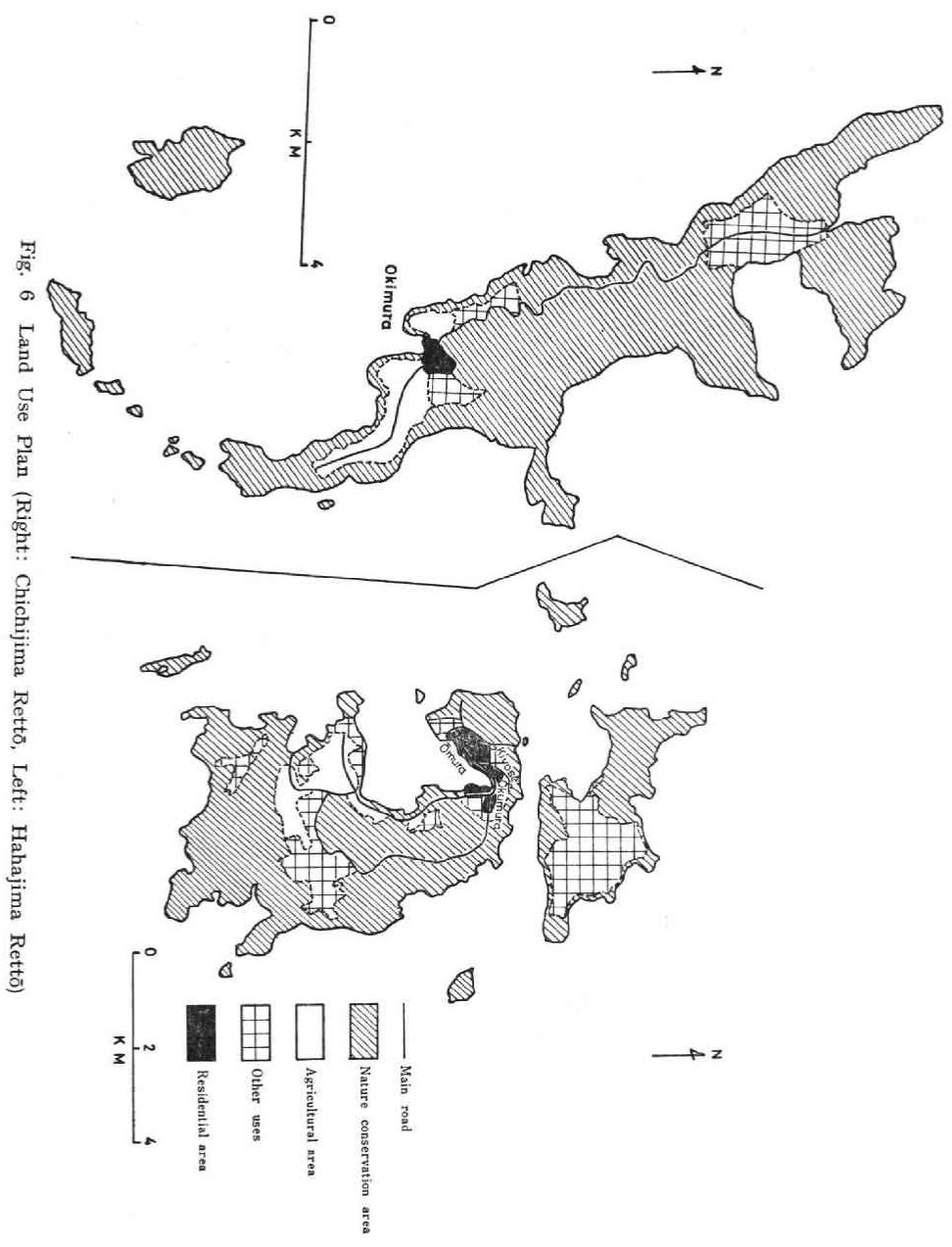


Fig. 6 Land Use Plan (Right: Chichijima Rettō, Left: Hahajima Rettō)

Table 6 Number of Former Islanders Who Wish to Return to Ogasawara, Classified by Occupations

	Person	
Agriculture	631	28%
Fishery	305	13
Construction	205	9
Manufacturing	70	3
Wholesale and retail trade	301	13
Transportation	81	4
Service	281	12
Government	271	12
Others	128	6
Total	2273	100

A questionnaire was conducted on March 20th, 1968 by the Ministry of Home Affairs. According to the investigation, the people who wished to return to Ogasawara numbered 4,125 persons, who amounted to 68% of the former islanders, and 2,273 persons desired to engaged in any occupation.

(4) Thoughtful consideration should be given to develop transportation facilities to the Japanese main islands.

(5) The estimated future population numbers about 3,000 persons, of whom 2,000 persons are expected to live on Chichijima and the remainder on Hahajima. About 1,300 former islanders and their descendants will re-immigrate by 1974, and this population will amount to 1,900 persons.

(6) Kazan Rettō is excluded from this program.

According to the land use plan, land on Chichijima and Hahajima is divided into areas of four types: settlement, land for agriculture, transportation and conservation of nature (Fig. 6).

With regard to industrial development, Ogasawara has serious problems to solve. Nowadays, the old principal crops such as sugar cane, tomato and pumpkin have lost their marketability. Even in Ryūkyū, sugar cane culture is unstable, and is barely carried on through price protection by governmental policy. Therefore, it may be very difficult to restore the sugar industry in Ogasawara. Owing to the development of vinyl-house culture of tomatoes and pumpkins in the Japanese main islands, Ogasawara cannot compete regarding the price of the products. Therefore, the agriculture of Ogasawara should stand on the basis of new farming type different from that before World War II.

Also, under the circumstances of a nationwide decline of inshore fishery, the Ogasawara fishery will not be an exceptional case. Particularly, Ogasawara is located far from the markets of the Japanese main islands, and fresh fish could not be shipped without refrigeration. Moreover, the management scale of the fishery

is too small to cut shipping costs to compete with the coastal fishery in the Japanese main islands. Accordingly, the inshore fishery of Ogasawara may be responsive only to the demand of the islanders themselves. The function as a base for pelagic fishery and whaling in the South Seas before the war, cannot be resumed any longer for the islands, because the enlargement of the scale of fishery may make the relay base a nuisance.

The circumstances are too unfavourable for a program for the rehabilitation of the industry. Agriculture in the future should take a form which is able to fit the changes in market demand, to take effective advantage of the subtropical climate, and to surmount high shipping costs. Thus, the principal crops may be limited to tropical fruits, ornamental plants, and vegetables for local consumption. The emphasis of inshore fishery should be laid on supplying raw materials for processing, and the function as a relay port for pelagic fishery will be changed to that of a supply base of fuel, food and bait.

Because of an excellent landscape of beautiful coasts and colourful vegetation, the tourist industry attracts the attention of the public as a new industry for the future. However, there is no air-port in Ogasawara Guntō, and distance is still a handicap. Accordingly, unless the transportational conditions are improved, the tourist industry of Ogasawara may not be popularized by immediately. Also, various establishments for visitors may be necessary for the development of the tourist industry. But it is in fear that there is a danger of destruction of the physical environment through the construction of tourist institutions and the inflow of tourists. From this point of view, the protection of nature should acquire a priority.

4 Conclusion

Ogasawara scattered within the northern Pacific, have many problems arising from the changing cultural patterns of the external world which are being felt in Ogasawara. New geographical information has brought into question some of the old conceptions concerning the physical character of the islands, their people, and their culture. A more detailed survey of Ogasawara is still needed in order to meet the contemporary social and economic problems and prepare the islanders for the future.

Probably, Ogasawara may be a special case with a different nature from Ryūkyū and many island groups isolated from the Japanese main islands. Ogasawara as well as Ryūkyū were placed under the administration of U.S. military during a long time in this century. Concerning fauna and flora, historical background and culture, Ryūkyū which extends in a 1,000 *km* long arc between Formosa and Kyūshū Island, has been closely interconnected to continental China,

Formosa and Japan. In the last two decades, under the special political circumstances, Ryūkyū's people have developed their economic activity and have made their own world, influenced by the changing patterns in the neighbouring countries.

Ogasawara is a secluded world remotely located from the Japanese main islands and other countries in the northern Pacific. This results in inconvenience and high costs of transportation which retard the expansion of new patterns. In Ogasawara the cultural history of the islanders is rather brief, and what is worse, the islands have experienced an emptiness of people and abandonment of industry during a long time under the U.S. administration. Therefore, the creation of culture including economic activity by new islanders is needed in order to restore the islands.

Ryūkyū has had similar problems for cultural, social, and economic development, with the return to Japan in sight. But the problems relate to the measures of approaching the standards of the Japanese main islands in respect to economic activity, living and culture. And the geographic appraisals of factors involving economic and cultural geography have been compiled from this point of view.

Many of the isolated islands in Japan have such unfavourable conditions for industrial development as rugged terrain, poor water resources and lack of minerals, and low productivity of soils. Since the enactment of the Remote Islands Development Act in 1953, various measures have been taken by the national government to improve the living standard of inhabitants in many islands. However, the objectives of the act are the "remote" islands which are located rather nearer to the Japanese main islands, compared with Ogasawara. Those island groups have offered more potentialities as bases for denser population through historical, cultural and economic interconnections to the Japanese main islands. But even those islands could easily become overpopulated in terms of the relationship of their natural resources to current use of these resources involving land, water, minerals, ocean resources and forests. The difference of the economic activity and living standard between the island groups and the Japanese main islands has inevitably brought on an outflow of population into the Japanese main islands and stagnation in these islands. Accordingly, it is natural that such measures for improvement of living standards as construction of fishing ports and roads, engineering of submarine pipelines for water supply, and engineering of cables for electricity supply, have been taken in these islands.

The measures planned as "economic and social development projects" in Ogasawara are of more importance. The construction of ports and roads, engineering of water-pipes, and setting of new settlements may be fundamental to prepare the islanders for the future. Especially, the construction of an air-port may give a new meaning to distance and hence to spatial relationships between Ogasawara and

the Japanese main islands. The opening of air-transportation may result in changing economic and political potentialities. The islands were once of strategic importance, but today the value is lost with the evolution of long distance air craft. However, the potentialities which are connected with improved transport will relate to improvement of marketing opportunities of some tropical fruits and flowers or to the development of a tourist industry in the future.

Geographic research on Ogasawara is very timely not only because the islands face the beginning of a development program, but because they face common problems of limited resources, seclusion, and increasing population pressure. However, the penetration of modern culture into even the remotest islands has resulted in many changing phases in the physical and cultural interrelationships, and the change will not stop but rather hasten its pace with the measures by the national government. Therefore, a careful appraisal is needed of the geographic environment and its existing and potential relationships.

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Photo 1 Futami Bay, Chichijima

We can see the unique landscape on Ōmura, the only settlement of Ogasawara now inhabited. There are not only extensive open places of grass, senior high school, white houses of islanders, apartments for islanders and officials, but many other establishments. Moreover, there is a luxuriant growth of secondary forest characterised by *Leucaena leucocephala* forest and *Casuarina exuissetifolia* forest.



Photo 2 Pillow Structure

An example of pillow structure developed in boninite bedrock at the sea cliff near Tatsumi-zaki, the southeastern part of Chichijima. Each "pillow" ranges within 0.5–1.0 m in diameter. Boninite, the most widespread baserock of Chichijima, is a peculiar bronzite-andesite, which erupted and deposited subaqueously in Oligocene age and is closely related to the deposition of nummulitic tuff in the Ogasawara. As a kind of vesicular structure, most boninites have a pillow structure within themselves, in which the rounded masses fit closely upon one another like piled up pillows, and their intervening spaces are filled with tuffaceous materials forming a hard crust against weathering.



Photo 3 Hillside Climax Forest on the Inland of Chichijima

Though the flora of Ogasawara is as poor as the fauna, it has some peculiarities. Ogasawara are located at the point of contact between Southeast Asian-system and Polynesian-system. And its flora closely contacts with Japan proper, Formosa, and Polynesia. Plants of Ogasawara consist of about 90 families, 250 genera and 400 species, and 80% of them are tropical and subtropical plants. There are many plants indigenous to Ogasawara (estimated at 25% of about 400 species.) The plant communities in Ogasawara are broadly divided into the two groups: coastal plant community and inland plant community. In this photo, we can see *Schima mertensiana* forest and *Dysoxylum lepidotum* forest.



Photo 4 Vegetation in Mukojima

One of the vegetational changes in Ogasawara is caused by goats, which devastated the plants of Ogasawara for a long time. At the present time, we can see many goats which scramble freely over the hills on Chichijima, Minamijima, and especially on Mukojima. The plant communities in Mukojima are broadly divided into two groups: *Livistonia chinensis* var. *boninensis*-*Pandanus boninensis* community in the valleys and *Paspalum orbiculare* community in the hills. Moreover, we can see the bare land surfaces which are caused by the overgrazing and strong winds.

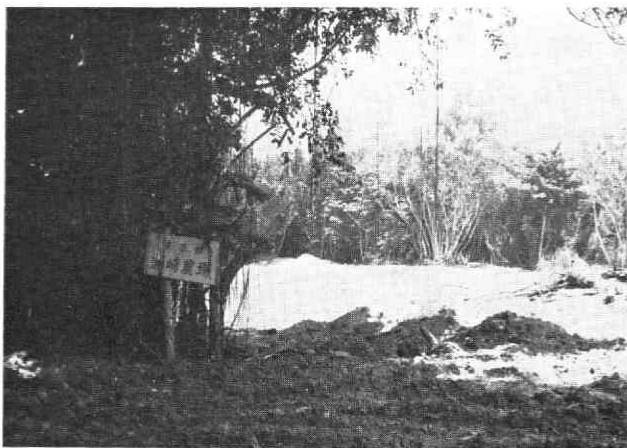


Photo 5 Reversion to Jungle

Because of the change to an uninhabited island, vegetational changes for 23 years of American control are striking. Especially, invading into a farmland, communities, and roads, Ginkogan (*Leucaena glauca*) grows as impenetrable jungle here and there. In this prolific scrub trees, we can see a great number of snails, about five inches long. The giant African snail (*Achatina fulica*) devastates plants wherever it goes. *Leucaena glauca* and *Achatina fulica* are the "kings of Ogasawara" that are symbolic of fauna and flora in Ogasawara. Unfortunately, farming in Ogasawara is being restricted by this vermin and prolific plant.



Photo 6 Luxuriant Growth of Naturalized and Exotic Plants

Another phase in plant community in Ogasawara is the dominance of a secondary forest such as *Leucaena glauca*, *Pinus lucheensis* and *Casuarina equisetifolia*. Especially *Leucaena glauca*, with its feathery leaves and long green pods, grows into a nearly impenetrable jungle on once settled places, farm land, and rocky hills. It was brought to camouflage gun positions by the Japanese, and has overgrown in postwar days. In this photo, we can see *Cocos nucifera* and the white house of an islander, decorated with many beautiful flowers.