Price variations among Irian Jaya urban centres reflect the strong, natural impediments to intra-provincial trade, especially between the highlands and the coast and between the north and south coasts. Nevertheless, intra-provincial integration, especially across the north, should progress with growth of the towns: increased trade volumes lower unit transport costs and allow development of new industries supplying provincial markets. The urban growth that would support diversification of the town economies into industries supplying provincial markets depends initially on continued growth in government expenditure or in processing and servicing for new export industries. Several towns could become processing centres for fish, timber and other raw materials and all northern towns are likely to become suppliers of materials to the Gag Island nickel project. Sorong will be transformed by growth associated with adjacent resource developments into perhaps the largest town in eastern Indonesia. But these are future prospects, and the following chapter underlines the limited nature of recent resource investments' contributions to the provincial economy.

8 The Enclaves

Irian Jaya is not richly endowed with agricultural land and transport costs are very high, so that the province has been by-passed by the expansion of capitalist agriculture that has occurred in other parts of the tropical world. But world forest, mineral and fish resources have been under severe pressure and rising prices have made production profitable in difficult locations like Irian Jaya. These market factors have combined with reduction of political uncertainty to spur the growth of new resource-based industries.

Oil and mining

Despite the cessation of exploration by the Nederlandsch Nieuw Guinee Petroleum Maatschappij several years before the transfer of sovereignty and the decline in annual production to less than 500,000 barrels per annum, considerable recent interest has been shown in oil exploration and the early drilling has produced promising results. A consortium led by Petromer Trend began drilling in the Manokwari-Sorong region in September 1972 following an extensive geophysical survey. Their first well yielded 1680 barrels per day and a subsequent strike from a well yielding 21,000 suggests that a rich field may have been discovered.[1] Several other companies began exploration over a wide area in Irian Jaya in 1972 and 1973 and one further strike has been made close to an old Seram field.[2]

Little is known about the geology of much of the province. However, several promising non-ferrous mineral prospects have been discovered allowing two large projects to begin. In its 1968 annual report the Freeport Sulphur Company announced that its subsidiary Freeport Indonesia had

[1] *Antara Financial and Economic News*, 18 October 1972, p. 3; 3 November 1972, p. 1; 12 February 1973, p. 2.

[2] The strike was made by Gulf and Western. Other exploration is being undertaken by Tesoro Oil (contracting for Wendel Phillips) in the Yapen-Sarmi area, a Phillips/Superior consortium off the south coast, AGIP off Sorong and Continental Oil on shore near Merauke (Dinas Pertambangan, Jayapura).

proved the existence near Mt Erstberg of a large ore body containing high concentrations of copper and small quantities of gold and silver.[3] In late 1972 PT Pacific Nickel announced a decision to go ahead with a major project on Gag Island, offshore from Sorong. By mid-1972 three other large mining companies had been granted exploratory rights over mining blocks. PT Baliem Valley and PT Paniai Lake began exploration in the central highlands in 1972 (Table 21). PT Kennecott was granted rights over highlands country adjacent to the Papua New Guinea border, but withdrew and ceded all blocks in 1972 after two years' exploration.

The mining contract between Freeport and the Indonesian government was the first approved under Indonesia's new Foreign Investment Law of 1967, and the company was granted very favourable terms. Freeport has special status as a pioneer investor with a three-year corporation tax holiday. It will pay corporation tax at 35.5 per cent after three years and 41.75 per cent after a further seven years, which is close to normal rates for copper mining. The company will pay no land rent or royalty and has no specific obligations for local or provincial development. With the value of exports ranging around $70-100 million per annum taxation yields after the tax-free period will vary around $15-25 million.

A very high proportion of the $150 million invested was used for provision of basic infrastructure.[4] The mining environment has required a highly capital-intensive operation and the company kept the work force as small as possible to avoid labour problems in an isolated, difficult location. Freeport estimate that the access road accounted for almost one-third of capital expenditure, running 120 kilometres from the coast to the mine at almost 3700 metres, including 1100 metres tunnelling through the Carstenz Range. Aerial tramways carry ore nearly two kilometres from the mine to the mill at an elevation of 2800 metres and a pipeline carries copper concentrate slurry from the mill to the port. On the coast, the new port of Amapere has

[3] The report announced the existence of 33 million tons of ore averaging 2.5 per cent copper, 0.025 ounces of gold and 0.0265 silver per ton. Company officials have indicated that a larger ore body exists, but no new statement of reserves has been made.

[4] The company has an equity tranche of $20 million and most of the remaining capital is provided by loans from United States, German and Japanese sources. The loans are backed by long-term sales contracts to German and Japanese interests, which have contracted to purchase one-third and two-thirds respectively of total output. The sales contracts are based on the average European selling price of copper from Zambia and Chile. Most of the loans are directly or indirectly guaranteed by United States and German government agencies. Overall, the interest rate averaged about 9.5 per cent.

been built by the company, with ownership and legal control vested in the Indonesian government. A town site for 1500 persons has been constructed 10 kilometres from the mine and an airstrip has been built 35 kilometres from the port.

Table 21 Mining contracts signed in Irian Jaya to December 1972

Name of Company	*Shareholders (per cent)*	*Location*	*Year Granted Exploration Licence*	*Ore*	*Progress*
Freeport Indonesia	Freeport 87; rest Japanese consortium	Central highlands 120 kilometres from coast NE of Kokanau	1967	Mainly copper	Construction begun in 1970; first shipment Dec. 1972
PT Pacific Nickel	US Steel 43; Newmont 15; Gorden (Canada) 10; Hoogovens (Dutch) 15; Mueller 10	Waigeo and Gag Islands off Sorong; Cyclop mountains near Jayapura	1969	Mainly nickel	Exploration of first block completed; second block not yet explored in mid-1972
PT Kennecott	Kennecott	Eastern highlands to border with Papua New Guinea	1969	Mainly copper	Following exploration, withdrawal at end of 1971
PT Lake Paniai	Newmont Mining 40; ICI, BHP and Philipp Bros. each 20	Lake Paniai area with Enarotali as centre	1972	Various including oil	Started exploration in mid-1972
PT Baliem Valley	Newmont Mining 40; ICI, Philipp Bros., American Smelting and Refining each 20	Central highlands between Freeport and Kennecott exploration areas	1972	Various including lead and molybdenum	Started exploration in mid-1972

Source: Dinas Pertambangan, Jayapura, 1972.

The cost of construction was held to a minimum by judicious use of skilled labour from a number of foreign sources. At one stage of construction, about three hundred Filipinos and three hundred Koreans were employed, with the remainder of the foreign workforce coming from Australia, the United

States and, to a lesser extent, Japan. The company enforced tight work and camp discipline and maintained a highly differentiated wage structure.[5]

The isolation of the mine, the capital-intensive nature of the operation and poor Indonesian planning have meant that the spin-off to the national and provincial economies, apart from taxation, has been slight. The town is about 19 kilometres or a day's walk from the nearest village. Thus existing villages can gain little benefit from the new school, hospital and community facilities or from sales of food to the town. The Agricultural Service plans to resettle twenty-five families in a new village adjacent to the road to supply vegetables to the town. As with the Bougainville project in Papua New Guinea, there have been disputes over the adequacy of payments for land. The Indonesian government purchased land to be used by the project with tobacco and other goods. One informant described to us how villagers had felt cheated some time after the sale of the land and had made periodic, ineffectual attacks on the camp during construction. The isolation of the project has prevented the villagers' claims becoming widely known and has allowed the government to ignore complaints.

Both local and total employment were larger in the construction than in the production stage. At the height of construction activity about 850 foreign and 1200 Indonesian workers were employed. Several hundred local villagers were employed in unskilled jobs and paid 8-10 cents per hour, in kind at the request of the Indonesian government. Because of their irregular work performance only forty workers from neighbouring villages were employed at the end of construction, and of these only four held more highly paid semi-permanent positions.

The company employs directly only about four hundred workers now that production has started. Others are employed under sub-contracts. Freeport has had difficulty recruiting skilled Indonesians[6] and attractive salaries have been offered to draw workers from construction jobs in Java and Sumatra and from other employment in Irian Jaya. It is expected that the Fundwi vocational training school in Jayapura will supply a large number of skilled personnel. Company training efforts are confined to on-the-job training.

[5] Indonesian plant operators received a basic monthly pay of $100 plus food and lodging, Filipinos and Koreans received about $300 per month plus board, Australians' wages were several times higher, while Americans received $1500 per month. There was abundant overtime, so that remuneration of the lowest-paid Indonesian operators equalled $150 per month plus food and board. English was the main language of communication, through bilingual foremen (personal communications with senior company officials).

[6] All foreign investment contracts in Indonesia require 75-80 per cent of jobs to be filled by nationals within three to seven years.

In the construction phase almost no foodstuffs, building materials, plant or equipment were purchased within Indonesia. A supply headquarters was established in Darwin and large quantities of goods flown and shipped from there. Frequent transfer calls brought machinery from the United States and Japan and buildings arrived prefabricated from Japan. However, the growing number of Indonesians from other provinces at the project caused Indonesian foodstuffs to be flown by chartered aircraft from Ujang Pandang from October 1972.

The mining project at Gag Island will be very much larger than Freeport. Employment and local purchases will be many times larger[7] and without the three-year tax holiday and with slightly higher rates of taxation on nickel, tax receipts will be much greater.[8] The company, in which United States Steel is the principal shareholder, has planned an investment of around $550 million covering an integrated mining and refining operation. Annual output of pure nickel may exceed 45,000 tons and 4500 tons per annum of cobalt will be refined as a by-product. Production is planned to begin early in 1976.

The company estimates that 2500 to 3000 workers will be employed once mining begins. The investment will cover construction of a township for about 15,000 on Gag Island together with a port, an airfield and other infrastructure. The company has announced its intention to spend approximately $25 million on a very intensive training program. It is aware of potential cost advantages in development of local supplies of foodstuffs and building materials and has asked Lakbangda to co-ordinate the development of local supplies. Sorong will be an important supply centre and is a possible location for an industry producing steel drum containers for the nickel and cobalt pellets.

Forestry

Irian Jaya possesses a very large, accessible forest area but there are major problems associated with its commercial exploitation.[9] The great variety of

[7] The contract covering the development of the resources was signed after our visits to Irian Jaya. Our information was obtained from the contract of work, from interviews with company and provincial officials and, more recently, from personal communications with UNDP officials in Jayapura.

[8] Under Presidential Instruction No. 18, 1968, nickel mining companies pay corporation taxes at 37.5 per cent for the first ten years and 45 per cent thereafter.

[9] For more information on forest resources, see S. D. Richardson, *The Role of Forest-based Industries in the Development of West Irian*, New York, Fundwi, 1968.

species means that a large-scale operation is required, with different species being earmarked for log and lumber export, domestic sales of lumber, chipping and other processing. Projects must be sufficiently large to justify the charter of shipping for major markets and to induce calls by liners to other markets. Difficult terrain raises logging costs and, in contrast to other major Indonesian forest areas, there are few possibilities for large-scale river transport in logging operations.

Most of the land area above high water to an altitude of 3000 metres is covered by forest of some economic significance. From the swamps to a height of 600 metres the lowland rain forest (which covers all areas except the savannah in the southeast) features a wide diversity of species. The lowland forests contain good volume density and species for commercial development.[10] The forest from 600 to 1400 metres is more expensive to work because of more difficult accessibility and steeper slopes but it contains a higher proportion of more valuable species, including members of the *Dipterocarpai* (which form the basis of the Kalimantan timber industry) and several high-value conifers.[11] Several pure stands of these softwoods hold promise of successful development along the lines of the Klinkii stands in the vicinity of Bulolo in Papua New Guinea if access can be achieved. Above 1400 metres, inaccessibility reduces the economic role of the forests to local supply.

The 1968 Fundwi report placed great emphasis on forest industries. It proposed the establishment of a large West Irian Forest Corporation, to be a three-way joint venture between Fundwi, private foreign interests and the Indonesian government. Provision of the timber resource was to pay for the Indonesian government's share. A valuable forest area near Sorong was put aside for the venture. Foreign corporations showed interest in the venture but none entered commitments and the Fundwi funds were finally put to other projects.

Over the past few years several foreign companies have looked over Irian Jaya forest resources, but none has made commitments to invest and only Marubeni is close to a final agreement. The Japanese company has a concession area of 255,000 hectares near Nabire and plans to undertake large-scale investment if it obtains more favourable terms. It plans to invest approximately $8 million in logging (capacity 600,000 cubic metres), in the construction of a sawmill (capacity 60,000 cubic metres), in port facilities

10 Richardson, ibid., ventured the opinion that numbers of stems and volumes per unit area were more favourable overall than in Papua New Guinea.
11 *Podocarpus*, *arancania* and *agathis*.

and later in a chipmill (capacity 420,000 cubic metres). After eight years it will carry out a feasibility study on the possibility of establishing a pulp plant. In late 1972 negotiations with the central government were deadlocked: the company was not prepared to go ahead if required to pay in full the standard Indonesian timber export tax of 10 per cent. The provincial government is anxious that the deadlock be resolved, since the domestic linkages of such a large project and its demonstration effect on the timber industry could be very important. Given the uncertainty associated with large-scale operations in a new timber province, a more flexible approach could bring greater national benefits.[12]

Following Fundwi's failure to launch the West Irian Forest Corporation, its forestry efforts have been concentrated on a logging and sawmilling operation near Jayapura at Hamadi. The aim of the project was to demonstrate the feasibility of operating a profitable, commercial, forest-based industry in Irian Jaya. The project has failed, incurring large losses and absorbing virtually all of the $1.4 million Fundwi and Rp 233 million counterpart allocations to forest industries.[13] Its design was faulty, as it was over-capitalised for the planned level of output and highly dependent on expensive expatriate skills.[14]

The Hamadi project was designed to produce 20,000 cubic metres of logs per year and to export 15,000 cubic metres of this as logs, converting the balance of 5000 cubic metres into sawn timber for the local market. Only one export shipment was ever made: 1261 cubic metres to Japan, combined with a shipment from Vanimo close to the border in Papua New Guinea. The Hamadi exports were too small to fill chartered ships and the Vanimo firm was not prepared to share shipments during the Japanese market slump in 1971 and 1972.[15] In an attempt to increase local sales and to utilise some

12 Perhaps some tax could be contingent on a certain level of commercial profitability being attained.
13 The accounts of the project are difficult to interpret as they exclude the major cost items – expatriate staff and, less importantly, overhead expenses related to government and Fundwi administration. Excluding these important costs, invoiced sales to June 1972 amounted to Rp 96 million and the commercial result showed a loss of Rp 19 million. Rp 48 million in trade debts, a large proportion being owed by government departments, is included in invoiced sales.
14 Fifteen expatriate staff were employed in the early stages, of whom one remained as manager in late 1972. The heavy expenditure and losses at Hamadi have been justified in terms of the jobs created but only about eighty persons, most of them indigenes, were employed at the project.
15 South Pacific logs were abandoned first in an oversupplied market because of the greater species mix.

excess logging capacity, machinery to prepare specialised products for interior finishing was installed in late 1972. The manager was pessimistic about the prospects for exporting sawn timber but the new demand at the Pacific Nickel project will transform the market situation and may prevent further losses.

The very large sawmill established at Manokwari by the Dutch is now a state enterprise managed by the forestry service. The rated capacity of the mill is 12,000 cubic metres of sawn timber per annum and a peak production of 8214 cubic metres was achieved in 1960. Output slumped to 1040 cubic metres in 1965 and 614 cubic metres in 1968. The national company which operates the sawmill (PKN Manokwari) incurred substantial losses over this period and the provincial government extended IBRp 5.8 million (approximately $1 million) in subsidies. A new manager in 1969 attributed past losses to poor management, inefficient recruiting of personnel and purchase of spare parts, overcentralised decision-making, poor organisation of log supplies and lack of purchasing support from government organisations.[16] Reforms in 1969 appeared to put PKN on a sounder footing and output increased in the second half of the year. In 1970 total output reached 1578 cubic metres and in 1969/70 an operating profit was realised for the first time for many years. But imposition of the 10 per cent export tax in 1970 and the slump in international timber markets in 1971 seriously affected sales. Increased prices of electricity and severe market difficulties caused a fall in output and losses in 1971.

The marketing problems would have been very much less severe if contacts had been maintained with the European market, which formerly absorbed most of the output of *Intsia*, the dominant species. The absence of regular liner shipping from Manokwari to the Netherlands has hindered restoration of the trade. A minimum of 1000 cubic metres is required to induce calls from vessels travelling to Europe and the mill has not been able to guarantee supply of such large quantities. Large sales from Papua New Guinea indicate that there is still a European market for *Intsia*.

Fishing

There are valuable fish resources off the north and south coasts of Irian Jaya. The shallow Arafura Sea is a favoured habitat of prawns and the deep waters off the north coast from Jayapura to Sorong are rich in skipjack and other

[16] See Direksi PKN Manokwari, *Laporan Rehabilitasi P. D. Kehutanan Manokwari*, Irian Barat, August 1970.

Table 22 Foreign investment in prawning in the Arafura Sea

Name of Company	Status	Location of cold storage/ administration	Planned: Investment ($m)	Planned: No. of Boats by 1974	Planned: Total Capacity (tonnage)	Actual: No. boats 1972 (July)	Actual: Output (1972) Volume (tons)	Actual: Output (1972) Value ($)	Employment (1972) Foreign	Employment (1972) Indonesian
West Irian Fisheries Industries (WIFI)	Joint venture between Nisho Iwai and PT Kasari	Sorong	3.65	20	2600	11	800	1,600,000	120	84
Irian Marine Production Development (IMPD)	Joint venture between Mitsubishi and PT Modena	Sorong	2.8	11	1500	6	300	600,000	50	72
PT Tofico [a]	Direct Toyomengka	Jakarta	2.7	10	1520				83	158
PT Nusantara Fishery	Joint venture between Taiyo Fishing & EMDC	Ambon	1.36	8	1400				64	45
PT Mina Kertika	Joint venture between Kijo Kufo and Inkopal	Ambon	3.5	12	1800				101	54

[a] Operating boats in Irian Jaya and West Kalimantan.

Source: Interviews with WIFI and IMPD and the Fisheries Department, Jakarta.

tuna species. Shallower waters adjacent to Sorong support large concentrations of small species required as live bait for poling skipjack.

By mid-1972 four Japanese joint ventures, one wholly-owned Japanese company and several domestic companies had prawning rights in the Arafura Sea (Table 22). Two of the foreign companies were based on Sorong, two on Ambon and one on Jakarta. Although the industry is in its infancy and although production by domestic companies has scarcely begun, prawns were the largest export from the province in 1972.

The prawning industry's present contribution to the national and provincial economies is very small. Royalties represent a very small proportion of the value of output[17] and the authorities do not have the means to assess and collect efficiently tax on corporate incomes. All supplies for the trawlers and most of the crews on the boats come from Japan. Only the shore personnel purchase local consumption goods and two 100-ton cold storage chambers and housing for project personnel are the only shore installations. There were 160 Japanese working on the two boats operating from Sorong and these made up most of the crews. However, one company sent a number of Indonesians to Japan for training in docking and ship repairs in mid-1972. Wages for Indonesian crew members are high, ranging from Rp 13,000 per month for unskilled labour to Rp 17,000 per month at that time. Most Indonesian crew members are from outside Irian Jaya.

The skipjack tuna resource off Sorong was surveyed in 1970/71 by a Japanese company under Fundwi auspices. The survey revealed high catches per boat, year-round supplies, a good processing yield and high quality fish.[18] In the first year of the survey, 2300 tons valued at about one million dollars were exported. Sixty-eight Indonesians, including twenty-eight Irianese, received training in skipjack tuna fishing operations.

From October 1972, three Japanese vessels were permitted to work the waters off Sorong on a six-month licence. The FAO fisheries expert based at Sorong thought it likely that they would haul skipjack at the rate of 4000 tons per annum valued at about $2 million and international financing for a larger industry is being sought.

In negotiations with the Directorate-General of sea fisheries in early 1973 the Asian Development Bank seemed favourably disposed towards financing a tuna fishing venture.[19] It is likely that the Bank will finance Indonesian

[17] Royalties are $20 per ton and licence fees $1000 plus $3500 per annum for each 100 DWT boat.
[18] Nichiro Gyogyo, *Pilot Fishing Operations of Skipjack and Tuna*, Tokyo, 1971.
[19] UNDP officials, Jayapura, personal communication, February 1973.

government purchase of thirty small-sized tuna fishing vessels and the construction of an onshore freezing facility. This project is similar in conception to established World Bank-financed operations elsewhere in Indonesia.[20] Pole-fishing for tuna is dependent on the availability of live bait, so that these operations will be confined to the neighbourhood of Sorong. Different techniques would be needed to gain access to the large resource off Jayapura. In late 1972, there were no plans to develop an industry in this area.

Several officials associated with fishing are worried that foreign companies are allowing boats to fish illegally in Indonesian waters and that they are taking prawns too small and too close to the shore. Lack of government boats to police fishing laws and contracts is a major problem of the Fisheries Service. The fishing industry in Irian Jaya can make a very large contribution to the provincial and national economies, but only if planning and administration are improved considerably. Increased efficiency of ports and towns would make Irian Jaya bases more attractive and would strengthen the government's bargaining power in relation to foreign investors. It would also make possible the establishment of a large processing industry. The long-term prospects of the industry would also be enhanced by the integration of fishing, supplying and processing activities of companies based on Ambon and Sorong.

By the late 1970s, annual revenues from the two large mining projects alone will greatly exceed the annual level of external subsidy to Irian Jaya in recent years and within a decade Irian Jaya is likely to be a very large net contributor to central government revenues. Yet only a very small proportion of the indigenous population will benefit directly from these developments. If efforts are made to integrate the activities of investors into other national and provincial economic activity, the new industries based on natural resources will generate much employment and spur the growth of the towns. But as will become more clear, most of these opportunities will be utilised by immigrants from other parts of Indonesia.

[20] For example, investments by PN Perikani and some private firms in North Sulawesi. See Boediono, 'An Economic Survey of North Sulawesi', p. 76.