5.1. Regional Development and Potentiality of Riau Province

Riau, with a land area of 94,562 km² has a large potential for agricultural development. Though its soil is not highly fertile, it does enjoy constant rainfall throughout the year. Convenient transportation for agricultural products exists via the major three rivers of Rokan, Siak and Indragiri which are navigable for great distances inland. These rivers already play an important role in the inland transportation network of Riau Province. The province's main roads connect Pasir Pangarayan – Bangkinang – Pekanbaru – Taluk Kuantan – Rengat. In addition, a main road built by Caltex links Pekanbaru with Dumai. There are also well advanced plans for roads which will link Dumai with Kota Pinang and Pasir Pangarayan with Duri – Dumai.

Although Riau has high potential for development in sectors of its economy other than crude oil production, it is at present underpopulated. To remedy this situation, the Government of Indonesia has launched transmigration and plantation development programs, which are expected to contribute greatly to upgrading the economic structure of Riau Province, thereby helping the province realize its full potential.

5.1.1. Population

Land area and population in Indonesia are shown by province in Table 5.1.1 ~ 5.1.2. As can be seen, the total area of Indonesia is about 2 million km², of which 25% is occupied by Sumatra, 7% by Java, 5% by Nusa Tenggara, 28% by Kalimantan, 10% by Sulawesi and 26% by Maluku and Irian Jaya. The total population is about 147 million, of which 62% live in Java, 19% in Sumatra, 6% in Nusa tenggara, 4% in Kalimantan, 7% in Sulawesi and only 2% in Maluku and Irian Jaya. This great distortion in population gives rise to a very high population density of 690 persons/km² in Java. This population density is more than ten times greater than that of Sumatra, which has 59 persons/km². Socio-economic conditions naturally differ greatly by province, depending on patterns of population distribution. The government has made intensive efforts to improve these socio-economic conditions through a series of five-year plans, which have included large scale agricultural development plans and transmigration plans. In Sumatra, as in Indonesia as a whole, population distribution varies by region, as can be seen in the above two tables. Sumatra's total land area is about 474,000 km², or 25% of all Indonesia.

Its 28 million population has been increasing at a rate of 3.32% over the last decade, the highest population increase rate in the nation. This very high population increase rate is due mainly to the previously mentioned governmental policy of transmigration. Lampung Province, the province nearest Java Island, has the highest population increase rate in Sumatra, at about 6% and also has the highest population density, of 139 persons/km². North Sumatra Province has the second highest population density of 118 persons/km², with a 2.6% population increase rate. Of 8 provinces in sumatra, the Province of Riau has the lowest population density at 23 persons/km², about one sixth that of Lampung. This is due mainly to its geographical setting as roughly 50% of its land area does not exceed an elevation of 15 m above sea level.

The Bengkalis District of Riau Province, where Dumai Port is located, occupies about 32% of the province, for a total area of 30,000 km². This district's population of about 0.5 million amounts to about 23% of the Province's total. Kampar is the second largest district with an area of 28,000 km² and a population of about 360,000. Indragiri Hilir and Kepulauan Riau are comparatively highly populated with populations of about 400,000 and 420,000, and population

densities of 34 persons/km² and 52 persons/km² respectively. The population increase rates for the various districts of Riau Province are shown in Table 5.1.3. The highest rate of 3.8% occurs in Kampar District. Detailed figures for population by district in Riau Province are shown in Table 5.2.47. Table 5.1.4 shows population increases due to transmigration in Riau Province. It should be noted that about 35% of the transmigrants are concentrated in the Pasir Pangarayan area where on-going large scale agricultural development has been taking place. This area has received about 28,000 persons / year during the three years starting from 1979.

5.1.2. The Economic Potential of Riau Province

There is great potential for economic development in Riau Province. Major steps towards realizing this potential have been initiated in recent years through an agricultural development plan and the transmigration program which aims to settle 54,000 families in the province during the Pelita III. Considerable funds have been invested in road improvement, irrigation schemes and other agricultural programs.

Riau's gross domestic product per capita is very high compared with that of Indonesia as a whole because of its petroleum production which accounts for about one half of Indonesia's total. Table 1.1.7 in Chapter 1 shows the GRDP for Riau Province by sector. The mining and quarrying sector accounted for about 83% of the total in 1980. The shares of other sectors in the GRDP are even more clearly shown in Table 1.1.10. In 1980, excluding petroleum, the agricultural sector, accounted for 29%, followed by 27% for the trade, hotel and restaurant sector and 14% for the transport and communication sector. The major industries in Riau, other than petroleum, are wood processing, coconut oil and rubber. Riau's GRDP, excluding petroleum, grew at an annual increase rate of 6.7% from 1975 to 1980, which is the same rate as for North Sumatra. However, if we include petroleum, the GRDP decreased at a rate of 1.7%, due to annual average decrease rate in the petroleum sector of 3.0%.

There is great potential for successful palm oil and rubber production in Riau, despite rather poor soil conditions, because there is sufficient rainfall evenly distributed throughout the year. The areas with highest potential are Tandun/Pasir Pangarayan in Riau and Torgamba/Kota Pinang in North Sumatra, both of which are relatively close to Dumai Port and linked to the port by a fairly good road network (see Fig. 5.1.1). For exporting palm oil from Dumai, storage tanks and handling facilities have already been planned in the port area. At present, North Sumatra is the most important oil palm/rubber plantation area, though in the forseeable future, the oil production of Riau Province should exceed that of North Sumatra.

Areas for other agricultural activities in Riau are indicated in Table 5.1.5 ~ Table 5.1.8. As can be seen, plantation area used for producing rubber amounts to about 260,000 ha, followed by 210,000 ha for coconut, 140,000 ha for paddy fields, and the remainder for other agricultural products.

There is also great potential in Riau Province for forestry production, as indicated in Table 5.1.9. Forestry products are exported to Japan, Taiwan and Singapore, contributing importantly to Indonesia's foreign currency income. Major saw mills and plywood factories are concentrated in and around Pekanbaru and along the major rivers of Riau Province.

Problems that stand in the way of increased forestry production and export are the lack of an established control/management system for conservation of forestry resources, a shortage of

workers and funds for wages, the difficulty of machine maintenance, and the small scale of firms which, being dependant on a limited number of importers, and are highly sensitive to market conditions. When these problems are resolved a high and steady volume of forestry exports will be realized.

In the field of manufacturing, oil refineries are the main industry. The construction of a hydrocracking factory at Dumai was begun in June 1981, and is scheduled for completion in 1983, with a refining capacity of 85,000 barrels per day.

As for electricity supply in Riau Province, a feasibility study is being conducted for the hydraulic power plant project near Bangkinang. The power plant is scheduled to be completed in 1990, with a capacity of 160,000 kw. This project is expected to aid various industrial activities, as well as to help regional irrigation.

The infrastructure of Riau Province, especially the road network improvement plan, has been treated in a previous section, and a further discussion will be presented in the cargo forecast section.

Table 5.1.1 Population of Indonesia as of 1961, 1971, and 1980 Population Census by Province and Island

Province/Island	Population Census			Population Growth Rate %	
	31 October 1961	24 September 1971	31 October 1980	1961 ~ 1971	1971 ~ 1980
(1)	(2)	(3)	(4)	(5)	(6)
1. Daerah Istimewa Aceh	1 628 983	2 008 595	2 611 271	2.14	2.93
2. Sumatera Utara	4 964 734	6 621 831	8 360 894	2.95	2.60
3. Sumatera Barat	2 319 057	2 793 196	3 406 816	1.90	2.21
4. Riau	1 234 984	1 641 545	2 168 535	2.92	3.11
5. Jambi	744 381	1 006 084	1 445 994	3.09	4.07
6. Sumatera Selatan	2 773 464	3 440 573	4 629 801	2.20	3.32
7. Bengkulu	406 249	519 316	768 064	2.51	4.39
8. Lampung	1 667 511	2 777 008	4 624 785	5.29	5.77
SUMATERA	15 739 363	20 808 148	28 016 160	2.86	3.32
9. D.K.I. Jakarta	2 973 052	4 579 303	6 503 449	4.45	3.93
10. Jawa Barat	17 614 555	21 623 529	27 453 525	2.09	2.66
11. Jawa Tengah	18 407 471	21 877 136	25 372 889	1.76	1.64
12. D.I. Yogyakarta	2 241 477	2 489 360	2 750 813	1.07	1.10
13. Jawa Timur	21 823 020	25 516 999	29 188 852	1.59	1.49
JAWA	63 059 575	76 086 327	91 269 528	1.91	2.02
14. Bali	1 782 529	2 120 322	2 469 930	1.77	1.69
15. Nusa Tenggara Barat	1 807 830	2 203 465	2 724 664	2.02	2.36
16. Nusa Tenggara Timur	1 967 297	2 295 287	2 737 166	1.57	1.95
17. Timor Timur	-	-	555 350	-	-
NUSA TENGGARA	5 557 656	6 619 074	8 487 110	1.78	2.01
18. Kalimantan Barat	1 581 034	2 019 936	2 486 068	2.51	2.31
19. Kalimantan Tengah	496 522	701 936	954 353	3.56	3.43
20. Kalimantan Selatan	1 473 155	1 699 105	2 064 649	1.45	2.16
21. Kalimantan Timur	550 764	733 797	1 218 016	2.94	5.73
KALIMANTAN	4 101 475	5 154 774	6 723 086	2.34	2.96
22. Sulawesi Utara	1 310 054	1 718 543	2 115 384	2.78	2.31
23. Sulawesi Tengah	693 157	913 662	1 289 635	2.83	3.86
24. Sulawesi Selatan	4 516 544	5 180 576	6 062 212	1.40	1.74
25. Sulawesi Tenggara	559 594	714 120	942 302	2.49	3.09
SULAWESI	7 079 349	8 526 901	10 409 533	1.90	2.22
26. Maluku	789 534	1 089 565	1 411 006	3.31	2.88
27. Irian Jaya	758 396	923 440	1 173 875	2.01	2.67
MALUKU + IRIAN JAYA	1 547 930	2 013 005	2 584 881	2.69	2.79
INDONESIA	97 085 348	119 208 229	147 490 298	2.10	2.32*)

*) Excluding Timor Timur.

Source: Statistik Indonesia 1980/1981, BPS

Table 5.1.2 Population Density by Province and Island

Province/Island	Area (km^2/sq km)	% of Total Areas	Population Density per sq km		
			1961*)	1971*)	1980*)
(1)	(2)	(3)	(4)	(5)	(6)
1. Daerah Istimewa Aceh	55,392	2.88	29	36	47
2. Sumatera Utara	70,787	3.69	70	94	118
3. Sumatera Barat	49,778	2.59	47	56	68
4. Riau	94,562	4.93	13	17	23
5. Jambi	44,924	2.34	17	22	32
6. Bengkulu	21,168	1.10	19	24	36
7. Lampung	33,307	1.74	50	83	139
8. Sumatera Selatan	103,688	5.40	27	33	45
SUMATERA	473,606	24.67	33	44	59
9. D.K.I. Jakarta	590	0.03	5,039	7,761	11,023
10. Jawa Barat	46,300	2.41	380	467	593
11. Jawa Tengah	34,206	1.78	538	639	742
12. D.I. Yogyakarta	3,169	0.17	707	785	868
13. Jawa Timur	47,922	2.50	455	532	609
JAWA	132,187	6.89	477	576	690
14. Bali	5.561	0.29	320	381	444
15. Nusa Tenggara Barat	20,177	1.05	90	109	135
16. Nusa Tenggara Timur	47,876	2.49	41	48	57
17. Timor Timur	14,874	0.78	35	41	37
NUSA TENGGARA	88,488	4.61	63	75	96
18. Kalimantan Barat	146,760	7.65	10	14	17
19. Kalimantan Tengah	152,600	7.95	3	5	6
20. Kalimantan Selatan	37,660	1.96	39	45	55
21. Kalimantan Timur	202,440	10.55	2	4	6
KALIMANTAN	539,460	28.11	8	9	12
22. Sulawesi Utara	19,023	0.99	69	90	111
23. Sulawesi Tengah	69,726	3.63	10	13	18
24. Sulawesi Selatan	72,781	3.79	62	71	83
25. Sulawesi Tenggara	27,686	1.44	20	26	34
SULAWESI	189,216	9.85	37	45	55
26. Maluku	74,505	3.88	11	15	19
27. Irian Jaya	421,981	21.99	2	2	3
MALUKU + IRIAN JAYA	496,486	25.87	3	4	5
INDONESIA	1,919,443	100.00	51	62	77

*): Population Census Results.
Source: Statistik Indonesia 1980/1981, BPS

Table 5.1.3 Population of Riau Province, 1961, 1971 and 1980

DISTRICT	31 OCTOBER 1961	24 SEPTEMBER 1971	31 OCTOBER 1980	GROWTH RATE	
				1961 ~ 1971	1971 ~ 1980
1. PEKANBARU	70,821	145,030	186,262	7.51	2.79
2. KAMPAR	209,304	258,692	362,867	2.16	3.79
3. INDRAGIRI HULU	377,211	197,156	229,182	-	1.67
4. INDRAGIRI HILIR		206,028	398,276	-	3.70
5. BENGKALIS	298,682	423,503	565,671	3.59	3.25
6. KEPULAUAN RIAU	278,966	331,136	425,277	1.75	2.79
PROPINSI RIAU	1,234,984	1,641,545	2,168,535	2.92	3.11

Source: (The result of population census 1961, 1971 and 1980)

Table 5.1.4 Number of Transmigrants in Riau Province by Settlement Area, 1977/1978 ~ 1981/1982

Settlement Area	1977/1978		1978/1979		1979/1980		1980/1981		1981/1982		Total	
	Families	Family Members	Families	Family Members	Families	Family Members	Families	Family Members	Families	Family Members	Families	Family Members
Reteh I	-	-	462	2,114	38	190	-	-	-	-	500	2,304
Reteh II	-	-	-	-	301	1,383	99	438	-	-	400	1,821
Siak I	-	-	-	-	101	482	846	3,437	554	2,368	1,501	6,287
Siak II	-	-	-	-	-	-	351	1,503	707	3,322	1,538	4,825
Rokan II	-	-	-	-	-	-	219	871	744	3,193	963	4,064
Tempuling	-	-	-	-	-	-	261	1,156	419	1,794	680	2,950
Kuala Cenaku	-	-	-	-	-	-	951	3,934	467	2,063	1,418	5,997
Pasir Pangarayan I	-	-	-	-	375	1,712	1,529	6,300	96	412	2,000	8,424
Taluk Kuantan I	-	-	-	-	200	791	1,800	7,357	-	-	2,000	8,148
Rokan II	-	-	-	-	-	-	100	403	973	4,005	1,073	4,408
Pasir Pangarayan II	-	-	-	-	-	-	1,866	7,901	2,193	9,103	4,059	17,004
Taluk Kuantan II	-	-	-	-	-	-	235	979	1,053	4,562	1,288	5,541
Rengat/Belilas I	-	-	-	-	-	-	499	2,031	1,289	5,163	1,788	7,194
Pasir Pangarayan III	-	-	-	-	-	-	-	-	764	3,047	764	3,047
Taluk Kuantan III	-	-	-	-	-	-	-	-	-	-	-	-
Rengat/Belilas II	-	-	-	-	-	-	-	-	-	-	-	-
Siak III	-	-	-	-	-	-	-	-	-	-	-	-
Rokan III	-	-	-	-	-	-	-	-	-	-	-	-
Natuna	-	-	-	-	-	-	-	-	-	-	-	-
Rokan IV Koto	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	462	2,114	1,015	4,558	8,756	36,310	9,259	39,032	19,492	82,014

Source: Rep. Office of Dit. Gen. Transmigration, Riau Province.

Table 5.1.5 Planted Areas of Small Holders by Crop Item in Riau Province, 1972 ~ 1981 (ha)

Crops	Area									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Rubber	256,517	261,217	264,594	266,995	264,909	362,125	255,905	256,277	257,448	261,568.6
Coconut	139,828	142,428	145,029	148,685	158,465	179,182	191,183.22	183,809.70	202,019	210,307.47
Clove	1,250.05	1,539	1,839	2,578.72	3,373.49	4,643	7,053.78	7,122.98	9,764	9,764
Sugar Cane	226.70	545	596	254	507.48	294	404	605.50	385	385
Cinnamon	28.95	67	67	137.32	193.77	204	241	300.50	-	-
Coffee	1,775.87	1,777	2,341	1,953	2,031.91	2,249	2,567.50	2,604.50	3,448.8	3,448.8
Pepper	4.11	4	5	8.34	13.34	19.99	123	129	53	53
Cashew	506	1,108	1,158	891	1,235.60	1,191	1,194	1,397.50	81	81
Cambir	1,664.84	1,586	1,689	1,436.25	5,259.98	1,213	2,069.25	2,089.25	2,174	2,174
Gengger	61.25	-	-	-	-	-	-	-	-	-
Sere	-	-	-	105	80.75	58	58	-	-	-
Tobacco	2.10	-	-	-	-	-	-	-	-	-
Cocoa	-	-	-	25	26.72	10	178.20	-	169	169
Palm	-	-	-	-	16	22	22	-	23	23
Capok	-	-	-	-	110.15	129	55.58	63.30	170	170
Nutmeg	-	-	-	-	0.20	-	7.49	-	53	-
Arecanot	-	-	-	-	2.90	-	-	-	-	-

Source: Farm Agriculture Service Riau Province.

Table 5.1.6 Harvested Area for Food Stuffs by Crop Item in Riau Province, 1975 ~ 1981 (ha)

Crops	1975	1976	1977	1978	1979	1980	1981
1. Wet paddy field	91,858.17	86,517.81	109,972.00	90,361.22	82,330.00	85,959.59	86,365.50
2. Dry paddy field	51,755.75	52,834.90	56,684.00	46,495.00	51,784.09	44,023.50	52,091.00
3. Maize	5,609.21	8,085.09	12,685.91	9,481.05	66,008.40	5,751.65	13,394.50
4. Cassava	7,537.35	6,881.70	2,743.65	7,840.75	7,984.40	8,255.65	8,869.00
5. Sweet potatoes	2,123.35	2,043.93	7,151.26	2,350.05	1,949.60	3,109.05	1,753.00
6. Black radish	570.64	–	793.92	628.10	–	445.45	685.00
7. Peanuts	544.17	524.00	857.15	643.60	708.45	811.07	2,433.50
8. Soya been	329.00	459.58	511.00	379.00	353.17	349.00	917.50
9. Small green pea	325.15	714.69	972.50	2,263.00	1,040.52	1,852.00	1,148.50
Total	160,853.89	158,061.89	192,370.39	160,402.77	212,158.63	150,556.92	167,657.50

Source: Agriculture service Riau Province.

Table 5.1.7 Harvested Area of Vegetables in Riau Province by Crop Item, 1975 ~ 1981 (ha)

Crops	1975	1976	1977	1978	1979	1980	1981
Chilly	1,004.68	1,918.28	2,226.30	2,380.40	2,825.90	1,955.67	1,931.50
Cucumber	382.70	782.25	957.75	972.50	1,562.70	1,147.35	897.00
Nightsade	650.84	1,263.70	1,093.05	1,319.53	1,931.10	1,438.35	1,779.00
Vegetable bean	787.20	1,859.40	1,556.13	1,959.45	2,260.70	1,725.14	1,184.50
Spinach	642.56	614.55	672.15	556.06	787.35	639.43	1,149.50
Water cress	446.50	546.83	594.63	582.14	1,415.10	1,237.05	1,090.50
Luffa cylindrica Roem	467.56	636.70	240.05	299.20	182.20	278.18	450.00
Brassica rugosa	81.25	55.55	75.40	82.76	104.80	135.66	41.50
Gourd	418.72	277.04	388.78	459.60	227.20	513.53	499.50
Cucumberlike	298.85	384.90	158.10	259.07	288.90	623.30	233.00
Sauripus Androginuss merr	24.34	20.63	25.60	20.40	20.40	45.90	55.85
Total	5,245.20	8,495.92	7,989.94	8,899.13	11,606.43	9,739.56	9,311.85

Source: Agriculture Service, Riau Province

Table 5.1.8 Harvested Area of Fruits by Crop Item in Riau Province, 1975 ~ 1981 (ha)

Crops	1975	1976	1977	1978	1979	1980	1981
Banana	5,142.52	7,989.52	7,794.42	14,868.99	4,888.37	5,706.62	5,462.90
Zibethinus	756.20	802.63	893.00	819.34	942.20	910.60	994.55
Lansium Domiaticum	357.50	341.20	352.00	407.45	238.54	343.42	264.34
Orange	525.18	1,190.00	1,163.00	1,058.20	779.28	3,118.29	2,402.19
Rambotan	705.89	556.67	189.99	523.89	658.52	1,343.01	847.06
Manguata	300.25	141.00	495.50	320.20	32.85	25.50	74.60
Papaya	237.42	425.57	453.53	310.12	300.56	2,047.30	378.73
Pine Apple	1,405.54	2,504.74	2,429.48	2,035.32	1,378.31	2,433.63	2,734.01
Nephelium mutabile	111.35	3.75	3.75	3.65	0.75	3.65	14.60
Cuaves	143.24	146.74	147.22	115.37	151.18	831.55	164.45
Manggos	132.75	181.12	189.25	363.50	204.95	212.21	176.41
Total	9,817.84	14,283.97	14,111.94	20,826.03	9,775.51	16,975.86	13,513.86

Source: Agriculture Service, Riau Province.

Table 5.1.9 Principal Forest Products of Riau Province by Commodity, 1974 ~ 1981

Commodity	Unit	1974	1975	1976	1977	1978	1979	1980	1981
Logs	M3	1,646,138.92	126,535.51	1,337,203.85	1,500,483.18	1,070,962.41	1,799,944.92	1,474,509.89	475,868.19
Sawn Wood	M3	11,686.65	25,646.62	29,936.20	27,625.90	95,518.37	200,523.06	207,763.50	194,178.39
Rattan	Ton	736.90	207.49	1,818.45	2,740.71	1,158.45	2,458.45	727.55	100.00
Wildcantchous	Ton	1,057.61	1,570.48	2,309.95	2,702.11	1,043.00	1,658.00	1,391.00	891.00
Charcoal	Ton	6,683.65	1,413.50	1,529.50	4,045.87	12,708.05	20,565.50	14,717.85	29,113.76
Lembo bark	Ton	96.00	62.20	6.40	67.00	-	-	43.50	-
Resins	Ton	88.00	59.00	40.55	15.00	79.00	29.00	60	-
Mangrovepoles	Btg	-	-	619,632.00	2,741,078.00	10,467.53	240,728.28	-	-
Nibung poles	Btg	8,624.00	10,100.00	13,214.00	5,400.00	2,000.00	2,000.00	-	-
Crocodile hide	Inch	-	-	-	805.00	-	-	-	-
Cuanas hide	Inch	1,400.00	650.000	-	-	-	-	-	-
Snake hide	M	-	-	-	1,569.00	-	-	-	-
Birds nest	Kg	-	-	-	-	-	-	-	-

Source: Forestry Service, Riau Province.

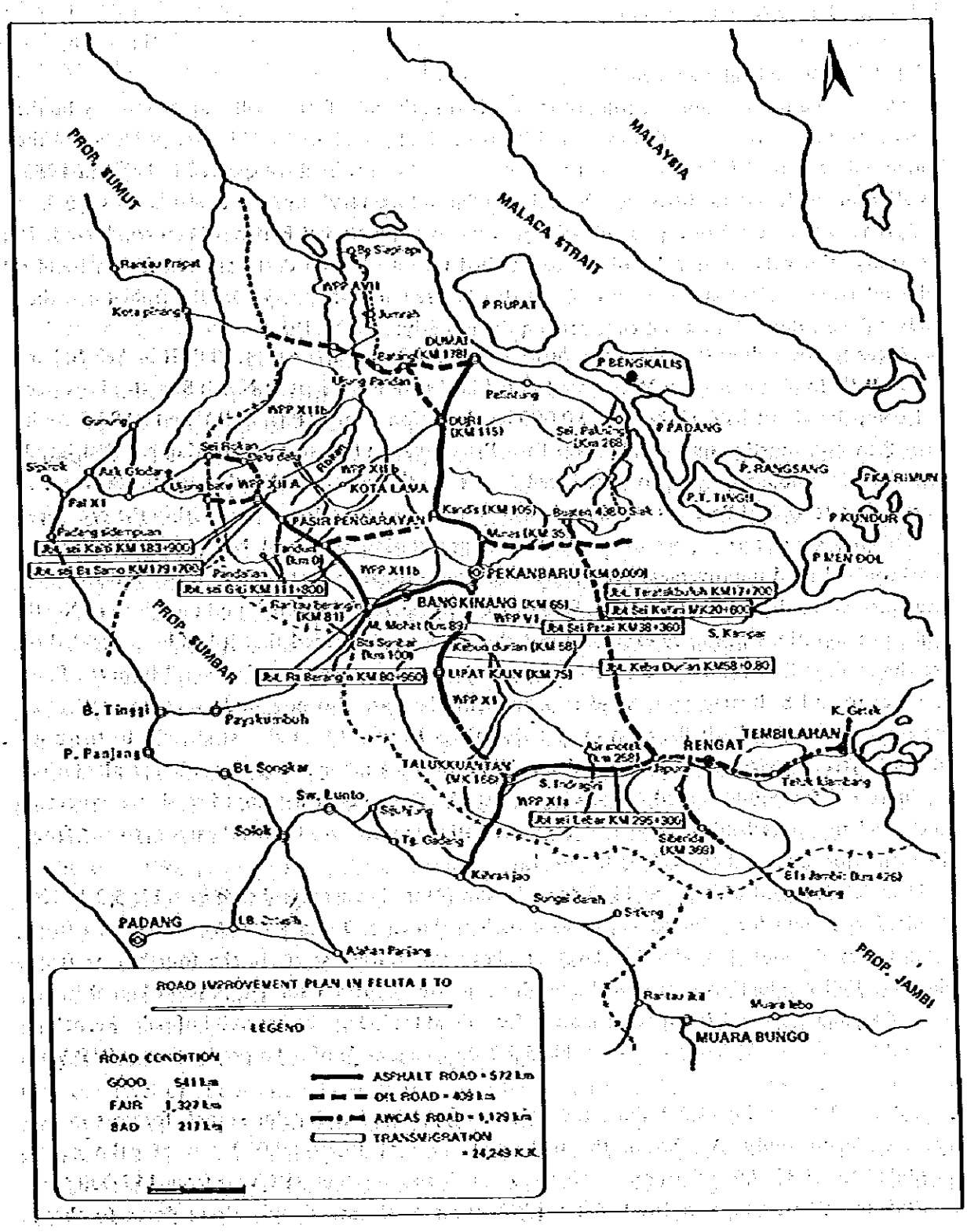

Fig. 5.1.1 Road Network in Riau

5.2 Cargo Forecast

5.2.1 Palm Oil and Palm Kernels

One of the most important roles of Dumai Port in the near future will unquestionably be the shipment of large volumes of plam oil and its by-product plam kernels which are produced in the hinterland of Dumai Port. As production and shipment of palm oil is expected to begin in 1983, installation of port facilities for handling palm oil is very urgent. Towards this goal, a comprehensive study *for a palm oil storage installation in Dumai Port has been conducted. In the study, the volume of palm oil to be handled through Dumai Port has been forecast and a palm oil storage plan has been formulated. In the present study, major results from this other study will be followed, as it was conducted quite recently, in June 1982.

Areas for oil palm plantations are shown in Fig. 5.2.1. As can be seen, PTP III in Aek Nabara and PTP IV in Torgamba/Tg. Medan are located in the southern part of North Sumatra Province, and comprise about half of the total 80,000 ha plantation area. PTP II, PTP V and PTP VI are in Riau Province, mostly concentrated near Pasir Pangarayan in the west part of Kampar District. A considerable amount of palm oil produced in the southern part of North Sumatra Province is transported to Dumai Port outside the province, rather than to Belawan Port within the province, due to the shorter transport distance. This transportation plan will be supplemented by a synchronized road improvement plan extending from Dumai to Kota Pinang which is now being implemented as detailed in Chapter 1. Export from Kuala Tanjung of palm oil produced in North Sumatra plantations was once examined but the team was informed that it had been decided to use the loading facilities there for other cargoes. As for transportation of palm oil from the Pasir Pangarayan and S. Buatan areas, road improvement plans are also now underway. In particular, the road connecting Pasir Pangarayan and Dumai via Duri will lead almost straight to the port without affecting city traffic in Pekanbaru. This will be a main transport route for plantation products and for goods needed in carrying out work. These newly developed roads are expected to expand the hinterland of Dumai Port by facilitating movement of general cargoes to and from the plantation areas and areas along the roads.

The development plan up to 1987 for oil palm plantation areas is shown in Table 5.2.1. The standard yield rate for palm oil and palm kernels is shown in Table 5.2.2. As can be seen from these tables the initial production level of about 0.7 ton/ha starts in the fourth year from planting. Full production comes in the tenth year with about 5.5 ton/ha. A palm kernel is the core of a palm fruit and is exported mainly for animal feed. The average yeild of palm kernels is about 0.8 ton/ha, or 15% of palm oil. Table 5.2.3 shows a sample of palm production at PTP V in Tandun.

Table 5.2.4 and Fig. 5.2.2 show the volume of palm oil and palm kernels forecast in the aforementioned study. As shown, the first production of about 60,000 ton of palm oil is scheduled for 1983. After that, production shows a sharp growth of 35%/year from 157,000 tons in 1985 to 696,000 tons in 1990. After 1992, the growth rate sharply slows down to about

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*) North Sumatra Transport Project, Dumai, PTP Palm Oil Storage Bulking Installation.
June 1982, BCEOM.

2%/year. This sharp decrease can be explained by the fact that the present plantation area developemnt plan does not include programs begun after 1987. Rather, it is scheduled to finish by 1987 so that most of the area planted by the end of the plan will be in full production by 1993.

The target year of the long term plan in the present study is 2000. However, such a long term agricultural development plan is not usual, being too distant for detailed planning. Therefore, it will be necessary to re-check oil palm forecasts, especially after 1990. For this purpose, statistics concerning palm oil production in Indonesia and world-wide will have to be reviewed.

World-wide palm oil production is shown in Table 5.2.5 and Fig. 5.2.3. As shown, total world production of palm oil increased from 2 million tons in 1970 to 5 million tons in 1980, for an annual growth rate of about 10%. The major producing countries are Malaysia, Nigeria and Indonesia which had production shares of 50.7%, 13.3% and 12.8% respectively in 1980. In 1970, Nigeria was the largest plam oil producing country with a share of 27.4%, but in the following decade it was replaced by Malaysia, which had a higher annual growth rate of about 20%. Indonesia increased its production from 0.22 million tons in 1970 to 0.65 million tons in 1980, for an annual growth rate of 11.6%. Table 5.2.6 shows world-wide palm kernel production, which natually exhibited a similar increasing trend as that of palm oil. Palm kernel production in Indonesia increased from 49,000 tons in 1970 to 120,000 tons in 1980.

The palm oil produced in Indonesia is, for the most part, exported, though it is also in part consumed domestically as shown in Table 5.2.7 ~ Table 5.2.9. As shown in the tables, major importing countries are the Netherlands, the United Kingdom, Kenya and Germany. The percentage of palm oil that was exported decreased from 93.5% in 1976 to 72.8% in 1980. This was due mainly to increasing domestic consumption as a substitute for coconut oil, as shown in Table 5.2.8. Tables 5.2.10 ~ 11 and Fig. 5.2.4 show, increases in palm oil plantation areas and production. It also shows the planned increase in the total mature area of PTP and PNP oil palm plantations, from 122,000 ha in 1978 to 335,000 ha in 1988 at an annual growth rate of 10.6%. At the same time palm oil and palm kernel production is expected to increase from 439,000 t in 1978 to 1,612,000 t in 1988 at a growth rate of 13.9% per annum. Fig. 5.2.5 indicates the accomplished and forecast palm oil/kernel production for the whole of Indonesia as well as the volume forecast for Dumai Port. It is assumed that total Indonesian production will increase until 1990 at a rate of 11%, taking into consideration all of the abovementioned factors. In 1990, the cargo volume through Dumai Port should reach 30% of the total Indonesian production. Then, in the years following 1992, based upon the previously cited study, Dumai will continue to handle the same level of about one million tons causing its share of the Indonesian total to decrease to around 16% by the year 2000. However, in fact it seems unlikely that such a decrease in Dumai's share of the total Indonesian palm oil volume will actually occur, as there is much land still available for plantations in Riau and North Sumatra Provinces. By taking this fact into account, it can be assumed that the volume of palm oil handled in Dumai Port will increase after 1992 at 11%, the same rate as for overall Indonesian production. As for the export ratio of palm oil after 1983, based on average figures from 1978 ~ 1980, it can be assumed that 70% of total production will be exported (see Table 5.2.7) while the remaining 30% will be domestically consumed. Similarly, it is assumed that 60% of the palm kernels will be exported. The forecast

for palm oil and palm kernels is summarized in Table 5.2.12.

Table 5.2.1 Planting Plan for Oil Palm Plantations (ha)

Year	P.T.P. II		P.T.P. III	P.T.P. IV			P.T.P. V			
	Tandun	S. Buatan	Aek Nabara	Air Molek	Meng-Kaus	Tor-gamba	Ujung Batu	PIR		S. Rokan
								SH	NE	
1975				N.A.						
1976			400							
1977			400							
1978			200							
1979			–			7,060				
1980	2,000		4,195			7,060	2,000			2,089
1981	3,000	2,000	2,500			7,060	2,500	1,000	500	2,325
1982	1,000	2,500	250				2,500	2,000	1,000	2,500
1983	–	6,000	250			7,060	3,000	2,000	1,000	3,000
1984	5,500	6,000			1,500	7,060				
1985	7,500	6,000			3,000					
1986	–	1,500			3,500					
1987										
1988										
1989										
1990										

SH: Small Holder
NE: Nucleus Estate
Source: PTP Plantation Plan

Table 5.2.2 Standard Production Rate of Palm Oil/Kernel

Year	Palm Oil (t)	Palm Kernel (t)
0	Plantation	Start
1		
2		
3	0.68	0.06
4	2.07	0.22
5	3.47	0.41
6	4.56	0.51
7	5.18	0.68
8	5.42	0.82
9	5.52	0.84
10	5.50	0.84
11	5.49	0.83
12	5.42	0.82
13	5.31	0.81
14	5.21	0.79
15	5.07	0.77

Source: PTP Plantation Plan

Table 5.2.3 Production Plan for Palm Oil/Kernel (PIR in PTP V)

Year	Area (ha)		Production		Palm Oil (t)	Palm Kernel (%)	Palm Kernel (t)
	Planted Area	Production Area	Palm Fruit (t)	Palm Oil (%)			
1981	–	–	–	–	–	–	–
1982	1,000	–	–	–	–	–	–
1983	2,000	–	–	–	–	–	–
1984	2,000	–	–	–	–	–	–
1985	–	1,000	5,000	10	500	2	100
1986	–	3,000	20,000	14	2,800	2	400
1987	–	5,000	45,000	17	7,650	2.5	1,125
1988	–	5,000	68,000	18	12,240	2.5	1,700
1989	–	5,000	87,000	19	16,530	3	2,610
1990	–	5,000	101,000	20	20,200	3.5	3,535
1991	–	5,000	113,000	20	22,600	3.5	3,955
1992	–	5,000	121,000	20	24,200	3.5	4,235
1993	–	5,000	125,000	20	25,000	3.5	4,375
1994	–	5,000	125,000	20	25,000	3.5	4,375
1995	–	5,000	125,000	21	26,250	3.5	4,375
1996	–	5,000	122,000	21	25,620	3.5	4,270
1997	–	5,000	117,000	21	24,570	3.5	4,095
1998	–	5,000	113,000	21	23,730	3.5	3,955
1999	–	5,000	115,000	21	24,150	3.5	4,025
2000	–	5,000	114,000	21	23,940	3.5	3,990

Source: Plantation Plan of PTP V

Table 5.2.4 Forecast of CPO/RBD and Palm Kernel Handled in Dumai Port

Years	CPO (tons)						RBD (tons)		Grand Total	Palm Kernel Total
	PTP II Tandun	PTP III Aek Nabara Small Holders	PTP IV Torgamba Tg. Medan	PTP V Ujung Batu	PTP VI Tandun	Total CPO	PTP III	Total RBD		
1983	800	40,387	15,455	1,400	–	58,042	–	–	58,042	8,010
1984	2,800	59,141	31,063	5,590	–	68,594	–	–	68,594	9,535
1985	8,550	50,824	52,428	14,500	600	126,902	30,000	30,000	156,902	21,966
1986	24,360	46,093	77,121	28,920	2,320	178,814	60,000	60,000	238,814	34,150
1987	48,240	75,671	102,186	47,340	5,340	278,777	60,000	60,000	338,777	49,461
1988	81,864	111,336	127,677	63,705	9,720	394,302	60,000	60,000	454,302	67,237
1989	118,902	164,815	152,090	75,195	15,740	526,742	60,000	60,000	586,742	88,598
1990	152,893	195,986	180,273	83,640	22,750	635,542	60,000	60,000	695,542	107,113
1991	197,200	210,140	203,595	88,080	30,850	729,865	60,000	60,000	789,865	124,009
1992	226,620	214,064	217,014	89,635	39,450	786,683	60,000	60,000	846,683	134,626
1993	248,360	213,384	223,082	89,265	40,000	814,091	60,000	60,000	874,091	141,603
1994	261,640	211,151	221,291	87,164	50,000	831,246	60,000	60,000	891,246	147,056
1995	270,080	208,168	224,319	85,260	58,400	846,227	60,000	60,000	906,227	151,340

Source: Estimates from PTP January 1982

Table 5.2.5 World-Wide Palm Oil Production (000 t)

Country or area	1970	1973	1974	1975	1976	1977	1978	1979	1980
WORLD	1972	3691	2959	3218	3476	3821	4049	4550	5080
AFRICA	1128	1172	1236	1315	1294	1302	1316	1284	1365
Angola	38	40	40	40	40	42	40	40	40
Benin	32	16	26	39	20	25	27	28	28
Burundi	1	1	1	1	1	1	1	1	1
Central African Republic	2	2	2	2	2	2	2	2	2
Congo	8	8	8	7	7	7	7	7	7
Equatorial Guinea	4	4	4	4	5	5	5	5	5
Gabon	2	2	2	2	2	1	1	1	1
Gambia	2	2	3	3	3	3	3	3	3
Ghana	20	20	23	24	18	20	21	21	21
Guinea	44	40	37	40	35	38	41	40	42
Guinea-Bissau	4	5	5	5	5	5	5	5	5
Ivory Coast	50	99	146	153	151	148	146	132	170
Liberia	14	18	19	23	24	25	25	26	27
Madagascar	...	0	1	3	1	2	2	2	2
Nigeria	540	590	600	640	655	660	670	650	675
Soa Tome and Principe	1	1	1	0	1	1	1	1	1
Senegal	5	4	5	5	6	6	6	6	6
Sierra Leone	48	38	39	43	45	41	45	45	48
Togo	17	17	17	18	18	18	18	19	20
United Republic of Cameroon	65	69	72	80	80	77	78	78	79
United Republic of Tanzania	2	2	2	2	2	3	3	3	3
Zaire	232	194	184	181	175	173	171	170	180
NORTH AMERICA	32	44	41	41	41	41	42	44	45
Costa Rica	13	22	22	22	23	23	23	23	23
Honduras	6	9	8	9	9	10	10	11	12
Mexico	13	11	9	8	7	6	6	7	7
Nicaragua	...	2	2	2	2	2	3	3	3
SOUTH AMERICA	42	67	75	65	70	92	97	122	133
Brazil	5	6	7	7	9	12	15	16	16
Colombia	27	44	51	39	39	48	49	62	70
Ecuador	4	13	11	14	15	22	22	29	33
Paraguay	7	4	6	4	5	5	4	5	5
Peru	...	...	...	...	0	3	4	5	6
Surinam	...	...	0	1	1	2	3	5	3
ASIA	770	1268	1552	1747	1990	2299	2498	3000	3437
China	115	152	156	156	160	168	176	184	190
Indonesia	222	295	357	417	434	497	525	606	650
Malaysia	431	812	1031	1161	1380	1614	1778	2189	2575
Philippines	2	8	8	11	12	12	11	12	12
Thailand	...	1	1	3	4	8	9	9	10
OCEANIA	...	40	45	50	82	87	96	100	101
Papua New Guinea	...	40	44	49	77	80	85	84	84
Solomon Islands	...	0	1	1	5	7	11	16	17

Source: Food and Agriculture Organization of the United Nations.

Table 5.2.6 World-Wide Palm Kernel Production (000 ton)

Country or Area	1970	1973	1974	1975	1976	1977	1978	1979	1980
WORLD	1198	1193	1373	1398	1427	1507	1459	1703	1813
AFRICA	745	637	744	730	705	700	610	710	725
Angola	17	12	12	12	12	13	12	12	12
Benin	61	82	82	83	94	84	66	70	70
Burundi	1	2	2	2	2	2	2	2	2
Central African Republic	1	2	2	2	1	1	1	1	1
Congo	2	1	1	1	1	1	1	1	1
Equatorial Guinea	2	2	2	2	2	2	3	3	3
Gabon	0	0	0	0	0	0	0	0	0
Gambia	2	2	1	1	2	0	2	1	1
Ghana	37	32	33	34	32	30	30	30	30
Guinea	35	35	35	35	35	35	35	35	35
Guinea-Bissau	7	5	9	7	8	10	12	10	10
Ivory Coast	21	24	39	36	36	32	31	26	30
Liberia	13	12	18	14	12	10	9	8	7
Madagascar	...	0	0	1	0	0	0	1	1
Nigeria	299	231	310	300	295	302	239	335	345
Soo Tome and Principe	2	2	2	1	1	2	2	2	2
Senegal	17	6	9	5	5	5	5	5	5
Sierra Leone	67	47	49	54	39	36	30	33	30
Togo	23	14	15	14	14	11	7	12	12
United Republic Caseroon	40	40	41	45	45	44	45	45	46
United Republic of Tanzania	1	6	6	7	7	8	8	9	10
Zaire	96	81	76	75	73	72	71	70	74
NORTH AMERICA	20	22	23	21	25	25	18	19	20
Costa Rica	3	7	7	8	8	8	9	9	10
Honduras	2	3	3	3	3	3	1	1	1
Mexico	14	13	14	10	15	14	8	9	10
SOUTH AMERICA	263	255	266	258	278	296	302	321	330
Brazil	235	229	237	230	243	253	260	262	266
Colombia	7	9	9	10	10	11	13	15	17
Ecuador	5	5	3	4	6	4	5	4	8
Paraguey	16	12	17	12	12	17	10	16	16
Surinam	1	1	1	3	7	10	15	25	24
ASIA	171	272	331	380	406	471	513	636	720
China	28	38	39	39	41	40	42	44	46
Indonesia	50	65	75	85	82	92	99	113	120
Malaysia	92	167	215	254	280	335	368	475	550
Philippines	1	1	1	2	2	2	2	2	2
Thailand	...	0	0	1	1	2	2	2	2
OCEANIA	...	7	8	9	13	15	15	17	17
Papua New Guinea	...	7	7	8	13	13	13	13	13
Solomon Islands	...	0	0	0	0	1	2	3	3

Source: Food and Agriculture Organization of the United Nations.

Table 5.2.7 Production and Export of Palm Oil (000 t)

Palm Oil/Kernal Production

Commodity	Year				
	1976	1977	1978	1979	1980
Palm Oil Production	433.9	497.4	525.0	559.9	691.0
Palm Kernel Production	82.1	92.3	99.4	113.4	121.1

Export of Palm Oil

Country of Destination	1976	1977	1978	1979	1980
Japan	31.8	11.5	8.3	5.0	9.5
India	13.1	40.7	39.9	12.9	38.8
Pakistan	76.8	71.6	21.9	26.1	6.1
Iraq	24.7	73.3	101.3	34.3	44.8
Turkey	10.5	–	–	–	–
Kenya	36.3	24.8	37.7	28.1	63.4
U.S.A.	29.2	41.4	15.6	16.7	7.6
Canada	28.0	15.4	22.2	14.0	6.6
United Kingdom	13.7	13.8	17.6	46.0	78.4
Netherlands	71.9	66.0	76.5	97.4	148.7
Germany, Fed. Rep. of	43.4	29.3	36.7	29.5	45.0
Belgium & Luxembourg	0.2	–	–	–	–
Sweden	0.8	–	–	–	–
Italy	9.7	5.0	8.1	15.8	22.6
Others	15.5	11.8	26.4	25.5	31.4
Total	405.6	404.6	412.2	351.3	502.9
Export/Production (%)	93.5	81.3	78.5	62.7	72.8
		F.O.B. value: US $1,000,000			
Japan	10.4	5.6	4.5	3.0	4.7
India	4.2	20.2	19.5	7.8	20.0
Pakistan	25.3	31.9	11.2	15.2	3.5
Iraq	9.0	35.1	53.7	20.3	22.9
Turkey	3.7	–	–	–	–
Kenya	13.2	11.1	17.9	15.7	33.2
U.S.A.	9.7	19.3	8.1	9.8	4.0
Canada	9.1	7.1	11.3	8.3	3.5
United Kingdom	4.5	5.8	9.3	27.1	40.0
Netherlands	23.5	28.5	38.1	57.7	73.4
Germany, Fed. Rep. of	13.9	12.3	17.5	16.7	22.1
Belgium & Luxembourg	0.0	–	–	–	–
Sweden	0.3	–	–	–	–
Italy	3.4	2.2	4.1	9.5	11.8
Others	5.3	4.5	13.6	13.3	15.6
Total	135.5	183.6	208.8	204.4	254.7

Source: Central Statistic Bureau

Table 5.2.8 Food Balance of Palm Oil and Coconut Oil (000 t)

Commodity		Production	Import	Supply	Export	Domestic Consumption	Per Capita Consumption (kg)
Coconut Oil	1977	612	11	623	–	623	4.56
	78	471	92	563	–	550	3.93
	79	...	..	...	...	...	...
Palm Oil	1977	497	–	497	405	93	0.68
	78	525	–	525	412	113	0.81
	79	...	...	...	...	...	...

Table 5.2.9 Palm Oil/Kernel Production and Export in North Sumatra (t)

Production	1979		1980	
	Palm Oil	Palm Kernel	Palm Oil	Palm Kernel
PTP & PNP	423,592	82,708	459,769	86,013
Foreign Private Estate	160,396	29,499	172,048	29,891
National Private Estate	8,036	1,261	13,557	3,035
Total	592,024	113,468	645,374	118,939

Export	1979		1980	
	Palm Oil	Palm Kernel	Palm Oil	Palm Kernel
	457,255	72,671	422,802	70,636
Export/Production (%)	77.2	64.0	65.5	59.4

Table 5.2.10 Oil Palm Plantation Area, Realization & Plan (ha)

PNP/PTP	Condition	Realization				Plan						
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
I	Mature	5,423	7,294	8,752	8,065	8,590	9,470	10,725	11,925	14,195	18,195	18,195
	Immature	3,580	2,007	1,726	2,739	3,335	4,725	7,470	6,270	4,000	-	-
	Total	9,003	9,301	10,478	10,804	11,925	14,195	18,195	18,195	18,195	18,195	18,195
II	Mature	20,970	21,629	27,316	24,416	24,132	35,597	38,258	10,754	42,653	48,001	53,565
	Immature	6,489	8,497	8,275	16,247	14,111	9,357	9,942	13,651	15,168	11,657	7,983
	Total	27,459	30,126	35,591	40,713	42,243	44,954	48,200	54,405	57,821	59,659	61,548
III	Mature	2,171	2,268	2,829	4,830	7,018	11,185	14,256	15,256	18,560	19,560	19,560
	Immature	3,227	6,745	7,163	9,374	8,356	5,874	5,304	4,304	1,000	-	-
	Total	5,398	9,013	9,992	14,204	15,374	17,059	19,560	19,560	19,560	19,560	19,560
IV	Mature	-	-	-	-	4,164	8,667	13,948	20,813	24,063	29,988	37,210
	Immature	1,688	4,164	8,667	13,948	17,149	14,646	15,290	16,397	19,147	20,722	22,250
	Total	1,688	4,164	8,667	13,948	21,313	23,313	29,238	37,210	43,210	50,710	59,460
V	Mature	6,131	7,892	8,506	10,417	12,480	15,752	18,144	20,646	22,938	25,285	26,558
	Immature	5,435	6,151	7,165	8,333	9,463	8,524	7,232	6,142	3,850	1,502	229
	Total	11,566	14,043	15,671	18,750	21,949	24,276	25,376	26,788	26,788	26,787	26,787
VI	Mature	38,426	41,986	41,904	41,752	44,103	44,142	46,406	46,473	49,579	46,956	51,284
	Immature	5,605	5,189	5,492	6,347	6,971	7,932	9,468	12,401	13,295	16,918	15,090
	Total	44,031	47,175	47,396	48,099	51,074	52,074	55,874	58,874	62,874	63,874	66,374
VII	Mature	40,505	41,831	43,411	47,597	50,000	52,768	54,225	61,828	68,281	72,743	76,470
	Immature	10,276	11,051	12,843	11,315	16,293	21,525	24,068	19,615	13,662	9,200	5,473
	Total	50,781	52,882	56,254	59,112	66,293	74,293	78,293	81,443	81,943	81,943	81,943
VIII	Mature	-	-	-	-	-	2,537	4,767	6,000	6,000	6,000	6,000
	Immature	-	173	2,537	4,767	5,852	3,463	1,233	-	-	-	-
	Total	-	173	2,537	4,767	5,852	6,000	6,000	6,000	6,000	6,000	6,000
IX	Mature	4,250	5,500	6,100	6,982	7,896	8,946	8,946	8,946	8,946	8,946	8,946
	Immature	2,572	1,482	1,796	1,964	1,050	-	-	-	-	-	-
	Total	6,822	6,982	7,896	8,946	8,946	8,946	8,946	8,946	8,946	8,946	8,946

Source: PTP Plantation Plan

Table 5.2.10 Oil Palm Plantation Area, Realization and Plan (ha) (cont'd)

PNP/PTP	Condition	Realization				Plan						
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
X	Mature	4,190	5,244	6,502	8,233	10,221	11,976	11,976	13,565	14,240	17,606	20,665
	Immature	5,904	6,852	5,630	4,362	4,199	5,630	8,689	9,206	9,531	6,165	3,174
	Total	10,094	12,096	12,132	12,595	14,420	17,606	20,665	22,771	23,771	23,771	23,839
XI	Mature	-	-	-	-	-	-	-	400	1,400	2,400	3,400
	Immature	-	-	-	400	1,400	2,400	3,400	3,600	2,600	1,600	600
	Total	-	-	-	400	1,400	2,400	3,400	4,000	4,000	4,000	4,000
XIX	Mature	-	-	-	-	-	-	1,150	1,150	3,000	4,500	6,000
	Immature	-	-	-	1,150	1,150	3,000	3,350	4,850	3,000	1,500	-
	Total	-	-	-	1,150	1,150	3,000	4,500	6,000	6,000	6,000	6,000
XXIII	Mature	-	-	-	-	-	-	-	-	-	500	1,250
	Immature	-	-	-	-	-	500	1,250	2,250	3,250	3,500	2,750
	Total	-	-	-	-	-	500	1,250	2,250	3,250	4,000	4,000
XXVIII	Mature	-	-	-	-	-	-	-	100	1,600	4,000	6,000
	Immature				-	100	1,600	4,000	5,900	4,400	2,000	-
	Total	-	-	-	-	100	1,600	4,000	6,000	6,000	6,000	6,000
	TOTAL											
	Mature	122,066	133,644	145,320	152,300	172,610	199,040	222,801	247,856	275,455	304,680	335,103
	Immature	44,776	53,311	51,294	81,188	89,429	89,176	100,696	104,506	92,903	74,264	57,549
	Grand Total	166,842	185,955	206,614	233,488	262,039	288,216	323,497	352,442	368,358	378,945	392,652

Source: PTP Plantation Plan

Table 5.2.11 Palm Oil/Kernel Production, Realization & Plan (t)

PNP/PTP	Realization				Plan						
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
I	3,733	9,159	19,761	27,252	37,733	47,785	52,099	57,133	63,903	73,871	84,993
II	59,448	87,366	98,866	105,767	124,578	119,499	136,089	158,241	185,289	219,925	263,496
III	6,468	10,107	13,027	16,241	24,102	30,420	44,125	56,742	73,385	85,568	94,579
IV	-	-	-	33	4,927	16,606	33,676	57,895	84,028	109,599	135,979
V	16,474	16,899	32,742	39,449	46,687	55,853	67,622	83,117	102,574	125,227	142,395
VI	153,748	167,469	175,806	179,845	187,709	198,615	203,754	206,343	209,103	215,890	420,098
VII	180,673	194,045	197,705	207,107	215,077	248,536	265,732	287,279	321,762	371,002	227,263
VIII	-	-	-	-	-	2,587	8,819	17,283	25,047	31,496	35,447
IX	13,289	19,067	21,828	26,794	36,595	37,119	41,493	44,381	38,165	52,228	54,290
X	5,237	9,912	23,096	26,062	34,848	39,971	46,871	53,958	58,780	64,840	71,252
XI	-	-	-	-	-	-	-	231	1,262	3,608	7,351
XIX	-	-	-	-	-	776	4,452	12,364	24,524	39,631	56,698
XXIII	-	-	-	-	-	-	-	-	-	518	1,781
XXVIII	-	-	-	-	-	-	-	-	1,296	6,814	16,087
Total	439,070	513,964	582,831	628,550	712,256	797,767	904,732	1,034,967	1,199,118	1,400,277	1,611,709

Source: PTP Plantation Plan

Table 5.2.12 Forecast for Palm Oil and Palm Kernel (000 t)

	Palm Oil			Palm Kernel		
	Export	Local-out	Total	Export	Local-out	Total
1985	110	47	157	13	9	22
6	167	72	239	20	14	34
7	237	102	339	29	20	49
8	318	136	454	40	27	67
9	411	176	587	53	36	89
90	487	209	696	64	43	107
1	553	237	790	74	50	124
2	615	263	878	84	56	140
3	684	293	977	95	63	158
4	760	326	1,086	107	72	179
5	846	362	1,208	121	81	202
6	940	403	1,343	134	90	224
7	1,045	448	1,493	149	100	249
8	1,163	498	1,661	166	111	277
9	1,293	554	1,847	185	123	308
2000	1,438	616	2,054	206	137	343

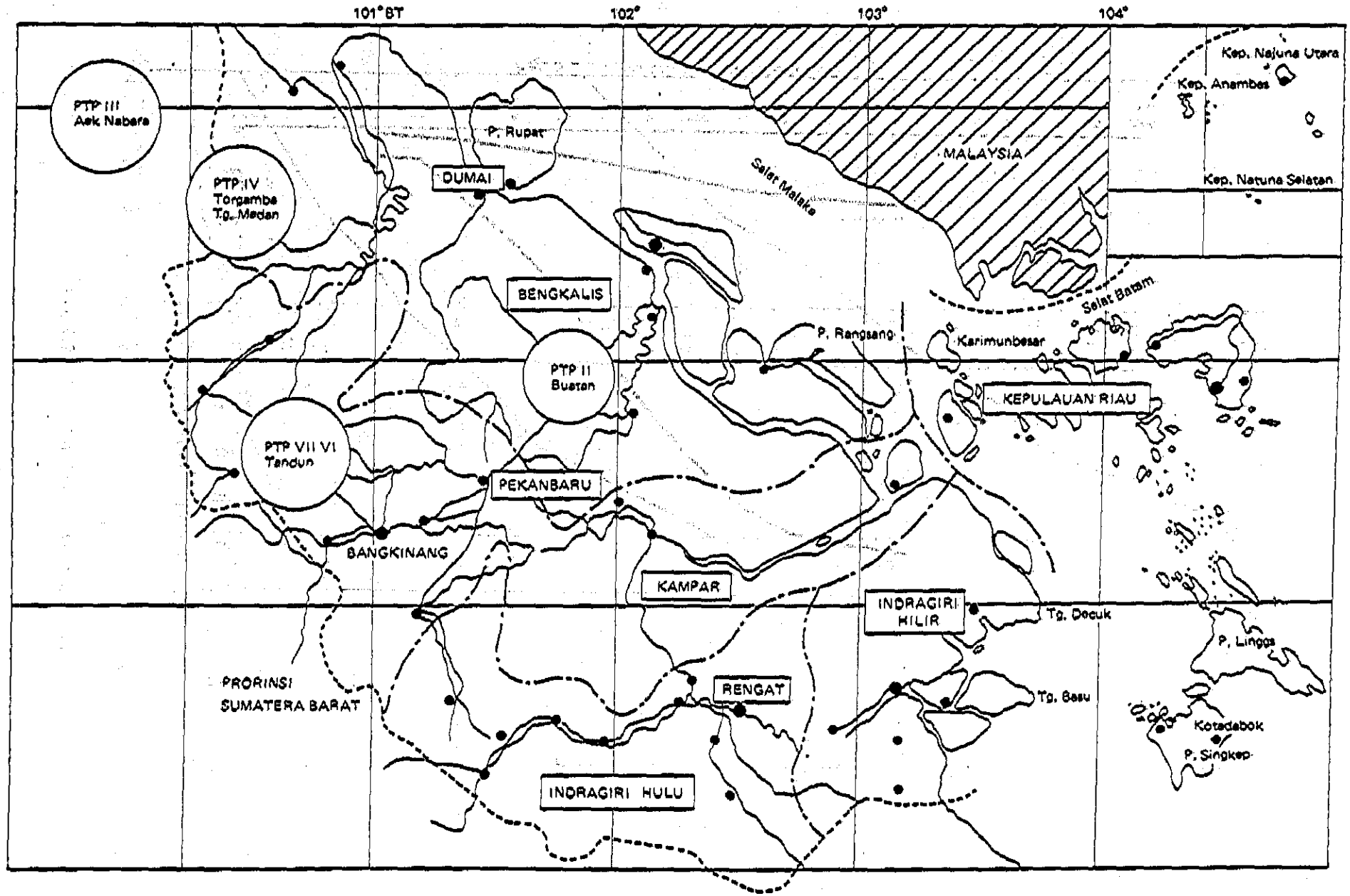


Fig. 5.2.1 Oil Palm Plantation Locations

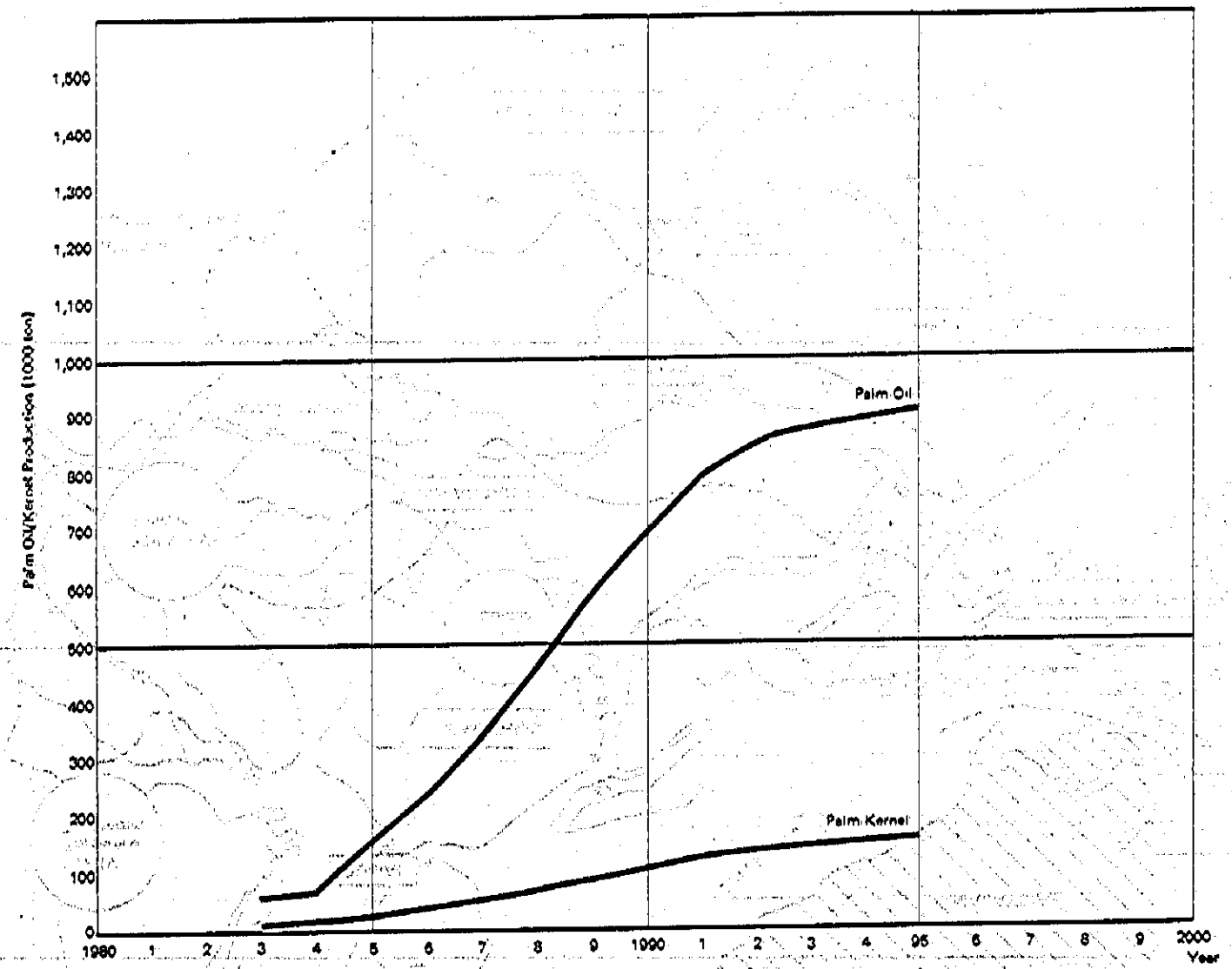


Fig. 5-2-2 Palm Oil/Kernel Production

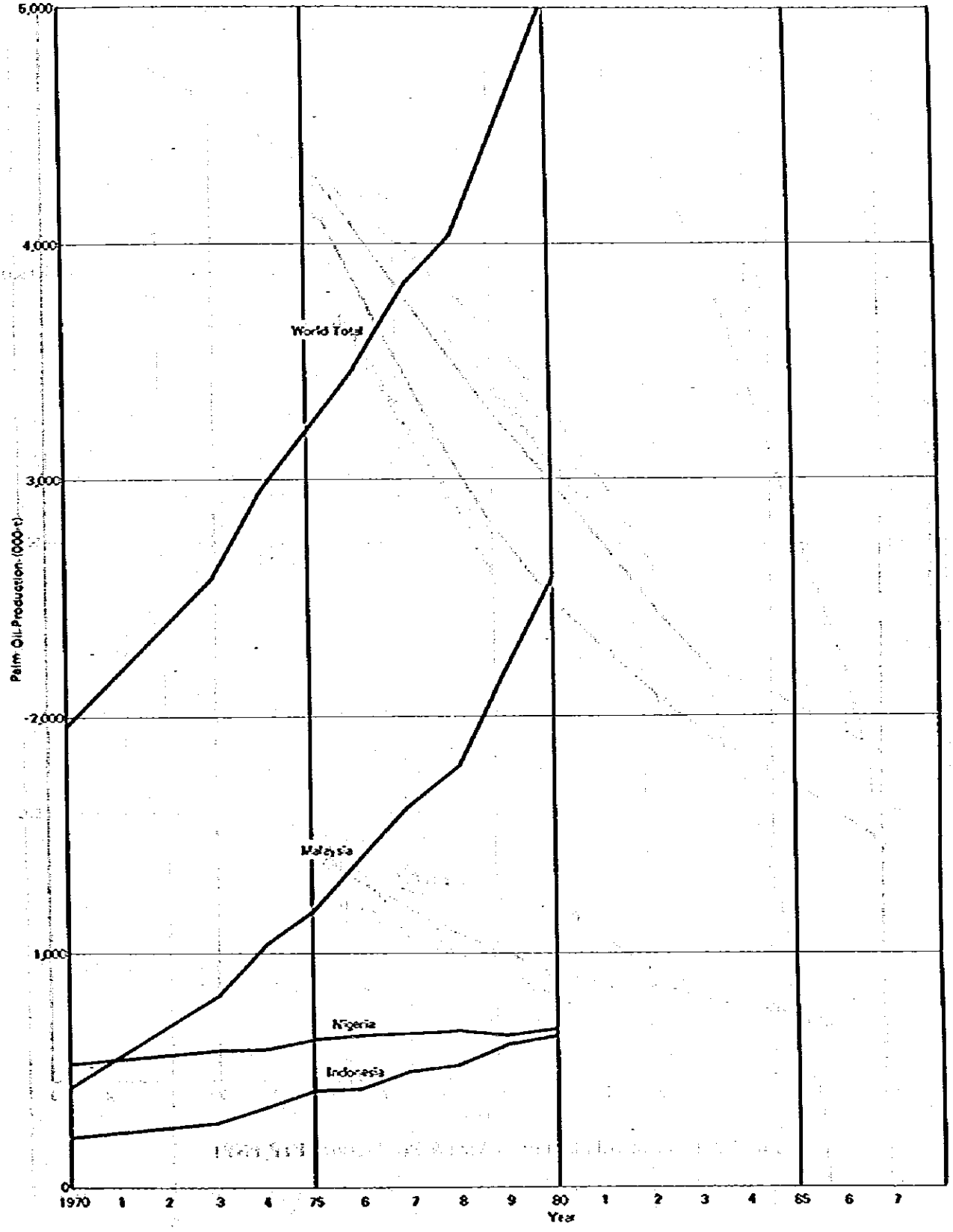


Fig. 5.2.3 World-Wide Palm Oil Production

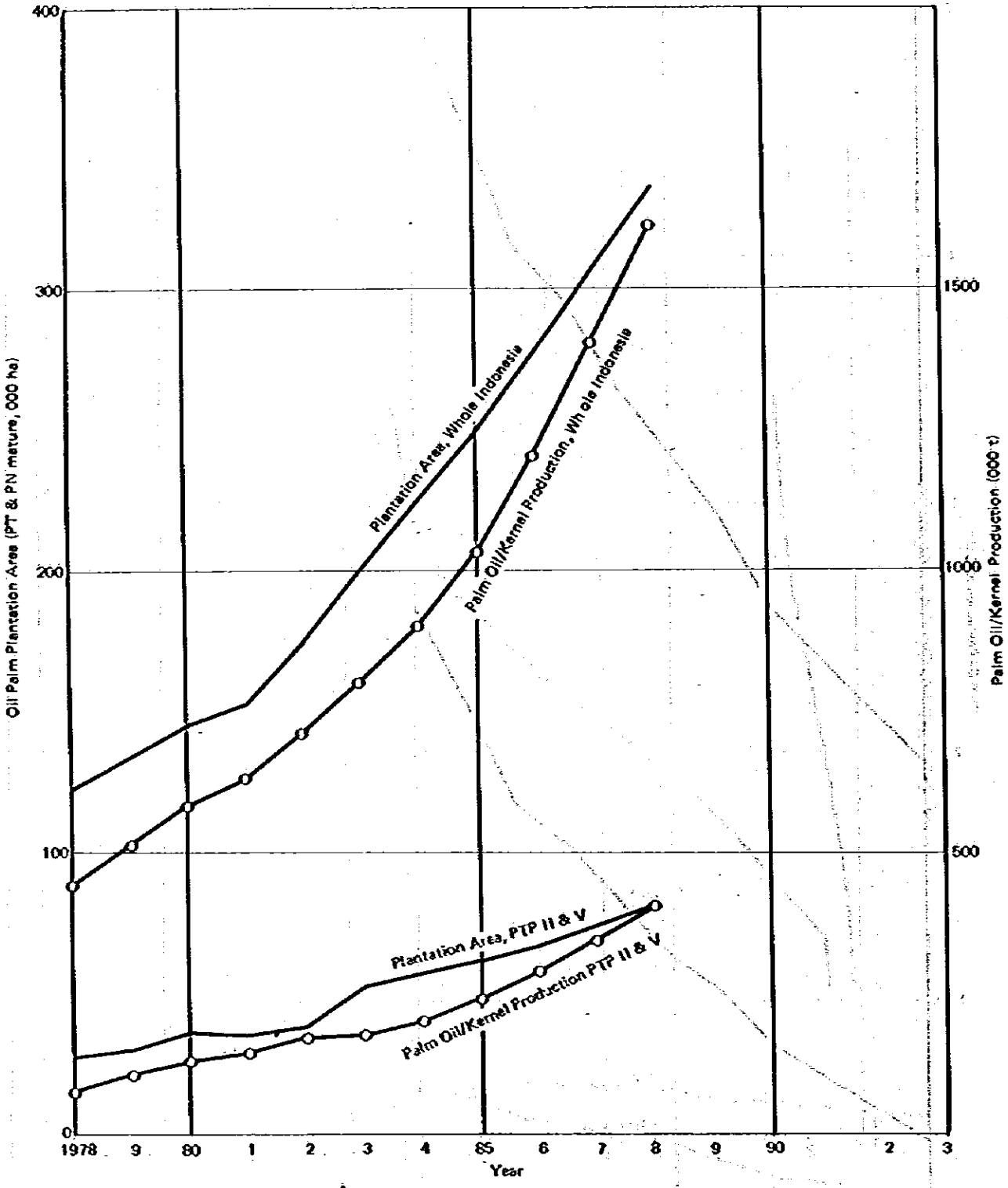


Fig. 5.2.4 Palm Oil Plantation Area & Production (PTP/PNP)

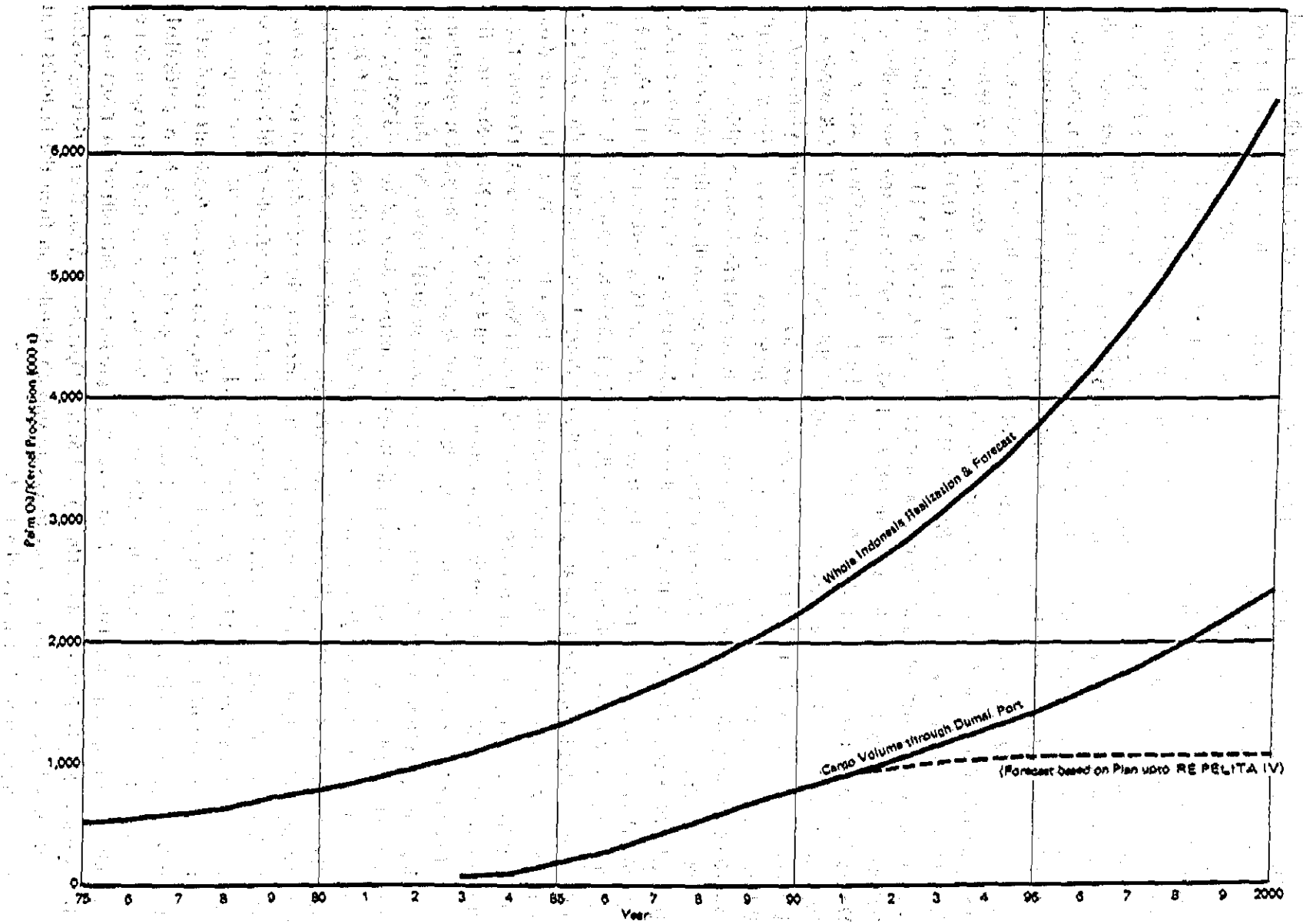


Fig. 5.2.5 Palm Oil/Kernel Production, Realization & Forecast

5.2.2. Fertilizer

Oil palm plantations require large amounts of fertilizer. Plans call for all of the Riau and North Sumatra plantations mentioned in the previous section to obtain necessary fertilizer through Dumai Port. Such a system is quite rational in terms of increasing the efficiency of land transportation; the out-going palm kernel cargo will be counter balanced by incoming fertilizer from the port. Furthermore, it is very likely that fertilizer required for other agricultural activities, such as for production of rice, vegetables, and other foodstuffs, will be transported together with the above mentioned fertilizer, thereby increasing the scale and economic efficiency of the sea and land transportation. This additional demand for fertilizer has been taken into consideration in the cargo forecast. Standard fertilizer requirements for oil palm plantations are shown in Table 5.2.13. As shown about 0.3t/ha of fertilizer is required in the first year about 0.5 – 0.8 t/ha during the following two years and about 0.6 t/ha from the fourth year on. The fertilizer is composed of 23% urea, 23% RP, 35% MOP, 17% Mg and 1% B. Of these components, urea is domestically available, and the others must be imported. Table 5.2.14 shows volumes of fertilizer which were consumed in PTP V in 1980 ~ 1981, all of which was transported through Dumai Port. As for the transportation of fertilizer used for the other agricultural activities, it is assumed that Dumai Port will serve the entire Bengkalis District, and a half of Kampar and Labuhanbatu Districts. In making this prediction the existence of neighboring ports such as Pekanbura, Rengat, Tanjung Balai, etc. has been taken into account. Areas in Riau and North Sumatra Provinces where other agricultural products are harvested are shown in Tables 5.2.15 ~ 5.2.18 and Table 5.2.19 ~ 5.2.22. An outstanding feature of agricultural land utilization in Bangkalis and Kampar Provinces is the fact that the overwhelming majority of the land is occupied by only three items – which take up 93% (rice 25%, rubber 45%, coconut 23%) of the total agricultural area of Benkalis District and 85% (30%, 43%, 12%) in Kampar District. Similarly, in Labuhanbatu District in North Sumatra, 45% of all agricultural land is used for paddies and 22% for rubber. According to the above stated assumption, in 1990 Dumai Port will serve about 103,000 ha of rubber plantation area in Riau and 40,000 ha in North Sumatra. At the same time, it will serve about 169,000 ha of other agriculture in Riau and 41,000 ha in North Sumatra. The annual rate of increase for these areas has been determined according to the present agricultural development plan (see Table 5.2.42) as well as past trends of increase. Standard fertilizer requirements per hectare for these other agricultural products is assumed to be 300 kg, and assumed to have the same composition as shown in Table 5.2.25 in the fertilizer demand forecast for all of Indonesia. For rubber plantations, fertilizer requirements are shown in Table 5.2.23. By multiplying the production areas by unit fertilizer requirements, the total demand for fertilizer can be forecast as shown in Table 5.2.24. The question of whether this fertilizer can be produced domestically or whether it must be imported is discussed below.

The government of Indonesia has made intensive efforts to increase foodstuff production through five-year development programs. Increased rice production has been particularly emphasized. To achieve these goals, the following policies have been carried out; expansion of agricultural areas, implementation of massive crop production intensification programs – Bimas/Inmas, Special Intensification (Insus) and Special Operations. Also, the marketing system for fertilizers has been improved so as to ensure smooth distribution from the factories that produce the fertilizer to the farmers who use it.

To meet the increasing demand for fertilizers, the government has constructed several fertilizer factories. The first factory was PT. PUSRI I, constructed in 1963 in Palembang with an annual production capacity of 100,000 tons of urea. In 1972 PT. PETROKIMIA GRESIK was established in East Java with an annual production capacity of 45,000 tons of urea and 150,000 tons of ammonium sulphate. In 1979 this factory was expanded to have an annual production capacity of TSP 330,000 tons, DAP 80,000 tons and NPK 50,000 tons. In 1974, a third factory, PT. PUSRI II, came into operation in Palembang with an annual capacity of 380,000 tons of urea. In 1977, 1978 PT. PUSRI III and PT. PUSRI IV started production, with an annual capacity of 570,000 tons of urea. The next factory PT. PUPUK KUJANG in Cikampek, West Java started producing 570,000 tons of urea in 1978. PT. KALTIM in Bontang, East Kalimantan is scheduled to come into operation in 1982 with a capacity of 570,000 tons of urea. In Aceh the ASEAN fertilizer factory is scheduled to produce 570,000 tons of urea in 1983. To supply TSP fertilizer, PT. PETROKIMIA GRESIK will be expanded and is expected to produce a total of 975,000 tons annually.

Fertilizer production at the abovementioned factories has contributed substantially to increased foodstuff production. However, total production capacity is not and will not be enough to keep pace with increasing domestic requirements. The resulting shortage must be met by imports. Fertilizer requirements have been projected based on the area engaged in foodstuff production, the volume of fertilizer required per hectare, fertilizer consumption in previous years, etc. The demand/supply situation in regards to fertilizer for all of Indonesia is shown in Table 5.2.25 and Fig. 5.2.6. As shown, the type of fertilizer required in the largest quantities in urea, which accounts for 65% of all the fertilizer used followed by TSP at 21%, ZA at 7% MOP/KCL at 5% and rock phosphate at 2%. The annual growth rates for the 1) required, and 2) produced quantities of fertilizer between 1981 and 1987 are forecast respectively as follows: 11.7% and 13.2% for urea; 10.6% and 19.4% for TSP; and 6.7% and 17.8% for ZA. Although required amounts of rock phosphate are forecast to increase at an annual rate of 12.2% production is not sheduled until after 1984. For MOP/KCL, required amounts are estimated to increase at a rate of 11.9%, but there are as yet no plans for domestic production.

Required fertilizer at oil palm/rubber plantaitons and other agricultural activities includes large amounts of N, RP, MOP and Mg. N can be domestiecally obtained within Indonesia, but the other fertilizers must be imported. In 1990, required amounts of fertilizer are forecast at 96,000 t of N, 56,000 t of RP and 68,000 t of MOP. In the year 2000, they are forecast at 145,000 t of N, 91,000 t of RP and 118,000 t of MOP. During the 1990's. as the volume of required fertilizer will still be relatively small, both imported and domestically produced fertilizers will be transported in bags to Dumai Port via an interinsular shipping route. However from the year 2000 onwards, transportation in bulk may be preferable.

Table 5.2.13 Standard Fertilizer Requirement (kg/ha)

Oil Palm

Year / Fertilizer	1	2	3	4	%
Urea	90	131	193	143	23.4
RP	126	181	265	143	23.4
MOP	61	103	226	215	35.1
Mg	32	41	121	107	17.4
Borate	4.4	4.4	4.4	4.4	0.7
Total	313.4	460.4	809.4	612.4	100.0

Source: PTP Plantation Plan

Table 5.2.14 Fertilizers Consumed in PTP V (kg)

Year / Fertilizer	1980	1981	Total
Urea	179,190	141,168	320,358
RP	714,678	756,575	1,471,253
MOP	222,946	236,016	458,962
Mg	222,946	161,020	383,966
Borate	14,585	15,440	30,025
Total	1,176,155	1,169,119	2,345,274

Source: PTP V Statistics

Table 5.2.15 Harvested Area of Food Stuffs by Crop Item and Regency/Municipality, 1981 (ha)

Crops Item	Pekanbaru	Kampar	Indr. Hulu	Indr. Hilir	Bengkalis	Kep. Riau	Total
Wet Paddy	5.00	19,362.00	8,857.00	35,631.00	22,433.50	377.00	86,355.50
Dry Paddy Field	255.00	27,312.00	11,772.00	1,958.00	10,764.00	-	52,061.00
Maize	9.00	3,264.00	828.00	8,501.00	638.50	154.00	13,394.50
Cassava	62.00	1,492.00	736.00	3,280.00	2,777.00	522.00	8,869.00
Black Radish	4.00	116.00	-	287.00	170.00	108.00	685.00
Sweet Potatoes	18.00	391.00	244.00	474.00	455.00	171.00	1,753.00
Peanuts	1.00	1,192.00	435.00	28.00	113.50	64.00	2,433.50
Soya Bean	-	456.00	217.00	143.00	31.50	40.00	917.50
Small Green Pea	-	859.00	173.00	45.00	24.50	36.00	1,118.50
Total	354.00	55,084.00	23,262.00	50,378.00	37,107.50	1,472.00	167,653.50

Source: Agriculture Service, Riau Province.

Table 5.2.16 Harvested Area of Vegetables in Riau Province by Crop Item, 1981 (ha)

Crops	Pekanbaru	Kampar	Ind. Hulu	Ind. Hilir	Bengkalis	Kep. Riau	Total
Chilly	1.00	1,273	236	108	287.50	26	1,931.50
Cucumber	-	613	-	90	394	-	897.00
Vegetables Bean	1.00	966	164	117	512	19	1,779.00
Eight sede	2.00	716	125	53	269.50	17	1,184.50
Spinach	12.00	659	193	165	278.50	36	1,149.50
Water Cress	20.00	527	73	133	286.50	51	1,090.50
Luffa Cylindrica Roém	-	341	15	61	-	33	450.00
Brassica Sogosa	-	-	-	-	41.50	-	41.50
Gourd	-	361	-	38	89.50	11	499.50
Cucumber Like	-	229	-	4	-	-	233.00
Sauropus Androginus Méér	-	44.85	-	11	-	-	55.85
Total	36.00	5,329.85	812	782	2,159.00	193	9,311.85

Source: Agriculture Service, Riau Province.

Table 5.2.17 Harvested Area of Fruits in Riau Province by Crop Item and Regency/Municipality, 1981 (ha)

Crops	Pekanbaru	Kampar	Ind. Hylu	Ind. Hilir	Bengkalis	Kep. Riau	Total
Banana	106.72	1,567.40	1,125.00	1,169.75	979.03	115.00	5,462.90
Zibethinus	4.86	363.37	610.24	22.25	193.83	-	934.55
Lansium Domesticum	2.20	81.85	125.24	7.25	47.80	-	264.34
Orange	10.39	1,245.12	462.20	529.95	154.52	-	2,402.19
Rambotan	158.78	379.93	160.74	51.27	96.34	-	847.06
Mangusta	6.00	-	-	10.20	58.40	-	74.60
Papaya	34.89	85.48	25.60	117.00	51.84	64.00	370.73
Pine Apple	46.00	1,968.05	9.50	375.65	260.83	92.00	2,734.03
Sephilium mutabile	14.60	-	-	-	-	-	14.60
Guaves	65.33	52.05	10.10	36.97	-	-	164.45
Manggos	9.60	55.75	23.50	69.00	18.56	-	176.41
Total	459.37	6,158.92	2,352.12	2,371.30	1,851.15	271.00	13,513.86

Source: Agriculture Service, Riau Province.

Table 5.2.18 Planted Area of Small Holders in Riau Province by Regency/Municipality 1981 (ha)

Crops	Kampar	Bengkalis	Ind. Hulu	Ind. Hilir	Kep. Riau	Total
Rubber	67,171	58,565	82,150.4	3,562	50,120.2	261,568.6
Coconut	18,487	29,513	1,650.05	132,848	27,809.42	210,307.47
Clove	1,352.9	597	1,583.75	-	2,937.71	6,471.36
Sugar Cane	287	-	98	-	97.5	482.5
Cinnamom	-	-	-	-	-	-
Coffee	780.3	343.7	1,206.9	998.3	120.6	3,449.8
Pepper	24.5	-	-	-	28.5	53.0
Cashew	121	-	816	-	-	567
Gambir	-	-	40	-	2,134	2,174
Ceagger	-	-	-	-	-	-
Sere	-	-	-	-	-	-
Cocoa	-		164.2	5	-	169.2
Palm	23	-		-	-	23
Capok	119.5	-	-	47	-	166.5
Nutmeg	-	-	-	-	-	-
Arecanut	-	-	-	-	-	-
Tobacco	-	-	-	-	-	-

Source: Farm Agriculture Service, Riau Province.

Table 5.2.19 Harvested Area of Food Stuffs in North Sumatra, 1979 (ha)

	Wet/Dry Land Paddy	Maize	Cassava	Sweet Potato	Peanut	Soya Bean	Small Green Pea
Nias	36,774	6,321	10,590	12,990	193	-	10
Tap. Selatan	53,904	975	696	436	1,020	749	659
Tap. Tengah	10,548	160	656	290	34	-	-
Tap. Utara	62,942	1,129	4,662	5,075	3,033	198	-
Labuhan Batu	65,384	1,280	355	29	218	107	48
Asahan	62,910	1,436	870	258	423	748	335
Simalungun	56,505	9,974	4,050	1,189	2,609	121	322
Dairi	14,807	331	179	180	1,683	78	20
Karo	33,701	13,433	493	398	779	214	20
Deli Serdang	90,477	3,376	3,031	1,346	1,221	3,223	2,209
Langkat	65,198	2,374	1,764	785	1,054	5,697	793
Medan	6,359	351	312	223	333	361	421

Source: Agriculture Service, Province of North Sumatra

Table 5.2.20 Harvested Area of Vegetables in North Sumatra 1979 ~ 1980 (ha)

	Vegetables	1979	1980
01	Shallotes	3,256	3,059
02	Garlic	163	497
03	Leek	882	998
04	Potatoes	1,677	1,904
05	Cabbage	1,402	1,643
06	Sawi/Brasica Rugosa	1,429	2,088
07	Carrot	192	201
08	Radish	42	54
09	Kacang-kacangan dt Panen Panen sekalious	1,317	414
10	Kacang-kacangan dt Panen lebih dari satu kalf	1,368	5,913
11	Terong/Right Shads	2,117	2,634
12	Buncis/Bean	1,936	2,293
13	Ketimun/Cucumber	1,089	1,231
14	Lain-lain sayur-sayuran	2,975	2,778
15	Cabe/Chilli	6,629	9,106
16	Tomat/Tomatoes	1,653	2,052

Source: Agriculture Service, Province of North Sumatra.

Table 5.2.21 Harvested Area of Fruits in North Sumatra 1979 ~ 1980 (ha)

Year		1979	1980
01	Adpokat	1,186	1,040
02	Mangga	134	306
03	Rambutan	426	824
04	Duku/Langsat	1,098	1,380
05	Jeruk Siam	186	541
06	Jeruk Keprok	1,550	6,442
07	Jeruk Besar	73	83
08	Jeruk lain-lain	315	893
09	Durian	1,956	1,618
10	Jambu Biji	98	160
11	Jambu Air	37	770
12	Jambu Bol	27	91
13	Sawo	238	200
14	Pepaya	3,527	1,505
15	Pisang	5,147	8,722
16	Nenas	6,587	6,075
17	Salak	2,636	2,716
18	Lain-lain buah-buahan	2,625	318

Source: Agriculture Service, Province of North Sumatra.
Note: 1980 Preliminary Figures.

Table 5.2.22(a) Planted Area of Small Holders in North Sumatra 1979 (ha)

No.	Daerah Tk.II Regency Municipality	Rubber Area (Ha)	Coconut Area (Ha)	Clove Area (Ha)	Tobacco Area (Ha)	Nutmeg Area (Ha)	Aromatic Oil Area (Ha)
1.	Deli Serdang	26,229	13,681	3,024	-	40	-
2.	Langkat	26,759	4,284	1,039	-	20	-
3.	Asahan	7,944	43,981	942	99	25	-
4.	Labuhan Batu	45,673	5,128	1,136	-	19	-
5.	Karo	-	360	1,080	120	8	-
6.	Dairi	383	248	550	39	-	174
7.	Simalungun	7,848	3,130	3,048	29	18	-
8.	Tapanuli Utara	10,338	387	358	20	-	-
9.	Tapanuli Tengah	20,884	4,789	1,264	-	19	125
10.	Tapanuli Selatan	85,003	6,336	3,955	197	12	91
11.	Nias	17,333	30,324	1,217	-	155	818
	Total	248,394	112,648	17,613	504	316	1,208

Source: Estate Service Province of North Sumatra.

Table 5.2.22(b) Planted Area of Small Holders in North Sumatra 1979 (ha)

No.	Regency	Coffee Area (Ha)	Sugar Cane Area (Ha)	Benzoin Area (Ha)	Pepper Area (Ha)	Cassia Vera Area (Ha)	Cocca Area (Ha)
1.	Deli Serdang	930	-	-	7	51	-
2.	Langkat	184	-	-	6	121	-
3.	Asahan	119	58	-	-	50	19
4.	Labuhan Batu	321	209	-	-	72	-
5.	Karo	356	90	-	-	263	2
6.	Dairi	12,177	8	640	5	80	-
7.	Simalungun	3,044	-	-	16	1,407	-
8.	Tapanuli Utara	5,922	95	17,182	-	-	-
9.	Tapanuli Tengah	244	35	-	-	-	-
10.	Tapanuli Selatan	5,350	-	56	20	2,738	-
11.	Nias	-	-	-	-	-	-
	Total	28,647	495	17,878	54	4,782	21

Source: Estate Service Province of North Sumatra.

Table 5.2.23 Standard Fertilizer Requirement for Rubber (kg)

Year / Fertilizer	Before Planting	1	2	3	4	5	6	%
Urea	–	75	96	118	124	129	154	33.3
RP	420	150	168	188	180	129	154	33.3
MOP	–	50	60	71	68	86	103	22.2
Mg	–	50	48	47	45	43	52	11.2
Total	420	325	372	424	417	387	463	100.0

Source: PTP Plantation Plan

Table 5.2.24 Fertilizer Demand Forecast ('000 t)

	Palm	Rubber	Other	Total
1985	81.8	61.2	54.1	197.1
6	92.0	61.9	55.7	209.6
7	102.2	62.6	57.4	222.2
8	115.8	63.3	59.2	238.2
9	129.4	64.0	61.0	254.4
90	143.0	64.7	62.9	270.6
1	156.6	65.4	64.9	286.9
2	170.2	66.1	66.9	303.2
3	183.8	66.8	69.0	319.6
4	197.4	67.6	71.2	336.2
5	211.0	68.3	73.5	352.8
6	224.6	69.0	75.9	369.5
7	238.2	69.8	78.4	386.4
8	251.8	70.6	80.9	403.3
9	265.4	71.3	83.6	420.3
2000	279.0	72.1	86.4	437.5

Table 5.2.25 Demand/Supply of Fertilizers (000 ton)

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Urea	Requirement	950	1,066	1,187	1,777	2,147	2,408	2,683	2,971	3,407	3,767	4,168
	Production	819	1,451	1,817	2,045	1,907	2,151	2,406	3,432	3,745	3,917	4,004
	Difference	-131	+385	+630	+268	-240	-257	-277	+461	+338	+150	-164
	Import	-	-	-	210	170						
TSP	Requirement	219	266	239	471	704	788	877	970	1,066	1,172	1,289
	Production	-	-	51	465	475	475	825	975	1,275	1,325	1,375
	Difference	-219	-266	-187	-6	-229	-313	-52	+5	+209	+153	+86
	Import	140	180	160	160	75						
ZA	Requirement	140	155	220	254	292	321	353	371	390	410	431
	Production	92	141	110	150	150	150	150	250	350	375	400
	Difference	-48	-14	-110	-104	-142	-171	-203	-121	-40	-35	-31
	Import	58	41	-	45	205						
Rock Phos.	Requirement	21	29	68	50	60	70	80	90	110	110	120
	Production	-	-	-	50	60	70	80	90	-	-	-
	Difference	-21	-29	-68	0	0	0	0	0	-110	-110	-120
	Import											
MOP/ KCL	Requirement	63	113	121	125	135	150	166	198	239	250	265
	Production	-	-	-	-	-	-	-	-	-	-	-
	Difference	-63	-113	-121	-125	-135	-150	-166	-198	-239	250	-265
	Import	70	110	129	151	160						
Total	Requirement	1,393	1,629	1,835	2,677	3,338	3,737	4,159	4,600	5,212	5,709	6,273
	Production	911	1,592	1,978	2,710	2,592	2,846	3,461	4,747	5,370	5,617	5,779
	Difference	-482	-37	+143	+33	-746	-891	-698	+147	+158	-92	-494
	Import	268	331	289	566	610						

Note: Compiled from the data of Dept. of Industry and Agriculture.

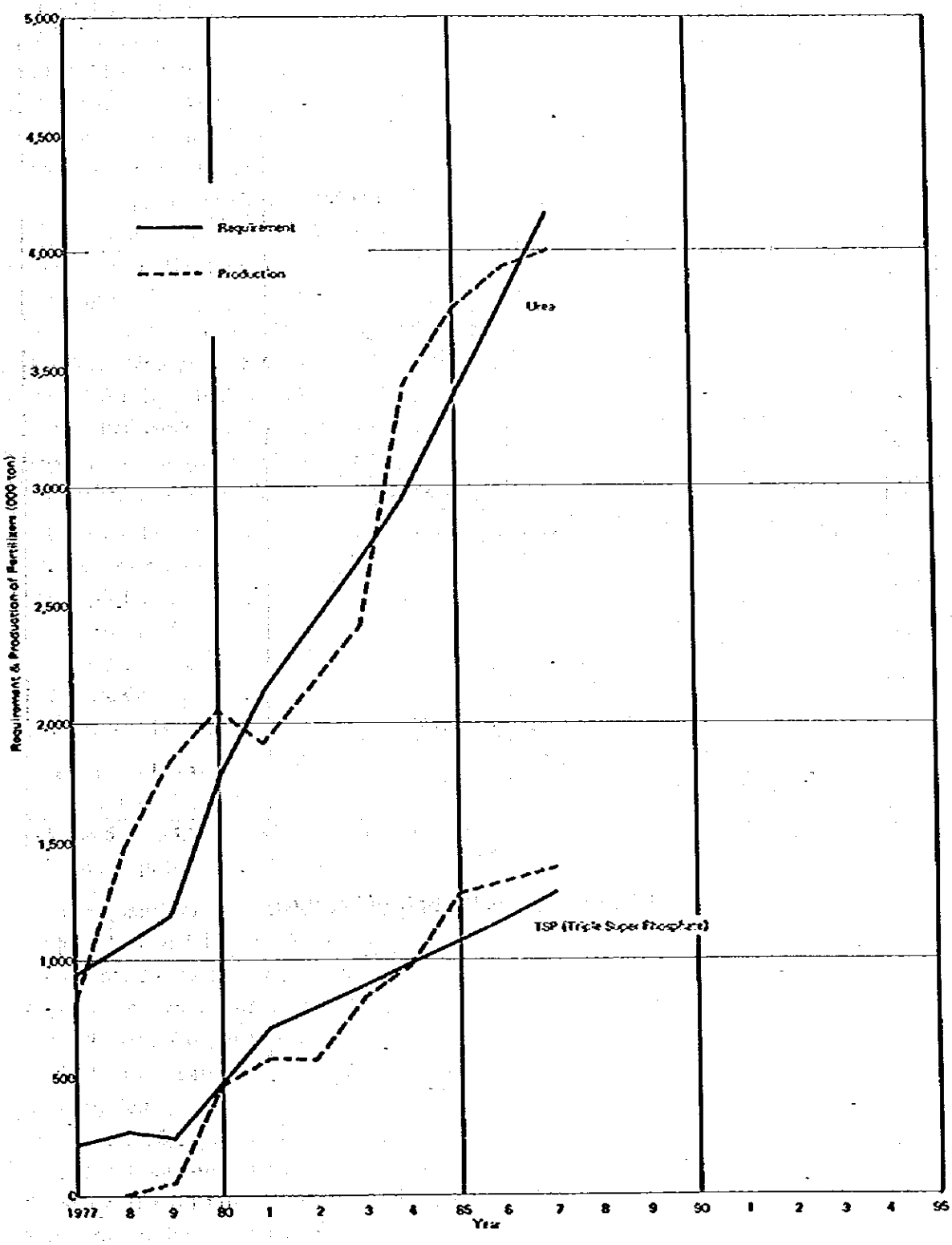


Fig. 5.2.6 (a) Demand/Supply of Fertilizers

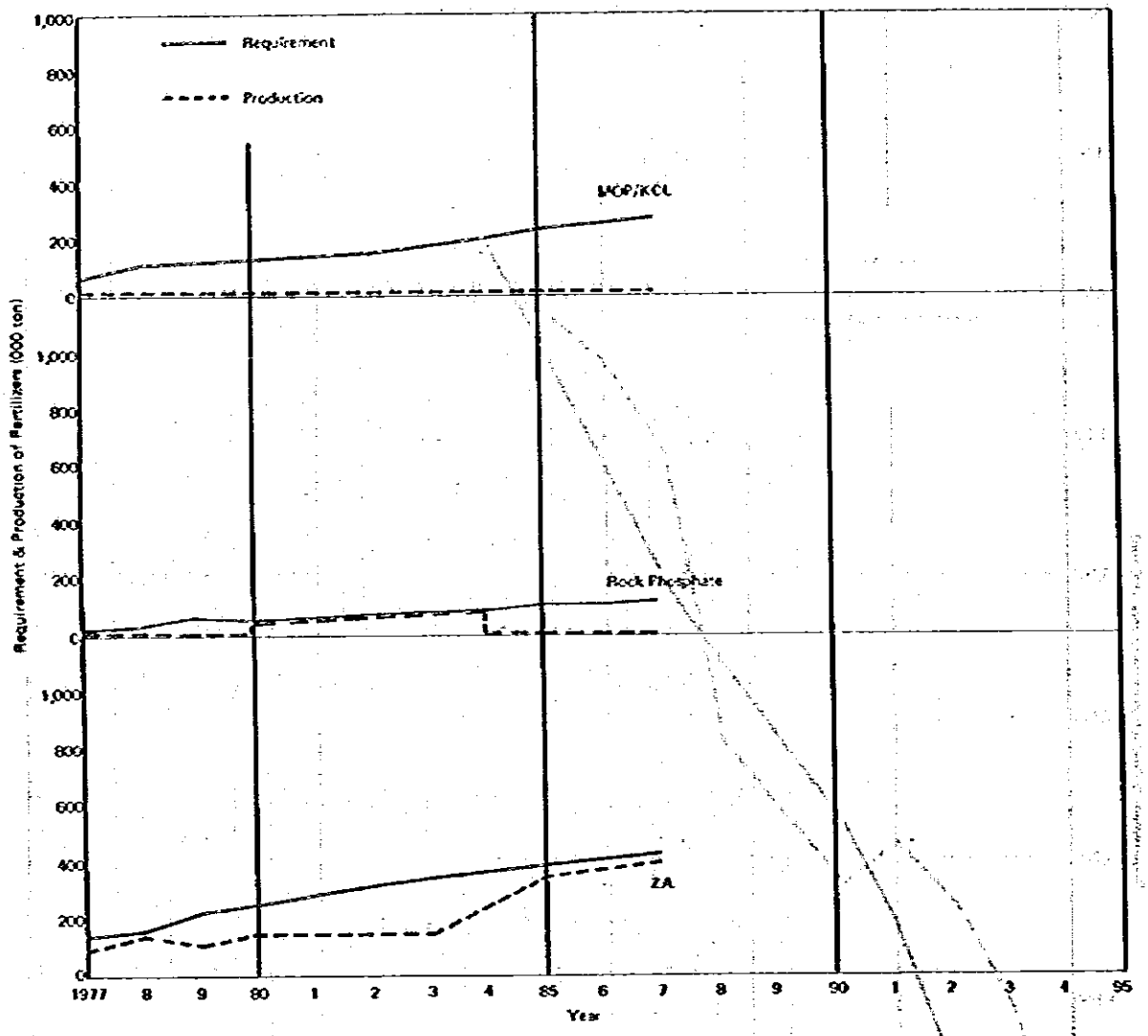


Fig. 5.2.6 (b) Demand/Supply of Fertilizers

5.2.3 Forestry Products

Forestry products are one of the major natural resources in Indonesia. Second only to oil exports, forestry exports accounted for approximately 26% of the nation's foreign currency in 1980. Tables 5.2.26 ~ 5.2.28 and Figs. 5.2.7 ~ 5.2.8 show historical trends and forecasts of log, sawn timber, and plywood production/export.

As shown in the tables and the figures the total volume of log production for all of Indonesia is between 20 and 30 million m^3, with a maximum of 31 million m^3 produced in 1978. Future exports of logs are, as clearly indicated in Fig. 5.2.7, sheeduled to be eliminated by 1984 under current government policy. While increased production/export of sawn timber and plywood will be encouraged. The production of plywood is forecast to increase from 1 million m^3 in 1980 to 5.5 million m^3 in 1984. Of these volumes about 40% of the sawn timber and 70% of the plywood are for export. Major importing countries are Japan, Korea and Taiwan for logs; Hongkong, Singapore, Europe and USA for plywood; and Europe, Singapore, Malaysia and Thailand for sawn timber. Table 5.2.29 shown Indonesia's forest areas by function and province in December 1980. As shown, Riau Province contains about 9% of Indonesia's total productive forest area, equivalent to 33% of the forest area in Sumatra.

Forest areas in Riau Province are classified as follows:

(1) Reserved Forest	786,938 ha
(2) Production Forest	5,537,060 ha
(a) Determined	2,487,730 ha
(b) Fixed	2,772, 890 ha
(c) Mangrove	276,440 ha
(3) Nature Conservation	267,160 ha
(4) Protected Forest	741,842 ha

The potential volume of forestry production for all of Riau has been estimated by the forestry department at about 3.8 million m^3/year. Export of forestry products in Riau Province is shown in Table 5.2.30. As shown, export volume fluctuates widely, depending upon market conditions, which were quite poor in 1981.

The quantities of forestry products handled at Dumai Port for the same period are shown in Table 5.2.31 and Fig. 5.2.9. Dumai Port handled about 2 million m^3 of forestry products (log equivalent) during this period, or about 16% of the total exports from Riau Province. The first shipments of sawn timber left Dumai Port in 1972. Such shipments then showed a sharp increase in 1978, with a volume of 8,000 m^3 in the following year. In 1980 – 81, 90% of total forestry products that passed through Dumai Port were for export, the remainder being for local consumption.

Fig. 5.2.10 shows locations of saw mills and plywood factories in Riau Province. As can be seen, locations are mainly along major rivers and the coast. Such sites are economical for transport of both raw and processed material. It is likely that timber mills and plywood factories will continue being built in these areas for a considerable time into the future because of the limited access of lumber producing areas to Dumai Port. Table 5.2.32 shows saw mills that operate near Dumai Port, some of which export products directly from their own loading facilities. Total production capacity of these mills is about 175,000 m^3/year. Most saw mills in Riau are now

working at only 40 ~ 50% efficiency due to the worldwide economic recession. However, it is forecast that the maximum potential production volume of 300,000 m³ (estimated from total production forest area within an economically feasible transport distance of Dumai Port, as shown in Fig. 5.2.10) will be reached after at least five years. This forecast is based on the assumption that the sawn timber/plywood market will gradually recover within at least 5 years. It also takes into account the governmental policy of prohibiting log exports after 1984. Fig. 5.2.9. shows the future volume of forestry products as forecast by logistic curve.

Table 5.2.26 Log Production and Export in Indonesia (000 m³)

	Production	Domestic Consumption	Export	Export Ratio (%)
1973	25,800	6,705	19,095	74.0
1974	23,280	5,403	17,877	76.8
1975	16,296	2,785	13,511	82.9
1976	21,427	3,550	17,877	83.4
1977	22,939	3,727	19,212	83.8
1978	31,094	11,651	19,443	62.5
1979	25,587	7,644	17,943	70.1
1980	23,500	10,000	13,971	60.7
1981	22,500	14,000	8,500	37.8
1982	23,400	17,400	6,000	25.6
1983	22,000	20,000	2,000	9
1984	25,000	25,000	0	0

Source: KEHUTANAN and SEALPA

Table 5.2.27 Sawn Timber/Plywood Production and Export (000 m³)

	Sawn Timber			Plywood		
	Production	Domestic Consumption	Export	Production	Domestic Consumption	Export
1973	1,375	1,037	338	9	75	1.5
1974	1,812	1,458	354	24	24	
1975	2,500	2,090	410	107	105	2.0
1976	3,000	2,356	650	214	204	10
1977	3,500	2,910	590	270	261	9
1978	3,500	2,740	760	424	395	29
1979	4,000	2,730	1,270	623	498	125
1980	4,000	2,869	1,131	1,011	766	245
1981	5,500	4,000	1,500	1,554	889	655
1982	6,050	4,050	2,000	2,750	1,155	1,595
1983	6,655	4,155	2,500	3,820	1,500	2,320
1984	7,000	4,000	3,000	5,500	1,600	3,900

Source: ISA and APKINDO

Table 5.2.28 Export of Log, Plywood and Sawn Timber, 1980 (000 m^3)

Importer	Log	%	Plywood	%	Sawn Timber	%	Total	%
JAPAN	9,193	65.2	9	3.6	91	8.0	9,293	60.6
KOREA	1,914	13.7			11	1.0	1,925	12.5
TAIWAN	1,439	10.3	11	4	87	7.7	1,537	10.0
S'PORE	629	4.5	50	20.4	264	23.3	943	6.1
EUROPE	489	3.5	31	12.6	415	36.7	935	6.1
MIDDLE EAST			18	7.3	10	0.9	28	
USA (CANADA)			26	10.6	13	1.1	39	
AUSTRALIA					2	0.2	2	
HONGKONG			100	40.8	42	3.7	142	0.9
MALAYSIA/THAI					195	17.2	195	1.3
OTHERS	307	2.2					307	
TOTAL	13,971	100	245	100	1,131	100	15,347	

Table 5.2.29 Forest Area by Function in Each Province

December 1980
(000 ha)

Province	Total Area	Protection Forest	Production Forest	Nature Conservation	Reserved Forest
(1)	(2)	(3)	(4)	(5)	(6)
1. Daerah Istimewa Aceh	4,090	216	3,207	667	
2. Sumatera Utara	4,350	1,140	1,261	254	1,695
3. Sumatera Barat	2,360	1,218	860	282	
4. Riau	6,600	376	6,078	146	
5. Jambi	3,670	127	2,672	256	615
6. Sumatera Selatan	4,660	468	3,338	182	672
7. Bengkulu	1,386	246	734	406	
8. Lampung	1,304	296	341	487	180
SUMATERA	28,420	4,087	18,491	2,680	3,162
9. D.K.I. Jakarta	1	–	1	–	–
10. Jawa Barat	934	299	422	213	–
11. Jawa Tengah	624	21	600	3	–
12. Daerah Istimewa Yogyakarta	18	–	15	–	3
13. Jawa Timur	1,314	259	807	178	70
JAWA & MADURA	2,891	579	1,845	394	73
14. Bali	125	60	29	22	14
15. Nusa Tenggara Barat	848	634	123	89	2
16. Nusa Tenggara Timur	1,063	530	36	92	405
BALI & NUSA TENGGARA	2,036	1,224	188	203	421
17. Kalimantan Barat	9,760	1,513	8,211	36	–
18. Kalimantan Tengah	13,075	743	11,878	454	–
19. Kalimantan Selatan	1,395	169	1,154	72	–
20. Kalimantan Timur	17,240	1	12,388	1,867	2,984
KALIMANTAN	41,470	2,426	33,631	2,429	2,984
21. Sulawesi Utara	1,384	313	508	327	236
22. Sulawesi Tengah	3,588	544	2,673	371	–
23. Sulawesi Selatan	3,222	1,077	677	199	1,269
24. Sulawesi Tenggara	1,716	843	701	172	–
SULAWESI	9,910	2,777	4,559	1,069	1,505
25. Maluku	6,000	1,829	4,084	87	–
26. Irian Jaya	31,500	11	6,437	3,288	21,764
27. Timor Timur	...	...	...	...	...
INDONESIA	122,227	12,933	69,235	10,150	29,909

Source: Directorate General of Forestry.

Table 5.2.30 Export of Principal Forest Products in Riau Province, 1971/1972 ~ 1981/1982 (t)

Year	Log	Sawn Wood	Total
1971/1972	860,261.52	551.14	860,812.66
1972/1973	1,241,495.85	3,187.20	1,244,683.05
1973/1974	1,940,415.94	32,629.57	1,973,043.41
1974/1975	1,331,484.41	4,470.21	1,335,963.62
1975/1976	915,853.30	7,433.86	923,287.16
1976/1977	1,416,801.30	29,038.00	1,445,839.30
1977/1978	1,334,944.99	42,113.49	1,377,038.48
1978/1979	778,281.98	48,262.26	826,544.24
1979/1980	1,254,071.81	80,402.01	1,334,473.82
1980/1981	1,019,999.95	89,787.42	1,109,787.37
1981/1982	262,972.39	83,640.36	366,612.75

Source: Forestry Service Riau Province.

Table 5.2.31 Timber Shipment through Dumai Port (t)

Year	Export		Local		Total (Log equivalent)
	Log	S. Timber	Log	S. Timber	
1971	10,545	–	–	–	10,545
1972	103,413	–	–	975	105,363
1973	130,622	1,960	–	150	136,952
1974	150,740	590	–	400	152,720
1975	114,565	160	–	665	116,306
1976	261,646	120	–	621	263,128
1977	319,077	4	–	1,381	321,847
1978	136,146	1,453	–	6,750	152,552
1979	255,745	22,801	–	5,599	312,565
1980	221,023	29,780	6,448	9,686	306,403
1981	117,251	38,363	9,879	4,967	213,790

Source: Forestry Service Riau Province

Table 5.2.32 Sawmills near Dumai Port

Name	Location	Sawer	Capacity (m^3/month)
PT. CHANDRA Dirgantara Bekasap	Duri	7	2,100
PT. Dumai Sawmill Timber	"	4	1,200
PT. Murini Timber Sebanga	"	7	2,100
PT. Murini Timber Pungat	"	4	1,200
PT. Murini Timber Beringin	"	4	1,200
CV. Hasan Basri	"	2	400
PT. Surya Jaya Dumai Timber	Dumai	4	1,400
PT. Sinar Rupat Trading Co.	"	4	1,200
CV. Bastrico	"	2	400
CV. Dai Bhakti	"	2	400
PT. Cayantry Balani	"	6	3,000
		Total	14,600 175,200 m^3/year

Source: Forestry Service Riau Province

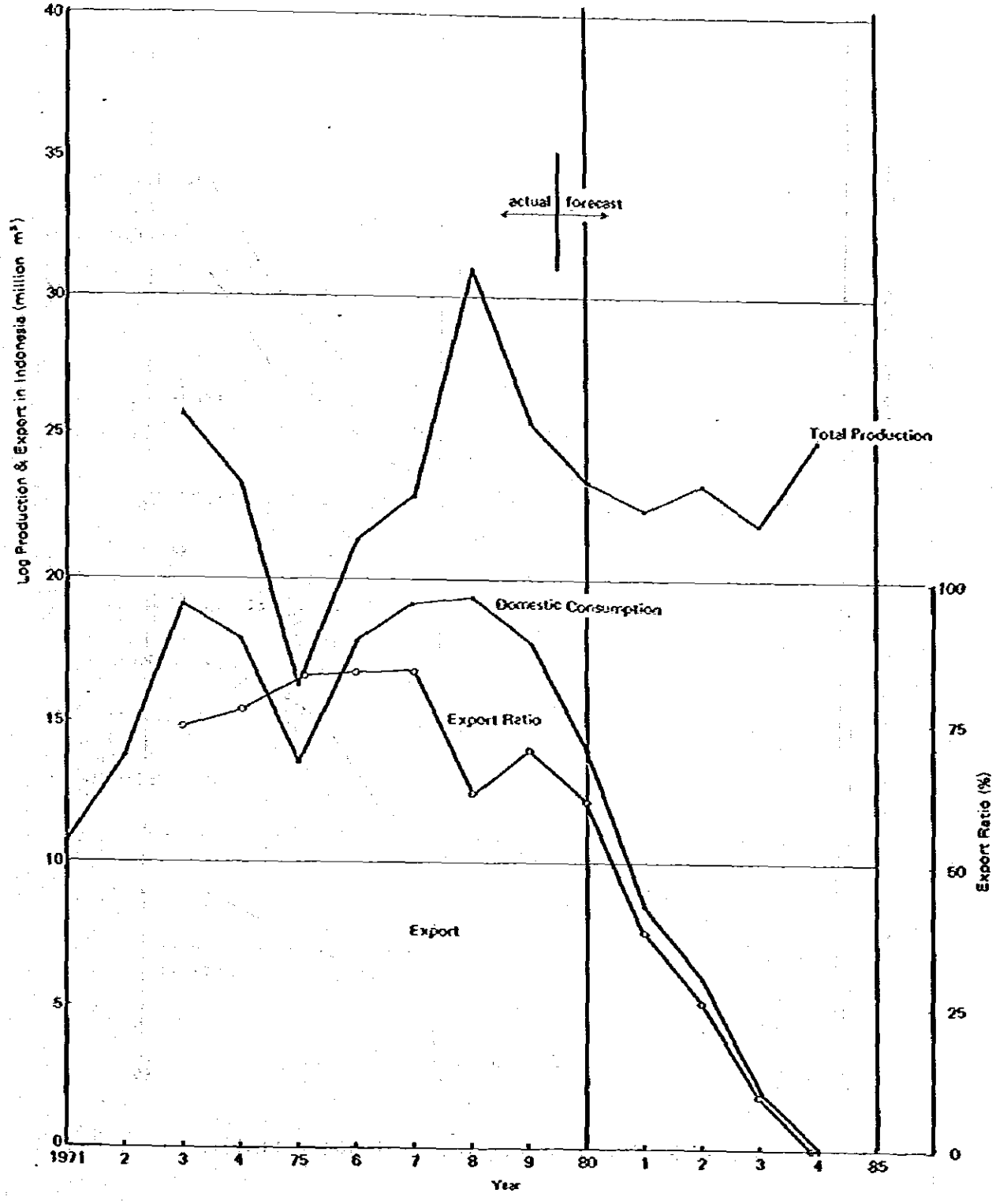


Fig. 5.2.7 Log Production and Export in Indonesia

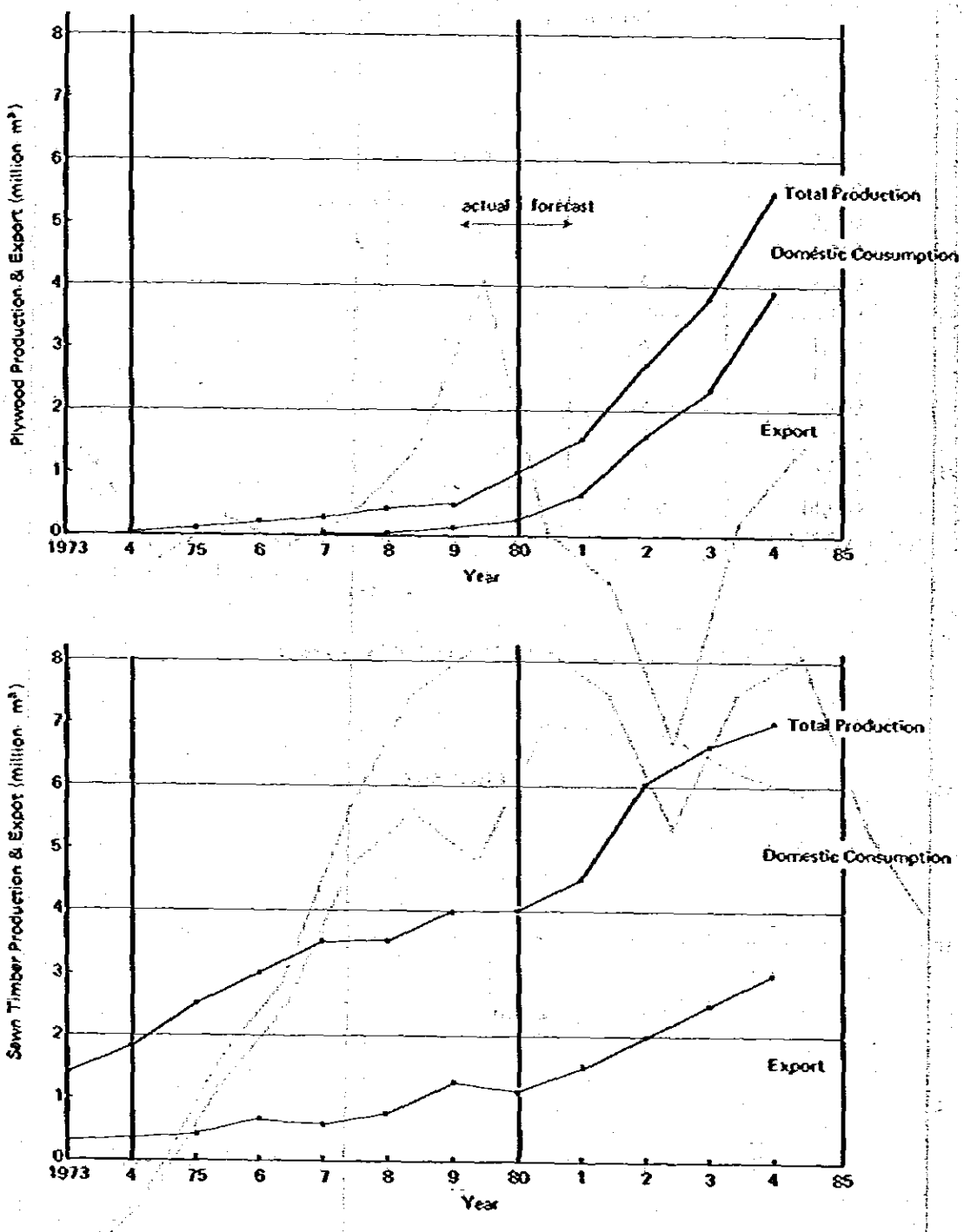


Fig. 5.2.8 Sawn Timber/Plywood Production and Export

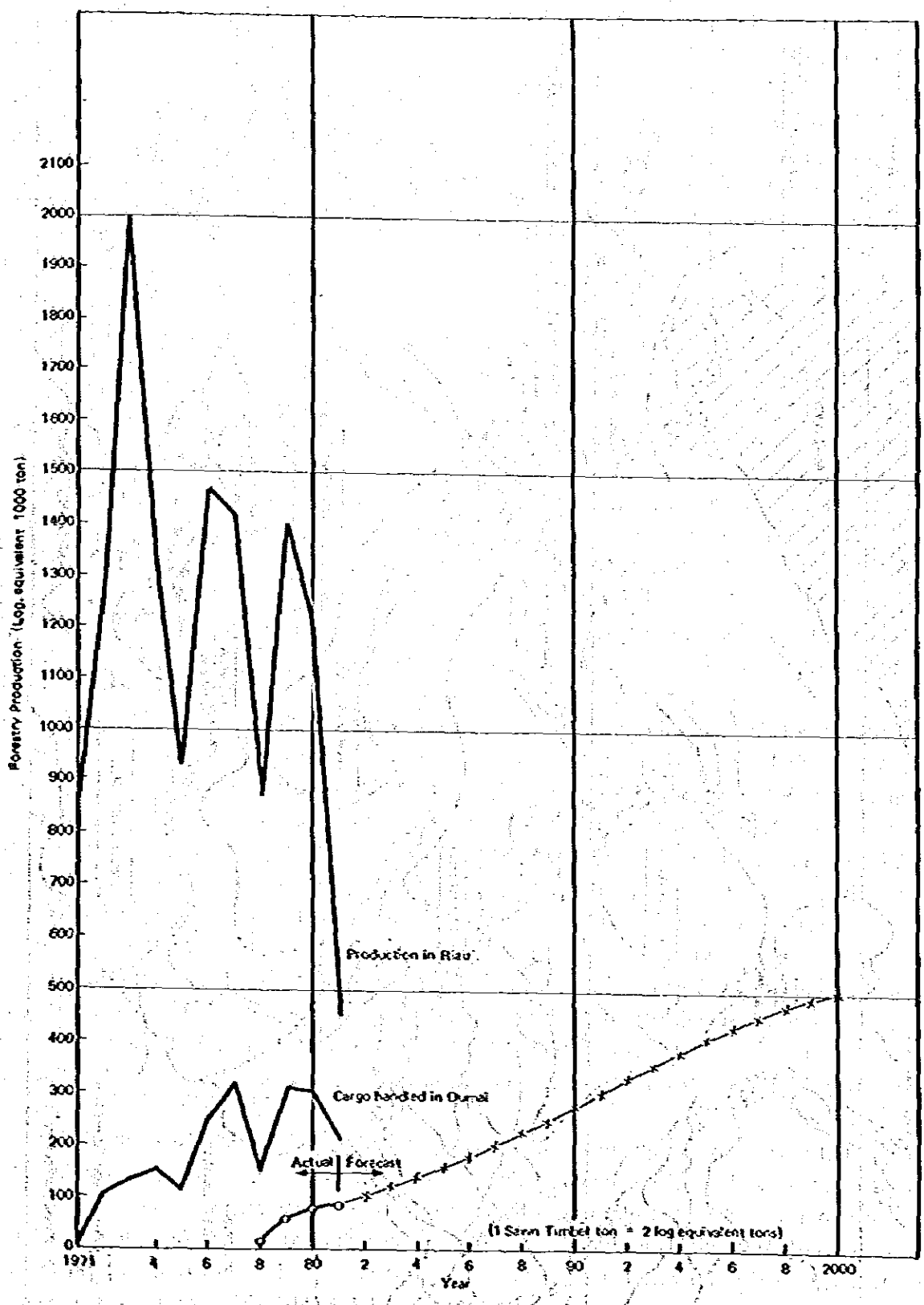


Fig. 5.2.9 Forestry Production in Riau and Volume handled in Dumai Port

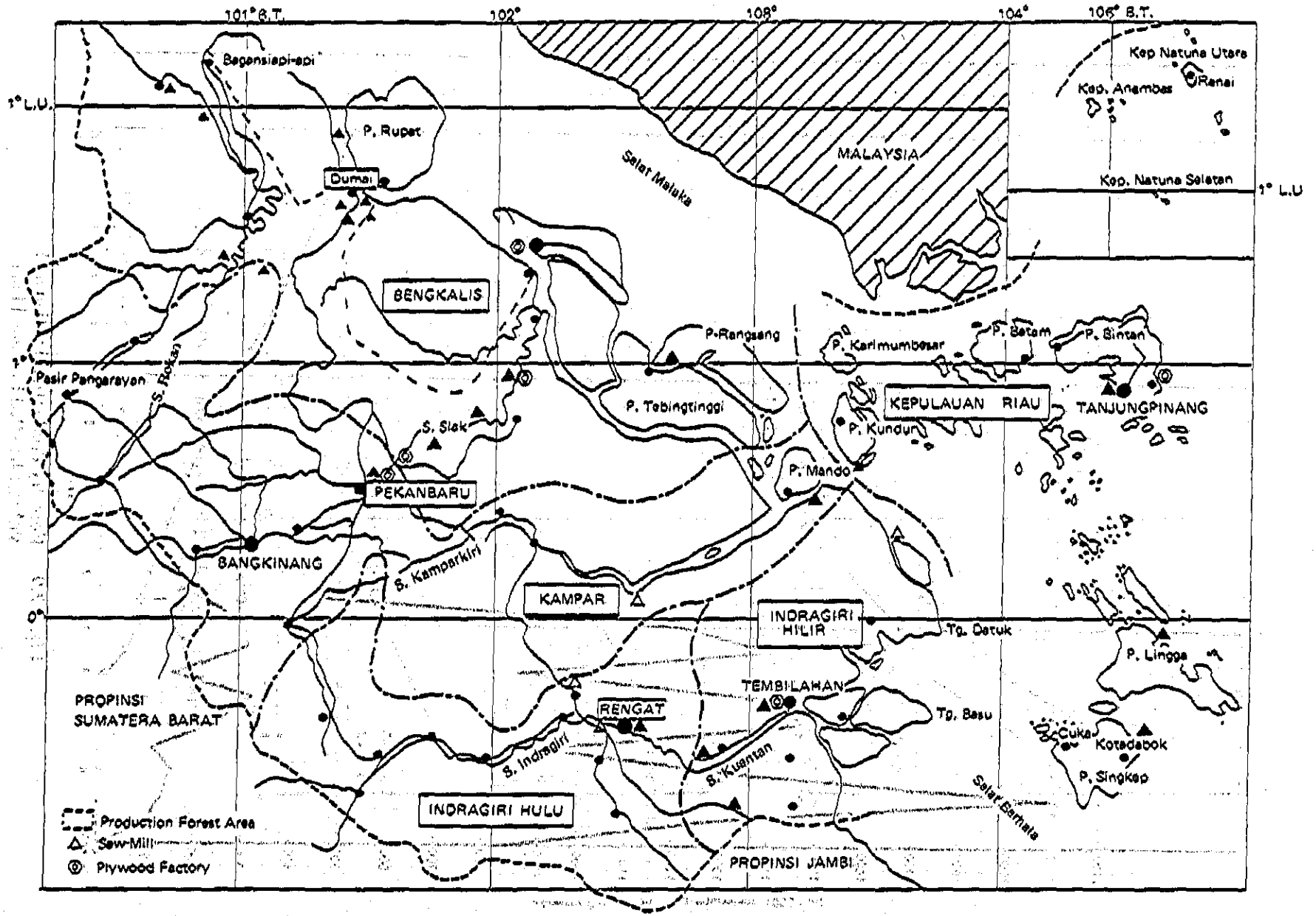


Fig. 5.2.10 Location of Saw Mill

5.2.4 Rice

For many years a rice production in Riau Province has not kept up with increasing demands. Harvested areas and yield rates for paddies in Riau and other Provinces of Indonesia are shown in Tables 5.2.33 and 5.2.34. As shown, the area occupied by rice fields in Riau Province decreased from about 142,000 ha in 1976 to 124,000 ha in 1979, while the yield rate increased slightly from 1.7 t/ha in 1976 to 1.8 t/ha in 1979. The situation concerning demand and supply of rice in Riau Province is shown in Table 5.2.35. As shown, increases in rice production were not enough to offset the rapid growth in population, which has mainly been due to the on-going, large scale transmigration plan. Rice shortages increased from 60,000 t in 1975 to about 150,000 t in 1980. Rice equivalent to these shortages has had to be imported or shipped in locally. Table 5.2.36 shows the past movement of rice through Dumai Port. As shown, about 45% of rice brought in to make up for shortages in Riau have passed through Dumai Port. Future rice demand has been forecast using the population growth rate and per capita consumption. On the other hand, rice production has been estimated by regression curve based on the past trends from 1974 to 1981. Demand/supply for rice and volumes of rice passing through Dumai Port are indicated in Fig. 5.2.11.

The percent of the rice shortage in Riau Province to be made up for in the future by rice imported from abroad depends upon the future demand/supply condition of rice for the whole of Indonesia. Tables 5.2.37 ~ 5.2.40 show the historical development in Indonesia of rice field acreage, rice production any yield rate. These trends are illustrated in Fig. 5.2.12. As shown, rice production in Indonesia increased from 12 million tons in 1968 to 18 million tons in 1979, an increase caused more by the increasing yield rate than through an increase in the harvested area. For the future demand/supply condition of rice, the ISTS report forecasts a shortage of rice amounting to 1.1 million tons in 1984 and 1.5 million tons in 1988. Imported rice amounted to 0.96 million tons in 1970, 0.69 in 1975 and 2.01 in 1980. It is expected that the future condition of rice demand/supply will not greatly differ from the present situation, upon comparison of past import figures and the future forecast. On the other hand, the future rice production was forecast by Ministry of Agriculture in December 1982 as shown in Fig. 5.2.12 and the Indonesia's total rice productions in 1984 and 1988 were forecast at 25.8 million tons and 29.6 million tons respectively. While the ISTS forecasts are 20.9 million tons and 23.5 million tons in the same years and these are about 80% of the above figures.

As shown in Fig. 5.2.12, the ISTS forecast could be judged to be more likely to happen according to the past trends of rice production increase. Therefore in the present study, the ISTS forecast is basically followed. However, should the Ministry's forecast be realized, Indonesia will be self-sufficient in rice and the rice shortage in Riau will naturally be met by domestic production.

Therefore, as will be detailed in Chapter 6, a port plan assuming that rice self-sufficiency will be gradually achieved by 2000 will also be examined. In this reagard, the forecast of port cargo should be periodically reviewed especially for agricultural products which have a tendency to fluctuate more widely than the other commodities handled through the port. Based on these considerations, it is assumed that the future share of imported rice through Dumai Port will remian at the present level. Table 5.2.41 shows the future movement of rice through Dumai Port. For 1990, the total in/out movement of rice is forecast at 122,000 t, and for 2000, it is forecast at 189,000 t.

Table 5.2.33 Harvested Paddy Area by Province (1976 ~ 1980) (ha)

Province	Year				
	1976	1977	1978	1979	1980
(1)	(2)	(3)	(4)	(5)	(6)
1. Daerah Istimewa Aceh	241 602	237 144	234 482	256 576	226 326
2. Sumatera Utara	497 992	513 576	530 442	533 235	532 197
3. Sumatera Barat	248 580	260 180	264 235	272 863	289 498
4. Riau	142 122	138 416	133 149	124 622	134 578
5. Jambi	134 936	140 265	134 656	166 588	146 969
6. Sumatera Selatan	347 247	356 883	377 912	355 022	359 266
7. Bengkulu	72 171	64 186	73 983	73 085	70 013
8. Lampung	229 049	240 945	257 688	244 346	272 135
SUMATERA	1 913 699	1 951 595	2 006 547	2 026 337	2 030 982
9. D.K.I. Jakarta	13 210	18 084	19 400	18 496	21 544
10. Jawa Barat	1 802 374	1 692 177	1 861 234	1 805 862	1 859 599
11. Jawa Tengah	1 183 574	1 236 231	1 360 848	1 291 917	1 336 485
12. Daerah Istimewa Yogyakarta	128 300	118 324	138 171	114 628	129 303
13. Jawa Timur	1 338 111	1 312 903	1 370 646	1 397 593	1 431 047
JAWA & MADURA	4 465 569	4 377 719	4 750 299	4 628 496	4 777 978
14. Bali	149 229	152 523	166 663	181 540	182 372
15. Nusa Tenggara Barat	205 671	187 737	224 194	201 206	223 516
16. Nusa Tenggara Timur	125 038	127 083	124 025	117 643	145 658
BALI & NUSA TENGGARA	479 938	467 343	514 882	500 389	551546
17. Kalimantan Barat	309 434	311 740	305 071	304 477	304 141
18. Kalimantan Tengah	115 746	114 792	116 646	123 957	123 660
19. Kalimantan Selatan	269 625	284 955	307 881	310 013	289 597
20. Kalimantan Timur	77 883	79 185	75 514	80 105	78 171
KALIMANTAN	772 688	790 672	805 112	818 552	795 569
21. Sulawesi Utara	84 190	86 010	81 606	70 290	98 094
22. Sulawesi Tengah	96 174	96 547	97 708	114 386	101 204
23. Sulawesi Selatan	504 348	537 435	610 343	591 132	607 828
24. Sulawesi Tenggara	27 995	27 951	38 456	32 326	31 682
SULAWESI	712 707	747 943	828 113	808 134	838 808
25. Maluku	23 561	23 687	22 509	20 188	22 486
26. Irian Jaya	597	609	1 707	1 468	966
MALUKU & IRIAN JAYA	24 158	24 296	24 216	21 656	23 452
OUTER JAVA & MADURA	3 903 190	3 981 849	4 178 870	4 175 068	4 240 357
INDONESIA	8 368 759	8 359 568	8 929 169	8 803 564	9 018 335

Net area harvested.
Source: Statistik Indonesia 1980/1981, BPS

Table 5.2.34 Paddy Yield Production Rate (Wetland + Dryland Paddy) by Province

(100 kg/ha)
1976 ~ 1980

Province (1)	Year 1976 (2)	1977 (3)	1978 (4)	1979 (5)	1980 (6)
1. Daerah Istimewa Aceh	29.17	29.36	27.10	27.96	30.00
2. Sumatera Utara	29.43	27.39	28.56	28.65	27.82
3. Sumatera Barat	29.45	31.53	31.81	33.27	34.96
4. Riau	17.34	17.41	18.13	18.05	20.51
5. Jambi	23.68	23.98	24.65	25.76	26.41
6. Sumatera Selatan	21.13	22.34	21.59	23.82	24.78
7. Bengkulu	23.61	24.31	22.68	21.76	25.63
8. Lampung	23.56	24.15	23.56	24.59	25.83
SUMATERA	25.67	25.80	25.69	26.71	27.61
9. D.K.I. Jakarta	23.40	25.43	24.28	25.56	29.43
10. Java Barat	30.51	29.87	30.94	32.47	35.08
11. Java Tengah	31.41	30.86	33.04	32.03	38.95
12. D.I. Yogyakarta	29.10	28.62	30.63	35.37	36.16
13. Java Timur	33.19	34.06	35.55	37.56	43.86
JAVA & MADURA	31.49	31.35	32.84	33.93	38.80
14. Bali	34.03	35.12	34.40	35.44	39.93
15. Nusa Tenggara Barat	28.00	26.73	28.42	28.56	29.89
16. Nusa Tenggara Timur	16.58	16.31	14.53	16.07	17.65
BALI & NUSA TENGGARA	26.90	26.63	27.01	28.12	29.98
17. Kalimantan Barat	15.07	16.83	17.22	18.50	19.10
18. Kalimantan Tengah	13.79	14.12	12.80	15.69	17.14
19. Kalimantan Selatan	18.04	19.81	22.10	23.12	23.78
20. Kalimantan Timur	13.49	13.58	14.70	15.97	16.85
KALIMANTAN	15.76	17.18	18.21	19.58	20.28
21. Sulawesi Utara	23.40	23.41	25.02	26.32	26.93
22. Sulawesi Tengah	19.32	18.47	16.88	17.06	19.78
23. Sulawesi Selatan	27.34	28.78	28.25	28.88	30.10
24. Sulawesi Tenggara	13.64	14.02	12.92	16.15	15.65
SULAWESI	25.26	26.28	25.88	26.48	27.94
25. Maluku	7.31	7.05	7.07	7.97	7.35
26. Irian Jaya	17.89	17.93	13.87	15.94	16.10
MALUKU & IRIAN JAYA	7.57	7.32	7.55	8.51	7.71
OUTER JAWA & MADURA	23.67	24.16	24.35	25.34	26.50
INDONESIA	27.84	27.93	28.86	29.85	33.01

Source: Statistik Indonesia 1980/1981, BPS

Table 5.2.35 Rice Demand/Supply in Riau Province (t)

Year	Population	Demand	Paddy Production	Rice Production	Shortage
1974	1,785,464	214,256	157,465	149,592	64,664
1975	1,836,171	220,341	166,024	157,723	62,617
1976	1,888,318	226,598	160,391	142,871	83,727
1977	1,941,946	233,234	165,574	157,676	75,358
1978	1,997,097	280,592	169,941	160,992	119,600
1979	2,053,814	288,561	172,071	163,468	125,093
1980	2,169,745	304,849	163,045	154,893	149,956
1981	2,238,092	314,451	168,018	159,617	154,834
1982	2,277,647	320,009	190,620	181,089	138,920
1983*	2,349,393	330,090	291,646	277,064	53,026

Source: Agriculture Service Riau Province
Population Growth 3.15%/year
Rice Consumption 120 kg per capita – 1977
140.5 kg – 1978

*; Forecast

Table 5.2.36 Rice Shortage in Riau and Rice Movement through Dumai Port (t)

	Import	Local in	Total in	Shortage	Local out
1974	9,700	69,650	79,350	64,664	2,711
75	4,000	13,300	17,300	62,617	1,342
76	24,551	35	24,586	83,727	8,659
77	35,860	931	36,791	75,358	11,048
78	34,763	5,172	39,935	119,600	10,508
79	38,203	6,296	44,499	125,093	9,455
1980	50,114	29,562	79,676	149,956	19,052
81	9,034	43,832	52,866	154,834	9,879
Total	206,225	168,778	375,003	835,849	72,654

Source: Dumai Port Statistics

Table 5.2.37 Area Harvested, Production and Yield Rate for Food Crops

1976 ~ 1980

Crops	Year				
	1976	1977	1978	1979	1980
(1)	(2)	(3)	(4)	(5)	(6)
1. Paddy					
Area harvested (ha)	8,368,759	8,359,568	8,929,169	8,803,564	9,018,335
Production (ton)	23,300,939	23,347,132	25,771,570	26,282,663	29,773,962
Yield rate (100 kg/ha)	27.84	27.93	28.86	29.85	33.01
2. Wet Land Paddy					
Area harvested (ha)	7,229,417	7,202,360	7,698,409	7,675,118	7,807,416
Production (ton)	21,851,528	21,808,340	24,172,366	24,731,872	28,039,593
Yield rate (100 kg/ha)	30.72	30.28	31.40	32.22	35.91
3. Dry Land Paddy					
Area harvested (ha)	1,139,342	1,157,208	1,230,760	1,128,446	1,210,919
Production (ton)	1,449,411	1,538,792	1,599,204	1,550,791	1,734,369
Yield rate (100 kg/ha)	12.72	13.30	12.99	13.74	14.32

Source: Statistik Indonesia 1980/1981, BPS

Table 5.2.38 Target and Realization of Rice Harvest Acreage in 1968 ~ 1981

Year	Target of Repelita (000 ha)	Realization of Harvest						
		Total (000 ha)	Increase		% Target	Intensification		Non Intensification (000 ha)
			(000 ha)	%		(000 ha)	(%)	
1968	–	8,020	–	–	–	1,597	19.91	6,423
69	7,600	8,014	–6	–0.07	105.45	2,130	26.58	5,884
70	7,960	8,135	121	1.51	102.20	2,093	25.73	6,042
71	8,320	8,324	189	2.32	100.05	2,788	33.49	5,536
72	8,760	7,898	–426	–5.12	90.16	3,169	40.12	4,729
73	8,920	8,403	505	6.39	94.20	3,988	47.46	4,415
74	8,210	8,509	106	1.25	103.64	3,724	43.77	4,785
75	8,274	8,495	–14	–0.16	102.67	3,637	42.81	4,858
76	8,341	8,369	–126	–1.49	100.34	3,613	43.17	4,756
77	8,474	8,360	–9	–0.11	98.65	4,238	50.69	4,122
78	8,713	8,929	569	6.81	102.48	4,848	54.29	4,081
79	8,885	8,803	–126	–1.41	99.08	5,023	57.06	3,780
80	9,065	9,018[1]	214	2.43	99.48	5,603	62.13	3,415
81	9,295	9,297[2]	279	3.09	100.02			
Average	8,599	8,575	101	1.21	99.73	4,055	47.12	4,480

Source: Dept. of Agriculture R.I.
Note: 1) Provisional figures
2) Forecast

Table 5.2.39 Target and Realization of Rice Production 1968 ~ 1981

Year	Target Repelita (000 ton)	Realization of Production						
		Total (000 ton)	Increase		Target %	Intensification		Non Intensification (000 tons)
			(100 ton)	%		(000 ton)	Total Prod %	
1968	–	11,667	–	–	–	–	–	–
69	10,520	12,249	582	4.99	116.43	4,019	32.81	8,230
70	11,430	13,140	591	7.27	114.96	4,693	32.81	8,447
71	12,520	13,724	584	4.44	109.62	5,719	41.67	8,005
72	13,810	13,183	–541	–3.94	95.46	7,165	54.36	6,018
73	14,800	14,607	1,424	10.80	98.70	8,855	60.62	5,752
74	15,032	15,275	668	4.58	101.62	8,458	55.37	6,817
75	15,633	15,185	–90	–0.60	97.13	8,047	53.17	7,111
76	16,383	15,845	660	4.35	96.72	8,602	54.29	7,243
77	17,235	15,876	31	0.20	92.11	9,663	60.87	6,213
78	18,183	17,525	1,649	10.39	96.36	11,378	64.92	6,147
79	17,940	17,872	347	1.98	99.62	12,039	67.36	5,833
80	18,442	20,246[1)]	2,374	13.28	109.78	14,933	73.76	5,313
81	18,995	21,668[2)]	1,422	7.02	114.07			
Average	15,856	16,417	851	5.30	103.51	9,754	57.99	6,623

Source: Dept. of Agriculture R.I.
Note: 1) Prov. Figures 2) Forecast

Table 5.2.40 Target and Realization of Average Paddy Harvest Per-Ha Intensification and Non-Intensification in 1968 ~ 1981

Year	Target REPELITA (Q/ha)			Intensification		Non Intensification		Total	
	Intensification	Non Intensification	Total	Q/ha	% of Target	Q/ha	% of Target	Q/ha	% of Target
1968	"	"	–	–	–	–	–	14.54	–
69	"	"	13.00	18.87	"	13.99	"	15.28	110.72
70	"	"	14.30	23.26	"	13.98	"	16.15	112.94
71	"	"	15.10	20.51	"	14.46	"	16.48	109.14
72	"	"	15.80	22.61	"	12.72	"	16.69	105.63
73	"	"	17.20	22.20	"	13.03	"	17.38	101.05
74	24.90	11.60	18.30	22.70	91.16	14.25	122.84	17.96	98.14
75	25.30	11.20	18.90	22.22	87.83	14.64	130.71	17.87	94.55
76	26.60	11.00	16.60	23.80	92.97	15.23	138.45	18.93	96.58
77	25.70	11.00	20.30	22.30	88.72	15.07	137.00	18.99	93.55
78	25.50	11.20	20.90	33.47	92.04	15.06	134.46	19.62	93.88
79	23.75	15.11	20.19	23.97	100.93	15.43	102.12	20.30	100.54
80	23.75	14.87	20.34	26.65	122.21	15.56	109.65	23.41*	110.37
81	23.53	14.87	20.44	"	"	"	"	23.31'	114.04
Average	23.68	14.72	20.32	25.29	106.57	15.49	105.88	22.02	108.32

Source: Dept. of Agriculture R.I.
Note: *) Provisional figures I
') Provisional figures II

Table 5.2.41 Rice Demand/Supply and Cargo Volume through Dumai Port (000 t)

Year	Rice Demand	Rice Production	Shortage	Import	Local in	Local out	In Total	In/Out Total
1985	385	178	180	45	36	16	81	97
86	369	181	188	47	38	17	85	102
87	381	184	197	49	40	18	89	107
88	394	187	207	51	42	19	93	112
89	407	190	216	54	44	19	98	117
1990	420	193	226	56	46	20	102	122
91	433	197	237	59	48	21	107	128
92	447	200	248	61	50	22	111	133
93	462	203	259	64	52	23	116	139
94	477	207	270	67	55	24	122	146
95	493	210	282	70	57	25	127	152
96	509	214	295	73	60	27	133	160
97	525	217	308	76	62	28	138	166
98	542	221	321	80	65	29	145	174
99	560	225	335	83	68	30	151	181
2000	578	228	350	87	71	31	158	189

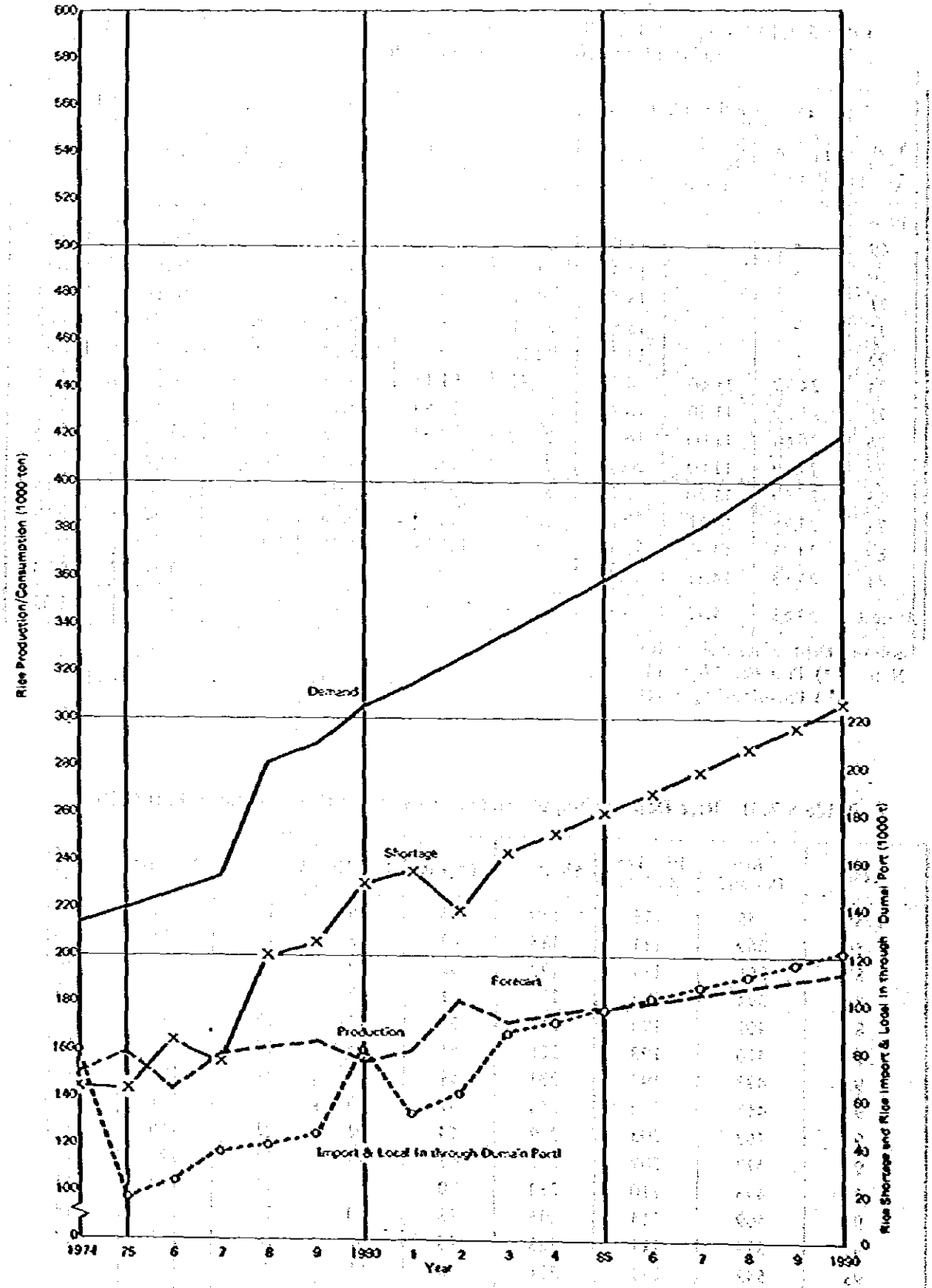


Fig. 5.2.11 Rice Demand/Supply

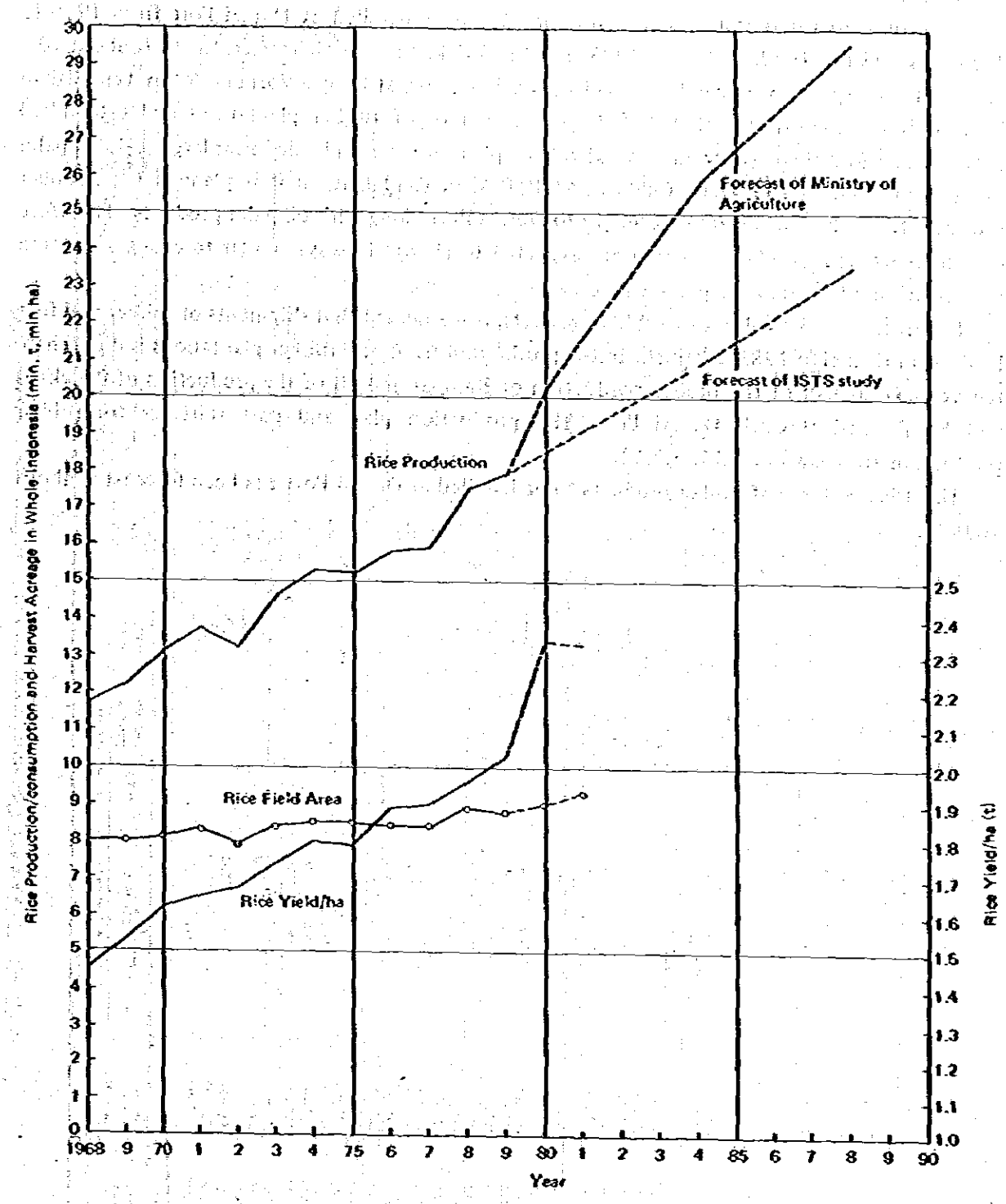


Fig. 5.2.12 Rice Production/consumption and Harvest Acreage in the Whole of Indonesia

5.2.5. Rubber

According to cargo statistics, the volume of rubber handled at Dumai Port from 1966 to 1981 was 428 t in 1972, 2,287 t in 1973, 162 t in 1974 and none thereafter. In 1981, about 70% of all rubber exports were handled at Pekanbaru Port, 20% at Rengat Port and 5% at Tembilahan Port. This was mainly due to the distribution pattern of rubber plantations and established patterns of cargo flow. However, several rubber plantaitons are planned near large scale oil palm plantations such as PTP II in Tandun and PTP V in Pandalian, so it is planned that, rubber products from these locations be brought to Dumai Port along with oil palm products. Therefore current patterns of rubber shipment are expected to change in ways similar to changes in cargo movement mentioned in the previous section.

In forecasting the volume of rubber products, it is assumed that shipments of rubber will first leave from Dumai in 1985, when the initial production from new rubber plantations is due. Then, ten years later, half of the rubber porduction of Kampar and all of the production of Bengkalis will be shipped through Dumai Port. The production plan and past statistics for rubber production are shown in Table 5.2.42.

The 1990 volume of rubber products to be handled at Dumai Port has been forecast at about 20,000 t.

Table 5.2.42 Rubber and Coconut Production in Riau Province (1969 ~ 1990)

Year	District	Rubber							Coconut						Remark
		Area (ha)	Production (ton)	Replantation (ha) Target	Realisation U	Realisation K	No. of Farmer Target	No. of Farmer Realisation	Area (ha)	Production (ton)	Replantation (ha) Target	Realisation U	Realisation K	No. of Farmer Target	No. of Farmer Realisation	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1969	Kampar	52,344	11,945		177	800			4,879	3,246			100			U = Best seed
	Bengkalis	55,228	12,603			500			7,475	4,656			300			K = Usual seed
	Ind. Hulu	71,816	17,454		558	1,200			844	559			50			
	Ind. Hilir	4,654							99,359	65,461			450			- = Begin in 1981 - 1990 estimation number
	Kep. Riau	83,256	19,003			500			21,294	13,365			100			
	Total	267,298	61,005		735	3,000			133,851	87,287			1,000			
1970	Kampar	55,343	12,990		461	700			4,979	3,294		13	120			
	Bengkalis	55,226	12,960		338	500			7,775	4,484		40	300			
	Ind. Hulu	71,138	16,696		340	1,500			894	584		20	80			
	Ind. Hilir	4,654	1,089						99,809	65,172		1,620	1,000			
	Kep. Riau	65,914	15,470			300			21,394	12,663		40	265			
	Total	252,275	59,205		1,139	3,000			134,851	86,197		1,733	1,765			
1971	Kampar	56,143	13,362		804	800			5,014	3,342		160	50			
	Bengkalis	55,728	13,265		199	300			8,115	4,312		1,150	150			
	Ind. Hulu	72,990	17,371		797	1,500			994	610		50	25			
	Ind. Hilir	4,617	1,097						102,429	64,883		1,239	700			
	Kep. Riau	65,887	15,201		70	200			21,399	11,959		150	75			
	Total	255,345	60,796		1,870	3,000			138,951	85,106		2,749	1,000			
1972	Kampar	56,533	13,501		397	800			5,514	3,300		140	80			
	Bengkalis	56,228	13,403		90	500			8,266	4,139		990	200			
	Ind. Hulu	73,760	17,579		363	1,500			1,086	635		49	80			
	Ind. Hilir	4,687	1,119						103,404	64,397		1,180	600			
	Kep. Riau	65,209	15,543			200			21,559	11,257		80	40			
	Total	256,417	61,145		850	3,000			139,829	84,018		2,439	1,000			
1973	Kampar	56,256	13,954		823	800	13,954		5,004	3,437		10	80		3,437	
	Bengkalis	56,928	13,635		200	500	13,635		9,145	3,907		580	300		3,967	
	Ind. Hulu	75,885	18,176		625	1,500	18,176		1,246	660			160		660	
	Ind. Hilir	4,837	1,153				1,153		104,684	64,308		1,300	980		61,308	
	Kep. Riau	65,309	16,531		50	200	16,531		21,749	10,554		110	80		10,554	
	Total	261,217	63,449		1,700	3,000	63,449		142,828	82,926		2,000	1,600		82,926	
	Volita				6,284	15,000						8,923	6,365			
1974	Kampar	59,225	14,523		167	800	10,393		5,724	3,484			80		19,560	
	Bengkalis	57,428	13,794			500	13,540		9,925	3,795		530	300		8,462	
	Ind. Hulu	77,595	18,922		210	1,500	28,872		1,396	685			160		16,773	
	Ind. Hilir	4,837	1,175				1,605		104,994	64,020		980	1,380		32,613	
	Kep. Riau	65,509	16,146			200	17,345		21,989	9,852		90	80		14,316	
	Total	264,594	64,560		377	3,000	71,955		146,028	81,836		1,600	2,000		91,664	
1975	Kampar	59,857	14,890		160	472	19,264		5,856	3,580		728	104.8		19,680	
	Bengkalis	57,944	13,037		80	436	14,114		10,130	3,605			505		9,143	
	Ind. Hulu	78,796	20,774		80	1,261	29,341		1,482	709			107		16,783	
	Ind. Hilir	4,818	1,227				1,605		107,903	64,451			1,394		32,723	
	Kep. Riau	65,580	16,528			71	11,582		23,214	9,580		72	1,668		16,450	
	Total	266,995	66,456		320	2,240	72,906		148,685	81,923		144.80	778.8		94,779	
1976	Kampar	60,140	15,628		83	710	19,624		6,002	3,579		177			19,680	
	Bengkalis	58,143	13,037			200	14,114		12,289	4,999		545			9,142	
	Ind. Hulu	79,298.9	20,492.3		2,033	200	29,524		1,567.55	727.4		86			16,947	
	Ind. Hilir	4,621	1,151.72				1,605		110,123	66,630.5		1,034			32,723	
	Kep. Riau	62,452	16,291.74				11,423		28,483.30	11,360.05		1,740			16,377	
	Total	264,643.9	69,600.77		2,116	1,110	76,290		158,465.05	87,496.95		3,582			94,869	

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1977	Kampar	60,812	17,356		194	365		19,358	6,160	3,967		108			20,255	
	Bengkalis	58,812	12,856			200		14,489	25,874	11,489		2,637			7,211	
	Ind. Hulu	79,251	19,337		5,000	200		30,293	1,700	727		1,875			16,133	
	Ind. Hilir	4,590	1,141					1,680	115,253	66,990		1,386			32,978	
	Kep. Riau	58,488	12,920					10,351	12,260	496					15,989	
	Total	262,125	63,610		5,194	765		76,171	179,182	93,433		4,715.75			92,566	
1978	Kampar	61,561	17,785.6		56	400		19,764	6,396.8	4,241		78.6			20,255	
	Bengkalis	59,659	15,125		428	200		17,637	28,280	12,084		471.3			5,484	
	Ind. Hulu	79,251	19,337		6,700	200		30,293	1,700	727					16,133	
	Ind. Hilir	4,493	1,125					1,654	115,261	67,006.7		1,178.6			33,165	
	Kep. Riau	50,961	11,320					12,341	29,585	13,648.7		314.3			15,980	
	Total	255,905	64,692.6		7,184	800		81,689	181,222.8	97,707.4		2,043			89,017	
	Pelita II															
1979	Kampar	66,647	18,272		200	200		19,528	18,030	6,009.6		186.7			20,076	
	Bengkalis	59,619	15,055		400	200		16,955	28,280	11,924		1,119.7			5,484	
	Ind. Hulu	80,893.4	19,068.3		8,200	300		32,470	1,499	58.8		266			21,902	
	Ind. Hilir	3,562	1,061.8					1,097	126,813	68,704.9		2,799.6			33,044	
	Kep. Riau	51,858	11,365			150		12,333	27,089	11,827.5		746.5			12,017	
	Total	262,559.4	64,822.1		8,800	850		82,623	201,711	98,524.8		5,118.5			93,523	
1980	Kampar	67,171	16,250		8,898	250			17,040.3	3,948.6		547				
	Bengkalis	58,565	14,875.2		2,757	250			30,632.7	13,008.4		2,233				
	Ind. Hulu	82,150.4	22,979.5		11,800	300			1,924	947		533				
	Ind. Hilir	3,562	1,135.6						133,616.6	68,992		5,603				
	Kep. Riau	50,120.2	12,769.1			200			31,011.92	14,504		2,314				
	Total	260,568.6	68,009.4		23,455	1,000			214,229.72	101,400		11,432				
*)1981	Kampar	63,108	17,424.4		11,538	250			17,809.5	3,979.7		814				*) 1982 - 1990 estimate number
	Bangkalis	58,087	14,420.5		3,102	250			32,632.7	13,292		2,500				
	Ind. Hulu	89,008	22,612.7		14,900	300			2,436	1,066.4		400				
	Ind. Hilir	4,127	1,061						130,224.6	70,347.1		17,393				
	Kep. Riau	47,335	11,784.12		564	200			32,881.92	13,864.1		2,781				
	Total	261,665	67,302.72		30,104	1,000			215,984.72	103,549.3		23,888				
1982	Kampar	68,557	18,091.4		9,409	250			38,433.5	4,093.8		684				
	Bangkalis	57,944	14,331.5		2,776	250			36,432.7	13,296.5		2,367				
	Ind. Hulu	94,766	22,285.7		18,100	300			2,813	1,140.4		466				
	Ind. Hilir	4,012	1,016						166,690.6	70,870.8		17,260				
	Kep. Riau	46,210	11,321.12		564	200			34,614.92	14,573.6		2,648				
	Total	271,489	67,045.72		30,849	1,000			278,984.72	103,975.1		23,425				
1983	Kampar	71,725	18,680.4		9,184	250			19,147.5	4,207.3		747				
	Bangkalis	57,478	14,497.5		2,776	250			38,365.7	13,353.16		2,433				
	Ind. Hulu	102,113	21,782.7		4,400	300			3,620	1,196.26		466				
	Ind. Hilir	3,900	973						181,240.6	71,085		17,326				
	Kep. Riau	44,116	11,454.12		564	200			36,413.92	15,283.1		2,714				
	Total	280,332	67,387.72		16,924	1,000			278,787.72	105,126.82		23,686				
1984	Kampar	77,323	19,767.7		9,154	250			9,849.5	4,256.3		747				
	Bangkalis	56,421	14,855.3		2,610	250			38,365.7	15,172.9		2,433				
	Ind. Hulu	102,113	21,788.9		4,400	300			3,705	1,254.5		466				
	Ind. Hilir	3,900	930						199,781.8	71,601.9		17,326				
	Kep. Riau	45,116	11,501.12		564	200			38,212.92	14,922.8		2,774				
	Total	284,873	68,843.02		16,728	1,000			289,914.72	107,208.4		23,646				
1985	Kampar	80,439	20,279.8		9,624	250			10,331.5	4,285.2		747				
	Bangkalis	55,833	15,146.5		2,610	250			40,298.7	15,148		2,433				
	Ind. Hulu	101,344	22,119.2			300			4,130	1,256.5		466				
	Ind. Hilir	3,685	889						216,322.6	71,940.4		17,326				
	Kep. Riau	43,020	11,535.12		564	200			40,011.92	14,406.4		2,714				
	Total	284,341	70,069.62		12,798	1,000			311,334.72	107,016.5		23,684				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1986	Kampar	84,009	20,760.3		10,124	250			11,253.5	42407.2		747				
	Bengkalis	55,260	13,676.4		2,610	250			42,231.7	15,681		2,433				
	Ind. Hulu	98.807	23,792.7			300			4,595	1,218.4		466				
	Ind. Hilir	3,582	849						232,863.6	73,672.9		17,326				
	Kep. Riau	42,016	11,796.12		364	200			41,810.92	14,261.3		2,714				
	Total	283,674	71,874.52		13,298	1,000			332,754.72	309,241		23,686				
1987	Kampar	87,459	21,178.1		10,124	250			11,955.5	4,830.7		747				
	Bengkalis	54,704	16,228.7		2,610	250			44,164	17,171.8		2,433				
	Ind. Hulu	96,341	25,196.2			300			5,040	1,429.4		466				
	Ind. Hilir	3,482	820						249.404.6	87,726.2		17,326				
	Kep. Riau	41,040	11,917.12		364	200			43,609.92	15,636.6		2,714				
	Total	283,026	75,330.12		13,298	1,000			354,174.02	126,794.7		23,686				
1988	Kampar	91,156	23,776.3		10,124	250			12,657.5	5,300.1		747				
	Bengkalis	54,333.7	17,118.1		2,610	250			46,097.7	18,891.8		2,433				
	Ind. Hulu	93,944	29,731.2			300			5,485	1,869.4		466				
	Ind. Hilir	3,385	773						265,945.6	102,009		17,326				
	Kep. Riau	40,090	10,324.12			200			45,409.92	17,241.4		2,714				
	Total	282,912	81,722.72		13,298	1,000			375,594.72	145,311.7		23,686				
1989	Kampar	94,750	29,318.7		10,468	250			10,359.5	6,047		747				
	Bengkalis	53,980	18,365.2		2,610	250			48,030.7	20,497.4		2,433				
	Ind. Hulu	91,614	36,705.2			300			5,930	2,195.4		466				
	Ind. Hilir	3,290	736						282,486.6	116,177.6		17,326				
	Kep. Riau	39,168	7,624.12		564	200			47,207.92	18,731.8		2,714				
	Total	282,802	92,949.2		13,642				397,014.72	163,649.2		23,686				
1990	Kampar	98,257	33,798.4							14,061.6		6,650.8				
	Bengkalis	53,633	20,180.6							49,963.7		22,159.8				
	Ind. Hulu	89,349	45,110.2							6,375		2,378.1				
	Ind. Hilir	3,257	700							299,027.6		130,402.8				
	Kep. Riau	38,272	4,225.12							49,006.92		20,278.9				
	Total	282,768	106,014.32							418,434.72		182,070.4				

Source: Plantation Service Riau Province

5.2.6 Construction Materials and Other Cargos

Movement of amounts of palm oil/kernel and fertilizer between plantation sites and the port will likely give rise to major changes in present cargo flow patterns of Riau Province and the southern part of North Sumatra. As the improvement of connecting roads proceeds, being built up to keep pace with the progress of plantation development, it is expected that Dumai Port's hinterland for general cargoes will gradually encroach on the hinterlands of neighbooring ports such as Pekanbaru, Rengat, Selat Panjang, Tanjung Balai, etc.

A clearer picture of this future situation can be obtained by focusing on port cargo that will be transported over land by truck. According to the port cargo volume forecast of the previous sections, the number of trucks (capacity, 8t) by commodity going to/from the port is calculated at about 300 vehicle/day for palm oil, 100 for fertilizer, 50 for rice and 50 for forestry products; for a total of about 500 vehicles/day. This large flow of port cargo will be running between the port and the plantation sites. But for higher land transportation efficiency (or higher trucker profits) other cargo generated in the vicinity of plantations or in areas along roads are very likely to be carried on the same traffic route. As a consequence, a new port hinterland division in Riau Province and a new port cargo traffic pattern will be established. The overall port cargo movement in Riau Province has been discussed in Cahpter 4. As mentioned, if one takes into account (from notrh ot south) Kaula Tanjung, Tanjung Balai, Labuhan Bilik, Pekanbaru, Rengat, Tembilahan, etc. the hinterland of Dumai Port includes the districts of Bengkalis, Kampar and Labuhan Batu, all of which are within a 200 km transport distance of Dumai Port. Also, in the hinterland of Dumai Port there are several small ports such as Siak Sri Indrapura. Bagansiapi-api, Seneboi, Panipahan and Selat Panjung. The activities of these ports are shown in Tables 5.2.43 ~ 5.2.46. The future role of Dumai Port in terms of general cargo movement in its hinterland can be determined by analyzing cargo statistics from these ports. Each port can be chatacterized by its major cargo: crude oil, rice, logs and construction materials at Dumai Port, fishery products at Bagansiapi-api, logs at Seneboi, general cargo and rubber at Pekanbaru. Of the commodities itmized in the Tables, classified under the catagory of construction material and other cargoes are fishery products, agricultural products, foodstuffs, general cargo and other goods.

The current in/out general cargo volume for the area that will encompass Dumai Port's future hinterland (all of Bengkalis and half of Kampar) has been calculated using cargo statistics for Dumai, Siak Sri Indrapura, Sei Pakning, Bagansiapi-api, Seneboi, Panipahan and Selat Panjang. The total cargo volume averaged to about 140 kg per person in 1978 ~ 1979. This 1979 value has been set as the base value to which population and per capita income growth rates will apply.

The hinterland population relying on Dumai Port for general cargo supplies was calculated at 460,000 in the 1980 census as shown in Table 5.2.47 and Fig. 5.2 13. In addition, the population of plantation areas in the southern part of North Sumatra has been included in the general cargo demand. The annual population growth rate has been assumed to be 3.11%, applying to all of Riau Province and due to the effect of transmigration. Per capita genral cargo demand has been assumed to increase at 3.6% the same rate as for per capita income growth.

Industrial development in Riau Province, such as palm oil mills, a hydrocracker factory, a hydraulic power plant, saw mills, etc. will require construction/operation/maintenance materials. The construciton of the hydraulic powet plant of 160,000 kw near Bangkinang is planned to

commence in 1985 and involves various kinds of construction materials such as cement, steel bars, electric wire and machinery. Most of such cargoes are to be unloaded at Dumaai Port and their volume is estimated at about 60,000 t. The hydrocracker Pertamina factory is scheduled to be completed in 1983 and after completion the volume of general cargo for oil related activity there is estimated at about 30,000 t per year involving pipe, steel, maintenance parts, etc. 35,000 t of such cargo must be added to the aforementioned value. The total volume of general cargo through Dumai Port is thus forecast at about 160,000 t in 1990 and 300,000 t in 2000.

Table 5.2.43 Cargo unloaded for Interinsuler Trade by Port and Commodity in Riau Province 1981 (t)

Commodity	Port						
	Pekanbaru	Dumai	Siak Sri Indrapura	Bagan Siapi Api	Sinaboi	Panipahan	Selat Panjang
SALTED FISH	-	-	-	-	-	-	-
RICE	804	12,500	2	1,341	89	1	5,266
SUGAR CANE	10,578	-	-	757	52	110	1,383
SALTED	3,332	500	-	21,700	196	1,377	604
MAIZE	-	-	-	-	-	-	-
SAGO	-	-	-	-	-	-	-
COOKING OIL	7,327	-	-	385	18	42	126
SMALL WARES	-	-	-	-	96	12	-
FRESH SHRIMP	-	2	-	-	8	-	-
COPRA	-	-	-	-	-	-	-
COPRA CAKES	-	-	-	-	-	-	-
PEANUTS	25	-	-	11	0	-	-
RUBBER	11,287	-	-	-	-	-	-
CEMENT	60	-	-	137	5	5	891
BOARD	64	-	-	324	168	-	-
OTHER CONSTRUCTION MATERIALS	4,686	31,495	-	54	1	69	387
KEROSENE	-	-	39	3,428	33	617	900
CRUDE OIL	-	307,343	-	-	-	-	-
OTHER FUEL	-	-	42	-	736	455	2,275
REF OIL	-	111,553	-	-	-	-	-
TIN ORE	-	-	-	-	-	-	-
MACHINERY	464	6,141	-	-	-	3	-
DRUM	-	-	-	-	-	-	-
RESIDUEL FUEL OIL	-	463,248	-	-	-	-	-
SAND	-	-	-	-	9	-	-
CHAR COAL	-	-	-	-	-	-	-
OTHER WOOD	700	-	-	-	-	-	-
SOAP	39	-	-	219	-	3	118
PAPER	-	-	-	126	-	4	-
WHEAT FLOUR	5,045	-	-	625	29	5	945
CIGARETTES	-	-	-	186	6	30	8
VEGETABLES	-	-	-	-	-	-	157
TEXSTIL	33	-	-	1	-	0	8
ICE BLOCK	-	-	-	-	8	398	-
GASOLINE	-	-	-	-	-	160	-
COTTON	-	-	-	-	-	1	-
FERTILIZER	1	-	-	-	-	-	-
ZINK ROOF	-	-	-	20	-	-	-
RATTAN	-	165	-	-	-	-	-
ASPHALT	9,838	-	-	-	-	-	-
LOGS	-	-	-	-	30,790	15	-
GENERAL CARGO	29,004	-	9	5,458	-	-	-
OTHER GOODS	45	4,706	-	376	197	384	6,732
	9,358 1)	-	-	-	-	-	-
Total	73,514	937,653	92	35,147	33,176	3,894	19,800

Note: 1) = m^3
Source: Port Administrator

Table 5.2.44 Cargo loaded for Interinsular Trade by Port and Commodity in Riau Province 1981 (t)

Commodity	Port							
	Pekanbaru	Dumai	Sungai Pakning	Bagan Siapi-Api	Sinaboi	Selat Panjang	Siak Sri Indrapura	Panipahan
SALTED FISH	-	-	...	16,598	739	1,074	-	1,138
RICE	480	10,774	...	-	-	-	2	-
SUGAR CANE	-	-	...	-	-	-	-	-
COOKING OIL	-	-	...	-	-	-	-	11
MAIZE	-	-	...	-	-	-	-	-
COCONUT	-	-	...	-	-	-	-	-
COPRA	-	-	...	-	-	-	-	-
WHEAT FLOUR	-	-	...	-	-	-	-	-
SAGO	-	-	...	-	-	22,281	-	-
ICE BLOCK	-	-	...	-	8	-	-	-
COPRA CAKES	-	-	...	-	-	-	-	-
RUBBER	-	-	...	-	-	2,815	35	-
CEMENT	6	-	...	-	-	-	-	-
OTHER FUEL	246	6,669	...	-	-	-	42	-
PLANK BOARD	-	-	...	-	-	-	-	-
"	5,670	2,985	...	-	-	817	-	-
CRUDE OIL	-	1,115,985	...	-	-	-	-	-
REF OIL	-	811,821	...	-	-	-	-	-
BRAND	-	-	...	-	-	-	-	-
CONSTRUCTION MATERIALS	86	-	...	-	-	-	-	-
KEROSENE	-	-	...	-	-	-	39	-
CLOVE	-	-	...	-	-	-	-	-
BOTTLE	458	-	...	-	31	-	-	-
DRUM	113	-	...	-	128	-	-	115
LOGS	-	7,294	...	-	-	-	-	-
"	-	-	...	-	30,790	-	-	1,676
TIN ORE	106	-	...	-	-	-	-	-
MACHINARY	336	1,788	...	-	-	-	-	-
PLYWOOD	760	-	...	-	-	-	-	-
SHRIMP FISH	-	-	...	35	99	-	-	26
PRESERVE	-	-	...	28,439	867	-	-	2
CHARCOAL	762	-	...	-	50	915	-	-
GENERAL CARGO	373	-	...	-	-	-	2	-
OTHER GOODS	929	246	...	141	316	1,271	-	601
Total	-	7,294 1)	...	-	-	-	-	-
	10,325	1,950,260	...	45,213	33,028	29,172	120	3,568

Note: 1) = m^3
Source: Port Administrator

Table 5.2.45 Amount of Export loading by Port and Commodity in Riau Province 1981 (ton)

No.	Commodity	Pelabuhan/Port: Pekanbaru	Dumai	Siak	Sei Pakning	Sinaboi	Tanjung Balai Karimun	SLT	Panjang	Bagan Siapi API	Rengat	Tembilahan	Penipahan	Jualan/Total
1		2	3	4	5	6	7	8	9	10	11	12	13	
1.	IKAN/UDANG BASAH/FISH/FRESH SHRIMP	-	-	-	...	620.000	3,154.350	-	-	-	-	624.500		4,398.850
2.	BUNGKIL/COPRA CAKES	-	-	-	...	-	-	-	-	-	22,555.000	-		22,555.000
3.	ROTAN/RATTAN	571.000	-	-	...	-	40.000	-	-	3.458	-	-		614.458
4.	TEMBAKAU/ROKOK/TOBACCO	13.000	-	-	...	-	-	-	-	-	-	-		13.000
5.	GETAH JELUTUNG/JELUTUNG	985.000	-	-	...	-	-	-	-	434.615	-	-		1,419.615
6.	CRUM RUBBER	17,902.000	-	-	...	-	-	-	-	7,051.350	-	-		24,953.350
7.	KARET/RUBBER	4,772.000	-	-	...	-	326.600	-	-	-	1,764.000	-		6,862.600
8.	MINYAK MENTAH/REF OIL	-	17,514,867.000	-	...	-	-	-	-	-	-	-		17,514,867.000
9.	MOKY RESIDU/RESIDUEL FUEL OIL	-	1,763,807.000	-	...	-	-	-	-	-	-	-		1,763,807.000
								13,680.00(1)						13,680.00(1)
10.	KEPALA ARANG/COAL	-	-	-	...	-	7,194.000	-	-	-	-	-		7,194.000
			80,563.26(1)	10,960.63(1)	...			193,171.46(1)		4,270.43(1)	144,193.48(1)			433,161.26(1)
11.	KAYU BALAK/LOGS	-	-	-	...	-	1,002.000		5,097.000	-	-	-		6,099.000
12.	GAMBIR/GAMBIR	550.000	-	-	...	-	61.627	-	-	-	-	-		611.627
13.	KULIT MANIS/CASIAVERA	28.000	-	-	...	-	-	-	-	-	-	-		8.000
								21,526.76	-	136.07				21,662.83(1)
14.	PAPAN/BROTI/BOARD	9,032.000	102,920.000	-	...	-	21,771.420	-	-	-	-	-		53,723.420
15.	PLYWOOD	3,333.000	-	-	...	-	-	-	-	-	-	-		3,333.000
16.	KULIT/LEATHER	16.000	-	-	...	-	-	-	-	-	-	-		16.000
17.	LAINNYA/OTHER GOODS	69.100	908.000	-	...	-	66,902.200	-	-	-	-	-		67,879.300
			80,563.26(1)	10,960.63(1)	...	-	-	228,378.22(1)	-	4,406.50(1)	14,419.548	-		468,304.09
	Jumlah/Total	37,273.100	19,302,932.000	-	...	620.000	100,452.197	-	5,097.000	7,489.423	24,319.000	624.500		19,478,377.220

Note : (1) = m^3

Source : Port Administrator

Table 5.2.46(a) Import unloaded by Port and Month in Riau Province 1981 (ton)

No.	Month	Port					
		Pekanbaru	Dumai	Senaboi	Panipahan	TG. Balai	Total
1	2	3	4	5	6	7	8
1.	JANUARY	1,705.000	12,380.000	36.000	50.000	-	14,171.000
2.	FEBRUARY	1,976.000	11,666.000	24.000	-	8.500	13,674.500
3.	MARCH	581.000	...	42.000	-	-	623.000
4.	APRIL	899.000	...	42.000	-	-	941.000
5.	MAY	1,112.000	...	36.000	-	14.000	1,162.000
6.	JUNE	1,934.000	...	24.000	-	243.000	2,201.000
7.	JULY	3,627.000	5,364.000	24.000	-	-	9,015.000
8.	AUGUST	754.000	8,081.000	30.000	-	-	8,865.000
9.	SEPTEMBER	5,954.000	8,512.000	30.000	-	-	14,496.000
10.	OCTOBER	2,500.000	...	30.000	-	-	2,530.000
11.	NOVEMBER	2,799.000	35,303.000	24.000	-	-	38,126.000
12.	DECEMBER	2,436.000	39,293.000	30.000	-	-	41,759.000
	Total	26,277.000	120,599.000	372.000	50.000	265.500	147,563.500

Source: Port Administrator

Table 5.2.46(b) Import unloaded by Commodity and Month in Riau Province 1981 (ton)

No.	Month	Commodity							Total
		Beras	BHN Bangunan	Besi	Pupuk	Cancar	Mesin/Pipa	Lain-Lainnya	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	JANUARY	-	-	43.000	7,500.000	482.000	3,509.000	2,637.000	14,171.000
2.	FEBRUARY	3,000.000	212.000	-	-	265.000	4,053.500	6,144.000	13,674.500
3.	MARCH	-	-	-	-	-	581.000	42.000	623.000
4.	APRIL	-	264.000	-	-	608.000	27.000	42.000	941.000
5.	MAY	-	-	-	-	1,044.000	82.000	36.000	1,162.000
6.	JUNE	-	266.000	-	388.000	1,101.000	-	446.000	2,201.000
7.	JULY	-	130.000	-	-	1,247.000	3,741.000	3,897.000	9,015.000
8.	AUGUST	-	200.000	1,047.000	-	505.000	4,679.000	2,434.000	8,865.000
9.	SEPTEMBER	-	-	-	-	1,173.000	6,739.000	6,584.000	14,496.000
10.	OCTOBER	-	-	-	-	1,212.000	7.000	1,311.000	2,530.000
11.	NOVEMBER	-	186.000	22.000	-	1,592.000	33,407.000	2,919.000	38,126.000
12.	DECEMBER	6,034.000	-	-	-	769.000	30,510.000	4,446.000	41,759.000
	Total	9,034.000	1,258.000	1,112.000	7,888.000	9,998.000	87,335.500	30,938.000	147,563.500

Source: Port Administrator

Table 5.2.47 Population in Riau Province (1980)

No.	District	Population	%	Area (km²)	%	Population Density per km²
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Town					
I.	Kodya Pekanbaru	186,199	8.61	62.96	0.067	2,957
1.	Pekanbaru Kota	35,399	1.64	2.26	0.002	15,663
2.	Senapelan	32,298	1.49	6.65	0.007	4,857
3.	Sukajadi	47,679	2.20	5.10	0.006	9,349
4.	Lima Puluh	30,467	1.41	4.04	0.004	7,541
5.	Sail	17,291	0.80	3.26	0.004	5,304
6.	Rumbai	23,065	1.07	41.65	0.044	554
II.	Kampar	362,509	16.75	28,291.86	29.92	13
1.	Bangkinang	42,460	1.96	547.39	0.58	78
2.	Kampar	69,600	3.22	1,003.53	1.06	69
3.	Siak Hulu	67,708	3.13	4,150.87	4.39	16
4.	Kampar Kiri	24,360	1.12	1,961.41	2.07	12
5.	Langgam	7,344	0.34	3,069.11	3.25	2
6.	Pangkalan Kuras	9,806	0.45	1,724.75	1.82	6
7.	Bunut	10,515	0.49	3,486.21	3.69	3
8.	Kuala Kampar	24,870	1.15	3,707.77	3.92	7
9.	XIII Koto Kampar	17,962	0.83	1,752.90	1.85	10
10.	Tandun	10,254*	0.47	1,016.57	1.08	10
11.	Rokan IV Koto	10,824*	0.50	1,114.31	1.18	10
12.	Kunto Darussalam	6,869*	0.32	1,179.47	1.25	6
13.	Rambah	42,866*	1.98	1,029.60	1.09	42
14.	Kepenuhan	6,974*	0.32	918.82	0.97	8
15.	Tambusai	10,097*	0.47	1,629.09	1.72	6
III.	Bengkalis	501,924	23.20	30,116.45	31.85	17
1.	Bengkalis	69,680*	3.22	938.40	0.99	74
2.	Rupat	23,731*	1.10	1,524.85	1.61	16
3.	Bukit Kapur	10,038*	0.46	1,197.00	1.27	8
4.	Mandau	64,961*)	3.00	6,985.47	7.39	9
5.	Siak	18,721*)	0.87	2,808.55	2.97	7
6.	Sei Apit	25,365	1.17	2,202.54	2.33	12
7.	Tebing Tinggi	100,232	4.63	2,358.93	2.49	42
8.	Bukit Batu	28,674*	1.33	1,870.21	1.98	15
9.	Bangko	70,643*	3.27	2,528.35	2.67	28
10.	Merbau	29,432	1.36	1,348.91	1.43	22
11.	Kubu	36,392*	1.68	3,023.59	3.20	12
12.	Tanah Putih	24,055*	1.11	3,329.65	3.52	7

continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)
IV.	Indragiri Hulu	227,885	10.53	15,854.29	16.77	14
1.	Rengat	39,298	1.82	2,131.05	2.25	18
2.	Pasir Penyu	47,411	2.19	1,485.94	1.57	32
3.	Peranap	13,560	0.63	1,700.98	1.80	8
4.	Cerenti	16,893	0.78	906.01	0.96	18
5.	Kuantan Hilir	26,430	1.22	788.72	0.83	34
6.	Kuantan Tengah	40,670	1.88	541.10	0.57	75
7.	Kuantan Mudik	26,656	1.23	1,935.57	2.05	14
8.	Sengingi	6,023	0.28	3,484.63	3.69	2
9.	Siberida	10,944	0.50	2,880.29	3.05	4
V.	Indragiri Hilir	398,214	18.40	11,605.97	12.27	34
1.	Tembilahan	53,143	2.46	377.99	0.40	141
2.	Tempuling	30,611	1.41	1,055.68	1.12	29
3.	Kuala Indragiri	33,287	1.54	723.35	0.76	46
4.	Enok	56,323	2.60	1,550.99	1.64	36
5.	Reteh	109,765	5.07	1,622.67	1.72	68
6.	Mandah	27,890	1.29	1,479.29	1.56	19
7.	Gaung Anak Serka	63,622	2.94	2,684.74	2.84	24
8.	Kateman	23,573	1.09	2,111.31	2.23	11
VI.	Kepulauan Riau	422,712	19.53	8,099.69	8.56	52
1.	Bintan Selatan	90,250	4.17	632.08	0.67	143
2.	Bintan Utara	16,072	0.74	501.75	0.53	32
3.	Bintan Timur	28,484	1.32	521.30	0.55	55
4.	Bintan	38,663	1.79	612.53	0.65	63
5.	Kundur	47,611	2.20	358.39	0.38	133
6.	Karimum	47,926	2.21	221.55	0.23	216
7.	Tambelan	3,880	0.18	169.42	0.18	23
8.	Siantan	22,200	1.03	267.17	0.28	83
9.	Midai	5,062	0.23	39.10	0.04	129
10.	Moro	17,022	0.79	260.65	0.28	65
11.	Singkep	36,000	1.66	808.02	0.85	45
12.	Senayang	13,294	0.61	397.49	0.42	33
13.	Lingga	18,952	0.88	892.72	0.94	21
14.	Jemaja	6,689	0.31	260.65	0.28	26
15.	Serasan	7,483	0.34	234.58	0.25	32
16.	Bunguran Barat	12,887	0.60	938.34	0.99	14
17.	Bunguran Timur	10,237	0.47	983.95	1.04	10
VII.	Kota Adm. Dumai	64,453*	2.98	530.38	0.56	122
1.	Dumai Barat	22,854	1.06	423.38	0.45	54
2.	Dumai Timur	41,599	1.92	107.00	0.11	389
	Total	2,163,896	100.00	94,561.60	100.00	23

* Indicates districts in the hinterland of Dumai Port for G/C.
Source: Statistic Bureau, Pekanbaru

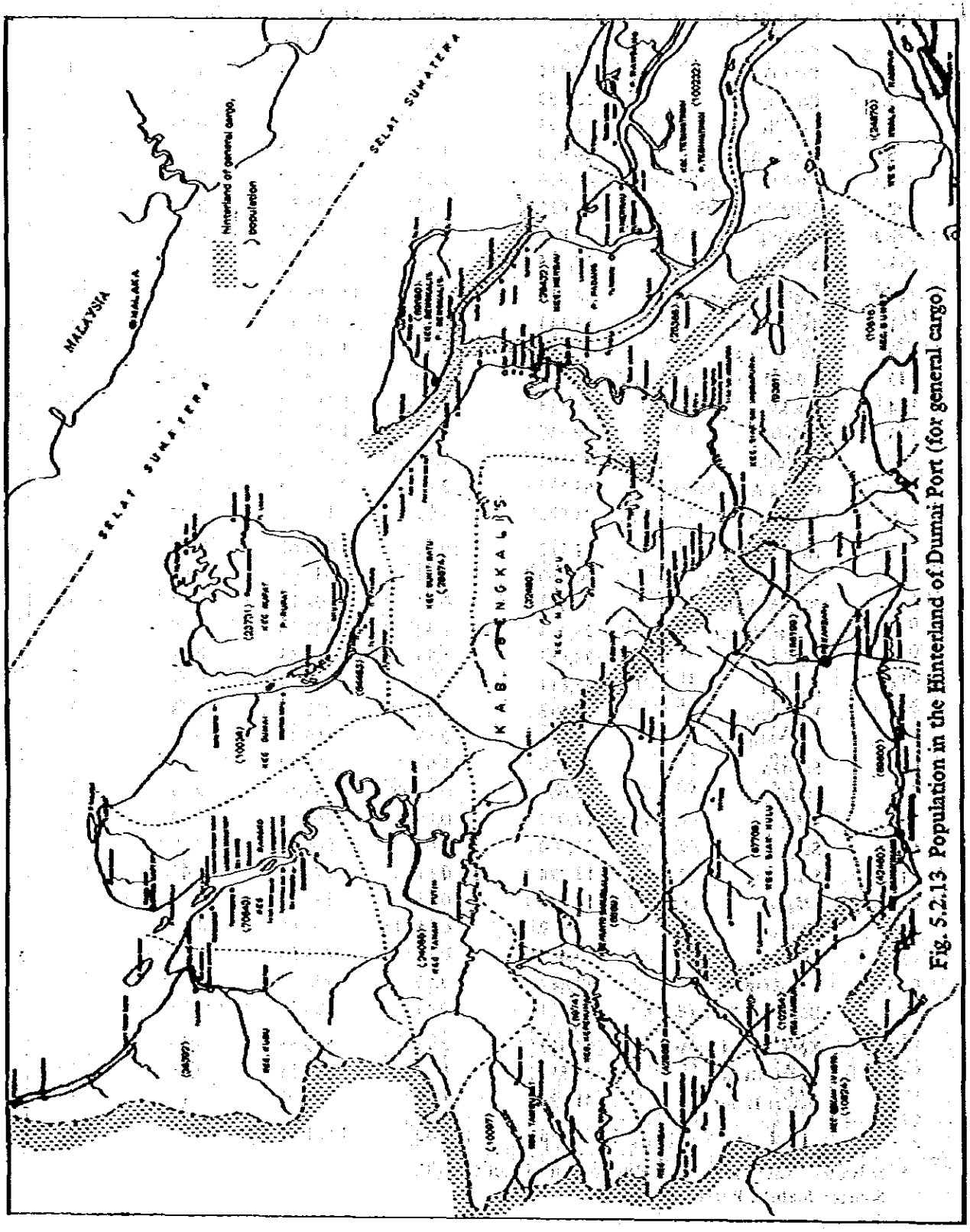


Fig. 5.2.13 Population in the Hinterland of Dumai Port (for general cargo)

5.3 Traffic Demand in 1990 and 2000

Cargo forecasts by commodity were dealt with in the previous sections. This section presents the forecast for total cargo flow through Dumai Port for the target years 1990 and 2000. Future cargo volume and its composition is shown in Table 5.3.1. Table 5.3.2 forecasts cargo by commodity and shipping route. Increases in cargo through Dumai Port are illustrated in Fig. 5.3.1. Total port cargo volume is forecast at 671,000 t in 1985; 1,517,000 t in 1990; 2,406,000 t in 1995; and 3,657,000 t in 2000. Annual growth is predicted to occur at a rate of 9%. The striking feature of this cargo forecast is the large and rapidly increasing share of palm oil, rising from 696,000 t in 1990 to 2,054,000 t in 2000, for an annual increase rate of 11%. The percent of total port cargo occupied by palm oil will increase from 23% in 1985 to 46% in 1990, and then to 56% of the total by the year 2000. It is assumed that 70% of the palm oil will be for export, with the remaining 30% kept for domestic consumption. In contrast to palm oil, other dry cargoes are not expected to increase at such a high rate, nor will their share of total cargo volume undergo such yearly variance. Total volume for other dry cargo is forecast at 514,000 t in 1985, 821,000 t in 1990, 1,198,000 t in 1995 and 1,603,000 t in 2000. These dry cargos will thus increase at a rate of 8% per annum. Of these dry cargoes, palm kernel will increase at the relatively high rate of 12% rising from 107,000 t in 1990 to 343,000 t in 2000. Palm kernel will occupy a 13% share of total dry cargo in 1990. It is assumed that 60% of palm kernels will be for export, and 40% for local consumption. Fertilizer will occupy a 33% share of dry dargo in 1990, increasing from 271,000 t in 1990 to 438,000 t in 2000 at an annual growth rate of 5%. Forestry products, including sawn timber and plywood, are forecast at 139,000 m^3 in 1990 and 250,000 m^3 in 2000, an increase rate of 6% per annum. 90% of these products are assumed to be for export. The total in/out volume of rice is forecast at 122,000 t in 1990 and 189,000 t in 2000, for an annual increase rate of 5%. 20% of total in-coming rice will be reshipped to supply outlying districts within Riau Province. General cargo, including imported construction materials and rubber for export will occupy 22% of the total dry cargo, or 182,000 t in 1990. This will increase to 383,000 t in 2000, rate of 8% per annum.

Table 5.3.1 Cargo Forecast for Dumai Port (000 t)

Commodity	1985		1990		1995		2000	
	Volume	%	Volume	%	Volume	%	Volume	%
Palm Oil	157	23	696	46	1,208	50	2,054	56
Palm Kernel	22	3	107	7	202	8	343	9
Fertilizer	197	29	271	18	353	15	438	12
Timber	79	12	139	9	202	8	250	7
Rice	97	15	122	8	152	7	89	5
G/C & Rubber	119	18	182	12	289	12	383	11
Sub Total (ex. PO)	514	77	821	54	1,198	50	1,603	44
Grand Total	671	100	1,517	100	2,406	100	3,657	100

Table 5.3.2 Cargo Forecast for Dumai Port by Commodity/Trade (000 t)

Commodity	1985					1990					1995					2000				
	Foreign In	Trade Out	Domestic In	Trade Out	Total	Foreign In	Trade Out	Domestic In	Trade Out	Total	Foreign In	Trade Out	Domestic In	Trade Out	Total	Foreign In	Trade Out	Domestic In	Trade Out	Total
Crude Palm Oil		80		47	127		427		209	636		786		362	1,148		1,378		616	1,994
RBD		30			30		60			60		60			60		60			60
Palm Kernel		13		9	22		64		43	107		121		81	202		206		137	343
Fertiliser																				
Urea			75		75			96		96			120		120			146		146
Rock Phosphate	40				40	56				56	74				74	91				91
MOP	45				45	68				68	93				93	118				118
Others	22		15		37	33		18		51	46		20		66	39		24		83
Forestry Products		71		8	79		125		14	139		182		20	202		225		25	250
Rice	45		36	16	97	56		46	20	122	70		57	25	152	87		71	31	189
Rubber							19			19		59			59		79			79
Construction Material	35				35	35				35	35				35	35				35
General Cargo	45	1	25	13	84	69	1	39	19	128	105	2	39	29	195	145	3	81	40	269
Total	232	195	151	93	671	317	696	199	305	1,517	423	1,210	256	517	2,406	535	1,951	322	849	3,657

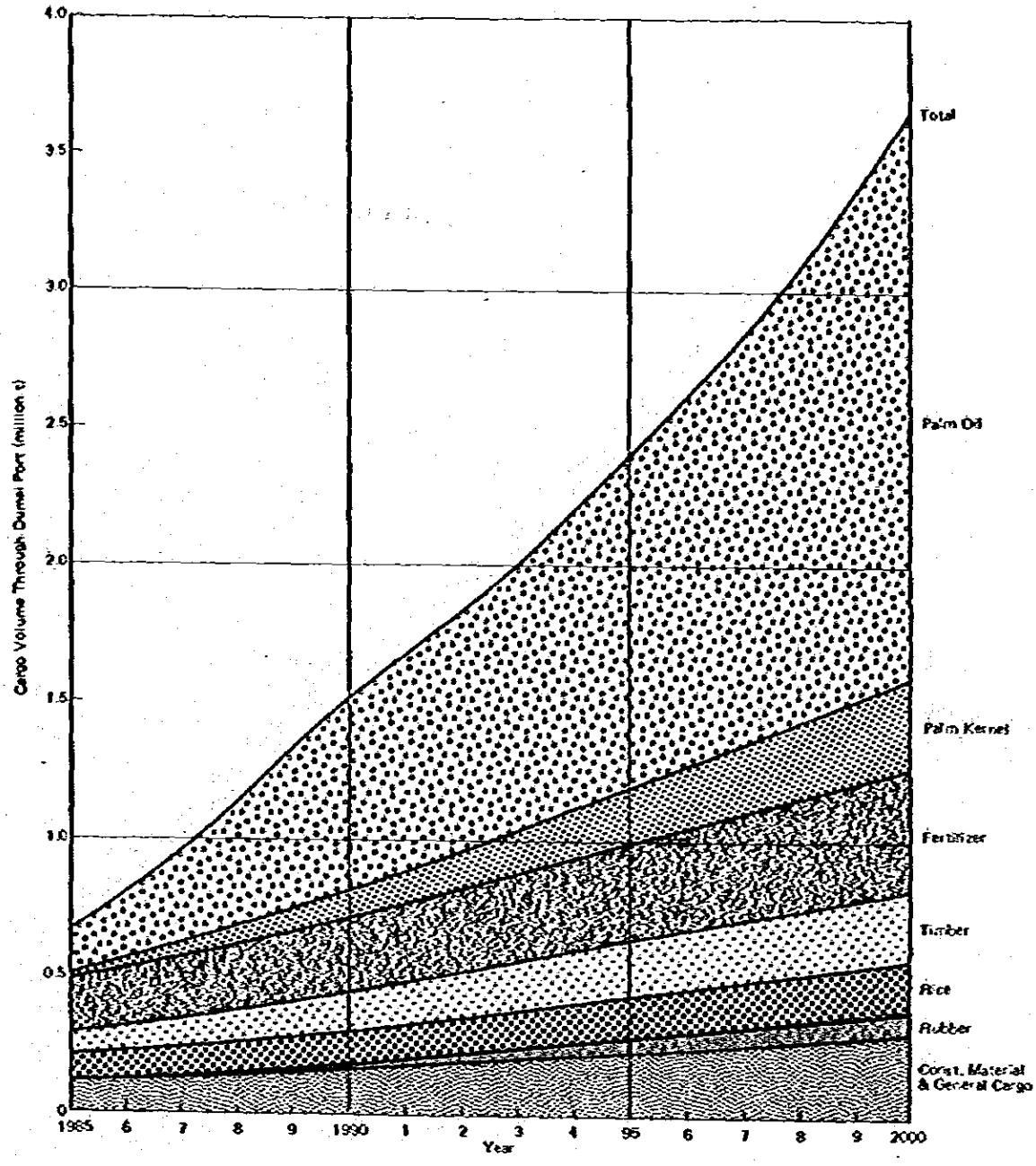
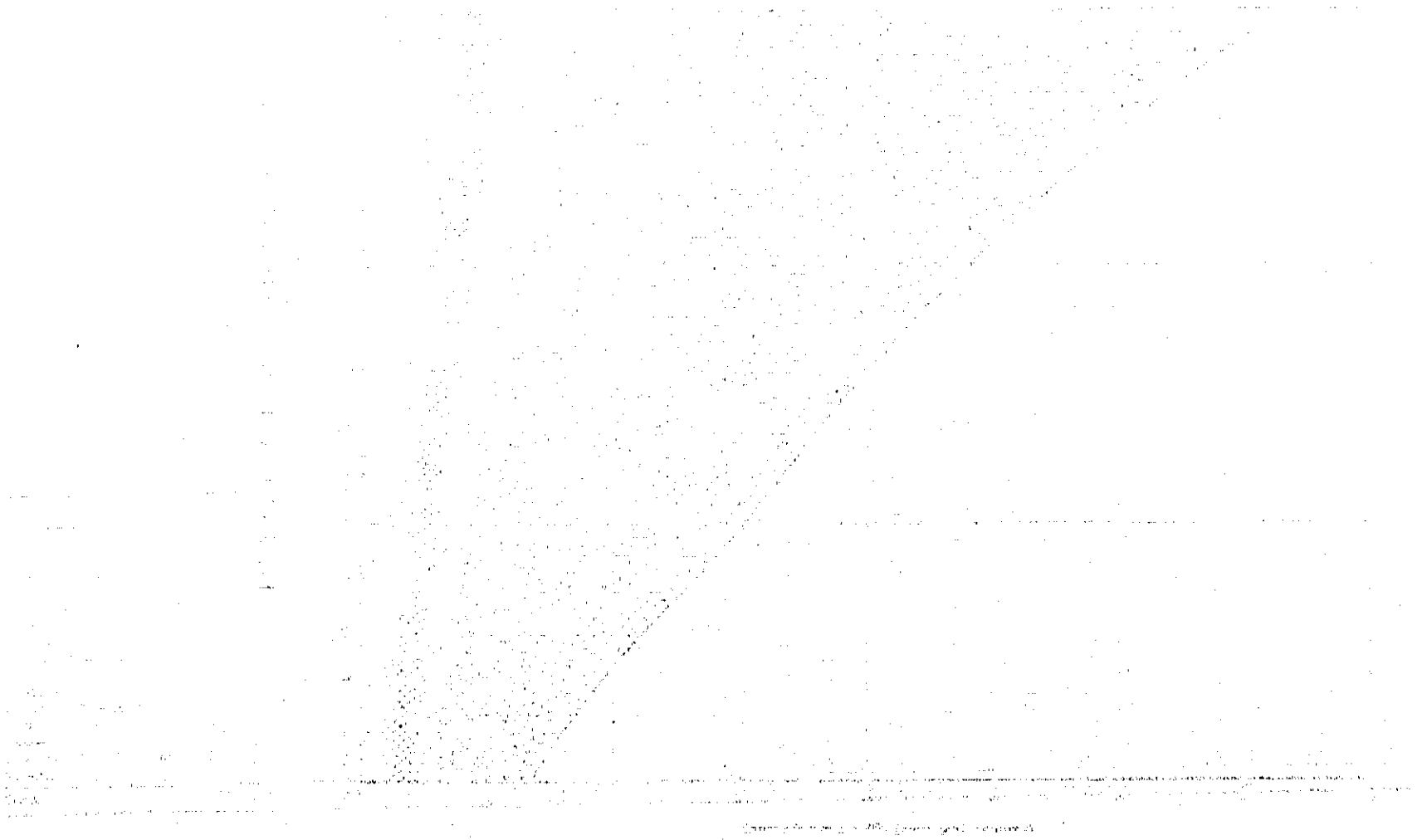


Fig. 5.3.1 Cargo Forecast for Dumai Port



CHAPTER 6.
PORT PLAN