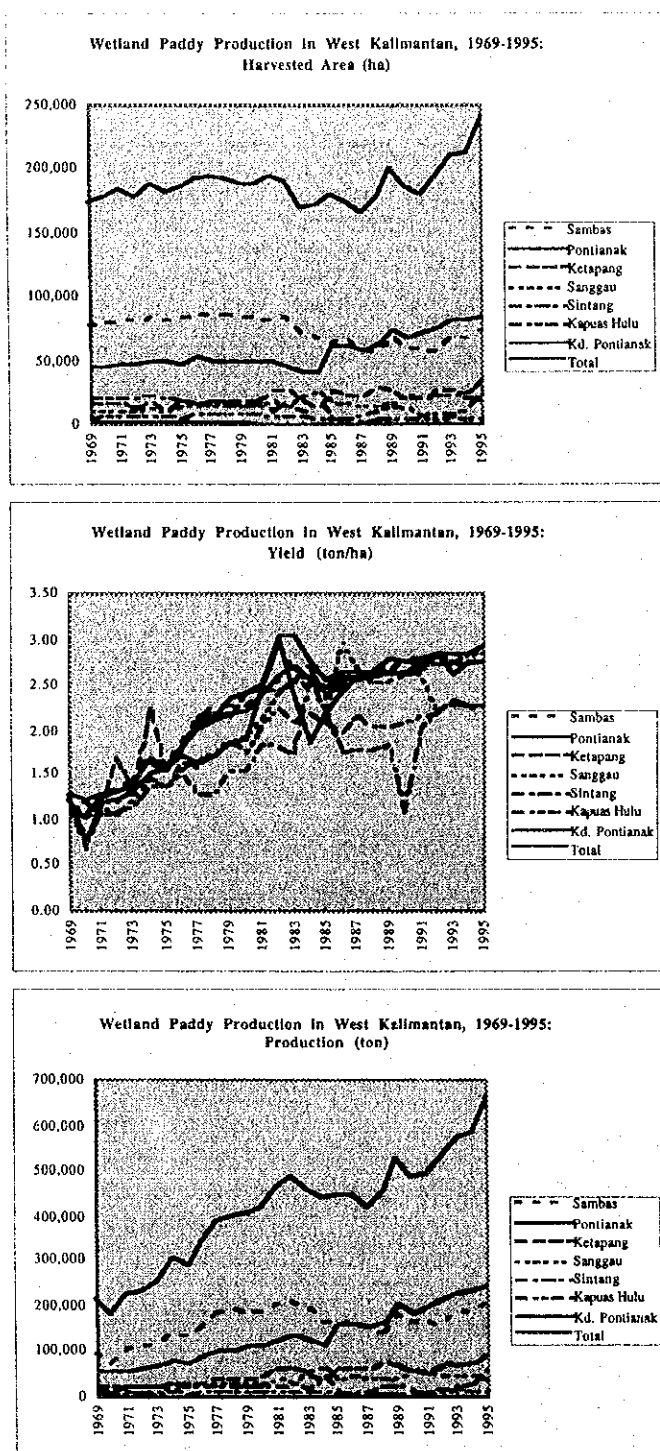
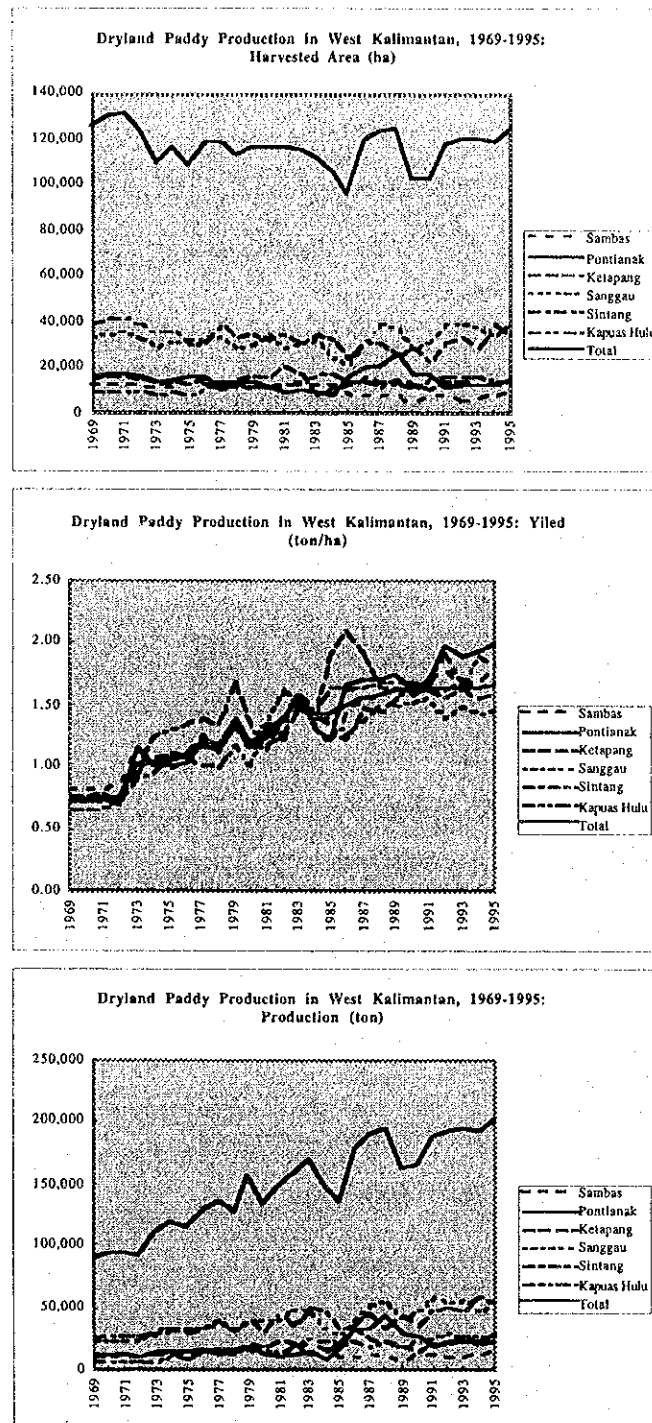


**Figure 4.2.3 Paddy Production in 1969-1995:
Area Harvested, Yield, and Production**



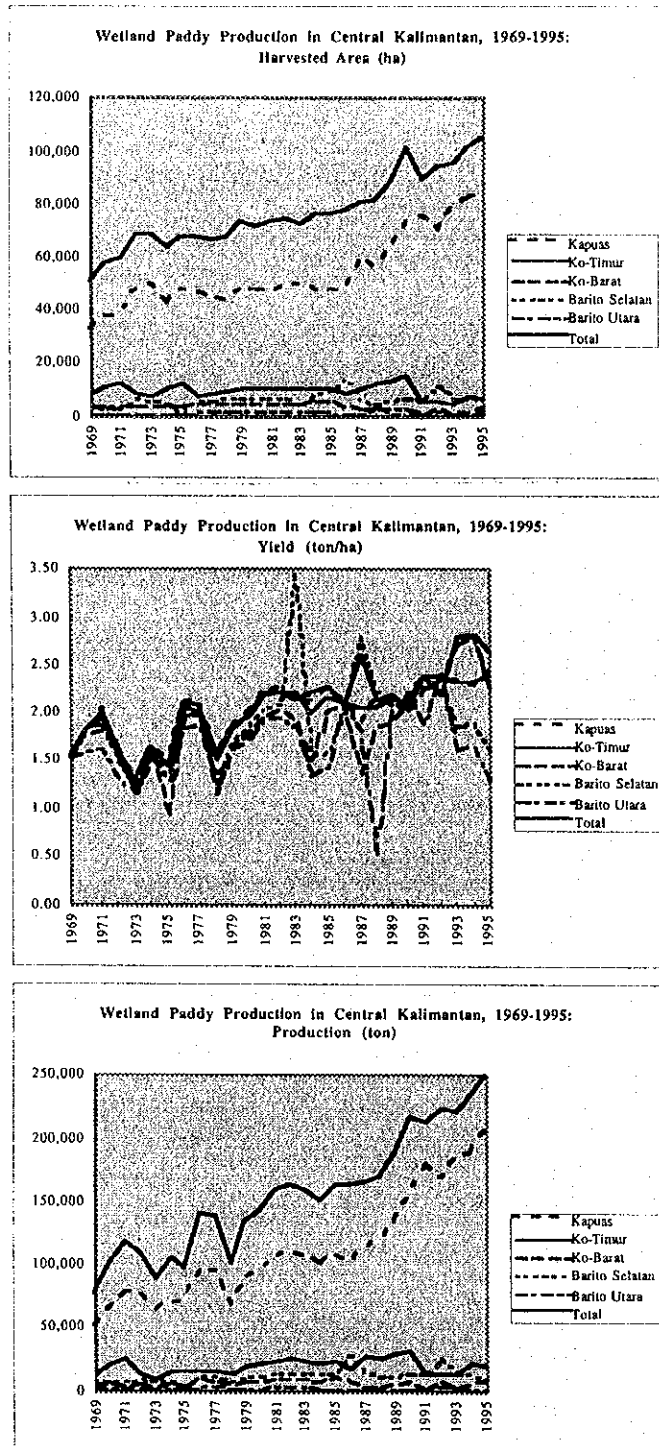
Sources: Dinas Pertanian Tanaman Pangan Kalimantan Barat Tk. I, *Hasil Pembangunan Pertanian: Tanaman Pangan dan Hortikultura Pembangunan Jangka Panjang I (PJPI)*, 1995.
 Kantor Statistik Kabupaten Sambas, *Kabupaten Sambas Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Pontianak, *Kabupaten Pontianak Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Ketapang, *Kabupaten Ketapang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Sanggau, *Kabupaten Sanggau Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Sintang, *Kabupaten Sintang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Kapuas Hulu, *Kabupaten Kapuas Hulu Dalam Angka 1995, 1996*.
 Kantor Statistik Kotamadya Pontianak, *Kotamadya Pontianak Dalam Angka 1995, 1996*.

Figure 4.2.3 Paddy Production in 1969-1995: Area Harvested, Yield, and Production (Continued)



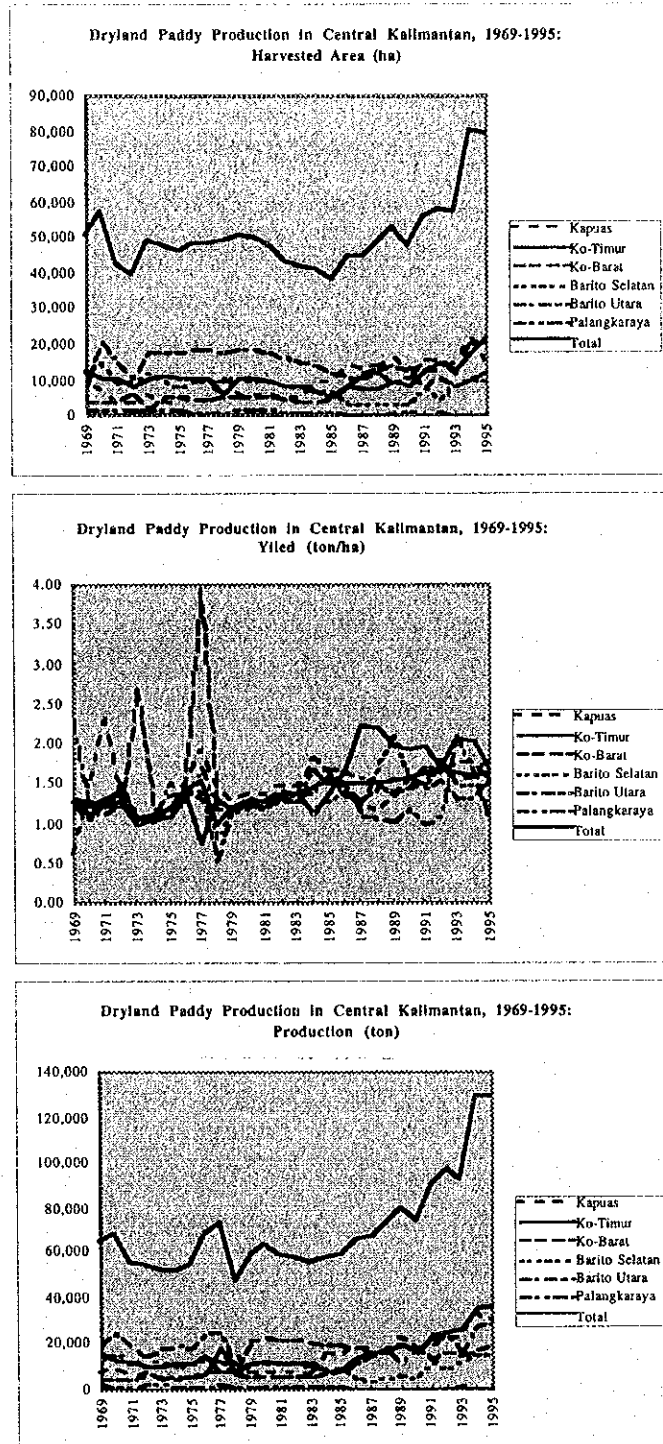
Sources: Dinas Pertanian Tanaman Pangan Kalimantan Barat Tk. I, *Hasil Pembangunan Pertanian: Tanaman Pangan dan Hortikultura Pembangunan Jangka Panjang I (PJPI)*, 1995.
 Kantor Statistik Kabupaten Sambas, *Kabupaten Sambas Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Pontianak, *Kabupaten Pontianak Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Ketapang, *Kabupaten Ketapang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Sanggau, *Kabupaten Sanggau Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Sintang, *Kabupaten Sintang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Kapuas Hulu, *Kabupaten Kapuas Hulu Dalam Angka 1995, 1996*.
 Kantor Statistik Kotamadya Pontianak, *Kotamadya Pontianak Dalam Angka 1995, 1996*.

**Figure 4.2.3 Paddy Production in 1969-1995:
Area Harvested, Yield, and Production (Continued)**



Source: Dinas Pertanian Tanaman Pangan Kalimantan Tengah Tk. I, *Data Tanaman Pangan Kalimantan Tengah 1969-1996, 1997*

Figure 4.2.3 Paddy Production in 1969-1995: Area Harvested, Yield, and Production (Continued)



Source: Dinas Pertanian Tanaman Pangan Kalimantan Tengah Tk. I, *Data Tanaman Pangan Kalimantan Tengah 1969-1996, 1997*

Central Kalimantan's wetland paddy area was deemed to increase remarkably when the area opened by the Peat Swampland Development Project (PLG or the one-million hectare peat land project; for its location, see Figure 4.2.1) in the districts of Kapuas and Barito Selatan became productive. The project was launched in order to improve national food self-sufficiency in early 1996 but suspended in June 1998 amid the economic crisis, criticized for destroying forests and threatening the environment. Even if the planned area of 600,000 ha had been fully developed into wetland paddy fields equipped with modern irrigation systems, it would have unlikely produced 2.5 million tons of paddy per annum. The expected yield of 4 tons/ha/year seemed to be too ambitious, judging from the fact that the average yield of wetland paddy has never reached 2.5 tons/ha/year in the province and that the most fertile wet land has been already utilized by the local people within the project area.³

A higher possibility for increasing paddy production may exist in the expansion of planted area by multiple cropping associated with the construction of irrigation facilities. Multiple cropping is presently practiced only on 16% of the total wetland paddy area in both provinces (Table 4.2.8), though the Agricultural Survey data seem to overestimate the wetland paddy area as compared with the numbers indicated in the provincial production statistics. That is, the total wetland paddy area of West Kalimantan and Central Kalimantan is shown to be 477,000 ha and 280,000 ha, respectively, whereas the total area of *harvested* wetland paddy was 241,000 ha in the former province and 105,000 ha in the latter in 1995 (Table 4.2.5).

Among other food crops (*palawija*), the production of cassava and sweet potatoes has declined or stagnated in recent years. The situation may reflect a change in people's preference or taste towards rice, but it also appears to be a part of the general tendency in which the food production, especially in terms of yield per unit of land, has stagnated in upland agricultural areas due to a shift from swidden agriculture toward sedentary agriculture under population pressure over land as well as to the extensive land enclosure for plantation development. On the other hand, maize and soybean in West Kalimantan and groundnuts in Central Kalimantan have shown relatively high growth in output due to the expansion of market-oriented production, particularly in lowland agricultural areas in West Kalimantan, e.g., Sambas and Pontianak.

The productivity of food crops per unit of land is generally low in the area. In 1995, for example, the yield of paddy (wetland and dryland combined) was 2.38 tons/ha/year in West Kalimantan and 2.05 tons/ha/year in Central Kalimantan, much lower than the national average of 4.31 tons/ha/year.⁴ The low productivity is a fundamental problem of the area's agriculture. It is not merely due to the low level of the application of modern inputs and technologies but

³ This is clearly indicated by overlaying a map of the project area with the soil suitability map prepared by the study team.

⁴ *Kalimantan Barat Dalam Angka 1996*, op. cit., p. 510-511.

originated from Kalimantan's poor soils in contrast with Java's rich volcanic soils. Experts assert that the agricultural systems in Kalimantan are constrained by "low fertility; soil erosion; mineral stress; pernicious weed invasion; failure of irrigation systems; increased flood hazard; salinisation; chemical pollution; loss of natural control agents for insects and other pests; and industrial and urban expansion."⁵ The situation may be reflected in the yield trend in which most food crops have not demonstrated substantial increase in the recent past.

Table 4.2.8 Multiple Cropping Rates of Wetland Paddy in 1995

West Kalimantan								(ha)
District/Municipality	Sambas	Pontianak	Ketapang	Sanggau	Sintang	Kap. Hulu	Kod. Ponti	Total
Technical Irrigation	70	0	0	0	0	0	0	70
Once	20	0	0	0	0	0	0	20
Twice or More	50	0	0	0	0	0	0	50
Semi Technical Irrigation	2,601	4,839	1,750	400	100	555	0	10,245
Once	300	2,832	650	120	25	170	0	4,097
Twice or More	2,301	2,007	1,100	280	75	385	0	6,148
Non Technical Irrigation	6,493	26,914	6,573	6,952	4,816	1,923	0	52,771
Once	3,607	22,376	6,243	4,494	2,721	1,151	0	40,592
Twice or More	2,886	4,538	330	1,558	2,095	772	0	12,179
Rain-fed	38,450	40,385	20,462	23,285	14,541	4,797	0	141,920
Once	28,137	35,472	20,427	20,967	10,993	4,372	0	120,368
Twice or More	10,313	4,913	35	2,318	3,548	425	0	21,552
Pasang Surut	19,798	33,017	9,442	4,078	0	0	71	66,406
Once	11,352	26,173	9,122	140	0	0	71	46,858
Twice or More	8,446	6,844	320	3,938	0	0	0	19,548
Others	6,562	46,120	34,052	37,660	31,960	48,779	111	205,244
Once	6,453	33,617	31,035	37,255	31,631	46,552	111	186,654
Twice or More	109	12,503	3,017	405	329	2,227	0	18,590
Total	73,974	151,275	72,279	71,475	51,417	56,054	182	476,656
Once	49,869	120,470	67,477	62,976	45,370	52,245	182	398,589
Twice or More	24,105	30,805	4,802	8,499	6,047	3,809	0	78,067
Multiple Cropping Rate	32.6	20.4	6.6	11.9	11.8	6.8	0.0	16.4
Ratio of Irrigated Area (%)	12.4	21.0	11.5	9.0	9.6	4.4	0.0	13.2
Central Kalimantan								(ha)
District/Municipality	Kapuas	Ko-Timur	Ko-Barat	Barito Sel.	Barito Ut.	Ko. P'raya	Total	
Technical Irrigation	0	110	0	970	230	0	1,310	
Once	0	110	0	620	230	0	960	
Twice or More	0	0	0	350	0	0	350	
Semi Technical Irrigation	0	3	0	200	260	0	463	
Once	0	3	0	200	260	0	463	
Twice or More	0	0	0	0	0	0	0	
Non Technical Irrigation	40,116	10,125	850	121	751	0	51,963	
Once	29,204	9,775	850	65	751	0	40,645	
Twice or More	10,912	350	0	56	0	0	11,318	
Rain-fed	23,523	8,404	4,400	10,551	909	0	47,787	
Once	17,013	8,404	4,383	10,351	909	0	41,060	
Twice or More	6,510	0	17	200	0	0	6,727	
Pasang Surut	68,182	8,138	1,858	0	0	0	78,178	
Once	41,103	8,138	1,858	0	0	0	51,099	
Twice or More	27,079	0	0	0	0	0	27,079	
Others	42,044	21,568	3,900	26,831	5,771	0	100,114	
Once	42,044	21,568	3,736	26,731	5,771	0	99,850	
Twice or More	0	0	164	100	0	0	264	
Total	173,865	48,348	11,008	38,673	7,921	0	279,815	
Once	129,364	47,998	10,827	37,967	7,921	0	234,077	
Twice or More	44,501	350	181	706	0	0	45,738	
Multiple Cropping Rate	25.6	0.7	1.6	1.8	0.0	0.0	16.3	
Ratio of Irrigated Area (%)	23.1	21.2	7.7	3.3	15.7	0.0	19.2	

Source: Biro Pusat Statistik, Agricultural Survey: Land Area by Utilization for Outside of Java 1995, 1996.

⁵ Kathy MacKinnon et al., *The Ecology of Kalimantan: Indonesian Borneo*, Singapore: Periplus Editions (HK), 1996, p. 4.

Horticulture

A variety of fruits and vegetables are grown in both Wet and Central Kalimantan (Table 4.2.9) and the production tends to increase especially in the districts of Sambas, Pontianak, Kapuas, Kotawaringin Timur, and Kotawaringin Barat in recent years, presumably due to population growth in urban areas. The intensive cultivation of certain kinds of vegetables, such as Chinese cabbages, spinach, and kangkung (water or swamp cabbage), is particularly well developed among ethnic Chinese farmers in the suburban areas of Pontianak and Singkawang, West Kalimantan.

Table 4.2.9 Horticulture Production in 1995

	West Kalimantan		Central Kalimantan	
	Area harvested (ha)	Production (ton)	Area harvested (ha)	Production (ton)
Vegetables				
Spring Onion	337	1,677	74	205
Spinach	1,477	3,295	1,288	3,272
Kidney Bean	224	631	213	560
Chili	2,178 [*]	5,691 [*]	2,148	3,908
Longyam Beans	3,163 [*]	14,834 [*]	3,218	3,483
Kangkung (Water Cabbage)	1,979	4,616	1,202	3,668
Cucumber	2,833	14,715	2,534	5,645
Chinese Cabbage	1,826	5,017	164	418
Eggplant	1,860	4,240	2,319	5,022
Tomato	269	1,439	852	2,683
Pumpkin	321	1,311	420	1,494
Fruits				
Avocado	n.a.	1 [*]	17	61
Star Fruit	n.a.	99 [*]	728	3,077
Duku/Langsat (Lazon)	768 [*]	4,971 [*]	812	7,113
Durian	3,170 [*]	19,081 [*]	1,533	18,267
Jambu (Rose Apple)	356 [*]	1,723 [*]	589	4,437
Mandarin Orange	7,962 [*]	121,980 [*]	796	2,458
Mango	268 [*]	530 [*]	508	1,370
Mangosteen	n.a.	n.a.	29	67
Cempedak/Nangka (Jackfruit)	n.a.	3,989 [*]	702	1,940
Pineapple	329 [*]	4,042 [*]	719	2,839
Papaya	117 [*]	2,098 [*]	147	1,675
Banana	4,511 [*]	17,497 [*]	4,175	20,639
Rambutan	2,748 [*]	6,593 [*]	3,934	12,675
Salak (Zallaca Edulis)	44 [*]	727 [*]	29	88
Sapodilla	162 [*]	781 [*]	327	1,098
Sirsak	n.a.	289 [*]	44	153
Sukun (Breadfruit)	n.a.	172 [*]	19	87

Note: ^{*}) Preliminary figures.

Sources: Kantor Statistik Propinsi Kalimantan Barat, *Kalimantan Barat Dalam Angka 1996, 1997*;

Pemerintah Propinsi Dati. I Kalimantan Barat, Dinas Pertanian Tanaman Pangan, *Laporan Tahunan Dinas Pertanian Tanaman Pangan Tahun 1995, 1996*.

Pemerintah Propinsi Dati. I Kalimantan Tengah, Dinas Pertanian Tanaman Pangan, *Tanaman Pangan dan Hortikultura Kalimantan Tengah Dalam Angka 1996, 1997*.

Estate Crops

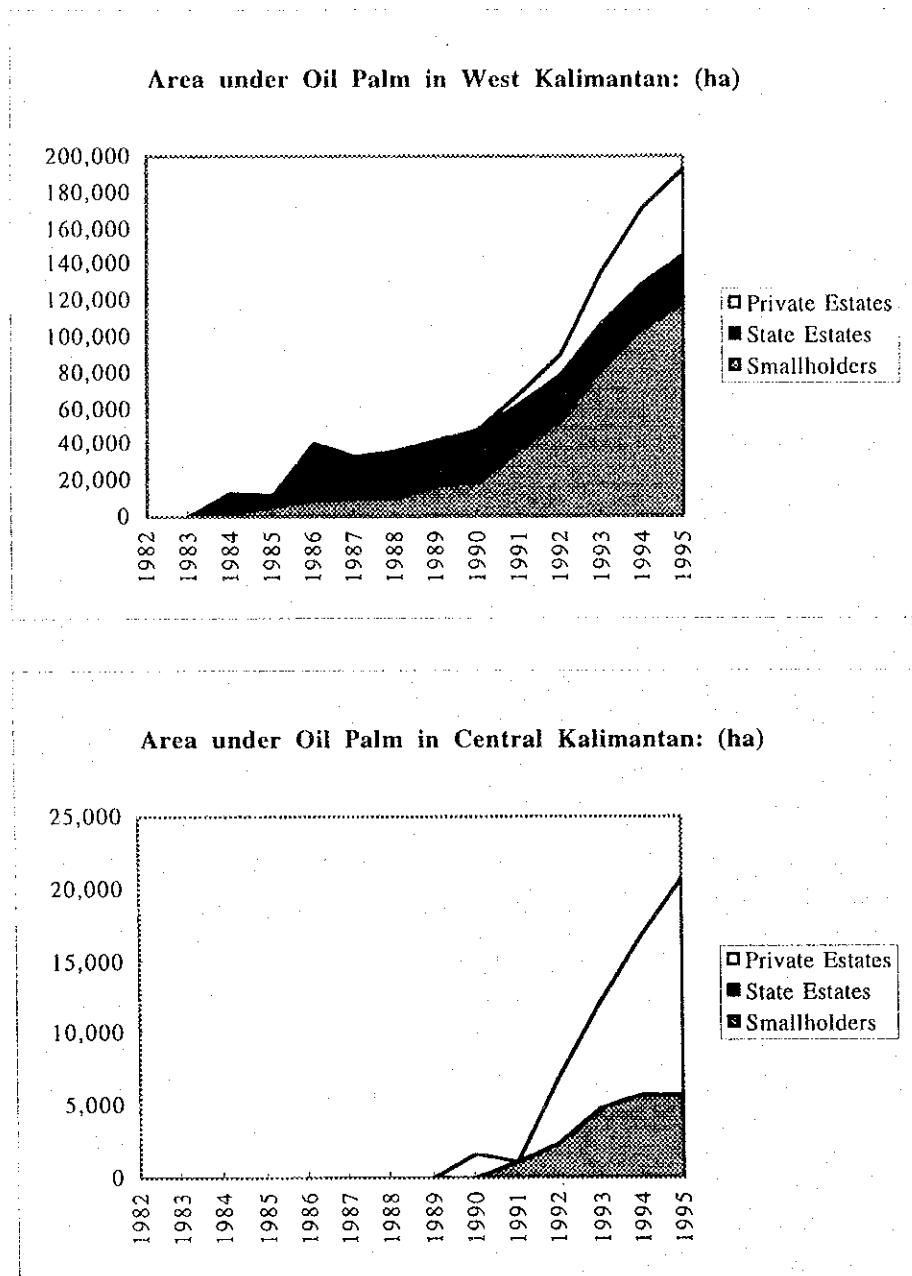
While rubber production has exhibited moderate, but very steady, growth in the last two-and-a-half decades, the recent expansion of area under oil palms is spectacular. The oil palm plantation boom started in West Kalimantan in the mid-1980s and in Central Kalimantan in the early 1990s, only after land became no longer easily available for expansion in Sumatra (Figure 4.2.4). For the period of 1990-1995, the planted area grew at the annual average rates of 32% and 67% in West and Central Kalimantan, respectively, and in 1996, reached 209,000 ha in the former province and 90,000 ha in the latter (Tables 4.2.10 and 4.2.11). The existing plans for oil palm plantation development of the two provinces suggest that the expansion of area under oil palm will be further accelerated in the next 5-10 years and the most important tree crop in the study area during the Seventh Five-Year Development Plan (REPELITA VII, 1999-2003).

In the study area, as in other parts of the country, there are three management types of tree crop plantations: 1) large estates of state-owned companies (PTP); 2) large estates of private companies (PBS); and 3) smallholder farms. Oil palm plantation development in West Kalimantan was led by state-owned companies until the early 1990s, following the development pattern of Sumatra, the largest oil palm producer in Indonesia, but in more recent years private companies have been major investors in the sector. As PTPs did in earlier years, those private companies are contributing to the expansion of smallholder farms under the PIR (Perusahaan Inti Rakyat Perkebunan, or Nucleus Smallholder Estate) scheme since the Ministry of Agriculture has prioritized permits to develop oil palm plantations for investors who will implement projects in partnership with smallholders.⁶

Oil palm plantations, including those planned, are located all over the study area, but the two largest producing districts in the respective provinces will be Sanggau and Ketapang in West Kalimantan and Kotawaringin Timur and Kotawaringin Barat in Central Kalimantan (Table 4.2.8). It should be noted that Sanggau and Kotawaringin Timur are currently major rubber producers in the respective provinces and many of the smallholder rubber groves are being converted to oil palm plantations. Since oil palm plantation is currently the most dominant force in the area's agriculture and rural development, the problems related to land use, agricultural production, and human settlement are discussed in the main text of this report (See 3.5.2 Oil Palm Plantation Development).

⁶ There are several patterns in the PIR scheme: 1) Local PIR; 2) Assisted PIR (PIR-Bun); 3) Accelerated PIR; 4) Special PIR; and 5) PIR-Trans (PIR associated with the transmigration program) and PIR-KKPA (the Kredit Koperasi Primer Anggota or primary cooperative credit for members). For the characteristics of each PIR pattern and the implementation producer for PIR projects, see Discussion Paper No. 2 "The PIR Scheme in Oil Palm Plantation Development: Why Do Plasma Farmers Have Economic Difficulties in the Initial Stage?"

Figure 4.2.4 Area under Oil Palm by Management Type in 1982-1995



Source: Directorate General of Estate, Ministry of Agriculture.

Table 4.2.10 Progress of Oil Palm Plantation Development as of 1997

Province	Date of Information	Area offered by the provincial government ("Arahan Lahan")	Area with Approval of the Director General of Estates, Ministry of Agriculture (Ijin Prinsip)	Area to be Developed into Oil Palm Plantations (an estimate by Dinas Perkebunan)	Area Planted by 1996	Productive Area in 1996
West Kalimantan	Nov. 1997	3,246,103	1,593,356*	approx. 1,500,000	208,638	88,483
Province	Date of Information	Area allocated for plantations based on the provincial spatial plan (RTRWP)	Area with Approval of the Director General of Estates, Ministry of Agriculture (PPUP)	Total Area of Oil Palm Plantations with PPUP	Area Planted by 1996	Productive Area in 1996
Central Kalimantan	Dec. 1997	1,700,000	1,712,412	1,557,752	89,910	14,103

Sources: Dinas Perkebunan Tk. I Kalimantan Barat.
Dinas Perkebunan Tk. I Kalimantan Tengah.

Notes: *) 1,242,856 ha (for large private estates) + 350,500 ha (for PIR-Trans and PIR-KKPA), not including the area allocated for PTPN XIII (191,000 ha) and PIR-Bun (167,700 ha).

Table 4.2.11 Plantations with Approval of the Director General of Estate, Ministry of Agriculture (PPUP)

West Kalimantan as of 1996'

District	Rubber		Oil Palm		Sugar Cane		Pepper		Cocoa		Hybrid Coconut		Others**		Total	
	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)
Sambas	1	590	12	92,175	0	0	1	240	3	3,408	0	0	3	5,912	20	102,325
Pontianak	2	5,500	17	210,714	0	0	0	0	5	7,256	1	600	3	4,295	28	228,365
Sanggau	0	0	36	408,130	0	0	0	0	0	0	0	0	1	9,000	37	417,130
Ketapang	1	10,000	21	247,200	0	0	0	0	1	3,500	0	0	0	0	23	260,700
Sintang	3	22,750	18	227,500	0	0	0	0	1	3,500	0	0	2	11,972	24	285,722
Kapuas Hulu	1	6,410	6	108,000	0	0	0	0	0	0	0	0	0	0	7	114,410
Total	8	45,250	110	1,293,719	0	0	1	240	10	17,664	1	600	9	31,179	139	1,388,652

Central Kalimantan as of August 1997

District	Rubber		Oil Palm		Sugar Cane		Pepper		Cocoa		Hybrid Coconut		Others**		Total	
	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)	Unit	Area (ha)
Kota-Barat	2	12,700	43	421,300	0	0	1	160	0	0	0	0	0	0	46	434,160
Kota-Timur	2	10,100	62	634,952	0	0	0	0	1	5,000	0	0	0	0	65	650,052
Kapuas	7	4,500	20	257,000	0	0	0	0	1	2,000	1	12,000	0	0	29	275,500
Barito Selatan	5	25,200	4	34,000	1	60,000	0	0	0	0	0	0	0	0	10	119,200
Barito Utara	1	6,000	15	210,500	0	0	0	0	0	0	0	0	0	1	17,000	233,500
Total	17	58,500	144	1,557,752	1	60,000	1	160	2	7,000	1	12,000	1	17,000	167	1,712,412

Sources: Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Perkebunan

Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Perkebunan.

Notes: *) Not including the area allocated for PTPN XIII (191,000 ha) and PIR-Bun (167,700 ha).

***) Including estates that plant more than one crop.

Although currently overshadowed by the remarkable expansion of oil palm, rubber is still the most important estate crop in the two provinces in terms of landuse, income generation and employment (labor force utilization), and export and has large potential to continue to be an important source of income not only for farmers but also for the area as a whole. At present, more than 90% of the area's rubber is produced by smallholders (Table 4.2.12). Those farmers generally practice swidden farming, i.e., cultivate food crops (e.g., dryland paddy, palawija, fruits and vegetables) and some other cash crops (e.g., fruits and forest products) together with rubber as discussed in (3) Farm Households. Smallholder rubber groves cover more than 95%

of the total area of rubber planted. Rubber products have the largest share, second only to wood products, in the area's exports.

Table 4.2.12 Rubber Production in the Study Area in 1996

	Smallholders		Large Estates		Total		Farmers (family)
	Area (ha)	Production (ton)	Area (ha)	Production (ton)	Area (ha)	Production (ton)	
West Kalimantan	432,082	177,720	17,444	19,564	449,526	197,284	218,018
Central Kalimantan	260,824	114,053	11,549	6,926	272,373	120,979	98,817
Total	692,906	291,773	28,993	26,490	721,899	318,263	316,835

Sources: Dinas Perkebunan Tk. I Kalimantan Barat and Kalimantan Tengah.

The smallholder rubber producers account for nearly one third of the total households in both provinces, that is, rubber provides livelihood for more than 1.5 million people. The percentage of rubber producing households is as large as 50% of the total households in the district of Sanggau, West Kalimantan, one of the most typical swidden agricultural areas in the region. They depend mainly on cash income from the sale of rubber for their needs, i.e., food and other basic commodities, education, medical services, etc. Thus, the smallholder rubber sector significantly contributes to the region's economy, particularly employment in rural areas.

The area planted with rubber expanded at a rate of 2.4% in West Kalimantan and at a rate of 5.9% in Central Kalimantan for the period of 1969-1995, while rubber output increased at rates of 2.2% and 6.3% in the respective provinces for the same period (Table 4.2.7). These past trends, together with the steady increases in the newly planted area (or the area "not yet productive") of rubber and the number of rubber farmers in the last 20 years in West Kalimantan (Table 4.2.13), indicate the smallholders' continued interest in rubber cultivation. Their interest probably stems from two factors: 1) There are few alternative employment opportunities, particularly those compatible with their farm work and life style, nearby their villages; and 2) Rubber has long been a very stable source of income for them.

Table 4.2.13 Rubber Production by Smallholders in West Kalimantan, 1978-1996

Year	Area (ha)				Production (ton)	Yield (ton/ha)	Farmer (family)
	Not yet productive	Productive	Unproductive	Total			
1978	35,737	221,892	35,746	293,375	83,233	0.375	131,334
1982	50,807	229,179	38,216	318,202	107,789	0.470	133,280
1987	73,398	242,090	43,015	358,502	112,079	0.463	168,800
1991	97,324	256,074	41,747	395,144	117,866	0.460	178,516
1993	120,611	251,388	37,866	409,865	133,177	0.536	200,436
1996	124,027	267,641	57,858	449,526	197,284	0.737	218,018

Sources: Dinas Perkebunan Tk. I Kalimantan Barat and Kalimantan Barat Dalam Angka various issues.

A major problem in the smallholder rubber sector is low productivity per unit of land, around 500 kg of dry rubber per hectare, due to a large percentage of senile trees and unselected planting materials associated with little or no technical investment. More than 10% of the total

planted area has trees that are due for replanting. Replanting has become increasingly expensive to most rubber smallholders as the size of land available for swidden agriculture is rapidly shrinking due not only to population pressure but also to new types of land development, e.g., oil palm plantations and HTI. Government support for the smallholder rubber sector is small in comparison with its significant contribution to the regional economy. Although the government has been implementing various replanting projects for rubber smallholders with assistance from international lending agencies, the effort has yet to reach the majority of them.

Among other estate crops, the production of coffee, cocoa, pepper, and cloves in West Kalimantan and that of cocoa, pepper, and cloves in Central Kalimantan have generally grown for the period of 1969-1995, though there are some fluctuations from year to year due to changes in international prices and the climate. The production of coconuts, currently the second most important estate crop in both provinces, has stagnated in West Kalimantan.

Currently, these estate crops are almost entirely produced by smallholders with an exception of cocoa, whose planted area and output by large estates exceed those by smallholders in Central Kalimantan. At present some more large estates are entering or planning to enter the coconut plantation industry in both provinces (Table 4.2.11).

As against policy emphasis on the diversification of agricultural production in the area, the Land Resources Statistics indicates that there is not much potential for crops other than rubber, oil palm, coconuts, and citrus fruits in both provinces (Table 4.2.14). This is particularly the case with Central Kalimantan, a large part of whose land is characterized as infertile, fragile, and erodible soils, peat swamps, and/or steep slopes.⁷ RePPPProT, conducted in the late 1980s, remarks that even lands which are not suitable for transmigration due to the need for expensive fertilizer treatment have greater potential under commercial management, especially for the plantation of oil palm.⁸ However, some agronomists recommend agroforestry projects that "simulate natural forests, with multiple crops, ground cover and a multi-layered canopy," in consideration of the soil conditions and topography of the region.⁹ Smallholder rubber groves, which are a low-input agroforestry system with the regrowth of natural forest, could be a main crop in such a project.

⁷ Regional Physical Planning Programme for Transmigration (RePPPProT), *Review of Phase I Results: Central Kalimantan*, Direktorat Bina Program, Indonesia, 1985, pp. 39-49 and Annexe 5.1.

⁸ *Ibid.*, p. 55.

⁹ MacKinnon et al., *op. cit.*, p. 569.

Table 4.2.14 Potential Levels of Land for Plantations in 1993

(1,000 ha)

Crops	West Kalimantan				Central Kalimantan			
	High	Medium	Low	No	High	Medium	Low	No
Cocoa	-	-	-	6,926	-	-	-	-
Sugar Cane	-	-	-	-	37	-	1,052	9,217
Cotton	-	-	-	6,926	-	-	-	-
Coconut	3,531	217	1,656	1,742	-	-	-	-
Oil Palm	3,757	329	2,550	1,022	3,721	1,442	3,637	1,192
Citrus Fruits	-	1,389	551	5,819	-	-	-	-
Mango	-	-	-	-	-	-	-	-
Rubber	3,368	207	1,205	3,085	2,422	1,355	1,940	4,567

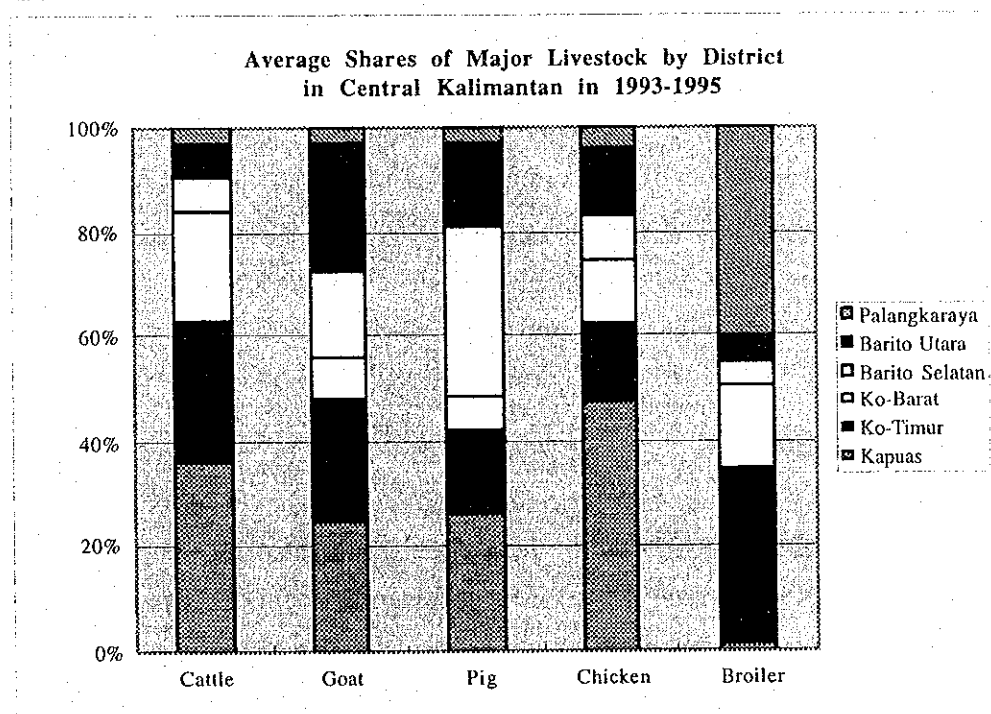
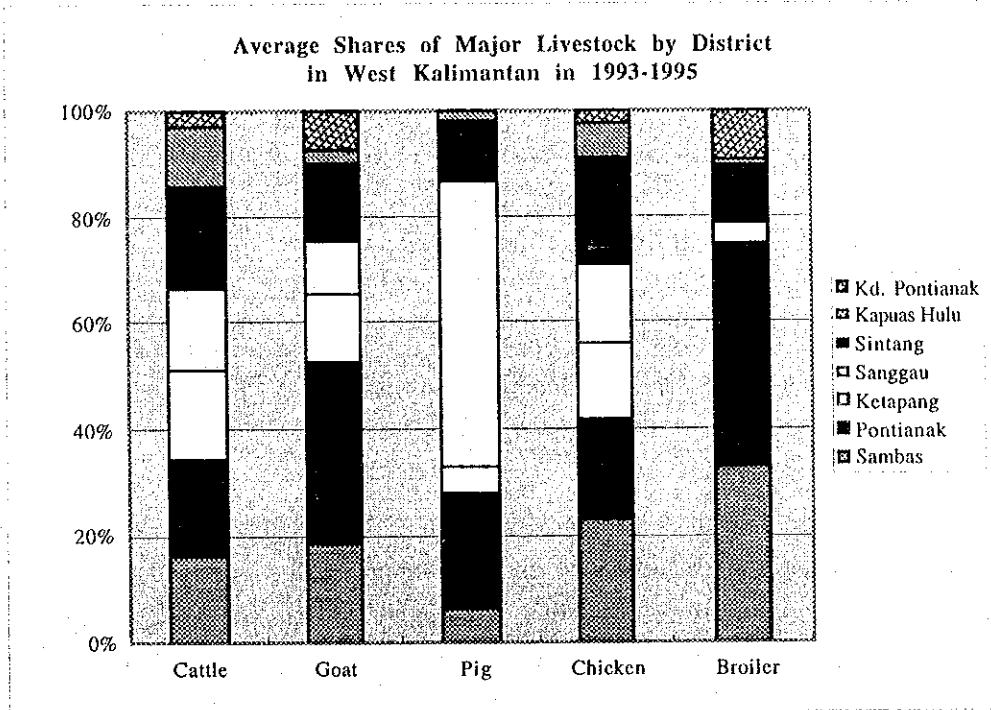
Source: Departemen Pertanian, Badan Penelitian dan Pengembangan Pertanian, Pusat Penelitian Tanah dan Agroklimat 1995, *Statistik Sumberdaya Lahan 1995*, as quoted in Biro Pusat Statistik, *Statistik Sumber Daya Alam Indonesia* 1996, pp. 32-39.

Livestock

Although farmers of the study area have been traditionally engaged in raising livestock along with cultivating various crops, the population of major livestock has grown at a fast rate recently and the structure of the livestock sector has also changed due to income growth, an associated increase in protein intake, urbanization, etc. (Table 4.2.7). Such a change appears to be occurring more rapidly in West Kalimantan. While the population of large livestock, such as cattle, pigs, and goats, has grown at rates less than 10%, that of poultry has increased at rates more than 10% in the province. The growth rates are generally more moderate in Central Kalimantan. The population growth of beef cattle, the majority of which are Balinese cows, and goats is due partly to government assistance for poverty alleviation (e.g., BANDES and IDT programs). In poultry production that requires higher levels of inputs and production techniques, i.e., that of broiler chicken and layers, lowland and suburban agriculture areas, such as the districts of Sambas and Pontianak and the municipality of Palangkaraya, have larger shares of the total population (Figure 4.2.5).

Some common problems in expanding livestock and improving the productivity addressed by the Service of Livestock of the two provinces include: 1) Low levels of techniques and skills due to the low level of education of farmers; 2) low profitability due to the small scale of production in most smallholder farms; 3) smallholder production which is mainly for the purpose of saving rather than of earning an income; and 4) high rates of diseases and few control measures due to the lack of capital. Nevertheless, the Service of Livestock of Central Kalimantan intends to implement livestock development projects using technologies applicable under the existing conditions, e.g., the expansion of cattle production units on oil palm plantations for the purposes of increasing farmers' income and producing manure as fertilizers and the production of country chicken with low inputs.

Figure 4.2.5 Shares of Major Livestock by District in 1993-1995



Sources: Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Peternakan, *Data Base Peternakan Dalam Pelita I-VI Tahun 1969-1996, 1997*.
 Dinas Peternakan Propinsi Dati I Kalimantan Tengah, *Statistik Peternakan Kalimantan Tengah 1996, 1997*.
 Dinas Peternakan Propinsi Dati I Kalimantan Tengah, *Statistik Peternakan Kalimantan Tengah 1995, 1996*.

(3) Major Products by District (Kabupaten)

As observed in provincial production, the agricultural production of each district, in terms of area or population, is concentrated on a limited number of similar crops and livestock in each subsector; namely, paddy, maize, and cassava in the food crop sector, rubber, oil palm, and coconuts in the estate crop sector, and beef cattle, goats, pigs, country chickens, and broiler chickens in the livestock sector (Table 4.2.15). It should be noted that the area harvested with mandarin oranges in Sambas was 13,156 ha in 1992, far larger than the dryland paddy area of 5,520 ha in the same year, but decreased to 6,991 ha in 1993 due to an inappropriate trade policy and disease.¹⁰ The data for area under mandarin oranges are not available for the years after 1993.

The districts of the two provinces can be divided into two groups according to the crops produced: 1) lowland agricultural districts whose wetland paddy area is larger than dryland paddy area and where food crops are cultivated in combination with vegetables and fruits mainly for sale; and 2) upland agricultural districts whose dryland paddy area is larger than wetland paddy area and where food crops are cultivated in combination with estate crops, especially rubber. In lowland agricultural areas, because of their locations close to urban centers, the population of broiler chickens is generally larger than that of country chickens. In this categorization, districts categorized as lowland agricultural areas are Sambas, Pontianak, and Ketapang in West Kalimantan and Kapuas in Central Kalimantan, whereas districts categorized as upland agricultural areas are Sanggau, Sintang, and Kapuas Hulu in West Kalimantan and all other districts other than Kapuas in Central Kalimantan. As a matter of fact, however, some areas within lowland agricultural districts have characteristics of upland agriculture, i.e., more dryland paddy area than wetland paddy area and the cultivation of rubber and other estate crops.

It should be added that despite the recent stagnant trends in area and yield, dryland paddy is still a very important crop in the upland agricultural areas, particularly in Sanggau, Sintang, Kotawaringin Timur, and Barito Utara. As it is widely cultivated by swidden farmers, its cultivation is often taken to be synonymous with swidden agriculture. Experts point out that dryland paddy can be grown on agriculturally poor land and thereby utilizes soil-terrain conditions that often cannot support any cash crop, which makes land productive when it would be otherwise closed to agriculture.¹¹ Almost all swidden farmers practice multiple cropping. It is typically interspersed at various stages of the agricultural cycle with a variety of other crops such as taro, maize, peppers, cassava, sugar cane, bananas, and vegetables.

¹⁰ Dinas Pertanian Tanaman Pangan Kalimantan Barat Tk. I, *Hasil Pembangunan Pertanian: Tanaman Pangan dan Hortikultura Pembangunan Jangka Panjang I (PJPI)*, 1995, p. 57.

¹¹ MacKinnon et al., op. cit., p. 543.

Table 4.2.15 Major Agricultural Products by District in 1993-1995

West Kalimantan											
District	Food Crop (Area Harvested: ha)			Estate Crop (Area: ha)			Livestock (Population: head)				
	Average of 1993-1995			Cumulative Area in 1995			Average of 1993-1995				
	Wet Paddy	Dry Paddy	Maize	Rubber	Coconut	Oil Palm	Pig	Cattle	Broiler	Layer	
Sambas	68,790	7,256	5,528	106,032	28,717	13,461	60,115	24,189	2,659,690	1,482,400	
Pontianak	Wet Paddy	Dry Paddy	Cassava	Rubber	Coconut	Oil Palm	Pig	Goat	Broiler	Chicken	
	82,478	13,710	6,798	119,214	52,248	12,295	185,310	27,682	3,400,942	629,884	
Ketapang	Wet Paddy	Dry Paddy	Cassava	Oil Palm	Rubber	Coconut	Pig	Cattle	Chicken	Duck	
	28,496	14,244	1,229	50,575	19,002	10,337	47,574	24,543	474,388	29,273	
Sanggau	Dry Paddy	Wet Paddy	Cassava	Rubber	Oil Palm	Coconut	Pig	Cattle	Chicken	Broiler	
	36,645	20,476	4,858	111,896	89,348	1,506	468,107	22,695	480,480	317,785	
Sintang	Dry Paddy	Wet Paddy	Maize	Rubber	Oil Palm	Coconut	Pig	Cattle	Broiler	Chicken	
	33,804	15,799	2,677	68,088	10,211	2,388	98,215	27,795	884,263	654,815	
Kapuas Hulu	Dry Paddy	Wet Paddy	Maize	Rubber	Coffee	Coconut	Cattle	Pig	Chicken	Broiler	
	14,717	5,640	813	20,195	313	279	16,663	13,897	229,821	70,932	
Kodya Pontianak	Cassava	Wet Paddy	Maize	..	..	..	Cattle	Goat	Broiler	Chicken	
	142	61	44	..	..	..	4,191	5,321	739,281	68,997	

Central Kalimantan											
District	Food Crop (Area Harvested: ha)			Estate Crop (Area: ha)			Livestock (Population: head)				
	Average of 1993-1995			Cumulative Area in 1995			Average of 1993-1995				
	Wet Paddy	Dry Paddy	Cassava	Rubber	Coconut	Clove	Pig	Cattle	Chicken	Broiler	
Kapuas	82,493	17,123	1,603	68,941	17,147	1,485	34,816	17,158	1,057,702	20,753	
Kotawaringin Timur	Dry Paddy	Wet Paddy	Cassava	Rubber	Coconut	Coffee	Pig	Cattle	Broiler	Chicken	
	17,365	7,056	954	32,074	20,886	935	21,192	12,691	509,155	321,818	
Kotawaringin Barat	Dry Paddy	Wet Paddy	Maize	Rubber	Coconut	Pepper	Cattle	Pig	Chicken	Broiler	
	10,183	2,392	830	14,828	5,047	1,825	10,042	7,927	272,475	248,162	
Barito Selatan	Dry Paddy	Wet Paddy	Cassava	Rubber	Coconut	Coffee	Pig	Goat	Chicken	Broiler	
	9,450	7,034	443	65,828	835	143	42,281	3,301	181,262	68,283	
Barito Utara	Dry Paddy	Wet Paddy	Cassava	Rubber	Coconut	Coffee	Pig	Goat	Chicken	Broiler	
	17,864	1,250	511	71,399	1,932	855	21,358	4,904	292,798	75,677	
Kodya Palangkaraya	Maize	Cassava	Soybean	Rubber	Coconut	Pepper	Pig	Cattle	Broiler	Chicken	
	309	297	190	1,595	526	45	3,679	1,294	605,427	84,118	

Sources: Dinas Pertanian Tanaman Pangan Kalimantan Barat Tk. I, *Hasil Pembangunan Pertanian: Tanaman Pangan dan Hortikultura Pengangunan Jangka Panjang I (PJPI)*, 1995.
 Kantor Statistik Kabupaten Sambas, *Kabupaten Sambas Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Pontianak, *Kabupaten Pontianak Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Ketapang, *Kabupaten Ketapang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Sanggau, *Kabupaten Sanggau Dalam Angka 1995, 1997*.
 Kantor Statistik Kabupaten Sintang, *Kabupaten Sintang Dalam Angka 1995, 1996*.
 Kantor Statistik Kabupaten Kapuas Hulu, *Kabupaten Kapuas Hulu Dalam Angka 1995, 1996*.
 Kantor Statistik Kotamadya Pontianak, *Kotamadya Pontianak Dalam Angka 1995, 1996*.
 Dinas Pertanian Tanaman Pangan Kalimantan Tengah Tk. I, *Data Tanaman Pangan Kalimantan Tengah 1969-1996, 1997*.
 Kantor Statistik Propinsi Kalimantan Barat, *Kalimantan Barat Dalam Angka 1995, 1996*.
 Kantor Statistik Propinsi Kalimantan Tengah, *Kalimantan Tengah Dalam Angka 1995, 1996*.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Peternakan, *Data Base Peternakan Dalam Pelita I-VI Tahun 1969-1996, 1997*.
 Dinas Peternakan Propinsi Dati I Kalimantan Tengah, *Statistik Peternakan Kalimantan Tengah 1996, 1997*.
 Dinas Peternakan Propinsi Dati I Kalimantan Tengah, *Statistik Peternakan Kalimantan Tengah 1995, 1996*.

4.2.3 Farm Households

A notable characteristic of farm households in the study area is that one household is typically engaged in various kinds of agricultural activities, from the cultivation of food crops, vegetables, fruits, and tree crops through to livestock production and aquaculture. Such a situation, though easily observed almost everywhere in the rural areas of the two provinces, is partially indicated in the distribution of agricultural households by activity presented in the Agricultural Census of 1993 (Table 4.2.16). While more than 80% of the total land-using agricultural households¹² are engaged in the cultivation of paddy and palawija, a large number

¹² In the Agricultural Census, the land-using agricultural households, *rumah tangga petani pengguna lahan*, is defined as the agricultural household cultivating land, whether wet or dry land, owned land or rented land, excluding households engaged in marine fishing, forest products gathering, processing, waged farm work, etc.

of those households also cultivate other crops, particularly estate crops, as shown by the shares of horticulture, estate crops, livestock, and aquaculture.

Some significant facts that can be inferred from these numbers are: 1) Many farmers of the study area practice multiple agriculture; 2) Farmers cultivate various crops not only for home consumption (food crops) but also for commercialization (horticulture and estate crops) even in locations far from urban centers; and 3) As a whole, thereby, the study area already has highly diversified agriculture. This conclusion is also supported by the results of the social survey conducted by the study team in more than 10 villages in both provinces. Almost all the farm households surveyed, 20 per village, are engaged in a variety of agricultural activities, e.g., the cultivation of paddy, vegetables, fruits, rubber, oil palm, cocoa, livestock production, fishing, and hunting for home consumption and cash income, while villages located in the vicinities of service centers tend to have more diversified agriculture for cash income (For the details of the survey results, see the Technical Report of the study).

In Sanggau, West Kalimantan, for example, 91% of the total land-using agricultural households are paddy and palawija households while 76% are estate crop households, which suggests that a large part of the households producing paddy and palawija also produce estate crops. Presumably, the majority of estate crops cultivated are rubber as the number of rubber households was 51,455 in Sanggau in 1993 as compared with the total estate crop households of 58,214 for the district in the 1993 census.¹³ It should be noted that the number of households actually cultivating estate crops is supposed to be far larger than those counted by the census because the census limits estate crop households to those who have more than a certain number of trees, e.g., 250 for rubber, 25 for coconuts, 125 for coffee, 125 for cocoa, and 25 for oil palm. The social survey conducted by the study team, however, has revealed that most of rubber-based swidden farmers cultivate fewer than 100 rubber trees, especially in the district of Sanggau, which has a relatively high population density.

The average area of wetland paddy fields is 0.44 ha per household in West Kalimantan and 0.53 ha per household in Central Kalimantan (Table 4.2.17). But the farm households of lowland agricultural areas, e.g., Sambas (0.52 ha), Pontianak (0.70 ha), and Kapuas (0.90 ha), tend to have larger wetland paddy area. This tendency is due partly to the statistics which simply divides the total area of wet land by the number of households cultivating paddy (including dryland paddy) and palawija and, consequently, leads to a larger average wetland paddy area per household for those districts that have a larger wetland paddy area.

¹³ Kantor Statistik Propinsi Kalimantan Barat, *Kalimantan Barat Dalam Angka 1993, 1994*, p. 230.

Table 4.2.16 Number of Agricultural Households by Subsector and District in 1993

West Kalimantan

District/Municipality	Total land-using agriculture*	Food Crop		Estate Crop	Livestock	Aquaculture in fresh and brackish water
		Paddy and palawija	Horticulture			
Sambas	115,308	96,312	34,949	45,853	19,231	1,817
Pontianak	118,936	103,623	20,642	78,086	41,253	1,788
Sanggau	77,096	70,500	5,769	58,214	32,853	3,677
Ketapang	58,665	53,537	12,993	27,454	15,701	627
Sintang	77,789	71,395	6,434	44,924	26,042	1,105
Kapuas Hulu	28,573	26,722	2,905	17,148	6,853	1,145
Kodya Pontianak	5,689	2,513	2,561	831	1,844	21
Total	482,056	424,602	86,253	272,510	143,777	10,180

Share by Subsector (%)

Sambas	115,308	83.53	30.31	39.77	16.68	1.58
Pontianak	118,936	87.13	17.36	65.65	34.69	1.50
Sanggau	77,096	91.44	7.48	75.51	42.61	4.77
Ketapang	58,665	91.26	22.15	46.80	26.76	1.07
Sintang	77,789	91.78	8.27	57.75	33.48	1.42
Kapuas Hulu	28,573	93.52	10.17	60.01	23.98	4.01
Kodya Pontianak	5,689	44.17	45.02	14.61	32.41	0.37
Total	482,056	88.08	17.89	56.53	29.83	2.11

Central Kalimantan

District/Municipality	Total land-using agriculture*	Food Crop		Estate Crop	Livestock	Aquaculture in fresh and brackish water
		Paddy and palawija	Horticulture			
Kotawaringin Barat	23,143	19,833	5,612	5,931	4,578	655
Kotawaringin Timur	58,886	41,049	17,479	19,555	6,582	491
Kapuas	79,328	72,396	22,790	29,823	11,213	1,283
Barito Selatan	24,136	19,055	5,474	13,282	3,193	572
Barito Utara	23,260	21,472	6,431	12,472	4,436	287
Kodya Palangkaraya	1,931	1,339	1,316	411	556	10
Total	210,684	175,144	59,102	81,474	30,558	3,298

Share by Subsector (%)

Kotawaringin Barat	23,143	85.70	24.25	25.63	19.78	2.83
Kotawaringin Timur	58,886	69.71	29.68	33.21	11.18	0.83
Kapuas	79,328	91.26	28.73	37.59	14.13	1.62
Barito Selatan	24,136	78.95	22.68	55.03	13.23	2.37
Barito Utara	23,260	92.31	27.65	53.62	19.07	1.23
Kodya Palangkaraya	1,931	69.34	68.15	21.28	28.79	0.52
Total	210,684	83.13	28.05	38.67	14.50	1.57

Sources: Biro Pusat Statistik, Sensus Pertanian 1993, *Analisis Profil Rumah tangga Pertanian: Propinsi Kalimantan Barat*, 1995.

Biro Pusat Statistik, Sensus Pertanian 1993, *Analisis Profil Rumah tangga Pertanian: Propinsi Kalimantan Tengah*, 1995.

Note: *) "Rumah tangga pertanian pengguna lahan," not including agricultural households that practice marine fishing, forest products gathering, processing, waged farm work, etc.

Table 4.2.17 Average Wetland Paddy Area per Paddy and Palawija Household by District in 1993-1995

West Kalimantan						
District/Municipality	1983			1993		
	Area of Wet Land (ha)	Number of Paddy/Palawija Households	Average Area of Wet Land (ha)	Area of Wet Land (ha)	Number of Paddy/Palawija Households	Average Area of Wet Land (ha)
Sambas	..	89,060	..	50,314	96,312	0.52
Pontianak	..	79,369	..	72,048	103,623	0.70
Ketapang	..	42,810	..	19,510	53,537	0.36
Sanggau	..	56,273	..	23,833	70,500	0.34
Sintang	..	55,341	..	12,897	71,395	0.18
Kapuas Hulu	..	20,198	..	8,793	26,722	0.33
Kodya Pontianak	..	1,431	..	135	2,513	0.05
Total	0	344,482	0.00	187,530	424,602	0.44
Central Kalimantan						
District/Municipality	1983			1993		
	Area of Wet Land (ha)	Number of Paddy/Palawija Households	Average Area of Wet Land (ha)	Area of Wet Land (ha)	Number of Paddy/Palawija Households	Average Area of Wet Land (ha)
Kapuas	..	55,007	..	65,266	72,396	0.90
Kotawaringin Timur	..	29,184	..	15,056	41,049	0.37
Kotawaringin Barat	..	11,920	..	4,291	19,833	0.22
Barito Selatan	..	14,010	..	6,542	19,055	0.34
Barito Utara	..	15,253	..	1,515	21,472	0.07
Kodya Palangkaraya	..	695	..	0	1,339	0.00
Total	0	126,069	0.00	92,670	175,144	0.53

Source: Biro Pusat Statistik, *Agricultural Survey: Land Area by Utilization for Outside of Java 1995, 1996*.

4.2.4 Food Self-sufficiency

The supply of rice, a staple food for the population of the study area, is deficient in both provinces (Table 4.2.18). The deficits, calculated by subtracting "demand" (per capita rice consumption multiplied by the population) from "supply" (the total paddy production multiplied by a rice milling rate of 65%), are 77,210 tons for West Kalimantan and 31,545 tons for Central Kalimantan in 1995. However, the actual deficits in rice are far larger since this calculation does not take into account post-harvest losses and a possible variation in rice milling rates. The rice import of West Kalimantan by inter-island trade amounted to 169,632 tons in 1995,¹⁴ while the supply of rice from other provinces, supposedly mainly from South Kalimantan, to Central Kalimantan was 33,845 tons in the same year.¹⁵

While some lowland agricultural districts, e.g., Pontianak, Ketapang, and Kapuas, have a rice surplus, the rice shortage is more acute for districts in upland agriculture areas, e.g., Sanggau, Kapuas Hulu, and all other districts of Central Kalimantan but Kapuas (Table 4.2.18). Although the deficiency rates based on the above calculations are about the same for both

¹⁴ Ibid., p. 321.

¹⁵ Kantor Statistik Propinsi Kalimantan Tengah, *Kalimantan Tengah Dalam Angka 1996, 1997*, p. 241.

provinces, the actual situation of supply and demand for rice appears to be tighter in Central Kalimantan than in West Kalimantan, as indicated by the higher prices in the former province.

Table 4.2.18 Rates of Self-sufficiency in Rice in 1995

West Kalimantan								
District/Municipality	Sambas	Pontianak	Sanggau	Ketapang	Sintang	Kapuas Hulu	Kodya Poni	Province
Production of Wetland Paddy (ton)	208,277	245,507	42,788	97,911	59,196	11,500	147	665,326
Production of Dryland Paddy (ton)	15,615	29,686	56,668	23,000	53,134	24,859	0	202,962
Total Production of Paddy (ton)	223,892	275,193	99,456	120,911	112,330	36,359	147	868,288
Supply of Rice* (ton)	145,530	178,875	64,646	78,592	73,015	23,633	96	564,387
Per Capita Rice Consumption** (kg)	176.47	176.47	176.47	176.47	176.47	176.47	176.47	176.47
Population**	844,154	868,885	467,463	365,389	446,562	175,645	447,632	3,635,730
Demand for Rice (ton)	148,968	153,332	86,023	64,480	78,805	30,996	78,994	641,597
Surplus/Deficit (ton)	-3,438	25,543	-21,376	14,112	-5,790	-7,363	-78,898	-77,210
Rate of Self-sufficiency (%)	97.69	116.66	75.15	121.89	92.65	76.25	0.12	87.97
Price of Rice****(Rupiah/kg)	995.28	892.50	996.56	789.58	895.83	1,042.50	859.31	..
Per Capita GRDP (Rupiah)	1,321,745	2,427,965	1,471,448	1,842,568	1,090,149	1,588,638	3,717,569	1,976,690

Central Kalimantan							
District/Municipality	Ko-Barat	Ko-Timur	Kapuas	Barito Sel.	Barito Utara	Kodya Praya	Province
Production of Wetland Paddy (ton)	8,331	19,124	208,059	11,394	2,118	0	249,026
Production of Dryland Paddy (ton)	18,735	36,955	27,596	14,371	31,362	84	129,103
Total Production of Paddy (ton)	27,066	56,079	235,655	25,765	33,480	84	378,129
Supply of Rice* (ton)	17,593	36,451	153,176	16,747	21,762	55	245,784
Per Capita Rice Consumption** (kg)	176.47	176.47	176.47	176.47	176.47	176.47	176.47
Population**	199,240	426,911	476,546	169,190	165,809	133,840	1,571,536
Demand for Rice (ton)	35,160	75,337	84,096	29,857	29,260	23,619	277,329
Surplus/Deficit (ton)	-17,567	-38,886	69,080	-13,110	-7,498	-23,564	-31,545
Rate of Self-sufficiency (%)	50.04	48.38	182.14	56.09	74.37	0.23	88.63
Price of Rice****(Rupiah/kg)	1,231.25	1,143.54	1,195.10	1,055.68	1,110.21	1,147.71	..
Per Capita GRDP (Rupiah)	3,667,553	n.a.	1,733,315	2,283,236	3,916,553	2,584,007	2,697,220

- Sources: Kantor Statistik Propinsi Kalimantan Barat, *Kalimantan Barat Dalam Angka 1996*, 1997;
 Kantor Statistik Propinsi Kalimantan Barat, *Kalimantan Barat Dalam Angka 1995*, 1996;
 BAPPEDA Tk. I Kalimantan Barat, *Analisis Ekonomi Regional Kalimantan Barat*, September 1997.
 Kantor Statistik Kabupaten Sambas, *Kabupaten Sambas Dalam Angka 1995*, 1996.
 Kantor Statistik Kabupaten Pontianak, *Kabupaten Pontianak Dalam Angka 1995*, 1996.
 Kantor Statistik Kabupaten Ketapang, *Kabupaten Ketapang Dalam Angka 1995*, 1996.
 Kantor Statistik Kabupaten Sanggau, *Kabupaten Sanggau Dalam Angka 1995*, 1997.
 Kantor Statistik Kabupaten Sintang, *Kabupaten Sintang Dalam Angka 1995*, 1996.
 Kantor Statistik Kabupaten Kapuas Hulu, *Kabupaten Kapuas Hulu Dalam Angka 1995*, 1996.
 Kantor Statistik Kotamadya Pontianak, *Kotamadya Pontianak Dalam Angka 1995*, 1996.
 Kantor Statistik Propinsi Kalimantan Tengah, *Kalimantan Tengah Dalam Angka 1996*, 1997;
 Kantor Statistik Propinsi Kalimantan Tengah, *Kalimantan Tengah Dalam Angka 1995*, 1996;
 Kantor Statistik Propinsi Kalimantan Tengah, *Pendapatan Regional Kalimantan Tengah 1996*, 1997;
 Kantor Statistik Kotawaringin Barat, *Pendapatan Regional Kotawaringin Barat 1993-1996*, 1997;
 Paparan Bupati Kepala Daerah Tingkat II Barito Utara Tentang Kondisi Dan Potensi Ekonomi Kabupaten Dati II Barito Utara, January 1998;
 Kantor Statistik Kabupaten Barito Selatan, *Pendapatan Regional Barito Selatan 1993-1996*, 1997;
 Kantor Statistik Kabupaten Kapuas, *Pendapatan Regional Kapuas 1993-1995*, 1997;
 Kantor Statistik Kotamadya Palangka Raya, *Pendapatan Regional Kotamadya Palangka Raya 1993-1996*, 1997.

- Notes: *) "Supply of Rice" = "Production of Paddy" x 0.65 (the average milling rate), not including the ending stocks in the previous year.
 **) An estimate for West Kalimantan in 1995 (Table 14.2.1 of the first source).
 ***) Projection.
 ****) Annual average prices at Kabupaten capitals. The prices in Central Kalimantan are those for "Banjar rice."

The data suggest that the prices for rice are determined not only by the degree of deficiency but also by the conditions of transportation, i.e., accessibility to markets. The higher price of rice in Central Kalimantan is in fact due to the poor transportation conditions of the province, where larger vessels cannot reach upper areas even of major rivers during the dry season. The higher price for Sanggau than Sintang, which occurred not only in 1995 but also throughout the recent

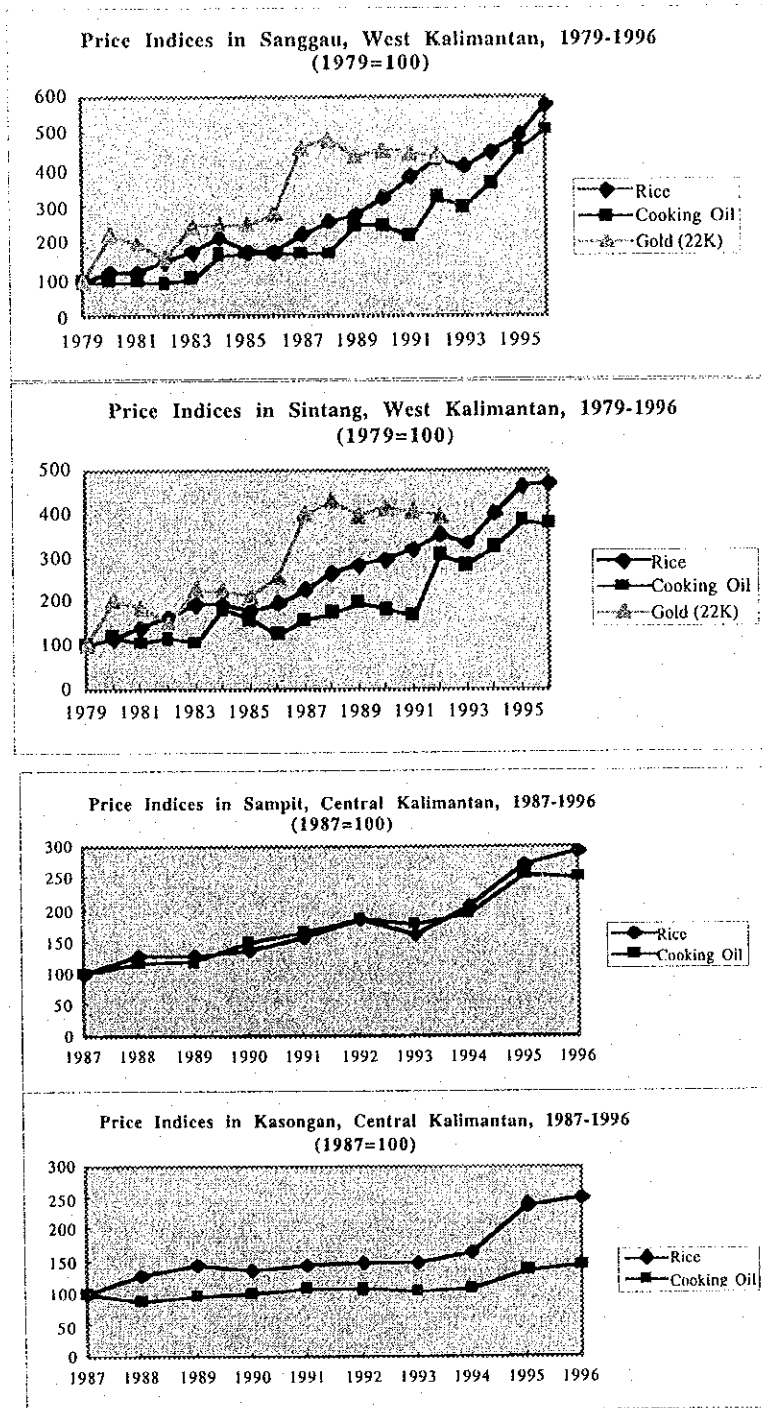
past, also seems to be due to low accessibility to markets in areas far from the district capital, as well as to relatively high population densities, i.e., higher demand for rice in relation to supply, even in such remote areas.

The prices of rice increased substantially in 1994, when the drought in Indonesia led to the rice import of more than a millions, and continued to rise thereafter (Figure 4.2.6). It must be considered crucial that the recent increase in rice prices is larger than that of other basic commodities, e.g., cooking oil. With the average per capita consumption of rice over 170 kg/year, the deficiency in rice is severely affecting the household economy not only of the non-rice producing population but also paddy farmers, most of whom do not harvest enough for year-round consumption. Those farmers who depend on cash income from the sale of other crops for their needs also see their terms of trade deteriorating *vis-à-vis* the increased prices of rice (Figure 4.2.7), though the situation has significantly changed since early 1998 due to a sharp depreciation of rupiah, i.e., a higher farm price for rubber, an export commodity.

The current economic crisis, together with prolonged drought in the 1997/98 planting season and unusually high precipitation in the 1998 planting season, may have a devastating impact on rice production in the region. Although the price of rice received by farmers has increased due to the nationwide food shortage, the prices of agricultural inputs and basic necessities have more than doubled, or even tripled for some goods, over the last 12 months. The relatively lower price for rice, which is largely attributable to the government subsidy for imported rice, appears to become a disincentive to planting paddy. Farmers are turning to more profitable economic activities, such as tree crop cultivation and gold mining, in areas where such income opportunities are available. In order to ensure the continuation of rice production, the current food policy should be re-designed so as to give more incentives (e.g., subsidized credits and inputs and the elimination of the price distortion caused by subsidizing imported rice) to paddy farmers, at least until the rice supply-demand situation is substantially improved.

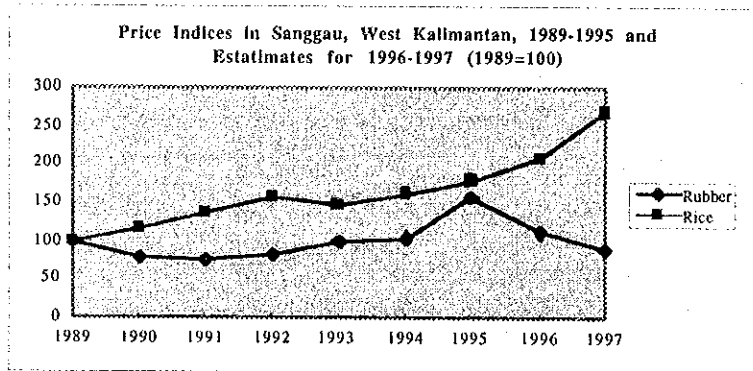
Government officials concerned with agricultural policies for the study area, as well as local farmers, seem to have paid more attention to the "spectacular" development of the oil palm sector, even though still much policy emphasis is placed on food self-sufficiency in the agricultural sector. However, the current situation of food shortage poses a critical question, i.e., whether farmers of the study area can continue to buy rice by the cash income from the cultivation of oil palms, as well as other estate crops, after they submit all or some of their productive lands for oil palm plantation development where they would otherwise produce paddy or other food crops.

Figure 4.2.6 Price Indices in Some Towns in the Study Area



Sources: Kantor Statistik Propinsi Kalimantan Barat, Kalimantan Barat Dalam Angka, various issues.
 Kantor Statistik Propinsi Kalimantan Tengah, Kalimantan Tengah Dalam Angka, various issues.

Figure 4.2.7 Price Indices in Sanggau, West Kalimantan, 1989-1995 and Estimates for 1996-1997 (1989=100)



Sources: Dinas Perkebunan Tk. I Kalimantan Barat; and Kantor Statistik Propinsi Kalimantan Barat, Kalimantan Barat Dalam Angka, various issues.
 Dinas Perkebunan Tk. I Kalimantan Tengah; and Kantor Statistik Propinsi Kalimantan Tengah, Kalimantan Barat Dalam Angka, various issues.

4.2.5 Processing Industries

Processing industries for agricultural products are not well developed in the study area, especially Central Kalimantan. Reflecting the importance of rubber in the estate crop sector, the largest agro-based processing industry is the manufacturing of crumb rubber (SIR), but even for that industry there are only six factories in West Kalimantan and three in Central Kalimantan (Table 4.2.19). Although crude palm oil (CPO) extraction can be classified as an “processing” industry, it is actually a part of oil palm plantation activity since fruit fresh bunches (FFB) cannot be commercialized without instantaneous oil extraction. As of late 1997, the number of CPO plants are 11 in West Kalimantan and 3 in Central Kalimantan based on data provided by the Service (*Dinas*) of Estate in each province as well as information obtained by the study team. The number seems to be rapidly growing, especially in West Kalimantan, where many oil palm trees are entering the productive stage.

While all CPO plants are on oil palm plantations because of the need for immediate processing, crumb rubber factories are located in industrial-commercial centers, e.g., Pontianak, Sampit, and Kuala Kapuas (Figure 4.2.8). These cities have ports and thus are convenient for exporting finished commodities. Industries manufacturing consumer products, such as cooking oils, are also situated in urban centers, e.g., Pontianak and Sambas. Although data are not available, it is presumed that small-scale agro-based factories are also concentrated in those urban centers. There is an “agroindustrial” center in Tayan, the district of Sanggau, West Kalimantan according to the plan of the province’s Estate Service. The factory was initially scheduled to start manufacturing cooking oil and oleochemical products based on palm oil by 1996 but it has not been put into operation as of July 1998. Besides, some private companies are planning to

set up an palm oil-based processing factory for cooking oil, palm kernel oil, crude stearine, fatty acid, etc. in Central Kalimantan.

Potential agroindustrial products, other than palm oil, rubber, and coconuts, identified by the Regional Office of the Ministry of Agriculture include: 1) oranges for manufacturing juice and syrup; 2) peppers for oil, oleoresin, and pepper powder; 3) soybean for tahu products; 4) cassava for tapioca flour and chips; 5) groundnuts for cooking oil; and 6) fish for salted fish, fish chips, dried fish, and fish flour.¹⁶ Despite the ample availability of a variety of agricultural products, however, there are a number of constraints on the development of agroindustry in the study area. West Kalimantan's Regional Office of the Ministry of Industry and Trade has indicated weaknesses of the industrial sector, of which relevant to the development of agroindustry are:¹⁷

- 1) Raw materials are available, but their quality is not good enough and supply is not continuous to support industrial development.
- 2) Human resources are not sufficient, especially skilled workers such as machine operators and managers.
- 3) Processing techniques are not used efficiently and effectively, in addition to the insufficient availability of information on technologies.
- 4) Knowledge of international markets is limited, especially that related to product quality, design, price, and importing countries.
- 5) Credit schemes provided by the government are difficult to use, especially for small-scale entrepreneurs.
- 6) Entrepreneurs are not aware of the requirements for licenses.
- 7) The existing infrastructure is not sufficient to fully support project implementation.
- 8) The skill levels of young people and women in the fields of industry and trade are still low.
- 9) Information and data on industry are still inadequate.
- 10) Investment promotion for the industry and trade sector outside the province is not enough.

The conditions of Central Kalimantan's industrial sector are similar to these of West Kalimantan but the underdevelopment of its processing industries is also due to the concentration of those industries in South Kalimantan. Central Kalimantan has been traditionally the main provider of raw material to South Kalimantan. This is particularly the case with rubber and rattan, for which the former province has larger production but a smaller processing capacity than the latter. The trading relationships between the two provinces, though difficult to trace on official statistics, appear to have a significant impact on the industrial development of Central Kalimantan.

¹⁶ Kantor Wilayah Departemen Pertanian Propinsi Kalimantan, *REPELITA VI Pertanian Propinsi Kalimantan Barat*, February 1994, P. 65.

¹⁷ Kantor Wilayah Departemen Pertambangan dan Perdagangan Propinsi Kalimantan, *Program Kerja 1998/99*.

Table 4.2.19 Locations and Capacities of Processing Plants as of 1997

West Kalimantan

Processed Products	Capacity	Location		Name of Company
		District	Subdistrict	
Rubber				
Crumb rubber/SIR20	43 tons/day	Pontianak	Siantan	PT. Hok Tong
Crumb rubber/SIR20	65 tons/day	Pontianak	Siantan	PT. Giat Usaha Dieng
Crumb rubber/SIR20	110 tons/day	Pontianak	Siantan	PT. Sumber Alam
Crumb rubber/SIR20	110 tons/day	Pontianak	Siantan	PT. Sumber Jantin
Crumb rubber/SIR10-20	120 tons/day	Pontianak	Sungai Raya	PT. New Kalbar Processor
Crumb rubber/SIR20	16 tons/day	Sambas	Sambas	
RSS	2 tons/day	Sanggau	Gn. Meliau	PTPN XIII
..	12 tons/day	Sintang		Not yet in operation
Coconut				
Cooking oil	0.6 tons/day	Pontianak	Siantan	
Cooking oil (from fresh coconut)	3 tons/day	Pontianak	Siantan	
Cooking oil	7.5 tons/day	Pontianak	Siantan	
Cooking oil (from fresh coconut)	2.5 tons/day	Pontianak	Siantan	
Cooking oil (from fresh coconut)	4 tons/day	Pontianak	Siantan	
Cooking oil (from fresh coconut)	5 tons/day	Sambas	Sambas	
Oil Palm				
Cooking oil	3 tons/day	Pontianak	Siantan	PT. Mentawi
Crude stearin	3 tons/day	Pontianak	Siantan	
CPO	30 tons FFB/hour	Pontianak	Ngabang	PTPN XIII
CPO	26 tons FFB/hour	Pontianak	Air Besar	PT. Kembayan Subur Agro
CPO	30 tons FFB/hour	Sambas	Ledo	PT. Mitra Inti Sejati Plantation
CPO	60 tons FFB/hour	Sanggau	Gn. Meliau	PTPN XIII
CPO	30 tons FFB/hour	Sanggau	Gn. Meliau	PT. Bintang Harapan Desa
CPO	60 tons FFB/hour	Sanggau	Parindu	PTPN XIII
CPO	30 tons FFB/hour	Sanggau	Bintang Hulu	PT. Kalimantan Sanggar Pusaka
CPO	30 tons FFB/hour	Sanggau	Sekadau	PT. Multi Prima Enkatal
CPO	40 tons FFB/hour	Ketapang	Tumbang Titi	PT. Subur Ladang Andalan
CPO	40 tons FFB/hour	Ketapang	Sandai	PT. Prakarsa Tani Sejati
CPO	60 tons FFB/hour	Ketapang	Manis Mata	PT. Harapan Sawit Lestari
Cocoa				
Cocoa oil	..	Pontianak	Siantan	
Tengkawang				
Tengkawang oil	..	Pontianak	Siantan	

Central Kalimantan

Processed Products	Capacity	Location		Name of Company
		District	Subdistrict	
Rubber				
Crumb rubber	6,000 tons/year	Kapuas		PT. Karya Sejati
Crumb rubber	9,000 tons/year	Kapuas		PT. Polymers Internasional
Crumb rubber	3,000 tons/year	Ko-Timur	Sampit	PT. Sampit
Oil Palm				
CPO		Bar-Utara	Teweh Tengah	PT. Antang Ganda Utama
CPO		Ko-Barat	Arut Selatan	PT. Indo Truba Tengah
CPO		Ko-Barat	Arut Selatan	Estates of Astra Group

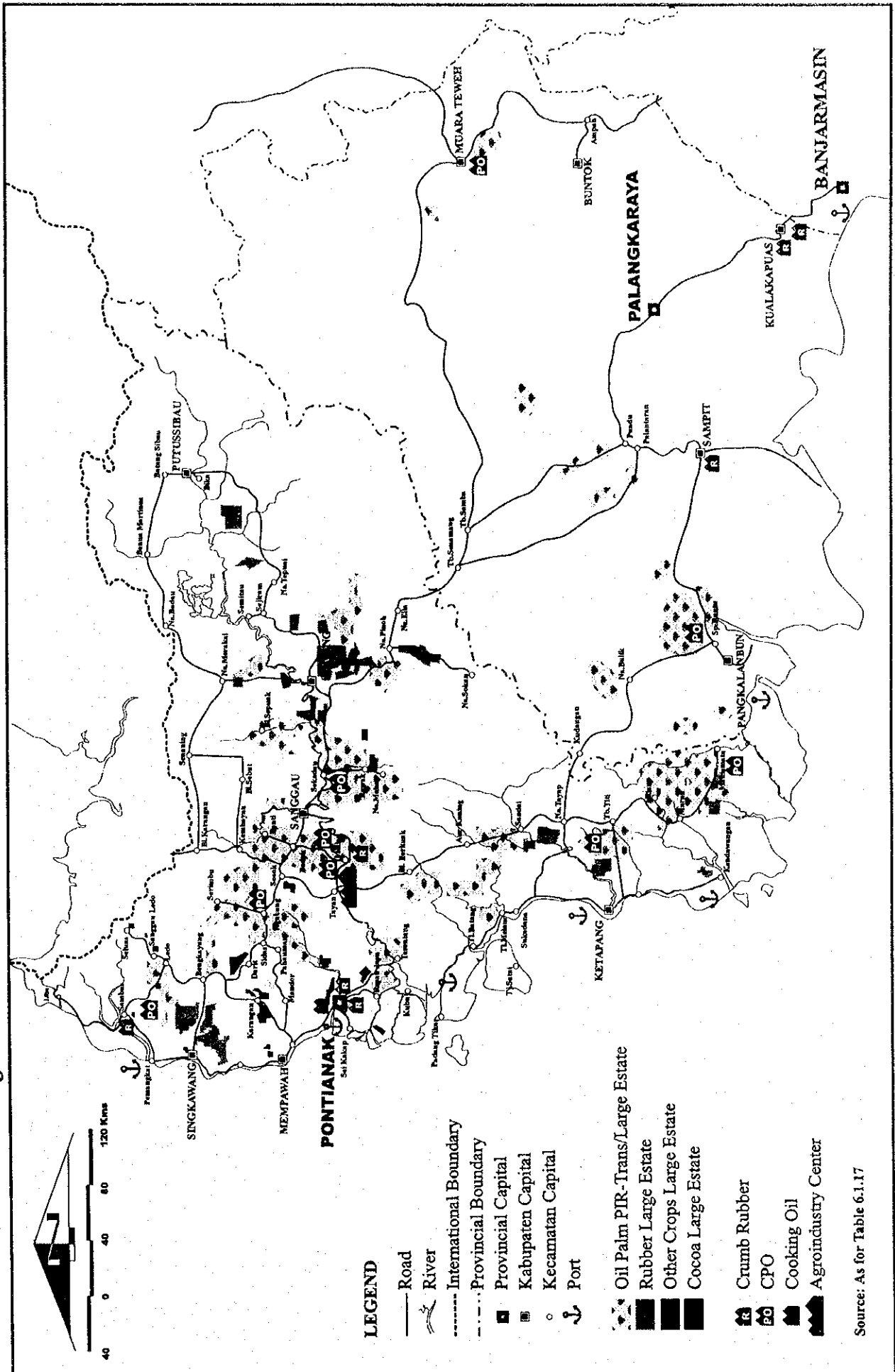
Sources: Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Perkebunan.

Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Perkebunan, Laporan Tahunan Tahun 1996.

PT. CAPRICORN Indonesia Consult Inc., Study on Palm Oil Industry and Plantation in Indonesia, 1997.

Information obtained by the JICA study team through interviews.

Figure 4.2.8 Locations of Tree Crop Plantations and Processing Plants



Source: As for Table 6.1.17

4.2.6 Agricultural Support Services

Agricultural support services in the two provinces, like in other provinces, are provided by various government agencies: the Regional Office of the Ministry of Agriculture (Kantor Wilayah, or Kanwil, Departemen Pertanian), the Service of Food Crop Agriculture (Dinas Pertanian Tanaman Pangan), the Service of Estate (Dinas Perkebunan), the Service of Livestock (Dinas Peternakan), the Service of Fisheries (Dinas Perikanan), both at the provincial level (Daerah Tingkat I) and at the district level (Daerah Tingkat II), and the district and subdistrict branch offices of the provincial-level services (*cabang*). The organizational charts of the provincial-level services are presented in Figures 4.2.9-4.2.11. For agroindustry, related agencies include: the Regional Office of the Ministry of Industry and Trade (Kantor Wilayah Departemen Perindustrian dan Perdagangan), the Service of Industry (Dinas Perindustrian), and corresponding offices at the district and subdistrict levels, including the branch offices. Development projects and programs for the agricultural sector are implemented mainly by the services.¹⁸

One of the serious problems concerning the existing public administration for the agricultural sector is the division according to crop or product. Data and information are prepared and published by each service, policies and plans are formulated by each service, and development projects and programs are implemented by each service, even though their clients, i.e., farmers, are almost always engaged in a variety of agricultural activities. For example, plasma farmers in a PIR project can obtain little information about food crop cultivation because the project is implemented under the supervision of the Directorate General of Estate, the Ministry of Agriculture at the national level and the Service of Estate at the provincial level.¹⁹ Each service has also similar budget items, e.g., "resources, facilities, and infrastructure improvement" and "integrated smallholder agricultural development." They could be used more effectively if the budgets allocated to different subsectors were combined, especially for such purposes as infrastructure and human resources development.

Research and extension services, a key to enhance productivity and production, are carried out or coordinated directly by bodies of the Ministry of Agriculture, the former by the Agency for Agricultural Research and Development and the latter by the Center for Agricultural Extension. There are two research centers in the regions, namely, the Assessment Institute for Agricultural Technology (LPTP) in Pontianak, West Kalimantan and the Assessment Station for Agricultural

¹⁸ In other sectors, the regional offices of the responsible ministries often implement development projects and programs. For details, see Chapter 4 Local Public Administration.

¹⁹ The Directorate General of Estate was transferred from the Ministry of Agriculture to the Ministry of Forestry and Plantation in March 1998, but its structure and function remain the same as before as of August 1998.

Technology (BPTP) in Palangkaraya, Central Kalimantan. The organizational structure of LPTP in Pontianak is shown in Figure 4.2.12.

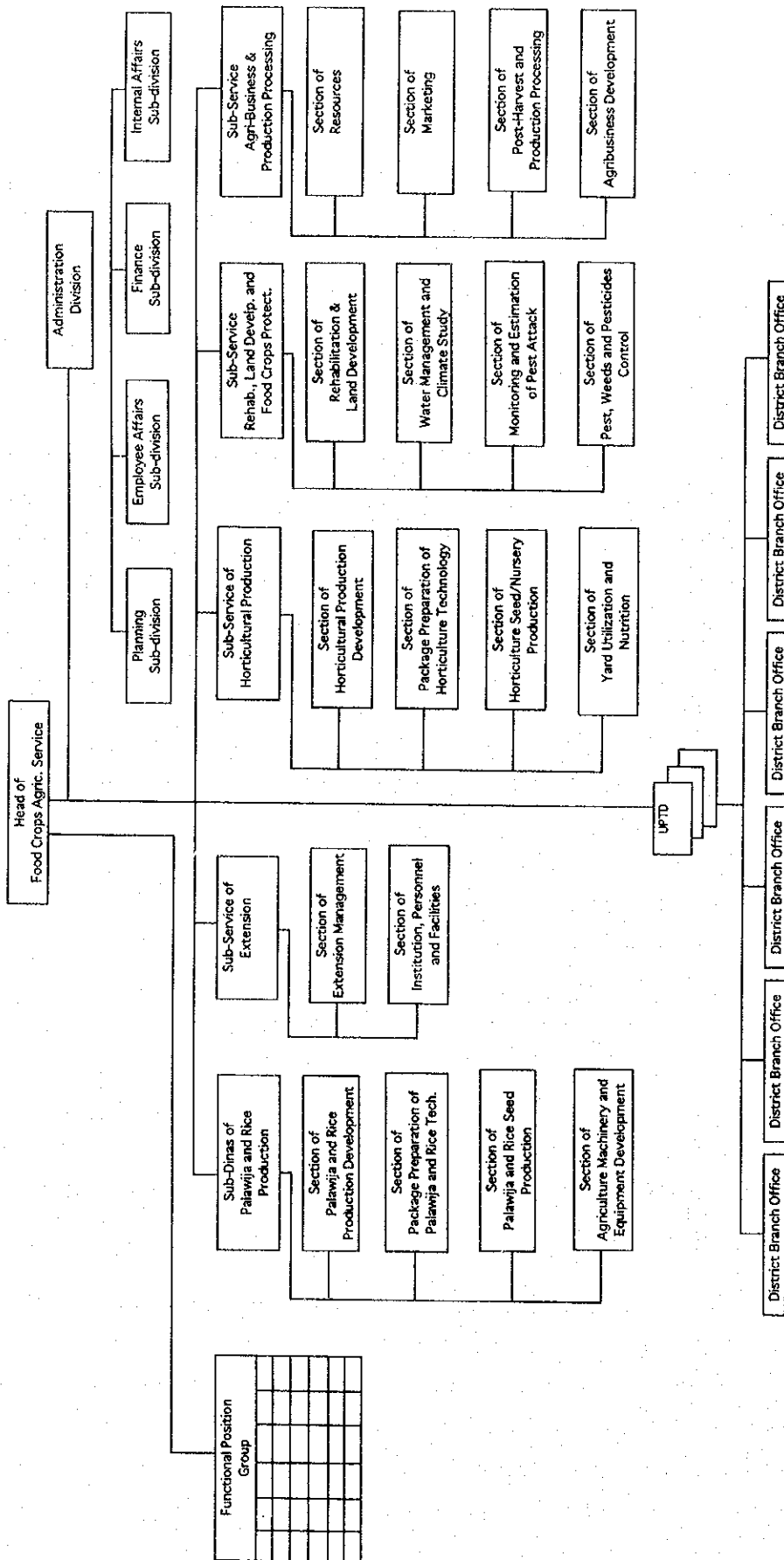
The activity of the agricultural extension stations (BPP), which are organized by crop group, is supported by the agricultural information and extension centers (BIPP), which are currently being installed nationwide for integrated extension services. The new scheme, together with the establishment of the assessment institutes, aims at strengthening the linkage between research and extension. The numbers of extension workers (PPL) and subject matter specialists (PPS) and related facilities are presented in Table 4.2.20. Since 1995/96, however, PPLs have begun reporting directly to district governments and operating without subsectoral boundaries under the new government policy of decentralized and integrated extension.

Interviews with those concerned with extension services indicate that there is a need for improving the quality of those services as well as for increasing the number of extension workers, though the central and provincial governments are making efforts for this purpose. It is often pointed out that extension work is extremely difficult in swidden agricultural areas where farms are scattered over vast areas often with steep slopes, particularly in Central Kalimantan. Extension workers are stationed in most of the subdistrict centers, but they rarely visit villages within their responsible districts because they are only provided with limited transportation means and access to most villages is not well established. Therefore, it can be presumed that the number of villages actually covered by extension services is not so large.

A fundamental question raised by such a situation, which does not seem to be substantially improved in the near future due to budget limitations, is whether the existing form of agricultural extension is appropriate under the conditions of the study area. It would be more cost effective and efficient if some volunteer farmers could obtain technologies and information matching their needs at a training center located in the vicinities of their villages (e.g., subdistrict centers) and diffuse them to fellow villagers. They could be awarded some bonus or allowance. As a matter of fact, the social survey has found that farmers in certain areas are well educated and able to absorb and disseminate new knowledge (there are even some high school graduates in the villages surveyed). Such a system can also help to overcome the existing division of extension services by subsector.

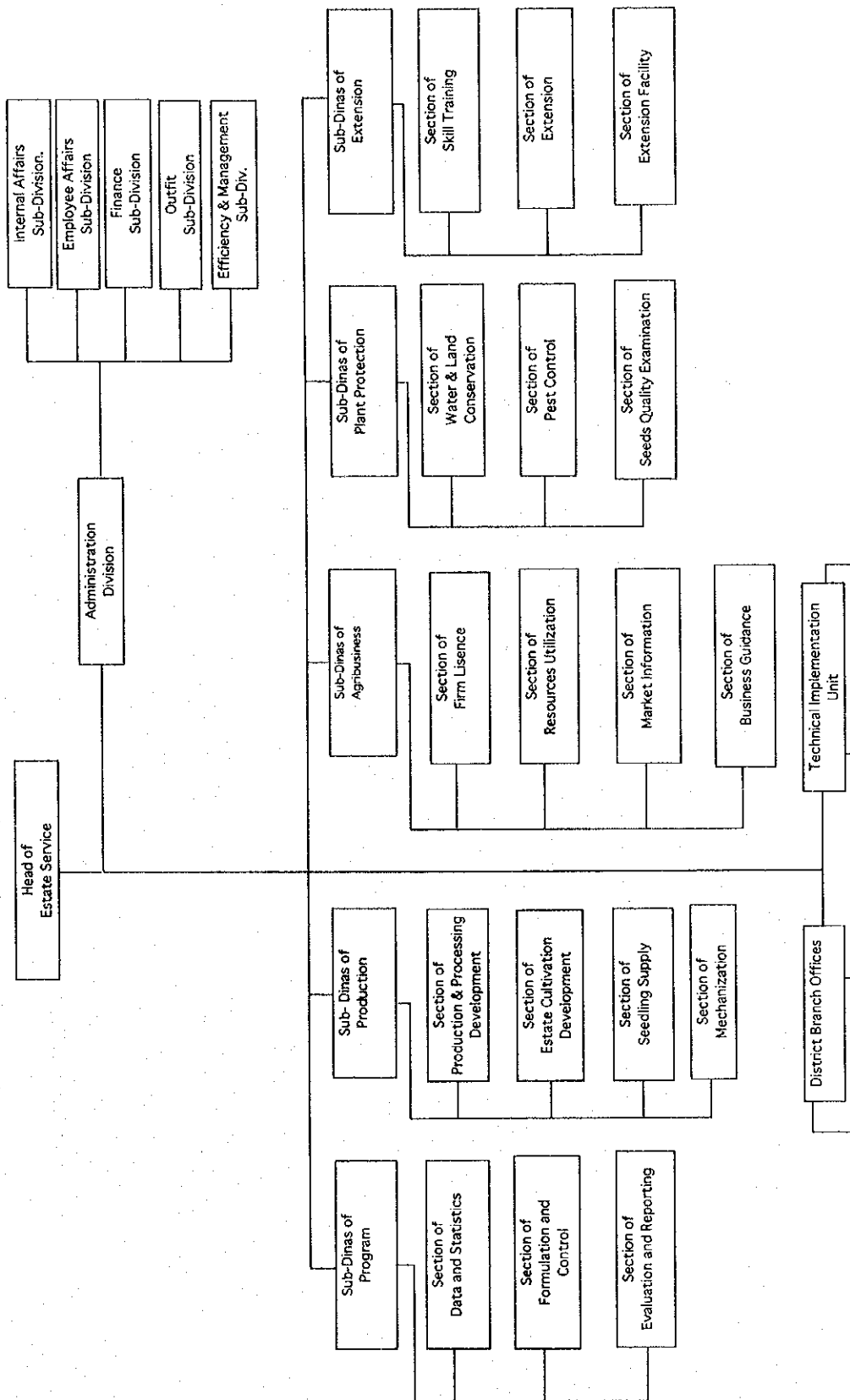
Irrigation facilities development, an important support service for agricultural production, is carried out by the Subservice of Irrigation (Subdinas Pengairan), the Service of Public Works. The Agricultural Survey indicates that the paddy area covered by some kind of irrigation system is less than 20% and other area is cultivated under rain-fed conditions or with traditional tidal irrigation (*pasang surut*) in the two provinces (Table 4.2.4). The details of its work, projects, and programs are presented in the chapter on water resources in this report.

Figure 4.2.9 Organizational Structure of the Food Crop Agriculture Service



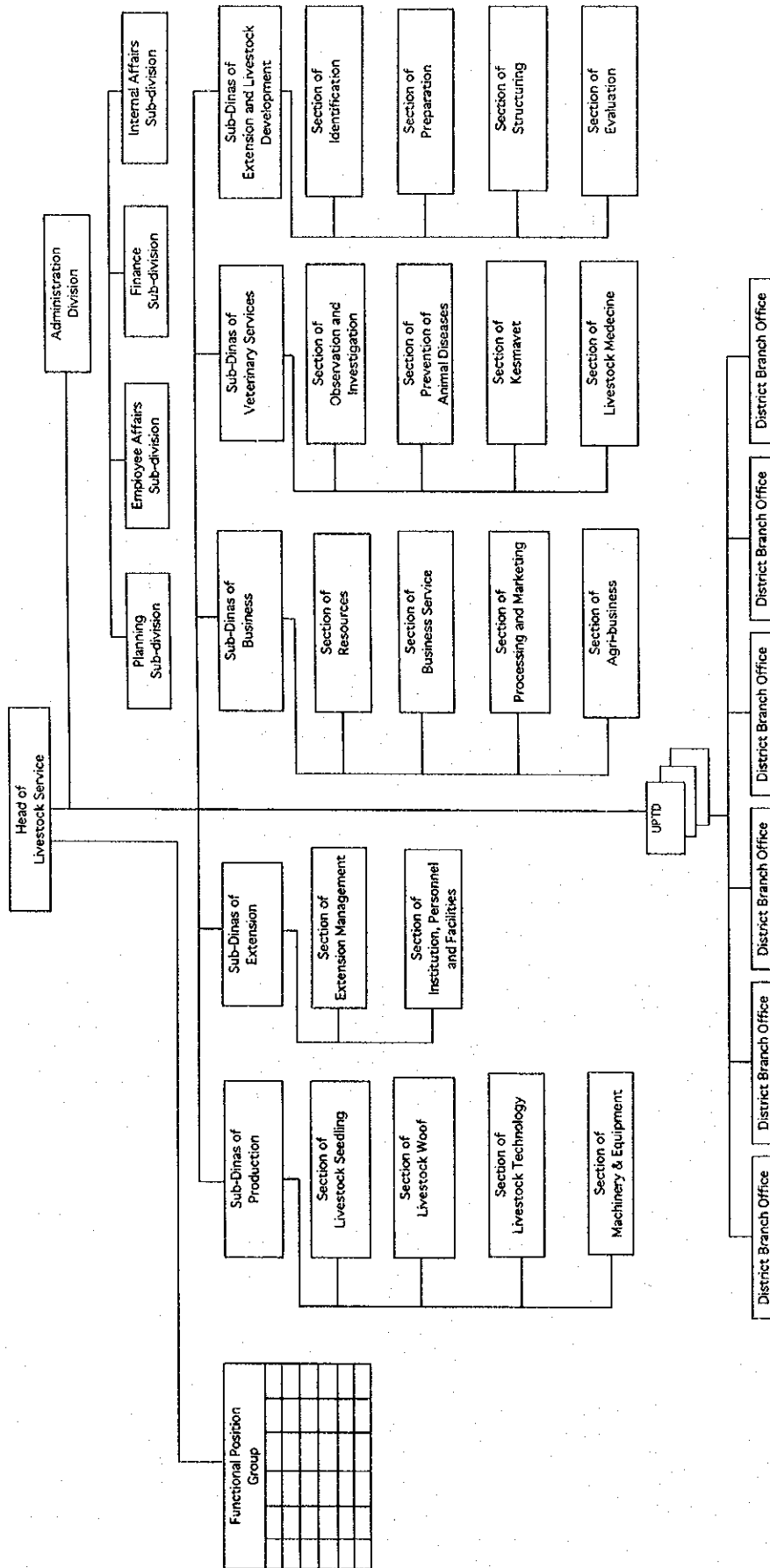
Source: Pemerintah Propinsi Kalimantan Tengah Dinas Pertanian Tanaman Pangan dan Hortikultura.

Figure 4.2.10 Organizational Structure of the Estate Service



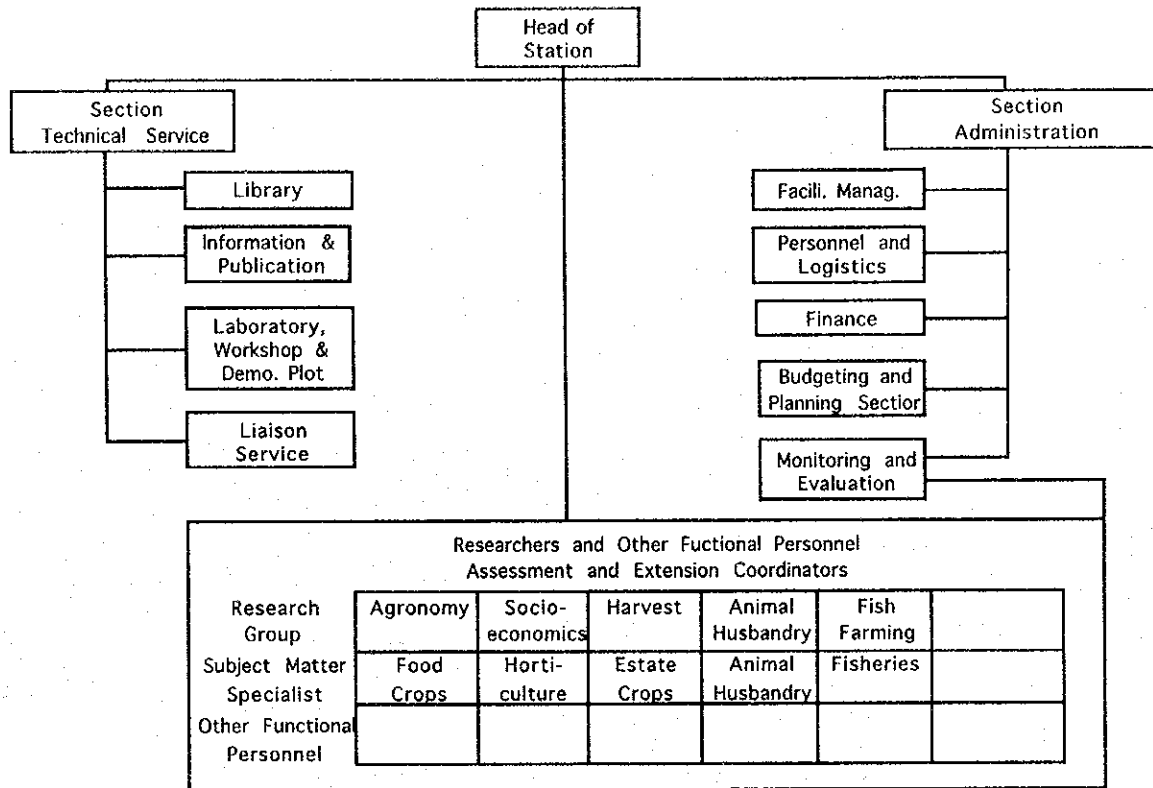
Source: Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Perkebunan.

Figure 4.2.11 Organizational Structure of the Livestock Service



Source: Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Peternakan.

Figure 4.2.12 Organizational Structure of the Assessment Institute for Agricultural Technology (LPTP) in Pontianak, West Kalimantan



Source: Assessment Institute for Agricultural Technology Pontianak, "Strategic Planning Assessment Institute for Agricultural Technology 1997-2007," 1997.

Table 4.2.20 Agricultural Extension Services by Subsector and District in 1995/1996

(1) Extension Workers (PPS/PPL)

West Kalimantan

District/Municipality	Food Crop			Estate Crop			Livestock			Total		
	PPS	PPL	Total	PPS	PPL	Total	PPS	PPL	Total	PPS	PPL	Total
Sambas	5	112	117	1	108	109	1	23	24	7	243	250
Pontianak	5	131	136	3	120	123	1	32	33	9	283	292
Sanggau	2	51	53	1	67	68	1	9	10	4	127	131
Ketapang	3	56	59	1	50	51	2	7	9	6	113	119
Sintang	2	61	63	1	58	59	1	9	10	4	128	132
Kapuas Hulu	2	43	45	0	29	29	1	6	7	3	78	81
Kodya Pontianak	1	11	12	0	3	3	1	5	6	2	19	21
Province	6	0	6	2	0	2	4	0	4	12	0	12
Total	26	465	491	9	435	444	12	91	103	47	991	1,038

Central Kalimantan

District/Municipality	Food Crop			Estate Crop			Livestock*			Total		
	PPS	PPL	Total	PPS	PPL	Total	PPS	PPL	Total	PPS	PPL	Total
Kotawaringin Barat	5	68	73	1	65	66	1	28	29	7	161	168
Kotawaringin Timur	4	62	66	3	86	89	2	28	30	9	176	185
Kapuas	4	87	91	1	110	111	2	41	43	7	238	245
Barito Selatan	3	38	41	1	81	82	1	19	20	5	138	143
Barito Utara	2	24	26	3	60	63	1	14	15	6	98	104
Kodya Palangkaraya	4	36	40	2	29	31	0	18	18	6	83	89
Province	0	0	0	1	28	29	2	1	3	3	29	32
Total	22	315	337	12	459	471	9	149	158	43	923	966

(2) Agricultural Extension Stations (BPP) and Agricultural Extension Work Areas (WKPP)

West Kalimantan

District/Municipality	Food Crop		Estate Crop		Livestock		Total		
	BPP	WKPP	BPP	WKPP	BPP	WKPP	BPP	WKPP	BIPP
Sambas	5	179	4	97	3	n.a.	12	276	1
Pontianak	7	177	3	79	1	n.a.	11	256	1
Sanggau	2	84	3	48	2	n.a.	7	132	1
Ketapang	3	83	2	57	1	n.a.	6	140	1
Sintang	2	94	3	66	1	n.a.	6	160	1
Kapuas Hulu	1	92	1	30	1	n.a.	3	122	1
Kodya Pontianak	1	6	0	4	0	n.a.	1	10	1
Total	21	715	16	381	9	n.a.	46	1,096	7

Central Kalimantan

District/Municipality	Food Crop		Estate Crop		Livestock*		Total		
	BPP	WKPP	BPP	WKPP	BPP	WKPP	BPP	WKPP	BIPP
Kotawaringin Barat	8	10	3	120	1	34	12	164	1
Kotawaringin Timur	13	24	3	174	2	24	18	222	1
Kapuas	8	23	6	116	2	43	16	182	1
Barito Selatan	2	12	3	72	1	33	6	117	1
Barito Utara	2	11	2	45	0	15	4	71	1
Kodya Palangkaraya	0	2	0	18	1	18	1	38	0
Total	33	82	17	545	7	167	57	794	5

Sources: Kantor Statistik Propinsi Kalimantan Barat, Kalimantan Barat Dalam Angka 1995, 1996.
 Pemerintah Propinsi Daerah Tk. I Kalimantan Barat Dinas Pertanian Tanaman Pangan, Laporan Tahunan Tahun 1995, 1996.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Perkebunan.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Peternakan.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Pertanian Tanaman Pangan, Tanaman Pangan dan Hortikultura Kalimantan Tengah Dalam Angka Tahun 1996, 1997.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Perkebunan, Laporan Tahunan Tahun 1996, 1997.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Peternakan.

Notes: PPS = Penyuluh Pertanian Senior, or Subject Matter Specialist.
 PPL = Penyuluh Pertanian Lapangan, or Agricultural Field Instructor.
 BPP = Balai Penyuluhan Pertanian, or Agricultural Extension Station.
 WKPP = Wilayah Kerja Penyuluhan Pertanian, or Agricultural Extension Work Area.
 BIPP = Balai Informasi dan Penyuluhan Pertanian, or Agricultural Information and Extension Center.
 *) Data for 1997/1998.

4.3 EXISTING POLICY, PLANS, PROGRAMS, AND PROJECTS

4.3.1 The Sixth Five-Year Development Plan (REPELITA VI)

(1) West Kalimantan

Although abandoned in the 1998/99 fiscal year because of the economic crisis, REPELITA VI has set the target of annual growth rate for the agricultural sector (including forestry and fisheries) at 4.5% per annum for the province, much higher than the national target of 3.4%. In order to achieve the target, agricultural development is directed towards increasing productivity and efficiency and diversifying agricultural products for export, particularly by the PIR scheme for palm oil and rubber and the production of oranges. The growth target for each crop and product for the two provinces is presented in Table 4.3.1. Not surprisingly, the highest growth rate is expected for oil palm in the plan of each province.

The plan emphasizes that the development efforts should be made in an integrated manner and supported by the development of market-oriented agribusiness and agroindustry that create and expand job and business opportunities and enhance the income and living standards of farmers and fishermen. Development priority is given to the improvement of agricultural productivity and production of the Kapuas River basin and the areas surrounding Pontianak, Sanggau, and Singkawang, which will occur through:

- 1) Improving the quality and intensification of smallholder food crops such as rice, maize, cassava, green beans, and sweet potatoes;
- 2) Developing horticultural crops such as oranges and durian;
- 3) Increasing fishery catches, e.g., prawn, swell fish, grouper, large tuna, tuna, and tiny sea fish;
- 4) Improving fresh water and marine aquaculture businesses, especially for gold fish, prawn, grouper, carp, nile tilapia, crabs, and cat fish;
- 5) Developing animal husbandry businesses, e.g., pigs, cattle, chickens (non-broiler), broiler chickens, and ducks;
- 6) Developing estate crops such as rubber, oil palm, and cocoa;
- 7) Developing processing industries of agricultural products such as fruits, fish, and meat; and
- 8) Improving counseling activities to enable agricultural producers to master and apply new technology.

Table 4.3.1 Targets of REPELITA VI for Agricultural Production

	West Kalimantan						Central Kalimantan					
	1994	1995	1996	1997	1998	Average Growth Rates (%)	1994	1995	1996	1997	1998	Average Growth Rates (%)
Food Crops												
1. Area Harvested (ha)												
Paddy	..	..	..	..	..	..	154,305	155,748	158,139	160,472	162,744	1.34
Maize	..	..	..	..	..	..	9,217	9,936	10,710	11,548	12,447	7.80
Cassava	..	..	..	..	..	..	5,500	5,618	5,749	5,864	5,990	2.16
Sweet Potato	..	..	..	..	..	..	1,500	1,532	1,565	1,599	1,633	2.15
Soybean	..	..	..	..	..	..	13,367	15,672	18,376	21,545	25,262	17.25
Groundnut	..	..	..	..	..	..	1,573	1,910	2,319	2,815	3,418	21.41
Green Bean	..	..	..	..	..	..	429	474	522	577	637	10.39
Vegetables	..	..	..	..	..	..	11,329	12,242	13,218	14,294	15,446	8.06
Fruits	..	..	..	..	..	..	13,641	13,841	14,036	14,226	14,411	1.38
2. Yield (ku/ha)												
Paddy	..	..	..	..	..	..	23.39	24.05	24.50	24.99	25.45	2.13
Maize	..	..	..	..	..	..	10.50	10.80	11.00	11.30	11.50	2.30
Cassava	..	..	..	..	..	..	120.18	121.38	122.60	128.82	125.06	1.00
Sweet Potato	..	..	..	..	..	..	91.07	91.98	92.90	93.83	94.77	1.00
Soybean	..	..	..	..	..	..	10.50	11.00	11.50	12.00	12.50	4.46
Groundnut	..	..	..	..	..	..	10.13	10.23	10.33	10.44	10.54	1.00
Green Pea	..	..	..	..	..	..	7.02	7.09	7.16	7.23	7.31	1.02
Vegetables	..	..	..	..	..	..	16.65	16.82	16.98	17.15	17.33	1.01
Fruits	..	..	..	..	..	..	52.85	53.38	53.91	54.45	55.00	1.00
3. Production (ton)												
Paddy	743,850	763,200	783,100	803,400	824,300	2.60	360,918	374,509	387,437	400,984	414,256	3.51
Maize	19,150	19,960	20,820	21,750	22,700	4.34	10,178	11,243	12,401	13,673	15,067	10.30
Cassava	217,970	222,330	226,780	231,315	235,950	2.00	66,099	68,200	70,374	72,609	74,921	3.18
Sweet Potato	17,100	18,700	20,250	22,600	24,300	9.18	13,605	14,095	14,543	15,006	15,488	3.29
Soybean	8,500	9,200	9,960	10,370	11,180	7.09	14,774	18,147	22,244	27,215	33,240	22.47
Groundnut	1,920	1,995	2,025	2,170	2,260	4.16	1,593	1,954	2,396	2,983	3,603	22.63
Green Pea	323	330	350	370	385	4.49	301	336	374	417	465	11.49
Vegetables	..	..	..	..	..	..	18,862	20,586	22,468	24,521	26,762	9.14
Fruits	..	..	..	..	..	..	72,093	73,883	75,672	77,462	79,252	2.40
Estate Crops												
1. Cumulative Area (ha)												
Rubber	431,179	441,248	451,570	460,663	470,663	2.21	221,420	238,251	256,084	273,914	291,774	7.14
Coconut	79,848	79,848	79,848	79,848	79,848	0.00	44,466	42,745	43,557	44,282	45,046	0.32
Oil Palm	173,411	236,475	281,959	282,788	294,788	14.18	41,595	55,315	68,635	82,375	96,114	23.29
Coffee	9,830	10,187	10,561	10,953	11,363	3.69	5,194	5,360	5,527	5,693	5,859	3.06
Pepper	6,036	6,236	6,440	6,653	6,875	3.31	9,714	9,880	10,047	10,213	10,379	1.67
Cocoa	7,259	7,607	7,996	8,383	8,792	4.91	14,712	18,419	21,936	25,503	29,070	18.56
2. Production (ton)												
Rubber	141,439	143,219	146,530	152,872	157,640	2.75	73,906	83,513	94,370	104,751	116,274	12.00
Coconut (Copra)	45,886	47,417	48,128	48,851	49,583	1.96	29,682	31,167	32,725	34,361	36,079	5.00
Oil Palm (CPO)	115,154	143,093	185,249	251,568	339,436	31.03	8,099	19,805	41,601	62,500	83,500	79.19
Coffee	3,037	3,115	3,247	3,779	3,642	4.65	788	881	836	861	887	3.00
Pepper	3,904	4,130	4,355	4,581	4,815	5.38	81.00	81.56	82.15	83.27	83.85	0.87
Cocoa	860	1,022	1,185	1,348	1,510	15.11	363	632	886	1,109	1,272	36.82
Livestock Products (ton)												
Cattle	25,208	26,528	27,888	29,271	30,709	5.06	5,617	6,915	8,455	10,313	12,656	22.52
Broiler Chicken	12,510	13,412	14,386	15,436	16,570	7.28	4,714	4,948	5,175	5,441	5,715	4.93
Duck	237	252	267	282	298	5.89	..	..	..	..	..	..

Sources: Kantor Wilayah Departemen Pertanian Propinsi Kalimantan Barat, REPELITA VI Pertanian Propinsi Kalimantan Barat, February 1994.

Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah, Dinas Perkebunan, Rencana Pembangunan Lima Tahun VI (REPELITA VI): Perkebunan Kalimantan Barat (Edisi Kedua Disempurnakan), March 1996.

Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah, Dinas Pertanian Tanaman Pangan, Rencana Pembangunan Lima Tahun VI (REPELITA VI): Subsektor Pertanian Tanaman Pangan, 1994.

(2) Central Kalimantan

REPELITA VI has set the target of annual growth rate for the agricultural sector (including forestry and fisheries) at 3.6% per annum for the province. The overall direction and objectives of the sectoral development are similar to those of West Kalimantan, that is, to increase productivity and efficiency, to diversify agricultural products for export, and to develop market-oriented agribusiness and agroindustry which will create and expand job and business opportunities and enhance the income and living standards of farmers and fishermen. Priority is given to improvement in the productivity and production of the precincts of Kapuas, Kotawaringin Timur, and Danau Sembuluh, which will be accomplished through:

- 1) Enhancing the quality and intensification of smallholder food crops such as rice, maize, soybeans, green beans, groundnuts, and cassava;
- 2) Developing horticultural crops such as jackfruits, rambutan, and oranges;
- 3) Increasing fishery catches, e.g., flounder, gray mullet, sea fish, and bambangan;
- 4) Developing aquaculture businesses, especially for carp, river fish, decorative fish, murrel, yellow carp, Nile tilapia, and prawn;
- 5) Developing animal husbandry businesses, e.g., cattle, goats, pigs, country chickens, broiler chickens, and ducks;
- 6) Developing estate crops such as rubber, coconuts, coconut palm,²⁰ and cocoa;
- 7) Developing processing industries of agricultural products such as fruits, fish, and meat; and
- 8) Improving counseling activities to enable agricultural producers to master and apply new technology.

Documents on the Second Long-Term Development Plan (PJPII) for are not available at the time of writing this report, though the Regional Office of the Ministry of Agriculture has not prepared any document for the plan. One exception is a policy paper on the plan prepared by the Service of Food Crop Agriculture of Central Kalimantan, which emphasizes the importance of increasing rice production as well as enhancing the income level of farmers and employment opportunities within the subsector.²¹

4.3.2 Policies and Programs

The development program for the agriculture sector has been formulated by the Regional Office of the Ministry of Agriculture for the policy purposes of: 1) developing market-oriented commercial agribusiness; 2) fulfilling food needs; 3) increasing export and income; and 4)

²⁰ As cited in an English translation of REPELITA VI for the province, but it seems to be "oil palm," for which the Indonesian original version must be referred to.

²¹ Pemerintah Propinsi Daerah Tingkat I Kalimantan Tengah Dinas Pertanian Tanaman Pangan, Pembangunan Jangka Panjang II (PJPII): Sub Sektor Pertanian Tanaman Pangan Kalimantan Tengah 1993-2018.

enhancing the welfare of farmers. Development projects of each subsector within the agriculture sector are formulated and implemented based on the program as delineated below.²²

1) Integrated Smallholder Agricultural Development Program (P2RT)

This program is directed to establish farming communities in rural areas in order to enable them to utilize factors of production and to increase their welfare through farmer groups and farmer cooperatives so that they may foster a self-supporting attitude for agricultural industrialization. Main activities include:

- a) Improvement of yield per unit of land for smallholder agriculture through intensification, integrated pest control, and agribusiness management;
- b) Expansion of small-scale agricultural areas to attain the scale of economy;
- c) Development of the agribusiness system;
- d) Development of service units in production centers;
- e) Development of farmer and trader groups into small-scale agribusiness entities; and
- f) Increase of the use, operation, and maintenance of infrastructure.

2) Agribusiness Development Program

This program is directed to create a conducive condition to accelerate economic growth in rural areas in order to obtain higher value added by using higher levels of capital, technology, management, market access, and inputs as well as to create agribusiness integrated with agroindustry through interrelation between the private sector and cooperatives. Main activities include:

- a) Establishment of agricultural associations in all sectors related to agribusiness;
- b) Analysis on inhibiting regulations and formulation of alternative policies that can support the development of agribusiness and agroindustry;
- c) Improvement of marketing subsystems through regulation and deregulation that can guarantee a proper profit for farmers and other agribusiness actors;
- d) Development of cooperation between farmers and agroindustrial entities based on a business partnership principle;
- e) Marketing promotion and the provision of information infrastructure;
- f) Development of processing, storage, and packing technologies; and
- g) Development of production centers based on the scale of economy principle.

3) Food and Nutrient Diversification Program

²² The description of the programs is based on a paper "Agricultural Development Program" provided by the Regional Office of the Ministry of Agriculture of West Kalimantan, but the programs for Central Kalimantan are basically the same as those presented here.

This program is directed to maintain the stability of food self-sufficiency and to improve the nutrient conditions through increasing the variety of food from crops, livestock, and fish. Main activities include:

- a) Increased utilization of house yards and other agricultural lands;
- b) Diversification of food consumption through counseling activities in cooperation with communities and rural institutions;
- c) Enhancement of the quantity and quality of food through better processing, storage, packaging, and distribution;
- d) Analysis on the food and nutrient situation; and
- e) Improvement of the skills of agricultural officers, counselors, and female farmers necessary for food diversification in rural areas.

4) Agricultural Resources, Facilities, and Infrastructure Development Program

This program is directed to improve the quality of self-support and to increase competitive human resources for managing and utilizing natural resources optimally as well as for developing facilities and infrastructure necessary for agricultural development. Main activities include:

- a) Improvement of the quality of agricultural education and training so as to facilitate agribusiness, environment conservation, and the realization of regional resource potential;
- b) Support for farmers so that they can become progressive businessmen, make a decision by themselves, and make use of available economic opportunities ;
- c) Opening of new agricultural areas with various kinds of suitability;
- d) Rural water resources development through the construction and rehabilitation of irrigation systems to support intensification and diversification;
- e) Development of agricultural machine-equipment workshops;
- f) Production of frozen semen and vaccines for livestock development;
- g) Development and utilization of centers for seed protection, crop protection; veterinary; training, etc.;
- h) Construction and rehabilitation of roads;
- i) Improvement of the coordination with related agencies in such areas as infrastructure development and transmigration; and
- j) Development of farmer groups, credit facilities, marketing facilities, storage, and infrastructure for paddy production (*saprodi*).

Addressing the existing problems concerning agriculture, such as the lack of human resources, business orientation among farmers, good technologies, market information, and infrastructure, the low levels of food and nutrient diversification and partnership between farmers and

businesses, etc. these programs are very comprehensive, but it is not clear, at least to the study team, how each activity presented here will be materialized. Some, e.g., the improvement of school curricula, may have been already implemented, but others, e.g., making farmers progressive businessmen, seem to be too obscure and too difficult to implement. Projects formulated based on these programs are discussed in the next section.

4.3.3 Projects

Although the study team has obtained some information on agricultural development projects and programs, further analysis will be carried out in the next part of Phase II in relation to the formulation of the master plan. The schemes and problems concerning two of the most important projects in the study area, i.e., the PIR scheme and the rubber replanting scheme, are discussed in Discussion Papers No. 2 and No. 15, related to oil palm plantation development and the rubber economy, respectively. Major development projects that cover the agricultural sector include:

- (1) West Kalimantan: The Integrated Economic Development Area (KAPET) for the districts of Sanggau, the Integrated Swamp Development Project in the districts of Pontianak (financed by the World Bank), and the Smallholder Tree Crop Processing Project (financed by the Asian Development Bank).
- (2) Central Kalimantan: KAPET for the Kahayan Kapuas Barito (KAKAB) area, the Peat Swampland Development (PLG) Project, the Upland Farmer Development Project, the Tree Crop Smallholder Sector Project, and the Smallholder Tree Crop Processing Project (the latter three projects are financed by the Asian Development Bank).

On-going projects and budgets therefor in the 1997/1998 fiscal year by subsector (i.e., by service) are presented in Table 4.3.2. They are based on the development programs set for the agricultural sector as a whole and, consequently, contain similar titles across the board. It is also noticeable that only a very small amount of budget is allocated to projects implemented at the district level (APBD II).

For the 1998/99 fiscal year, due to a budget revision, the provincial governments have been asked by BAPPENAS to review their situations and submit proposals for emergency or rescue projects and programs to cope the problems brought about by the economic crisis. While each *Dinas* has yet to respond with details at the time of this report writing, the proposals for rescue projects and programs prepared by the Service of Food Crop Agriculture of Central Kalimantan, for example, include: 1) the provision of credit; 2) the provision of seeds/seedlings and other inputs; 3) the organization of pest control groups; 4) field training for farmer groups; 5) assistance for mechanization; and 6) the cultivation of "sleeping lands" with assistance of the

Armed Forces (ABRI) and the Governor's Instruction (IN-GUB).²³ The Service of Estate Crops of Central Kalimantan has drafted a concept of "community empowerment" through establishing business partnerships between local farmers and large plantations in crop cultivation, processing, and marketing.²⁴

Table 4.3.2 On-going Agricultural Development Projects in 1997/1998

West Kalimantan

Project/Program		Budget	Target (Rp. 1,000)
Food Crops			
PS2PTPH	Resources, Facilities and Infrastructure Improvement Project	APBN	964,368
PLPS (ISDP)	Integrated Swamp Development Project	APBN/WB	1,197,476
PSPB	Facilities and Infrastructure Development with Assistance	APBN	164,124
PSULK (KUF)	Kalimantan Upland Farming System Development Project	GTZ	
PIADP	Irrigation Agriculture Development	APBN	
P2RT	Integrated Smallholder Agricultural Development Project	APBN	617,246
PUP-PTPH	Food Crop and Horticulture Agribusiness Development Project	APBN	171,275
PAH	?	APBN/OECF	370,074
P3R-UPSUS	Special Improvement Effort for Smallholder Agriculture	APBD	351,451
P3R	Smallholder Agricultural Development Projects (Provincial)	APBD	101,500
P2R	Smallholder Agricultural Development Projects	APBD	473,689
SPP-SPMA	Development of Agricultural Technical Schools	APBD	249,900
Estate Crops			
P2RT	Integrated Smallholder Development Project	APBN	700,406
PUP	Plantation Business Development Project	APBN	169,269
PS2P	Resources, Facilities and Infrastructure Improvement Program	APBN	592,899
PIR	Nucleus Smallholder Estate Development Projects	APBN	430,209
STCPP	Smallholder Tree Crop Processing Project	ADB	5,475,307
ISDP	Integrated Swamp Development Project	APBN/WB	2,957,866
TCSDP	Tree Crop Smallholder Development Project	APBN/WB	5,655,692
	Integrated Regional Development Project	APBD I	1,919,468
	Scattered Smallholder Estate Development Projects	APBD I	340,000
Livestock			
	West Kalimantan Livestock Development Project	APBD I	520,000
PS2P	Resources, Facilities and Infrastructure Improvement Program	APBN	533,177
P2RT	Integrated Smallholder Development Project	APBN	200,750
PUP	Livestock Business Development Project	APBN	141,450

Sources: Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Pertanian Tanaman Pangan, *Evaluasi Pembangunan Pertanian Tanaman Pangan dan Hortikultura di Propinsi Kalimantan Barat*, 1997.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Pertanian Tanaman Pangan, *Laporan Tahunan Tahun 1995, 1996*.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Perkebunan.
 Pemerintah Propinsi Daerah Tingkat I Kalimantan Barat Dinas Peternakan.

²³ Dinas Pertanian Tanaman Pangan Kalimantan Tengah Tk. I, "Dampak Krisis Ekonomi dan Pengaruhnya Setra Reformasi Pembangunan Dalam Rangka Pelaksanaan Program/Proyek Pembangunan Sub Sektor Pertanian Tanaman Pangan di Kalimantan Tengah," July 1998.

²⁴ Dinas Perkebunan Kalimantan Tengah Tk. I, "Konsep Upaya Pemberdayaan Masyarakat di Sekitar Perusahaan Perkebunan di Kalimantan Tengah," July 1998.

**Table 4.3.2 On-going Agricultural Development Projects in 1997/1998
(Continued)**

Central Kalimantan

Project/Program		Budget	Target (Rp. 1,000)
Food Crops			
PS2PTPH	Resources, Facilities and Infrastructure Improvement Project	APBN	2,800,000
P2PTPH	Food Crop and Horticulture Development Project	APBN	600,000
PSPB	Facilities and Infrastructure Development with Assistance	BLN	1,356,194
PLG	One Million Hectare Land Development Project	APBN	19,000
	Scattered Smallholder Food Crop Development Projects	APBD I	350,000
	Seed Station, Agricultural Extension Station and Agricultural Machine Workshop Development Project	APBD I	250,000
	Integrated Regional Food Crop Development Project	APBD I	75,000
	Facilities and Infrastructure Improvement Project for Dinas TPH	APBD I	137,500
PLG	One Million Hectare Swamp Land Coordination and Development Projects in Kabupaten Kapuas and Barito Selatan	APBD I	400,000
PPTRP	Smallholder Food Crop Agriculture Development Projects	APBD I	1,412,500
SPP-SPMA	Development of Agricultural Schools in Buntok and Sampit	APBD I	187,500
Estate Crops			
	Central Kalimantan Plantation Development Project	APBN	526,787
P2RT	Integrated Smallholder Development Project in Kab. Barito Utara	APBN	599,616
PUP	Central Kalimantan Plantation Business Development Project	APBN	250,000
PIR	Nucleus Smallholder Estate Development Projects	APBN	250,000
STCPP	Smallholder Tree Crop Processing Project	ADB	2,786,540
PS2P	Resources, Facilities and Infrastructure Improvement Program	APBN	342,006
UFDP	Upland Farmer Development Project	ADB	2,388,418
TCSSP	Tree Crop Smallholder Sector Project	ADB	9,417,530
	Integrated Regional Development Project	APBD I	400,000
	Scattered Smallholder Estate Development Projects	APBD I	2,580,000
	Facilities and Infrastructure Improvement Project	APBD I	300,000
Livestock			
	Central Kalimantan Livestock Development Project	APBN	400,000
	Scattered Smallholder Livestock Development Projects	APBD I	1,100,000
	Smallholder Livestock Development Projects	APBD I, II	2,000,000
PS2P	Resources, Facilities and Infrastructure Improvement Program	APBD I	800,000
	Facilities and Infrastructure Improvement Project for Dinas	APBD I	700,000
P2RT	Integrated Smallholder Development Project in Kab. Ko-Barat	APBN	500,000
PUP	Livestock Business Development Project	APBN	250,000

Sources: Department Pertanian, Kantor Wilayah Propinsi Kalimantan Tengah, *Rencana Pembangunan Daerah (PEETADA)*, Sektor Pertanian Propinsi Kalimantan Tengah Tahun 1997/98.