APPENDIX

ANALYSES OF KEY DEVELOPMENT ACTIVITIES AND POLICIES

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A.1 INTRODUCTION

This appendix contains the analyses of the key development activities and policies which are transforming the region. In these analyses, we have tried to uncover the characteristics of the key development activities and policies. Understanding the characteristics of the factors, actors and actions influencing the regional transformation could provide essential implications/guidelines for discussing issues and basic strategies in the following chapters.

In this sense, this appendix does not provide an overview of each sector, which is given in full detail in the Volume 4: Sector Plan(1) and Volume 5: Sector Plan(2).

A.2 OIL PALM PLANTATION DEVELOPMENT

(1) Past Trends

While oil palm plantation development began to flourish in Sumatra in the mid-1980s, the boom started in West Kalimantan in the early 1990s and in Central Kalimantan in the mid-1990s, only after land became no longer easily available for expansion in Sumatra (Figure A.2.1). In Indonesia, there are three management types of oil palm 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 the country as a whole, but in more recent years private companies have had major investors in the sector. As PTP in earlier years, those private companies are also contributing to the expansion of smallholder farms under the PIR (Perusahaan Inti Rakyat Perkebunan, or Nucleus Smallholder Estate) scheme.

For the period of 1990-1995, the area planted with oil palms 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. However, the existing plans for 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 (Table A.2.1 and Figure A.2.2).

Table A.2.1 Plans of Oil Palm Plantation Development as of Late 1997

(ha)

Province	Date of Information	Area offered by the provincial government ("Arahan Lahan")	Area Approved by the Director General of Estates, Ministry of Agriculture (Ijin Prinsip)	Area to be Developed into Oil Palm Plantations (an estimate by Dinas Perkebunan)	Area under Oil Palm in 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 Approved by the Director General of Estates, Ministry of Agriculture (PPUP)	Total Area of Oil Palm Plantations with PPUP	Area under Oil Palm in 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.

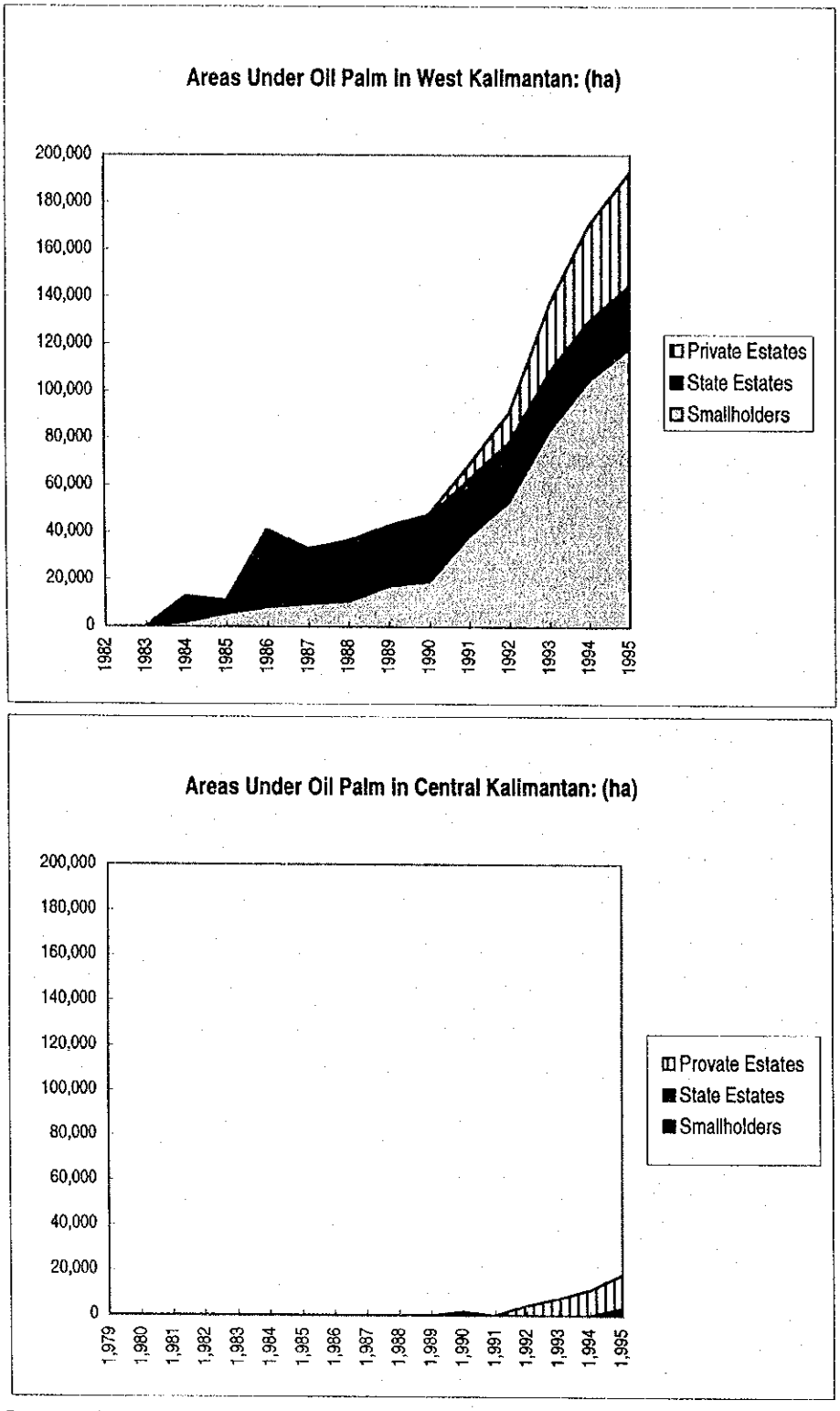
Notes: *) 1,242,856 ha (for large private estates) + 350,500 ha (for PIR-Trans and PIR-KKPA), not including the area allocated for PTPN XIII (191,000 ha) and PIR-Bun (167,700 ha).

(2) Problems

While the oil palm plantation industry has begun to become the prime mover of economic growth in the two provinces and to help to improve the welfare of the local people, the expansion has also brought about various kinds of problems, particularly those related to the extensive land development. The results of the social survey and interviews conducted by the JICA study team exhibit such cases as: 1) A land is offered by the provincial government without consultation with local communities; 2) Local participants in a PIR project are compelled to give up their productive farms and groves because of the obscure procedure for land acquisition; 3) Those whose lands have been expropriated for a plantation are paid little compensation for the loss even where customary rights have been established; 4) Land disputes between the plantation company and local communities continue; and 5) The initial economic difficulties of plasma farmers.[1]

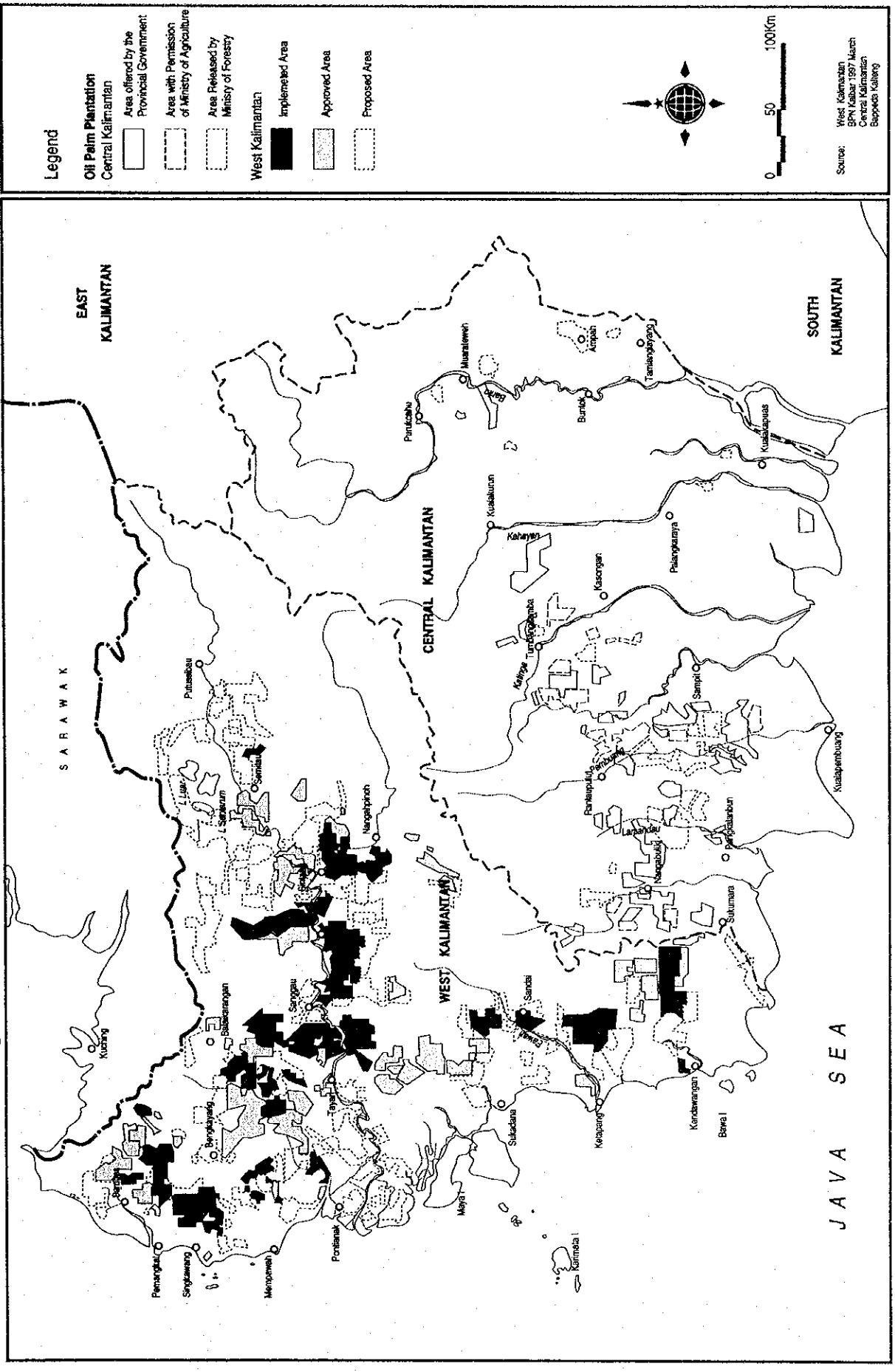
[1] These problems are elucidated in JICA-SCRDP-Kaltengbar's Discussion Paper No. 2 "The PIR Scheme in Oil Palm Plantation Development: Why Do Plasma Farmers Have Economic Difficulties in the Initial Stage?"

Figure A.2.1 Areas under Oil Palm in the Study Area in 1982-1995



Source: Directorate General of Estate, Ministry of Agriculture.

Figure A.2.2 Existing and Planned Oil Palm Plantation in the Study Area



(3) Prospective Investment in the Sector and Future Outlook

As of late 1997, the provincial government of West Kalimantan offers as much as 3.2 million ha for tree crop plantation development, despite its 1994 spatial structural plan that has set a directive of cultivation area (arahan kawasan budidaya) at 2.5 million ha for dryland agriculture (including estate crops, livestock, and horticulture). In the proposed area, lands with the approval of Director General of Estate, the Ministry of Agriculture (ijin prinsip) amount to 1.6 million, which includes areas for other tree crops but is allocated mainly, more than 90%, for oil palm. In Central Kalimantan, the lands with the approval of Director General of Estate, the Ministry of Agriculture (PPUP) totals 1,712,412 ha, slightly over but almost equal to the 1.7 million ha allocated by the 1992 provincial spatial plan (RTRWP) for tree crop plantation, of which 1,557,752 ha is approved for oil palm plantation.

However, the land potential map prepared by the study team based on the land systems designated by the RePPProT has revealed that not all the lands proposed and approved for oil palm plantation are suitable (Figure A.2.3). In Central Kalimantan, most of the approved lands appear to be situated in suitable areas, whereas in West Kalimantan, even lands unsuitable for any tree crop are offered for oil palm plantation. The study team has estimated the potential area for oil palm plantation to be 3.4 million ha in total for the two provinces, of which 1.8 million ha can be actually planted with oil palms, 1 million ha in West Kalimantan and 0.8 million ha in Central Kalimantan (Table A.2.2). The estimated area that can be planted with oil palms in the provinces, even though much smaller than the area planned by the provincial governments, exceeds the total area currently under oil palm in Sumatra and is comparable to that in Malaysia (Table A.2.3).

The total production of palm oil in the two provinces is thus expected to reach 4.7 million tons, even higher than the present level of Sumatra, which produced 4.5 million tons of CPO in 1996 (Tables A.2.3 and A.2.4).

Except for palm oil derivatives (oleochemicals), most of the demand for CPO is driven by the overall demand for fats and oils, which is primarily a function of population and income growth. While Indonesia's oil palm production is projected to be over 10 million tons in 2005, approximately a half of the output is expected to be consumed domestically due to population and income growth as well as new developments and uses in the oleochemical sector.[2] The country's export of oil palm is also likely to increase at a high rate (provided the present export ban is lifted) as population and income growth in major edible oil importing countries, such as

[2] Jaime Castaneda and Mark Giordano, "Palm Oil Prospects for 2005," ERS Staff Paper No. AGES-9518, the U.S. Department of Agriculture, August 1995, pp. 8-11.

India, China and Pakistan, is expected to boost world demand for palm oil, which has a price advantage over other edible oils such as soybean oil and sunflower oil.

(4) Possible Impacts of High Concentrations of Oil Palm Plantations

Although the establishment of the plantation industry can have positive impacts on the economic development of the study area, such as increases in regional income and employment, specialization in palm oil production and the concentration of large oil palm estates in the area are likely to have some undesirable impacts, not only on the economy but also on the society and the environment. Such impacts include:

1) The economy will become highly dependent on the production of a single primary product, palm oil, whose price fluctuates according to the situation of international markets. As demonstrated by most of the countries specializing in one or a few primary commodities (e.g., bananas, coffee, copper, etc.), the area's economic growth will be instantaneously, and constantly, influenced by changes in the international prices of oil palm. The World Bank long-term projections indicate a decline in palm oil prices in real terms after 2000 despite the general prospect of a growing world demand for the oil.[3]
2) A large part of the profit generated in the plantation industry will be "repatriated" to Jakarta because it is a capital intensive industry and because of the availability of loans from local banks is limited. It is therefore highly likely that the plantation development will have only a limited impact on the regional economy.
3) The regional society may be adversely affected by the changes in landuse and farming and settlement patterns. Some indigenous people are forced to alter their ways of farming and living due to the increased competition for land resources brought about by the development of an oil palm plantation. In worst cases, they have to give up their houses and farms and/or groves which are still productive and can generate income.
4) Although the impacts of oil palm plantation development are difficult to assess and predict, the expansion of areas planted with oil palms at an unprecedented speed is expected to cause severe environmental degradation. Soil erosion due to land clearing and pollution due to the extensive use of agricultural chemicals, such as fertilizers, herbicides, and pesticides, will possibly damage the ecosystem of the study area. For fertilizers alone, for example, as much as one ton is applied to one hectare of land annually. If development is continued at the present rate and planned scale, many species, including those of a great economic value, will likely disappear from the area in the not distant future. Their impacts on the health of farmers, workers and residents in and around plantations should also not be overlooked.

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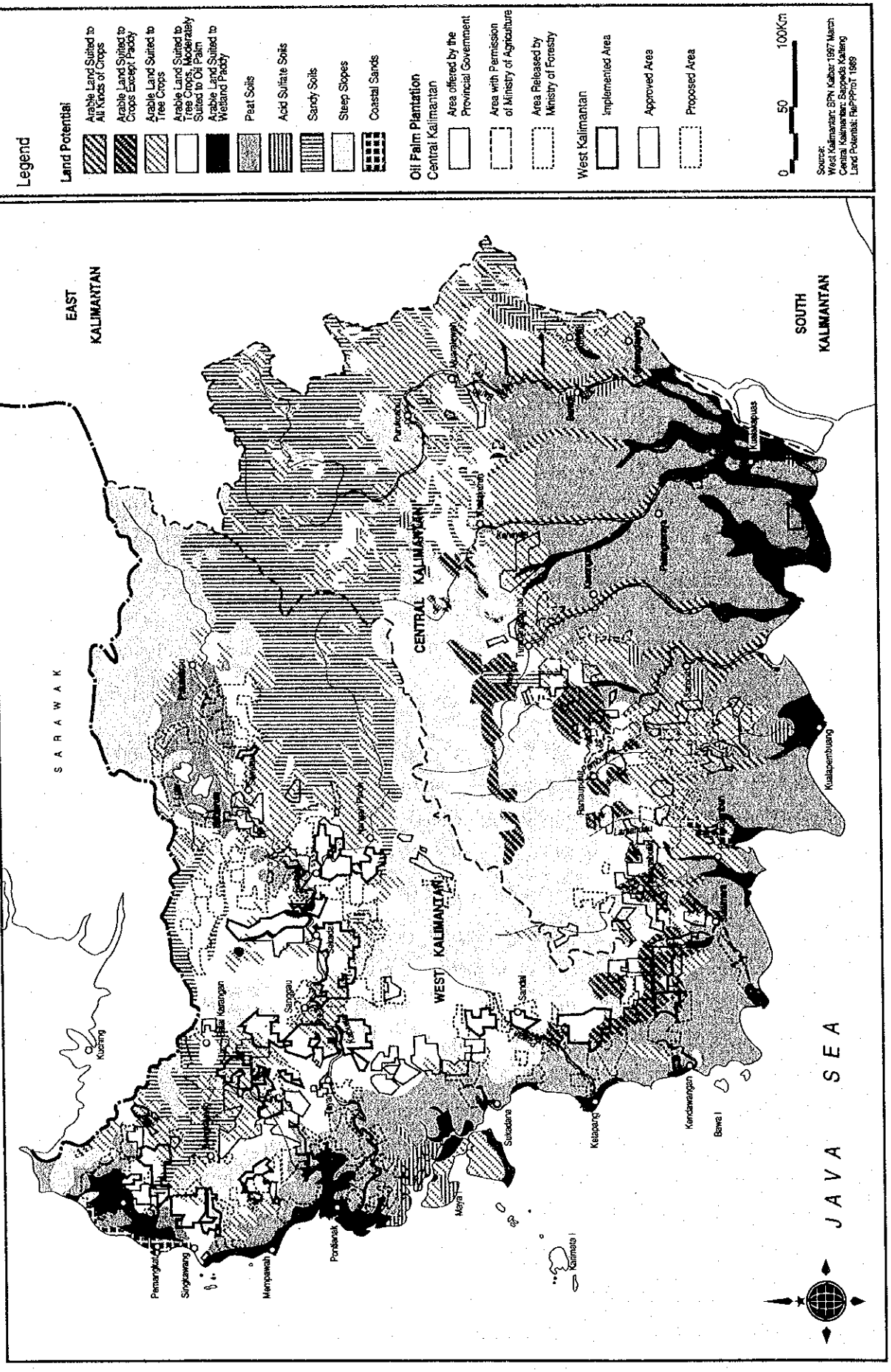
[3] World Bank, *Commodity Markets and The Developing Countries*, Vol. 4, No. 2, February 1997.

Figure A.2.3 Land Potential Existing and Planned Oil Palm Plantations in the Study Area



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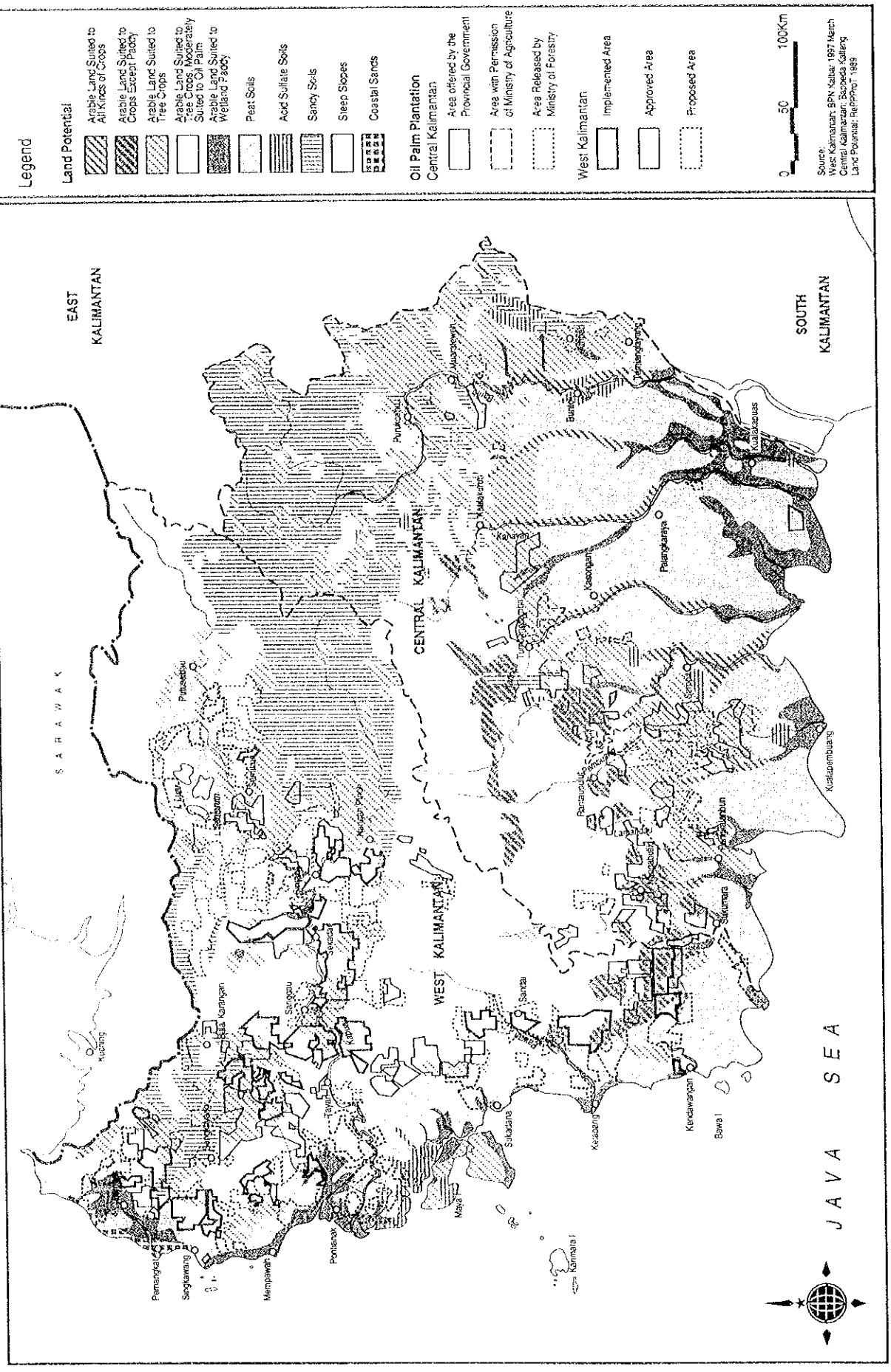

Table A.2.2 Estimates of Potential Areas for Oil Palm Plantation by the Study Team

Status	Total Area	Percentage of	Potential	Percentage of Net	Net Planted Area
West Kalimantan					
Approved	1,593	80%	1,274	50%	637
Proposed	1,653	47%*	777	50%	388
Total Planned**	3,246		2,051		**1,026**
Central Kalimantan					
Area w/ PPUP for Oil Palm	1,558	85%	1,324	60%	**794**
Total			**3,375**		**1,820**

*) Based on the following estimation. (ha)

Suitability	Area	Suitable Area	Percentage
0%	671,748	0	
50%	152,222	76,111	
70%	113,197	79,238	
80%	471,600	377,280	
100%	253,277	253,277	
Total	1,662,044	785,906	**47.29%**

Note: Suitability is based on RePPProT's land systems (See Figure 6.1.2).
**) Including area for tree crops other than oil palm.

Table A.2.3 Oil Palm Area and Production in Malaysia, Sumatra and the Study Area in 1996

	Malaysia	Indonesia Total	Sumatra	West Kalimantan	Central Kalimantan
Area Planted (1,000 ha)	2,161*	2,227	1,783	211	30
CPO Production (1,000 ton)	8,060	4,960	4,507	205	12

Sources: Directorate General of Estate, Ministry of Agriculture, Statistik Perkebunan Indonesia 1995-1997, 1997. ISTA Mielk GmbH, Oil World April 1996, as quoted in Yuri Sato, "The Palm Oil Industry in Indonesia: Its Structural Changes and Competitiveness," in Mari E. Pangestu and Yuri Sato eds., Waves of Change in Indonesia's Manufacturing Sector, 1997, p. 64.
Note: *) Mature area in 1995.

Table A.2.4 Estimates of CPO Production in 2018 by the Study Team

Province	Net Potential Area (1000 ha)	% of Area Planted by 2018	Actual Area Planted (1000 ha)	% of Mature Area	Mature Area (1000 ha)	Average FFB Yield (ton/ha)	FFB Output (ton)	Oil Extraction Rate	CPO Output (ton)
West Kalimantan	1,026	85%	872	85%	741	18	13,343	20%	2,669
Central Kalimantan	794	85%	675	85%	574	18	10,326	20%	2,065
Total	1,820		1,547		1,315		23,669		4,734

Assumption 1: The total area of plantations to be planted by 2018 is 85% of the total net potential area in the respective provinces.
Assumption 2: Mature (productive) area is to account for 85% of the total planted area in 2018.
Assumption 3: The average FFB yield per hectare is to be 18 tons as the productive area will include plantations at various growth stages (i.e., year 4, year 5, ... year 25).
Assumption 4: The CPO extraction rate is to be 20%.

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Under the current market conditions, the value added of the oil palm industry (CPO production) can be estimated to be around US$1,000/ha/year. Based on the assumption that the total planted area is 1.5 million ha in 2018, the total value added of the industry will amount to US$1.5 billion that year, equivalent to 30% of the combined GRDP of West and Central Kalimantan in 1995 (Rp.11.5 trillion = US$4.9 billion). While the contribution is large enough to cover the possible decline in the GRDP after timber resources are completely depleted in West Kalimantan, which is already less dependent on timber resources, Central Kalimantan does not seem to be able to make up for the loss of the forestry-related industry only by oil plantation development.

The labor requirement of the oil palm plantation industry is estimated to be 0.25-0.2 man-year/ha at present in Kalimantan (an estimate by the Estate Service of Central Kalimantan), which can be reduced to 0.125 man-year/ha in the future if the labor productivity of the area's oil palm plantations follow the pattern of their Malaysian counterparts. Therefore, even if the region's net potential area of 1.8 million ha were fully developed into oil palm plantations, it would require the labor of 450,000 man-years at most and would not be able to provide enough employment to the local population whose labor force is growing at a rate more than 2.0% annually.

There appears to exist some feasibility of developing the downstream industry in the study area as some private companies have proposed and/or are planning to set up processing industries beyond CPO extraction, i.e., manufacturing of cooking oil, palm kernel oil, crude stearin, fatty acid, etc. While many experts claim that the area's underdeveloped infrastructure, especially poor road networks and port facilities, raises the costs of production, some foreign investors (mainly from Malaysia) show interest in manufacturing palm oil products in the area because of Indonesia's existing trade policy that bans the export of CPO. However, such problems as concentration, profit drains, the in-migration of managerial and technical workers from Java and Sumatra, and low labor requirement observed in the oil plantation industry will remain unsolved as the downstream industry is generally large-scale and capital intensive. Oleochemical products will be mainly for export markets and unlikely help to develop the manufacturing of products further downstream in the study area due to its relatively small population size and low income.

(5) Implications

1) Food production may decrease without proper landuse planning since a large part of the lands on which oil palm plantations are being or planted to be established are currently used

for food crop cultivation.[4] Therefore it is important to formulate a landuse plan to secure areas suitable for food crop production.

2) Most oil palm plantation projects are located in areas where other alternative economic activities are not available to smallholders once the lands endowed with resources are cleared for large-scale plantations. Therefore, there would be more chances both for transmigrants and for local participants to be better-off if they could preserve and utilize economic resources, such as swidden farms, villages and local knowledge in and around project areas.

[4] The situation is described in JICA-SCRDP-Kaltengbar's Discussion Paper No. 3 "Proposal of A New Community-Based Oil Palm Plantation Development Scheme."

A.3 RUBBER ECONOMY

(1) Past Trend and Present Situation

More than 90% of the region's rubber is produced by smallholders who 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 (Table A.3.1). 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 region's exports.

Table A.3.1 Rubber Production in the Region in 1996

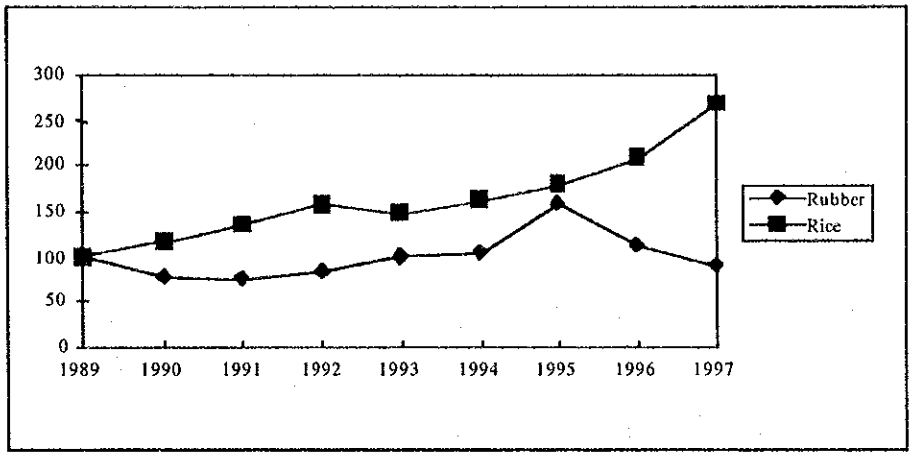
	Smallholders		Large Estates		Total		Farmers
	Area (ha)	Production (ton)	Area (ha)	Production (ton)	Area (ha)	Production (ton)	(family)
West Kalimantan	432,082	177,720	17,444	19,564	449,526	197,284	218,018
Central Kalimantan	260,824	114,053	11,549	6,926	272,373	120,979	98,817
Total	692,906	291,773	28,993	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 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 importance of rubber production in the rural economy has increased in both provinces as the production of food, especially dryland paddy, has decreased (in West Kalimantan) or stagnated (in Central Kalimantan) in the last three decades due to decreasing amounts of land available to paddy cultivation and stagnant yield per hectare. Therefore, the rubber-based swidden farmers have to buy an increasingly large part of their rice consumption in recent years. Due probably to the growing demand for rice, the terms of trade of rubber with respect to rice have deteriorated (Figure A.3.1). This aggravated economic situation, together with the average size of rubber groves which has significantly decreased in the last one-and-a-half decades (Table A.3.2), have been compelling rubber farmers to look for new income sources. This picture agrees with the information provided by swidden farmers during the social survey conducted in Nanga Mahap, Sanggau.

Figure A.3.1 Price Indices in Sanggau, West Kalimantan 1989-1995 and Estimates for 1996-1997 (1989=100)



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

Table A.3.2 Average Rubber Farm Size in West Kalimantan in 1982 and 1996

	1982			1996		
	Productive Area (ha)	Total Rubber Farmers	Area per Farmer (ha)	Productive Area (ha)	Total Rubber Farmers	Area per Farmer (ha)
West Kalimantan	229,179	133,280	1.72	267,641	218,018	1.23
Kabupaten Sanggau	75,816	33,946	2.23	69,558	51,807	1.34

Sources: Dinas Perkebunan Tk. I Kalimantan Barat and Kalimantan Barat Dalam Angka in 1982.

Nevertheless, smallholder rubber farmers in the region do not seem to have given up cultivating rubber at all, as indicated by the steady increases in newly planted areas (or areas "not yet productive") with rubber and the number of rubber farmers in the last 20 years (Table A.3.3). Their continued interest in rubber cultivation appears to be mainly because there are few alternative employment opportunities, particularly employment compatible with their "way of life" in the vicinities of their villages and because rubber is still, as has long been, a very stable source of income for them. Some farmers in the survey village expressed their preference for the type of work by saying, "I do not like wage work because I do not like to be 'ordered' what to do by others," while they generally showed interest in becoming plasma farmers of an oil palm PIR project.

Table A.3.3 Rubber Production by Smallholders in West Kalimantan, 1978-1996

Year	Area (ha)				Production	Yield	Farmer
	Not yet	Productive	Unproductive	Total	(ton)	(ton/ha)	(family)
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
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.

(2) Future Outlook

In the current market situation, oil palm seems to have a larger income generating capacity, presumably with a value added of $1,000 per hectare, than natural rubber. As discussed in A.2, however, its labor requirement is estimated to be 0.25-0.2 man-year per hectare in present Kalimantan (an estimate by the Estate Service of Central Kalimantan) could be reduced to a level around 0.125 man-year per hectare in the future. Therefore, even if the region's total planned area of 3 million ha for oil palm were fully developed into plantations, it would require labor of 750,000 man-years at most and would not be able to provide enough employment to the local population whose labor force is growing at a rate of more than 2.0% per annum.

Furthermore, it is often pointed out that the type of work provided in the PIR scheme, or plantation work in general, does not fit with the working culture of the local people and thus a large part of the employment opportunities to be created by oil palm plantation development would be fulfilled by transmigrants, either spontaneous or government-sponsored. Such a situation is in fact already occurring in some large private oil palm estates in the region. Thus, smallholder rubber cultivation has an advantage in terms of employment generation in the region as the local farmers know the work, have necessary skills and can have a higher degree of control over their work, though high yielding varieties of rubber currently being distributed in the region require some new techniques, particularly for crop care and tapping.

Indonesia is expected to become the world's largest producer of natural rubber with the total production of 2.0 million tons in 2020 as Malaysia's production will decrease to 1.0 million tons due to a decrease in its rubber plantation area.[5] The world total supply of natural rubber is estimated to be 7.8 million tons in 2020, while world consumption is expected to reach 11.5 million tons in that year. By then, the world natural rubber price (RSSI, Singapore) will increase well above S$3.00/kg, and possibly even above S$4.00/kg, as compared with S$2.44 per kg in December 1995. The World Bank's long-term projections indicate that the prices for natural rubber will be improved by 2010, while those for palm oil are expected to weaken (Table A.3.4).

[5] Burger and Smit, "World Demand and Supply of Natural Rubber to the Year 2000," paper prepared for the International Rubber Marketing Conference 1996, 11-13 April 1996, Phuket, Thailand, March 1996.

Table A.3.4 Rubber and Palm Oil Prices in 1996 and Projections for 2005 and 2010

Year	Rubber (RSSI, Malaysia)		Oil Palm (CPO)	
	Constant 1990 US$/ton	Current US$/ton	Constant 1990 US$/ton	Current US$/ton
1996	120	139	456	531
2005	117	168	320	460
2010	121	195	300	483

Source: World Bank, Commodity Markets and The Developing Countries, Vol. 4, No. 2, February 1997.

(3) The Significance of Smallholder Rubber

From the analysis presented in the previous sections, as well as the general recognition of its merits, the significance of smallholder rubber production can be summarized as follows:

(1) Smallholder rubber groves cover more than 95% of the total area of rubber planted.
(2) More than 90% of the total rubber production in the region is produced by smallholders.
(3) Rubber smallholders account for nearly one third of the total households in both provinces.
(4) The smallholders depend on cash income from the sale of rubber for a substantial part of their basic needs.
(5) Despite the price fluctuation in international markets, rubber is one of the most stable income sources for rubber smallholders, who also cultivate a variety of other crops.
(6) Second to wood products, rubber is the largest export commodity in both provinces.
(7) International prices of natural rubber are expected to improve as world demand grows.
(8) Smallholder rubber groves, which are a low-input agroforestry system with the regrowth of natural forest, contribute to environmental conservation.

(4) Problems

A major problem in the smallholder rubber sector is low productivity per unit of land, around 500 kg of dry rubber per hectare per year, 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).

However, government support of the smallholder rubber sector is small in comparison to its significant contribution to the regional economy and environmental conservation. 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 rubber smallholders in the region.

The components of government-assisted replanting projects, such as the Smallholder Rubber Development Project (SRDP) and the Tree Crop Smallholders Development Project (TCSDP) funded by the World Bank, the Tree Crop Smallholder Sector Project (TCSSP) by the Asian Development Bank, and the Replanting-Rehabilitation and Extension of Export Crops (PRPTE) directly from the Indonesian government, generally include: 1) colonial rubber plants; 2) fertilizers; 3) pesticides; 4) cash money to help farmers to do some terracing; and 5) land certificates. Participating smallholders are provided with a credit package which is supposed to be repaid within 15 years.

However, one of the major problems common among these projects is cost recovery through credit collection, which poses the question of financial sustainability over the long term. The second problem is the lack of effective tapping techniques and crop care due to inadequate extension services during the mature period of rubber plantings. The third, and probably the most serious problem to the farmers, is the inflexible scheme of project implementation, e.g., establishing a "collective" rubber grove that does not fit with the region's existing land holding system which is based on individual farming territories and the distribution of planting materials by the project.

(5) Implications

1) The accelerated land expropriation for oil palm plantation development tends to encroach on the smallholder rubber groves of a great economic, as well as ecological, value, even though existing rubber groves are an important source of income for a substantial part of the rural population of the study area.
2) The conversion of all or most of the existing rubber groves into oil palm plantations may lead to: a) the instability of rural livelihood by making farmers dependent on a single source of income; b) a monocultural economy for the study area; c) loss of the future income earning opportunities that could be realized by rubber plantation and export; and d) less assistance for agriculture and rural development in areas where there are no oil palm plantations.

A.4 EXTENSIVE AGRICULTURE

Extensive agriculture, such as swidden farming, swidden-based rubber cultivation, swidden-based rattan cultivation and management of other useful tree groves, constitutes the major part of the agriculture in Kalimantan. The indigenous people in Kalimantan have widely practiced this type of agriculture. Usually the land is used in a cycle of 5 to 30 years, relying on nature's power of forests formed on relatively poor soils. In many cases, the soils are not tilled in the extensive agriculture, so that the disturbance of the soils is minimal.

Since it integrates fallow management by the planting of rubber trees, rattan and fruit trees, Kalimantan's extensive agriculture is called a swidden-agroforestry system. While the swidden is left in fallow, many wild species of vegetation grow in the fallow swidden. The secondary forests based on the swidden-agroforestry systems have a high diversity.

The extensive agriculture and management of secondary forests generate cash incomes, as well as subsistence needs. At the same time, in order to support their daily needs, they combine the extensive agriculture and other various economic activities, such as small-scale wetland rice cultivation, livestock raising, gold mining and other wage work. In fact, about 40 % of the rural population in West Kalimantan and most of the rural population in Central Kalimantan are supported by such extensive agriculture.

Table A.4.1 Number of Shifting Cultivators according to Different Sources

	Total Population Statistical Year Book, 1985	Data Poko Peladang Berpindah, 1983	Studi Kelayakan Pengendalian Perladangan Berpindah, 1982/1983	Percentage of Total who are shifting cultivators' households(1)
West Kalimantan	2,829,510	336,200	342,625	29.0%-29.1%
Central Kalimantan	1,121,815	434,050	370,055	79%-92%
Indonesia Total		5,792,535	5,553,935	-

Note (1): This estimate is based on the assumption that the average number of household members is six, and among a household there are 2.5 members working for shifting cultivation. The number of population in shifting cultivators' households is calculated by multiplying 2.4. Source: Review of Shifting Cultivation in Indonesia, the Ministry of Forestry and FAO (1989)

In West and Central Kalimantan, extensive agriculture occupies quite large areas and covering areas of relatively good soil, as shown in Figure A.4.1. Moreover, it produces important crops, such as rubber, rattan and paddy. The smallholder rubber groves, which are mostly swidden-based, produced 139,000 tons and 84,000 tons in West and Central Kalimantan respectively in 1996. The natural rubber production of the two provinces accounts for 14% of Indonesia's total rubber production. Before the introduction of the export ban of raw and semi-processed rattan canes, Central Kalimantan was one of the exporting provinces of rattan canes. It produces a substantial amount of paddy for subsistence (nearly 150,000 tons and more than 200,000 tons annually in West and Central Kalimantan respectively. See Figure A.5.1.)

Oil Palm Plantation Development and Extensive Agriculture

In the last ten years, the government of Indonesia has promoted the development of oil palm plantations in the outer islands. In West and Central Kalimantan, the suitable areas for oil palm plantation development are those areas which have been occupied by the extensive agriculture. In fact, many concessions and areas offered for oil palm plantations occur in areas subject to the extensive agriculture, as shown in Figures A.4.2 and A.4.3.

The coordination and adjustment between oil palm plantation development and the local people's extensive agriculture is really necessary for the following reasons and purposes:

1) to secure sustainable livelihood of the local people, including the future generations, practicing the extensive agriculture,
2) to secure the areas under the extensive agriculture as much as possible for reserving the potential land for the future, and
3) to allow the areas of extensive agriculture to function as a kind of buffer zones within the intensive plantation agriculture, in order to avoid a monocultural environment derived from the massive oil palm plantation development.

The most promising way to achieve these purposes is to combine oil palm plantation development and local people's extensive agriculture at the local level. This needs participatory landuse planning at the community level.

Outside the Areas of Oil Palm Plantation Development

In the areas in which no oil palm plantation development is planned, extensive agriculture needs more attention in regional development, because it is the mainstay of most of the local people. Their agriculture and livelihood means have not attracted Indonesian policy makers' attention. However, it is necessary to improve extensive agriculture in terms of techniques and marketing based on the territory, forests, water and knowledge of the local people. At the same time, negative conditions against their agriculture and other livelihood practices have to be removed as much as possible. Among the examples are that the local people do not have commercial rights to the forest products (timber and others) nearby their home village and that high export taxes are still imposed on the export of rattan canes.

The secondary forests formed by their extensive agriculture are valuable in that the secondary forests are pools of forest resources and the local people's knowledge. Without a forest environment, local people's knowledge on forests easily disappears.

Figure A.4.1 Areas of Extensive Agriculture in West and Central Kalimantan

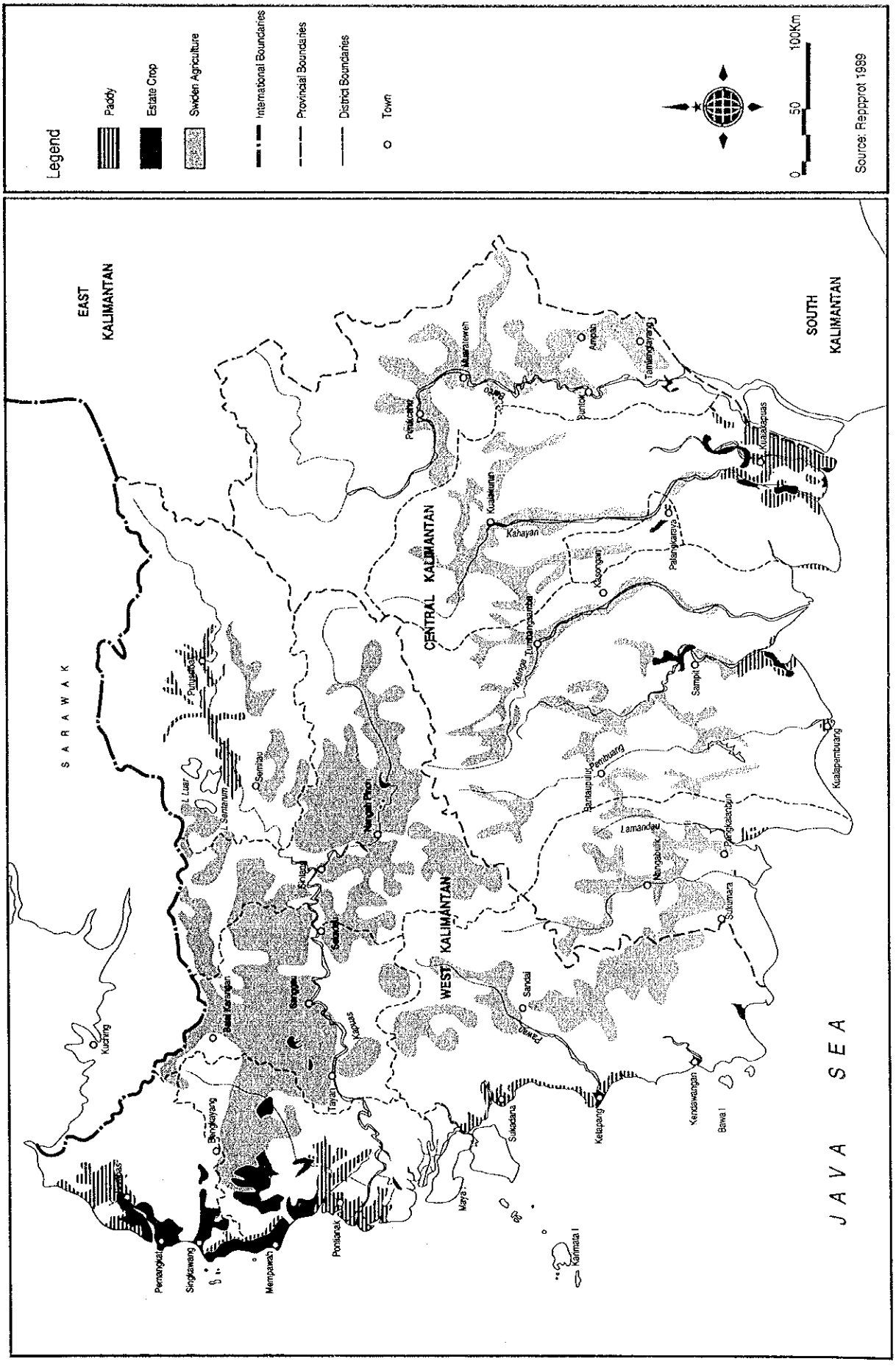


Figure A.4.2 Oil Palm Plantation and Extensive Agriculture in West Kalimantan

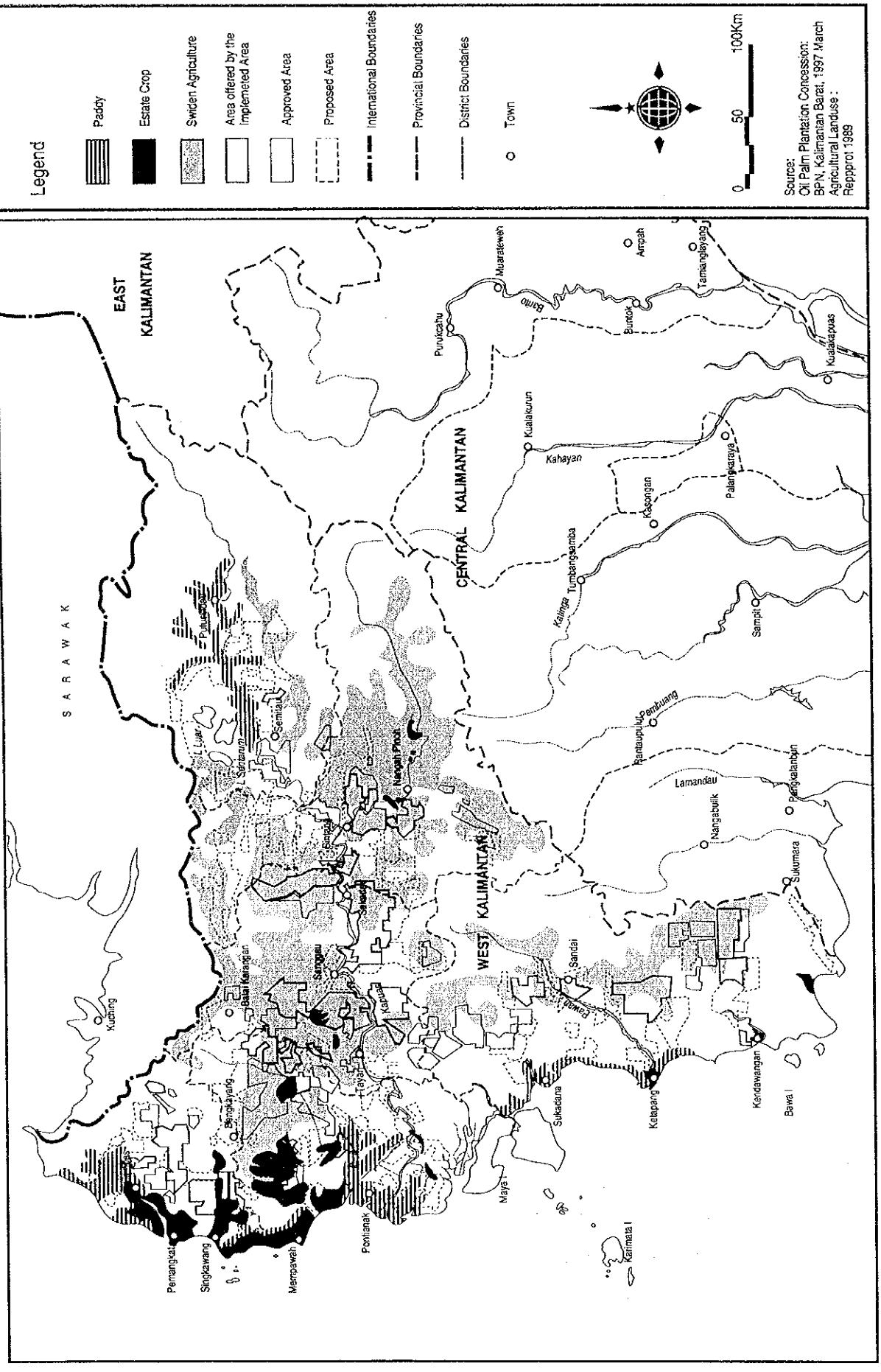
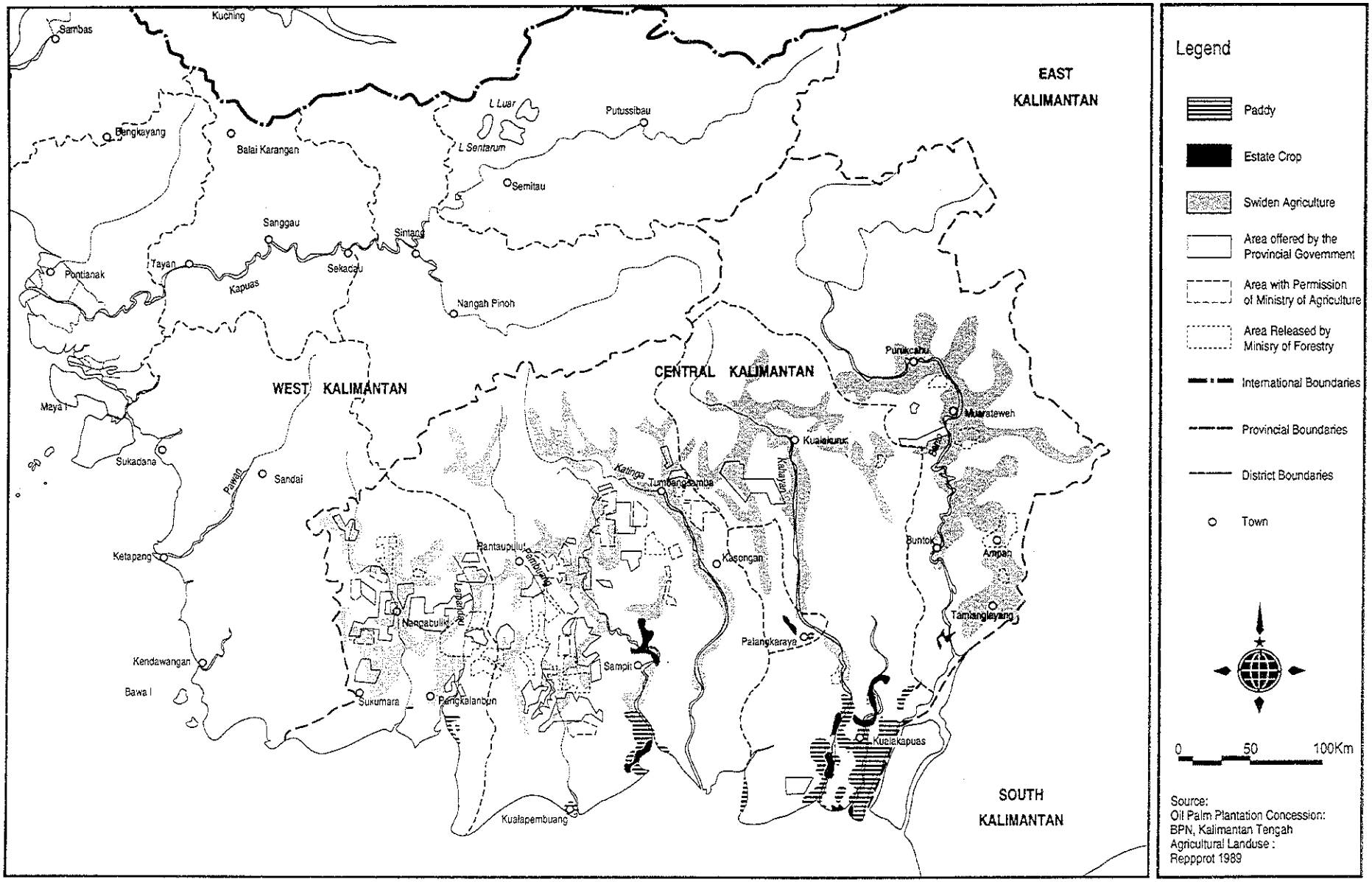


Figure A.4.3 Oil Palm Plantation and Extensive Agriculture in Central Kalimantan



A.5 FOOD PRODUCTION

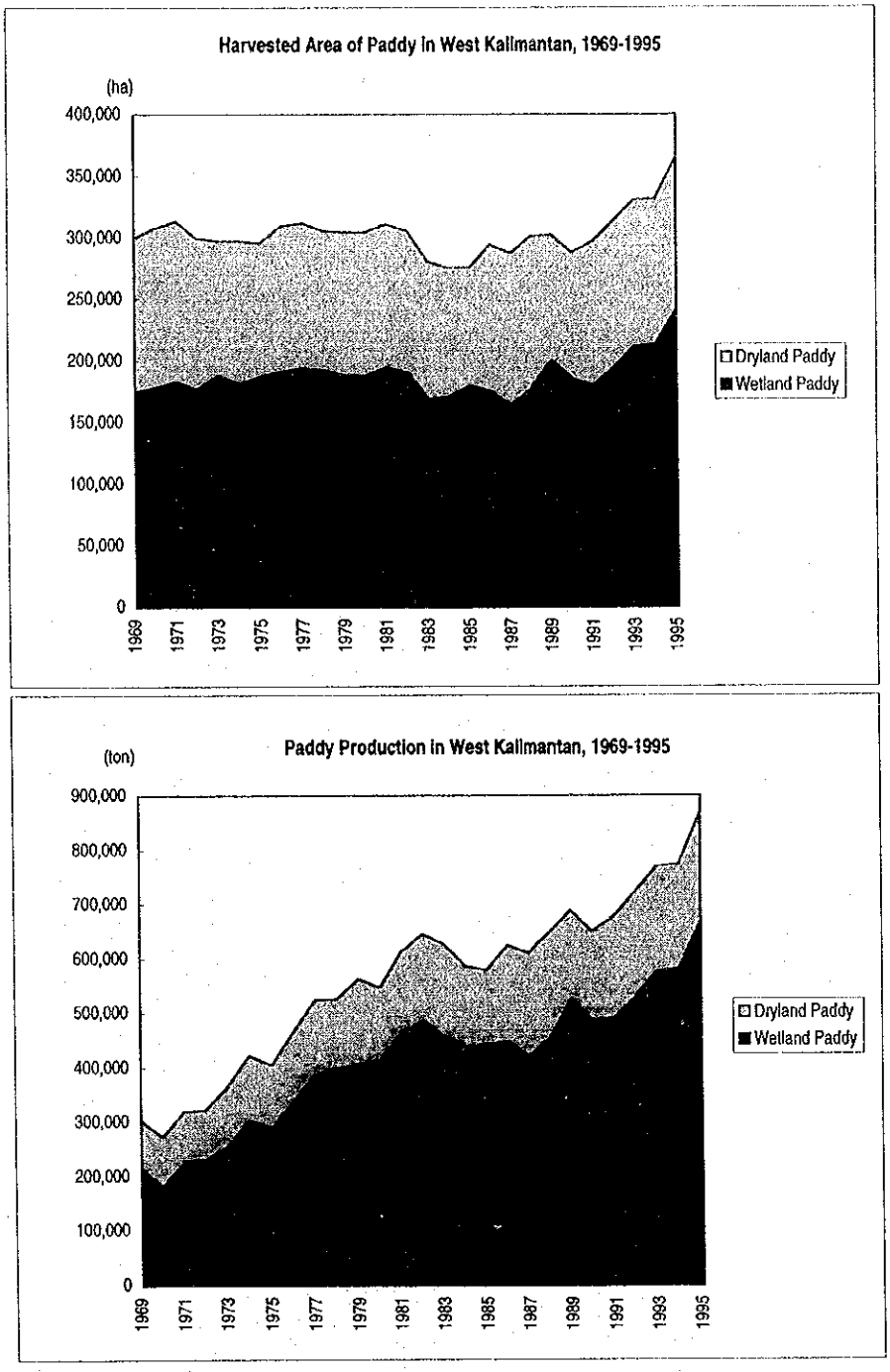
(1) Trends of Production

The production of both wetland paddy and dryland paddy grew steadily for the period of 1969-1995 in the two provinces (Figure A.5.1). The growth was brought about mainly by an increase in yield per hectare in West Kalimantan and by an expansion of area harvested in Central Kalimantan. In recent years, however, the growth of yield is slow for both wetland paddy and for dryland paddy in West Kalimantan, though it may be related to an expansion of harvested area, i.e., a tendency to cultivate more infertile, marginal land. The trends of slow growth in wetland paddy area (an annual average growth rate of 1.25%) and of negative growth in dryland paddy area (-0.05%) for 1969-1995, together with the high rates of land utilization, suggest that there is not so much possibility for a substantial expansion of paddy area in West Kalimantan in the future.

In Central Kalimantan, the growth in paddy output has resulted from both an expansion of area harvested and an increase in yield, but to a larger extent from the former than the latter. This is particularly the case with wetland paddy, whose growth was led by the district of Kapuas, the single largest producer of wetland paddy with a share of more than 80% of the province's total wetland paddy production. The growth in area of harvested dryland paddy was negative until the late 1980s, but the area expanded rapidly, especially in 1994 and 1995, for which the reason is not clear but may be associated with new land development for plantations as the largest expansion occurred in Barito Utara, followed by Kotawaringin Timur and Kapuas. Nevertheless, dryland paddy will unlikely lead paddy production of the province in the long run if the yield trends continue to follow the pattern of the past.

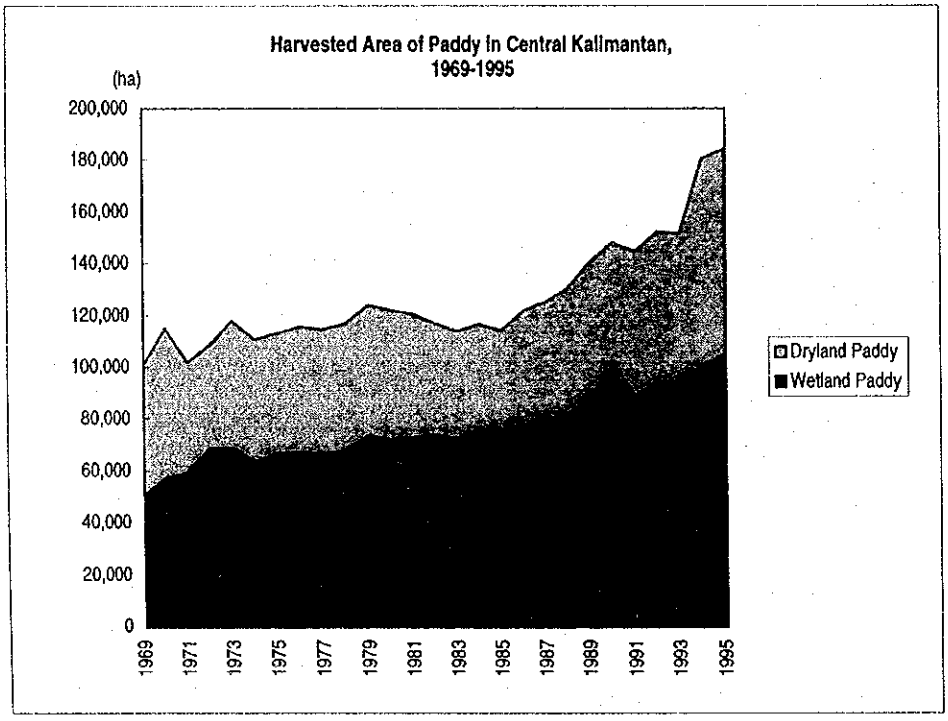
The wetland paddy area will be remarkably increased when the area currently opened by the Peat Swampland Development Project (PLG or the one-million hectare project) in the district of Kapuas becomes productive land . Even if the planned area of 600,000 ha is fully developed into wetland paddy fields equipped with modern irrigation systems, it will unlikely produce 2.5 million tons of paddy per annum. The expected yield of 4 tons/ha/year seems to be too ambitious, judging from the facts 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, which can be clearly indicated by overlaying a map of the project area with the soil suitability map prepared by the study team.

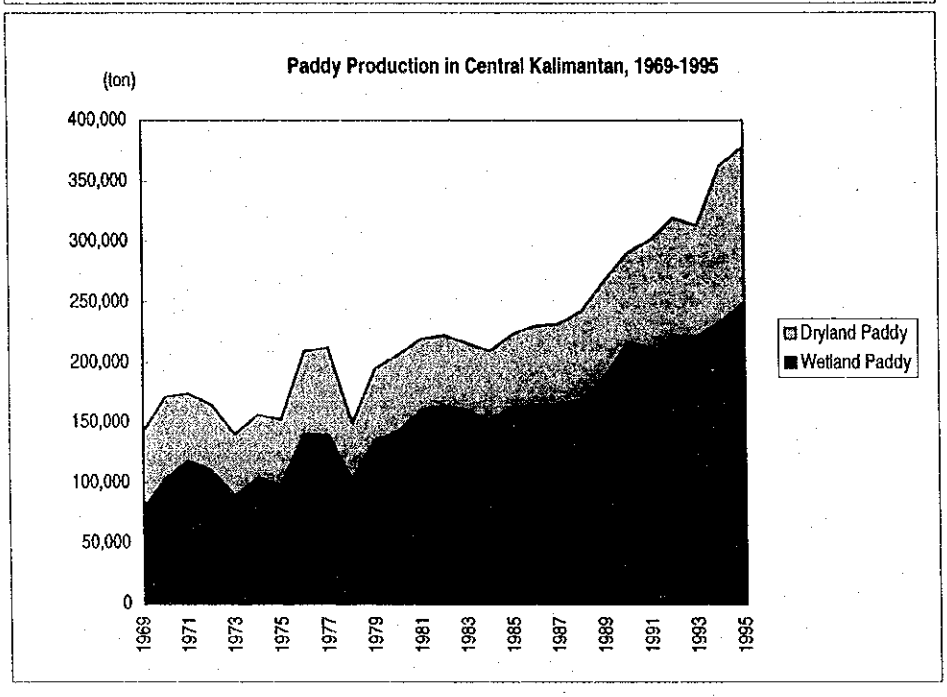
Figure A.5.1 Paddy Production in 1969-1995



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 A.5.1 Paddy Production in 1969-1995 (Continued)





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

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 based on the Agricultural Survey of 1995, though the 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.

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 toward 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 expansion of is under oil palm plantations in recent years (Figure A.4.2).

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.[6] 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 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."[7] The situation may be reflected in the yield trend in which most food crops have not demonstrated substantial increase in the recent past.

(2) Food Self-sufficiency

The supply of rice, a staple food for the population of the study area, is deficient in both provinces (Table A.5.1). 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

[6] *Kalimantan Barat Dalam Angka 1996*, op. cit., p. 510-511.

[7] Kathy MacKinnon et al., *The Ecology of Kalimantan: Indonesian Borneo*, Hong Kong: Periplus, 1996, p. 4.

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,[8] while the supply of rice from other provinces to Central Kalimantan was 33,845 tons in the same year.[9]

Table A.5.1 Rates of Self-sufficiency in Rice in 1995

West Kalimantan

District/Municipality	Sambas	Pontianak	Sanggau	Ketapang	Sintang	Kapuas	Kodya PNK	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	487,463	365,389	446,562	175,645	447,632	3,635,73
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	..

Central Kalimantan

District/Municipality	Ko-Barat	Ko-Timur	Kapuas	Barito Sel.	Barito	Kodya	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)	27066	56079	235655	25765	33480	84	378129
Supply of Rice* (ton)	17593	36451	153176	16747	21762	55	245784
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	..

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

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."

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 agricultural areas, e.g., Sanggau, Kapuas Hulu, and all other districts of Central Kalimantan but Kapuas. Although the deficiency rates based on the above calculations are about the same for both 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 relatively higher prices in the former province. 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.

[8] Ibid., p. 321.

[9] Kantor Statistik Propinsi Kalimantan Tengah, *Kalimantan Tengah Dalam Angka 1996*, 1997, p. 241.

The prices of rice increased substantially in 1994, when the drought in Indonesia led to the rice import of more than a million tons, and continued to rise thereafter. 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, including rice, also see their terms of trade deteriorating vis-à-vis the increased prices of rice as described in A.3.

(3) Implication

At present, even though great policy emphasis in the agricultural sector is placed on food self-sufficiency, more attention of those who are concerned with agricultural policies for the study area, as well as of local farmers, seems to be paid to the spectacular development of the oil palm 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 cash income from oil palm cultivation after they surrender all or some of their productive lands on which they would otherwise produce paddy or other food crops to oil palm plantation development. The incoherent implementation of agricultural policy also seems to be brought about by the very rigid division within the administration for the sector.

A.6 LOGGING OPERATIONS

The study area is richly endowed with forest resources and is one of the largest areas of tropical forest in Indonesia. As shown in Table A.6.1, logging production and forest based industries have contributed much to the regional economy and the national economy, contributing to the sizable foreign exchange earnings(8.5 percent of total export value in 1995).

Table A.6.1 Role of Forestry in the Regional Economy

	West Kalimantan*	Central Kalimantan**
1. Share in GPP(%)		
Forestry	8	23
Wood and Other Forestry Products	13	12

Source: *:Kalimantan Barat Dalam Angka 1995
**:Pendapatan Regional Kalimantan Tangah 1993 - 1995

Large-scale cutting of timber in Kalimantan began in 1967 when all Indonesian forests were declared the property of the state. As world demand for cheap tropical hardwood grew, log production in the study area was increased in the latter half of the 1980s.(see Figure A.6.1 and A.6.2 , Table A.6.2) This was accompanied by an important change in logging methods in the 1970s.

During the 1970 – 80 period, Indonesia became the largest exporter of tropical hardwoods in the world and the countries importing logs form Indonesia became the world leaders in tropical hardwood products. In 1980, the Government of Indonesia introduced a policy for phasing out the export of logs, leading to a total ban on log exports by 1985.

During the 1985 – 90, after the log export ban, log production in the area increased rapidly(see Figure A.6.1 and A.6.2). The study area has produced 155 million cubic meters of logs in the past 24 years, from 1973 to 1996, which account for 27 % of the total log production in Indonesia for the same period.

However, the production in the study area has been decreasing in the 1990s and the reduction has greatly affected the regional economy through the degradation of the forest based industry.

The government estimated the sustainable yield of log production by province in Replita V as 1.4 and 3.8 million m^3/year in West Kalimantan and Central Kalimantan, respectively. The production in both provinces exceed this by about 1 million m^3 /year of the sustainable yield. Over logging may be one of the main causes for the decreasing log production.

Plywood production is the greatest user of log materials from tropical rain forests. The study area produced 20 percent of the total national plywood production in 1990/91 because the main log production in the area is disterocarp such as Meranti which is utilized by the plywood industry.

The plywood production has been decreasing since 1991/92 in proportion to the decreasing log production in the area. According to statistics, the production levels of the study area are far below the installed capacity, accounting for 50 % of the production capacity in Central Kalimantan and 87 % in West Kalimantan in 1996. However, the lack of materials for the industry is actually more severe than that of the statistics. As of 1997 only two groups, Aras Kusuma Group and Enas Group, can run their plywood factories and others can not because of the shortage of materials.

In response to this decline of timber production, the following two things are taking place :

- IPK (Izin Pemanfaatan Kayu, or Wood Utilization Permit), characterized by clear cutting has increased (Table A.6.2). which has led to decreasing the share of materials for plywood in total log production.
- HPH (Hak Pengusahaan Hutan, or Timber Concession) areas are distributed in less fertile areas, (mountains and sandstone) in West Kalimantan. Forests in the area are dominated by more slender trees (Figure A.6.3).

In Central Kalimantan, the log production far exceeds the installed capacity every year. However, more than 50 percent of log production is exported to other provinces.

Figure A.6.1 Estimated Log Production from HPH in West Kalimantan

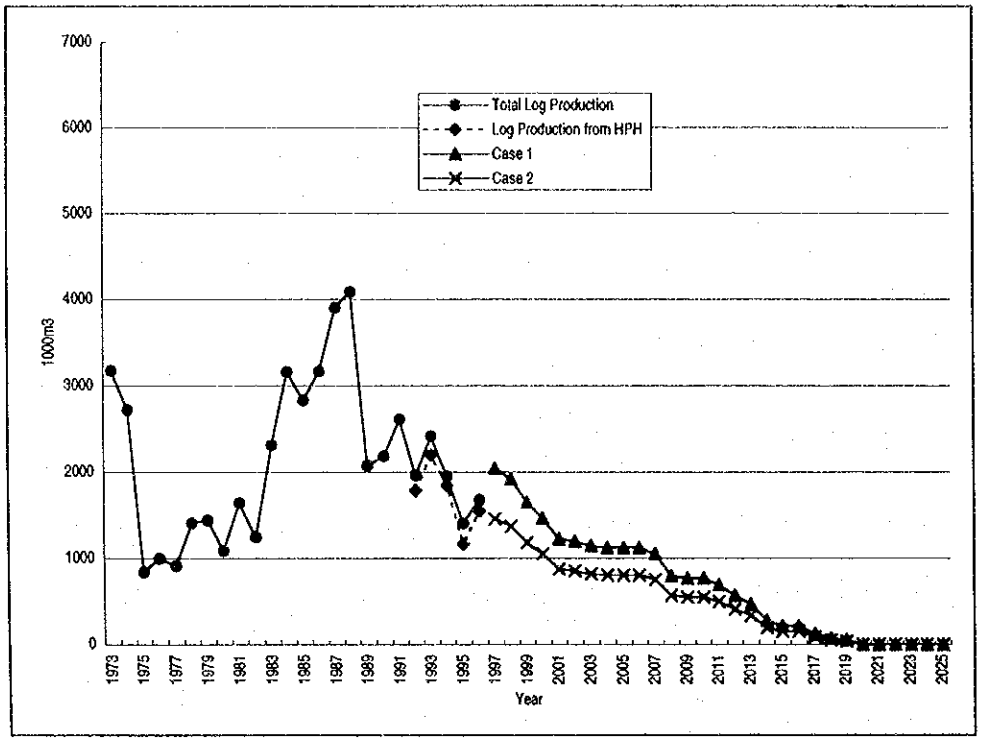


Figure A.6.2 Estimated Log Production from HPH in Central Kalimantan

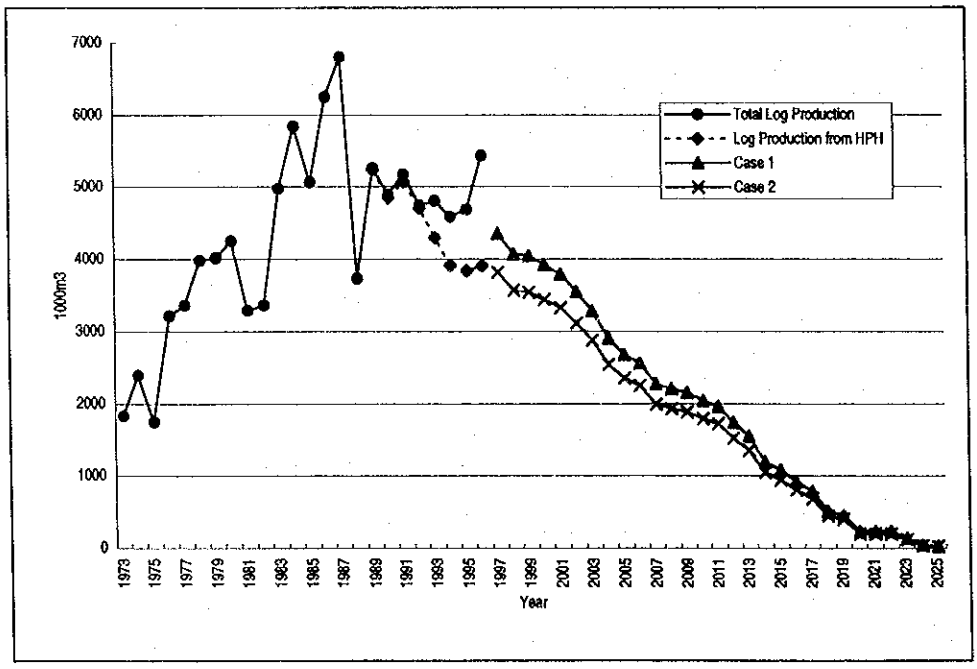


Table A.6.2 Estimated Log Production from HPH

Unit : 1000 m3

Year	West Kalimantan			Central Kalimantan			Study Area		
	HPH*	Case 1**	Case 2**	HPH*	Case 1**	Case 2**	Production*	Case 1**	Case 2**
1973	3,178			1,831			5,009		
1974	2,724			2,395			5,119		
1975	842			1,748			2,590		
1976	999			3,212			4,211		
1977	912			3,362			4,274		
1978	1,406			3,981			5,387		
1979	1,444			4,015			5,459		
1980	1,087			4,256			5,343		
1981	1,640			3,292			4,932		
1982	1,248			3,359			4,607		
1983	2,314			4,977			7,291		
1984	3,161			5,843			9,004		
1985	2,835			5,063			7,898		
1986	3,168			6,245			9,413		
1987	3,903			6,803			10,706		
1988	4,088			3,736			7,824		
1989	2,070			5,237			7,307		
1990	2,185			4,851			7,036		
1991	2,610			5,072			7,682		
1992	1,789			4,703			6,492		
1993	2,199			4,295			6,494		
1994	1,845			3,911			5,756		
1995	1,171			3,839			5,010		
1996	1,551			3,908			5,459		
1997		2,043	1,459		4,355	3,815		6,398	5,274
1998		1,921	1,372		4,074	3,569		5,995	4,941
1999		1,651	1,179		4,041	3,541		5,692	4,720
2000		1,468	1,049		3,925	3,439		5,393	4,488
2001		1,226	876		3,793	3,323		5,019	4,199
2002		1,200	857		3,548	3,109		4,748	3,966
2003		1,143	816		3,281	2,874		4,424	3,690
2004		1,124	803		2,903	2,543		4,027	3,346
2005		1,124	803		2,680	2,348		3,804	3,151
2006		1,124	803		2,562	2,245		3,686	3,048
2007		1,051	751		2,272	1,990		3,323	2,741
2008		792	566		2,203	1,930		2,995	2,496
2009		768	548		2,149	1,883		2,917	2,431
2010		768	548		2,042	1,789		2,810	2,337
2011		691	493		1,960	1,717		2,651	2,210
2012		572	409		1,735	1,520		2,307	1,929
2013		468	334		1,544	1,352		2,012	1,686
2014		276	197		1,191	1,043		1,467	1,240
2015		215	154		1,078	944		1,293	1,098
2016		215	154		919	805		1,134	959
2017		121	86		783	686		904	772
2018		77	55		510	447		587	502
2019		49	35		452	396		501	431
2020		0	0		231	202		231	202
2021		0	0		231	202		231	202
2022		0	0		231	202		231	202
2023		0	0		139	122		139	122
2024		0	0		40	35		40	35
2025		0	0		25	22		25	22
Total	50,369	20,087	14,347	99,931	54,897	48,094	150,300	74,984	62,441

Case 1's estimate: The log volume produced from HPH is calculated by applying the average yield of the past 10 years to HPH areas.

Case 2's estimate: The log volume produced from HPH is calculated by applying the average yield of the past 5 years to unlogged HPH areas.

Source: *:Forestry Statistics in Indonesia
HPH area: Regional Forestry Office and Master Plan for Forest Plantation
**:Estimated by JICA-SCRDP Kaltengbar

Log production in the future is estimated by the study team based on the HPH concession area which still had logging licenses in 1995. According to the results, the degradation of log production has continued because of resource depletion. The estimated log production in the area would decrease to 50 percent of the existing level after 10 years. The forest inventory study by the FAO in 1996, based on satellite imagery from 1990 to 1994, shows almost the same results as the estimation (see Figure A.6.4) that Melanti of sufficient girth to be cut is distributed only in national parks and the mountainous areas of the provincial boundary between West and Central Kalimantan.

The forest depletion would adversely affect the regional economy and environment. The most serious damage in the regional economy is stagnation or bankruptcy of the wood-based industry due to raw material shortage.

Although ex-HPH areas have been transferred to PT. Inhutani for forest management. A clear vision on the future forests of the region has not yet been established, especially for forest protection until the next timber harvesting.

Table A.6.3 Area and Log Production of IPK

		92/93	93/94	94/95	95/96	96/97
West Kalimantan	1000ha	5	-	3	142	6
	1000m3	178	215	105	236	125
Central Kalimantan	1000ha	2	17	19	29	48
	1000m3	46	513	681	842	1,528

Source : Regional Forestry Office, West and Central Kalimantan, 1997

Figure A.6.3 Distribution of Forest Concession Areas (HPH)

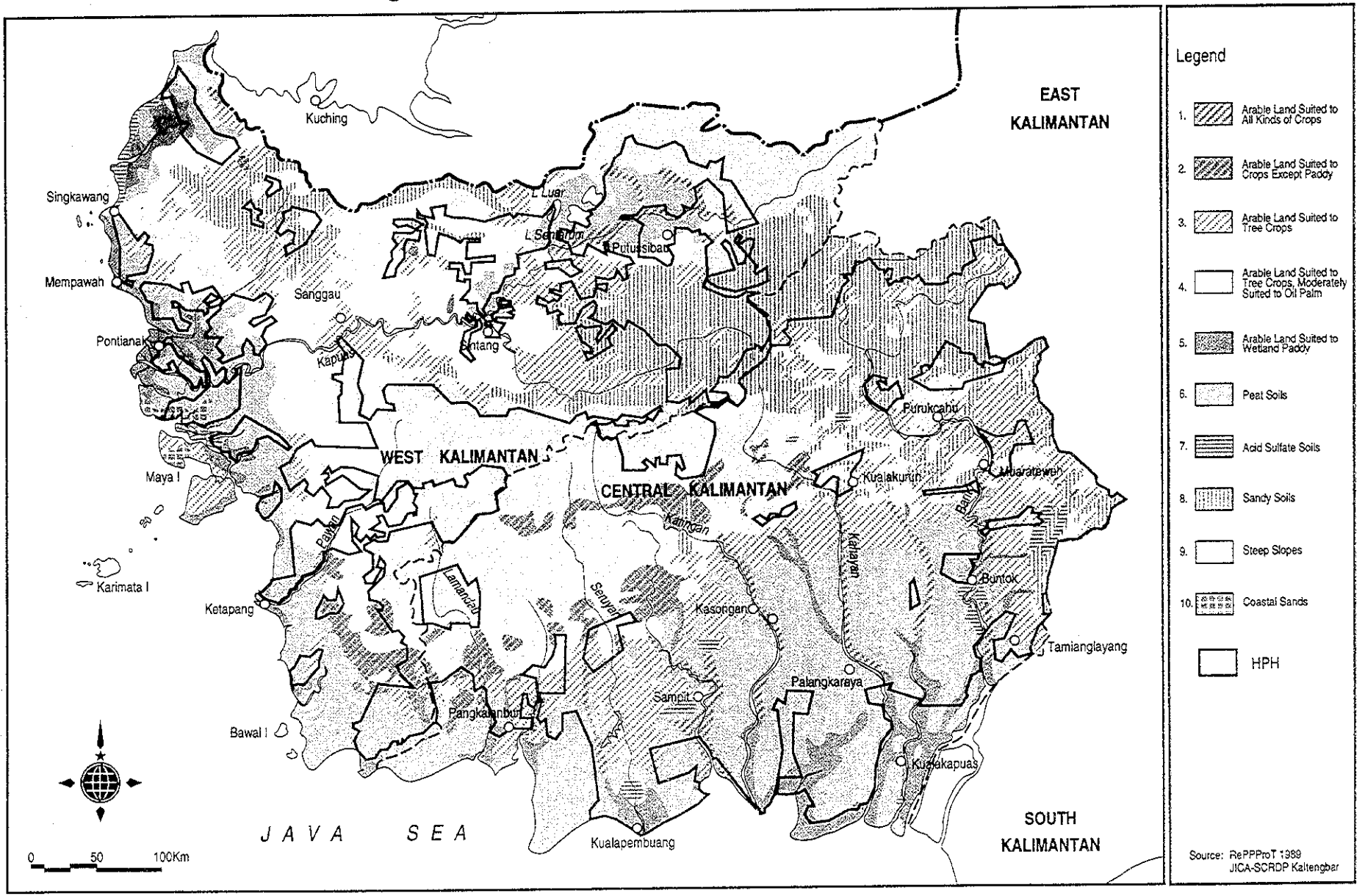
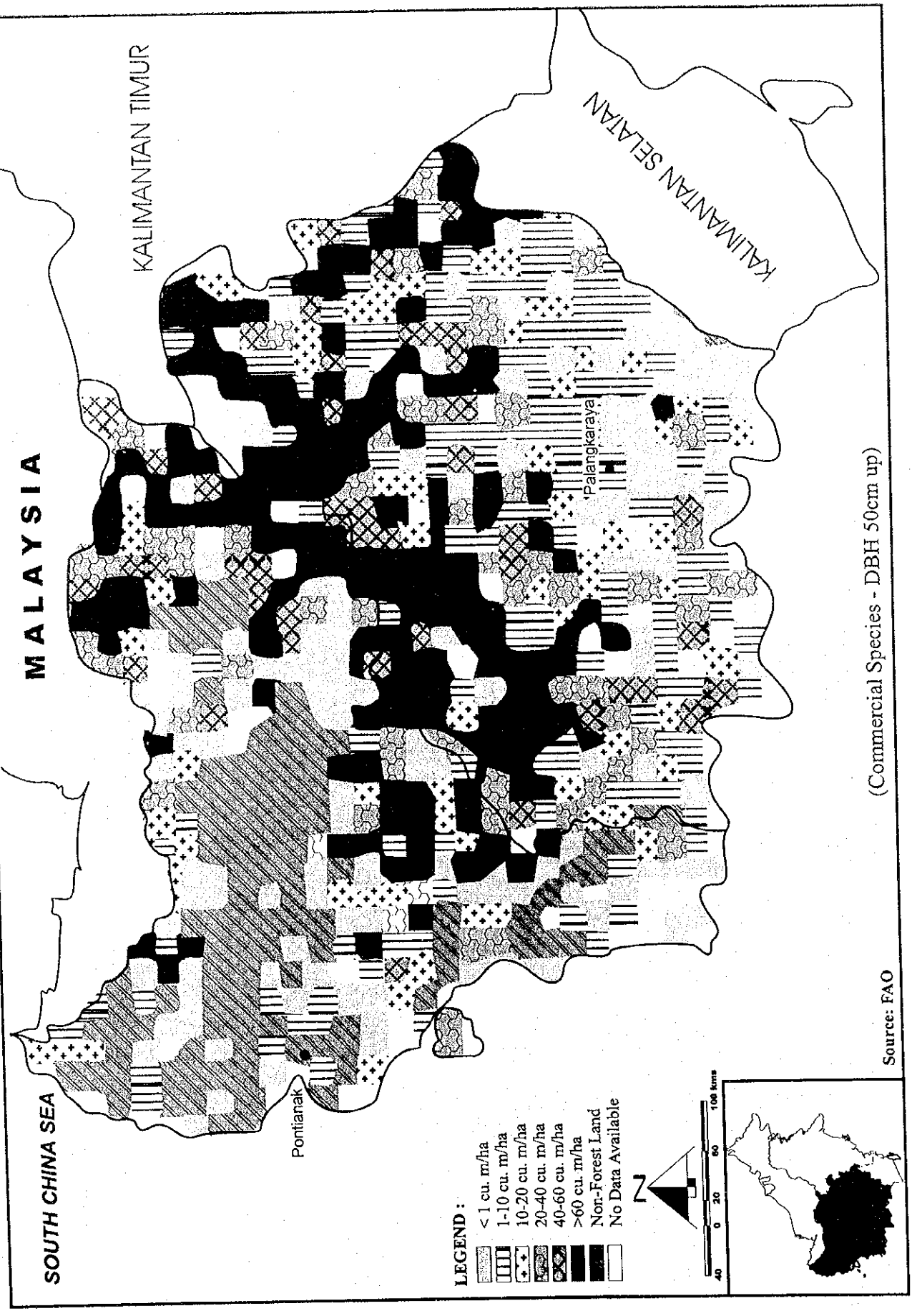


Figure A.6.4 Exploitable Volume per Hectare



A.7 INDUSTRIAL TREE PLANTATION DEVELOPMENT

The Timber Estates Development Program and Industrial Forest Plantations or Hutan Tanaman Industri (HTI) have been established in 1986 by Ministrial Decree 320 Kpts-II/1986. According to the Decree, the purpose of establishing HTI is to enhance the productivity of unproductive forest land to produce raw materials for wood industries.

The Industrial Forest Plantations (HTI) are implemented on permanent production forest areas, either inside or outside forest concession areas and particularly on permanent unproductive forest areas. The forest plantation is undertaken by the private sector, state-owned forestry companies and joint ventures between the state-owned companies and the private sector. It also involves village-level cooperatives.

A number of approaches have been used by the government to encourage the implementation of the industrial plantation forests, viz. integration of industrial forest plantations system with the transmigration program. This system is aimed at accelerating the implementation of both industrial plantation forest and community resettlement program particularly for those who practice shifting cultivation.

Industrial Timber Plantation in the study area started in the early 1990s. The total land actually planted by 1996 was 22 thousand hectares in West Kalimantan, accounting for 50 percent of target area (Table A.7.1) of which 53 percent is HTI-Murni for pulp and 44 percent HTI-Trans. The most common species used for HTI development in West Kalimantan are Acasia sp. for pulp HTI, Paraseriathes falcataris and Pinus merkushi for non pulp HTI and Hevea sp. for HTI trans.

HTI-Trans is dominant in Central Kalimantan, sharing more than 60 percent of the implemented area. Main tree species for Trans HTI in Central Kalimantan are Meranti, Sungkai, Sengon and Acacia etc.

HTIs in the area, however, have not been harvested yet because the average rotation of the species for pulp is 8 years. As shown in section A.6 forest resources in the study area have been degraded and the wood based industry has stagnated in proportion to decreasing log production. It is impossible that the production from HTI is a substitute for HPH (Forest Concession Rights) to sustain the existing wood based industry, mainly the plywood industry in the study area because the implemented HTI area is too small compared with the HPH area and the tree species are different from those which are used for plywood.

Figure A.7.1 shows the distribution of HTI on the Land Potential Map and Table A.7.2 shows HTI area by the land potentiality. The total HTI area is 2.3 million ha and 83 thousand ha in West and Central Kalimantan, which shares 16 percent and 0.5 percent of the total provincial area, respectively. HTI occupies more than 20 percent of the oil palm suitable area in West Kalimantan.

Recently, oil palm development has attracted a great deal of attention as the main industry in substitution for the existing wood based industry in the study area because the natural conditions are suitable for crop growth. Oil palm is also more remunerative than pulp, 1,050 US$/ha/year for pulp and 1,600 US$/ha/year for oil palm (Dinas Perkebunan Kalteng). It is well known that arable soils in the study area are limited. Considering the land use effectiveness, the land use plan on oil palm and HTI areas should be adjusted.

The pulp industry is expected to be a promising industry in the study area with the expansion of the HTI pulp area. However, increasing demands of the materials may lead to new pressures on natural forest, clear cutting of logged over forest etc.

Table A.7.1 Industrial Timber Plantation by 1996

(unit:ha)

	Target Area	Implemented Area	(%)
West Kalimantan			
HTI-Trans	23,141	9,703	42
HTI-Murni(Pulp)	20,521	11,705	57
HTI-Murni(Non-Pulp)	435	807	185
Sub-total	44,097	22,214	50
Central Kalimantan			
HTI-Trans	24,152	10,354	43
HTI-Murni	10,000	6,500	65
Sub-total	34,152	16,854	49
Total	78,249	39,068	50

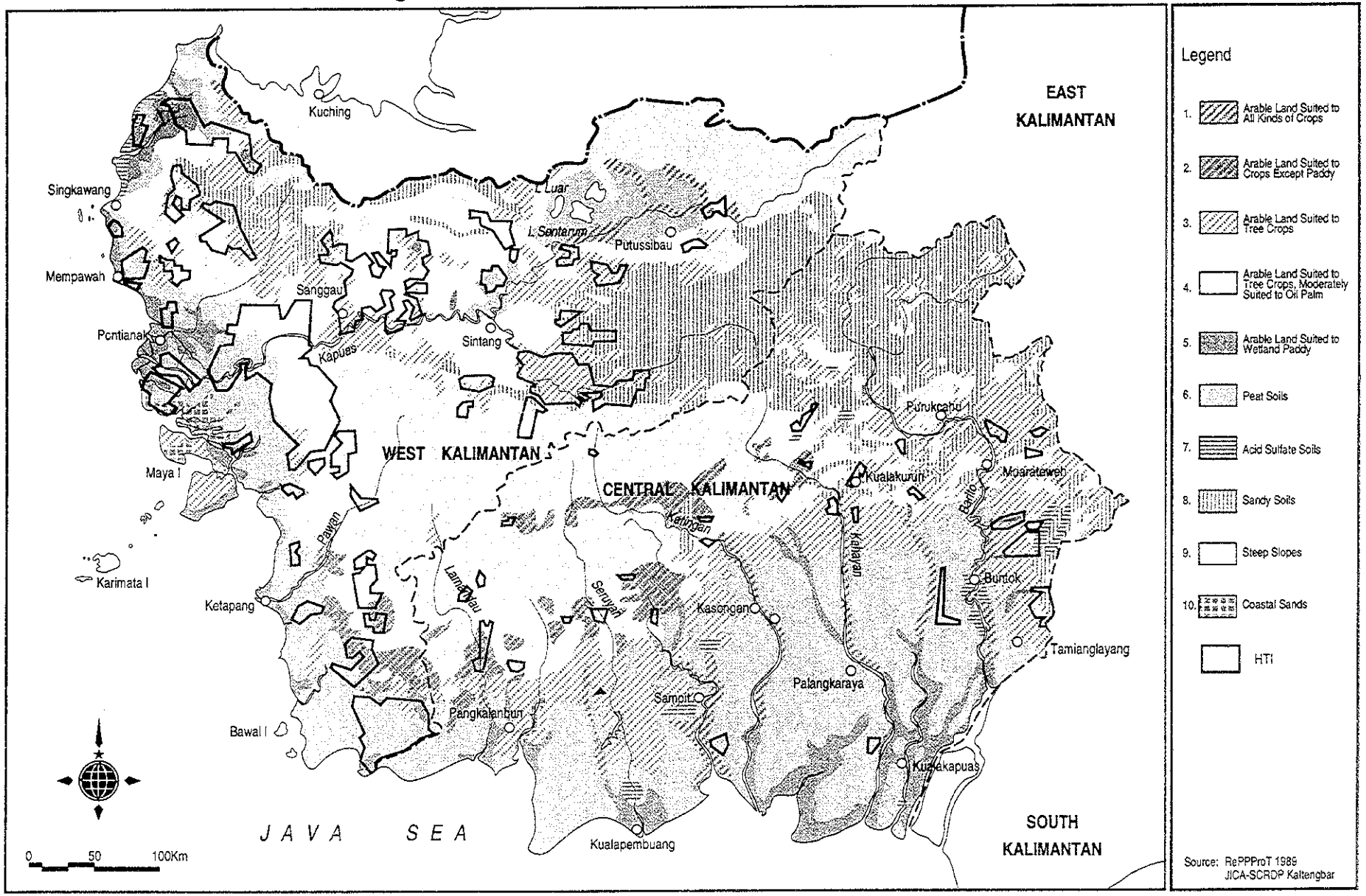
Source: Laporan Bulanan, West Kalimantan,1997. Laporan Tahunan, Central Kalimantan, 1995/1997

Table A.7.2 Distribution of Industrial Timber Plantation (HTI) by Soil Potentiality

		Suitable Area1)	Less Suitable Area2)	Suitable for Rice	Sub-total	Unsuitable Area3)	Total
West Kalimantan	ha	489,446	816,778	74,644	1,380,868	923,029	2,303,897
	%	21	35	3	60	40	100
Central Kalimantan	ha	18,727	26,265	0	44,992	37,707	82,699
	%	23	32	0	54	46	100

1) Suitable area for oil palm(Zone 1,2,3)
2) Less suitable area for oil palm(Zone 4)
3) Unsuitalbe for agriculture(Zone 6,7,8,9,10)
Source : RePPProT, Regional Forestry Office, West and Central Kalimantan, 1997

Figure A.7.1 Distribution of Industrial Timber Estate (HTI)



A.8 INDUSTRIAL DEVELOPMENT

(1) The Manufacturing

The dynamic performance analyses of the manufacturing subsector covering the past 14 years illustrates, that the subsector's importance has increased in West and Central Kalimantan's regional economies in terms of its share and overall employment generation (the previous Table 1 refers). Real growth (on a constant 1983 price base) of manufacturing subsector output has exceeded GRDP output growth in both Provinces. The share of the manufacturing subsector in West Kalimantan's total GRDP has increased from 14.0% in 1983 to 19.5% in 1997, but only from 10.0% in 1983 to 11.7% in 1997 in Central Kalimantan. Employment accounted in 1995 for 5.0% and 4.0% of total manufacturing employment, respectively.

However, in the case of both provinces the absolute fragility of the manufacturing subsector comes to light when investigating the system of structural linkages between the primary sector, which constitutes the raw-material input base, and the horizontal and vertical structural features of the manufacturing base itself.

Key features of the manufacturing subsector structure are summarized as :

- Both Provinces have a manufacturing structure, which is highly concentrated on resource based processing, in particular wood, palm oil, and rubber processing, with very little or no relevant levels of horizontal and/or vertical integration
- There is no relevant base, or the base does not carry sufficient critical mass, in all strategic lines of manufacturing (that is ISIC codes 35 to 39)
- Subsequently, manufacturing subsector growth performance and employment levels are a direct function of plantation and forest concession exploitation levels and/or enlargements. In other words, if the resource base grows at the required pace, so do the processing establishments, and vice versa
- Given the projected situation for logging in the coming five to ten years, and in particular thereafter, the wood-processing based industrial scale industry has already to be classified as an industry in "severe crisis", with all its implications for the very base of manufacturing in both Provinces, as well as its employment implications. This line-of-industry is in need of a comprehensive structural adjustment package
- The scope and depth of manufacturing in the resource based manufacturing establishments is relative shallow (relatively unsophisticated primary processing steps, involving low-level outdated technologies), and
- While there are concentration points of manufacturing activities, there seems to be no "center of gravitation", which would combine favorable externalities with a supportive infrastructure and synergies.

(2) KAPET Sanggau

Sanggau in West Kalimantan is identified as one of the 13 Integrated Strategic Areas (KAPET) in Eastern Indonesia which has been given priority for development, recognized as having the potential to develop faster than other areas. In KAPET Sanggau, there are three primary product subsectors and their processing industries which are expected to lead the development of the area; they are i) bauxite mines, ii) forestry and iii) oil-palm plantations. Apart from the project of bauxite mining and alumina production which is explained in the following, a pulp factory is scheduled to start production in Tayan in a few years and a number of palm oil plantations and CPO plants are also supposed to start operation in the area.

(3) Bauxite Development Project at Tayan

In the Sanggau district, a bauxite development project at Tayan is in the pipeline, as a strategic industry of KAPET Sanggau. The state mining company PT Aneka Tambang, together with potential Japanese investors, has almost finished the study on bauxite exploitation and alumina production project in the area.

There are two alternatives in alumina production after exploitation of bauxite; production of 1) chemical grade alumina which is used by chemical industries other than aluminum smelt and 2) smelter grade alumina, for use as aluminum smelt. The former requires 800,000 tons of bauxite for annual production of 300,000 tons of alumina, while the latter requires 2.5 million tons of bauxite to produce 900,000 tons of alumina per year. The study results, according to PT Aneka Tambang, have indicated that the chemical grade will be economically more viable as the production of smelter grade needs a huge amount of investment, but the Indonesian Government sources prefer smelter grade alumina production. Thus the project is suspended at the moment, though it seems that Japanese investors are keenly interested in early commencement of the development project for production of chemical grade alumina.

The following is the required total investment amount and the number of direct employment of the project for each case, including the exploitation of bauxite.

Proposed Product	Total Investment	Direct Employment
Chemical Grade	US$200 million	400 (+100 by contractor)
Smelter Grade	US$1 billion	700 (+100 by contractor)

Be it chemical grade or smelter, the project will have a significant impact on the regional economy and society. The project may require the development of supporting facilities including;

1) Improvement of the connecting road between Tayan and Pontianak (to be paved in 1998) for transport of input materials, supplies and workers (alumina itself is to be transported to Pontianak by ship via the Kapuas River);
2) Increased capacity of electric supply; 20 MW according to the Cipta Karya report;
3) Enough supply of pure water to wash bauxite ore.; 5 million m3 to be taken from the Kapuas River;
4) Dredging of the Kapuas River for ship transportation of alumina.

Besides this, employee facilities, such as housing, school, hospital and commercial facilities are to be established around the project site.

(4) Other Industrial Areas in West Kalimantan

Apart from the Sanggau strategic area, West Kalimantan has a few plans for the development of other industrial zones. Entikong, with its strategic location as the town bordering Malaysia, is expected to have industries like food processing of agricultural products and handicrafts. According to Bappeda West Kalimantan, the Entikong area could become, in the future, a bonded or tax free zone, to promote trade between the two countries. Further, there is a plan to establish an industrial estate in Sambas, in order to provide logistical support to the Natuna Island development project. A similar plan to set up an industrial zone in Teluk Air area has also been identified. While in Sungai Purun, 30km from Pontianak city, there already exists an industrial zone where a number of manufacturers of furniture, window frames and dolls are concentrated.

(5) Industrial Estate in Central Kalimantan

Construction of an industrial estate has been proposed in the triangular area of Kuala Kapuas, Pulang Pisau and Bahaur, or KAPIHA. Though the plan seems to be still in the preliminary stage without a fixed time schedule (proposed for FY 1998/99) or area (supposed to range from 20,000 to 50,000 ha), the following kinds of industries are expected to be developed:

- Agriculture and forestry products including food processing, wood processing and rubber processing.
- Metal, machine and chemical products
- Textile and leather products

Both local and foreign investors have been targeted to start operations in the estate where some infrastructure and service facilities are to be provided, including roads, electricity, water supply, telecommunication, waste water treatment, housing, public transport and facilities for workers, banks, and a post office.

(6) Development Potential

The province of West Kalimantan has a difficult task of promoting 'new' industries because the wood based industry, which has been the single most important industry of the province, is now declining. Forestry resources, even though logs are becoming less and less available, could survive by converting the products and raising the technology level and value added. Another possibility is the pulp manufacturing industry, which may bring about investors' interests in the region of both West and Central Kalimantan, if the new project in Sanggau succeeds. With all these efforts, however, it is an urgent task to find other sources of income and employment generation for the replacement of wood processing. It is urged that West Kalimantan try to diversify its industries in order to facilitate sustainable development.

Palm oil plantations, the most promising industry, are supposed to expand their production with plenty of new plantations expected to start operation in the near future. International demand conditions appear favorable for CPO producers for the moment. Development of downstream industries of oil palm, such as oleochemicals, could be possible in the future if technical and financial supports from central government are made available. It seems that every policy maker of each province as well as private investor sees palm oil plantation, or CPO, as the single most prominent replacement of wood processing, but there is a risk of severe loss in the case of international price fluctuation in the future. In this sense the government should look at the possibility of other crops and manufacturing industry development by considering the long term profit of the industrial sector of the region.

Considering that both provinces have a comparative advantage in the abundance of natural resources, it is reasonable and realistic to promote resource based industries such as agro-industries and mineral processing industries by continuing to enjoy this advantage. A success of the above mentioned bauxite exploitation and alumina production project in Tayan would encourage other private sector involvement in mineral processing. Though at the moment, many mining and quarrying resources are exported without any value added, the introduction of capital and technology would make the processing industry viable.

While trying to achieve high economic growth, particular attention to the environmental impact of industrialization should be paid so that sustainable industrial development is attained. As so called "polluting" industries are already located and planned to be located along the Kapuas river, more stringent environmental regulations monitoring activities should be applied.

(7) Small Scale Industries

Another important issue for industrial development in both provinces is the promotion of small and home industries. It is recommended that the provinces put more resources into the

promotion of this group, which, besides contributing to job creation and balanced income distribution, would strengthen the industrial base of the regional economy. To overcome the obstacles often faced by small and medium industries; such as poor marketing and managerial know-how, poor quality control and low technology, and inaccessibility to financing sources, district level testing and inspection centers need to be established. This would also promote research and development (R&D) facility development and ensure that information and training on marketing and management are readily available. The government's assistance for small and medium manufacturers to have easier access to soft loans and simpler licensing procedures are also desired.

In the Entikong bonded zone and the industrial estate in Sambas shown above, efforts to promote the small scale industries are already seen with the consideration of markets. In Central Kalimantan, many small industries are gathering to the Kotawaringin Barat district. To promote these local industries together with the plantation based industries should be another focus of industrialization efforts.

A.9 SWAMP DEVELOPMENT

There are three major types of swamps in the study area. The first is mangrove forest swamp, which is under the influence of sea water. The second is peat swamp forest, which receives moisture mainly from rainfall and as a result, it is nutrient-poor. The third is fresh water swamp, which receives dissolved mineral nutrients in floodwaters from river and streams. Fresh water swamp is suitable for intensive wetland agriculture. Shallow peatlands are also suitable for some agricultural uses. However, due to the micro differences in soil conditions, it is difficult to find areas for large-scale development in peat swamp areas.

Table A.9.1 Three Types of Swamps

Unit: km^2

	West Kalimantan	Central Kalimantan	Total
Mangrove	2,126	1,657	3,783
Peat Swamp	22,616	45,536	68,152
Fresh Water Swamp	6,312	8,802	15,114
Total	31,054	55,995	87,049
% of Total Area	21%	36%	29%

Source: RePPProT

Agricultural Use

Even though there are three different types of swamp forests in Indonesia, the government has tended to invariably consider swamp land as a rich and exploitable resource to accept transmigrants in order to increase agricultural production, as well as to meet the increasing demands for land for commercial agriculture by the private sector.

Huge areas of swamp land (more than 2 million ha) have been developed spontaneously by the Banjarese of Kalimantan and Buginese farmers of South Sulawesi in the coastal swamp areas of Kalimantan and Sumatra. Furthermore, 1.2 million ha of swamp land have been developed through the government projects of transmigration settlements.

In West Kalimantan, the government at present has confined its efforts to the second stage development of existing transmigration settlements based on swamp reclamation. In West Kalimantan, some peat swamp areas are offered for oil palm plantation development by the provincial authorities (See Figure A.2.3). In Central Kalimantan, the government has embarked on large-scale swamp development for wetland rice cultivation and transmigration settlements.

Forest Development

Swamp forests have been subject to formal timber exploitation. As shown in Figure A.6.3, most of the coastal swamp areas are covered by timber concession areas in both West and

Central Kalimantan. Recently, the concessions for industrial tree plantation were also given to some swamp areas (See Figure A.7.1).

Conservation

Presidential Decree No. 32 of 1990 sets the criteria to designate protected peatlands as follows:

- peatlands with a peat thickness of more than 3 m,
- peatlands located on the upper stream of river basins
- the peatlands which run through cities or other important sites

However, since no survey of peat thickness was conducted to identify protected peatlands, the on-going agricultural and forest development has not yet been effectively guided by this presidential decree.

Road Development in Swamp Areas

As roads have developed in Kalimantan, more and more road sections run through swamp areas, because most of the major towns are located in the coastal areas, which are surrounded by swamp areas. The swamp forests along the major roads in Kalimantan are mostly deforested due to formal and informal timber extraction and informal agricultural uses. When the means of regional transport shifts from rivers to roads, environmental degradation along roads will be inevitable.

Ecological Values and Fragility of Swamp Land

All the types of swamp land are fragile. Once disturbed, it is difficult to restore the function of the swamp land. The peat swamp areas have the following ecological values: [10]

- Hydrological: through regulation of groundwater recharge and discharge and surface flooding;
- Sanitation: through the retention of sediment, contaminants and toxins;
- Heritage: through preserving the maintenance of biodiversity, wildlife resources and cultural uniqueness;
- Protection: through carbon sequestration and storage;
- Production: through the retention of nutrients, generating valuable forest and agricultural resources, and providing a constant water supply.

[10] Taken from T. Notohadiprawiro (1997), "Twenty-five Years Experience in Peatland Development for Agriculture in Indonesia", Tropical Peatlands, edited by J.O. Rieley and S.E. Page, Cardigan: Samara Publishing Limited.