2.3.19 Delevopment of Log Process Industry

Since it is impossible that the export of logs can restore under the current policies, the amount of export of sawn timber and plywood may increase.

It is, however, extremely difficult to describe the prospect. The following are the results of an opinion survey at a mill in Samarinda City.

Plywood may be far more stable than sawn timber as an international product because:

(1) Plywood is more homogeneous,

(2) To utilize modern manufacturing facilities, plywood is used more advantageous in control and techniques, by automatic methods.

(3) Sawn timber is technically difficult to process such as cross- and quarter-grain sawing, uneven sizes,

(4) Sawn timber products of various sizes must be sorted to export order, and

(5) Sawn timber is difficult to dry. In addition, plywood has lower rate of occurrence of products inadequate for export and is easier to sell domestically than sawn timber.

This is why Indonesian Government pays attention to the upbringing of the plywood industry.

As of the time of the investigation, five of the plywood mills located around Samarinda City were in operation, with their average rate of operation of 70%, while some of the 16 operationable sawmills had already stopped their operation, with their average operation rate of less than 30%. There were also pessimistic opinions on the management of sawmills as the export industry. It would be premature, however, to underestimate sawn timber because there is a worldly increasing trend of lack of wood products; rather, efforts should be made for technical improvement. There was also a tendency of use of logs of poorer quality because sawn timber did not pay. By such a manner, it will be fallen to vicious cycle. It is required to avoid that by using logs of good quality.

As the prospects of the log process industry in East Kalimantan, a basic program established by a local forestry office in East Kalimantan, Samarinda sets the consumption of logs in 1984 as follows:

Raw logs for sawing	6,800,000 m^3 per year
Raw logs for plywood	4,000,000 m^3 per year
Raw logs for paper making	11,000,000 m^3 per year

The following table shows the number of mills completed before the promulgation of the regulations of May 1981 and the number of those for which licenses to construct have been granted.

	Completion		Number of mills construction licenses granted
	Number of mills	Annual consumption of logs	
Sawmills	24	About 1,500,000 m^3	29
Plywood mills	6	About 700,000 m^3	5

It was reported that, due to a rush of applications for the construction of plywood mills after the application of the regulations, the Central Government would temporarily stop the reception of applications at 100 in November 1981. They said that the Government intend to limit the number of plywood mills to 130 (100 plus existing 30 plywood mills). The construction of a small-scale plywood mill with the annual consumption of fifty thousand to sixty thousand m^3 logs requires costs of approximately seven million dollars. Thus, the applicants have many fluid elements including their funds.

Table F10 Situations of Indonesian log process industry (As of December 1980)

Possession of Concession	Type of mill	Progress	Number of mills	Productive Capacity (m^3/shift/year)
Concessionaire	Sawmill	In operation	188	5,504,000
		Under construction	28	786,500
		In application	82	2,207,000
	Veneer and plywood mill	In operation	25	984,000
		Under construction	12	500,000
		In application	88	3,642,500
Non-concessionaire	Chip mill	In operation	1	84,000
		Under construction	-	-
		In application	2	339,000
	Sawmill	In operation	1,510	3,797,000
	Veneer and plywood mill	In operation	3	73,000

Many of the applicants for the construction of sawmills as shown in Table F10 were switched to those for the construction of plywood mills in accordance with the purposes of the regulations of May 1981.

2.3.20 Future of Conversion of Forest Land to Agricultural Land

As already mentioned, solution of the problem of overpopulation in Java requires transmigration for which transmigration development camps have been constructed steadily.

Forest land around Samarinda City has been much changed, and many emigrants are sent there by several buses, almost every day.

The background and contents of the plan described by the transmigration Planning Administrator of Samarinda City have already been mentioned. What specially interested us was that as much as 5,200,000 ha. of forest is scheduled to be reclaimed in the whole area of East Kalimantan in order to accept transmigrants (government-planned transmigrants and spontaneous transmigrants). That area was equivalent to 25 per cent of the total district area. Moreover, most of the area planned for reclamation was planned to be provided by conversion from forest land, which accounted for 30 per cent of the total forest area.

It is unavoidable that forest land decreases due to the transmigration program, but it will be a big problem for the forestry authority to deal with management and control of remaining forest land. It is essential to strengthen forest management, but it is not enough to prevent encroachment of forest land due to shifting cultivation.

The forestry authority makes it a primary subject that takes an increase in forest power and recovery of soil power by means of afforestation. It may be one of the problems at the stage of turning point of forest policy.

2.3.21 Increase in Importance of Afforestation

Indonesia has conducted its development through a selective cutting system with 35 years as a cutting cycle. Regeneration of selective cutting of broad-leaved forests is generally said to be difficult. This is especially true in the tropic zone.

It has already been mentioned that there are many discussions on the regeneration of selective cutting in the Philippines.

Indonesia has different conditions of selective cutting from the Philippines. Generally, its conditions of regeneration are probably better than those of the Philippines.

However, Indonesia, too, should promote development of techniques to renovate remaining forests after selective cutting more wholesomely and rapidly. The second division of this survey group undertook a basic survey for that purpose. However, development of applied techniques cannot be achieved in such a short period as a few years. Continuous surveys and experiments in collaboration between the university and local forestry offices will be required in the future.

It is included waste land, ruins of shifting cultivation in the category of forest land.
which have grown at the ruins of shifting cultivation have been encroached by repeated performance of the shifting cultivation. There are not a few cases to observe rapid decrease in potential power of the soil productivity by shortened fallow period of shifting cultivation. Moreover, the transmigration Bureau at East Kalimantan plans reclamation of 5,200,000 ha.

As described below, the director of the East Kalimantan Forest Administration Office emphasizes the restoration of waste land by means of artificial afforestation. Table F11 shows the area of artificial afforestation in East Kalimantan, which is approximately 14,000 ha. in total, governmental and private. Major planted trees are Pinus merkusii, Pinus caribaea, Albizia falcata, Eucalyptus spp, etc. Only one company plants meranti (Dipterocarpacea). (Table F12)

Table F11 Change of plantation hectareage by enterprise in East Kalimantan

Enterprise	Local forestry office		P.T. ITCI	P.T. BFI	P.T.GPI	
Year	Plantation within forest	Plantation outside forest				
	ha.	ha.	ha.	ha.	ha.	
1969	16.9	-				
1970	1.0					
1971	110.0					
1972	60.4			28.0		
1973	23.2			9.0		
1974	680.0	20.0	157.0	96.0		
1975	13.0	36.0	900.0	185.0		
1976	57.0	20.0	(1,010.0)	182.0	4.0	
1977	372.8	10.0	796.0	50.0	9.0	
1978	2,315.0	44.7	548.0	29.0	24.9	
1979	1,585.0	217.4	1,056.0	30.0	54.2	
1980	2,065.0	214.9	846.0		100.0	
Total	7,299.3	563.0	5,313.0	609.0	192.1	13,976.4
	(1)		(2)	(3)	(4)	

Source: (1) Local Forest Administration (2) P.T. ITCI (3) P.T. BFI (4) P.T. GPI

Plantation within forest: Plantation in land after cutting

Plantation outside forest: Restoration of grassland

It is known that plantation of pine trees in tropical lowlands has problems. As mentioned earlier, the investigation of artificial afforestation of pinus merkusii test-planted by a lecturer at Murawaruman University showed that as many as 40% foxtails were produced.

Ir. Gani Abu, the chief of the East Kalimantan Forest Administration Office said that they also planted the same pine trees, with similar results as to the foxtail. They have no established theory about the cause, so he explained to us that it might be impossible to plant Pinus merkusii in tropical lowlands because it grows naturally in highland more than 400 meters above the sea level in Indonesia.

He also said that rapid progress of disforestation for reclamation of agricultural land was unavoidable, but afforestation would be urgent for the restoration of waste land resulting from such disforestation, and the conventional pace of plantation was not enough.

For seeking adequate afforestation for grassland: (1) Broadleaf trees, especially leguminous plants should be examined considering the purposes

of soil improvement; (2) Exotic species should be added to major native species. Initially, precious species should be considered; and (3) Performance of afforestation test of various plots of single and mixed species is urgently required, though creation of forests of single species can cause damage by noxious insects.

It is needless to say that the first target of the planting is to recover the public function of forests. However, change in the structure of demand for timber may allow full accomplishment of the purpose of assurance of timber resources. After the first planting as described above, regeneration species of next stage should fully be studied and its full test period given.

Table F12 Transition of hectarage of artificial afforestation by East Kalimantan Forestry Office between 1969/1970 and 1980/1981

Unit: ha.

Year	Reforestation		Afforestation (Forestation other than reforestation)	
	Area	Species	Area	Species
'67-'70	16.9	Pinus merkusii, Pinus caribaea, Acasia auriculiformis, Cupressus sp. Gmelina arborea, Albizzia falcata, Eucalyptus sp.	-	-
'70-'71	1.0	Agathis	-	-
'71-'72	110.0	Pinus merkusii, Albizzia falcata, Acasia sp.	-	-
'72-'73	60.35	Pericopsis, Albizzia falcata, Acasia sp., Sungkai	-	-
'73-'74	23.20	Meranti, Agathis, Kapur, Bangkirai, Keruing, Ulin, Pinus merkusii, Acasia sp., Albizzia falcata, Mahogani	-	-
'74-'75	680	Pinus merkusii, Albizzia falcata, Pinus oocarpa, Enterolobium, Mahogani	20	Pinus merkusii
'75-'76	13	Pinus merkusii	36	Pinus merkusii, Flamboyan
'76-'77	57	Pinus merkusii, Albizzia falcata, Caliandra sp.	20	Pinus merkusii, Kelapa
'77-'78	372.8	Pinus merkusii, Albizzia falcata, Fagraea sp., Rotan	10	Pinus merkusii

Unit: ha.

Year	Reforestation		Afforestation (Forestation other than reforestation)	
	Area	Species	Area	Species
'78-'79	2,315	Pinus merkusii, Kemiri, Durian, Jambu mente	44.7	Pinus merkusii, Kelapa, Rambutan, Acasia sp., Sonokembang, Cempedak, Jambumente, Albizzia falcats, Cengkeh, Durian
'79-'80	1,585	Pinus merkusii	217.4	Pinus merkusii, Petai, Jeruk, Coklat, Kelapa, Durian, Cempedak, Kayu manis, Cengkeh, Kopi, Rambutan, Acasia, Albizzia sp., Palem Raja
'80-'81	2,065	Pinus merkusii, Meranti, Kapur, Tengkawang	214.9	Kelapa, Cengkeh, Kopi, Buah-buahan
Total	7,299.25		563	

Source: Forestry Administration Bureau

Table F13 Plantation by P.T. ITCI in hectare

1974/1975-1980/1981
Unit: ha.

Species	1974/'75	1975/'76	1977/'78	1978/'79	1979/'80	1980/'81	Total
Eucalyptus deglupta	32	332	394	401	360	230	1,927
Eucalyptus urophylla	-	-	-	-	26	-	26
Eucalyptus tereticornis	-	-	-	-	-	230	260
Pinus caribaea	59	439	325	97	356	-	1,446
Pinus oocarpa	5	15	24	-	108	-	195
Kelembayan (Anthocephalus chinensis)	-	39	25	47	106	190	881
Albizzia falcata	40	63	-	-	-	30	133
Acacia mangium	-	-	-	-	47	45	207
Leucaena leucocephala	-	-	-	-	-	76	76
Others	21	12	28	3	53	45	162
Total	157	900	796	548	1,056	846	5,313

Source: P.T. ITCI's Headquarters at Balikpapan

Table F14 Plantation by P.T. BFI in hectare

Unit: ha.

Species	1972	1973	1974	1975	1976	1977	1978	1979	Total
Ochroma lagopus	-	-	59	83	26	-	-	-	168
Ochroma limonensis	-	-	-	35	57	-	20	22	134
Ochroma bicolor	-	-	-	1	-	-	-	-	1
Pinus merkusii	1	-	2	-	-	-	-	-	3
Pinus oocarpa	-	-	16	44	12	-	-	-	72
Pinus caribaea	-	-	6	-	44	-	-	-	50
Albizzia falcata	13	9	3	22	43	50	9	-	149
Gmelina arborea	-	-	7	-	-	-	-	-	7
Others	14	-	3	-	-	-	-	8	25
Total	28	9	96	185	182	50	29	30	609

Source: P.T. BFI

Table F15 Plantation by P.T. GPI

Year	Area (ha.)	Tree species	Number of Planted trees
1976-1977	4.0	Albizzia f., Pinus, Mahogani, Meranti, Anthocepalus cadamba, Santalum album	5,675
1977-1978	9.0	Meranti	3,700
1978-1979	24.9	Meranti	4,560
1979-1980	54.2	Meranti	9,992
1980-1981 (up to July, 1980)	100.0	Meranti	14,000
Total	192.10		37,972

Source: P.T. GPI's Office at Batu Ampar

2.3.22 Reevaluation of Forest Resources

As mentioned above, mankind has not always evaluated forest resources correctly in every age or in every country. Data of forest resources prepared by FAO following reports of every government includes not only virgin forests of big trees but also grassland in a category of forests. Therefore, statistics of FAO does not mean that the actual situations of forest resources are cleared properly. At present, with a rapid increase in population and thus more and more agricultural reclamation progressed, when we promote afforestation as one of the countermeasure, it is necessary to have clarification of the actual situations of forests and forest land.

Table F16 shows three kinds of statistics of forest resources published by the Indonesian Forestry Administration Bureau.

Table F16 Statistics of Indonesian forests

Unit: one million ha.

Cited from →	Forest in Indonesia 1980	Forest in Indonesia 1975	World forest resources data collected by FAO 1970
Abbreviation →	A	B	C
Production F	63.7	42.0	42.0
Protection F	14.2	3.0	
Conservation F	7.9	48.0	43.0
Reserved F	36.4		
Devastated land	0	27.0	30.0
Denuded or open L	0	0	9.0
Total	122.2	120.0	124.0

Source: A, B and C are all from the Indonesian General Forest Administration Bureau

As shown in Table F16, A, B and C have no great difference in the total area of forests, but do in the area of devastated land and denuded land: A, 0 hectare; B, 27,000,000 ha.; C, 39,000,000 ha. A decrease in the area of devastated land and denuded land in each statistics does not mean that they are excluded from the forests or treated as fallow land.

Measures to be taken vary greatly depending upon whether the area of denuded land, etc. is 0 or 39,000,000 ha. Those who believe in statistics with the area of 0 ha. may never understand about importance of afforestation.

Evaluation of forests in East Kalimantan has also similar problems. Table F17 shows statistics of forests in all Indonesia, all Kalimantan and East Kalimantan by reciting statistics A in Table F16.

Table F17 Classification of area of forests in all Indonesia and Kalimantan in 1980 in one million ha.

	All Indinesia		All Kalimantan		East Kalimantan	
	1 mil. ha.	%	1 mil.ha.	%	1 mil. ha.	%
Land area	191.96	100	53.94	100	20.24	100
Production F	63.71	33.2	32.72	60.7	11.78	58.2
Protection F	14.18	7.4	2.74	5.1	0.01	-
Conservation F	7.91	4.1	0.82	1.5	0.27	1.3
Reserved F	36.42	19.0	5.19	9.6	5.18	25.6
Devastated L	0		0		0	
Total of land area	122.23	63.7	41.47	76.9	17.24	85.2
Rate of forest area	63.7%		76.9%		85.2%	

Source: General Forest Administration Bureau

Statistics show that the percentage of the total area of forests and that of productive forests against the area of the district are as high as 85 per cent and 58 per cent, respectively. So, reclamation of 5,200,000 ha. may be no concern. But there are problems mentioned previously.

It must be noted that there is a difference between statistical figures and actual conditions in every country. Especially, statistics in sparsely populated districts should be noted.

Some managers of forest development said that certain parts illustrated as forests on map proved to be burnt by shifting cultivation, and that parts (such as swamps) other than forests were included. When refer to such statistic above, although there is no forest area lost in the statistics, actually, many forest zones are changing to denuded land rapidly. With such situation being in mind, it is necessary to carry out follow-up surveys for correct present situation of forest utilization.

3. Conclusion

Research result showed the need for development of practical applied techniques in conformity with shifting cultivators and communities. It became clear that stabilization of a farmer's life is a promise to that of forests. It is essential, therefore, that forest utilization should be conducted based on proper classification of land utilization and proper agricultural techniques introduced economically step by step. It would be emphasize necessity of basic researches for the purpose of the execution above.

As a countermeasure for the above, scientific survey of the state of forest and land utilization in vast areas should be carried out under recognition of the social needs. And it is required to study methods of experiment, guidance and popularization for improvement of agricultural techniques which many farmers are apparently seeking, even if they have no voice. Further, it is very important to test various methods of afforestation for the grassland and devastated land resulted from human destruction of forest and farmland.

In accordance with improvement of local economic conditions generally by such policies mentioned above, it will be opened the way for further development by using more higher and advanced research institute.

In seeking to stabilize the life of the farmers, it is essential to study rational relationship between forest utilization and agricultural reclamation by the cooperation both concerned of forestry and agriculture. In this connection, there is a word, "Agro-forestry". The meaning of the word is said that tree form (tree species) agriculture for getting crops permanently, and/or a type of agriculture which is done at the same spot of forestry. But there remained many points to be studied for the idea itself and methods of the word meaning. What are required by the farmers and the local society are stable grain supply and development of intensive farming method which people can carry out for the attainment. The prerequisite to achieve the object is to solve the matter by the cooperation of both parties concerned of agriculture and forestry

as mentioned above. The thought and practice to "Forest conservation for protection of agricultural environment" in Japan since old days will be a guidance. Without this, no stability may be assured for the land-use industry especially in Kalimantan.

(1) *Survey of Land Utilization in Connection with Forests*

Basic data on forests in the humid tropics and on land utilization are not sufficient as mentioned earlier. The environs of Samarinda City do not represent the land utilization problems in East Kalimantan. The problem is necessary to be investigated and examined more widely. There are different states on forests and forest land conditions after logging or degrees of degradation of grassland by excessive agricultural use between different districts, i.e. one is the hilly forest around Samarinda City where is the place easily accessible in East Kalimantan, another is the mountaneous forest which is stretching from approximately 100 km west of the city to 300 km south-east of the same. Thus, their problems are also different.

Transmigration settlements have been constructed rapidly during a period of our investigation of only one and a half year, and thus circumstances have changed completely in many areas. More and more changes may occur due to further reclamation plans.

To deal with problems following reclamation, it is desired that satellite photos be observed periodically tounderstand problems and more detailed information be obtained based on data provided by ground surveys and using aerial photos.

Basic methods for forestry, agriculture and reclamation will be obtained by the information, thus probably utilizing them for specific cases. Conventionally, air photos have been used for forest development, and they may also be expected much in the future.

(2) Experimentations on Improvement in Agriculture and Popularization

Improvement in rice fields is an effective way as an increased yield of agricultural products, at which utmost efforts have been made.

Upland field in Indonesia which account for about fifty per cent of the total area of arable land are mostly extensive slash-and-burn methed. A future increase in productivity of the field for the stabilization of the life of the farmers will require improvement in poor soil capacity and farming methods.

Stabilization of a farmer's life by making use of fixed fields may decrease occurrence of new devastated land, also allowing green restoration of existing devastated land (grassland). Stabilization of cultivation methods have been suggested in Section 4. According to the suggestion, it is required prompt realization. As proposed by Mulawarman University, it is important to start an experimentation on understanding what farmers need and how to popularize.

Surveys made so far have shown that introduction of permanent crops may stabilize soil and a farmer's life. For those crops, however, cultivation of a new market is required. For example, the price of pepper reduced to half as compared with that of two years ago (1978). A long-term, locally wide guidance is required whether the reduction is influenced by a big economic cycle or due to an economically excessive supply. Study must also be conducted about what kind of assistance is required in changing shifting cultivation to permanent forming system. There is a subject what protection forest should be for the maintenance of agricultural environment in the humid tropics. Once tropical forests were nests of noxious animals and insects causing damage to agriculture. Future protective forests cannot promise the happiness of many people unless they are man-controlled healthy forests.

(3) Restoration of Forest Conservation

Necessity for restoration of forest conservation, the third major point, has already been described. What is especially important is to arouse people's interest. Having an optimistic idea of forest resources will prevent the promotion of forest conservation. This is why this report has paid attention to the problem of resources. The idea of afforestation should also be noted as a pre-technical matter.

Conventional afforestation has pursued timber resources of high quality, and public benefit has been secondary. Afforestation required by Southeast Asian countries may be that of the public forest for the stabilization of the public livelihood. It is necessary to adopt primary concept of afforestation for water control and reservation, multi-purpose agricultural protection, and soil productivity restoration. Afforestation for public purpose will be served as timber resources more than enough, when timber supply becomes scant in the future.

To restore from grassland, early growing tree species are planted to improve soil productivity at first step, and then economic species will be planted on a full scale in later. Use of early growing species as timber resources may have full possibility of success. As mentioned above, transition to inferior log in wood utilization has been conducted all over the world. It is important to further study what advantageous species to be planted by what technical method. And also healthy and rapid growing method of natural regeneration is required for remained trees after selective cutting.

Dipterocarp species have been regarded as difficult to regenerate. The reasoning has been presumed by long years' observation by experienced people of tropical forestry. It is expected that natural regeneration will be improved by scientific study for the presumed reasons above.

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List of Tables and Figures

Supplement

Management Aspect of Forest Resources in East Kalimantan

1. Forest Resources

1.1 Introduction

All the forests of Indonesia are national forests. As is shown in Table 1, the forest area of Kalimantan occupies 33.9 % (41,470,000 ha) of the whole forest area of Indonesia, excluding East Timor, and is the largest of all in this country.

The forest area of East Kalimantan Province is 17,240,000 ha, which is 85.2 % of the total area of this province, or 14.1 % of the total forest area of Indonesia.

Table 1. Forest area of Indonesia, except East Timor by islands and utilizations (1980)[1)]

Unit: thousand ha

Names of islands or province	Area of land	Utilization of forests				Total and percentage	
		Protection forest	Production forest	Natural conservation forest	Reserved forest		
Sumatera	47,361	4,682	18,060	2,226	3,452	28,420	(23.2)
Java	13,219	579	1,845	394	73	2,891	(2.4)
West Kalimanta Province	14,676	1,514	8,211	35	-	9,760	(8.0)
Central Kalimantan Province	15,260	1,053	11,568	454	-	13,075	(10.7)
East Kalimantan Province	20,244	1	11,783	267	5,189	17,240	(14.1)
South Kalimantan Province	3,766	171	1,154	65	5	1,395	(1.1)
Sub-total	53,946	2,739	32,716	821	5,194	41,470	(33.9)
Bali	556	60	29	22	14	125	(0.1)
West Nusa Tenggara	2,018	634	125	89	-	848	(0.7)
East Nusa Tenggara	4,788	530	36	57	440	1,063	(0.9)
Sulawesi	18,922	2,946	4,154	944	1,866	9,910	(8.1)
Maluku	7,451	2,000	3,859	69	72	6,000	(4.9)
Irian Jaya	42,198	11	2,888	3,288	25,313	31,500	(25.8)
East Timor	1,499	-	-	-	-	-	-
Total	191,958	14,181	63,712	7,910	36,424	122,227	(100.0)

to be continued

Notes: Java includes Madura Island. West Nusa Tenggara includes Lombok Island, and East Nusa Tenggara includes Sumba Island and West Timor Island, and Maluku includes Seram Island and Halmahera Island.

The total of concession area (for holding timber company) in East Kalimantan, until 1981, is 11,510,000 ha or for about 97.1 % of the total production forest in this region.

Table 2. Volume of trees of more than 50 cm in diameter in main area of Indonesia (1974)[4)]

Names of islands	Area of production forest (thousand ha)	Commercial forest		Non-commercial forest (m^3)	Total and percentage (m^3)
		Forests of Diptero-carpacea (m^3)	Forests of other than Diptero-carpaceae (m^3)		
Sumatera	7,576.1	533,168.88	63,922.59	131,263.50	728,354.97 (21.5)
Java	-	-	-	-	-
West Kalimantan Province	2,965.8	133,612.31	41,650.93	36,993.44	212,256.68 (6.3)
Central Kalimantan Province	4,303.6	256,681.88	57,460.26	59,478.51	373,620.65 (11.1)
South Kalimantan Province	664.3	38,698,83	10,954.31	8,416.70	58,069.84 (1.7)
East Kalimantan Province	7,507.9	760,309.51	126,357.80	159,993.14	1,046,660.45 (30.9)
Sub-total of Kalimantan	15,441.6	1,189,302.53	236,423.30	264,881.79	1,690,607.62 (50.0)
Bali	-	-	-	-	-
West Nusa Tenggara	41	4,289.83	922.91	529.31	5,742.05 (0.2)
East Nusa Tenggara	-	-	-	-	-
Sulawesi	1,335.3	36,088.75	40,360.53	23,152.46	99,601.74 (3.0)
Maluku	1,566	120,628.98	62,733.96	33,665.42	217,028.36 (6.4)
Irian Jaya	3,644	141,650.24	293,083.36	202,257.28	639,990.88 (18.9)
Total	29,604	2,025,129.21	697,446.65	658,749.76	3,381,325.62 (100.0)

Note: Figures in the parentheses show the percentage per total.

Table 2 shows the production forests area and the standing stock of commercial and noncommercial trees with the diameter greater than 50 cm. If we call this kind of trees a greater diameter type, the total area of forests in Indonesia of this greater diameter type will be only 29,600,000 ha, or 46.5 % of the total production forest area of 63,710.000 ha in Indonesia, as is shown in Table 1. The area of the greater diameter type forest in East Kalimantan is a little less than 7,510,000 ha, which is 63.7 % of the production forests in this province.

Table 3 shows the average number of trees and the volume, per ha, according to diameter classes, tree species group and its utilization. From these Figures, we can find that the volume of Dipterocarpaceae of greater than 20 cm tree in diameter, per ha, is about 109 m^3, which is more than 50 % of the total volume. And it also shows that the light wood stock of Dipterocarpaceae which shared 96 % of the total amount of wood export until 1970, is about 65 m^3, or 32 % of the volume of the stand.

Table 3. Average number of trees and average volume of production forest per ha, in East Kalimantan (1973) [5)]

Kind of trees			Diameter (cm)							
			20 - 34		35 - 49		50 ≥		Total	
			N	V	N	V	N	V	N	V
Commercial tree species (for export)	Dipterocarpaceae	Floater	13.17	6.39	9.63	11.88	10.38	46.68	33.18	64.95
		Sinker	6.35	3.28	5.01	6.57	8.10	37.07	19.46	43.92
		Sub-total	19.52	9.67	14.67	18.45	18.48	80.75	52.64	108.87
	Non Dipterocarpaceae	Floater	1.84	0.87	1.68	2.25	1.91	9.08	5.43	12.20
		Sinker	6.59	2.84	5.07	6.25	5.52	16.74	17.18	25.83
		Sub-total	8.43	3.71	6.75	8.50	7.43	25.82	22.61	38.03
Commercial tree species (not for export)		Floater	2.41	1.09	1.41	1.80	0.66	2.63	4.48	5.52
		Sinker	9.41	3.90	4.12	4.62	3.79	13.41	17.32	21.93
		Sub-total	11.82	4.99	5.53	6.42	4.45	16.04	21.80	27.45
Non-commercial tree species		Floater	12.37	5.09	4.46	0.78	1.53	5.13	18.36	11.00
		Sinker	10.37	4.64	4.00	4.82	2.03	8.03	15.40	17.49
		Sub-total	22.74	9.73	8.46	5.60	3.56	13.16	34.76	28.49
Other			6.41	2.60	3.18	3.61	1.80	6.63	11.39	12.84
Total			68.92	30.70	38.56	42.58	35.72	142.40	143.20	215.68

Note: N: Average number of trees V: Average volume

1.2 *The third five-year program of forest development*

As is shown in Table 2, the total volume of more than 50 cm in diameter of Dipterocarpaceae and non-Dipterocarpaceae is 886,670,000 m^3, in East Kalimantan.

In order to know better about the resources essencial for the development such as, the forests, the land, the water and the energy, further research on its natural resources and more detailed evaluation are required.

Some important points shown by the third Five-Year Forest Development Program suggest the direction of the further researches in the future. Through the research of this time, have be found these fundamental points to be clarified concerning the forest resource problems.

(1) According to the data published by the Office of Directorate General of Forestry in 1970, 39,000,000 ha of waste land or bare land is included in the area of the forest. But, according to the statistics published in 1980, there is no record of the waste land. Therefore, the investigation about the actual conditions of the waste land is urgent.

(2) The forests are changing rapidly because of the exploitation and the deforestation. So, we must find the appropriate way of investigation in accordance with the change.

(3) The survey has been done inquiring about the fact that a little less than 98 % of the production forests are decided as holding timber company area. And according to the results of this survey, it can be suggested the following points:

1 30 - 60 % of the concessions has the non productive area.

There are exclusing area such as clearings, secondary forests, swamp forests, mountain forests, protection forests, and sometimes, swamps. Moreover, some of the forests which are classified as commercial trees statistically are excluded from exploitation because they are not permitted for cutting for export.

2 With the increase of the population of Indonesia and the policy of the enocouragement of immigration, it has become urgent to keep balance between the request for the deforestation and the importance of the forest administration and management. We think it is most important that the resarch on the effective

utilization of the forest and woodland must be done as soon as possible.

As we have seen above, we should take into consideration that the actual situation of the forest resources could not be explained fully by the statistical data known, and that there exists some differences between the statistical figures and the actual circumstances.

To cope with the immigration policy which is the inevitable demand of today, quality information should be provided in a rapid way. It will be understood that the preliminary knowledge about the site of exploitation should be sought as soon as possible together with the aerial survey and the field research.

2. Forest Administration

2.1 Forest administration system

The supervision and administration of forests are done by the Provincial Forestry Service of East Kalimantan (Dinas Kehutanan Propins Kalimantan Timur) located in the provincial capital, Samarinda.

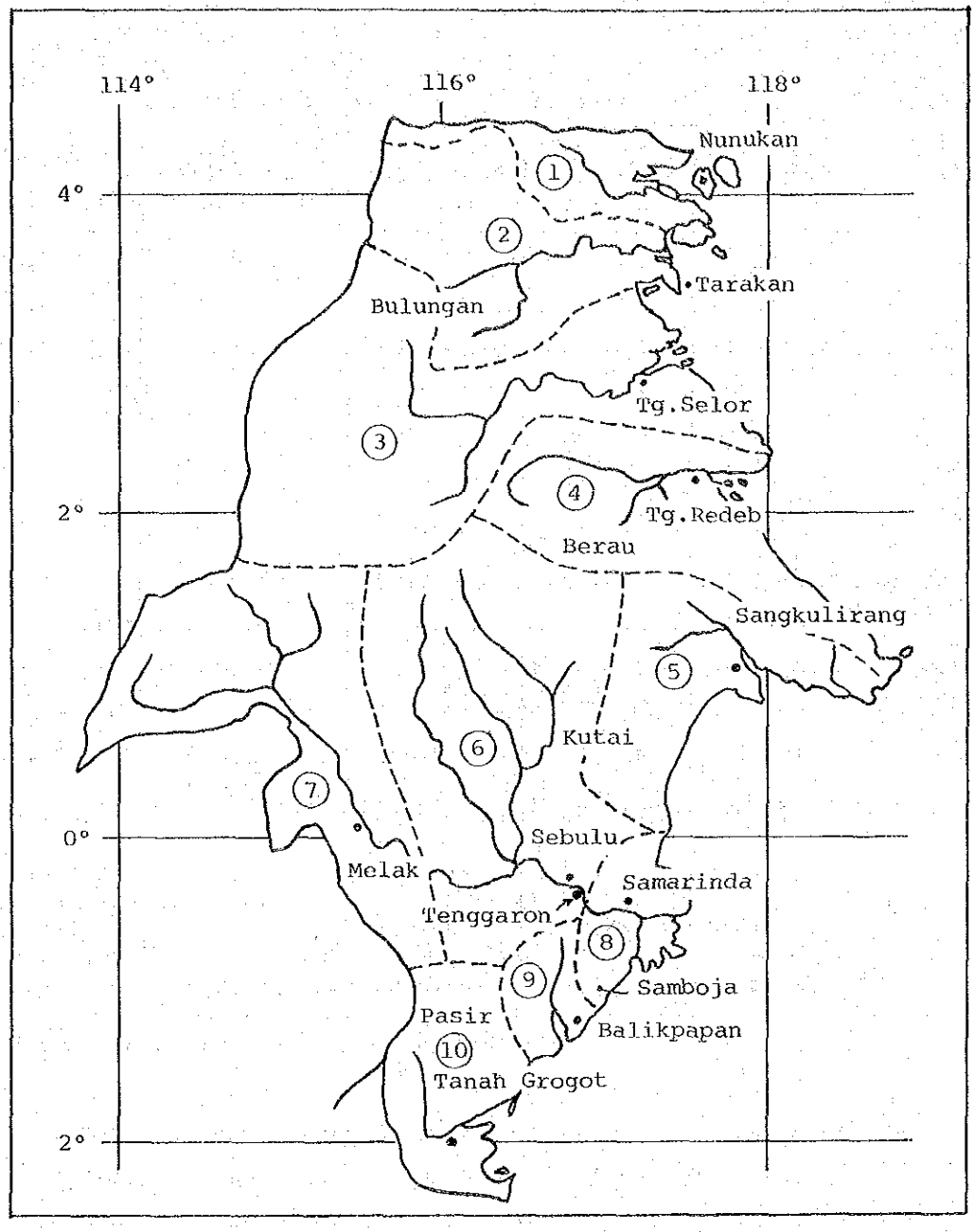
The Provincial Forestry Service of East Kalimantan (PFSEK) is under the supervision of the governor of E. Kalimantan on the administrative side, but as for the technical side, it is under the supervision of the office of Directorate General of Forestry (ODGF), which is located in Jakarta. The P.F.S.E.K. gets the financial aid from the O.D.G.F. At present, the main duty of the P.F.S.E.K. is the supervision administratively of the forest concession holder activity. This office is not cutting the forests by itself, but it is doing the reforestation and afforestation on non productive forest area.

The organization of the head office consists of the Head of Provincial Forestry service and the following seven divisions:

Security and General Control Division, Secretary Div., Financial Div., Forest Planning Div., Forest Exploitation Div., and Marketing Div.

Then for the local forestry administration system, there are ten Forest Districts (abbreviation for Indonesian is KPH)., and Forest District offices, 41 Sub-Districts of Forest (BKPH) and Forest Sub-District offices, and 129 District of Forest Rangers (RPH) and District offices of Forest Ranger, in the forests of East Kalimantan, as is shown in Fig. 1.

Fig. 1. Division of the Forest Districts and the location of the Forest District offices (as of Oct. 1980)



Names of the Forest Districts (KPH)

①	Bulungan Utara	⑥	Mahakam Tengah
②	Bulungan Tengah	⑦	Mahakam Ulu
③	Bulungan Selatan	⑧	Mahakam Ilir
④	Berau	⑨	Balikpapan
⑤	Bontang/Sangkulirang	⑩	Pasir

Data provided by the Provincial Forestry Service of East Kalimantan.

Fig. 1. Division of the Forest Districts and the location of the Forest District offices (as of Oct. 1980)

Table 4. The forest area by the Forest Districts of East Kalimantan (1978) [3)]

Unit: ha

Names of the forest district	Area of the land	Classification by forest utilization			Total
		Protection forest	Production forest	Wildlife preservation forest	
1 Bulungan Utara	1,033,840	199,000	652,000	-	851,000
2 Bulungan Tengah	1,148,424	609,000	399,000	-	1,008,000
3 Bulungan Selatan	3,956,860	1,475,000	2,190,000	-	3,665,000
4 Berau	2,277,749	236,910	1,829,090	-	2,066,000
5 Bontang/ Sangkulirang	1,553,779	78,000	765,000	200,000	1,043,000
6 Mahakam Tengah	4,899,616	451,200	3,600,800	70,000	4,122,000
7 Mahakam Ulu	4,169,528	992,000	2,603,000	5,000	3,600,000
8 Mahakam Ilir	676,528	17,000	371,000	-	388,000
9 Balikpapan	428,336	18,000	114,000	-	132,000
10 Pasir	1,079,840	28,000	389,000	-	417,000
Total	21,194,500	4,104,110	12,912,890	275,000	17,292,000

(Dinas Kehutanan Propinsi Kalimantan Timur)

Notes: Utara means North, Tengah Central, Selatan South, Ulu Up and Ilir Down. Figures in the parentheses mean the ratio per statistics (%).

As shown in Fig. 1, the location of the Forest District Office of each Forest District is (1) Nunukan, (2) Tarakan, (3) Tanjungselor, (4) Tanjunggredeb, (5) Sangkulirang, (6) Tenggarong, (7) Melak, (8) Samarinda, (9) Balikpapan, and (10) Tanah Grogot.

Now, we are going to explain about the organization of Forest District of Mahakam Ilir and 8 . Under the head of Forestry District (KKPH), there are four sections:

① Secretariat Section, ② Planning and Control Sec., ③ Exploitation an and Silviculture Sec., and ④ Marketing Sec. And, in this Forest District, there are three Forest Sub-Districts, each of which has one sub-Forest District Office. Under this Forest District Office, there are a total of nine local offices and Control Office of Flow of Forest Product (KS. LLHH) and Office of Forest Police (KGPK), which is located on the bank of the Mahakam River in Samarinda.

The total number of the personnel that belongs to the head office and the local offices of admiistrative organizations of forestry, such as the Forest District Offices, is aroung one thousand, as of Oct., 1980, of which about 150 belong to the head office in Samarinda (Anonym 1980).

2.2 The fundamental policy of the forest administration shown in the Third Five-Year Development Program

The fundamental policy of forestry administration shown in the Third Five-Year Development Program (Repelita Rencana Pembangunan lima tahun ketiga in Indonesian: from April 1979 through March 1984), which is in progress now, is as follows. In Chapter 7 "The Natural Resources and the Biological Environment" of this program, the basic policy of the nation, regarding the natural resources like those of forests, is made clear as follows:

① The inventory and the evaluation of the natural resources should be done in more detail for the purpose of knowing better about such natural resources as the forests, the land, the water and the energy, which are essential for the development.

② In order to take out, process and utilize the natural resources and at the same time, to preserve the biological environments, we must use the appropriate technology for the protection and preservation of these natural resources and the biological environments.

③ In implementing the development program, we should take into considerations the influences that might be affected on the biological environments, and do our best to protect them. This research should be done for the qualitative development of the biological environments in every field and in every district.

④ For the recovery of the lost natural resources of the area, the new program for the preservation of the forest, the land and the water should be established following the field research of that area.

⑤ The utilization of the farmland and the ocean ahould be emphasized so long as the quality of the biological environment is never spoiled or well protected.

⑥ As regards the development of the housing, the improvement of the biological environment of the low income families should be given the priority.

The guideline for the utilization of the natural resources could be summed up in these three points:

① The utmost utilization of the resources so long as they are well protected. ② Never let the natural resources be drained.
③ Leave some space for the future development.

As stated fundamental policy mentioned above, the preservation and the protection, together with the effective utilization of the natural resources are emphasized. In accordance with these fundamental policies, the policy of the forestry section was established. The quotation of the sentense in full is shown below, although it might be too long.

"The object of development of the third Repelita in the field of forestry is the utilization and the protection of forest resources. So, the best way for the resource utilization must be sought for. In order to realize this object, it is important to do recovery of the forests, the afforestation and the protection of the biological environments. Besides, the control of cutting, reforestation of the unproductive forests and the supervision for the regeneration of forests are necessary. Moreover, in order to strengthen the control, the afforestation after cutting should be enforced to the forestry enterprises.

Another measure to be taken to protect the forests from devastation is the encouragement of shifting cultivation to the inhabitants near the forest area for the purpose of letting them utilize the forests well. On the other hand, it is also important to cultivate the grass or to plant the firewood to satisfy the demand for fuel in the neighbouring villages.

The unmarketable coppice and other forest products should also be made best use of as fuel or for industrial purposes.

In order to increase the national revenues, not only the development of the process wood industry but also the surveys on forest protection and forest area should be emphasised. Especially, protection of forests is very important for the preservation of natural resources and the prevention of

flood in the valley.

As for the forest area survey, aerial photo should be used. This is also helpful for the protection of wild animals and is used for the determination of protection forest area, wild animal protection area and the national park area. In these areas, illegal cutting or illegal catching is prohibited, because of the biological reasons and for tourism.

As for the regeneration and the afforestation, the government offers the financial aid for the protection in the dangerous valley area, but the enterprises with the concession holdings are also responsible for the recovery of forests after cutting.

According to the policy described above, the Third Repelita forecasts the annual increase of export to be around 4.64 % (lumber 25.51 % increase, veneer/plywood 117.10 % increase), while the log export will decrease by 2.60 % on the annual average.

On the other hand, national demand for the log will increase by 24 % on the average per annum. And other forest products than wood, such as, rattan, copal, damar, charcoal, resin, tangkawang seeds, sandalwood, and telepine are protected to obtain foreign currency.

The expected recovery of the area exposed to landslide will be 1,000,000 ha, which includes 300,000 ha of afforestation and 700,000 ha of regeneration area. And the protection forest area will be 10,000,000 ha."

Besides these sentences quoted above, the third Five-Year Development Program describes about the forecast of the forest and the forestry industry as follows:

"2. Agricultural development and the natural environment. ..... Forests are useful in many ways, economic, social and cultural. The natural resources of forests include wood, rattan, leaves, wild animal, water and the biological environment. The cutting in large scale, not only degrades the economic value of the area, but also propagates trees of no economic value. In order to overcome this problem, disciplined selective cutting system should be enforced in the Indonesian tropical forest."

"4. Preservation of the natural force. The natural disasters, such as flood, drought, landslide, famine and blight hinder the productive force of the nature. Moreover, in the regions where the population is increasing rapidly, like Java, population capacity is decreasing

more and more. As a result, landslides are occurring everywhere without being recovered and are left in dangerous situations, of which we should be aware. In recognition of this fact, the Indonesian government has started to aid the implementation of the afforestation project to recover the dangerous areas, from the fisical 1976. Thus, during the second Repelita, afforestation of 393,000 ha and the regeneration of 1,124,000 ha were realized, besides 26,000 ha of the former cutting area and 121,000 ha of forest recovery....."

"5. Forest production build-up plan. Those who have the concession should abide by the actual regulations and do their duties, and administrative force should be strengthened. In addition, we should stop the indiscriminate cutting, protect the environment from polution, encourage the development of process industries and increase the job opportunities. And during the third Repelita, the amount of log export should be decreased, while the process wood export should be increased gradually. In order to prepare the good seedlings for afforestation, and for the implementation of the regeneration and afforestation plan, we should make more nursery gardens, though some are already established in East Kalimantan.

"9. Safety plan of forests, land and water. The aim of this plan is to protect the dangerous areas by afforestation and regeneration, asking for the participation of the local people, also. Various administrative authorities also will cooperate with them, offering aides. DAS will be able to take precedence of flood control countermeasures in the upper stream. The afforestation area of the dangerous region is expected to be 1,500,000 ha, during the third Repelita, while the regeneration area of private property is 3,500,000 ha. In the various valleys of Java, they are trying every effort for the-safety of the area, but yet, there are 35 areas that tre called as dangerous valleys.[8)]"

From the description above, it is clear that the main policy of forestry administration of Indonesia is the preservation and promotion of the forest resources and their effective utilization. This fundamental policy is, as will be explained in detail later, realized in the strict regulation of cutting, the restriction in export, and the encouragement of the process wood industries, in East Kalimantan.

Photo 1.

Provincial Forestry Service of East Kalimantan (in Samarinda)

Photo 2.

Forest District Office of Mahakam Ilir (in Samarinda)

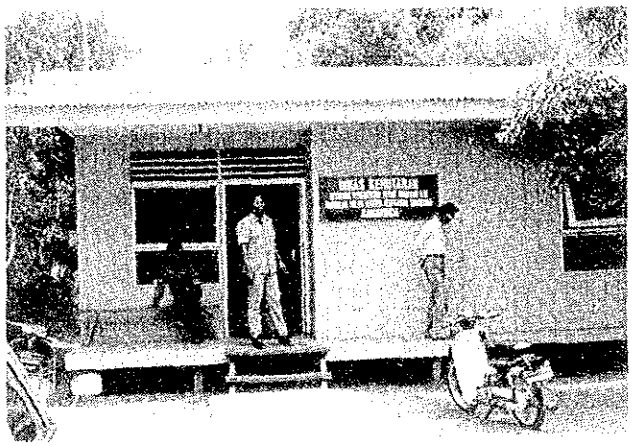
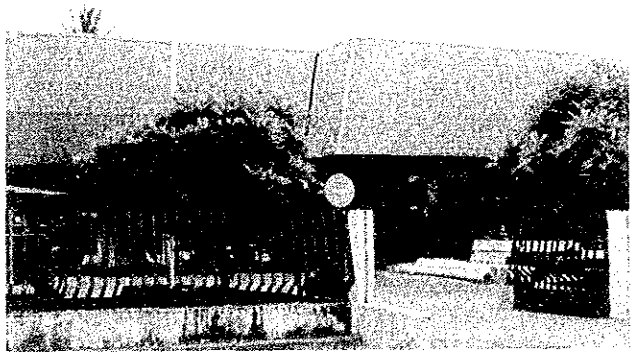


Photo 4.

Head Office of Unit 1 of P.T. Inhutani (in Balikpapan)

Photo 3.

Office of Forest Police (in Samarinda)



3. The System and General Aspects of Forestry Production

3.1 The transition of issue of Forest Concession holding company (HPH). Till 1967, forest development had been achieved in small scale, only in some teak forests in Java and in the outer islands. But, since the promulgation of the Capital Investment Law (Act No.1 of Foreign Capital Investment Law of 1967 and Act No.6 of National Capital Investment Law of 1968) in accordance with the Forest Law (Act No.5) of 1967, the introduction of foreign and national investments became very active in the outer islands, especially in Kalimantan, followed by active forest developments mainly by means of deforestation.[7] As is shown in Table 5, the amount of wood production in Indonesia was only 1,928,000 m^3 in 1967, but it increased to 6,206,000 m^3 in 1969, and to 26,297,000 m^3 in 1973, and it reached 26,256,000 m^3 in 1978.

Table 5. Transition of output of wood in Indonesia (log and lumber) [1) 7) 11)]

Unit: thousand m^3

Year	Amount of production	Year	Amount of production	
1950	1,488	1966	1,923	
51	1,522	67	1,928	
52	1,960	68	3,828	
53	1,853	69	6,206	(477)
54	1,874	70	10,899	(568)
55	2,034	71	13,706	(470)
56	2,112	72	17,717	(840)
57	2,287	73	26,297	(1,377)
58	1,812	74	23,280	(1,919)
59	1,888	75	16,296	(1,708)
60	1,859	76	21,428	(625)
61	1,906	77	22,940	(605)
62	1,018	78	26,256	(1,513)
63	1,961	79	24,617	(3,433)
64	1,870	80	12,103	
65	1,685			

Note: Figures in the parentheses mean the amount of production of lumber, converted into that of logs. Figures of 1980 show the output up to September of that year.

The center of development is East Kalimantan Province. As is shown in the statistics of the transition of the concession holding company (HPH) area up to 1973, according to "Kalimantan-Timur Dalam-Angka 1974" (East Kalimantan in Figure '74), which was published by the Bureau of Statistics and Census of East Kalimantan Province, the area under Forest Concession Right (Forest Utilization Right or Hak pengusahaan (HPH)) was 1,150,000 ha is 1968. Afterward, it increased every year till it reached about 6,600,000 ha in 1973 (See Table 6). Later, the condition for the issue of the forest concession holding company was modified, and, following the presidential order dated Nov. 3, 1973, the forest concession holding company is to be issued only to the domestic enterprises qualified legally as P.T. (corporated company).[10] Till Oct., 1973, the forest concession right, valid for twenty years, was given also to the joint companies. But after that, they were no more permitted the right for forest utilization. As a result, the foreign enterprises had to make a joint company with the Indonesian enterprise to obtain the forest concession holding company that they could continue the cutting as a contractor under the contract.[9]

Table 6. Transition of the area of forests in East Kalimantan under the forest utilization right issued by the central government[12]

Unit: ha

Year	Reserved forest	Area of forests with issue of Forest Utilization Right	Total area
1968	4,431,750	1,148,850	5,580,600
69	6,214,150	1,698,850	7,913,000
70	3,518,900	4,860,600	8,379,500
71	6,613,900	5,385,600	11,999,500
72	6,170,500	6,059,000	12,229,500
73	5,777,500	6,603,000	12,380,500

The transition of the concession area from 1969 - 70 to 1980 - 81, according to the statistics by the Provincial Forestry Office in Oct., 1981, is shown in Table 7. The forest concession holding company area from 1969 - 70 to 1980 - 81 is 11,514,450 ha, and 79 % of which, or 39,065,750 ha, belongs to 102 private timber companies, while 21 % of which, or 2,448,700 ha belongs to the state timber company, P.T. INHUTANI I (State Forest

Exploitation and Industry Company Ltd.). According to Table 1, the forest area of East Kalimantan is 17,240,000 ha. So, the concession holding company (HPH) is issued to about 67 % of the total forest area, or 98 % of the 11,783,000 ha production forest area.

Table 7. Transition of the area of forests under the forest utilization right in East Kalimantan, according to the years

Unit: ha

Classification whether governmental or private	Year	Number of wood companies with concession holding company (HPH)	Area of forests with concession holding company (HPH)
Private lumber company	1969 - 70	9	1,571,750
	70 - 71	12	1,440,000
	71 - 72	6	459,000
	72 - 73	10	676,500
	73 - 74	25	1,879,500
	74 - 75	9	653,000
	75 - 76	5	290,500
	76 - 77	5	390,000
	77 - 78	6	387,000
	78 - 79	8	392,500
	79 - 80	4	617,000
	80 - 81	3	309,000
	Sub-total	102	9,065,750
State timber company, P.T. INHUTANT I	Unit 1	1	980,200
	Unit 2	1	1,468,500
	Sub-total	2	2,448,700
Total		104	11,514,450

East Kalimantan Provincial Forestry Office.

3.2 The transition of the cutting seen from the figures of statistics

The deforestation area and the output of logs in East Kalimantan from 1967 - 68 to 1980 - 81 are as shown in Table 8.

Table 8. Transition of cutting area and the amount of production of logs[3) 12) 13)] in East Kalimantan

Year	Area of cutting (ha)	Amount of production (m^3)
1967 - 68	Unknown	260,000
68 - 69		820,000
69 - 70	66,491	2,200,000
70 - 71	126,976	5,460,000
71 - 72	145,717	5,520,000
72 - 73	171,166	7,570,000
73 - 74	221,344	8,270,000
74 - 75	196,541	7,260,258
75 - 76	191,912	7,480,647
76 - 77	241,225	9,361,207
77 - 78	250,553	9,883,016
78 - 79	(250,000)	10,158,523
79 - 80	Unknown	7,902,424
80 - 81		5,138,498

East Kalimantan Provincial Forestry Office.

Figures in the parenthesis are estimates.

It is clear that from 1968 - 69, the forest development became very active, as the data shows. The output of logs in 1967 - 68 was only 260,000 m^3, but after that, it increased to 820,000 m^3 in 1968 - 69, 5,460,000 m^3 in 1970 - 71, 7,480,000 m^3 in 1975 - 76, and 10,160,000 m^3 in 1978 - 79, in this province. The percentage of the amount of wood production of East Kalimantan vs total output of Indonesia was about 13 % in 1967, 21 % in 1968, 20 % in 1970, 46 % in 1975 and 39 % in 1978. From these figures, we can find that the center of forest development of Indonesia is East Kalimantan.

The output of wood in 1979 - 80 decreased to 7,900,000 m^3, and in 1980 - 81, it decreased considerably to 5,140,000 m^3, which is only 51 % of the output in 1978 - 89.

This tendency of rapid decrease, which was accelerated by the severe "log export restrictions" proclaimed in May, 1980, will continue in the future and is already apparent in the decrease of deforestation area which is 225,000 ha - 250,000 ha in 1981.

Table 9 shows the trend of the output of wood according to the different kinds of trees. Of the total amount of production, Meranti which belongs to genus Dipterocarpaceae ranks first, followed by Kapur of the same genus, and Keruing also of the same genus. The total output of these three kinds of Dipterocarpaceae amounts to 8,720,000 m^3, or 95.6 % of the total output of wood in this province (meranti: 84.3 %, Kapur: 11.1 %, and Agathis: 3.1 %, or 280,000 m^3).

The output of logs and that of lumber according to Forest Districts in 1978 are shown in Table 10.

Table 9. Transition of the amount of production of logs according to kinds of trees in East Kalimantan[12)]

Unit: 1,000 m^3

Year / Kind of trees	1967 - 68	1968 - 69	1969 - 70	1970 - 71	1971 - 72	1972 - 73	1973 - 74
Meranti	230	770	3,010	5,300	5,260	6,770	7,690 (84.3)
Kapur	101	30	60	80	90	510	1,000 (11.1)
Agathis	20	20	50	40	40	230	280 (3.1)
Keruing	-	-	10	-	10	40	30 (0.3)
Benuang	-	-	30	10	30	-	10 (0.1)
Medang	-	-	20	7	-	-	-
Kayu Kuku	-	-	20	30	-	-	-
Others	-	-	-	20	90	20	110 (1.2)
Total	351	820	3,200	5,487	5,520	7,570	9,120 (100.0)

Note: Figures in the parentheses show the percentage per total.

Table 10. Amount of production of logs and lumber in 1978 in East Kalimantan according to Forest Districts [3)]

Unit: m^3

Name of Forest District	Log	Lumber
① Bulungan Utara	242,074	80
② Bulungan Tengah	545,891	-
③ Bulungan Selatan	509,014	2,234
④ Berau	791,245	2,696
⑤ Bontang/Sangkulirang	1,944,796	9,156
⑥ Mahakam Ulu	936,411	-
⑦ Mahakam Ilir	446,324	66,070
⑧ Mahakam Tengah	3,065,240	-
⑨ Balikpapan	1,147,057	8,014
⑩ Pasir	589,905	1,872
Total	10,217,956	90,124

The data concerning the development of forests are shown in Table 11 - 13. With the vigorous activities of forest developments, the number of machines, such as tractor, logging truck and chainsaw, is increasing, and also, the total extension of the wood transportation road (forest way) reached 14,576 km (main road: 7,466 km, branch road: 7,110 km).

The total number of workers engaged in the development of forests was 26,378 (24,241 Indonesians and 2,137 foreigners) in 1978 - 79.

Table 11. Transition of the number of machines for the forest exploitation in East Kalimantan [12) 13)]

Kind of machines	1968	1969	1970	1971	1972	1973	1978
Yarder	10	10	10	10	10	10	38
Tractor	216	313	427	760	875	938	1,788
Logging truck	181	296	399	689	894	915	1,856
Chainsaw	250	366	500	945	1,058	1,068	2,133
Loader	3	5	10	22	35	36	178
Grader	26	36	46	74	93	933	200
Crane	3	7	13	25	34	38	33
Dump truck	11	23	45	87	112	119	366
Shovel	1	5	12	21	24	26	63
Skidder	-	4	4	14	16	16	132
Roller	-	-	3	5	9	10	17
Tug boat	11	62	120	140	166	169	Unknown
Pontoon	1	3	8	22	26	29	94
Speed boat	66	87	106	156	183	190	Unknown

Table 11-2 Number and total price of imported machines for the forest development in East Kalimantan [14)]

Unit: $1,000

KindKof machines	1969		1970		1971		1972	
	Number	Price	Number	Price	Number	Price	Number	Price
Tractor	97	9,700	114	11,400	333	33,300	115	11,500
Logging truck	115	5,888	103	5,200	290	14,500	205	10,300
Chainsaw	116	464	134	536	445	1,780	123	493
Loader	2	260	5	650	12	1,560	13	1,690
Grader	10	1,000	10	1,000	28	2,800	20	2,000
Crane	4	520	6	780	12	1,560	9	117
Dump truck	12	600	22	1,100	42	2,100	25	1,230
Shovel	4	520	7	910	11	1,430	3	390
Skidder	4	200	-	-	10	500	2	100
Roller	-	-	3	150	-	-	5	250
Tug boat	51	2,550	58	2,990	20	1,000	26	1,300
Pontoon	2	20	5	50	14	140	4	40
Speed boat	21	105	21	105	50	250	27	135
Total		21,827		24,871		60,920		29,545

Table 12. The transportation road by forest district (path for the transportation of wood) in East Kalimantan in 1978 - 79[5]

Name of Forest District	Distance of the transportation road		Total
	Main road	Branch	
1 Bulungan Utara	648.19	271.71	919.90
2 Bulungan Tengan	395.60	181.70	577.30
3 Bulungan Selatan	309.60	387.10	696.70
4 Berau	925.46	579.68	1,505.14
5 Bontang/Sangkulirang	1,389.20	1,110.67	2,499.87
6 Mahakam Ulu	842.30	880.77	1,643.07
7 Mahakam Ilir	275.20	172.95	448.15
8 Mahakam Tengah	1,269.36	1,097.72	2,367.08
9 Balikapapan	617.20	1,900.60	2,517.80
10 Pasir	794.00	607.00	1,401.00
Total	7,466.11	7,109.90	14,576.01

Table 13. Number of lumber company employees in East Kalimantan in 1978 - 79 by Forest District

Name of Forest District	Indonesian	Foreigner	Total
1 Bulungan Utara	1,618	87	1,705
2 Bulungan Tengah	1,198	103	1,301
3 Bulungan Selatan	2,579	176	2,755
4 Berau	2,651	220	2,871
5 Bontang/Sangkulirang	4,099	305	4,404
6 Mahakam Ulu	2,968	322	3,290
7 Mahakam Ilir	767	101	868
8 Mahakam Tengah	4,111	568	4,679
9 Balikpapan	2,349	119	2,468
10 Pasir	1,901	136	2,037
Total	24,241	2,137	26,378

Statistics and Census office in East Kalimantan

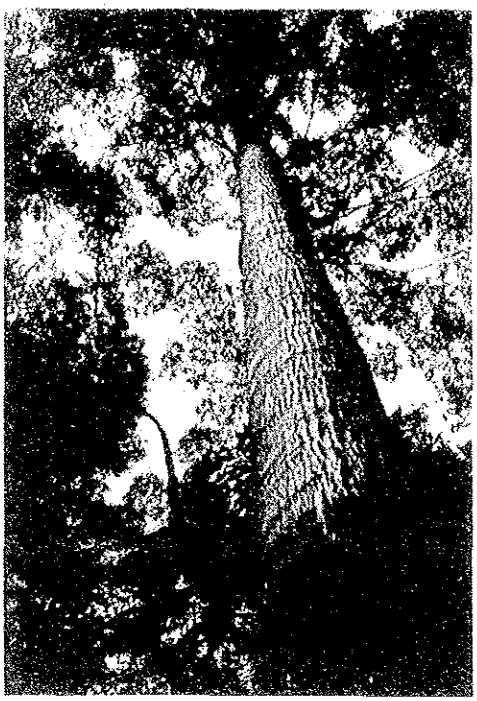


Photo 5.

Meranti tree in the concession of P.T. KTI

Photo 6.

Cutting site in P.T. KTI

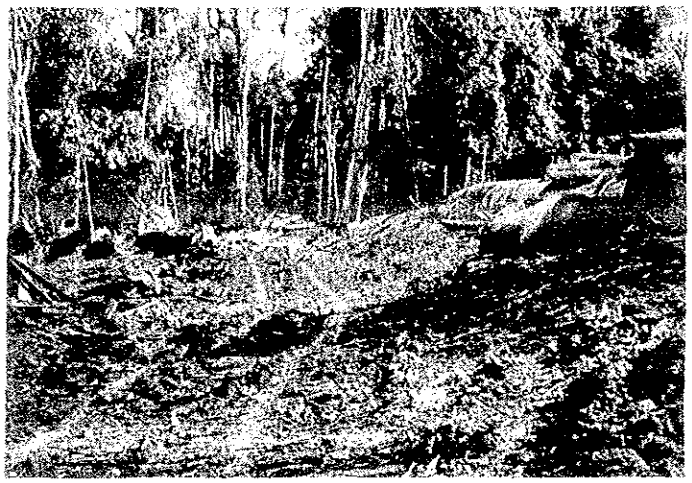


Photo 7.

Cutting site in the concession of P.T. GPI

Photo 8.

Transportation of logs
in the concession of P.T. GPI

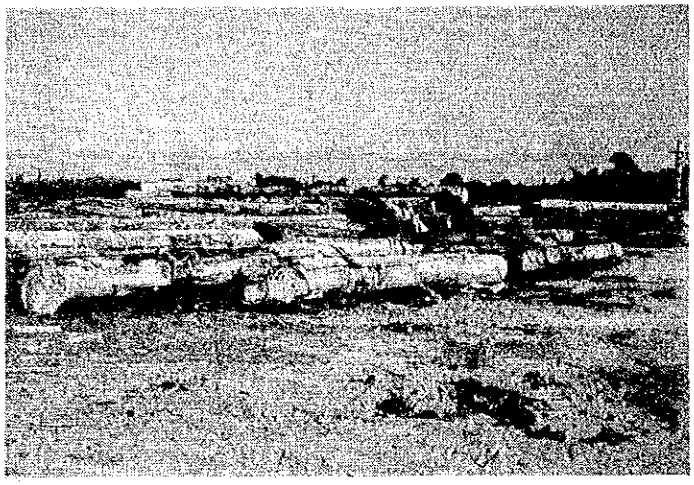


Photo 9.

Log yard of P.T. KTI

Photo 10.

Log pond of P.T. ITCI

Photo 11.

County office in Samboja District

Photo 12.

Cooperative Unit of Village (KUD) in Separi District

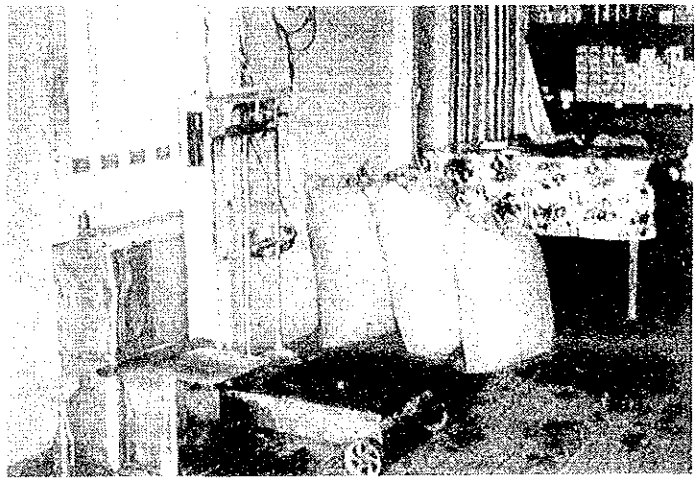


Photo 13.

Shop of KUD in Separi District

Photo 14.

Truck of KUD in the concession of P.T. ITCI

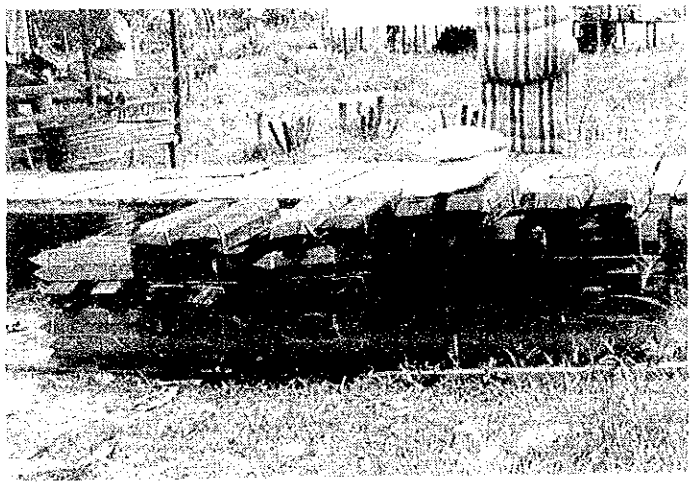


Photo 15.

Sirap on sale along the highway between Samarinda and Balikpapan

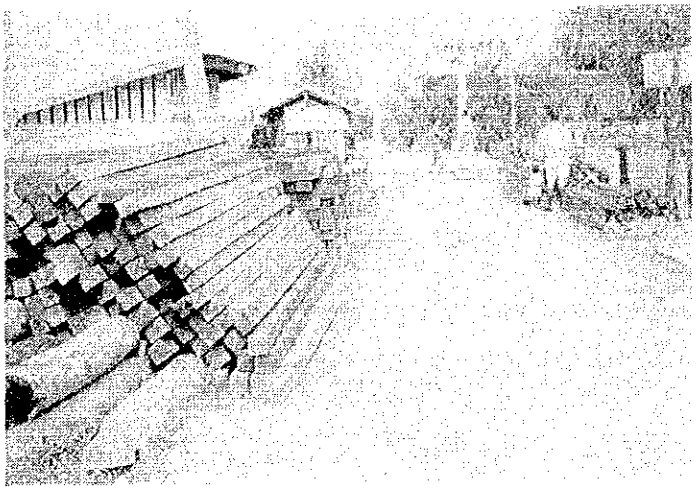


Photo 16.

Square lumber produced by KUD in Separi District

3.3 Organizations and activities of the major wood production enterprises

As of Oct., 1980, 102 timber companies[24] with the forest concession holding company are producing wood. Among these 102 companies, 90 are owned and run by the Indonesians, and P.T. Inhutani I is one of these.

Two of these 102 companies; (1) P.T. Limbang Ganeca, and (2) P.T. Inne Dong Wha are straight investment (or foreign investment) companies. Those that are classified as joint companies under foreign and Indonesian Joint Investment are following 10 companies: (1) P.T. Sangkulirang, which was the joint company of the British company and the Indonesian Navy till March, 1981, but is now under the management of the Indonesian Navy, after the withdrawal of the British company in April, 1981, (2) P.T. International Timber Cooperation Indonesia (I.T.C.I.), which is invested by the international timber capital, Weyerhouser Company, (3) P.T. Gonpu Indonesia, (4) P.T. Kutai Timber Indonesia (K.T.I.), which is invested by Sumitomo Ringyo of Japan, (5) P.T. Georgia Pacific Indonesia, an American Company, (6) P.T. Safdeco, (7) P.T. Taballar Wood Industries, (8) P.T. Balikpapan Forest Industries Ltd. (B.F.I.), which is invested by the Mitsubishi Trading Cooperation of Japan, (9) P.T. East Kalimantan Timber Industries, and (10) P.T.A.G. Timber Raya.

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