

### 2.3.11. Change of the Forest Utilization

#### (1) Change of the Development for Log Utilization

It was around 1919 when the South Sea log of Dipterocarp family became an international merchandise. It began to prevail from about the latter part of 1920s to 1930s. It was about that time when the log of East Kalimantan was introduced to Japan. Three Japanese firms were engaged in import of Kalimantan log. South Sea Forestry Inc. which was the largest of the three was engaged in log production in Nunukan and Sesayap located in the north part of East Kalimantan in 1932. After a while, this company moved to Sangkulirang district and tried mechanized forestry. But it failed to prevail.

The main forestry machine of that time was Yarder which was winch modified to fit forestry by using steam engine. This machine was set on a large wooden sled, weighing over 20 tons when fully equipped, and was quite difficult to self-propel.

On the other hand, accessible forest resources in East Kalimantan were located generally in gentle topographies while vast swamp is extending deeply to inland and dividing the distribution of high-quality forests. Furthermore, there is a problem of damage to the highest-quality forests by shifting cultivation. At the same time, as there were scarce gravels and stones which are used for road building, it was quite difficult to use heavy, low mobility and non-efficient Yarder. Owing especially to these reasons, the mechanization of forestry in this country had to wait until tractors prevailed.

After the war, powerful and high-mobility tractors began to prevail, and trucks also became powerful and large. In East Kalimantan, a new type of mechanized forestry using these machines began from about 1965. Especially after 1970, it increased drastically.

The log production before the full-scale mechanized forestry was depended on man power (Kuda-kuda). The distance of transfer was from 500 m to at most about 2 km. The log produced by manpower were

transported by natural passage of rivers which stretched to all directions in the region, and mostly loaded on ships at river-mouth.

The total export volume of log of Indonesia in 1965 was 150 thousand m<sup>3</sup> as shown in Table D10. Along with the transition from transfer by man power to mechanized forestry, export volume and increase rate had marked as shown in Table D21.

Table D10 Change of Export Volume and Increase Rate of Log in Indonesia

unit: 1,000 m<sup>3</sup>

	1965	1966	1967	1968	1969	1970	1971	1972	1973
Export volume	150	295	531	1,333	3,685	7,834	10,822	13,354	18,500
(Rate over the previous year)		(1.97)	(1.80)	(2.51)	(2.76)	(2.13)	(1.38)	(1.23)	(1.39)
(Standard year = 1965)	(1)	(1.97)	(3.54)	(8.89)	(24.57)	(52.23)	(72.15)	(89.03)	(123.33)

Source: Yearbook of forest products FAO

Note: Quoted from Table B2

From 1965 to 1970, the increase rate had soared more than two times every year over the previous year. Compared with the export volume of 1965, that of 1973 marked 123 times. This increase rate can be considered to be rather excessive.

Today, it is in a turning period for adjustments. Current problems will be discussed later.

Table D11 Timber export by islands of origin 1971-1978

unit : 1,000 m<sup>3</sup>

Islands	1971	1972	1973	1974	1975	1976	1977	1978
Sumatra	2,090	2,625	4,618	4,498	2,910	4,121	4,525	4,073
Kalimantan	7,414( 69)	9,732( 70)	13,101( 67)	11,975( 66)	9,987( 72)	12,943	13,615( 69)	14,615( 72)
Sulawesi	134	174	332	478	356	604	649	553
Java	53	57	67	54	37	54	55	33
Nusatenggara	1	1	52	27	45	71	78	72
Maluk	1,065	1,281	1,260	1,038	569	712	829	931
Irian Jaya	4	-	4	12	17	16	55	83
Total	10,761(100)	13,891(100)	19,433(100)	18,082(100)	13,921(100)	18,521(100)	19,306(100)	20,199(100)

Note: Figure in ( ) shows the percentage in total. Total figure is not equal to sum of each figure in 1972, 1973 and 1978.

Source: Directorate General of Forestry, forest statistic

Table D12 Export volume and value of log from East Kalimantan 1968-1979

Fiscal Year	Export (m <sup>3</sup> )	Value (US \$)
1968	603,344.21	
1969	2,665,268.02	7,326,500.00
1970	4,574,818.16	71,655,580.00
1971	4,601,162.27	79,697,456.24
1972	6,305,519.05	123,172,060.98
1973	7,603,713.12	316,884,594.76
1974	6,927,757.65	306,398,140.23
1975	6,542,606.57	253,960,606.74
1976	8,795,055.84	432,231,011.53
1977	8,657,660.02	467,162,959.39
1978 <sup>*)</sup>	8,869,521.96	483,098,358.69

Note: \*) Estimate

Source: Directorate General of Forestry, forest statistic

(2) Change of the Production of Wood Products and Special Forest Goods

In the city of Samarinda, there have been a government-owned large scale sawmill. But others were mostly small scale or sawed manually. Products of that time were mostly transported to Surabaya and sold domestically.

Since 1972, in East Kalimantan, 24 sawmills and 6 plywood factories with modern facilities have been built one after another. Especially in the surroundings of Samarinda City located by the Mahakam River, 16 sawmills and 5 plywood factories are lining up which is completely different view compared with that of 10 years ago.

(Tables D13, D14) (Figure D2)

The production volume of sawing products has been increasing at high speed that was 87,200 m<sup>3</sup> in fiscal 1978, 156,000 m<sup>3</sup> in 1979 and 290,000 m<sup>3</sup> in 1980. Accompanied with increase in production,

the export volume has also been increasing rapidly that was 14,200 m<sup>3</sup> in fiscal year 1978, 63,000 m<sup>3</sup> in 1979 and 109,000 m<sup>3</sup> in 1980. (Table D25) The resultant problems will be described later.

In fiscal 1979 when production volume of plywood first appeared in statistics, it was 25,000 m<sup>3</sup>. But already in fiscal 1980, it tripled to 75,800 m<sup>3</sup>. Its export began in fiscal 1979 and amounted to 18,700 m<sup>3</sup>. In fiscal 1980, it increased by about 2.8 times to 52,400 m<sup>3</sup>. (Table D25)

On the other hand, traditional manual sawing is still alive and shipped in a large volume. Today, chainsaw is used and is a source of cash income for rural communities.

During this survey period, the export regulation of logs and strengthening of obligation to log processing were imposed twice. The explanation and trend of these events will be discussed in the chapter of "Turning Period of Forest Utilization".

As for the main special forest products, there are three products such as straight grained board for roof thatching (Sirap), rattan (Rottan) and resin (Damar). Sirap is also the secondary source of income for rural communities. Its material is Ulin, It is quite hard but easy to divide by grain and durable. So it was traditionally used for roof thatching. The production volume in East Kalimantan is 17,200 bundles. One bundle is said to thatch one square meter of roof.

In the past, rattan as a special product of Kalimantan has been exported in form of unprocessed material to countries of the world including Japan and China and highly admired. Today, it is guided to export after processing to, for example, furniture, etc. The production volume has been 9,000 to 11,000 tons, and export has been declined to 2,000 to 3,000 tons per annum. (Table D15)

Damar is the resin of a needle-leaved tree, Agathis, and mainly exported for material of paints. It declined in selling for a certain period because of the artificial synthetic paints. But

recently, it is told to be recovered again as an industrial material. The production volume reaches 100 tons mark per annum which is not a large amount. (Table D26)

Table D13-1 Status of sawmill industry in East Kalimantan (as of Oct. 1981) ⊙ mark means under operation.

Others are either under construction or plan.

(1) Samarinda district

Nos.	Name of Company	Plant site	Kind of production	Design capacity in M3 Per Annum
⊙ 1.	P.T. Jatitrin	Sungai Kunjang	sawn timber	input - 72.000 M3 output - 36.000 M3
⊙ 2.	C.V. Sumber Baru	Sungai Kunjang	sawn timber	input - 36.000 M3 output - 18.000 M3
⊙ 3.	P.T. Inhutani	Karang Asam	sawn timber	input - 48.000 M3 output - 24.000 M3
⊙ 4.	P.T. Avedeco	Kampung Bukuan, Palaran.	sawn timber	input - 60.000 M3 output - 30.000 M3
⊙ 5.	P.T. Keratus Kalimantan Timber.	Kampung Bukuan, Palaran.	sawn timber	input - 28.800 M3 output - 14.400 M3
⊙ 6.	P.T. Emporium Lumber	Kampung Bukuan, Palaran.	sawn timber & wood working	input - 36.000 M3 output - 18.000 M3
⊙ 7.	F.T. Bukuan Sawmill	Kampung Bukuan, Palaran.	sawn timber	input - 90.000 M3 output - 45.000 M3
⊙ 8.	P.T. Rimba Tiga Raya	Sungai Tiram, Kecamatan Samboja.	sawn timber	input - 48.000 M3 output - 24.000 M3
9.	P.T. Alas Kusuma	Sungai Gelendrong, Kecamatan Samboja.	sawn timber	input - 28.800 M3 output - 14.400 M3
10.	PT. Gunung Jati Rimba	Palaran.	sawn timber & veneer.	24.000 M3
11.	P.T. Dasawana Buana Industri Bukuan Kodya Samarinda.	Bukuan, Palaran.	sawn timber, moulding & veneer. block board	input - 62.000 M3 18.000 M3 8.600 M3
12.	P.T. Bengen Timber	Mangkajene, Kecamatan Palaran.	sawn timber wood working	input - 24.000 M3 - 5.000 M3
13.	P.T. Ratah Timber	Bukuan, Palaran.	sawn timber	.....
14.	P.T. Rimba Samudra	Loah Buah.	.....	.....
15.	P.T. Limbang Ganeca	Loah Buah	.....	.....
16.	P.T. Sangkulirang	Loah Buah	.....	.....
17.	P.T. East Kalimantan Timber.	Kecamatan Melan, Kabupaten Kutai.	sawn timber wood working	.....
⊙ 18.	P.T. Rashna Indochem sub-total	Sangkulirang.	sawn timber wood working	input - 76.000 M3 ⊙ mark import 494,800

(2) Pasir district

⊙ 1.	P.T. Inne Dong Wna	Kampung Tujul Lombok, Pasir.	sawn timber	input - 24.000 M3.
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Table D13-2 Status of sawmill industry in East Kalimantan (Oct., 1981)

(Part 2) ⊙ indicates under operation.

Others are either under construction or plan.

(3) Kutai district

Nos.	Name of Company	Plant Site	Kind of production	Design capacity in M <sup>3</sup>
⊙ 1.	P.T. Sumber Kas Timber	Pulau Atas, Kecamatan Anggana.	sawn timber	input : 90.000 M <sup>3</sup>
⊙ 2.	G.V. Triga	Loah Buah, Kecamatan Loa Janan.	sawn timber	input : 39.000 M <sup>3</sup>
3.	P.T. Kayu Mulawarman	Loa Kulu.	sawn timber	input : 48.000 M <sup>3</sup>
4.	P.T. Kutai Timber Indonesia.	Sebulu.	sawn timber	input : 2.400 M <sup>3</sup>
5.	P.T. Marimun Timber Industries.	Muara Pahu.	sawn timber	input : 7.200 M <sup>3</sup>
⊙ 6.	P.T. Segara Timber	Sangkulirang	sawn timber	input : 36.000 M <sup>3</sup>
⊙ 7.	P.T. Sewarga	Sangkulirang.	sawn timber	input : 15.000 M <sup>3</sup>
⊙ 8.	P.T. Dwi Warna Timber,	Sangkulirang.	sawn timber	input : 24.000 M <sup>3</sup>
9.	P.T. Wono	Sangkulirang	sawn timber	input : 7.200 M <sup>3</sup>
⊙ 10.	G.V. Rimba Hijau	Sangkulirang	sawn timber	input : 36.000 M <sup>3</sup>
11.	P.T. Hutrindo	Bengalon, Kecamatan Sangkulirang.	sawn timber	input : 60.000 M <sup>3</sup>
12.	P.T. Bontang Wood	Bengalon, Kecamatan Sangkulirang.	sawn timber	input : 96.000 M <sup>3</sup>
13.	P.T. Panca Samudra Utama	Loa Buah.	Veneer, sawn timber, wood working.	input : 108.000 M <sup>3</sup>
14.	P.T. Belayan Industri	Kabupaten Kutai	sawn timber	.....
15.	P.T. Persada Bumi Hijau	Kabupaten Kutai	sawn timber wood working & dry kiln.	input : 32.000 M <sup>3</sup>
	Sub-total			⊙ import 240,000 m <sup>3</sup> others 360,800 m <sup>3</sup>

(4) Balikpapan district

Nos.	Name of Company	Plant site	Kind of production	Design capacity in M <sup>3</sup>
⊙ 1.	P.T. Balikpapan Forest Industries.	Teluk Tebang, Balikpapan.	sawn timber	input - 57.000 M <sup>3</sup>
⊙ 2.	P.T. I.T.C.I.	Kampung Kenanga, Balikpapan.	sawn timber	input - 162.000 M <sup>3</sup>
⊙ 3.	P.T. Satya Maya Raya	Tepi Sungai Muau, Buluminung, Balikpapan Seberang.	sawn timber	input - 32.000 M <sup>3</sup>
⊙ 4.	P.T. Cidatin	Kampung Baru Tengah, Jembatan I no. 49-51, Balikpapan.	railway sleepers.	18.000 pcs
⊙ 5.	P.T. Cidatin Ltd.,	Camp Sigrit, Kampung Baru Tengah, Jembatan I No. 49-51, Balikpapan.	railway sleepers.	12.000 pcs
6.	G.V. Rico	Jl. Ka. Tubun RT. III/ 236, Balikpapan.	sawn timber	input - 36.000 M <sup>3</sup>
7.	Nyo Samuel Theodorus Teluk Baru.	Jl. Pandan Wangi RT. XXIV No. 3-4, Balikpapan.	sawn timber	input - 7.200 M <sup>3</sup>

Table D13-3 Status of sawmill industry in East Kalimantan (Oct., 1981)

(Part 3) ⊙ indicates under operation.

Others are either under construction or plan.

(5) Berau district & Bulungan district

Nos.	Name of Company	Plant Site	Kind of production	Design capacity in M3
<u>I. Berau district</u>				
1.	P.T. United Timber Jaya	Tanjung Redeb.	sawn timber	input : 36.000 M3
<u>II. Bulungan district</u>				
1.	C.V. Handayani	Juata Laut, Tarakan	sawn timber	input : 36.000 M3
2.	C.V. Karya Mulya	Juata Laut, Tarakan	sawn timber	input : 6.000 M3
3.	C.V. Hulu	Juata Laut, Tarakan	sawn timber	input : 6.000 M3
4.	C.V. Sekaryani Jaya	Juata Laut, Tarakan	sawn timber	input : 24.000 M3
⊙ 5.	P.T. Kayan River Timber Product.	Kampung Mara, Kecamatan Tanjung Palas, Bulungan.	sawn timber	input : 168.000 M3.
⊙ 6.	P.T. Inhutani I Unit II	Juata Laut, Tarakan	sawn timber	input : 36.000 M3
7.	P.T. Hutam Makmur	Juata Laut, Tarakan	sawn timber	input : 4.200 M3
8.	P.T. Dana Mulia Bhakti	Tanjung Bayu, Kecamatan Tanjung Palas.	sawn timber	input : 40.000 M3
9.	P.T. Inhutani I Unit II Nunukan.	Kecamatan Nunukan.	sawn timber	input : 24.000 M3
10.	P.T. Inhutani I Unit II Sesayap.	Kecamatan Sesayap	sawn timber	input : 24.000 M3.
⊙ 11.	P.T. Chipdeco Factory	Juata Laut, Tarakan	wood chip	130.000 M3.

Note: This data is prepared by the Ministry of Industry's branch office located in Samarinda, and obtained through Mr. Takashi Saito. (1) Samarinda district

Table D14 Status of plywood industry in East Kalimantan (as of Oct., 1981)

⊙ mark indicates under operation.  
Others are either under construction or plan.

(1) Samarinda district

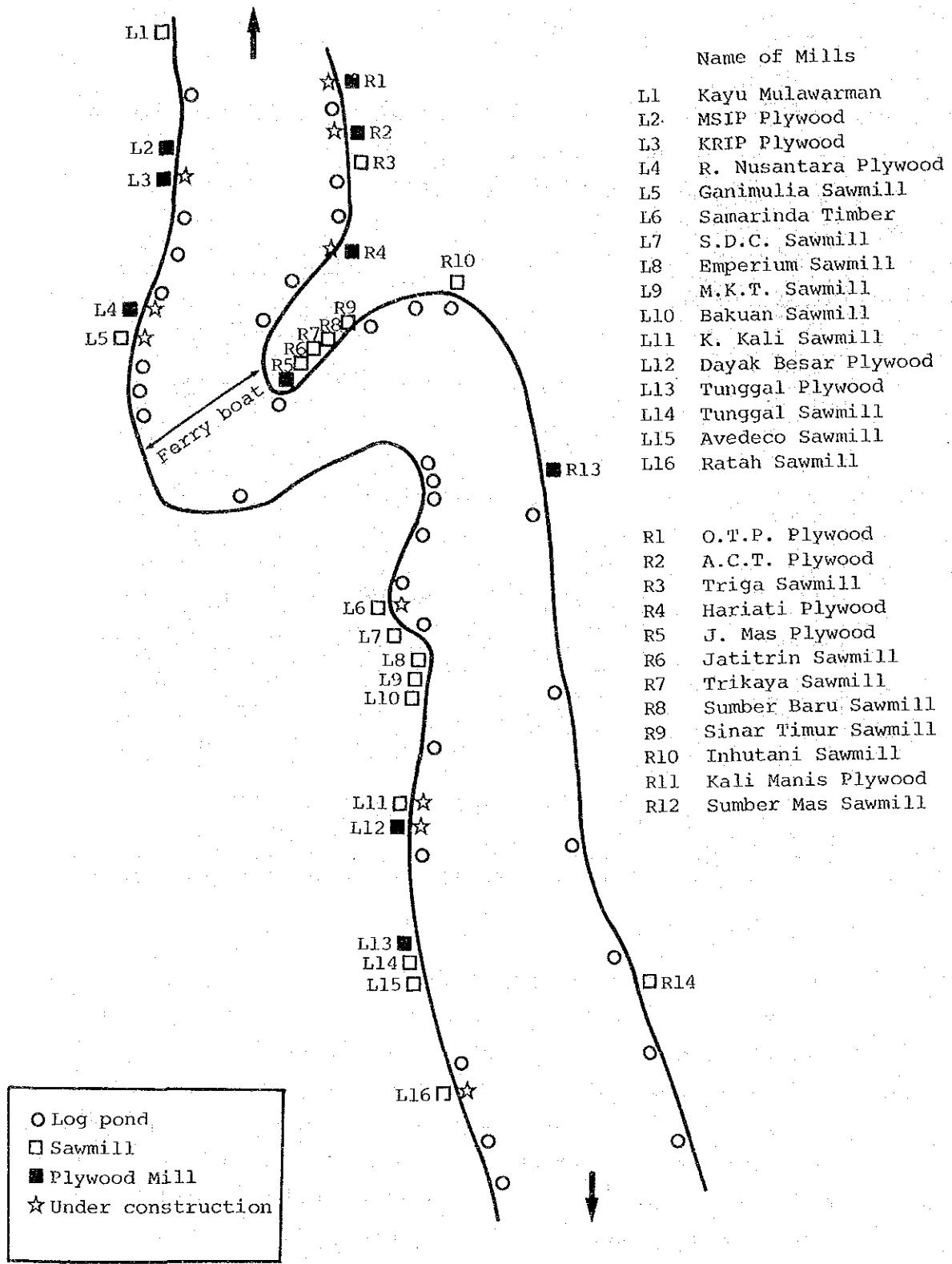
Hos.	Name of Company	Plant site	Design Capacity in M <sup>3</sup> & Pc per annum
⊙ 1.	P.T. Jaya Has Purnama Plywood	Sungai Kunjang, Samarinda.	60.000 M <sup>3</sup> 2.400.000 pcs
⊙ 2.	P.T. Kalimantan Plywood	Kampung Solili, Samarinda.	50.000 M <sup>3</sup> 7.715.000 pcs
⊙ 3.	P.T. Tunggal Yudi Sawmill Plywood.	Kampung Bukuan, Palaran.	83.000 M <sup>3</sup> 3.000.000 pcs
4.	P.T. Dayak Besar	Kampung Bukuan, Palaran	72.000 M <sup>3</sup> 8.000.000 pcs
5.	P.T. Gunung Jati Rimba	Kampung Palaran.	24.000 M <sup>3</sup> 3.258.000 pcs
6.	P.T. Nutrindo Palaran Plywood.	Kampung Palaran.	75.903,61 M <sup>3</sup> 6.300.000 pcs
7.	P.T. Kalhold Utama	Kampung Palaran.	57.831,32 M <sup>3</sup> 4.800.000 pcs
8.	P.T. Kaltim Lumber	Kampung Bukuan, Palaran.	.....
9.	P.T. Kayu Kalimantan	Mangkujenang, Palaran.	15.060,24 M <sup>3</sup> 1.250.000 pcs.
10.	P.T. Hutan Jaya	Mangkujenang, Palaran.	40.000 M <sup>3</sup>
11.	P.T. Budhi Inti Plywood.	Kampung Palaran.	60.000 M <sup>3</sup>
12.	P.T. Dasawana Buana Industri Bukuan Kodya Samarinda	Kampung Bukuan	1.932.000 pcs
13.	P.T. Sylva Duta	Kampung Bukuan	.....
14.	P.T. Inhutani I	Palaran.	.....
15.	P.T. Santi Hurni Plywood	Samarinda.	3.000.000 pcs

(2) Kutai district

Hos.	Name of Company	Plant site	Design Capacity in M <sup>3</sup> & Pc per annum
⊙ 1.	P.T. Beranti Sakti Indah Plywood.	Kampung Sengkotek, Loa Janan	125.000 M <sup>3</sup> .
⊙ 2.	P.T. Kayan River Indah Plywood.	Kampung Sengkotek, Loa Janan	114.000 M <sup>3</sup> .
3.	P.T. Gani Mulia Sejahtera Industries.	Kecamatan Loa Janan.	87.000 M <sup>3</sup>
4.	P.T. Dhaya Agung Wood Ind.	Loa Buah.	2.940.000 pcs
5.	P.T. Haryati Jaya Plywood.	Loa Buah.	3.800.000 pcs
6.	P.T. Sumalindo (Multi Forest)	Loa Janan	.....
7.	P.T. Melapi Timber	Loa Buah.	.....
8.	P.T. Kagum Sakti	Sangkulirang	75.000 M <sup>3</sup>
9.	P.T. Oceanis Timber Product	Loa Buah	.....

Note: This data is prepared by the Ministry of Industry's branch office located in Samarinda through Mr. Saito.





Source: Nanpo Forestry Co., Ltd.

Fig. 04 Plywoodmill and Sawmill along Mahakam River Area in Samarinda (As of September 20, 1980)

Table D15. Change of production and sales volume of log and other forest products in East Kalimantan  
1978 - 1980 (fiscal year)

	Unit	1978	1979	1980
Log produced	1,000 m <sup>3</sup>	10,159	7,902	5,138
Log exported	1,000 m <sup>3</sup>	9,239	6,688	3,117
(%)		(100)	(72)	(34)
Sawn timber produced	1,000 m <sup>3</sup>	87.2	156.0	290.0
exported	"	14.2	63.0	109.9
used domestic	"	73.0	93.0	180.1
Veneer produced	1,000 m <sup>3</sup>	37.4	63.9	56.7
exported	"	37.4	63.9	56.7
Plywood produced	1,000 m <sup>3</sup>		25.0	75.8
exported	"	0	18.7	52.4
used domestic	"	0	6.3	23.4
Chip wood produced	1,000 ton	125.0	150.5	127.3
exported	"	125.0	150.5	127.3
Rottan produced		9.2	10.8	10.9
exported	1,000 ton	3.1	2.9	2.1
used domestic	"	6.0	7.9	8.8
Damar produced	1,000 ton	0.16	0.18	0.08
exported		0.16	0.17	-
used domestic		-	0.01	0.08

Source: Forest Management Bureau of East Kalimantan<sup>(9)</sup>  
Data were created on Aug. 22, 1981.

Note: Figures are not equal to the log export volume in Table D23 which was announced by the Directorate General of Forestry.

### (3) Change of Production Form of Logs

The form of log's flow is quite characteristic. It is rare that the persons who have obtained license to cut forest and to engage directly in development business. The licensee often gives the development right (private right) to a third party (firm) and leaves management fully to the third party although maintaining some influence. It is said that many of the third parties are Indonesian citizens of Chinese ancestry. This form of development seems to have influenced the procedure of development.

In business entities of such form, activities of log production were often sub-contracted to technicians' group of Chinese Malaysians. The technicians' group is a group controlled by master and consisted of operators, drivers and maintenance technicians of

chainsaw, tractors and trucks. They often make short contract by the unit of one year in a package from cutting to transportation, and receive payments according to the volume of production. So, they do not have long term plans. The creation of the long term plan was almost impossible also because of the lack of engineers in the technicians, group. As a result, many troubles have occurred and remained.

As Indonesian government have gradually strengthened the restriction of entry of foreign technicians, entry as group is rarely heard today. Many Indonesian technicians have already been trained, so the employment of foreigners became unnecessary. According to the survey by statistics office of East Kalimantan, the number of laborers employed in forestry in the region in fiscal 1978 was 24,241 Indonesians and 2,137 foreigners. (Production volume of log in that year was 10.16 million m<sup>3</sup>)

The number of licenced persons to log production in East Kalimantan as shown in Table D27, is 104. In many cases, the licensed area is divided to 50 thousand to 100 thousand ha. and lent the development right to the third party. In 1973, there were about 130 forest development firms and about 150 operation places in East Kalimantan.

Table D16 Change in number of licensees for logging and area of concession in East Kalimantan by fiscal year

Unit: ha.

Classification of the licensees	Fiscal year	Number of the licensees	Area of the concession
Private	1969	9	1,571,750
	1970	12	1,440,000
	1971	16	459,000
	1972	10	676,500
	1973	25	1,879,500
	1974	9	653,000
	1975	5	290,500
	1976	5	390,000
	1977	6	387,000
	1978	8	392,500
	1979	4	617,000
	1980	3	309,000
	Sub-total		102
National Logging Firm I	Unite I	1	980,200
P.T. INHUTANI I	Unite II	1	1,468,500
	Sub-total	2	2,448,700
	Total	104	11,514,450

Source: Forest Management Bureau of East Kalimantan

Among the forest development firms in East Kalimantan, combined number of 100% foreign-capital firms and joint ventures by Indonesian firms and foreign firms were at its peak only slightly over 10. There were also some foreign firms which later transferred all the stocks to Indonesian firms.

Although most of the development firms have not taken joint venture style with foreign firms, they are active in receiving finance of business funds from foreign companies. They exported produced logs to the financing company and applied a part of charge to the repayment. The total amount of finance by the foreign firms are estimated to be 200 to 300 million dollars. But as foreign exchange was liberated in Indonesia, the reality is unclear. Besides, that huge sum of money is said to be already paid back.

Among the firms which have taken the above mentioned employment of Malaysian technicians, group and finance form, some firms are said to be continuing business for 7 to 10 years and cut over forest area to the last merchantable tree, as it will be described later.

The status of these remaining forest must be the theme of academic survey.

(4) Change of the Distribution of Logs and Wood Products

Table D28 shows how the timber industry has contributed to national economy. But the contribution rate of timber in Indonesia's total amount of export including all items had dropped to 8% in fiscal 1978 from 13% in fiscal 1971. This was caused by the disproportionate increase of the amount of petroleum export by the sudden rise of its unit price. Looking at the increase rate of export amount by comparing the fiscal years 1971 and 1978, as shown in Table D28, the amount of petroleum increased by extreme 12.6 times, timber by 5.9 times, rubber by 4.4 times and total value of other items by 5.5 times. And combined amount of rubber and other items have increased by 5.2 times. So, by excluding the special situation of petroleum, contribution of timber during this period was also great.

Next, as for the rate of East Kalimantan in log export of Indonesia, as shown in Table D29, the amount had stabilized to about 46% in fiscal 1978 from about 63% in fiscal 1970. This decline is the result of dispersion of producing area to all over Indonesia. In spite of it, the contribution by East Kalimantan is still disproportionately high especially in terms of export value. For example, as shown in Table D29, the export volume of East Kalimantan log in the fiscal 1978 accounted for 45.6% of country total, but its export value accounted for 53.1%. In short, log of East Kalimantan is high in quality and high in contribution rate.

Considering of export value, let us pay attention to the export of rubber. According to Table D28, export value of rubber amounted to equivalent to 87% of timber's export value. According to statistics, the planted area of rubber in Indonesia is 1,882,500 ha. (Statistical pocketbook of Indonesia 1979/1980), while the area of productive forest in Indonesia is 50 million ha.<sup>(1)</sup> That means, although the area of rubber plantation accounts for only 4% of productive forests, the export value of its products is similar to that of log. This is suggestive today when forestry should head toward breeding forestry.

Table D17 Change of export value and share of main export items  
of Indonesia

Unit: One million dollars

Fiscal year	Total export value		Petroleum		Timber		Rubber		Others	
	Amount	value index	Amount	Value index	Amount	Value index	Amount	Value index	Amount	Value index
1971	1,365 (1.00)	100%	590 (1.00)	43%	169 (1.00)	12%	222 (1.00)	16%	385 (1.00)	28%
1972	1,816	100	965	53	230	13	196	11	424	23
1973	3,264	100	1,708	52	583	18	396	12	577	18
1974	7,189	100	5,133	71	726	10	487	7	843	12
1975	6,668	100	4,961	74	500	7	365	5	840	13
1976	8,461	100	6,081	72	782	9	534	6	1,065	13
1977	10,630	100	7,297	69	951	9	592	6	1,794	16
1978	11,643 (8.53)	100	7,438 (12.61)	64	995 (5.89)	8	861 (4.39)	7	2,349 (5.54)	20

Source: The Directorate General of Forestry  
Indonesian statistics on trade of forest products

Table D18 Comparison of export amount and volum of log of East  
Kalimantan and all Indonesia

Unit: 1,000 m<sup>3</sup>

Unit: One million doll

Fiscal year	Quantity			Amount		
	Whole Indonesia	East Kalimantan	Proportion	Whole Indonesia	East Kalimantan	Proportion
	A	B	B/A%	C	D	D/C%
1969	3,673	2,665	72.6	25.99	7.33	28.2
1970	7,303	4,575	62.6	98.87	71.66	72.5
1971	10,680	4,601	43.1	165.83	76.70	46.3
1972	13,759	6,306	45.8	226.59	123.17	54.4
1973	19,095	7,604	39.8	565.12	316.88	56.1
1974	17,728	6,928	39.1	699.02	306.40	45.8
1975	13,510	6,543	48.4	468.28	253.96	54.2
1976	17,877	8,795	49.2	729.28	432.23	59.3
1977	19,212	8,658	45.1	900.97	467.16	51.9
1978	19,433	8,870	45.6	909.31	483.10	53.1
1979	18,205			1,551.32		

Source: Same as Table D17

Next, the destinations of log export were shown in Table D19 concerning all Indonesia and Table D31 for East Kalimantan. Each of these tables will be one of the data to analyze the status of international timber distribution in the future.

According to Table D30, 76% of Indonesia's timber were exported to Japan in fiscal 1971. The volume declined year by year, and in

fiscal 1979, and it finally decreased to 50%. As if to cover that decrease, the shares of Korea and Taiwan, especially the former, increased significantly. That trend is same in export destination rate of East Kalimantan shown in Table D31.

Since May, 1980, Indonesia's restriction on log export had been strengthened. Log importing countries such as Japan, the Republic of Korea, and Taiwan suffered a hard blow. Eventually, the trade of the processed wood product would be expanded, but many problems to be solved lies ahead.

Table D19 Change of export volume of timber(log/lumber) from Indonesia by destination countries 1971 - 1979(fiscal year)

Unit: 1,000 m<sup>3</sup>

Destination country	1971	1972	1973	1974	1975	1976	1977	1978	1979
Japan %	8,232 (76)	9,687 (70)	12,167 (63)	12,187 (67)	7,587 (55)	9,932 (54)	9,483 (48)	9,238 (46)	9,708 (50)
Korea %	485 (5)	1,520 (11)	2,001 (10)	2,136 (12)	2,741 (20)	3,501 (19)	4,829 (24)	5,187 (26)	4,449 (23)
Taiwan %	579 (5)	1,240 (9)	2,172 (11)	2,227 (12)	2,163 (16)	2,581 (14)	3,369 (17)	3,432 (17)	2,569 (13)
Singapore %	382 (4)	498 (4)	1,488 (8)	819 (5)	755 (5)	1,026 (6)	1,127 (6)	1,396 (7)	1,412 (7)
Other Asian % countries	641	408	238	282	227	225	273	320	
Italy %	287	333	391	233	221	489	296	356	405
Other European % countries	43	50	311	140	212	744	372	204	} 946
U.S.A. %	4	31	22	24	4	11	40		
Australia %	23	25	80	35	11	12	7	9	
Others %	85	99	564	-	-	-	11	21	
Total %	10,761 (100)	13,891 (100)	19,434 (100)	18,083 (100)	13,921 (100)	18,521 (100)	19,807 (100)	20,199 (100)	19,489 (100)

Source: The Directorate General of Forestry

Table D20 Change of log export volume from East Kalimantan by destination country  
1978 - 1979 (fiscal year)

Unit: 1,000 m<sup>3</sup>

Destination country	1978		1979		1980	
	Volume	%	Volume	%	Volume	%
Japan	4,316	48.7%	4,101	56.5%		
Korea	2,987	33.7	2,101	29.0		
Taiwan	1,307	14.7	836	11.5		
Hong Kong	89	1.0	94	1.3		
Singapore	57	0.6	26	0.4		
Europe	100	1.1	75	0.1		
U.S.A.	-		1			
Others	13	0.1	23	0.3		
Total	8,868	100	7,257	100		
(Official announcement by the Forestry Management Bureau)	(9,239)		(6,688)			

Source: P.T.ITCI:the Forestry Management Bureau

Note: There are discrepancies in total amount by the fiscal year between data of P.T.ITCI and announcement by the Forestry Management Bureau. But there are not much difference in total amount of two years.

Finally, as for the outlook of distribution of wood products, it is in fledgeling stages, an export industry in East Kalimantan. Today, there is no company to receive finance from foreign firms in case of constructing log processing factory. It is completely different compared with around first half of 1970s when production of log by mechanization had begun. That is, the firm of the size to build factories became to have ample funds. But, for medium-size firms, raising funds for building plywood mill in the future is considered to be overburden.

As for the wood products, it is rather a future problem. So, it is not directly discussed, and reference should be made to the change of export volume of plywood and lumber by destination country.

(Tables D32 and D33)

As a reference, status of wood products' export by loading port is shown in Table D34. According to the table, the export volume from Samarinda accounts for most of it.



Table D21 Change of export volume and value of plywood from Indonesia by destination country

Destination country	1977		1978		1979	
	m <sup>3</sup>	US \$	m <sup>3</sup>	US \$	m <sup>3</sup>	US \$
Japan			18.5	7,953	377.4	44,000
Hong Kong	157.0	44,876	2,110.5	312,992	19,185.0	8,784,000
Shingapore	821.0	123,599	722.0	115,388	10,017.6	2,923,000
England	9,981.0	1,256,841	27,184.0	8,086,197	47,132.1	14,794,000
U.S.A.	123.0	19,280	28,465.0	383,276	696.9	170,000
Malaysia	7.5	1,924	-	-	-	-
Thailand			701.0	9,813		
Canada			9,630.0	1,251,960	9.6	5,000
Holland			1,017.0	162,677	655.2	187,000
Others					18,806.1	816,000
Total	11,089.5	1,446,526	69,848.0	10,330,256	96,879.0	27,723,000
in which East Kalimantan			0		18,732.0	

Source: The Directorate General of Forestry

Note: Figures of the fiscal year 1979 are incomplete values.

Table D22 Change of export volume of sawn timber from East Kalimantan by destination country

Unit: m<sup>3</sup>

Destination country	1978	1979
Japan	1,074	4,706
Korea	584	2,384
Hong Kong	1,063	5,630
Singapore	10,436	16,542
Europe	2,577	16,357
U.S.A.	71	10,506
Others	-	701
Total	15,804	56,827

Source: The Directorate General of Forestry

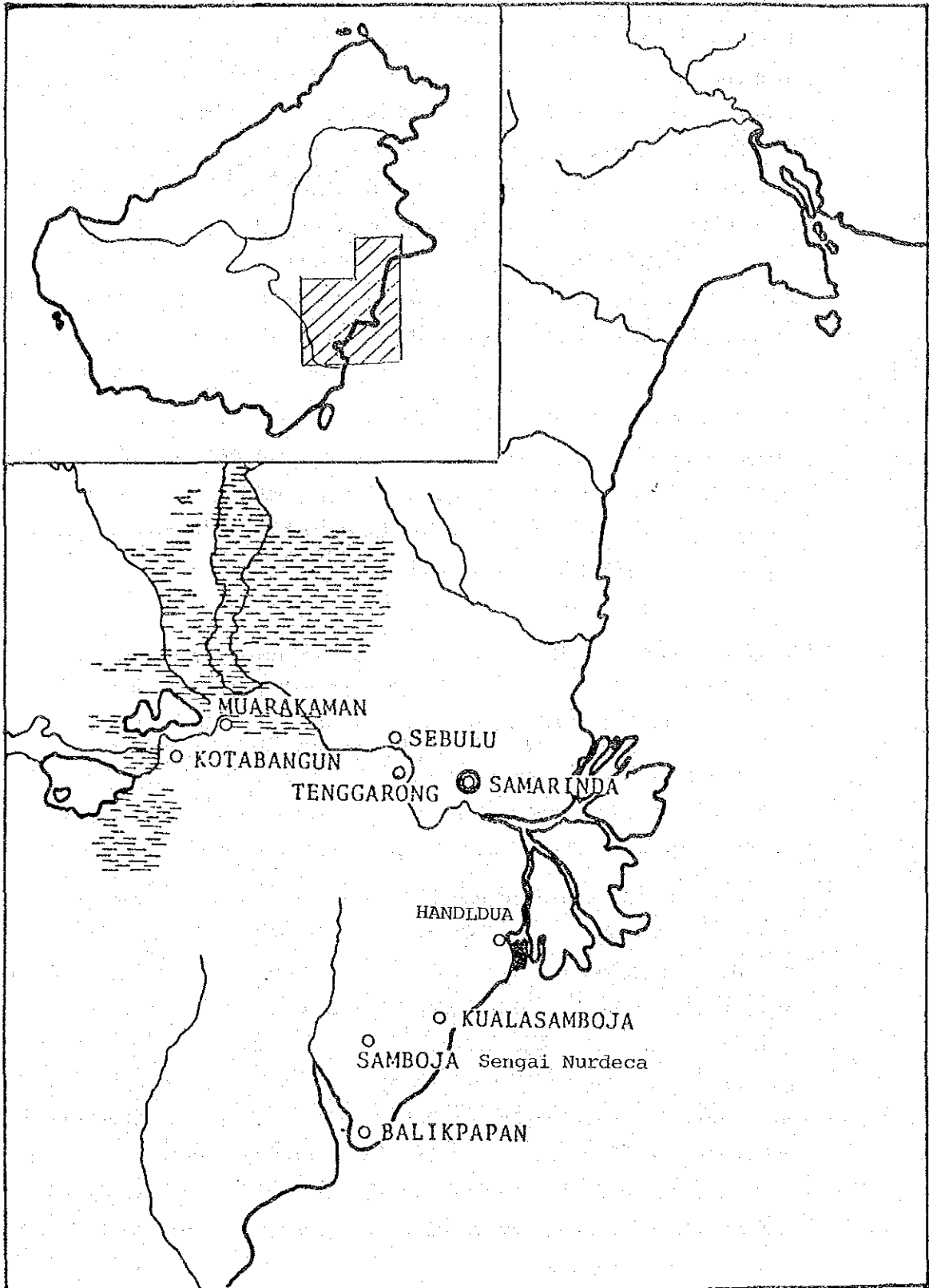
Table D23 Exporting status of logs and other forestry products  
from East Kalimantan by port (loading place) (1979)

Item	Unit	Samarinda	Balikpapan	Tarakan	Nunukan	Total
Log	1,000 m <sup>3</sup>	4,025 (55)	1,443 (20)	1,680 (23)	109 (2)	7,257 (100)
Lumber	m <sup>3</sup>	27,478 (48)	23,243 (41)	6,105 (11)	-	56,826 (100)
Veneer panel	m <sup>3</sup>	53,033	-	-	-	53,033
Wood chip	m <sup>3</sup>	-	-	109,563	-	109,563
Plywood	m <sup>3</sup>	12,735	-	-	-	12,735
Rottan	ton	3,713 (80.4)	893 (19.3)	12 (0.3)	-	4,618 (100)
Sarang Burung (Net of Bird)	kg	4,677	-	-	-	4,677
Damar	ton	195	-	-	-	195
Akar Rumput (Gross root)	kg	1,130	-	-	-	1,130

Note: Figures in ( ) indicate the percentage(%) of total

Source: Statistics and Census office in East Kalimantan

Fig. D5 Surveyed land sketch



### 2.3.12 Change of Forest Land Utilization

Speaking of forest land utilization, throughout the world and historically, the forest clearing to seek place for food production is most prevalent. And, concerning sacrifice of forest, cultivation in tropical sphere is larger than timber utilization in term of area. The finest virgin forests in each region have always been the first victim of cultivation. And in tropical sphere, grassland which is the former site of cultivation excessively utilized for long time occupies a large area. The cause of turning to grassland in Southeast Asia is the repetition of shifting cultivation. But, there is an opinion to approve shifting cultivation and an idea that more than 10 years of fallow period is enough. The process from cultivation to grassland had not been clarified.

Around Samarinda district where observation has been done has few grassland and also has short history for the subject. But in the surveyed area, we heard from an old man about unbelievably rapid process of turning into grassland.

#### (1) A Story of rapid changing for grass land (interviewed on Nov. 7, 1980)

Name of the man is Baso and was born in Goa of Sulawesi, Bugis tribe.

Current address: Sengai Murdeca Village, Samboja County

History of village: According to the village headman, this village was built in 1971 when oil field was discovered on the coast of Samboja County. Therefore, the history is slightly over 60 years.

Contents of the story by the old man: "I am now 74 years old. I came to Samboja from Sulawesi in 1926 and first worked in oil field. I married in 1929 and began shifting cultivation," "Crop was up land rice." "First clearing land was a virgin forest in Kampung Java in Samboja County. At that time, the clearing of virgin forest was still permitted, so I cut virgin forests and made shifting cultivation one after another. It was the period of the Netherland governed. In the meantime, regulations became more strict, and clearing of virgin forests was not permitted anymore. So, I began to re-clear the secondary forests and made shifting cultivation."

"I have never re-cleared the first cultivated land. But other people cleared the secondary forests grew there a few times and repeated shifting cultivation and turned to grassland since long time ago."

"I don't know how many times shifting cultivation was repeated, but anyway, the place where was virgin forest 51 years ago has turned to a grassland. And now it is told that pine trees are being planted."

"Today, I have orchards in 4 places which are 10 ha. in total. I am planting durian, nangka, langsat, rambutan and banana. I am very much satisfy of my current life."

In Kampung Java, there is a region where swamp is planned to change to paddy fields financed by loan from the World Bank. Around that region, hills were turned to grassland, and pine trees were planted in part. Attention must be paid to the fact that a virgin forest had virtually turned to grassland of Alang-alang (*Imperata cylindrica*) in less than 50 years.

In order to go there for follow-up survey, although it is 40 to 50 km in a straight line, it takes about 130 Km including bad roads detouring via Balikpapan.

(2) Current Status of the Land Where Virgin Forest was Cultivated 18 Years Ago (interviewed on Nov. 7, 1980)

We could have seen the place which supports the above story in the same village. That is the place where virgin forest was cultivated 18 years ago, and after two periods of fallow, third shifting cultivation took place, and recently upland rice was planted. The first fallow period was about 10 years, and this time was 5-6 years fallow period. In this place, as in Photo 2, roots of big trees grown in virgin forests could be seen remaining unburnt. In the back, there is a secondary forest of 5-6 years old. The thickness of top soil layer of this field is about 1 cm. In some places there is none. We wondered how it could be possible to harvest in such condition.

Our interest was concentrated on the forecast of harvest. According

to the answers we got there, they were expecting 60 kaleng(0.72 ton) per ha. in form of unhulled rice. But, they did not seem to have confidence. So, we have decided to ask the actual amount in the next survey. (the above was interviewed on Nov., 1980) When we visited again on Sep. 1981, we could not meet land owners. The place is covered with bushes gregariously, and fruit trees such as Bankiraian and Buas-Buas were planted among them. According to peasants' explanation, it is almost certain that this place is unusable as cultivated field again. It showed the difficulty of land utilization in tropics. Name of that bush is Karamunting (*Melastoma* sp) and it is told that if this bush appears, tree species which constitute the secondary forest of high trees does not grow. Enough follow-up survey in the future and continuous observation are necessary.

In general, it is told that in determining the feasibility of re-cultivation of secondary forest, shifting cultivators judge by the time when breast height diameter of trees which constitute the secondary forest reach 10 to 20 cm.



Photo 1

Planting of uplant rice in the field. About one month after planting. Roots of large trees are still remaining after 18 years.



Photo 2

Same field. Secondary forest in the back is 5 to 6 years old.

### (3) Diminishing Yield

When virgin forest was cultivated, the field of upland rice first planted was 200-250 kaleng (2.4 - 3.0 tons) per ha. in form of unhulled rice. In the following year, it was about 160 kaleng (2 tons). In the third year, it halved to 80 kaleng.

After about 13-15 years of fallow period, it was re-cleared and got harvest of 80 kaleng (1.1 tons) again. After the further fallow of 5 years and the third cultivation, the harvest was 50-60 kaleng (0.6 - 0.72 tons). This data shows that fertility, especially thickness of surface soil which recovers during the fallow period is quite little.

Above is all harvest of unhulled rice per ha. In form of rice, its yield is 60%. 1 kaleng is 1 petroleum can of 18 liters.

Interviews of harvest in the second survey were conducted by two groups in different villages. As a result, considerable difference was obtained. This is considered to be the result of improper questions and answers because it was the first experience for both groups.

### (4) Tribes of Inhabitants and Traditional Farming

As a general tendency, each tribe seems to have a crop which is good at. Following table shows its content.

Tribe	Native place	Type of farming
Bugis	Sulawesi	Paddy field and fruit tree
Banjar	South Kalimantan	Paddy field
Java	Java	Paddy field
Dayak	Kalimantan	Dry field

In paddy fields, the natural decline of fertility is few, and the effect of fertilizer is remarkable. But recently, there are few lands suited for paddy fields where problem of irrigation which is indispensable in development of paddy field could be solved by an individual or a group of a few people. There are many cases of success of paddy field development in settlements invested by the government. But voluntary transmigrants generally perform shifting cultivation regardless of tribe. Among them, many people of Bugis tribe are switching to horticulture.

(5) New Settler of Bugis Tribe

In 1960's, there was the first log production boom throughout East Kalimantan. Log production that time was mostly dependent on man power, and as described before, a logging method called Kuda Kuda was used.

The export amount of log in 1965 was about 150 thousand m<sup>3</sup> in all Indonesia, and it increased by about 52 times to 7.83 million m<sup>3</sup> in 1970. In 1970 export amount, log of East Kalimantan accounted for 60%, and most of them were produced by man power. Since the latter half of 1971, logging by man power was prohibited in East Kalimantan and created a large number of unemployment. Most of the laborers employed for man power logging in East Kalimantan were Bugis tribe. The number of people employed is told to have amounted to tens of thousands.

From around 1971, logging has rapidly been switched to mechanization. A considerable number of people were absorbed to mechanical logging. But many have lost jobs. Out of the unemployed people, ones who have remained in Samarinda and did not return to hometown were employed in construction of national road between Samarinda and Balikpapan in 1972 or engaged in cultivation. That construction work had ended in 1976, and many remained to live by the road. As one can see from their personal histories, they are generally brave and enterprising.

Today, they are living mainly in the area between about km 36 to 58 from the national road at opposite shore of city area of Samarinda in direction of Balikpapan. In Batuah Village were surveyed, 700 households, about 1,600 people are residing.

99% of them are Bugis tribe, and they first practice shifting cultivation. Today, 445 households are running pepper farm in about 900 ha. of land. It is about 2 ha. for one household. Besides, there are about 50 ha. of cocoa farm and 100 ha. of clove farm. Coffee is planted around their houses.

As can be seen from this example, while fertility is under going decreases by the repetition of shifting cultivation, in orchards



they have gained ground that enough to settle.

There are the necessity to escape from shifting cultivation and problem of fund to switch crop. Besides, there are many problems such as kind of crop to plant after pepper which lasts for about 10 years after planting damages by blight and harmful insects, and stability of price.

### 2.3.13 Social Effects of Forest Exploitation

Forest development not only gives social effects on forest areas by logging, but also produces added value in the course of log processing and distribution. It creates employment, with eventual effects on the life of people. The understanding of social effects of use of timber must include people's involvement in the whole process ranging from the production to the consumption of timber. This section, however, limits the effects of forest development very narrowly to areas where such forests are located, and investigates cases of K.T.I. which depends on local employment for major part of its labor force and I.T.C.I. which depends little on the same.

K.T.I. was established as a joint venture of a Japanese enterprise (Sumitomo Forestry K.K.) and an Indonesian enterprise in 1969 and started its log production in the District of Sebulu in 1970. Its annual average cutting volume is approximately eighty thousand cubic meters. Since its start, the Enterprise has invested a large amount of money giving great influences on communities.

The first influence is by the employment of local residents created by the start of business. Investigation conducted in 1980 showed that K.T.I. employed 169 Indonesians in all. Current wages are Rp. 30,000 to Rp. 100,000 depending upon types of occupation. The Enterprise pays local residents approximately ten million to fifteen million rupiahs per month as total wages. Employment of 160 and more wageworkers in Sebulu which was a traditional agricultural and fishing village not only has changed its working structure but also has given extremely great effects on local economy including local stores.

The second influence is by forest roads constructed by K.T.I. Those roads are used not only for logging but also multilaterally

for local development including forest administration after cutting. Forest clearing using forest roads developed by K.T.I. is now under way for settlement (transmigrant) of 3,000 households in part of the cutover. Of them, 1,600 households have already settled there.

As effects of the Enterprise on the local community, residents in Sebulu indicate: (1) supply of employment opportunities to them and (2) contribution of Enterprise's services to their life. Specifically, the latter includes the creation of a football ground, repair of major roads and contribution of funds for construction and repair of schools, mosques, etc. and for events held in the village.

The above are merits given by forest development for the local community. As demerits caused by such development, we asked villagers if cutting of virgin forests in wide areas of as many as tens of thousands of hectare had adverse effects on forest conservation, amount of flowing water in rivers, etc. It was found out that there was no notable adverse effect for the time being.

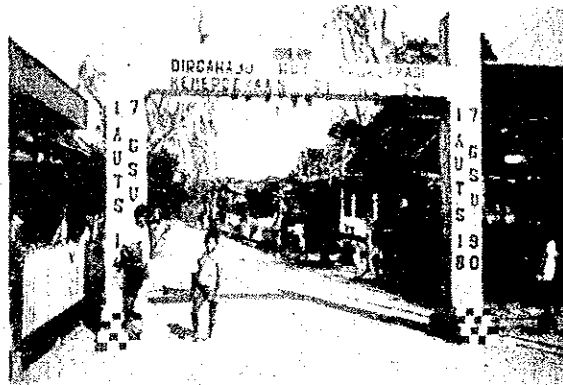
One major problem in connection with forest development in this region is whether local resident workers who have acquired logging techniques in the work of K.T.I. can continue to get employment opportunities locally even after that work is completed. K.T.I. is engaged in logging for 10 years, with additional 10 years left for development. The planned area subject to the undertaking is 50,000 ha., and the duration of the present scale of the undertaking is limited. Fortunately, K.T.I. has already obtained a new place of undertaking in another district and is now engaged in logging. Since dependence on local labor force has a great local effect of employment, a problem of unemployment upon the completion of the undertaking should be fully considered.

Even in the same forest development, enterprises which adopt such employment systems as are not totally dependent on local employment have different effects on local communities. They have less local effects of employment and less local economic contribution. Therefore, a problem of unemployment upon the completion of the undertaking is not so serious. A case of a village called Selerong in which I.T.C.I.

was engaged in logging can be taken as an example. I.T.C.I. was engaged in the undertaking in that village for 7 years between 1973 and 1980. The majority of about 300 workers employed were those from Balikpapan under exclusive contract. The number of labor force employed locally was only 35 mainly consisting of second and third farm children, which accounted for a little over 10% of all. Key workers engaged in logging were those under exclusive contract, and those employed locally engaged mainly in chores. After the suspension of the work in 1980, local workers converted themselves to shifting cultivators, engaging in the production of Ulin and sirap made from Ulin. Upon unemployment, local people employed by I.T.C.I. returned to their traditional shifting cultivation, without unemployment problem.

It is generally said that construction of forest roads in connection with forest development have advantages for local development. The investigation has shown, however, that it has disadvantages of allowing easy movement of shifting cultivators. Using those roads, settlers go inland farther and farther disorderly to encroach on forests. The forestry authority has regulations on them but it seems difficult to grasp cultivators fully.

Forest roads constructed for forest development are also used temporarily in governmental disafforestation for transmigration in this district. However, an about 80-km fine road has been constructed between the district and the city of Samarinda by the Government.



A road fixed by the service of KTI

### 2.3.14 Disafforestation and Agriculture

The human being uses forests diversely as forestry, agriculture as land production industry, sightseeing resources, etc. This section covers agricultural use of forests in East Kalimantan. A large scale disafforestation by transmigrants is now under way in East Kalimantan as a measure to solve overpopulation in Java.

#### (1) Disafforestation for Transmigrant

The results and the plan of transmigration are examined here. As shown in Table E1, the government has transmigrated 25,537 families (127,689 persons) to the outer zone on the first five-year program (1969 to 1973) and 59,429 families (204,250 persons) on the second five-year program (1974/1975 to 1978/1979). However, only about 1/4 of planned 250,000 families transmigrated actually during the period of the second five-year program, indicating the existence of many technical and administrative problems of realization of transmigration. Nevertheless, the government plans the transmigration of 500,000 families on the third five-year program, which indicates how important the solution of the population problem of Java is.

Table E1 Indonesian plan and results of transmigration

	Planned period	Plan	Results		
			Family	Population	
Results	First five-year development program (1969-73)		25,537	127,689	
	Second five-year development program (74/75-78/79)	250,000	59,429	204,250	
Plan	Third five-year development program (79/80-83/84)	500,000			
	Break-down	1979/80	50,000		
		1980/81	75,000		
		1981/82	100,000		
		1982/83	125,000		
1983/84		150,000			

Source: Third Five-Year Development Program in Indonesia. 1979, Vol. III, Japan and Indonesian Association.

The results of transmigration to East Kalimantan are as shown in Table E2. A total of 15,090 families (63,965 persons) transmigrated there by June, 1981. Of them, 4,733 families (19,317 persons)

transmigrated there before the first five-year program (1954-1968), which accounted for 31.4%(30.2%) of the total. 2,812 families (12,500 persons) transmigrated there during the period of the first five-year development program, accounting for 18.6%(19.5%) of the total, and 4,000 families (17,603 persons) during the period of the second five-year development program, accounting for 26.5% (27.5%) of the total. The third five-year program started in 1979/1980, and 3,545 families (14,545 persons) have already settled there only for a year and more, accounting for 23.5%(22.7%) of the total. Those transmigrants to East Kalimantan account for 11% of all Indonesian migrants in case of the first program and 6.7% in case of the second program.

Table E2 Number of families and population transmigrating to East Kalimantan by period and hometown

		Before program 1954-1968	Program I 1969-1973	Program II 1974-1978	Program III 1979-	Total	%
East Java	Family	1,549	1,094	2,138	1,451	6,228	41.3
	Population	6,295	4,827	9,558	5,846	26,526	41.5
Central Java	Family	1,733	1,103	1,000	694	4,530	30.0
	Population	7,410	5,165	4,515	2,871	19,961	31.2
Djokjakarta	Family	0	200	200	100	500	3.3
	Population	0	827	723	347	1,897	3.0
West Java	Family	1,455	315	600	300	2,670	17.7
	Population	5,612	1,410	2,642	1,139	10,803	16.9
Jakarta	Family	0	100	62	200	362	2.4
	Population	0	271	165	698	1,134	1.8
Others	Family	0	0	0	800	800	5.3
	Population	0	0	0	3,644	3,644	5.7
Total	Family	4,733	2,812	4,000	3,545	15,090	100.0
	Population	19,317	12,500	17,603	14,545	63,965	100.0
%	Family	31.4	18.6	26.5	23.5	100.0	
	Population	30.2	19.5	27.5	22.7	100.0	

Source: Buku Data Transmigrasi di Kali-Tim

Many of the transmigrants are from East Java, which accounts for 41.3% of the transmigrant families, Central Java, 30.0% and West Java, 17.7%. The total percentage of those three areas is as much as 89%. Jakarta and Djokjakarta have a comparatively small number of transmigrants. There is also transmigration from Bali and other areas on the third five-year program.

By area of settlement, the Kutai Prefecture accounts for 45.5% of

transmigration (greatest) and, next, the Balikpapan prefecture, 26.7%. What is to be particularly noted here is that transmigration concentrates on Kutai on the third five-year program. A total of 3,545 families (14,545 persons) have settled in three areas, Teluk, Dalam, Separi and Sebulu in less than two years. That number exceeds the total number obtained in the period of the first program and is almost the same as the total obtained in the period of the second program. Large-scale remarkable settlement is in progress in East Kalimantan.

The area of land reclaimed before the third five-year development program was 27,666 ha.

Two types of settlement are available: Government-managed and private (voluntary). In case of the government-managed settlement, a government's transmigration administrative organization is in direct charge of the clearing of forests, creation of settlement land, construction of houses, etc., as well as construction of related facilities such as roads, schools, hospitals, and mosques. Then, the organization supplies settlers there with productive materials such as farm implements, fertilizer, and seeds and living materials such as rice, sugar, salt, and dried fish for a year to assure steady settlement. It is said that costs and expenses for them amount to as much as US\$5,000.00 per settler.

In principle, 2 ha. of land is distributed to a farm family. Additional reclaimed land (up to 5 ha.) is distributed to those families who have labor force sufficient to cultivate it. The right of use of distributed land is given for about five years after settlement. After that period, the limited ownership of that land is given (but not tradable). Completely private ownership of that land is given 10 years after settlement, which allows its trade.

It is needless to say that 2 ha. of land is also distributed to voluntary settlers.

Now, let's examine the actual condition of settlement land with Teluk Dalam taken as an example. This district is a large-scale development having a reclaimed area of 10,000 ha. The work of

creation was completed in 1979, and settlement started in 1980. Two thousand families have already settled there. There are 1,200 families from Java (60% of all settlers), 300 families from Bali (15%), 300 families from Lombok (15%) and 200 local farm families (10%). As can be seen from the above, the majority of the settlers are from Java.

Of 2 ha. distributed to a settler, 0.25 ha. is for housing and gardening, 1 ha. for cultivation land, which opened by Government, while 0.75 ha. must be opened by himself. Of 10,000 ha. of reclaimed land, 4,000 ha. have already been distributed (2 ha. to 2,000 families each), and 6,000 ha. remain undistributed. This means that there still remain considerable reserved land even after discounting roads and public land (for schools, mosques, meeting places, and clinics). That land will be distributed to those settlers who wish to expand their cultivated land (up to 5 ha.) and to voluntary settlers.

Reclamation work is in charge of a local agency of the government as a directly controlled national undertaking. The charge will be transferred to a state concerned (Propinsi) after five years.

An officer in charge of reclamation work explained to us that they scheduled to form independent agricultural management within a year of supply of living materials from the government, but that the work was not in progress as scheduled due to poor site conditions and insufficient facilities. When the investigation was conducted, five families of all settlers had given up farming, in place of whom voluntary reclaimers had settled there.

Farmers in reclaimed land earn their livings by cash crops such as corns, cassava, banana, and vegetables. Because no cooperative is available, they send their crops personally in the city of Samarinda about forty km away from the reclaimed land.

Settlement in the reclaimed land of Teluk Dalam started in 1980. It is at a stage of establishment after settlement. To determine whether it succeeds or not as a farming development, its further progress needs to be observed.

In order to see the actual situations of reclamation by migrants,

a Wonotirto Village, Samboja Province which had experienced 10 to 20 and more years after settlement was examined as a government-operated large-scale development in contrast to the reclaimed land of Teluk Dalam described above.

146 families (625 persons) from Middle Java settled in the village for the first time in 1957. After settlement, houses and living expenses for eight months were supplied in kind. Many of the settlers had experiences in and knowledge of agriculture in Java, but no experience in shifting cultivation. Reclamation for farmland was not so easy because of different natural conditions for agriculture and submergion of fields in rainy seasons. In 1970, 100 families (382 persons) settled there from Bandung and West Java. Thereafter, 49 families (198 persons) settled there from West Java in 1971, and 51 (289 persons) from West Java in 1972. The total families were 346 (869 persons), and they formed a Wonotirto Village consisting of 13 RTs.

When an investigation was performed in 1980, there were 307 families, which means that 39 families had deserted the village. The investigation showed that those deserters had returned to Java or had flown into large cities such as Balikpapan and Samarinda. In 1981, further 17 families moved to other Villages in Samboja. Consequently, 290 families remain in the Wonotirto Village at present. Of them, 250 are farmers, 8 merchants, 32 officers or other employees.

The village has a total land area of 1,517 ha., of which 350 ha. are for farmland, 95 ha. for houses, 5 ha. for public plazas, 711 ha. for forests, 202 ha. for swamps, and 154 ha. for others. Of 350 ha. for farmland, 325 ha. for paddy fields (250 for irrigated paddy fields and 75 for non-irrigated paddy fields), and 25 ha. for orchards, which is characterized by so much ha. of paddy fields. 711 ha. of forests are subject to shifting cultivation, a traditional agricultural method in East Kalimantan.

Normally, professional farmers use their distributed land of 2 ha. for paddy fields (1 ha.), housing and gardening and fields (0.25 ha.), and orchards (0.75 ha.). In addition, they cultivate 2 ha. of



shifting cultivation. Actually, however, those values vary with individual capacity, labor force, etc, and have changed in 10 to 20 years after settlement. Two farmers are taken up below as such example.

A farmer A settled from Middle Java in 1957. He (54 years old as of the investigation in 1980) was the eldest son of the farm family, and settled for vast land with his family members (his wife, parents-in-law, and four children). All products from a hectare of paddy field, garden and field are for themselves. He earns aliving as a public officer, and his wife runs a small store. His three sons support themselves. Two daughters and a son are wagemworkers. Three boys are at their respective educational stages.

A farmer B was from East Java. He did not settle as a settler from the beginning but entered his village as a worker, counting on his relatives for help in 1957. He got married to a daughter of a farm family who settled in the village as an transmigrant in 1964. He became independent as a farmer with a hectare of farmland given by his father-in-law. In 1969, he bought a hectare of farmland from a farmer who deserted the village, and also added new housing land to that he had bought before marriage. At present, he is a farmer who possesses a hectare of housing land and garden and field, and 2 ha. of farmland (3 ha. in total).

Of 2 ha. of paddy field, 1 to 1.5 ha. is subject to planting. He says that he limits planting because of insufficient labor force (himself and his wife), hard mowing before planting, and high wages for employing persons for such work. Up to 2 ha. of shifting cultivation is available, but actually, only about a hectare of it is used.

The farmer B produces 150 kaleng from a hectare of paddy field and 100 kaleng from a hectare of shifting cultivation (250 kaleng in total). Of them, he applies 150 kaleng for his private use (for his four other family members and for seeds), and 100 kaleng for sale to earn 150,000 rupiahs in cash. Otherwise, he earns cash by selling coconuts, eggs, cattle, etc. His wife peddles vegetables.

The farmer from Java points out two reasons why he cannot engage in intensive paddy agriculture similar to that he engaged in previously in Java. The first is that no buffalo can be used because the rice field has excessive water in rainy seasons. The second is that roots still remain left in rice fields in that area even 20 years after cultivation disabling plowing of the fields. He tried double-cropping in his rice field in vain due to bird damage at the harvest time. In addition to those conditions, although agricultural chemicals is sprinkled to prevent and exterminate damage by blight and noxious insects, poor techniques and dependence on grass fertilizer rather than chemical fertilizer cause low productivity. Through various changes including over 10 per cent desertion of settlers, the Wonotirto village has created paddy agriculture and orchards to maintain steady agricultural lives while still depending upon shifting cultivation, too. This village is characterized by its emphasis on the cultivation of rice fields.

As shown in Table E3, among items planted in the whole reclaimed land in East Kalimantan, paddy rice accounts for 18.5 per cent of the acreage of all crops, of which rice grown in up land by shifting cultivation accounts for 58 percent. When compared with planting conditions in the whole East Kalimantan (Table E4), the planting rate of paddy is low and that of upland rice and cassava is high. As described later, considering that the shifting cultivation has a problem of land use and is in the course of restriction by administrative regulation, a farming method compatible with natural conditions in East Kalimantan needs be examined and established urgently for large-scale reclamation by transmigrant.

Table E3 Harvest area by crops in reclaimed land in East Kalimantan (1979) in ha.

Unit: ha.

	Whole reclaimed land		Lempake		Samboja		
	Area	%	Area	%	Area	%	
Paddy	2,045	18.5	350	24.1	50	28.6	
Dry field rice	6,407	58.1	1,000	68.9	45	25.7	
Total	8,452	76.6	1,350	93.0	95	54.3	
Others	Corn	802	7.3	50	3.4		
	Potato	267	2.4	15	1.0		
	Casaba	885	8.0	20	1.4	80	45.7
	Peanut	315	2.8	2	0.1		
	Soybean	91	0.8	5	0.3		
	Vegetable	120	1.1	10	0.7		
	Green pea	93	0.8	-	-		
	Sub-total	2,573	23.4	102	7.0	80	45.7
	Total	11,025	100	1,452	100	175	100

Source: Buku Data Transmigrasi Kalimantan Timur 1980

Table E4 Change of harvest areas by crops in East Kalimantan in hectares and per cent

Crop name	1973	1974	1975	1976	1977	1978	Planting rate
Paddy rice	20,980 100	25,050 119	33,653 160	34,709 165	35,160 167	32,392 154	37.3
Up land rice	38,460 100	40,900 106	42,882 111	43,174 112	44,025 114	43,122 112	51.2
Corn	1,563 100	1,972 126	1,855 117	1,839 118	2,324 149	2,337 150	2.8
Casaba	3,100 100	2,943 95	2,739 88	2,751 89	3,725 120	3,760 121	4.5
Sweet potato	988 100	869 88	819 83	872 88	846 86	926 94	1.1
Peanut	225 100	238 104	252 112	238 105	693 308	714 317	0.8
Soybean	300 100	234 78	244 81	243 81	939 313	914 305	1.1
Total	65,616 100	72,620 110	82,444 126	83,826 128	87,712 134	84,165 128	100.0

Source: Statistical Yearbook of Indonesia. 1978/1979



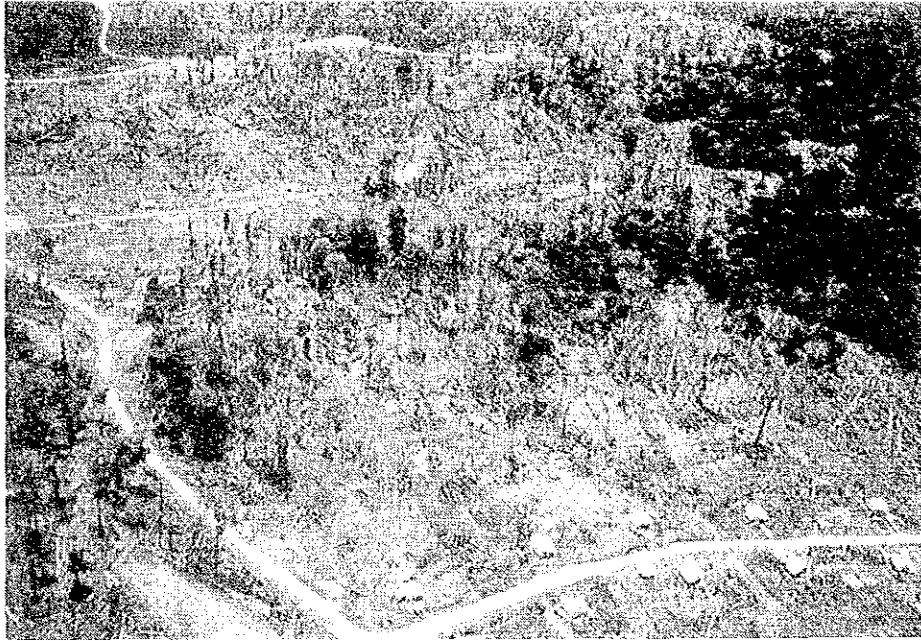


Fig. 1 Part of reclaimed land in Teluk Dalam



Fig. 2 Reclaimed land in Sebulu (View of distributed 0.25 ha. of housing land and garden and field)





Fig. 3 Wonotirto village (Roots left in rice field)

(2) Disafforestation by Predecessors

The word "predecessor" used here means settlers other than those who have transmigrated after the war. Predecessors use forests mostly for agriculture, i.e. shifting cultivation except use for timber and hunting. It is needless to say that shifting cultivation is a general agricultural method which is common in Southeast Asia including East Kalimantan.

i) Shifting Cultivation

Shifting cultivation carried out by farmers in the Samarinda district, East Kalimantan has the following characteristics.

Generally, forests are cut in July (trees of small diameter are felled, and those of large diameter wound-dried). Trees cut are left as they are for drying. They are fired at the beginning of September. The burnt site is rearranged at the end of September or at the beginning of October, and then sown after rain. Rainfall before sowing is a favorable condition for germination. The shifting cultivation is characterized by labor-saving cultivation with no care taken until harvesting, four months after sowing.

However, such labor-saving cultivation can only apply for the first year requiring no weeding or other work. The second and subsequent years will require weeding, extermination of noxious insects or other care.

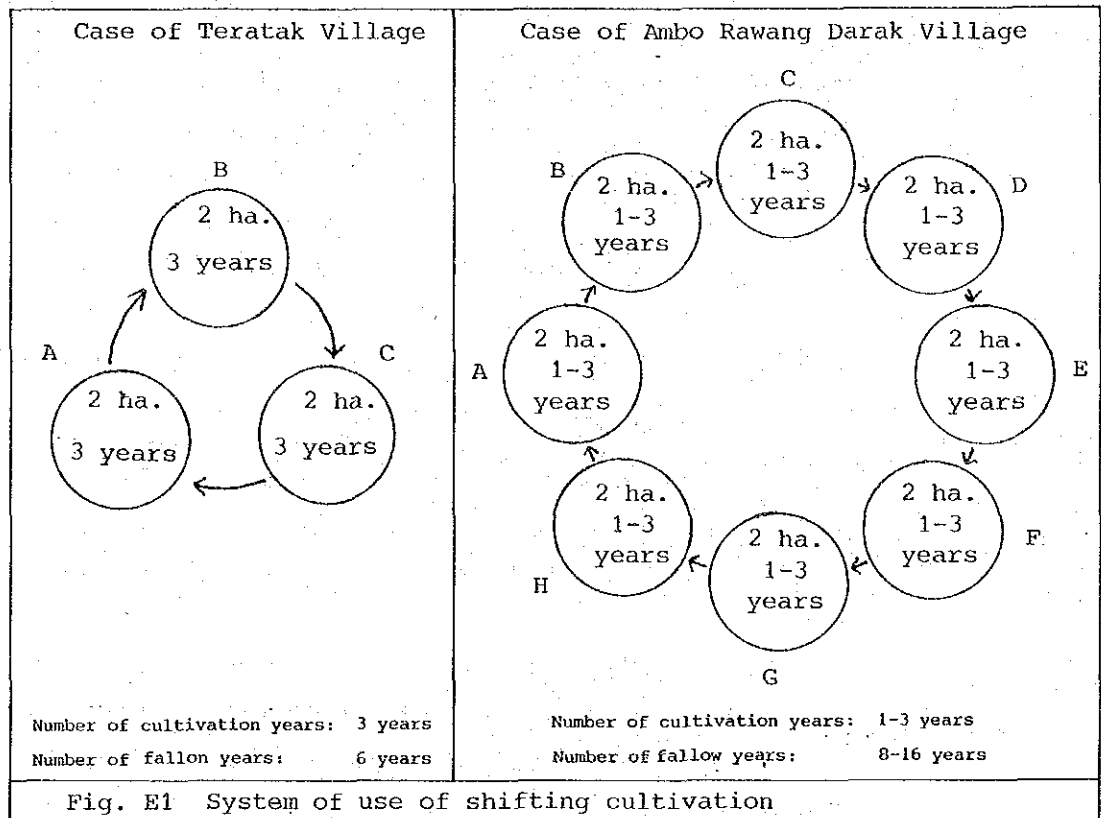
In a village called Sei-Merdeka, Samboja, cutting work has been conducted through "gotong-royong" (mutual aid), with cooperation in the village as a premise. A village, Teratak, Muara Kaman, has employed workers who use chain saws for cutting. The introduction of an efficient chain saw provides a momentum for converting forest cutting work for shifting cultivation from the "gotong-royong" system to a personal system.

When a farmer wants shifting cultivation in a forest, he should apply to his village chief for such use, who will investigate in practice whether that land has been used by another farmer, adjust interests between villagers if any, and apply to his Camat (county chief) for permission. Actually, however, the village chief processes such application at his own discretion and make a "ex post facto" report to the Camat.

An average shifting cultivation field area per farmer is 2 ha. Since this area is a cultivation area for a single year, forest area required for a farmer to continue his shifting cultivation varies with the length of the rotation, i.e. the number of years of use of fields (number of planting years) and the number of years in fallow period. In the Teratak village mentioned above, shifting cultivation are subject to planting for three years and are left in fallow for subsequent six years, requiring at least 6 ha. In the Ambo Rawang Dayak village, the number of planting years is 1 to 3, and period in fallow 8 to 9 years, requiring 16 ha. for a certain farmer. Thus, as far as this investigation is concerned, forest area required for shifting cultivation ranges from 6 to 16 ha. for a farmer. (See Fig. E1.)



Actually, if shifting cultivation is repeated by short fallow period of ten years or less, the surface soil will become thinner, that is, the land will be devastated. Therefore, area of 6-16 ha. per family is not enough. That is an essential problem of shifting cultivation at present.



The rotation system varies with places: Upland rice - Upland rice - Upland rice; Upland rice - Soybean; Upland rice - Banana - Papaya - Nangka, etc. Generally, Upland rice is cultivated mostly, with repetition in the forest second and third years. Where repeated cultivation of Upland rice is not possible, Durian, Rambutan, Nangka, Kelapa, Kopi, etc. are planted after production of Upland rice in the first year. In Sebulu, some farmers produced Upland rice and soybeans in the first year of their cultivation, planted coffee trees in the same years, and repeated this rotation for three years, and in the fourth year, used the fields as coffee plantations.

Plantation of fruit trees and garden plants in fields has two aims. One is to use land intensively. The other is to demonstrate that a particular person uses land by planting fruit trees and garden plants because he needs evidence of use of that land in a shifting cultivation zone where no private ownership of land is established.

The volume of production of upland rice is 1.0 to 3.2 tons of unhulled rice (Gabah) depending upon places. The volume in the first year decreases greatly in subsequent years. For example, in the case of Teratak Village, the volume was 3 tons, 2 tons, and 1 ton in the first, second, and third years, respectively. In the case of Sei-Merdeka Village, it was 2.6 tons, 1.3 tons, and 0.6 ton in the first, second, and third years, respectively.

ii) Shifting Cultivation rationale

In a tropical climate and conditions of vast forests, poor labor force, and low level of farming technique, the slash-and burn method on shifting cultivation using Soil productivity, has ratio-nary as a land use method. It may be called an agricultural production method depending on the recovery of soil productivity by forests. However, there are problems as explained later.

Suppose a hectare of shifting cultivation field produces 1.5 tons of upland rice on the average, and 0.9 ton of cleaned rice would be produced. In a 2-ha. burnt field, 1.8 tons of cleaned rice would be produced. A person consumes an annual average amount of rice of 180 kg, a family of five members eats 900 kg of rice annually, which means a family of five members eats 900 kg of rice annually, which means that the family has more than enough rice. Actually, rice consumption may increase because of seed rice and etiquette rice (Funeral, wedding, etc.). The volume of production may also vary with climatic conditions (rainfall in a sowing season) and conditions of occurrence of damage by noxious pest. Farmers in Wonotirto Village assume the rate of success in shifting cultivation to be 50%. With this value as a premise, a 2-ha. field would actually be a hectare of field, with the volume of production being 0.9 ton, which is for selfsupply. The slash-and burn method

is an important farming method for farmers in East Kalimantan in that it enables cultivation with no fertilizer and assures them of main food.

In addition to the production of upland rice, some farmers plant fruit trees and crop trees to make intensive use of shifting cultivation fields for a long period of harvests. For example, a farmer in Sei-Murdeka Village, Samboja earns 700 rupiahs daily (approx. 250,000 rupiahs annually) by rubber trees planted after settlement. In Sebulu, farmers intend to use their shifting cultivation fields as coffee plantations.

### iii) Problem of Shifting Cultivation

The slash-and burn method of agriculture is criticized in many countries of the world by reason that it leads to the destruction of the forest. The method in this region also has some problems. One is that the area of devastated forests increases as the number of settlers increases because the method requires deforestation and thus a vast forest for a family to live (16 ha. in the case of Samboja). Dead trees being left after firing for field burning stand close together in an area from Samarinda to Balikpapan except experimental forest of the university whose cutting is prohibited. At present, settlement is carried out after useful Dipterocarp trees are cut. However, the fact that large-diameter trees other than Dipterocarp trees have been burnt may be another problem from the point of effective use of forest resources.

Another problem is that repeated use of shifting cultivation causes a decrease in soil productivity due to loss of organic matter in the soil, a great reduction in nourishment, and outflow of soil itself caused by heavy rainfalls. Invasion of Alang Alang in fields which occurs frequently after the second year has danger that a forest is converted into grassland rapidly in the order of a forest, shifting cultivation and grassland.

Some farmers insist that the problem of Alang Alang can be exterminated when fruit trees grow up. In a region, pending trees which grow up rapidly in a few years are effective for extermination of those Alang Alang. This point requires a further examination through experiments, etc., but, in general, it cannot be denied that the conversion of forests into grassland results from a failure in artificial activities of performance of the slash-and-burn method.

A relatively small number of men have used vast forests as shifting cultivation with biological ecology balance and long periods in fallow. But this method of self-support economy is influenced politically due to an increase in the number of settlers, recognition of the value of forest resource, etc. and is liable to excessive cultivation and too short rotation in exchange economy. The request for changes of land use and the pressure to change managing techniques may have led to the cultivation of fruit trees and crop trees in shifting cultivation fields. From the viewpoint of intensification of land use and land maintenance, recognition of importance of permanent crops and the cultivation of fruit trees and crop trees can be evaluated high.

The slash-and-burn method should continue unstable so long as it remains at such a level of farming techniques that paddy rice cultivation is not well spread, only one hoe, sickle, saw, axe are provided at each family and that almost no fertilizer is used. Consequently, a study of an agricultural method with soil maintenance adapted to zones of tropical rain forests taken as a premise may be an important subject.



Slash and burn field  
(Teratak)



Burning the field (Samboja)



Farmer's tool, Aniani  
(Rapak Dalam Village)



Farmer's tool, Pacucu  
and Tajak (Rapak Dalam Village)



Farmer's tool, saw (Rapak Dalam Village)



Farmer's tool, Kapak (Rapak  
Dalam Village)





Fruit tree and Alang Alang after burning  
field (Sei-Merdeka Village)



Seedling of fruit tree to be planted after  
burning field





## 2.3.15 Social Problems in rural area

### (1) Grassland in forest land

Social influences which may occur due to the existence of grassland are roughly divided into three categories: problems of forest conservancy and water control, problems of agricultural environment, and restraints on regional development.

#### i) Problems of Forest Conservancy and Water Control

As described earlier, since the district subject to this investigation had a small number of grasslands and was located in hill areas with a change in elevation of less than 100m, there seemed no such serious social problems as seen in other districts. However, there seem influences on rice fields below hill areas where grassy plains are distributed in the district investigated. Having observed damage by erosion on grassland along sides of provincial roads and forest roads, the problem of forest conservancy and water control caused by grassy plains in other districts may not be underestimated.

#### ii) Problems of Agricultural Environment

For investigation, we were billeted in a tent in a virgin forest in a humid tropical zone, and experienced large waterdrops falling from crowns of trees as if it rained from night to early morning. Thus, at night, the forest restore water evaporating at day, which restrains water evaporation from the virgin forest in a tropical zone to approximately 1,000 mm a year.

From a grassy plain, 1,500 to 1,800 mm of water evaporates from the surface of the ground. Much of the water moves over forest zones as clouds and irrigates forests as rainfalls. (13)

Rain falling on a grassy plain may flow down through the surface of the ground more than that on a forest and movement of air by the wind over a grassy plain is larger than that over the forest. Thus, a grassy plain can dry areas around it. It is well thinkable that this phenomenon gives adverse effects on the climate of a region, especially negative effects on burnt fields, which requires further investigations.

### iii) Restraints on Regional Development

Many grassy plains have thin surface soil and poor fertility, which are inadequate for agricultural development, being disadvantageous to regional development. Leaving land unused means a loss to the nation. It is desirable that measures be taken to restore soil productivity and prevent conversion into grasslands under consideration that there are many people who desire arable land.

### (2) Use of Land After Logging and Social Problems

In the case of K.T.I., utilization of land after logging may be divided into two categories: Forestry and agriculture.

Forest utilization is a matter of government-managed forests, i.e. under national management. This case has a technical problem whether Dipterocarp trees after selective cutting can grow up 1 cm in diameter a year and restore similar sizes to those of the present after 35 years of cutting cycle, as predicted.

One of the agricultural problems is adjustment of demands by farmers including predecessors and migrants for preparation of shifting cultivation. As described earlier, the shifting cultivation is actually under the control of a village chief. How far can national forest management apply to farmers who have lived for years according to their traditional customs? For example, observation of shifting cultivation field of a farmer who settled along a road of an experimental forest of Mulawarman University in Samboja indicates how difficult adjustment of traditional customs and modern management is.

Agricultural use of land after cutting trees takes on a remarkably different light depending on the type of a developmental subject: Predecessors or spontaneous transmigrating farmers; or large-scale performance as governmental work of reclamation being performed now as national project in the district of Samarinda under the finance from the World Bank (e.g., reclamation in Teluk Dalam or Sebulu as mentioned earlier).

Farmers establish their agricultural bases gradually while maintaining the life of their families by means of self-supply production

using shifting cultivation. Specifically, they create rice fields and/or orchards little by little to establish agricultural management. As indicated by many cases, this method also has danger that farmers with no fund or technique may devastate and desert their land under severe natural conditions, resulting to fall wandering people. Therefore, governmental aid on both technical and financial aspects such as financing for creation of rice fields must be considered as a premise at the time of settlement.

In the case of large-scale development, developmental conditions are arranged in advance by the government; cultivated land is distributed and public facilities are constructed. Vast land of as many as thousands of hectares is cleared at a time by bulldozers in a forest zone. It is unknown that such an artificial environment can stabilize as an ecological system. Thus, establishment of farming as an immigrant under severe natural conditions in East Kalimantan requires governmental aid on both technical and financial aspects, otherwise immigrants will meet difficulties as the case of spontaneous transmigrants.

What should be noted from a view point of sociology with respect to agricultural development is importance of collectivism as observed in "gotong royong (mutual help)".

They call a village "kampung" or "desa" in East Kalimantan. It consists of several or 10 and more RTs (Rokun Tetangga, neighborhood association). As of the time of the investigation, Samboja County contained 13 villages. The smallest village had 3 RTs, 128 families and 689 population, and the largest had 6 RTs, 607 families and 3,269 population. Sebulu County consisted of 6 villages and Muarakanman County 11.

Villagers elect a chief, who will designate RTs. The chief discharges his duties such as movement of residents, management of shifting cultivation, and other important administrative roles. Under the chief, three staff members are in charge of development, economy, and life care, being leaders of the village. The function of RTs is to have orders from the chief and to be fully understood by the villagers, and at the same time, to provide mutual aid in close

contact with residents' daily life. It is demonstrated clearly by the fact that RTs work as a unit of a funeral. In the village of Kuala-Samboja, two RTs work as a unit of a funeral, at which RT members customarily bring 1 kg of rice or 500 to 1,000 rupiahs in cash. Since RT is a basic unit of farmer's life, new settlers will usually belong to the same RT as those who have the same birthplace.

Every village makes use of "gotong royong" for repair, maintenance and cleaning of roads, rivers, bridges, etc., cutting work in shifting cultivation, maintenance of channels for irrigation, etc., for which all men in the village provide service. An absentee must get a permit from the village chief and offer tea cake to all members as a customary practice. Repair and cleaning of mosques is one of the important works of "gotong royong" in this district where people have deep faith in Islam.

"Gotong royong" plays an important role in both production and living aspects. In this respect, collectivism represented by "gotong royong" may be characteristic of Indonesian village life. When colonist farmers try to make agricultural use of land after logging, "gotong royong" plays an important part in resolving immediate difficulties to construct a village.

It is necessary also to be examined that "gotong royong" is undergoing a change in the process of changes in Indonesian villages. In the village of Teratak, villagers have meeting every Friday (day of Islamic worship). The village of Muarakaman Ulu, has it as required, not periodically. That fact demonstrates a difference between a traditional village which centers on agricultural production and an urbanized village. Utilization of land after logging needs be based upon collaboration within a village as shown by "gotong royong", and also requires overall regional development policies to enhance independence of a village itself.



Ulin, fence material at riverside made  
in Gotong Royong



### 2.3.16 Outline of Farm household Economy

As well known, to understand farm household economy, agricultural income (gross agricultural earnings minus agricultural operating costs) and income gained by other than agriculture (side business earnings and those gained as a wageworker) must be measured, household expenses made clear and finally the existence of surplus of farm household economy clarified. In order to calculate agricultural income, it is necessary to collect data on the volume of production, prices and costs of production by crops for understanding by area, by type of production, and by scale. Like a survey of farm household economy conducted in Japan, such surveys need be conducted by entry in an agricultural account book, which must count on future systematic surveys.

Consequently, this section only outlines farm household economy based on hearing surveys.

In the village of Teratak, a farmer has farmland of 2 to 3 ha. on the average. We will examine a farmer who manages 3 ha. (a hectare of rice field and 2 ha. of shifting cultivation fields) and has 7 family members (husband, wife and 5 children). Agricultural income is mainly earned by cultivation in a rice field and in a field. As shown in Table E5, East Kalimantan has less volume of production of paddy rice and up land rice per hectare than Indonesia.

Table E5 Change of hectarage of harvest and yield per year of paddy rice and up land rice in Indonesia and East Kalimantan

			1974	1975	1976	1977	1978	1979
Indonesia	paddy rice	ha. ton	7,340,234 (2.86)	7,334,474 (2.84)	7,229,417 (3.07)	7,202,360 (3.03)	7,698,409 (3.14)	7,663,501 (3.24)
	up land rice	ha. ton	1,168,364 (1.21)	1,160,622 (1.28)	1,139,342 (1.27)	1,157,208 (1.33)	1,230,760 (1.30)	1,186,488 (1.29)
East Kalimantan	paddy rice	ha. ton	25,050 (1.71)	33,653 (1.51)	34,709 (1.62)	35,116 (1.62)	32,392 (1.94)	34,212 (1.93)
	up land rice	ha. ton	40,900 (1.13)	42,882 (1.16)	43,174 (1.13)	44,025 (1.15)	43,122 (1.17)	45,234 (1.10)

Source: Biro Pusat Statistik, Buku Saku Statistik Indonesia. 1979/1980

Note: The yield is of dry unhusked rice.

For rice fields, Table E6 is used as a basis of calculation. Unlike cultivation of paddy rice in Java and Madura, East Kalimantan is characterized by extensive agriculture with very low amount of fertilizer and chemicals. Those statistics vary with areas and individual management because they are average values. The volume of production is 2,412 kg per ha. and the amount of production 184,081 rupiahs. Since the costs of production are 4,985 rupiahs, net earnings per ha. are 179,096 rupiahs.

Table E6 Amount and volume of production and net earnings per ha. of paddy field in 1978

		East Kalimantan	Java, Madura
Volume of production	kg	2,412	4,445
Amount of production	Rp	184,081	270,558
Costs of production			
Seed	Rp	3,701	3,964
Chemical	"	162	2,221
Fertilizer	"	1,091	18,463
Labor cost	"	-	45,023
Others	"	31	14,180
Total	"	4,985	83,851
Net earnings	"	179,096	186,707

Source: "The 3rd Five-Year Indonesian Development Program", Vol. II (1979) Japan-Indonesian Association.

Note: The volume of production is of dry stalk paddy.

Table E7 Amount and volume of production of up land rice and net earnings in 1978

		Java, Madura	Outer territory	Whole Indonesia
Volume of production	kg	1,969	1,638	1,718
Amount of production	Rp	116,987	110,353	111,950
Costs of production				
Seed	"	3,210	3,014	3,061
Chemical	"	598	208	302
Fertilizer	"	7,057	1,098	2,532
Labor cost	"	25,502	10,397	14,034
Others	"	2,914	2,951	2,943
Total	"	39,281	17,668	22,872
Net earnings	"	77,706	92,685	89,078

Source: Same as Table E6

Note: The volume of production is of dry stalk paddy.



In the case of shifting cultivation, the field investigation showed that the volume of production of up land rice varied from 1 to 3.2 tons, and the statistics showed that it was approximately 1.1 tons. Using average statistical values for the whole outer territory, the volume of production of up land rice comes to 1.6 tons and amount of production 110,353 rupiahs, as shown in Table E7. Since no fertilizer or chemical is used in shifting cultivation in East Kalimantan, only the cost of seeds is required, with resultant net earnings of 107,339 rupiahs. Therefore, agricultural net earnings (sum of net earnings per 2 ha. of shifting cultivation field and those of paddy rice) amount to 401,388 rupiahs.

5.6 tons of rice (2.4 tons of paddy rice and 3.2 tons (1.6 tons x 2) of up land rice) is all dry unhulled rice. The volume, after cleaning, will reduce to 2.85 tons. When it is assumed that 1.4 tons of rice is applied for household and etiquette rice, 1.45 tons of rice could be for sale (strictly speaking, seed rice is also required, which is 47 kg of unhulled rice per hectare of rice field). Since the price of rice is 163 rupiahs (1979's rice price in Samarinda City: Statistical Pocketbook of Indonesia 1979/1980), 236,350 rupiahs will be earned. When the price of rice is 250 rupiahs as investigated in the site, 362,500 rupiahs will be earned in cash.

As household expenses, a usual farm family needs 30,000 to 50,000 rupiahs per month. If it is assumed that a family needs 40,000 rupiahs, it would need 480,000 rupiahs annually. If the family produces only rice, it would be 120,000 to 250,000 rupiahs short. It would have to earn a living in cash by the sale of fruits and garden plants such as pineapples, coffee, dorians, bananas, or to earn wages.

As mentioned earlier, a farmer in the village of Wonotirto applies 150 of 250 kaleng of rice produced for his family and sells the remaining 100 kaleng for 150,000 rupiahs in cash. He makes up for his deficit by the sale of fruits, cattle, and vegetables, and by the peddling of vegetables by his wife.

Settling farmers in newly reclaimed land may make a living by means of supplies in kind from the government in the first year but will have to support themselves in the second and subsequent years, which

will not be easy at all. However, settlers have high morale because farmers who are confined to petty land in Java have possibilities of being owners of land of 2 to 5 ha. in East Kalimantan. Continuous technical and financial aid may be required for those farmers to succeed in agriculture adapted to East Kalimantan.

### 2.3.17 Proposed Experiment from Mulawarman University

#### (1) Experiment of Afforestation

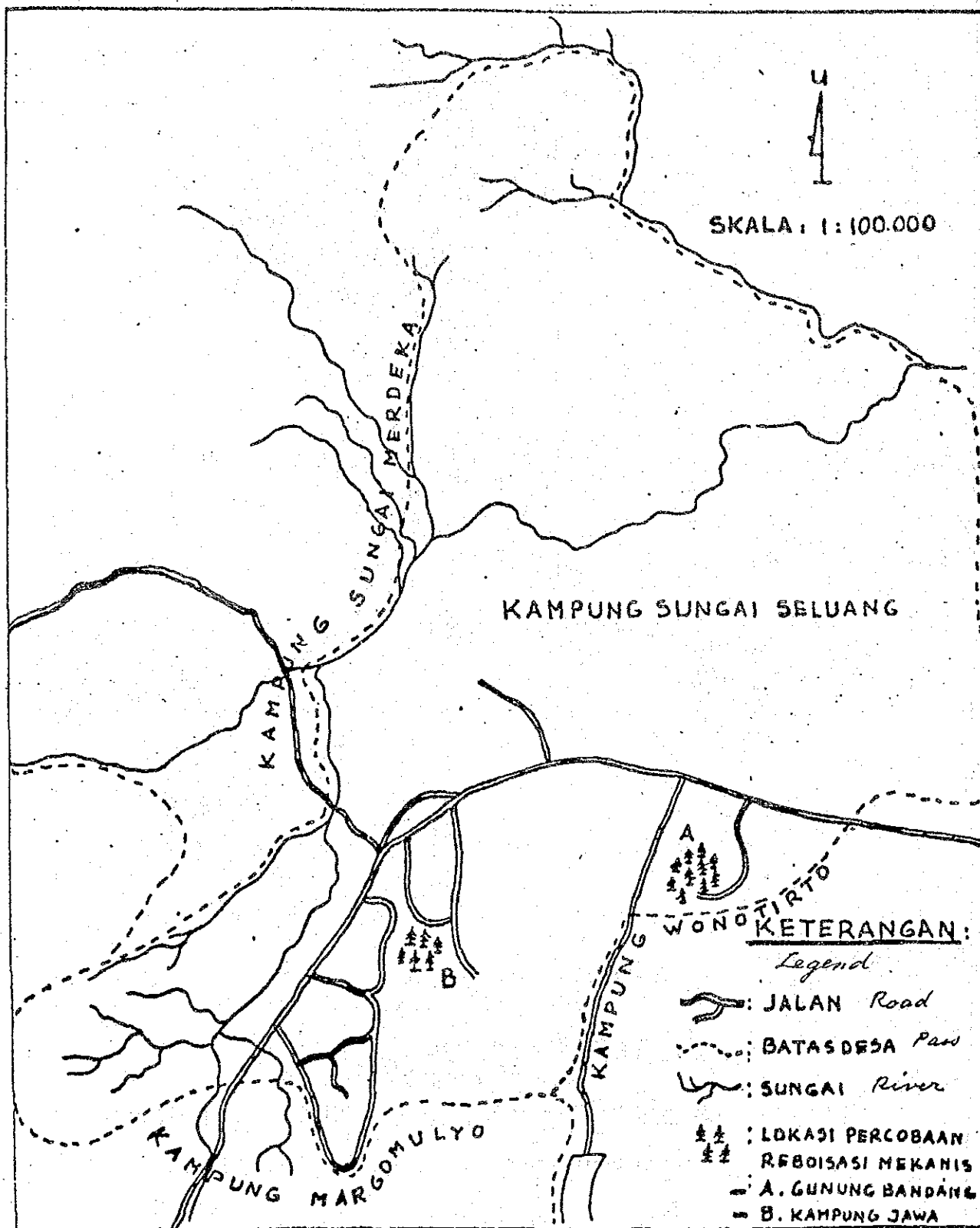
Mulawarman University, planted some pine trees in 1976. The location was Kampung Java where, according to an ancient, hills which were reclaimed 51 years ago changed into grasslands, and thus pine trees were planted.

That plantation is an important experiment though no follow-up investigation has been conducted after it. The following is a consideration of the experiment based on data obtained at the time of the plantation and conditions at the time of the investigation.

The experiment was conducted at a village called Kampung Sungai Seluang Samboja, approximately seventy kilometers from Balikpapan in the direction of Handil dua (Fig. D1). The plantation was conducted at points A and B as shown in Fig. F1, but the investigation was limited to the point B.

A total of 36 plots of plantation were allocated, 27 plots for the test place A and 9 plots for B. Each plot had 0.1 hectare.

Fig. F1 Location of test places for plantation  
 KANPONG SUNGAI SELUANG, SAMBOJA



H. Dan.

Fig. F2. Layout of plots of plantation

GUNUNG BANDANG, SAMBOJA  
A Block

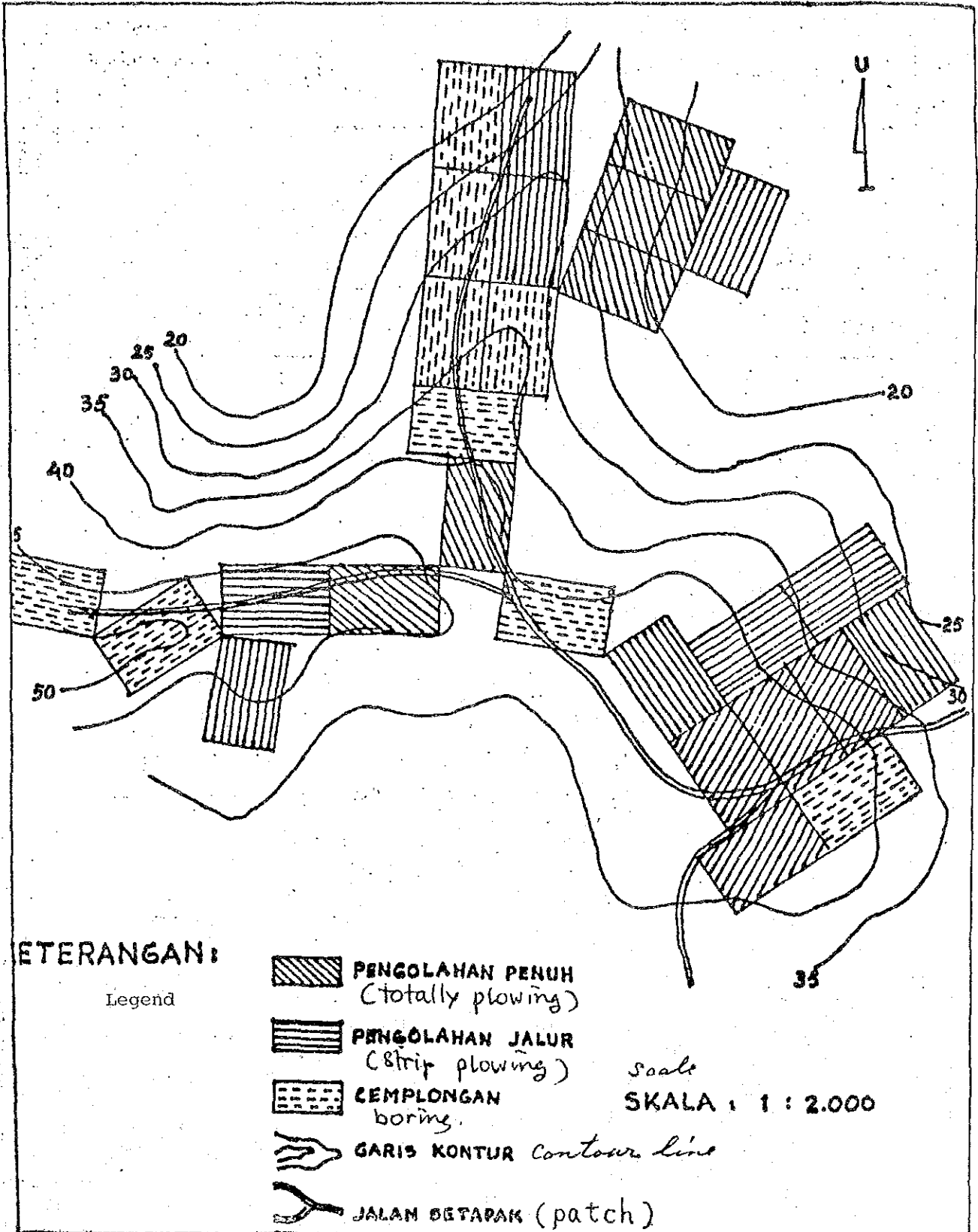
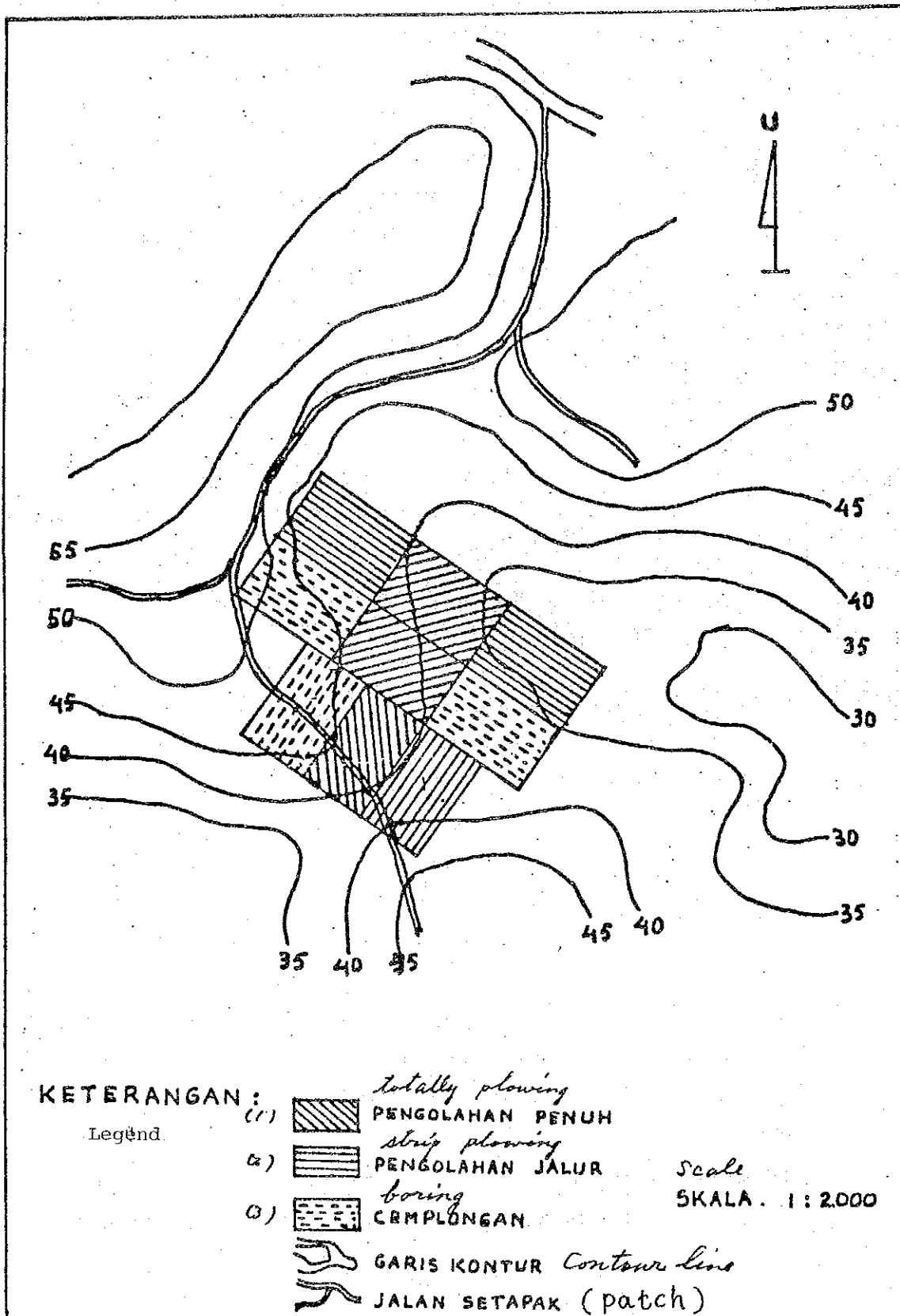


Fig. F3 Layout of plots of plantation examination  
 KAMPUNG JAVA , SAMBOJA  
 B Block



The plantation A had an elevation of 20 to 50 m, and B, 35 to 50 m. The topography consisted of hills with an inclination of up to 30%. The plantation plot was divided into three categories based on its slope: 0 to 10.0%, 10.1 to 20%, and 20.1 to 30%. Each category had 12 plots.

In plantation, three ground treating methods were adopted:

(1) Overall plowing of plots by tractors, (2) stripe plowing of plots by tractors, and (3) manual digging of planting holes with no special treatment. These three methods were applied to three categories of slope with four plots allocated to each of them.

For afforestation, Pinus merkusii was planted in an area of 3 x 3 m (approx. 1,100 pines per ha.).

This investigation was conducted only in the plantation plots created by stripe plowing and having a slope category of 0 to 10%, and in the plots where planting holes were dug.

The investigation was conducted in September 1981, about 5 years after planted in November 1976. Pine trees in the stripe-plowed plots grew well, with an average tree height of 8 m. Some trees measured had an average diameter of about 10 cm, with the largest of 13 cm. Trees in this test place grew rapidly, but many foxtails as shown in photo also grew, nearly 30 to 40% of all planted trees.

Adjacent to the test place were non-plowed plots where only planting holes were dug. Planted trees were 2 to 3 m in height and 3 to 4 cm in diameter. Comparison between the plots and those plowed for plantation can clearly give a great difference.

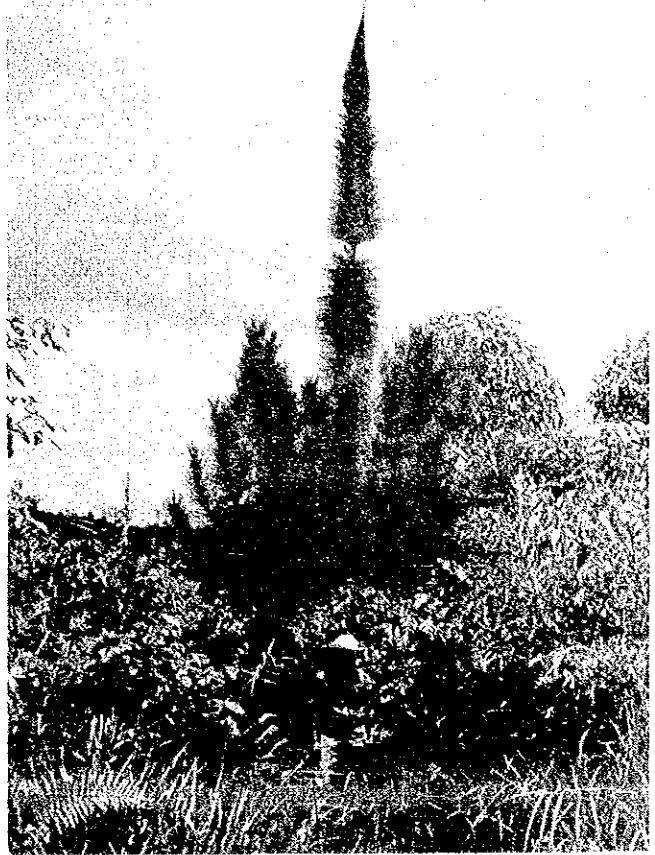
Although depending upon soil conditions, it was found that plowing of grassland, i.e. improvement in physical properties of soil could accelerate the growth of planted trees very well. The effect of plowing may also apply to burnt fields in areas of the same soil conditions.

As shown in photo, foxtail grow up tall abnormally with no side branches. Their poor quality as timber has been in question since 1973.

It is understandable to plant pine trees for breeding timber resource. However, plantation of broadleaf trees should also be considered in some places because the restoration of soil power is one of the important purposes of afforestation.

Table F1 through F6, prepared by Ir. Soeitono, show the results of the (1) survey of soil treatment operation time, (2) survey of planting time, (3) survey of costs of soil treatment, (4) survey of costs of planting, (5) survey of costs of overall operation,

and (6) survey of survival of planted trees. According to them, planting after stripe plowing by tractors has the lowest cost. When it is taken as 100, the cost caused from total plowing is 141 and that of manual hole digging is 269.



Foxtail

Table F1 Time study of soil treatment (plowing & boring)  
per 0.1 ha. for each slop classes

unit: minute

Class of slope	No. plot	Method of soil treatment			Total	Avg.
		Totally plowing	Stripe plowing	Hole digging		
Gentle (0- 10.0%)	1	43.25	37.50	49.50	130.25	
	2	54.75	40.00	84.50	179.25	
	3	39.90	36.00	70.50	146.40	
	4	40.90	29.00	97.85	167.75	
	Sub total		178.80	142.50	302.35	
Medium (10.1 -20%)	1	53.00	34.00	75.50	162.50	
	2	40.00	39.90	73.60	153.50	
	3	35.00	41.00	91.20	167.20	
	4	39.14	20.65	134.00	193.79	
	Sub total		167.14	135.55	347.30	
Heavy (20.1- 30%)	1	44.00	32.00	233.40	309.40	
	2	62.00	34.50	182.00	278.50	
	3	48.00	43.75	141.50	233.25	
	4.	50.40	40.80	130.40	221.60	
	Sub total		204.40	151.50	687.30	
Total		550.34	420.10	1363.95	2343.39	
Average		45.86	35.75	113.66		

Remarks; Plowing done by tractor.  
Hole digging done by man power.



Table F2 Time study of planting per 0.1 ha plot  
for each soil treatments and soil classes

unite; minute

Class of soil	No. Plot	Method of treatment			Total	Avg.
		Totally plowing	Strpe plowing	Hole digging		
Gentle (0 - 10%)	1	24,00	20,50	27,40	71,90	
	2	26,00	18,40	29,90	74,30	
	3	22,00	24,40	26,70	73,10	
	4	31,00	23,60	29,50	84,10	
Sub total		103,00	86,90	113,50	303,40	25,28
Medium (10, 1-20%)	1	37,00	24,30	29,50	90,80	
	2	20,00	27,40	31,40	78,80	
	3	38,00	20,50	27,50	86,80	
	4	29,00	29,40	34,70	93,10	
Sub total		124,00	101,60	123,10	348,70	29,05
Heavy (20, 1-30%)	1	29,00	31,40	32,20	92,60	
	2	31,00	23,40	36,30	90,70	
	3	34,00	28,80	28,70	91,50	
	4	36,00	37,20	37,80	111,00	
Sub total		130,00	120,80	135,00	385,80	32,15
Total		357,00	309,30	371,60	1037,90	
Average		29,75	25,77	30,96		

Table F3 Cost study of soil treatment per 0.1 ha  
for each slope classes

unite; Rp

Class of slope	No. of plot	Method of soil treatment			Total	Avg.
		Totally plowing	Stripe plowing	Hole digging		
Gentle (0 - 10%)	1	: 974,80:	707,77:	965,17 :		
	2	:1233,99:	754,95:	1647,61 :		
	3	: 899,29:	679,46:	1347,64 :		
	4	: 921,83:	547,34:	1907,92 :		
Sub total		:3929,91:	2689,52:	5895,34 :	12514,77:	104290
Medium (10,1-20%)	1	:1194,55:	641,71:	1472,13 :		
	2	: 901,55:	753,06:	1435,08 :		
	3	: 788,85:	773,83:	1778,25 :		
	4	: 882,16:	389,74:	2612,79 :		
Sub total		:3767,11:	2558,34:	7298,25 :	13623,70:	1135,31
Heavy (20,1-30%)	1	: 991,70:	603,96:	4550,93 :		
	2	:1397,40:	651,15:	3548,71 :		
	3	:1081,86:	825,73:	2759,02 :		
	4	:1135,95:	770,05:	2542,59 :		
Sub total		:4606,91:	2850,89:	13401,25 :	20859,05:	1738,25
Total		12303,93:	8098,75:	26594,84 :	46997,52:	
Average		:1025,33:	674,90:	2216,24 :		

Table F4. Cost study of planting per 0.1 ha. plot  
for each soil treatments and slope classes  
unite; Rp

Class of slope	No. of plots	Method of soil treatment			Total	Avg.
		Totally plowing	Stripe plowing	Hole digging		
Gentle (0 - 10%)	1	284,06	243,20	293,48		
	2	307,73	218,28	355,26		
	3	249,88	289,46	317,24		
	4	366,91	279,97	350,51		
<b>Sub total</b>		1208,58	1030,91	1316,49	3555,98	296,33
Medium (10, 1-20%)	1	437,92	288,28	350,51		
	2	236,72	325,05	373,09		
	3	449,76	243,20	326,75		
	4	343,24	348,78	412,30		
<b>Sub total</b>		1467,64	1205,31	1462,65	4135,60	344,63
Heavy (20, 1-30%)	1	343,24	372,51	282,59		
	2	366,91	277,60	431,31		
	3	402,42	341,66	341,01		
	4	426,09	441,31	449,13		
<b>Sub total</b>		1538,66	1433,08	1604,04	4575,78	381,32
<b>Total</b>		4214,88	3669,30	4383,18	12267,36	
<b>Average</b>		351,24	305,78	365,27		

Table F5 Cost study of the whole operation per 0.1 ha  
for soil treatment and planting

unite; Rp

Class of slope	No. of plot	Method od soil treatment			Total	Avg.
		Totally plowing	Stripe plowing	Hole Digging		
Gentle (0 - 10%)	1	1258,86	950,97	1258,86		
	2	1541,72	973,23	2002,87		
	3	1149,17	968,92	1691,88		
	4	1288,74	827,31	2963,30		
Sub total		5238,49	3720,43	7916,91	16875,83	1406,32
Medium (10,1-20%)	1	1632,47	929,99	1822,64		
	2	1138,27	1078,11	1808,17		
	3	1238,61	1017,03	2105,00		
	4	1225,40	738,52	3025,09		
Sub total		5234,75	3763,65	8760,90	17759,30	1479,94
Heavy (20,1-30%)	1	1334,94	976,47	4933,52		
	2	1764,31	928,75	3980,02		
	3	1484,28	1167,39	3100,03		
	4	1562,04	1211,36	2991,72		
Sub total		6145,57	4283,97	15005,29	25434,83	219,94
Total		16618,81	11768,05	31683,10	60069,96	
Average		1384,90	980,67	2640,26		
Index		141	100	269		

Table F6

Survival number of planted Pinus merkusii

Class of slope	No. of plot	Method of soil treatment			Total	Avg.
		Totally plowing	Stripe plowing	Hole digging		
Gentle (0-10%)	1	111	74	122		
	2	127	135	129		
	3	136	128	116		
	4	134	119	112		
Sub total		508	456	479	1.443	120,25
Medium (10,1-20%)	1	54	134	127		
	2	91	140	72		
	3	88	91	138		
	4	138	137	114		
Sub total		371	502	451	1.324	110,33
Heavy (20,1-30%)	1	68	129	127		
	2	136	130	120		
	3	117	162	104		
	4	120	80	130		
Sub total		441	501	481	1.423	118,58
Total		1320	1459	1411	4.190	
Average		110	121,58	117,58		

(2) Proposal of Follow-up Investigation of Shifting Cultivation

A series of investigations which were conducted by us are not enough to provide correct values because they only drew opinions from farmers.

Therefore, Drs. Fiddy Finandar, in charge of human sociology, insists that a follow-up investigation is required concerning the worsening of soil productivity in shifting cultivation fields and the reduction in the crop and proposes that it be conducted by the university.

2.3.18 Change of Timber Production and Distribution

During the period of this investigation, two changes in forestry policies were observed, strongly regulating the export of logs which had been in rapid expansion since 1965.

Indonesian Government imposed obligations of timber working on log producers. In May, 1980, the government amended it stricter for observance by rule. It decided to execute stricter policies in May 1981 and subsequent years, which caused a big drop in imports of logs giving serious effects to the timber industry circles both Indonesia and Japan.

Information on those regulations is as follows:

(1) Regulations Enforced in May, 1980 and Their Effects

- i) To impose a duty to supply on the average of 60% of the volume of log production for domestic consumption. (Note: The percentage varies with the number of years elapsed after the start of the production of logs. 70% or more is imposed on those who have been engaged in the production of logs for more than seven years.)
- ii) To issue a permit of the export of the remaining logs (40% on the average) only to those who have obtained a certificate of supply of the specified volume for domestic consumption.
- iii) As shown in Table F7, the number of exporters who reduced their export of logs to zero increased monthly since April, 1980. Of 53 log exporters in Samarinda and Sangkulirang, 40 exporters reduced their export of logs to zero in September.

- iv) Therefore, with the same volume of logs produced as in the previous year, 1979, it was not possible to consume 60% of the volume in the country. Both the volume of logs produced and exports were reduced.
- v) As a result, the total volume of logs exported between April, 1980 and March, 1981 reduced to 47% over the preceding year and to 33%, compared with results of 1978/1979, respectively. (9)

Table F7 Samarinda/Sangkalirang Area Log export record  
(Apr. - Sep. 1980.)

Data: shipping agent \*\*Departure base

No	Shipper	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total
1.	S.MAS	34,200	10,500	22,100	5,200	12,200	18,000	102,200
2.	G.P.I	23,400	11,600	12,000	12,000	6,500	18,000	83,500
3.	K.MAS	12,400	4,700	5,600	0	5,800	11,000	39,500
4.	JATITRIN	18,500	0	6,000	4,900	6,000	0	35,400
5.	S.MARI	14,000	3,900	0	0	2,500	12,200	32,600
6.	PORODISA	17,600	0	14,600	0	0	0	32,200
7.	R.NUSANTARA	12,200	0	0	0	12,800	6,000	31,000
8.	K.T.I.	4,900	4,100	6,000	6,400	3,000	6,400	30,800
9.	D.BESAR	12,700	5,600	0	6,000	6,000	0	30,300
10.	PT.S'RANG	6,000	0	3,000	5,900	3,000	6,000	23,900
11.	BENGEN	6,000	15,000	0	0	4,000	0	25,000
12.	K.KALT	12,300	0	6,000	0	0	0	18,300
13.	RATAH	6,100	9,400	2,400	0	0	0	17,900
14.	L.J.U.	6,500	0	5,200	0	0	6,000	17,700
15.	MARIMUN	5,900	0	0	6,300	0	5,400	17,600
16.	D.DJAYA	11,200	0	0	0	0	5,800	17,000
17.	B.BARU	11,000	0	5,800	0	0	0	16,800
18.	B.D.B.D.	5,200	5,000	6,000	0	0	0	16,200
19.	WONO	5,900	0	4,800	0	0	5,200	15,900
20.	INHUTANI	0	6,300	2,700	0	0	6,000	15,000
21.	BAITIMUR	5,500	0	2,700	0	6,800	0	15,000
22.	G.H.T.	0	14,200	0	0	0	0	14,200
23.	SEGARA	6,200	1,400	0	6,000	0	0	13,600
24.	SAFDECO	7,000	0	6,400	0	0	0	13,400
25.	M.FOREST	6,300	0	0	0	6,000	0	12,300
26.	O.T.P.	0	14,200	0	0	0	0	14,200
27.	K.MAHAKAM	0	9,100	2,700	0	0	0	11,800
28.	RAHSNA	5,900	5,900	0	0	0	0	11,800
29.	S.AGUNG	11,500	0	0	0	0	0	11,500
30.	R.HIJAU	5,700	0	5,700	0	0	0	11,400
31.	H.B.B.	6,300	0	0	0	6,000	0	12,300
32.	CITA	0	0	4,000	0	6,000	0	10,000
33.	AC.TIMBER	5,900	5,900	0	0	0	0	11,800
34.	TUNGGAL	0	6,200	0	3,200	0	0	9,400
35.	TELEN	5,400	0	4,000	0	0	0	9,400
36.	AVEDECO	2,300	0	0	5,300	0	0	7,600
37.	HARIATI	0	7,200	0	0	0	0	7,200
38.	L.GANECA	0	6,300	0	0	0	0	6,300
39.	HIMA	6,200	0	0	0	0	0	6,200
40.	M.K.T.	0	0	0	0	6,000	0	6,000
41.	SEWARGA	0	0	6,000	0	0	0	6,000
42.	HUTRJNDO	0	0	6,000	0	0	0	6,000
43.	D.USAHA	6,000	0	0	0	0	0	6,000
44.	G.MULIA	5,800	0	0	0	0	0	5,800
45.	P.B.HIJAU	2,700	0	0	3,000	0	0	5,700
46.	TRISILA	5,300	0	0	0	0	0	5,300
47.	I.T.C.I.	3,500	4,700	0	0	0	0	8,200
48.	ALAS	0	4,500	0	0	0	0	4,500
49.	BHIRAWA	0	0	0	0	0	4,000	4,000
50.	E.K.T.I	0	3,000	0	0	0	0	3,000
51.	L.PRAJA	0	0	0	2,800	0	0	2,800
52.	D.WARNA	7,000	0	6,400	0	0	0	13,400
53.	TRIGA	1,700	0	0	0	0	0	1,700
	Total	325,300	151,300	141,700	69,000	92,600	110,000	889,900 m <sup>3</sup>

Source: Nanpoh Forestry Co., Ltd.



(2) Regulations Enforced in May, 1981 and Their Effects

In May, 1981, all the regulations enforced in the preceding year were abolished, and new regulations enforced to permit the export of 20 per cent of the volume of logs produced so long as 80 per cent of it was applied for use for manufacture of plywood in the country. Even if logs were applied for lumbering, no export licence was granted for the remaining logs. As a provisional measure, however, the export licence for 40 per cent of the volume of logs produced was granted to those who were constructing plywood mills. Real effects of the regulation appeared in August, 1981. In 1978, three years before the above year, the monthly average exported volume of logs was approximately 350,000 m<sup>3</sup> in the district of Samarinda, and some timber freight vessels were always at anchor at the port of Samarinda. The volume of export in September, 1981 was assumed to reduce to 20,000 m<sup>3</sup>, and almost no ship was at anchor at the port. There were about 130 log producers in East Kalimantan in 1973, but the number reduced to less than 120 in 1978. (Annual exports of logs: 8,770,000 m<sup>3</sup>) (Fig. F8) In October, 1980 immediately after the first regulation was enforced in May, 1980, the number reduced to 102 as shown in Fig. F9.

At the time of survey conducted after the enforcement of the regulation in May, 1981, it is said that 50 per cent of the producers surviving from 1980 had already given up their business. In addition, it was predicted that the remaining 25 per cent of them might discontinue their business sooner or later. Thus, only big companies (remaining 25 per cent) could survive. That is, about 50 log producers could not make new investment in the construction of plywood mills because they had already cut almost all merchantable trees in their forest concessions, and it was said that about 30 companies could not construct their plywood mills by themselves. It was expected that medium and small producers might be consolidated in about 20 remaining big producers.

The prospect of reopening of log production depends on the construction of plywood mills. At present, the region has six plywood mills. The mills, together with two mills owned by local traders in

Surabaja can only consume about 1,000,000 m<sup>3</sup> annually. Therefore, the amount of logs permitted for export is only 250,000 m<sup>3</sup> annually. That amount accounts for only 3 per cent of the results of the export of logs in 1978. Even if plywood mills are constructed as scheduled by the government in the future, the amount of logs permitted for export is expected to be around 1,000,000 m<sup>3</sup> annually. That amount accounts for 12 per cent of the peak, and in addition, may require a few years to be achieved. While the forest resources preservation is carrying out after the era of log export has been over, the log process industry of Japan, Korea, Taiwan and Singapore that have been depending greatly on the Indonesian log will be affected by this.

It seems that temporary confusion is seen in the log production and demand even in Indonesia, particularly in the sawn timber industry.

Table 18 Timber Export by Exporters from East Kalimantan in 1978

No	Exporters	Loga(m)	Sawntimber (m)	Total(m)	Value(US.\$)
1.	Hararata Goy, PT.	323,725.51	—	323,715.51	16,529,411.18
2.	Kayu Mas, PT.	160,535.12	—	160,535.12	8,490,835.88
3.	Hutrinco, PT.	285,630.70	—	285,630.70	14,175,602.89
4.	Porodisa, PT.	263,874.22	—	263,874.22	13,589,835.02
5.	Rhasna Indochem, PT.	99,433.77	—	99,433.77	5,097,217.06
6.	Sangkulirang, PT.	246,062.15	—	246,062.15	11,617,629.64
7.	Sylva Duta, PT.	25,659.74	—	25,659.74	1,361,890.48
8.	Sima Agung, PT.	80,189.48	—	80,189.48	3,950,412.48
9.	United Wono, PT.	25,166.97	—	25,166.97	1,168,322.50
10.	Inhutani / United Wono, PT.	33,152.66	—	33,152.66	1,606,054.76
11.	Segara Timber, PT.	74,642.48	—	74,642.48	3,447,009.03
12.	Dwi Warna Timber, PT.	53,187.10	81.53	53,268.63	2,602,153.57
13.	Cita Timber, PT.	25,702.62	—	25,702.62	1,285,897.71
14.	Inhutani / Cita Timber, PT.	18,154.02	—	18,154.02	920,677.32
15.	Inhutani / Telen, PT.	12,900.94	—	12,900.94	677,879.36
16.	Bumi Subur, CV.	12,791.19	—	12,791.19	622,867.66
17.	Triaila, PT.	12,669.20	—	12,669.20	908,155.64
18.	Swarga, Pa.	1,583.11	—	1,583.11	78,385.98
19.	Gani Mulia Abadi, PT.	50,071.66	—	50,071.66	2,519,196.50
20.	Georgia Facitic, PT.	49,600.11	—	49,600.11	2,539,642.14
21.	Harapan Baru Bhakti, PT.	38,558.55	—	38,558.55	1,935,055.98
22.	Safdeco, PT.	86,114.90	—	86,114.90	4,531,877.12
23.	Jatirin, PT.	99,820.20	—	99,820.20	5,847,088.65
24.	AC. Timber, PT.	98,790.54	—	98,790.54	5,187,649.44
25.	Budi Dharma Bhakti, PT.	100,089.46	—	100,089.46	4,967,301.54
26.	Bumi Subur, PT.	20,686.50	—	20,686.50	1,047,739.86
27.	Bintang Baru, PT.	35,548.25	—	35,548.25	1,859,523.25
28.	East Kalimantan	59,427.97	—	59,427.97	3,044,891.32
29.	Haryati Timber, PT.	47,444.45	—	47,444.45	1,942,696.94
30.	Limbang Praja, PT.	10,979.15	—	10,979.15	592,489.74
31.	Mariman Timber, PT.	35,772.40	—	35,772.40	1,812,652.25
32.	Ratah Timber, PT.	143,209.67	—	143,209.67	7,465,831.08
33.	Sumber Mas Timber, PT.	282,560.60	394.13	282,954.73	14,753,667.84
34.	Tunggal Yusi Timber, PT.	112,309.20	1,719.56	114,028.76	5,958,646.78
35.	Triga, PT.	2,200.56	—	2,200.56	109,044.64
36.	Wijayakusuma, PT.	26,168.86	—	26,168.86	1,400,608.84
37.	Daya Usaha, PT.	69,299.98	—	69,299.98	3,469,439.38
38.	M.K.I., PT.	5,151.46	—	5,151.46	262,648.88
39.	Meratus Kalimantan, PT.	37,304.72	4,510.60	41,815.32	2,561,466.12
40.	Dayak Besar, PT.	19,261.58	—	19,261.58	1,036,776.39
41.	Avedoco, PT.	38,474.95	468.53	38,943.48	2,082,131.15
42.	Bhirawa Timber, PT.	47,299.62	—	47,299.62	2,417,551.94
43.	G.P.I., PT.	213,811.59	—	213,811.59	10,577,193.05
44.	Good Hope, PT.	167,210.00	—	167,210.00	8,976,125.76
45.	I.T.C.L., PT.	996,734.15	—	996,734.15	50,991,589.60
46.	Inhutani, PT.	34,642.28	509.14	35,151.40	1,872,078.02
47.	K.T.I., PT.	56,177.26	—	56,177.26	3,002,336.65
48.	Kayu Kalimantan, PT.	54,262.68	—	54,262.68	2,808,372.34
49.	Limbang Gnessa, PT.	27,721.69	—	27,721.69	1,422,913.64
50.	Lestari Jaya Utama, PT.	66,334.99	—	66,334.99	3,485,914.10
51.	Melapi Timber, PT.	101,198.28	—	101,198.28	5,196,961.60
52.	Inhutani / Sungai Mas, PT.	21,007.49	—	21,007.49	3,877,377.12
53.	Melapi Cq Sungai Mas, PT.	7,146.53	—	7,146.53	355,880.26
54.	Multi Forest, PT.	42,070.17	—	42,070.17	2,169,283.18
55.	M.K.T., PT.	27,654.28	—	27,654.28	1,394,808.24
56.	Overness Timber, PT.	108,045.56	—	108,045.56	5,356,449.64
57.	Perdana Kutai, PT.	35,412.59	—	35,412.59	1,877,827.54
58.	Rimba Samadera, PT.	82,023.40	—	82,023.40	4,328,583.14
59.	Rimba Nusantara, PT.	145,317.30	—	145,317.30	7,178,670.28
60.	U.D. Sampurna	70,962.57	—	70,962.57	3,672,612.78
61.	Oceanias, PT.	75,322.61	—	75,322.61	6,156,490.41
62.	Kayu Mahakam, PT.	74,476.89	—	74,476.89	3,954,887.61
63.	Inhutani / SMT, PT.	43,020.68	—	43,020.68	2,366,130.18

No	Exporters	Logs(m <sup>3</sup> )	Sawntimber (m <sup>3</sup> )	Total(m <sup>3</sup> )	Value(US\$)
64.	Belayan Riyer, PT.	1,683.58	--	1,683.58	97,484.84
65.	Weyerhaeue, PT.	73,978.34	--	73,978.34	3,970,263.36
66.	RDR Cq Inhutani	10,059.04	--	10,059.04	493,505.96
67.	Baltimur Lumber, PT.	68,002.24	--	68,002.24	3,516,403.88
68.	Baltimur Cq Inhutani, PT.	24,560.97	--	24,560.97	1,253,921.16
69.	Meranti Sakti Indonesia, PT.	35,277.06	--	35,277.06	1,848,894.66
70.	Hima Kalimantan, PT.	17,799.28	--	17,799.28	877,377.21
71.	ITCI/Cita, PT.	104,827.70	--	104,827.70	5,354,364.94
72.	B.F.I, PT.	140,680.89	--	140,680.89	7,355,727.51
73.	Weyco/Cita, PT.	190,131.08	--	190,131.08	9,995,996.52
74.	Bengen Timber, PT.	17,299.61	--	17,299.61	851,722.08
75.	Alas Kusuma, PT.	191,094.29	--	191,094.29	9,810,200.96
76.	Inno Dong Hwa, PT.	122,796.88	--	122,796.88	6,234,752.34
77.	Matiary Maja, PT.	40,346.04	--	40,346.04	2,000,972.28
78.	Telaga Mas, PT.	97,428.47	--	97,428.47	4,994,001.02
79.	Frima Wood, PT.	14,742.64	--	14,742.64	1,088,368.69
80.	Tanjung Raya, PT.	2,109.32	--	2,109.32	120,160.72
81.	Berau Timber/Halmahera Indah, PT.	39,772.29	--	39,772.29	3,046,678.26
82.	Inhutani/Makmambang Unit I PT.	57,220.89	--	57,220.89	2,920,380.24
83.	Inhutani/Wijaya Kusuma, PT.	43,463.17	--	43,463.17	2,295,111.10
84.	Inhutani/UIFL HK.	217,779.78	--	217,779.78	10,836,273.11
85.	Makmambang Unit II, PT.	72,708.62	--	72,708.62	3,785,008.08
86.	Troyana, PT.	13,439.81	--	13,439.81	647,035.54
87.	Gempu Indonesia Limited PT.	132,606.09	--	132,606.09	6,729,878.16
88.	Rantai Harapan/Daya Usaha CV.	35,149.20	--	35,149.20	1,608,951.60
89.	Daisy Timber, PT.	57,452.93	--	57,452.93	3,013,552.80
90.	Tabalar Wood, PT.	70,840.23	--	70,840.23	3,742,373.08
91.	Inhutani/Kahold I, PT.	35,469.15	--	35,469.15	1,922,157.02
92.	Sumber Sejahtera, PT.	16,702.57	--	16,702.57	884,072.26
93.	Inhutani/Tarakan Jaya, PT.	2,379.95	--	2,379.95	125,079.60
94.	Sentosa Kalimantan Jaya, PT.	34,486.61	--	34,486.61	1,830,973.00
95.	Pantai Harapan/Eka Satya Raya, PT.	20,872.22	--	20,872.22	922,036.74
96.	United Timber Jaya,	32,569.37	506.48	33,075.85	1,780,381.08
97.	Inhutani/Rimba Jaya Raya.	12,756.80	--	12,756.80	1,167,697.95
98.	Inhutani Unit II, Kahold Unit III, PT.	45,892.56	--	45,892.56	2,535,300.18
99.	Inhutani Unit II/Kalindo Jaya, CV.	21,502.11	--	21,502.11	1,046,206.50
100.	Inhutani Unit II/Kalindo IV.	19,482.52	--	19,482.52	1,406,315.85
101.	Indo Meranti/II Indah PT.	12,496.75	--	12,496.75	735,692.43
102.	Mula Bhakti, PT.	21,995.37	--	21,995.37	1,630,524.64
103.	Sinar Terang Jaya, CV.	10,163.97	--	10,163.97	422,193.44
104.	Inhutani II/MSK, PT.	2,400.21	--	2,400.21	152,607.72
105.	MSK Timber, PT.	2,255.79	--	2,255.79	187,928.47
106.	Inhutani I/Kahold IV, PT	14,921.90	--	14,921.90	851,026.54
107.	Inhutani I/Kalindo Jaya	51,646.07	--	51,646.07	2,567,615.80
108.	R.K.T.P., PT.	269,288.75	1,004.71	270,293.46	12,618,881.46
109.	Inhutani/STC Semoga, PT.	341.28	--	341.28	45,203.78
110.	Inhutani/General Wood, PT.	8,671.31	--	8,671.31	429,463.86
111.	Inhutani/Hutan Mas, PT.	14,615.71	--	14,615.71	746,868.86
112.	Inhutani/Terang Jaya, PT.	8,039.83	--	8,039.83	384,338.18
113.	Inhutani/Konahutan In, PT.	87,246.95	--	87,246.95	4,313,548.63
114.	Inhutani/Murni CV.	5,529.36	--	5,529.36	298,995.26
115.	Inhutani/Nasalabi Unit I.	23,777.81	--	23,777.81	1,206,728.58
116.	KKC/Kayu Rawa Jaya	8,997.43	--	8,997.43	330,259.38
117.	Edy Tunggal, PT.	17,567.61	--	17,567.61	942,020.36
118.	Inhutani/Eddy Tunggal, PT.	3,761.08	--	3,761.08	187,210.80
119.	Inhutani/Terang Jaya Nugraha, PT.	22,087.00	--	22,087.00	1,168,668.00
120.	Chipdeco	73,012.00	--	73,012.00	1,365,180.00
121.	Inhutani/Nunukan, PT.	113,353.01	--	113,353.01	5,850,133.10
122.	Yamaker, PT.	126,393.91	--	126,393.91	6,529,352.60
123.	Karyasa Kencana	3,376.00	--	3,376.00	23,362.00
124.	Sebatik Abadi, PT.	12,685.14	--	12,685.14	633,117.78
125.	Bumi Raya, PT.	1,874.89	--	1,874.89	53,037.95
126.	Terang, CV.	--	202.00	202.00	12,735.82
127.	Sinar Timur, PT.	--	567.97	567.97	66,680.47
	Total	8,773,622.72	9,964.65	8,783,587.37	454,352,252.18

Note: One company appears in several places of shipment

Source: P.T. CITI

Table 19 Name List of Logging Company in East Kalimantan (As of October 1980)

Name	Name	Name	Name
① P.T. Yamaker	② P.T. Dayak Besar Timber	⑤ P.T. Hanarata Timber Coy	⑧ P.T. Sahid Timber/Sumber Mas
② P.T. Porodisa Trading Co. Ltd.	③ P.T. Sumber Sejahtera	- Hanarata Unit Berau	⑩ P.T. Panca Olah Rimba
③ P.T. Dayak Besar Timber	④ P.T. Bhirawa Timber	- Hanarata Unit Sangkulirang	⑫ P.T. Tunggal Tusi Timber
④ P.T. Satya Dyaya Raya	⑤ P.T. Astini	⑥ P.T. Pantai Harapan	⑬ P.T. Sumber Mas I
⑤ P.T. Limbung Gameca	⑥ P.T. Enda Mas Timber Cut	⑦ P.T. Avedeco	⑭ P.T. Meranti Sakti Indonesia I
⑥ P.T. I.T.C. I	⑦ P.T. Segara Timber Coy	⑧ P.T. Karyasa Kencana	⑮ P.T. Suwani Jaya
⑦ P.T. Sylvaduta Corporation	⑧ P.T. Dwi Warna Timber	⑨ P.T. Sahid Timber	⑯ P.T. Buana Lestari
⑧ P.T. Gonpu Indonesia	⑨ P.T. Balikpapan Forest Industries	⑩ P.T. R.T. Melapi	P.T. Multi Forest
⑨ P.T. Kayu Mahakam	⑩ P.T. Pula Laut Timber Coy	- Melapi Unit Sumbermas Timber	⑰ P.T. Jatitrin
⑩ P.T. Sangkulirang	⑪ P.T. Tanah Grogot	- Melapi Sendiri	⑱ P.T. Hayam Wuruk
⑪ Fa. Swarga	⑫ P.T. M.S.K. Timber	⑬ P.T. Edi Mulyo Corporation	⑲ P.T. Metro Dhaya Buana
⑫ P.T. Kaltimex Jaya	⑬ P.T. Wijaya Kesuma	⑭ P.T. Sumber Mas Timber I	⑳ P.T. Bengen Timber
⑬ P.T. Telaga Mas Kalimantan	⑭ P.T. Oceania Timber Products	⑮ P.T. Sumber Mas Timber II	㉑ P.T. Meranti Sakti Indonesia II
⑭ P.T. Kutai Timber Indonesid	⑮ P.T. Gani Mulya Abadi	⑯ P.T. Meratus Kalimantan Timber	㉒ P.T. Sumber Mas
⑮ P.T. Mutiari Mara	⑯ P.T. Meratus Kalimantan Timber	⑰ P.T. Lestari Jaya Utama	㉓ P.T. Belayan
⑯ P.T. Sima Agung	⑰ P.T. Gunung Gajah/Rimba Samudra	⑱ P.T. General Wood Industries	㉔ P.T. Basumex/Rimba Nusantera
⑰ P.T. Rainh Timber Coy	⑱ P.T. Adidy Timber	㉑ P.T. A.C. Timber Raya	㉕ P.T. Gunung jati Rimba
⑱ P.T. Georgia Pacific Indonesia	㉒ P.T. Sumber Kayan Raya	㉒ P.T. Hariati Timber Industries	㉖ P.T. Gata Ratu
㉑ P.T. Satdeco	㉓ P.T. Harapan Baru Bhaki	㉓ P.T. Panambangan	㉗ P.T. Marimun Timber
㉒ P.T. Cidatim	㉔ P.T. East Kalimantan Timber Industries	㉔ P.T. Cinta Satya Pusada	㉘ P.T. Gama Mula Raya
㉓ P.T. Inne Gong Who	㉕ P.T. Alas	㉕ P.T. Perada Bumi Hijau	㉙ P.T. Alas Helan
㉔ P.T. Dayak Besar	㉖ P.T. Kayu Mas Timber	㉖ P.T. B.D.B.D.R	㉚ P.T. Naki Marga Jaya
㉕ P.T. Sebatik Abadi	㉗ P.T. Berau Timber Coy	㉗ P.T. Mayangtara Upaya	㉛ P.T. Lestari Greenland Utama
㉖ P.T. Limbung Proja	㉘ P.T. Tanjung Aru Alpino	㉘ P.T. Dana Mula Bakti	㉜ P.T. Putra Lestari
㉗ P.T. Baltimur Lumber - Unit Indomark - Unit Paragon	㉙ P.T. Rejosani Bumi	㉙ P.T. Inbutani I Unit I	
㉘ P.T. Sentosa Kalimantan Jaya	㉚ P.T. Kayu Kalimantan	㉚ P.T. Inbutani I Unit I	
㉙ P.T. Roshra Irdadrem	㉛ P.T. Djsyanti Jaya	㉛ P.T. Kayan River Timber Products	
㉚ P.T. Tabalar Wood Industries	㉜ P.T. Alen Timber Raya		