

*Master Plan Study on Lower Asahan River Basin Development*

*Vol. 3  
Agricultural Development Plan*

## **Appendix 3-B**

# **Agriculture and Agro-economy**



**Appendix 3-B**  
**AGRICULTURE AND AGRO-ECONOMY**

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Table B-1 GDP OF INDONESIA AND GDRP OF NORTH SUMATRA,  
MEDAN AND KABUPATEN/KOTAMADYA CONCERNED, 1983-1986

	(Unit: Rp. million)				
	1983	1984	1985	1986	Average of Annual Growth Rate (%) 1983/86 or 84/86
<b>A. INDONESIA</b>					
1. Agriculture		20,333,900	22,412,000	24,921,600	123
2. Mining & Quarrying		15,985,800	15,403,600	10,740,900	67
3. Manufacturing		11,081,600	12,713,300	13,899,900	125
4. Electricity, Gas & Water Supply		655,200	781,300	858,000	131
5. Construction		4,756,800	5,301,800	5,242,600	110
6. Trade, Hotel & Restaurant		13,973,500	14,561,400	16,081,200	115
7. Banking / Insurance		2,691,800	2,802,400	3,279,500	122
8. Others		17,576,200	13,079,000	12,031,100	68
<b>B. NORTH SUMATERA PROVINCE</b>					
1. Agriculture	1,021,363	1,269,058	1,408,833	1,688,403	165
2. Mining & Quarrying	1,545	1,725	1,896	2,055	133
3. Manufacturing	453,747	621,853	681,055	747,753	165
4. Electricity, Gas & Water Supply	25,036	35,805	46,285	55,641	222
5. Construction	158,938	172,150	174,878	179,642	113
6. Trade, Hotel & Restaurant	508,271	599,556	632,302	727,200	143
7. Banking / Insurance	211,592	256,123	288,789	317,960	150
8. Others	3,131,126	3,886,811	4,240,954	4,838,966	155
<b>C. MEDAN</b>					
1. Agriculture	25,887	34,679	42,840	52,756	204
2. Mining & Quarrying	5	7	10	14	269
3. Manufacturing	108,767	145,061	169,419	174,378	160
4. Electricity, Gas & Water Supply	18,868	26,817	34,576	41,712	221
5. Construction	55,164	56,558	56,162	61,204	111
6. Trade, Hotel & Restaurant	263,710	290,312	275,656	317,418	120
7. Banking / Insurance	109,873	135,537	154,638	171,161	156
8. Others	870,267	1,038,908	1,107,355	1,236,003	142
<b>D. KABUPATEN ASAHAN</b>					
1. Agriculture	133,372	162,865	172,351	213,739	160
2. Mining & Quarrying	93	104	115	125	135
3. Manufacturing	13,380	197,953	186,318	226,459	1692
4. Electricity, Gas & Water Supply	406	592	794	932	230
5. Construction	15,338	15,872	15,844	15,323	100
6. Trade, Hotel & Restaurant	37,150	48,739	56,463	64,428	173
7. Banking / Insurance	15,641	11,271	12,736	14,441	92
8. Others	366,553	483,002	493,056	589,670	161
<b>E. LABUHAN BATU</b>					
1. Agriculture	94,476	117,295	123,989	169,028	179
2. Mining & Quarrying	137	156	176	189	138
3. Manufacturing	39,980	53,762	62,900	65,835	165
4. Electricity, Gas & Water Supply	453	647	866	1,019	225
5. Construction	6,151	6,421	6,418	6,198	101
6. Trade, Hotel & Restaurant	29,492	38,247	44,614	51,503	175
7. Banking / Insurance	8,610	10,011	11,247	12,354	143
8. Others	213,629	268,690	294,031	354,912	166

Note: (\*) : by industrial origin at current market price

Table B-2 GDP OF INDONESIA AND GDRP OF NORTH SUMATRA, MEDAN AND KABUPATEN/KOTAMADYA CONCERNED, 1984-1986 AT CONSTANT PRICE 1983

	1983	1984	1985	1986	(Unit: Rp. million) Average of Annual Growth Rate (%) 1983/86 or 84/86
<b>A. INDONESIA</b>					
1. Agriculture		18,431,100	19,209,000	19,687,000	107
2. Mining & Quarrying		14,788,700	13,980,500	14,572,000	99
3. Manufacturing		9,770,300	10,579,100	11,161,500	114
4. Electricity, Gas & Water Supply		550,300	594,900	633,700	115
5. Construction		4,393,800	4,508,000	4,197,600	96
6. Trade, Hotel & Restaurant		12,159,700	12,363,000	12,730,300	105
7. Banking / Insurance		2,422,300	2,430,600	2,558,500	106
8. Others		15,628,200	16,245,700	16,933,900	108
<b>B. NORTH SUMATERA PROVINCE</b>					
1. Agriculture		1,129,279	1,174,921	299,626	27
2. Mining & Quarrying		1,583	1,620	1,657	105
3. Manufacturing		494,806	529,487	563,738	114
4. Electricity, Gas & Water Supply		25,852	28,937	34,503	133
5. Construction		160,453	155,226	150,959	94
6. Trade, Hotel & Restaurant		513,238	521,885	560,254	109
7. Banking / Insurance		225,551	233,710	245,992	109
8. Others		3,388,374	3,510,320	3,754,203	111
<b>C. MEDAN</b>					
1. Agriculture		29,127	32,828	25,622	88
2. Mining & Quarrying		7	8	11	167
3. Manufacturing		118,121	134,503	135,578	115
4. Electricity, Gas & Water Supply		19,336	21,624	25,818	134
5. Construction		55,379	53,048	53,632	97
6. Trade, Hotel & Restaurant		253,264	239,785	245,794	97
7. Banking / Insurance		120,621	125,472	133,935	111
8. Others		906,636	924,742	963,136	106
<b>D. KABUPATEN ASAHAN</b>					
1. Agriculture		148,367	150,517	168,928	114
2. Mining & Quarrying		96	98	101	106
3. Manufacturing		149,736	137,203	158,602	106
4. Electricity, Gas & Water Supply		424	486	577	136
5. Construction		15,484	14,979	13,924	90
6. Trade, Hotel & Restaurant		39,630	44,119	49,328	124
7. Banking / Insurance		9,753	10,094	10,915	112
8. Others		404,404	398,745	444,839	110
<b>E. LABUHAN BATU</b>					
1. Agriculture		107,158.63		123,168.39	115
2. Mining & Quarrying		143.54		152.48	106
3. Manufacturing		43,486.78		51,062.58	117
4. Electricity, Gas & Water Supply		464.80		633.90	136
5. Construction		6,209.54		5,542.13	89
6. Trade, Hotel & Restaurant		31,592.09		39,449.92	125
7. Banking / Insurance		8,738.57		9,328.27	107
8. Others		234,896.32		268,190.34	114



Table B-3 EXPORT &amp; IMPORT OF MAJOR COMMODITY IN INDONESIA 1983-1987

	1983	1984	1985	1986	1987
<b>A. EXPORT</b>					
Rubber (000 M.Ton)	938.0	1,009.5	1,009.9	958.7	1,033.4
(000 000 US \$)	843.5	984.6	716.6	711.5	847.4
Fertilizers (000 M.Ton)	343.0	262.3	684.5	1,537.0	576.6
(000 000 US \$)	46.8	37.2	80.0	127.3	46.2
Tea (000 M.Ton)	68.6	85.7	90.1	79.0	89.9
(000 000 US \$)	120.4	226.3	149.1	99.1	115.8
Coffee (000 M.Ton)	241.6	294.9	285.9	298.5	291.1
(000 000 US \$)	429.9	567.9	561.9	821.7	541.8
Tobacco (000 Kg)	22,551.0	19,316.8	20,226.6	23,092.0	19,821.3
(000 US \$)	38,282.7	32,948.6	43,084.8	62,529.7	65,867.1
Palm Oil (000 M.Ton)	345.8	127.9	518.8	566.9	404.9
(000 000 US \$)	111.5	63.3	189.4	112.9	109.9
White Pepper (000 Kg)	15,076.7	8,635.0	12,120.3	16,265.4	18,164.5
(000 US \$)	20,066.0	22,792.0	41,395.6	83,969.8	93,017.9
Black Pepper (000 Kg)	29,984.2	25,182.4	14,081.3	13,301.0	18,164.5
(000 US \$)	31,932.4	41,445.0	3,975.8	52,964.4	42,648.6
Teak wood (000 Kg)	5,035.2	26,356.3	32,107.3	32,250.4	28,026.7
(000 US \$)	2,718.8	16,834.0	20,245.0	21,634.6	20,288.6
Wood (000 M. Ton)	2,983.0	2,476.7	1,294.6	1,372.5	1,758.7
(000 000 US \$)	341.8	358.2	235.0	271.1	407.0
Crude oil (000 M. Ton)	54,894.4	50,055.5	39,126.1	44,454.0	40,161.5
(000 000 US \$)	12,600.0	11,021.4	8,251.3	4,593.3	5,331.7
Petroleum/Petroleum Product (000 M. Ton)	59,755.9	57,229.3	43,195.0	51,657.9	48,411.9
(000 000 US \$)	315.8	276.3	246.5	153.3	143.3
Weaving yarns, textile and its product (000 Kg)	31,160.2	51,030.2	61,539.8	71,947.2	97,226.5
(000 US \$)	120,511.4	200,474.7	239,823.4	306,802.0	401,993.8
Ready made clothes (000 Kg)	22,049.5	31,932.5	37,974.6	56,451.6	50,407.3
(000 US \$)	157,158.9	295,743.3	339,121.9	521,965.6	537,662.9
Shrimp (000 Kg)	26,166.2	28,025.4	30,979.6	36,101.0	43,348.7
(000 US \$)	194,447.1	195,551.6	202,707.5	284,875.5	360,326.8
Gas (000 M. Ton)	10,272.3	15,038.0	15,789.1	16,250.2	17,336.6
(000 000 US \$)	2,582.8	3,541.1	3,634.5	2,775.6	2,491.7
Plywood (000 Kg)	1,253,432.4	1,763,154.2	231,682.9	2,582,122.3	3,344,846.6
(000 US \$)	509,410.8	667,859.0	824,718.8	1,002,379.5	1,594,841.3
Others					
<b>Total (1000 ton)</b>	<b>1,509,158.1</b>	<b>2,052,212.7</b>	<b>511,751.2</b>	<b>2,912,633.1</b>	<b>3,686,745.4</b>
<b>(106 US \$)</b>	<b>908,448.6</b>	<b>1,304,078.8</b>	<b>1,531,878.5</b>	<b>2,064,636.8</b>	<b>2,770,301.7</b>
<b>B. IMPORT</b>					
Rice (000 M. Ton)	1,168.8	414.3	33.8	27.8	83.9
(000 000 US \$)	384.0	132.1	8.8	5.9	19.6
Fertilizers (000 M. Ton)	913.6	619.8	429.3	133.6	238.1
(000 000 US \$)	139.0	91.5	60.4	23.2	45.7
Cement (000 M. Ton)	691.2	70.5	14.9	6.3	3.2
Crude Petroleum/Products (000 M. Ton)	12,564.8	10,099.6	5,199.7	5,825.6	7,881.4
(000 000 US \$)	4,144.2	2,696.7	1,275.5	1,086.3	1,275.0
Iron & Steel tubes (000 M. Ton)	266.0	216.2	164.9	167.5	138.8
Motor Vehicles ( unit)	142,880.0	167,752.0	79,870.0	34,224.0	29,816.4
(000 000 US \$)	474.3	566.2	216.1	171.4	143.8
Machinery (000 M. Ton)	259.3	201.1	139.2	146.1	240.8
(000 000 US \$)	1,687.9	1,133.1	879.9	832.7	991.2
Others					
<b>Total (1000 ton)</b>	<b>158,743.7</b>	<b>179,373.5</b>	<b>85,851.8</b>	<b>40,530.9</b>	<b>38,402.6</b>
<b>(10<sup>6</sup> US \$)</b>	<b>15,595.2</b>	<b>12,237.9</b>	<b>6,552.0</b>	<b>6,995.4</b>	<b>9,217.8</b>

Table B-4 VALUE OF EXPORT BY SITC GROUPS 1983-1987

(FOB Value: 000,000 US\$)

SITC (1)	Commodity Group (2)	1983 (3)	1984 (4)	1985 (5)	1986 (6)	1987 (7)
0	Food Stuff & Live Animals	1,093.1	1,368.5	1,383.1	1,773.8	1,581.7
1	Beverages & Tobacco	47.8	43.5	48.7	68.7	82.2
2	Raw materials in edible	1,649.7	1,761.9	1,403.1	1,473.1	1,725.7
3	Related materials	16,153.0	16,044.6	12,757.3	8,309.6	9,585.5
4	Oils & Fats	148.7	174.9	414.1	165.7	174.7
5	Chemicals	119.0	169.7	210.0	260.3	200.7
6	Manufactured goods classified chiefly by materials	1,349.7	1,565.3	1,804.4	1,984.4	3,044.0
7	Machinery & Transport equipment	133.3	223.2	98.0	62.6	54.7
8	Miscellaneous manufactured articles	213.2	372.2	437.1	678.0	657.1
9	Commodities & Transactions not classified according to kind	238.4	164.0	30.9	28.8	130.9
	<b>Total</b>	<b>21,145.9</b>	<b>21,887.8</b>	<b>18,586.7</b>	<b>14,805.0</b>	<b>17,237.2</b>

Table B-5 VALUE OF IMPORT BY SITC GROUPS 1983-1987

(FOB Value: 000 000 US \$)

SITC (1)	Commodity Group (2)	1983 (3)	1984 (4)	1985 (5)	1986 (6)	1987 (7)
0	Food Stuff & Live Animals	1,134.5	676.2	556.1	610.0	686.3
1	Beverages & Tobacco	27.8	29.1	20.9	28.1	30.4
2	Crude materials inedible	675.6	883.4	729.0	830.1	923.6
3	Minerals fuels, lubricants related materials	4,149.9	2,705.1	1,287.7	1,106.9	1,423.8
4	Animals & vegetables oils & Fats	12.1	51.7	35.5	17.9	108.2
5	Chemicals	1,893.0	2,137.4	1,916.6	1,909.7	2,394.6
6	Manufactured goods classified chiefly by materials	2,351.5	1,885.1	1,717.9	1,668.3	1,701.9
7	Machinery & Transport equipment	5,684.0	5,036.9	3,617.0	4,117.5	4,548.6
8	Miscellaneous manufactured articles	358.8	378.6	331.9	389.3	429.9
9	Commodities & Transactions not classified according to kind	64.6	98.6	46.5	40.6	81.2
	Total	16,351.8	13,882.1	10,259.1	10,718.4	12,328.5

Table B-6 IMPORT OF RICE BY COUNTRY OF ORIGIN 1983-1987

Country of Origin (1)	1983 (2)	1984 (3)	1985 (4)	1986 (5)	1987 (6)
Net weight : 000 M. Ton					
Japan	71.1	65.8	0.0	0.0	-
Republic of China	397.5	63.2	-	-	1.6
Thailand	336.3	22.5	24.3	25.9	0.4
Philippines	24.2	0.0	0.0	-	76.9
Burma	171.9	62.9	-	0.4	-
U.S.A	73.8	57.3	2.8	1.3	-
Others	94.0	142.6	6.7	0.2	5.0
<b>Total</b>	<b>1,168.8</b>	<b>414.3</b>	<b>33.8</b>	<b>27.8</b>	<b>83.9</b>
CIF. Value : 000 000 US \$					
Japan	21.7	20.4	0.0	0.0	-
Republic of China	127.6	19.6	-	-	0.4
Thailand	102.5	5.5	3.8	5.2	0.1
Philippines	12.8	0.0	0.0	-	17.6
Burma	51.4	18.8	-	0.1	-
U.S.A	28.7	21.2	1.5	0.5	-
Others	39.3	46.6	3.5	0.1	1.5
<b>Total</b>	<b>384.0</b>	<b>132.1</b>	<b>8.8</b>	<b>5.9</b>	<b>19.6</b>

Table B-7

## SOIL AND LAND CLASSIFICATION ON POTENTIAL AREA FOR AGRICULTURAL DEVELOPMENT

Soil Units	Soil Type/Associations 2)	Land System	Land Class			Distribution	
			Paddy Crop	Tree Crop	Upland Crop	Area (ha)	Proportion (%)
Partly ripened poorly drained low land soils	Halaquepts (f), Tropaquepts (f) Tropaquents (f), Tropohemists (t) Sulfaquents (t)	Tidal flat above storm level	S2	S3	S3	29,100	16.3
Unripened poorly drained low land soils	Hydraquents (p), Sulfaquents (m)	Tidal flat	S2	S3	S3	19,030	10.6
Coastal swamp soils	Hydraquents (p), Sulfaquents (m)	Coastal swamp, mangrove veg.	S3	N	N	5,770	3.2
Fine textured alluvial soils	Tropaquents (d), Dystrypepts (f) Tropofluents (f), Tropofibrists (t)	Alluvial valleys	S2	S2	S3	34,240	19.2
Coarse to fine textured alluvial soils 3)	Tropaquents (d), Dystrypepts (f) Tropofluents (f)	Alluvial plains	S2	S2	S3	-	-
Moderately deep organic soils	Troposaprists (p), Tropaquents (f)	Peat dome peat depth 0.5-2n	S3	S2	S3	52,470	29.1
Deep organic soils	Troposaprists (p), Tropaquents (f)	Peat dome peat depth >2n	S3	S2	S3	8,250	4.5
Flat volcanic tuff soils	Dystrypepts (p), Tropaquepts (m) Kanhapludults (t)	Flat plains and fans of Toba tuff	S2	S2	S2	29,370	16.4
Cently sloping volcanic tuff soils	Dystrypepts (p), Hapludults (m)	Cently sloping foot slopes of Toba tuff	S3	S2	S3	460	0.3
Steep mountain soils 3)	Humitropepts (d), Dystrypepts (m) Tropothents (f)	Strongly dissected mountains	N	N	N	-	-
Total						178,690	100

## Note:

- 1) Distribution of potential acid sulphate soil is not considered in classification, due to data on the distribution and depth of the same layer unavailable.
- 2) p-predominant (>75%), d-dominant (50-75%), f-fair (25-50%)  
m-minor (10-25%), t-trace (<10%)
- 3) Not distributed in the potential area for agricultural development.

Table B-8 PRELIMINARY CRITERIA FOR LAND CLASSIFICATION

Soil & Land Characteristics	Paddy				Tree Crop			
	Class 1	Class 2	Class 3	N	Class 1	Class 2	Class 3	N
Effective soil depth (cm)	>100	50-100	20-50	<20	>100	75-100	50-75	<50
Texture	fine	medium-fine	coarse	stony	medium-fine	fine	coarse	-
Acidity (pH)	>5.5	4.0-5.5	3.5-4.0	3.5	>5.5	4.0-5.5	3.5-4.0	<3.5
ECe (ms)	<4	4-8	8-16	>16	<4	4-8	8-16	>16
Peat thickness (cm) & degree of decomposition	sapric: <30	sapric: 30-50 hemic: <30 fibric: <30	sapric: - hemic: 30-100 fibric: 30-100	hemic: >100 fibric: >100	sapric: <50	sapric: - hemic: <50 fibric: <50	hemic: <50-200 fibric: <50-200	hemic: >200 fibric: >200
Drainability	poor-moderate	poor-very poor moderate-well	well-excessive	excessive	moderate-well	moderate	poor	excessive very poor
Topography (slope, %)	<0.5	0.5-2	2-5	>5	<3	3-8	8-15	>15

Soil & Land Characteristics	Upland Crop			
	Class 1	Class 2	Class 3	N
Effective soil depth (cm)	>100	50-100	20-50	<20
Texture	medium-fine	fine	coarse	stony
Acidity (pH)	>5.5	4.5-5.5	4.0-4.5	<4.0
ECe (ms)	<4	4-8	8-16	>16
Peat thickness (cm) & degree of decomposition	sapric: <50	sapric: 50-100 hemic: <30 fibric: <30	sapric: - hemic: 30-200 fibric: 38-100	hemic: >200 fibric: >200
Drainability	moderate-well	moderate-poor	poor	very poor excessive
Topography (slope, %)	<3	3-5	5-8	>8

Table B-9 POPULATION IN STUDY AREA, KABUPATEN & KOTAMADYA CONCERNED, NORTH SUMATRA, SUMATRA AND INDONESIA IN 1971 - 1987

Region	Area (km <sup>2</sup> )	Population				Average Growth Rate of Population per Annum (%)			Population Density per km <sup>2</sup>		
		1971	1980	1983	1987	1971/80	1980/83	1980/87	1980	1983	1987
Indonesia	1,919,443	119,208,229	147,490,298	158,082,700	*	2.4	2.3	*	77	82	*
Sumatra	473,606	20,808,148	28,016,160	30,928,500	*	3.4	3.3	*	59	65	*
North Sumatra	70,787	6,621,831	8,360,894	9,023,520	9,901,862	2.6	2.5	2.3	119	127	140
<b>Area concerned the study area</b>											
Kab. Asahan	4,681	593,584	774,980	800,069	880,286	3.0	1.1	2.4	166	171	188
kab. Labuhan Batu	9,323	360,153	547,171	591,275	667,371	4.8	2.6	3.1	59	65	72
Kodya Tanjung Balai	1.9	33,535	41,776	42,814	45,581	2.5	0.8	1.6	21,987	22,534	23,990
<b>Total</b>	<b>14,005.9</b>	<b>987,272</b>	<b>1,363,927</b>	<b>1,434,158</b>	<b>1,593,238</b>	<b>3.7</b>	<b>1.7</b>	<b>2.4</b>	<b>97</b>	<b>102</b>	<b>114</b>
<b>Study Area</b>											
Kab. ASahan	4,043	426,934	582,299	603,405	664,826	3.5	1.2	2.5	144	149	164
Kab. Labuhan Batu	1,906				149,779	5.2	1.2	0.9	67	69	79
Kodya Tanjung Balai	1.9	33,535	41,776	42,814	44,181	2.5	0.8	0.8	21,987	22,534	23,253
<b>Total</b>	<b>5,950.9</b>				<b>858,786</b>	<b>3.7</b>	<b>1.2</b>	<b>2.1</b>	<b>120</b>	<b>124</b>	<b>144</b>

Source: Sensus Penduduk 1971; Penduduk Propinsi Sumatera Utara Menurut Kabupaten/Kotamadya dan Kecamatan, 1980 and 1987; Statistik Indonesia 1983 and 1987.

Table B-10 POPULATION DISTRIBUTION BY KECAMATAN/DAERAH  
IN THE STUDY AREA IN 1980 AND 1987

Kecamatan/ Kotamadya	Area (km2)	Population			Average Growth Rate per Annum (%) 1980/1987	Population Density per km2 in 1987	Sex Ratio %		No. of Total Household 1987	Average Family Size 1987	Estimated No. of Farm Household (1) 1987	Percentage of Farm Household to T. Household in 1983 (%)
		1980	1983	1987			Male	Female				
<b>Kab. Asahan</b>												
1. Kota Kisaran Timur	38.9	126,323	36,247	49,094	7.9	1,261	49.55	50.45	8,093	6.1	817	10.1
2. Kota Kisaran Barat	33.0		52,120	51,823	*	1,572	49.98	50.02	9,356	5.5	879	9.4
3. Tanjung Tiram	283.7	68,608	68,818	75,998	2.5	268	51.62	48.38	14,307	5.3	9,614	67.2
4. Meranti	285.0		52,456	54,574	*	192	50.07	49.93	9,898	5.5	6,958	70.3
5. Buntu Pane	435.5	48,702	49,456	55,116	2.7	127	51.06	48.94	10,913	5.1	8,807	80.7
6. Bandar Pasir Mandoge	651.0	14,143	16,955	22,185	6.9	34	49.06	50.94	5,013	4.4	3,439	68.6
7. Air Joman	155.0	38,866	40,081	43,157	1.9	278	49.45	50.55	7,603	5.7	5,170	68.0
8. Tanjung Balai	154.0	61,524	61,888	72,110	3.9	468	48.67	51.33	14,402	5.0	6,222	43.2
9. Sei Kepayang	464.0	36,308	36,622	37,243	0.4	80	49.24	50.76	6,752	5.5	4,679	69.3
10. Simpang Empat	184.8	33,950	34,882	38,638	2.6	209	49.31	50.69	7,175	5.4	4,606	64.2
11. Air Batu	190.7	57,122	52,169	54,940	1.3	288	49.46	50.54	10,510	5.2	7,494	71.3
12. Pulau Rakyat	432.0	62,219	65,258	68,863	1.3	159	49.42	50.58	14,046	4.9	9,242	65.8
13. Bandar Pulau	735.0	34,534	36,453	41,085	3.0	56	49.89	50.11	8,454	4.9	6,045	71.5
<b>Total (A)</b>	<b>4,042.6</b>	<b>582,299</b>	<b>603,405</b>	<b>664,826</b>	<b>2.5</b>	<b>164</b>	<b>49.84</b>	<b>50.16</b>	<b>126,522</b>	<b>5.3</b>	<b>73,972</b>	<b>58.5</b>
<b>Kab. Lsb. Batu</b>												
1. Kualuh Hulu	982.0	90,760	95,164	97,230	0.5	99	50.53	49.47	18,599	5.2	11,755	63.2
2. Kualuh Hilir*	726.0	43,885	43,971	48,232	2.3	66	50.47	49.53	9,645	5.0	7,620	79.0
3. Aek Natas*	928.0	40,919	42,272	43,558	0.7	47	50.34	49.66	8,467	5.1	5,436	64.2
<b>Total (B)</b>	<b>2,636.0</b>	<b>175,564</b>	<b>181,407</b>	<b>189,020</b>	<b>0.9</b>	<b>72</b>	<b>50.47</b>	<b>49.53</b>	<b>36,711</b>	<b>5.1</b>	<b>24,811</b>	<b>63.2</b>
<b>Total (B)*</b>	<b>1,905.6</b>			<b>149,779</b>					<b>28,989</b>		<b>19,353</b>	<b>66.8</b>
<b>Kotamadya Tg. Balai</b>												
1. Tg. Balai Kota I	0.5	8,804	9,031	9,591	1.5	19,182	49.39	50.61	1,547	6.2		
2. Tg. Balai Kota II	0.6	15,905	15,919	16,373	0.7	27,288	46.64	53.36	2,964	5.5		
3. Tg. Balai Kota III	0.3	7,605	7,996	8,382	1.2	27,940	14.66	85.34	1,599	5.2		
4. Tg. Balai Kota IV	0.5	9,462	9,868	9,835	-3.3	19,670	49.80	50.20	1,763	5.6		
<b>Total (C)</b>	<b>1.9</b>	<b>41,776</b>	<b>42,814</b>	<b>44,181</b>	<b>0.8</b>	<b>23,253</b>	<b>48.36</b>	<b>51.64</b>	<b>7,873</b>	<b>5.6</b>	<b>1,740</b>	<b>22.1</b>
<b>Grand Total</b>												
<b>(A + B + C)</b>	<b>6,680.5</b>	<b>799,639</b>	<b>827,626</b>	<b>898,027</b>	<b>2.1</b>	<b>134</b>	<b>49.88</b>	<b>50.12</b>	<b>171,106</b>	<b>5.2</b>	<b>100,523</b>	<b>59.9</b>
<b>Grand Total</b>												
<b>(A + B' + C)*</b>	<b>5,950.1</b>			<b>858,786</b>					<b>163,384</b>		<b>95,065</b>	<b>58.4</b>

\*: In the study area, area of Kualuh Hulu and Kualuh Hilir is 471.7 km2 and 451.9 km2. Population and no. of household is estimated based on the area.  
(1): No. of farm household is estimated on the basis of percentage of farm household to total household in 1983 agri. census.



Table B-11 POPULATION CLASSIFIED BY OCCUPATION  
IN THE STUDY AREA IN 1987

Kecamatan/ Kotamadya	Farmer	Fishermen	Trader	Labor of NGO	Armyforce & Labor of G	Landless Farmer	Un- employed	Total
<b>Kab. Asahan</b>								
1. Kota Kisaran Timur	3,085	-	1,860	2,757	1,880	2,417	-	11,999
2. Kota Kisaran Barat	2,703	225	4,138	10,995	1,785	11,117	-	30,963
3. Tanjung Tiram	22,225	9,317	1,665	4,789	806	1,636	2,020	42,458
4. Meranti	18,197	78	461	3,573	619	1,570	271	24,769
5. Buntu Pane	6,945	-	574	4,949	218	2,113	-	14,799
6. Bandar Pasir Mandoge	9,277	-	288	7,504	250	53	81	17,453
7. Air Joman	21,374	253	590	847	421	1,727	228	25,440
8. Tanjung Balai	7,751	13,196	2,030	3,571	1,150	2,789	-	30,487
9. Sei Kepayang	13,859	1,406	583	118	440	1,696	329	18,431
10. Simpang Empat	19,153	2,142	1,119	6,178	3,957	2,605	-	35,154
11. Air Batu	16,357	75	936	9,199	238	3,344	-	30,149
12. Pulau Rakyat	15,718	173	1,023	5,657	790	3,392	1,001	27,754
13. Bandar Pulau	7,713	-	567	8,811	293	-	3,541	20,925
Total	164,357	26,865	15,834	68,948	12,847	34,459	7,471	330,781
(%)	50	8	5	21	4	10	2	100
<b>Kab. Lab. Batu</b>								
1. Kauluh Hulu	18,884	90	2,213	3,521	1,200	11,578	1,766	39,252
2. Kualuh Hilir	*	*	*	*	*	*	*	*
3. Aek Natas	6,119	137	494	398	479	612	415	8,654
Total	25,003	227	2,707	3,919	1,679	12,190	2,181	47,906
(%)	52	0	6	8	4	25	5	100
<b>Kotamadya Tg. Balai</b>								
1. Tg. Balai Kota I								
2. Tg. Balai Kota II								
3. Tg. Balai Kota III								
4. Tg. Balai Kota IV								
Total								
(%)								
Grand Total (*)	189,360	27,092	18,541	72,867	14,526	46,649	9,652	378,687
(%)	50	7	5	19	4	12	3	100

NGO: Non Governmental Organization

G: Governmental Organization

\*: excluding T. Balai and Kualuh Hilir

Table B-12 POPULATION CLASSIFIED BY RELIGIONS  
IN THE STUDY AREA IN 1987

Kecamatan/ Kotamadya	Islam	Protestant	Catholic	Buddism	Hindu	Total
<b>Kab. Asahan</b>						
1. Kota Kisaran Timur	37,901	7,148	2,255	1,769	21	49,094
2. Kota Kisaran Barat	39,372	5,398	708	5,943	402	51,823
3. Tanjung Tiram	64,157	10,148	864	829	-	75,998
4. Meranti	44,383	9,010	1,142	38	1	54,574
5. Buntu Pane	50,374	4,238	426	78	-	55,116
6. Bandar Pasir Mandoge	12,968	8,349	498	370	-	22,185
7. Air Joman	41,454	969	220	514	-	43,157
8. Tanjung Balai	67,263	2,604	741	1,502	-	72,110
9. Sei Kepayang	32,888	3,056	1,241	58	-	37,243
10. Simpang Empat	31,953	4,687	1,665	333	-	38,638
11. Air Batu	51,775	2,578	251	329	7	54,940
12. Pulau Rakyat	59,339	5,724	3,286	514	-	68,863
13. Bandar Pulau	38,597	1,996	336	93	63	41,085
Total	572,424	65,905	13,633	12,370	494	664,826
(%)	86	10	2	2	0	100
<b>Kab. Lab. Batu</b>						
1. Kauluh Hulu	78,393	13,380	4,669	770	18	97,230
2. Kualuh Hilir	*	*	*	*	*	*
3. Aek Natas	33,923	8,905	679	51	0	43,558
Total	112,316	22,285	5,348	821	18	140,788
(%)	80	16	4	1	0	100
<b>Kotamadya Tg. Balai</b>						
1. Tg. Balai Kota I						
2. Tg. Balai Kota II						
3. Tg. Balai Kota III						
4. Tg. Balai Kota IV						
Total	26,596	4,200	431	12,894	60	44,181
(%)	60	10	1	29	0	100
Grand Total (*)	711,336	92,390	19,412	26,085	572	849,795
(%)	84	11	2	3	0	100

\*: not including Kualuh Hilir

Table B-13 POPULATION CLASSIFIED BY ETHNIC GROUP  
IN THE STUDY AREA IN 1987

Kecamatan/ Kotamadya	Melayu	Jawa	Batak	Minang	Banjar	Aceh	Other	Total
<b>Kab. Asahan</b>								
1. Kota Kisaran Timur	5,135	25,036	15,218	1,109	506	236	1,854	49,094
2. Kota Kisaran Barat	4,049	23,877	11,153	5,169	698	415	6,462	51,823
3. Tanjung Tiram	34,929	23,811	13,127	828	662	1,591	1,050	75,998
4. Meranti	3,334	39,723	11,101	136	30	67	183	54,574
5. Buntu Pane	181	38,283	15,921	162	371	167	31	55,116
6. Bandar Pasir Mandoge	-	10,647	11,300	75	84	70	9	22,185
7. Air Joman	4,199	26,561	7,775	254	2,457	129	1,782	43,157
8. Tanjung Balai	10,338	9,555	43,597	2,512	1,672	2,934	1,502	72,110
9. Sei Kepayang	3,053	6,248	25,955	489	394	261	843	37,243
10. Simpang Empat	1,156	21,388	9,732	262	2,667	124	3,309	38,638
11. Air Batu	3,497	41,468	7,885	115	1,245	58	672	54,940
12. Pulau Rakyat	817	48,301	18,185	340	678	28	514	68,863
13. Bandar Pulau	296	23,080	17,213	80	108	60	248	41,085
Total	70,984	337,978	208,162	11,531	11,572	6,140	18,459	664,826
(%)	11	51	31	2	2	1	3	100
<b>Kab. Lab. Batu</b>								
1. Kualuh Hulu								
2. Kualuh Hilir								
3. Aek Natas								
Total	55,761	95,455	37,804					189,020
(%)	29.5	50.5	20					100
<b>Kotamadya Tg. Balai</b>								
1. Tg. Balai Kota I	1,705	413	2,867	1,400	0	97	3,109	9,591
2. Tg. Balai Kota II	2,564	1,183	3,992	1,346	0	141	7,147	16,373
3. Tg. Balai Kota III	2,770	680	3,823	555	0	17	537	8,382
4. Tg. Balai Kota IV	439	2,389	4,054	241	0	22	2,690	9,835
Total	7,478	4,665	14,736	3,542	0	277	13,483	44,181
(%)	17	11	33	8	0	1	31	100
Grand Total (*)	134,223	438,098	260,702	15,073	11,572	6,417	31,942	898,027
(%)	15	49	29	2	1	1	4	100

Table B-14 POPULATION CLASSIFIED BY AGE DISTRIBUTION  
IN THE STUDY AREA IN 1987

Kecamatan/ Kotamadya	0 - 4		5 - 9		10 - 14		15 - 24		25 - 49		Over 50		Total		Total Population
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
<b>Kab. Asahan</b>															
1. Kota Kisaran Timur	3,690	3,757	3,732	3,800	3,534	3,599	5,320	5,417	5,563	5,665	2,486	2,531	24,325	24,769	49,094
2. Kota Kisaran Barat	4,160	4,163	5,059	5,062	3,652	3,655	5,100	5,104	5,310	5,314	2,621	2,623	25,902	25,921	51,823
3. Tanjung Tiram	6,756	6,331	6,493	6,085	6,046	5,666	6,026	5,647	8,443	7,912	5,468	5,125	39,232	36,766	75,998
4. Meranti	4,678	4,665	4,074	4,062	3,566	3,556	5,266	5,250	6,545	6,526	3,198	3,188	27,327	27,247	54,574
5. Buntu Pane	4,689	4,494	4,559	4,369	3,875	3,714	5,874	5,629	6,324	6,061	2,823	2,705	28,144	26,972	55,116
6. Bandar Pasir Mandoge	1,840	1,909	1,816	1,883	1,747	1,811	2,064	2,143	2,050	2,135	1,368	1,419	10,885	11,300	22,185
7. Air Joman	3,667	3,748	4,012	4,101	3,167	3,238	3,944	4,031	4,292	4,387	2,260	2,310	21,342	21,815	43,157
8. Tanjung Balai	6,486	6,840	6,205	6,544	5,531	5,833	6,532	6,888	7,111	7,499	3,232	3,409	35,097	37,013	72,110
9. Sei Kepayang	2,496	2,573	2,402	2,477	2,565	2,645	3,347	3,450	5,019	5,175	2,508	2,586	18,337	18,906	37,243
10. Simpang Empat	3,384	3,478	3,136	3,224	2,604	2,677	3,755	3,861	4,418	4,542	1,755	1,804	19,052	19,586	38,638
11. Air Batu	4,475	4,574	4,415	4,512	3,788	3,871	5,576	5,698	6,220	6,356	2,698	2,757	27,172	27,768	54,940
12. Pulau Rakyat	5,377	5,503	4,720	4,831	5,173	5,294	7,168	7,335	7,879	8,063	3,717	3,803	34,034	34,829	68,863
13. Bandar Pulau	3,386	3,401	3,384	3,399	2,935	2,948	4,097	4,116	4,853	4,876	1,841	1,849	20,496	20,589	41,085
Total	55,084	55,436	54,007	54,349	48,183	48,507	64,069	64,569	74,027	74,511	35,975	36,109	331,345	333,481	664,826
(%)	8.3	8.3	8.1	8.2	7.2	7.3	9.6	9.7	11.1	11.2	5.4	5.4	49.8	50.2	100.0
<b>Kab. Lab. Batu</b>															
1. Kualuh Hulu	5,459	5,367	6,021	5,829	5,707	5,704	10,444	9,866	5,444	5,283	16,244	15,862	49,319	47,911	97,230
2. Kualuh Hilir	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3. Aek Natas	3,551	3,649	3,573	3,666	3,584	3,675	4,157	4,151	4,592	4,706	2,137	2,117	21,594	21,964	43,558
Total	9,010	9,016	9,594	9,495	9,291	9,379	14,601	14,017	10,036	9,989	18,381	17,979	70,913	69,875	140,788
(%)	6.4	6.4	6.8	6.7	6.6	6.7	10.4	10.0	7.1	7.1	13.1	12.8	50.4	49.6	100.0
<b>Kotamadya Tg. Balai</b>															
1. Tg. Balai Kota I															
2. Tg. Balai Kota II															
3. Tg. Balai Kota III															
4. Tg. Balai Kota IV															
Total															44,181
(%)															
Grand Total (*)	64,094	64,452	63,601	63,844	57,474	57,886	78,670	78,586	84,063	84,500	54,356	54,088	402,258	403,356	805,614
(%)	8.0	8.0	7.9	7.9	7.1	7.2	9.8	9.8	10.4	10.5	6.7	6.7	49.9	50.1	100.0

\*: not including T. Balai and Kualuh Hilir

Table B-15 TENURIAL STATUS OF FARM LAND CLASSIFIED BY FARM SIZE IN THE STUDY AREA IN 1983

	Below 0.25 ha				0.25 ha - 0.50 ha				Over 0.50 ha				Grand total
	Land-owner	Tenant	Partly land owner	Total	Land-owner	Tenant	Partly land owner	Total	Land-owner	Tenant	Partly land owner	Total	
<b>Kab. Asahan</b>	12,173	3,993	585	16,751	10,695	3,934	1,357	15,986	26,641	3,472	3,488	33,601	66,338
1. Kota Kisaran B				0				0					0
2. Kota Kisaran T	2,322	523	40	2,885	1,967	635	220	2,822	2,484	390	717	3,591	9,298
3. Merauti				0				0				0	0
4. Tj. Tiram	1,202	402	110	1,714	853	361	115	1,329	3,502	499	469	4,470	7,513
5. Buntu Pane	1,720	579	12	2,311	1,286	442	64	1,792	2,221	158	163	2,542	6,645
6. B. P. Mandoge	37	14	3	54	18	24	0	42	1,046	48	27	1,121	1,217
7. Air Joman	1,220	511	80	1,811	1,072	365	296	1,733	2,082	315	302	2,699	6,243
8. Tj. Balai	296	80	103	479	461	508	145	1,114	1,665	330	271	2,266	3,859
9. Sei Kepayang	344	47	9	400	546	204	32	782	3,144	770	485	4,399	5,581
10. Simpang Empat	513	375	36	924	591	381	69	1,041	1,914	349	224	2,487	4,452
11. Air Batu	2,186	614	62	2,862	1,609	376	249	2,234	2,175	170	319	2,664	7,760
12. P. Rakyat	1,850	440	98	2,388	1,927	389	108	2,424	3,847	141	285	4,273	9,085
13. Bandar Pulau	483	408	32	923	365	249	59	673	2,511	302	226	3,039	4,635
<b>Kab. Lab. Batu</b>	2,151	1,074	233	3,458	2,351	1,692	457	4,500	12,184	1,729	1,687	15,600	23,558
1. K. Hulu	1,582	831	138	2,551	1,564	941	325	2,830	6,739	572	1,018	8,329	13,710
2. K. Hilir	50	52	14	116	190	454	67	711	3,534	858	300	4,692	5,519
3. Aek Natas	519	191	81	791	587	297	65	949	1,911	299	369	2,579	4,319
<b>Kotamadya Tj. Balai</b>	93	37	8	138	86	17	1	104	353	29	14	396	638
<b>Study Area</b>	14,417	5,104	826	20,347	13,132	5,643	1,815	20,590	39,178	5,230	5,189	49,597	90,534
(%)	15.9	5.6	0.9	22.5	14.5	6.2	2.0	22.7	43.3	5.8	5.7	54.8	100.0
<b>All Kab. Asahan</b>	17,340	6,205	806	24,351	15,586	5,777	1,902	23,265	33,746	4,362	4,884	42,992	90,608
(%)	19.1	6.8	0.9	26.9	17.2	6.4	2.1	25.7	37.2	4.8	5.4	47.4	100.0
<b>All Kab. Lab. Batu</b>	8,205	2,967	547	11,719	7,658	4,430	905	12,993	40,499	6,770	4,908	52,177	76,889
(%)	10.7	3.9	0.7	15.2	10.0	5.8	1.2	16.9	52.7	8.8	6.4	67.9	100.0
<b>N. Sumatera Province</b>	192,960	74,824	21,370	289,154	167,716	58,821	31,473	258,010	279,605	36,663	49,147	365,415	912,579
(%)	21.1	8.2	2.3	31.7	18.4	6.4	3.4	28.3	30.6	4.0	5.4	40.0	100.0

Table B-16 DISTRIBUTION OF FARM SIZE IN THE STUDY AREA IN 1983

	Farm Size (ha)									Total
	below 0.05	0.05 0.09	0.10 0.24	0.25 0.49	0.50 0.74	0.75 0.99	1.00 1.99	2.00 2.99	over 3.00	
Kab. Asahan Proportional %	4,415 (6.4)	2,990 (4.3)	9,317 (13.5)	10,470 (15.2)	9,801 (14.2)	5,164 (7.5)	15,321 (22.2)	6,175 (8.9)	5,405 (7.8)	69,058 (100.0)
1. Kota Kisaran B	44	103	333	275	78	44	39	5	0	921
2. Kota Kisaran T	9	18	108	162	108	32	72	4	0	513
3. Meranti	388	352	1,255	1,239	1,137	607	1,433	275	66	6,752
4. Tj. Tiram	719	275	969	1,199	1,127	658	2,280	1,010	622	8,859
5. Buntu Pane	203	364	1,414	1,825	1,134	603	1,357	421	380	7,701
6. B. P. Mandoge	59	83	113	270	279	93	539	387	382	2,205
7. Air Joman	250	219	939	1,117	1,183	724	1,622	734	602	7,390
8. Tj. Balai	1,598	167	245	304	637	274	1,029	529	529	5,312
9. Sei Kepayang	435	165	99	231	374	143	1,199	924	1,232	4,802
10. Simpang Empat	65	110	475	585	700	400	1,235	365	295	4,230
11. Air Batu	181	274	1,308	1,274	1,103	573	1,421	343	216	6,693
12. P. Rakyat	163	427	1,651	1,714	1,507	778	1,805	331	168	8,544
13. Bandar Pulau	301	433	413	275	434	235	1,290	847	913	5,141
Kab. Lab. Batu Proportional %	538 (2.3)	539 (2.3)	1,980 (8.3)	2,614 (11.0)	2,667 (11.2)	1,187 (5.0)	6,845 (28.8)	4,069 (17.1)	3,338 (14.00)	23,777 (100.0)
1. K. Hulu	212	313	1,558	1,908	1,134	530	2,623	1,394	1,235	10,907
2. K. Hilir	51	36	97	296	643	362	2,242	2,015	1,658	7,400
3. Aek Natas	275	190	325	410	890	295	1,980	660	445	5,470
Kotamadya Tj. Balai Proportional %	679 (41.0)	41 (2.5)	21 (1.3)	67 (4.0)	93 (5.6)	68 (4.1)	255 (15.4)	234 (14.1)	198 (12.0)	1,656 (100)
Study Area Proportional % (%)	5,632 (6.0)	3,570 (3.8)	11,318 (12.0)	13,151 (13.9)	12,561 (13.3)	6,419 (6.8)	22,421 (23.7)	10,478 (11.1)	8,941 (64)	94,491 100.0
All Kab. Asahan	7.4	5.4	14.8	15.9	14.6	7.5	20.7	7.5	6.2	100.0
All Kab. Lab. Batu	3.7	4.2	8.4	10.0	12.1	5.2	28.6	15.5	12.2	100.00
N. Sumatra Province	5.1	4.6	13.3	16.9	16.3	8.2	22.6	7.8	5.2	100.00

Table B-17 HARVESTED AREA, UNIT YIELD AND TOTAL PRODUCTION OF CROPS IN KABUPATEN ASAHAN (PADDY AND UPLAND PADDY)

Year and Season	PADDY IN WET PADDY FIELD									TOTAL OR AVERAGE		
	Special intensification			General intensification			Non-intensification			Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)			
1988												
Jan-Apr										36293	36.31	131780
May-Aug										8089	36.03	29145
Sep-Dec										15764	36.73	57901
Average										60146	36.38	218826
1987												
Jan-Apr	14254	48.19	68690	8745	38.39	33572	11980	22	26356	34979	36.77	128618
May-Aug	4411	51.38	22664	1890	34.69	6556	5250	26.3	13807	11551	37.25	43027
Sep-Dec	10882	39.2	42657	3534	28.29	9998	228	25.26	576	16644	36.35	53231
Average	29547	45.35	134011	14169	35.38	50126	17458	23.33	40739	61174	36.76	224876
1986												
Jan-Apr	13818	48.4	66878	8982	34.3	30810	12902	17.62	22735	35702	33.73	120423
May-Aug	1408	52.85	7441	961	35.48	3410	3221	25.5	8535	5590	34.68	19386
Sep-Dec	10592	36.16	38303	3896	29.27	11405	53	23.4	124	14541	34.27	49832
Average	25818	43.62	112622	13839	32.97	45625	16176	19.41	31394	55833	33.96	189641
1985												
Jan-Apr	10602	49.93	52937	8129	35.26	28661	11533	21.67	24992	30264	35.22	106590
May-Aug	4632	49.03	22711	2311	34.8	8042	7808	22.54	17601	14751	32.78	48354
Sep-Dec	4044	33.56	13572	1414	27.35	3868	224	14.87	333	5682	31.28	17773
Average	19278	46.28	89220	11854	34.23	40571	19565	43.53	42926	50697	34.07	172717
1984												
Jan-Apr	12094	50.3	60833	4247	40.73	17298	18001	25.62	46118	34342	36.18	124249
May-Aug	3388	36.11	12234	1673	35.29	5904	494	16.74	827	5555	34.14	18965
Sep-Dec	6731	34.84	23451	2429	26.76	8929	241	25.23	608	9401	35.09	32988
Average	22213	43.45	96518	8349	38.48	32131	18736	25.38	47553	49298	35.74	176202
1983												
Jan-Apr	9018	38.3	34539	4708	24.25	11417	16628	11.1	18457	30354	21.22	64413
May-Aug	3142	42.03	13206	568	27.8	1579	352	19.4	683	4062	38.08	15468
Sep-Dec	801	47.07	3770	275	27.78	764	1287	28.7	3694	2363	34.82	8228
Average	12961	39.75	51515	5551	24.79	13760	18267	12.5	22834	36779	23.96	88109
1982												
Average										55993		23015
1981												
Average										58950		193192

Year and Season	UPLAND PADDY IN DRY LAND			TOTAL PADDY AND UPLAND PADDY		
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
1988						
Jan-Apr	2797	19.86	5555	39070	35.13	137335
May-Aug	0	0	0	8089	36.03	29145
Sep-Dec	1632	19.78	3228	17396	35.14	61129
Average	4429	19.83	8783	64575	35.25	227609
1987						
Jan-Apr	4055	19.81	8033	39034	35.01	136651
May-Aug	0	0	0	11551	37.25	43027
Sep-Dec	2872	19.74	5669	17516	33.63	58900
Average	6927	19.78	13702	68101	35.03	238578
1986						
Jan-Apr	3816	18.63	7109	39518	32.27	127532
May-Aug	0	0	0	5590	34.68	19386
Sep-Dec	1998	19.86	3968	16539	32.53	53800
Average	5814	19.05	11077	61647	32.56	200718
1985						
Jan-Apr	4043	17.82	7205	34307	33.17	113795
May-Aug	0	0	0	14751	32.78	48354
Sep-Dec	2198	19.17	4213	7880	27.9	21986
Average	6241	18.29	11418	56938	32.34	184135
1984						
Jan-Apr	2473	17.71	4380	36815	34.94	128629
May-Aug	0	0	0	5555	34.14	18965
Sep-Dec	4503	12.7	5719	13904	27.84	38707
Average	6976	14.48	10099	56274	33.11	186301
1983						
Jan-Apr	2753	16.86	4642	33107	20.86	69055
May-Aug	0	0	0	4062	38.08	15468
Sep-Dec	4067	20.94	8510	6427	26.04	16738
Average	6817	19.29	13152	43596	23.23	101261
1982						
Average	11279		23894	67272		254046
1981						
Average	10406		24613	69356		217805

q/ha=quintal/ha, one quintal=100 kg

Table B-18 HARVESTED AREA, UNIT YIELD AND TOTAL PRODUCTION OF CROPS IN KABUPATEN LABUHAN BATU (PADDY AND UPLAND PADDY)

Year and Season	PADDY IN WET PADDY FIELD									TOTAL OR AVERAGE		
	Special intensification			General intensification			Non-intensification			Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)			
1988												
Jan-Apr										62536	34.41	215186
May-Aug										4000	35.24	14096
Sep-Dec										5416	34.8	18848
Average										71952	34.49	248130
1987												
Jan-Apr	12643	40.7	51457	35524	34.27	121741	3230	23.9	7719	51397	35.2	180917
May-Aug	1405	41.09	5773	3747	33.65	12609	0	0	0	5152	35.68	18382
Sep-Dec	3840	37.64	14454	2987	32.1	9588	4	25	10	6831	35.21	24052
Average	17888	40.07	71684	42258	34.06	143938	3234	23.9	7729	63380	35.24	223351
1986												
Jan-Apr	4089	35.46	14498	32563	32.4	105503	2293	19.48	4467	38945	31.96	124468
May-Aug	1924	38.98	7500	6707	30.29	20318	0	0	0	8631	32.23	27818
Sep-Dec	910	37.51	3413	1877	28.47	5344	0	0	0	2787	31.42	8757
Average	6923	36.71	25411	41147	31.88	131165	2293	19.48	4467	50363	31.98	161043
1985												
Jan-Apr	7249	41.68	30216	17681	30.82	54496	10720	21.38	22915	35650	30.19	107627
May-Aug	1290	56.75	7321	681	30.93	2106	2764	22.51	6222	4735	33.05	15649
Sep-Dec	1955	42.3	8269	1290	16.31	2104	104	18.56	193	3349	31.55	10566
Average	10494	43.65	45806	19652	29.87	58706	13588	21.59	29330	43734	30.6	133842
1984												
Jan-Apr	6579	40.05	26349	21136	32.17	67994	18604	21.74	40445	46319	29.1	134788
May-Aug	415	42.24	1753	1280	30.76	3937	216	22.96	496	1911	32.37	6186
Sep-Dec	424	44.72	1896	3185	33.02	10517	169	22.25	376	3778	33.85	12789
Average	7418	40.44	29998	25601	32.2	82448	18989	21.76	41317	52008	29.57	153763
1983												
Jan-Apr	12754	43.87	55952	19095	31.3	59767	15314	20.77	31807	47163	31.28	147526
May-Aug	976	34.25	3342	142	24.93	354	57	18.6	106	1175	32.37	3803
Sep-Dec	1773	53.56	9496	688	30.49	2098	308	29.49	908	2769	45.15	12502
Average	15503	44.37	68791	19925	31.23	62219	15679	20.93	32821	51107	32.05	163831
1982												
Average										57714	29.45	170132
1981												
Average										47347	30.66	145163

Year and Season	UPLAND PADDY IN DRY LAND			TOTAL PADDY AND UPLAND PADDY		
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
1988						
Jan-Apr	1120	18.32	2052	63656	34.13	217238
May-Aug	0	0	0	4000	35.24	14096
Sep-Dec	80	18	144	5496	34.56	18992
Average	1200	18.3	2196	73152	34.22	250326
1987						
Jan-Apr	2512	16.85	4233	53909	34.34	185150
May-Aug	0	0	0	5152	35.68	18382
Sep-Dec	0	0	0	6831	35.21	24052
Average	2512	16.85	4233	65892	34.54	227584
1986						
Jan-Apr	1311	21.49	2817	40256	31.62	127285
May-Aug	0	0	0	8631	32.23	27818
Sep-Dec	195	17.95	350	2982	30.54	9107
Average	1506	21.03	3167	51869	31.66	164210
1985						
Jan-Apr	1651	20.81	3436	37301	29.77	111063
May-Aug	18	16.32	29	4753	32.99	15678
Sep-Dec	210	17.95	377	3559	30.75	10943
Average	1879	20.45	3842	45613	30.19	137684
1984						
Jan-Apr	625	17	1062	46944	28.94	135850
May-Aug	0	0	0	1911	32.37	6186
Sep-Dec	75	11.07	83	3853	33.41	12872
Average	700	16.36	1145	52708	29.39	154908
1983						
Jan-Apr	1904	15.64	2978	49067	30.67	150504
May-Aug	0	0	0	1175	32.37	3802
Sep-Dec	360	15.64	563	3129	41.75	13065
Average	2264	15.64	3541	53371	31.36	167372
1982						
Average	5577	20.93	11672	63291	26.44	167372
1981						
Average	4766	21.35	10175	52113	29.81	155338

q/ha=quintal/ha, one quintal=100 kg



Table B-19 HARVESTED AREA, UNIT YIELD AND TOTAL PRODUCTION OF CROPS IN NORTH SUMATRA PROVINCE (PADDY AND UPLAND PADDY)

Year and Season	PADDY IN WKT PADDY FIELD									TOTAL OR AVERAGE		
	Special Intensification			General intensification			Non-intensification			Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)			
1988										325405	37.41	1217533
Jan-Apr										113100	39.02	441275
May-Aug										156317	38.76	605827
Sep-Dec										594822	38.07	2264590
Average												
1987												
Jan-Apr	163339	42.3	690861	105881	33.64	356182	40920	24.85	101695	310140	37.04	1148738
May-Aug	54431	43.22	235251	49806	36.31	180827	9183	26.11	23975	113420	38.80	440061
Sep-Dec	118756	40.01	475202	30293	33.63	101873	3605	26.99	9731	152654	38.44	586806
Average	336526	41.64	1401314	185980	34.35	638882	53708	25.21	135409	576214	37.76	2175605
1986												
Jan-Apr	139858	45.08	630538	98622	32.85	323944	45218	23.43	105966	283698	37.38	1060448
May-Aug	54504	42.91	233857	60362	33.68	203316	7460	26.89	20058	122326	37.38	457231
Sep-Dec	99487	40.05	398409	30851	32.29	99631	5392	26.45	14263	135730	37.74	512303
Average	293849	42.97	1262804	189835	33.03	626891	58070	24.16	140287	541754	37.47	2029982
1985												
Jan-Apr	134115	45.08	604620	71048	33.28	236427	58043	23.55	136714	263206	37.15	977761
May-Aug	61841	44.42	274693	69379	35.31	245007	18073	23.45	42373	149293	37.65	562073
Sep-Dec	89130	41.18	367080	18154	30.98	56237	4001	27.17	10871	111285	39.03	434158
Average	285086	43.72	1246363	158581	33.91	537671	80117	23.71	189958	523784	37.69	1973992
1984												
Jan-Apr	126867	46.76	593254	65334	34.56	225813	85805	25.09	217834	279006	37.16	1036901
May-Aug	47719	41.44	197765	66639	33.72	224709	5594	25.31	14159	119952	36.40	436633
Sep-Dec	79141	42.17	333701	29307	33.07	96925	5071	22.93	13147	113519	39.09	443773
Average	253916	44.29	1124720	161091	33.98	547447	97470	25.15	245140	512477	37.41	1917307
1983												
Jan-Apr	82825	40.1	332174	57167	32.13	183652	80656	20	161276	220648	30.69	677102
May-Aug	61688	47.7	294281	62744	35.85	224956	6684	23.73	15862	131116	40.81	535099
Sep-Dec	39806	47.82	190371	17625	34.96	61620	4483	30.27	13571	61914	42.89	265562
Average	184319	44.32	816826	137536	34.19	470228	91823	20.77	190709	413678	35.72	1477763
1982										492273		1925575
Average												
1981										463422		1786292
Average												

Year and Season	UPLAND PADDY IN DRY LAND			TOTAL PADDY AND UPLAND PADDY		
	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)	Harvested area (ha)	Average unit yield (q/ha)	Total production (ton)
1988						
Jan-Apr	42363	19.91	84341	367768	35.40	1301874
May-Aug	13182	19.77	26063	126282	37.01	467338
Sep-Dec	24788	19.13	47425	181105	36.07	653252
Average	80333	19.65	157831	675155	35.88	2422421
1987						
Jan-Apr	54646	19.17	104765	364786	34.36	1253503
May-Aug	12632	19.68	24861	126056	36.88	464922
Sep-Dec	22188	18.96	42066	174842	35.97	628872
Average	89466	19.19	171692	665680	35.26	2347297
1986						
Jan-Apr	50286	20.18	101482	333984	34.79	1161930
May-Aug	13755	19.4	26684	136081	35.56	483915
Sep-Dec	15783	18.92	29844	151513	35.78	542147
Average	79824	19.79	158010	621578	35.20	2187992
1985						
Jan-Apr	47398	20.34	96400	310604	34.58	1074161
May-Aug	18909	19.69	37227	168202	35.63	599300
Sep-Dec	16039	16.58	26604	127324	36.19	460762
Average	82346	19.46	160231	606130	35.21	2134223
1984						
Jan-Apr	51747	20.52	106192	330753	34.56	1143093
May-Aug	16995	19.5	33146	136947	34.30	469779
Sep-Dec	13846	14.93	20676	127365	36.47	464449
Average	82588	19.37	160014	595065	34.71	2077321
1983						
Jan-Apr	50085	22.23	111358	270733	29.12	788460
May-Aug	14024	26.17	36706	145140	39.40	571805
Sep-Dec	17270	19.96	34466	79184	37.89	300028
Average	81379	22.43	182530	495057	33.54	1660293
1982						
Average	91096		183864	583369		2109439
1981						
Average	93329		180516	556751		1966808

q/ha=quintal/ha, one quintal=100 kg

Table B-20 YIELD, HARVESTED AREA AND PRODUCTION ON MAJOR CROPS IN THE AREA CONCERNED WITH STUDY AREA

Year and Crops	Kabupaten Asahan			Kabupaten Labuhan Batu			North Sumatra Province		
	Harvested Area (ha)	Total production (ton)	Unit yield (ton/ha)	Harvested Area (ha)	Total production (ton)	Unit yield (ton/ha)	Harvested Area (ha)	Total production (ton)	Unit yield (ton/ha)
<b>Paddy</b>									
1981	58,950	-	-	47,347	-	-	463,422	-	-
1982	55,993	-	-	57,714	-	-	492,273	-	-
1983	36,779	88,109	2.40	51,107	163,831	3.21	413,678	1,477,763	3.57
1984	22,213	96,518	4.35	7,418	29,998	4.04	253,916	1,124,720	4.43
1985	50,697	172,717	3.41	43,734	133,842	3.06	523,784	1,973,992	3.77
1986	55,833	189,641	3.40	50,363	161,043	3.20	541,754	2,029,982	3.75
1987	61,174	224,876	3.68	63,380	223,351	3.52	576,214	2,175,605	3.78
1988	60,146	218,826	3.64	71,952	248,130	3.45	594,822	2,264,590	3.81
Average	50,223	165,115	3.48	49,127	160,033	3.41	482,483	1,841,109	3.85
<b>Upland Paddy</b>									
1981	10,406	-	-	4,766	-	-	93,329	-	-
1982	11,279	-	-	5,577	-	-	91,096	-	-
1983	6,817	13,152	1.93	2,264	3,541	1.56	81,379	182,530	2.24
1984	6,976	10,099	1.45	700	1,145	1.64	82,588	160,014	1.94
1985	6,241	11,418	1.83	1,879	3,842	2.05	82,346	160,231	1.95
1986	5,814	11,077	1.91	1,506	3,167	2.10	79,824	158,010	1.98
1987	6,927	13,702	1.98	2,512	4,233	1.69	89,466	171,692	1.92
1988	4,429	8,783	1.98	1,200	2,196	1.83	80,333	157,831	1.97
Average	7,361	11,372	1.85	2,551	3,021	1.81	85,045	165,051	2.00
<b>Maize</b>									
1981	1,830	-	-	1,049	-	-	31,165	-	-
1982	2,539	-	-	1,005	-	-	43,267	-	-
1983	2,770	7,134	2.58	401	516	1.29	45,573	113,924	2.50
1984	2,742	6,362	2.32	307	406	1.32	34,792	87,385	2.51
1985	3,082	5,623	1.82	379	483	1.27	47,975	96,652	2.02
1986	3,781	6,805	1.80	535	689	1.29	58,912	119,849	2.03
1987	3,300	5,914	1.79	720	875	1.22	64,579	129,601	2.01
1988	3,832	6,792	1.77	688	866	1.26	82,760	168,277	2.03
Average	2,985	6,438	2.01	636	639	1.27	51,128	119,281	2.18
<b>Cassava</b>									
1981	1,937	-	-	517	-	-	24,145	-	-
1982	1,281	-	-	275	-	-	21,974	-	-
1983	1,025	17,237	16.82	198	2,474	12.50	24,998	349,555	13.98
1984	1,632	32,056	19.64	193	2,400	12.44	23,406	343,818	14.69
1985	835	10,867	13.01	275	3,470	12.62	20,939	242,830	11.60
1986	1,110	15,402	13.88	422	5,346	12.67	19,784	247,635	125.17
1987	1,090	14,988	13.75	374	4,671	12.49	27,578	334,450	12.13
1988	1,317	18,137	13.77	330	4,153	12.59	26,768	327,662	12.24
Average	1,278	18,115	15.14	323	3,752	12.55	23,699	307,658	31.63
<b>Sweet Potato</b>									
1981	299	-	-	166	-	-	23,161	-	-
1982	180	-	-	35	-	-	16,704	-	-
1983	390	4,824	12.37	50	426	8.52	17,539	161,650	9.22
1984	161	1,977	12.28	32	271	8.47	16,484	163,398	9.91
1985	172	2,147	12.48	57	483	8.47	15,708	136,323	8.68
1986	159	1,984	12.48	158	1,358	8.60	14,335	131,168	9.15
1987	118	1,467	12.43	74	632	8.54	19,207	175,520	9.14
1988	241	3,005	12.47	84	722	8.60	16,002	155,436	9.71
Average	215	2,567	12.42	82	649	8.53	17,393	153,916	9.30
<b>Peanuts</b>									
1981	188	-	-	86	-	-	10,438	-	-
1982	232	-	-	58	-	-	11,495	-	-
1983	178	178	1.00	45	58	1.29	10,763	16,512	1.53
1984	193	193	1.00	33	42	1.27	12,007	14,845	1.24
1985	165	161	0.98	63	80	1.27	13,164	15,517	1.18
1986	233	236	1.01	85	106	1.25	12,241	14,957	1.22
1987	185	194	1.05	97	124	1.28	18,822	21,602	1.15
1988	246	254	1.03	69	86	1.25	28,502	28,502	1.16
Average	203	203	1.01	67	83	1.27	12,704	18,656	1.25
<b>Soybeans</b>									
1981	85	-	-	137	-	-	4,458	-	-
1982	460	-	-	168	-	-	3,265	-	-
1983	634	456	0.72	166	178	1.07	4,315	4,811	1.12
1984	623	456	0.73	124	147	1.19	9,057	8,310	0.92
1985	610	558	0.92	81	98	1.21	11,593	10,445	0.90
1986	1,973	1,716	0.87	484	521	1.08	22,061	20,218	0.92
1987	1,215	1,132	0.93	988	1,043	1.06	24,675	24,252	0.98
1988	889	831	0.94	2,372	2,561	1.08	29,957	29,981	1.00
Average	811	858	0.85	565	758	1.11	13,673	16,336	0.97
<b>Mongobean</b>									
1981	224	-	-	48	-	-	2,001	-	-
1982	281	-	-	76	-	-	3,087	-	-
1983	237	221	0.93	49	60	1.22	2,738	2,437	0.89
1984	219	203	0.93	21	27	1.89	2,516	2,515	1.00
1985	163	129	0.79	34	37	1.09	2,220	2,018	0.91
1986	376	325	0.86	67	71	1.06	3,774	3,423	0.91
1987	243	173	0.71	100	123	1.23	5,650	5,215	0.92
1988	350	250	0.71	85	105	1.24	8,094	7,645	?
Average	262	217	0.82	60	71	1.29	3,760	3,876	0.93

Table B-21 PLANTED AREA, HARVESTED AREA,  
PRODUCTION, AND UNIT YIELD OF OIL PALM IN  
PTP IN THE STUDY AREA IN 1983 & 1987

Name of Estate and No. of PTP	Planted Area (ha)		Harvested Area (ha)		Production (ton)		Unit Yield (ton/ha)	
	1983	1987	1983	1987	1983	1987	1983	1987
<b>Kabupaten Asahan</b>								
1. Sei Dadap (PTP. V)	1,893	1,876	1,824	1,516	39,356	37,092	22	25
2. Sei Silau (PTP. V)	1,571	1,571	1,571	1,571	35,365	37,636	23	24
3. Pulau Mandi (PTP. V)	1,569	2,186	1,569	1,569	23,435	39,035	15	25
4. Huta Padang (PTP. V)	1,991	2,268	931	1,959	4,956	28,842	5	15
5. Ambalatu Sei Kapuas (PTP. V)	2,296	2,296	2,296	2,296	30,691	30,074	13	13
6. Air Batu (PTP. V)	6,443	6,870	4,696	5,843	92,284	104,362	19	18
7. Pulau Raja (PTP. V)	4,480	4,272	4,189	3,603	81,689	74,210	14	21
8. Teluk Dalam (PTP. V)	4,503	4,652	4,330	4,552	90,000	102,438	21	23
<b>Kabupaten L. Batu</b>								
1. Adian torop (PTP. III)	17,021	3,924	853	2,093	6,824	25,830	8	12
2. Sungai Daun (PTP. IV)	7,698	7,226		4,534		16,722		4
Study Area	49,465	37,144	22,259	29,538	403,600	496,242	18	17
All Kabupaten Asahan	27,059	30,253	23,129	26,057	422,990	488,748	18	19
All Kabupaten L. Batu	76,005	62,247	24,608	43,455	387,185	479,862	16	11

Remark : Oil Palm's production is presented as FFB (fresh fruit bunch).

Table B-22 PLANTED AREA, HARVESTED AREA, PRODUCTION, AND UNIT YIELD OF RUBBER IN PTP IN THE STUDY AREA IN 1983 & 1987

Name of Estate and No. of PTP in the area	Planted Area (ha)		Harvested Area (ha)		Production (Ton)		Unit Yield (ton/ha)	
	1983	1987	1983	1987	1983	1987	1983	1987
<b>Kabupaten Asahan</b>								
1. Bandar Pulau (PTP. V)	3,756	1,494	2,688	1,072	3,383	1,094	1.30	1.02
2. Bandar Selamat (PTP. V)		1,765		1,639		2,012		1.23
3. Sei Dadap (PTP. V)	2,733	2,810	2,728	2,668	3,903	2,605	1.40	0.98
4. Sei Silau (PTP. V)	3,587	3,894	3,581	3,312	4,946	4,202	1.40	1.27
5. Pulau Mandi (PTP. V)	1,255	1,512	1,255	1,172	1,600	1,338	1.30	1.14
6. Ambalatu Sei Kapas (PTP. V)	715	725	640	557	991	872	1.50	1.56
7. Huta Padang (PTP. V)	1,848	1,602	192	686	264	578	1.40	0.84
<b>Kabupaten L. Batu</b>								
1. Membang Muda (PTP. III)	3,023	2,395	1,927	1,679	2,300	2,174	1.20	1.29
2. Labuhan Haji (PTP. III)	3,358	2,762	1,860	2,055	2,458	2,451	1.30	0.89
3. Adian Torop (PTP. III)	1,979	204						
Study Area	22,254	19,168	14,871	14,846	19,845	17,326	1.30	1.20
All Kabupaten Asahan	13,894	13,805	11,084	11,110	15,087	12,701	1.40	1.14
All Kabupaten L. Batu	23,121	27,093	11,891	15,249	14,316	18,055	1.20	1.18

Remark : Rubber's production is in Latex Plus Compo.

Table B-23

PLANTED AREA, HARVESTED AREA, PRODUCTION, AND  
UNIT YIELD OF MAJOR ESTATE CROPS IN SMALL HOLDER  
SYSTEM IN THE STUDY AREA IN 1983 & 1987 IN  
KABUPATEN LABUHAN BATU

Commodity	Planted Area (ha)		Harvested Area (ha)		Production (ton)		Unit Yield (ton/ha)	
	1983	1987	1983	1987	1983	1987	1983	1987
<u>Kab. Labuhan Batu</u>								
1. Oil Palm (Kelapa Sawit)	4,911	33,471	440	56,433	739	27,881	1.7	0.5
2. Rubber (Karet)	16,125	80,557	12,264	5,651	4,811	19,486	0.4	0.3
3. Coconut (kelapa)	39,910	13,021	25,824	7,197	20,312	6,353	0.8	0.8
4. Clove (Cengkeh)	713	670	90	234	13	51	0.1	0.2
5. Coffee (Kopi)	867	365	377	230	117	114	0.3	0.5
6. Sugar Cane (Tebu)	97	100	57	55	19	40	0.3	0.7
Total or Average	62,623	128,184	39,052	69,800	26,011	53,925		
<u>Kab. Asahan</u>								
1. Oil Palm (Kelapa Sawit)		5,271		3,635		4,725		1.3
2. Rubber (Karet)		10,731		6,523		3,353		0.5
3. Coconut (kelapa)		46,197		30,907		26,276		0.9
4. Clove (Cengkeh)		331		136		25		0.2
5. Coffee (Kopi)		638		403		168		0.4
6. Sugar Cane (Tebu)		23		18		19		1.1
Total or Average		63,191		41,622		34,566		
Grand Total or Average		191,375		111,422		88,491		

Source : Data statistik Tanaman Perkebunan 1987  
Dinas perkebunan Pemda Dati II Sumatera Utara

Table B-24

CROPPING INTENSITY OF PADDY IN  
KB. ASAHAN/1988

## 1. Irrigated Area

Kecamatan	Cultivable Area (ha)	Planted Area (ha)	Cropping Intensity (%)
K. Timur	275	418	152
K. Barat	-	-	-
Meranti	2,385	3,697	155
B. Pane	614	1,226	200
B.P. Mandoge	300	380	127
A. Joman	425	795	187
S. Kepayang	30	60	200
S. Empat	200	400	200
A. Batu	468	748	160
P. Rakyat	400	575	144
B. Pulau	505	756	150
T. Balai	350	475	136
<b>Kb. Asahan</b>	<b>5,952</b>	<b>9,530</b>	<b>160</b>

## 2. Rainfed Area

Kecamatan	Cultivable Area (ha)	Planted Area (ha)	Cropping Intensity (%)
K. Timur	190	190	100
K. Barat	276	221	80
Meranti	1,818	1,840	101
B. Pane	2,191	2,191	100
B.P. Mandoge	-	-	-
A. Joman	3,788	3,044	80
S. Kepayang	4,945	5,475	111
S. Empat	1,538	1,240	81
A. Batu	1,386	848	61
P. Rakyat	2,760	2,983	108
B. Pulau	582	561	96
T. Balai	-	-	-
<b>Kb. Asahan</b>	<b>19,474</b>	<b>18,593</b>	<b>95</b>

Source: Agricultural office in each Kecamatan.

Note: Data on T. Tiram and Kb. Labuban Batu not available.  
Data on swampy paddy area (rawa) excluded due no data on cultivable area.

Table B-25 LABOR REQUIREMENT PER HA

Item	Irrigated Paddy		Rainfed Paddy		Upland Crop
	Low Land	Valley Bottom	Low Land	Valley Bottom	
Labour Requirement (man days)					
1. Land Preparation	35	50	40	50	32
2. Transplanting	25	25	32	25	13
3. Weeding	25	25	25	25	30
4. Harvesting & processing	40	40	30	35	25
5. Others 1)	15	15	10	12	6
	140	155	137	147	106
Draft Animal Requirement 2)	5	-	-	-	-

Note: 1) Include fertilizer/chemical application & nursery works.  
 2) A pair of animal days, 8 hrs. work/day.

Table B-26 (1/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Farming Pattern	Prevailing Farming Practices	Results of Questionnaire Survey	
		Farming Conditions/Crop Budget/Farmers' Intentions	Farm Economic Conditions/Farm Budget/Farmers' Intentions
Double cropping of rice in flat low land - dry season crop is occasionally cancelled due to water shortage.  Corresponding area - irrigated area in the flat low land	Variety - HYV/IR46, IR64, etc.  Land preparation - draft animal Transplanting - semi-regular planting  Farm input - fairly intensive application of fertilizer - application of insecticide & herbicide is practiced.	Land holding/cultivated area & planted area <sup>1/</sup>  Cultivated Area paddy field 0.74 ha upland field 0.02 ha perennial crop 0.11 ha  Crop budget/ha, paddy (1988/89) <sup>1/</sup>  Cultivated Area Wet 3.8 Dry 3.6 yield (t) 1,069 gross value (Rp. 000) 1,024 farm cost (Rp. 000) 303 - seed 30 (68kg) - fertilizer* 60 - others 249 net return (Rp. 000) 731 * wet/dry avg.: urea 174 kg, TSP 134 kg, KCl 53 kg  Farming conditions (%) <sup>2/</sup> - water shortage 6 - excess water 48 - damage/pest & disease 100 - damage/rat 90 - follow intensification program (INSUS, etc) 97 - extension service 100 - member of cooperative 71  Farming constraints <sup>3/</sup> Wet 50 Dry 15 - flood 11 - poor drainage 10 - water shortage 107 - damage/pest & disease 46 - damage/rat 17 - labour shortage 1 - others 2  Farmers' expectations on agr. development <sup>3/</sup> - irrigation dev. 70 - drainage dev. 76 - land dev. 32 - strengthening of supporting services 40 - others 1  Farmers' intentions on crops to grow (%) <sup>4/</sup> 94 - paddy 94 - vegetable 6 - upland crop 6 - tree crop -	Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup>  Farm budget/farm (owner) gross return 1,559 paddy 1,514 other crops 45 farm cost 459 paddy 457 other crops 2 net farm income 1,100 off farm income 303 farm family income 1,403 farm family expenditure 803 net surplus 600  Farm living conditions (%) <sup>2/</sup> - drinking water source 13 - tap water 84 - well 3 - river 33  - electricity supply 55 - ownership of: - TV 73 - radio 33 - motorcycle 94 - bicycle 52 - off-farm income 94 - primary income source 94 - paddy - - upland crop - - tree crop 6 - others -  Farmers' expectations on social infrastructure development <sup>3/</sup> - road construction 109 - water supply 25 - electricity supply 58 - clinic 8 - others 62

Note: <sup>1/</sup> Sample mean value <sup>2/</sup> % of sample farmers reported "Yes" to inquiry.

<sup>3/</sup> Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.

<sup>4/</sup> % of farmers reported intention to grow.



Table B-26 (2/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Farming Pattern	Prevailing Farming Practices	Results of Questionnaire Survey																																																																																																																																																																																											
		Farming Conditions/Crop Budget/Farmers' Intentions	Farm Economic Conditions/Farm Budget/Farmers' Intentions																																																																																																																																																																																										
<p>Double cropping of rice in narrow valley bottom</p> <ul style="list-style-type: none"> <li>- dry season crop is occasionally cancelled due to water shortage.</li> <li>- cropping pattern of paddy + tree crop is also common.</li> </ul> <p>Corresponding area</p> <ul style="list-style-type: none"> <li>- irrigated area in the narrow valley bottom</li> </ul>	<p>Variety - HYV/IR46, IR64, etc.</p> <p>Land preparation</p> <ul style="list-style-type: none"> <li>- man power</li> </ul> <p>Transplanting</p> <ul style="list-style-type: none"> <li>- semi-regular planting</li> </ul> <p>Farm input</p> <ul style="list-style-type: none"> <li>- fairly intensive application of fertilizer</li> <li>- application of insecticide &amp; herbicide is practiced.</li> </ul>	<p>Land holding/cultivated area &amp; planted area <sup>1/</sup></p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Cultivated Area</th> <th colspan="2">Planted Area</th> </tr> <tr> <th>Wet</th> <th>Dry</th> <th>Wet</th> <th>Dry</th> </tr> </thead> <tbody> <tr> <td>paddy field</td> <td>0.61 ha</td> <td>0.32</td> <td>0.61</td> <td>0.32</td> </tr> <tr> <td>upland field</td> <td>0.08 ha</td> <td>0.01</td> <td>0.03</td> <td>0.01</td> </tr> <tr> <td>perennial crop</td> <td>0.58 ha</td> <td>0.58</td> <td>0.58</td> <td>0.58</td> </tr> </tbody> </table> <p>Crop budget/ha, paddy (1988/89) <sup>1/</sup></p> <table border="1"> <thead> <tr> <th></th> <th>Wet</th> <th>Dry</th> </tr> </thead> <tbody> <tr> <td>(owner)</td> <td>3.4</td> <td>3.3</td> </tr> <tr> <td>yield (t)</td> <td>850</td> <td>841</td> </tr> <tr> <td>gross value (Rp. 000)</td> <td>247.44</td> <td>252.47</td> </tr> <tr> <td>farm cost (Rp. 000)</td> <td>18</td> <td>17</td> </tr> <tr> <td>- seed</td> <td>51</td> <td>53</td> </tr> <tr> <td>- fertilizer*</td> <td>193</td> <td>182</td> </tr> <tr> <td>- others</td> <td>608</td> <td>589</td> </tr> <tr> <td>net return (Rp. 000)</td> <td></td> <td></td> </tr> <tr> <td>* wet/dry avg.: urea 163 kg, TSP 112 kg, KCI 37 kg</td> <td></td> <td></td> </tr> </tbody> </table> <p>Farming conditions (%) <sup>2/</sup></p> <table border="1"> <thead> <tr> <th></th> <th>Wet</th> <th>Dry</th> </tr> </thead> <tbody> <tr> <td>- water shortage</td> <td>62</td> <td>57</td> </tr> <tr> <td>- excess water</td> <td>100</td> <td>100</td> </tr> <tr> <td>- damage/pest &amp; 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Note: <sup>1/</sup> Sample mean value <sup>2/</sup> % of sample farmers reported "Yes" to inquiry.

<sup>3/</sup> Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.

<sup>4/</sup> % of farmers reported intention to grow.

Table B-26 (3/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Farming Pattern	Prevailing Farming Practices	Results of Questionnaire Survey																																																																																																																																																																																																																											
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<p>Single cropping of paddy in that low land and swampy land</p> <ul style="list-style-type: none"> <li>- cultivatio of local variety is prevailing during wet season.</li> </ul> <p>Corresponding area</p> <ul style="list-style-type: none"> <li>- poorly drained flat low land and swampy land.</li> </ul>	<p>Crop/Paddy</p> <p>Variety - local, partly HYV</p> <p>Land preparation</p> <ul style="list-style-type: none"> <li>- man power</li> </ul> <p>Transplanting</p> <ul style="list-style-type: none"> <li>- kernaap is prevailing</li> </ul> <p>Farm input</p> <ul style="list-style-type: none"> <li>- limited application of fertilizer</li> <li>- application of insecticide is generally practiced.</li> </ul> <p>Harvesting</p> <ul style="list-style-type: none"> <li>- ear harvesting is common.</li> </ul>	<p>Land holding/cultivated area &amp; planted area<sup>1/</sup></p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Cultivated Area</th> <th colspan="2">Planted Area</th> </tr> 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crop	0.16 ha	0.16	0.16			Wet	yield (t)	1.7	gross value (Rp. 000)	521	farm cost (Rp. 000)	153	- seed	16(56kg)	- fertilizer*	12	- others	125	net return (Rp. 000)	368		Wet	- water shortage	91	- excess water	98	- damage/pest & disease	91	- damage/fat	9	- follow intensification program (INSUS, etc)	33	- extension service	2	- member of cooperative	2		Wet	Dry	- flood	220		- poor drainage	76	40	- water shortage		225	- damage/pest & disease	100	N.A	- damage/fat	42	N.A	- labour shortage	2	N.A	- others	1	N.A		Wet	Dry	- irrigation dev.	255		- drainage dev.	144		- land dev.	17		- strengthening of supporting services	33		- others				Wet	Dry	- paddy	60	2	- vegetable	2		- upland crop			- tree crop (coconut)		38	<p>Farm budget/farm (owner farm)<sup>1/</sup></p> <table border="1"> <thead> <tr> <th></th> <th>Wet</th> <th>Dry</th> </tr> </thead> <tbody> <tr> <td>gross return</td> <td>1,213</td> <td></td> </tr> <tr> <td>- paddy</td> <td>6</td> <td></td> </tr> <tr> <td>- other crops</td> <td></td> <td></td> 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Note: 1/ Sample mean value 2/ % of sample farmers reported "Yes" to inquiry.  
 Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.  
 4/ % of farmers reported intention to grow.

Table B-26 (4/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Farming Pattern		Prevailing Farming Practices		Results of Questionnaire Survey																																																											
				Farm Economic Conditions/Farm Budget/ Farmers' Intentions																																																											
Rainfed paddy in narrow valley bottom - single cropping of paddy, dry season paddy is usually limited. - limited upland crop cultivation - tree crop cultivation is limited to a few farmers  Corresponding area - narrow valley bottom in the upland or hilly area	Crop/Paddy Variety - HYV (major), local (minor)  Land preparation - man power  Transplanting - direct transplanting from nursery to field (non "kemp")  Farm input - considerable application of fertilizer - application of agrochemicals is practiced.	Land holding/cultivated area & planted area <sup>1/</sup> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Cultivated Area</th> <th colspan="2">Planted Area</th> </tr> <tr> <th>Wet</th> <th>Dry</th> <th>Wet</th> <th>Dry</th> </tr> </thead> <tbody> <tr> <td>paddy field</td> <td>0.63 ha</td> <td>0.13</td> <td>0.62</td> <td>0.13</td> </tr> <tr> <td>upland field</td> <td>0.05 ha</td> <td>0.05</td> <td>0.02</td> <td>0.05</td> </tr> <tr> <td>perennial crop</td> <td>0.29 ha</td> <td>0.29</td> <td>0.29</td> <td>0.29</td> </tr> </tbody> </table>			Cultivated Area		Planted Area		Wet	Dry	Wet	Dry	paddy field	0.63 ha	0.13	0.62	0.13	upland field	0.05 ha	0.05	0.02	0.05	perennial crop	0.29 ha	0.29	0.29	0.29	Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup> <table border="1"> <tbody> <tr> <td>gross return</td> <td>444</td> </tr> <tr> <td>paddy</td> <td>546</td> </tr> <tr> <td>other crops</td> <td>190</td> </tr> <tr> <td>farm cost</td> <td>90</td> </tr> <tr> <td>paddy</td> <td>100</td> </tr> <tr> <td>other crops</td> <td>800</td> </tr> <tr> <td>net farm income</td> <td>251</td> </tr> <tr> <td>off farm income</td> <td>1,051</td> </tr> <tr> <td>farm family income</td> <td>634</td> </tr> <tr> <td>farm family expenditure</td> <td>417</td> </tr> <tr> <td>net surplus</td> <td></td> </tr> </tbody> </table>		gross return	444	paddy	546	other crops	190	farm cost	90	paddy	100	other crops	800	net farm income	251	off farm income	1,051	farm family income	634	farm family expenditure	417	net surplus													
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Farming constrains <sup>3/</sup>																																																															
- flood	30																																																														
- poor drainage	25	21																																																													
- water shortage	5	90																																																													
- damage/pest & disease	73	50																																																													
- damage/rat	44	21																																																													
- labour shortage																																																															
- others																																																															
- road construction	54																																																														
- water supply	9																																																														
- electricity supply	75																																																														
- clinic																																																															
- others	38																																																														
		Farmers' expectations on agr. development <sup>3/</sup> <table border="1"> <tbody> <tr> <td>- irrigation dev.</td> <td>105</td> </tr> <tr> <td>- drainage dev.</td> <td>51</td> </tr> <tr> <td>- land dev.</td> <td>2</td> </tr> <tr> <td>- strengthening of supporting services</td> <td>14</td> </tr> <tr> <td>- others</td> <td></td> </tr> </tbody> </table>		- irrigation dev.	105	- drainage dev.	51	- land dev.	2	- strengthening of supporting services	14	- others		Farmers' intentions on crops to grow (%) <sup>4/</sup> <table border="1"> <tbody> <tr> <td>- paddy</td> <td>100</td> </tr> <tr> <td>- vegetable</td> <td></td> </tr> <tr> <td>- upland crop</td> <td></td> </tr> <tr> <td>- tree crop (coconut)</td> <td>19</td> </tr> </tbody> </table>		- paddy	100	- vegetable		- upland crop		- tree crop (coconut)	19																																								
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Note: 1/ Sample mean value 2/ % of sample farmers reported "Yes" to inquiry.

Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.

4/ % of farmers reported intention to grow.

Table B-26 (5/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Farming Pattern	Prevailing Farming Practices	Results of Questionnaire Survey	
		Farming Conditions/Crop Budget/Farmers' Intentions	Farm Economic Conditions/Farm Budget/Farmers' Intentions
Upland crop farming - Double cropping of upland crop - maize is primary crop in both season. - tree crop cultivation is limited.	Crop/Maize Variety - HYV(Arjuna) Farm input - heavy dressing of N&P - non or limited application of agro-chemicals  Other crops include: cassava, soybean	Land holding/cultivated area & planted area <sup>1/</sup>  Cultivated Area upland field 1.39 ha perennial crop 0.52 ha  Crop budget/ha, maize (1988/89) <sup>1/</sup>  Wet/Dry Season (Avg.) yield (t) 2.2 gross value (Rp. 000) 303 farm cost (Rp. 000) 134 - fertilizer <sup>4/</sup> 67 - others 67 net return (Rp. 000) 124  * wet/dry avg. urea 191 kg, TSP 166 kg, KCl 0 kg	Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup> gross return 1,066 farm cost 435 net farm income 571 off farm income 127 farm family income 698  Farm living conditions (%) <sup>2/</sup> - drinking water source - tap water - well 100 - river - electricity supply - ownership of: - TV 27 - radio 9 - motorcycle - bicycle 100 - off-farm income 9 - primary income source - upland crop 100
Corresponding area - limited and scattered in the Study Area - mainly in hilly area		Farming conditions (%) <sup>2/</sup> - water shortage - excess water - damage/pests disease - damage/rat - follow intensification program (INSUS, etc) - extension service - member of cooperative Farming constraints <sup>3/</sup> - flood - poor drainage - water shortage - damage/pests disease - damage/rat - labour shortage - others Farmers' expectations on agr. development <sup>3/</sup> - irrigation dev. 105 - drainage dev. 51 - land dev. 2 - strengthening of supporting services 14 - others Farmers' intentions on crops to grow (%) <sup>4/</sup> - paddy 100 - vegetable - upland crop - tree crop (coconut) 19	Farmers' expectations on social <sup>3/</sup> in frastructure development - road construction 23 - water supply - electricity supply 35 - clinic - others 18

Note: 1/ Sample mean value 2/ % of sample farmers reported "Yes" to inquiry.  
Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.  
4/ % of farmers reported intention to grow.

Table B-26 (6/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Results of Questionnaire Survey		
Farming Pattern	Crop Budget (Owner farm)	Farm Economic Conditions/Farm Budget/ Farmers' Intentions
Smallholder's tree crop farming Oil palm	<p>Cultivated area <sup>1/</sup></p> <p>oil palm rubber</p> <p>5.2 ha 0.2 ha</p> <p>Crop budget/ha, oil palm (1988/89) <sup>1/</sup></p> <p>yield (t) gross value (Rp. 000) farm cost (Rp. 000) net return (Rp. 000)</p> <p>15.0 1,121 312 809</p>	<p>Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup></p> <p>gross return 7,857 farm cost 2,017 farm income 5,840</p> <p>Farm living conditions (%) <sup>2/</sup></p> <p>- drinking water supply well 100 - electricity supply 70 - ownership of: TV 70, radio 60, motorcycle 100</p> <p>Farmers' expectation on social infrastructure development <sup>3/</sup></p> <p>road 29, school 16</p>
Smallholder's tree crop farming Rubber	<p>Cultivated area <sup>1/</sup></p> <p>rubber</p> <p>1.0 ha</p> <p>Crop budget/ha, rubber (1988/89) <sup>1/</sup></p> <p>yield (t) gross value (Rp. 000) farm cost (Rp. 000) net return (Rp. 000)</p> <p>5.1 2,008 99 1,909</p>	<p>Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup></p> <p>gross return 2,008 farm cost 99 farm income 1,909</p> <p>Farm living conditions (%) <sup>2/</sup></p> <p>- drinking water supply well 71, tap waer 29 - electricity supply 71 - ownership of: TV 43, radio 43, motorcycle 29, bicycle 100</p> <p>Farmers' expectation on social infrastructure development <sup>3/</sup></p> <p>electricity 31, road 8</p>
Smallholder's tree crop farming Coconut	<p>Cultivated area <sup>1/</sup></p> <p>coconut</p> <p>1.5 ha</p> <p>Crop budget/ha, coconut (1988/89) <sup>1/</sup></p> <p>yield (t) gross value (Rp. 000) farm cost (Rp. 000) net return (Rp. 000)</p> <p>3.0 697 49 648</p>	<p>Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup></p> <p>gross return 1,815 farm cost 366 family income 1,449</p> <p>Farm living conditions (%) <sup>2/</sup></p> <p>- drinking water supply well 82, tap waer 18 - electricity supply 18 - ownership of: TV 27, radio 64, motorcycle 18, bicycle 100</p> <p>Farmers' expectation on social infrastructure development <sup>3/</sup></p> <p>school 23, toilet 14, road 9</p>

Note: <sup>1/</sup> Sample mean value.

<sup>2/</sup> % of sample farmers reported "Yes" to inquiry.

<sup>3/</sup> Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allotting 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.

TableB-26 (7/7) PREVAILING FARMING PRACTICES / FARMING AND FARM ECONOMIC CONDITIONS

Category	Results of Questionnaire Survey Farm Economic Conditions/Farmers' Intentions																
<p>Landless farmer - estate labourer</p>	<p>Farm budget/farm (1988/89, Rp. 000) <sup>1/</sup></p> <table border="0"> <tr> <td>family income</td> <td>718</td> </tr> <tr> <td>family expenditure</td> <td>683</td> </tr> <tr> <td>net surplus</td> <td>35</td> </tr> </table> <p>Farm living conditions (%) <sup>2/</sup></p> <table border="0"> <tr> <td>- drinking water source</td> <td>well 100</td> </tr> <tr> <td>- electricity supply</td> <td>60</td> </tr> <tr> <td>- ownership of:</td> <td></td> </tr> <tr> <td>TV 50, radio 30, motorcycle 30, bicycle 90</td> <td></td> </tr> </table> <p>Farmers expectation on social infrastructure development (%) <sup>3/</sup></p> <table border="0"> <tr> <td>electricity 38, toilet 16, road 14</td> <td></td> </tr> </table>	family income	718	family expenditure	683	net surplus	35	- drinking water source	well 100	- electricity supply	60	- ownership of:		TV 50, radio 30, motorcycle 30, bicycle 90		electricity 38, toilet 16, road 14	
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electricity 38, toilet 16, road 14																	
<p>Landless farmer - irrigated paddy area</p>	<p>Farm living conditions (%) <sup>2/</sup></p> <table border="0"> <tr> <td>- drinking water source</td> <td>well 86, river 14</td> </tr> <tr> <td>- electricity supply</td> <td>14</td> </tr> <tr> <td>- ownership of:</td> <td></td> </tr> <tr> <td>TV 0, radio 64, motorcycle 0, bicycle 86</td> <td></td> </tr> </table> <p>Farmers expectation on social infrastructure development (%) <sup>3/</sup></p> <table border="0"> <tr> <td>electricity 23, toilet 14, road 39</td> <td></td> </tr> </table>	- drinking water source	well 86, river 14	- electricity supply	14	- ownership of:		TV 0, radio 64, motorcycle 0, bicycle 86		electricity 23, toilet 14, road 39							
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- ownership of:																	
TV 0, radio 64, motorcycle 0, bicycle 86																	
electricity 23, toilet 14, road 39																	

Note: 1/ Sample mean value.

2/ % of sample farmers reported "Yes" to inquiry.

3/ Top, 2nd & 3rd priority on candidate dev. schemes were placed by sample farmers according to their expectations. Allocating 5, 3, 1 points to each selected scheme in accordance of priority ratings and total points allocated to each scheme are indicated.

Table B-27

**THE NUMBER AND CAPACITY OF WAREHOUSE  
IN NORTH SUMATRA PROVINCE**

Categories of Warehouse	Capacity (Ton)	Medan *	(UNIT:Nos)			
			Region other than Medan			
			I*	II *	III *	IV *
1. New type BULOG (A)	3,500	18	-	1	-	1
2. New type BULOG (B)	1,000	-	2	1	2	2
3. Semi-permanent PERMANEN	1,000	-	-	-	4	4
4. Old type BULOG (A)	6,000	-	1	-	-	-
5. Old type BULOG (B)	2,000	15	-	-	-	-
6. Old type BULOG (C)	250	-	-	-	-	1
<b>Number of Warehouse</b>		<b>33</b>	<b>3</b>	<b>2</b>	<b>6</b>	<b>8</b>
<b>Total Capacity</b>		<b>93000</b>	<b>8000</b>	<b>4500</b>	<b>6000</b>	<b>9500</b>

Remarks: \* = Depot number, III includes Kab. Asahan & Lab. Batu

Table B-28 NUMBER OF RICE MILLS IN THE STUDY AREA

(Unit: Nos)

KECAMATAN/ KOTAMADYA	Big-scale mill	Small scale mill	Rice mill unit	Huller	Engelberg
Kab. Asahan					
1. Kota Kisaran Timur	4	4	-	-	-
2. Kota Kisaran Barat	2	-	-	-	-
3. Tanjung Tiram	4	38	-	-	-
4. Meranti	-	34	-	-	-
5. Buntu Pane	18	1	-	-	-
6. Bandar Pasir Mandoge	-	3	-	-	-
7. Air Joman	2	20	1	-	-
8. Tanjung Balai	-	1	-	-	-
9. Sei Kepayang	-	10	-	-	-
10. Simpang Empat	2	23	-	-	-
11. Air Batu	3	8	-	-	-
12. Pulau Rakyat	1	20	-	-	-
13. Bandar Pulau	3	12	-	-	-
Kab. Lab. Batu					
1. Kualuh Hulu	3	20	-	4	-
2. Kualuh Hilir	3	22	-	15	-
3. Aek Natas	5	4	2	5	-
<b>Total</b>	<b>50</b>	<b>220</b>	<b>3</b>	<b>24</b>	<b>0</b>

Source: Dinas Pertanian Asahan &amp; Lab. Batu Rice Mills



Table B-29 GOVERNMENT SUPPORT PRICE FOR MAJOR CROPS  
(PURCHASED PRICE THROUGH DOLOG)

YEAR	Paddy			Rice		Maize		Soybeans		Green Beans	
	Basic Price	Price Via KUD	Price via Others	Price via KUD	Price via Others	Basic Price	Price via KUD	Basic Price	Price via KUD	Basic Price	Price via KUD
1980/1981	105	111	108	175	173	95	102	240	251	290	303
1981/1982	120	128	124	195	191	105	113	270	283	310	325
1982/1983	135	146	140	214	210	105	113	280	293	310	325
1983/1984	145	156	152	238	233	105	113	280	293	310	325
1984/1985	165	178	173	270	264	110	120	300	313	325	340
1985/1986	165	188	183	285	279	110	120	300	313	325	340
1986/1987	175	188	183	285	279	110	120	300	313	325	340
1987/1988	190	203	198	313	307	110	120	300	313	325	340

Table B-30 RETAIL PRICE OF MAJOR FARM OUTPUTS  
AND INPUTS AT KISARAN IN 1988

No.	Comodity	Unit	Price in 1988											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>I. Rice</b>														
1	Ramos	Kg	650	600	500	500	500	565	650	650	650	650	650	675
2	Sawah Halus	Kg	500	465	450	450	450	485	560	550	575	550	550	650
3	I.R	Kg	475	440	430	430	450	450	540	540	540	530	530	550
<b>II Upland Crop</b>														
1	Ubi Kaju	Kg	75	75	50	75	75	75	75	75	100	100	100	100
2	Ubi Rambat	Kg	100	100	100	75	100	100	100	100	150	150	150	150
3	Jagung	Kg	200	200	200	200	200	200	200	200	200	200	200	200
4	Kacang Kuning	Kg	800	800	800	850	850	750	750	750	800	750	700	850
5	Kacang Ijo	Kg	1,100	1,200	1,300	1,200	1,200	1,200	1,200	1,100	1,300	1,300	1,300	1,300
6	Kacang Tanah	Kg	1,400	1,400	1,400	1,300	1,300	1,400	1,300	1,200	1,300	1,200	1,300	1,400
<b>III Fertilizer</b>														
1	Urea	Kg	135	135	135	135	135	135	135	135	135	165	165	165
2	T.S.P.	Kg	135	135	135	135	135	135	135	135	135	165	165	165
3	Z.A	Kg	135	135	135	135	135	135	135	135	135	165	165	165
4	K.C.L.	Kg	135	135	135	135	135	135	135	135	135	165	165	165
<b>IV Chemicals</b>														
1	Drusban	Ltr	7,700	7,700	7,700	7,700	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
2	Ajodiran	Ltr	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
3	Diazinon	Ltr	7,500	7,500	7,500	7,500	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
4	Baicap	Ltr	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300	5,300

No.	Comodity	Unit	Price in 1989						Average	Average
			Jan	Feb	Mar	Apr	May	Jun	Jul-88 Jun-89	Jan-88 Jun-89
<b>I. Rice</b>										
1	Ramos	Kg	700	650	725	675	650	650	664.58	627.22
2	Sawah Halus	Kg	650	625	675	650	625	600	605.00	558.89
3	I.R	Kg	550	550	575	550	500	500	537.92	507.22
<b>II Upland Crop</b>										
1	Ubi Kaju	Kg	100	75	75	75	75	75	85.42	80.56
2	Ubi Rambat	Kg	125	125	125	100	100	125	125.00	115.28
3	Jagung	Kg	200	200	200	200	200	200	200.00	200.00
4	Kacang Kuning	Kg	850	800	800	800	800	800	787.50	794.44
5	Kacang Ijo	Kg	1300	1200	1200	1200	1200	1200	1233.33	1222.22
6	Kacang Tanah	Kg	1400	1400	1300	1400	1300	1400	1325.00	1338.89
<b>III Fertilizer</b>										
1	Urea	Kg	165	165	165	165	165	165	157.50	150.00
2	T.S.P.	Kg	170	170	170	170	170	170	160.00	151.67
3	Z.A	Kg	165	165	165	165	165	165	157.50	150.00
4	K.C.L.	Kg	165	165	165	165	165	165	157.50	150.00
<b>IV Chemicals</b>										
1	Drusban	Ltr	13,000	13,000	13,000	13,000	13,000	13,000	13000.00	11822.22
2	Ajodiran	Ltr	5,200	5,200	5,200	5,200	5,200	5,200	5200.00	5200.00
3	Diazinon	Ltr	9,000	9,000	9,000	9,000	9,000	9,000	9000.00	8666.67
4	Baicap	Ltr	5,300	5,300	5,300	5,300	5,300	5,300	5300.00	5300.00

Table B-31 NUMBER OF VILLAGE WHICH CREDIT FACILITY IS GIVEN

KECAMATAN	BIMAS	KIK	KMKP	KCK	Other	No. of village
<b>Kab. Asahan</b>						
1. Kota Kisaran Timur	3	3	-	2	4	5
2. Kota Kisaran Barat	1	3	3	4	6	6
3. Tanjung Tiram	4	6	1	4	5	19
4. Meranti	1	1	1	2	27	12
5. Buntu Pane	-	1	1	3	2	11
6. Bandar Pasir Mandoge	1	-	-	-	-	4
7. Air Joman	5	3	1	3	3	8
8. Tanjung Balai	2	2	2	2	7	11
9. Sei Kepayang	2	1	1	3	7	17
10. Simpang Empat	4	3	2	1	3	10
11. Air Batu	7	2	2	3	3	14
12. Pulau Rakyat	2	2	1	1	2	21
13. Bandar Pulau	1	1	-	-	2	17
<b>Kab. Lab. Batu</b>						
1. Kualuh Hulu	8	4	-	2	3	22
2. Kualuh Hilir	-	-	-	-	-	10
3. Aek Natas	12	-	2	5	26	17
Kotamadya Tg. Balai	3	4	4	4	3	4
<b>Total</b>	<b>56</b>	<b>36</b>	<b>21</b>	<b>39</b>	<b>103</b>	<b>208</b>
<b>(%)</b>	<b>27</b>	<b>17</b>	<b>10</b>	<b>19</b>	<b>50</b>	<b>100</b>

KIK and KMKP: small-scale credit given to the people who are willing to improve their manufacturing unit

KCK: small-scale credit given to the small-scale trader

Table B-32 NUMBER OF KUD AND PARTICIPANT RATIO OF FARMERS  
IN THE STUDY AREA IN 1987

Name of Kecamatan	Total No. of Farm Household	No. of Unit	Number of Participant	Saving Money	Percentage (%)
<b>Kab. Asahan</b>					
1. Kota Kisaran Timur	817	1	400	97,200	49
2. Kota Kisaran Barat	879	-	-	-	-
3. Tanjung Tiram	9,614	4	2,145	44,141,286	22
4. Meranti	6,958	4	1,363	868,900	20
5. Buntu Pane	8,807	2	1,431	670,779	16
6. Bandar Pasir Mandoge	3,439	2	1,126	1,069,600	33
7. Air Joman	5,170	3	594	2,078,300	11
8. Tanjung Balai	6,222	2	1,069	2,877,800	17
9. Sei Kepayang	4,679	2	331	569,307	7
10. Simpang Empat	4,606	3	1,152	390,425	25
11. Air Batu	7,494	3	707	1,693,100	9
12. Pulau Rakyat	9,242	4	1,584	3,743,970	17
13. Bandar Pulau	6,045	2	652	316,908	11
<b>Total (or average)</b>	<b>73,972</b>	<b>32</b>	<b>12,554</b>	<b>58,517,575</b>	<b>17</b>
<b>Kab. Lab. Batu</b>					
1. Kualuh Hulu	11,755	2	1,722	47,912,425	15
2. Kualuh Hilir	4,941	1	-	-	-
3. Aek Natas	2,647	2	280	280,000	11
<b>Total (or average)</b>	<b>19,343</b>	<b>5</b>	<b>2,002</b>	<b>48,192,425</b>	<b>10</b>
<b>Kotamadya Tg. Balai</b>					
1. Tg. Balai Kota I					
2. Tg. Balai Kota II					
3. Tg. Balai Kota III					
4. Tg. Balai Kota IV					
<b>Total (or average)</b>	<b>1,740</b>				<b>0</b>
<b>Grand Total *)</b>	<b>95,055</b>	<b>37</b>	<b>14,556</b>	<b>106,710,000</b>	<b>15</b>

Note: \*) not including T. Balai

Table B-33 NUMBER OF ORGANIZATION GIVING CREDIT SERVICES

Kecamatan	Kind Facility				No. of Village	No. of Credit Organization per Village
	Bank	KUD	Cooperation Unit other KUD	Other		
<u>Kab. Asahan</u>						
1. Kota Kisaran Timur	-	1	7	-	5	1.6
2. Kota Kisaran Barat	4	-	10	3	6	2.8
3. Tanjung Tiram	1	4	7	3	19	0.8
4. Meranti	1	4	1	1	12	0.6
5. Buntu Pane	1	2	1	-	11	0.4
6. Bandar Pasir Mandoge	-	2	1	1	4	1.0
7. Air Joman	1	3	1	-	8	0.6
8. Tanjung Balai	-	2	-	-	11	0.2
9. Sei Kepayang	-	2	-	10	17	0.7
10. Simpang Empat	1	3	3	-	10	0.7
11. Air Batu	-	3	5	-	14	0.6
12. Pulau Rakyat	-	4	10	4	21	0.9
13. Bandar Pulau	-	2	-	2	17	0.2
<u>Kab. Lab. Batu</u>						
1. Kualuh Hulu	1	2	2	-	22	0.2
2. Kualuh Hilir	1	1	2	-	10	0.4
3. Aek Natas	1	1	5	-	17	0.4
Kotamadya Tg. Balai	3	1	14	2	4	5.0
<b>Total</b>	<b>15</b>	<b>37</b>	<b>69</b>	<b>26</b>	<b>208</b>	<b>0.7</b>
<b>(%)</b>	<b>7</b>	<b>18</b>	<b>33</b>	<b>13</b>	<b>100</b>	

Table B-34 NUMBER OF VILLAGE HAVING FARMERS' ORGANIZATION

Kecamatan	Organization				No. of Village	No. of Credit Organization per Village
	P3A	INSUS	Group of Female Farmer	Farmer Union for Farming		
<u>Kab. Asahan</u>						
1. Kota Kisaran Timur	1	2	1	2	5	1.2
2. Kota Kisaran Barat	-	-	-	2	6	0.3
3. Tanjung Tiram	6	4	2	14	19	1.4
4. Meranti	6	9	1	10	12	2.2
5. Buntu Pane	5	4	1	1	11	1.0
6. Bandar Pasir Mandoge	4	4	4	3	4	3.8
7. Air Joman	2	2	1	8	8	1.6
8. Tanjung Balai	1	1	-	3	11	0.5
9. Sei Kepayang	1	2	1	7	17	0.6
10. Simpang Empat	2	3	-	8	10	1.3
11. Air Batu	2	3	1	8	14	1.0
12. Pulau Rakyat	3	1	1	13	21	0.9
13. Bandar Pulau	3	4	-	6	17	0.8
<u>Kab. Lab. Batu</u>						
1. Kualuh Hulu	1	4	-	12	22	0.8
2. Kualuh Hilir	-	-	-	5	10	0.5
3. Aek Natas	1	3	1	7	17	0.7
Kotamadya Tg. Balai	-	-	-	-	4	0.0
<hr/>						
Total	38	46	14	109	208	1.0
(%)	18	22	7	52	100	

Table B-35 TRANSMIGRATION DEVELOPMENT IN  
NORTH SUMATRA PROVINCE

Project	Year	No. of Family	No. of Population
Pre-Pelita			
UPT Sicanggang	1959	400	1,850
UPT Bulungihit	1968	200	875
Pelita I and II			
UPT Aek Naetek I*	1973/74	200	887
UPT Aek Naetek II*	1974/75	500	1,883
Pelita III			
UPT Sinunukan I/IV	79/80-81/82	1,990	9,667
UPT Ujung Batu I/IV	81/82-82/83	2,471	10,794
UPT Batang Pane I/III	81/82-82/83	1,181	5,256
UPT Manduamas I/III	82/83-83/84	1,499	7,765
UPT Silara-kara I/III	82/83-83/84	1,460	6,903
UPT Sei Lapan	82/83	500	2,632
UPT Rianiate I/II	83/84	600	2,788
UPT Lumut	83/84	131	721
Pelita IV			
UPT Batahan	86/87	200	1,018
UPT Manduamas IV	86/87	206	1,034
UPT Rianiate I/II	86/87	219	1,118
UPT M. Majanggut	87/88	134	681
Total		11,891	55,872
Pelita V			
Sola		4,050	
Batang Pane		2,000	
Tabayung/Natal		2,000	
Batahan/Natal		500	
Rawa Kolang		745	
Pakkat/Parlilitan		905	
P.Panji/Kp.Rakyat		3,500	
Total		13,700	

\* transmigration projects in the study area

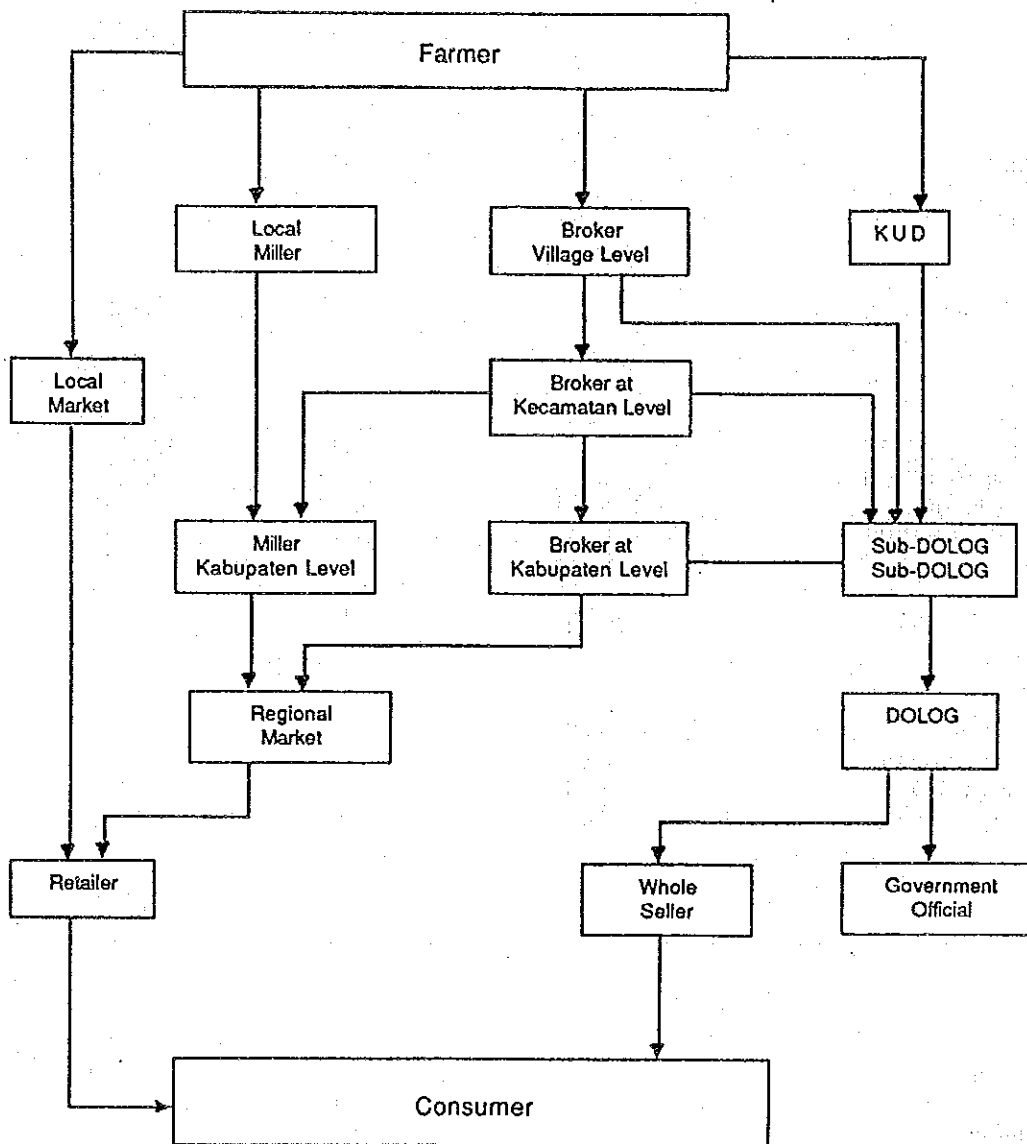


Fig. B-1 GENERAL RICE MARKETING FLOW



Table B-36 (1/2) ROAD CONDITIONS IN THE STUDY AREA  
- Road Length and Conditions by Kabupaten -

Status	Kabupaten Asahan	Kabupaten Lab. Batu	Kodya Tg. Balai	Kab./Kodya Total	North Sumatra Province
<b>1. Length of Roads (km)</b>					
State	0	0	0	0	793
Provincial	271	267	0	538	2,544
Kab./Kodya	546	930	47	1,523	14,970
Total	817	1,197	47	2,061	18,307
<b>2. Surface Types of Kab./Kodya Roads (km)</b>					
Asphalted	128	352	32	512	4,826
Gravelled	160	115	10	285	2,857
Others (Earth, etc.)	257	463	4	724	7,288
Total	545	930	46	1,521	14,971
<b>3. Conditions of Kab./Kodya Roads (km)</b>					
Good	484	165	12	661	2,923
Sufficient	38	160	26	224	2,629
Bad	8	275	5	288	3,148
Very bad	15	330	3	348	6,271
Total	545	930	46	1,521	14,971

Source: Sumatra Utara Dalam Angka 1987

Table B-36 (2/2) ROAD CONDITIONS IN THE STUDY AREA  
- Road Condition of Villages by Kecamatan -

Kecamatan	Type of Transport				Passable by 4-wheel Vehicle	Total No. of Village
	River Way	Land Way				
		Asphalt	Hard Earth	Earth	Total	
<b>Kab. Asahan</b>						
1. Kota Kisaran Timur	-	5	-	-	5	5
2. Kota Kisaran Barat	-	3	1	2	6	6
3. Tanjung Tiram	-	3	-	16	19	19
4. Meranti	-	-	2	10	12	12
5. Buntu Pane	-	2	-	9	11	11
6. Bandar Pasir Mandoge	-	-	4	-	4	4
7. Air Joman	-	-	3	5	8	8
8. Tanjung Balai	1	6	2	2	10	11
9. Sei Kepayang	-	3	3	11	17	8
10. Simpang Empat	-	3	-	7	10	10
11. Air Batu	-	2	2	10	14	14
12. Pulau Rakyat	-	1	2	18	21	20
13. Bandar Pulau	-	2	2	13	17	17
<b>Kab. Lab. Batu</b>						
1. Kualuh Hulu	1	10	5	6	21	21
2. Kualuh Hilir	8	-	-	2	2	-
3. Aek Natas	-	1	1	15	17	13
<b>Kotamadya Tg. Balai</b>						
	-	4	-	-	4	4
<b>Total</b>	<b>10</b>	<b>45</b>	<b>27</b>	<b>126</b>	<b>198</b>	<b>177</b>
<b>(%)</b>	<b>5</b>	<b>22</b>	<b>13</b>	<b>61</b>	<b>95</b>	<b>85</b>

Note: \* Transport facilities linking the village with other villages.

Table B-37 AVAILABILITY OF PUBLIC TRANSPORTATION BY KECAMATAN

Kacamatan	Without Machine				
	Bicycle	Becak	Cart	Carriage	Small Boat
<b>Kab. Asahan</b>					
1. Kota Kisaran Timur	-	5	5	-	1
2. Kota Kisaran Barat	-	6	-	-	-
3. Tanjung Tiram	1	5	-	-	4
4. Meranti	1	8	-	-	-
5. Buntu Pane	9	1	-	-	1
6. Bandar Pasir Mandoge	-	-	-	-	-
7. Air Joman	-	3	-	-	3
8. Tanjung Balai	1	6	-	-	6
9. Sei Kepayang	3	-	-	-	11
10. Simpang Empat	6	3	-	-	3
11. Air Batu	1	2	-	-	-
12. Pulau Rakyat	4	8	1	-	4
13. Bandar Pulau	-	1	-	-	-
<b>Kab. Lab. Batu</b>					
1. Kualuh Hulu	-	1	1	-	1
2. Kualuh Hilir	6	-	-	-	7
3. Aek Natas	14	-	1	-	3
Kotamadya Tg. Balai	-	4	-	-	4
<b>Total</b>	<b>46</b>	<b>53</b>	<b>8</b>	<b>0</b>	<b>48</b>
<b>(%)</b>	<b>22.1</b>	<b>25.5</b>	<b>3.8</b>	<b>0.0</b>	<b>23.1</b>

Kacamatan	With Machine (motorised)					No. of Village
	Motor Cycle	Tricycle Taxi	4-Wheeled Vehicle	Motorized Small Boat	Ship/ Boat	
<b>Kab. Asahan</b>						
1. Kota Kisaran Timur	4	1	-	-	-	5
2. Kota Kisaran Barat	5	-	6	-	-	6
3. Tanjung Tiram	-	-	11	3	1	19
4. Meranti	-	-	10	-	-	12
5. Buntu Pane	1	-	11	-	-	11
6. Bandar Pasir Mandoge	3	-	4	-	-	4
7. Air Joman	6	-	7	1	-	8
8. Tanjung Balai	11	-	7	5	3	11
9. Sei Kepayang	15	-	6	9	5	17
10. Simpang Empat	-	1	7	2	-	10
11. Air Batu	13	-	13	-	-	14
12. Pulau Rakyat	17	1	13	3	-	21
13. Bandar Pulau	13	-	16	-	-	17
<b>Kab. Lab. Batu</b>						
1. Kualuh Hulu	20	-	15	3	1	22
2. Kualuh Hilir	5	-	-	3	10	10
3. Aek Natas	15	-	12	2	1	17
Kotamadya Tg. Balai	4	-	4	-	2	4
<b>Total</b>	<b>132</b>	<b>3</b>	<b>142</b>	<b>31</b>	<b>23</b>	<b>208</b>
<b>(%)</b>	<b>63.5</b>	<b>1.4</b>	<b>68.3</b>	<b>14.9</b>	<b>11.1</b>	<b>100.0</b>

Table B-38 NUMBER OF CUSTOMERS SERVED WITH PIPED WATER SUPPLY BY KECAMATAN

Name of Kecamatan	Total Number of Household (1)	CUSTOMER						Number of Customer (2)	(%)(2)/(1)
		Industry	Trade	Social Place	Private Household	Gover. Office	Public Water Supply		
<u>Kab. Asahan</u>									
1. Kota Kisaran Timur	8,093	6	462	40	2,318	44	7	2,878	28.6
2. Kota Kisaran Barat	9,356	6	462	40	2,318	44	7	2,878	24.8
3. Tanjung Tiram	14,307	-	92	2	417	2	-	513	2.9
4. Meranti	9,898	-	-	-	-	-	-	-	-
5. Buntu Pane	10,913	-	-	-	83	-	-	83	0.8
6. Bandar Pasir Mandoge	5,013	-	-	-	106	-	-	106	2.1
7. Air Joman	7,603	-	42	1	81	6	-	130	1.1
8. Tanjung Balai	14,402	-	-	-	-	-	-	-	-
9. Sei Kepayang	6,752	-	-	-	-	-	-	-	-
10. Simpang Empat	7,175	-	-	-	-	-	-	-	-
11. Air Batu	10,510	-	34	-	98	7	-	139	0.9
12. Pulau Rakyat	14,046	-	-	-	-	-	-	-	-
13. Bandar Pulau	8,454	-	-	-	-	-	-	-	-
TOTAL (or average)	126,522	12	1,092	83	5,421	103	14	6,727	4.3
<u>Kab. Lab. Batu</u>									
1. Kualuh Hulu	18,599	-	-	-	-	-	-	-	-
2. Kualuh Hilir	9,645	-	-	-	-	-	-	-	-
3. Aek Natas	8,467	-	-	-	-	-	-	-	-
TOTAL (or average)	36,711	-	-	-	-	-	-	-	-
<u>Kotamadya Tg. Balai</u>									
1. Tg. Balai Kota I	1,547	-	-	-	-	-	-	-	-
2. Tg. Balai Kota II	2,964	-	-	-	-	-	-	-	-
3. Tg. Balai Kota III	1,599	-	-	-	-	-	-	-	-
4. Tg. Balai Kota IV	1,763	-	-	-	-	-	-	-	-
TOTAL (or average)	7,873	-	-	-	-	-	-	-	-
Grand Total :	171,106	-	-	-	-	-	-	-	-

Table B-39 SOURCE OF DOMESTIC WATER SUPPLY BY KECAMATAN

Kacamatan	The main source of potable water							Total No. of village	
	State Water Company	Electric Pump	Non Electric Pump	Well	Spring	River Lake	Rain water		Other
<u>Kab. Asahan</u>									
1. Kota Kisaran Timur	1	-	-	4	-	-	-	-	5
2. Kota Kisaran Barat	1	-	-	5	-	-	-	-	6
3. Tanjung Tiram	2	1	1	14	-	-	-	1	19
4. Meranti	-	-	-	12	-	-	-	-	12
5. Buntu Pane	-	-	-	8	-	3	-	-	11
6. Bandar Pasir Mandoge	-	-	-	-	4	-	-	-	4
7. Air Joman	-	-	-	8	-	-	-	-	8
8. Tanjung Balai	1	-	-	4	-	5	1	-	11
9. Sei Kepayang	-	-	-	12	-	3	2	-	17
10. Simpang Empat	-	1	1	6	-	-	-	2	10
11. Air Batu	-	-	-	13	-	1	-	-	14
12. Pulau Rakyat	-	2	-	19	-	-	-	-	21
13. Bandar Pulau	-	1	-	9	4	3	-	-	17
<u>Kab. Lab. Batu</u>									
1. Kualuh Hulu	-	-	-	22	-	-	-	-	22
2. Kualuh Hilir	-	-	-	5	-	1	4	-	10
3. Ack Natas	-	-	-	14	-	3	-	-	17
Kotamadya Tg. Balai	2	-	-	-	-	2	-	-	4
<b>Total</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>155</b>	<b>8</b>	<b>21</b>	<b>7</b>	<b>3</b>	<b>208</b>
<b>(%)</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>75</b>	<b>4</b>	<b>10</b>	<b>3</b>	<b>2</b>	<b>100</b>

Table B-40

**NUMBER OF CUSTOMERS PROVIDED WITH  
ELECTRIC SUPPLY BY KECAMATAN**

Name of Kecamatan	Total Number of Household (1)	Number of PLN			Number of Customers of Non-PLN		Percentage  (7)=((2)+(6))/(1)
		Private Household (2)	Trade & Industry (3)	Offices (4)	Number of Generator (5)	Private Household (6)	
<u>Kab. Asahan</u>							
1. Kota Kisaran Timur	8,093	8,884	22	256	10	363	114.3
2. Kota Kisaran Barat	9,356	8,884	22	256	10	363	98.8
3. Tanjung Tiram	14,307	2,239	154	12	26	1,138	23.6
4. Meranti	9,898	397	-	3	36	1,375	17.9
5. Buntu Pane	10,913	0	-	-	79	2,899	26.6
6. Bandar Pasir Mandoge	5,013	48	-	4	14	256	6.1
7. Air Joman	7,603	214	3	5	25	1,152	18.0
8. Tanjung Balai	14,402	6,856	145	16	23	898	53.8
9. Sei Kepayang	6,752	90	-	3	27	1,217	19.4
10. Simpang Empat	7,175	1,050	2	8	4	1,337	33.3
11. Air Batu	10,510	400	5	-	38	2,016	23.0
12. Pulau Rakyat	14,046	132	10	3	73	4,576	33.5
13. Bandar Pulau	8,454	142	-	-	46	1,761	22.5
<b>Total</b>	<b>126,522</b>	<b>29,336</b>	<b>363</b>	<b>566</b>	<b>411</b>	<b>19,351</b>	<b>38.5</b>
<u>Kab. Lab. Batu</u>							
1. Kualuh Hulu	18,599	1,777	0	4	80	1,227	16.2
2. Kualuh Hilir	9,645	119	0	0	?	476	6.2
3. Ack Natas	8,467	68	1	0	51	976	12.3
<b>Total</b>	<b>36,711</b>	<b>1,964</b>	<b>1</b>	<b>4</b>	<b>131</b>	<b>2,679</b>	<b>12.6</b>
<u>Kotamadya Tg. Balai</u>							
1. Tg. Balai Kota I	1,547						
2. Tg. Balai Kota II	2,964						
3. Tg. Balai Kota III	1,599						
4. Tg. Balai Kota IV	1,763						
<b>Total</b>	<b>7,873</b>						
<b>Grand Total (*)</b>	<b>163,233</b>	<b>31,300</b>	<b>364</b>	<b>570</b>	<b>542</b>	<b>22,030</b>	<b>32.7</b>

\*: excluding T. Balai

Table B-41 NUMBER OF MEDICAL FACILITIES IN THE STUDY AREA BY KABUPATEN

Kacamatan	Health Facilities							Number of			Population
	Hospital	Maternity Hospital	Clinic	Public Health Center	Small Puskesmas	Surgery	Family Planning House	Doctor	Nurse mid-wife	Traditional mid-wife	
<b>Kab. Asahan</b>											
1. Kota Kisaran Timur	1	2	2	1	3	4	21	3	43	11	49,094
2. Kota Kisaran Barat	2	3	7	-	3	13	72	17	116	5	51,823
3. Tanjung Tiram	-	4	4	2	11	3	25	1	60	95	75,998
4. Meranti	-	2	4	1	6	-	63	1	39	48	54,574
5. Buntu Pane	-	3	5	1	5	-	23	-	33	53	55,116
6. Bandar Pasir Mandoge	1	-	-	1	2	-	18	1	62	2	22,185
7. Air Joman	-	5	2	2	9	-	35	-	30	40	43,157
8. Tanjung Balai	-	7	7	5	4	-	12	3	10	75	72,110
9. Sei Kepayang	1	4	-	2	5	-	-	1	32	45	37,243
10. Simpang Empat	-	2	7	1	7	-	33	1	36	48	38,638
11. Air Batu	-	3	12	4	4	3	6	13	40	57	54,940
12. Pulau Rakyat	-	6	11	2	7	1	35	2	83	65	68,863
13. Bandar Pulau	1	2	4	1	2	-	5	2	58	24	41,085
<b>Kab. Lab. Batu</b>											
1. Kualuh Hulu	1	7	5	4	7	3	12	4	82	81	97,230
2. Kualuh Hilir	-	3	1	1	6	-	2	1	27	57	48,232
3. Aek Natas	1	4	2	1	11	1	12	1	37	53	43,558
Kotamadya Tg. Balai	1	7	2	3	1	13	57	16	49	17	44,181
<b>Total</b>	<b>8</b>	<b>62</b>	<b>73</b>	<b>31</b>	<b>90</b>	<b>37</b>	<b>410</b>	<b>66</b>	<b>837</b>	<b>776</b>	<b>898,027</b>
Nos./10000 persons	0.1	0.7	0.8	0.3	1.0	0.4	4.6	0.7	9.3	8.6	

Table B-42 NUMBER OF EDUCATION FACILITIES IN THE STUDY AREA BY KABUPATEN

Kecamatan	Kinder garden state	Primary school		Middle school		High school		
		private	state	private	state	private	state	private
Kab. Asahan								
1. Kota Kisaran Timur	0	1	21	14	2	11.0	2	8
1. Kota Kisaran Barat	0	6	24	14	3	10.0	1	10
3. Tanjung Tiram	0	0	60	33	2	8.0	0	3
4. Meranti	0	1	46	11	0	3.0	0	1
5. Buntu Pane	0	4	66	11	1	7.0	0	1
6. Bandar Pasir Mandoge	0	3	18	0	1	3.0	0	0
7. Air Joman	0	0	35	26	1	6.0	0	3
8. Tanjung Balai	0	1	41	32	3	5.0	1	5
9. Sei Kepayang	0	0	36	36	1	12.0	0	4
10. Simpang Empat	0	4	25	12	1	3.0	1	1
11. Air Batu	0	9	41	18	1	3.0	0	2
12. Pulau Rakyat	0	6	81	20	2	6.0	0	4
13. Bandar Pulau	0	2	33	7	1	5.0	0	3
Kab. Lab. Batu								
1. Kualuh Hulu	0	5	85	17	3	17.0	1	6
2. Kualuh Hilir	0	0	32	38	1	9.0	0	1
3. Aek Natas	0	1	40	11	1	9.0	1	0
Kotamadya Tg. Balai	0	8	32	11	2	8.0	1	6
<hr/>								
Total	0	51	716	311	26	125	8	58
no. of school per 10000 person(*)	0	2	29	13	1	5	0.3	2

(\*): persons whose age ranges 5 and 14 , persons in T.Balai and Kualuh Hilir not including

Table B-43

COMMUNICATION FACILITIES IN THE  
STUDY AREA BY KECAMATAN

Name of Kecamatan	Total Number of Household (1)	No. of Post Office	No. of Telephone Users			Percentage (2)/(1)	No. of television (3)	Percentage (3)/(1)
			Private Household (2)	Company	Gover. Office			
<u>Kab. Asahan</u>								
1. Kota Kisaran Timur	8,093	1	130	11	26	1.6	2,022	25.0
2. Kota Kisaran Barat	9,356	-	684	16	102	7.3	3,992	42.7
3. Tanjung Tiram	14,307	2	0	-	-	0.0	1,855	13.0
4. Meranti	9,898	1	0	-	-	0.0	279	2.8
5. Buntu Pane	10,913	1	0	-	-	0.0	1,026	9.4
6. Bandar Pasir Mandoge	5,013	1	0	-	-	0.0	289	5.8
7. Air Joman	7,603	1	0	-	-	0.0	787	10.4
8. Tanjung Balai	14,402	-	0	-	2	0.0	2,443	17.0
9. Sei Kepayang	6,752	1	0	-	-	0.0	409	6.1
10. Simpang Empat	7,175	1	0	-	-	0.0	891	12.4
11. Air Batu	10,510	1	2	2	6	0.0	979	9.3
12. Pulau Rakyat	14,046	1	16	3	10	0.1	2,134	15.2
13. Bandar Pulau	8,454	1	0	-	-	0.0	801	9.5
<b>TOTAL</b> (or average)	<b>126,522</b>	<b>12</b>	<b>832</b>	<b>32</b>	<b>146</b>	<b>0.7</b>	<b>17,907</b>	<b>14.2</b>
<u>Kab. Lab. Batu</u>								
1. Kualuh Hulu	18,599	-	143	5	15	0.8	3233	17.4
2. Kualuh Hilir	-	-	-	-	-	-	-	-
3. Aek Natas	8,467	-	0	3	2	0.0	667	7.9
<b>TOTAL</b> (or average)	<b>27,066</b>	<b>0</b>	<b>143</b>	<b>8</b>	<b>17</b>	<b>0.5</b>	<b>3900</b>	<b>14.4</b>
<u>Kotamadya Tg. Balai</u>								
1. Tg. Balai Kota I	1,547	-	-	-	-	-	-	-
2. Tg. Balai Kota II	2,964	-	-	-	-	-	-	-
3. Tg. Balai Kota III	1,599	-	-	-	-	-	-	-
4. Tg. Balai Kota IV	1,763	-	-	-	-	-	-	-
<b>TOTAL</b> (or average)	<b>7,873</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Grand Total :</b>	<b>161,461</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>



Table B-44 PROJECTION OF POPULATION

Year	Population ('000)	Population Growth Rate (%)
1990	10,541	*
1995	11,551	*
2000	12,567	1.7
2005	13,605	1.6
2010	14,656	1.5
2015	15,789	1.5
2020	17,009	1.5

Note: \* Population growth rate is accorded to figures rprepared by Bureau of statistic office in Jakarta.

Table B-45 PROPOSED FARMING PRACTICES OF PADDY 1)

Practice	Irrigated Area	Rainfed Area
Land preparation	1 ploughing & 2 levelling by draft animal, depth of ploughing > 15 cm	1 ploughing & 1 levelling by manpower, depth of ploughing >10 cm
Seed variety	certified HYV (IR46, IR64, etc.)	certified HYV (IR46, IR64, etc.)
Nursery	area: 1/20 of field, fertilization of N required, careful water management essential, nursery period: 20 days	area: 1/20 of field, fertilization of N required, careful water management essential, nursery period: 20 days
Transplanting	density: 20 x 20 cm or follow the recommendation of extension services depending on variety	density: 20 x 20 cm or follow the recommendation of extension services depending on variety
Fertilization (kg/ha)	INSUS Packet D level	INSUS Packet A/B level
Urea	225	150
TSP	150	100
KCl	100	50
ZA	100	50
	3 topdressing of N	2 topdressing of N
Weeding	2 times at least, depending on weed growth, control by water management recommended.	2 times at least, depending on weed growth, control by water management recommended.
Plant protection 2)	application of insecticide to control brown plant hoppers and etc., spraying by sprayer, rodenticide essential, regulation of cropping season in a project area	application of insecticide to control brown plant hoppers and etc., spraying by sprayer, rodenticide essential, regulation of cropping season in a project area.
Harvesting & processing	by sickle & threshing machine	by sickle & threshing machine

Note:

- 1) As for kind of chemicals and dosage, farming guideline of extension service should be followed.
- 2) It is recommended that plant protection works should be carried out in a systematic way through the farmer's cooperatives and/or villages under the guidance by the agricultural extension services to ensure safety and effective use of chemicals. The period after harvest and before planting is the best time to implement rat control. During this period, the vegetation which provide food & shelter for rats is considered to be minimum and the population is correspondingly low. Control efforts can be concentrated on this period, while, sustained practice of baiting using rodenticides throughout a year is prerequisite.

Table B-46 FARM INPUT OF PADDY PER HA WITH AND WITHOUT PROJECT CONDITION

WITHOUT PROJECT CONDITION

Items	Unit	Irrigated low land Q'ty	Irrigated valley bottom Q'ty	Rainfed low land Q'ty	Rainfed valley bottom Q'ty
Crop Yield	paddy ton/ha	paddy 4	paddy 3.5	paddy 2	paddy 2.5
Farm input (per ha)					
seed	Kg	60	45	56	44
urea	Kg	174	163	33	98
TSP	Kg	133	112	28	84
KCI	Kg	53	37	2.5	15
Anmmon.sulphate	Kg	0	0	0	0
agr.chemicals	Lit.	2.9	3	1.5	1.9
agr.machinery	mechanial-day	3	3	2	2
labour	man-day	140	155	137	147
draft animal 1)	animal-day	5	0	0	0

WITH PROJECT CONDITION

Items	Unit	Irrigated low land Q'ty	New irrigated land and small scale irr.system Q'ty	Control Drainage Q'ty
Crop Yield	paddy ton/ha	paddy 5.5	paddy 5	paddy 4
Farm input (per ha)				
seed	Kg	30	30	30
urea	Kg	225	225	150
TSP	Kg	150	150	100
KCI	Kg	100	100	50
Anmmo.sulphate	Kg	100	100	50
agr.chemicals	Lit.	3	3	2
agr.machinery	mechanial-day	4	4	3
labour	man-day	150	145	170
draft animal 1)	animal-day	5	5	0

Note: 1) A pair of animal day, 8 hrs. work/day.

Table B-47 FARM INPUT OF OIL PALM PER HA WITH PROJECT CONDITION

Items	Unit	Growth Year (Year after Planted)					
		1	2	3	4	5-8	9-30
Yield	ton/ha	0	0	0	0	12	22
Seeding	No.	143					
Replant	No.	17					
Urea	Kg/ha	30	193	400	450	450	450
TSP	Kg/ha	30	97	286	286	400	450
KCl	Kg/ha	30	114	286	286	400	450
	Kg/ha	7.7	58	171	171	200	225
Fused Phosphate							
Sevin	lit/ha	4.8	0	1	1	1	1
Klerat	lit/ha	6	6	0.5	0.5	0.5	0.5
Temik	lit/ha	2	1	1	1	1	1
Herbicide	lit/ha	4	4	4	4	5	5
Labor	man-day/ha	129	63	77	85	90	90

Table B-48

**LABOUR REQUIREMENT PER HA WITH AND WITHOUT PROJECT CONDITION**

**1. With Project Condition**

	Irrigated Area in Low Land	New Irrigated Area & Irrigated Area in Valley Bottom	Rainfed Area, Drainage Control	Oil Palm
<b>Labour Requirement (man-days)</b>				
1. Land Preparation	35	35	60	-
2. Transplanting	25	25	25	-
3. Weeding	30	30	30	-
4. Harvesting & processing	45	40	40	40
5. Others 1)	15	15	15	50
<b>Total</b>	<b>150</b>	<b>145</b>	<b>170</b>	<b>90</b>
<b>Draft Animal Requirement 2)</b>	<b>5</b>	<b>5</b>	<b>-</b>	<b>-</b>

**2. Without Project Condition**

	Irrigated Paddy in Low land	Irrigated Paddy in Valley Bottom	Rainfed Paddy in Low Land	Rainfed Paddy in Valley Bottom	Upland Crop
<b>Labour Requirement (man-days)</b>					
1. Land Preparation	35	50	40	50	32
2. Transplanting	25	25	32	25	13
3. Weeding	25	25	25	25	30
4. Harvesting & processing	40	40	30	35	25
5. Others 1)	15	15	10	12	6
<b>Total</b>	<b>140</b>	<b>155</b>	<b>137</b>	<b>147</b>	<b>106</b>
<b>Draft Animal Requirement 2)</b>	<b>5</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Note:**

- 1) Include fertilizer/chemical application & nursery works.
- 2) a pair of animal days

Table B-49 LABOUR REQUIREMENT WITH PROJECT CONDITION

Project Areas/Items	Irrigated Area Low Land	Newly Irrigated Area & Irrigated Area in Valley Bottom	Control Drainage	Total
<b>Silau-Bunut</b>				
Planted area (ha)	13,880	14,710	-	28,590
Labour requirement (mandays)	2,082,000	2,132,950	-	4,214,950
<b>Tambung Tulang</b>				
Planted area (ha)	-	-	5,755	5,755
Labour requirement (mandays)	-	-	978,350	978,350
<b>S. Empat</b>				
Planted area (ha)	-	-	2,800	2,800
Labour requirement (mandays)	-	-	476,000	476,000
<b>Pd. Mahondang</b>				
Planted area (ha)	2,000	10,370	-	12,370
Labour requirement (mandays)	300,000	1,503,650	-	1,803,650
<b>Leidong-Asahan</b>				
Planted area (ha)	100	33,500	28,800 1)	62,400
Labour requirement (mandays)	15,000	4,857,500	2,592,000	7,464,500
<b>Kandpan Left</b>				
Planted area (ha)	-	-	4,320	4,320
Labour requirement (mandays)	-	-	734,400	734,400
<b>Aek Natas</b>				
Planted area (ha)	-	8,380	-	8,380
Labour requirement (mandays)	-	1,215,100	-	1,215,100
<b>Kualuh Right</b>				
Planted area (ha)	-	4,850	-	4,850
Labour requirement (mandays)	-	703,250	-	703,250
<b>Aek Naetek</b>				
Planted area (ha)	-	6,900	-	6,900
Labour requirement (mandays)	-	1,000,500	-	1,000,500
<b>Small Scale</b>				
Planted area (ha)	-	14,076	-	14,076
Labour requirement (mandays)	-	2,041,020	-	2,041,020
<b>Total/Labour requirement (mandays)</b>	<b>2,397,000</b>	<b>13,453,970</b>	<b>4,780,750</b>	<b>20,631,720</b>

1) Smallholder oil palm

Table B-50 LABOUR REQUIREMENT WITHOUT PROJECT CONDITION

Project Areas/Items	Irrigated Area	Rainfed Area 1/	Total
Silau-Bunut			
Planted area (ha)	11,104	7,355	18,459
Labour requirement (mandays)	1,554,560	1,007,635	2,562,195
Tambung Tulang			
Planted area (ha)	-	4,040	4,040
Labour requirement (mandays)	-	553,480	553,480
S. Empat			
Planted area (ha)	-	-	-
Labour requirement (mandays)	-	-	-
Pd. Mahondang			
Planted area (ha)	1,600	1,750	3,350
Labour requirement (mandays)	224,000	239,750	463,750
Leidong-Asahan			
Planted area (ha)	80	15880	15,960
Labour requirement (mandays)	11,200	2175560	2,186,760
Kandpan Left			
Planted area (ha)	-	2,064	2,064
Labour requirement (mandays)	-	282,768	282,768
Aek Natas			
Planted area (ha)	-	2,984	2,984
Labour requirement (mandays)	-	408,808	408,808
Kualuh Right			
Planted area (ha)	-	2,040	2,040
Labour requirement (mandays)	-	279,480	279,480
Aek Naetek			
Planted area (ha)	-	2,400	2,400
Labour requirement (mandays)	-	328,800	328,800
Small Scale			
Planted area (ha)	1,664	5,998	7,662
Labour requirement (mandays)	257,920	881,546	1,139,466
<b>Total/Labour requirement (mandays)</b>	<b>2,047,680</b>	<b>6,157,827</b>	<b>8,205,507</b>

1/ Including rainfed PU area, rainfed non-PU area & other area

Table B-51 ECONOMIC PRICES FOR CROPS(\*)

	Paddy	Maize	Soy Beans	Ground Nuts
Projected 1995 world market price of rice(US\$/ton)(1)	259	102	296	791
Quality adjustment(2)	26	0	0	0.72
International shipping and handling (US\$/ton)	28	22	38	
CIF price at Belawan(US\$/ton)	261	124	334	570
CIF price at Belawan (Rp./kg)(3)	462	219	591	1008
Port charge,handling,operation (Rp./Kg)	37	22	21	40
Transport to wholesaler (Rp./Kg)	13	13	13	13
Trader margin (Rp./Kg)	11	13	13	13
Ex-mill or wholesale price (Rp./Kg)	501	241	612	1,048
Conversion to paddy (4)	326			
Milling cost (Rp./Kg)	13			
Transport farm to mill (Rp./Kg)	13	12	12	12
Economic farm gate price (Rp./Kg)	300	229	600	1,036

(1) Based on the IBRD commodity price projection, Feb.1989.  
The IBRD figures estimated are given in 1985 constant prices, which have been adjusted by a factor of 1.495(MUV) to allow for price escalation between 1985 and 1989.  
pricing basis : rice Thai, milled, 5% broken,FOB Bangkok  
maize, US no.2 yellow,FOB Gulf ports  
soybeans(US),CIF Rotterdam  
groundnut oil,bulk , CIF UK

(2) a 10 % discount for rice and world price/domestic shelled nut ratio(0.72)

(3) one US\$ = Rp. 1,770

(4) 65%

(\*) paddy, maize, soybean and groundnuts:import parity



Table B-52 ECONOMIC PRICES FOR OIL PALM

	Growth Age (3)	
	4-7	8-30
Projected 2000 world market price of palm oil(1)	443	443
Freight/insurance(\$)	60	60
FOB(\$)	383	383
FOB(Rp.)(2)	677,910	677,910
Extraction rate (%)	16	20
Price/FFB (Rp.)	108,466	135,582
Projected 2000 world market price of palm kernel(1)	268	268
Freight/insurance(\$)	55	55
FOB(\$)	213	213
FOB(Rp.)(2)	377,010	377,010
Extraction rate (%)	4	6
Price/FFB(Rp.)	15,080	20,736
FOB Fresh Fruit Bunch price per ton (Rp.)	123,546	156,318
Transport charge(Rp.)	4,300	4,300
Milling charge per FFB ton	4,500	4,500
Replacement cost of equipment/mill per FFB ton (Rp.)	2,400	2,400
Selling and administration cost per FFB ton (Rp.)	12,600	12,600
Economic farm gate price of FFB (ton)	99,746	132,518
	99,800	132,500

(1) Based on the IBRD commodity price projection, Feb.1989  
The IBRD figures estimated are given in 1985 constant prices,  
which have been adjusted by a factor of 1.495(MUV) to allow  
for price escalation between 1985 and 1989  
pricing basis: palm oil(Malaysian), 5% bulk, CIFJ N. W Europe  
palm kernels(Nigerian), CIF UK

(2) one US\$ = Rp.1,770

(3) year after planting

Table B-53 ECONOMIC PRICES FOR FERTILIZER(\*)

A) urea	
Price of FOJB Europe (\$/ton)	211
Price differential of Indonesian urea (\$/ton)	16
FOB price of baggd urea ex-factory Lhokseumawe(\$/ton)	227
Ex-factory Lhokseumawe(Rp./Kg)	402
Transport to project area(Rp./Kg)	18
Handling costs(Rp./Kg)	17
Transpot wholesaler to farm(Rp./Kg)	11
Economim farmgate price(Rp./Kg)	448
B) TSP	
Price US Gulf(\$/ton)	206
Freight and insurance(\$/ton)	60
CIF Indonesia(\$/ton)	266
CIF Indonesia(Rp./Kg)	471
Transport to project area(Rp./Kg)	18
Handling costs(Rp./Kg)	17
Transport wholesaler to farm(Rp./Kg)	11
Economic farmgate price(Rp./Kg)	517
C) KCI	
Price FOB Vancourver(\$/ton)	108
Freight and insurance(\$/ton)	50
CIF Indonesia (\$/ton)	158
CIF price Belawan(Rp./Kg)	280
Transpot to project area(Rp./Kg)	18
Handling costs(Rp./Kg)	17
Transport wholesaler to farm (Rp./Kg)	11
Economic farm gate price(Rp./Kg)	326

Remarks: exchange rate of one US\$ = Rp.1,770

(\*) urea:export parity  
TSP and KCI:import parity

Table B-54 CROP BUDGET OF PADDY PER HA IN TERMS OF ECONOMIC VALUE

WITHOUT PROJECT CONDITION

Items	Unit	Irrigated low land			Irrigated valley bottom			Rainfed low land			Rainfed valley bottom		
		Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount
Yield	ton/ha	4.0			3.5			2.0			2.5		
Unit price	Rp./ton		300,000			300,000			300,000			300,000	
Gross income	Rp./ha			1,200,000			1,050,000			600,000			750,000
Production cost (per ha)				479,121			417,940			269,365			343,472
seed	Rp/Kg	60	230	13,800	45	230	10,350	56	290	16,240	44	230	10,120
urea	Rp/Kg	174	448	77,952	163	448	73,024	33	448	14,784	98	448	43,904
TSP	Rp/Kg	133	517	68,761	112	517	57,904	28	517	14,476	84	517	43,428
KCl	Rp/Kg	53	326	17,278	37	326	12,062	2.5	326	815	15	326	4,890
Anmmon.sulphate	Rp./lit	0		0	0		0	0		0	0		0
agr.chemicals	Rp./lit	2.9	7,700	22,330	3	7,700	23,100	1.5	7,700	11,550	1.9	7,700	14,630
agr.machinery	mechanial-day	3	3,000	9,000	3	3,000	9,000	2	3,000	6,000	2	3,000	6,000
labour	man-day	140	1,500	210,000	155	1,500	232,500	137	1,500	205,500	147	1,500	220,500
draft animal	animal-day	5	12,000	60,000	0	12,000	0	0	12,000	0	0	12,000	0
Primary profit	Rp./ha			720,879			632,060			330,635			406,528

WITH PROJECT CONDITION

Items	Unit	Irrigated low land			New irrigated land and irrigated land valley bottom			Drainage control		
		Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount
Yield	ton/ha	5.5			5.0			4.0		
Unit price	Rp./ton		300,000			300,000			300,000	
Gross income	Rp./ha			1,650,000			1,500,000			1,200,000
Production cost				557,950			550,450			431,500
seed	Rp/Kg	30	230	6,900	30	230	6,900	30	230	6,900
urea	Rp/Kg	225	448	100,800	225	448	100,800	150	448	67,200
TSP	Rp/Kg	150	517	77,550	150	517	77,550	100	517	51,700
KCl	Rp/Kg	100	326	32,600	100	326	32,600	50	326	16,300
Anmmo.sulphate	Rp/kg	100	200	20,000	100	200	20,000	50	200	10,000
agr.chemicals	Rp./lit	3	7,700	23,100	3	7,700	23,100	2	7,700	15,400
agr.machinery	mechanial-day	4	3,000	12,000	4	3,000	12,000	3	3,000	9,000
labour	man-day	150	1,500	225,000	145	1,500	217,500	170	1,500	255,000
draft animal	animal-day	5	12,000	60,000	5	12,000	60,000	0	12,000	0
Primary profit	Rp./ha			1,092,050			949,550			768,500

Table B-55

## CROP BUDGET OF OIL PALM PER HA IN TERMS OF ECONOMIC VALUE

Terms	Unit for Q'ty	Growth Stage (Year after Planting)								
		1			2			3		
		Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount
Yield	ton/ha									
Unit price	Rp/ton									
Gross income	Rp/ha									
Production cost				729,230			402,477			703,198
seedling	no./ha	143	2,000	286,000	0	2,000	0	0	2,000	0
replanting	no./ha	17	2,000	34,000	0	2,000	0	0	2,000	0
urea	Kg/ha	30	448	13,440	193	448	86,464	400	448	179,200
TSP	Kg/ha	30	517	15,510	97	517	50,149	286	517	147,862
KCl	Kg/ha	30	326	9,780	114	326	37,164	286	326	93,236
fused phosphate	Kg/ha	7.5	400	3,000	58	400	23,200	171	400	68,400
sevin	Lit/ha	4.8	10,000	48,000	0	10,000	0	1	10,000	10,000
klerat	Lit/ha	6	4,000	24,000	6	4,000	24,000	0.5	4,000	2,000
temik	Lit/ha	2	15,000	30,000	1	15,000	15,000	1	15,000	15,000
herbicide	Lit/ha	4	18,000	72,000	4	18,000	72,000	4	18,000	72,000
labour	Man-day/ha	129	1,500	193,500	63	1,500	94,500	77	1,500	115,500
Net income	Rp/ha			(729,230)			(402,477)			(703,198)

Terms	Unit for Q'ty	Growth Stage (Year after Planting)								
		4			5 - 8			9 - 30		
		Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount	Q'ty	Unit Price	Amount
Yield	ton/ha				12			22		
Unit price	Rp/ton					99,800			132,500	
Gross income	Rp/ha						1,197,600			2,915,000
Production cost				735,598			868,800			922,950
seedling	no./ha	0	2,000	0	0	2,000	0	0	2,000	0
replanting	no./ha	0	2,000	0	0	2,000	0	0	2,000	0
urea	Kg/ha	450	448	201,600	450	448	201,600	450	448	201,600
TSP	Kg/ha	286	517	147,862	400	517	206,800	450	517	232,650
KCl	Kg/ha	286	326	93,236	400	326	130,400	450	326	146,700
fused phosphate	Kg/ha	171	400	68,400	200	400	80,000	225	400	90,000
sevin	Lit/ha	1	10,000	10,000	1	10,000	10,000	1	10,000	10,000
klerat	Lit/ha	0	4,000	0	0	4,000	0	0.5	4,000	2,000
temik	Lit/ha	1	15,000	15,000	1	15,000	15,000	1	15,000	15,000
herbicide	Lit/ha	4	18,000	72,000	5	18,000	90,000	5	18,000	90,000
labour	Man-day/ha	85	1,500	127,500	90	1,500	135,000	90	1,500	135,000
Net income	Rp/ha			(735,598)			328,800			1,992,050

Table B-56 (1/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Irrigated Paddy-Low Land: Irrigation Development  
Farm Size: Paddy Field 0.5 ha

Farm Size: Paddy Field 1.0 ha

Item	Unit	Owner Farm						Owner Farm					
		Without			With			Without			With		
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
Paddy													
Cropped Area	ha	0.80			1.00			1.60			2.00		
Unit Yield	t/ha	4.0			5.5			4.0			5.5		
Unit Price	Rp/kg		270			270			270			270	
Gross Return	Rp.000			864.0		1485.0				1728.0			2970.0
Production Cost	Rp.000			144.4		204.9				288.2			409.8
seed	Rp/kg	48	450	21.6	30	450	13.5	96	450	43.2	60	450	27.0
urea	Rp/kg	139	165	23.0	225	165	37.1	278	165	45.9	450	165	74.3
TSP	Rp/kg	106	165	17.6	150	165	24.8	212	165	35.0	300	165	49.5
KCL	Rp/kg	42	165	7.0	100	165	16.5	84	165	13.9	200	165	33.0
aurum.sulphate	Rp/kg	0	165	0.0	100	165	16.5	0	165	0.0	200	165	33.0
agr.chemicals	Rp./ltr	2.3	6500	15.1	3	6500	19.5	4.6	6500	29.9	6	6500	39.0
agr.machinery	macine-day	2.4	3000	7.2	4	3000	12.0	4.8	3000	14.4	8	3000	24.0
hired labour2/	man-day	0	2500	0.0	0	2500	0.0	0	2500	0.0	0	2500	0.0
draft animal3/	animal-day	4	12000	48.0	5	12000	60.0	8	12000	96.0	10	12000	120.0
land tax	Rp./ha	0.5	10000	5.0	0.5	10000	5.0	1.0	10000	10.0	1.0	10000	10.0
land rent	Rp./ha	0	100000	0.0	0	100000	0.0	0	100000	0.0	0	100000	0.0
Net Return	Rp.000			719.6		1280.1				1439.8			2560.2
Other Crops													
Net Income 4/	Rp.000			43.0		43.0				43.0			43.0
Net Farm Income	Rp.000			762.6		1323.1				1482.8			2603.2
Family Expenditure 4/	Rp.000			803.0		803.0				803.0			803.0
Net Surplus	Rp.000			-40.4		520.1				679.8			1800.2
Tenant Farm													
Tenant Farm													
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
Paddy													
Net Return 5/	Rp.000			674.6		1235.1				1349.8			2470.2
Other Crops													
Net Income	Rp.000			0.0		0.0				0.0			0.0
Net Farm Income	Rp.000			674.6		1235.1				1349.8			2470.2
Family Expenditure	Rp.000			803.0		803.0				803.0			803.0
Net Surplus	Rp.000			-128.4		432.1				546.8			1667.2

1/: Unit price based on questionnaire results. Off-farm income not included.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit- a pair of draft animal

4/: based on questionnaire results

5/: assumed land rent per ha = Rp.100000

Table B-56 (2/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Irrigated Paddy-Valley Bottom: Irrigation Development  
Farm Size: Paddy Field 0.5 ha

Farm Size: Paddy Field 1.0 ha

Item	Unit	Owner Farm						Owner Farm					
		Without			With			Without			With		
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
Paddy													
Cropped Area	ha	0.80			1.00			1.60			2.00		
Unit Yield	t/ha	3.5			5.0			3.5			5.0		
Unit Price	Rp/kg		270			270			270			270	
Gross Return	Rp.000			756.0			1350.0			1512.0			270.0
Production Cost	Rp.000			85.4			204.9			170.3			409.8
seed	Rp/kg	36	450	16.2	30	450	13.5	72	450	32.4	60	450	27.0
urea	Rp/kg	130	165	21.5	225	165	37.1	261	165	43.1	450	165	74.3
TSP	Rp/kg	90	165	14.9	150	165	24.8	179	165	29.5	300	165	49.5
KCl	Rp/kg	30	165	5.0	100	165	16.5	59	165	9.7	200	165	33.0
ammun.sulphate	Rp/kg	0	165	0.0	100	165	16.5	0	165	0.0	200	165	33.0
agr.chemicals	Rp./tr	2.4	6500	15.6	3.0	6500	19.5	4.8	6500	31.2	6	6500	39.0
agr.machinery	machine-day	2.4	3000	7.2	4.0	3000	12.0	4.8	3000	14.4	8	3000	24.0
hire labour2/	man-day	0	2500	0.0	0	2500	0.0	0	2500	0.0	0	2500	0.0
draft animal3/	animal-day	0	12000	0.0	5.0	12000	60.0	0	12000	0.0	10	12000	120.0
land tax	Rp./ha	0.5	10000	5.0	0.5	10000	5.0	1.0	10000	10.0	1.0	10000	10.0
land rent	Rp./ha	0	100000	0.0	0	100000	0.0	0	100000	0.0	0	100000	0.0
Net Return	Rp.000			670.6			1145.1			1341.7			2290.2
Other Crops													
Net Income 4/	Rp.000			616.0			616.0			616.0			616.0
Net Farm Income	Rp.000			1286.6			1761.1			1957.7			2906.2
Family Expenditure 4/	Rp.000			1074.0			1074.0			1074.0			1074.0
Net Surplus	Rp.000			212.6			687.1			883.7			1832.2
		Tenant Farm						Tenant Farm					
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
Paddy													
Net Return 5/	Rp.000			625.6			1100.1			1251.7			2200.2
Other Crops													
Net Income	Rp.000			0.0			0.0			0.0			0.0
Net Farm Income	Rp.000			625.6			1100.1			1251.7			2200.2
Family Expenditure 4/	Rp.000			1074.0			1074.0			1074.0			1074.0
Net Surplus	Rp.000			-448.4			26.1			177.7			1126.2

1/: Unit price based on questionnaire results. Off-farm income not included.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit- a pair of draft animal

4/: based on questionnaire results

5/: assumed land rent per ha = Rp.100000

Table B-56 (3/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Rainfed Paddy-Low Land: Irrigation Development  
Farm Size: Paddy Field 1.0 ha

Farm Size: Paddy Field 2.0 ha

Item	Unit	Owner Farm						Owner Farm					
		Without			With			Without			With		
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
<b>Paddy</b>													
Cropped Area	ha	1.0			2.0			2.0			4.0		
Unit Yield	t/ha	2.0			5.0			2.0			5.0		
Unit Price	Rp/kg		300			270			300			270	
Gross Return	Rp.000			600.0		2700.0			1200.0			5400.0	
<b>Production Cost</b>	Rp.000			47.3		409.8			94.6			819.6	
seed	Rp/kg	56	255	14.3	60	450	27.0	112	255	28.6	120	450	54.0
urea	Rp/kg	33	165	5.4	450	165	74.3	66	165	10.9	900	165	148.5
TSP	Rp/kg	28	165	4.6	300	165	49.5	56	165	9.2	600	165	99.0
KCL	Rp/kg	2.5	165	0.4	200	165	33.0	5.0	165	0.8	400	165	66.0
amm.sulphate	Rp/kg	0	165	0.0	200	165	33.0	0	165	0.0	400	165	66.0
agr.chemicals	Rp./ltr	1.5	6500	9.8	6	6500	39.0	3.0	6500	19.5	12	6500	78.0
agr.machinery	macine-day	2	3000	6.0	8	3000	24.0	4	3000	12.0	16	3000	48.0
hired labour <sup>2/</sup>	man-day	0	2500	0.0	0	2500	0.0	0	2500	0.0	0	2500	0.0
draft animal <sup>3/</sup>	animal-day	0	12000	0.0	10	12000	120.0	0	12000	0.0	20	12000	240.0
land tax	Rp./ha	1.0	6800	6.8	1.0	10000	10.0	2.0	6800	13.6	2.0	10000	20.0
land rent	Rp./ha	0	50000	0.0	0	100000	0.0	0	50000	0.0	0	100000	0.0
Net Return	Rp.000			552.7		2292.2			1105.4			4580.4	
<b>Other Crops <sup>4/</sup></b>													
Net Income	Rp.000			2.0		2.0			2.0			2.0	
Net Farm Income	Rp.000			554.7		2292.2			1107.4			4582.4	
Family Expenditure <sup>4/</sup>	Rp.000			999.0		999.0			999.0			999.0	
Net Surplus	Rp.000			-444.3		1293.2			108.4			3583.4	
		Tenant Farm						Tenant Farm					
		O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)	O'ly	Unit Price	Amount (Rp.000)
<b>Paddy</b>													
Net Return <sup>5/</sup>	Rp.000			509.5		2250.2			1019.0			4500.4	
<b>Other Crops</b>													
Net Income	Rp.000			0.0		0.0			0.0			0.0	
Net Farm Income	Rp.000			509.5		2250.2			1019.0			4500.4	
Family Expenditure	Rp.000			999.0		999.0			999.0			999.0	
Net Surplus	Rp.000			-489.5		1251.2			20.0			3501.4	

1/: Unit price based on questionnaire results. Off-farm income not included.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit - a pair of draft animal

4/: Based on questionnaire results

5/: Assumed land rent per ha : rainfed field=Rp.50,000, irrigated field=Rp.100,000

Table B-56 (4/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Rainfed Paddy-Valley Bottom: Irrigation Development  
Farm Size: Paddy Field 0.5 ha

Farm Size: Paddy Field 1.0 ha

Item	Unit	Owner Farm						Owner Farm					
		Without			With			Without			With		
		O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)
Paddy													
Cropped Area	ha	0.5			0.85			1.0			1.70		
Unit Yield	t/ha	2.5			5.0			2.5			5.0		
Unit Price	Rp/kg		270			270			270			270	
Gross Return	Rp.000			337.5			1147.5			675.0			2295.0
Production Cost	Rp.000			39.1			176.0			78.1			350.1
seed	Rp/kg	22	450	9.9	26	450	11.7	44	450	19.8	51	450	23.0
urea	Rp/kg	49	165	8.1	191	165	31.5	98	165	16.2	383	165	63.2
TSP	Rp/kg	42	165	6.9	128	165	21.1	84	165	13.9	255	165	42.1
KCL	Rp/kg	7.5	165	1.2	85	165	14.0	15	165	2.5	170	165	28.1
anmm.sulphate	Rp/kg	0	165	0.0	85	165	14.0	0	165	0.0	170	165	28.1
agr.chemicals	Rp./ltr	1.0	6500	6.5	2.6	6500	16.9	2.0	6500	13.0	5.1	6500	33.2
agr.machinery	macine-day	1	3000	3.0	3.4	3000	10.2	2	3000	6.0	6.8	3000	20.4
hired labour2/	man-day	0	2500	0.0	0	2500	0.0	0	2500	0.0	0	2500	0.0
draft animal3/	animal-day	0	12000	0.0	4.3	12000	51.6	0	12000	0.0	8.5	12000	102.0
land tax	Rp./ha	0.5	6800	3.4	0.5	10000	5.0	1.0	6800	6.8	1.0	10000	10.0
land rent	Rp./ha	0	50000	0.0	0	100000	0.0	0	50000	0.0	0	100000	0.0
Net Return	Rp.000			298.4			971.5			596.9			1944.9
Other Crops 4/													
Net Income	Rp.000			446.0			446.0			446.0			446.0
Net Farm Income	Rp.000			744.4			1417.5			1042.9			2390.9
Family Expenditure 4/	Rp.000			634.0			634.0			634.0			634.0
Net Surplus	Rp.000			110.4			783.5			408.9			1756.9
		Tenant Farm						Tenant Farm					
		O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)	O'y	Unit Price	Amount (Rp.000)
Paddy													
Net Return 5/	Rp.000			276.8			951.5			553.7			1904.9
Other Crops													
Net Income	Rp.000			0.0			0.0			0.0			0.0
Net Farm Income	Rp.000			276.8			951.5			553.7			1904.9
Family Expenditure	Rp.000			634.0			634.0			634.0			634.0
Net Surplus	Rp.000			-357.2			317.5			-80.3			1270.9

1/: Unit price based on questionnaire results. Off-farm income not included.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit- a pair of draft animal

4/: based on questionnaire results

5/: Assumed land rent per ha : rainfed field=Rp.50,000, irrigated field=Rp.100,000



Table B-56 (5/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Rainfed Paddy-Low Land: Control Drainage  
Farm Size: Paddy Field 1.0 ha

Farm Size: Paddy Field 2.0 ha

Item	Unit	Owner Farm						Owner Farm						
		Without			With			Without			With			
		O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)	
Paddy														
Cropped Area	ha	1.0			1.0			2.0			2.0			
Unit Yield	t/ha	2.0			4.0			2.0			4.0			
Unit Price	Rp/kg		300			270			300			270		
Gross Return	Rp.000			600.0			1080.0			1200.0			2160.0	
Production Cost	Rp.000			47.3			100.1			94.6			200.1	
seed	Rp/kg	56	255	14.3	30	450	13.5	112	255	28.6	60	450	27.0	
urea	Rp/kg	33	165	5.4	150	165	24.8	66	165	10.9	300	165	49.5	
TSP	Rp/kg	28	165	4.6	100	165	16.5	56	165	9.2	200	165	33.0	
KCL	Rp/kg	2.5	165	0.4	50	165	8.3	5	165	0.8	100	165	16.5	
anmm.sulphate	Rp/kg	0	165	0.0	50	165	8.3	0	165	0.0	100	165	16.5	
agr.chemicals	Rp./ltr	1.5	6500	9.8	2	6500	13.0	3	6500	19.5	4	6500	26.0	
agr.machinery	macine-day	2	3000	6.0	3	3000	9.0	4	3000	12.0	6	3000	18.0	
hired labour2/	man-day	0	2500	0.0	0	2500	0.0	0	2500	0.0	0	2500	0.0	
draft animal3/	animal-day	0	12000	0.0	0	12000	0.0	0	12000	0.0	0	12000	0.0	
land tax	Rp./ha	1.0	6800	6.8	1.0	6800	6.8	2.0	6800	13.6	2.0	6800	13.6	
land rent	Rp./ha	0	50000	0.0	0	50000	0.0	0	50000	0.0	0	50000	0.0	
Net Return	Rp.000			552.7			979.9			1105.4			1959.9	
Other Crops														
Net Income 4/	Rp.000			2.0			2.0			2.0			2.0	
Net Farm Income	Rp.000			554.7			981.9			1107.4			1961.9	
Family Expenditure 4/	Rp.000			999.0			999.0			999.0			999.0	
Net Surplus	Rp.000			-444.3			-17.1			108.4			962.9	
Tenant Farm														
			O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)
Paddy														
Net Return 5/	Rp.000				509.5			936.8			1019.0			1873.5
Other Crops														
Net Income	Rp.000				0.0			0.0			0.0			0.0
Net Farm Income	Rp.000				509.5			936.8			1019.0			1873.5
Family Expenditure	Rp.000				999.0			999.0			999.0			999.0
Net Surplus	Rp.000				-489.5			-62.2			20.0			874.5

1/: Unit price based on questionnaire results. Off-farm income not included.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit- a pair of draft animal

4/: Based on questionnaire results

5/: Assumed land rent per ha = Rp.50,000

Table B-56 (6/7) FARM BUDGET WITH AND WITHOUT PROJECT CONDITION 1/

Category/Swamp Area: Irrigation Development  
Farm Size: Paddy Field 1.0 ha

Category/Swamp Area: Control Drainage  
Farm Size: Paddy Field 1.0 ha

Item	Unit	Owner Farm					
		With			With		
		O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)
Paddy							
Cropped Area	ha	2.0			1.0		
Unit Yield	t/ha	5.0			4.0		
Unit Price	Rp/kg		270			270	
Gross Return	Rp.000			2700			1080
Production Cost	Rp.000			409.8			100.1
seed	Rp/kg	60	450	27.0	30	450	13.5
urea	Rp/kg	450	165	74.3	150	165	24.8
TSP	Rp/kg	300	165	49.5	100	165	16.5
KCL	Rp/kg	200	165	33.0	50	165	8.3
anmm.sulphate	Rp/kg	200	165	33.0	50	165	8.3
agr.chemicals	Rp./ltr	6.0	6500	39.0	2	6500	13.0
agr.machinery	macine-day	8	3000	24.0	3	3000	9.0
hired labour2/	man-day	0	2500	0.0	0	2500	0.0
draft animal3/	animal-day	10	12000	120.0	0	12000	0.0
land tax	Rp./ha	1.0	10000	10.0	1.0	6800	6.8
land rent	Rp./ha	0	100000	0.0	0	50000	0.0
Net Return	Rp.000			2290.2			979.9

1/: Unit price based on questionnaire results.

2/: Without costing labour, because mutual cooperation in labour supply is still common in the study area.

3/: Unit- a pair of draft animal

Table B-56 (7/7)

FARM BUDGET WITH AND WITHOUT  
PROJECT CONDITION 1/Category/Swamp Area: Smallholder Oil Palm  
Farm Size: Oil Palm 2.0 ha

Farm Size: 3.0 ha

Item	Unit	Owner Farm					
		With			With		
		O'ty	Unit Price	Amount (Rp.000)	O'ty	Unit Price	Amount (Rp.000)
Paddy							
Cropped Area	ha	2.0			3.0		
Unit Yield	t/ha	22.0			22.0		
Unit Price	Rp/kg		80			80	
Gross Return	Rp.000			3520.0			5280.0
Production Cost	Rp.000			1021.6			1532.4
seed	Rp/kg	0	255	0.0	0	450	0.0
urea	Rp/kg	900	165	148.5	1350	165	222.8
TSP	Rp/kg	900	165	148.5	1350	165	222.8
KCL	Rp/kg	900	165	148.5	1350	165	222.8
anmm.sulphate	Rp/kg	900	165	148.5	1350	165	222.8
fused phosphate	Rp/kg	450	400	180.0	675	400	270.0
agr.chemicals	Rp./ltr	13	-	234.0	19.5	-	351.0
land tax	Rp./ha	2.0	6800	13.6	3.0	6800	20.4
Net Return	Rp.000			2498.4			3747.6

1/: Unit price based on questionnaire results.



*Master Plan Study on Lower Asahan River Basin Development*

*Vol. 3  
Agricultural Development Plan*

## **Appendix 3-C**

# **Irrigation and Drainage**



**Appendix 3-C**  
**IRRIGATION AND DRAINAGE**

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Table C-1

## IRRIGATION CONDITIONS OF DPU MANAGEMENT AREA IN NORTH SUMATERA PROVINCE

(Unit : ha)

Area	Commanding Area of Main Irrigation System						TOTAL
	Paddy field			Other Land Use			
	Irrigated P.Field	Non-irrigated P.Field	Total	Convertible Land to Paddy Field	Not-Convertible Land to Paddy Field	Total	
<b>1 Sumatera Island (1987)</b>							
1.1 Technical Irrigation System	213,900	13,300	227,200	75,600	16,500	92,100	319,300
1.2 Semi-Technical Irrigation System	281,900	36,000	317,900	51,000	7,900	58,900	376,800
1.3 Simple Irrigation System	125,800	22,000	147,800	20,900	4,600	25,500	173,300
Total of Sumatera Island	621,600	71,300	692,900	147,500	29,000	176,500	869,400
(Proportion, %)	71%	8%	80%	17%	3%	20%	100%
<b>2 North Sumatera Province (1987)</b>							
1.1 Technical Irrigation System	68,800	4,300	73,100	2,600	2,900	5,500	78,600
1.2 Semi-Technical Irrigation System	80,800	13,700	94,500	11,200	2,700	13,900	108,400
1.3 Simple Irrigation System	19,400	1,000	11,400	1,600	600	2,200	13,600
Total of N. Sumatera	160,000	19,000	179,000	15,400	6,200	21,600	200,600
(Proportion, %)	80%	9%	89%	8%	3%	11%	100%
<b>3 Lower Asahan Study Area (1988)</b>							
1.1 Technical Irrigation System	2,800	800	3,600	100	600	700	4,300
1.2 Semi-Technical Irrigation System	5,500	6,600	12,100	2,300	2,600	4,900	17,000
1.3 Simple Irrigation System	800	300	1,100	2,400	200	2,600	3,700
Total of Study Area	9,100	7,700	16,800	4,800	3,400	8,200	25,000
(Proportion, %)	36%	31%	67%	19%	14%	33%	100%

Table C-2 IRRIGATION AREA UNDER MANAGEMENT OF DPU IN THE STUDY AREA

(Unit: ha)										
No.	Name of Irrigation Area	Location (Kecamatan)	Total Irrigation Area (ha)	Paddy Field(Sawah)			Other Land Use			
				Irrigated Sawah	Rainfed Sawah	Total	Convertible area to Sawah	Not convertible to Sawah	Swamp Area	Total
AS-1	Serbangan	Maranti	2,333	1,682	332	2,014	0	319	0	319
2	Panca Arga	Maranti	2,500	750	0	750	750	0	1,000	1,750
3	Silo Bonto	Air Joman	3,231	750	0	750	2,427	54	0	2,481
4	Tinggi Raja	Buntu Panc	163	108	44	152	0	11	0	11
5	Sei Silau	Air Batu	1,315	856	150	1,006	0	309	0	309
6	Desa Gajah	Tanjung Tiram	600	600	0	600	0	0	0	0
7	Sijambi	Simpang Empat	763	539	122	661	0	102	0	102
8	Padang Mahondang	Pulau Rakyat	3,231	1,000	1,400	2,400	831	0	0	831
9	Bandar Saleh	Simpang Empat	250	250	0	250	0	0	0	0
10	Sei Beluru	Maranti	150	150	0	150	0	0	0	0
11	Sei Serani	Maranti	150	150	0	150	0	0	0	0
12	Tambun Tulang	Maranti	5,050 *	0	5,050	5,050	0	0	0	0
13	Rawa Sei Labah	Sei Kepayang	4,000 *	0	650	650	0	0	3,350	3,350
Sub-total AS			23,736	6,835	7,748	14,583	4,008	795	4,350	9,153
AK-1	Si Umbut-umbut	Kisaran Timur	1,001	325	170	495	10	496	0	506
2	Pulau Bargot	Buntu Panc	150	87	48	135	13	2	0	15
3	Pardamaran	Pulau Rakyat	130	50	40	90	0	40	0	40
4	Kapias Batu VIII	Tg. Balai	358	55	175	230	74	54	0	128
5	Tasik Malaya	Air Joman	2,297	755	203	958	532	807	0	1,339
6	Marjanji Aceh	Bandar Pulau	229	90	57	147	15	67	0	82
7	Sei Lebah	Sei Kepayang	4,245 *	50	2,500	2,550	650	545	500	1,695
8	Binjai Serbangan	Air Joman	210	80	95	175	25	10	0	35
9	Simpang Empat	Simpang Empat	800	100	650	750	35	15	0	50
10	Aek Kuasan	Pulau Rakyat	375	50	70	120	190	65	0	255
Sub-total AK			9,795	1,642	4,008	5,650	1,544	2,101	500	4,145
Total of Kab. Asahan			33,531	8,477	11,756	20,233	5,552	2,896	4,850	13,298
LBT-1	Sinar Toba	Kualuh Hulu	600	271	194	465	46	89	0	135
2	Gunting Saga	Kualuh Hulu	450 *	0	327	327	16	107	0	123
3	Si Kopi-kopi	Kualuh Hulu	336	104	128	232	16	88	0	104
4	Sono Martini	Kualuh Hulu	3,000 *	0	780	780	0	0	2,220	2,220
5	Tapian Nauli	Aek Natas	1,000 *	0	843	843	51	21	85	157
6	Sukarame-Sukasari	Kualuh Hulu	1,500 *	0	950	950	0	0	550	550
7	Aek Natas	Aek Natas	4,500 *	0	2,540	2,540	345	15	1,600	1,960
8	Aek Nactek	Kualuh Hulu	4,500 *	0	3,000	3,000	0	0	1,500	1,500
9	Leidong	Kualuh Hilir	16,000 *	0	13,400	13,400	0	0	2,600	2,600
10	Siam Porik	Kualuh Hulu	327	109	137	246	32	49	0	81
11	Bandar Lama	Kualuh Hulu	215	70	40	110	0	105	0	105
Sub-total LBT			32,428	554	22,339	22,893	506	474	8,555	9,535
Total of Kab. Labuhan Batu			32,428	554	22,339	22,893	506	474	8,555	9,535
Total of Study Area			65,959	9,031	34,095	43,126	6,058	3,370	13,405	22,833

Source:

AS ; Luas Areal Daerah Yang Dikelola Cabang Dinas Pengairan Asahan, DPUP Sum-Ut, June 1989  
 AK ; Daftar Inventarisasi Daerah Pengairan, Kabupaten Daerah Tingkat II Asahan, DPU, April 1988  
 LB ; Rekapitulasi Buku Pinter Daerah Irigasi PU, Cabang Dinas Pengairan Labuhan Batu, April 1988

\* : Control Drainage Scheme maintained by DPU

Table C-3

## IRRIGATION CONDITION OF DPU MANAGEMENT AREA IN THE STUDY AREA

(Unit : ha)

No.	Name of Irrigation Area	Total Gross Area (ha)	Irrigation Level of the System			Commanding Area of Main Irrigation System(CAMIS)						Out of the Commanding Area of Main Irrigation System (including swampy area)						
			T	ST	SD	With Tertiary System			Without Tertiary System			Total of CAMIS	Sawah	Non Sawah	Total			
						Sawah	Non Sawah	Total	Sawah	Non Sawah	Total							
AS- 1	Serbangan	2,333	2,333	0	0	496	64	560	1,518	255	1,773	2,333	0	0	0			
2	Panca Arga	2,500	0	2,500	0	0	0	0	750	1,750	2,500	2,500	0	0	0			
3	Silo Bonto	3,231	0	0	3,231	0	0	0	750	135	885	885	1,765	581	2,346			
4	Tinggi Raja	163	0	163	0	0	0	0	153	10	163	163	0	0	0			
5	Sei Silau	1,315	0	1,315	0	0	0	0	1,006	309	1,315	1,315	0	0	0			
6	Desa Gajah	600	0	600	0	0	0	0	600	0	600	600	0	0	0			
7	Sijambi	763	763	0	0	485	28	513	176	74	250	763	0	0	0			
8	Padang Mahondang	3,231	0	1,000	0	0	0	0	2,400	831	3,231	3,231	0	0	0			
9	Bandar Saleh	250	0	250	0	0	0	0	250	0	250	250	0	0	0			
10	Sei Beluru	150	150	0	0	0	0	0	150	0	150	150	0	0	0			
11	Sei Serani	150	0	150	0	0	0	0	150	0	150	150	0	0	0			
12	Tambun Tulang	5,050	0	0	0	0	0	0	0	0	0	0	5,050	0	5,050			
13	Rawa Sei Labah	4,000	0	0	0	0	0	0	0	0	0	0	650	3,350	4,000			
Sub-total AS		23,736	3,246	5,978	3,231	0	981	92	1,073	0	7,903	3,364	11,267	12,340	0	7,465	3,931	11,396
AK- 1	Si Umbut-umbut	1,001	0	1,001	0	0	0	0	495	506	1,001	1,001	0	0	0			
2	Pulau Bargot	150	0	150	0	0	0	0	135	15	150	150	0	0	0			
3	Pardamaran	130	0	130	0	0	0	0	90	40	130	130	0	0	0			
4	Kapias Batu VIII	358	0	358	0	0	0	0	230	128	358	358	0	0	0			
5	Tasik Malaya	2,297	0	2,297	0	0	0	0	958	1,339	2,297	2,297	0	0	0			
6	Marjanji Aceh	229	0	229	0	0	0	0	147	82	229	229	0	0	0			
7	Sei Lebah	4,245	0	0	0	0	0	0	50	0	50	50	2,500	1,695	4,195			
8	Binjai Serbangan	210	0	210	0	0	0	0	175	35	210	210	0	0	0			
9	Sei Hussa	800	0	800	0	0	0	0	750	50	800	800	0	0	0			
10	Aek Kuasan	375	0	375	0	0	0	0	120	255	375	375	0	0	0			
Sub-total AK		9,795	0	5,550	0	0	0	0	3,150	2,450	5,550	5,600	2,500	1,695	4,195			
Total of Kab.Asahan		33,531	3,246	11,528	3,231	0	981	92	1,073	0	11,053	5,814	16,817	17,940	9,965	5,626	15,591	
LBT-1	Sinar Toba	600	460	0	0	0	0	0	390	70	460	460	75	65	140			
2	Gunting Saga	450	0	0	302	0	0	0	267	35	302	302	60	88	148			
3	Sono Martini	3,000	0	0	0	0	0	0	0	0	0	0	780	2,220	3,000			
4	Si Kopi-kopi	336	182	0	0	0	0	0	157	25	182	182	75	79	154			
5	Tapian Nauli	1,000	0	0	0	0	0	0	0	0	0	0	843	157	1,000			
6	Sukarame-Sukasari	1,500	0	0	0	0	0	0	0	0	0	0	950	550	1,500			
7	Aek Natas	4,500	0	0	0	0	0	0	0	0	0	0	2,540	1,960	4,500			
8	Aek Naecek	4,500	0	0	0	0	0	0	0	0	0	0	3,000	1,500	4,500			
9	Leidong	16,000	0	0	0	0	0	0	0	0	0	0	2,000	14,000	16,000			
10	Siam Porik	327	0	257	0	0	0	0	201	56	257	257	45	25	70			
11	Bandar Larna	215	0	75	0	0	0	0	70	5	75	75	40	100	140			
Sub-total LBT		32,428	642	332	302	0	0	0	1,085	191	1,276	1,276	10,408	20,744	31,152			
Total of Kab.L.Batu		32,428	642	332	302	0	0	0	1,085	191	1,276	1,276	10,408	20,744	31,152			
Total of Study Area		65,959	3,888	11,860	3,533	0	981	92	1,073	0	12,138	6,005	18,093	19,216	20,373	26,370	46,743	

## Irrigation Level:

T: Technical Irrigation Level;  
 ST: Semi-Technical Irrigation Level;  
 SD: Non-Technical Irrigation Level;

## Note:

Definition of irrigation level by DPU, DGWRD, is as below:

Technical Irrigation : Where as the discharge of irrigation water can be measured and controlled well, and all structures are permanent.

Semi-Technical Irrigation Level: Where as the discharge of irrigation water can be measured but its flow cannot be controlled, or its flow can be controlled but the discharge cannot be measured, and all structures are permanent of semi-permanent.

Non-Technical Irrigation Level: Where as the discharge of irrigation water cannot be measured and controlled, and all structures are semi-permanent or temporary built.

## Source:

AS ; Luas Areal Daerah Yang Dikelola Cabang Dinas Pengairan Asahan, DPUP Sum-Ut, June 1989  
 AK ; Daftar Inventarisasi Daerah Pengairan, Kabupaten Daerah Tingkat II Asahan, DPU, April 1988  
 LB ; Rekapitulasi Buku Pintar Daerah Irigasi PU, Cabang Dinas Pengairan Labuhan Batu, April 1988

Table C-4 EXISTING IRRIGATION FACILITIES IN DPU MANAGEMENT AREA

No.	Name of Irrigation Area	Total Gross Area (ha)	Total of CAMIS (ha)	Water Source	Intake Structure			Main Irrigation System					Drainage System		Inspection Roads (km)	Flood Protection Dikes (km)
					Fixed Weir (Nos)	Prece Intake (Nos)	Pump (Nos)	Main Canal (km)	Sec. Canal (km)	Supply Canal (km)	Total (km)	Related Struc. (Nos)	Drain Canals (km)	Related Struc. (Nos)		
AS-1	Serbangan	2,333	2,333	Bunut river	1	-	-	4.48	21.09	0.00	25.57	40	20.06	5	0.00	0.00
2	Panca Arga	2,500	2,500	Bunut river	1	-	-	1.21	3.20	0.00	4.41	12	1.04	5	0.00	0.00
3	Silo Bonto	3,231	885	-	-	-	-	0.75	2.20	0.00	2.95	0	15.32	8	0.00	3.35
4	Tinggi Raja	163	163	Natural lake	-	2	-	0.41	5.33	0.00	5.74	8	0.47	0	0.00	0.00
5	Sei Silau	1,315	1,315	Silau river	-	1	-	1.67	20.41	0.00	22.08	40	11.86	4	0.43	0.00
6	Desa Gajah	600	600	Siluar river	-	1	-	0.75	1.50	0.00	2.25	1	3.35	1	0.00	0.00
7	Sijambi	763	763	Silau river	-	1	-	1.13	3.93	0.00	5.06	14	18.82	0	0.00	0.00
8	Padang Mahondang	3,231	3,231	R. Asahan	-	1	-	0.85	11.51	0.00	12.36	22	15.95	2	0.00	0.00
9	Bandar Saleh	250	250	Silau river	-	1	-	0.05	1.60	0.00	1.65	3	3.42	0	0.00	0.00
10	Sei Beluru	150	150	Bunut river	1	-	-	0.50	3.20	0.00	3.70	7	0.00	0	0.00	0.10
11	Sei Serani	150	150	Bunut river	1	-	-	1.10	5.19	0.00	6.29	7	0.00	0	0.00	0.05
12	Tamban Tulang	5,050	0	-	-	-	-	0.00	0.00	0.00	0.00	0	7.00	1	0.00	0.00
13	Rawa Sei Lebah	4,000	0	-	-	-	-	0.00	0.00	0.00	0.00	0	0.00	0	0.00	0.00
Sub-total AS		23,736	12,340		4	7	0	12.90	79.16	0.00	92.06	154	97.29	26	0.43	3.50
AK-1	Si Umbut-umbut	1,001	1,001	Silau river	-	1	-	7.25	4.69	0.00	11.94	10	2.00	1	0.00	0.00
2	Pulau Bargot	150	150	-	1	-	-	3.00	0.00	0.00	3.00	1	0.00	0	0.00	0.00
3	Pardamaran	130	130	-	1	-	1*	3.50	0.00	0.00	3.50	5	0.00	0	0.00	0.00
4	Kapias Batu VIII	358	358	Silau river	1	-	-	5.90	0.00	0.00	5.90	5	0.00	0	0.00	0.00
5	Tasik Malaya	2,297	2,297	Silau river	-	1	-	5.90	2.22	0.00	8.12	7	0.00	0	0.00	0.00
6	Marjanji Aceh	229	229	Natural lake	1	-	-	1.06	4.03	0.00	5.09	2	0.00	0	0.00	0.00
7	Sei Lebah	4,245	4,245	-	-	-	1*	1.20	0.30	0.00	1.50	4	1.00	1	0.00	0.00
8	Binjai Serbangan	210	210	Silau river	1	-	-	6.00	0.00	0.00	6.00	4	0.00	0	0.00	0.00
9	Simpang Empat	800	800	Hessa river	1	-	-	12.00	6.80	0.00	18.80	20	3.00	3	0.00	0.00
10	Aek Kuasan	375	375	Kuasan river	1	-	-	2.50	0.00	0.00	2.50	2	0.00	0	0.00	0.00
Sub-total AK		9,795	9,795		7	2	3	48.31	18.04	0.00	66.35	60	6.00	5	0.00	0.00
Total of Kab. Asahan		33,531	22,135		11	9	3	61.21	97.20	0.00	158.41	214	103.29	31	0.43	3.50
LBT-	Sinar Toba	600	460	Simangalam r.	1	-	-	1.35	5.50	0.00	6.85	10	3.55	9	0.85	0.00
2	Gunting Saga	450	302	Spring	1	-	-	0.00	3.45	1.65	5.10	8	10.50	1	0.00	0.00
3	Sono Maruni	3,000	0	-	-	-	-	0.00	0.00	0.00	0.00	0	44.60	0	0.00	0.00
4	Si Kopi-kopi	336	182	Kanopan river	1	-	-	0.90	7.93	0.00	8.83	14	4.00	9	0.00	0.10
5	Tapian Nauli	1,000	0	-	-	-	-	0.00	0.00	0.00	0.00	0	16.00	0	0.00	0.00
6	Sukarame-Sukasari	1,500	0	-	-	-	-	0.00	0.00	0.00	0.00	0	6.00	0	0.00	0.00
7	Aek Natas	4,500	0	-	-	-	-	0.00	0.00	0.00	0.00	0	10.65	0	0.00	7.95
8	Aek Naetek	4,500	0	-	-	-	-	0.00	0.00	0.00	0.00	0	15.60	0	0.00	21.50
9	Leidong	16,000	0	-	-	-	-	0.00	0.00	0.00	0.00	0	0.00	0	0.00	0.00
10	Siam Porik	327	257	-	1	-	-	1.41	6.62	0.00	8.03	17	0.00	9	0.00	0.70
11	Bandar Lama	215	75	-	-	-	-	1.20	1.00	0.00	2.20	3	2.25	8	0.00	0.00
Sub-total LBT		32,428	1,276		4	0	0	4.86	24.50	1.65	31.01	52	113.15	36	0.85	30.25
Total of Kab. L. Batu		32,428	1,276		4	0	0	4.86	24.50	1.65	31.01	52	113.15	36	0.85	30.25
Total of Study Area		65,959	23,411		15	9	3	66.07	121.70	1.65	189.42	266	216.44	67	1.28	33.75

\* : No operation activity

Source:

AS ; Luas Areal Daerah Yang Dikelola Cabang Dinas Pengairan Asahan, DPUP Sum-Ur, June 1989  
 AK ; Daftar Inventarisasi Daerah Pengairan, Kabupaten Daerah Tingkat II Asahan, DPU, April 1988  
 LB ; Rekapitulasi Buku Pinter Daerah Irigasi PU, Cabang Dinas Pengairan Labuhan Batu, April 1988

Table C-5

## LIST OF RELATED STRUCTURES OF DPU MANAGEMENT SYSTEM

No.	Name of Irrigation Area	Related structures on Irrigation canals										Related structures on Drainage canals					
		Irr. Canals (km)	ST	SS	TO	AQ	SP	BR	CV	DR	Others	Total (Nos)	Drain Canals (km)	BR	CV	FG	Total (Nos)
AS-	1 Serbangan	25.57	0	0	23	2	6	6	0	3	0	40	20.06	5	0	0	5
	2 Panca Arga	4.41	0	0	4	2	1	3	1	1	0	12	1.04	5	0	0	5
	3 Silo Bonto	2.95	0	0	0	0	0	0	0	0	0	0	15.32	5	0	0	5
	4 Tinggi Raja	5.74	0	0	6	0	0	1	0	1	0	8	0.47	0	0	0	6
	5 Sei Silau	22.03	0	0	17	6	2	12	3	0	0	40	11.86	4	0	0	4
	6 Desa Gajah	2.25	0	0	0	0	0	1	0	0	0	1	3.35	1	0	0	1
	7 Sijambi	5.06	0	0	7	4	0	0	3	0	0	14	18.82	0	0	0	0
	8 Padang Mahondang	12.36	0	0	9	2	3	3	4	1	0	22	15.95	0	2	0	2
	9 Bandar Saleh	1.65	0	0	2	1	0	0	0	0	0	3	3.42	0	0	0	0
	10 Sei Beluru	3.70	0	0	4	0	1	0	2	0	0	7	0.00	1	0	0	1
	11 Sei Serani	6.29	0	0	3	0	0	2	2	0	0	7	0.00	0	0	0	0
	12 Tambun Tulang	0.00	0	0	0	0	0	0	0	0	0	0	7.00	0	0	0	0
	13 Rawa Sei Lebah	0.00	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0
	Sub-total AS	92.06	0	0	75	17	13	28	15	6	0	154	97.29	21	2	0	23
AK-	1 Si Umbut-umbut	11.94	0	0	8	0	1	1	0	0	0	10	2.00	1	0	0	1
	2 Pulau Bargot	3.00	0	0	0	1	0	1	0	0	0	1	0.00	0	0	0	0
	3 Pardamaran	3.50	0	0	2	0	0	0	3	0	0	5	0.00	0	0	0	0
	4 Kapias Batu VIII	5.90	0	0	3	0	0	0	2	0	0	5	0.00	0	0	0	0
	5 Tasik Malaya	8.12	0	0	5	0	0	2	2	0	0	7	0.00	0	0	0	0
	6 Marjanji Aceh	5.09	0	0	0	0	0	0	2	0	0	2	0.00	0	0	0	0
	7 Sei Lebah	1.50	0	0	1	1	1	0	0	0	0	4	1.00	1	0	0	1
	8 Binjai Serbangan	6.00	0	0	1	2	1	1	1	0	0	4	0.00	0	0	0	0
	9 Simpang Empat	18.80	0	0	9	4	5	5	2	0	0	20	3.00	1	2	0	3
	10 Aek Kuasan	2.50	0	0	0	0	2	0	0	0	0	2	0.00	0	0	0	0
	Sub-total AK	66.35	0	0	29	8	10	10	12	0	0	60 #	6.00	3	2	0	5
	Total of Kab.Asahan	158.41	0	0	104	25	23	38	27	6	0	214 0	103.29	24	4	0	28
LBT-	1 Sinar Toba	6.85	1	0	3	3	0	2	1	0	0	10	3.55	0	8	1	9
	2 Gunung Saga	5.10	0	0	5	0	0	1	2	0	0	8	10.50	0	1	0	1
	3 Sono Martini	0.00	0	0	0	0	0	0	0	0	0	0	44.60	0	0	0	0
	4 Si Kopi-kopi	8.83	1	0	5	0	0	2	1	5	0	14	4.00	0	9	0	9
	5 Tapian Nauli	0.00	0	0	0	0	0	0	0	0	0	0	16.00	0	0	0	0
	6 Sukarame-Sukasan	0.00	0	0	0	0	0	0	0	0	0	0	6.00	0	0	0	0
	7 Aek Natas	0.00	0	0	0	0	0	0	0	0	0	0	10.65	0	0	0	0
	8 Aek Naetek	0.00	0	0	0	0	0	0	0	0	0	0	15.60	0	0	0	0
	9 Leidong	0.00	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0
	10 Siam Porik	8.03	0	0	4	0	1	2	7	3	0	17	0.00	0	9	0	9
	11 Bandar Lama	2.20	0	0	1	1	0	1	0	0	0	3	2.25	6	0	1	8
	Sub-total LBT	31.01	2	0	18	4	1	8	11	8	0	52 0	113.15	6	27	2	36
	Total of Kab.L.Batu	31.01	2	0	18	4	1	8	11	8	0	52 0	113.15	6	27	2	36
	Total of Study Area	189.42	2	0	122	29	24	46	38	14	0	266	216.44	30	31	2	64

## Note:

ST:	Sediment Trap	AQ:	Aqueduct	CV:	Culvert
SS:	Scouring Gate	SP:	Syphon	DR:	Drop
TO:	Turnout	BR:	Bridge	FG:	Flap Gate

## Source:

AS ; Luas Areal Daerah Yang Dikelola Cabang Dinas Pengairan Asahan, DPUP Sum-Ul, June 1989  
AK ; Daftar Inventarisasi Daerah Pengairan, Kabupaten Daerah Tingkat II Asahan, DPU, April 1988  
LB ; Rekapitulasi Buku Pinter Daerah Irigasi PU, Cabang Dinas Pengairan Labuhan Batu, April 1988

Table C-6 CANAL DENSITY OF EXISTING IRRIGATION AND DRAINAGE SYSTEMS IN DPU MANAGEMENT AREA

No.	Name of Irrigation Area	Total Gross Area (ha) (A)	Total of CAMIS (ha) (B)	Main Irrigation System			Drainage System		
				Total Length (km) (C)	Canal density		Drain Canals (km) (D)	Canal density	
					(1) (m/ha) (C/A)	(2) (m/ha) (C/B)		(1) (m/ha) (D/A)	(2) (m/ha) (D/B)
AS-1	Serbangan	2,333	2,333	25.57	11.0	11.0	20.06	8.6	8.6
2	Panca Arga	2,500	2,500	4.41	1.8	1.8	1.04	0.4	0.4
3	Sito Bonto	3,231	885	2.95	0.9	3.3	15.32	4.7	17.3
4	Tinggi Raja	163	163	5.74	35.2	35.2	0.47	2.9	2.9
5	Sei Silau	1,315	1,315	22.08	16.8	16.8	11.86	9.0	9.0
6	Desa Gajah	600	600	2.25	3.8	3.8	3.35	5.6	5.6
7	Sijambi	763	763	5.06	6.6	6.6	18.82	24.7	24.7
8	Padang Mahondang	3,231	3,231	12.36	3.8	3.8	15.95	4.9	4.9
9	Bandar Saleh	250	250	1.65	6.6	6.6	3.42	13.7	13.7
10	Sei Beluru	150	150	3.70	24.7	24.7	0.00	0.0	0.0
11	Sei Serani	150	150	6.29	41.9	41.9	0.00	0.0	0.0
12	Tambun Tulang	5,050	0	16.00	3.2	0.0	7.00	1.4	0.0
13	Rawa Sei Lebah	4,000	0	6.00	1.5	0.0	0.00	0.0	0.0
	Sub-total AS	23,736	12,340	114.06	4.8	9.2	97.29	4.1	7.9
AK-1	Si Umbut-umbut	1,001	1,001	11.94	11.9	11.9	2.00	2.0	2.0
2	Pulau Bargot	150	150	3.00	20.0	20.0	0.00	0.0	0.0
3	Pardamaran	130	130	3.50	26.9	26.9	0.00	0.0	0.0
4	Kapias Batu VIII	358	358	5.90	16.5	16.5	0.00	0.0	0.0
5	Tasik Malaya	2,297	2,297	8.12	3.5	3.5	0.00	0.0	0.0
6	Marjanji Aceh	229	229	5.09	22.2	22.2	0.00	0.0	0.0
7	Sei Lebah	4,245	4,245	1.50	0.4	0.4	1.00	0.2	0.2
8	Binjai Serbangan	210	210	6.00	28.6	28.6	0.00	0.0	0.0
9	Simpang Empat	800	800	18.80	23.5	23.5	3.00	3.8	3.8
10	Aek Kuasan	375	375	2.50	6.7	6.7	0.00	0.0	0.0
	Sub-total AK	9,795	9,795	66.35	6.8	6.8	6.00	0.6	0.6
	Total of Kab.Asahan	33,531	22,135	180.41	5.4	8.2	103.29	3.1	4.7
LBT-1	Sinar Toba	600	460	6.85	11.4	14.9	3.55	5.9	7.7
2	Gunting Saga	450	302	5.10	11.3	16.9	10.50	23.3	34.8
3	Sono Martini	3,000	0	0.00	0.0	0.0	44.60	14.9	0.0
4	Si Kopi-kopi	336	182	8.83	26.3	48.5	4.00	11.9	22.0
5	Tapian Nauli	1,000	0	0.00	0.0	0.0	16.00	16.0	0.0
6	Sukarame-Sukasari	1,500	0	0.00	0.0	0.0	6.00	4.0	0.0
7	Aek Natas	4,500	0	0.00	0.0	0.0	10.65	2.4	0.0
8	Aek Naetek	4,500	0	0.00	0.0	0.0	15.60	3.5	0.0
9	Leidong	16,000	0	0.00	0.0	0.0	0.00	0.0	0.0
10	Siam Porik	327	257	8.03	24.6	31.2	0.00	0.0	0.0
11	Bandar Lama	215	75	2.20	10.2	29.3	2.25	10.5	30.0
	Sub-total LBT	32,428	1,276	31.01	1.0	24.3	113.15	3.5	88.7
	Total of Kab.L.Batu	32,428	1,276	31.01	1.0	24.3	113.15	3.5	88.7
	<b>Total of Study Area</b>	<b>65,959</b>	<b>23,411</b>	<b>211.42</b>	<b>3.2</b>	<b>9.0</b>	<b>216.44</b>	<b>3.3</b>	<b>9.2</b>



Table C-7 EXISTING FLOOD DIKES

River	Length ( km )		
	Mainstream	Tributary	Total
Bunut river	14	-	14
Silau river	35	-	35
Asahan river	14 (2.1)	4	18 (2.1)
Kualuh river	22 (5.0)	7	29 (5.0)
Total	85 (7.1)	11	96 (7.1)

Note:

- 1) ( ) : Length of new levees under construction.
- 2) The levees are of earth ones having crown width of 2 to 3.5 m, side slope of 1:1 to 1:2 and direct height of 1 to 4 m.
- 3) Main existing flood control facilities in the object rivers have been constructed by DPU Sumatra Utara.
- 4) Location of the dikes are illustrated in Fig. C-1.

Table C-8 FLOOD CONTROL WORKS CARRIED OUT IN LAST 10 YEARS

Fiscal Year	Location	Budget (Rp. 1,000)	Construction Works (m)		Remarks
			New Dike	Up-grading/ rehabilitation of dike	
<b>Silau River</b>					
1979/80	Kab. Asahan	75,950	6,270		1877
1981/82	Kab. Asahan	147,500	15,700		300
1983/84	Kab. Asahan	299,105	1,260		
1984/85	Kab. Asahan	258,000		2,000	
1985/86	Kab. Lab. Batu	344,244	1,030		(APBN)
1986/87	Kab. Asahan	424,210	15	1,620	(APBN)
	Kab. Asahan	99,753	70		
1987/88	Kab. Asahan	149,485	680		(APBN)
1989/90	Kab. Asahan	220,000		1,885	(Annual fee)
					(Ongoing)
Total		2,018,247	25,025	5,505	314 2,177
<b>Asahan River</b>					
1979/80	Kab. Asahan	50,000	3,410		1795
1982/83	Kab. Asahan	100,000	550		
1983/84	Kab. Asahan	150,000	4,385	2,695	
1986/87	Kab. Asahan	49,700		1,115	
1989/90	Kab. Asahan	436,000		4,000	(Annual fee)
			2,100		(Ongoing)
Total		785,700	8,345	7,810	1,795
<b>Kualuh River</b>					
1982/83	Kab. Lab. Batu	149,590	5,400		
1983/84	Kab. Labuhan Batu	264,746	6,790	180	70
1984/85	Kab. Lab. Batu	198,858		5,100	(APBN)
1985/86	Kcc. Kualuh Hulu	219,545		15,700	
	Kab. Lab. Batu			1550	
1986/87	Kab. Lab. Batu	17,750		17,850	
1987/88	Kab. Lab. Batu	122,316		4,665	
1989/90	Kab. Lab. Batu	300,000	5,000		(APBN)
					(Ongoing)
Total		1,272,805	17,190	45,045	70
<b>Bunut River</b>					
1989/90 (Ongoing)		15,000		700	

Source : URAIAN SINGKAT PROYEK 1989 DPU SUMATERA UTARA.

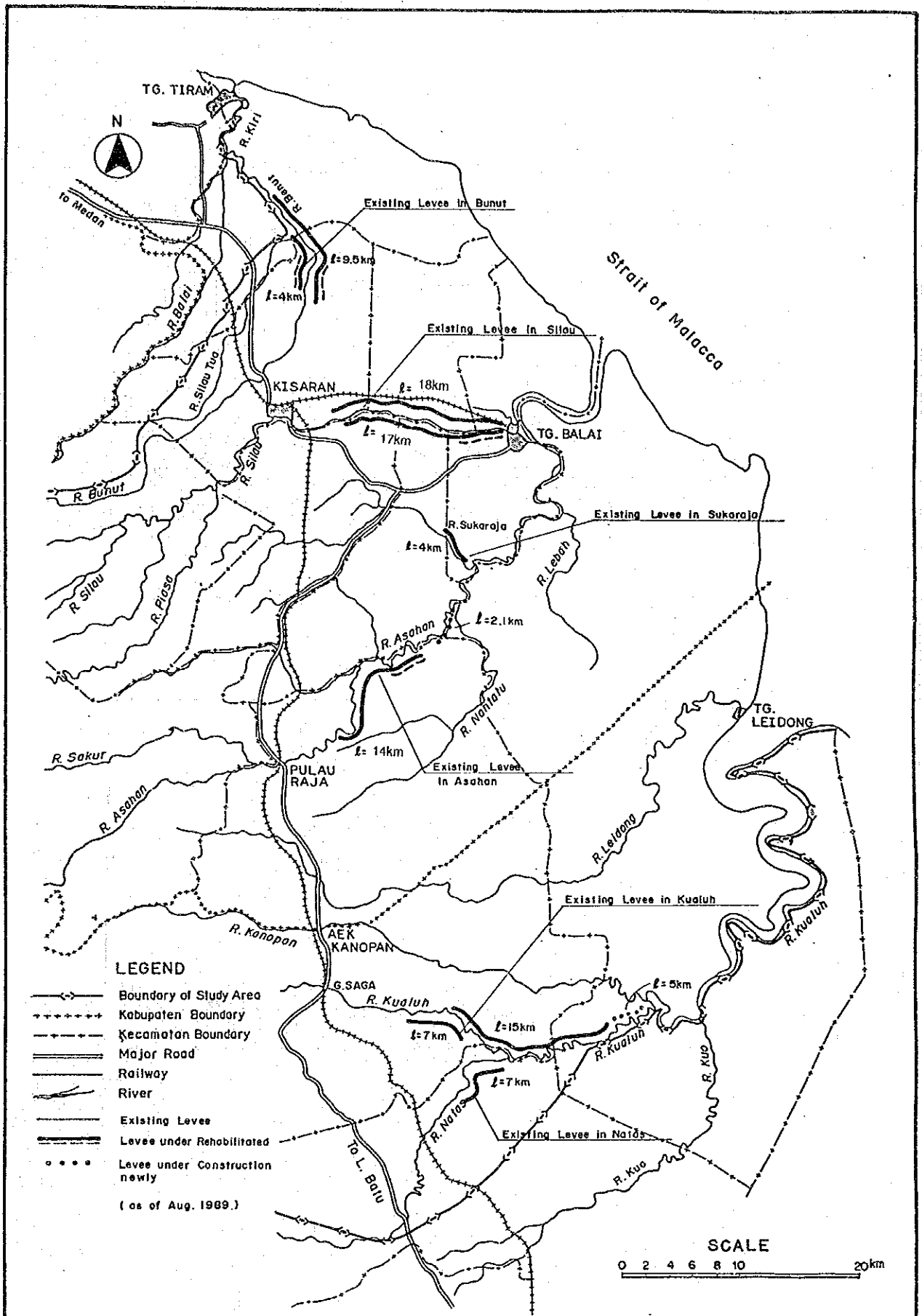


Fig. C-1 LOCATION OF EXISTING FLOOD DIKES

Republic of Indonesia  
 MASTER PLAN STUDY ON  
 LOWER ASAHAN RIVER BASIN DEVELOPMENT  
 Japan International Cooperation Agency

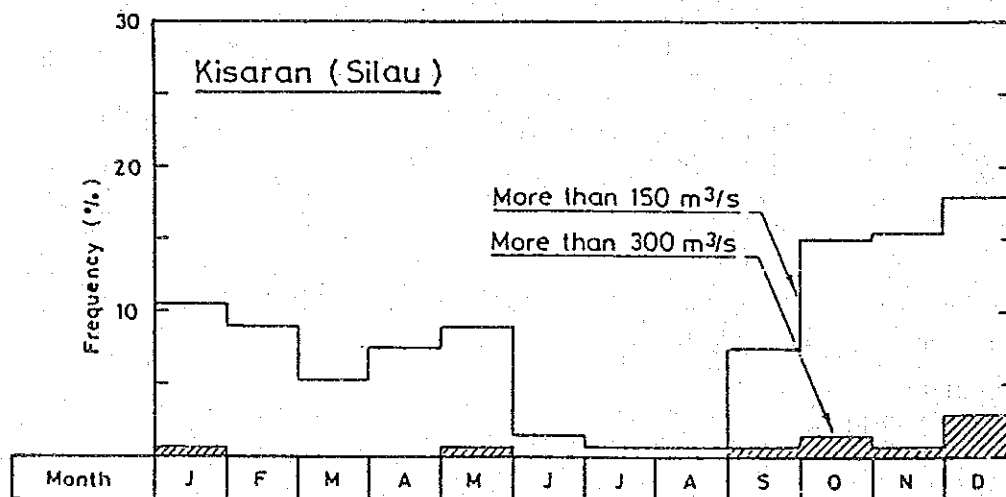
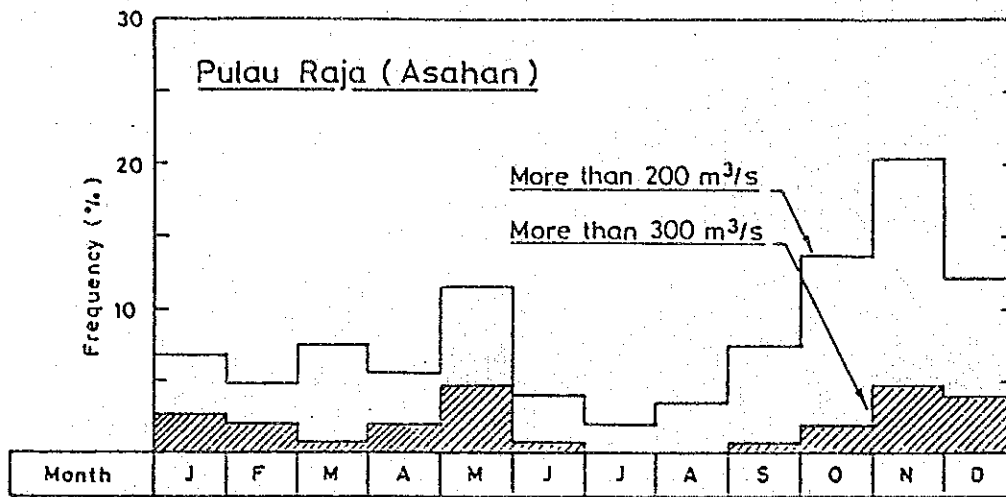


Fig. C-2 MONTHLY FLOOD FREQUENCY

Table C-9 ORGANIZATION OF IRRIGATION SERVICE OFFICES OF DPU

Position	(Unit : person)	
	DPU Asahan Branch Office	DPU L.Batu Branch Office
1 Head of office	1	1
2 Sub-chief of office	1	0
3 Administration Section		
(1) Chief	1	1
(2) Staff	12	3
4 Exploration Section		
(1) Chief	1	1
(2) Staff	2	2
5 Maintenance Section		
(1) Chief	1	1
(2) Staff	2	2
6 Tertiary Section		
(1) Chief	1	1
(2) Staff	2	2
7 Branch offices		
(1) Chief	8	5
(2) Staff	25	9
<b>Total of Staff</b>	<b>57</b>	<b>28</b>
Commanding Area(ha)	28,900	125,550
(Irrigation area)	(19,900)	(8,550)
(Swamp area)	(9,000)	(117,000)
Command area per staff (ha / staff)		
Total	507	4,484
Irrigation area	349	305
Command area per Branch Office (field) staff (ha / staff)		
Total	876	8,968
Irrigation area	603	611

Table C-10

**PROPOSED PROJECT AREA DURING  
REPLITA V BY PROJECT STATUS**

(Unit : ha)

Area	Project Status			Total
	A	B	C	
1 Indonesia	334,300	144,600	734,300	1,213,200
2 Sumatera Island	126,100	117,000	298,000	541,100
3 North Sumatera Province	40,500	15,000	91,500	147,000

## Project Status:

- A : On-going project
- B : Under process of budget or design preparation
- C : Newly proposed for Repelita V

## Source :

The Preliminary Study on the Formation of Irrigation Development Program, May 1989, JICA, Directorate of Planning, DGWRD

Table C-11 ON-GOING AND PLANNED MAJOR IRRIGATION PROJECTS IN NORTH SUMATRA PROVINCE

No	Project Name	Project Area (ha)	Location (Kecamatan)	Type of Project	Project Cost (Rp.mil)	Fund Sources	Executing Agency	Progress in ha		
								Pelita IV	Pelita V	Pelita VI
1	Sungai Ular Irrigation	18,500	Deli Serdang/ Simalungun	Rehabilitation/ Extension of Sawah	F/C:22,745 L/C: 6,284	OECD-Japan GOI	DPU-Jakarta	19,670	0	0
2	Simalungun Irrigation	51,000	Simalungun	Irrigation development/ Tertiary development	NA NA	ADB,IFAD GOI	DPU-Jakarta	40,500	10,500	0
3	Namu Sira Sira Irrigation	6,350	Langkat	Irrigation development/ Tertiary development	F/C: 6,320 L/C: 4,655	ADB GOI	DPU-Jakarta	120	5,230	1,000
4	Batang Gadis Irrigation	6,700	Tapanuli Selatan	Irrigation development/ Tertiary development	F/C: 4,990 L/C: 2,385	ADB GOI	DPU-Jakarta	4,300	2,400	0
5	Bah Bolon Irrigation	12,250	Asahan/ Simalungun	Irrigation development/ Tertiary development	F/C:18,900 L/C:18,500	ADAB-Austr GOI	DPU-Jakarta	5,100	7,150	0
6	Batang Ilung Irrigation	4,000	Tapanuli Selatan	Irrigation development/ Tertiary development	F/C: 4,650 L/C: 2,650	ADB GOI	DPU-Jakarta	4,000	0	0
7	North Sumatera Irrigation	15,000	Tapanuli Utara/ Tapanuli Tenga/ Tapanuli Selatan/ Asahan	Rehabilitation works	NA NA	ADB GOI	DPU Sum-U	4,600	10,400	0
8	North Sumatera Swamp	10,800	Deli Serdang/ Langkat/L.Batu/ Tapanuli Utara/ Tapanuli Tenga/ Tapanuli Selatan	Swamp development	F/C: 0 L/C: 1,770	- GOI	DPU Sum-U	10,800	0	0
<b>Total</b>		<b>124,600</b>						<b>89,090</b>	<b>35,680</b>	<b>1,000</b>

Pelita IV :1984/85-1989/90

Pelita V : 1989/90-1994/95

Pelita VI :1994/95-1999/2000

ADB : Asian Development Bank

IFAD : International Fund for Agricultural Development

DPU Sum-Ut : DPU North Sumatera Province

Source: Kegiatan Pembangunan Proyek Proyek Pengairan, Pekerjaan Umum Propinci Sumatera Utara

Table C-12 (1/2)

**IRRIGATION AND DRAINAGE DEVELOPMENT  
PROJECTS IN REPELITA V IN THE STUDY AREA**

No.	Project	Project Area (ha)	Location (Kecamatan)	Description of the Project	Estimated Project Cost (Rp.mil)
<b>I. Asahan District</b>					
1	Panca Arga	2,500	Meranti	Converting the rain-fed sawa to irrigated sawa	250
2	Serbangan	2,333	Meranti	Rehabilitation works for the existing irrigation facilities	200
3	Sei Silau	1,315	Air Batu	Rehabilitation works for the existing irrigation facilities	75
4	Sei Dadap	200	S. Empat	Converting the rain-fed sawa to irrigated sawa (to be defined as new DP)	150
5	Sijambi	763	Tj. Balai/ S. Empat	Rehabilitation works for the existing irrigation facilities	100
6	Rawa Danau Sijabut	100	Air Batu	Converting the rain-fed sawa to irrigated sawa (to be defined as new DP)	75
7	Padang Mahondang	3,231	Pulau Rakyat	Rehabilitation works for the existing irrigation facilities	175
8	Tambung Tulang	6,900	Tj. Tiram	Drainage improvement of swampy area	200
9	Rawa Sei Lebah	4,000	Sei Kepayang	Drainage improvement of swampy area	300
10	Rawa Kuala Sikasin	800	Tj. Tiram	Drainage improvement of swampy area	100
11	Silau Bunut Rivers Trans-basin Project	14,500	Tj. Tiram/ Meranti/ Air Joman	Rehabilitation works for the existing irrigation facilities, and Construction of trans-basin canal from the Silau to the Bunur river	1500
Sub-total Asahan		36,642			3,125



Table C-12 (2/2) IRRIGATION AND DRAINAGE DEVELOPMENT  
PROJECTS IN REPELITA V IN THE STUDY AREA

No.	Project	Project Area (ha)	Location (Kecamatan)	Description of the Project	Estimated Project Cost (Rp.mil)
II. Labuhan Batu District					
1	Kualuh Irrigation	995	Kualuh Hulu	Irrigation and drainage facilities development	310
2	Aek Naetek	1,400	Kualuh Hulu	Irrigation and drainage facilities development	115
3	Teluk Binjai	1,600	Kualuh Hilir	Irrigation and drainage facilities development	165
4	Kuala Tani	1,450	Aek Natas	Irrigation and drainage facilities development	155
5	Tanjung Selamat	200	Kualuh Hulu	Drainage facilities development	20
6	Aesa Tualang	250	Aek Natas	Irrigation facilities development	50
7	Bandar Lama	125	Kualuh Hulu	Irrigation and drainage facilities development	40
8	Sikopi Kopi	170	Kualuh Hulu	Rehabilitation of irrigation facilities	30
9	Siamporik	200	Kualuh Hulu	Rehabilitation of irrigation facilities	80
10	Sono Martani	500	Kualuh Hulu	Drainage facilities development	65
11	Sinar Toba	120	Kualuh Hulu	Rehabilitation of irrigation facilities	40
12	Gunting Saga	575	Kualuh Hulu	Rehabilitation of irrigation facilities	190
Sub-total L. Batu		7,585			1,260

Source :

(1) Asahan : Rencana Program Proyek Pelita V (Th.1989/90 s/d 1993/94), Dinas Pekerjaan Umum, Cabng Dinas Pengairan Asahan, Kisaran, DPUP Cabang Dinas Pengairan Asahan, April 1989

(2) L.Batu : Program Pengairan Pelita V Th.1989/90 s/d 1993/94, Dinas Pekerjaan Umum, Cabng Dinas Pengairan Labuhan Batu, R.Prapat, DPUP Cabang Dinas Pengairan Labuhan Batu, April 1989

Table C-13 SCHEDULED FLOOD CONTROL WORKS DURING REPELITA V

Work Item	Kualuh R.	Bunut R.	Silau R.	Asahan R.
1. Survey and investigation (km)	15.0	-	-	-
2. Construction of new levee incl. tributary (km)	65.6	-	-	8.0
3. Excavation of Channel (km)	69.4	4.5	0.6	3.5
4. Rehabilitation of existing levee (km)	9.7	1.6	12.0	12.3
5. Operation/maintenance (km)	141.0	-	-	-

## Note:

- 1) The detail locations of those works have been not yet clarified according to the district offices concerned.
- 2) Regarding new levees, those are expected to be realised in such reaches in the upstream of the Panca Agra weir in the Bunut, right bank downstream of the existing levee in the Asahan, and in the left bank downstream of the existing levee in the Kualuh and right bank in the lower Kanopan.

Source: Pengairan, DPU, Sumatra Utara, Medan and district offices in Asahan and L.Batu

Table C-14 SCHEDULED BUDGET FOR FLOOD CONTROL WORKS IN REPELITA V

River	Category in Budget (Rp.1000)		
	National	Regional	Total
Kualuh River	2,458,252	2,070,000	4,528,252
Bunut River	-	335,000	335,000
Silau River	-	1,720,000	1,720,000
Asahan River	-	2,286,000	2,286,000
Total	2,458,252	6,411,000	8,869,252

## Note:

- 1) For administration or operation/maintenance of such objective rivers, the 3 budget categories are available throughout central government and local government. They are of national (APBN) and regional budget (APBD), and annual fee.

The annual fee is a special fund provided from PT Indonesia Asahan Aluminium in view of financial assistance for basin development in the three Kab. of Asahan, Simalungun and Tapanuli Tengah and in the two cities of Tanjung Balai and Tebbing Tinggi.

- 2) The above allocated budgets cover the costs for implementation of flood control works.
- 3) Total annual fee of Rp.656,000,000 for 1988-89 is included in Bunut, Silau and Asahan rivers.

Source: Pengairan, DPU, Sumatra Utara, Medan and district offices in Asahan and L.Batu

Table C-15 UNIT DIVERSION WATER REQUIREMENT

Unit Diversion Water Requirement (l/sec/ha)				
Month	Area 1(Bunut, Silau)	Area 2 (Asahan)	Area 3 (Kualuh)	Area 4 (Natas)
Jan.	0.89	1.12	1.13	0.77
Feb.	0.18	0.53	0.52	0.17
Mar.	0.16	0.00	0.00	0.60
Apr.	1.26	0.61	0.61	1.44
May	1.49	1.27	1.30	1.18
Jun.	1.21	1.38	1.26	1.06
Jul.	0.77	0.86	0.99	0.47
Aug.	0.17	0.48	0.47	0.00
Sep.	0.15	0.00	0.00	0.15
Oct.	1.04	0.45	0.50	0.87
Nov.	1.44	1.18	1.18	1.10
Dec.	1.28	1.28	1.20	1.01

Calculation Conditions;

1. All procedures follow DGWRD design criteria.
2. Crop water Requirement is based on FAO reference Evapotranspiration.
3. Nursery and preparation requirement is estimated as 200mm.
4. Percoration Loss is supposed to be 2mm/day.
5. Overall Irrigation Efficiency is supposed to be 60%.
6. - Area 1 comprises project No.1 and No.2.  
 - Area 2 comprises project No.3, No.4, No.5 and No.10.  
 - Area 3 comprises project No.6, No.8 and No.9.  
 - Area 4 comprises project No.7.
7. Effective rainfall is estimated based on the 5-year low rainfall.

Table C-16

## POTENTIAL IRRIGABLE AREA OF EACH RIVER

(unit: m<sup>3</sup>/sec)

Description	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
<b>(1) Bunut river</b>	<b>2,200</b>	<b>ha</b>										
-5 year low flow	3.4	3.1	3.0	3.3	3.3	3.0	2.7	2.4	3.5	4.3	4.6	4.0
-Maintenance flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Available flow	3.4	3.1	3.0	3.3	3.3	3.0	2.7	2.4	3.5	4.3	4.6	4.0
-Unit diversion requirement	0.9	0.2	0.2	1.3	1.5	1.2	0.8	0.2	0.2	1.0	1.4	1.3
-Irrigation Demand	2.0	0.4	0.4	2.8	3.3	2.7	1.7	0.4	0.3	2.3	3.2	2.8
-Surplus flow	1.4	2.7	2.6	0.5	0.0	0.3	1.0	2.0	3.2	2.0	1.4	1.2
<b>(2) Silau river</b>	<b>11,800</b>	<b>ha</b>										
-5 year low flow	50.7	44.3	44.9	48.9	49.2	44.2	39.4	34.6	50.9	65.9	69.9	60.0
-Maintenance flow	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
-Available flow	20.8	14.4	15.0	19.0	19.3	14.3	9.5	4.7	21.0	36.0	40.0	30.1
-Unit diversion requirement	0.9	0.2	0.2	1.3	1.5	1.2	0.8	0.2	0.2	1.0	1.4	1.3
-Irrigation Demand	10.5	2.1	1.9	14.9	17.6	14.3	9.1	2.0	1.8	12.3	17.0	15.1
-Surplus flow	10.3	12.3	13.1	4.1	1.7	0.0	0.4	2.7	19.2	23.7	23.0	15.0
<b>(3) Asahan river</b>	<b>23,000</b>	<b>ha</b>										
-5 year low flow	126.6	105.1	110.5	114.2	110.7	119.1	114.1	97.1	116.3	135.5	154.9	150.5
-Maintenance flow	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
-Available flow	45.1	23.6	29.0	32.7	29.2	37.6	32.6	15.6	34.8	54.0	73.4	69.0
-Unit diversion requirement	1.1	0.5	0.0	0.6	1.3	1.4	0.9	0.5	0.0	0.5	1.2	1.3
-Irrigation Demand	25.8	12.2	0.0	14.0	29.2	31.7	19.8	11.0	0.0	10.4	27.1	29.4
-Surplus flow	19.3	11.4	29.0	18.7	0.0	5.9	12.8	4.6	34.8	43.7	46.3	39.6
<b>(4) Kualuh river</b>	<b>6,600</b>	<b>ha</b>										
-5 year low flow	47.5	41.6	40.2	43.0	44.5	41.9	33.7	27.5	40.0	61.6	62.1	60.8
-Maintenance flow	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
-Available flow	23.1	17.2	15.8	18.6	20.1	17.5	9.3	3.1	15.6	37.2	37.7	36.4
-Unit diversion requirement	1.1	0.5	0.0	0.6	1.3	1.3	1.0	0.5	0.0	0.5	1.2	1.2
-Irrigation Demand	7.5	3.4	0.0	4.0	8.6	8.3	6.5	3.1	0.0	3.3	7.8	7.9
-Surplus flow	15.6	13.8	15.8	14.6	11.5	9.2	2.8	0.0	15.6	33.9	29.9	28.5
<b>(5) Natas river</b>	<b>6,800</b>	<b>ha</b>										
-5 year low flow	21.0	20.2	18.5	20.7	19.7	19.8	14.6	12.3	19.4	29.8	28.6	28.7
-Maintenance flow	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
-Available flow	10.1	9.3	7.6	9.8	8.8	8.9	3.7	1.4	8.5	18.9	17.7	17.8
-Unit diversion requirement	0.8	0.2	0.6	1.4	1.2	1.1	0.5	0.0	0.2	0.9	1.1	1.0
-Irrigation Demand	5.2	1.2	4.1	9.8	8.0	7.2	3.2	0.0	1.0	5.9	7.5	6.9
-Surplus flow	4.9	8.1	3.5	0.0	0.8	1.7	0.5	1.4	7.5	13.0	10.2	10.9

## Notes ;

1) The water balance bordered show each critical month.

2) Applied equation;  $PIA = (BF - MF) / UWR$ 

where, PIA : Potential irrigable area (ha)  
 BF : 5-year monthly low river flow (m<sup>3</sup>/sec)  
 MF : River maintenance flow (m<sup>3</sup>/sec)  
 UWR: Unit diversion irrigation water requirement (m<sup>3</sup>/sec/ha)

Table C-17

WATER BALANCE CALCULATION SHEETS FOR BUNUT, SILAU, ASAHAN,  
KUALUH AND NATAS RIVERS(unit: m<sup>3</sup>/sec)

Water Balance of Each Rivers	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
<b>(1) Bunut river(8,351ha)</b>												
-5 year low flow	3.4	3.1	3.0	3.3	3.3	3.0	2.7	2.4	3.5	4.3	4.6	4.0
-Maintenance flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Inter basin Transfer	-4.0	0.0	0.0	-7.2	-9.2	-7.1	-3.7	0.0	0.0	-4.3	-7.4	-6.7
-Available flow	7.4	3.1	3.0	10.5	12.5	10.1	6.4	2.4	3.5	8.6	12.0	10.7
-Irrigation Demand	7.4	1.5	1.4	10.5	12.5	10.1	6.4	1.5	1.3	8.6	12.0	10.7
-Surplus flow	0.0	1.6	1.6	0.0	0.0	0.0	0.0	0.9	2.2	0.0	0.0	0.0
<b>(2) Silau river(5,945ha)</b>												
-5 year low flow	50.7	44.3	44.9	48.9	49.2	44.2	39.4	34.6	50.9	65.9	69.9	60.0
-Maintenance flow	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
-Inter basin Transfer	4.0	0.0	0.0	7.2	9.2	7.1	3.7	0.0	0.0	4.3	7.4	6.7
-Available flow	16.8	14.4	15.0	11.8	10.1	7.2	5.8	4.7	21.0	31.7	32.6	23.4
-Irrigation Demand	5.3	1.1	1.0	7.5	8.9	7.2	4.6	1.0	0.9	6.2	8.5	7.6
-Surplus flow	11.5	13.3	14.0	4.3	1.2	0.0	1.2	3.7	20.1	25.5	24.1	15.8
<b>(3) Asahan river(22,115ha)</b>												
-5 year low flow	126.6	105.1	110.5	114.2	110.7	119.1	114.1	97.1	116.3	135.5	154.9	150.5
-Maintenance flow	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
-Inter basin Transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Available flow	45.1	23.6	29.0	32.7	29.2	37.6	32.6	15.6	34.8	54.0	73.4	69.0
-Irrigation Demand	24.8	11.7	0.0	13.5	28.1	30.5	19.0	10.6	0.0	10.0	26.1	28.3
-Surplus flow	20.3	11.9	29.0	19.2	1.1	7.1	13.6	5.0	34.8	44.0	47.3	40.7
<b>(4) Kualuh river(5,875ha)</b>												
-5 year low flow	47.5	41.6	40.2	43.0	44.5	41.9	33.7	27.5	40.0	61.6	62.1	60.8
-Maintenance flow	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
-Inter basin Transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Available flow	23.1	17.2	15.8	18.6	20.1	17.5	9.3	3.1	15.6	37.2	37.7	36.4
-Irrigation Demand	6.6	3.1	0.0	3.6	7.6	7.4	5.8	2.8	0.0	2.9	6.9	7.1
-Surplus flow	16.5	14.1	15.8	15.0	12.5	10.1	3.5	0.3	15.6	34.3	30.8	29.3
<b>(5) Natas river(4,190ha)</b>												
-5 year low flow	21.0	20.2	18.5	20.7	19.7	19.8	14.6	12.3	19.4	29.8	28.6	28.7
-Maintenance flow	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
-Inter basin Transfer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-Available flow	10.1	9.3	7.6	9.8	8.8	8.9	3.7	1.4	8.5	18.9	17.7	17.8
-Irrigation Demand	3.2	0.7	2.5	6.0	4.9	4.4	2.0	0.0	0.6	3.6	4.6	4.2
-Surplus flow	6.9	8.6	5.1	3.8	3.9	4.5	1.7	1.4	7.9	15.3	13.1	13.6

Note; Negative numbers in Inter basin transfer stand for receiving and positive numbers for releasing.  
The water balance bordered show each critical month.

Table C-18 SUPPLEMENTAL FLOOD PROTECTION DIKE FOR THE IRRIGATION DEVELOPMENT

River	Project	Dike Length (km)
1. Asahan (left bank)	- Simpang Empat swamp and Sukaraja (right bank)	11.5
2. Nantalu (left bank)	- Padan Mahondan extension	8.5
3. Kualuh (right bank)	- Kualuh right bank	4.0
4. Natas (left bank)	- Aek. Natas	16.0
5. Total		40.0

Note :

- 1) Constructions of supplemental flood dikes are proposed in addition to the long term flood protection plan formulated in Part-1 Study.
- 2) Locations are given in Fig. C-3.

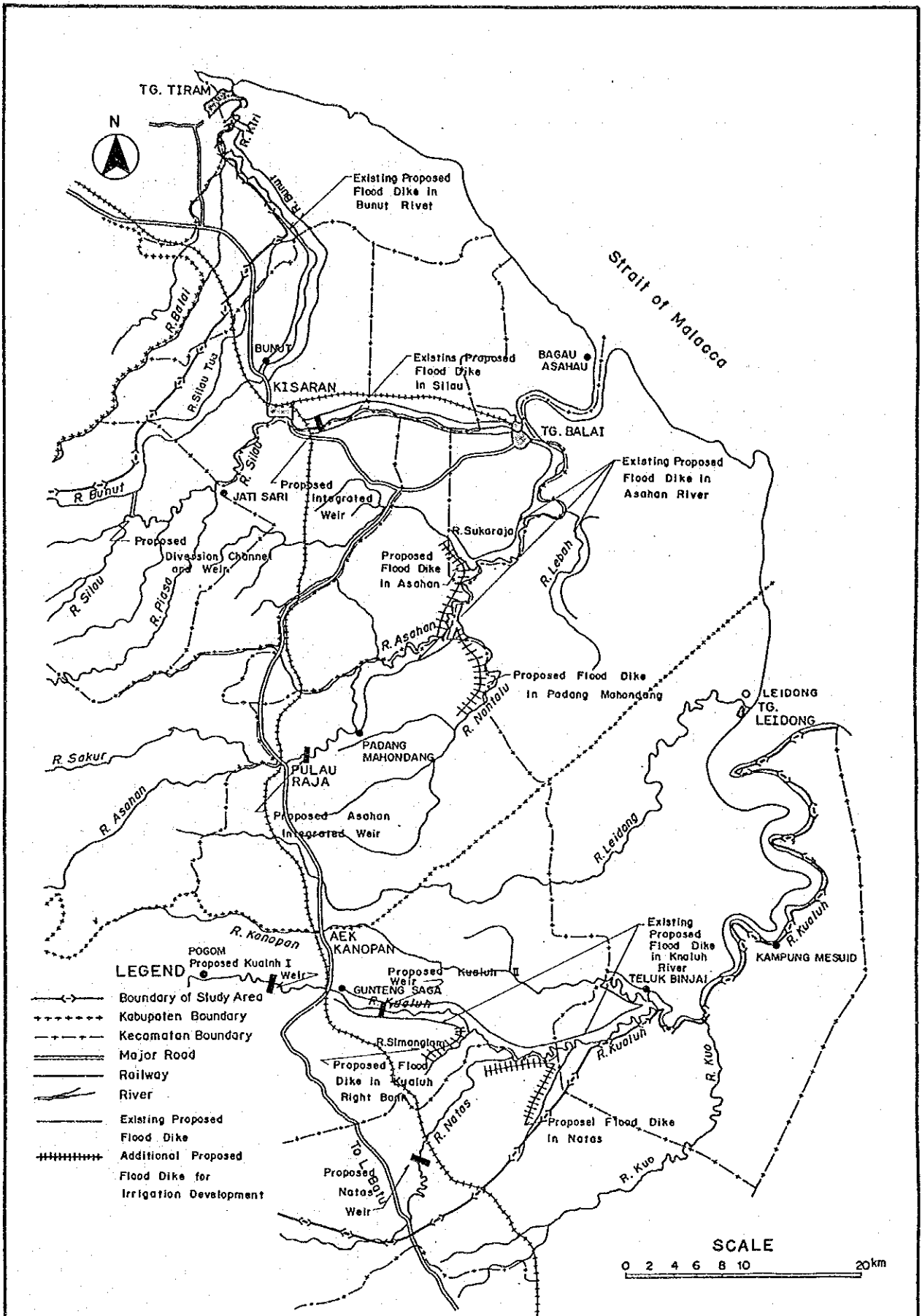


Fig. C-3 LOCATION OF SUPPLEMENTAL FLOOD DIKES AND RIVER STRUCTURES

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 LOWER ASAHAN RIVER BASIN DEVELOPMENT  
 Japan International Cooperation Agency

Table C-19 COMPARISON OF WEIR TYPE

Item	Weir Type and Merit Order		
	Sluice/Roller Gate	Inclined Weir	Inflatable Rubber-made Dam
1. Structural aspect			
Scale structure size	3	2	1
Foundation at proposed site	3	2	1
Limitation of weir height	1	2	2
Limitation of span length	3	2	1
Durability of weir	1	2	2
Easiness of construction	3	2	1
2. Operation/Maintenance aspect			
Reliability of operation	1	2	2
Water level control	1	2	2
Gate operation for sedimentation	1	2	1
Durability against flowing wood/debris	1	2	2
Easiness of operation	3	2	1
Easiness of maintenance	3	2	1
3. Construction cost	3	2	1
4. Merit order of the above	3	2	1

Note;

- 1) 1 : indicates superior.  
 2 : indicates good.  
 3 : indicates inferior.

- 2) Based on the above result, inflatable rubber-made dam is selected especially in view of light-weight structure, no back water effect due to automatically deflation during the high flow and easiness operation. Regarding a weak point of the rubber-made dam against flowing wood and debris, no flowing objects can be observed in the Silau river. A sedimentation problem can also be solved by periodical flushing or deflation during high flow.



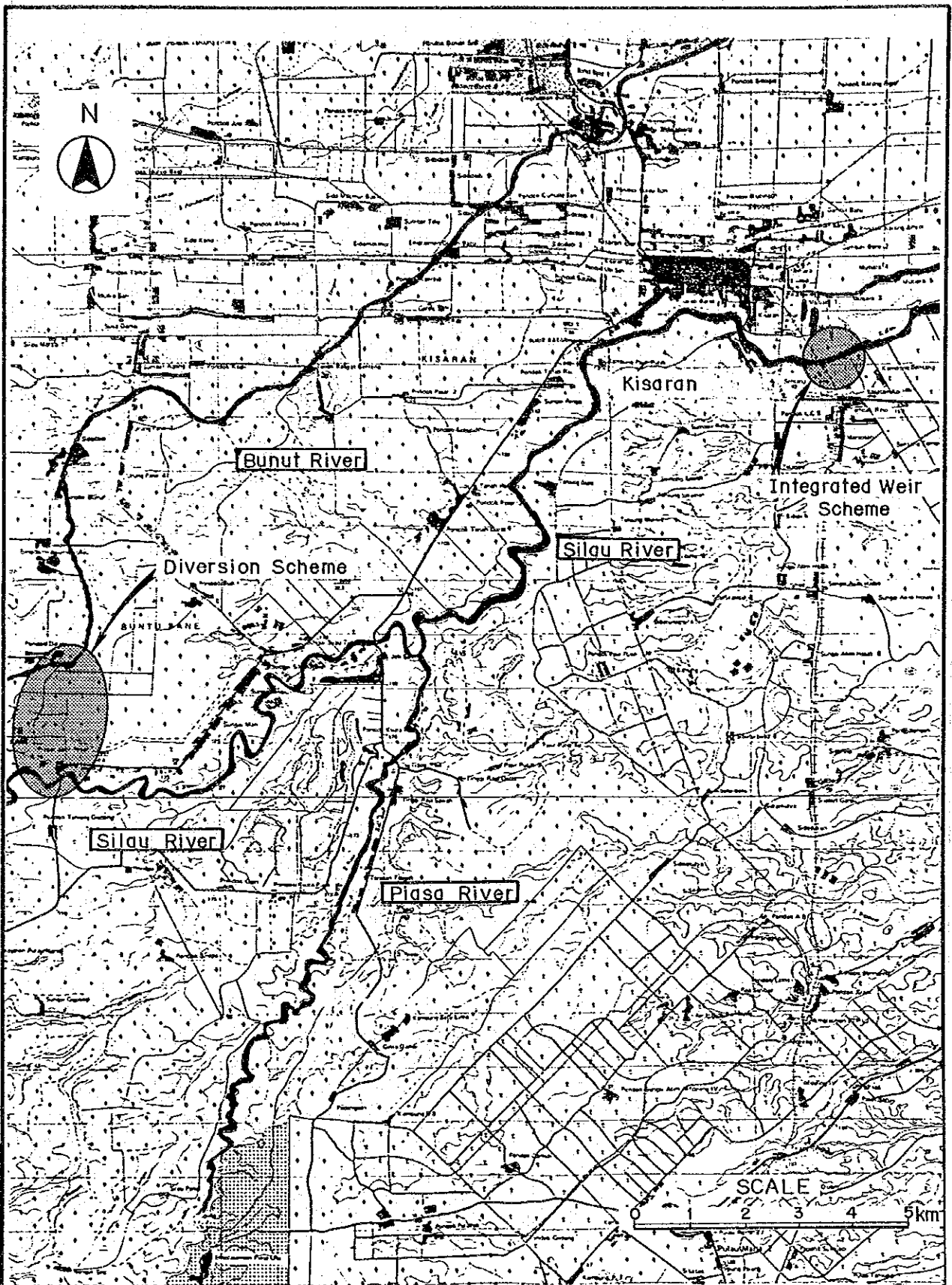
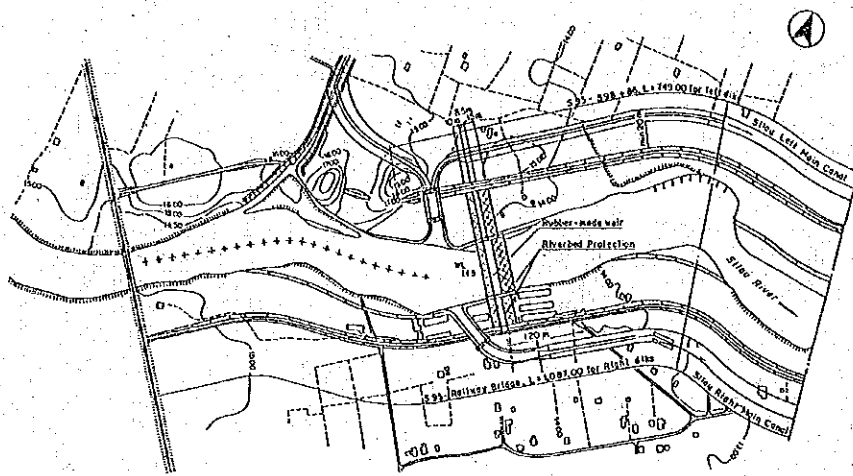


Fig. C-4 LOCATION OF SILAU INTEGRATED WEIR AND SILAU-BUNUT INTER-BASIN PLAN

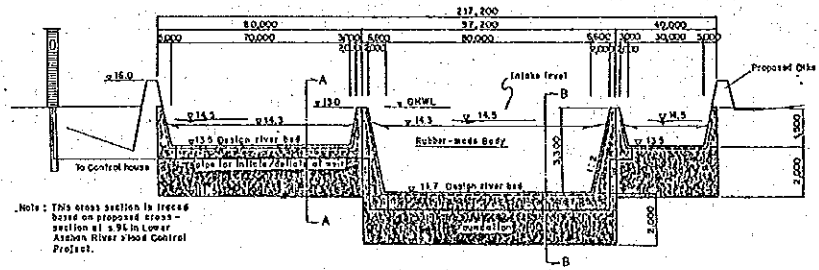
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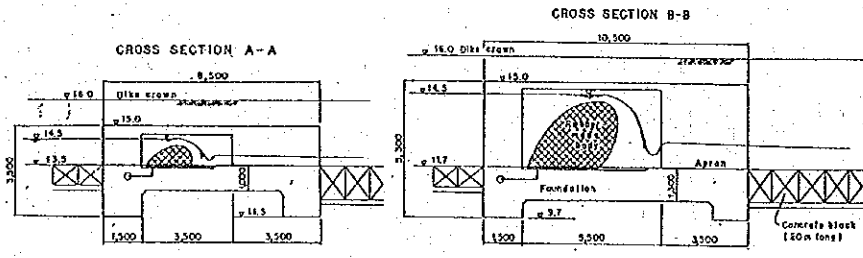
**LEGEND**  
 Proposed Dam  
 Proposed Canal  
 Contour Line  
 Gate

SCALE - 1:1000  
 0 100 200

PLAN



Note: This cross section is traced based on proposed cross-section at a 96m Lower Asahan River Flood Control Project.



POFILE

Fig. C-5 PLAN AND POFILE OF SILAU INTEGRATED WEIR

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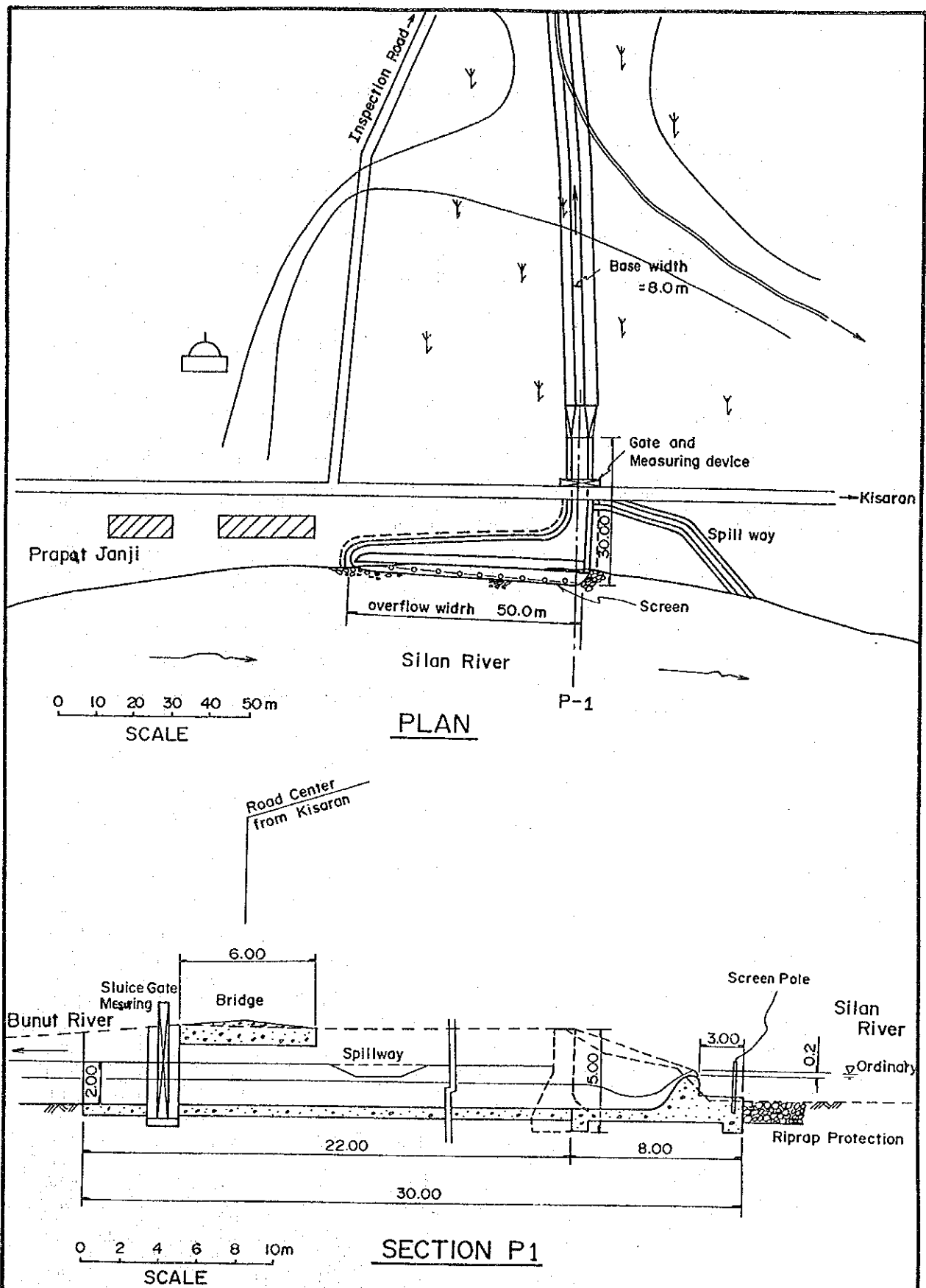


Fig. C-6 PLAN AND PROFILE DIVERSION  
STRUCTURE OF SILAU BUNUT  
INTER-BASIN PLAN

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Japan International Cooperation Agency

Table C-20 PRESENT LAND USE IN THE PROPOSED PROJECT AREA

(1) Project area in Net								(Unit : ha)
No	Name of Project	Paddy fields (Net)				Swamp area (N=G*0.7)	Other land (N=G*0.7)	Total
		Irrigated Sawah (PU) (N=G*0.9)	Rainfed Sawah (PU) (N=G*0.8)	Rainfed Sawah (Non-PU) (N=G*0.8)	Total of paddy field			
		1	Silau-Bunut (Silau) (Bunut)	6,940 2,860 4,080	1,000 740 260			
2	Tambung Tulang	0	4,040	0	4,040	1,760	0	5,800
3	S.Empat	0	0	0	0	2,800	0	2,800
4	Pd.Mahondang	1,000	1,120	50	2,170	3,450	580	6,200
5	Leidong-Asahan	50	13,240	2,640	15,930	29,570	0	45,500
6	Kanopan Left	0	1,384	680	2,064	2,236	0	4,300
7	Aek Natas	0	2,704	0	2,704	1,216	280	4,200
8	Kualuh Right	0	0	2,040	2,040	360	0	2,400
9	Aek Naetek	0	2,400	0	2,400	1,100	0	3,500
10	Small-Scale	1,040	1,390	4,770	7,200	0	0	7,200
Total		9,030	27,278	15,470	51,778	42,492	1,930	96,200

(2) Project area in Gross								(Unit : Ha)
No	Name of Project	Paddy Fields (Sawah)				Swamp area	Other * land	Total
		Irrigated Sawah (PU)	Rainfed Sawah (PU)	Rainfed Sawah (Non-PU)	Total			
		1	Silau-Bunut (Silau) (Bunut)	7,635 3,145 4,490	1,250 920 330			
2	Tambung Tulang	0	5,050	0	5,050	2,450	0	7,500
3	S.Empat	0	0	0	0	4,000	0	4,000
4	Pd.Mahondang	1,100	1,400	60	2,560	4,910	830	8,300
5	Leidong-Asahan	50	16,550	3,300	19,900	42,200	0	62,100
6	Kanopan Left	0	1,730	850	2,580	3,220	0	5,800
7	Aek Natas	0	3,380	0	3,380	1,720	400	5,500
8	Kualuh Right	0	0	2,550	2,550	550	0	3,100
9	Aek Naetek	0	3,000	0	3,000	1,500	0	4,500
10	Small-Scale	1,155	1,740	5,735	8,630	0	0	8,630
12	Out of project area	0	0	5,070	5,070	0	0	5,070
Total		9,940	34,100	24,160	68,200	60,550	2,750	131,500

\* : Other land includes convertible area to paddy fields, and paddy fields in the coconuts plantation area

Table C-21 LIST OF IRRIGATION AND DRAINAGE FACILITIES IN THE PROPOSED PROJECT AREA

No	Project name	Irrigation Canals			Drain canal (km)	Farm road (km)	Flood dike (km)	Related structure	
		Main (km)	Secondary (km)	Total (km)				Irri (nos)	Drain (nos)
1	Silau Bunut	36.69	69.23	105.92	75.87	0.43	3.50	150	24
2	Tambung Tulan	0.00	0.00	0.00	7.00	0.00	0.00	0	1
3	S. Empat	0.00	0.00	0.00	0.00	0.00	0.00	0	0
4	Pd. Mahondang	0.85	11.51	12.36	15.95	0.00	0.00	22	2
5	Leidong-Asahan	1.20	0.30	1.50	1.00	0.00	0.00	4	1
6	Kanopan Left	0.00	0.00	0.00	50.60	0.00	0.00	0	0
7	Aek Natas	0.00	0.00	0.00	26.65	0.00	7.95	0	0
8	Kualuh Right	0.00	0.00	0.00	0.00	0.00	0.00	0	0
9	Aek Naetek	0.00	0.00	0.00	15.60	0.00	0.00	0	0
10	Samall Scale	28.57	41.07	69.64	23.77	0.85	0.90	90	39
Total		67.31	122.11	189.42	216.44	1.28	12.35	266	67

Table C-22

## Unit Construction Cost

		(Unit : Rupiah)	
Work Item	Unit Cost	Work Item	Unit Cost
<b>I. Compensation</b>			
<b>(1) Land Aquisition(m2)</b>			
-Resident	440		
-Farm	330		
-Fish pond	360		
-Swamp	110		
-Coconut palm	280		
<b>(2) House Compensate(m2)</b>			
-Permanent	52,000		
-Semi permanent	30,000		
-Simple	19,000		
<b>(3) Tree Compensate(nos)</b>			
-Large	1,500		
-Small	300		
-Banana,etc	200		
<b>II. Earth Work</b>			
<b>(1) Preparation(m2)</b>			
-Clearing general	681		
-Stripping t=25cm	1,080		
<b>(2) Excavation(m3)</b>			
-Trench excavation(spoiling 500m)	3,259		
-Trench excavation(spoiling 2,000m)	6,445		
-Structural excavation	3,360		
-Ex. manpower,dry condition	2,426		
-Ex. manpower,wet condition	5,700		
<b>(3) Embankment(m3)</b>			
-Em.,ex.material	1,123		
-Em.,haul=500m	5,533		
-Em.,haul=2000m	5,762		
-Em.,Hydrostructure	3,053		
-Backfill,manpower	1,135		
-Backfill,machinery(haul dist.=500m)	3,000		
<b>(4) Transportation(m3)</b>			
-Haul dist.=500m	815		
-Haul dist.=8,000m	6,621		
-Haul dist.=10,000m	8,175		
<b>III. Concrete Work</b>			
<b>(1) Concrete(m3)</b>			
-Type A(K=225)	103,917		
-Type A(K=175)	96,941		
-Type A(K=125)	90,136		
-Mortar	121,699		
-Concrete Plate	34,156		
-Concrete lining	270,000		
<b>(2) Reinforcement Bar(t)</b>			
-Round bar	1,290,110		
-Deform bar	1,485,754		
<b>(3) Form,etc</b>			
-Wooden form(m3)	7,206		
-Plywood form(m3)	9,015		
-Water stop(lin.m),(W=200mm)	27,909		
-Joint filler(m2),(t=10mm)	25,429		
-Scaffolding(m2)	5,508		
-Form support(m3)	6,022		
-Dowel bar(pc),(dia. 19mm * 1.0m)	4,241		
<b>(4) Concrete Pipe(lin.m)</b>			
-dia.300mm	36,000		
-dia.400mm	48,000		
-dia.500mm	66,000		
-dia.600mm	84,000		
-dia.700mm	120,000		
-dia.800mm	156,000		
-dia.900mm	198,000		
-dia.1,000mm	240,000		
<b>IV. Other Items</b>			
<b>(1) Finishing</b>			
-sod facing(m2)	1,427		
-Masonry lining(m3)	79,800		
-Gravel metaling(m3)	42,846		
-Gravel fill(m3)	35,533		
-Sand fill(m3)	3,848		
-Gabion(m3)	96,000		
-Gabion mattress(m3)	120,000		
<b>(2) Piling(lin.m)</b>			
-350 * 350mm	85,832		
-dia. 350mm	50,993		
-dia. 400mm	65,509		
-dia. 450mm	79,364		
-Sheet pile,L=2m	89,683		
<b>(3) Weep Hole(pc)</b>			
-dia. 60 * 400mm	6,509		
-dia. 60 * 600mm	8,652		
-dia. 60 * 750mm	10,798		
<b>(4) Bridge,4 * 10m(m2)</b>			
		121,000	
<b>V. Gates</b>			
<b>(1) Flap gate,timber(set)</b>			
-W=1.0m	1,400,323		
-W=1.25m	1,812,876		
-W=1.50m	2,706,506		
-W=1.75m	3,205,010		
-W=3.0m	7,052,904		
<b>(2) Slide Gate,Steel(set)</b>			
-1.25 * 1.25m	2,374,314		
-1.5 * 1.5m	2,968,654		
-0.4 * 3.85m	1,873,128		
<b>(3) Stop log(set)</b>			
-1.15 * 1.0m	284,581		
-1.5 * 1.4m	585,047		
-1.5 * 1.8m	752,633		
-1.75 * 1.6m	776,353		
-1.75 * 2.0m	971,194		
-2.0 * 1.8m	997,922		
-3.25 * 3.0m	2,999,880		
<b>(4) staff gauge(nos)</b>			
		63,228	
<b>VI. Tertiary Development(per ha)</b>			1,221,428

(Conversion rate : 1\$=1,770Rp=140Yen)