Table 4.14 Information on Mantalat Land System (MTL)

1.	Land Type	:	linear sedimentary ridge systems with steep displopes
2.	Lithology :		
	- Type	;	sedimentary
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	felsic
	- Rock type	;	sandstone, shale, mudstone, marl
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	river
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,800 - 4,400 mm
	- Wet months	;	1 - 12
	- Dry months	;	0 - 7
	- Growing period	;	210 - 365 days for arable crops 150 - 365 days for tree crops
	- Mean temperature	;	min. 20 - 23°C, max. 28 - 31°C
8.	Vegetation/Land Use	:	moist primary lowland forest, logged forest, shifting cultivation
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	Tropudults
	Associated	;	Dystropepts
	- Texture (top/sub soils)		
	Dominant	;	mod. coarse/mod. coarse
	Associated	;	mod. fine/fine
	- Acid sulphate hazard at	;	
	- Salininty	;	
11.	Altitude	:	- Min ; 0 m - Max ; 1,000 m - Range ; 100-600 m
12.	Drainage	:	- Pattern ; trellis - Density ; 2.1 - 5.0 km/km^2
13.	Slope :		
	- Steepness	;	1 - 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 30%
14.	Additional Notes	:	Mineral soil depth is 101 - 150 cm

Table 4.15 Information on Pendreh Land System (PDH)

1.	Land Type	:	sedimentary mountains, non-orientated
2.	Lithology :		
	- Type	;	sedimentary
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	qualtz, felsic
	- Rock type	;	sandstone, conglomerate, shale
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	river
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,800 - 4,400 mm
	- Wet months	;	0 - 12
	- Dry months	;	0 - 4
	- Growing period	;	210 - 365 days for arable crops 150 - 365 days for tree crops
	- Mean temperature	;	min. 12 - 23°C, max. 19 - 31°C
8.	Vegetation/Land Use	:	moist primary lowland forest, submontane forest, logged forest
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	
	Associated	;	Tropudults, Dystropepts
	- Texture (top/sub soils)		
	Dominant	;	
	Associated	;	mod. coarse/medium, mod. fine/mod. fine
	- Acid sulphate hazard at	;	
	- Salininty;		
11.	Altitude	:	- Min ; 100 m - Max ; 2,467 m - Range ; 100-2,000 m
12.	Drainage	:	- Pattern ; rectangular - Density ; 2.1 - 4.0 km/km^2
13.	Slope :		
	- Steepness	;	41 - 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 25%
14.	Additional Notes	:	Mineral soil depth is 26 - 50 cm

Table 4.16 Information on Pakalunai Land System (PLN)

1.	Land Type	:	non-sedimentary hills
2.	Lithology :		
	- Type	;	metamorphic
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	qualtz, basic
	- Rock type	;	dolerite, basalt
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	river
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,700 - 4,400 mm
	- Wet months	;	2 - 12
	- Dry months	;	0 - 7
	- Growing period	;	240 - 365 days for arable crops 210 - 365 days for tree crops
	- Mean temperature	;	min. 20 - 23°C, max. 28 - 31°C
8.	Vegetation/Land Use	:	moist primary lowland forest, logged forest, shifting cultivation
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	Dystropepts
	Associated	;	Tropudults
	- Texture (top/sub soils)		
	Dominant	;	mod. coarse/mod. fine
	Associated	;	mod. fine/mod. fine
	- Acid sulphate hazard at	;	
	- Salininty	;	
11.	Altitude	:	- Min ; 50 m - Max ; 500 m
12.	Drainage	:	- Pattern ; dendritic - Density ; > 4.0 km/km^2
13.	Slope :		
	- Steepness	;	41 - 60%
	- Distribution	;	(0 - 3%) 5% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 10%
14.	Additional Notes	:	Peat depth is 10 cm and mineral soil depth is 51 - 75 cm

Table 4.17 Information on Telawi Land System (TWI)

1.	Land type	:	granite mountain ridge systems
2.	Lithology :		
	- Type	;	plutonic
	- Induration	;	hard
	- Grade	;	coarse
	- Mineralogy	;	felsic
	- Rock type	;	granite
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	river
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	2,500 - 2,700 mm
	- Wet months	;	8 - 10
	- Dry months	;	0 - 1
	- Growing period	;	270 - 300 days for arable crops 240 - 270 days for tree crops
	- Mean temperature	;	min. 7 - 15°C, max. 13 - 21°C
8.	Vegetation/Land Use	:	moist primary submontane forest
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	
	Associated	;	Tropudults, Dystropepts
	- Texture (top/sub soils)		
	Dominant	;	
	Associated	;	medium/fine, medium/mod. fine
	- Acid sulphate hazard at	;	
	- Salinity	;	
11.	Altitude	:	- Min ; 1,600 m - Max ; 4,100 m
12.	Drainage	:	- Pattern ; rectangular - Density ; 2.1 - 4.0 km/km^2
13.	Slope :		
	- Steepness	;	40 - 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 20%
14.	Additional Notes	:	Mineral soil depth is 51 - 75 cm

Table 4.18 Information on Bukit Pandan Land System (BPD)

1.	Land Type	:	non-sedimentary mountain ridge systems
2.	Lithology :		
	- Type	;	metamorphic
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	quartz, basic
	- Rock type	;	quartzite, basalt, schist
	- Rock Outcrop	;	10%
3.	Groundwater Quality	:	none
4.	Fisheries	:	river
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,700 - 4,400 mm
	- Wet months	;	2 - 12
	- Dry months	;	0 - 7
	- Growing period	;	240 - 365 days for arable crops 180 - 365 days for tree crops
	- Mean temperature	;	min. 13 - 23°C, max. 19 - 31°C
8.	Vegetation/Land Use	:	moist primary lowland forest, logged forest, submontane forest
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	Dystropepts
	Associated	;	Tropudults, Paleudults
	- Texture (top/sub soils)		
	Dominant	;	medium/mod. fine
	Associated	;	mod. fine/fine, coarse/mod. fine
	- Acid sulphate hazard at	;	
	- Salininty ;		
11.	Altitude	:	- Min ; 100 m - Max ; 1,900 m - Range ; 100 - 1,900 m
12.	Drainage	:	- Pattern ; rectangular - Density ; > 4.0 km/km^2
13.	Slope :		
	- Steepness	;	> 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 0%
14.	Additional Notes	:	Mineral soil depth is 26 - 0 cm

Table 4.19 Information on Okki Land System (OKI)

1.	Land Type	:	rugged karst ridges and mountains
2.	Lithology :		
	- Type	;	sedimentary
	- Induration	;	hard
	- Grade	;	fine
	- Mineralogy	;	calcareous
	- Rock type	;	limestone
	- Rock Outcrop	;	90%
3.	Groundwater Quality	:	fresh
4.	Fisheries	:	none
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,600 - 4,200 mm
	- Wet months	;	0 - 11
	- Dry months	;	0 - 4
	- Growing period	;	210 - 365 days for arable crops 150 - 330 days for tree crops
	- Mean temperature	;	min. 20 - 23°C, max. 28 - 31°C
8.	Vegetation/Land Use	:	forest on limestone, rock outcrops
9.	Accelerated Erosion Extent	:	none
10.	Soils :		
	- Great soil groups		
	Dominant	;	Rendolls
	Associated	;	Eutropepts, Tropofolists
	- Texture (top/sub soils)		
	Dominant	;	mod. fine/rock
	Associated	;	fine/fine, peat/peat
	- Acid sulphate hazard at	;	
	- Salininty	;	
11.	Altitude	:	- Min ; 50 m - Max ; 1,100 m - Range ; 50 - 500 m
12.	Drainage	:	- Pattern ; karstic - Density ; < 0.5 km/km^2
13.	Slope :		
	- Steepness	;	>60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 0%
14.	Additional Notes	:	Mineral soil depth is 0 - 10 cm

Table 4.20 Information on Lohai Land System (LH)

1.	Land Type	:	steep long-sided narrow ridges
2.	Lithology :		
	- Type	;	sedimentary
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	felsic
	- Rock type	;	sandstone, mudstone
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	none
5.	Rivers Flood Risk : none		
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,800 - 4,200 mm
	- Wet months	;	1 - 12
	- Dry months	;	0 - 1
	- Growing period	;	180 - 365 days for arable crops 150 - 365 days for tree crops
	- Mean temperature	;	min. 18 - 23°C, max. 25 - 31°C
8.	Vegetation/Land Use	:	moist primary lowland forest, shifting cultivation
9.	Accelerated Erosion Extent	:	local
10.	Soils :		
	- Great soil groups		
	Dominant	;	
	Associated	;	Tropudults, Dystropepts
	- Texture (top/sub soils)		
	Dominant	;	
	Associated	;	mod. fine/mod. fine, mod. fine/fine
	- Acid sulphate hazard at	;	
	- Salininty	;	
11.	Altitude	:	- Min ; 0 m - Max ; 1,000 m - Range ; 0 - 1,000 m
12.	Drainage	:	- Pattern ; trellis - Density ; 2.1 - 4.0 km/km^2
13.	Slope :		
	- Steepness	;	> 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 0%
14.	Additional Notes	:	Mineral soil depth is 26 - 50 cm

Table 4.21 Information on Luang Land System (LNG)

1.	Land Type	:	ultrabasic/basic mountains
2.	Lithology :		
	- Type	;	volkanic,plutonic
	- Induration	;	hard
	- Grade	;	mixed
	- Mineralogy	;	basic, ultra basic
	- Rock type	;	peridotite, serpentinite, basalt
	- Rock Outcrop	;	5%
3.	Groundwater Quality	:	none
4.	Fisheries	:	none
5.	Rivers Flood Risk	:	none
6.	Inundation	:	none
7.	Climate :		
	- Mean annual rainfall	;	1,700 - 3,000 mm
	- Wet months	;	2 - 10
	- Dry months	;	0 - 3
	- Growing period	;	240 - 330 days for arable crops 180 - 270 days for tree crops
	- Mean temperature	;	min. 17 - 23°C, max. 24 - 31°C
8.	Vegetation/Land Use	:	forest on ultrabasic hills, logged forest
9.	Accelerated Erosion Extent	:	none
10.	Soils :		
	- Great soil groups		
	Dominant	;	
	Associated	;	Tropudults, Dystropepts
	- Texture (top/sub soils)		
	Dominant	;	
	Associated	;	mod. fine/fine, medium/mod. fine
	- Acid sulphate hazard at	;	
	- Salininty	;	
11.	Altitude	:	- Min ; 100 m - Max ; 1,100 m - Range ; 100-1,100 m
12.	Drainage	:	- Pattern ; rectangular - Density ; > 4.0 km/km^2
13.	Slope :		
	- Steepness	;	> 60%
	- Distribution	;	(0 - 3%) 0% (0 - 8%) 0% (9 - 25%) 0% (26 - 40%) 10%
14.	Additional Notes	:	Mineral soil depth is 51 - 75 cm

Table 4.22 Distribution of Land System

(Unit: ha)

	Land System	Tabalong	H.S.U	H.S.T.	H.S.S.	Tapin	Strip along the Barit	Total
1. Strip along the Barito	KHY							2,750
2. Scattered Swmps	TNJ	3,175	0	3,870	2,805	3,150		13,000
3. Seven Swamps	Marsh				1,025			1,025
	GBT	2,148	17,449					19,597
	MDW	7,691	17,970	560	38,855	61,343		126,419
	KLR	1,940	25,529	8,884	8,520	7,138		52,011
	KHY	0	5,059	0	21,744	93,740		120,543
	TNJ	630	28,150	9,210	18,680	19,985		76,655
Sub Total		12,409	94,157	18,654	88,824	182,206		396,250
4. Alluvial Plain	TNJ	24,533	16,627	52,478	30,935	16,401		140,974
5. Alluvial Valleys	BKN	21,410	16,805	3,361	546	1,412		43,534
6. Plains	KPR	1,940	0	0	0	0		1,940
	LWW	76,427	48,324	4,962	136	17,964		147,813
	TWH	67,072	23,321	16,488	9,816	4,864		121,561
	TWB	0	0	7,445	1,295	3,138		11,878
Sub Total		145,439	71,645	28,895	11,247	25,966		283,192
7. Hills	SST	693	0	0	0	0		693
	MPT	56,748	17,795	6,484	9,475	8,551		99,053
	MTL	10,184	0	0	1,772	4,863		16,819
	PLN	1,595	0	0	0	0		1,595
	LHI	1,247	0	2,401	4,771	0		8,419
Sub Total		70,467	17,795	8,885	16,018	13,414		126,579
8. Mountains	BRW	277	0	0	0	0		277
	PDH	64,508	9,770	12,007	24,131	16,866		127,282
	TWI	0	0	6,884	2,522	0		9,406
	BPD	18,777	43,614	9,605	0	0		71,996
	OKI	19,886	3,431	0	3,272	6,903		33,492
	LNG	13,719	3,256	2,561	0	0		19,536
Sub Total		117,167	60,071	31,057	29,925	23,769		261,989
Total		394,600	277,100	147,200	180,300	266,318	2,750	1,268,268

Source: Ref. C-06

Table 5.1 Criteria on Physical Limits to Assess Land Suitability for Wetland Arable Crops

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to low/infrequent - Inundation risk ; up to seasonal											
		S	S	N	S	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-5,000 mm AND - Combination ; more than 4 wet months (mean >200 mm) AND up to 7 dry months (mean < 100 mm) - Eqivalent to ; up to 3 dry months (mean <60 mm) - Growing days ; not shorter than 100 days - Mean temperature (^{0}C) ; 15-34											
		S	S	S	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 0.25 m											
		S	S	S	S	S	S	S	S	S	S	?	S
5. Depth of Soil	:	- Peat ; up to deep - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	imperpect to very poor											
		S	S	S	S	S	S	S	N	N	N	S	N
7. Elevation	:	up to 1,500 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	flat											
		S	S	S	S	S	S	S	N	N	N	N	N
9. Fragmentation	:	- *Smallholders; medium to large blocks with 0 to 8% slope on 30% area* - Estates ; more than 75% area with slope of less than 25%											
		S	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	S	S	S	S	S	N	N	N	N	N

Table 5.2 Criteria on Physical Limits to Assess Land Suitability for Tidal Irrigation

Potentially Limiting Factor	:	Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	##	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; none - Inundation risk ; up to permanent - Tidal range ; 0.5-1.5 m											
3. Climate	:	- Mean annual rainfall ; not relevant - Combination ; not relevant - Eqivalent to ; not relevant - Growing days ; not relevant - Mean temperature (^{0}C) ; 18-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to medium and organic at top soil of 0.25 m											
		S	S	S	S	S	S	S	S	S	N	?	S
5. Depth of Soil	:	- Peat ; up to moderately shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	imperfect to very poor											
		S	S	S	S	S	S	N	N	N	N	N	N
7. Elevation	:	0-3 m											
		N	N	N	S	N	N	N	N	N	N	N	N
8. Slope	:	flat											
		S	S	S	S	S	S	N	N	N	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; not suitable											
		S	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	S	N	N	N	N	N	N	N	N

Table 5.3 Criteria on Physical Limits to Assess Land Suitability for Fish Culture

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	up to saline											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - *Inundation risk ; none* - Tidal range ; 0.5-3.0 m											
		S	S	N	S	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-3,600 mm - Combination ; up to 5 dry months (mean <100 mm) - Eqivalent to ; up to 2 dry month (mean <60 mm) - Growing days ; not relevant - Mean temperature (^{0}C) ; 18-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately fine at top soil of 0.25 m											
		N	N	S	S	S	S	S	S	S	N	?	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; extremely deep											
		N	N	N	S	N	S	N	N	N	N	N	N
6. Soil Drainage	:	*poor to very poor*											
		S	S	S	S	S	S	N	N	N	N	N	N
7. Elevation	:	0.3-1.9 m											
		N	N	N	S	N	N	N	N	N	N	N	N
8. Slope	:	flat											
		S	S	S	S	S	S	N	N	N	N	N	N
9. Fragmentation :		- Smallholders; small to large blocks with 0 to 8% slope on 30% area - Estates ; not relevant											
		S	S	S	S	S	S	S	S	S	S	#	S
FULL SUITABILITY		N	N	N	S	N	N	N	N	N	N	N	N

Table 5.4 Criteria on Physical Limits to Assess Land Suitability for Houselot

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; none											
		S	S	S	S	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-5,000 mm AND - Combination ; up to 6 dry months (mean <100 mm) - Eqivalent to ; up to 3 dry months (mean <60 mm) - Growing days ; not shorter than 100 days for food crops - Mean temperature (^{0}C) ; 13-34											
		S	S	S	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	?	S
5. Depth of Soil	:	- Peat ; up to shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	N	N	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 1,500 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to gentle											
		S	S	S	S	S	S	S	S	N	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 40%											
		S	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	N	S	S	S	S	N	N	N	N

Table 5.5 Criteria on Physical Limits to Assess Land Suitability for Dryland Arable Crops

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to low/infrequent - Inundation risk ; up to seasonal											
		S	S	N	S	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-5,000 mm AND - Combination ; up to 6 dry months (mean <100 mm) - Eqivalent to ; up to 3 dry months (mean <60 mm) - Growing days ; not shorter than 100 days - Mean temperature (^{o}C) ; 13-34											
		S	S	S	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 0.25 m											
		S	S	S	S	S	S	S	S	S	S	?	S
5. Depth of Soil	:	- Peat ; up to moderately shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 1,500 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to very gentle											
		S	S	S	S	S	S	S	S	N	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		S	S	S	S	S	S	S	S	S	#	N	N
FULL SUITABILITY		N	N	S	S	S	S	S	S	N	N	N	N

Table 5.6 Criteria on Physical Limits to Assess Land Suitability for Pasture/Livestock

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	S	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-6,000 mm - Combination ; up to 6 wet months (mean > 200 mm), parthly up to 4 dry months (mean < 100 mm), OR up to 3 dry months, partly up to 5 wet months - Eqivalent to ; up to 1 dry month (mean < 60 mm) - Growing days ; not shorter than 100 days - Mean temperature (^{0}C) ; 16-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to coarse at top soil of 0.25 m											
		N	S	S	S	S	S	S	S	S	S	?	S
5. Depth of Soil	:	- Peat ; very shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	N	N	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to imperfect											
		N	S	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 2,000 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; small to large blocks with 0 to 8% slope on 30% area - Estates ; not more than 75% area with slope of less than 25%											
		S	S	S	S	S	S	S	S	S	#	S	S
FULL SUITABILITY		N	N	N	N	S	S	S	S	S	S	N	S

Table 5.7 Criteria on Physical Limits to Assess Land Suitability for Agroforestry

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	##	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to medium - Flood/heavy sediment ; none and, for estate crops, low/infrequent - Inundation risk ; up to seasonal											
		S	S	N	S	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-6,000 MM - Combination ; - - Eqivalent to ; - - Growing days ; not relevan - Mean temperature (^{O}C) ; 18-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	?	S
5. Depth of Soil	:	- Peat ; up to shallow - Mineral soil ; deep to extremely deep											
		N	N	N	S	S	S	N	S	S	S	N	S
6. Soil Drainage	:	well to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 2,000 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 40%											
		S	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	S	S	S	N	S	S	S	N	S

Table 5.8 Criteria on Physical Limits to Assess Land Suitability for Rubber

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to high/frequent - Inundation risk ; up to seasonal											
		S	S	N	N	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,500-5,000 mm OR - Combination ; up to 3,500 mm for wet months (mean >200 mm) OR up to 6 dry months (mean <100 mm), partly up to 5,000 mm with 2 dry months - Eqivalent to; up to dry 3 months (mean <60 mm) OR partly no dry month - Growing days ; not shorter than 185 days - Mean temperature (^{o}C) ; 20-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		N	N	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to shallow - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	well to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to steep and, for estate crop, up to very steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	S	#	S
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	S	N	S

Table 5.9 Criteria on Physical Limits to Assess Land Suitability for Oil Palm

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	up to saline											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to high/frequent - Inundation risk ; up to seasonal											
		S	S	N	N	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,500-6,000 mm OR - Combination ; up to 4,000 mm for wet months (mean >200 mm) OR up to 3 dry months (mean <100 mm), partly up to 6,000 mm with 1 dry month - Eqivalent to ; up to 1 dry month (mean <60 mm) OR partly no dry month - Growing days ; not shorter than 275 days - Mean temperature (^{o}C) ; 20-34											
		S	N	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat; up to moderately shallow and, for estate crop, up to deep - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	up to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	S	#	S
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	S	N	S

Table 5.10 Criteria on Physical Limits to Assess Land Suitability for Coconut

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	up to saline											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to high/frequent - Inundation risk ; up to seasonal											
		S	S	N	N	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-5,000 mm AND - Combination ; up to 4 dry months (mean <100 mm) - Eqivalent to ; up to 1 dry month (mean <60 mm) - Growing days ; not shorter than 245 days - Mean temperature (^{0}C) ; 20-34											
		N	N	N	N	N	S	N	S	S	S	N	N
4. Dominant Soil Texture	:	up to coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat; up to moderately shallow and, for estate crop, up to deep - Mineral soil ; deep to extremely deep											
		N	N	S	S	S	S	N	S	S	S	N	S
6. Soil Drainage	:	up to imperpect											
		N	N	N	S	S	N	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; up to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	N	S	N	S	S	$	N	N

Table 5.11 Criteria on Physical Limits to Assess Land Suitability for Sago Palm

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	S	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to high/frequent - Inundation risk ; seasonal and necessary											
		N	N	N	S	S	S	S	S	S	N	N	N
3. Climate	:	- Mean annual rainfall ; more than 1,250 mm AND - Combination ; up to 2 dry months (mean <100 mm) - Eqivalent to ; no dry month (mean <100 mm) - Growing days ; not shorter than 300 days - Mean temperature (^{O}C) ; 20-34											
		N	N	N	N	N	N	N	N	N	N	N	N
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to moderately shallow - Mineral soil ; deep to extremely deep											
		N	N	S	S	S	S	N	S	S	S	N	S
6. Soil Drainage	:	imperfect to very poor											
		S	S	S	S	S	S	N	N	N	N	N	N
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	flat											
		S	S	S	S	S	S	N	N	N	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	N	N	N	N	N	N	N	N	N

Table 5.12 Criteria on Physical Limits to Assess Land Suitability for Clove

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; none - Flood/heavy sediment ; none - Inundation risk ; none											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,500-5,000 mm AND - Combination ; up to 5 dry months (mean <100 mm) - Eqivalent to ; up to 2 dry months (mean <60 mm) - Growing days ; not shorter than 185 days - Mean temperature (°C) ; 20-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse at top soil of 1.5 m											
		N	N	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	N	S	N	S
6. Soil Drainage	:	up to imperpect											
		N	N	N	N	S	N	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	S
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	$	N	$

Table 5.13 Criteria on Physical Limits to Assess Land Suitability for Cocoa

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-3,000 mm AND - Combination ; up to 6 dry months (mean <100 mm) - Eqivalent to ; up to 3 dry months (mean <60 mm) - Growing days ; not shorter than 200 days - Mean temperature (^{0}C) ; 19-34											
		S	S	S	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse at top soil of 1.5 m											
		N	N	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; moderately deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	well to imperfect											
		N	N	N	N	S	N	S	S	S	S	S	S
7. Elevation	:	*up to 800 m*											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to very steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	S	#	S
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	S	N	S

Table 5.14 Criteria on Physical Limits to Assess Land Suitability for Cashew

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-4,000 mm - Combination ; up to 5 dry months (mean <100 mm) - Eqivalent to ; up to 2 dry months (mean <60 mm) - Growing days ; not shorter than 180 days - Mean temperature (^{o}C) ; 20-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to deep - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	up to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to moderately steep											
		S	S	S	S	S	S	S	S	S	S	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	S	N	S	S	S	S	S	N	N	N

Table 5.15 *Criteria on Physical Limits to Assess Land Suitability for Tea*

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-6,00 mm AND - Combination ; up to 3 dry months (mean <100 mm) - Eqivalent to ; up to 1 dry months (mean <60 mm) - Growing days ; not shorter than 275 days - Mean temperature (°C) ; mean minimun 9-20 and mean maximum 19-28											
		N	N	N	N	N	N	N	N	N	N	S	N
4. Dominant Soil Texture	:	up to moderately coarse at top soil of 1.5 m											
		N	N	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	well to imperfect											
		N	N	N	N	S	N	S	S	S	S	S	S
7. Elevation	:	above 500 m											
		N	N	N	N	N	N	N	N	N	N	S	N
8. Slope	:	up to steep and, for estate crop, up to very steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	N	N	N	N	N	N	N	N

Table 5.16 Criteria on Physical Limits to Assess Land Suitability for Robusta Coffee

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWV	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-5,00 mm AND - Combination ; up to 4 dry months (mean <100 mm) - Eqivalent to ; up to 1 dry month (mean <60 mm) - Growing days ; not shorter than 245 days - Mean temperature (^{o}C) ; 19-34											
		N	N	N	N	N	S	N	S	S	S	S	N
4. Dominant Soil Texture	:	up to coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to moderately shallow - Mineral soil ; deep to extremely deep											
		N	N	S	S	S	S	N	S	S	S	N	S
6. Soil Drainage	:	up to imperfect											
		N	N	N	N	S	N	S	S	S	S	S	S
7. Elevation	:	up to 800 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	N	S	N	S	S	$	N	N

Table 5.17 Criteria on Physical Limits to Assess Land Suitability for Pepper

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; none - Flood/heavy sediment ; none - Inundation risk ; none											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 2,000-5,000 mm - Combination ; up to 5 dry months (mean <100 mm) - Eqivalent to ; up to 2 dry months (mean<60 mm) - Growing days ; not shorter than 180 days - Mean temperature (^{0}C) ; 20-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse at top soil of 1.5 m											
		N	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	up to imperfect											
		N	N	N	N	S	N	S	S	S	S	S	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	$	N	$

Table 5.18 Criteria on Physical Limits to Assess Land Suitability for Tobacco

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- *Floodwater risk only ; none* - Flood/heavy sediment ; none - Inundation risk ; none											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 400-2,500 mm AND - Combination ; up to 6 dry months (mean <100 mm) - Eqivalent to ; up to 3 dry months (mean <60 mm) - Growing days ; not shorter than 90 days - Mean temperature (^{o}C) ; 15-34											
		N	N	N	N	N	N	N	N	N	N	N	N
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to moderately shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to imperfect											
		N	N	S	N	S	N	S	S	S	S	S	S
7. Elevation	:	up to 1,500 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to moderately steep											
		S	S	S	S	S	S	S	S	S	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	N	N	N	N	N	N	N	N

Table 5.19 *Criteria on Physical Limits to Assess Land Suitability for Sugarcane*

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-5,000 mm - Combination ; up to 5 dry months (mean <100 mm) - Eqivalent to ; up to 2 dry months (mean <60 mm) - Growing days ; not shorter than 180 days - Mean temperature (^{o}C) ; 17-34											
		S	S	S	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse and, for estate crop, organic at top soil of 1.5 m											
		#	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to shallow - Mineral soil ; moderately shallow to extremely deep											
		N	N	N	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to very poor											
		S	S	S	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 1,200 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to moderately steep											
		S	S	S	S	S	S	S	S	S	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	S	S	S	S	S	S	N	N	N

Table 5.20 Criteria on Physical Limits to Assess Land Suitability for Banana

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to low - Flood/heavy sediment ; none - Inundation risk ; up to seasonal											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,250-5,000 mm - Combination ; up to 4 dry months (mean <100 mm) - Eqivalent to ; up to 1 dry month (mean <60 mm) - Growing days ; not shorter than 240 days - Mean temperature (^{0}C) ; 13-34											
		S	S	N	S	S	S	S	S	S	S	S	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; up to shallow - Mineral soil ; deep to extremely deep											
		N	N	S	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	up to poor											
		N	N	S	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 1,800 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	S	N	S

Table 5.21 Criteria on Physical Limits to Assess Land Suitability for Pineapple

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; none - Flood/heavy sediment ; none - Inundation risk ; none											
		S	S	N	N	N	N	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 1,000-4,000 mm - Combination ; up to 4 dry months (mean <100 mm) - Eqivalent to ; up to 1 dry month (mean <60 km) - Growing days ; not shorter than 240 days - Mean temperature (^{o}C) ; 18-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to medium and organic at top soil of 1.5 m											
		S	S	S	S	S	S	S	S	S	N	S	S
5. Depth of Soil	:	- Peat ; up to deep - Mineral soil ; moderately shallow to extremely deep											
		N	N	S	S	S	S	S	S	S	S	S	S
6. Soil Drainage	:	well to poor											
		N	N	N	S	S	S	S	S	S	S	S	S
7. Elevation	:	up to 1,000 m											
		S	S	S	S	S	S	S	S	S	S	S	S
8. Slope	:	up to moderately steep											
		S	S	S	S	S	S	S	S	S	N	N	N
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to i% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	N	#	N
FULL SUITABILITY		N	N	S	S	S	S	S	S	S	N	N	N

Table 5.22 Criteria on Physical Limits to Assess Land Suitability for Mandarin Orange

Potentially Limiting Factor		Land System											
		GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Groundwater Quality	:	fresh											
		S	S	S	N	S	S	S	S	#	#	#	#
2. Inundated Land	:	- Floodwater risk only ; up to high - Flood/heavy sediment ; up to high/frequent - Inundation risk ; up to seasonal											
		S	S	N	N	S	S	S	S	S	S	S	S
3. Climate	:	- Mean annual rainfall ; 850-5,000 mm AND - Combination ; up to 5 dry months (mean <100 mm) - Equivalent to ; up to 2 dry months (mean <60 mm) - Growing days ; not shorter than 185 days - Mean temperature (^{o}C) ; 20-34											
		S	S	S	S	S	S	S	S	S	S	N	S
4. Dominant Soil Texture	:	up to moderately coarse and organic at top soil of 1.5 m											
		N	N	S	S	S	S	S	S	S	S	S	S
5. Depth of Soil	:	- Peat ; not suitable - Mineral soil ; deep to extremely deep											
		N	N	N	N	S	S	N	S	S	S	N	S
6. Soil Drainage	:	well to imperpect											
		N	N	N	S	S	S	N	S	S	S	N	S
7. Elevation	:	up to 500 m											
		S	S	S	S	S	S	S	S	S	S	N	S
8. Slope	:	up to steep											
		S	S	S	S	S	S	S	S	S	S	S	S
9. Fragmentation	:	- Smallholders; medium to large blocks with 0 to 8% slope on 30% area - Estates ; more than 75% area with slope of less than 25%											
		#	S	S	S	S	S	S	S	S	$	#	$
FULL SUITABILITY		N	N	N	N	S	S	N	S	S	$	N	$

Table 5.23 Suitabilities of Land System Identified in Study Area

Land Use/Crop	Land System											
	GBT	MDW	KLR	KHY	TNJ	BKN	KPR	LWW	TWH	TWB	BRW	SST
1. Wetland arable crops	N	N	S	S	S	S	S	N	N	N	N	N
2. Tidal irrigation	N	N	N	S	N	N	N	N	N	N	N	N
3. Fish Culture	N	N	N	S	N	N	N	N	N	N	N	N
4. Houselot	N	N	N	N	S	S	S	S	N	N	N	N
5. Dryland arable crops	N	N	S	S	S	S	S	S	N	N	N	N
6. Pasture/Livestock	N	N	N	N	S	S	S	S	S	S	N	S
7. Agroforestry	N	N	N	S	S	S	N	S	S	S	N	S
8. Estate and Industrial Crops												
- Rubber	N	N	N	N	S	S	N	S	S	$	N	$
- Oil palm	N	N	N	N	S	S	N	S	S	$	N	$
- Coconut	N	N	N	N	N	S	N	S	S	N	N	$
- Sago palm	N	N	N	N	N	N	N	N	N	N	N	N
- Clove	N	N	N	N	S	S	N	S	S	$	N	$
- Cashew	N	N	S	N	S	S	S	S	S	N	N	N
- Tea	N	N	N	N	N	N	N	N	N	N	N	N
- Robusta coffee	N	N	N	N	N	S	N	S	S	$	N	N
- Pepper	N	N	N	N	S	S	N	S	S	$	N	$
- Tobacco	N	N	N	N	N	N	N	N	N	N	N	N
- Sugar cane	N	N	N	S	S	S	S	S	S	N	N	N
- Banana	N	N	N	N	S	S	N	N	S	S	N	S
- Pineapple	N	N	S	S	S	S	S	S	S	N	N	N
- Mandarin orange	N	N	N	N	S	S	N	S	S	$	N	$

Source : RePPProT ; Review of Phase I Results, East & South Kalimantan

Remarks : S ; Suitable

S ; Suitable with one or more limiting factors

$; Suitable for estates but not suitable for smallholders

N ; Not suitable

Table 6.1 Present Land Use

(Unit: ha)

Land Use Category	Symbol	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Strip along the Barito	Total
Forest	Hc	0	8,315	82	3,408	7,060	2,450	21,315
	Hg	10,947	24,310	0	35,583	55,930	0	126,770
	Hn	0	0	0	0	157	0	157
	Hk	8,938	0	0	0	0	0	8,938
	Hh	135,875	53,966	16,489	3,613	15,375	0	225,318
	Hf	0	2,327	5,763	2,658	0	0	10,748
	Hi	18,500	3,431	2,161	1,909	0	0	26,001
	Hu	13,165	3,256	0	0	0	0	16,421
	Hx	16,422	0	0	0	0	0	16,422
	Fr	9,215	3,489	0	0	942	0	13,646
	Sub-total	213,062	99,094	24,495	47,171	79,464	2,450	456,736
Bush & Grassland	B	24,181	27,622	36,661	48,474	65,629	0	202,567
	Ra	48,918	16,532	3,761	22,904	14,826	0	106,541
	Rr	0	25,124	6,083	3,067	13,100	0	47,374
	Sub-total	73,099	69,278	46,105	74,445	93,555	0	356,482
Cultivated Land	Pakly	11,650	35,690	48,740	36,980	32,140	300	165,500
	P	62,490	41,692	13,010	11,440	13,542	0	142,174
	L	25,345	16,691	3,820	3,476	34,098	0	83,430
	Sub-total	99,485	94,073	65,570	51,896	79,780	300	391,104
Others	K	8,330	11,050	11,030	5,763	13,519	0	49,692
	W	624	3,605	0	1,025	0	0	5,254
	Sub-total	8,954	14,655	11,030	6,788	13,519	0	54,946
	Total	394,600	277,100	147,200	180,300	266,318	2,750	1,268,268

Table 6.2 Relationship between Present Land Use and Physiographic Type in Study Area

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	147,535	707	1,060	52,591	59,458	204,385	465,736
Bush	74,217	2,325	0	44,102	36,338	45,585	202,567
Grassland	47,374	0	3,878	70,878	23,646	8,139	153,915
Paddy	91,474	71,700	2,326	0	0	0	165,500
Estate	0	37,686	28,747	75,741	0	0	142,174
Upland & Shifting	36,764	4,004	2,788	28,857	7,137	3,880	83,430
Town & Others	9,382	24,552	4,735	11,023	0	0	49,692
Water	5,254	0	0	0	0	0	5,254
Total	412,000	140,974	43,534	283,192	126,579	261,989	1,268,268

Table 6.3 Relationship between Present Land Use and Physiographic Type in Tabalong

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	10,240	707	900	44,344	50,166	106,705	213,062
Bush	0	0	0	9,147	9,353	5,681	24,181
Grassland	0	0	0	44,206	3,811	901	48,918
Paddy	4,650	7,000	0	0	0	0	11,650
Estate	0	8,869	20,371	33,250	0	0	62,490
Upland & Shifting	0	0	113	14,215	7,137	3,880	25,345
Town & Others	70	7,957	26	277	0	0	8,330
Water	624	0	0	0	0	0	624
Total	15,584	24,533	21,410	145,439	70,467	117,167	394,600

Table 6.4 Relationship between Present Land Use and Physiographic Type in Hulu Sungai Utara

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	32,625	0	0	6,339	6,048	54,082	99,094
Bush	989	0	0	11,514	9,130	5,989	27,622
Grassland	25,124	0	3,605	10,310	2,617	0	41,656
Paddy	26,200	7,164	2,326	0	0	0	35,690
Estate	0	3,082	7,399	31,211	0	0	41,692
Upland & Shifting	1,745	1,686	2,675	10,585	0	0	16,691
Town & Others	3,869	4,695	800	1,686	0	0	11,050
Water	3,605	0	0	0	0	0	3,605
Total	94,257	16,627	16,805	71,645	17,795	60,071	277,100

Table 6.5 Relationship between Present Land Use and Physiographic Type in Hulu Sungai Tengah

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	82	0	160	1,280	1,361	21,612	24,495
Bush	480	0	0	20,012	6,724	9,445	36,661
Grassland	6,083	0	0	2,561	800	0	9,444
Paddy	10,985	37,755	0	0	0	0	48,740
Estate	0	12,370	0	640	0	0	13,010
Upland & Shifting	2,881	0	0	939	0	0	3,820
Town & Others	2,013	2,353	3,201	3,463	0	0	11,030
Water	0	0	0	0	0	0	0
Total	22,524	52,478	3,361	28,895	8,885	31,057	147,200

Table 6.6 Relationship between Present Land Use and Physiographic Type in Hulu Sungai Selatan

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	38,991	0	0	0	0	8,180	47,171
Bush	22,231	0	0	3,272	5,248	17,723	48,474
Grassland	3,067	0	273	7,839	10,770	4,022	25,971
Paddy	24,480	12,500	0	0	0	0	36,980
Estate	0	11,247	193	0	0	0	11,440
Upland & Shifting	1,022	2,318	0	136	0	0	3,476
Town & Others	813	4,870	80	0	0	0	5,763
Water	1,025	0	0	0	0	0	1,025
Total	91,629	30,935	546	11,247	16,018	29,925	180,300

Table 6.7 Relationship between Present Land Use and Physiographic Type in Tapin

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	63,147	0	0	628	1,883	13,806	79,464
Bush	50,517	2,325	0	157	5,883	6,747	65,629
Grassland	13,100	0	0	5,962	5,648	3,216	27,926
Paddy	24,859	7,281	0	0	0	0	32,140
Estate	0	2,118	784	10,640	0	0	13,542
Upland & Shifting	31,116	0	0	2,982	0	0	34,098
Town & Others	2,617	4,677	628	5,597	0	0	13,519
Water	0	0	0	0	0	0	0
Total	185,356	16,401	1,412	25,966	13,414	23,769	266,318

Table 6.8 Relationship between Present Land System and Land Use in Study Area

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	Total
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	1,025	0	0	0	0	0	1,025
	GBT	0	0	0	0	0	0	19,014	0	0	0	0	0	0	0	0	0	0	583	19,597
	MDW	0	0	0	0	0	0	106,072	0	0	0	407	0	0	0	6,092	0	0	13,848	126,419
	KLR	208	0	0	0	0	0	1,108	7,918	0	0	5,978	0	4,229	0	7,541	0	0	25,029	52,011
	KHY	10,368	0	0	0	0	0	576	13,315	0	157	30,379	0	0	0	60,584	0	0	7,914	123,293
	TNJ	152,598	0	0	0	0	0	0	82	0	0	4,004	37,686	0	0	2,325	0	33,934	0	230,629
	BKN	2,326	991	0	0	0	0	0	0	0	0	2,788	28,747	0	69	0	3,878	4,735	0	43,534
	Sub-total	165,500	991	0	0	0	0	126,770	21,315	0	157	43,556	66,433	5,254	69	76,542	3,878	38,669	47,374	596,508
2 - 8	KPR	0	0	1,940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,940
	LWW	0	3,672	0	0	0	0	0	0	0	0	17,092	72,421	0	11,111	427	32,765	10,325	0	147,813
	Sub-total	0	3,672	1,940	0	0	0	0	0	0	0	17,092	72,421	0	11,111	427	32,765	10,325	0	149,753
16 - 25	TWH	0	33,316	0	0	0	0	0	0	0	0	11,765	3,320	0	1,524	36,950	33,988	698	0	121,561
	Sub-total	0	33,316	0	0	0	0	0	0	0	0	11,765	3,320	0	1,524	36,950	33,988	698	0	121,561
26 - 40	TWB	0	400	0	0	0	0	0	0	0	0	0	0	0	628	6,725	4,125	0	0	11,878
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	277	0	0	0	277
	SST	0	0	0	693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	693
	Sub-total	0	400	0	693	0	0	0	0	0	0	0	0	0	628	7,002	4,125	0	0	12,848
41 - 60	MPT	0	44,870	0	0	1,524	0	0	0	0	0	6,860	0	0	0	31,807	13,992	0	0	99,053
	MTL	0	0	0	0	346	8,938	0	0	0	0	277	0	0	314	440	6,504	0	0	16,819
	PDH	0	61,465	416	0	11,294	0	0	0	4,985	0	2,425	0	0	0	38,626	8,071	0	0	127,282
	PLN	0	0	0	0	1,595	0	0	0	0	0	0	0	0	0	0	0	0	0	1,595
	TWI	0	8,452	0	0	0	0	0	0	0	0	0	0	0	0	954	0	0	0	9,406
	Sub-total	0	114,787	416	0	14,759	8,938	0	0	4,985	0	9,562	0	0	314	71,827	28,567	0	0	254,155
< 60	BPD	0	64,071	0	58	0	0	0	0	5,763	0	0	0	0	0	2,104	0	0	0	71,996
	OKI	0	6,903	23,645	0	416	0	0	0	0	0	1,455	0	0	0	3,406	68	0	0	35,893
	LHI	0	1,178	0	0	0	0	0	0	0	0	0	0	0	0	4,250	3,151	0	0	8,579
	LNG	0	0	0	15,670	1,247	0	0	0	0	0	0	0	0	0	58	0	0	0	16,975
	Sub-total	0	72,152	23,645	15,728	1,663	0	0	0	5,763	0	1,455	0	0	0	9,818	3,219	0	0	133,443
Total		165,500	225,318	26,001	16,421	16,422	8,938	126,770	21,315	10,748	157	83,430	142,174	5,254	13,646	202,566	106,542	49,692	47,374	1,268,268

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandnus

Table 6.9 Relationship between Present Land System and Land Use in Tabalong

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		Total
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GBT	0	0	0	0	0	0	2,148	0	0	0	0	0	0	0	0	0	0	0	2,148
	MDW	0	0	0	0	0	0	7,691	0	0	0	0	0	0	0	0	0	0	0	7,691
	KLR	208	0	0	0	0	0	1,108	0	0	0	0	0	624	0	0	0	0	0	1,940
	KHY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TNJ	11,442	0	0	0	0	0	0	0	0	0	0	8,869	0	0	0	0	8,027	0	28,338
	BKN	0	831	0	0	0	0	0	0	0	0	113	20,371	0	69	0	0	26	0	21,410
	Sub-total	11,650	831	0	0	0	0	10,947	0	0	0	113	29,240	624	69	0	0	8,053	0	61,527
2 - 8	KPR	0	0	1,940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,940
	LWW	0	3,672	0	0	0	0	0	0	0	0	7,355	30,686	0	7,622	347	26,468	277	0	76,427
	Sub-total	0	3,672	1,940	0	0	0	0	0	0	0	7,355	30,686	0	7,622	347	26,468	277	0	78,367
16 -25	TWH	0	29,586	0	0	0	0	0	0	0	0	6,860	2,564	0	1,524	8,800	17,738	0	0	67,072
	Sub-total	0	29,586	0	0	0	0	0	0	0	0	6,860	2,564	0	1,524	8,800	17,738	0	0	67,072
26 - 40	TWB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	277	0	0	0	277
	SST	0	0	0	693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	693
	Sub-total	0	0	0	693	0	0	0	0	0	0	0	0	0	0	277	0	0	0	970
41 - 60	MPT	0	35,892	0	0	1,524	0	0	0	0	0	6,860	0	0	0	9,215	3,257	0	0	56,748
	MTL	0	0	0	0	346	8,938	0	0	0	0	277	0	0	0	69	554	0	0	10,184
	PDH	0	46,008	416	0	11,294	0	0	0	0	0	2,425	0	0	0	3,464	901	0	0	64,508
	PLN	0	0	0	0	1,595	0	0	0	0	0	0	0	0	0	0	0	0	0	1,595
	TWI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	81,900	416	0	14,759	8,938	0	0	0	0	9,562	0	0	0	12,748	4,712	0	0	133,035
< 60	BPD	0	18,708	0	0	0	0	0	0	0	0	0	0	0	0	69	0	0	0	18,777
	OKI	0	0	16,144	0	416	0	0	0	0	0	1,455	0	0	0	1,871	0	0	0	19,886
	LHI	0	1,178	0	0	0	0	0	0	0	0	0	0	0	0	69	0	0	0	1,247
	LNG	0	0	0	12,472	1,247	0	0	0	0	0	0	0	0	0	0	0	0	0	13,719
	Sub-total	0	19,886	16,144	12,472	1,663	0	0	0	0	0	1,455	0	0	0	2,009	0	0	0	53,629
Total		11,650	135,875	18,500	13,165	16,422	8,938	10,947	0	0	0	25,345	62,490	624	9,215	24,181	48,918	8,330	0	394,600

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandnus

Table 6.10 Relationship between Present Land System and Land Use in Hulu Sungai Utara

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	Total
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GBT	0	0	0	0	0	0	16,866	0	0	0	0	0	0	0	0	0	0	583	17,449
	MDW	0	0	0	0	0	0	7,444	0	0	0	407	0	0	0	989	0	0	9,130	17,970
	KLR	0	0	0	0	0	0	0	5,873	0	0	1,338	0	3,605	0	0	0	0	14,713	25,529
	KHY	1,919	0	0	0	0	0	0	2,442	0	0	0	0	0	0	0	0	0	698	5,059
	TNJ	31,445	0	0	0	0	0	0	0	0	0	1,686	3,082	0	0	0	0	8,564	0	44,777
	BKN	2,326	0	0	0	0	0	0	0	0	0	2,675	7,399	0	0	0	3,605	800	0	16,805
	Sub-total	35,690	0	0	0	0	0	24,310	8,315	0	0	6,106	10,481	3,605	0	989	3,605	9,364	25,124	127,589
2 - 8	KPR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LWW	0	0	0	0	0	0	0	0	0	0	7,095	30,455	0	3,489	0	6,297	988	0	48,324
	Sub-total	0	0	0	0	0	0	0	0	0	0	7,095	30,455	0	3,489	0	6,297	988	0	48,324
16 - 25	TWH	0	2,850	0	0	0	0	0	0	0	0	3,490	756	0	0	11,514	4,013	698	0	23,321
	Sub-total	0	2,850	0	0	0	0	0	0	0	0	3,490	756	0	0	11,514	4,013	698	0	23,321
26 - 40	TWB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 60	MPT	0	6,048	0	0	0	0	0	0	0	0	0	0	0	0	9,130	2,617	0	0	17,795
	MTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PDH	0	3,547	0	0	0	0	0	0	2,327	0	0	0	0	0	3,896	0	0	0	9,770
	PLN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TWI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	9,595	0	0	0	0	0	0	2,327	0	0	0	0	0	13,026	2,617	0	0	27,565
< 60	BPD	0	41,521	0	58	0	0	0	0	0	0	0	0	0	0	2,035	0	0	0	43,614
	OKI	0	0	3,431	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,431
	LHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LNG	0	0	0	3,198	0	0	0	0	0	0	0	0	0	0	58	0	0	0	3,256
	Sub-total	0	41,521	3,431	3,256	0	0	0	0	0	0	0	0	0	0	2,093	0	0	0	50,301
Total		35,690	53,966	3,431	3,256	0	0	24,310	8,315	2,327	0	16,691	41,692	3,605	3,489	27,622	16,532	11,050	25,124	277,100

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandnus

Table 6.11 Relationship between Present Land System and Land Use in Hulu Sungai Tengah

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	Total
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MDW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	560	560
	KLR	0	0	0	0	0	0	0	0	0	0	2,881	0	0	0	480	0	0	5,523	8,884
	KHY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TNJ	48,740	0	0	0	0	0	0	82	0	0	0	12,370	0	0	0	0	4,366	0	65,558
	BKN	0	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,201	0	3,361
	Sub-total	48,740	160	0	0	0	0	0	82	0	0	2,881	12,370	0	0	480	0	7,567	6,083	78,363
2 - 8	KPR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LWW	0	0	0	0	0	0	0	0	0	0	779	640	0	0	80	0	3,463	0	4,962
	Sub-total	0	0	0	0	0	0	0	0	0	0	779	640	0	0	80	0	3,463	0	4,962
16 -25	TWH	0	880	0	0	0	0	0	0	0	0	160	0	0	0	13,207	2,241	0	0	16,488
	Sub-total	0	880	0	0	0	0	0	0	0	0	160	0	0	0	13,207	2,241	0	0	16,488
26 - 40	TWB	0	400	0	0	0	0	0	0	0	0	0	0	0	0	6,725	320	0	0	7,445
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	400	0	0	0	0	0	0	0	0	0	0	0	0	6,725	320	0	0	7,445
41 - 60	MPT	0	1,361	0	0	0	0	0	0	0	0	0	0	0	0	4,883	240	0	0	6,484
	MTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PDH	0	2,962	0	0	0	0	0	0	0	0	0	0	0	0	9,045	0	0	0	12,007
	PLN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TWI	0	6,884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,884
	Sub-total	0	11,207	0	0	0	0	0	0	0	0	0	0	0	0	13,928	240	0	0	25,375
< 60	BPD	0	3,842	0	0	0	0	0	0	5,763	0	0	0	0	0	0	0	0	0	9,605
	OKI	0	0	2,161	0	0	0	0	0	0	0	0	0	0	0	240	0	0	0	2,401
	LHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,000	561	0	0	2,561
	LNG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	3,842	2,161	0	0	0	0	0	5,763	0	0	0	0	0	2,240	561	0	0	14,567
Total		48,740	16,489	2,161	0	0	0	0	82	5,763	0	3,820	13,010	0	0	36,660	3,362	11,030	6,083	147,200

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandrus

Table 6.12 Relationship between Present Land System and Land Use in Hulu Sungai Selatan

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	Total
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	1,025	0	0	0	0	0	1,025
	GBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MDW	0	0	0	0	0	0	35,242	0	0	0	0	0	0	0	3,613	0	0	0	38,855
	KLR	0	0	0	0	0	0	0	2,045	0	0	818	0	0	0	2,590	0	0	3,067	8,520
	KHY	3,808	0	0	0	0	0	341	1,363	0	0	204	0	0	0	16,028	0	0	0	21,744
	TNJ	33,172	0	0	0	0	0	0	0	0	0	2,318	11,247	0	0	0	0	5,683	0	52,420
	BKN	0	0	0	0	0	0	0	0	0	0	0	193	0	0	0	273	80	0	546
	Sub-total	36,980	0	0	0	0	0	35,583	3,408	0	0	3,340	11,440	1,025	0	22,231	273	5,763	3,067	123,110
2 - 8	KPR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LWW	0	0	0	0	0	0	0	0	0	0	136	0	0	0	0	0	0	0	136
	Sub-total	0	0	0	0	0	0	0	0	0	0	136	0	0	0	0	0	0	0	136
16 -25	TWH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,272	6,544	0	0	9,816
	Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,272	6,544	0	0	9,816
26 - 40	TWB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,295	0	0	1,295
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,295	0	0	1,295
41 - 60	MPT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,931	6,544	0	0	9,475
	MTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	136	1,636	0	0	1,772
	PDH	0	2,045	0	0	0	0	0	0	2,658	0	0	0	0	0	15,474	3,954	0	0	24,131
	PLN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TWI	0	1,568	0	0	0	0	0	0	0	0	0	0	0	0	954	0	0	0	2,522
	Sub-total	0	3,613	0	0	0	0	0	0	2,658	0	0	0	0	0	19,495	12,134	0	0	37,900
< 60	BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OKI	0	0	1,909	0	0	0	0	0	0	0	0	0	0	0	1,295	68	0	0	3,272
	LHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,181	2,590	0	0	4,771
	LNG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	0	1,909	0	0	0	0	0	0	0	0	0	0	0	3,476	2,658	0	0	8,043
Total		36,980	3,613	1,909	0	0	0	35,583	3,408	2,658	0	3,476	11,440	1,025	0	48,474	22,904	5,763	3,067	180,300

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandnus

Table 6.13 Relationship between Present Land System and Land Use in Tapin

(Unit: ha)

Slope (%)	Land System	Land Use Symbol																		
		Paddy	Hh	Hi	Hu	Hx	Hk	Hg	Hr	Hf	Hn	L	P	W	Fr	B	Ra	K	Rr	Total
>2	Marsh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MDW	0	0	0	0	0	0	55,695	0	0	0	0	0	0	0	1,490	0	0	4,158	61,343
	KLR	0	0	0	0	0	0	0	0	0	0	941	0	0	0	4,471	0	0	1,726	7,138
	KHY	4,341	0	0	0	0	0	235	7,060	0	157	30,175	0	0	0	44,556	0	0	7,216	93,740
	TNJ	27,799	0	0	0	0	0	0	0	0	0	0	2,118	0	0	2,325	0	7,294	0	39,536
	BKN	0	0	0	0	0	0	0	0	0	0	0	784	0	0	0	0	628	0	1,412
	Sub-total	32,140	0	0	0	0	0	55,930	7,060	0	157	31,116	2,902	0	0	52,842	0	7,922	13,100	203,169
2 - 8	KPR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LWW	0	0	0	0	0	0	0	0	0	0	1,727	10,640	0	0	0	0	5,597	0	17,964
	Sub-total	0	0	0	0	0	0	0	0	0	0	1,727	10,640	0	0	0	0	5,597	0	17,964
16 -25	TWH	0	0	0	0	0	0	0	0	0	0	1,255	0	0	0	157	3,452	0	0	4,864
	Sub-total	0	0	0	0	0	0	0	0	0	0	1,255	0	0	0	157	3,452	0	0	4,864
26 - 40	TWB	0	0	0	0	0	0	0	0	0	0	0	0	0	628	0	2,510	0	0	3,138
	BRW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	0	0	0	0	0	0	0	0	0	0	0	0	628	0	2,510	0	0	3,138
41 - 60	MPT	0	1,569	0	0	0	0	0	0	0	0	0	0	0	0	5,648	1,334	0	0	8,551
	MTL	0	0	0	0	0	0	0	0	0	0	0	0	0	314	235	4,314	0	0	4,863
	PDH	0	6,903	0	0	0	0	0	0	0	0	0	0	0	0	6,747	3,216	0	0	16,866
	PLN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TWI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	8,472	0	0	0	0	0	0	0	0	0	0	0	314	12,630	8,864	0	0	30,280
< 60	BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OKI	0	6,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,903
	LHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LNG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total	0	6,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,903
Total		32,140	15,375	0	0	0	0	55,930	7,060	0	157	34,098	13,542	0	942	65,629	14,826	13,519	13,100	266,318

Remarks : Hh : Lowland forest, Hi : Forest on limestone, Hu : Forest on ultrabasic hills, Hx : Logged primary forest, Hk : Heath forest, Hg : Peat swamp forest,
Hr : Swamp forest, Hf : Submontane forest, Hn : Nipah forest
L : Shifting cultivation, P : Estates, W : Water, Fr : Reaffrestation of foresty areas, B : Bush, Ra : Alang-alang, K : Settlement, Rr : Swamp including sedges, pandnus

Table 7.1 List of Forest and Nature Reserves in South Kalimantan

	Forest Reserve	Kabupaten	Area (ha)
1.	Gazetted forest reserves		
	CA P. Kaget	Barito Kuala	85
	CA. Gn. Kentawan	H.S.S.	245
	CA. Teluk Kelumpang Selat Laut and Sebuku	Kotabaru	66,650
	SM. Pleihari Tanah Laut	Tanah Laut	35,000
	SM. Pleihari Martapura	Banjar	36,400
	TW. P. Kembang	Barito Kuara	60
	Sub-total		138,440
2.	Recommended forest reserves awaiting gazettment		
	CA. P. Kalangbahu	Kotabaru	600
	CA. P. Birak-birakan	Kotabaru	400
	CA. Gn. Sebatung	Kotabaru	133
	CA. P. Sewangi	Kotabaru	620
	Sub-total		1,753
3.	Proposed forest reserves		
	CA. Pamukan	Kotabaru	10,000
	CA. Meratus Hulu	Kotabaru, H.S.U. and H.S.S.	200,000
	CA. Meratus Hulu	H.S.U. and Tabalong	46,250
	CA. Muara Uya	Tabalong	25,000
	CA. Hutan Gambut	Banjar and Barito Kuala	-
	CA. Pleihari	Banjar	125,000
	Sub-total		406,250
4.	Proposed nature reserves		
	Selat Laut	Kotabaru	25,300
	Selat Sebuku	Kotabaru	11,800
	Teluk Kelumpan	Kotabaru	16,300
	Gunung Sebatung	Kotabaru	1,400
	Klumpang	Kotabaru	10,900
	Pamukan	Kotabaru	26,700
	Meratus	Tabalong	26,400
	Meratus Hulu Barabai	H.S.U.	36,800
	Muara Uya	Tabalong	24,400
	Pleihari Martapura Perluasan	Banjar	125,600
	Pleihari Tanah Laut	Tanah Laut	38,900
	Total		344,500

Table 7.2 Existing Transmigration Sites in South Kalimantan

1. Not Identified Sites

Pre-PELITA	PELITA II
Takisung	Tajaupecah
Tamban	Batutungku
Berangas	Masingai
Maracahan	Sebamban I, II, III
Belandean	Batulicin I, II, III
Sebelimbing	Tabunganon II
	Sei Muhur
PELITA I	Sakaiagun I
	Sebamban IV (?)
Barambai	Satui I (Sebamban V)
Tambarangan	Sei Seluang
Hatungan	Sei Kupang
Parandakan	Pamukan I, II,
Miawa	Lasung (Sebamban VI)
Sidodadi	PIR Khusus Batulicin
	Kelumpang I, II, III
	Berangas II
	Sei Puntik
	Hayup
	Jorong

2. Phase IIIA Transmigration Sites

Batulicin III, V	Kotabaru	24,400 ha
Batutunkgu	Kotabaru	5,200
Kelumpang III	Kotabaru	10,300
Kelumpang IV	Kotabaru	9,200
Kelumpang IV/EF	Kotabaru	13,200
Sebamban I, II, III, VI	Kotabaru and Tanah Laut	53,600
		115,900 ha

Table 7.3 Features of New Recommended Transmigration Sites in South Kalimantan (1/5)

Identity	:	Site No. 1 (Tanah Laut)
Location	:	115°02'E, 0°54'S
Area	:	33,400 ha
Land systems	:	Lawanguwang (LWW), minor Teweh (TWH) and Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	4,909 households
Comments	:	Access presently exists. Pelaihari is nearest center, 30 km away. Recommended for Dryland development.

Identity	:	Site No. 2 (Tanah Laut)
Location	:	115°12'E, 0°54'S
Area	:	25,200 ha
Land systems	:	Lawanguwang (LWW), minor Teweh (TWH), Kahayan (KHY) and Kajapah (KJP)
Minor limits	:	Low soil fertility
Carrying capacity	:	4,102 households
Comments	:	Access presently exists. Pelaihari is nearest center, 30 km away. Recommended for Dryland development.

Identity	:	Site No. 3 (Tanah Laut)
Location	:	115°08'E, 0°45'S
Area	:	21,300 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH), minor Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	4,420 hourseholds
Comments	:	Access presently exists. Pelaihari is nearest center 50 km away. Recommended for Mixed development.

Identity	:	Site No. 4 (Tanah Laut)
Location	:	115°15'E, 0°45'S
Area	:	21,500 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH), minor Kahayan (KHY) and Mantalat (MTL)
Minor limits	:	Low soil fertility
Carrying capacity	:	3,910 households
Comments	:	Access presently exists. Pelaihari is nearest center 50 km away. Recommended for Mixed development.

Table 7.3 Features of New Recommended Transmigration Sites in South Kalimantan (2/5)

Identity	:	Site No. 5 (Tanah Laut and Kotabaru)
Location	:	115°20'E, 0°43'S
Area	:	17,700 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH), and Mantalat (MTL)
Minor limits	:	Low soil fertility
Carrying capacity	:	4,060 households
Comments	:	Access presently exists. Pelaihari is nearest center 80 km away. Recommended for Tree Crop development.

Identity	:	Site No. 6 (Kotabaru)
Location	:	115°26'E, 0°40'S
Area	:	24,400 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH)
Minor limits	:	Low soil fertility
Carrying capacity	:	4,417 households
Comments	:	Access presently exists. Pelaihari is nearest center 80 km away. Recommended for Tree Crop development.

Identity	:	Site No. 7 (Kotabaru)
Location	:	115°36'E, 3°35'S
Area	:	23,100 ha
Land systems	:	Lawanguang (LWW)
Minor limits	:	Low soil fertility
Carrying capacity	:	3,432 households
Comments	:	Access presently exists. Pelaihari is nearest center 100 km away. Recommended for Dryland development. River Sebamban passes through area.

Identity	:	Site No. 8 (Kotabaru)
Location	:	115°38'E, 3°23'S
Area	:	23,700 ha
Land systems	:	Kapor (KPR), Lawanguang (LWW)
Minor limits	:	Low soil fertility in Lawanguang LS
Carrying capacity	:	3,260 households
Comments	:	Access presently exists. Pelaihari is nearest center at least 100 km away. Recommended for Dryland development.

Table 7.3 Features of New Recommended Transmigration Sites in South Kalimantan (3/5)

Identity	:	Site No. 9 (Kotabaru)
Location	:	115°50'E, 3°04'S
Area	:	30,000 ha
Land systems	:	Kapor (KPR), Lawanguang (LWW)
Minor limits	:	Low soil fertility in Lawanguang LS
Carrying capacity	:	4,043 households
Comments	:	Access presently exists. Pelaihari is nearest center over 100 km distant. Recommended for Mixed development. River Catung passes through the area.

Identity	:	Site No. 10 (Kotabaru)
Location	:	116°08'E, 3°32'S
Area	:	25,300 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH)
Minor limits	:	Low soil fertility
Carrying capacity	:	7,007 households
Comments	:	No access from mainland, though road proposed on island. Pelaihari is nearest center at least 160 km away. Recommended for Tree Crop development.

Identity	:	Site No. 11 (Kotabaru)
Location	:	116°14'E, 3°38'S
Area	:	16,100 ha
Land systems	:	Lawanguang (LWW), Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	2,254 households
Comments	:	No access from mainland, though road proposed on island. Pelaihari is nearest center at least 160 km away. Recommended for Dryland development.

Identity	:	Site No. 12 (Kotabaru)
Location	:	116°13'E, 3°47'S
Area	:	19,300 ha
Land systems	:	Lawanguwang (LWW)
Minor limits	:	Low soil fertility
Carrying capacity	:	2,702 households
Comments	:	No access from mainland, though road proposed on island. Pelaihari is nearest center at least 160 km away. Recommended for Dryland development.

Table 7.3 Features of New Recommended Transmigration Sites in South Kalimantan (4/5)

Identity	:	Site No. 13 (Kotabaru)
Location	:	116°04'E, 3°43'S
Area	:	22,700 ha
Land systems	:	Lawanguwang (LWW), Teweh (TWH), minor Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	3,540 households
Comments	:	No access from mainland, though road proposed on island. Pealihari is nearest center at least 160 km away. Recommended for Dryland development.

Identity	:	Site No. 14 (Kotabaru)
Location	:	116°08'E, 3°53'S
Area	:	13,000 ha
Land systems	:	Lawanguwang (LWW), Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	1,790 households
Comments	:	No access from mainland, though road proposed on island. Pelaihari is nearest center at least 160 km away. Recommended for Dryland development.

Identity	:	Site No. 15 (Kotabaru)
Location	:	116°14'E, 3°55'S
Area	:	16,800 ha
Land systems	:	Lawanguwang (LWW), minor Kahayan (KHY)
Minor limits	:	Low soil fertility
Carrying capacity	:	2,674 households
Comments	:	No access from mainland, though road proposed on island. Pelaihari is nearest center at least 160 km away. Recommended for Dryland development.

Identity	:	Site No. 16 (Barito Kuala)
Location	:	114°14'E, 2°52'S
Area	:	20,800 ha
Land systems	:	Kahayan (KHY)
Minor limits	:	Wet-season flooding and inundation
Carrying capacity	:	2,662 households
Comments	:	Access via River Barito to Banjarmasin, the nearest center, 60 km away. Recommended for Wetland development.

Table 7.3 Features of New Recommended Transmigration Sites in South Kalimantan (5/5)

Identity	:	Site No. 17 (Kotabaru)
Location	:	115°48'E, 2°58'S
Area	:	22,700 ha
Land systems	:	Kapor (KPR), minor Lawanguang (LWW)
Minor limits	:	Low soil fertility in Lawanguang LS
Carrying capacity	:	2,931 households
Comments	:	Access road presently exists. Nearest center is Martapura 110 km away. Recommended for Wetland development. River Gegayang passes through area.

Identity	:	Site No. 18 (Kotabaru)
Location	:	116°01'E, 2°32'S
Area	:	19,300 ha
Land systems	:	Lawanguwang (LWW), Kapor (KPR)
Minor limits	:	Low soil fertility in Lawanguang LS
Carrying capacity	:	2,539 households
Comments	:	Logging road provides access from coast. Nearest center is Martapura 110 km away. Recommended for Wetland development.

Identity	:	Site No. 19 (Kotabaru)
Location	:	116°03'E, 2°22'S
Area	:	20,300 ha
Land systems	:	Lawanguwang (LWW), minor Teweh (TWH)
Minor limits	:	Low soil fertility
Carrying capacity	:	3,187 households
Comments	:	Logging road provides access from coast. Nearest center is Martapura 110 km away. Recommended for Dryland development. River Cengal passes through area.

Table 7.4 Land Use Change in Study Area

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
	-	-	-	+10,400 *2	+30,783	+12,019	+53,202
Forest	-2,442	-	-	-2,211	-	-	-40,685
	-	-	-	-36,032 *3	-	-	-
Bush	+28,822 *1	-	-	-	-	-	+28,822
	-11,296	-2,100	-	-11,671	-	-	-34,214
	-	-	-	-9,147 *3	-	-	
	+28,822	-	-	+10,400	-	-	
Grassland	-2,615	-	-3,605	-25,817	-23,646	-81,439	-108,883
	-	-	-	-34,661 *3	-	-	
Paddy	+24,295	+2,100	-	-	-	-	+26,395
Estate	-	-	+6,280	+60,621	-	-	+66,901
Upland & Shifting	-28,822 *1	-	-	-6,860 *3	-	-	-78,238
	-7,942	-	-2,675	-20,922	-7,137	-3,880	
Town & Others	-	-	-	+86,700 *3	-	-	+86,700
Water	-	-	-	-	-	-	-

Remarks: *1 to *3; Indicating shift between marked land use category.

Table 7.5 Land Use Change in Tabalong

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
Forest	-	-	-	-36,032 *1	+10,948	+4,781	-20,303
Bush	-	-	-	-9,147 *1	-	-	-9,147
Grassland	-	-	-	-9,545 *2	-3,811	-901	-48,918
	-	-	-	-34,661 *1	-	-	
Paddy	-	-	-	-	-	-	-
Estate	-	-		+16,900 *2	-	-	+16,900
Upland & Shifting	-	-		-7,355 *2	-7,137	-3,880	-18,372
	-	-		-6,860 *1	-	-	-6,860
Town & Others	-	-		+86,700 *1	-	-	+86,700
Water	-	-	-	-	-	-	-

Remarks: *2; Muara Uya PIR scheme area
*1; Tanjung Oil Field concession area

Table 7.6 Land Use Change in Hulu Sungai Utara

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
Forest	-2,442	-	-	-2,211 *2	+2,617	-	-2,036
Bush	+407 *1	-	-	+11,514 *2	-	-	+11,107
Grassland	-2,615	-	-3,605 *2	-10,310 *2	-2,617	-	-19,147
Paddy	+6,395	-	-	-	-	-	+6,395
Estate	-	-	+6,280 *2	+34,620 *2	-	-	+40,900
Upland & Shifting	-1,338 -407 *1	- -	-2,675 *2 -	-10,585 *2 -	- -	- -	-15,005
Town & Others	-	-	-	-	-	-	-
Water	-	-	-	-	-	-	-

Remarks: *1; Reserve area for natural fish spawning and nursery
*2; Paringin PIR Khusas II scheme area

Table 7.7 Land Use Change in Hulu Sungai Tengah

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
Forest	-	-	-	+2,561	+800	-	+3,361
Bush	+481	-	-	-	-	-	+481
Grassland	-	-	-	-2,561	-800	-	-3,361
Paddy	+2,400	-	-	-	-	-	+2,400
Estate	-	-	-		-	-	
Upland & Shifting	-2,400 -481	- -	- -	- -	- -	- -	-2,400 -481
Town & Others	-	-	-	-	-	-	-
Water	-	-	-	-	-	-	-

Remarks: *1; Reserve area for natura fish spawning and nursery

Table 7.8 Land Use Change in Hulu Sungai Selatan

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
Forest	-	-	-	+7,839	+10,770	+4,022	+22,631
Bush	+818 -11,296	- -	- -	- -	- -	- -	-10,478
Grassland	-	-	-	-7,839	-10,770	-4,022	-22,631
Paddy	+11,500	-	-	-	-	-	+11,500
Estate	-	-	-	-	-	-	-
Upland & Shifting	-204 -818	- -	- -	- -	- -	- -	-204 -818
Town & Others	-	-	-	-	-	-	-
Water	-	-	-	-	-	-	-

Remarks: *1; Reserve area for natural fish spawning and nursery

Table 7.9 Land Use Change in Tapin

(Unit: ha)

Land Use Category	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Change in Total
Forest	-	-	-	-	+5,648	+3,216	+8,864
Bush	+27,116	-2,100	-	-157	-	-	+24,859
Grassland	-	-	-	-5,962	-5,648	-3,216	-14,826
Paddy	+4,000	+2,100	-	-	-	-	+6,100
Estate	-	-	-	+9,101	-	-	+9,101
Upland & Shifting	-4,000 -27,116	- -	- -	-2,982 -	- -	- -	-6,982 -27,116
Town & Others	-	-	-	-	-	-	-
Water	-	-	-	-	-	-	-

Remarks: *1; Reserve area for natural fish spawning nd nursery
*2; Part of Danau Salak NES III scheme area

Table 7.10 Relationship between Recommended Land Use and Physiographic Type in Study Area

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	145,093	707	1,060	24,747	90,241	216,404	478,253
Bush	91,743	225	0	23,284	36,338	45,585	197,175
Grassland	44,759	0	273	0	0	0	45,032
Paddy	115,769	73,800	2,326	0	0	0	191,895
Estate	0	37,686	35,027	136,362	0	0	209,075
Upland	0	4,004	113	1,075	0	0	5,192
Town & etc.	9,382	24,552	4,735	97,723	0	0	136,392
Water	5,254	0	0	0	0	0	5,254
Total	412,000	140,974	43,534	283,192	126,579	261,989	1,268,268

Table 7.11 Relationship between Recommended Land Use and Physiographic Type in Tabalong

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	10,240	707	900	8,312	61,114	111,486	192,859
Bush	0	0	0	0	9,353	5,681	15,034
Grassland	0	0	0	0	0	0	0
Paddy	4,650	7,000	0	0	0	0	11,650
Estate	0	8,869	20,371	50,150 *1	0	0	79,390
Upland	0	0	113	0	0	0	113
Town & etc.	70	7,957	26	86,977 *2	0	0	95,030
Water	624	0	0	0	0	0	624
Total	15,584	24,533	21,410	145,439	70,467	117,167	394,600

Remarks: *1; Including Muara Uya PIR scheme area
*2; Including Tanjung Oil Field concession area

Table 7.12 Relationship between Recommended Land Use and Physiographic Type in Hulu Sungai Utara

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	30,183 *1	0	0	4,128	8,665	54,082	97,058
Bush	1,396	0	0	0	9,130	5,989	16,615
Grassland	22,509	0	0	0	0	0	22,509
Paddy	32,595	7,164	2,326	0	0	0	42,085
Estate	0	3,082	13,679 *2	65,831 *2	0	0	82,592
Upland	0	1,686	0	0	0	0	1,686
Town & etc.	3,869	4,695	800	1,686	0	0	11,050
Water	3,605	0	0	0	0	0	3,605
Total	94,157	16,627	16,805	71,645	17,795	60,071	277,100

Remarks: *1; Including fish spawning and nursery reserve area
*2; Including Parigin PIR Khusas II scheme area

Table 7.13 Relationship between Recommended Land Use and Physiographic Type in Hulu Sungai Tengah

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	82	0	160	3,841	2,161	21,612	27,856
Bush	961 *	0	0	20,012	6,724	9,445	37,142
Grassland	6,083	0	0	0	0	0	6,083
Paddy	13,385	37,755	0	0	0	0	51,140
Estate	0	12,370	0	640	0	0	13,010
Upland	0	0	0	939	0	0	939
Town & etc.	2,013	2,353	3,201	3,463	0	0	11,030
Water	0	0	0	0	0	0	0
Total	22,524	52,478	3,361	28,895	8,885	31,057	147,200

Remars: *1; Including fish spawning and nursery reserve area

Table 7.14 Relationship between Recommended Land Use and Physiographic Type in Hulu Sungai Selatan

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	38,991	0	273	7,839	10,770	12,202	70,075
Bush	11,753 *	0	0	3,272	5,248	17,723	37,996
Grassland	3,067	0	0	0	0	0	3,067
Paddy	35,980	12,500	0	0	0	0	48,480
Estate	0	11,247	193	0	0	0	11,440
Upland	0	2,318	0	136	0	0	2,454
Town & etc.	813	4,870	80	0	0	0	5,763
Water	1,025	0	0	0	0	0	1,025
Total	91,629	30,935	546	11,247	16,018	29,925	180,300

Remars: *1; Including fish spawning and nursery reserve area

Table 7.15 Relationship between Recommended Land Use and Physiographic Type in Tapin

(Unit: ha)

Physiographic Type	Swamps	Alluvial Plains	Alluvial Valleys	Plains	Hills	Mountains	Total
Forest	63,147	0	0	628	7,531	17,022	88,328
Bush	77,633 *1	225	0	0	5,883	6,747	90,488
Grassland	13,100	0	0	0	0	0	13,100
Paddy	28,859	9,381	0	0	0	0	38,240
Estate	0	2,118	784	19,741 *2	0	0	22,643
Upland	0	0	0	0	0	0	0
Town & etc.	2,617	4,677	628	5,597	0	0	13,519
Water	0	0	0	0	0	0	0
Total	185,356	16,401	1,412	25,966	13,414	23,769	266,318

Remarks: *1; Including fish spawning and nursery reserve area
*2; Including part of Danau Salak NES III scheme area

Table 7.16 Distribution of Paddy Area under the Present Condition

(Unit: ha)

Item	Tabalong	H.S.U	H.S.T.	H.S.S.	Tapin	Strip along the Barito	Total
1. By Land Form							
(1)Strip along the Barito	-	-	-	-	-	300	300
(2)Seven Swamps	1,475	26,200	7,151	21,675	21,709	-	78,210
(3)Scattered Swamps	3,175	-	3,834	2,805	3,150	-	12,964
Sub-total	4,650	26,200	10,985	24,480	24,859	300	91,474
(4)Alluvial Plains	7,000	7,164	37,755	12,500	7,281	-	71,700
(5)Alluvial Valleys	-	2,326	-	-	-	-	2,326
Total	11,650	35,690	48,740	36,980	32,140	300	165,500
2. By Land System							
(1)KLR	208	-	-	-	-	-	208
(2)KHY	-	1,919	-	3,808	4,341	300	10,368
(3)TNJ	11,442	31,445	48,740	33,172	27,799	-	152,598
(4)BKN	-	2,326	-	-	-	-	2,326
Total	11,650	35,690	48,740	36,980	32,140	300	165,500
3. By Facility							
(1)Polder	480	13,223	-	-	-	-	13,703
(2)Drainage	1,640	850	1,310	5,500	8,344	-	17,644
(3)Rainfed in Swamps	2,530	12,127	9,675	18,980	16,515	300	60,127
Sub-total	4,650	26,200	10,985	24,480	24,859	300	91,474
(4)Irrigation	825	604	2,964	3,838	1,420	-	9,651
(5)Rainfed in Alluvial Plains	6,175	6,560	34,791	8,662	5,861	-	62,049
Sub-total	7,000	7,164	37,755	12,500	7,281	-	72,700
(6)Rainfed in Alluvial Valleys	-	2,326	-	-	-	-	2,326
Total	11,650	35,690	48,740	36,980	32,140	300	165,500

Table 7.17 Distribution of Paddy Area under the Future Condition from Engineering Viewpoint

(Unit: ha)

Item	Tabalong	H.S.U	H.S.T.	H.S.S.	Tapin	Strip along the Barito	Total
1. By Land Form							
(1)Strip along the Barito	-	-	-	-	-	300	300
(2)Seven Swamps	1,475	32,595	9,551	33,175	25,709	-	102,505
(3)Scattered Swamps	3,175	-	3,834	2,805	3,150	-	12,964
Sub-total	4,650	32,595	13,385	35,980	28,859	300	115,769
(4)Alluvial Plains	7,000	7,164	37,755	12,500	9,381	-	73,800
(5)Alluvial Valleys	-	2,326	-	-	-	-	2,326
Total	11,650	42,085	51,140	48,480	38,240	300	191,895
2. By Land System							
(1)KLR	208	3,255	2,400	-	-	-	5,863
(2)KHY	-	5,059	-	15,308	8,341	300	29,008
(3)TNJ	11,442	31,445	48,740	33,172	29,899	-	154,698
(4)BKN	-	2,326	-	-	-	-	2,326
Total	11,650	42,085	51,140	48,480	38,240	300	191,895
3. By Facility							
(1)Polder	562	17,117	-	600	-	-	18,279
(2)Drainage	3,855	7,955	8,934	24,505	22,250	-	67,499
(Provided with irrigation water)	-	(785)	(1,400)	-	(400)	-	(2,585)
(3)Rainfed in Swamps	233	7,523	4,451	10,875	6,609	300	29,991
Sub total	4,650	32,595	13,385	35,980	28,859	300	115,769
(4)Irrigation	3,652	6,559	12,732	9,205	8,286	-	40,434
(5)Rainfed in Alluvial Plains and Valleys	3,348	605	25,023	3,295	1,095	-	33,366
Sub total	7,000	7,164	37,755	12,500	9,381	-	73,800
(6)Rainfed in Alluvial Valleys	-	2,326	-	-	-	-	2,326
Total	11,650	42,085	51,140	48,480	38,240	300	191,895

FIGURES

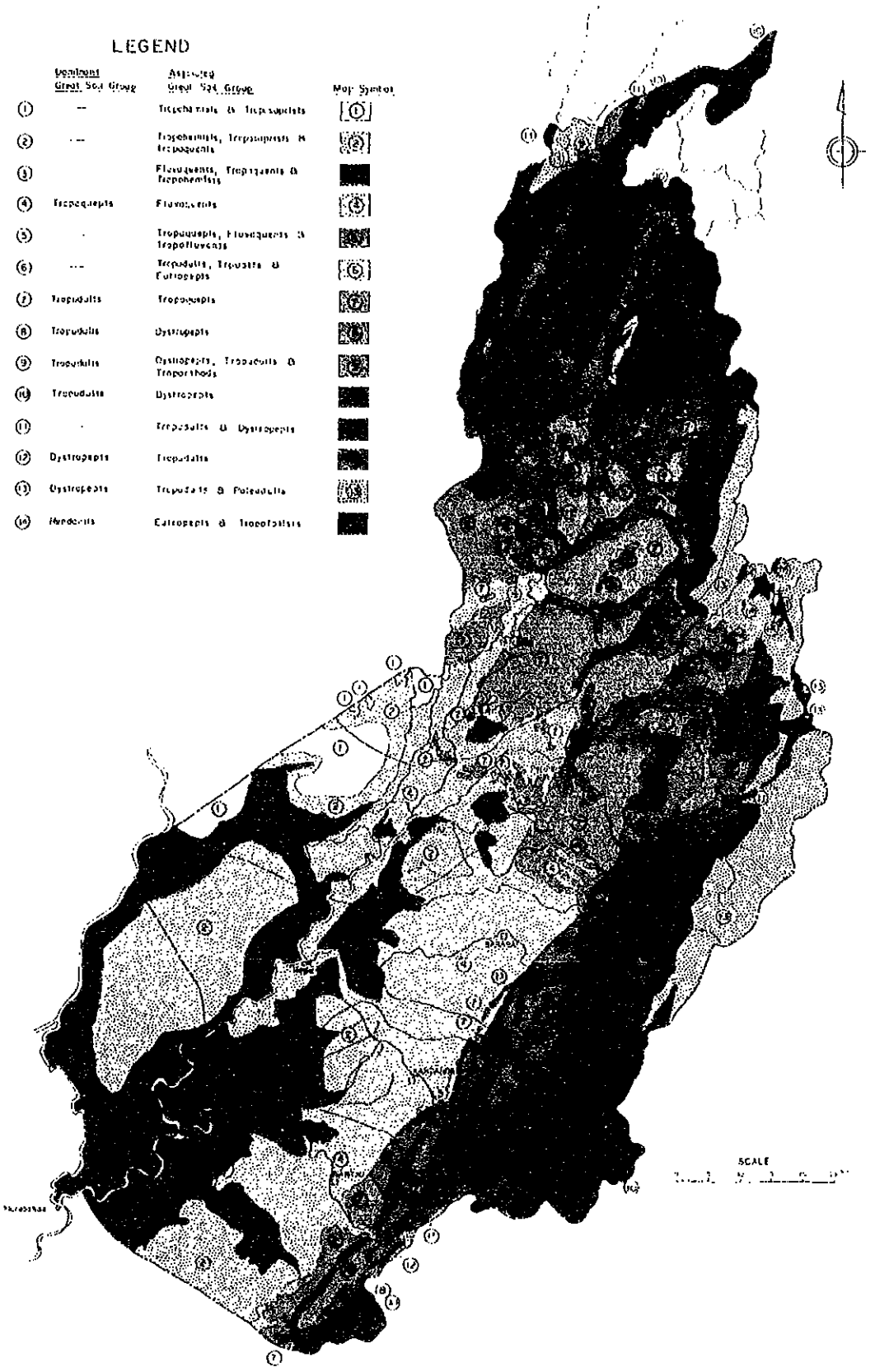

Figure 3.1 Soil Map

REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
NEGARA RIVER BASIN OVERALL IRRIGATION DEVELOPMENT PLAN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

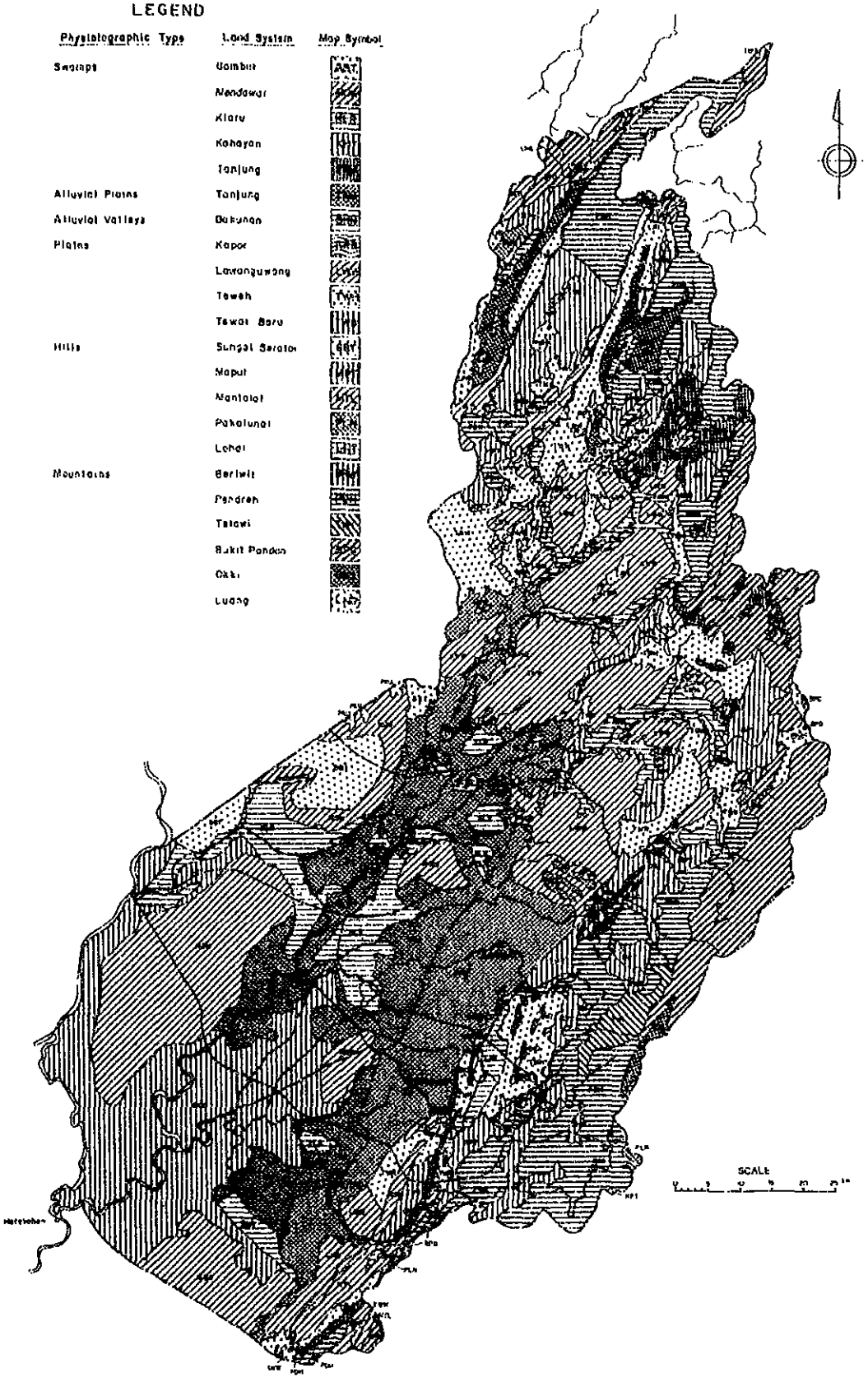

Figure 4.1 Land System Map

REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
NEGARA RIVER BASIN OVERALL IRRIGATION DEVELOPMENT PLAN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

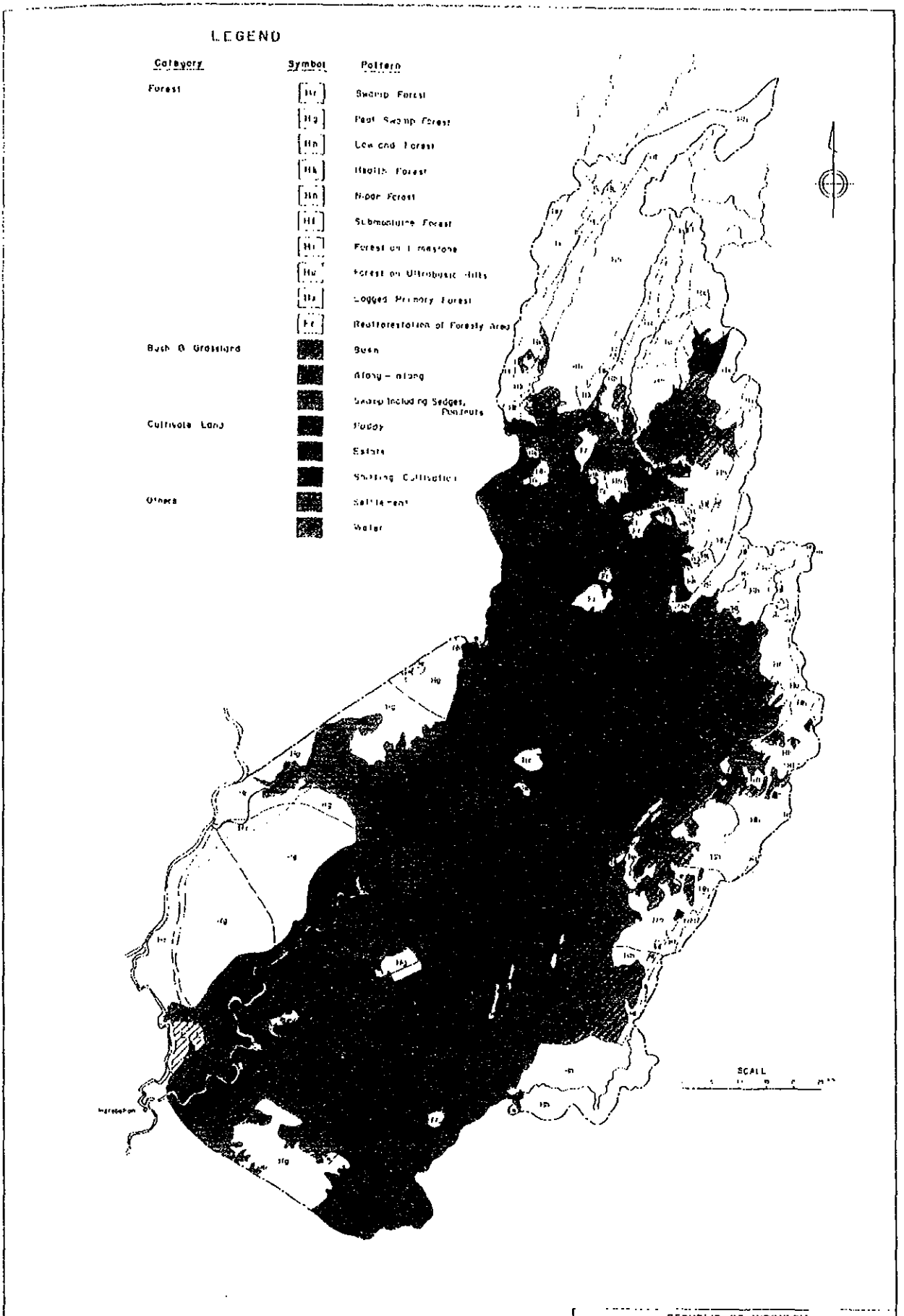

Figure 6.1 Land Use Map

REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
NEGARA RIVER BASIN OVERALL IRRIGATION DEVELOPMENT PLAN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

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C - 02	Final Report, Survei Kapabilitas Tanah di Wilayah Amuntai Kabupaten Hulu Sungai Utara Propinsi Kalimantan Selatan (Survey on Land Capability in Amuntai Area, Kabupaten Hulu Sungai Utara)	1985	Departement Pekerjaan Umum, KANTOR WILAYAH PROPINSI SELATAN, Proyek Perencanaan Pengembangan Sumber-sumber Air (prepared by : Faculty of Agricultural Department of Lambung Mangkurat University)
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ANNEX D
AGRONOMY

ANNEX D AGRONOMY

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1. INTRODUCTION

Annex D presents the outcome of the agricultural study carried out through the present Study. The main objectives of the agricultural study are:

- To clarify the present condition of agriculture in the Study Area focusing on technical aspects of the present activities on agricultural production,

- To identify the constraints to the further development of agricultural production in the Study Area from agronomic viewpoints, and

- To formulate the most applicable and profitable agricultural setting by making reference to the land suitability classification and the engineering studies on the irrigation development and drainage improvement.

The data and informations obtained from various government agencies concerned are crop yield and production, cropping calendar, farming practices, farm inputs and labour requirements and so on. The main agencies contacted are; Provincial Agricultural Offices and its Kabupaten branches, Provincial Statistic Office, DPUP's Kabupaten Offices, Banjarbaru Sub-station of Research Institute for Food Crops (BARIF), Rural Extension Centers in the Study Area, Agricultural Faculty of Lambung Mangkurat University (UNLAM) and so on. In addition, field interviews with farmers are carried out in order to obtain more practical informations particularly for farming practices, farm inputs and labour requirements.

2. PRESENT AGRICULTURAL CONDITON IN THE STUDY AREA

2.1 Present Agricultural Production

2.1.1 Crop yield and production

Present yield and production of major crops in the Study Area are estimated based upon the data obtained from Provincial Agricultural Office and its Kabupaten branch offices, i.e. Tabalong, Hulu Sungai Utara (H.S.U.), Hulu Sungai Tengah (H.S.T.), Hulu Sungai Selatan (H.S.S.) and Tapin. In the Study Area, major crops grown are paddy and rubber, followed by coconut, palawija crops such as ground nut, maize, cassava and soybean, vegetables and fruits. Present production of these crops on the average for the recent five years' data from 1982 to 1986 are summarized below:

Crop	Area Harvested (ha)	Unit Yield (ton/ha)	Production (ton)
Paddy	128,795	3.24	417,498
- Wetland paddy	116,114	3.41	395,637
- Upland paddy	12,681	1.73	21,932
Maize	2,529	0.79	1,989
Ground nut	3,711	0.88	3,269
Soybean	684	0.84	572
Cassava	1,715	7.24	12,408
Vegetables	2,707	1.73	4,686
Fruits	2,537	3.71	9,412
Rubber *1	68,451	0.55	24,752
Coconut *1	21,281	0.89	14,515

Remarks: *1; For tree crops, their area planted is indicated.

Wetland paddy is extremely important in the Study Area, occupying the largest area harvested. However, the area harvested and production of the crop is largely fluctuating year by year as shown in Tables 2.1 and 2.2.

Major reasons for such large fluctuation in the areas harvested and production are attributed to: (1) unstable and uneven distribution of rainfall and (2) unexpected damages caused by rats, insects and diseases.

In the Study Area, unit yields of major crops show a wide variation by Kabupaten. For example, an unit yield of wetland paddy ranges from 2.84 ton/ha as dried paddy in Kabupaten Hulu Sungai Utara to 4.16 ton/ha in Kabupaten Hulu Sungai Selatan. Also as regards palawija crops, ranges between the highest and lowest unit yields are: 0.78 to 0.90 ton/ha for groundnut, 0.70 to 1.05 ton/ha for maize, 4.97 to 10.00 ton/ha for cassava, and 0.63 ton/ha to 1.05 ton/ha for soybean.

The detailed data concerning unit yields by Kabupaten in the Study Area are given in Table 2.3.

2.1.2 Livestock

Various kinds of livestock are raised in the Study Area including cattle, buffalo, pig, sheep, goat, chicken and duck. Based on the data obtained from Provincial Agricultural Office, the average total number and the number per 100 farm households of livestock raised in the Study Area in the recent five years from 1982 to 1986 by Kabupaten are given in Table 2.4 and summarized as below:

Total number (unit: Head)

Item	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Cattle	5,800	2,657	3,954	2,535	8,703	23,649
Buffalo	43	9,588	3,885	3,092	997	17,605
Pig	6,053	1,135	1,173	180	59	8,600
Sheep	530	3,773	5,609	1,955	451	12,318
Goat	9,171	6,501	13,425	3,283	4,269	36,649
Chicken (improved)	14,682	41,146	38,650	14,212	9,012	117,702
Chicken (traditional)	326,290	509,838	661,744	437,156	355,266	2,290,294
Duck	63,480	686,874	392,536	409,016	61,960	1,613,866

Number per 100 farm households (unit: Head)

Item	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Cattle	25.3	8.7	10.1	5.7	40.3	14.9
Buffalo	0.2	31.4	9.9	6.9	4.6	11.1
Pig	26.4	3.7	3.0	0.4	0.3	5.4
Sheep	2.3	12.4	14.3	4.4	2.1	7.8
Goat	40.0	21.3	34.3	7.4	19.8	23.1
Chicken (improved)	64.1	134.9	98.8	31.9	41.7	74.2
Chicken (traditional)	1,424.8	1,671.6	1,692.4	980.2	1,644.8	1,443.2
Duck	277.2	2,252.0	1,003.9	917.1	286.9	1,016.9

The average numbers per 100 farm households of main livestock raised in the Study Area are: 15 heads for cattle, 11 heads for buffalo, 23 heads for goat, 74 heads for improved chicken, 1,443 heads for traditional chicken and 1,017 heads for duck. These numbers except chicken and duck are relatively lower than those of Indonesian national averages as shown below:

(unit: head/100 households)

Item	Study Area Average	National Average /*
Cattle	15	45
Buffalo	11	15
Goat	23	49
Chicken (improved)	74	164
Chicken (traditional)	1,443	525
Duck	1,017	81

Most of these livestock are raised by small farmers or backyard raisers, and large scale commercial production is still underdeveloped in the Study Area. Under the present condition, therefore, the livestock raising is not mainline of the agricultural activities in the Study Area. In the future, however, the livestock will be expected to play an important role in fulfillment of the increasing protein food requirements and in provision of motive power for farm operation and transportation.

Detailed data on livestock in the Study Area are shown in Table 2.4.

2.2 Present Cropping Calendar and Farming Practices

Present cropping calendar is identified and examined by the type of field condition. Basically, field conditions are classified into the following types:

- Type 1 Paddy fields under the existing DPUP's schemes covering 9,651 ha by irrigation schemes, 17,644 ha by drainage schemes and 13,703 ha by polder schemes
- Type 2 Paddy fields with a total area of 60,127 ha in the swamps, 62,049 ha in the alluvial plains and 2,326 ha in the alluvial valleys
- Type 3 Upland and tree crops fields of 225,604 ha

Each type is also divided into several sub-types. The present cropping calendar is identified by each sub-type as described hereinafter.

2.2.1 Existing DPUP's schemes

The existing DPUP's schemes in the Study Area are composed of irrigation, drainage and polder schemes. Present cropping calendar in the existing DPUP's schemes can be featured according to each type.

(1) Irrigation schemes

The present cropping calendar in the existing irrigation schemes is generalized as a single cropping of paddy in wet season. Double cropping of paddy or two cropping of paddy and palawija crops is limited to a minor areal extent. The wet season paddy is planted in October to November and harvested in February to March. The dry season paddy starts immediately after harvesting the wet season paddy and is harvested in August to September. The planted area in dry season generally becomes smaller due to insufficient supply of irrigation water. A cropping intensity is therefore not more than 100% in the Study Area as a whole, with some exceptional cases such as Jaro scheme in Kabupaten Tabalong which realizes about 200% of the cropping intensity with double cropping of paddy.

Anticipated development target is not fully achieved in on-going scheme areas, although common use of high-yielding varieties as well as fertilizers and agro-chemicals has been encouraged for beneficial farmers.

Main palawija crops grown are maize, groundnut, soybean and mungbean. Cultivation method of these crops is simple and local varieties are commonly used. Seeding of maize and groundnut is generally carried out by putting seeds into prepared holes made in a field. On the other hand, for soybean and mungbean, seeds are broadcasted on a field after

harvesting of the wet season paddy by a direct sowing method. Neither fertilizer nor agro-chemical is applied. Harvesting of these crops is done in August and September with sickles or by hand.

(2) Drainage schemes

The present cropping calendar in the existing drainage schemes is generalized as a single cropping of paddy. Cropping timing and period of paddy vary to wide extent according to the actual effects of drainage control facilities in the respective schemes. The dry season cropping is carried out in some parts where the wet season cropping is impossible due to insufficient drainage control capacity of the available drainage facilities.

Cropping intensity is therefore about 100%. Although high-yielding varieties are adapted to some extent, the amounts of fertilizers and agro-chemicals used are relatively small, resulting in low yield of paddy. High frequency of inundation damage during the wet season makes farmers hesitate to use such expensive farm inputs.

(3) Polder schemes

The present cropping calendar in the existing gravity polder schemes is generalized as a single cropping of paddy in the dry season. In the Alabio polder scheme where mechanical polder facilities are provided with, double cropping of paddy or two cropping of paddy and palawija crops have not been practices. Even through year-round irrigation water sources are available, farmers' intend to continue primitive farming practices following traditional way.

Typical cropping calendars in the existing DPUP's schemes are illustrated in Figure 2.1.

2.2.2 Paddy field not improved

In the Study Area, there are 124,502 ha of paddy fields without any irrigation, drainage and polder facilities. Present cropping calendar of these paddy fields are featured as below:

(1) Alluvial plains and valleys

In the alluvial plains and valleys, a single cropping of paddy in the wet season is common in paddy fields not irrigated of 64,375 ha. Paddy is planted in October to November and harvested in February to March. Local varieties are broadly used for home consumption and local marketing. No fertilizers and agro-chemicals are used.

(2) Swamps

In the swamps, cropping period is confined to the later part of wet season to the dry season. Paddy is planted at farmers themselves own risk in April to June depending on decrease in inundated water level on paddy fields, and harvested in August to October. According to

the satellite image analysis under the present Study, such type of paddy fields are estimated to cover 60,127 ha in the swamps. Besides, unmistakable traces of crop cultivation, either paddy or palawija crops, can be observed in another 24,274 ha in the swamps, but these areas are not annually cultivated by farmers.

2.2.3 Upland and tree crops fields

Main annual upland crops grown in the Study Area are upland paddy, maize, soybean, groundnut, sweet potato, and cassava. The cropping period is generally confined to the wet season. In the Study area, no distinct difference can be usually observed in fields growing upland crops between by specific farming practices and under shifting cultivation method. The result of land use analysis under the present Study reveals that a total of 83,430 ha can be identified as upland and shifting cultivation area. Its distribution is as follows:

Swamps	36,764 ha
Alluvial plains	4,004
Alluvial valleys	2,788
Plains	28,857
Hills	7,137
Mountains	3,880

Upland and shifting cultivation area in the swamps includes periodically cultivated area of 24,274 ha mentioned in Section 2.2.2.(2). The remaining 12,490 ha are mainly of debris of fires as a result of felling activities to harvest iron woods.

In the alluvial plains and valleys, upland and shifting cultivation area is commonly utilized by villagers for the purpose of growing annual upland crops such as maize, soybean, groundnut, sweet potato and cassava. On the other hand, upland and shifting cultivation area in the plains, bills and mountains is currently used by shifters for growing upland paddy and maize through their traditional practices.

As for perennial crops, rubber and coconuts predominate in the Study Area. The difference of tree crops area between the statistical data and satellite image interpretations shows the existence of abandoned rubber areas once managed by smallholders. The estimated rubber areas abandoned are around 52,400 ha. Proportional extents of the present planted area for the main perennial crops by Kabupaten in the Study Area based on crop statistics are summarized as below:

(Unit: %)

Crop	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Rubber	77.7	79.1	70.7	34.0	65.4	68.1
Coconuts	13.1	10.9	20.1	56.4	17.5	21.1
Clove	3.1	1.9	3.8	2.9	7.0	3.5
Coffee	2.3	4.6	1.2	0.6	1.4	2.2
Cashewnuts	1.6	-	-	3.2	0.4	1.0
Fruit trees	1.1	3.6	3.8	1.4	3.2	2.5
Others	1.1	-	0.4	1.5	5.1	1.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Rubber has the largest share followed by coconut. By these crops, almost 90% of the total area planted are occupied. Rubber takes the largest part by a range of 65% to 79% in the four Kabupatens, except for Kabupaten Hulu Sungai Selatan where coconut planted area has the largest share followed by rubber.

2.3 Present Farm Inputs and Labour Requirements

The present farm inputs and labour requirements for cultivation of wetland paddy, palawija crops, annual and perennial upland crops are estimated on the basis of data obtained from Provincial Agricultural Offices and confirmed by field interviews with farmers in the Study Area. The results are shown in Table 2.5.

2.4 Present Constraints from Agronomic Viewpoints

The present constraints against the agricultural development in the Study Area are summarized as follows:

- Shortage of irrigation water throughout the Study Area due to insufficient irrigation facilities,
- Long duration period of inundated water on paddy fields in the swamps due to insufficient provision of drainage facilities,
- Insufficient and less proper control of diseases, insects and rats in fields,
- Lack of effective water management,
- Lack of modern crop cultivation knowledge and techniques, and
- Less interest of local farmers to intensified agriculture.

3. AGRICULTURAL DEVELOPMENT PLAN

3.1 Basic Concepts for Agricultural Development

The agricultural development concepts in the Study Area are set up as follows:

- Improvement of the present agricultural constraints,
- Increase in production of staple food crops by means of crop intensification so as to contribute to the government policy for self-sufficiency in food, and
- Level up of the living standard of the farmers through the increase of their farm products.

The present main physical constraints to the development of profitable farming are summarized as follows:

- Shortage of irrigation water and lack of technical irrigation facilities, and
- Poor drainage conditions especially in the swamps which result in low crop yield due to limitation on planting and growing period, crop damage at flood times and restriction to introduction of intensified farming.

These constraints could be settled by providing with systematic irrigation and drainage facilities to a large extent through implementation of development schemes formulated under the present Study.

At present, farmers in the Study Area are not so aware of modern farming practices. In order to realize high land productivity with provision of irrigation and drainage facilities, present farming practices will have to be improved. For promoting introduction of modern farming practices in the Study Area, the existing agricultural institutions which are not efficiently operated at present will have to be strengthened, especially in the field of agricultural extension services.

Taking into account the possibility of improvement in both physical and institutional aspects mentioned above, the agricultural development strategy in the Study Area are formulated as summarized below:

(1) Expansion of double cropping of paddy in irrigation scheme areas

For the purpose of stabilizing and increasing wetland paddy production in the Study Area, irrigation water supply condition will have to be much improved compared with the present condition by constructing new irrigation water source facilities. To realize such possibility to the maximum extent by least costly measures, double cropping of wetland paddy using high-yielding varieties can be considered as the most promising measure.

(2) Promotion of palawija cropping in drainage improvement and polder development scheme areas

In the drainage improvement and polder development scheme areas, single cropping of wetland paddy for the wet season will be common even after surface water depth can be artificially controlled by provision of drainage facilities. As irrigation water supply to the dry season crops will be very limited due to insufficiency of available irrigation water, profitable dryland crops will have to be introduced into these scheme areas where production bases are improved to desirable conditions.

(3) Promotion of crop diversification in remaining rainfed paddy fields

In the alluvial plains and valleys, there would remain rainfed paddy field after implementation of all irrigation schemes. For such area not to be benefited by irrigation development irrigation, diversification of the present cropping calendar consisting of the wet season paddy only will have to be promoted. Tree crop such as citrus which require less water supply for growth and promise high marketability will be able to be selected as a crop to be diversified. Besides, in the area where the drainage condition is not good and soil moisture is still retained in the dray season, pulses crops such as soybean, mungbean and groundnut are recommended after harvesting of paddy, from the viewpoints of their high marketability and short growing period.

3.2 Proposed Cropping Calendar

After the implementation of irrigation development, drainage improvement and polder development schemes formulated under the present Study, the existing rainfed paddy fields will be irrigated and the current irrigated paddy fields will be technically improved. In addition, by strengthening of agricultural extension services, modern farming practices suitable for improved field conditions will be spread over the Study Area.

Taking into account the above improvements of crop production basis, proposed cropping calendars are formulated aiming to realize the maximum utilization of paddy fields to be improved by providing irrigation and drainage facilities. The basic type of proposed cropping calendars are summarized below:

Scheme	Calendar	Intensity (%)
Irrigation	Wet season paddy/Dry season paddy	200
Drainage	Wet season paddy/Dry Season palawija	200
Polder	Fallow/Dry season paddy	100

The detailed descriptions on each calendar including exceptional cases are given below.

(1) Irrigation schemes

The double cropping of paddy is proposed. The wet season cropping starts from the beginning of December, while the dry season one is from the beginning of June. Early-maturing varieties like IR36, IR46, IR56 and IR60 will have to be adapted. The growing period is 130 to 140 days for the wet season and 110 to 120 days for the dry season with 60 days of the staggering period for transplanting works. Some of the existing and newly developed irrigation schemes will be unable to secure enough water sources for supplying the dry season irrigation water. For such schemes, an alternative cropping calendar is recommended comprising irrigated wet season paddy and the rainfed dry season palawija crops.

(2) Drainage schemes

With provision of the effective drainage control system, most of the existing and new drainage schemes will be able to avoid completely the occurrence of crop damage due to deep inundation water caused by unexpected heavy rainfall during the period of May. Taking into consideration such production basis improvement, the proposed cropping calendar is a combination of the wet season paddy and the dry season palawija. Paddy planting starts from the beginning of December. The cultivation of palawija crops such as maize, soybean, groundnut and mungbean will have to be planted immediately after harvesting paddy, due to lack of water supply in the dry season. Therefore, the growing period of palawija crops is limited to 2 to 3 months after the harvest of paddy. In several drainage scheme areas, irrigation water will be able to be supplied from the newly developed irrigation schemes either for the dry season or for the both seasons. Alternative cropping calendars recommended are (1) the rainfed wet season paddy and the irrigated dry season paddy, and (2) the irrigated double cropping of paddy.

(3) Polder schemes

The proposed cropping calendar is the single cropping of the dry season paddy. In the Alabio polder scheme, the irrigated double cropping of paddy is proposed with provision of proper operation and maintenance system to enable full use of the existing irrigation and drainage pump facilities.

3.3 Proposed Farming Practices

Proper farming practices are one of the essential factors for realizing full exploitation of the agricultural potential in the Study Area. Based on the data prepared by Provincial Agricultural Office and Rural Extension Centers covering the Study Area, the proposed farming practices for the future cropping calendars with development schemes are designed. With regard to the future cropping calendars without scheme implementation, no substantial changes in the farming practices can be considered.

(1) Wetland paddy

Based on improved field conditions by providing irrigation and drainage facilities, intensive farming practices consisting of introduction of high yield varieties, proper fertilizer application, pest and disease control and proper water management will be be able to be applied to the Study Area to increase crop productivity.

Seedling and nursery preparation

High yielding varieties like IR36, IR46, IR56 and IR60 are proposed. The seed requirement is 40 kg/ha. The seed treatment is essential for securing high crop yield, although at present it is commonly not carried out. Use of certified to extension seeds is prerequisite. Seed selection is done by using a solution of 1.13 specific gravity before pre-germination. The selected seeds are disinfected by using an adequate seed disinfectant such as Benrate. Pre-germination practice is recommended for increasing the germination percentage.

The nursery has to be prepared as flat as possible. The size of nursery is about 1/20 of paddy fields to be transplanted. Fertilization is essential with the recommended dosage being 5 kg of urea. Careful water management is important for healthy growth of seedlings. The nursery period is 20 days after seedling.

Land preparation

The land preparation is carried out by animal power, at least 10 days before transplanting. Harrowing and puddling works are also required after ploughing. For efficient puddling works, use of animal power is recommended.

Transplanting

Transplanting is undertaken by manual labour with a spacing of 20 cm x 20 cm, and planting of 2 to 3 seedlings per one hill is recommended. In consideration of the close correlation between number of panicles per one m^2 and unit yield, more dense planting is recommended. The irrigation water has to be controlled to give shallow depths for enforced acceleration of vigorous tillering at transplanting time. Irrigation water is taken into the field again after rooting.

Fertilizer application

Proper application of fertilizer is essential for full exploitation of agricultural potential under irrigated condition. The soils of the Study Area are generally poor in plant nutrient, especially nitrogen and phosphate. These chemical elements have to be supplemented by fertilizers. Considering the soil condition, the suitable fertilizers are urea, triple superphosphate (TSP) and potassium chloride (KCl). The total fertilizer requirement for sustaining the target yields would be 200 kg/ha of urea, 150 kg/ha of TSP and 100 kg/ha

of KCl. The basic fertilizer application is 65 kg/ha of urea, 150 kg/ha TSP and 100 kg/ha of KCl when field preparation is practiced. Top dressing is made at 2 different times, once just before the maximum tillering stage at about 15 days after transplanting and later at the spikelet differentiation stage corresponding to 20 days before heading. The amount of fertilizer to be applied is about 65 kg/ha of urea at each time of top dressing. In the paddy fields where the percentage of ripened grains is low, top-dressing with the same application of urea at the full heading stage is often quite effective.

Weed control

After transplanting, manual weeding should be carried out at 3 different times depending on the conditions of weed growth. For effective weeding, it is recommended that the rotary weeder, being widely used in Java, be introduced. Use of herbicides is not recommended taking into account cost performance and environment impacts.

Agro-chemical application

For plant protection, application of insecticide is required for control of plant hoppers, stem borers and so on. Considering the life-cycle of these insects, a total of 3 lit/ha of insecticides is required for 3 to 4 separate applications during each cropping season. In addition, it will be necessary to apply 3 kg/ha of rodenticide for preventing rat damage. In selecting suitable insecticides, chemical toxicity which may directly or indirectly affect human beings natural environments, should be taken into consideration. It is recommended that plant protection works should be carried out in a systematic way through the farmer's co-operatives with the minimum occasion.

Harvesting and threshing

Harvesting is carried out by manual labour. The harvested paddy is dried on the ground. In future, artificial dryers will have to be considered because a lot of harvested grains are presently damaged by unexpected rains. For threshing, use of a treadle thresher, instead of traditional hand threshing should be considered.

(2) Palawija crops

Cultivation of palawija crops such as maize, groundnut, soybean and mungbean will be more encouraged in the Study Area. Modern farming practices such as introduction of high yield varieties, reasonable fertilizer application and control of insects and diseases are the basic requirements for further promotion of palawija crop cultivation. In order to attain the target yield of these crops, it is inevitable to provide not only the above various modern cultivation techniques but also strengthening of the present agricultural support services. The standard farming practices of palawija crops are shown in Table 3.1.

3.4 Farm Input and Labour Requirements

The proposed farm input and labour requirements are shown in Table 3.2 for paddy and in Table 3.3 for palawija crops.

3.5 Anticipated Crop Yield

3.5.1 Re-estimate of present yield level of the wetland paddy

According to the data from Provincial Agricultural Office, the present yield of wetland paddy in the Study Area is 3.7 ton/ha. This is the average yield of the recent five years' data from 1982 to 1986, and covering all types of paddy fields such as irrigated paddy fields, drained and poldered paddy fields and rainfed paddy fields. This present yield is estimated based on the harvested area. In the Study Area, a total of 165,500 ha is identified as paddy field through satellite image analysis under the present Study. Based on this figure which can be considered as a planted area, the above average yield becomes 2.4 ton/ha. In order to estimate anticipated yield under the future conditions, the present yield level of wetland paddy based on the data of Provincial Agricultural Office is re-estimated by paddy field condition as well as by type of facilities.

In re-estimating the present yield of wetland paddy in the Study Area, the following conditions are taken into account.

- High yield level recorded at the well-irrigated paddy fields should be characterized as an exceptional case at present. Therefore, it is not generalized as the present yield level in the irrigated paddy field as a whole.

- Yield level in rainfed paddy field is classified by physiographic conditions, i.e. the alluvial plains and the swamps.

- Present yield level in drainage improvement and polder development schemes are on the same level of rainfed paddy field in the swamps because of insufficient operation of facilities.

Based on the above conditions as well as data and informations collected in Rural Extension Centers and DPUP's Kabupaten branch offices in the Study Area, the present yield level of wetland paddy is re-estimated as below:

Type of Schemes/Field Condition	Yield (ton/ha)
Irrigation schemes	2.5
Drainage schemes	1.5
Polder schemes	1.5
Rainfed paddy field	
- Alluvial plains	2.5
- Swamps	1.5

3.5.2 Anticipated crop yield under future condition without production base improvement

(1) Wetland paddy

Under the future condition of without production base improvement, no substantial changes are expected in farming practices. The present yield level is, therefore, forecasted to remain unchanged. However, in the existing irrigation scheme areas, partial improvements of irrigation facilities are expected by DPUP's investment in the future. Taking such improvement into account, yield level of the existing irrigation scheme areas can be expected to from increase 2.5 to 3.5 ton/ha.

(2) Palawija crops

According to the data obtained from Provincial Agricultural Office, the average unit yield of Palawija crops in the recent five years from 1982 to 1986 in the Study Area are shown in Table 2.3 and summarized below:

Crop	Yield (ton/ha)
Maize	0.79
Groundnut	0.88
Soybean	0.84
Mungbean	0.56

These yield data are directly applied to the anticipated yield under the future condition without production base improvement.

3.5.3 Anticipated crop yield under future condition with production base improvement

The yield and production of crop in the Study Area will be increased and stabilized year by year under the proper irrigation water management and drainage control as well as strengthening of the agricultural support services.

Under the future condition with production base improvement, the anticipated yields of paddy are estimated to be 5.5 ton/ha of dried paddy (gabah) for irrigation development schemes and 3.0 ton/ha for drainage improvement and polder development schemes. These unit yields are estimated in due consideration of the experimental data obtained from the demonstration plots of Agricultural Extension Offices and also data in pilot farms in the Riam Kanan Irrigation Project both ranging from 6.0 to 7.0 ton/ha. It is also referred to that the average unit yield of paddy under intensification program where full irrigation facilities are provided is 6.0 ton/ha in the Study Area. The anticipated yields of palawija crops are estimated taking into account introduction of high yield varieties, periodical irrigation water supply and optimum use of farm inputs. The yields estimated are 3.5 ton/ha for maize, 2.0 ton/ha for groundnut, 2.0 ton/ha for soybean and 1.2 ton/ha for mungbean. All crop yields estimated will gradually increase to the anticipated levels after completion of production base improvement works. Under the present Study, such build-up period is set up to be five years.

3.6 Change in Paddy Cultivation Area

In the Study Area, there exist paddy field 165,500 ha in total at present. Through implementation of new irrigation water source and swamp development works, new paddy field of 26,395 ha will be opened up in the swamps and alluvial plains. The distribution of paddy field by type is as follows:

(Unit: ha)

Type of Production Basis	Present	Future Production Basis Improvement	
		Without	With
Irrigated	9,651	11,047	40,434
Drained	17,644	38,369	67,499
(Irrigated)	(-)	(-)	(2,585)
Poldered	13,703	13,703	18,279
(Irrigated)	(4,500)	(4,500)	(4,500)
Rainfed	124,502	103,976	65,683
(Swamps)	(60,127)	(40,997)	(29,991)
(Alluvial plains)	(62,049)	(60,653)	(33,366)
(Alluvial valleys)	(2,326)	(2,326)	(2,326)
Total	165,500	165,500	191,895

The following shows seasonal paddy planted areas under conditions of the present, the future without production basis improvement and the future with production basis improvement. The details are given in Tables 3.4 to 3.9.

(Unit: ha)

Planting Season	Present	Future Production Basis Improvement	
		Without	With
Wet	94,532	113,345	144,575
Dry	73,717	60,191	85,524
Total	168,249	173,536	230,099

According to the result of drainage control effect analysis, inundation condition of paddy fields is categorized into the following four cases taking into account water depth and submerged period.

- Water depth of deeper than 20 cm for less than 24 hours
- Water depth of deeper than 20 cm for 24 to 48 hours
- Water depth of deeper than 20 cm for 49 to 72 hours
- Water depth of deeper than 20 cm for more than 72 hours

From the agronomic viewpoint, paddy plants grown are to be damaged when such inundation situation occurs. The degree of damage is projected as yield reduction. It is 70% for the second case, 80% for the third case and 100% for the last case, while no crop yield reduction is expected for the first case. In estimating actual damages or effect of drainage improvement, this yield reduction ratio is converted to areal factor in the following manner.

(Unit: %)

Yield Reduction Ratio	Normal Harvest Area	No Harvest Area
0	100	0
70	30	70
80	20	80
100	0	100

4. RECOMMENDATION

For the future agricultural development, the following measures to the existing agricultural support services shall be recommended from agronomic viewpoints:

- To raise the level of rice cultivation techniques of the Field Extension Workers (PPL) through practical training in order to enable them to judge conditions of rice in paddy fields and also advise the farmers properly and timely,

- To promote the intensification programme in the Study Area through the expansion of group activities under advice of PPL,

- To strengthen the operation of seed stations in the Study Area so as to provide the beneficial farmers with the necessary quantity of certificated extension seeds, and

- To strengthen the agronomic research on irrigated cultivation of paddy and palawija crops and propagate recommended farming practices, including the use of new varieties to the farmers through the existing extension channels.

TABLES

Table 2.1 Cropped Area of Major Crops in the Study Areas
Summary Table (1/6)

Unit:ha

Crop	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Wetland Paddy	14,738	29,936	23,537	20,147	27,756	116,114
Upland Crop	4,473	6,053	3,072	4,410	7,474	25,482
Upland paddy	2,654	3,526	1,818	1,560	3,123	12,681
Maize	264	427	182	501	1,156	2,529
Groundnut	178	335	174	745	2,280	3,711
Soybeans	156	141	92	46	249	684
Mungbeans	92	77	81	90	59	399
Sweet potato	187	275	89	463	43	1,057
Cassava	321	476	311	383	223	1,715
Vegetables	622	798	325	621	342	2,707
Tree Crop	29,430	22,775	19,072	15,368	14,225	100,870
(Estate Crop)	29,062	21,962	18,343	15,150	13,763	98,280
-Rubber						
(P.A) /1	22,630	18,006	13,483	5,228	9,104	68,451
(H.A) /2	14,990	11,345	11,801	3,787	3,067	44,991
-Coconut						
(P.A)	3,803	2,485	3,837	8,660	2,496	21,281
(H.A)	2,905	1,599	3,220	6,849	1,665	16,238
-Clove						
(P.A)	896	423	733	444	1,001	3,497
(H.A)	174	110	242	205	390	1,121
-Coffee						
(P.A)	662	1,042	236	94	195	2,228
(H.A)	393	677	124	46	109	1,350
-Cashewnut						
(P.A)	474	0	0	496	61	1,031
(H.A)	23	0	0	0	23	46
(Fruits)	314	813	729	218	462	2,537
-Banana	182	584	156	87	317	1,327
-Rambutan	38	38	86	82	59	303
-Citrus	3	17	300	6	18	344

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Note: Above data show the average in recent five years from 1982 to 1986.
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.1 Cropped Area of Major Crops in the Study Areas
Kabupaten Tabalong (2/6)

Unit: ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Wetland Paddy	16,375	13,281	14,349	15,146	14,538	14,738
Upland Crop	4,200	2,298	5,238	5,612	5,017	4,473
Upland paddy	3,022	356	3,067	3,838	2,987	2,654
Maize	131	334	288	248	318	264
Groundnut	89	199	218	184	199	178
Soybeans	73	183	164	149	213	156
Mungbeans	44	97	92	120	105	92
Sweet potato	106	172	227	195	233	187
Cassava	229	312	391	277	396	321
Vegetables	506	645	791	601	566	622
Tree Crop	27,733	28,601	28,455	29,105	33,257	29,430
(Estate Crop)	27,030	28,226	28,223	28,807	33,026	29,062
-Rubber						
(P.A) /1	20,706	21,695	21,824	22,521	26,405	22,630
(H.A) /2	14,341	14,494	15,686	15,214	15,214	14,990
-Coconut						
(P.A)	3,766	3,834	3,694	3,814	3,906	3,803
(H.A)	2,789	2,845	2,780	2,814	3,296	2,905
-Clove						
(P.A)	889	844	748	1,008	990	896
(H.A)	95	112	229	226	210	174
-Coffee						
(P.A)	627	616	612	696	757	662
(H.A)	323	323	415	420	484	393
-Cashewnut						
(P.A)	672	606	697	187	209	474
(H.A)	2	2	15	51	43	23
(Fruits)	430	375	232	298	237	314
-Banana	300	183	135	147	147	182
-Rambutan	11	72	43	35	28	38
-Citrus	3	5	2	3	2	3

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.1 Cropped Area of Major Crops in the Study Areas
Kabupaten Hulu Sungai Utara (3/6)

Unit: ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Wetland Paddy	29,120	23,883	30,688	31,288	34,700	29,936
Upland Crop	6,301	3,411	6,581	7,145	6,828	6,053
Upland paddy	3,661	621	4,325	5,270	3,755	3,526
Maize	440	457	509	235	492	427
Groundnut	223	294	195	245	716	335
Soybeans	41	78	95	152	338	141
Mungbeans	33	51	88	68	143	77
Sweet potato	390	271	205	122	385	275
Cassava	591	402	558	384	445	476
Vegetables	922	1,237	606	669	554	798
Tree Crop	19,056	21,279	21,316	25,324	26,898	22,775
(Estate Crop)	18,727	20,482	20,416	24,197	25,987	21,962
-Rubber						
(P.A) /1	14,886	16,566	16,714	20,054	21,808	18,006
(H.A) /2	10,343	10,541	11,684	12,050	12,109	11,345
-Coconut						
(P.A)	2,410	2,502	2,358	2,578	2,578	2,485
(H.A)	1,556	1,564	1,608	1,632	1,636	1,599
-Clove						
(P.A)	382	373	425	469	468	423
(H.A)	50	83	143	136	136	110
-Coffee						
(P.A)	1,049	1,041	919	1,094	1,107	1,042
(H.A)	653	668	661	698	705	677
-Cashewnut	-	-	-	-	-	0
(Fruits)	329	797	900	1,127	911	813
-Banana	60	524	601	935	800	584
-Rambutan	53	26	34	43	35	38
-Citrus	16	22	22	10	13	17

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.1 Cropped Area of Major Crops in the Study Areas
Kabupaten Hulu Sungai Tengah (4/6)

Unit: ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Wetland Paddy	23,885	22,113	23,590	24,335	23,762	23,537
Upland Crop	2,966	2,297	2,916	3,535	3,644	3,072
Upland paddy	1,925	1,300	2,075	1,871	1,919	1,818
Maize	126	197	197	238	150	182
Groundnut	160	110	94	253	251	174
Soybeans	44	48	43	106	218	92
Mungbeans	41	59	44	143	120	81
Sweet potato	62	159	71	80	75	89
Cassava	425	197	145	375	414	311
Vegetables	183	227	247	469	497	325
Tree Crop	18,583	18,598	19,260	19,520	19,400	19,072
(Estate Crop)	18,029	18,075	18,325	18,615	18,670	18,343
-Rubber						
(P.A) /1	13,260	13,278	13,551	13,664	13,664	13,483
(H.A) /2	12,470	12,495	12,350	10,846	10,846	11,801
-Coconut						
(P.A)	3,776	3,804	3,754	3,925	3,925	3,837
(H.A)	3,379	3,405	3,242	3,038	3,038	3,220
-Clove						
(P.A)	734	733	752	723	723	733
(H.A)	150	177	362	260	260	242
-Coffee						
(P.A)	196	196	204	291	291	236
(H.A)	114	114	134	130	130	124
-Cashewnut	-	-	-	-	-	0
(Fruits)	554	523	935	905	730	729
-Banana	6	195	210	120	249	156
-Rambutan	90	-	103	193	43	86
-Citrus	303	250	360	300	287	300

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.1 Cropped Area of Major Crops in the Study Areas
Kabupaten Hulu Sungai Selatan (5/6)

Unit: ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Wetland Paddy	19,110	19,819	20,022	19,366	22,419	20,147
Upland Crop	3,550	5,012	4,043	3,984	5,460	4,410
Upland paddy	935	2,286	2,005	1,100	1,475	1,560
Maize	480	866	339	302	518	501
Groundnut	983	200	368	949	1,226	745
Soybeans	29	72	75	13	42	46
Mungbeans	86	101	53	77	134	90
Sweet potato	656	93	198	640	729	463
Cassava	164	373	532	467	380	383
Vegetables	217	1,021	473	436	956	621
Tree Crop	14,620	15,143	14,215	16,490	16,371	15,368
(Estate Crop)	14,491	15,024	13,912	16,172	16,150	15,150
-Rubber						
(P.A) /1	4,727	4,785	4,828	5,818	5,984	5,228
(H.A) /2	3,288	3,340	3,240	4,281	4,787	3,787
-Coconut						
(P.A)	8,153	8,182	8,114	9,556	9,297	8,660
(H.A)	6,154	6,248	6,287	7,767	7,788	6,849
-Clove						
(P.A)	376	374	418	500	551	444
(H.A)	87	104	173	314	345	205
-Coffee						
(P.A)	102	98	97	88	85	94
(H.A)	33	33	51	56	57	46
-Cashewnut						
(P.A)	900	1,360	220	-	-	496
(H.A)	-	-	-	-	-	0
(Fruits)	129	119	303	318	221	218
-Banana	43	67	69	87	170	87
-Rambutan	25	16	174	173	23	82
-Citrus	7	3	9	9	4	6

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.1 Cropped Area of Major Crops in the Study Areas
Kabupaten Tapin (6/6)

Unit: ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Wetland Paddy	22,952	29,143	28,550	29,713	28,424	27,756
Upland Crop	7,082	7,659	9,005	6,970	6,654	7,474
Upland paddy	4,255	2,114	3,602	2,974	2,668	3,123
Maize	762	1,451	1,915	900	751	1,156
Groundnut	1,553	3,107	2,698	1,993	2,047	2,280
Soybeans	17	112	115	494	506	249
Mungbeans	1	72	35	33	153	59
Sweet potato	58	45	35	70	8	43
Cassava	180	196	259	232	249	223
Vegetables	256	562	346	274	272	342
Tree Crop	11,371	12,838	14,745	15,932	16,241	14,225
(Estate Crop)	10,750	12,381	14,409	15,454	15,822	13,763
-Rubber						
(P.A) /1	6,449	8,031	10,076	10,906	10,056	9,104
(H.A) /2	2,790	2,831	2,970	3,175	3,569	3,067
-Coconut						
(P.A)	2,416	2,348	2,301	2,664	2,751	2,496
(H.A)	1,449	1,465	1,722	1,794	1,893	1,665
-Clove						
(P.A)	923	902	959	1,111	1,112	1,001
(H.A)	307	334	433	433	445	390
-Coffee						
(P.A)	165	171	215	174	249	195
(H.A)	78	86	117	86	180	109
-Cashewnut						
(P.A)	58	62	61	61	61	61
(H.A)	22	23	24	24	24	23
(Fruits)	621	457	336	478	419	462
-Banana	355	232	250	375	375	317
-Rambutan	110	85	34	47	20	59
-Citrus	12	36	17	15	9	18

Remarks: /1 ; P.A., Planted area
/2 ; H.A., Harvested area
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Summary Table (1/6)

Unit: ton

Crop	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Paddy	49,524	89,586	101,608	81,703	95,076	417,498
Wetland paddy	45,421	85,037	97,958	78,541	88,679	395,637
Upland paddy	4,103	4,549	3,650	3,162	6,468	21,932
Upland Crop	4,906	6,381	4,453	6,255	6,429	28,424
Maize	206	448	147	383	805	1,989
Groundnut	145	262	152	663	2,047	3,269
Soybeans	99	107	73	32	261	572
Mungbeans	49	43	49	48	34	224
Sweet potato	883	1,372	410	2,267	344	5,277
Cassava	2,456	3,447	2,371	1,903	2,231	12,408
Vegetables	1,067	702	1,251	959	707	4,686
Tree Crop	11,692	9,885	12,440	11,007	4,982	50,006
(Estate Crop)	10,856	7,799	8,851	9,999	3,090	40,594
-Rubber	8,399	6,359	6,606	1,907	1,481	24,752
-Coconut	2,119	1,151	2,154	7,934	1,157	14,515
-Clove	24	13	32	22	56	147
-Coffee	122	277	46	14	38	498
-Cashewnut	3	0	0	0	6	8
(Fruits)	836	2,086	3,589	1,008	1,892	9,412
-Banana	455	1,694	921	667	1,304	5,041
-Rambutan	44	43	766	141	185	1,179
-Citrus	14	20	1,188	16	66	1,304

Note: Above data show the average in recent five years from 1982 to 1986
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Kabupaten Tabalong (2/6)

Unit: ton

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	51,743	40,925	51,572	55,682	47,697	49,524
Wetland paddy	46,820	40,387	47,136	49,906	42,857	45,421
Upland paddy	4,923	538	4,436	5,776	4,840	4,103
Upland Crop	3,144	4,728	6,463	4,596	5,599	4,906
Maize	95	217	230	203	286	206
Groundnut	70	161	174	153	166	145
Soybeans	40	101	98	101	156	99
Mungbeans	22	44	46	72	62	49
Sweet potato	411	783	1,135	957	1,131	883
Cassava	1,643	2,340	3,128	2,098	3,073	2,456
Vegetables	863	1,082	1,652	1,012	725	1,067
Tree Crop	11,672	11,189	11,991	11,477	12,129	11,692
(Estate Crop)	10,289	10,413	11,434	10,687	11,455	10,856
-Rubber	7,887	7,972	9,019	8,368	8,748	8,399
-Coconut	2,099	2,133	2,085	1,970	2,307	2,119
-Clove	17	20	29	28	26	24
-Coffee	96	96	125	126	169	122
-Cashewnut	1	1	2	5	4	3
(Fruits)	1,383	776	557	790	674	836
-Banana	900	229	334	339	473	455
-Rambutan	37	65	45	43	31	44
-Citrus	15	25	10	11	7	14

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Kabupaten Hulu Sungai Utara (3/6)

Unit: ton

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	71,208	68,966	91,535	97,537	118,686	89,586
Wetland paddy	65,725	68,240	87,277	90,673	113,271	85,037
Upland paddy	5,483	726	4,258	6,864	5,415	4,549
Upland Crop	7,540	6,187	6,296	5,020	6,860	6,381
Maize	523	522	466	236	491	448
Groundnut	176	178	162	208	587	262
Soybeans	29	46	82	116	260	107
Mungbeans	20	31	47	38	78	43
Sweet potato	2,407	1,451	941	560	1,503	1,372
Cassava	3,932	2,516	4,204	3,187	3,395	3,447
Vegetables	453	1,443	394	675	546	702
Tree Crop	7,885	8,588	9,808	11,583	11,563	9,885
(Estate Crop)	7,157	7,285	8,126	8,042	8,386	7,799
-Rubber	5,688	5,797	6,718	6,628	6,963	6,359
-Coconut	1,167	1,173	1,126	1,142	1,145	1,151
-Clove	9	15	18	10	14	13
-Coffee	293	300	264	262	264	277
-Cashewnut	-	-	-	-	-	0
(Fruits)	728	1,303	1,682	3,541	3,177	2,086
-Banana	296	941	1,142	3,106	2,985	1,694
-Rambutan	66	12	41	58	36	43
-Citrus	12	30	30	14	13	20

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Kabupaten Hulu Sungai Tengah (4/6)

Unit: ton

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	84,275	99,950	108,247	114,421	101,147	101,608
Wetland paddy	81,176	97,696	104,577	109,337	97,005	97,958
Upland paddy	3,099	2,254	3,670	5,084	4,142	3,650
Upland Crop	4,259	3,772	2,385	5,225	6,623	4,453
Maize	100	158	155	187	136	147
Groundnut	144	94	82	211	228	152
Soybeans	31	32	26	77	200	73
Mungbeans	28	38	25	85	71	49
Sweet potato	288	747	318	360	335	410
Cassava	3,313	1,537	1,086	2,813	3,104	2,371
Vegetables	355	1,166	693	1,492	2,549	1,251
Tree Crop	9,930	10,567	16,112	12,901	12,690	12,440
(Estate Crop)	9,140	9,185	9,314	8,167	8,449	8,851
-Rubber	6,858	6,872	7,101	5,965	6,236	6,606
-Coconut	2,196	2,213	2,107	2,127	2,127	2,154
-Clove	26	39	45	26	26	32
-Coffee	45	46	47	46	46	46
-Cashewnut	-	-	-	-	-	0
(Fruits)	790	1,382	6,798	4,734	4,241	3,589
-Banana	28	488	1,329	761	1,998	921
-Rambutan	87	-	2,000	1,395	349	766
-Citrus	240	695	2,335	1,380	1,292	1,188

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Kabupaten Hulu Sungai Selatan (5/6)

Unit: ton

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	67,488	84,539	87,864	88,675	79,951	81,703
Wetland paddy	65,921	80,190	83,958	85,958	76,679	78,541
Upland paddy	1,567	4,349	3,906	2,717	3,272	3,162
Upland Crop	4,858	4,592	4,695	7,031	10,099	6,255
Maize	373	684	242	229	387	383
Groundnut	676	497	294	748	1,098	663
Soybeans	17	47	53	9	32	32
Mungbeans	42	51	28	44	76	48
Sweet potato	2,726	407	922	3,141	4,140	2,267
Cassava	663	1,692	2,578	2,248	2,334	1,903
Vegetables	361	1,214	578	612	2,032	959
Tree Crop	9,979	10,156	10,372	12,132	12,397	11,007
(Estate Crop)	9,186	9,318	9,407	10,842	11,241	9,999
-Rubber	1,512	1,670	1,701	2,141	2,513	1,907
-Coconut	7,518	7,497	7,544	8,544	8,567	7,934
-Clove	13	15	22	24	35	22
-Coffee	10	10	15	17	20	14
-Cashewnut	-	-	-	-	-	0
(Fruits)	793	838	965	1,290	1,156	1,008
-Banana	453	651	606	611	1,015	667
-Rambutan	44	9	153	454	46	141
-Citrus	16	7	22	25	11	16

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.2 Production of Major Crops in the Study Area
Kabupaten Tapin (6/6)

Unit: ton

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	75,172	96,058	102,963	103,215	97,972	95,076
Wetland paddy	66,731	91,619	95,384	97,260	92,403	88,679
Upland paddy	8,441	4,439	7,579	5,955	5,926	6,468
Upland Crop	4,414	6,664	7,154	7,161	6,753	6,429
Maize	572	900	1,244	638	669	805
Groundnut	1,422	2,113	2,246	2,161	2,294	2,047
Soybeans	10	75	66	558	597	261
Mungbeans	-	33	22	20	96	34
Sweet potato	465	365	273	564	55	344
Cassava	1,800	1,886	2,461	2,549	2,458	2,231
Vegetables	145	1,292	842	671	584	707
Tree Crop	4,580	4,386	4,390	5,745	5,807	4,982
(Estate Crop)	2,914	2,954	3,111	3,069	3,400	3,090
-Rubber	1,258	1,274	1,411	1,588	1,874	1,481
-Coconut	1,087	1,098	1,205	1,166	1,230	1,157
-Clove	61	66	65	43	45	56
-Coffee	27	30	41	30	63	38
-Cashewnut	10	10	4	2	2	6
(Fruits)	1,666	1,432	1,279	2,676	2,407	1,892
-Banana	745	476	925	2,164	2,210	1,304
-Rambutan	335	256	140	131	62	185
-Citrus	39	140	50	70	31	66

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Summary Table (1/6)

Unit:ton/ha

Crop	Tabalong	H.S.U.	H.S.T.	H.S.S.	Tapin	Study Area
Paddy	2.85	2.68	4.01	3.76	3.08	3.24
Wetland paddy	3.08	2.84	4.16	3.90	3.19	3.41
Upland paddy	1.55	1.29	2.01	2.03	2.07	1.73
Upland Crop						
Maize	0.78	1.05	0.81	0.76	0.70	0.79
Groundnut	0.81	0.78	0.87	0.89	0.90	0.88
Soybeans	0.63	0.76	0.80	0.68	1.05	0.84
Mungbeans	0.54	0.56	0.61	0.53	0.58	0.56
Sweet potato	4.73	5.00	4.58	4.89	7.97	4.99
Cassava	7.65	7.24	7.62	4.97	9.99	7.24
Vegetables	1.72	0.88	3.85	1.55	2.07	1.73
Tree Crop						
(Estate Crop)						
-Rubber	0.56	0.56	0.56	0.50	0.48	0.55
-Coconut	0.73	0.72	0.67	1.16	0.70	0.89
-Clove	0.14	0.12	0.13	0.11	0.14	0.13
-Coffee	0.31	0.41	0.37	0.31	0.35	0.37
-Cashewnut	0.12	0.00	0.00	0.00	0.24	0.18
(Fruits)						
-Banana	2.49	2.90	5.90	7.65	4.11	3.80
-Rambutan	1.17	1.12	8.93	1.72	3.12	3.89
-Citrus	4.53	1.19	3.96	2.53	3.71	3.79

Note: Above data show the average in recent five years from 1982 to 1986.
Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Kabupaten Tabalong (2/6)

Unit: ton/ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	2.67	3.00	2.96	2.93	2.72	2.85
Wetland paddy	2.86	3.04	3.28	3.29	2.95	3.08
Upland paddy	1.63	1.51	1.45	1.50	1.62	1.55
Upland Crop						
Maize	0.73	0.65	0.80	0.82	0.90	0.78
Groundnut	0.79	0.81	0.80	0.83	0.83	0.81
Soybeans	0.55	0.55	0.60	0.68	0.73	0.63
Mungbeans	0.50	0.45	0.50	0.60	0.59	0.54
Sweet potato	3.88	4.55	5.00	4.91	4.85	4.73
Cassava	7.17	7.50	8.00	7.57	7.76	7.65
Vegetables	1.71	1.68	2.09	1.68	1.28	1.72
Tree Crop						
(Estate Crop)						
-Rubber	0.55	0.55	0.57	0.55	0.57	0.56
-Coconut	0.75	0.75	0.75	0.70	0.70	0.73
-Clove	0.18	0.18	0.13	0.12	0.12	0.14
-Coffee	0.30	0.30	0.30	0.30	0.35	0.31
-Cashewnut	0.50	0.50	0.13	0.10	0.09	0.12
(Fruits)						
-Banana	3.00	1.25	2.47	2.31	3.22	2.49
-Rambutan	3.36	0.90	1.05	1.23	1.11	1.17
-Citrus	5.00	5.00	5.00	3.67	3.50	4.53

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Kabupaten Hulu Sungai Utara (3/6)

Unit: ton/ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	2.17	2.81	2.61	2.67	3.09	2.68
Wetland paddy	2.26	2.86	2.84	2.90	3.26	2.84
Upland paddy	1.50	1.17	0.98	1.30	1.44	1.29
Upland Crop						
Maize	1.19	1.14	0.92	1.00	1.00	1.05
Groundnut	0.79	0.61	0.83	0.85	0.82	0.78
Soybeans	0.71	0.59	0.86	0.76	0.77	0.76
Mungbeans	0.61	0.61	0.53	0.56	0.55	0.56
Sweet potato	6.17	5.35	4.59	4.59	3.90	5.00
Cassava	6.65	6.26	7.53	8.30	7.63	7.24
Vegetables	0.49	1.17	0.65	1.01	0.99	0.88
Tree Crop						
(Estate Crop)						
-Rubber	0.55	0.55	0.57	0.55	0.58	0.56
-Coconut	0.75	0.75	0.70	0.70	0.70	0.72
-Clove	0.18	0.18	0.13	0.07	0.10	0.12
-Coffee	0.45	0.45	0.40	0.38	0.37	0.41
-Cashewnut	0.00	0.00	0.00	0.00	0.00	0.00
(Fruits)						
-Banana	4.93	1.80	1.90	3.32	3.73	2.90
-Rambutan	1.25	0.46	1.21	1.35	1.03	1.12
-Citrus	0.75	1.36	1.36	1.40	1.00	1.19

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Kabupaten Hulu Sungai Tengah (4/6)

Unit: ton/ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	3.27	4.27	4.22	4.37	3.94	4.01
Wetland paddy	3.40	4.42	4.43	4.49	4.08	4.16
Upland paddy	1.61	1.73	1.77	2.72	2.16	2.01
Upland Crop						
Maize	0.79	0.80	0.79	0.79	0.91	0.81
Groundnut	0.90	0.85	0.87	0.83	0.91	0.87
Soybeans	0.70	0.67	0.60	0.73	0.92	0.80
Mungbeans	0.68	0.64	0.57	0.59	0.59	0.61
Sweet potato	4.65	4.70	4.48	4.50	4.47	4.58
Cassava	7.80	7.80	7.49	7.50	7.50	7.62
Vegetables	1.94	5.14	2.81	3.18	5.13	3.85
Tree Crop						
(Estate Crop)						
-Rubber	0.55	0.55	0.57	0.55	0.57	0.56
-Coconut	0.65	0.65	0.65	0.70	0.70	0.67
-Clove	0.17	0.22	0.12	0.10	0.10	0.13
-Coffee	0.39	0.40	0.35	0.35	0.35	0.37
-Cashewnut	0.00	0.00	0.00	0.00	0.00	0.00
(Fruits)						
-Banana	4.67	2.50	6.33	6.34	8.02	5.90
-Rambutan	0.97	0.00	19.42	7.23	8.12	8.93
-Citrus	0.79	2.78	6.49	4.60	4.50	3.96

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Kabupaten Hulu Sungai Selatan (5/6)

Unit: ton/ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	3.37	3.82	3.99	4.33	3.35	3.76
Wetland paddy	3.45	4.05	4.19	4.44	3.42	3.90
Upland paddy	1.68	1.90	1.95	2.47	2.22	2.03
Upland Crop						
Maize	0.78	0.79	0.71	0.76	0.75	0.76
Groundnut	0.69	2.49	0.80	0.79	0.90	0.89
Soybeans	0.59	0.65	0.71	0.69	0.76	0.68
Mungbeans	0.49	0.50	0.53	0.57	0.57	0.53
Sweet potato	4.16	4.38	4.66	4.91	5.68	4.89
Cassava	4.04	4.54	4.85	4.81	6.14	4.97
Vegetables	1.66	1.19	1.22	1.40	2.13	1.55
Tree Crop						
(Estate Crop)						
-Rubber	0.46	0.50	0.53	0.50	0.52	0.50
-Coconut	1.22	1.20	1.20	1.10	1.10	1.16
-Clove	0.15	0.14	0.13	0.08	0.10	0.11
-Coffee	0.30	0.30	0.29	0.30	0.35	0.31
-Cashewnut	0.00	0.00	0.00	0.00	0.00	0.00
(Fruits)						
-Banana	10.53	9.72	8.78	7.02	5.97	7.65
-Rambutan	1.76	0.56	0.88	2.62	2.00	1.72
-Citrus	2.29	2.33	2.44	2.78	2.75	2.53

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.3 Unit Yield of Major Crops in the Study Area
Kabupaten Tapin (6/6)

Unit: ton/ha

Crop	1982	1983	1984	1985	1986	Average 1982-86
Paddy	2.76	3.07	3.20	3.16	3.15	3.08
Wetland paddy	2.91	3.14	3.34	3.27	3.25	3.19
Upland paddy	1.98	2.10	2.10	2.00	2.22	2.07
Upland Crop						
Maize	0.75	0.62	0.65	0.71	0.89	0.70
Groundnut	0.92	0.68	0.83	1.08	1.12	0.90
Soybeans	0.59	0.67	0.57	1.13	1.18	1.05
Mungbeans	0.00	0.46	0.63	0.61	0.63	0.58
Sweet potato	8.02	8.11	7.80	8.06	6.88	7.97
Cassava	10.00	9.62	9.50	10.99	9.87	9.99
Vegetables	0.57	2.30	2.43	2.45	2.15	2.07
Tree Crop						
(Estate Crop)						
-Rubber	0.45	0.45	0.48	0.50	0.53	0.48
-Coconut	0.75	0.75	0.70	0.65	0.65	0.70
-Clove	0.20	0.20	0.15	0.10	0.10	0.14
-Coffee	0.35	0.35	0.35	0.35	0.35	0.35
-Cashewnut	0.45	0.43	0.17	0.08	0.08	0.24
(Fruits)						
-Banana	2.10	2.05	3.70	5.77	5.89	4.11
-Rambutan	3.05	3.01	4.12	2.79	3.10	3.12
-Citrus	3.25	3.89	2.94	4.67	3.44	3.71

Source: Provincial Agricultural Office, South Kalimantan Province

Table 2.4 Population and Production of Major Livestocks in the Study Area
Summary Table (1/6)

Item	Tabalong			H.S.U			H.S.T			H.S.S			Tapin			Study Area		
	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	5,800	170		2,657	82		3,954	128		2,535	78		8,703	280		23,649	738	
Buffalo	43	1		9,588	105		3,885	43		3,092	31		997	9		17,605	189	
Pig	6,053	72		1,135	17		1,173	17		180	3		59	1		8,600	110	
Horse	9			134			61			7			722			933	0	
Goat	9,171	17		6,501	15		13,425	30		3,283	8		4,269	10		36,649	80	
Sheep	530	0.46		3,773	4.49		5,609	2.3		1,955	0.92		451	0.33		12,318	8.5	
Chicken																		
-Improved	14,682	13	209	41,146	26	419	38,650	25	392	14,212	8	120	9,012	9	128	117,702	81	1,268
-Native	326,290	355	135	509,838	558	212	661,744	766	296	437,156	485	185	355,266	389	148	2,290,294	2,553	976
Duck	63,480	24	227	686,874	278	2,569	392,536	164	1,598	409,016	166	1,519	61,960	26	238	1,613,866	658	6,151

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988",
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.4 Population and Production of Major Livestocks in the Study Area
Kabupaten Tabalong (2/6)

Item	1982	1983			1984			1985			1986			Average /1		
	Popula'n (head)	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	6,862	5,176	174		5,482	162		5,547	170		5,935	173		5,800	170	
Buffalo	48	49	1		51	1		45			21			43	1	
Pig	8,000	7,030	73		6,724	97		5,518	76		2,995	43		6,053	72	
Horse	10	10			10			11			4			9		
Goat	9,242	8,071	15		8,313	15		6,662	23		8,569	15		8,171	17	
Sheep	686	619	0.37		625	0		652	0.96		70	0.15		530	0.46	
Chicken																
-Improved	11,010	3,600	1	23	14,900	6	104	14,500	7	98	30,300	38	609	14,862	13	206
-Native	326,680	317,470	341	116	318,300	341	126	321,400	366	151	347,600	372	147	326,290	355	135
Duck	76,960	57,480	24	197	58,600	23	193	55,100	23	192	69,300	27	324	63,480	24	227

Remarks: /1; Average of population, five years average 1982 to 1986
Average of production, four years average 1983 to 1986

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988",
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.4 Population and Production of Major Livestocks in the Study Area
Kabupaten Hulu Sungai Utara (3/6)

Item	1982	1983			1984			1985			1986			Average /1		
	Popula'n (head)	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	2,615	2,676	90		2,807	83		2,480	76		2,707	79		2,657	82	
Buffalo	7,944	9,964	113		9,975	106		9,891	107		10,164	92		9,588	105	
Pig	538	811	8		868	12		1,670	23		1,787	26		1,135	17	
Horse	142	140			141			142			106			134		
Goat	7,501	6,731	13		6,932	13		7,200	25		4,141	7		6,501	15	
Sheep	3,510	3,370	2.02		4,414	2.6		4,558	6.75		3,013	6.57		3,773	4.49	
Chicken																
-Improved	37,150	41,800	15	265	43,700	18	306	42,600	21	290	40,480	51	813	41,146	26	419
-Native	501,390	506,400	543	185	508,100	546	201	513,100	585	241	520,200	557	220	509,838	558	212
Duck	675,210	681,960	279	2,337	692,500	278	2,286	690,400	283	2,404	694,300	270	3,248	686,874	278	2,569

Remarks: /1; Average of population, five years average 1982 to 1986
Average of production, four years average 1983 to 1986

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988".
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.4 Population and Production of Major Livestocks in the Study Area
Kabupaten Hulu Sungai TEngah (4/6)

Item	1982	1983			1984			1985			1986			Average /1		
	Popula'n (head)	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	3,020	3,225	108		3,567	105		4,698	144		5,262	153		3,954	128	
Buffalo	3,062	3,562	40		3,804	41		4,324	47		4,675	42		3,885	43	
Pig	731	811	8		868	12		1,670	23		1,787	26		1,173	17	
Horse	51	56			57			69			74			61		
Goat	11,182	9,719	20		10,410	18		12,873	43		22,943	40		13,425	30	
Sheep	16,082	5,221	3.14		5,437	3.2					1,304	2.85		5,609	2.3	
Chicken																
-Improved	36,610	39,500	15	251	41,300	17	289	37,200	18	252	38,670	49	777	38,650	25	392
-Native	507,640	478,880	514	174	480,200	515	191	888,400	1,012	416	953,600	1,021	402	661,744	766	296
Duck	320,600	309,980	127	1,062	315,300	126	1,041	391,600	161	1,363	625,200	243	2,925	392,536	164	1,598

Remarks: /1; Average of population, five years average 1982 to 1986
Average of production, four years average 1983 to 1986

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988",
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.4 Population and Production of Major Livestocks in the Study Area
Kabupaten Hulu Sungai Selatan (5/6)

Item	1982	1983			1984			1985			1986			Average /1		
	Popula'n (head)	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	2,461	2,369	79		2,498	74		2,639	81		2,710	79		2,535	2,535	
Buffalo	3,762	3,821	43		3,833	41		1,909	21		2,135	19		3,092	3,092	
Pig	140	148	2		173	2		202	3		237	3		180	180	
Horse	5	7			7			7			7			7	7	
Goat	2,029	2,564	5		3,139	6		3,643	13		5,041	9		3,283	3,283	
Sheep	3,584	3,558	2.13		2,682	1.55								1,955	1,955	
Chicken																
-Improved	17,170	18,010	7	114	12,800	5	89	14,000	7	95	9,080	11	182	14,212	14,212	120
-Native	405,690	405,690	436	148	457,600	491	182	458,500	522	215	458,300	491	194	437,156	485	185
Duck	397,000	406,580	166	1,393	420,700	168	168	453,900	187	1,580	366,900	143	1,716	409,016	166	1,519

Remarks: /1; Average of population, five years average 1982 to 1986
Average of production, four years average 1983 to 1986

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988",
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.4 Population and Production of Major Livestocks in the Study Area
Kabupaten Tapin (6/6)

Item	1982	1983			1984			1985			1986			Average /1		
	Popula'n (head)	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg	Popula'n (head)	Prod'n (ton) Meat	Prod'n (ton) Egg
Cattle	6,962	8,318	279		8,993	266		9,109	279		10,135	296		8,703	280	
Buffalo	1,478	1,183	13		997	11		508	5		820	7		997	9	
Pig	89	91	1		42	1		36			38	1		59	1	
Horse	658	671			703			778			799			722		
Goat	3,670	3,773	7		4,376	8		4,546	16		4,980	9		4,269	10	
Sheep	812	575	0.34		482	0.28		191	0.28		196	0.43		451	0.33	
Chicken																
-Improved	1,510	4,270	2	27	8,900	4	62	14,000	7	95	16,380	21	329	9,012	9	128
-Native	346,960	349,870	376	127	351,800	377	140	355,100	405	167	372,600	399	157	355,266	389	148
Duck	56,650	58,750	24	201	61,200	25	202	63,400	26	221	69,800	27	327	61,960	26	238

Remarks: /1; Average of population, five years average 1982 to 1986
Average of production, four years average 1983 to 1986

Source: Population, Sub-office of Live Stock, Agricultural Office South Kalimantan Prpvince.
Production, Estimated from "Statistical Book on Livestock 1988",
Directorate of Livestock Program,
Directorate General of Livestock Services,
Livestock Production Improvement Project

Table 2.5 Farm Input and Labour Requirement per Ha of
Major Crops Under Present Condition
Wetland Paddy (1/4)

Item/Field Condition		(i) Existing Irrigation Schemes/ Rainfed Area	(ii) Existing Drainage and Polder/ Swamp Area
1. Farm Input			
- Seed	(kg)	25	20
- Fertilizer			
Urea	(kg)	100	0
TSP	(kg)	50	0
KCl	(kg)	0	0
- Agro-chemical			
Pesticide	(lit.)	3	0
Rodenticide	(kg)	3	0
2. Labour Requirement	(m/d)		
- Nursery Preparation/ Seedling Treatment		10	5
- Land Preparation		25	20
- Transplanting		25	25
- Fertilizer Application		5	0
- Agro-chemical Application		5	0
- Weeding		20	20
- Water Management		0	0
- Harvesting		30	30
- Threshing/Drying/ Transportation		20	20
Total Requirement		140	120

Table 2.5 Farm Input and Labour Requirement per Ha of
Major Crops Under Present Condition
Palawija Crops (2/4)

Item/Crop		Maize	Soybeans	Groundnuts	Mungbeans
1. Farm Input					
- Seed	(kg)	30	30	50	25
- Fertilizer					
Urea	(kg)	0	0	0	0
TSP	(kg)	0	0	0	0
- Agro-chemical					
Pesticide	(lit.)	0	0	0	0
2. Labour Requirement	(m/d)				
- Land Preparation		0	0	0	0
- Seeding		10	10	15	10
- Fertilizer Application		0	0	0	0
- Agro-chemical Application		0	0	0	0
- Weeding		15	20	15	20
- Harvesting/Threshing/ Drying/Transportation		20	20	25	20
Total Requirement		45	50	55	50

Table 2.5 Farm Input and Labour Requirement per Ha of
Major Crops Under Present Condition
Annual Upland Crops (3/4)

Item/Crop		Cassava	Sweet Potato	Upland Paddy
1. Farm Input				
- Seed	(kg)	10,000 *1	25,000 *1	40
- Fertilizer				
Urea	(kg)	0	0	100
TSP	(kg)	0	0	50
- Agro-chemical				
Pesticide	(lit.)	0	0	2
2. Labour Requirement	(m/d)			
- Land Preparation		25	30	30
- Seeding		15	20	20
- Fertilizer Application		0	0	5
- Agro-chemical Application		0	0	5
- Weeding		20	25	30
- Harvesting/Threshing/ Drying/Transportation		25	30	20
Total Requirement		85	105	110

Remarkes: *1; Sticks per ha.

Table 2.5 Farm Input and Labour Requirement per Ha of
Major Crops Under Present Condition
Perennial Crops (4/4)

Item/Crop		Rubber	Coconut
1. Farm Input			
- Fertilizer			
Urea	(kg)	0	0
TSP	(kg)	0	0
KCl	(kg)	0	0
- Agro-chemical			
Pesticide	(lit.)	0	0
2. Labour Rec	(m/d)		
- Fertilizer Application		0	0
- Agro-chemical Application		0	0
- Weeding		30	15
- Harvesting/Processing		150	30
Total Requirement		180	45

Table 3.1 (1/3) Proposed Farming Practices of Palawija Crops
Maize

Days	Managements	Amount of Implements
	Preparation of field	Using of animal power
0	Sowing	40 kg/ha, spacing 50 x 100 cm
15	Application of fertilizer (1st)	Urea 60 kg/ha, TSP 50 kg/ha
17	Intertillage and weeding (1st)	Hoe and hand
30	Control of insect damage (1st)	Insecticide 2 lit/ha
40	Application of fertilizer (2nd)	Urea 40 kg/ha
43	Intertillage and weeding	Hoe and hand
95	Harvesting	
100	Drying	
105	Cleaning	

Notes: 1) High yielding varieties: Arjuna, Harapan baru, H-68, H-159
2) This table is compiled on the basis of the data published by Central Research Institute for Agriculture, Bogor.

Table 3.1 (2/3) Proposed Farming Practices of Palawija Crops
Groundnut

Days	Managements	Amount of Implements
	Preparation of field	Using of animal power
0	Sowing	Seed 80 kg/ha, spacing 25 x 25 cm
17	Application of fertilizer (1st)	Urea 100 kg/ha, TSP 40 kg/ha
20	Intertillage and weeding	Hoe and hand
35	Control of insect damage (1st)	Spraying of insecticides 2 lit/ha
45	Application of fertilizer (2nd)	Urea 50 kg/ha
47	Intertillage and weeding (2nd)	Hoe and hand
100	Harvesting	
105	Drying	
110	Cleaning	

Notes: 1) High yielding varieties: Gajah, Banteng, Gajah Campur, Kidang, Macan.
2) This table is compiled on the basis of the data published by Central Research Institute for Agriculture, Bogor.

Table 3.1 (3/3) Proposed Farming Practices of Palawija Crops
Soybeans and Mungbeans

Days	Managements	Amount of Implements
	Preparation of field	Using of animal power
0	Sowing	Seed 40 kg/ha, spacing 30 x 50 cm
15	Application of fertilizer (1st)	Urea 50 kg/ha, TSP 100 kg/ha
17	Intertillage and weeding (1st)	Hoe and hand
30	Control of insect damage (1st)	Spraying of insecticides 1 lit/ha
40	Application of fertilizer (2nd)	Urea 50 kg/ha
45	Intertillage and weeding (2nd)	Hoe and hand
90	Harvesting	
95	Drying	
100	Cleaning	

Notes: 1) High yielding varieties: Mungbeans; No.129, Bhakti, Artaijo, Siwalik.
Soybeans; Orba, Wilis, Kucir, Mas.
2) This table is compiled on the basis of the data published by Central Research Institute for Agriculture, Bogor.

Table 3.2 Farm Input and Labour Requirement per Ha of Major Crops Under With and Without Project Conditions Wetland Paddy

Item/Field Condition		(i) Existing Irrigation Schemes/ Rainfed Area		(ii) Existing Drainage and Polder/ Swamp Area	
		With	Without	With	Without
1. Farm Input					
- Seed	(kg)	40	25	25	20
- Fertilizer					
Urea	(kg)	200	100	100	0
TSP	(kg)	150	50	80	0
KCl	(kg)	100	0	0	0
- Agro-chemical					
Pesticide	(lit.)	3	3	3	0
Rodenticide	(kg)	3	3	3	0
2. Labour Requirement	(m/d)				
- Nursery Preparation/ Seedling Treatment		20	10	10	5
- Land Preparation		30	25	30	20
- Transplanting		35	25	30	25
- Fertilizer Application		10	5	5	0
- Agro-chemical Application		5	5	5	0
- Weeding		30	20	30	20
- Water Management		10	0	0	0
- Harvesting		40	30	30	30
- Threshing/Drying/ Transportation		30	20	20	20
Total Requirement		210	140	160	120
3. Animal Power *1	(t/d)	15	0	15	

Remarks: *1; Animal power is mainly used for land preparation and includes for the use of two cattles or buffaloes with an operator.

Table 3.3 Farm Input and Labour Requirement per Ha of Major Crops Under With and Without Project Conditions Palawija Crops

Item/Crop		Maize		Soybeans		Groundnuts		Mungbeans	
		With	Without	With	Without	With	Without	With	Without
1. Farm Input									
- Seed	(kg)	40	30	40	30		50		25
- Fertilizer									
Urea	(kg)	100	0	100	0		0		0
TSP	(kg)	50	0	10	0		0		0
- Agro-chemical									
Pesticide	(lit.)	2	0	2	0	2	0	2	0
2. Labour Requirement	(m/d)								
- Land Preparation		15	0	10	0	10	0	10	0
- Seeding		15	10	15	10	15	15	15	10
- Fertilizer Application		5	0	5	0	5	0	5	0
- Agro-chemical Application		5	0	5	0	5	0	5	0
- Weeding		30	15	35	20	35	15	35	20
- Harvesting/Threshing/ Drying/Transportation		30	20	35	20	40	25	35	20
Total Requirement		100	45	105	50	110	55	105	50
3. Animal Power *1	(t/d)	10	0	10	0	10	0	10	0

Remarks: *1; Animal power is mainly used for land preparation and includes for the use of two cattles or buffaloes with an operator.

Table 3.4 Change in Paddy Planted Area in Study Area

(Unit: ha)

Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	9,651	2,749	11,047	6,141	40,434	31,119
Drained	15,906	1,738	34,819	3,550	63,949	6,135
(Irrigated)	(-)	(-)	(-)	(-)	(1,800)	(2,585)
Poldered	4,500	9,203	4,500	9,203	4,500	18,279
(Irrigated)	(4,500)	(-)	(4,500)	(-)	(4,500)	(4,500)
Rainfed	64,475	60,027	62,979	41,297	35,692	29,991
(Swamps)	(100)	(60,027)	(-)	(41,297)	(-)	(29,991)
(Alluvial plains)	(62,049)	(-)	(60,653)	(-)	(33,366)	(-)
(Alluvial valleys)	(2,326)	(-)	(2,326)	(-)	(2,326)	(-)
Total	94,532	73,717	113,345	60,191	144,575	85,524

Table 3.5 Change in Paddy Planted Area in Kabupaten Tabalong

(Unit: ha)

Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	825	436	1,079	674	3,652	2,904
Drained	952	688	1,525	1,500	2,355	1,500
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Poldered	-	480	-	480	-	562
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Rainfed	6,175	2,530	5,921	1,145	3,348	233
(Swamps)	(-)	(2,530)	(-)	(1,145)	(-)	(233)
(Alluvial plains)	(6,175)	(-)	(5,921)	(-)	(3,348)	(-)
(Alluvial valleys)	(-)	(-)	(-)	(-)	(-)	(-)
Total	7,952	4,134	8,525	3,799	9,355	5,199

Table 3.6 Change in Paddy Planted Area in Kabupaten Hulu Sungai Utara

(Unit: ha)

Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	604	133	653	347	6,559	5,443
Drained	650	200	3,355	-	7,955	785
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(785)
Poldered	4,500	8,723	4,500	8,723	4,500	17,117
(Irrigated)	(4,500)	(-)	(4,500)	(-)	(4,500)	(4,500)
Rainfed	8,886	12,127	8,837	11,417	2,931	7,523
(Swamps)	(-)	(12,127)	(-)	(11,417)	(-)	(7,523)
(Alluvial plains)	(6,560)	(-)	(6,511)	(-)	(605)	(-)
(Alluvial valleys)	(2,326)	(-)	(2,326)	(-)	(2,326)	(-)
Total	14,640	21,183	17,345	20,487	21,945	30,868

Table 3.7 Change in Paddy Planted Area in Kabupaten Hulu Sungai Tengah

(Unit: ha)

Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	2,964	955	4,231	3,386	12,732	11,887
Drained	1,310	-	4,134	900	8,034	2,300
(Irrigated)	(-)	(-)	(-)	(-)	(1,400)	(1,400)
Poldered	-	-	-	-	-	-
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Rainfed	34,891	9,575	33,524	6,051	25,023	4,451
(Swamps)	(100)	(9,575)	(-)	(6,051)	(25,023)	(4,451)
(Alluvial plains)	(34,791)	(-)	(33,524)	(-)	(-)	(-)
(Alluvial valleys)	(-)	(-)	(-)	(-)	(-)	(-)
Total	39,165	10,530	41,889	10,337	45,789	18,638

Table 3.8 Change in Paddy Planted Area in Kabupaten Hulu Sungai Selatan

(Unit: ha)

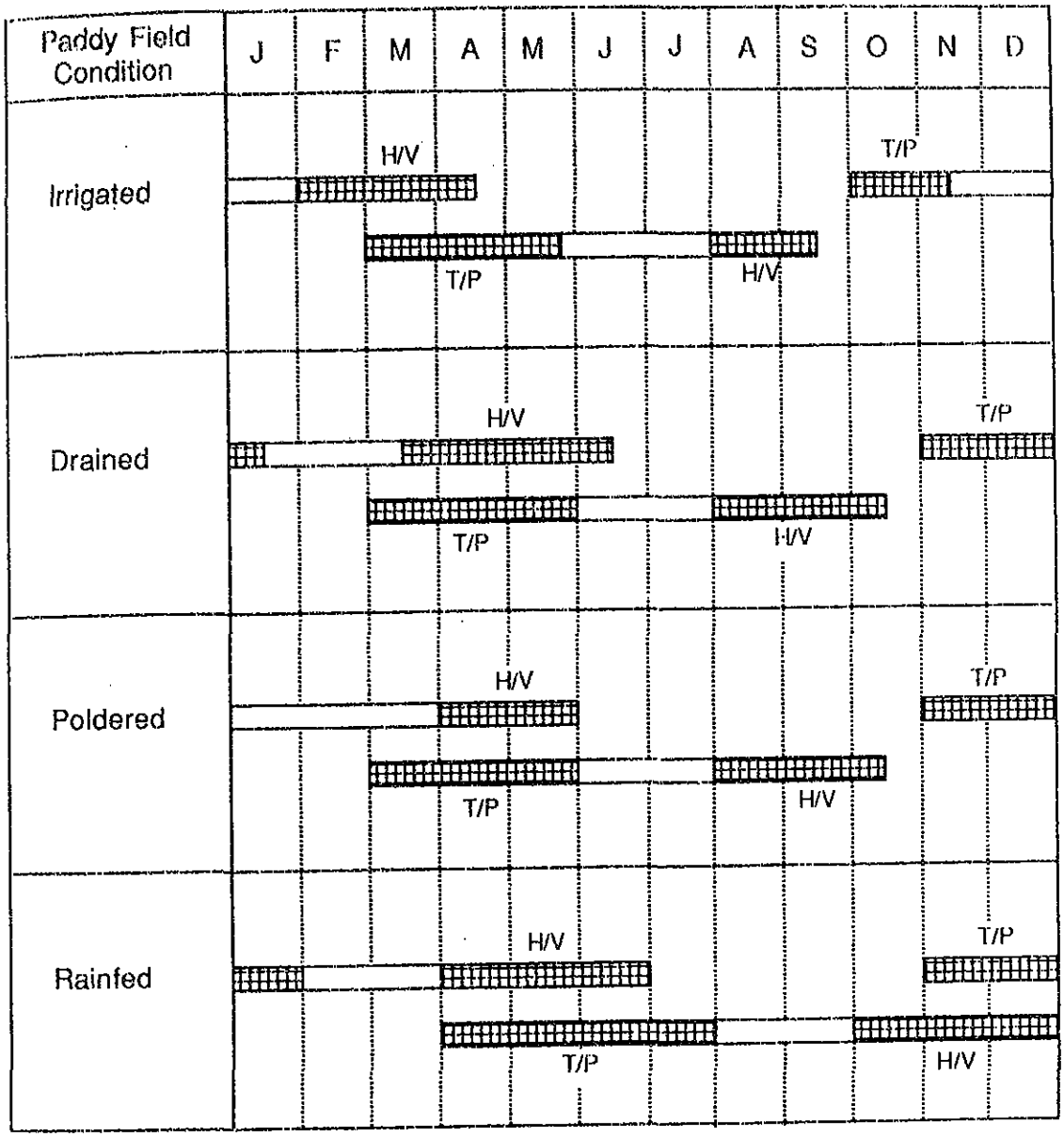
Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	3,838	1,050	2,426	770	9,205	6,310
Drained	5,000	500	10,105	600	23,905	600
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Poldered	-	-	-	-	-	600
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Rainfed	8,662	18,980	10,074	13,775	3,295	10,875
(Swamps)	(-)	(18,980)	(-)	(13,775)	(-)	(10,875)
(Alluvial plains)	(8,662)	(-)	(10,074)	(-)	(3,295)	(-)
(Alluvial valleys)	(-)	(-)	(-)	(-)	(-)	(-)
Total	17,500	20,530	22,605	15,145	36,405	18,385

Table 3.9 Change in Paddy Planted Area in Kabupaten Tapin

(Unit: ha)

Type of Production Basis	Present		Future Production Basis Improvement			
			Without		With	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Irrigated	3,510	1,420	2,658	964	8,286	4,575
Drained	7,994	350	15,700	550	21,700	950
(Irrigated)	(-)	(-)	(-)	(-)	(400)	(400)
Poldered	-	-	-	-	-	-
(Irrigated)	(-)	(-)	(-)	(-)	(-)	(-)
Rainfed	5,861	16,515	4,623	8,609	1,095	6,609
(Swamps)	(-)	(16,515)	(-)	(8,609)	(-)	(6,609)
(Alluvial plains)	(5,861)	(-)	(4,623)	(-)	(1,095)	(-)
(Alluvial valleys)	(-)	(-)	(-)	(-)	(-)	(-)
Total	17,365	18,285	22,981	10,123	31,081	12,134

FIGURES



Remarks : H/V : Harvesting
T/P : Transplanting

Figure 2.1 Present Cropping Calendar by Type of Scheme

REPUBLIC OF INDONESIA
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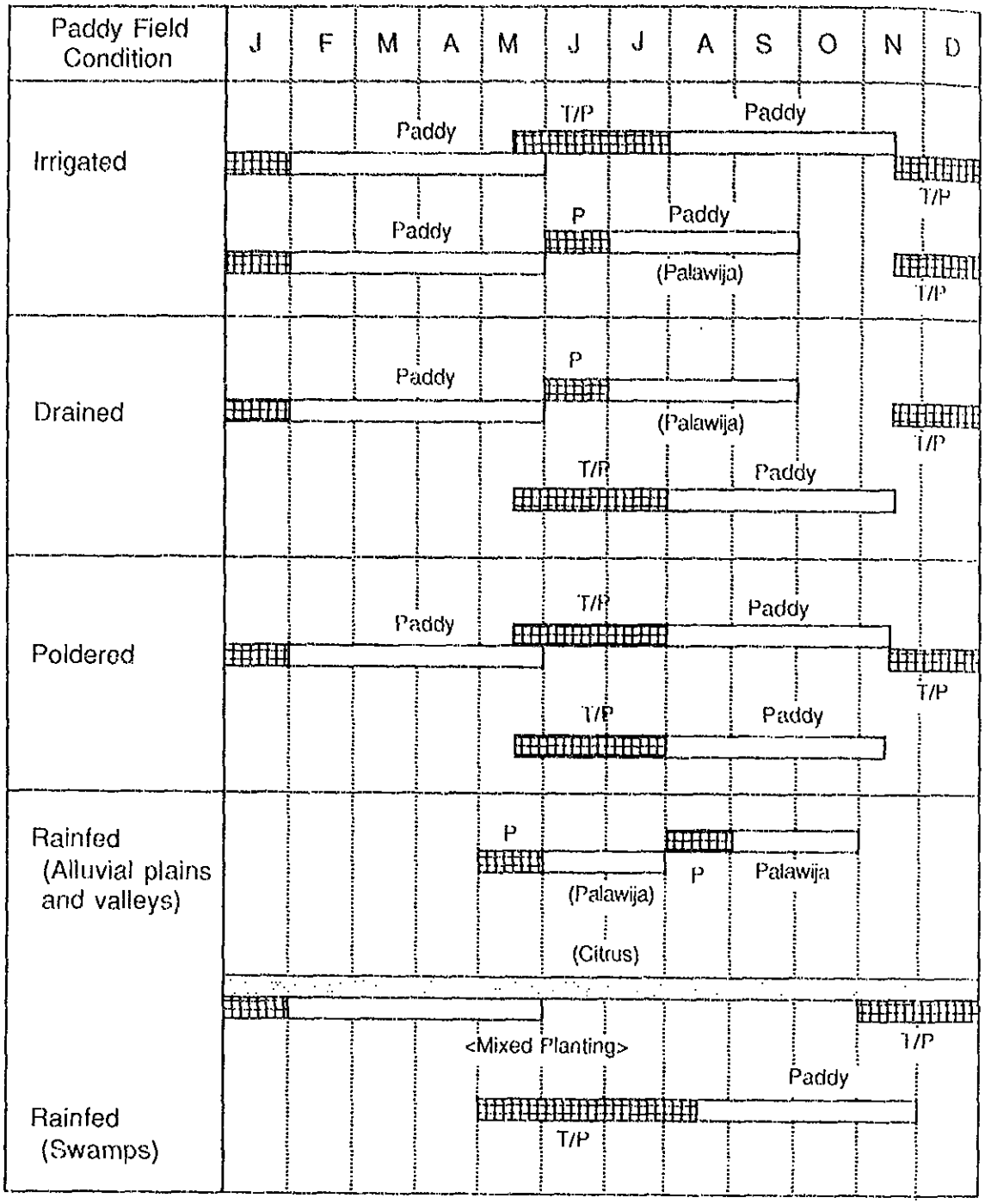
NEGARA RIVER BASIN OVERALL IRRIGATION DEVELOPMENT PLAN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY



Remarks: T/P: Transplanting
P: Planting

Figure 3.1 Proposed Cropping Calendar by Type of Scheme

REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
NEGARA RIVER BASIN OVERALL IRRIGATION DEVELOPMENT PLAN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY

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D - 03	Test Farm P4S Fakultas Pertanian, Universitas Gadjah Mada, Yogyakarta (Test Farm Results, Agricultural - Faculty, P4S, Gadjah Mada University, Vol. 1/2	1981	P4S, Agricultural Faculty of Gadjah Mada University
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D - 05	Rice : Soil, Water, Land	1978	Frans. R. Moormann and Nice Van Breemen, IRRI
D - 06	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)
D - 07	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record, Kabupaten Tapin)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)
D - 08	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record, Kabupaten Hulu Sungai Selatan)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)
D - 09	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record, Kabupaten Hulu Sungai Tengah)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)
D - 10	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record, Kabupaten Hulu Sungai Utara)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)

Number in Order	Title	Year Issued	Author/ Organization Issued
D - 11	Sensus Pertanian 1983, Data, Hasil Pendaftaran, Rumah Tangga (Agricultural Statistics 1983, Household Record, Kabupaten Tabalong)	1984	Biro Pusat Statistik, Kantor Statistik, Propinsi Kalimantan Selatan (Central Statistics Bureau, Statistics Office, Province of South Kalimantan)
D - 12	Sensus Pertanian 1983, (Agricultural-Census) Hasil Sensus Sampel (Result of sample Census) Kalimantan Selatan	1986	Biro Pusat Statistik Jakarta - Indonesia (Central Bureau of Statistics)
D - 13	Statistik Kehutanan, Propinsi Kalimantan Selatan, Tahun : 1985/1986 (Estimate Statistics, Province of South Kalimantan, 1985/1986)	1986	Departemen Kehutanan, Kantor Wilayah Propinsi Kalimantan Selatan, Banjarbaru (Planning Departmen, Regional
	Dibuat dalam rangka, Bagian Proyek Perencanaan dan Pengendalian Pembangunan, Kehutanan Propinsi Dati I Kalimantan Selatan Tahun 1986/1987		Office, Province South-Kalimantan, Banjarbaru)
D - 14	Kabupaten Dati II Hulu Sungai Selatan Fakta dan Penjelasan (Facts and Expantion on Kabupaten Hulu Sungai Selatan) Publikasi No.319 Kerja sama dengan, Pemerintah Kabupaten Dati II Hulu Sungai Selatan	1984	Direktorat Tata Guna Tanah Direktorat Jenderal Agraria Departemen Dalam Negeri
D - 15	Kabupaten Dati II Tapin, Fakta Dan Penjelasan (Facts and Expantion on Kabupaten Tapin) Publikasi No.427 Kerja sama dengan, Pemerintah Kabupaten Dati II Tapin	1984	Direktorat Tata Guna Tanah Direktorat Jenderal Agraria Departemen Dalam Negeri
D - 16	Kabupaten Dati II Tabalong, Fakta dan Penjelasan (Facts and Expantion on Kabupaten Tabalong) Publikasi No. 477 Kerja sama dengan, Pemerintah Kabupaten Dati II Tabalong	1984	Direktorat Tata Guna Tanah Direktorat Jenderal Agraria Departemen Dalam Negeri
D - 17	Kabupaten Dati II Hulu Sungai Utara Fakta dan Penjelasan (Facts and Expantion on Kabupaten Hulu Sungai Utara) Publikasi No. Kerja sama dengan, Pemerintah Kabupaten Dati II Hulu Sungai Utara	1984	Direktorat Tata Guna Tanah Direktorat Jenderal Agraria Departemen Dalam Negeri

Number in Order	Title	Year Issued	Author/ Organization Issued
D - 18	Statistik Kehutanan, Propinsi Kalimantan Selatan Tahun 1986/1987 (Estimation and Statistics of South Kalimantan Province, 1986/1987)	1987	Departemen Kehutanan, Kantor Wilayah Propinsi Kalimantan Selatan, Banjarbaru
D - 19	Pengembangan Sistem Pengamatan, Peramalan, Pengendalian Jasad Pengganggu Dan Pengawasan Pestisida Di Balai Proteksi tanaman Pangan VIII, Banjarmasin, Evaluasi selama PELITA IV (1984-1988) (Development of System For Observation, Forecasting and Control of Plant Disease and Pesticide in Center for Food Crop Protection VIII, Banjarmasin, Evaluation during "PELITA IV", 1984-1988)	1988	Direktorat Jenderal Pertanian Tanaman Pangan, Balai Proteksi VIII, Banjarmasin (Directorate General of Agriculture, Food Crop, Center For Food Crop Protection VIII, Banjarmasin
D - 20	Kegiatan dan Data Operasional Dolog Kal Sel (1983/84 - 1987/88) (Activity and Data on Operation of "DOLOG", South Kalimantan 1983/84-1987/88)	1988	DOLOG, Banjarmasin
D - 21	Peta Lokasi Gudang Dolog di Kalimantan, Buku III (Location Map of Warehouse Operated by Dolog in Kalimantan)	1985	BULOG, Jakarta
D - 22	Kabupaten Daerah Tingkat II Hulu Sungai Tengah Fakta dan Penjelasan (Facts and Explanation on Kabupaten Hulu Sungai Tengah) Publikasi No. 476 Kerja sama Dengan Pemerintah Kabupaten Daerah Tingkat II Hulu Sungai Tengah	1986	Direktorat Tata Guna Tanah, Direktorat Jenderal Agraria Departemen Dalam Negeri
D - 23	The Agroclimatic Maps of Kalimantan, Maluku, Irian Jaya and Bali, West and East Nusa Tenggara	1980	Central Research Institute for Agriculture, Bogor
D - 24	Agro Climatology Special Series (II) A Compilation of Long - Term Monthly Rainfall Data for Kalimantan, Bali, Nusa Tenggara, Maluku and Irian Jaya	1980	Central Research Institute for Agriculture, Bogor
D - 25	*Occurence of Rice Yellow Dwarf* in Indonesia	1978	Central Research Institute for Agriculture, Bogor

Number in Order	Title	Year Issued	Author/ Organization Issued
D - 26	Laporan Tahunan Dinas, Tahun 1986/1987 (Annual Report on Activity, 1986/1987)	1987	Dinas Pertanian Tanaman Pangan Propinsi Daerah Tingkat I, Kalimantan Selatan (Provincial office of Agriculture and Food Crops)
D - 27	Laporan : Inventarisasi Data Perusahaan Penggilingan Padi Huller dan Penyosohan Beras tahun 1987 di Propinsi Daerah Tk I. Kalimantan Selatan (Data Inventarization of Rice Mill Unit and Huller, year of 1987 in South Kalimantan Province)	1988	Sub Dinas Bina Usaha Petani dan Pengolahan Hasil - Dinas Pertanian Tanaman Pangan Propinsi Dati I. KalSel Banjarbaru (Sub Dinas of Farmer Business and yield Processing - Dinas of Food Crops - South
D - 28	USAHA PETERNAKAN Perencanaan Usaha, Analisa dan Pengelolaan (Livesock Busines : Business Planning, Analysa and Management)	-	Direktorat Bina Usaha Petani Ternak dan Pengolahan Hasil Peternakan Direktorat Jenderal Peternakan (Directorate of cattle Farm Management and Yield Processing of Livestock -Directorate General of Livestock)
D - 29	Data Statistik Perkebunan tahun 1987 (Estate Crops Statistic Data, 1987)	1988	Asian Development Bank (ADB) in Cooperation with Lambung Mangkurat University Banjarbaru. (DINAS of ESTATE crops Kal.Sel)
D - 30	Base - Line Report : Livestock Development in South Kalimantan : A Project Benefit Monitoring and Evaluation	1985	Asian Development Bank (ADB) in Cooperation with Lambung Mangkurat University Banjarbaru
D - 31	Interim Second - Phase Report ADB - Assisted Livestock Development in South Kalimantan : A Project Benefit Monitoring and Evaluation	1986	Asian Development Bank (ADB) in Cooperation with Lambung Mangkurat University Banjarbaru
D - 32	Third - Phase Report ADB - Assisted Development in South Kalimantan : A Project Benefit Monitoring and Evaluation	1987	Asian Development Bank (ADB) in Cooperation with Lambung Mangkurat Livestock University Banjarbaru

Number in Order	Title	Year Issued	Author/ Organization Issued
D - 33	Laporan : Survey Populasi dan Angka Kelahiran ternak sapi di Daerah H.S Selatan, Tengah dan Utara, dalam rangka Program Pengembangan Wilayah II Propinsi Kalimantan Selatan (Population Survey and Fertility of Cow Livestock in Kab. H.S.S; H.S.T; and H.S.U.)	1983	Badan Perencanaan Pembangunan Daerah (BAPPEDA) Propinsi Kalimantan Selatan Banjarmasin
D - 34	Laporan Tahunan Penyelenggaraan BBI Padi 1987/1988 (Annual Report - Implementation of Paddy seed Center, 1987/1988)	1988	Balai Benih Induk Padi Binuang (Paddy Seed Center in Binuang)
D - 35	Rencana Intensifikasi Padi, Palawija dan Sayuran Tahun Anggaran 1988/89 (Intensification Plan for Paddy, Palawija and Vegetables, Budget year 1988/89)	1988	Satuan Pelaksanaan BIMAS Kabupaten H.S. Utara (Secretariate BIMAS in Utara)
D - 36	Harga Pasar Komoditi Perkebunan Kalimantan Selatan Triwulan IV Tahun Anggaran 1987/88 (Market Price of Estate Commodity in South Kalimantan , Januari 1 - Maret 31 1988)	1988	Dinas Perkebunan Kalimantan Selatan (Dinas Estate Crops South Kalimantan Province)

ANNEX E
AGRO-ECONOMY

ANNEX E AGRO-ECONOMY

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1. INTRODUCTION

This sectoral study report describes present agricultural conditions, identifies the constraints encountered in the Study Area and provides recommendation which should be taken into account for the agricultural development planning.

The collection of the existing data was mainly done from the following government authorities concerned and private institutions.

National level:

a. Directorate General of Food Crops, Ministry of Agriculture
b. Directorate General of Estate Crops, Ministry of Agriculture
c. Directorate General of Fishery, Ministry of Agriculture
d. Agency for Agricultural Education, Training and Extension
e. Directorate General of Water Resources Development, Ministry of Public Works
f. Central Bureau of Statistics
g. National Logistic Board (BULOG)

Province and Kabupaten level:

a. Provincial Development Planning Agency (BAPPEDA), South Kalimantan
b. KANWIL Agriculture, South Kalimantan
c. KANWIL Forestry, South Kalimantan
d. KANWIL Transmigration, South Kalimantan
e. KANWIL Cooperative, South Kalimantan
f. DINAS Food Crops, South Kalimantan
g. DINAS Estate Crops, South Kalimantan
h. DINAS Fishery, South Kalimantan
i. DINAS Livestock, South Kalimantan
j. Provincial BIMAS Secretariat, South Kalimantan
k. Banjarbaru Research Institute for Food Crops
l. Food Crops Protection Center, South Kalimantan
m. Seed Control and Certification Center, South Kalimantan
n. Provincial Public Works, South Kalimantan
o. Bank Indonesia, Regional Office, Banjarmasin
p. KANWIL Bank Rakyat Indonesia, Banjarmasin
q. P.T. Pertani, Banjarmasin
r. P.T. Pusri, Banjarmasin
s. Regional Logistic Depot (DOLOG), Banjarmasin
t. Statistics Office, South Kalimantan
u. Kabupaten Offices in Tabalong, Hulu Sungai Utara, Hulu Sungai Tengah, Hulu Sungai Selatan and Tapin

2. AGRICULTURAL BACKGROUND

2.1 Role of Agriculture in National Economy

Agriculture is the back bone of the Indonesian economy. More than 75% of the population live in rural areas and agriculture directly employs more than 50% of the labor force. The sector accounts for about 25% of GDP every year and has contributed to almost 50% of the non-oil export earnings since 1980.

Real agricultural GDP grew steady at an annual average rate of 3.8% p.a. during 1970s and 3.1% p.a. from 1980 to 1986 (see Table 2.4, Annex A). This growth derived from undertaking of the Government's program for increasing rice production to large extent. The paddy production increased from 18 million tons in 1969, the first year of the Repelita I, to 35 million tons in 1983, the last year of the Repelita III, as shown in Table 2.1. As a result, the self-sufficiency of rice was realized in 1985. Since then, however, high-productive paddy field in Java has been converted due to urbanization and industrialization. There has been no considerable increase in the annual rice production of the country as a whole. As seen in Table 2.1, the increase rate of paddy output dropped to 2.4% p.a. in 1985 and 1.8% p.a. in 1986, though it was high at 7.7% p.a. during 1979-1983 period on an average. The increase rate in 1986 was lower than the estimated population growth of 2.12% p.a. for that year. The maintenance of self-sufficiency of rice is, therefore, still important subject in the agricultural sector of Indonesian economy.

During the period from 1980 to 1986 agricultural subsectors performed also well. Subsectors of farm food crops, farm non-food crops, livestock and fishery grew at an average annual rate of more than 3%. During the same period, however, forestry subsector showed minus growth of 12.4% p.a. due to the ban on log exports. Because of the recent low prices of agricultural commodities, estate subsector grew lower at an average annual rate of 0.5% p.a. (see Table 2.4, Annex A).

2.2 Role of Agriculture in Regional Economy

Agriculture is the most important sector in the economy of South Kalimantan Province. Real GRDP at 1983 constant price was Rp. 972 billion in 1985. Of this, Rp. 305 billion were earned by the agricultural sector. The contribution of this sector to real GRDP was maintained at the level of 31% for the last three years. Further, the manufacturing sector has scaled up in the share of GRDP through promotion of plywood industry (see Tables 2.8 and 2.10, Annex A).

The annual growth rate of real GRDP in the agricultural sector had shown a gradually upward trend from its lowest one in 1982. It attained to 7.4% in 1985 (see Table 2.11, Annex A). The growth rate of livestock subsector was remarkably higher at 18.5% p.a. among the agriculture sector during 1980-1985 period. Food crop and estate crop subsectors showed steady growth at 5.6% p.a. and 3.3% p.a., respectively. However, during the same period, no growth was performed by fishery subsector and minus growth

was attained by forestry subsector. Table 2.2 reveals the composition of each subsector to the agricultural GRDP both in South Kalimantan and Indonesia for the comparison. Its feature is that the share of fishery, forestry and estate crop subsectors in South Kalimantan were larger than those of in Indonesia.

3. AGRO-ECONOMIC SITUATIONS IN THE STUDY AREA

3.1 Agricultural Population and Farm Households

As already presented in Section 3.2 in Annex A, the total farm households in the Study Area in 1985 are estimated at about 158,700 (see Table 3.1 Annex A) which accounted for 75.7% of the total farm households in South Kalimantan. Assuming that the average family size of total households is the same with that of farm households and the male/female rate of total population is also the same with that of farm population, demographic features of farm households in the respective Kabupatens in the Study Area are estimated as shown in Table 3.1.

The estimated farm population in the Study Area is about 675,300 in total in 1985. Within this total farm population, the working population is estimated at about 270,100 or 40% of the total farm population in the Study Area, based on the demographic data obtained from the Statistics Office, South Kalimantan.

The distribution of farm households by agricultural subsector in the Study Area is presented with that in South Kalimantan and Indonesia based on the results of 1983 Agricultural Census as shown in Table 3.2. According to the table, the distribution characteristics of farm households in the Study Area pointed out are as follows:

(a) The majority of farm households are food crop households in the Study Area and about 91% of the total farm households cultivate paddy and other main food crops, though this characteristic is almost the same with that in South Kalimantan and Indonesia. Among the food crop households in the Study Area, however, the proportion of horticulture households is relatively small at about 26% of the total farm households, if compared with that in South Kalimantan (33%) and Indonesia (43%).

(b) The proportion of smallholders estates households in the Study Area is smaller than that in Indonesia. About 51% of the total farm households are the smallholders estates households in the Study Area, but they are about 60% in Indonesia.

(c) The number of fish cultivation households in the Study Area is very small at about one forth of that in Indonesia. In contrast, the proportion of fishcatching households in lakes and rivers is about ten times of that in Indonesia.

(d) The proportion of livestock breeding households are small at about 11% of the total farm households in the Study Area, if compared with that in Indonesia (23%).

(e) The number of labor households is less than 10% of the total farm households in the Study Area, while that in Indonesia is about 26%.

3.2 Land Tenure and Holding

Based on the 1983 Agricultural Census, average size of land controlled per farm household is estimated in the selected five different areas, i.e. Indonesia, Java, Off-Java, South Kalimantan and the Study Area as shown below:

	Farm Households (1000)	Land Controlled (1000ha)	Ave. Size of Land Controlled (ha)
Indonesia	19,505	18,348	0.94
Java	11,569	6,395	0.55
Off-Java	7,936	11,953	1.51
South Kalimantan	319	346	1.08
Study Area	156	123	0.79

As seen in the table above, there are conspicuous differences on the average sizes of land controlled among the selected areas. The average size in the Study Area is the second smallest at 0.79 ha/farm household after Java. This size is almost the half of that in Off-Java (1.51 ha/farm household) and about 27% smaller than that in South Kalimantan (1.08 ha/farm household).

Based on 1983 Agricultural Census, the number of farm households which control land and the number of owner farm households are also estimated together with their land area controlled in the Study Area and South Kalimantan as shown in Table 3.3. According to the table, 148,300 farm households or about 95% of the total farm households control their land in the Study Area, ranging from 98% in Tapin to 92% in Tabalong. The remaining 5% are considered to be labor households without farmland, owner farm households who do not control land, etc.

The owner farm households in the Study Area is estimated at about 138,200 households or 89% of the total farm households. This proportion is slightly higher than that in South Kalimantan (83%). At the Kabupaten level, this proportion is the highest in Hulu Sungai Selatan (92%) and the lowest in Hulu Sungai Tengah (86%). The land controlled by owner farm households in the Study Area is about 99,900 ha or 82% of the total land controlled. This proportion is the highest in Tabalong (91%) and the lowest in Hulu Sungai Selatan (71%). The average size of land controlled per owner farm household is estimated at 0.72 ha in the Study Area, ranging from 1.17 ha in Tapin to 0.58 ha in Hulu Sungai Tengah.

The remaining 18% of the total land controlled are considered to be the land controlled by tenant farm households, leased land by private estates, etc. The data on tenant farm households in the Study Area are not readily available.

Based on the 1983 Agricultural Census, the number of farm households by holding size is summarized as shown in Table 3.4. As seen in the table, the farm households which control the land less than 0.5 ha are about 50% of the total farm households, while those in South Kalimantan are about 37%. The farm households which control the land more than 1.0 ha is relatively small at about 23% of the total farm households in the Study Area, if compared with that in South Kalimantan (40%).

Through the above analyses, the status of land tenure and holding in the Study Area can be summarized as follows:

(a) The average size of land controlled is comparatively small at about 0.79 ha in the Study Area.

(b) More than 95% of the total farm households control their land. The proportion of farm households which do not control land are small, if compared with that in South Kalimantan.

(c) Nearly 90% of the total farm households are the owner farm households, but their land controlled is relatively small at about 80% of the total land controlled. Accordingly, the average size of land controlled by owner farm households is small at 0.72 ha.

(d) About 50% of the total farm households are the small farm households who control the land less than 0.5 ha. The large farm households who control the land more than 1.0 ha are about 23% of the total farm households.

3.3 Agricultural Production

3.3.1 Production characteristics

The present production characteristics in the Study Area are clarified through the comparison of agricultural production, crop yield level and production growth in the Study Area with those in South Kalimantan and Indonesia. For the said comparison, crop production data obtained from the government offices concerned are compiled and analyzed for the respective areas as shown in Tables from 3.5 to 3.7.

(1) Production share of agricultural products

The production share of agricultural products of the Study Area in South Kalimantan and in Indonesia is estimated as shown in Table 3.8. Among the agricultural production in the Study Area, a share of freshwater fish is estimated the highest at

about 7.4% followed by rubber (2.5%), eggs (2.2%) and paddy (1.2%) in Indonesia's total production. Shares of all these agricultural products are estimated higher than the share of farm households of the Study Area in Indonesia (0.8%). In South Kalimantan, the Study Area has the production share of about 90% for rubber, 70% for freshwater fish, 57% for eggs, 51% for meat, 48% for paddy and 50% for sweet potato. All these products have higher shares than the share of farm households in South Kalimantan(47%).

(2) Crop productivity

The crop productivity remains still at low level in the Study Area as seen in Table 3.9 which shows the comparison of average unit yields on food and estate crops among the Study Area, South Kalimantan and Indonesia. The unit yield levels of these crops in the Study Area are estimated little higher than those in South Kalimantan, but lower than those in Indonesia, in general.

Among the food crops in the Study Area, only dry land paddy shows higher unit yield than the average of Indonesia as a whole. The unit yields of all other food crops are lower than those in Indonesia. Among the estate crops, only coconut shows higher unit yield than the average of Indonesia as a whole, while all unit yields of other estate crops are lower than those in Indonesia.

(3) Livestock population

The livestock subsector is not a main line of agriculture in the Study Area, except for poultry, i.e. chickens and ducks. Table 3.9 also shows the comparison of livestock population among the Study Area, South Kalimantan and Indonesia in terms of livestock population per 100 farm households. As seen in the table, it is estimated that all large livestock population per 100 farm households are small in the Study Area, if compared with those in Indonesia as a whole. For instance, cattle population per 100 farm households in the Study Area is estimated at only about 33% of that in Indonesia. On the contrary, population of ducks and chickens per 100 farm households in the Study Area are estimated at about 13 times and two times larger than those in Indonesia, respectively.

(4) Production growth

During recent four years, the production growth of food crops was remarkable in the Study Area as well as in South Kalimantan, if compared with that in Indonesia as shown below:

(Unit: % p.a.)

	Study Area (1982-86)	South Kalimantan (1982-86)	Indonesia (1981-85)
Wet land paddy	6.6	6.4	4.6
Dry land paddy	0.1	6.2	2.9
Total Paddy	6.2	6.4	4.5
Maize	4.3	20.4	0.3
Cassava	6.1	19.6	1.4
Sweet potato	3.3	5.8	1.6
Soybeans	76.9	69.3	5.3
Groundnuts	15.1	19.7	3.4

Source: Tables 3.5, 3.6 and 3.7

In the estate crop subsector, the production growth rates of rubber, coconuts and coffee were higher than those in Indonesia, but lower than those in South Kalimantan as shown below:

(Unit: % p.a.)

	Study Area (1982-86)	South Kalimantan (1982-86)	Indonesia (1981-85)
Rubber	3.2	3.5	2.4
Coconut	2.2	3.7	-0.2
Coffee	4.5	9.3	3.2
Cloves	3.6	9.1	4.2
Pepper	6.9	9.1	4.2

Source: Tables 3.5, 3.6 and 3.7

3.3.2 Food crops

Based on the statistical data, crop harvested area, production and unit yield by Kabupaten are estimated for all food crops in the Study Area as shown in Table 3.10. As seen in the table, wet land paddy is the most important food crop in all the Kabupatens in the Study Area. On an average, wet land paddy alone accounts for about 80% of the total area harvested and 87% of the total production of food crops in weight in the Study Area.

As also seen in Table 3.10, the share of crop production by Kabupaten is almost proportioned to the distribution of farm households in the respective Kabupatens in the Study Area for most of all food crops, though there are some exceptions. Wet land paddy in Hulu Sungai Tengah, for example, has a share of about 25% in the total production in the

Study Area, and the farm households in this Kabupaten is also about 25% of the total farm households in the Study Area.

The exceptions which should be noted are as follows:

(a) In Tapin, the production share of palawija crops are remarkably higher than the distribution of farm households in the Study Area. Such crops are maize with the production share of 40%, soybeans (46%) and groundnuts (63%), while the share of farm households of this Kabupaten is about 14%.

(b) In Hulu Sungai Tengah, the production share of citrus (91%) is also remarkably higher than the share of farm households (25%).

(c) In Tabalong, the production share of vegetables (23%) and mungbeans (22%) are relatively higher than the share of farm households (14%).

(d) In Hulu Sungai Selatan, the production of sweet potato (43%) has relatively higher share than the share of farm households of this Kabupaten in the Study Area(19%).

(e) In Hulu Sungai Utara, the production share of banana (34%) is slightly higher than the share of farm households (28%).

The unit yield of paddy is the highest in Hulu Sungai Tengah (4.2 tons /ha) and the lowest in Hulu Sungai Utara (2.8 tons/ha) among the five Kabupatens in the Study Area. Most of all palawija crops in Tapin indicate relatively higher unit yields. The unit yield of vegetables in Hulu Sungai Tengah is more than two times higher than that in the Study Area as a whole. The unit yields of all fruits trees are relatively higher in Hulu Sungai Tengah, particularly for rambutan, while these in Hulu Sungai Utara are the lowest among the five Kabupatens.

Production increase was remarkable in soybeans (76.9% p.a.), citrus (43.2% p.a.), banana (37.6% p.a.), mungbeans (36.0% p.a.) and vegetables (31.1% p.a.) during recent four years from 1982 to 1986 as shown in Table 3.5. Such increases of soybeans and mungbeans were largely derived from the area expansion, while those of citrus, banana and vegetables were from yield increase. Only rambutan showed minus growth (-2.1% p.a.) and dry land paddy grew slowly(0.1%). Growth of these two crops were lower than the population growth in the Study Area (0.96% p.a. during 1980-85) as well as in South Kalimantan (2.33% p.a. during 1980-85).

3.3.3 Estate crops

Among estate crops grown in the Study Area, rubber is the most important crop. This crop alone accounts for about 73% of the total planting area and 60% of the total production of estate crops in weight in the Study Area as shown in Table 3.11. Coconut is the second important crop after rubber and accounts for about 19% of the total planting area and 37% of

the total production in weight. Accordingly, among estate crops in the Study Area, these two representative crops occupy more than 90% of the total planting area and produce nearly 100% of the total production in weight.

The production of rubber in Tabalong has the highest share of about 35% of the total production in the Study Area, followed by Hulu Sungai Utara (25%) and Hulu Sungai Tengah (24%). Coconuts production is the highest in Hulu Sungai Selatan with the share of about 53% of the total production in the Study Area.

The unit yield of rubber is the highest in Hulu Sungai Tengah (437 kg/ha) followed by Hulu Sungai Selatan (425 kg/ha). The lowest unit yield is shown in Tapin (147 kg/ha), due to the recent wide expansion of no production new rubber estates. As for coconuts, Hulu Sungai Selatan has the highest unit yield (991 kg/ha). The production increase of rubber was 3.2% p.a. in the Study Area during 1982-1986 period. This growth was performed by area expansion as shown in Table 3.5.

The estates in the Study Area can be classified into the following four types according to their development and management systems:

(a) Individual smallholders estates;

These estates are developed and managed by individual smallholders themselves without any particular assistance from the Government. In the Study Area, about 79% of rubber area, 98% of coconut area and most of all other estate crops areas has been developed and are cultivated under this system as shown in Table 3.12.

(b) Project Management Units (PMUs);

These are the government assisted schemes particularly for the existing smallholders to replant rubber, coconuts, etc. Fairly intensive supports, i.e. credit and extension services are available in PMU. However, areas of these schemes are still small extent in the Study Area as also shown in Table 3.12.

(c) Nucleus Estates and Smallholders (NESs);

In these schemes, planting and maintaining of tree crops are made by the Government on previously underdeveloped land until they reach maturity, using farmers selected to be settlers as employees. After the maturity, farmers have to take a management responsibility as smallholders. Government-owned nucleus estates with processing facilities are usually developed in these schemes together with smallholders estates, but there are no such nucleus estates in the Study Area at present. Smallholders in these schemes can receive inputs, extension and processing services.

There are three NESs in the Study Area. All of these schemes are for rubber trees and accounted for about 14% of total rubber area. The development of all these schemes are still on-going, though it has been stopped due largely to the Indonesia's budget austerity, and still no production as of 1987 as shown in Tables 3.14 and 3.15.

(d) Private estates;

These schemes are developed and managed by the private sectors. Farmers are hired as a labor force for the production. There are no smallholders in these schemes in general. Rubber areas of these schemes were about 4% of total area in 1987 as shown in Table 3.12. At present, there are 10 private estates in the Study Area as shown in Table 3.16. Most of tree crops in these schemes are still young because of these new locations.

The area distribution and production share by the said different types of estates are summarized for the two representative estate crops of rubber and coconuts as shown below:

(Unit: total=100)

	Small-holders *	NESs	Private	Total
Rubber				
- Area	82.7	13.5	3.8	100.0
- Production	98.2	0.0	1.8	100.0
Coconuts				
- Area	100.0	0.0	0.0	100.0
- Production	100.0	0.0	0.0	100.0

*: Including PMUs

Source: DINAS Estate Crops, South Kalimantan

The table below shows the area distribution of productive, young and old trees for rubber based on the 1987 data:

(Unit: %)

	Productive	Young	Old	Total
Smallholders	5.6	33.6	10.7	100.0
- NESs	0.0	100.0	0.0	100.0
- PMUs	0.0	100.0	0.0	100.0
- Individual	67.8	19.1	13.1	100.0
Private Estates	35.8	48.8	15.4	100.0
Total	54.9	34.2	10.9	100.0

Source: DINAS Estate Crops, South Kalimantan