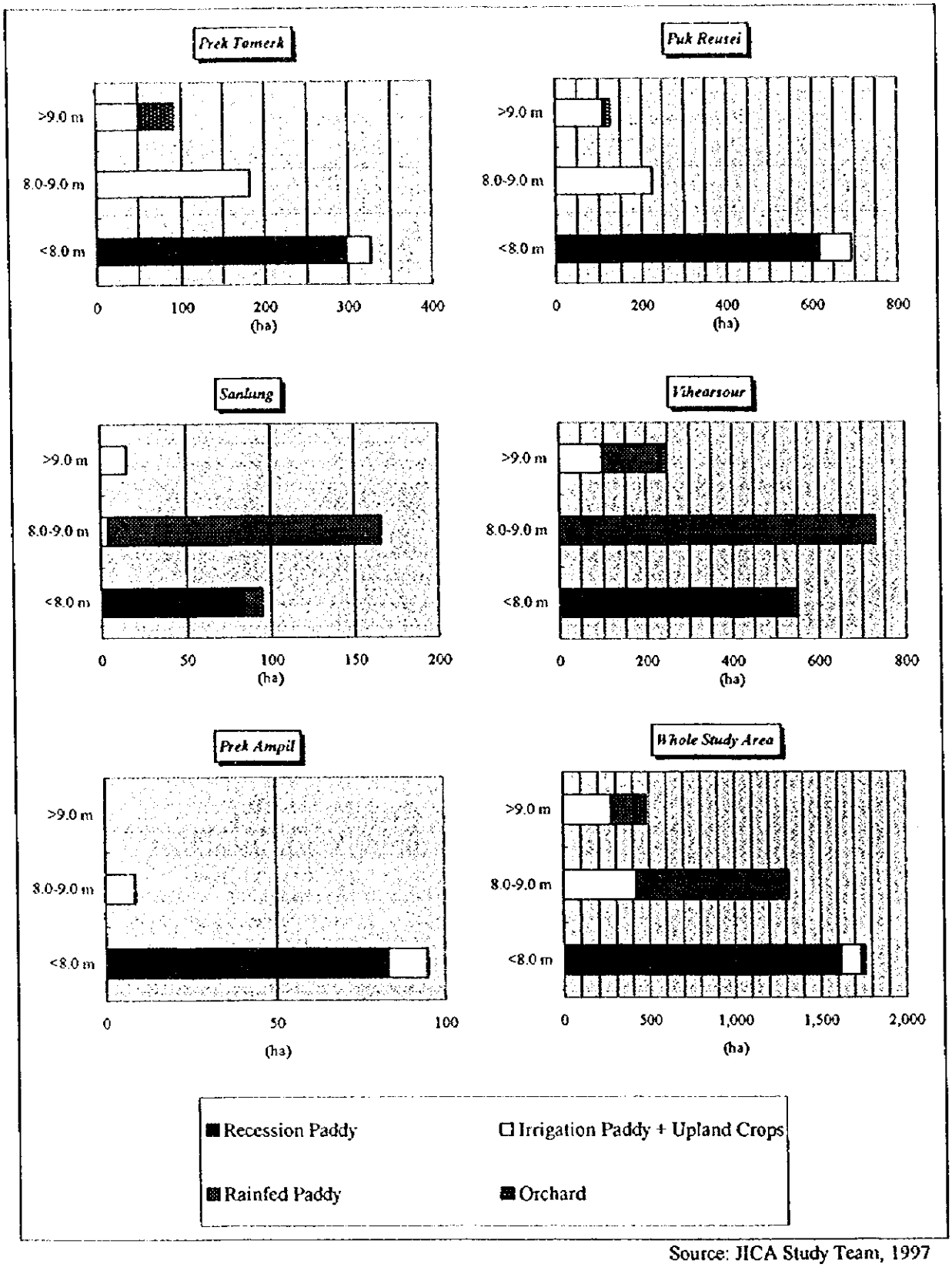
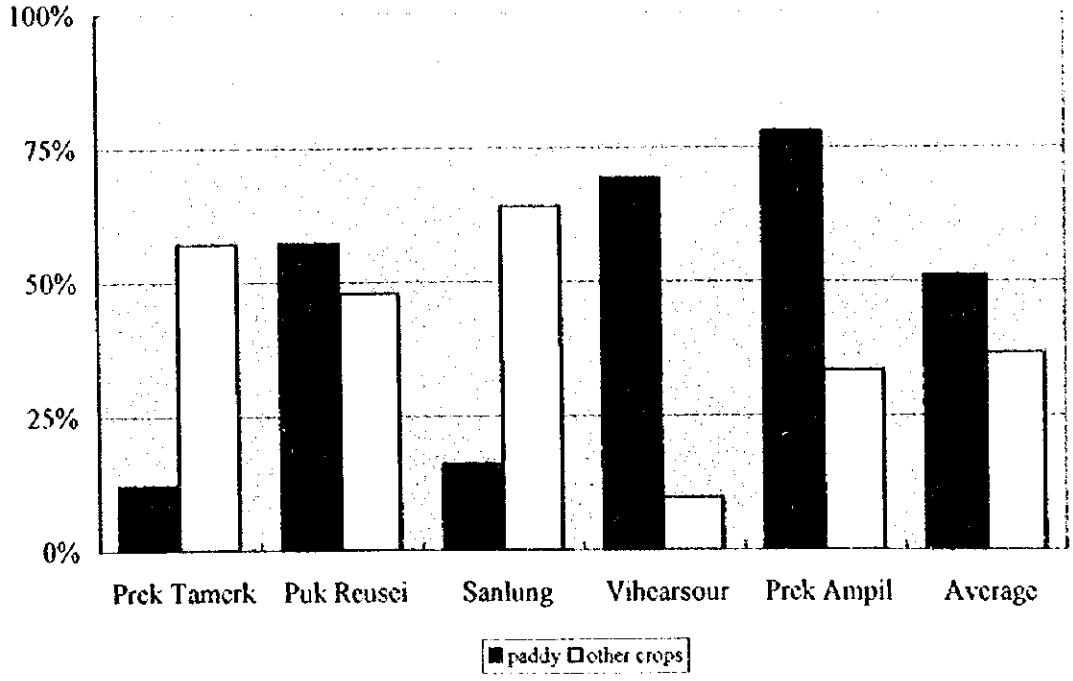


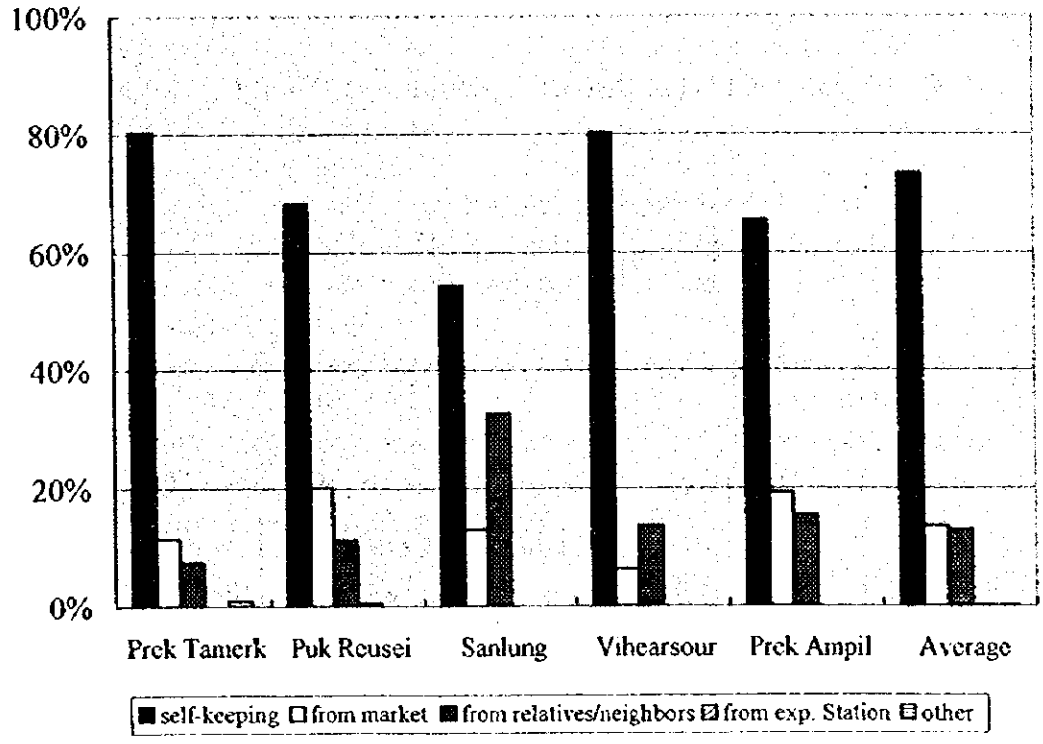
Source: JICA Study Team, 1997

Figure 1.16 Present Agricultural Land Use by Commune and Elevation



Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Figure 1.17 Percentage of Farm Product Selling Farmer by Crop and Commune



Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Figure 1.18 Procurement of Paddy Seed for Nursery in the Study Area

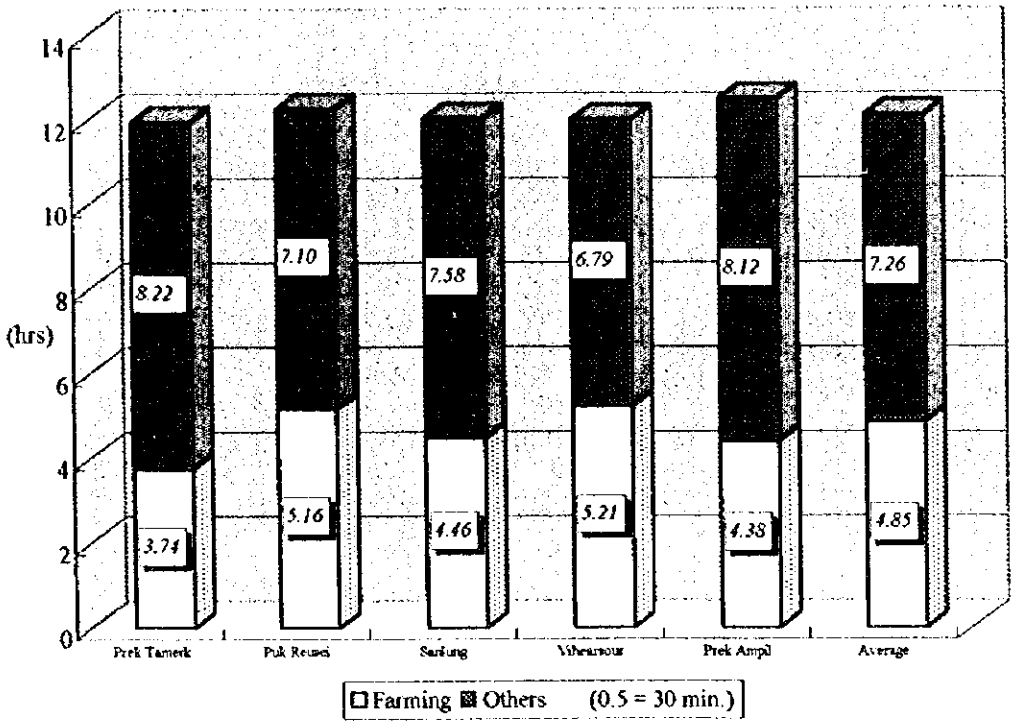
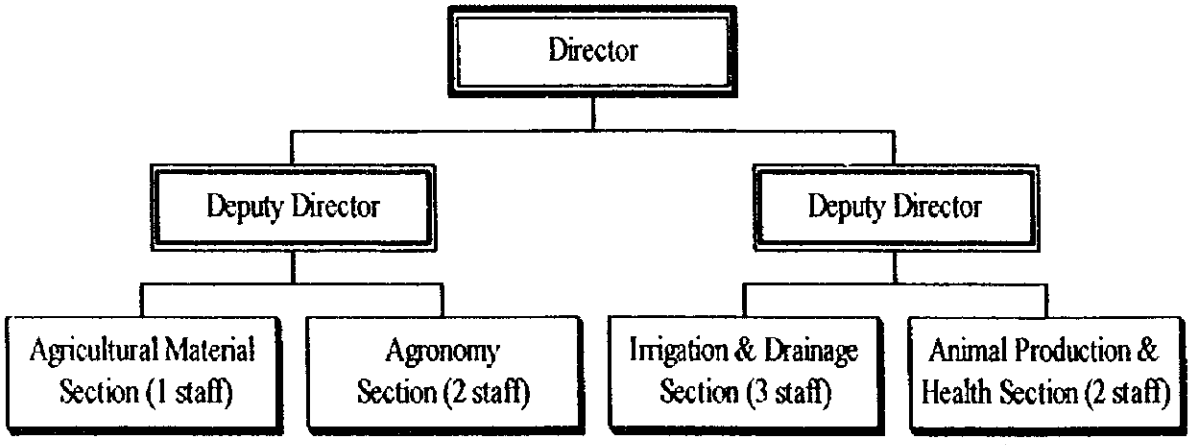


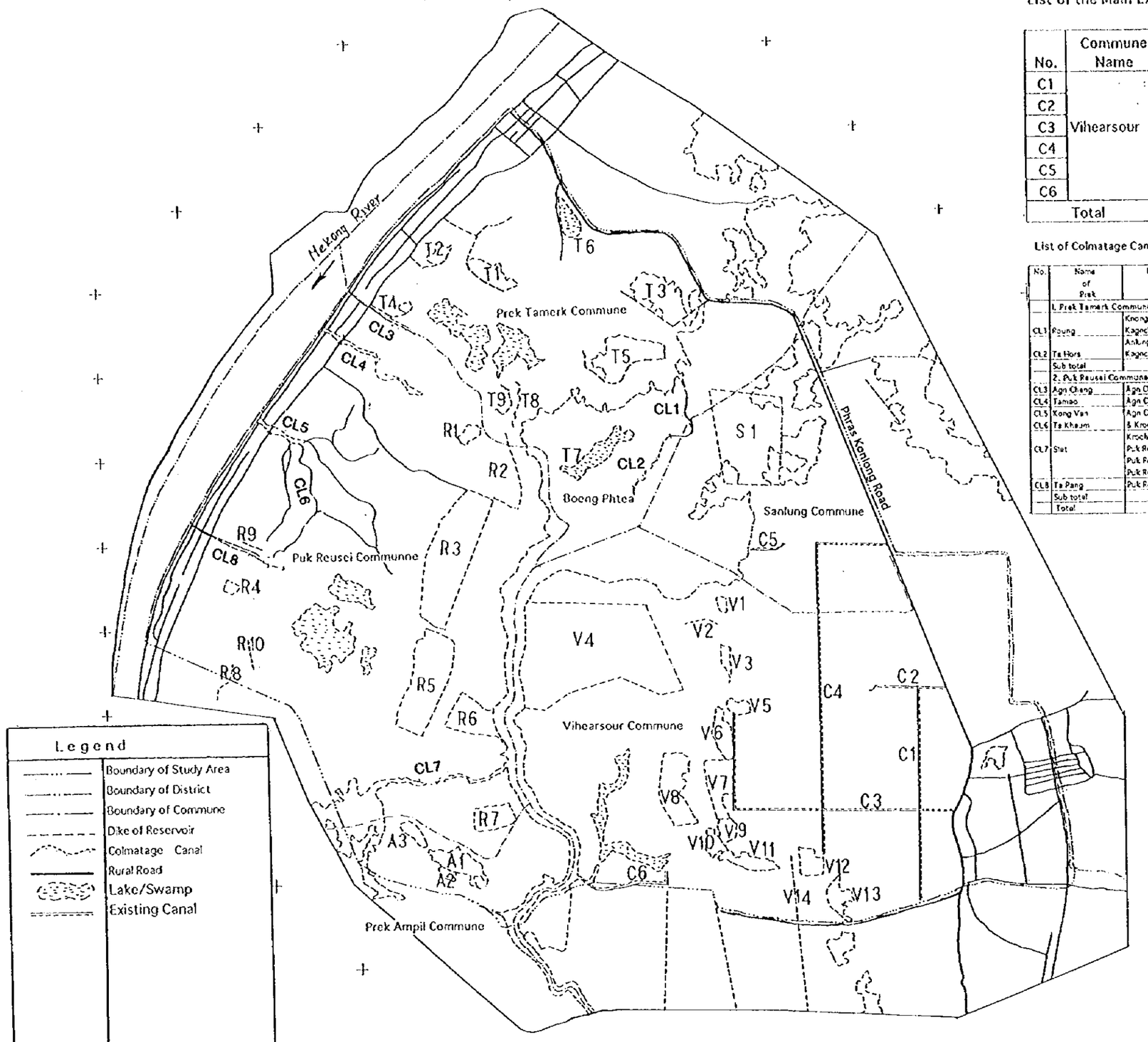
Figure 1.19 Distribution of Farming Practice to Female Daily Working Hours

Source: JICA Study Team, 1997

Figure 1.20 Organization Chart of District Agriculture Office in Ksach Kandal



Source: District Agriculture Office, Ksach Kandal



List of the Main Existing Canals

No.	Commune Name	Length (km)	Remarks
C1	Vihearsour	2.55	Pol-pot Canal
C2		1.05	Pol-pot Canal
C3		3.3	Pol-pot Canal
C4		4.47	Pol-pot Canal
C5		0.5	
C6		1.1	
Total		12.97	

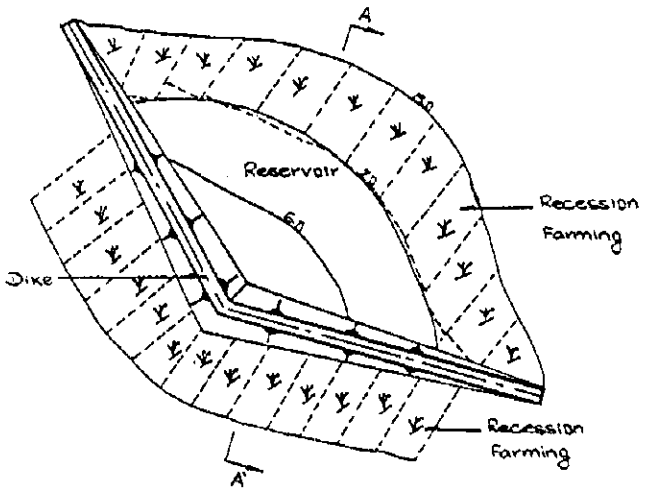
List of Colmatage Canal

No.	Name of Prek	Name of village	Number of Families	Colmatage areas: Upland Crop (ha)	Wet Season Rice (ha)	Dry Season Rice (ha)
	1. Prek Tamerk Commune					
CL3	Poung	Knong Kagnchap Cheung	15	2	-	4
CL2	Ta Hors	Anlung Kagnchap Cheung	17	2	-	20
	Sub total		32	4	0	24
	2. Puk Reusei Commune					
CL3	Agn Chang	Agn Chang Lou	18	10	10	-
CL4	Tamao	Agn Chang Krom	298	23	23	-
CL5	Xong Van	Agn Chang Krom	300			
CL6	Ta Kheam	& Kroch Seauch	312	34	32	-
CL7	Slet	Kroch Seauch Puk Reusei Lou Puk Reusei Krom Puk Reusei Kandal	1264			360
CL8	Ta Pang	Puk Reusei Lou	300	33	19	-
	Sub total		2492	100	84	360
	Total		2524	104	84	384

List of Reservoir

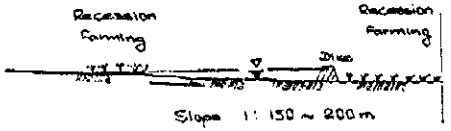
No.	Name: Reservoir/ Lake/Swamp	Name: Village	Number of Family	Irrigable Area (ha): Dry season	Irrigable Area (ha): Wet season
1.Prek Tamerk Commune					
R1	Ehmol	Svay Ati Lou & Kandal	203	31	20
R2	Ta Dau	Svay Ati Krom & Kandal	85	25	35
R3	Bravash	Knong & Boeng Kakreachap Cheung	370	52	14
R4	Khlar Sako	Svay Ati Krom	75	18	6
R5	Bac Chang Hour	Cheung & Tbong Boeng Kagnchap	120	50	10
R6	Boeng Krao Chap	Cheung Boeng Kagnchap	10	2	7
R7	Kropou	Cheung Boeng Kagnchap	20	10	
R8	O San Dan	Tbong Boeng Kagnchap	120	30	2
R9	Trao Peang Reusei	Tbong	40	15	2
	Total		1043	233	96
2.Puk Reusei Commune					
R1	Ta Yi	Agn Chang Lou	4	4	0
R2	Cheung Chang	Agn Chang Lou	20	5.8	0
R3	Promek Khlar	Agn Chang Krom	550	86	0
R4	Ta Svay	Puk Reusei Lou	24	30	0
R5	Phleuv Tuk	Puk Reusei Lou & Kroch Seauch	612	63.5	0
R6	Pro Phogh	Puk Reusei Lou & Kroch Seauch	336	23.12	0
R7	Khnach	Puk Reusei Krom & Klaing Mong	256	55.77	0
R8	Tunnup Tmol	Puk Reusei Kandal	16	7	0
R9	Ta Long	Puk Reusei Kandal	16	10	3
R10	Ta Eelo	Puk Reusei Kandal	95	30	15
	Total		1043	324.2	18
3.Sanlung Commune					
S1	Som Say	Sanlung	95	45	0
4. Prek Ampil Commune					
A1	Tamao	Ta Tol	4	4	0
A2	Ta Phng	Ta Tol	16	10	0
A3	Meas Satt	Ta Tol	15	7	0
	Total		35	21	0
5 Vihearsour Commune					
V1	Fa Ham	Prol Chas	3	2	0
V2	Khtom Leak	Prol Chas	20	4	0
V3	Tro Peang Kraing	Prol Chas	15	12	0
V4	Fa Non	Prol Chas	92	42	0
V5	O Diev Lou	Prol Chas	10	8	0
V6	O Diev Krom	Vihearsour Cheung	45	4	0
V7	Choir Touk Cheng	Sala	40	7	0
V8	San Dan	Sala	44	20	0
V9	Choir Touk Tbong	Sala	35	3.5	0
V10	Min Thom	Sala	10	4	0
V11	Ta Top	Vihearsour Cheung	6	6	0
V12	Fa Ngen	Vihearsour Cheung	310	20	0
V13	Trapeang Chouk	Vihearsour Cheung			
V14	Kom Pheak	Vihearsour Cheung			
	Total		610	332.5	0
	Grand Total		2826	755.7	114

Figure 1.21 Location of the Colmatage Canals, Reservoirs and Main Canals

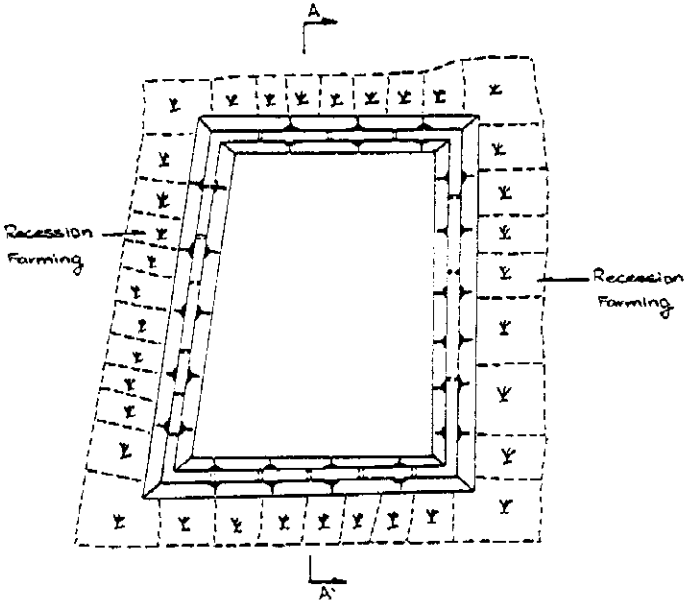


Typical Plan of Semi-Closed Type Reservoir

Not to scale

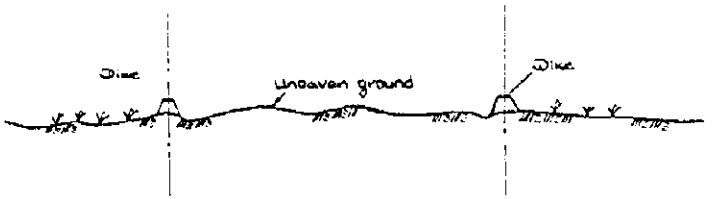


Section A-A'



Typical Plan of Closed Type Reservoir

Not to scale



Section A-A'

Figure 1.22 Type of Reservoir in the Study Area

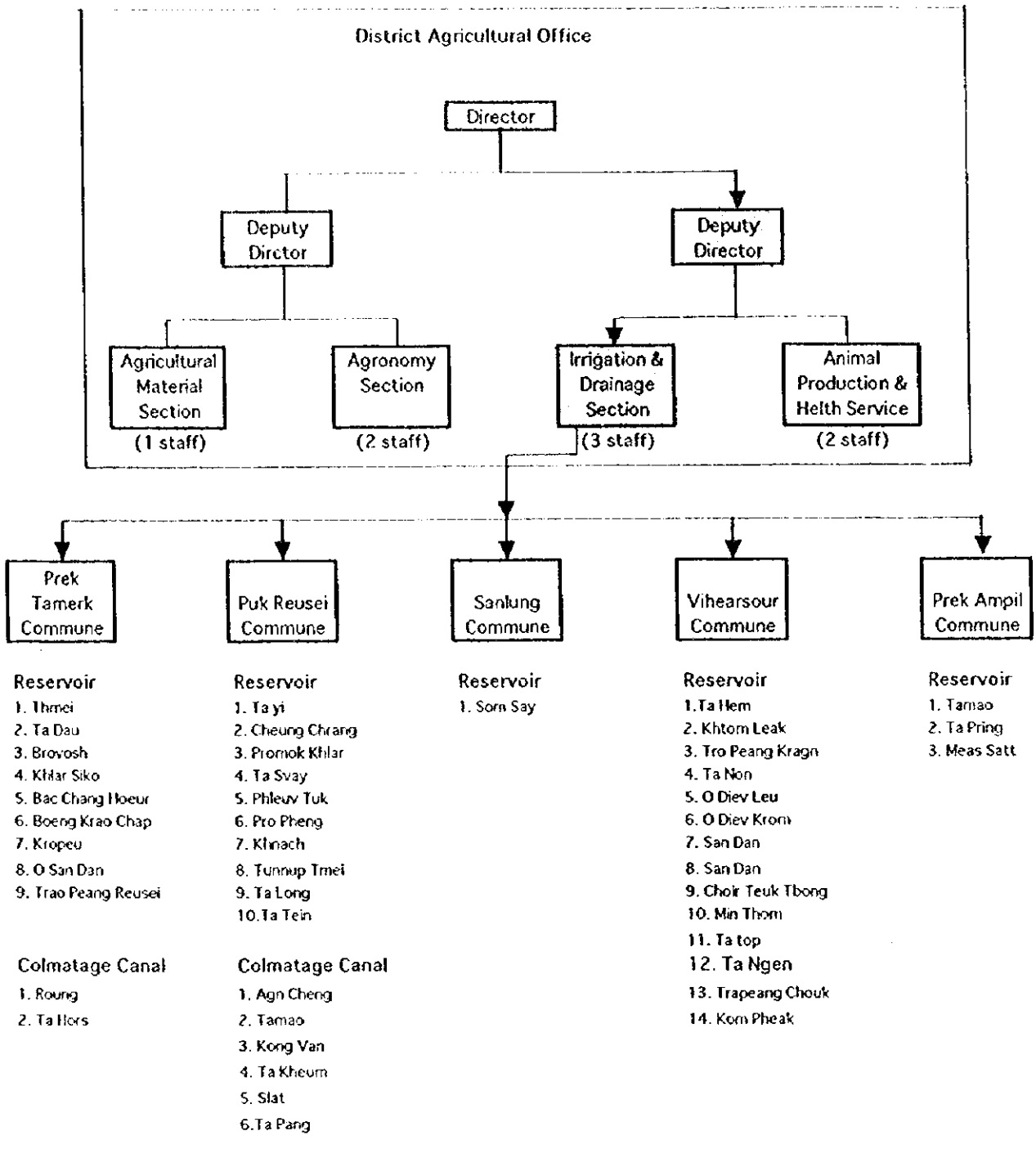


Figure 1.23 Organization of the O&M for Irrigation Facilities in Boeng Phtea Area

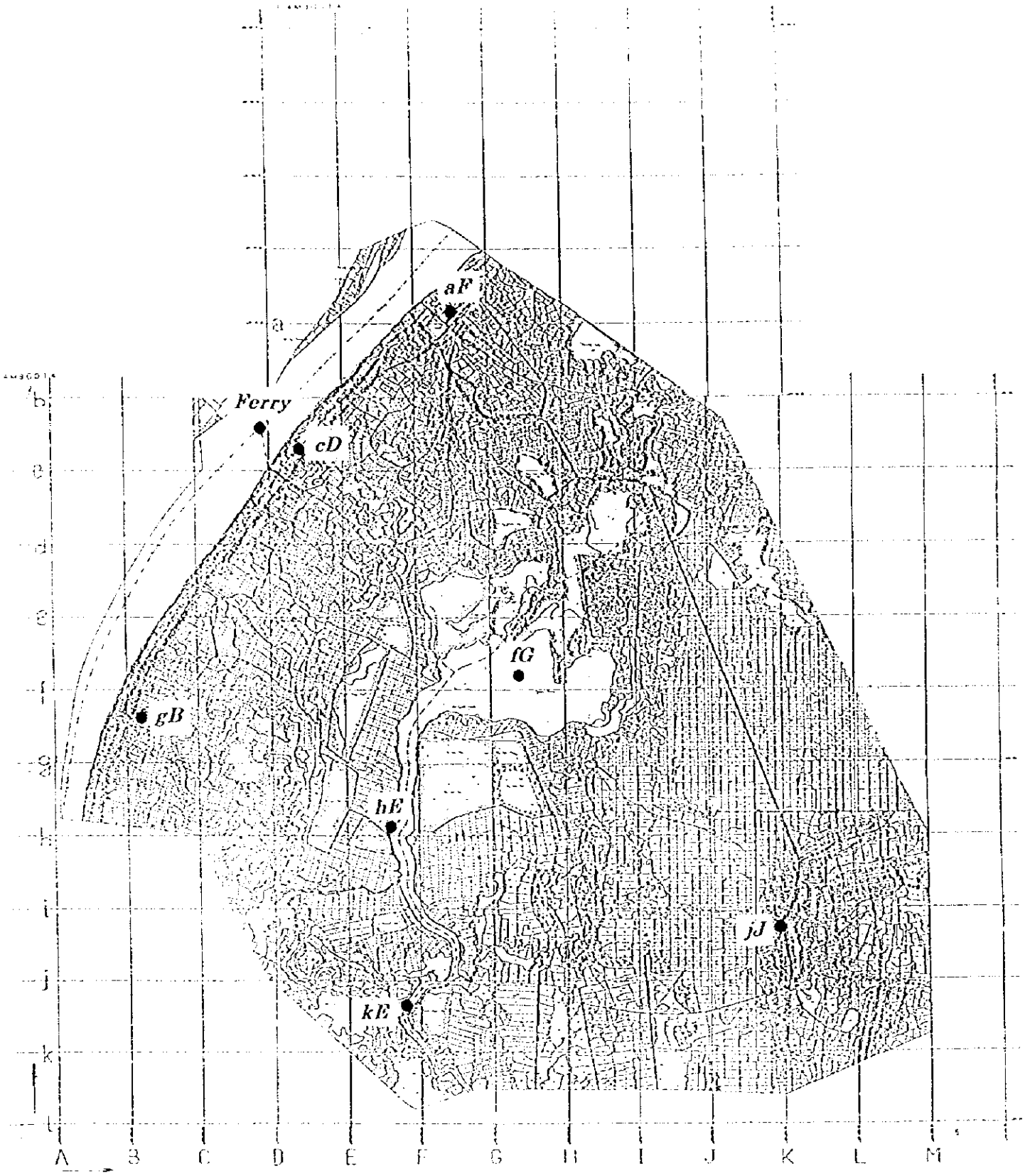


Figure 1.25 Location Map of Water Quality Survey

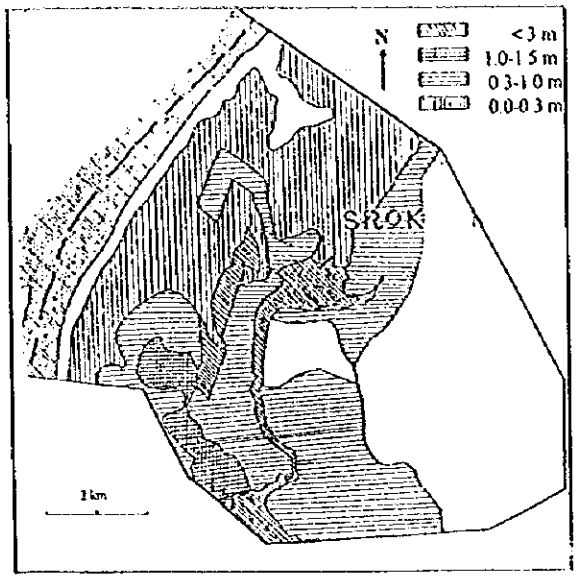


Figure 1.26 Flooded Areas and Flood Depth in the Study Area (Dec., 1994)
(Redrawn from LANSAT imagery -December, 1994)

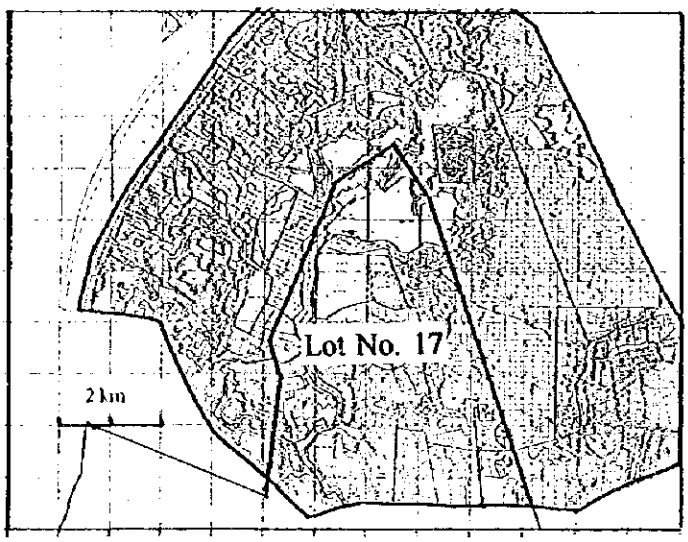


Figure 1.27 Part of the Fishing Lot No.17 in the Study Area

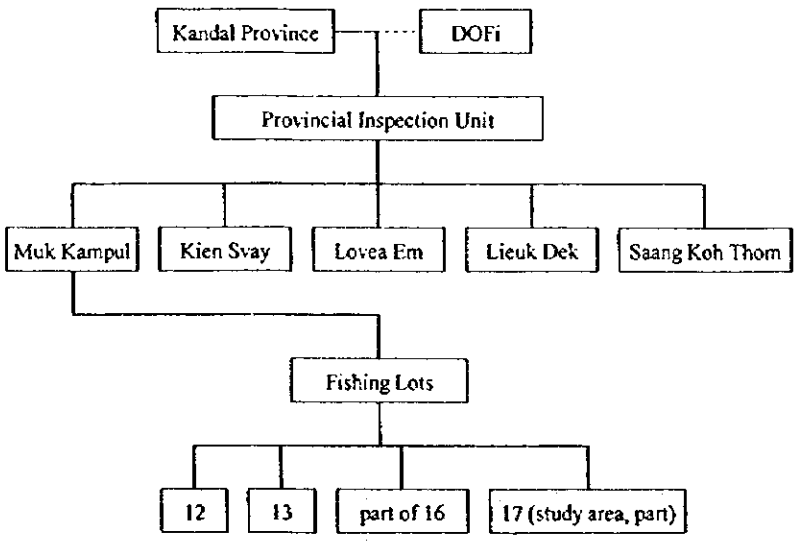


Figure 1.28 Organization Chart of Fishery Authority in the Study Area

Table 1.1 Present Land Use in the Study Area by Commune and Elevation

(Unit : ha)

Commune	Land Elevation (m)	Farm land	Waste/ Grass/Bush land	Reservoir /Inundated Forest	River/Lake	Residential land	Road Canal	Total	Distribution
Prek Tamerk	>9.0	92	-	-	-	79	6	177	14.6%
	8.0-9.0	184	-	-	-	9	5	198	16.3%
	<8.0	327	311	122	77	-	2	839	69.1%
	Sub Total	603	311	122	77	88	13	1,214	100.0%
	Distribution	49.7%	25.6%	10.0%	6.3%	7.2%	1.1%	100.0%	-
Puk Reusei	>9.0	128	-	-	-	96	29	253	13.7%
	8.0-9.0	226	9	-	-	-	20	255	13.8%
	<8.0	693	356	231	48	-	15	1,343	72.6%
	Sub Total	1,047	365	231	48	96	64	1,851	100.0%
	Distribution	56.6%	19.7%	12.5%	2.6%	5.2%	3.5%	100.0%	-
Sanlung	>9.0	16	1	-	-	-	2	19	3.3%
	8.0-9.0	166	16	-	-	-	-	182	31.3%
	<8.0	95	152	57	76	-	-	380	65.4%
	Sub Total	277	169	57	76	-	2	581	100.0%
	Distribution	47.7%	29.1%	9.8%	13.1%	0.0%	0.3%	100.0%	-
Vihear-sour	>9.0	249	-	9	-	115	11	384	16.7%
	8.0-9.0	733	12	-	-	-	2	747	32.5%
	<8.0	552	220	260	135	-	2	1,169	50.8%
	Sub Total	1,534	232	269	135	115	15	2,300	100.0%
	Distribution	66.7%	10.1%	11.7%	5.9%	5.0%	0.7%	100.0%	-
Prek Ampil	>9.0	-	-	-	-	-	-	-	0.0%
	8.0-9.0	9	-	-	-	-	-	9	4.9%
	<8.0	95	50	13	17	-	-	175	95.1%
	Sub Total	104	50	13	17	-	-	184	100.0%
	Distribution	56.5%	27.2%	7.1%	9.2%	0.0%	0.0%	100.0%	-
Total	>9.0	485	1	9	-	290	48	833	13.6%
	8.0-9.0	1,318	37	-	-	9	27	1,391	22.7%
	<8.0	1,762	1,089	683	353	-	19	3,906	63.7%
	Total	3,565	1,127	692	353	299	94	6,130	100.0%
	Distribution	58.2%	18.4%	11.3%	5.8%	4.9%	1.5%	100.0%	-

Source : JICA Study Team, July, 1997

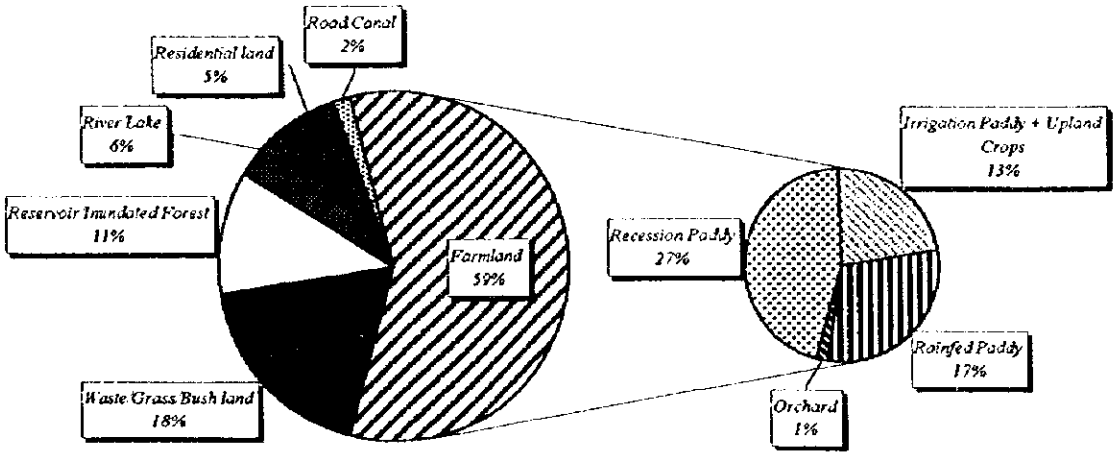


Figure 1.9 Present Land Use in the Study Area

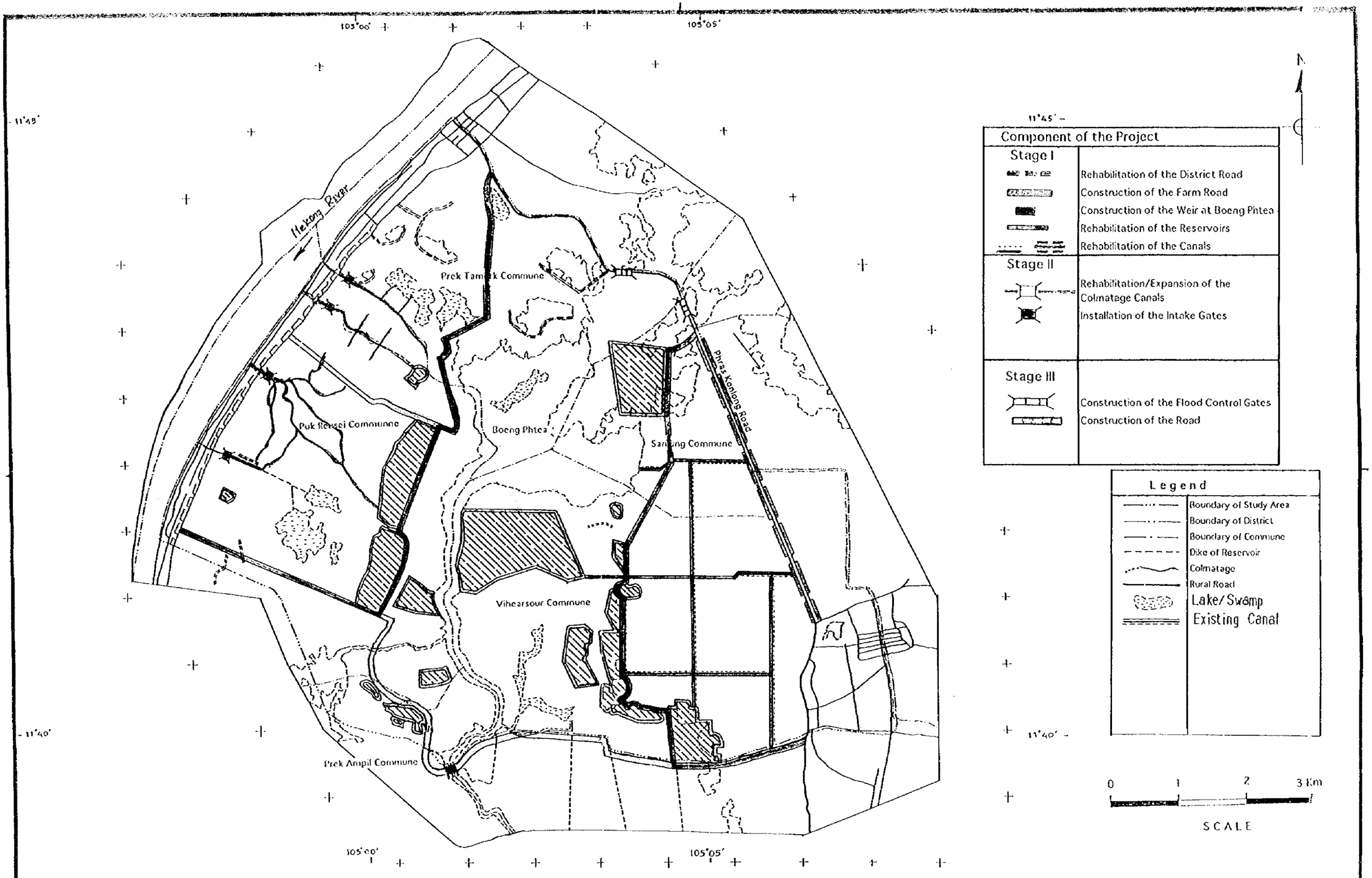
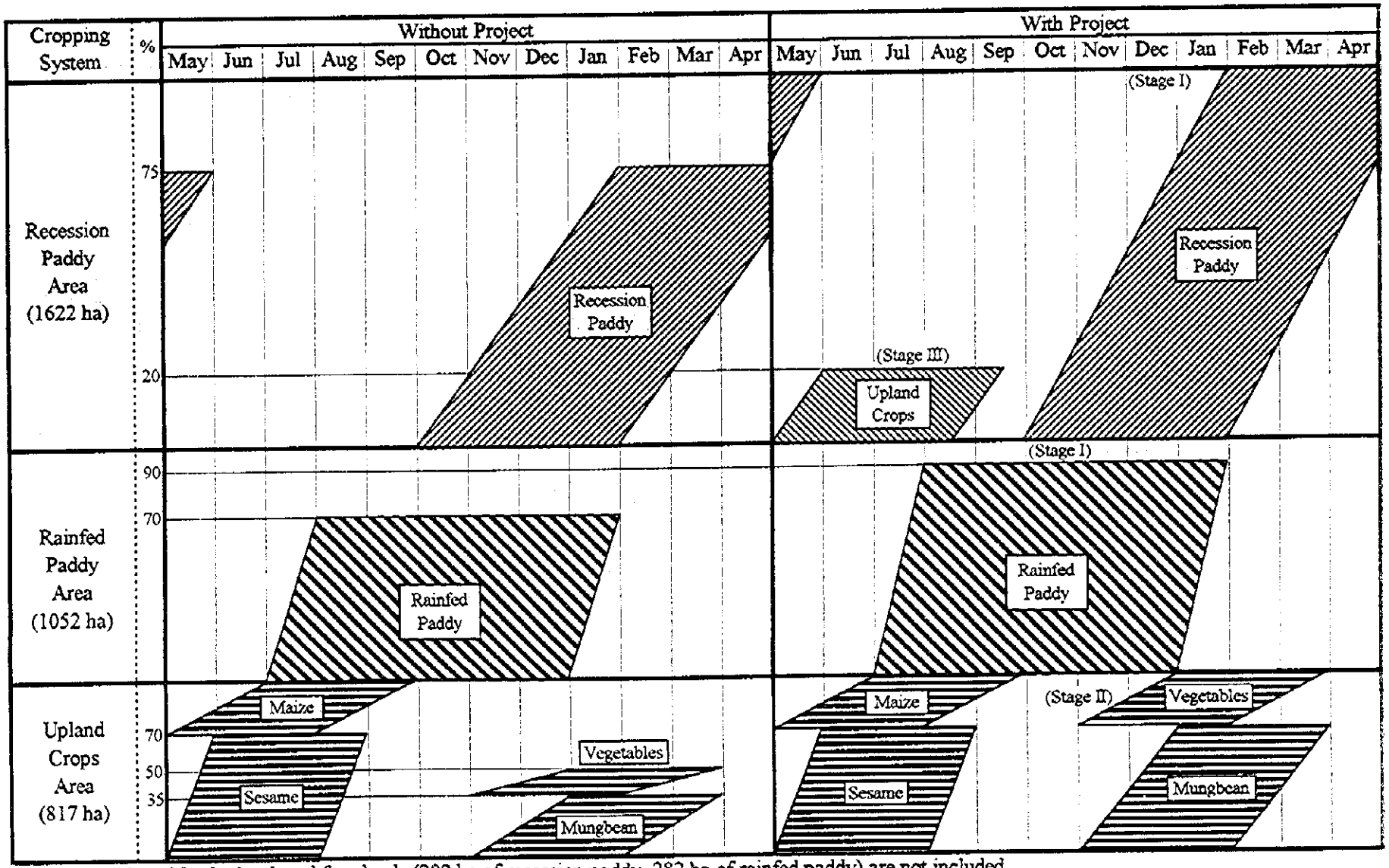


Figure 2.1 Agricultural Development Plan at Each Stage in Boeng Phtea Area

Figure 2.2 Present and Proposed Cropping Patterns



Note: Newly developed farmlands (282 ha of recession paddy, 282 ha of rainfed paddy) are not included.

Source: JICA Study Team

Table 2.11 Change of the Cropping Areas in Accordance with the Development Stage

(Unit : ha)

Item	Land Area	Without Project	Stage I	Stage I+II	Stage I+II+III
Recession paddy	1,622	1,217	1,622	1,622	1,622
Recession paddy (newly developed)	0	0	282	282	282
Recession paddy (2nd cropping)	0	0	0	0	324
Rainfed paddy	1,052	736	947	947	947
Rainfed paddy (newly developed)	0	0	282	282	282
Upland crops (1st cropping)	817	817	817	817	817
Upland crops (2nd cropping)	0	419	419	817	817
Orchard	74	74	74	74	74
Total	3,565	3,263	4,443	4,841	5,165

Source: JICA Study Team

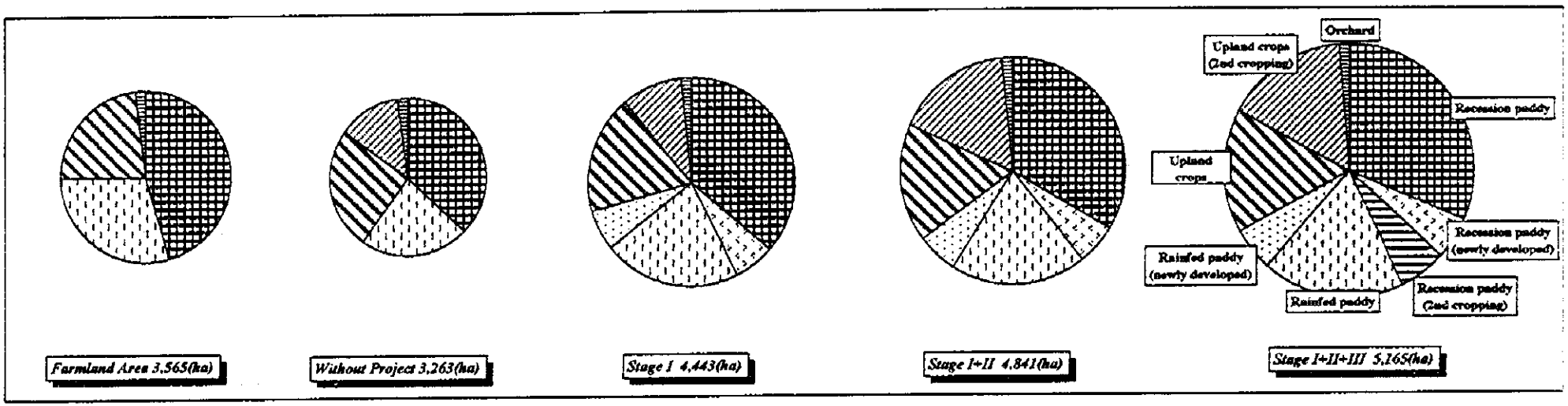


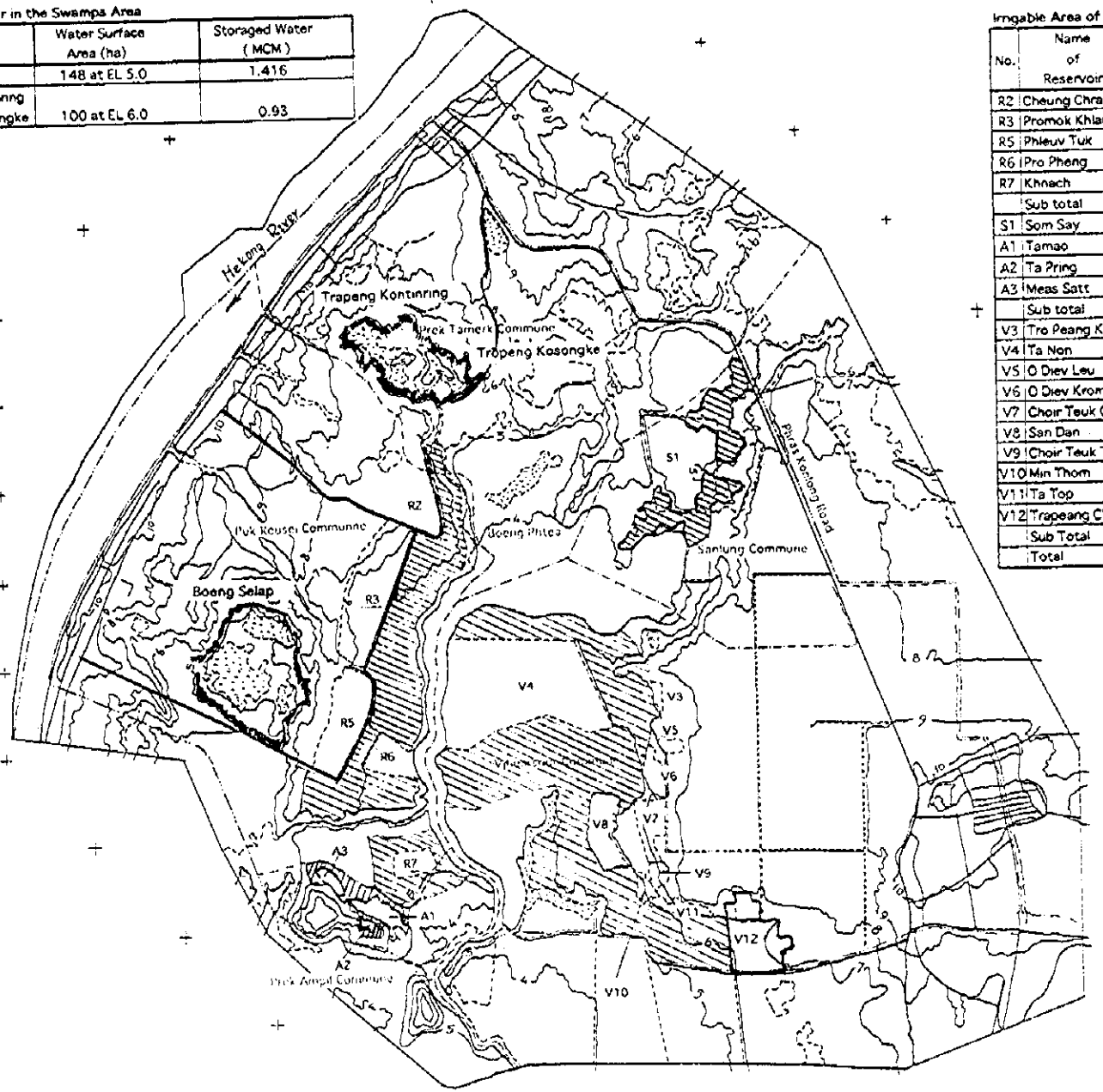
Figure 2.3 Change of the Cropping Areas in Accordance with the Development Stage

Available Water in the Swamps Area

Name	Water Surface Area (ha)	Storaged Water (MCM)
Boeng Selap	148 at EL 5.0	1.416
Trapeng Kontinring /Trapeng Kosongke	100 at EL 6.0	0.93

Irrigable Area of the Dry Season Recession Paddy Around the Reservoir

No.	Name of Reservoir	Name of Commune	Existing Irrigation Area Dry Season (ha)	Existing Irrigation Area Wet Season (ha)	Irrigable Area (ha)	Balance (ha)
R2	Cheung Chrang		5.8	0		
R3	Promok Khlar		86	0		
R5	Phleuv Tuk	Puk Reuser	63.5	0		
R6	Pro Pheng		23.1	0	216	37.6
R7	Khnach		55.8	0	66	10.2
	Sub total		234.2	0	282	47.8
S1	Som Say	Santung	45	0	76	31
A1	Tamao		4	0		
A2	Ta Pring	Prek Ampil	10	0		
A3	Meas Satt		7	0		
	Sub total		21	0	27	6
V3	Tro Peang Kraon		12	0		
V4	Ta Non		42	0		
V5	O Diev Leu		8	0		
V6	O Diev Krom		4	0		
V7	Choir Teuk Cheng		7	0		
V8	San Dan	Vihearsour	20	0		
V9	Choir Teuk Thong		3.5	0		
V10	Min Thom		4	0		
V11	Ta Top		6	0		
V12	Trapeang Chouk		20	0		
	Sub Total		126.5	0	446	319.5
	Total		426.7		831	404.3



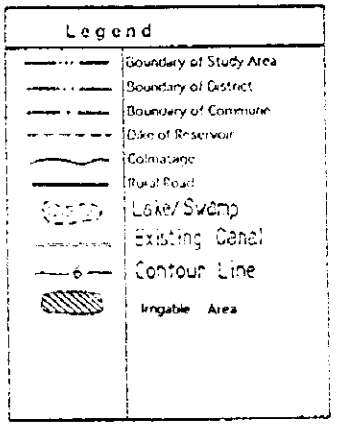


Figure 2.4 Irrigable Area for the Dry Season Recession Paddy in the Reservoirs and Available Water in the Swamps at Stage-1 Development Plan

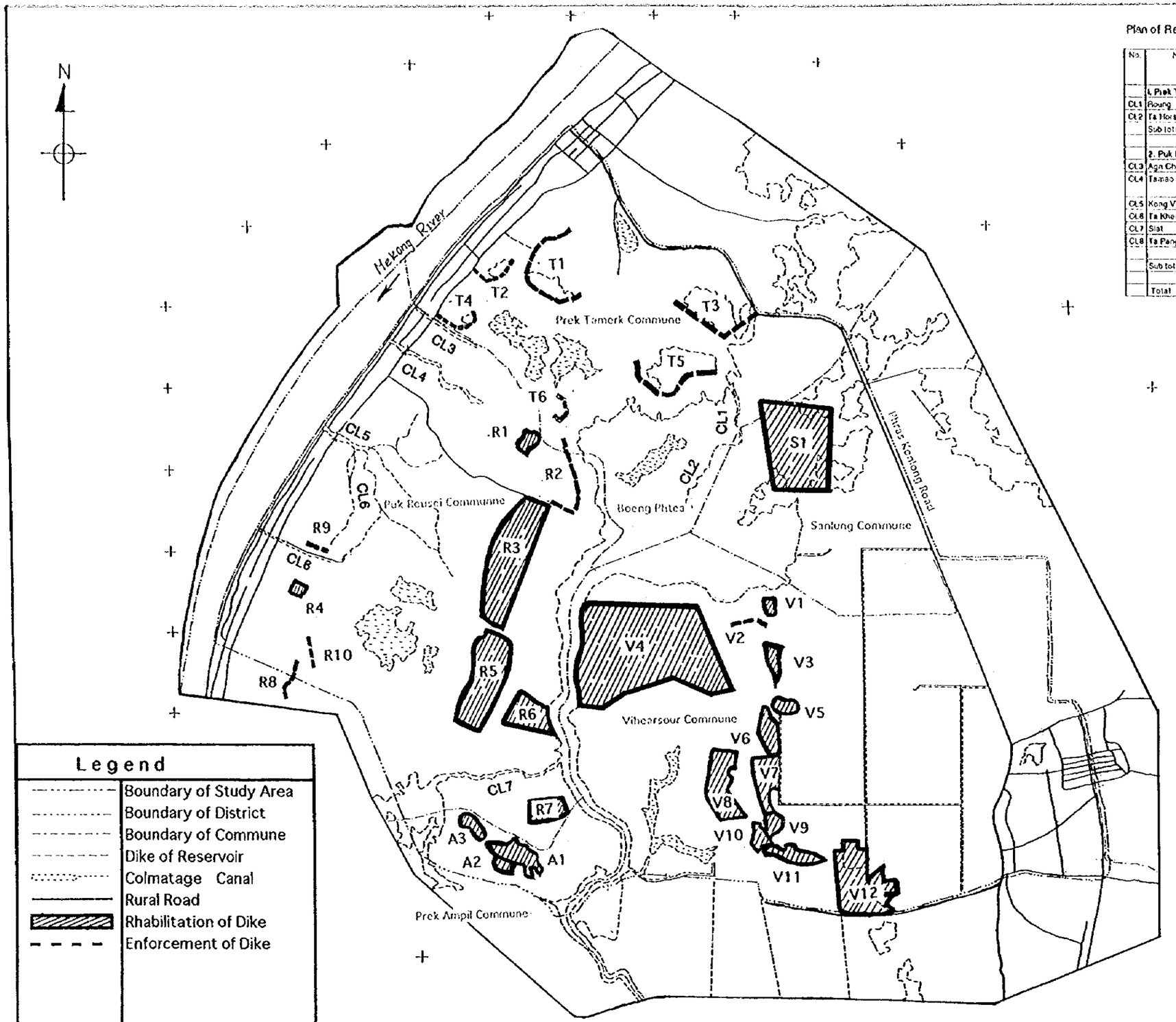


Figure 2.5 Rehabilitation Plan of Reservoirs and Colmatage Canal

Plan of Rehabilitation/Expansion of Colmatage Canal at Boeng Phtea Area

No.	Name of Prek	Description of Existing Canal: Type	Width	Bottom Width (m)	Depth (m)	Length (m)	Plan: Rehabilit. of Canal Type	Length (m)	Expans. of Canal Type	Length (m)	Intake Gate Type	Nos.	Bridge Type	Nos.
	1. Prek Tamerk Commune													
CL1	Roung		15	8	1.5	1000								
CL2	Ta Nors		15	8	2.5	1500								
	Sub total					2500		0		0				
	2. Puk Reusei Commune													
CL3	Aga Cheng		10	5	1.5	500	B	500	A	500	B	1	A	1
CL4	Tamao		67	58	12.5	1258	E	1260	A	1200	E	1	A	2
									C	700			E	1
CL5	Kong Van					1500	E	1500			E	1		
CL6	Ta Kheum		57	50	8.2	2500	E	2500	C	500				
CL7	Siat		30	30	1.8	6000					B	1		
CL8	Ta Pang		12	10	1.5	1500	B	1500	A	1100	B	1		
	Sub total					13258		7260		4000		5		4
	Total					15758		7260		4000		5		4

PLAN of Rehabilitation /Enforcement of the Reservoirs

No.	Reservoir Name	Commune Name	Length of Dike (m)	Plan: crest El.(m)	Top of width (m)	Volume (1000m³)	Surplus of Volume (1000m³)
T1	Thmei	Prek Tamerk	2000	8.4	2.5	110.8	0
T2	Ta Dau		7000	8.0	2.5	22.6	0
T3	Brovosh		1300	8.5	3.0	200.5	0
T4	Khlor Sko		470	8.0	2.5	16.5	0
T5	Bac Chang Hoeur		2000	7.5	3.0	207.9	0
T6	Trao Peang Reusei		800	7.5	3.0	11.0	0
	Sub Total		13570.0			569.2	0.0
R1	Ta Yi	Puk Reusei	700	8.5	2.0	64.6	38.0
R2	Cheung Chrang		1150		3.0	188.7	0
R3	Promok Khlor		3900	8.5	3/2	1572.4	718.0
R4	Ta Svay		600	9.0	2.0	55.4	27.0
R5	Phleuv Tuk		3200	8.8	3/2	1089.3	482.0
R6	Pro Pheng		1800	7.6	2.0	376.2	190.0
R7	Khnach		1300	7.4	2.0	237.6	120.0
R8	Tunnup Tmei		200	9.0	2.0	6.6	0
R9	Ta Long		250	8.9	2.0	5.9	0
R10	Ta Teih		600	7.0	2.0	30.3	0
	Sub total		13700.0			3626.9	1575.0
S1	Som Say	Sanlung	3600	7.5	3/2	1567.5	867.1
A1	Tamao	Prek Ampil	400	7.5	2.0	17.6	13.0
A2	Ta Pring		2000	7.5	2.0	159.3	118.0
A3	Meas Satt		1000	7.5	2.0	92.4	63.0
	Sub total		3400.0			269.3	194.0
V1	Ta Hem	Vihearsour	500	8.0	2.0	27.2	16.0
V2	Khtom Leak		450	8.0	2.0	16.5	0
V3	Tro Peang Kragn		1000	8.5	3/2	45.9	34.0
V4	Ta Non		5600	8.0	3/2	3250.1	1911.8
V5	O Diev Leu		800	8.0	3/2	40.8	17.0
V6	O Diev Krom		1500	8.0	3/2	158.1	93.0
V7	Choir Teuk Cheng		2000	8.0	3/2	277.1	163.0
V8	San Oan		2500	8.0	2.0	545.6	372.0
V9	Choir Teuk Tbong		1200	8.5	3/2	91.8	54.0
V10	Min Thom		800	8.5	2.0	85.8	58.5
V11	Ta Top		1900	9.0	3/2	185.3	82.0
V12	Trapeang Chouk		2900	9.0	3/2	601.8	500.0
	Sub Total		21150.0			5326.0	3301.3
	Total		55420.0			11358.8	5937.4

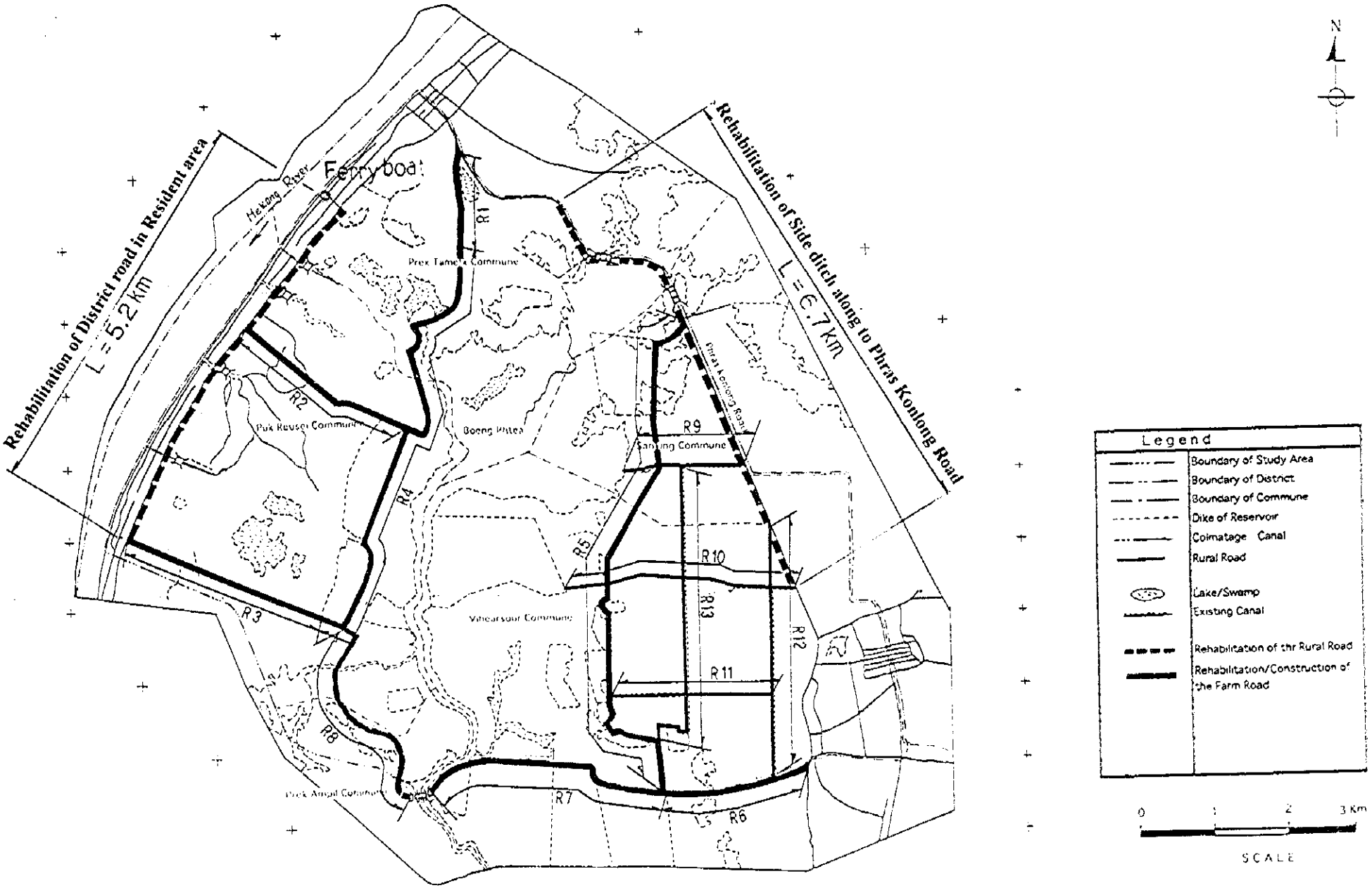


Figure 2.6 Plan of the Rural and Farm Road Networks

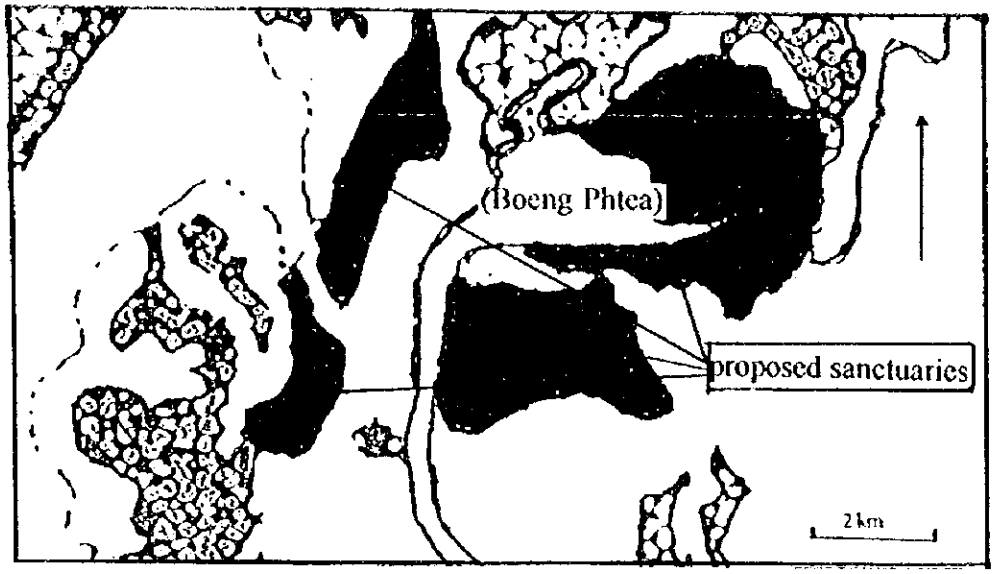


Figure 2.7 Proposed Sanctuaries in the Study Area

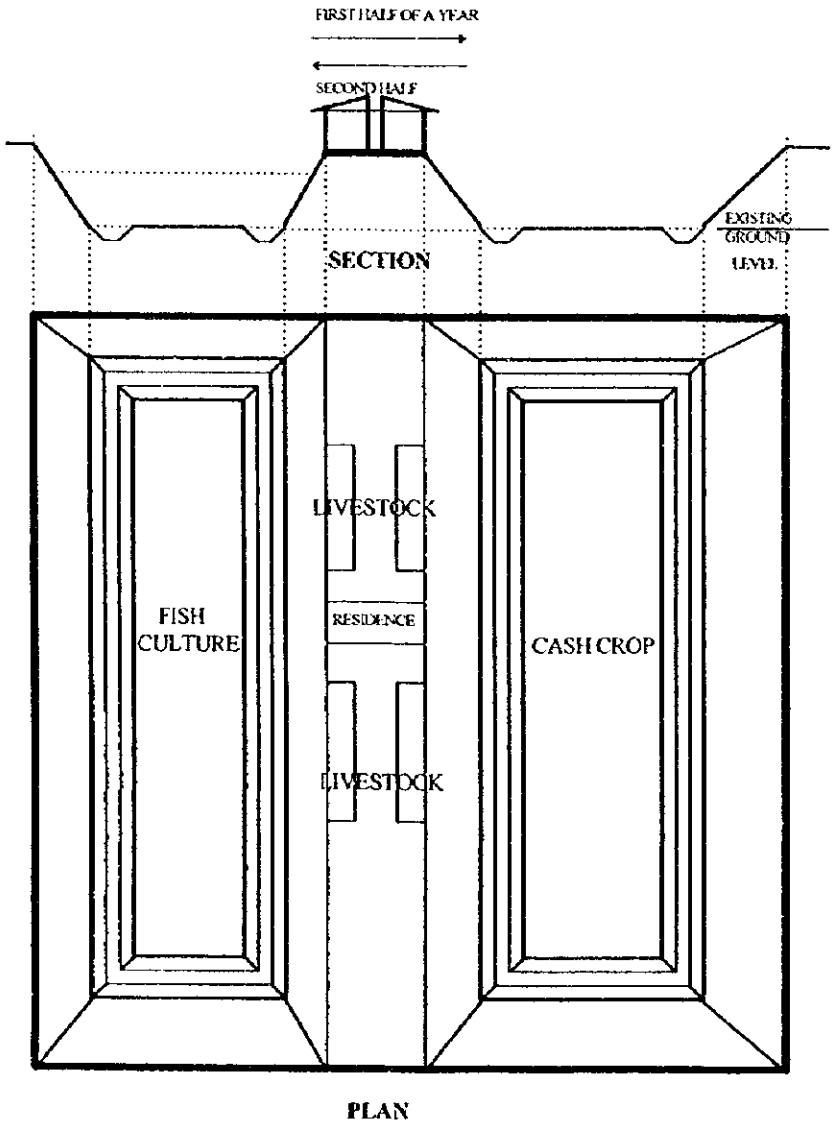
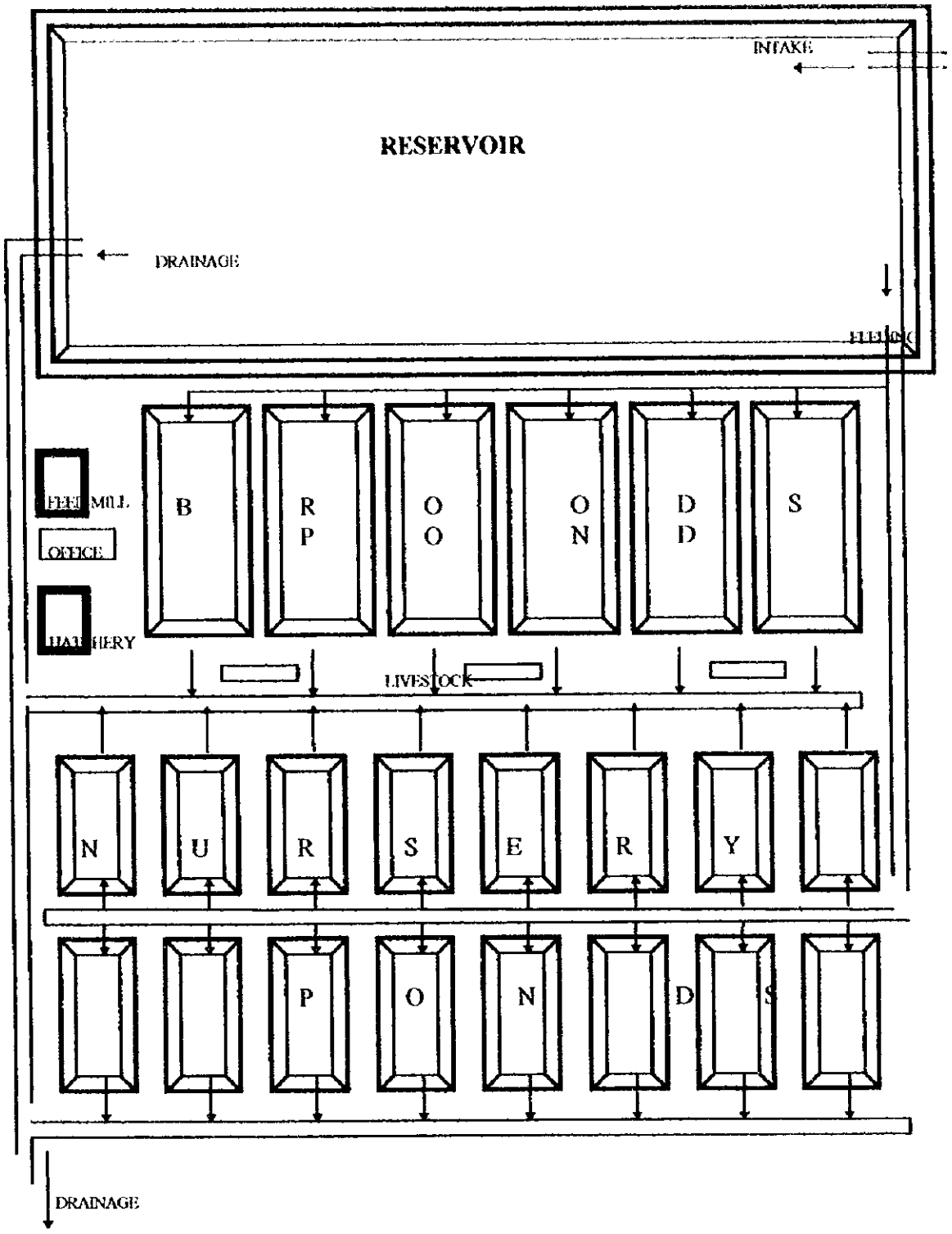


Figure 2.9 Model of Aqua-agriculture Integrated Farm



Reservoir 90 x 240 x 2.5 m (1 Unit)
Brood Stock Pond 30 x 70 x 1.8 m (6 Units)
Nursery Ponds 20 x 50 x 1.2 m (16 Units)
Hatchery 10x 12 m; Feed Mill 8 x 10 m; Office 5 x 8 m

Figure 2.8 General Layout of Fish Seed Production Station

Stage - I

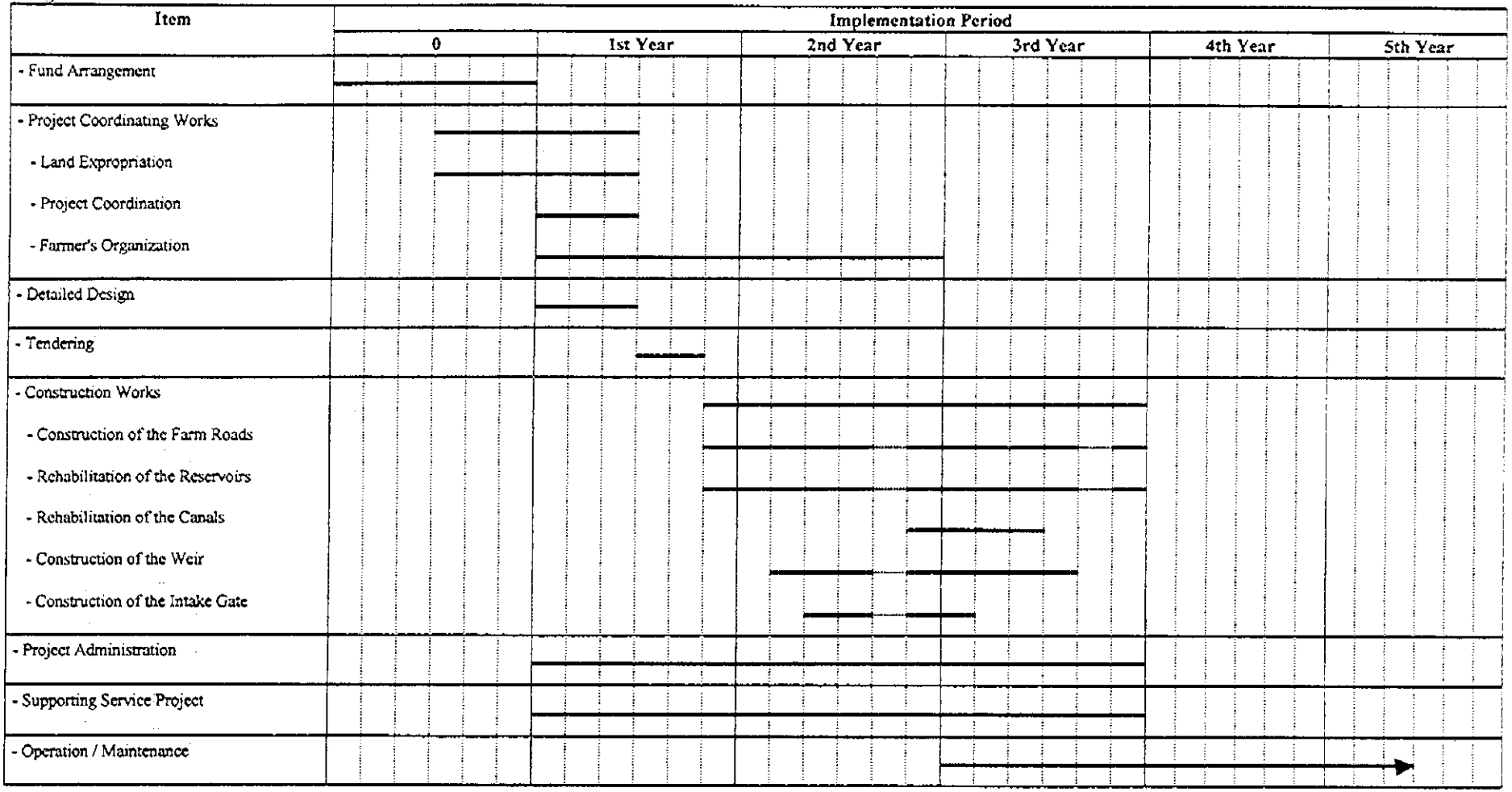


Figure 3.1 Implementation Schedule for the Stage-1

Stage - II

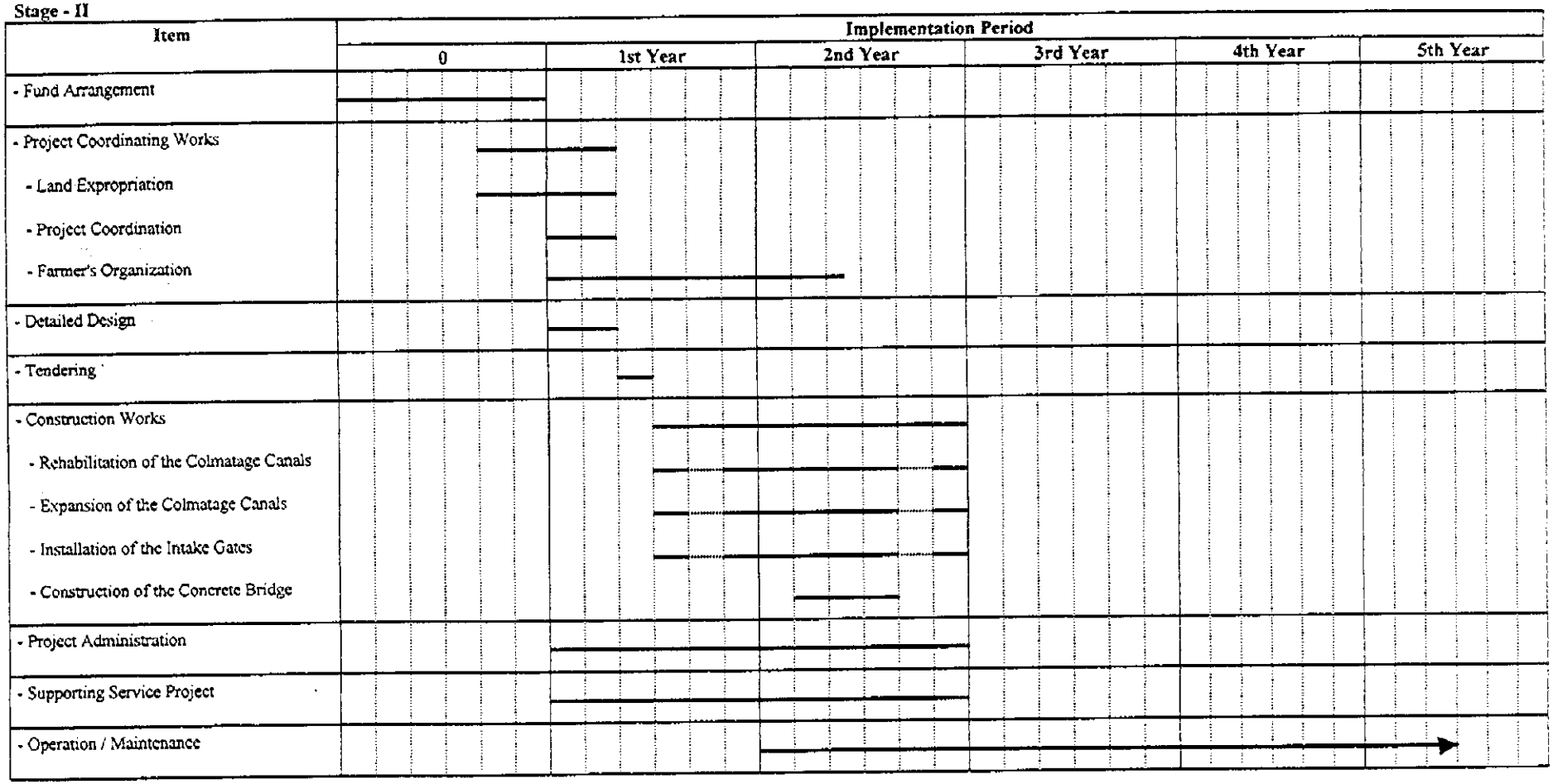


Figure 3.2 Implementation Schedule for the Stage-2

Stage - III

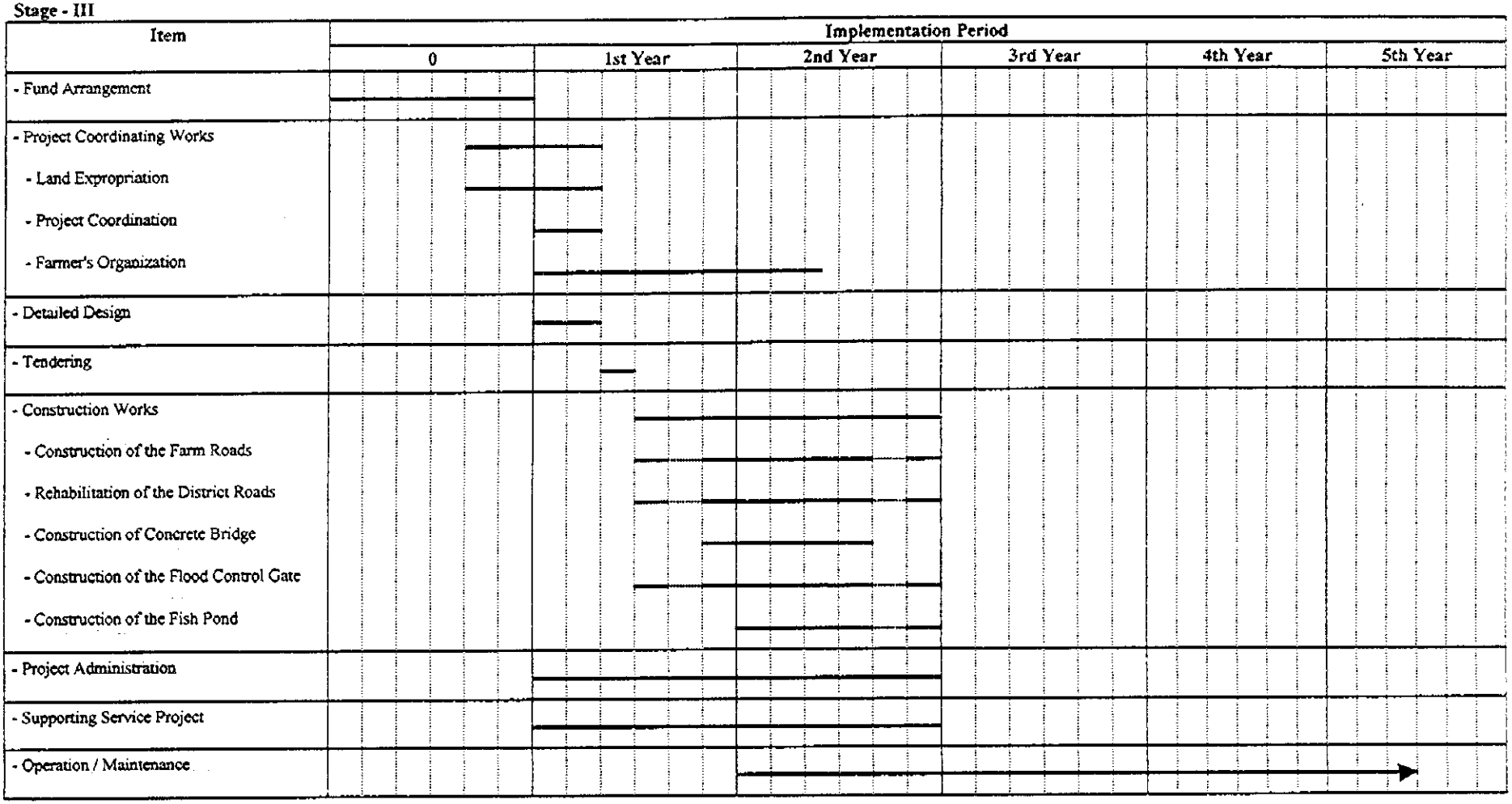


Figure 3.3 Implementation Schedule for the Stage-3

Figure 4.1 Impact on Socio-economic Environment with Project

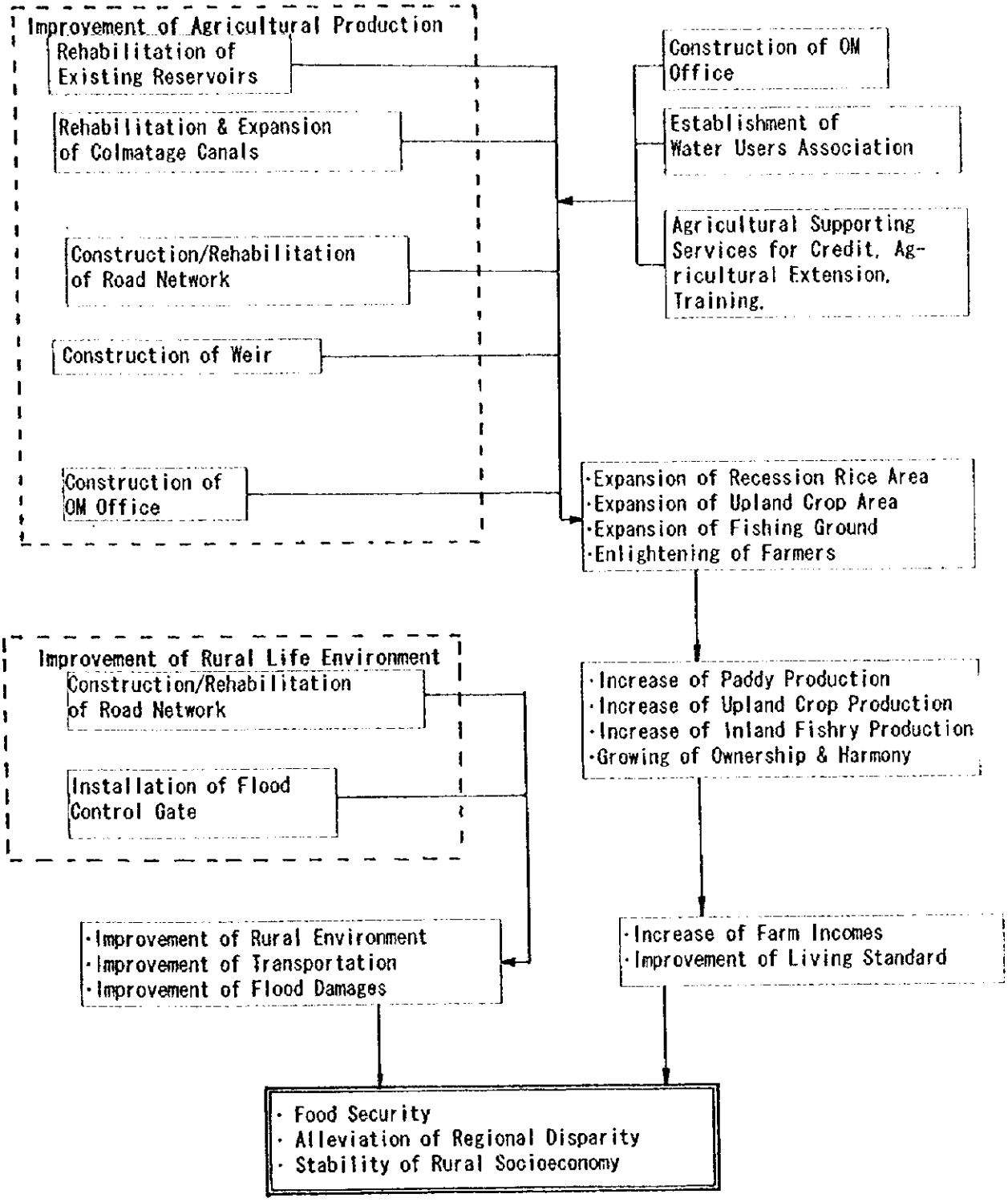


Table 1.2 Administrative Status of the Study Area

District	Commune	Village	Population	No. of Households	Averaged Family Size	No. of CDC	No. of CDC	No. of VDC
Ksach Kandal	Prek Tamerk	Svay Att Leu	837	159	5.26			1
		Svay Att Kandal	661	123	5.37			1
		Svay Att Krom	809	149	5.43			1
		Krang	1,617	291	5.54			1
		Boeng Kaerchap Cheung	1,074	196	5.48		1 CDC	1
		Boeng Kaerchap Tboeng	1,088	209	5.21			1
		Prek Tamerk	808	163	4.96			1
		Anlung	1,184	216	5.48			1
		Sub-Total	8,133	1,506	5.40			8
	Puk Russei	Ang Cheng Leu	1,690	316	5.35			1
		Ang Cheng Krom	1,610	300	5.37			1
		Kroch Seauch	1,793	312	5.75			1
		Puk Reusei Leu	1,631	300	5.44		1 CDC	1
		Puk Reusei Kandal	1,406	256	5.49			1
		Puk Reusei Krom	1,939	396	5.09	1 CDC in		1
		Sub-Total	10,110	1,880	5.38	Ksach Kandal		6
	Santung	Thoei	982	192	5.11		1 CDC	1
	Vihearsour	Prei Chas	1,615	312	5.18			1
		Seda	1,422	247	5.76			1
		Vihearsour Cheung	2,073	376	5.51		1 CDC	1
		Vihearsour Tboeng	1,413	259	5.46			1
		Sub-Total	6,523	1,194	5.46			4
	Prek Ampil	Ta Tut	1,265	220	5.84		1 CDC	1
		Total	27,033	4,992	5.42	1	5	20

Source. Ksach Kandal District Office

Table 1.3 Self-sufficiency of Paddy in the Three Districts

Province	District	Commune	No. of Villages	Population	No. of Households	Households Growing Paddy	Paddy Production (ton)	Paddy Surplus (ton)	Chronic Paddy Surplus (ton)	Surplus per Capita (kg)	Chronic Surplus per Capita(kg)
Kandal	Kean Svay	Banteay Daek	3	10,768	1,985	1,750	3,171	-19,156	76	-2	7
		Chheu Teal	4	5,945	1,304	1,121	1,078	-356,623	-347	-60	-58
		Dei Edth	3	6,419	2,277	1,714	1,783	-68,455	-66	-10	-10
		Koreang Svay	3	7,898	1,598	1,516	1,359	-511,155	-347	-65	-44
		Khaal Kaoh	3	13,181	1,540	618	1,012	-1,499,880	-1,499	-114	-114
		Kokir	4	12,743	2,277	1,975	984	-1,458,175	-1,458	-114	-114
		Kokir Thum	4	11,216	2,276	1,819	1,500	-947,638	-947	-84	-84
		Phum Thum	3	8,843	1,642	572	866	-910,458	-910	-103	-103
		Preak Aeng	6	10,122	1,997	57	142	-1,479,342	-1,478	-146	-146
		Preak Thnei	3	12,249	2,401	820	1,128	-1,297,421	-1,285	-106	-105
		Samraong Thum	6	15,594	3,316	2,933	3,900	-383,634	-383	-25	-25
		Veal Sbov	4	6,509	1,228			-997,920	-997	-153	-153
		Sub-total	46	121,509	23,821	14,895	16,903	-9,928,103	-9,642	-82	-79
	Ksach Kandal	Baak Daav	4	3,592	618	616	1,151	41,935	69	12	19
		Chey Thum	6	5,158	1,052	1,052	1,829	58,726	238	10	41
		Kompong Chamlang	3	4,151	829	810	1,104	-68,283	76	-16	18
		Kach Chouraan	4	4,886	955	915	645	-416,770	-416	-85	-85
		Kach Chrbea Tei	5	4,443	951			-681,156	-681	-153	-153
		Preah Prasab	4	7,621	1,415	1,100	1,531	-380,487	-313	-50	-41
		Preaek Ampil	7	9,751	1,879	1,645	2,182	-373,077	-373	-38	-38
		Preaek Luong	4	3,943	776	710	768	-209,825	-209	-53	-53
		Preaek Taa Kov	3	5,088	966	470	872	-331,152	-331	-65	-65
		Preaek Taa Meak	10	9,819	1,853	1,046	1,350	-810,637	-531	-83	54
		Puk Russei	6	9,776	1,838	1,683	2,798	-58,650	7	-6	1
		Rokaa Chonlueng	5	4,829	943	943	2,463	557,768	878	120	190
		Santung	6	6,158	1,157	1,112	811	-526,714	-123	-86	-20
		Sithor	6	5,574	1,082	873	880	-401,485	-259	-72	-46
		Svaay Chrum	3	3,484	684	85	221	-417,135	-408	-120	-117
		Svaay Romiet	6	4,774	819	787	711	-365,789	-365	-77	-76
		Taa Aek	3	2,875	541	501	114	-382,027	-372	-133	-129
		Vihear Suork	8	10,132	1,879	1,721	2,782	-131,738	262	-13	26
		Sub-total	93	136,446	26,215	18,084	22,192	-4,398,559	-2,849	-46	-27
	Saan	Khob	10	12,522	2,525	2,525	2,347	-711,948	-494	-57	-39
		Koah Antong Chen	4	4,602	1,061	349	45	-682,342	-682	-148	-148
		Koah Khael	6	3,542	1,506	1,552	2,128	-367,737	-129	-36	-13
		Koah Khsach Tonlea	5	5,445	1,153	1,149	732	-457,969	-275	-84	-51
		Krang Yov	15	12,735	2,785	2,412	10,825	3,618,602	4,608	284	362
		Prasaat	5	5,203	950	750	2,370	421,871	421	81	81
		Preaek Anbal	9	20,462	3,872	3,788	3,385	-1,395,161	798	-68	39
		Preaek Koy	7	11,022	2,156	1,842	763	-1,236,789	-1,089	-118	-106
		Rokaa Khpos	5	7,587	1,415	1,105	2,090	-87,550	52	-12	7
		Saan Phum	9	10,344	2,327	2,327	2,376	-439,486	89	-41	8
		Setbou	4	8,688	1,096	365	558	-845,805	-613	-106	-102
		Svay Prateal	9	10,006	2,144	1,616	1,314	-857,939	-716	-86	-72
		Svay Rolum	5	7,622	1,434	760	762	-776,494	-620	-102	-81
		Taa Lon	9	11,162	2,230	2,172	16	-1,702,791	-1,630	-153	-146
		Traeuy Slaa	9	15,394	3,122	2,438	3,250	-827,747	-522	-45	-34
		Tuek Vil	8	9,009	1,692	1,423	2,159	-265,015	-66	-29	-7
		Sub-total	119	159,245	31,568	26,507	35,130	-5,334,295	-895	-40	-8

Source:Crop and Food Supply Assessment Mission 1996/97, WFP/FAO

Table 1.4 Present Agricultural Land Use in the Study Area
by Commune and Elevation

(Unit : ha)

Commune	Land Elevation (m)	Recession Paddy	Irrigation Paddy + Upland Crops	Rainfed Paddy	Orchard	Total	Distribution
Prek Tamerk	>9.0	-	52	-	40	92	15.3%
	8.0-9.0	-	184	-	-	184	30.5%
	<8.0	298	29	-	-	327	54.2%
	Sub Total	298	265	-	40	603	100.0%
	Distribution	49.4%	43.9%	0.0%	6.6%	100.0%	-
Puk Reusei	>9.0	-	111	-	17	128	12.2%
	8.0-9.0	-	226	-	-	226	21.6%
	<8.0	619	74	-	-	693	66.2%
	Sub Total	619	411	-	17	1,047	100.0%
	Distribution	59.1%	39.3%	0.0%	1.6%	100.0%	-
Sanlung	>9.0	-	16	-	-	16	5.8%
	8.0-9.0	-	5	161	-	166	59.9%
	<8.0	84	-	11	-	95	34.3%
	Sub Total	84	21	172	-	277	100.0%
	Distribution	30.3%	7.6%	62.1%	0.0%	100.0%	-
Vihear-sour	>9.0	-	99	133	17	249	16.2%
	8.0-9.0	-	-	733	-	733	47.8%
	<8.0	538	-	14	-	552	36.0%
	Sub Total	538	99	880	17	1,534	100.0%
	Distribution	35.1%	6.5%	57.4%	1.1%	100.0%	-
Prek Ampil	>9.0	-	-	-	-	-	0.0%
	8.0-9.0	-	9	-	-	9	8.7%
	<8.0	83	12	-	-	95	91.3%
	Sub Total	83	21	-	-	104	100.0%
	Distribution	79.8%	20.2%	0.0%	0.0%	100.0%	-
Total	>9.0	-	278	133	74	485	13.6%
	8.0-9.0	-	424	894	-	1,318	37.0%
	<8.0	1,622	115	25	-	1,762	49.4%
	Total	1,622	817	1,052	74	3,565	100.0%
	Distribution	45.5%	22.9%	29.5%	2.1%	100.0%	-

Source : JICA Study Team, July, 1997

Table 1.5 Farmland Ownership of Interviewed Farmers in the Study Area

Commune	Number of Interviewed Farmer	Farmland Ownership (household)				Field Size (ha)				
		Paddy Field		Upland Field		Average			Minimum Field Size	Maximum Field Size
		Own	Not Own	Own	Not Own	Paddy	Upland	Total		
Prek Tamerk	100	100	0	52	48	0.54	0.44	0.77	0.12	5.30
Puk Reusei	182	173	9	130	52	0.49	0.17	0.58	0.15	3.00
Sanlung	25	25	0	16	9	0.77	0.50	1.09	0.15	4.00
Vihearsour	175	175	0	18	157	1.62	0.57	1.68	0.10	12.00
Prek Ampil	18	18	0	8	10	0.61	0.13	0.67	0.20	1.62
Total	500	491	9	224	276	0.92	0.29	1.03	0.10	12.00
Distribution	-	98%	2%	45%	55%	-	-	-	-	-

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Note: Field sizes are based on land owned farmers.

Table 1.6 Number of Interviewed Farmers by Income Source and Commune

Commune	Farm income > Fishery income = 0	Farm income > Fishery income > 0	Fishery income > Farm income > 0	Fishery income > Farm income = 0	Unknown	Total
Prek Tamerk	74	24	2	0	0	100
Puk Reusei	139	28	7	1	7	182
Sanlung	24	1	0	0	0	25
Vihearsour	138	21	9	3	4	175
Prek Ampil	14	4	0	0	0	18
Total	389	78	18	4	11	500

Source: Rural Socio-Economic Survey, JICA Study Team

Table 1.7 Paddy Cropping Practice in the Study Area

Commune	Practicing Paddy Type			Average Planted Area (ha)				Average Production (ton)				Average Yield (ton/ha)				Major Variety	
	Dry (D)	Wet (W)	(D+W)	(D)	(W)	(D)/ (D+W)	(W)/ (D+W)	(D)	(W)	(D)/ (D+W)	(W)/ (D+W)	(D)	(W)	(D)/ (D+W)	(W)/ (D+W)	Dry	Wet
Prek Tamerk	64	16	20	0.47	0.26	0.37	0.27	1.54	0.78	0.83	0.54	3.27	2.93	2.26	1.97	IR66	IR66
Puk Reusei	50	36	54	0.43	0.51	0.36	0.26	1.42	1.48	1.18	0.63	3.30	2.92	3.27	2.45	IR66	Kloeng
Sanlung	0	22	3	-	0.68	0.40	1.07	-	1.01	1.53	1.55	-	1.49	3.83	1.46	-	Sar Thungun
Vihearsour	18	8	140	0.90	0.92	0.81	0.88	2.58	1.17	2.19	1.13	2.86	1.27	2.70	1.28	IR42	Sar Thungun
Prek Ampil	12	3	2	0.57	0.70	0.27	0.34	1.73	1.53	0.77	0.88	3.04	2.19	2.86	2.58	IR66	Kloeng
Total/Average	144	85	219	0.52	0.55	0.65	0.67	1.65	1.20	1.79	0.96	3.17	2.18	2.77	1.42	-	-
Distribution	32%	19%	49%	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Note: The data of Puk Reusei Kandal village are excluded.

Table 1.8 Upland Crops Planted Area by Commune

Commune	1996/97 Planted Area (ha)															
	Maize		Vegetables			Cassava	Sweet Potato	Taro	Mung bean	Ground nut	Sugar cane	Chili	Sesame	Mat Grass	Tobacco	Jute
	White	Red	Fruit	Leaf	Tuber											
Prek Tamerk	10	3	16	5	11	4	2	3	1	3	20	34	10	20	2	20
Puk Reusei	16	1	17	1	9	2	1	2	2	3	15	36	18	20	3	6
Sanlung	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	0
Vihearsour	4	0	4	4	1	0	0	0	0	0	0	0	0	20	0	0
Prek Ampil	18	1	10	2	6	2	1	0	0	2	6	48	18	10	4	4
TOTAL (A)	48	5	47	12	27	8	4	5	3	8	41	118	46	96	9	30
Whole District (B)	135	5	216	33	80	25	31	25	15	25	55	365	105	255	38	46
Distribution (A/B)	35.6%	100.0%	21.8%	36.4%	33.8%	32.0%	12.9%	20.0%	20.0%	32.0%	74.5%	32.3%	43.8%	37.6%	23.7%	65.2%

Source: District Agriculture Office, Ksach Kandal

Table 1.9 Farming Practices of Wet Season Paddy in the Study Area

Commune	Number of Analysed Farmer	No. of Practiced Farmer	Seed Requirement for Nursery (kg/ha)	Urea Application				Agricultural Chemicals Application			
				No. of Applied Farmers	%	Average Amount (kg/ha)	Average Cost (Riel)	No. of Applied Farmers	%	Methyl Parathion (Folidol)	Mevin-phos
Prek Tamerk	100	36	120	36	100%	181	148,822	13	36%	4	8
Puk Reusei	156	90	118	85	94%	134	104,520	30	33%	15	4
Sanlung	25	25	115	0	0%	-	-	-	-	-	-
Vihearsour	175	148	122	50	34%	84	67,637	29	20%	28	-
Prek Ampil	18	5	131	5	100%	137	109,600	3	60%	0	3
Total/Average	474	304	120	176	58%	129	102,754	75	25%	47	15

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Note: Urea is the most popular fertilizer in the Study Area.
The data of Puk Reusei Kandal village are excluded.

Table 1.10 Farming Practices of Dry Season Paddy in the Study Area

Commune	Number of Analysed Farmer	No. of Practiced Farmer	Seed Requirement for Nursery (kg/ha)	Urea Application				Agricultural Chemicals Application			
				No. of Applied Farmers	%	Average Amount (kg/ha)	Average Cost (Riel)	No. of Applied Farmers	%	Methyl Parathion (Folidol)	Mevin-phos
Prek Tamerk	100	84	127	84	100%	181	147,171	47	56%	18	21
Puk Reusei	156	104	140	102	98%	153	121,124	67	64%	47	4
Sanlung	25	3	170	0	0%	-	-	-	-	-	-
Vihearsour	175	158	132	122	77%	90	73,463	61	39%	60	0
Prek Ampil	18	16	153	16	100%	105	84,788	6	38%	3	0
Total/Average	474	365	134	324	89%	134	107,875	181	50%	128	25

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Note: Urea is the most popular fertilizer in the Study Area.
The data of Puk Reusei Kandal village are excluded.

Table 1.11 Genral Paddy Cropping Period by Season and Commune

Commune	Wet Season					Dry Season				
	Variety Name	No. of Farmers	Land Prep. Month	Transplant. Month	Harvesting Month	Variety Name	No. of Farmers	Land Prep. Month	Transplant. Month	Harvesting Month
Prek Tamerk	IR66	26/36	7/8	8/9	11/12	IR66	50/84	7/8,10	10/11/12	1/2/3
Puk Reusei	Kloeng	48/90	6/7	7/8	10/11/12	IR66	85/95	10/11/12	11/12/1	2/3/4
	IR66	22/90	6/7	7/8	10/11	-	-	-	-	-
	Sar Thungun	15/90	4/5	5/6	10/11	-	-	-	-	-
Sanlung	Sar Thungun	19/25	6	7	12	-	-	-	-	-
	Bonla Phdau	6/25	6	7	11	-	-	-	-	-
Vihearsour	Sar Thungun	134/148	6	7	12	IR42	104/158	7,11/12	12/1	3/4
Prek Ampil	-	-	-	-	-	IR66	14/17	12	1	4

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Table 1.12 Animal Raising of Interviewed Farmers in the Study Area

Commune	Number of Interviewed Farmer	Draft Animal			Pigs			Chicken			Duck		
		Number of Owned Farmer	%	AVG. Heads	Number of Owned Farmer	%	AVG. Heads	Number of Owned Farmer	%	AVG. Heads	Number of Owned Farmer	%	AVG. Heads
Prek Tamerk	100	52	52%	2.3	67	67%	1.4	82	82%	9.8	4	4%	3.5
Puk Reusei	182	88	48%	2.4	100	55%	1.5	174	96%	9.5	8	4%	7.9
Sanlung	25	11	44%	2.1	24	96%	2.3	24	96%	11.1	3	12%	6.3
Vihearsour	175	115	66%	2.4	119	68%	1.8	152	87%	12.2	29	17%	7.9
Prek Ampil	18	8	44%	2.1	6	33%	1.8	18	100%	9.7	1	6%	1.0
Total/Average	500	274	55%	2.3	316	63%	1.7	450	90%	10.6	45	9%	7.2

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Table 1.13 Farm Machine Ownership of Interviewed Farmers in the Study Area

Commune	Number of Interviewed Farmer	Tractor		Thresher		Hand Sprayer		Mobile Pump	
		Number of Owned Farmer	%	Number of Owned Farmer	%	Number of Owned Farmer	%	Number of Owned Farmer	%
Prek Tamerk	100	0	0%	0	0%	8	8%	16	16%
Puk Reusei	182	1	1%	58	32%	28	15%	27	15%
Sanlung	25	0	0%	0	0%	0	0%	0	0%
Vihearsour	175	0	0%	2	1%	19	11%	11	6%
Prek Ampil	18	0	0%	2	11%	0	0%	1	6%
Total/Average	500	1	0%	62	12%	55	11%	55	11%

Source: Rural Socio-Economic Survey, JICA Study Team, 1997

Table 1.14 Cropping Season and Land Elevation Based on the Interview

No	Commune	Village	Elevation (m)	Flood Period and Cropping Pattern (4 5 6 7 8 9 10 11 12 1 2 3)	Paddy Variety
1	Vihearsour	Seda	9.5	Paddy	Sar Thungun, Kloeng
2	Puk Reusei	Agn Chang Krom	9.0-9.5	Sesame; Paddy	
3	Sanlung	Sanlung	9.0-9.5	Paddy	Bonla Phdau
4	Prek Tamerk	Anlong	9.0	Maize/Sesame; Paddy	IR66, Kloeng
5	Vihearsour	Seda	8.5-9.5	Paddy	Bonla Phdau
6	Puk Reusei	P. Reusei Leu	9.0	Sesame; Paddy	
7	Prek Tamerk	Svay Att Kandal	9.0	Cabbage; Paddy	IR66
8	Puk Reusei	Agn Chang Krom	9.0	Mungbean; Maize/Sesame; Upland Crop	
9	Puk Reusei	P. Reusei Kandal	8.5-9.0	Taro; Cabbage	
10	Prek Tamerk	Svay Att Leu	8.5	Cauliflower; Cabbage; Paddy	IR66
11	Puk Reusei	Kroch Seauch	8.5	Maize/Sesame; Paddy; Mungbean	IR66
12	Puk Reusei	Agn Chang Leu	8.5	Paddy; Wax gourd	IR66
13	Prek Tamerk	B. Kagnchap Cheung	7.5-8.0	Paddy	IR66, Kloeng
14	Prek Tamerk	Svay Att Kandal	7.5	Paddy; Paddy	Sar Thungun, Kloeng, IR66
15	Prek Tamerk	Svay Att Kandal	6.5-7.0	Paddy	IR66
16	Prek Tamerk	B. Kagnchap Tbong	6.0	Paddy	IR66
17	Puk Reusei	P. Reusei Kandal	5.5-6.0	Paddy	IR66
18	Sanlung	Sanlung	5.5-6.0	Paddy	IR66
19	Vihearsour	Seda	5.0-5.5	Paddy	IR66
20	Vihearsour	Seda	5.0-5.5	Paddy	

Source: JICA Study Team, 1997

Flood — Paddy - - - Upland Crop

Table 1.15 Various Yield Data in Ksach Kandal District

Year	Area	Season	Crop	Harvested Area (ha)	Production (ton)	Yield (ton/ha)	Data Source
1995	Prek Tamerk	Wet	Paddy - Early	111.0	333.0	3.00	District Agriculture Office
1995	Puk Reusei	Wet	Paddy - Early	5.0	15.0	3.00	District Agriculture Office
1995	Sanlung	Wet	Paddy - Early	277.0	831.0	3.00	District Agriculture Office
1995	Vihearsour	Wet	Paddy - Early	388.0	1,164.0	3.00	District Agriculture Office
1995	Prek Ampil	Wet	Paddy - Early	5.0	15.0	3.00	District Agriculture Office
1995	Prek Tamerk	Wet	Paddy - Medium	101.0	252.5	2.50	District Agriculture Office
1995	Puk Reusei	Wet	Paddy - Medium	135.0	337.5	2.50	District Agriculture Office
1995	Sanlung	Wet	Paddy - Medium	764.0	1,910.0	2.50	District Agriculture Office
1995	Vihearsour	Wet	Paddy - Medium	85.0	212.5	2.50	District Agriculture Office
1995	Prek Ampil	Wet	Paddy - Medium	17.0	42.5	2.50	District Agriculture Office
1995	Vihearsour	Wet	Paddy - Late	687.0	1,854.9	2.70	District Agriculture Office
1995	Ksach Kandal	Wet	Paddy - Early	1,955.0	5,865.0	3.00	District Agriculture Office
1995	Ksach Kandal	Wet	Paddy - Medium	3,925.0	9,812.5	2.50	District Agriculture Office
1995	Ksach Kandal	Wet	Paddy - Late	722.0	1,949.4	2.70	District Agriculture Office
1995	Ksach Kandal	Wet	Paddy - Early IR	1,072.0	4,106.0	3.83	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Paddy - Medium IR	1,109.0	4,702.0	4.24	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Paddy - 3 months	883.0	2,031.0	2.30	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Paddy - 4 months	2,851.0	6,985.0	2.45	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Paddy - 6 months	722.0	2,173.0	3.01	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Maize	504.0	771.0	1.53	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Sweet potato	46.0	184.0	4.00	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Cassava	30.0	150.0	5.00	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Mungbean	27.0	5.0	0.19	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Vegetables	228.0	1,000.0	4.39	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Sesame	250.0	37.0	0.15	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Peanut	70.0	13.0	0.19	Provincial Agriculture Office
1995	Ksach Kandal	Wet	Jute	157.0	109.0	0.69	Provincial Agriculture Office
1994/95	Ksach Kandal	Dry	Paddy - Early IR	1,586.0	6,098.0	3.84	Provincial Agriculture Office
1994/95	Ksach Kandal	Dry	Paddy - Medium IR	1,530.0	5,365.0	3.51	Provincial Agriculture Office
1994/95	Ksach Kandal	Dry	Paddy - 3 months	924.0	3,240.0	3.51	Provincial Agriculture Office
1994/95	Ksach Kandal	Dry	Paddy - 4 months	960.0	3,485.0	3.63	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Maize	10.0	12.0	1.20	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Sweet potato	46.0	253.0	5.50	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Cassava	30.0	210.0	7.00	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Mungbean	170.0	110.0	0.65	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Tobacco	50.0	27.0	0.54	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Vegetables	410.0	2,050.0	5.00	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Peanut	70.0	77.0	1.10	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Sugarcane	60.0	2,100.0	35.00	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Castoroil plant	7.0	8.0	1.14	Provincial Agriculture Office
1995/96	Ksach Kandal	Dry	Mat grass	900.0	180.0	0.20	Provincial Agriculture Office

Note: Data of upland crops are planted area.

Table 1.16 Yield Data of Common Upland Crops in the Study Area by Season

Item	Wet Season				Dry season			
	sesame	cassava	maize	cucumber	mat grass	mungbean	tomato	watermelon
Average Yield (ton/ha)	1.26	5.59	1.94	5.55	0.97	1.85	12.34	4.14
MIN - MAX (ton/ha)	0.3-8.0	4.0-8.0	0.6-3.5	4.1-8.0	0.1-4.0	0.7-3.0	3.0-30.0	3.6-5.0
No. of Practiced Farmers	33	14	10	5	62	21	8	8

Source: Rural Socio-Economic Survey, JICA Study Team

Note: In wet season, 85 farmers practice upland crops.
In dry season, 144 farmers practice upladn crops.

Table 1.17 Livestock Statistics of the Concerned Five Commune (1997.6)

(Unit : head)

Commune	Cattle						Buffaloe					
	< 3 Years Old			>= 3 Years Old			< 3 Years Old			>= 3 Years Old		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Prek Tamerk	442	440	882	513	822	1,335	3	2	5	6	6	12
Puk Reusei	745	565	1,310	549	1,107	1,656	7	5	12	10	20	30
Sanlung	121	229	350	25	313	338	123	116	239	230	227	457
Vihearsour	202	331	533	40	467	507	152	156	308	272	448	720
Prek Ampil	524	712	1,236	349	1,038	1,387	6	5	11	8	20	28
Total	2,034	2,277	4,311	1,476	3,747	5,223	291	284	575	526	721	1,247
District Total	4,462	5,447	9,909	3,261	8,343	11,604	789	826	1,615	1,320	1,938	3,258
Distribution(%)	45.6%	41.8%	43.5%	45.3%	44.9%	45.0%	36.9%	34.4%	35.6%	39.8%	37.2%	38.3%

Commune	Horse						Pig					Chicken	Duck
	< 3 Years Old			>= 3 Years Old			For Breeding			For Meat	Baby		
	Male	Female	Total	Male	Female	Total	Male	Female	Total				
Prek Tamerk	6	3	9	15	16	31	1	7	8	1,050	20	11,000	500
Puk Reusei	7	9	16	5	16	21	0	3	3	1,020	10	12,000	200
Sanlung	3	3	6	5	3	8	1	14	15	700	20	8,400	200
Vihearsour	11	6	17	12	7	19	0	8	8	1,070	30	7,300	600
Prek Ampil	2	1	3	5	3	8	0	4	4	880	30	11,000	200
Total	29	22	51	42	45	87	2	36	38	4,720	110	49,700	1,700
District Total	49	42	91	85	93	178	7	76	83	13,000	700	130,350	8,080
Distribution(%)	59.2%	52.4%	56.0%	49.4%	48.4%	48.9%	28.6%	47.4%	45.8%	36.3%	15.7%	38.1%	21.0%

Source : District Agriculture Office, Ksach Kandal

Table 1.18 Number of Farm Labor by Sex and Commune

(Unit : persons)

Commune	No. of Iterviewed Farmer	No. of Farm Labor				No. of Farm Labor per Household			
		Male		Female		Male		Female	
		Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Prek Tamerk	100	164	48	123	94	1.64	0.48	1.23	0.94
Puk Reusei	182	289	65	192	121	1.59	0.36	1.05	0.66
Sanlung	25	15	9	23	19	0.60	0.36	0.92	0.76
Vihearsour	175	249	109	165	180	1.42	0.62	0.94	1.03
Prek Ampil	18	33	8	17	21	1.83	0.44	0.94	1.17
Total/Average	500	750	239	520	435	1.50	0.48	1.04	0.87

Source : Rural Socio-Economic Survey, JICA Study Team

Table 1.19 List of Colmatage Canal at Boeng Phtea Area in Kandal Province (1/2)

No.	Name of Prek	Name of village	Number of Families	Prek Dimension				Bridge or Culvert	Water Source	Colmatage areas			Problem/Comment
				Top Width m	Bottom Widht m	Depth m	Length m			Upland Crop (ha)	Wet Season Rice(ha)	Dry Season Rice(ha)	
	I. Prek Tamerk Commune												
1	Roung	Knong Kagnchap Cheung	15	15	8	1.5	1000	B/C	Mekong	2	-	4	Dredging is need. Construction of concrete bridge
2	Ta Hors	Anlung Kagnchap Cheung	17	15	8	2.5	1500	-		2	-	20	Dredging is need.
	Sub total		32	15	8	2	2500			4	0	24	Dredging is need.
	2. Puk Reusei Commune												
3	Agn Cheng	Agn Cheng Leu	18	10	5	1.5	500	C.B	Mekong	10	10	-	Dredging is need.
4	Tamao	Agn Cheng Krom	298	67	58	13	1258	W.B	Mekong	23	23	-	Construction of concrete bridge
5	Kong Van	Agn Cheng Krom	300				1500		Mekong				Dredging is need.
6	Ta Kheum	& Kroch Seauch	312	57	50	8.2	2500	C.B	Mekong	34	32	-	Dredging is need.
7	Slat	Kroch Seauch Puk Reusei Leu Puk Reusei Krom Puk Reusei Kandal	1264	30	30	1.8	6000	-	Boeng Phtea			360	Dredging is need. Construction of intake facility
8	Ta Pang	Puk Reusei Leu	300	12	10	1.5	1500	C.B	Mekong	33	19	-	Dredging is need.
	Sub total		2492	29.33	25.5	4.3	13258			100	84	360	
	Total		2524	22.17	16.8	3.1	15758			104	84	384	

Note: C.B means Concrete Bridge and W.B means Wooden Bridge, B shows Bridge and C shows Culvert

Table 1.19 List of Colmatage Canal at Boeng Phtea Area in Kandal Province (2/2)

No.	Name of Prek	Construction/ Rehabilitation		Irrigation Type			Yield				Request
				Gravity	Traditi-nal Type	Pump	Wet Seson		Dry Season		
		Cons.	Rehabil.				Rice	Up-land	Rice	Up-land	
	1. Prek Tamerk Commune										
1	Roung	1820	-		-	4	-	-	2.5	-	
2		1820	-		-	5	-	-	2.5	-	
	Sub total										
	2. Puk Reusei Commune										
3	Agn Cheng	1955	1992		-		2.3	0.8	-	-	
4	Tamao	1977	-		-		2.0	0.7	-	-	
5	Kong Van										
6	Ta Kheum	1941	1991			5	1.5	0.8			
7	Slat	1930	-				-	-	3.0	-	
8	Ta Pang	1941	1987				2.0	0.8	-	-	
	Sub total										
	Total										

Table 1.21 Inventory of Reservoir in Boeng Phtea Area (1/2)

No.	Name		Type of Dike		Name of Manager	Dimension of Reservoir dike				Water Depth (m)		Irrigation Facilities			Irrigable Area (ha)		Numbers of Family	Comment/Request
	Reservoir/ Lake/Swamp	Village	Semi-Closed	Closed		Top width (m)	Bottom width (m)	Height (m)	Length (m)	Dry season	Wet season	Sluice Gate	Culvert	Traditional lifting	Dry season	Wet season		
1.Prek Tamerk Commune																		
1	Thmei	Svay Att Leu & Kandal	○		Cheuk Song	2.5	8	2	2000	0.5	4	0	0	5	31.0	20.0	203	Repair the dike
2	Ta Deu	Svay Att Krom & Kandal	○		Thai Im	2.5	6	1.6	700	0.5	3			9	25.0	35.0	85	Repair the dike
3	Brovosh	Knong & Boeng Kabnchap Cheung	○		Cha Leum Sat Son	3	8	2	1300	0.5	3	1	5	4	52.0	14.0	370	Repair the dike
4	Khlar Siko	Svay Att Krom	○		Mao Eng	2.5	8	2	470	1.5	4			10	18.0	6.0	75	Repair the dike & Need water control facilities
5	Bac Chang Hoeur	Boeng Kagnchap Cheung & Tbong	○		Van Husr Leug Theu	3	8	2	2000	0.5	5		6	70	50.0	10.0	120	Need Outlet Facilities
6	Boeng Krao Chap	Boeng Kagnchap Cheung		○	Arkor	4	9	1	500	0.5	4			5	2.0	7.0	10	Repair the dike
7	Kropeu	Boeng Kagnchap Cheung		○	Arkor				-	1.5	6			2	10.0	-	20	
8	O San Dan	Boeng Kagnchap Tbong	○		Prep Pren	2	8	1.5	500		3		1	30	30.0	2.0	120	Repair the dike & Need water control facilities
9	Trao Paang Reusei	Boeng Kagnchap Tbong	○		Tun Sot	1.5	2	1	800		3.5			10	15.0	2.0	40	Repair the dike & Need water control facilities
	Total		7	2		2.6	7.1	1.6	8270			1	12	145	233.0	96.0	1043	
2.Puk Reusei Commune																		
1	Ta Yi	Agn Cheng Leu		○	-	1.5	3	1.5	700	1.5	3			4	4.0	0.0	4	
2	Cheung Chrang	Agn Cheng Leu		○	Seng Aen	2	6	1.5	1150	1.5	2.2			20	5.8	0.0	20	Repair the dike
3	Promok Khlar	Agn Cheng Krom		○	Satt Oun	3.5	8	3.5	3900	2.2	3		1		86.0	0.0	550	Existing Intake Fcilty 1
4	Ta Svay	Puk Reusei Leu		○	Eng Jeum	2	6	1.5	760	1.2	2			22	39.0	0.0	74	
5	Phleuv Tuk	Puk Reusei Leu & Kroch Seauch		○	Kheun Khan	3	6.6	1.8	3200	1.8	2.5			18	63.5	0.0	612	Repair the dike
6	Pro Phagh	Puk Reusei Leu & Kroch Seauch		○	Kheun Khan	2	6	1.4	1840	1.7	1.8			35	23.1	0.0	396	Repair the dike
7	Khnach	Puk Reusei Krom & Kleng Meng		○	Soun Sox	2	6	1.4	1300	1.3	2			50	55.8	0.0	256	
8	Tunnup Tmei	Puk Reusei Kandal	○		Mom Peuv	2	6	1.7	200	1.7	2			7	7.0	0.0	16	
9	Ta Long	Puk Reusei Kandal	○		Ork Oun	2	6	1.5	250	1.5	2.5			15	10.0	3.0	16	
10	Ta Tein	Puk Reusei Kandal	○		Loun Kong	1.5	5	1	500	0.95	1.5			6	30.0	15.0	95	
	Total		3	7		2.2	5.9	1.7	13800			0	1	177	324.2	18.0	2039.0	

Table 1.21 Inventory of Reservoir in Boeng Phtea Area (2/2)

No.	Name		Type of Dike		Name of Manager	Dimension of Reservoir dike				Water Depth (m)		Irrigation Facilities			Irrigable Area (ha)		Numbers of Family	Comment/Request
	Reservoir/ Lake/Swamp	Village	Semi-Closed	Closed		Top width (m)	Bottom width (m)	Height (m)	Length (m)	Dry Season	Wet season	Sluice Gate	Culvert	Traditional lifting	Dry season	Wet season		
3.Sanlung Commune																		Need Intake Facilities, Pol Pot Dike, Lotus
1	Som Say	Sanlung		○	Chumchan	3	6	1.5	3600	1	3.5	0	0		45.0	0.0	95	Pond
4. Prek Ampil Commune																		
1	Tamao	To Tol		○	Cheuk Poje	2	5	0.5	400	1	3			6	4.0	0.0	4	
2	Ta Pring	Ta Tol		○	Cheuk Poje	1.5	5	0.5	2000	0.9	2			20	10.0	0.0	16	
3	Meas Sett	Ta Tol		○	-	1	2	0.9	1000	0.8	2				7.0	0.0	15	
	Total		0	3		1.2	3.3	0.3	3400			0	0	26	21.0	0.0	35	
5.Vihearsour Commune																		
1	Ta Hem	Prei Chas		○	Sin Chean	1.5	3	1	500	0.5	2				2.0	0.0	3	Need Intake Facilities
2	Khtom Leak	Prei Chas	○		Sin Chean	2	5	1.5	400	1	2.5				4.0	0.0	20	Need Intake Facilities
3	Tro Peang Krang	Prei Chas		○	Sin Chean	2.5	6	2	1000	1	3.5				12.0	0.0	15	Need Mobile Pumps
4	Ta Non	Prei Chas		○	Sin Chean	3	6	2	5600	1	3.5	1	1	3	42.0	0.0	92	Need Outlet Facilities, There is existing intake facility, Lotus Pond
5	O Diev Leu	Prei Chas		○	Nuttin	2	5	1.5	800	1	2.5				8.0	0.0	10	
6	O Diev Krom	Vihearsour Cheung		○	Srun Khou	2	5	1.5	1500	1	3				4.0	0.0	45	Repair the dike
7	Choir Teuk Cheng	Seda		○	Nuttin	2	5	1.5	2000	1	3				7.0	0.0	40	Repair the dike
8	San Den	Seda		○	Nuttin	2	5	2	2500	0.5	3				20.0	0.0	44	Need Mobile Pumps
9	Choir Teuk Tbong	Seda		○	Nuttin	2	5	1.5	1200	1	2				3.5	0.0	15	Repair the dike
10	Min Thom	Seda		○	Nuttin	2	5	1.5	800	1	2.5				4.0	0.0	10	Repair the dike
11	Ta Top	Vihearsour Cheung		○	Srun Khon	2	4	1	1900	0.8	2.5				6.0	0.0	6	Repair the dike
12	Ta Ngen	Vihearsour Cheung		○	Srun Khon	3	6	1.5	1200	1.5	7	0	7		20.0	0.0	310	Repair the dike
13	Trapeang Chouk	Vihearsour Cheung		○	Srun Khon	1	3	0.8	1900			Due to the shallow of the dike, Kom Pheak Reservoir water is used.						
14	Kom Pheak	Vihearsour Cheung	○		Srun Khon	3	8	2.5	2900	0.5-1.0	3.5	1	4	-	150.0	0.0	230	Need Intake Facilities, Irrigation area is out of study area.
	Total		2	12		2.1	5.1	1.6	23700			2	12	3	132.5	0.0	610	
	Grand Total		12	25					52770			3	25	351	755.7	114.0	3822	

Note : Data is obtained by the District Agricutural Office in Ksach Kandal District

Table 1.22 Present Estimated Water Storage Volume in the Reservoirs

No.	Name of Reservoir	Name of Commune	Length (m)	Type Area(1,000㎡) Closed	Type Area(1,000㎡) Closed	Existing Mean Dike EL.m	Existing Mean Bottom Et .m	Existing Mean Depth (m)	Existing Volume(1,000㎥) Semi Closed	Existing Volume(1,000㎥) Closed
1	Thmei	Prek Tamerk	2000	106		8.4	6.5	1.9	110.8	
2	Ta Dau		7000	41		8	7	1	22.6	
3	Brovosh		1300	243		8.5	7	1.5	200.5	
4	Khlar Siko		470	15		8	6	2	16.5	
5	Bac Chang Hoeur		2000	252		7.5	6	1.5	207.9	
6	Boeng Krao Chap		500		90	9.3	8.5	0.8	0.0	39.6
7	Kropeu		0		138	4.5	4	0.5		48.3
8	O San Dan		500	30		7.5	6.5	1	16.5	
9	Trao Peang Reusei		800	20		7.5	6.5	1	11.0	
	Sub Total		14570.0	707.0	228.0				585.7	87.9
10	Ta Yi	Puk Reusei	700		38	7.5	6.5	1		26.6
11	Cheung Chrang		1150	343		7.5	6.5	1	188.7	
12	Promok Khlar		3900		718	7.5	5.8	1.7		854.4
13	Ta Svay		600		27	8	6.5	1.5		28.4
14	Phleuv Tuk		3200		482	7.8	6	1.8		607.3
15	Pro Pheng		1800		190	6.6	5.2	1.4		186.2
16	Khnach		1300		120	6.4	5	1.4		117.6
17	Tunoup Tmei		200	12		9	8	1	6.6	
18	Ta Long		250	12		8.9	8	0.9	5.9	
19	Ta Teln		600	55		7	6	1	30.3	
	Sub total		13700.0	422.0	1575.0				231.4	1820.5
20	Som Say	Sanfung	3600		667	6.2	4.7	1.5		700.4
21	Tamao	Prek Ampil	400		13	6.5	6	0.5		4.6
22	Ta Pring		2000		118	6.5	6	0.5		41.3
23	Meas Satt		1000		42	6	5	1		29.4
	Sub total		3400.0		173.0					75.3
24	Ta Hem	Vihearsour	500		16	7	6	1		11.2
25	Khtom Leak		450	30		7	6	1	16.5	
26	Tro Peang Kragn		1000		34	7.5	7	0.5		11.9
27	Ta Non		5600		1738	6.9	5.8	1.1		1338.3
28	O Diev Leu		800		34	7.5	6.5	1		23.8
29	O Diev Krom		1500		93	7	6	1		65.1
30	Choir Teuk Cheng		2000		163	7	6	1		114.1
31	San Dan		2500		248	6.5	5.5	1		173.6
32	Choir Teuk Tbong		1200		54	7.5	6.5	1		37.8
33	Min Thom		800		39	7	6	1		27.3
34	Ta Top		1900		82	8	6.2	1.8		103.3
35	Ta Ngen		1200		79	8	7	1		55.3
36	Trapeang Chouk		1900		83	7.8	7	0.8		46.5
37	Kom Pheak		2900	-	-	7.9	5.5	2.4		0.0
	Sub Total		24250.0	30.0	2663.0				16.5	2008.2
	Total		59520.0	1159.0	5306.0				833.6	4692.2

Note 1) *Area means the full water surface area in the flood season

2) Bottom area in semi-closed reservoir is assumed 10 % of the full water surface

3) Bottom area in closed reservoir is assumed 40 % of the full water surface

Table 1.20 Major Feature of the Reservoirs in Each Commune

Name of Commune	No. of Reservoir	Available Water (MCM)	No. of Family	Irrigation Area (ha)	
				Dry Season	Wet Season
Prek Tamerk	9 (7)	0.7	1043	233	96
Puk Reusei	10 (3)	2.1	2039	324	18
Sanlung	1	0.7	95	45	0
Prek Ampil	3	0.1	35	21	0
Vihearsour	14 (2)	2.3	610	133	0
Total	37	5.8	3822	756	114

Note: ( ) means the number of semi-closed type reservoir

Table1.23 Inventory of the Main Existing Canal

No.	Commune Name	Bottom Width(m)	Mean Depth (m)	Length (km)	Water Source	Remarks
C1	Vihearsour	3 - 4	0.3 - 0.5	2.55	Boeng Sam Bour (Tonle Toch)	Pol Pot Canal
C2	-ditto-	2 - 3	0.3 - 0.5	1.05		-ditto-
C3	-ditto-	1	0.5 - 0.7	3.30		-ditto-
C4	-ditto-	1.5 - 2	0.5	4.47		-ditto-
C5	-ditto-	0.5	0.3	0.50	Boeng Phtea	
C6	-ditto-	1.5	0.6	0.30	-ditto-	
Total				12.97		

Table 1.24 Farm Road Density in Each Commune

Commune Name	Area (km^2)	Length (km)	km / km^2
Prek Tamerk	12.14	4.1	0.34
Puk Reusei	18.51	23.15	1.25
Sanlung	5.81	1.2	0.26
Vihcasour	23.00	8.66	0.38
Prek Ampil	1.84	0	0
Total	61.30	37.11	0.61

Table 1.25 Hospitals and Health Centers in the Study Area

Hospitals & HC	Number	Staff	Staff allocation	Facilities
District Hospital	1	34	Dr.3, Assis.4, Nur.13, et 14	Under extension by SHARE
Prek Tamerk HC	1	Paid2, unpaid 4	Prim. nurse 1, Midwife 1, et 4	Need rehabilitation
Puk Reusei HC	1	Paid2, unpaid 4	Prim. nurse 1, Midwife 1, et 4	Good
Sanlung HC	1	Paid2, unpaid 4	Prim. nurse 1, Midwife 1, et 4	Plan 1997 by SHARE
Vihearsour HC	1	Paid2, unpaid 4	Prim. nurse 1, Midwife 1, et 4	Plan 1997 by government
Prek Ampil HC	1	Paid2, unpaid 4	Prim. nurse 1, Midwife 1, et 4	Plan 1997 by SHARE
Private Clinic	2			

Source: Office of Health, Ksach Kandal
Note: HC stands for Health Center

Table 1.26 Schools in the Study Area

Primary Schools

	Name of school	Village	Rooms	Classes	Composition G1	G2	G3	G4	G5	G6	Shift	Students	Girls	Girl %	Std./ Class	Teach.	Std./ Tch.	Building conditions
1	Knong	Knong	20	46	17	10	9	6	3	1	2	1,776	776	43	39	56	32	C,C,C,C,C
2	Pechey Rangsey	Agn Cheng Leu	17	17	5	4	3	2	2	1	2	661	305	46	39	20	33	R,R,R
3	Puk Reusei Leu	Puk Reusei Leu	8	20	5	4	5	3	2	1	2	877	389	44	42	27	32	N,N,N,N
4	Puk Reusei Krom	Puk Reusei Krom	13	11	4	2	2	2	1	0	2	415	171	41	38	9	46	G,R,R
5	Prei Chas	Prei Chas	6	6	3	2	1	0	0	0	1	288	104	36	48	7	41	R,R
6	Vihearsour Cheung	Vihearsour Cheung	12	20	6	4	4	3	2	1	2	851	405	47	43	16	53	G,C,C
	Total		76	120	40	26	24	16	10	4		4,868	2,150	44	41	135	36	

Secondary Schools

					G7	G8	G9											
1	Sihanouk Reach College	Knong	30	19	5	5	9				1	692	221	32	37	43	16	R,R,R,R,R
2	Puk Reusei College	Puk Rousei Leu	14	8	3	3	2				1	281	84	30	35	16	18	G,N,N,N
	Total		44	27	8	8	11					973	305	31	36	59	16	

Kindergartens

1	Knong	Knong	3	3							1	138	60	43	46	3	46	R
2	Vihearsour Cheung	Vihearsour Cheung	3	3							1	80	39	49	27	3	27	R

Source: Office of Education, Ksach Kandal and direct hearing from some schools
Note: Composition means number of classes in each grade.
Std. stands for Students, Teach. for Teachers, and Tch. for Teachers as well.
In the building conditions, N means need of New building, R means need of rehabilitation,
C means under construction, and G means Good condition.

Table 1.27 Inventory of Rural Road

Commune	Resident Area (km^2)	Distance (km)				Density (km/km^2)			
		District road	Village road (*1)			District road	Village road		
			Major	Minor	total		Major	Minor	total
Prek Tamerk	0.883	7.00	9.08	8.75	17.83	7.928	10.283	9.909	20.193
Prek Tamerk									
Puk Reusei	1.098	4.80	7.55	7.15	14.70	4.372	6.876	6.512	13.388
Sanlung	0.368	2.90	4.60	1.80	6.40	7.880	12.500	4.891	17.391
Vihearsour	1.175	4.10	12.20	22.14	34.34	3.489	10.383	18.843	29.226
Prek Ampil	n.a	-	-	-	-	-	-	-	-
Total	3.524	18.80	33.43	39.84	73.27	5.335	9.486	11.305	20.792

Note ; (*1) Major roads can go by car. Minor roads can not go by car.
Source ; Field survey by JICA Study team.

Table 1.28 List of Bridges in the District Road

Location	Length (m)	Width (m)	Structure	Remarks
1) belong Mekong river				
Agn Cheng colmatage	8.8	5.9	concrete	Constructed in 1990
Tamao colmatage	60.0	3.3	wooden	Will be completed in 1997
Kong Van colmatage	62.6	6.1	concrete	Constructed in 1969
Ta Pang colmatage	6.0	7.7	concrete	Constructed in 1996
2) PrekTamerk~Vihearsour	(Phras Konlong road)			
Bridge (a); D.H.Q~3.0km	15.0	4.5	concrete	Under construction
Phras Konlong Bridge	84.0	5.0	steel	Under construction
Bridge (c); D.H.Q~7.0km	18.0	4.5	steel + wooden	
Bridge (d); D.H.Q~7.6km	15.0	4.5	steel + wooden	

Note ; D.H.Q = District Head Quarter office Source ; Field survey by JICA Study team

Table 1.29 Ratio of drinking water sources in the Study Area

Name of Commune	Nos. of Survey	Ratio of drinking water sources (unit :%)					
		Public pot	Tube-well	River	Hydrant	Pond	Open-well
Prek Tamerk	100	29	0	45	43	10	0
Puk Reusei	182	55	12	33	2	0	0
Sanlung	25	0	100	0	0	0	0
Vihearsour	175	24	79	1	0	3	3
Prek Ampil	18	17	11	72	0	0	0
Total	500	35	38	24	9	3	1

Source ; Rural Socio-economic Survey by JICA Study team

Table 1.30 Numbers of Tube Well constructed by UNICEF

Commune	Population	Numbers of Tube-well				Density	Depth	W.L	Yield
		(a)	(b)	(c)	total	(per./well)	(m)	(m)	(m^3/hr.)
Prek Tamerk	1,506	0	13	2	15	116	33.3	9.6	2.37
Puk Reusei	1,880	0	16	13	29	118	28.6	7.4	2.38
Sanlung	192	2	0	0	2	96	24.0	3.3	11.00
Vihearsour	1,194	15	0	4	19	80	24.6	4.4	4.21
Prek Ampil	220	0	0	0	0	n.a	n.a	n.a	n.a
Total	4,992	17	29	19	65	109	28.4	6.9	3.18

Note ; (a) = effective well, (b) = unsuitable for drinking and cooking, (c) = spoiled well
Source ; Numbers of Tube-well : Department of Rural Water Supply, MRD and Interview for the Director of Hospital in Ksach Kandal district.
Depth, W.L (water level) and yield (m^3/hr.) : Department of Rural Water Supply, MRD. This figure include unsuitable and spoiled well.

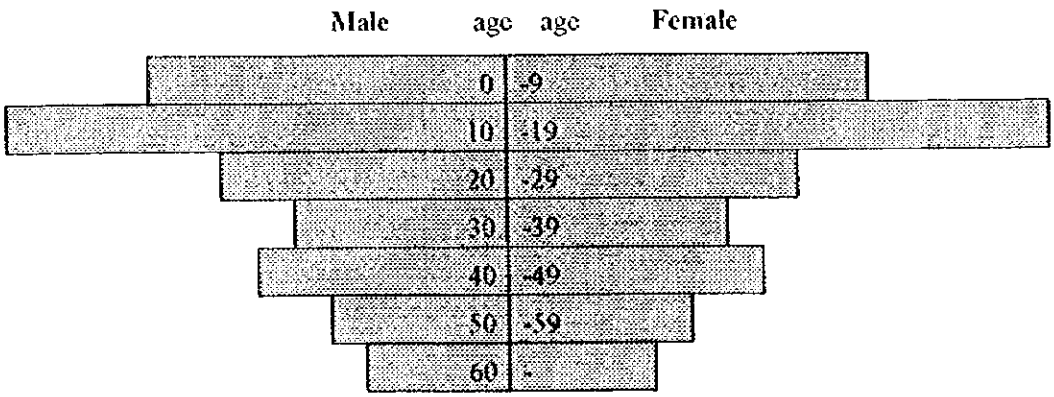


Figure 1.24 Population pyramid in the Study Area

Source: Rural Socio-economic Survey by the JICA study team

Table 1.31 Results of Simplified in-situ Test - Water Quality Survey

Well/lake water

Commune Village Household	Puk Reusei Puk Reusei School		Prek Ta Mak Svay Att Kroum				Mekong river Prek Agnchagn Ferry crossing	
Latitude	11-41-25		11-44-07		11-45-13			
Longitude	104-58-26		105-00-05		105-01-16			
No./code	gB		cD		aF		Ferry	
Well/lake	Tube		Tube		Tube		Mekong	
Season	Dry		Dry		Dry		Dry	
Date (97/xx/xx)	5/29		5/29		5/29		5/29	
Time	10:00		11:45		12:10		13:45	
pH	6.56	6.19	5.99	6.10	5.46	5.44	6.64	6.63
Ec (mS/cm)	0.842	0.842	0.703	0.702	1.230	1.230	0.198	0.192
SS (NTU)	22	25	54	53	1	1	58	61
DO (mg/l),PPM	2.56	2.56	3.38	2.86	4.02	3.42	6.82	5.64
Temp (□)	30.1	30.2	29.5	29.5	30.1	30.1	31.8	31.8
Nacl (%)	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00
C. Bacillus	+ve		-ve		+ve		+ve	
Misc. Bacteria	-ve		-ve		+ve		-ve	

Commune Village Household	Boeng Phtea Lower end		Boeng Phtea middle		Boeng Phtea Upper end		Viheasour Viheasour	
Latitude	11-39-52		11-41-15		11-42-16		11-40-15	
Longitude	105-00-41		105-00-37		105-1-11		105-03-32	
No./code	kE		hE		fG		jJ	
Well/lake	Lake		Lake		Lake		Open	
Season	Dry		Dry		Dry		Dry	
Date (97/xx/xx)	6/04		5/30		6/04		6/04	
Time	11:45		11:50		10:20		14:45	
pH	7.51	7.49	7.46	7.21	7.94	7.91	6.70	6.64
Ec (mS/cm)	0.121	0.120	0.169	0.168	0.145	0.145	2.570	2.570
SS (NTU)	527	557	785	794	941	924	7	6
DO (mg/l),PPM	8.66	8.53	3.84	3.13	8.76	8.63	4.19	3.58
Temp (□)	32.5	32.6	29.5	29.5	29.9	29.9	29.3	29.3
Nacl (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12
C. Bacillus	+ve		+ve		+ve		+ve	
Misc. Bacteria	-ve		-ve		-ve		+ve	

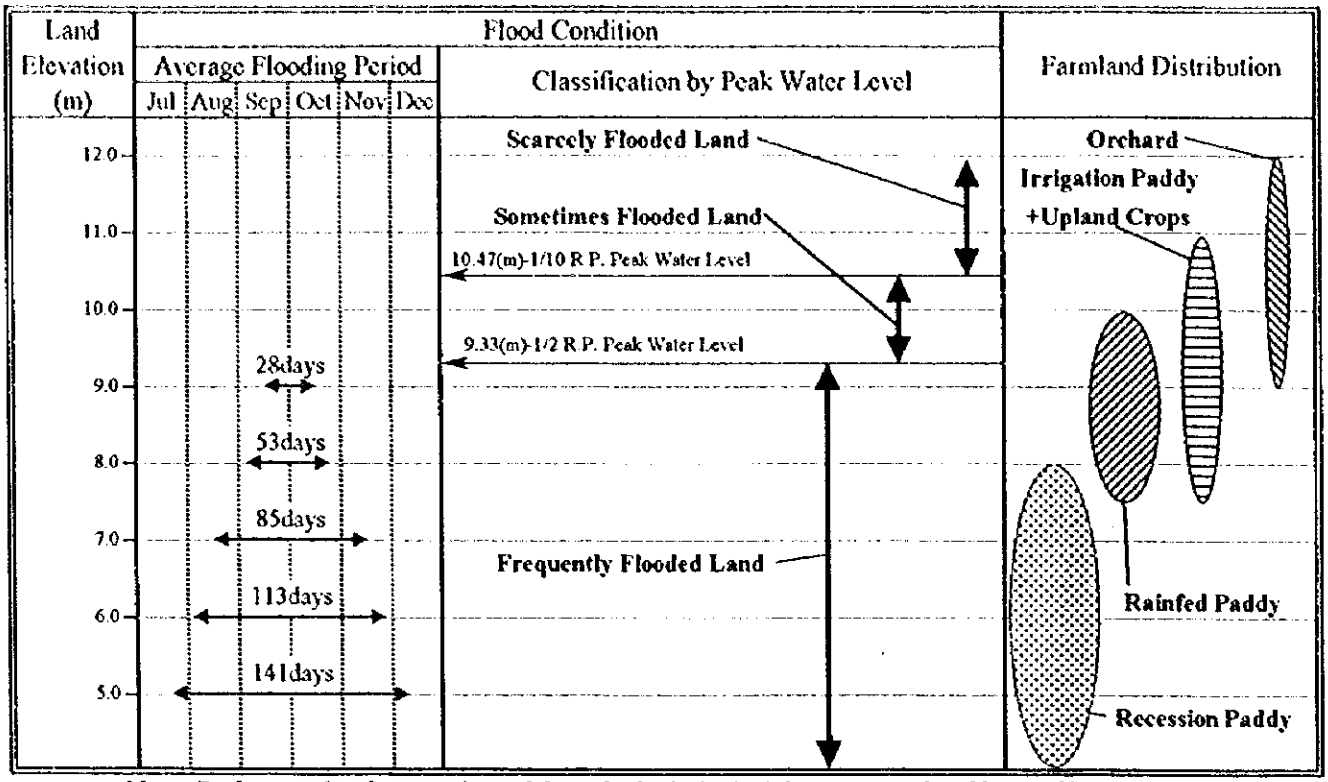
Note : Open: dug/open well tube/well by UNICEF equipped with handpump
gB: by UNICEF, LE 25.5.93, No.M399 PRF25, NB 10m, DB 2m3/hr
cD: No.403, water red in color sometimes, all purpose. Water in Mekong is preferred, due to taste.
aF: N.8m, 01-05-92, DB 2m3/hr, P 23m, M3271, no change in color Not for drinking, Mekong water is preferred due to taste.
jJ: all purpose, 5-7 families, dry season 3.5m, wet 7m. depth 12m

Table 1.32 Water Quality Test

Item	gB	cD	hE	aF	Ferry	fG	kE	jJ
Sampling date	29/05/97	29/05/97	30/05/97	29/05/97	29/05/97	04/06/97	04/06/97	04/06/97
pH	7.45	7.67	7.19	7.15	7.86	6.98	6.86	7.13
TSS mg/l	180.00	94.00	198.00	0.00	42.00	1450.00	715.00	0.00
Cond. mS/m, 25°C	79.10	65.70	15.69	112.80	17.80	14.54	11.36	242.00
Ca meq/l	1.93	1.23	0.59	4.60	0.81	0.40	0.33	5.94
Mg meq/l	1.71	1.95	0.40	3.76	0.49	0.36	0.12	4.59
Na meq/l	4.10	3.10	0.46	2.80	0.43	0.50	0.50	17.00
K meq/l	0.04	0.05	0.06	0.04	0.04	0.06	0.06	4.00
Alk meq/l	7.38	4.29	0.99	6.50	1.22	0.77	0.52	12.10
Cl meq/l	0.24	1.60	0.33	2.95	0.28	0.37	0.27	9.50
SO_4 meq/l	0.18	0.28	0.17	1.41	0.21	0.12	0.20	7.30
Tot.Fe mg/l	8.15	4.95	1.45	6.05	0.00	0.15	1.65	0.175
(NO_3+NO_2)-N mg/l	0.58	0.47	0.56	0.58	0.10	0.58	0.53	0.57
NO_2 -N mg/l	0.49	0.05	0.11	0.04	0.004	0.02	0.06	0.20
NH_4-N mg/l	0.009	1.12	0.06	0.001	0.001	0.25	0.19	0.05
PO_4-P mg/l	0.12	0.009	0.08	0.03	0.01	0.09	0.09	0.54
Tot.P mg/l	0.15	0.01	0.12	0.04	0.04	0.13	0.14	0.89
Si mg/l	13.00	10.38	3.50	11.63	4.88	1.63	3.50	2.38
COD_{Mn} mg/l	2.70	0.36	1.67	0.36	1.28	2.59	2.01	1.83
ΣCat	7.78	6.33	1.51	11.20	1.77	1.32	1.01	31.53
ΣAn	7.80	6.17	1.49	10.86	1.71	1.26	0.99	28.90
$\frac{\Sigma Cat - \Sigma An}{\Sigma Cat + \Sigma An} * 100$	0.12	1.28	0.67	1.54	1.16	2.33	1.00	4.35

Phnom Penh,13th June, 1997

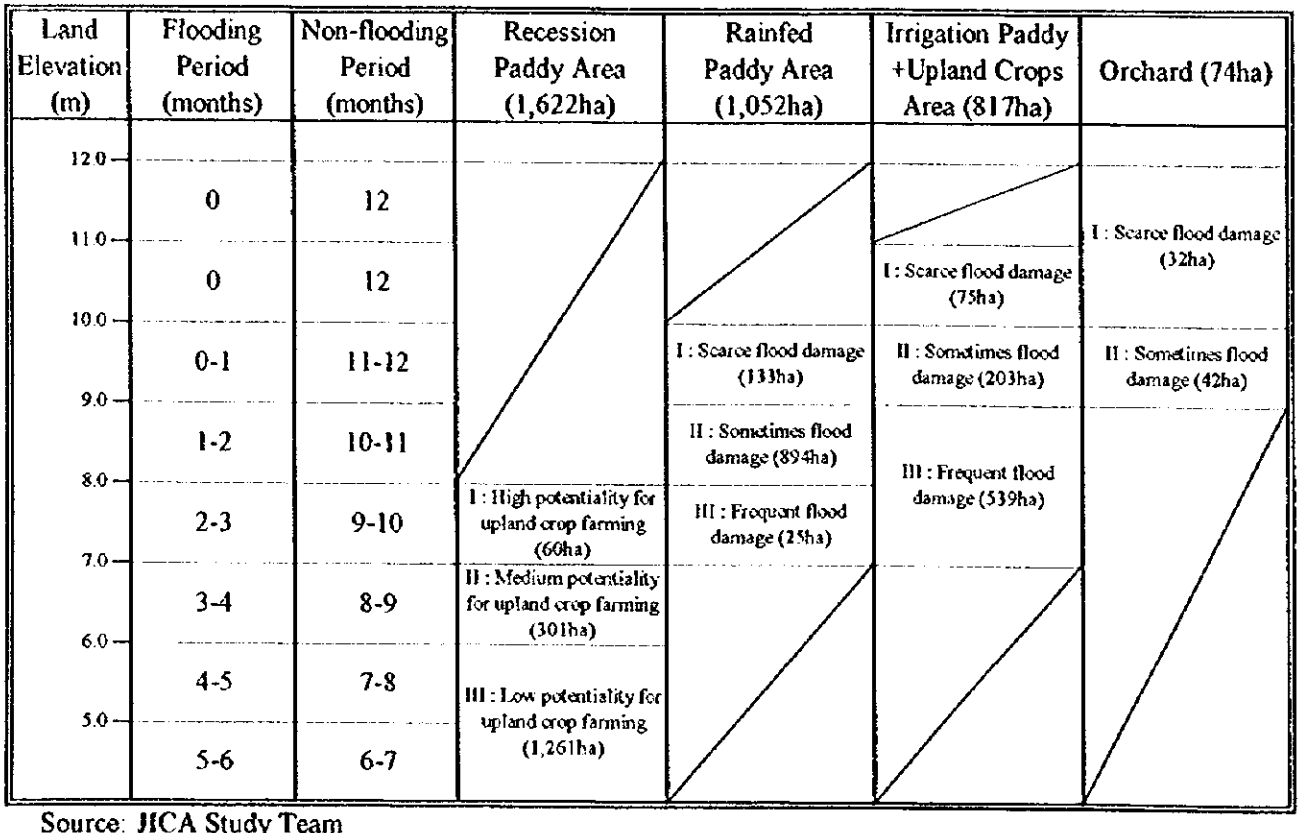
Table 2.1 Some Indices Limiting Agricultural Land Classification in the Study Area



Note: Peak water levels are estimated from the hydrological data measured at Chrouy Changvar. Peak water levels over 9.0 (m) are 11-year among 23-year. The average flooding period, 28days, is the average of 11-year data.

Source: JICA Study Team

Table 2.2 Agricultural Land Classification in the Study Area



Source: JICA Study Team

Tabel 2.3 Land Classification of Recession Paddy Area

Class	Non-flooded Conditions		Available Cropping Season for Upland Crops	Land Elevation (m)	Potentiality for Upland Crops
	Month	Season			
I	9 - 10	Oct/Nov - Aug/Sep	May/June - Aug/Sep	7.0 - 8.0	High
II	8 - 9	Nov - Aug	May/June - Aug	6.0 - 7.0	Medium
III	< 8	Nov/Dec - Jul/Aug	May/June - Jul/Aug	< 6.0	Low

Source: JICA Study Team

Tabel 2.4 Potential Areas by the Development Stage

Development Stage	Effective Area			
	Recession Paddy	Rainfed Paddy	Irrigation Paddy + Upland Crops	Orchard
Stage I	P.A.I.	P.A.I., F.D.R.	F.D.R.	F.D.R.
Stage II	-	-	P.A.I.	-
Stage III	P.A.I.(Upland Crops)	-	-	-

Source: JICA Study Team

Abbrev.: P.A.I.-Planted Area Increase, F.D.R.-Flood Damage Reduction

Table 2.6 General Characteristics of Recommended Paddy Varieties for Dry Season

Variety	Dry Season Yield (ton/ha)	Growth Duration (days)	Height (cm)
IR72	4.0	115	81
Kru	4.1	113	83
IR Kesar	4.2	117	91
IR 66	4.0	109	77

Source: "Rice Production in Cambodia", H. J. Nesbitt, 1996, CIAP

Table 2.7 Yields of Recommended Paddy Varieties Developed by IRRI for Wet Season

Variety	Yield of On-farm Trials (ton/ha)					Height (cm)
	1992	1993	1994	1995	Mean	
Santepheap 1	2.7	2.3	2.4	2.5	2.5	106
Santepheap 2	2.9	2.4	2.4	2.6	2.6	108
Santepheap 3	3.1	2.5	2.5	2.8	2.8	106
Local Check	2.5	2.3	2.2	2.5	2.4	-

Source: "Rice Production in Cambodia", H. J. Nesbitt, 1996, CIAP

Table 2.8 Yields of Recommended Paddy Varieties Selected from Cambodian Pure Line for Wet Season

Variety	Yield (ton/ha)					Height (cm)
	Affected by Fertilizer		Affected by Stress			
	Added	Absent	Absent	Drought	Flood	
CAR 1	2.9	2.6	2.8	2.7	2.7	127
CAR 2	2.9	2.6	2.7	2.7	2.7	126
CAR 3	2.9	2.7	2.9	2.5	2.4	122
Local Check	2.6	2.3	2.5	2.4	2.3	-
CAR 4	3.1	3.1	-	-	-	132
CAR 5	2.9	2.9	-	-	-	134
CAR 6	3.0	3.0	-	-	-	129
Local Check	2.3	2.7	-	-	-	-

Source: "Rice Production in Cambodia", H. J. Nesbitt, 1996, CIAP

Table 2.5 Summary of Potential Area and Agricultural Effect in accordance with the Development Stage

Development Stage and Components	Recession Paddy Area (1,622ha)		Rainfed Paddy Area (1,052ha)		Irrigation Paddy +Upland Crops Area (817ha)		Orchard (74ha)	
	Class	Agricultural Effect	Class	Agricultural Effect	Class	Agricultural Effect	Class	Agricultural Effect
Stage I								
(1) Construction/rehabilitation of farm roads/dikes	-	-	II, III (919ha)	Flood damage will be reduced.	II, III (742ha)	Flood damage will be reduced.	II (42ha)	Flood damage will be reduced.
(2) Rehabilitation of reservoirs	I, II, III (1,622ha)	Cropping intensity will increase.	-	-	-	-	-	-
(3) Construction/rehabilitation of canal systems	-	-	I, II, III (1,052ha)	Cropping intensity will increase.	-	-	-	-
(4) Construction of weir at Boeng Phtea	-	-	-	-	-	-	-	-
Combined Effect	II, III (282ha)	Farmland development in non-arable land.	II, III (282ha)	Farmland development in non-arable land.	-	-	-	-
Stage II								
(1) Construction/rehabilitation of colmatage canals	-	-	-	-	I, II, III (817ha)	Cropping intensity will increase.	-	-
Stage III								
(1) Construction of flood control gates	I, II, III (1,622ha)	Upland crops planted area will increase.	-	-	-	-	-	-
(2) Construction of farm roads	-	-	-	-	-	-	-	-

Note: Please refer to Table 2.2 for Class I, II and III.

Source: JICA Study Team, 1997

Table 2.9 Estimation of the Projected Yield in the Study Area

Crop	Present Yield (ton/ha)	Referential Yield Data		Projected Yield (ton/ha)
Recession Paddy	2.90 (Average of 363 farmers)	Average of 144 farmers among 500 interviewees (practicing only dry season paddy)	3.17	
		Average of 219 farmers among 500 interviewees (practicing both dry and wet season paddy)	2.77	
		94/95 Average of District - early IR	3.84	
		94/95 Average of District - medium IR	3.51	
		94/95 Average of District - 3 months	3.51	
		94/95 Average of District - 4 months	3.63	
		94/95 Average of Province - dry season	3.77	
		95/96 Average of Province - dry season	3.45	
		Improved IR varieties*	4.0-4.2	3.48
Rainfed Paddy	1.61 (Average of 304 farmers)	Average of 85 farmers among 500 interviewees (practicing only wet season paddy)	2.18	
		Average of 219 farmers among 500 interviewees (practicing both dry and wet season paddy)	1.42	
		95 Average of the five concerned communes (early)	3.00	
		95 Average of the five concerned communes (medium)	2.50	
		95 Average of District - early IR	3.83	
		95 Average of District - medium IR	4.24	
		95 Average of District - 3 months	2.30	
		95 Average of District - 4 months	2.45	
		95 Average of District - 6 months	3.01	
		94/95 Average of Province - wet season	2.09	
		95/96 Average of Province - wet season	2.23	
		Released varieties by CIAP*	2.4-2.9	1.93
Mungbean (Dry)	0.65 (Average of District) (1995)	Average of 21 farmers among 500 interviewees (range : 0.7-3.0)	1.85	
		95 Average of District	0.65	
		Average of Province and Cambodia		
		1990 1991 1992 1993 1994 1995		
		Prov. 0.67 0.75 0.45 0.48 0.70 0.80		
		Cam. 0.48 0.48 0.58 0.52 0.65 0.78		
		Cropping standard of Cambodia**	0.5-1.5	0.78
Vegetables (Dry)	5.00 (Average of District) (1995)	Average of 8 farmers among 500 interviewees (tomato) (range : 3.0-30.0)	12.34	
		Average of 8 farmers among 500 interviewees (watermelon) (range : 3.6-5.0)	4.14	
		95 Average of Province	4.62	
		Cropping standard of Cambodia** (tomato)	15.0-30.0	
		Cropping standard of Cambodia** (watermelon)	12.0-22.0	6.00
Maize (Wet)	1.53 (Average of District) (1995)	Average of 10 farmers among 500 interviewees (range : 0.6-3.5)	1.94	
		95 Average of Province - wet season	1.53	
		Average of Province and Cambodia		
		1990 1991 1992 1993 1994 1995		
		Prov. 1.38 1.92 2.32 2.06 3.18 2.84		
		Cam. 1.35 1.40 1.32 1.31 1.49 1.79		1.84
Sesame (Wet)	0.45 (Average of Province) (1995)	Average of 33 farmers among 500 interviewees (range : 0.3-8.0)	1.26	
		95 Average of Kratie Province	0.60	
		95 Average of Kampong Cham Province	0.50	
		95 Average of Prey Veng Province	0.30	
		Average of Province and Cambodia		
		1990 1991 1992 1993 1994		
		Prov. 0.40 0.42 0.46 0.27 0.45		
		Cam. 0.50 0.50 0.46 0.47 0.44		0.54

Note: *:"Rice Production in Cambodia", H. J. Nesbitt, 1996, CIAP

**:"Vegetables in Cambodia", Kbal Koh Vegetable Research Station, MAFF

Table 2.10 Comparison of Agricultural Production with/without Project

Developemt Stage and Crop	Total Area (ha)	Without Project				With Project			
		Cropping Intensity	Planted Area (ha)	Yield (ton/ha)	Production (ton)	Cropping Intensity	Planted Area (ha)	Yield (ton/ha)	Production (ton)
Stage I									
Recession Paddy	1,622	75%	1,217	2.90	3,529	100%	1,622	3.48	5,645
Recession Paddy (Newly developed)							282	3.48	981
Rainfed Paddy	1,052	70%	736	1.61	1,185	90%	947	1.93	1,828
Rainfed Paddy (Newly developed)							282	1.93	544
Total			1,953		4,714		3,133		8,998
Stage II									
Upland Crops (Mungbean)	817	35%	286	0.65	186	70%	572	0.78	446
Upland Crops (Vegetables)	817	15%	123	5.00	615	30%	245	6.00	1,470
Total			409		801		817		1,916
Stage III									
Upland Crops (Maize)	1,622	0%	0	1.53	0	6%	97	1.84	178
Upland Crops (Sesame)	1,622	0%	0	0.45	0	14%	227	0.54	123
Total			0		0		324		301

Source: JICA Study Team, 1997

Table 2.12 Estimation of the Stored Water in the Reservoirs (1/2)

No.	Reservoir Name	Commune Name	Length of Dike (m)	Type Area(1,000 m²) Semi-Closed	Type Area(1,000 m²) Closed	Existing Mean Dike EL.m	Existing Mean Bottom EL.m	Existing Mean Depth (m)	Existing Volume(1,000 m³) Semi Closed	Existing Volume(1,000 m³) Closed	Plan crest EL(m)	Plan Top of width (m)	Plan Volume (1000m³)	Surplus of Volume (1000m³)	Remarks
1	Thmei	Prek Tamerk	2000	106		8.4	6.5	1.9	110.8		8.4	2.5	110.8	0	Enforcement of embankment
2	Ta Dau		7000	41		8.0	7.0	1.0	22.6		8.0	2.5	22.6	0	Enforcement of embankment
3	Brovosh		1300	243		8.5	7.0	1.5	200.5		8.5	3.0	200.5	0	Enforcement of embankment
4	Khlar Siko		470	15		8.0	6.0	2.0	16.5		8.0	2.5	16.5	0	Enforcement of embankment
5	Bac Chang Hoeur		2000	252		7.5	6.0	1.5	207.9		7.5	3.0	207.9	0	Enforcement of embankment
6	Boeng Krao Chap		500		90.0	9.3	8.5	0.8	0.0	39.6			39.6	0	Swamp
7	Kropeu		0		138.0	4.5	4.0	0.5		48.3			48.3	0	Swamp
8	O San Dan		500	30		7.5	6.5	1.0	16.5		7.5	2.0	16.5	0	Enforcement of embankment
9	Trao Peang Reusei		800	20		7.5	6.5	1.0	11.0		7.5	3.0	11.0	0	Enforcement of embankment
	Sub Total		14570.0	707.0	228.0				585.7	87.9			673.6	0.0	
10	Ta Yi	Puk Reusei	700		38.0	7.5	6.5	1.0		26.6	8.5	2.0	64.6	38.0	Increase the embankment
11	Cheung Chrang		1150	343		7.5	6.5	1.0	188.7			3.0	188.7	0	Enforcement of embankment
12	Promok Khlar		3900		718.0	7.5	5.8	1.7		854.4	8.5	3/2	1572.4	718.0	Increase the embankment
13	Ta Svay		600		27.0	8.0	6.5	1.5		28.4	9.0	2.0	55.4	27.0	Increase the embankment
14	Phleuv Tuk		3200		482.0	7.8	6.0	1.8		607.3	8.8	3/2	1089.3	482.0	Increase the embankment
15	Pro Pheng		1800		190.0	6.6	5.2	1.4		186.2	7.6	2.0	376.2	190.0	Increase the embankment
16	Khnach		1300		120.0	6.4	5.0	1.4		117.6	7.4	2.0	237.6	120.0	Increase the embankment
17	Tunnup Tmei		200	12		9.0	8.0	1.0	6.6		9.0	2.0	6.6	0	Enforcement of embankment
18	Ta Long		250	12		8.9	8.0	0.9	5.9		8.9	2.0	5.9	0	Enforcement of embankment
19	Ta Tein		600	55		7.0	6.0	1.0	30.3		7.0	2.0	30.3	0	Enforcement of embankment
	Sub total		13700.0	422.0	1575.0				231.4	1820.5			3626.9	1575.0	

Note 1) *Area means the full water surface area in the flood season

2) Bottom area in semi-closed reservoir is assumed 10 % of the full water surface

3) Bottom area in closed reservoir is assumed 40 % of the full water surface

Table 2.12 Estimation of the Stored Water in the Reservoirs (2/2)

No.	Reservoir Name	Commune Name	Length of Dike (m)	Type Area(1,000 m²) Semi-Closed	Type Area(1,000 m²) Closed	Existing Mean Dike EL.m	Existing Mean Bottom EL.m	Existing Mean Depth (m)	Existing Volume(1,000 m³) Semi Closed	Existing Volume(1,000 m³) Closed	Plan crest EL(m)	Plan Top of width (m)	Plan Volume (1000m³)	Surplus of Volume (1000m³)	Remarks
20	Som Say	Sanlung	3600		667.0	6.2	4.7	1.5		700.4	7.5	3/2	1567.5	867.1	Increase the embankment
21	Tamao	Prek Ampil	400		13.0	6.5	6.0	0.5		4.6	7.5	2.0	17.6	13.0	Increase the embankment
22	Ta Pring		2000		118.0	6.5	6.0	0.5		41.3	7.5	2.0	159.3	118.0	Increase the embankment
23	Meas Satt		1000		42.0	6.0	5.0	1.0		29.4	7.5	2.0	92.4	63.0	Increase the embankment
	Sub total		3400.0		173.0					75.3			269.3	194.0	
24	Ta Hem	Vihearsour	500		16.0	7.0	6.0	1.0		11.2	8.0	2.0	27.2	16.0	Increase the embankment
25	Khtom Leak		450	30		7.0	6.0	1.0	16.5		8.0	2.0	16.5	0	Enforcement of embankment
26	Tro Peang Kragn		1000		34.0	7.5	7.0	0.5		11.9	8.5	3/2	45.9	34.0	Increase the embankment
27	Ta Non		5600		1738.0	6.9	5.8	1.1		1338.3	8.0	3/2	3250.1	1911.8	Increase the embankment
28	O Diev Leu		800		34.0	7.5	6.5	1.0		23.8	8.0	3/2	40.8	17.0	Increase the embankment
29	O Diev Krom		1500		93.0	7.0	6.0	1.0		65.1	8.0	3/2	158.1	93.0	Increase the embankment
30	Choir Teuk Cheng		2000		163.0	7.0	6.0	1.0		114.1	8.0	3/2	277.1	163.0	Increase the embankment
31	San Dan		2500		248.0	6.5	5.5	1.0		173.6	8.0	2.0	545.6	372.0	Increase the embankment
32	Choir Teuk Tbong		1200		54.0	7.5	6.5	1.0		37.8	8.5	3/2	91.8	54.0	Increase the embankment
33	Min Thom		800		39.0	7.0	6.0	1.0		27.3	8.5	2.0	85.8	58.5	Increase the embankment
34	Ta Top		1900		82.0	8.0	6.2	1.8		103.3	9.0	3/2	185.3	82.0	Increase the embankment
35	Ta Ngen		1200		79.0	8.0	7.0	1.0		55.3					Integration of 3 reservoirs
36	Trapeang Chouk		1900		83.0	7.8	7.0	0.8		46.5	9.0	3/2	601.8	500.0	Combined reservoirs area is 50ha
37	Kom Pheak		2900	-	(500)*	7.9	5.5	2.4		0.0					
	Sub Total		24250.0	30.0	2663.0				16.5	2008.2			5326.0	3301.3	
	Total		59520.0	1159.0	5306.0				833.6	4692.2			11463.2	5937.4	

Note 1) *Area means the full water surface area in the flood season
2) Bottom area in semi-closed reservoir is assumed 10 % of the full water surface
3) Bottom area in closed reservoir is assumed 40 % of the full water surface

Table 3.1 Summary of the Project Quantity

Project	Unit	Quantity	Remarks
Stage - I			
1. Construction of the Farm Roads			
- Length (n=10)	m	36,190	
- Culvert	L.S	12	
- Gate	L.S	6	
2. Rehabilitation of the Reservoirs			
1) Closed type			
- Length (n=21)	m	30,380	
- Intake gate	L.S	25	
- Outlet	L.S	301	
2) Semi-closed type			
- Length (n=11)	m	15,070	
- Outlet	L.S	149	
3. Rehabilitation of the Canals			
- Length (n=1)	m	3,600	Phras Konlong road
4. Construction of the Weir	L.S	1	Boeng Phtea
5. Construction of the Intake Gate	L.S	1	Slat colmatage canal
6. Agricultural Suppoting Service			
- A Building of Supporting Service Office	m^2	300	
- Facilities & Equipment	L.S	1	
Stage - II			
1. Rehabilitation of the Colmatage Canals			
- Length (n=5)	m	7,260	
2. Expansion of the Colmatage Canals			
- Length (n=4)	m	4,000	
3. Installation of the Intake Gate	L.S	4	
4. Construction of the Concrete Bridge	L.S	3	
Stage - III			
1. Construction of the Farm Roads			
- Length (n=3)	m	9,880	
- Culvert	L.S	3	
- Gate	L.S	1	
- Bridge	L.S	3	
2. Rehabilitation of the District Road			
- Length (n=2)	m	5,600	
3. Construction of the Concrete Bridge	L.S	1	Tamao colmatage canal
4. Construction of the Flood Control Gate	L.S	1	Phras Konlong bridge
5. Construction of the Fish Pond	L.S	1	

Table 3.2 Summary of the Project Cost

(Unit : US$)

Stage - I		Stage - II		Stage - III		Total
Description	Amount	Description	Amount	Description	Amount	
1. Construction cost		1. Construction cost		1. Construction cost		
1) Construction of the Farm Roads	1,092,933	1) Rehabilitation of the Colmatage Canals	613,224	1) Construction of the Farm Roads	466,764	2,172,921
2) Rehabilitation of the Reservoirs	2,849,577	2) Expansion of the Colmatage Canals	195,173	2) Rehabilitation of the District Roads	76,464	3,121,214
3) Rehabilitation of the Canals	129,560	3) Installation of of the Intake Gate	1,470,852	3) Construction of Concrete Bridge	50,375	1,650,786
4) Construction of the Weir	637,707	4) Construction of the Concrete Bridge	48,326	4) Construction of the Flood Control Gate	586,095	1,272,128
5) Construcion of the Intake Gate	149,331			5) Construcion of the Fish Pond	125,509	274,840
6) Agricultural Supporting Service	536,575					536,575
Sub - total of 1.	5,395,683	Sub - total of 1.	2,327,575	Sub - total of 1.	1,305,207	9,028,465
2. Administration cost	40,320	2. Administration cost	26,880	2. Administration cost	26,880	94,080
3. Consulting Service	539,568	3. Consulting Service	232,757	3. Consulting Service	130,521	902,846
4. Agricultural Supporting Service	80,820	4. Agricultural Supporting Service	77,720	4. Agricultural Supporting Service	77,720	236,260
Total of (1.~4.)	6,056,391	**Total of (1.~4.)**	2,664,932	**Total of (1.~4.)**	1,540,328	10,261,651
5. Physical Contingency	605,639	5. Physical Contingency	266,493	5. Physical Contingency	154,033	1,026,165
Total of (1.~5.)	6,662,030	**Total of (1.~5.)**	2,931,425	**Total of (1.~5.)**	1,694,361	11,287,816

Table 4.1 Financial Analysis of Typical Farm Household (1/2)

Boeng Phlea Area(Colmatage Area)

Farm Size:0.60 ha
Farm Model-Without Project

1. Crop Production

	Area (ha)	Yield (kg/ha)	Prod-uction (kg)	Unit Price (Riels/kg)	Value (Riels)	Produc-tion Cost (Riels)	Net Income (Riels)
Dry season paddy irrigated	0.57	2,900	1,653	316	522,348	235,590	286,758
Sesame	0.57	450	257	1,500	384,750	73,500	311,250
Total	1.14						598,008

2. Fishery Income(Riels/year)	163,000
3. Off-farm Income(Riels/year)	375,000
4. Total Income(Riels))	1,136,008
5. Living Expense(Riels/year)-Family size 5.75 person/family	722,000
6. Disposable Income(Riels/year)	414,008

Farm Model-With Project

1. Crop Production

	Area (ha)	Yield (kg/ha)	Prod-uction (kg)	Unit Price (Riels/kg)	Value (Riels)	Produc-tion Cost (Riels)	Net Income (Riels)
1) Paddy-irrigated	0.57	3,480	1,984	316	628,818	278,040	348,778
Sesame	0.57	540	308	1,500	461,700	90,480	371,220
Mungbean	0.57	780	445	1,700	755,820	179,160	576,660
Total	1.71						1,296,658

2. Fishery Income(Riels/year)	285,527
3. Off-farm Income(Riels/year)	610,875
4. Total Income(Riels))	2,123,060
5. Living Expense(Riels/year)-Family size 5.75 person/family	1,176,138
6. Disposable Income(Riels/year)	946,922

Boeng Phlea Area(Recession Area)

Farm Size:1.20 ha
Farm Model-Without Project

1. Crop Production

	Area (ha)	Yield (kg/ha)	Production (kg)	Unit Price (Riels/kg)	Value (Riels)	Production Cost (Riels)	Net Income (Riels)
Recession rice	0.40	2,900	1,160	316	366,560	165,326	201,234
Rainfed paddy	1.20	1,610	1,932	316	610,512	277,058	333,454
Total	1.60						534,687

2. Fishery Income(Riels/year)	334,000
3. Off-farm Income(Riels/year)	550,000
4. Total Income(Riels)	1,418,687
5. Living Expense(Riels/year)-Family size 6.73 person/family	1,050,000
6. Disposable Income(Riels/year)	368,687

Farm Model-With Project(I)

1. Crop Production

	Area (ha)	Yield (kg/ha)	Production (kg)	Unit Price (Riels/kg)	Value (Riels)	Production Cost (Riels)	Net Income (Riels)
Recession rice	0.80	3,480	2,784	316	873,744	390,231	483,513
Rainfed paddy	1.20	1,930	2,316	316	731,856	340,579	391,277
Total	2.00						880,790

2. Fishery Income(Riels/year)	544,086
3. Off-farm Income(Riels/year)	895,950
4. Total Income(Riels)	2,320,826
5. Living Expense(Riels/year)-Family size 6.73 person/family	1,710,450
6. Disposable Income(Riels/year)	610,376

Table 4.1 Financial Analysis of Typical Farm Household (2/2)

Boeng Ridey Area(Rainfed Area)

Farm Size:1.05 ha
Farm Model-Without Project

1. Crop Production

	Area (ha)	Yield (kg/ha)	Production (kg)	Unit Price (Riels/kg)	Value (Riels)	Production Cost (Riels)	Net Income (Riels)
Wet season paddy rainfed	1.05	1,610	1,691	316	534,138	242,426	291,712
Pig raising	2 head				420,000	172,000	248,000
Total	1.05						539,712

2. Fishery Income(Riels/year)	50,000
3. Off-farm Income(Riels/year)	898,000
4. Total Income(Riels))	1,487,712
5. Living Expense(Riels/year)-Family size 4.92 person/family	1,320,000
6. Disposable Income(Riels/year)	167,712

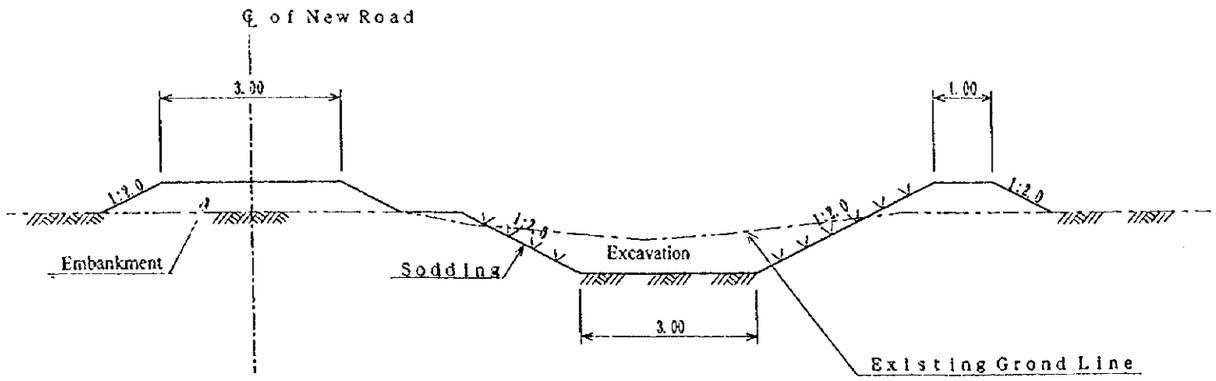
Farm Model-With Project(1)

1. Crop Production

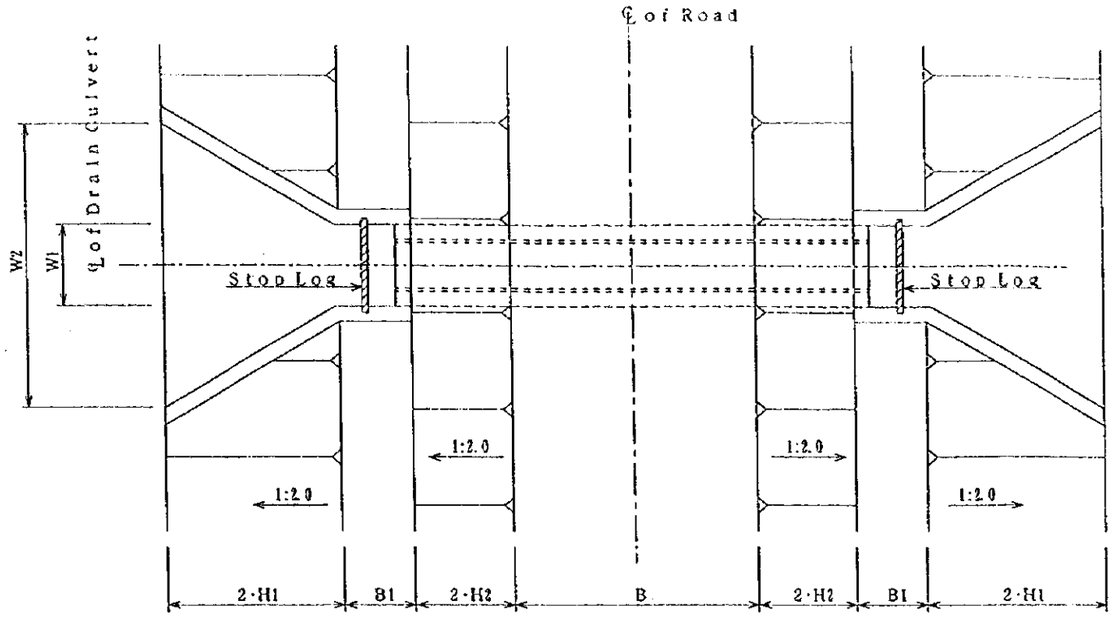
	Area (ha)	Yield (kg/ha)	Production (kg)	Unit Price (Riels/kg)	Value (Riels)	Production Cost (Riels)	Net Income (Riels)
Wet season paddy rainfed	1.05	1,930	2,027	316	640,374	298,007	342,367
Pig raising	4 head				840,000	344,000	496,000
Total	1.05						838,367

2. Fishery Income(Riels/year)	81,450
3. Off-farm Income(Riels/year)	1,462,842
4. Total Income(Riels))	2,382,659
5. Living Expense(Riels/year)-Family size 4.92 person/family	2,150,289
6. Disposable Income(Riels/year)	232,373

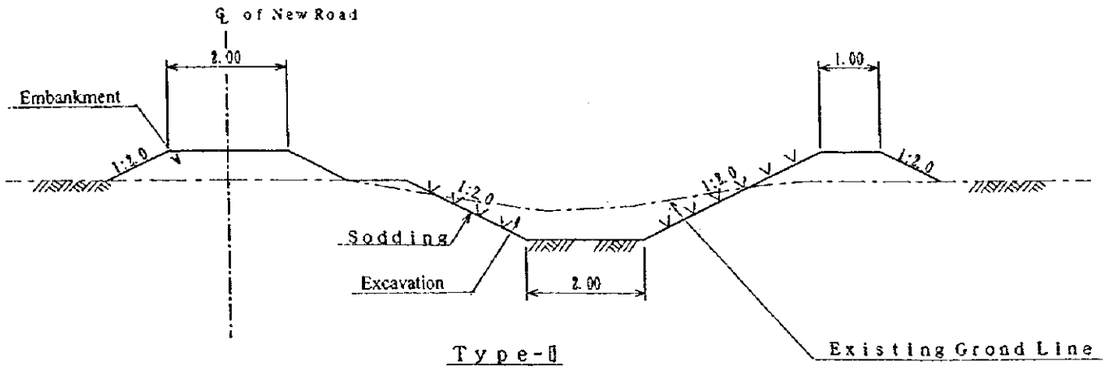
DRAWINGS



Type-I

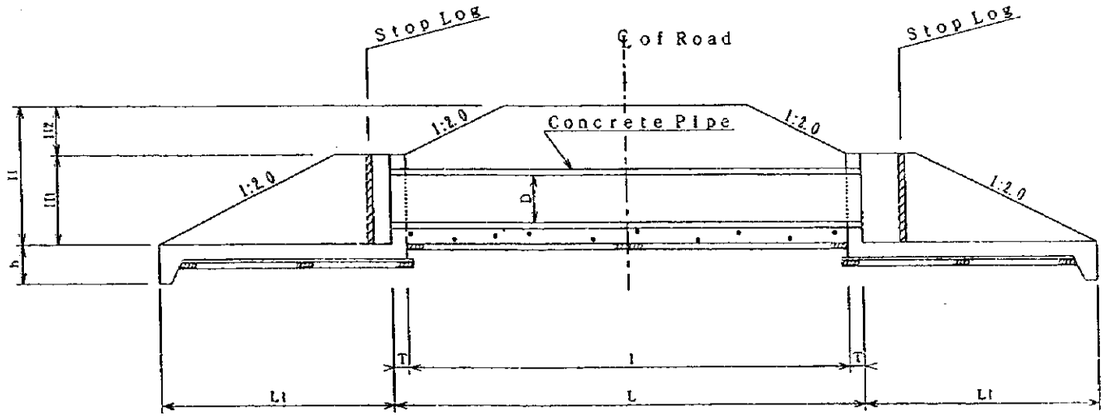


PLAN



Type-II

Typical Section of the Farm Road and Canal



PROFILE

Drain Culvert

Type	D (m)	B (m)	W1 (m)	W2 (m)	H1 (m)	H2 (m)
I	1.0	3.0	1.5	4.5	1.0	1.5
II	0.8	2.0	1.2	4.2	1.0	1.5

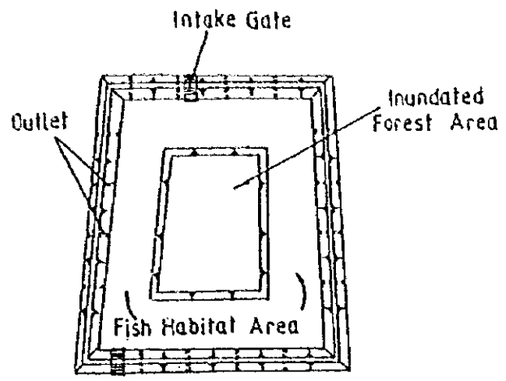
GOVERNMENT OF THE KINGDOM OF CAMBODIA
MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES

THE AGRICULTURAL DEVELOPMENT OF
THE MEKONG FLOODED AREA IN CAMBODIA

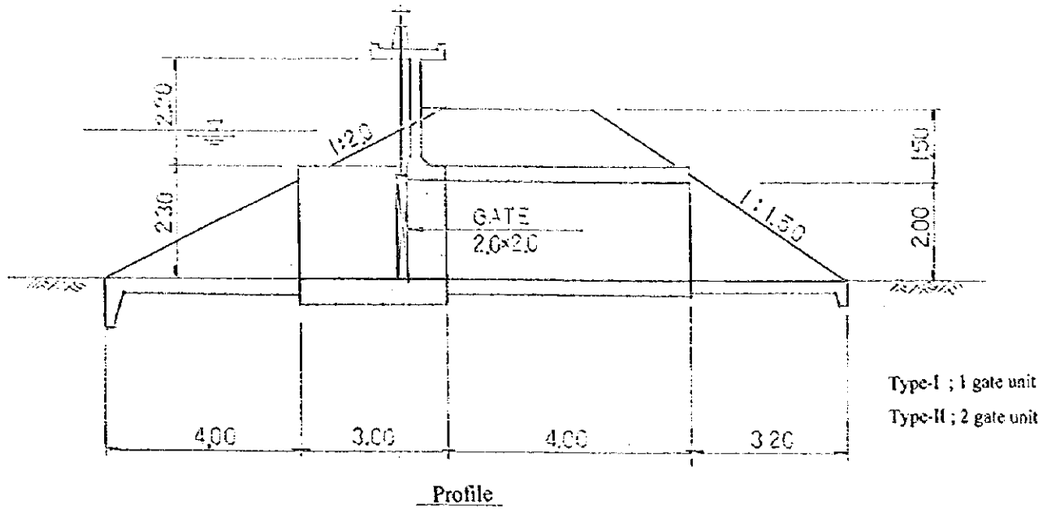
Rehabilitation Plan of Farm Road and Canal

Scale		No.	1

JAPAN INTERNATIONAL COOPERATION AGENCY

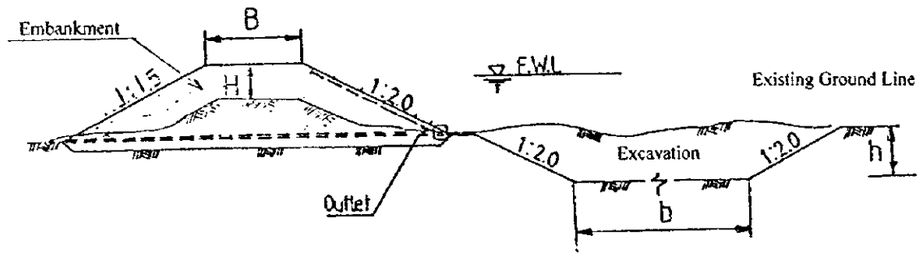


Plan of Reservoir



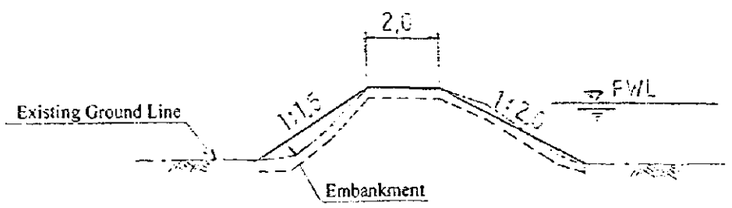
Profile

Intake Gate

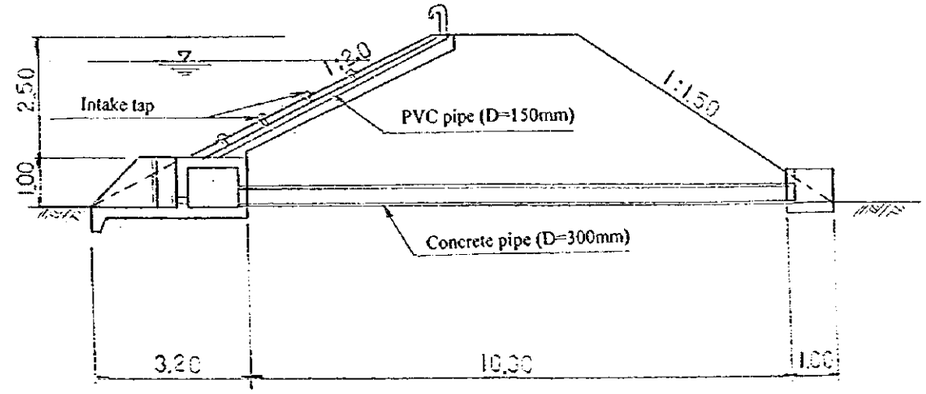


Type	H (m)	B (m)	b (m)	h (m)
I	1.0	2.0	10.0	2.0
II	1.5	2.0	10.0	2.0
III	2.0	2.0	10.0	2.0

Typical Section of the Reservoir (Closed type)



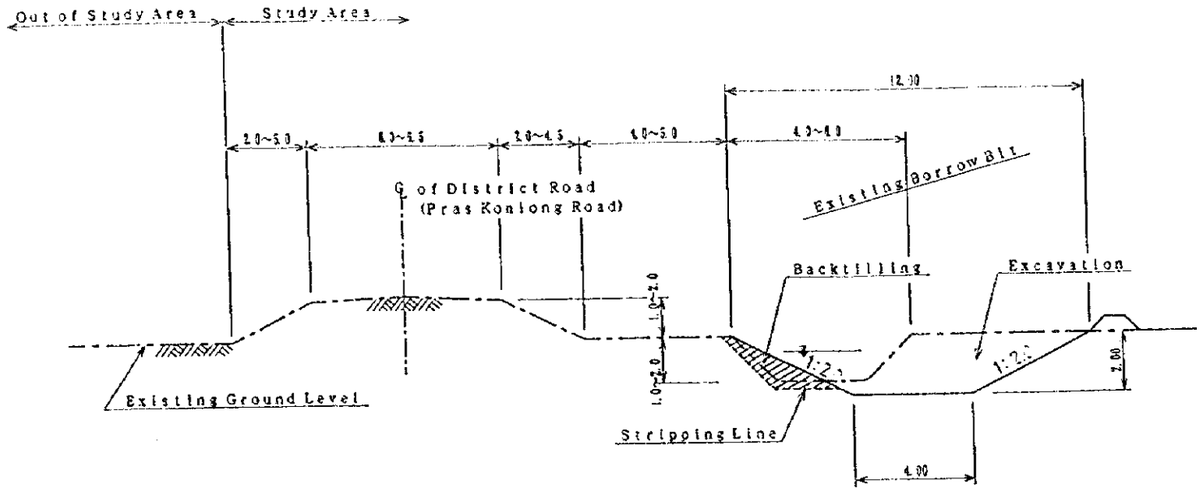
Typical Section of the Reservoir (Semi-Closed type)



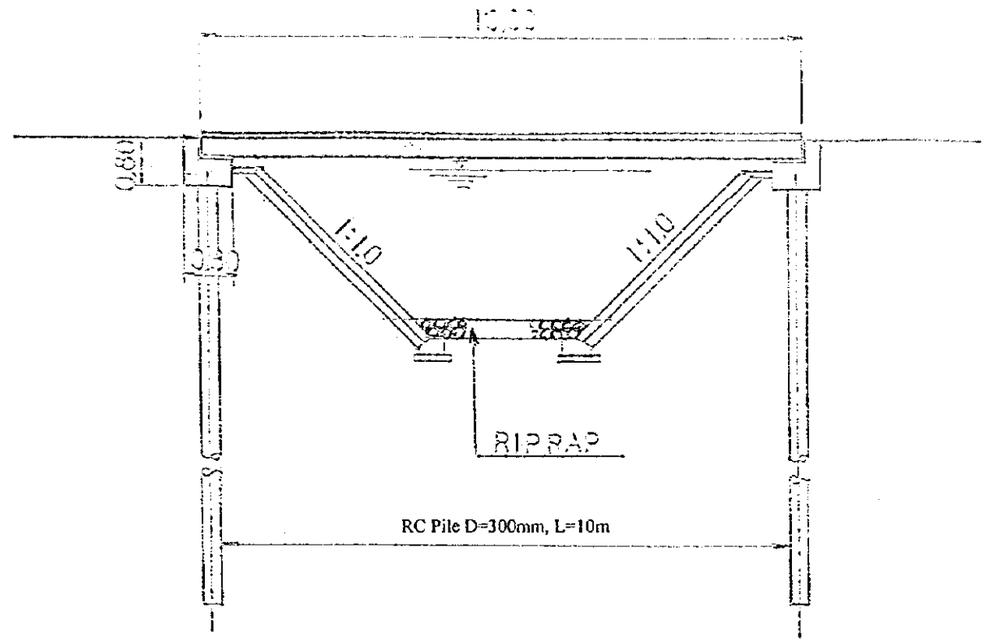
Profile

Outlet

GOVERNMENT OF THE KINGDOM OF CAMBODIA			
MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES			
THE AGRICULTURAL DEVELOPMENT OF THE MEKONG FLOODED AREA IN CAMBODIA			
Rehabilitation Plan of Reservoir			
Scale		No.	2
JAPAN INTERNATIONAL COOPERATION AGENCY			

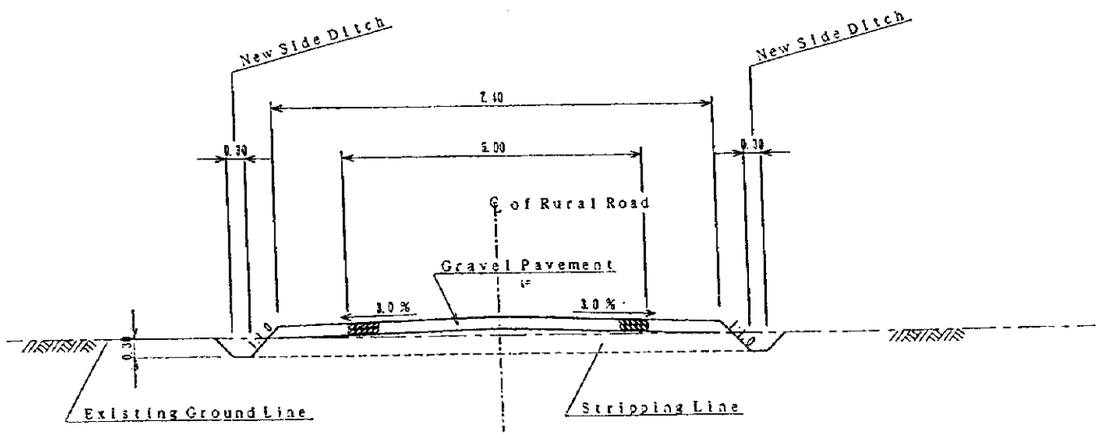


Rehabilitation of Side Ditch along Phras Konlong Road



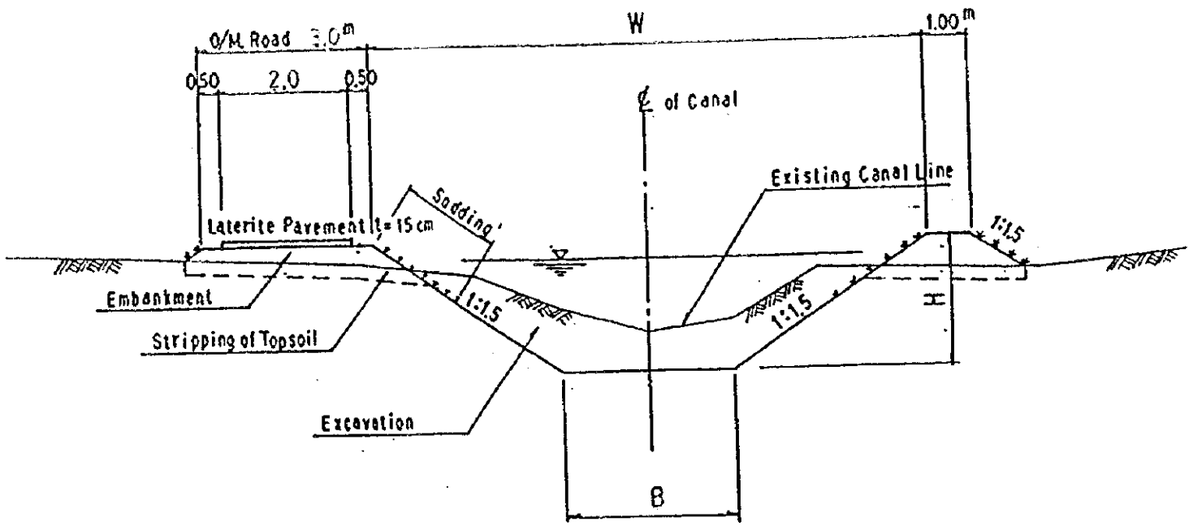
Typical Section of Bridge for Farm Road

Type-I ; W = 3.0m
Type-II ; W = 2.0m

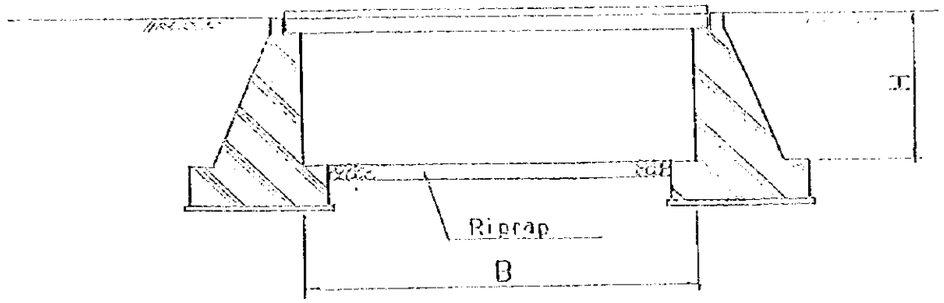


Rehabilitation of District Road in Resident Area

GOVERNMENT OF THE KINGDOM OF CAMBODIA MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES			
THE AGRICULTURAL DEVELOPMENT OF THE MEKONG FLOODED AREA IN CAMBODIA			
Rehabilitation Plan of District Road			
Scale		No.	3
JAPAN INTERNATIONAL COOPERATION AGENCY			

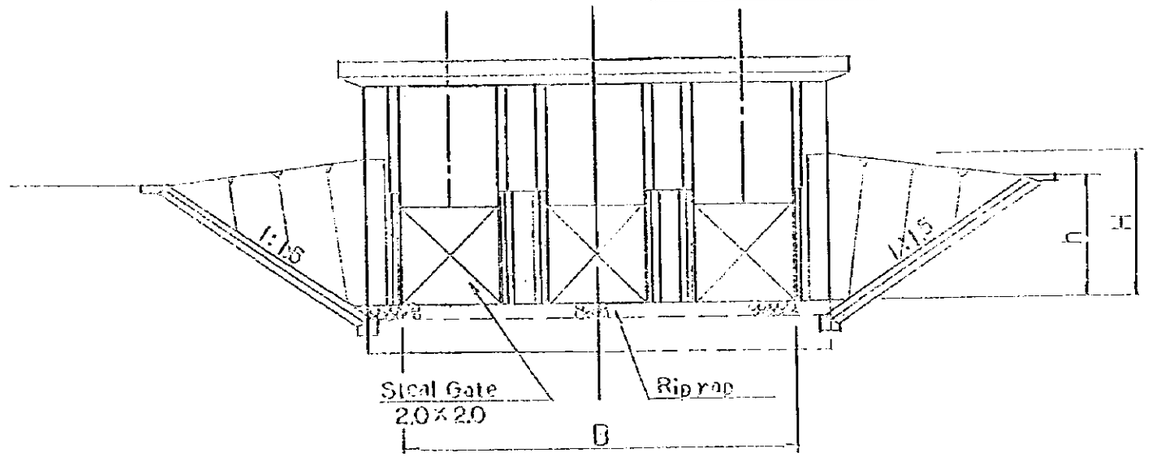


Typical Section of Colmatage Canal



Typical Section of Bridge for Colmatage Canal

Type	B (m)	H (m)	h (m)	Gate Unit
A	3.0	2.5	2.0	1
B	6.0	3.0	2.5	2
C	10.0	3.0	2.5	3
D	15.0	3.5	3.0	5
E	20.0	3.5	3.0	7



Typical Section of Intake Gate for Colmatage Canal

Typical Dimension of Designed Colmatage Canal

* Coefficient of roughness : n = 0.025

Type	Bottom Width (m)	Height of Canal (m)	Water Depth (m)	Freeboard (m)	Slope of Canal (1 : m)	Gradient of Canal (1/ I)	Velocity (m/s)	Discharge Capacity (m3/s)	Remarks
A	B ≦ 6	2.00	1.60	0.40	1.5	2,000	0.89	7.7	Culvert
B	6< B ≦ 10	2.50	2.10	0.40	1.5	3,000	0.96	22.4	2 series gate
C	10< B ≦ 15	2.50	2.10	0.40	1.5	3,000	1.02	33.3	3 series gate
D	15< B ≦ 20	3.00	2.60	0.40	1.5	4,000	1.03	57.2	5 series gate
E	B ≧ 20	3.00	2.60	0.40	1.5	4,000	1.07	80.0	7 series gate

GOVERNMENT OF THE KINGDOM OF CAMBODIA

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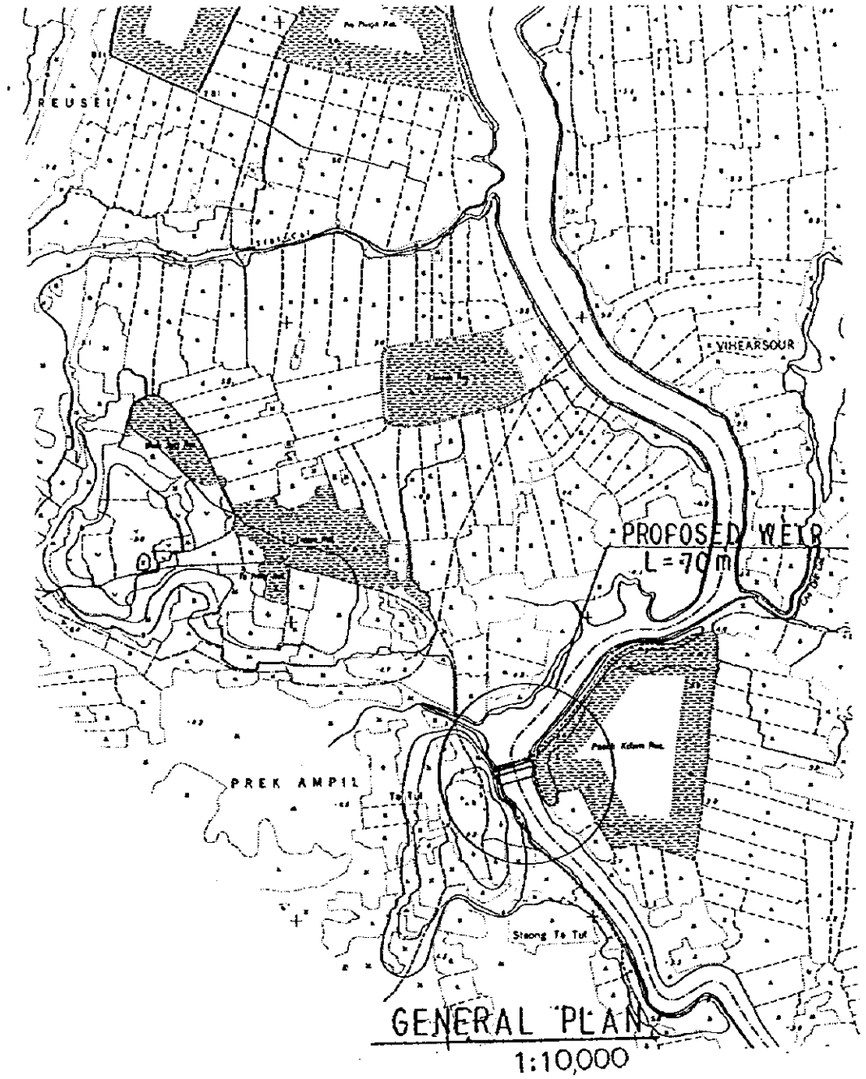
THE AGRICULTURAL DEVELOPMENT OF THE MEKONG FLOODED AREA IN CAMBODIA

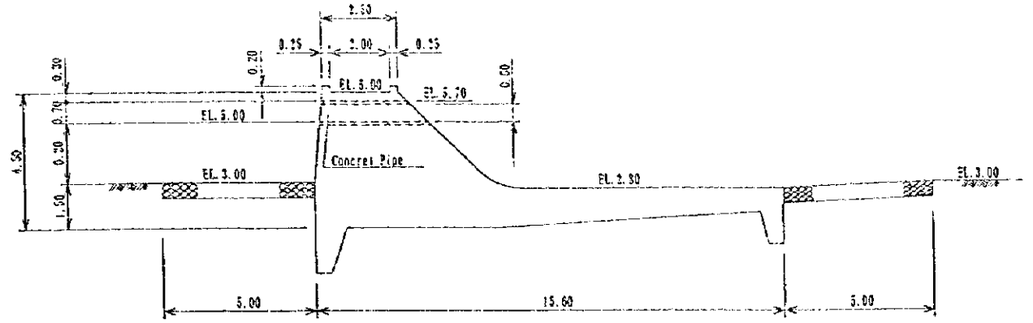
Rehabilitation Plan of Colmatage Canal

Scale		No.	4

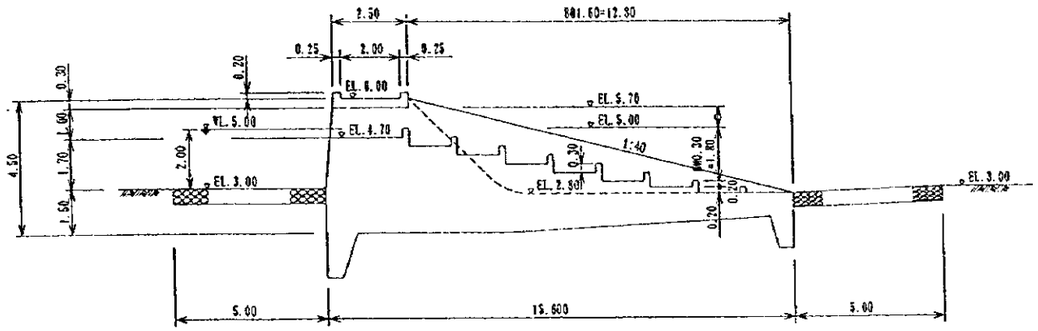
JAPAN INTERNATIONAL COOPERATION AGENCY



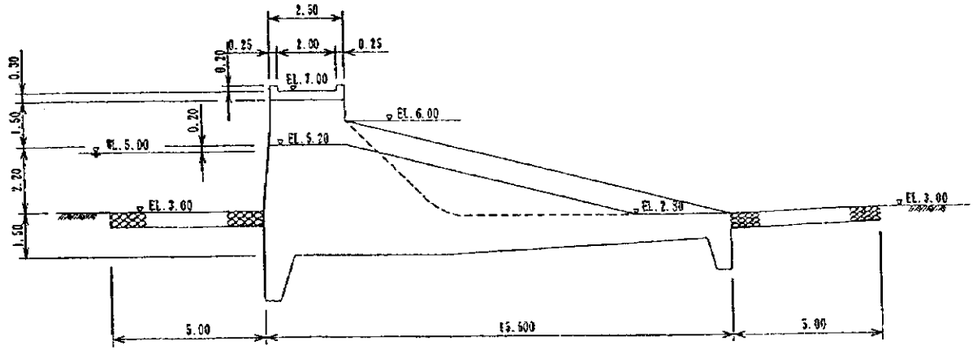
GENERAL PLAN
1:10,000



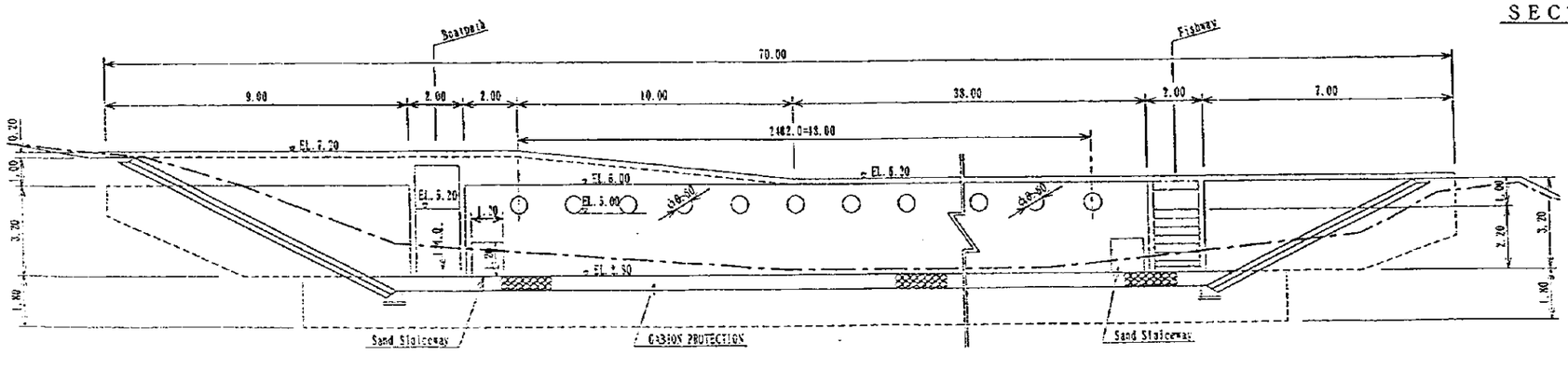
TYPICAL SECTION



SECTION OF FISHWAY



SECTION OF BOATPATH



FRONT ELAVATION

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MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES		
THE AGRICULTURAL DEVELOPMENT OF THE MEKONG FLOODED AREA IN CAMBODIA		
The Weir at Boeng Phtea		
Scale	No.	5
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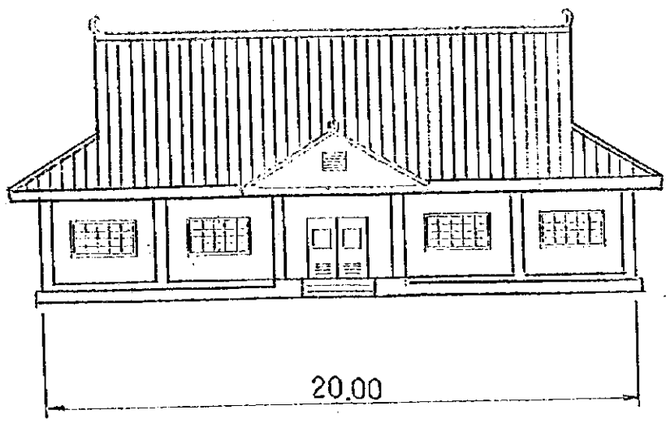
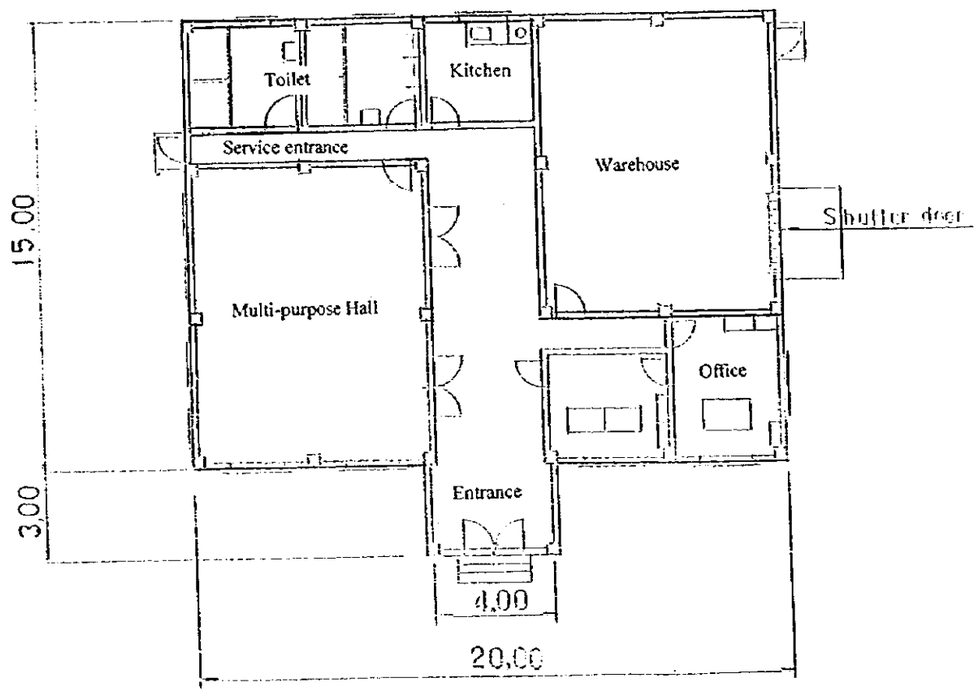


Front Elevation



Floor Plan

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THE AGRICULTURAL DEVELOPMENT OF THE MEKONG FLOODED AREA IN CAMBODIA			
Agricultural Supporting Service Office			
Scale		No.	6
JAPAN INTERNATIONAL COOPERATION AGENCY