

TABLES

VII IRRIGATION DEVELOPMENT PLAN

Table VII.1.1 (1/2) SUMMARY OF AVERAGE CROP PRODUCTIVITY IN STUDY AREA

Commodities	1. West Sumatra Province										Average
	Districts										
	Limapuluh Kota	Agam	Tanah Datar	Sijunjung	Solok						
1. Wet Rice	5.12	4.70	7.74	4.42	4.92						5.38
2. Upland Rice	3.03	1.94	2.38	2.38	2.02						2.35
3. Maize	3.63	2.33	2.29	2.24	2.73						2.64
4. Soybeans	1.88	1.11	1.24	1.01	1.75						1.40
5. Groundnuts	2.08	2.30	2.51	1.11	1.81						1.96
6. Green Peas	-	1.24	0.92	1.22	0.93						1.08
7. Cassava	31.58	18.21	12.11	12.08	20.72						18.94
8. Sweet Potato	26.83	28.28	11.54	5.85	10.35						16.57
9. Cow Peas	0.80	-	-	2.00	3.41						2.07
10. Chili Pepper	3.00	4.31	3.43	2.78	3.28						3.36
11. Tomato	7.98	15.73	8.34	-	5.51						9.39
12. Egg Plant	8.28	16.93	-	-	2.59						9.27
13. Cucumber	2.09	9.00	-	2.30	21.66						8.76

Unit : ton/ha

Data Sources : 1. Agricultural Services for Food Crops :

- Limapuluh Kota District (1992)
- Agam District (1993)
- Tanah Datar District (1992)
- Solok District (1993)

2. Statistics Office of West Sumatra Province, West Sumatra in Figures (1992)

Table VII.1.1 (2/2) SUMMARY OF AVERAGE CROP PRODUCTIVITY IN STUDY AREA

Commodities	Districts			Average
	Unit : ton/ha			
	Kampar	Indragiri Hulu	Indragiri Hilir	
1. Wet Rice	3.78	4.01	3.69	3.83
2. Upland Rice	2.04	2.29	2.34	2.22
3. Maize	2.24	2.49	1.19	1.97
4. Soybeans	1.10	1.07	1.37	1.18
5. Groundnuts	1.01	1.04	1.15	1.07
6. Green Peas	1.16	0.95	1.10	1.07
7. Cassava	15.49	14.35	13.39	14.41
8. Sweet Potato	10.24	8.28	7.03	8.52
9. Cow Peas	0.80	2.41	0.55	1.25
10. Chili Pepper	0.87	2.00	0.54	1.14
11. Tomato	-	14.37	-	14.37
12. Egg Plant	1.27	14.80	0.54	5.54
13. Cucumber	1.56	15.02	0.74	5.77

Data sources : 1. Agricultural Services for Food Crops :

- Kampar District (1993)
- Indragiri Hulu District (1993)
- Indragiri Hilir District (1992)

2. Statistics Office of Riau Province, Riau in Figures (1993)

Table VII.1.2 REALIZATION AND TARGET OF TRANSMIGRATION SETTLEMENT SCHEMES IN STUDY AREA IN RIAU PROVINCE

River Basin	Project Name	Kind of Transmigration	Existing Schemes		Target for Repelita VI		Total Allocated Area (ha)	Year of Transmigration Commencement	Remarks	
			No. of Households	Allocated Area (ha)	No. of Households	Allocated Area (ha)				
1. Kampar River Basin	1). Sel. Siberuang	Rubber	241	602.50	200	500.00	1,102.50	1992/1993	Local Resettlement	
	2). Sel. Muara Takus /SP1	Rubber	244	610.00	0	0.00	610.00	1993/1994	Local Resettlement	
	3). Sel. Muara Takus /SP2	Rubber	599	1,497.50	0	0.00	1,497.50	1993/1994	Local Resettlement	
	4). Koto Ranah	Rubber	592	1,480.00	313	782.50	2,262.50	1992/1993	Local Resettlement	
	5). Ranah Sungkal	Rubber	0	0.00	557	1,392.50	1,392.50	1994/1995	Local Resettlement	
	6). Ranah Koto Talago	Rubber	0	0.00	313	782.50	782.50	1994/1995	Local Resettlement	
	7). Sel. Batu Benusurat	Rubber	0	0.00	700	1,750.00	1,750.00	1994/1995	Local Resettlement	
	8). Bangkinang G/SP3	Oil Palm	447	1,117.50	2,453	6,132.50	7,250.00	1991/1992	Local Resettlement	
	9). Pasir Jambu	Food+Plantation	93	186.00	0	0.00	186.00	1990/1991	Local Resettlement	
	10). Jasa INDUSTRI	Industry	50	5.00	0	0.00	5.00	1990/1991	Local Resettlement	
Subtotal for Kampar Kanan			2,266	5,498.50	4,536	11,340.00	16,838.50			
2. Indragiri River Basin	11). Singingi F PIRTRANS	Oil Palm	2,549	6,372.50	0	0.00	6,372.50	1990/1991	Kab. Indragiri Hu.	
	12). Sel Paku	Food+Plantation	300	600.00	0	0.00	600.00	1990/1991	Local Resettlement	
	13). Sel Pagar PIRTRANS	Oil Palm	1,118	2,795.00	259	647.50	3,442.50	1988/1989	Local Resettlement	
	14). Sel Pagar TIMBER	Forestry	0	0.00	600	1,500.00	1,500.00	1994/1995	Local Resettlement	
	15). Lipat Kain	Oil Palm	0	0.00	961	2,402.50	2,402.50	1994/1995	Kab. Indragiri Hu.	
	Subtotal for Kampar Kiri			3,967	9,767.50	1,820	4,550.00	14,317.50		
	16). Langgam/Sorek SBP	Oil Palm	2,148	5,370.00	1,850	4,625.00	9,995.00	1989/1990		
	17). Langgam Ukul SLS	Oil Palm	3,157	7,892.50	0	0.00	7,892.50	1987/1988		
	18). Langgam Ukul IIS	Oil Palm	2,312	5,780.00	0	0.00	5,780.00	1987/1988		
	Subtotal for (16) to (18)			7,617	19,042.50	1,850	4,625.00	23,667.50		
Total for Kampar River Basin			13,850	34,308.50	8,206	20,515.00	54,823.50			
2. Indragiri River Basin	1). Ukul IIS/Sel Lala	Oil Palm	2,549	6,372.50	0	0.00	6,372.50	1990/1991		
	2). Rawa Sekip	Food+Plantation	200	400.00	400	800.00	1,200.00	1992/1993		
	3). Peranap	Forestry	0	0.00	300	750.00	750.00	1995/1996		
	Subtotal for Indragiri Hulu			2,549	6,772.50	700	1,550.00	8,322.50		
	4). Pulau Burung	Oil Palm	1,312	3,280.00	4,263	10,657.50	13,937.50	1991/1992		
Subtotal for Indragiri Hilir			1,000	2,500.00	10,500	26,250.00	28,750.00	1992/1993		
Total for Indragiri River Basin			2,312	5,780.00	14,763	36,907.50	42,687.50			
Grand Total for Whole Basin			4,861	12,553	15,463	38,458	51,010.00			
			18,711	46,861	23,669	58,973	105,833.50			

Note : Allocated Area : Plantation Oriented Transmigration--- 2.5 ha/household
 General Transmigration---2.0 ha/household
 Transmigration for Industry---0.1 ha/household

Local Resettlement : Resettlement Area for Local People living in Kota Panjang Area to be submerged by Dam Construction

Table VII.1.3 CLASSIFICATION OF PRESENT IRRIGATION SYSTEM IN STUDY AREA

1. West Sumatra Province

(A) Classification of Irrigation System by Districts

1. Kampar River Basin	District	Irrigation System	No. of Schemes	No. of Schemes		Existing Paddy Field (ha)
				not yet reached to Target		
	Limapuluh Kota	Simple	15	6		63
		Semi-technical	6	2		871
		Technical	1	0		994
		Subtotal	22	8		2,502
Total			22	8		2,502
2. Indragiri River Basin	Limapuluh Kota	Simple	48	8		4,516
		Semi-technical	20	0		6,122
		Technical	1	0		2,180
		Subtotal	69	8		12,818
	Agam	Simple	2	0		828
		Semi-technical	29	0		3,557
		Technical	0	0		0
		Subtotal	31	0		4,385
	Tanah Datar	Simple	87	0		8,650
		Semi-technical	15	3		4,044
		Technical	0	0		0
		Subtotal	102	3		12,694
	Sijunjung	Simple	40	23		2,660
		Semi-technical	17	7		649
		Technical	1	1		2,35
		Subtotal	58	31		5,665
	Solok	Simple	59	9		7,222
		Semi-technical	10	5		4,317
		Technical	8	5		5,540
		Subtotal	77	19		17,079
Total			337	61		52,641
Grand Total			359	69		55,143

(B) Classification of Irrigation Area by Irrigation System In Study Area

Irrigation System	No. of Schemes	No. of Schemes not yet reached to Target	Existing Paddy Field (ha)
Simple	251	46	24,513
Semi-technical	97	17	19,560
Technical	11	6	11,070
Total	359	69	55,143

2. Riau Province

(A) Classification of Irrigation System by Districts

	District	Irrigation System	No. of Schemes	No. of Schemes		Existing Paddy Field (ha)
				not yet reached to Target		
1. Kampar River Basin	Kampar	Semi-technical	29	29		4,132
	Indragiri Hu	Semi-technical	6	6		9
	Total			35	35	
2. Indragiri River Basin	Indragiri Hu	Semi-technical	24	23		3,310
Grand Total			59	58		7,451

Table VII.1.4 DEFINITION OF IRRIGATION SYSTEM

Items	Classification of Irrigation System		
	(1) Simple Irrigation System	(2) Semi-technical Irrigation System	(3) Technical Irrigation System
1). Headworks	Temporary structure	Permanent or semi-permanent structure	Permanent structure
2). Capacity of structures to measure and regulate discharge	Poor	Fair	Good
3). Canal system	Irrigation and drainage are combined	Irrigation and drainage are not completely separated	Irrigation and drainage are separated
4). Tertiary system	No tertiary system developed yet	Not developed or with low tertiary structure density	Fully developed
5). Overall efficiency	Less than 40 %	40-50 %	50-60 %
6). Size	Not more than 500 ha	Up to 2,000 ha	No limit

Source : Irrigation Design Standard published by Directorate General of Water Resources Development, Ministry of Public Works

Table VII.1.5 VILLAGE IRRIGATION PROJECTS IN STUDY AREA

1. West Sumatra Province

Basin	District	No. of Projects	Gross Area (ha)	Existing Irrigated Paddy Field (ha)
A. Kampar Basin	1) Limapuluh Kota	28	702	702
B. Indragiri Basin	1) Limapuluh Kota	338	10,263	10,263
	2) Agam	11	395	395
	3) Tanah Datar	686	7,801	7,801
	4) Sijunjung	166	4,289	4,289
	5) Solok	162	5,886	5,266
	Subtotal	1,363	28,634	28,014
Total		1,391	29,336	28,716

2. Riau Province

Basin	District	No. of Projects	Gross Area (ha)	Existing Irrigated Paddy Field (ha)
A. Kampar Basin				
(1) Kampar Kanan River	Kampar	4	270	20
(2) Kampar Kiri River	Kampar	1	185	5
	Indragiri Hulu	2	175	35
(3) Kampar Main Stream	Kampar	6	830	152
	Subtotal	13	1,460	212
B. Indragiri Basin	Indragiri Hulu	10	1,350	348
Total		23	2,810	560

Table VII.1.6 EXISTING SWAMP DEVELOPMENT PROJECTS IN STUDY AREA IN RIAU PROVINCE

District	Classification of Project (Tidal or Non-tidal)	No. of Projects	Potential Area (A)	Existing Paddy Field (B)	Existing Upland Field (C)	Existing Plantation (D)	Others Including Fish Pond (E)	Subtotal (B)+(C)+(D)+(E)	Estimated Remaining Potential Area (A)-(F)	No. of Households at Present	Unit : ha
											(F)
1. Kampar	(a) Tidal Irrigation	0	0	0	0	0	0	0	0	0	
	(b) Non-tidal Irrigation	3	3,018	644	81	50	123	898	2,120	1,593	
	Subtotal	3	3,018	644	81	50	123	898	2,120	1,593	
2. Indragiri Hulu	(a) Tidal Irrigation	2	7,619	2,345	1,678	0	0	4,023	3,596	1,316	
	(b) Non-tidal Irrigation	5	3,606	1,803	275	30	0	2,108	1,498	1,380	
	Subtotal	7	11,225	4,148	1,953	30	0	6,131	5,094	2,696	
3. Indragiri Hilir	(a) Tidal Irrigation	74	247,054	38,523	10,417	133,616	5,138	187,694	59,360	50,624	
	(b) Non-tidal Irrigation	0	0	0	0	0	0	0	0	0	
	Subtotal	74	247,054	38,523	10,417	133,616	5,138	187,694	59,360	50,624	
	Total	84	261,297	43,315	12,451	133,696	5,261	194,723	66,574	54,913	

Sources :

INVENTORY DATA BASE OF IRRIGATION SCHEMES, SWAMP AND EXISTING LAND USE IN RIAU PROVINCE DATA PROCESSING RESULT
INVENTORY PROJECT OF IRRIGATION SCHEMES, SWAMP AND EXISTING LAND USE IN RIAU PROVINCE 1992/1993

Table VII.3.1(1/2) FUTURE IRRIGATION DEVELOPMENT PLAN FORMULATED BY P.U. IN RIAU PROVINCE

1. Potential Areas (Not Identified Yet)

Scheme Name	Planned Gross Irrigable Area (A)	Level of Existing Irrigation System	Facility Abstracting Water for Existing System	Existing Irrigated Paddy Field (B)	Existing Rain-fed Paddy Field (C)	Irrigable Area at Present		Estimated Remaining Potential Area (A)-(B)-(C)	Catchment Area	Year to be Completed
						Dry Season	Wet Season			
1. Riantauberangin	40,000							250,000		
2. Gunung Sallan	5,000							35,000		
3. Punggal Lipat Kain	10,000							70,000		
Total	55,000							355,000		

B. Indragiri River Basin

Scheme Name	Planned Gross Irrigable Area (A)	Level of Existing Irrigation System	Facility Abstracting Water for Existing System	Existing Irrigated Paddy Field (B)	Existing Rain-fed Paddy Field (C)	Irrigable Area at Present		Estimated Remaining Potential Area (A)-(B)-(C)	Catchment Area	Year to be Completed
						Dry Season	Wet Season			
1. Lubukjambi	50,000							270,000		
2. Cineku Bt. Papan	8,000							40,000		
3. Gangsal	4,000							16,000		
4. Reteh	4,000							18,000		
5. Keritang	1,000							5,000		
6. Kuko	1,000							4,500		
Total	68,000							353,500		

Data Sources : Location of Irrigation Development Areas in Riau by PU in Riau

Table VII.3.1(2/2) FUTURE IRRIGATION DEVELOPMENT PLAN FORMULATED BY P.U. IN RIAU PROVINCE

2. Potential Areas (Identified)

A. Kampar River Basin	Scheme Name	Planned Gross Irrigable Area (A)	Level of Existing Irrigation System	Facility Abstracting Water for Existing System	Existing Irrigated Paddy Field (B)	Existing Rain-fed Paddy Field (C)	Irrigable Area at Present		Estimated Remaining Potential Area (A)-(B)-(C)	Catchment Area	Year to be Completed
							Dry Season	Wet Season			
	None	0									

Unit : ha

B. Indragiri River Basin	Scheme Name	Planned Gross Irrigable Area (A)	Level of Existing Irrigation System	Facility Abstracting Water for Existing System	Existing Irrigated Paddy Field (B)	Existing Rain-fed Paddy Field (C)	Irrigable Area at Present		Estimated Remaining Potential Area (A)-(B)-(C)	Catchment Area	Year to be Completed
							Dry Season	Wet Season			
	1. Sei Puthan	700								4,200	
	2. Air Molek	9,100								40,000	
	3. Kayu Aru	1,400								8,400	
	4. Perarap	15,000								35,200	
	5. Singingi	6,300								37,900	
	6. Cinaku Hulu	6,000								62,500	
	7. Cinaku Tengah	4,000								32,000	
	Total	42,500								220,100	

Unit : ha

Data Sources : Location of Irrigation Development Areas in Riau by PU in Riau

Table VII.3.2 SUMMARY OF BASIC FEATURES AND PRINCIPAL COMPONENTS OF NEW IRRIGATION DEVELOPMENT PROJECTS

Future Irrigation Development Projects	(A) Rantauberangin Irrigation Development Project	(B) Lubukjambi Irrigation Development Project
(1) River Basin	Kampar Kanan River Basin	Indragiri River Basin
(2) Irrigation Method to be applied	Gravity Irrigation	Gravity Irrigation
(3) Irrigation System to be applied	Technical Irrigation System	Technical Irrigation System
(4) Intake Facilities -Weir Crest Elevation	Kuok Intake Weir EL. 40m	Lubukjambi Intake Weir EL. 60m
(5) Primary Canal Length		
- Left Bank Primary Canal	84 km	119 km
- Right Bank Primary Canal	40 km	123 km
Subtotal	124 km	242 km
(6) Project Area estimated by PU, Riau Province	40,000 ha	50,000 ha
(7) Irrigable Area		
(7-1) Existing Irrigation Schemes to be incorporated		
(a) Left Bank Area	(10 schemes)	(12 schemes)
1) Existing Irrigated Area	1,837 ha	1,670 ha
2) Convertible Area to Irrigation		
2-1. Rainfed	553 ha	376 ha
2-2. Undeveloped yet	2,781 ha	2,096 ha
Total Area	5,171 ha	4,142 ha
(b) Right Bank Area	(12 schemes)	(8 schemes)
1) Existing Irrigated Area	1,822 ha	1,515 ha
2) Convertible Area to Irrigation		
2-1. Rainfed	375 ha	65 ha
2-2. Undeveloped yet	2,141 ha	650 ha
Total Area	4,338 ha	2,230 ha
Subtotal	9,509 ha (22 schemes)	6,372 ha (20 schemes)
(7-2) Existing Drainage and Swamp Development Schemes to be incorporated		
- Left Bank Area	2,975 ha (4 schemes)	-
- Right Bank Area	-	-
Subtotal	2,975 ha (4 schemes)	-
(7-3) Net Additional Area		
- Left Bank Area	10,517 ha	12,875 ha
- Right Bank Area	277 ha	10,902 ha
Subtotal	10,794 ha	23,777 ha
(7-4) Total Net Irrigable Area		
- Left Bank Area	15,688 ha	17,017 ha
- Right Bank Area	4,615 ha	13,132 ha
Subtotal	20,303 ha	30,149 ha

Note (7-3) Net Additional Area :

the net area including the existing drainage and swamp development schemes, if any, and excluding the existing irrigation schemes.

(7-4) Total Net Irrigable Area :

the total net irrigable area includes all the existing schemes.

Table VII.3.3 (1/3) EFFECTIVE RAINFALL IN RANTAUBERANGIN, LUBUKJAMBI,
AND WEST SUMATRA REGION IN STUDY AREA

1) Rantauberangin

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30
1981	3.1	4.0	4.5	4.5	3.1	3.3	14.3	4.9	11.1	3.6	3.2	0.0
1982	3.0	0.7	4.8	2.3	5.4	10.2	11.5	9.1	12.5	5.1	6.7	0.0
1983	2.7	3.2	2.8	1.6	5.8	4.3	3.3	5.9	3.1	1.4	2.1	0.0
1984	1.9	2.9	4.1	4.9	7.2	5.9	5.6	1.4	4.4	6.8	9.2	1.8
1985	9.3	2.2	5.8	0.3	6.3	2.5	5.1	3.1	4.0	6.6	0.7	0.0
1986	8.6	4.0	5.0	0.5	12.0	6.3	5.5	1.5	5.1	1.2	1.7	3.6
1987	3.9	3.3	2.7	3.1	5.8	2.7	6.5	4.7	7.0	1.5	5.3	0.3
1988	4.8	9.6	8.0	3.3	5.6	5.1	6.9	2.0	5.6	5.6	6.2	5.0
1989	12.4	6.8	1.4	7.6	5.4	1.3	4.2	1.7	3.3	2.8	0.0	4.3
1990	2.0	3.1	10.5	2.8	2.3	3.4	5.9	3.9	5.9	1.8	1.4	5.0
1991	2.4	9.1	1.5	0.4	10.2	11.6	6.3	5.0	5.2	2.9	1.3	1.4
1992	5.6	6.9	7.9	4.3	7.0	2.3	5.9	0.1	4.9	2.8	1.4	1.6

Unit : mm/day

Unit : mm/day

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
1981	4.8	2.9	0.0	3.4	2.7	1.2	4.0	9.6	3.8	3.1	7.4	3.5
1982	3.5	1.8	5.3	3.7	2.7	2.1	5.7	1.6	2.1	3.6	2.6	9.8
1983	3.3	2.6	0.4	3.7	9.3	2.5	2.8	4.0	5.7	3.9	5.2	7.1
1984	0.9	11.6	4.0	2.7	5.9	4.1	3.1	5.8	2.0	3.9	4.3	7.0
1985	1.8	0.1	0.7	2.9	1.5	2.1	11.0	15.1	12.2	1.4	8.7	3.3
1986	1.6	4.7	0.0	1.1	1.0	7.0	10.1	6.2	6.0	10.3	10.8	6.4
1987	1.3	2.2	4.4	0.0	5.3	5.4	8.7	7.0	9.8	2.2	10.5	3.1
1988	2.4	2.4	2.8	10.0	1.4	6.0	1.4	3.2	6.5	3.5	10.4	7.5
1989	3.7	1.8	1.4	2.8	5.3	3.2	6.3	9.2	6.6	3.1	6.8	5.2
1990	2.5	6.9	2.0	4.6	1.7	2.9	3.9	9.2	7.6	9.4	9.2	3.8
1991	2.1	0.0	3.7	2.8	2.4	4.4	1.9	7.6	9.6	8.2	5.3	8.1
1992	4.6	4.2	2.0	1.2	4.6	4.0	6.2	4.3	5.2	8.9	4.4	3.8

Note Leap Year : 1984, 1988, and 1992

Table VII.3.3 (2/3) EFFECTIVE RAINFALL IN RANTAUBERANGIN, LUBUKJAMBI,
AND WEST SUMATRA REGION IN STUDY AREA

2) Lubukjambi

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30
1981	7.0	6.4	6.4	6.4	6.8	4.7	13.8	6.4	4.5	5.6	3.3	1.7
1982	9.1	1.1	5.6	2.7	6.3	11.8	21.7	8.7	8.4	5.4	4.9	0.0
1983	7.6	10.7	4.1	3.2	6.9	3.5	2.4	2.3	16.2	6.6	3.4	5.4
1984	6.0	7.9	5.5	9.2	8.3	9.0	13.2	3.7	9.2	5.9	8.4	2.8
1985	10.9	8.0	3.1	0.5	9.5	6.0	2.7	3.0	8.4	5.2	1.3	0.6
1986	8.7	5.3	3.5	0.8	9.8	5.8	5.5	14.9	8.5	0.9	2.7	1.2
1987	5.6	5.9	4.7	0.3	7.2	2.3	0.6	2.9	6.4	3.5	3.7	3.5
1988	1.0	7.4	1.9	5.1	7.4	2.2	4.9	1.1	9.8	2.9	4.3	0.8
1989	10.5	5.4	2.7	4.3	4.6	7.6	4.0	2.2	8.0	3.3	2.6	2.0
1990	1.5	3.3	2.1	4.4	6.9	2.6	6.8	1.1	11.4	1.8	0.5	1.0
1991	10.0	7.8	3.9	5.2	4.2	11.2	8.9	2.4	2.9	4.4	2.5	1.7
1992	4.4	7.9	7.5	2.3	6.4	2.7	3.5	4.4	3.3	1.8	3.3	2.3

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
1981	4.4	4.5	0.0	0.3	7.3	5.8	8.5	2.5	8.3	2.8	4.0	3.9
1982	3.5	1.0	4.7	2.6	0.0	0.7	6.9	4.9	10.8	1.0	7.3	10.1
1983	6.8	3.9	4.6	4.6	5.3	0.5	4.6	5.3	9.3	5.6	5.0	7.4
1984	2.7	2.9	3.7	5.6	3.6	6.1	7.6	5.2	4.5	4.7	4.9	4.9
1985	4.2	3.1	0.4	3.5	2.7	5.7	7.6	5.3	4.2	2.7	9.1	11.6
1986	3.5	3.2	0.0	0.7	3.3	9.5	8.4	9.9	4.4	12.6	12.4	5.2
1987	1.1	2.2	3.5	1.1	3.1	2.7	3.6	4.3	7.1	4.2	3.4	1.4
1988	1.4	0.7	5.5	0.4	1.6	3.2	2.2	1.5	2.8	2.0	7.7	1.9
1989	3.0	0.0	0.7	4.5	4.9	0.6	5.5	2.3	10.3	9.8	15.7	7.2
1990	4.3	5.6	0.4	5.5	4.6	2.0	2.1	4.7	2.4	3.5	10.3	11.3
1991	1.5	1.1	4.0	0.0	1.6	1.4	0.4	1.9	14.2	10.8	7.4	12.2
1992	3.6	5.3	0.5	1.4	2.3	6.2	5.1	4.0	11.8	9.0	4.1	5.6

Note Leap Year : 1984, 1988, and 1992

Table VII.3.3 (3/3) EFFECTIVE RAINFALL IN RANTAUBERANGIN, LUBUKJAMBI,
AND WEST SUMATRA REGION IN STUDY AREA

3) West Sumatra Region

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30
	Unit : mm/day											
1981	2.0	3.4	4.5	3.2	5.3	3.8	8.0	6.4	7.7	6.2	1.9	1.0
1982	5.0	2.9	5.5	3.1	5.0	4.5	9.0	7.4	5.6	6.1	5.1	1.7
1983	6.3	4.1	3.7	5.3	4.2	3.6	3.4	6.4	7.0	1.9	3.3	1.3
1984	7.2	4.9	5.0	3.2	4.8	6.4	8.6	3.4	5.4	5.7	6.2	1.0
1985	4.9	4.3	6.2	0.5	6.0	4.9	4.8	1.9	5.4	4.6	1.0	0.7
1986	11.9	2.0	2.9	1.1	12.9	6.0	4.5	5.1	3.6	2.7	2.7	0.8
1987	4.6	3.4	2.3	2.6	6.4	7.2	5.0	8.4	12.1	2.4	1.9	1.7
1988	4.2	9.8	2.7	6.9	10.0	4.4	5.5	5.5	9.1	1.2	4.2	1.7
1989	7.2	8.3	3.5	8.4	2.4	5.4	4.6	1.0	6.0	1.8	0.7	3.5
1990	3.1	4.8	6.8	5.8	2.6	6.9	3.7	2.2	7.4	1.1	1.5	2.2
1991	5.4	7.1	4.0	1.3	4.3	9.6	8.2	3.1	5.2	4.8	2.8	1.4
1992	2.9	6.1	4.0	4.7	6.5	4.6	5.8	4.6	7.4	5.9	1.9	0.6

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
	Unit : mm/day											
1981	3.4	2.7	0.0	1.1	6.2	2.2	7.4	7.4	2.5	3.1	4.8	4.0
1982	1.7	1.3	2.1	2.1	2.1	2.5	5.2	2.9	5.6	5.3	6.0	6.6
1983	3.3	3.0	2.6	2.7	5.1	2.5	5.8	3.7	2.7	1.9	3.8	4.1
1984	3.0	4.6	0.5	1.9	2.2	4.6	0.9	3.6	8.1	8.8	2.9	6.0
1985	1.1	2.8	2.2	2.7	6.7	5.4	3.9	4.6	8.6	1.4	3.4	4.1
1986	2.1	2.9	0.5	2.6	2.5	4.5	5.4	5.3	1.7	4.6	8.4	4.1
1987	2.1	2.0	3.4	2.6	2.1	3.1	6.5	5.9	6.4	2.1	4.8	4.9
1988	3.0	1.1	3.5	8.0	7.0	5.0	1.5	2.3	2.5	6.4	4.5	3.2
1989	1.8	0.6	1.8	4.2	3.5	6.6	4.7	5.5	9.4	6.8	7.4	4.9
1990	4.0	3.2	0.5	0.8	3.4	3.7	6.5	6.8	3.5	8.6	7.1	5.3
1991	2.3	1.5	3.0	1.8	2.2	2.7	0.8	5.0	5.1	14.8	11.3	14.8
1992	4.7	6.0	1.0	1.7	3.5	5.7	4.2	1.7	10.7	11.4	6.0	5.0

Note Leap Year : 1984, 1988, and 1992

Table VII.3.4 METEOROLOGICAL DATA USED FOR CALCULATION OF REFERENCE CROP EVAPOTRANSPIRATION (Eto)

1. Kampar River Basin

Observation Station : Pasar Kampar

Observation Period : 1980-1993 (14 years)

Month	Daily Average Temperature (°C)		Rel. Humidity (%)		Wind Velocity (km/day)		Sunshine Ratio (%)	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
Jan.	27.9	27.7	81.7	80.6	23.2	29.3	28.6	28.9
Feb.	28.0	28.4	80.0	78.9	24.8	27.9	32.6	42.7
Mar.	28.2	28.7	80.2	79.1	24.9	26.1	29.4	36.2
Apr.	28.7	29.0	79.3	79.1	25.7	26.6	38.4	46.2
May	28.8	28.9	83.0	80.0	28.5	27.2	41.9	41.9
June	28.8	28.9	78.1	77.1	28.4	25.3	45.0	45.4
July	28.3	28.3	78.1	77.1	30.9	26.2	37.6	39.1
Aug.	28.2	28.5	77.3	76.9	29.3	30.9	35.1	28.0
Sep.	28.2	28.2	84.5	79.3	31.8	28.2	28.3	27.3
Oct.	28.2	28.4	79.0	82.6	32.5	28.0	29.5	32.4
Nov.	28.3	28.2	79.0	79.7	23.0	24.5	32.9	34.1
Dec.	27.2	27.6	81.0	88.6	25.5	24.5	29.4	24.2

2. Indragiri River Basin

Observation Station : Sentajo

Observation Period : 1979-1993 (15 years)

Month	Daily Average Temperature (°C)		Rel. Humidity (%)		Wind Velocity (km/day)		Sunshine Ratio (%)	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
Jan.	26.5	26.5	87.1	86.4	50.2	50.9	32.4	30.0
Feb.	27.2	27.5	77.8	77.3	46.5	45.4	40.2	44.8
Mar.	27.2	27.2	77.8	77.1	43.8	43.6	33.8	42.3
Apr.	27.1	27.2	76.6	76.4	43.3	43.7	43.3	47.4
May	27.7	28.0	83.8	84.2	44.9	44.8	48.2	41.7
June	27.5	27.3	86.8	85.7	43.7	44.4	30.7	30.1
July	27.2	27.2	83.9	84.3	43.9	45.6	35.2	43.0
Aug.	27.3	27.4	83.2	84.4	44.8	41.8	44.7	47.2
Sep.	27.0	27.1	84.9	85.8	43.1	43.5	39.3	39.0
Oct.	27.3	27.9	76.8	77.0	41.2	42.8	38.2	34.6
Nov.	27.1	27.0	68.3	68.4	37.9	43.3	39.4	40.4
Dec.	26.5	26.7	70.0	70.6	43.2	39.5	33.0	33.6

Note : Data which are not available at Sentajo station during the following months were supplemented with data at Peranap station.

1) Daily Average Temperature

1983 May, Aug., Sep., Oct.,
Nov., and Dec.
1984 One year data
1985 Jan., Feb., and Mar.
1988 Nov., and Dec.
1989 Nov., and Dec.
1990 Jan., Feb., Mar., Apr., May,
June, July, Nov., and Dec.

2) Sunshine Ratio

1990 Feb. Mar. Apr. Nov. and Dec.
1991 Jan. Feb. Mar. and Oct.
1992 One year data

Table VII.3.5 (1/4) CALCULATION OF REFERENCE CROP EVAPOTRANSPIRATION (Eto) BY MODIFIED PENMAN METHOD

1. Rantauberangin Irrigation Development Project (Jan. - June)

DATA and CALCULATION	Jan.		Feb.		Mar.		Apr.		May		June	
	1	2	1	2	1	2	1	2	1	2	1	2
[1]. Latitude 0° 20' N (Project Site Elevation : 25m)												
[2]. Tmax (°C)												
[3]. Tmin (°C)												
[4]. Tmean (°C)	27.90	27.70	28.00	28.40	28.20	28.70	28.70	29.00	28.80	28.90	28.80	28.90
[5]. Rel.Hum(max) (%)												
[6]. Rel.Hum(min) (%)												
[7]. Rel.Hum(mean) (%)												
[8]. ea: Mean saturation water vapour pressure (mbar)	81.70	80.60	80.00	78.90	80.20	79.10	79.30	79.10	83.00	80.00	80.00	78.10
[9]. U2: Total wind run at 2m height (km/day)	37.60	37.20	37.80	38.70	38.30	39.40	39.40	40.10	39.60	39.90	39.90	39.90
[10]. (1-W): Weighting factor	23.20	29.30	24.80	27.90	24.90	26.10	25.70	26.60	28.50	27.20	28.40	25.30
[11]. W: Weighting factor	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
[12]. n/N: Sunshine ratio (%)	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
[13]. N: Bright sunshine hours (hours)	28.60	28.90	32.60	42.70	29.40	36.20	38.40	46.20	41.90	41.90	45.00	45.40
[14]. Ra: Extra-terrestrial radiation (mm/day)	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10
[15]. f(i): Correction for temp. on longwave rad. Rnl	15.00	15.00	15.50	15.50	15.60	15.60	15.30	15.30	14.40	14.40	14.00	14.00
[16]. ed: Mean actual water vapour pressure (mbar)	16.30	16.20	16.30	16.40	16.30	16.40	16.40	16.50	16.50	16.50	16.50	16.50
[17]. Vaper Pressure=ea-ed (mbar)	30.72	29.98	30.24	30.53	30.72	31.17	31.24	31.72	32.87	31.92	30.93	30.76
[18]. f(u): Wind related function f(u)=0.27(1+U2/100)	6.88	7.22	7.56	8.17	7.58	8.23	8.16	8.38	6.73	7.98	8.67	9.14
[19]. n: Sunshine (hours)	0.33	0.35	0.34	0.35	0.34	0.34	0.34	0.34	0.35	0.34	0.35	0.34
[20]. Rns: Net shortwave radiation (mm/day)	3.46	3.50	3.94	5.17	3.56	4.38	4.65	5.59	5.07	5.07	5.45	5.49
Rns=[1-a]*[0.25+0.50*(n/N)]*Ra (a=0.25)	4.42	4.44	4.80	5.39	4.64	5.04	5.07	5.52	4.96	4.96	4.99	5.01
[21]. f(ed): Correc. for v. press. on l.wave rad. Rnl	0.12	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.12	0.12
[22]. f(n/N): Correc. for ratio actual and max. bright sunshine hours f(n/N) on l.wave rad. Rnl	0.36	0.36	0.39	0.48	0.36	0.43	0.45	0.52	0.48	0.48	0.51	0.51
[23]. Rnl: Net longwave radiation (mm/day)												
Rnl=f(i)*f(ed)*f(n/N)	0.70	0.76	0.83	0.94	0.70	0.85	0.89	1.03	0.87	0.87	1.01	1.01
[24]. Rn: Net radiation=Rns-Rnl (mm/day)	3.72	3.68	3.97	4.45	3.94	4.19	4.18	4.49	4.09	4.09	3.98	4.00
[25]. Eto*: Reference crop evapotranspiration unadjusted for day and night-time weather conditions (mm/day)												
Eto* =W*Rn+(1-W)*f(u)*(ea-ed)	3.39	3.41	3.65	4.08	3.63	3.87	3.86	4.16	3.69	3.77	3.76	3.79
[26]. Eto												
Eto=Eto* (No adjustment of Penman Eto*)	3.39	3.41	3.65	4.08	3.63	3.87	3.86	4.16	3.69	3.77	3.76	3.79

Table VII.3.5 (2/4) CALCULATION OF REFERENCE CROP EVAPOTRANSPIRATION (Eto) BY MODIFIED PENMAN METHOD

1. Rantauberangin Irrigation Development Project (July - Dec.)

DATA and CALCULATION	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1	2	1	2	1	2	1	2	1	2	1	2
[1]. Data, (): Calculation												
[1]. Latitude 0° 20' N (Project Site Elevation : 25m)												
[2]. Tmax (°C)												
[3]. Tmin (°C)												
[4]. Tmean (°C)	28.30	28.30	28.20	28.50	28.20	28.20	28.20	28.40	28.30	28.20	27.20	27.60
[5]. Rel.Hum(max) (%)												
[6]. Rel.Hum(min) (%)												
[7]. Rel.Hum(mean) (%)	78.10	77.10	77.30	76.90	84.50	79.30	79.00	82.60	79.00	79.70	81.00	88.60
[8]. ea: Mean saturation water vapour pressure (mbar)	38.50	38.50	38.30	39.00	38.30	38.30	38.30	38.70	38.50	38.30	36.10	37.00
[9]. U2: Total wind run at 2m height (km/day)	30.90	26.20	29.30	30.90	31.80	28.20	32.50	28.00	23.00	24.50	25.50	24.50
[10]. (1-W): Weighting factor	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.23
[11]. W: Weighting factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.77
[12]. n/N: Sunshine ratio (%)	37.60	39.10	35.10	28.00	28.30	27.30	29.50	32.40	32.90	34.10	29.40	24.20
[13]. N: Bright sunshine hours (hours)	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10
[14]. Ra: Extra-terrestrial radiation (mm/day)	14.10	14.10	14.80	14.80	15.30	15.30	15.40	15.40	15.10	15.10	14.70	14.70
[15]. f(t): Correction for temp. on longwave rad. Rnl	16.40	16.40	16.30	16.40	16.30	16.30	16.30	16.40	16.40	16.30	16.10	16.20
[16]. ed: Mean actual water vapour pressure (mbr)	30.07	29.68	29.61	29.99	32.36	30.37	30.26	31.97	30.42	30.53	29.24	32.78
[17]. Vaper Pressure=ea-ed (mbar)	8.43	8.82	8.69	9.01	5.94	7.93	8.04	6.73	8.08	7.77	6.86	4.22
[18]. f(u): Wind related function f(u)=0.27(1+U2/100)	0.35	0.34	0.35	0.35	0.36	0.35	0.36	0.35	0.33	0.34	0.34	0.34
[19]. n: Sunshine (hours)	4.55	4.73	4.25	3.39	3.42	3.30	3.57	3.92	3.98	4.13	3.56	2.93
[20]. Rns: Net shortwave radiation (mm/day) Rns=[1-a]*[0.25+0.50*(n/N)]*Ra (a=0.25)	4.63	4.71	4.72	4.33	4.49	4.44	4.59	4.76	4.69	4.76	4.38	4.09
[21]. f(ed): Correc. for v. press. on l.wave rad. Rnl	0.13	0.13	0.13	0.13	0.11	0.12	0.13	0.11	0.12	0.12	0.13	0.11
[22]. f(n/N): Correc. for ratio actual and max. bright sunshine hours f(n/N) on l.wave rad Rnl	0.44	0.45	0.42	0.35	0.35	0.35	0.37	0.39	0.40	0.41	0.36	0.32
[23]. Rnl: Net longwave radiation (mm/day) Rnl=f(t)*f(ed)*f(n/N)	0.94	0.96	0.89	0.75	0.63	0.68	0.78	0.70	0.79	0.80	0.75	0.57
[24]. Rn: Net radiation=Rns-Rnl (mm/day)	3.69	3.75	3.83	3.58	3.86	3.76	3.81	4.06	3.90	3.96	3.63	3.52
[25]. Eto* : Reference crop evapotranspiration unadjusted for day and night-time weather conditions (mm/day) Eto* =W*Rn+(1-W)*f(u)*(ea-ed)	3.52	3.58	3.65	3.48	3.46	3.53	3.60	3.67	3.62	3.66	3.32	3.04
[26]. Eto Eto=Eto* (No adjustment of Penman Eto*)	3.52	3.58	3.65	3.48	3.46	3.53	3.60	3.67	3.62	3.66	3.32	3.04

Table VII.5 (3/4) CALCULATION OF REFERENCE CROP EVAPOTRANSPIRATION (Eto) BY MODIFIED PENMAN METHOD

2. Lubukjambi Irrigation Development Project (Jan. - June)

DATA and CALCULATION	Jan.		Feb.		Mar.		Apr.		May		June	
	1	2	1	2	1	2	1	2	1	2	1	2
(1) Latitude 0° 30' S (Project Site Elevation : 25m)												
(2) Tmax (°C)												
(3) Tmin (°C)												
(4) Tmean (°C)	26.50	26.50	27.20	27.50	27.20	27.20	27.10	27.20	27.70	28.00	27.50	27.30
(5) Rel.Hum(max) (%)												
(6) Rel.Hum(min) (%)												
(7) Rel.Hum(mean) (%)	87.10	86.40	77.80	77.30	77.80	77.10	76.60	76.40	83.80	84.20	86.80	85.70
(8) ea: Mean saturation water vapour pressure (mbar)	34.70	34.70	36.10	36.80	36.10	36.10	35.90	36.10	37.20	37.80	36.80	36.30
(9) U2: Total wind run at 2m height (km/day)	50.20	50.90	46.50	45.40	43.80	43.60	43.30	43.70	44.90	44.80	43.70	44.40
(10) (1-W): Weighting factor	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.24	0.24
(11) W: Weighting factor	0.76	0.76	0.76	0.77	0.76	0.76	0.76	0.76	0.77	0.77	0.77	0.76
(12) n/N: Sunshine ratio (%)	32.40	30.00	40.20	44.80	33.80	42.30	43.30	47.40	48.20	41.70	30.70	30.10
(13) N: Bright sunshine hours (hours)	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10
(14) Ra: Extra-terrestrial radiation (mm/day)	15.10	15.10	15.30	15.30	15.70	15.70	15.30	15.30	14.30	14.30	13.80	13.80
(15) f(t): Correction for temp. on longwave rad. Rnl	16.00	16.00	16.10	16.20	16.10	16.10	16.10	16.10	16.20	16.30	16.20	16.20
(16) ed: Mean actual water vapour pressure (mbr)	30.22	29.98	28.09	28.45	28.09	27.83	27.50	27.58	31.17	31.83	31.94	31.11
(17) Vaper Pressure=ea-ed (mbar)	4.48	4.72	8.01	8.35	8.01	8.27	8.40	8.52	6.03	5.97	4.86	5.19
(18) f(u): Wind related function f(u)=0.27(1+U2/100)	0.41	0.41	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
(19) n: Sunshine (hours)	3.92	3.63	4.86	5.42	4.09	5.12	5.24	5.74	5.83	5.05	3.71	3.64
(20) Rns: Net shortwave radiation (mm/day) Rns=[1-a][0.25+0.50*(n/N)]*Ra (a=0.25)	4.67	4.53	5.18	5.44	4.93	5.43	5.35	5.59	5.27	4.92	4.18	4.15
(21) f(ed): Correc. for v. press. on l.wave rad. Rnl	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.12	0.11	0.11	0.12
(22) f(n/N): Correc. for ratio actual and max. bright sunshine hours f(n/N) on l.wave rad. Rnl	0.39	0.37	0.46	0.50	0.40	0.48	0.49	0.53	0.53	0.48	0.38	0.37
(23) Rnl: Net longwave radiation (mm/day) Rnl=f(t)*f(ed)*f(n/N)	0.81	0.77	1.04	1.13	0.90	1.08	1.18	1.28	1.03	0.86	0.68	0.72
(24) Rn: Net radiation=Rns-Rnl (mm/day)	3.86	3.76	4.14	4.31	4.03	4.35	4.17	4.31	4.24	4.06	3.50	3.43
(25) Eto* : Reference crop evapotranspiration unadjusted for day and night-time weather conditions Eto* =W*Rn+(1-W)*f(u)*ea-ed (mm/day)	3.39	3.34	3.92	4.10	3.81	4.08	3.96	4.07	3.81	3.66	3.15	3.09
(26) Eto Eto=Eto* (No adjustment of Penman Eto*)	3.39	3.34	3.92	4.10	3.81	4.08	3.96	4.07	3.81	3.66	3.15	3.09

Table VII.3.5 (4/4) CALCULATION OF REFERENCE CROP EVAPOTRANSPIRATION (Eto) BY MODIFIED PENMAN METHOD

2. Lubukjambi Irrigation Development Project (July - Dec.)

DATA and CALCULATION	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1	2	1	2	1	2	1	2	1	2	1	2
[1] Data, (): Calculation												
[1] Latitude 0° 30' S (Project Site Elevation : 25m)												
[2] Tmax (°C)												
[3] Tmin (°C)												
[4] Tmean (°C)	27.20	27.20	27.30	27.40	27.00	27.10	27.30	27.90	27.10	27.00	26.50	26.70
[5] Rel.Hum(max) (%)												
[6] Rel.Hum(min) (%)												
[7] Rel.Hum(mean) (%)	83.90	84.30	83.20	84.40	84.90	85.80	76.80	77.00	68.30	68.40	70.00	70.60
[8] ea: Mean saturation water vapour pressure (mbar)	36.10	36.10	36.30	36.50	35.70	35.90	36.30	37.60	35.90	35.70	34.70	35.10
[9] U2: Total wind run at 2m height (km/day)	43.90	45.60	44.80	41.80	43.10	43.50	41.20	42.80	37.90	43.30	43.20	39.50
[10] (1-W): Weighting factor	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.24
[11] W: Weighting factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
[12] n/N: Sunshine ratio (%)	35.20	43.00	44.70	47.20	39.30	39.00	36.20	34.60	39.40	40.40	33.00	33.60
[13] N: Bright sunshine hours (hours)	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10
[14] Ra: Extra-terrestrial radiation (mm/day)	14.00	14.00	14.70	14.70	15.30	15.30	15.40	15.40	15.20	15.20	14.90	14.90
[15] f(t): Correction for temp. on longwave rad. Rnl	16.10	16.10	16.20	16.20	16.10	16.10	16.20	16.30	16.10	16.10	16.00	16.00
[16] ed: Mean actual water vapour pressure (mbr)	30.29	30.43	30.20	30.81	30.31	30.80	27.88	28.95	24.52	24.42	24.29	24.78
[17] Vaper Pressure=ea-ed (mbar)	5.81	5.67	6.10	5.69	5.39	5.10	8.42	8.65	11.38	11.28	10.41	10.32
[18] f(u): Wind related function f(u)=0.27(1+U2/100)	0.39	0.39	0.39	0.38	0.39	0.39	0.38	0.39	0.37	0.39	0.39	0.38
[19] n: Sunshine (hours)	4.26	5.20	5.41	5.71	4.76	4.72	4.62	4.19	4.77	4.89	3.99	4.07
[20] Rns: Net shortwave radiation (mm/day) Rns=[1-a]*0.25+0.50*(n/N)*Ra (a=0.25)	4.47	4.88	5.22	5.36	5.12	5.11	5.09	4.89	5.10	5.15	4.64	4.67
[21] f(ed): Correc. for v. press. on l.wave rad. Rnl	0.13	0.12	0.13	0.12	0.13	0.12	0.14	0.13	0.17	0.17	0.17	0.17
[22] f(n/N): Correc. for ratio actual and max. bright sunshine hours f(n/N) on l.wave rad. Rnl	0.42	0.49	0.50	0.52	0.45	0.45	0.44	0.41	0.45	0.46	0.40	0.40
[23] Rnl: Net longwave radiation (mm/day) Rnl=f(t)*f(ed)*(n/N)	0.88	0.95	1.05	1.01	0.94	0.87	1.00	0.87	1.23	1.26	1.09	1.09
[24] Rn: Net radiation=Rns-Rnl (mm/day)	3.59	3.93	4.17	4.35	4.18	4.24	4.09	4.02	3.87	3.89	3.55	3.58
[25] Eto*: Reference crop evapotranspiration unadjusted for day and night-time weather conditions (mm/day) Eto* =W*Rn+(1-W)*f(u)*(ea-ed)	3.27	3.52	3.74	3.82	3.68	3.70	3.88	3.87	3.95	4.01	3.71	3.66
[26] Eto Eto=Eto* (No adjustment of Penman Eto*)	3.27	3.52	3.74	3.82	3.68	3.70	3.88	3.87	3.95	4.01	3.71	3.66

Table VII.3.6 (1/2) IRRIGATION WATER REQUIREMENTS DURING LAND PREPARATION

1. Present Condition of Existing Paddy Fields

T : Land Preparation Period=45 days

S : Presaturation Requirements added with 50 mm water layer=250 mm

P : Percolation =2.0 mm/day

1-1. Rantauberangin Irrigation Development Project

Month	Period	Eto (mm/day)	Eo (mm/day)	P (mm/day)	M (mm/day)	k	M*e**k	e**k-1	LPWR (mm/day)
Jan.	1-15	3.39	3.73	2.0	5.73	1.031	16.066	1.804	8.9
	16-End	3.41	3.75	2.0	5.75	1.035	16.187	1.815	8.9
Feb.	1-15	3.65	4.02	2.0	6.02	1.084	17.798	1.956	9.1
	16-End	4.08	4.49	2.0	6.49	1.168	20.869	2.216	9.4
Mar.	1-15	3.63	3.99	2.0	5.99	1.078	17.603	1.939	9.1
	16-End	3.87	4.26	2.0	6.26	1.127	19.321	2.086	9.3
Apr.	1-15	3.86	4.25	2.0	6.25	1.125	19.251	2.080	9.3
	16-End	4.16	4.58	2.0	6.58	1.184	21.500	2.267	9.5
May	1-15	3.69	4.06	2.0	6.06	1.091	18.042	1.977	9.1
	16-End	3.77	4.15	2.0	6.15	1.107	18.605	2.025	9.2
June	1-15	3.76	4.14	2.0	6.14	1.105	18.536	2.019	9.2
	16-End	3.79	4.17	2.0	6.17	1.111	18.741	2.037	9.2
July	1-15	3.52	3.87	2.0	5.87	1.057	16.892	1.878	9.0
	16-End	3.58	3.94	2.0	5.94	1.069	17.300	1.912	9.0
Aug.	1-15	3.65	4.02	2.0	6.02	1.084	17.798	1.956	9.1
	16-End	3.48	3.83	2.0	5.83	1.049	16.643	1.855	9.0
Sep.	1-15	3.46	3.81	2.0	5.81	1.046	16.537	1.846	9.0
	16-End	3.53	3.88	2.0	5.88	1.058	16.938	1.881	9.0
Oct.	1-15	3.60	3.96	2.0	5.96	1.073	17.428	1.924	9.1
	16-End	3.67	4.04	2.0	6.04	1.087	17.911	1.965	9.1
Nov.	1-15	3.62	3.98	2.0	5.98	1.076	17.539	1.933	9.1
	16-End	3.66	4.03	2.0	6.03	1.085	17.845	1.959	9.1
Dec.	1-15	3.32	3.65	2.0	5.65	1.017	15.622	1.765	8.9
	16-End	3.04	3.34	2.0	5.34	0.961	13.960	1.614	8.6

1-2. Lubukjambi Irrigation Development Project

Month	Period	Eto (mm/day)	Eo (mm/day)	P (mm/day)	M (mm/day)	k	M*e**k	e**k-1	LPWR (mm/day)
Jan.	1-15	3.39	3.73	2.0	5.73	1.031	16.066	1.804	8.9
	16-End	3.34	3.67	2.0	5.67	1.021	15.740	1.776	8.9
Feb.	1-15	3.92	4.31	2.0	6.31	1.136	19.651	2.114	9.3
	16-End	4.10	4.51	2.0	6.51	1.172	21.017	2.228	9.4
Mar.	1-15	3.81	4.19	2.0	6.19	1.114	18.858	2.047	9.2
	16-End	4.08	4.49	2.0	6.49	1.168	20.869	2.216	9.4
Apr.	1-15	3.96	4.36	2.0	6.36	1.145	19.986	2.142	9.3
	16-End	4.07	4.48	2.0	6.48	1.166	20.795	2.209	9.4
May	1-15	3.81	4.19	2.0	6.19	1.114	18.858	2.047	9.2
	16-End	3.66	4.03	2.0	6.03	1.085	17.845	1.959	9.1
June	1-15	3.15	3.47	2.0	5.47	0.985	14.648	1.678	8.7
	16-End	3.09	3.40	2.0	5.40	0.972	14.273	1.643	8.7
July	1-15	3.27	3.60	2.0	5.60	1.008	15.345	1.740	8.8
	16-End	3.52	3.87	2.0	5.87	1.057	16.892	1.878	9.0
Aug.	1-15	3.74	4.11	2.0	6.11	1.100	18.355	2.004	9.2
	16-End	3.82	4.20	2.0	6.20	1.116	18.926	2.053	9.2
Sep.	1-15	3.68	4.05	2.0	6.05	1.089	17.976	1.971	9.1
	16-End	3.70	4.07	2.0	6.07	1.093	18.108	1.983	9.1
Oct.	1-15	3.88	4.27	2.0	6.27	1.129	19.390	2.093	9.3
	16-End	3.87	4.26	2.0	6.26	1.127	19.321	2.086	9.3
Nov.	1-15	3.95	4.35	2.0	6.35	1.143	19.915	2.136	9.3
	16-End	4.01	4.41	2.0	6.41	1.154	20.325	2.171	9.4
Dec.	1-15	3.71	4.08	2.0	6.08	1.094	18.156	1.966	9.1
	16-End	3.68	4.03	2.0	6.03	1.085	17.845	1.959	9.1

Table VII.3.6 (2/2) IRRIGATION WATER REQUIREMENTS DURING LAND PREPARATION

2. Future Condition of Existing Paddy Fields

T : Land Preparation Period=45 days

S : Presaturation Requirements added with 50 mm water layer=250 mm

P : Percolation =3.0 mm/day

2-1. Rantauberangin Irrigation Development Project

Month	Period	Eto (mm/day)	Eo (mm/day)	P (mm/day)	M (mm/day)	k	M ^{e**k}	e**k-1	LPWR (mm/day)
Jan.	1-15	3.39	3.73	3.0	6.73	1.211	22.592	2.357	9.6
	16-End	3.41	3.75	3.0	6.75	1.215	22.749	2.370	
Feb.	1-15	3.65	4.02	3.0	7.02	1.264	24.848	2.540	9.8
	16-End	4.08	4.49	3.0	7.49	1.348	28.834	2.850	
Mar.	1-15	3.63	3.99	3.0	6.99	1.258	24.593	2.518	9.8
	16-End	3.87	4.26	3.0	7.26	1.307	26.826	2.695	
Apr.	1-15	3.86	4.25	3.0	7.25	1.305	26.736	2.688	9.9
	16-End	4.16	4.58	3.0	7.58	1.364	29.652	2.912	
May	1-15	3.69	4.06	3.0	7.06	1.271	25.165	2.564	9.8
	16-End	3.77	4.15	3.0	7.15	1.287	25.897	2.622	
June	1-15	3.76	4.14	3.0	7.14	1.285	25.809	2.615	9.9
	16-End	3.79	4.17	3.0	7.17	1.291	26.073	2.636	
July	1-15	3.52	3.87	3.0	6.87	1.237	23.669	2.445	9.7
	16-End	3.58	3.94	3.0	6.94	1.249	24.199	2.487	
Aug.	1-15	3.65	4.02	3.0	7.02	1.264	24.848	2.540	9.8
	16-End	3.48	3.83	3.0	6.83	1.229	23.344	2.418	
Sep.	1-15	3.46	3.81	3.0	6.81	1.226	23.206	2.408	9.6
	16-End	3.53	3.88	3.0	6.88	1.238	23.727	2.449	
Oct.	1-15	3.60	3.96	3.0	6.96	1.253	24.366	2.501	9.7
	16-End	3.67	4.04	3.0	7.04	1.267	24.993	2.550	
Nov.	1-15	3.62	3.98	3.0	6.98	1.256	24.509	2.511	9.8
	16-End	3.66	4.03	3.0	7.03	1.265	24.908	2.543	
Dec.	1-15	3.32	3.65	3.0	6.65	1.197	22.013	2.310	9.5
	16-End	3.04	3.34	3.0	6.34	1.141	19.844	2.130	

2-2. Lubukjambi Irrigation Development Project

Month	Period	Eto (mm/day)	Eo (mm/day)	P (mm/day)	M (mm/day)	k	M ^{e**k}	e**k-1	LPWR (mm/day)
Jan.	1-15	3.39	3.73	3.0	6.73	1.211	22.592	2.357	9.6
	16-End	3.34	3.67	3.0	6.67	1.201	22.167	2.323	
Feb.	1-15	3.92	4.31	3.0	7.31	1.316	27.255	2.728	10.0
	16-End	4.10	4.51	3.0	7.51	1.352	29.027	2.865	
Mar.	1-15	3.81	4.19	3.0	7.19	1.294	26.224	2.647	9.9
	16-End	4.08	4.49	3.0	7.49	1.348	28.834	2.850	
Apr.	1-15	3.96	4.36	3.0	7.36	1.325	27.690	2.762	10.0
	16-End	4.07	4.48	3.0	7.48	1.346	28.738	2.842	
May	1-15	3.81	4.19	3.0	7.19	1.294	26.224	2.647	9.9
	16-End	3.66	4.03	3.0	7.03	1.265	24.908	2.543	
June	1-15	3.15	3.47	3.0	6.47	1.165	20.742	2.206	9.4
	16-End	3.09	3.40	3.0	6.40	1.152	20.253	2.165	
July	1-15	3.27	3.60	3.0	6.60	1.188	21.651	2.281	9.5
	16-End	3.52	3.87	3.0	6.87	1.237	23.669	2.445	
Aug.	1-15	3.74	4.11	3.0	7.11	1.280	25.572	2.597	9.8
	16-End	3.82	4.20	3.0	7.20	1.296	26.313	2.655	
Sep.	1-15	3.68	4.05	3.0	7.05	1.269	25.079	2.557	9.8
	16-End	3.70	4.07	3.0	7.07	1.273	25.251	2.572	
Oct.	1-15	3.88	4.27	3.0	7.27	1.309	26.917	2.702	10.0
	16-End	3.87	4.26	3.0	7.26	1.307	26.826	2.695	
Nov.	1-15	3.95	4.35	3.0	7.35	1.323	27.597	2.755	10.0
	16-End	4.01	4.41	3.0	7.41	1.334	28.130	2.796	
Dec.	1-15	3.71	4.08	3.0	7.08	1.274	25.312	2.575	9.8
	16-End	3.66	4.03	3.0	7.03	1.265	24.908	2.543	

Table VII.3.7 (1/3) SUMMARY OF UNIT WATER REQUIREMENT IN PRESENT CONDITION (1981-1992 FOR 12 YEARS)

1. Rantauberangin Irrigation Development Project (Base Year 1988)

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.15	0.00	0.00	0.89	1.05	0.83	0.23	0.56	0.46	0.67	0.57	0.39
(2) 1982	0.15	0.00	0.00	1.29	0.56	0.00	0.23	0.23	0.46	0.36	0.23	0.39
(3) 1983	0.17	0.00	0.00	1.42	0.48	0.62	0.84	0.35	1.02	1.13	0.72	0.39
(4) 1984*	0.23	0.00	0.00	0.95	0.27	0.29	0.35	1.29	0.75	0.23	0.23	0.26
(5) 1985	0.00	0.00	0.00	1.66	0.40	1.00	0.46	0.94	0.83	0.23	0.92	0.39
(6) 1986	0.00	0.00	0.00	1.62	0.00	0.21	0.37	1.27	0.60	1.18	0.78	0.14
(7) 1987	0.09	0.00	0.00	1.15	0.48	0.96	0.23	0.60	0.46	1.11	0.27	0.37
(8) 1988*	0.03	0.00	0.00	1.28	0.52	0.46	0.23	1.17	0.50	0.25	0.23	0.04
(9) 1989	0.00	0.00	0.00	0.33	0.56	1.25	0.65	1.23	0.98	0.84	1.02	0.09
(10) 1990	0.22	0.00	0.00	1.20	1.22	0.81	0.29	0.77	0.46	1.05	0.82	0.04
(11) 1991	0.20	0.00	0.00	1.64	0.00	0.00	0.23	0.54	0.58	0.82	0.83	0.29
(12) 1992*	0.00	0.00	0.00	1.07	0.30	1.04	0.29	1.57	0.64	0.84	0.82	0.28

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.00	0.00	0.00	0.00	1.33	1.42	0.63	0.23	0.67	1.02	0.23	0.43
(2) 1982	0.00	0.00	0.00	0.00	1.33	1.24	0.27	1.15	1.02	0.91	0.79	0.23
(3) 1983	0.00	0.00	0.00	0.00	0.00	1.15	0.88	0.64	0.27	0.85	0.24	0.23
(4) 1984*	0.00	0.00	0.00	0.00	0.65	0.81	0.82	0.27	1.05	0.85	0.43	0.23
(5) 1985	0.00	0.00	0.00	0.00	1.58	1.24	0.00	0.23	0.23	1.37	0.23	0.46
(6) 1986	0.00	0.00	0.00	0.00	1.68	0.28	0.00	0.23	0.23	0.46	0.23	0.23
(7) 1987	0.00	0.00	0.00	0.00	0.78	0.54	0.03	0.23	0.23	1.21	0.23	0.48
(8) 1988*	0.00	0.00	0.00	0.00	1.60	0.42	1.18	0.81	0.23	0.93	0.23	0.23
(9) 1989	0.00	0.00	0.00	0.00	0.78	1.00	0.19	0.23	0.23	1.02	0.23	0.23
(10) 1990	0.00	0.00	0.00	0.00	1.54	1.07	0.65	0.23	0.23	0.46	0.23	0.39
(11) 1991	0.00	0.00	0.00	0.00	1.39	0.75	1.07	0.23	0.23	0.46	0.23	0.23
(12) 1992*	0.00	0.00	0.00	0.00	0.93	0.84	0.20	0.58	0.37	0.46	0.41	0.39

Note * : Leap Year

Table VII.3.7 (2/3) SUMMARY OF UNIT WATER REQUIREMENT IN PRESENT CONDITION (1981-1992 FOR 12 YEARS)

2. Lubukjambi Irrigation Development Project (Base Year 1986)

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.00	0.00	0.00	0.63	0.34	0.58	0.23	0.23	0.76	0.23	0.47	0.23
(2) 1982	0.00	0.00	0.00	1.41	0.41	0.00	0.23	0.23	0.46	0.23	0.24	0.34
(3) 1983	0.00	0.00	0.00	1.30	0.32	0.83	1.05	1.08	0.46	0.23	0.46	0.00
(4) 1984*	0.00	0.00	0.00	0.04	0.13	0.03	0.23	0.79	0.46	0.23	0.23	0.15
(5) 1985	0.00	0.00	0.00	1.87	0.00	0.31	0.98	0.94	0.46	0.27	0.75	0.30
(6) 1986	0.00	0.00	0.00	1.81	0.00	0.35	0.40	0.23	0.46	1.18	0.55	0.26
(7) 1987	0.00	0.00	0.00	1.91	0.28	1.08	1.43	0.96	0.46	0.63	0.41	0.10
(8) 1988*	0.00	0.00	0.00	0.90	0.25	1.10	0.52	1.34	0.46	0.76	0.33	0.29
(9) 1989	0.00	0.00	0.00	1.07	0.76	0.12	0.71	1.10	0.46	0.67	0.57	0.20
(10) 1990	0.00	0.00	0.00	1.05	0.32	1.02	0.23	1.34	0.46	0.99	0.86	0.27
(11) 1991	0.00	0.00	0.00	0.88	0.84	0.00	0.23	1.06	1.09	0.44	0.58	0.23
(12) 1992*	0.00	0.00	0.00	1.49	0.40	1.00	0.82	0.64	1.01	0.99	0.47	0.18

Unit : l/sec/ha

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(2) 1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(3) 1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(4) 1984*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(5) 1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(6) 1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(7) 1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(8) 1988*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(9) 1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(10) 1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(11) 1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(12) 1992*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unit : l/sec/ha

Note * : Leap Year

Table VII.3.7 (3/3) SUMMARY OF UNIT WATER REQUIREMENT IN PRESENT CONDITION (1981-1992 FOR 12 YEARS)

3. Irrigation Projects in West Sumatra Region in Study Area

Unit : l/sec/ha

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.22	0.00	0.00	1.30	0.61	0.77	0.23	0.23	0.46	0.23	0.67	0.27
(2) 1982	0.01	0.00	0.00	1.33	0.67	0.62	0.23	0.23	0.52	0.23	0.23	0.23
(3) 1983	0.00	0.00	0.00	0.86	0.84	0.81	0.84	0.23	0.46	0.97	0.47	0.25
(4) 1984*	0.00	0.00	0.00	1.30	0.72	0.22	0.23	0.85	0.57	0.23	0.23	0.27
(5) 1985	0.02	0.00	0.00	1.87	0.46	0.54	0.54	1.17	0.57	0.40	0.79	0.29
(6) 1986	0.00	0.00	0.00	1.75	0.00	0.31	0.61	0.49	0.94	0.80	0.55	0.29
(7) 1987	0.04	0.00	0.00	1.43	0.40	0.15	0.50	0.23	0.46	0.86	0.67	0.23
(8) 1988*	0.07	0.00	0.00	0.53	0.00	0.64	0.40	0.41	0.46	1.12	0.34	0.23
(9) 1989	0.00	0.00	0.00	0.21	1.22	0.43	0.59	1.36	0.46	0.99	0.84	0.10
(10) 1990	0.15	0.00	0.00	0.76	1.18	0.17	0.77	1.10	0.46	1.14	0.72	0.19
(11) 1991	0.00	0.00	0.00	1.70	0.82	0.00	0.23	0.92	0.61	0.36	0.54	0.25
(12) 1992*	0.16	0.00	0.00	0.99	0.38	0.60	0.33	0.60	0.46	0.23	0.67	0.30

Unit : l/sec/ha

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.00	0.00	0.00	0.00	0.61	1.24	0.13	0.23	1.02	1.09	0.37	0.44
(2) 1982	0.00	0.00	0.00	0.00	1.47	1.18	0.44	0.92	0.36	0.63	0.23	0.23
(3) 1983	0.00	0.00	0.00	0.00	0.84	1.18	0.31	0.75	0.97	1.34	0.58	0.43
(4) 1984*	0.00	0.00	0.00	0.00	1.45	0.74	1.34	0.77	0.23	0.46	0.77	0.23
(5) 1985	0.00	0.00	0.00	0.00	0.51	0.57	0.71	0.56	0.23	1.45	0.66	0.43
(6) 1986	0.00	0.00	0.00	0.00	1.39	0.76	0.39	0.42	1.18	0.78	0.23	0.43
(7) 1987	0.00	0.00	0.00	0.00	1.47	1.05	0.19	0.29	0.23	1.30	0.37	0.31
(8) 1988*	0.00	0.00	0.00	0.00	0.44	0.65	1.21	1.05	1.02	0.46	0.43	0.55
(9) 1989	0.00	0.00	0.00	0.00	1.18	0.35	0.54	0.37	0.23	0.46	0.23	0.31
(10) 1990	0.00	0.00	0.00	0.00	1.20	0.93	0.19	0.23	0.81	0.46	0.23	0.26
(11) 1991	0.00	0.00	0.00	0.00	1.45	1.14	1.36	0.48	0.47	0.46	0.23	0.23
(12) 1992*	0.00	0.00	0.00	0.00	1.18	0.51	0.65	1.17	0.23	0.46	0.23	0.30

Note *: Leap Year

Table VII.3.8 (1/2) SUMMARY OF CASE STUDY ON UNIT WATER REQUIREMENT

A. Rantauberangin Irrigation Development Project (Base Year 1988)

Case	Starting Date of Land Preparation		Jan.		Feb.		Mar.		Apr.		May		June	
			1.		2.		1.		2.		1.		2.	
			1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) Case 1	Feb. 16	Sep. 1	0.10	0.00	1.43	0.00	0.69	0.65	0.29	1.38	0.71	0.46	0.28	0.11
(2) Case 2	Jan. 1	July 16	1.01	0.00	1.10	0.12	0.50	0.85	0.23	0.93	0.06	0.00	0.00	0.00
(3) Case 3	Jan. 16	Aug. 1	0.00	0.00	1.06	0.25	0.51	0.66	0.47	1.30	0.36	0.07	0.00	0.00
(4) Case 4	Feb. 1	Aug. 16	0.00	0.00	1.25	0.38	0.49	0.67	0.28	1.57	0.45	0.37	0.03	0.00
(5) Case 5	Mar. 1	Sep. 16	0.43	0.00	0.00	0.00	0.88	0.84	0.26	1.39	0.52	0.73	0.33	0.46
(6) Case 6	Mar. 16	Oct. 1	0.55	0.23	0.00	0.00	0.00	1.03	0.45	1.36	0.52	0.53	0.60	0.59
(7) Case 7	Apr. 1	Oct. 16	0.81	0.23	0.23	0.23	0.00	0.00	0.63	1.54	0.50	0.54	0.40	0.86
(8) Case 8	Apr. 16	Nov. 1	0.62	0.46	0.74	0.23	0.06	0.00	0.00	1.73	0.69	0.52	0.41	0.66

Unit : l/sec/ha

Unit : l/sec/ha

Case	Starting Date of Land Preparation		July		Aug.		Sep.		Oct.		Nov.		Dec.	
			1.		2.		1.		2.		1.		2.	
			1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) Case 1	Feb. 16	Sep. 1	0.00	0.00	0.00	0.00	1.73	0.58	1.36	1.02	0.31	1.14	0.23	0.23
(2) Case 2	Jan. 1	July 16	0.00	1.54	1.28	0.00	1.36	0.40	1.57	0.95	0.23	0.21	0.00	0.00
(3) Case 3	Jan. 16	Aug. 1	0.00	0.00	1.47	0.00	1.33	0.40	1.38	1.21	0.24	0.65	0.00	0.00
(4) Case 4	Feb. 1	Aug. 16	0.00	0.00	0.00	0.00	1.73	0.58	1.36	1.02	0.31	1.14	0.23	0.23
(5) Case 5	Mar. 1	Sep. 16	0.27	0.00	0.00	0.00	0.00	0.78	1.56	1.00	0.32	0.95	0.46	0.23
(6) Case 6	Mar. 16	Oct. 1	0.79	0.28	0.00	0.00	0.00	0.00	1.75	1.20	0.30	0.96	0.23	0.46
(7) Case 7	Apr. 1	Oct. 16	1.08	0.80	0.25	0.00	0.00	0.00	0.00	1.39	0.50	0.94	0.23	0.23
(8) Case 8	Apr. 16	Nov. 1	1.34	1.10	0.75	0.00	0.00	0.00	0.00	0.00	0.69	1.13	0.00	0.23

Table VII.3.8 (2/2) SUMMARY OF CASE STUDY ON UNIT WATER REQUIREMENT

B. Lubukjambi Irrigation Development Project (Base Year 1986)

Case	Starting Date of Land Preparation		Jan.		Feb.		Mar.		Apr.		May		June	
			1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
			1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) Case 1	Feb. 16	Sep. 1	0.00	0.00	0.00	1.96	0.01	0.54	0.61	0.23	0.46	1.43	0.69	0.33
(2) Case 2	Jan. 1	July 16	0.19	0.69	0.99	1.63	0.23	0.75	0.52	0.23	0.00	0.00	0.00	0.00
(3) Case 3	Jan. 16	Aug. 1	0.00	0.88	1.18	1.59	0.23	0.56	0.79	0.23	0.23	0.39	0.00	0.00
(4) Case 4	Feb. 1	Aug. 16	0.00	0.00	1.37	1.78	0.01	0.57	0.60	0.46	0.23	1.02	0.23	0.00
(5) Case 5	Mar. 1	Sep. 16	0.23	0.06	0.00	0.00	0.02	0.72	0.58	0.23	0.23	1.69	0.94	0.90
(6) Case 6	Mar. 16	Oct. 1	0.23	0.35	0.22	0.00	0.00	0.90	0.76	0.00	0.23	1.50	1.20	1.25
(7) Case 7	Apr. 1	Oct. 16	0.46	0.44	0.69	0.42	0.00	0.00	0.95	0.00	0.10	1.50	1.00	1.50

Unit : l/sec/ha

Unit : l/sec/ha

Case	Starting Date of Land Preparation		July		Aug.		Sep.		Oct.		Nov.		Dec.	
			1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
			1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) Case 1	Feb. 16	Sep. 1	0.00	0.00	0.00	0.00	1.37	0.04	0.11	0.23	0.83	0.46	0.23	0.41
(2) Case 2	Jan. 1	July 16	0.00	1.37	1.88	1.56	1.00	0.23	0.46	0.23	0.56	0.00	0.00	0.00
(3) Case 3	Jan. 16	Aug. 1	0.00	0.00	2.06	1.75	0.98	0.23	0.23	0.46	0.75	0.23	0.00	0.00
(4) Case 4	Feb. 1	Aug. 16	0.00	0.00	0.00	1.94	1.18	0.02	0.23	0.23	1.02	0.23	0.23	0.09
(5) Case 5	Mar. 1	Sep. 16	0.18	0.00	0.00	0.00	0.00	0.06	0.23	0.01	0.84	0.23	0.46	0.52
(6) Case 6	Mar. 16	Oct. 1	0.60	0.22	0.00	0.00	0.00	0.00	0.34	0.01	0.81	0.23	0.23	0.78
(7) Case 7	Apr. 1	Oct. 16	0.80	0.67	0.45	0.00	0.00	0.00	0.00	0.02	0.99	0.00	0.23	0.59

Table VII.3.9 (1/2) SPECIFIC DISCHARGES AT DAMSITES

A. Rantiauberangin Irrigation Development Project (Base Year 1988)

Unit : m³/sec/km²

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.032	0.038	0.023	0.026	0.029	0.018	0.111	0.048	0.079	0.044	0.028	0.013
(2) 1982	0.030	0.012	0.020	0.014	0.033	0.061	0.089	0.087	0.109	0.057	0.063	0.017
(3) 1983	0.033	0.028	0.018	0.013	0.030	0.035	0.017	0.026	0.021	0.011	0.009	0.008
(4) 1984*	0.017	0.017	0.018	0.019	0.071	0.048	0.020	0.022	0.018	0.051	0.053	0.021
(5) 1985	0.079	0.019	0.031	0.016	0.024	0.021	0.029	0.021	0.014	0.041	0.012	0.008
(6) 1986	0.062	0.038	0.044	0.012	0.076	0.048	0.047	0.019	0.025	0.009	0.008	0.017
(7) 1987	0.031	0.027	0.017	0.019	0.027	0.026	0.035	0.024	0.053	0.014	0.019	0.009
(8) 1988*	0.026	0.065	0.081	0.029	0.033	0.044	0.041	0.021	0.031	0.045	0.042	0.022
(9) 1989	0.080	0.105	0.021	0.031	0.062	0.014	0.015	0.010	0.011	0.013	0.009	0.014
(10) 1990	0.021	0.024	0.066	0.038	0.015	0.015	0.024	0.029	0.041	0.015	0.010	0.019
(11) 1991	0.019	0.064	0.025	0.010	0.048	0.089	0.073	0.053	0.028	0.022	0.013	0.009
(12) 1992*	0.049	0.067	0.053	0.038	0.064	0.022	0.035	0.018	0.014	0.016	0.009	0.008

Note * : Leap Year

Unit : m³/sec/km²

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.027	0.030	0.011	0.016	0.010	0.010	0.019	0.061	0.044	0.024	0.027	0.027
(2) 1982	0.016	0.014	0.022	0.031	0.014	0.017	0.024	0.022	0.011	0.015	0.013	0.050
(3) 1983	0.014	0.009	0.008	0.022	0.054	0.023	0.014	0.022	0.031	0.023	0.025	0.037
(4) 1984*	0.009	0.070	0.053	0.014	0.027	0.026	0.017	0.039	0.019	0.019	0.024	0.031
(5) 1985	0.010	0.007	0.007	0.015	0.007	0.007	0.062	0.112	0.134	0.041	0.040	0.032
(6) 1986	0.011	0.020	0.011	0.008	0.007	0.041	0.070	0.038	0.070	0.063	0.100	0.053
(7) 1987	0.008	0.008	0.016	0.011	0.016	0.041	0.053	0.053	0.109	0.021	0.062	0.026
(8) 1988*	0.025	0.012	0.012	0.059	0.018	0.022	0.016	0.013	0.036	0.036	0.066	0.056
(9) 1989	0.020	0.009	0.008	0.010	0.021	0.018	0.034	0.070	0.049	0.033	0.038	0.023
(10) 1990	0.013	0.046	0.014	0.030	0.018	0.009	0.017	0.044	0.075	0.078	0.063	0.038
(11) 1991	0.012	0.008	0.021	0.014	0.012	0.025	0.010	0.032	0.090	0.068	0.030	0.047
(12) 1992*	0.022	0.023	0.011	0.009	0.021	0.027	0.038	0.025	0.030	0.080	0.026	0.018

Note * : Leap Year

Table VII.3.9 (2/2) SPECIFIC DISCHARGES AT DAMSITES

B. Lubukjambi Irrigation Development Project (Base Year 1986)

Unit : m³/sec/km²

Year	Jan.		Feb.		Mar.		Apr.		May		June	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.074	0.052	0.046	0.039	0.046	0.037	0.104	0.074	0.045	0.043	0.021	0.014
(2) 1982	0.066	0.022	0.030	0.017	0.035	0.090	0.196	0.104	0.074	0.054	0.056	0.013
(3) 1983	0.062	0.107	0.045	0.025	0.039	0.032	0.017	0.014	0.121	0.073	0.020	0.045
(4) 1984*	0.040	0.073	0.036	0.068	0.077	0.071	0.114	0.056	0.064	0.060	0.077	0.023
(5) 1985	0.098	0.054	0.047	0.015	0.046	0.051	0.024	0.025	0.040	0.052	0.015	0.011
(6) 1986	0.089	0.049	0.031	0.013	0.065	0.058	0.029	0.111	0.114	0.020	0.016	0.014
(7) 1987	0.053	0.046	0.031	0.017	0.040	0.022	0.010	0.014	0.036	0.024	0.029	0.015
(8) 1988*	0.009	0.037	0.016	0.024	0.049	0.019	0.019	0.011	0.047	0.043	0.019	0.008
(9) 1989	0.056	0.069	0.016	0.023	0.014	0.056	0.020	0.017	0.052	0.021	0.017	0.008
(10) 1990	0.030	0.025	0.010	0.019	0.042	0.018	0.033	0.012	0.063	0.027	0.007	0.008
(11) 1991	0.080	0.084	0.033	0.032	0.023	0.071	0.091	0.029	0.018	0.017	0.017	0.009
(12) 1992*	0.056	0.060	0.070	0.016	0.043	0.013	0.017	0.017	0.015	0.009	0.015	0.009

Note * : Leap Year

Unit : m³/sec/km²

Year	July		Aug.		Sep.		Oct.		Nov.		Dec.	
	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(1) 1981	0.021	0.035	0.011	0.009	0.035	0.047	0.054	0.029	0.060	0.025	0.028	0.024
(2) 1982	0.016	0.012	0.030	0.014	0.013	0.009	0.036	0.032	0.075	0.028	0.045	0.086
(3) 1983	0.044	0.033	0.026	0.035	0.036	0.011	0.020	0.030	0.067	0.037	0.045	0.078
(4) 1984*	0.015	0.031	0.023	0.023	0.022	0.045	0.043	0.054	0.027	0.033	0.040	0.036
(5) 1985	0.020	0.018	0.010	0.019	0.014	0.031	0.044	0.048	0.023	0.018	0.051	0.123
(6) 1986	0.015	0.021	0.010	0.009	0.014	0.057	0.075	0.079	0.059	0.096	0.118	0.054
(7) 1987	0.009	0.010	0.014	0.014	0.015	0.011	0.020	0.026	0.044	0.027	0.022	0.012
(8) 1988*	0.008	0.008	0.023	0.011	0.009	0.013	0.013	0.007	0.010	0.007	0.040	0.022
(9) 1989	0.010	0.006	0.006	0.018	0.024	0.009	0.023	0.014	0.050	0.078	0.158	0.060
(10) 1990	0.015	0.032	0.009	0.033	0.039	0.010	0.008	0.021	0.011	0.010	0.058	0.107
(11) 1991	0.009	0.008	0.018	0.007	0.009	0.007	0.006	0.007	0.090	0.087	0.070	0.124
(12) 1992*	0.015	0.030	0.011	0.008	0.009	0.034	0.029	0.029	0.089	0.068	0.035	0.039

Note * : Leap Year

**Table VII.3.10 OUTLINE OF TOTAL WATER REQUIREMENT IN BASE YEAR
(OVERALL PLAN)**

1. Rantauberangin Irrigation Development Project

Study Cases	Starting Date of Land Preparation		Left Bank Area (m ³ /sec.)		Right Bank Area (m ³ /sec.)	
	1st Crop	2nd Crop	1st Crop	2nd Crop	1st Crop	2nd Crop
	Case-1	Feb.16	Sep. 1	18.16	24.15	3.75
Case-2	Jan. 1	July 16	12.48	22.18	1.69	5.62
Case-3	Jan.16	Aug. 1	16.92	21.07	3.38	5.29
Case-4	Feb. 1	Aug.16	21.17	24.15	4.63	5.73
Case-5	Mar. 1	Sep.16	18.32	21.83	3.81	5.21
Case-6	Mar.16	Oct. 1	17.83	24.82	3.64	6.09
Case-7	Apr. 1	Oct.16	20.69	19.56	4.49	4.80
Case-8	Apr.16	Nov. 1	23.64	11.88	5.37	0.72

Note :  Optimum Total Water Requirements

2. Lubukjambi Irrigation Development Project

Study Cases	Starting Date of Land Preparation		Left Bank Area (m ³ /sec.)		Right Bank Area (m ³ /sec.)	
	1st Crop	2nd Crop	1st Crop	2nd Crop	1st Crop	2nd Crop
	Case-1	Feb.16	Sep. 1	29.21	18.88	24.36
Case-2	Jan. 1	July 16	23.62	28.82	20.05	23.63
Case-3	Jan.16	Aug. 1	22.93	31.85	19.51	26.00
Case-4	Feb. 1	Aug.16	26.15	30.16	22.01	24.54
Case-5	Mar. 1	Sep.16	22.39	10.82	20.10	9.16
Case-6	Mar.16	Oct. 1	19.31	10.43	17.62	8.83
Case-7	Apr. 1	Oct.16	21.07	12.75	18.24	10.79

Note :  Optimum Total Water Requirements

Table VII.3.11 (1/2) CALCULATION OF DESIGN WATER REQUIREMENT IN OPTIMUM CROPPING PATTERN
(OVERALL PLAN)

1. Rantauberangin Irrigation Development Project - Case-7 (Starting Date of Land Preparation 1st Crop : Apr. 1 ; 2nd Crop : Oct.16)

Irrigation Area	Month Period	Jan.		Feb.		Mar.		Apr.		May		June	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.81	0.23	0.23	0.25	0.00	0.00	0.63	1.54	0.50	0.54	0.40	0.86
	1) Water Req. for 10,517 ha (m ³ /sec/ha)	8.52	2.42	2.63	0.00	0.00	0.00	6.63	16.20	5.26	5.68	4.21	9.04
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.49	0.00	0.00	0.00	0.80
	Total Water Requirement (m ³ /sec)	8.52	2.42	2.63	0.00	0.00	6.63	20.69	5.26	5.68	4.21	9.84	
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	0.81	0.23	0.23	0.25	0.00	0.00	0.63	1.54	0.50	0.54	0.40	0.86
	1) Water Req. for 277 ha (m ³ /sec/ha)	0.22	0.06	0.06	0.07	0.00	0.00	0.17	0.43	0.14	0.15	0.11	0.24
	2) Additional Supply for Existing Schemes	0.30	0.00	0.00	0.00	0.00	0.00	0.00	4.06	0.00	0.00	0.00	0.98
	Total Water Requirement (m ³ /sec)	0.52	0.06	0.07	0.00	0.00	0.17	4.49	0.14	0.14	0.15	0.11	1.22

Irrigation Area	Month Period	July		Aug.		Sep.		Oct.		Nov.		Dec.	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	1.08	0.80	0.25	0.00	0.00	0.00	1.39	0.00	0.50	0.94	0.23	0.23
	1) Water Req. for 10,517 ha (m ³ /sec/ha)	11.36	8.41	2.63	0.00	0.00	0.00	14.62	0.00	5.26	9.89	2.42	2.42
	2) Additional Supply for Existing Schemes	1.42	2.13	0.00	0.00	0.00	0.00	5.03	0.00	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	12.78	10.54	2.63	0.00	0.00	0.00	19.65	0.00	5.26	9.89	2.42	2.42
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	1.08	0.80	0.25	0.00	0.00	0.00	1.39	0.00	0.50	0.94	0.23	0.23
	1) Water Req. for 277 ha (m ³ /sec/ha)	0.30	0.22	0.07	0.00	0.00	0.00	0.39	0.00	0.14	0.26	0.06	0.06
	2) Additional Supply for Existing Schemes	1.54	1.99	0.00	0.00	0.00	0.00	4.41	0.00	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	1.84	2.21	0.07	0.00	0.00	0.00	4.80	0.00	0.14	0.26	0.06	0.06

Table VII.3.11 (2/2) CALCULATION OF DESIGN WATER REQUIREMENT IN OPTIMUM CROPPING PATTERN
(OVERALL PLAN)

2. Lubukjambi Irrigation Development Project - Case-6 (Starting Date of Land Preparation 1st Crop : Mar.16 ; 2nd Crop : Oct. 1)

Irrigation Area	Month Period	Jan.		Feb.		Mar.		Apr.		May		June	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.23	0.35	0.22	0.00	0.00	0.90	0.76	0.00	0.23	1.50	1.20	1.25
	1) Water Req. for 12,875 ha (m ³ /sec/ha)	2.96	4.51	2.83	0.00	0.00	11.59	9.79	0.00	2.96	19.31	15.45	16.09
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75
	Total Water Requirement (m ³ /sec)	2.96	4.51	2.83	0.00	1.59	9.79	0.00	2.96	19.31	15.45	16.84	
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	0.23	0.35	0.22	0.00	0.00	0.90	0.76	0.00	0.23	1.50	1.20	1.25
	1) Water Req. for 10,902 ha (m ³ /sec/ha)	2.51	3.82	2.40	0.00	0.00	9.81	8.29	0.00	2.51	16.35	13.08	13.63
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	1.02	1.34
	Total Water Requirement (m ³ /sec)	2.51	3.82	2.40	0.00	0.00	9.81	8.29	0.00	2.51	17.62	14.10	14.97

Irrigation Area	Month Period	July		Aug.		Sep.		Oct.		Nov.		Dec.	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.60	0.22	0.00	0.00	0.00	0.00	0.34	0.01	0.81	0.23	0.23	0.78
	1) Water Req. for 12,875 ha (m ³ /sec/ha)	7.73	2.83	0.00	0.00	0.00	0.00	4.38	0.13	10.43	2.96	2.96	10.04
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	7.73	2.83	0.00	0.00	0.00	0.00	4.38	0.13	10.43	2.96	2.96	10.04
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	0.60	0.22	0.00	0.00	0.00	0.00	0.34	0.01	0.81	0.23	0.23	0.78
	1) Water Req. for 10,902 ha (m ³ /sec/ha)	6.54	2.40	0.00	0.00	0.00	0.00	3.71	0.11	8.83	2.51	2.51	8.50
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	6.54	2.40	0.00	0.00	0.00	0.00	3.71	0.11	8.83	2.51	2.51	8.50

Table VII.3.12 IRRIGATION AREA AND PRIMARY CANAL LENGTH FOR PRIORITY PROJECTS

	Project Name	(A) Rantauberangin Project	(B) Lubukjambi Project
(1)	Irrigation Area		
(1-1)	Existing Irrigation Schemes to be incorporated :		
	(a) Left Bank Area	5,171 ha (10 schemes)	4,142 ha (12 schemes)
	1) Existing Irrigated Area	1,837 ha	1,670 ha
	2) Convertible Area to Irrigation Area		
	2-1. Rainfed	553 ha	376 ha
	2-2. Undeveloped yet	2,781 ha	2,096 ha
	(b) Right Bank Area	4,338 ha (12 schemes)	- ha
	1) Existing Irrigated Area	1,822 ha	
	2) Convertible Area to Irrigation		
	2-1. Rainfed	375 ha	
	2-2. Undeveloped yet	2,141 ha	
	Subtotal (1-1)	9,509 ha (22 schemes)	4,142 ha (12 schemes)
(1-2)	Existing Drainage and Swamp Development Schemes to be incorporated :		
	(a) Left Bank Area	- ha	- ha
	(b) Right Bank Area	- ha	- ha
	Subtotal (1-2)	- ha	- ha
(1-3)	Net Additional Area ,including (1-2).		
	(a) Left Bank Area	4,429 ha	5,234 ha
	(b) Right Bank Area	277 ha	- ha
	Subtotal (1-3)	4,706 ha	5,234 ha
(1-4)	Total Net Irrigable Area = (1-1)+(1-3)		
	(a) Left Bank Area	9,600 ha	9,376 ha
	(b) Right Bank Area	4,615 ha	- ha
	Total (1-4)	14,215 ha	9,376 ha
(2)	Primary Canal Length		
(2-1)	Left Primary Canal	44 km	76 km
(2-2)	Right Primary Canal	40 km	- km
	Total Length	84 km	76 km

Table VII.3.13 OUTLINE OF TOTAL WATER REQUIREMENT IN BASE YEAR
(PRIORITY PROJECT)

1. Rantauberangin Irrigation Development Project

Study Cases	Starting Date of Land Preparation		Left Bank Area (m ³ /sec.)		Right Bank Area (m ³ /sec.)	
	1st Crop	2nd Crop	1st Crop	2nd Crop	1st Crop	2nd Crop
	Case-1	Feb.16	Sep. 1	9.76	13.62	3.75
Case-2	Jan. 1	July 16	5.78	12.80	1.69	5.62
Case-3	Jan.16	Aug. 1	9.01	12.12	3.38	5.29
Case-4	Feb. 1	Aug.16	11.61	13.62	4.63	5.73
Case-5	Mar. 1	Sep.16	9.86	12.33	3.81	5.21
Case-6	Mar.16	Oct. 1	9.55	14.17	3.64	6.09
Case-7	Apr. 1	Oct.16	11.31	11.19	4.49	4.80
Case-8	Apr.16	Nov. 1	13.11	5.00	5.37	0.72

Note :  Optimum Total Water Requirements

2. Lubukjambi Irrigation Development Project

Study Cases	Starting Date of Land Preparation		Left Bank Area (m ³ /sec.)		Right Bank Area (m ³ /sec.)	
	1st Crop	2nd Crop	1st Crop	2nd Crop	1st Crop	2nd Crop
	Case-1	Feb.16	Sep. 1	14.23	8.41	-
Case-2	Jan. 1	July 16	11.16	14.45	-	-
Case-3	Jan.16	Aug. 1	10.78	16.11	-	-
Case-4	Feb. 1	Aug.16	12.55	15.33	-	-
Case-5	Mar. 1	Sep.16	9.48	4.40	-	-
Case-6	Mar.16	Oct. 1	7.85	4.24	-	-
Case-7	Apr. 1	Oct.16	9.61	5.18	-	-

Note :  Optimum Total Water Requirements

Table VII.3.14 (1/2) CALCULATION OF DESIGN WATER REQUIREMENT IN OPTIMUM CROPPING PATTERN
(PRIORITY PROJECT)

1. Rantauberangin Irrigation Development Project - Case-7 (Starting Date of Land Preparation 1st Crop : Apr. 1 ; 2nd Crop : Oct. 16)

Irrigation Area	Month Period	Jan.		Feb.		Mar.		Apr.		May		June	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.81	0.23	0.23	0.25	0.00	0.00	0.63	1.54	0.50	0.54	0.40	0.86
	1) Water Req. for 4,429 ha (m ³ /sec/ha)	3.59	1.02	1.11	1.11	0.00	0.00	2.79	6.82	2.21	2.39	1.77	3.81
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.49	0.00	0.00	0.00	0.80
	Total Water Requirement (m ³ /sec)	3.59	1.02	1.11	1.11	0.00	0.00	2.79	11.31	2.21	2.39	1.77	4.61
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	0.81	0.23	0.23	0.06	0.00	0.00	0.17	0.43	0.14	0.15	0.11	0.24
	1) Water Req. for 277 ha (m ³ /sec/ha)	0.22	0.06	0.06	0.00	0.00	0.00	0.00	0.406	0.00	0.00	0.00	0.98
	2) Additional Supply for Existing Schemes	0.30	0.00	0.00	0.00	0.00	0.00	0.00	4.06	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	0.52	0.06	0.06	0.07	0.00	0.00	0.17	4.49	0.14	0.15	0.11	1.22

Irrigation Area	Month Period	July		Aug.		Sep.		Oct.		Nov.		Dec.	
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	1.08	0.80	0.25	0.00	0.00	0.00	0.00	1.39	0.50	0.94	0.23	0.23
	1) Water Req. for 4,429 ha (m ³ /sec/ha)	4.78	3.54	1.11	0.00	0.00	0.00	0.00	6.16	2.21	4.16	1.02	1.02
	2) Additional Supply for Existing Schemes	1.42	2.13	0.00	0.00	0.00	0.00	0.00	5.03	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	6.20	5.67	1.11	0.00	0.00	0.00	0.00	11.19	2.21	4.16	1.02	1.02
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	1.08	0.80	0.25	0.00	0.00	0.00	0.00	1.39	0.50	0.94	0.23	0.23
	1) Water Req. for 277 ha (m ³ /sec/ha)	0.30	0.22	0.07	0.00	0.00	0.00	0.00	0.39	0.14	0.26	0.06	0.06
	2) Additional Supply for Existing Schemes	1.54	1.99	0.00	0.00	0.00	0.00	0.00	4.41	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	1.84	2.21	0.07	0.00	0.00	0.00	0.00	4.90	0.14	0.26	0.06	0.06

Table VII.3.14 (2/2) CALCULATION OF DESIGN WATER REQUIREMENT IN OPTIMUM CROPPING PATTERN
(PRIORITY PROJECT)

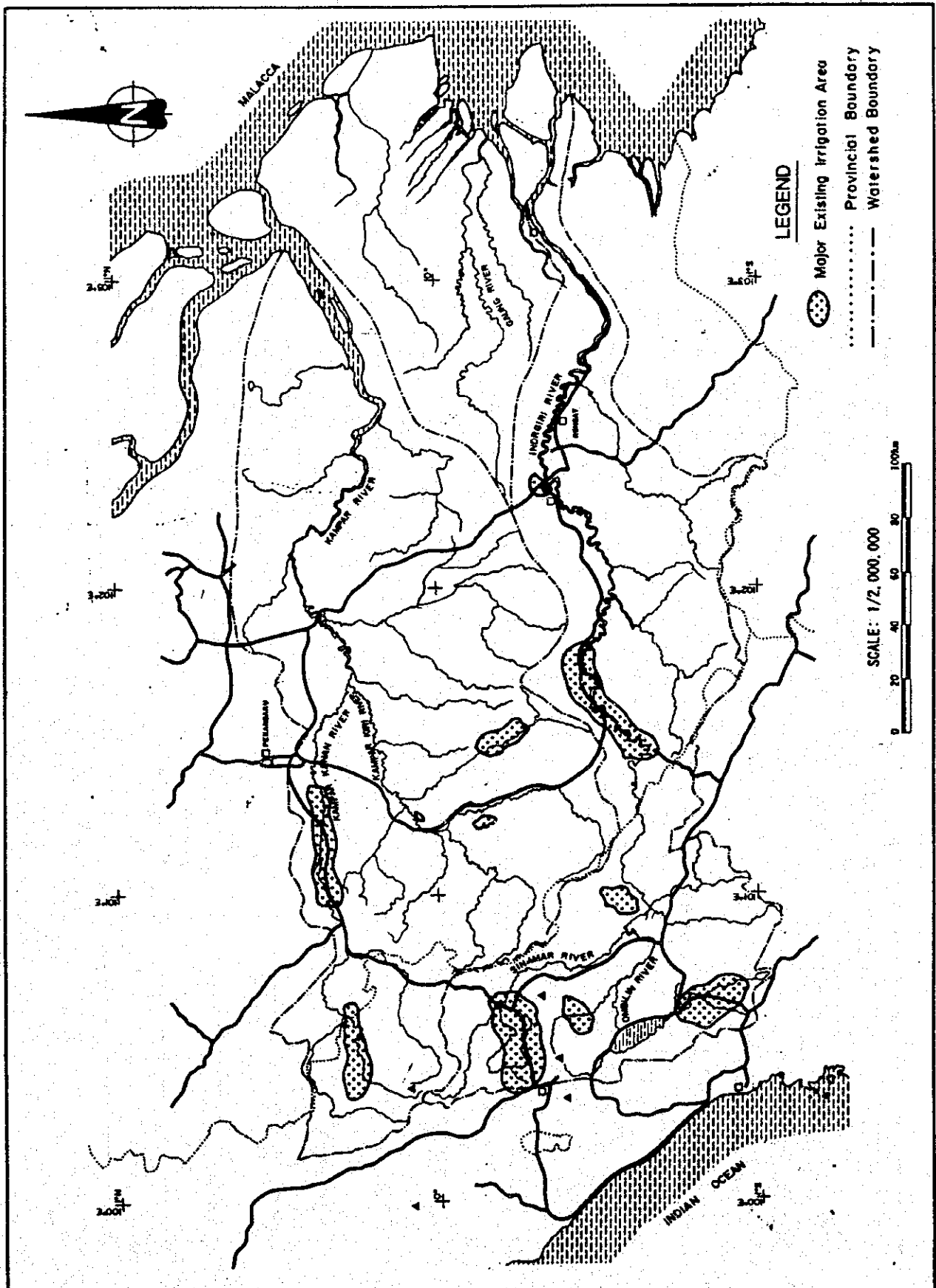
2. Lubukjambi Irrigation Development Project - Case-6 (Starting Date of Land Preparation 1st Crop : Mar.16 ; 2nd Crop : Oct. 1)

Irrigation Area	Month Period	Jan.		Feb.		Mar.		Apr.		May		June	
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.23	0.35	0.22	0.00	0.00	0.90	0.76	0.00	0.23	1.50	1.20	1.25
	1) Water Req. for 5,234 ha (m ³ /sec/ha)	1.20	1.83	1.15	0.00	0.00	4.71	3.98	0.00	1.20	7.85	6.28	6.54
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75
	Total Water Requirement (m ³ /sec)	1.20	1.83	1.15	0.00	0.00	4.71	3.98	0.00	1.20	7.85	6.28	7.29
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	-	-	-	-	-	-	-	-	-	-	-	-
	1) Water Req. for - ha (m ³ /sec/ha)	-	-	-	-	-	-	-	-	-	-	-	-
	2) Additional Supply for Existing Schemes	-	-	-	-	-	-	-	-	-	-	-	-
	Total Water Requirement (m ³ /sec)	-	-	-	-	-	-	-	-	-	-	-	-

Irrigation Area	Month Period	July		Aug.		Sep.		Oct.		Nov.		Dec.	
		1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End	1-15	16-End
		1.	2.	1.	2.	1.	2.	1.	2.	1.	2.	1.	2.
(A) Left Bank Area	Unit Water Requirement (l/sec/ha)	0.60	0.22	0.00	0.00	0.00	0.00	0.34	0.01	0.81	0.23	0.23	0.78
	1) Water Req. for 5,234 ha (m ³ /sec/ha)	3.14	1.15	0.00	0.00	0.00	0.00	1.78	0.05	4.24	1.20	1.20	4.08
	2) Additional Supply for Existing Schemes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Water Requirement (m ³ /sec)	3.14	1.15	0.00	0.00	0.00	0.00	1.78	0.05	4.24	1.20	1.20	4.08
(B) Right Bank Area	Unit Water Requirement (l/sec/ha)	-	-	-	-	-	-	-	-	-	-	-	-
	1) Water Req. for - ha (m ³ /sec/ha)	-	-	-	-	-	-	-	-	-	-	-	-
	2) Additional Supply for Existing Schemes	-	-	-	-	-	-	-	-	-	-	-	-
	Total Water Requirement (m ³ /sec)	-	-	-	-	-	-	-	-	-	-	-	-

FIGURES

VII IRRIGATION DEVELOPMENT PLAN

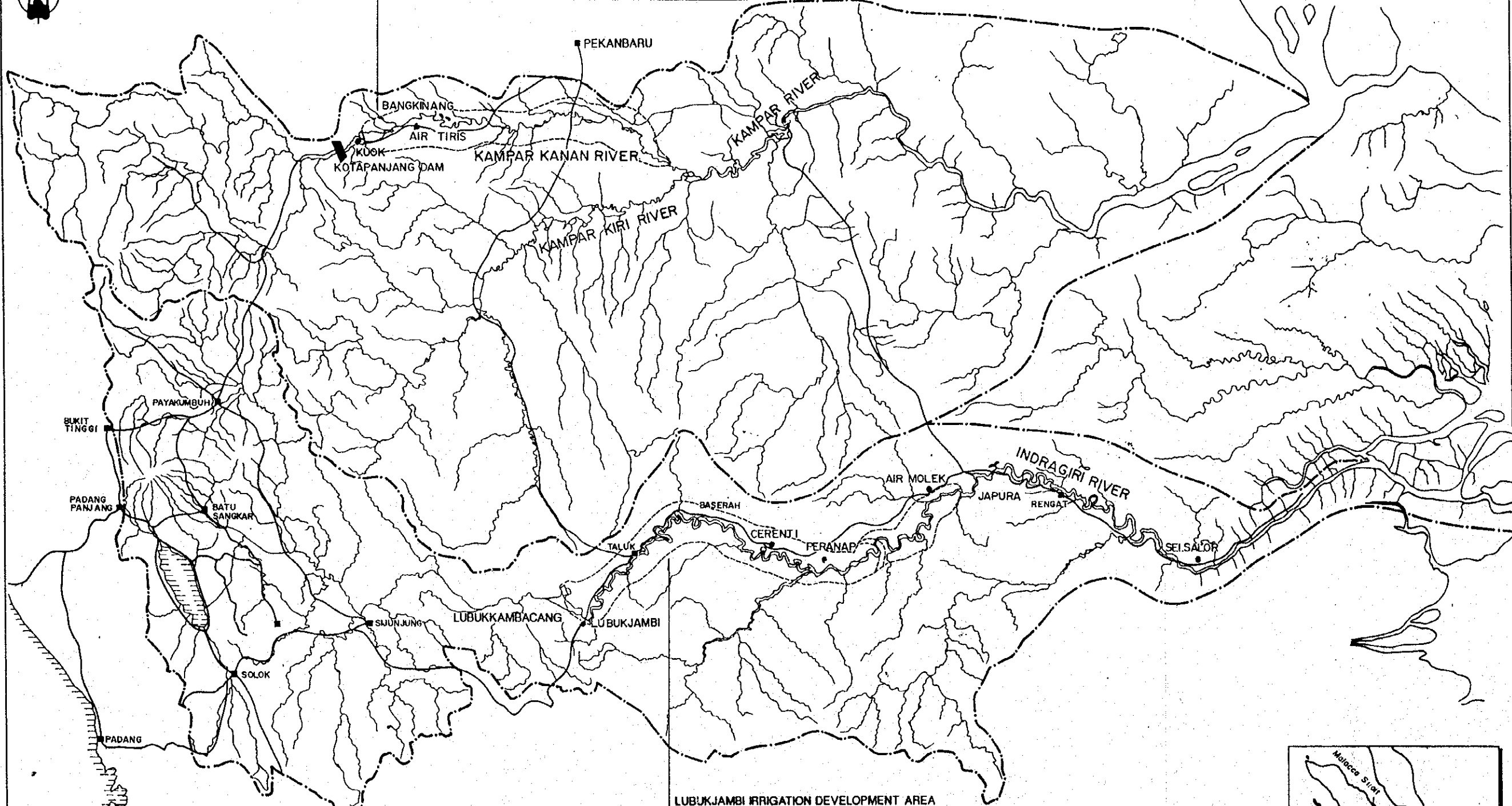


THE STUDY ON
 KAMPAR - INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT
 IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

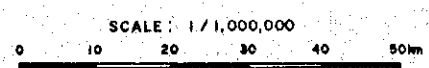
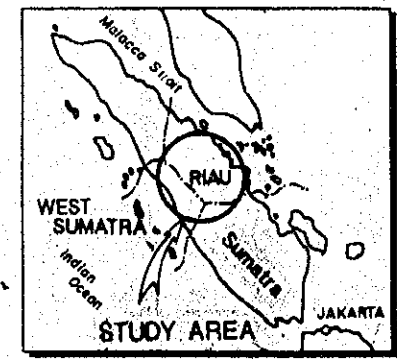
Fig. VI.1.1
 LOCATIONS OF MAJOR EXISTING
 IRRIGATION SCHEMES IN STUDY AREA



RANTAUBERANGIN IRRIGATION DEVELOPMENT AREA
 (GROSS IRRIGABLE AREA : ABOUT 40,000 ha ESTIMATED By PU. IN. RIAU)

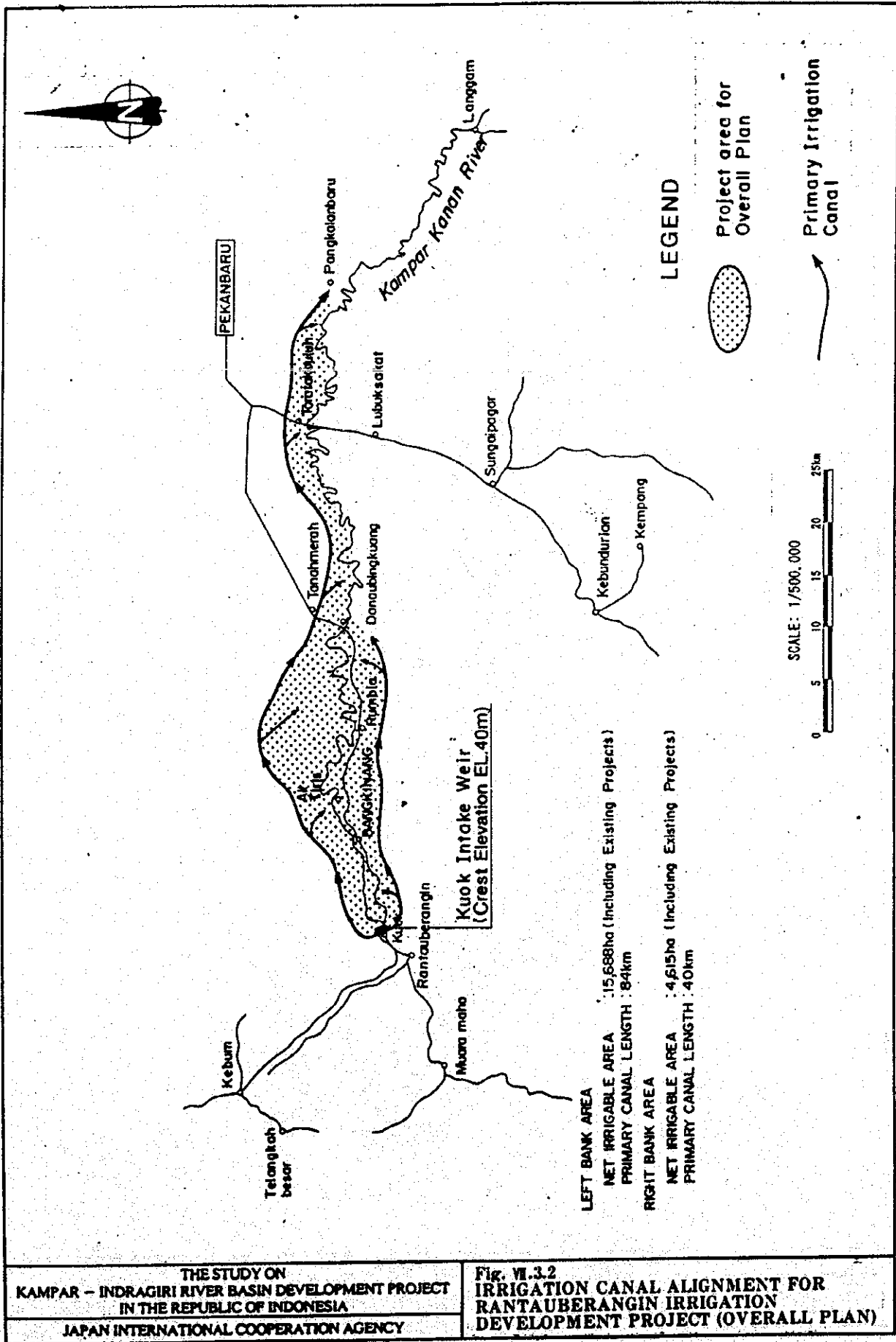


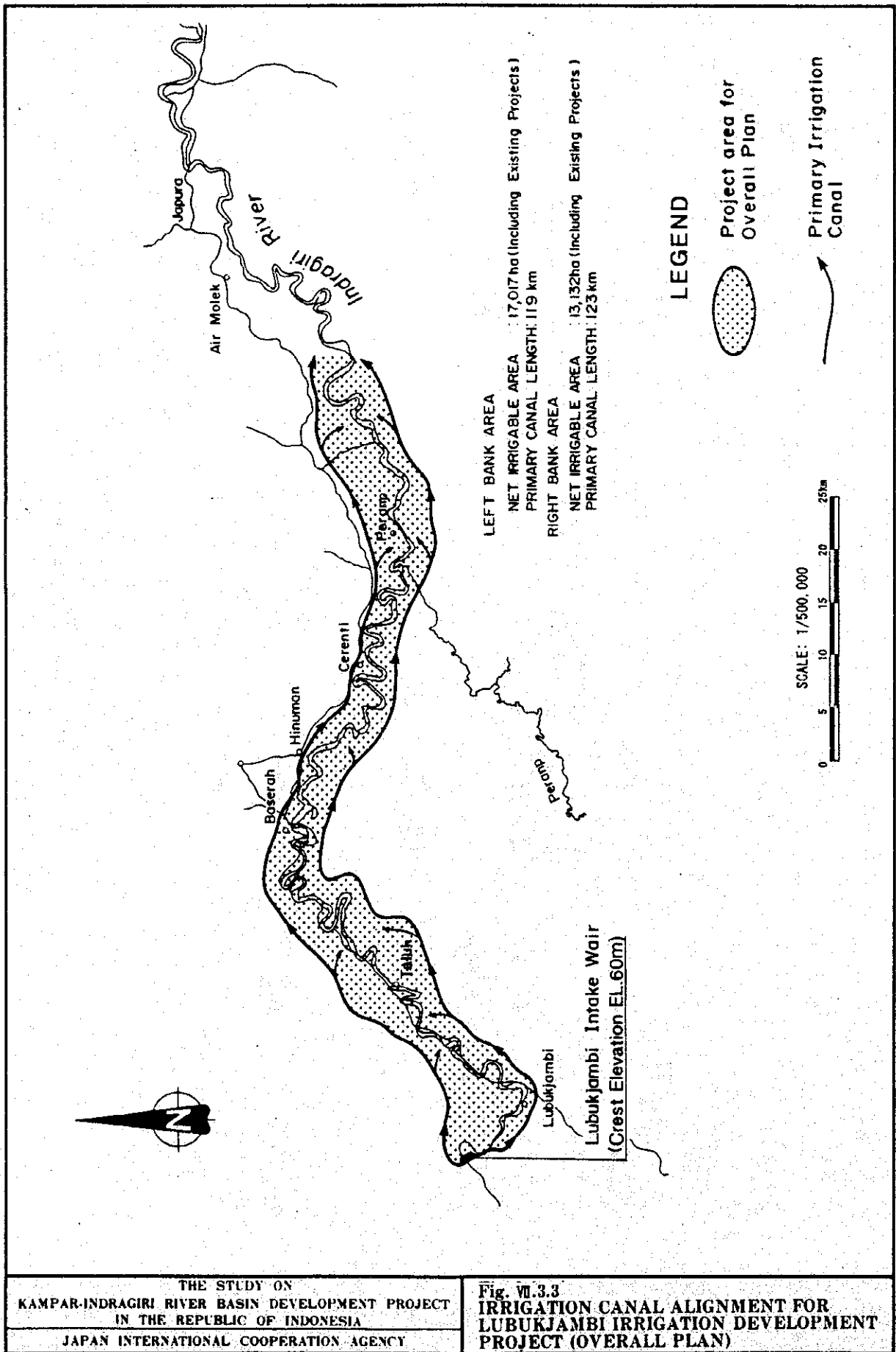
LUBUKJAMBI IRRIGATION DEVELOPMENT AREA
 (GROSS IRRIGABLE AREA : ABOUT 50,000 ha ESTIMATED By PU. IN. RIAU)

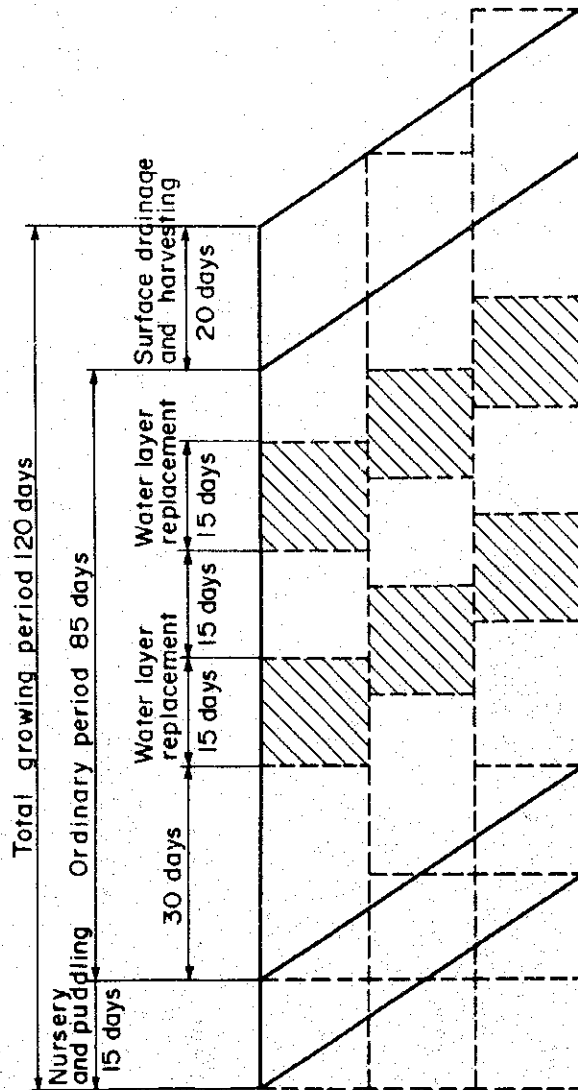


THE STUDY ON
 KAMPAR - INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT
 IN THE REPUBLIC OF INDONESIA
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Fig. VI.3.1
 OBJECTIVE IRRIGATION DEVELOPMENT
 PROJECTS

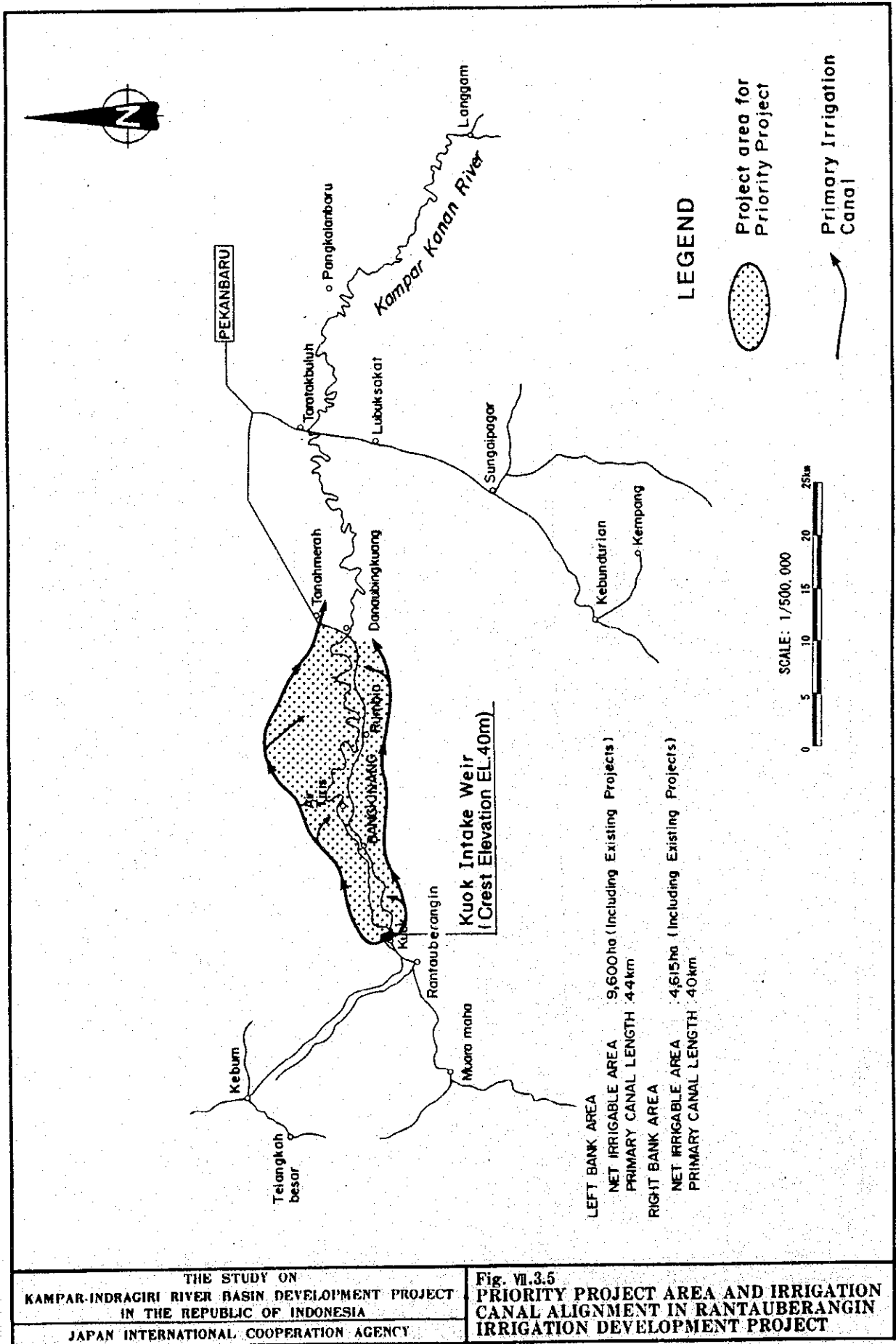






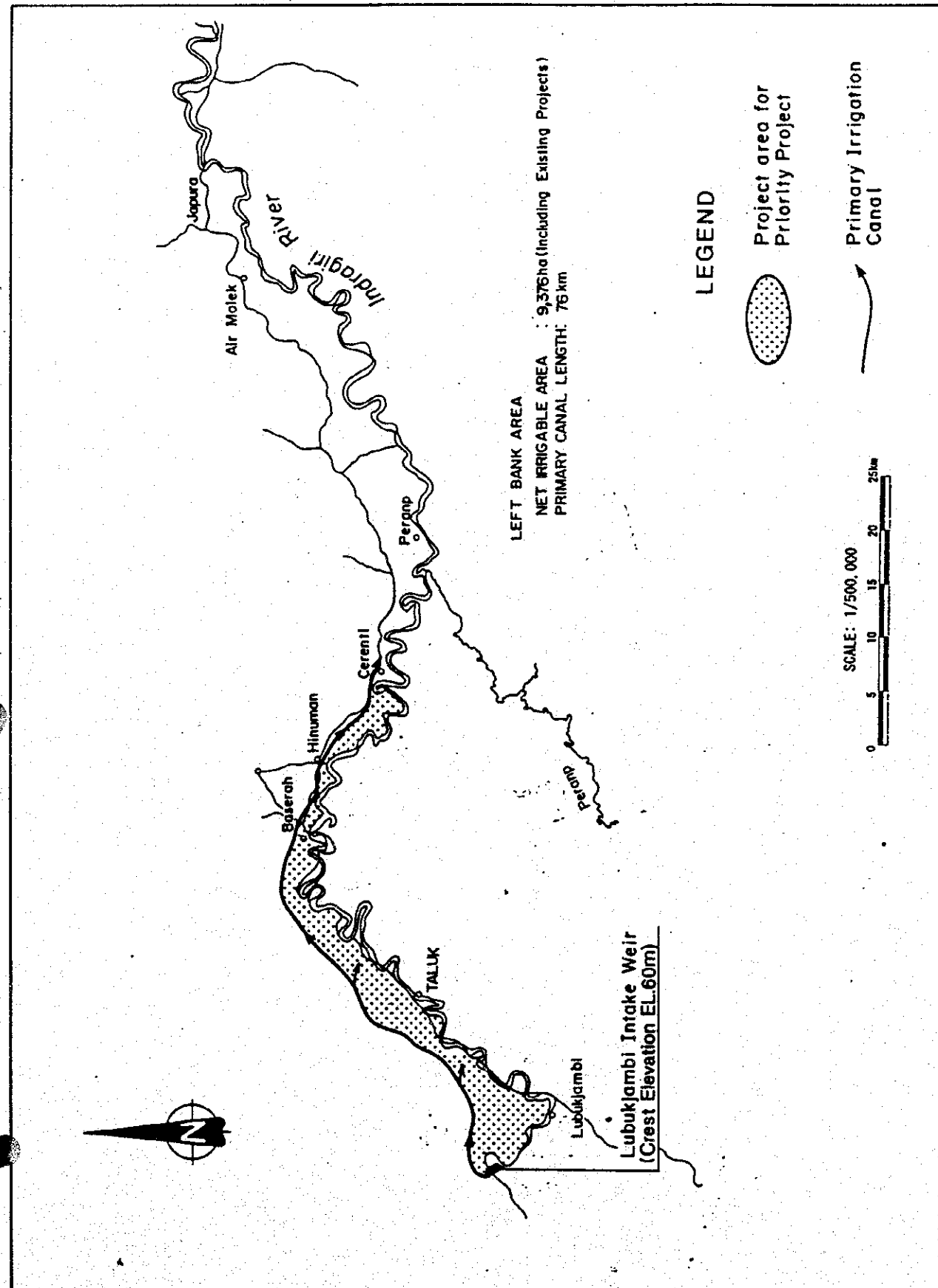
Remarks :

1. Rectangular shapes show actual farming period at each unit.
2. Inclined line is representative farming period for the whole area.
3. Commencement period of puddling is staggered in 45 days, and paddy cultivation is performed in 3 groups.



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Fig. VII.3.5
 PRIORITY PROJECT AREA AND IRRIGATION
 CANAL ALIGNMENT IN RANTAUBERANGIN
 IRRIGATION DEVELOPMENT PROJECT



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Fig. VII.3.6
 PRIORITY PROJECT AREA AND IRRIGATION
 CANAL ALIGNMENT IN LUBUKJAMBI
 IRRIGATION DEVELOPMENT PROJECT



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