Table 5.3 STATISTICS OF THE PUMP IRRIGATION SYSTEMS IN 1987

	BONGA #1	BONGA #2	BONGA #3	ALCALA-ANULUNG	SOLANA(1)	LIBMANAN-CABUSAO(1)
1. O & M COST (Peso) (2)	529,100	789,800	312,500	2,449,500	2,226,800	667,000
salaries	66,500	78,600	60,500	123,000	111,500	52,000
wage	8,500	0	8,300	176,200	29,000	39,400
cost of living allowance	25,200	32,100	23,500	204,400	103,500	76,600
representative allowance	400	800	300	6,100	7,800	3,200
food subsidy	6,200	6,700	6,300	51,200	23,200	45,700
medical allowance	7,700	11,500	8,500	74,500	36,500	600
government shares(6)	4,800	8,200	4,000	7,700	10,700	5,800
other cost with regards personnel cost(7)	20,300	26,800	17,600	149,600	71,900	45,500
travel expense	0	0	0	6,600	4,700	9,400
supplies/material	0	0	0	18,000	5,700	11,800
fuel, oil, spare part	0	0	0	60,000	10,400	200
water, illumination	0	0	0	3,000	10,800	11,100
power energy cost	389,500	625,100	183,500	1,516,700	1,745,200	363,800
collection expense	0	0	0	43,800	44,500	0
other cost with regards material cost	0	0	0	8,700	11,400	1,900
2. OPERATION AND MAINTENANCE COST PER HA (Peso/ha)	2,383	1,355	1,547	1,209	2,629	597
3. TOTAL AMOUNT OF IRRIGATION FEE COLLECTED (COLLECTION) (Peso)	283,400	509,000	100,000	1,572,300	1,165,900	181,900
4. TOTAL AMOUNT OF IRRIGATION FEE TO BE COLLECTED (COLLECTIBLE) (Peso)	340,600	855,100	309,400	2,493,800	1,935,500	1,168,650
5. IRRIGATION FEE COLLECTION EFFICIENCY (%)	83	60	32	63	60	16
6. VIABILITY OF THE PROJECT (item3-item1) (Peso)	(245,700)	(280,800)	(212,500)	(877,200)	(1,060,900)	(485,100)
7. IRRIGATED AREA/BENEFIT AREA (a) WET SEASON (ha)	165/80	375/337	140/109	1,030	847	1,118
(b) DRY SEASON (ha)	57/57	208/208	62/62	996	0	0
8. ESTIMATED ANNUAL IRRIGATION WATER SUPPLY (5)	2,497,500	5,184,200	2,553,300	28,059,100	12,828,300	8,342,000
10. ESTIMATED WATER CONSUMPTION (mm/day) (3)	9.40	7.40	10.50	11.50	12.60	6.20
10. WATER VALUE (Peso/cubic meter) (4)	0.16	0.12	0.07	0.05	0.14	0.04
11. POWER RATE (Peso/kWh)	1.98	2.37	2.09	0.81	1.92	1.97

Remarks:
(1); The pumps were not operated during dry season of 1987 in Solana and Libmanan-Cabusao systems.
(2); O & M cost of the irrigation association is not included.
(3); Estimated annual irrigation water supply/total annual irrigated area/120 days of growing period
(4); total pump energy cost/estimated annual irrigation water supply
(5); cubic meter
(6); government shares consist of fovernment shares, state insurance,etc
(7); other costs consist of anel.allowance, additional meal, children subsidy,incentive,etc

Table 6.1 NECESSITY OF O & M IMPROVEMENT IN THE PUMP IRRIGATION SYSTEMS

	bonga #1	Bonga #2	Bonga #3	Alcala-Amulung	Solana	Libmanan-Cabusao
1.REHABILITATION OF IRRIGATION AND DRAINAGE FACILITIES						
a. canal system	0	0	0	0	0	0
b.on-farm facility	0	0	0	0	0	0
2.REHABILITATION OF PUMP STATION						
a.pump equipment	0	0	0	X	0	0
b.electric equipment	0	0	0	X	0	0
3.DIRECT POWER SUPPLY FROOM NPC						
a.transmission line	0	0	0	X	0	0
b.substation	X	X	X	X	X	0
4.SUPPLY OF O & M EQUIPMENT	0	0	0	0	0	0
5.INCREASE OF NUMBER OF OM STAFF	X	X	X	X	X	0
6.REINFORCEMENT AND IMPROVEMENT OF MONITORING SYSTEM	0	0	0	0	0	0
7. REINFORCEMENT OF COMMUNICATION SYSTEMS	X	X	X	X	X	0
8.SPECIAL TRAINING OF FARMERS	0	0	0	0	0	0
9.SPECIAL TRAINING OF OM STAFF OF NIA	0	0	0	0	0	0

Remarks: 0: Improvement or reinforcement is needed.
x: No improvement is needed.

Table 6.2 NUMBER OF O & M STAFF TO BE REQUIRED

Name of System	Present condition			Future with project condition					
				Firmed-up service area			Maximum service area		
	WM	DT	PO	WM	DT	PO	WM	DT	PO
Bonga #1	1	0	1	1	-	1	1	-	1
Bonga #2	1	0	1	1	-	1	1	-	1
Bonga #3	1	0	1	1	-	1	1	-	1
Alcala-Amulung	2	7	2	2	6	2	2	6	2
Solana	2	5	2	-	-	-	-	-	-
Libmanan-Cabusao	2	0	1	2	9	1	3	11	1

WM: water master DT: ditch tender PO: pump operator
Present condition of the Solana system is in before turnover stage 3.

Table 6.3 PROPOSED PARAMETERS FOR IRRIGATION PLAN

Name of System	Sn(mm)		S(mm/d)		P(mm/d)		Ev(mm/d)		Et(mm/d)		LPWR(mm/d)		CWR(mm/d)		FD+DL(%)		CL(%)		OL(%)	
	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season
Bonga Pump #1	135	100	50	50	1.5	1.5	4.9	4.8	6.9	6.0	6.4	6.3	8.4	7.5	30	30	10	10	10	10
Bonga Pump #2	135	100	50	50	2.0	2.0	4.9	4.7	6.9	6.0	6.9	6.7	8.9	8.0	30	30	10	10	10	10
Bonga Pump #3	145	135	50	50	2.5	2.5	4.9	4.8	6.9	6.0	7.4	7.3	9.4	8.5	30	30	10	10	10	10
Alcala-Amulung	0	140	50	50	2.0	2.0	2.7	4.7	5.8	5.0	4.7	6.7	7.8	7.0	30	30	15	15	10	10
Solana	0	140	50	50	2.0	2.0	2.7	4.7	5.8	5.0	4.7	6.7	7.8	7.0	30	30	15	15	10	10
Libmanan-Cabusao	0	100	50	50	1.5	1.5	3.6	4.2	6.5	3.8	5.1	5.7	8.0	5.3	30	30	25	25	10	10

Sn(mm) ; Land soaking requirement
S(mm/d) ; Flooding water
P(mm/d) ; Deep percolation
Dry season means dry season crop.
Wet season means wet season crop.

Ev(mm/d) ; Evaporation rate
Et(mm/) ; Evapotranspiration
LPWR(mm/d) ; Land preparation requirement

CWR(mm/d); Crop water requirement
FD+DL(%) ; On-farm application loss
CL(%) ; Conveyance loss

OL(%) ; Operation loss

Table 6.4 UNIT WATER REQUIREMENT FOR EACH SYSTEM

(Unit ; mm/day)

Name of System	Turnout Water Requirement*						Diversion Water Requirement**					
	Sn + S(mm/d)		LPWR(mm/d)		CWR(mm/d)		Sn + S(mm/d)		LPWR(mm/d)		CWR(mm/d)	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Bonga Pump #1	34.4	27.9	8.3	8.2	10.9	9.8	41.2	33.4	10.0	9.8	13.1	11.7
Bonga Pump #2	34.4	27.9	9.0	8.7	11.6	10.4	41.2	33.4	10.8	10.5	13.9	12.5
Bonga Pump #3	36.2	34.4	9.6	9.5	12.2	11.1	43.5	41.2	11.5	11.4	14.7	13.3
Alcala Amulung	9.3	35.3	6.1	8.7	10.1	9.1	11.6	44.1	7.6	10.9	12.7	11.4
Solana	9.3	35.3	6.1	8.7	10.1	9.1	11.6	44.1	7.6	10.9	12.7	11.4
Libaanan Cabusao	9.3	27.9	6.6	7.4	10.4	6.9	12.5	37.6	9.0	10.0	14.0	9.3

* : including farm operation loss
** : including farm waste, conveyance and operation loss.
conveyance loss for Alcala Amulung PIS is tentative.

(Under condition of 24-hour consecutive water supply and simultaneouse distribution) (Unit :l/s/ha)

Name of System	Turnout Water Requirement*						Diversion Water Requirement**					
	Sn + S(l/s/ha)		LPWR(l/s/ha)		CWR(l/s/ha)		Sn + S(l/s/ha)		LPWR(l/s/ha)		CWR(l/s/ha)	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Bonga Pump #1	4.0	3.2	1.0	0.9	1.3	1.1	4.8	3.9	1.2	1.1	1.5	1.4
Bonga Pump #2	4.0	3.2	1.0	1.0	1.3	1.2	4.8	3.9	1.2	1.2	1.6	1.4
Bonga Pump #3	4.2	4.0	1.1	1.1	1.4	1.3	5.0	4.8	1.3	1.3	1.7	1.5
Alcala Amulung	1.1	4.1	0.7	1.0	1.2	1.1	1.3	5.1	0.9	1.3	1.5	1.3
Solana	1.1	4.1	0.7	1.0	1.2	1.1	1.3	5.1	0.9	1.3	1.5	1.3
Libaanan Cabusao	1.1	3.2	0.8	0.9	1.2	0.8	1.5	4.4	1.0	1.2	1.6	1.1

Table 6.5(1/2) DIVERSION WATER REQUIREMENT FOR BONGA PUMP #1
(MAXIMUM SERVICE AREA)

Dry Season						Wet Season					
Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	68	0.41	19	41.24	1st	1-7	68	0.37	17	37.22
2nd	1-7	136	0.51	19	25.65	2nd	1-7	136	0.48	17	24.14
3rd	1-7	202	0.60	19	20.32	3rd	1-7	202	0.58	17	19.64
4th	1-3	273	1.16	19	14.99	4th	1-3	273	1.17	17	13.02
	4-7	105	0.58	19			4-7	105	0.53	17	
5th	1-3	258	1.14	19	14.00	5th	1-3	258	1.14	17	12.44
	4-7	179	0.71	19			4-7	179	0.70	17	
6th	1-3	247	1.15	19	13.56	6th	1-3	247	1.13	17	12.09
	4-7	241	0.83	19			4-7	241	0.84	17	
7th	1-3	185	0.83	19	11.49	7th	1-3	185	0.83	17	10.77
	4-7	241	0.63	19			4-7	241	0.69	17	
8th	1-3	185	0.83	19	12.13	8th	1-3	185	0.83	17	11.10
	4-7	241	0.70	19			4-7	241	0.73	17	
9th	1-3	185	0.83	19	12.68	9th	1-3	185	0.83	17	11.43
	4-7	241	0.76	19			4-7	241	0.77	17	
10th	1-3	185	0.83	19	13.14	10th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
11th	1-3	185	0.83	19	13.14	11th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
12th	1-3	185	0.83	19	13.14	12th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
13th	1-3	185	0.83	19	13.14	13th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
14th	1-3	185	0.83	19	13.14	14th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
15th	1-3	185	0.83	19	13.14	15th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
16th	1-3	185	0.83	19	13.14	16th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
17th	1-3	185	0.83	19	13.14	17th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
18th	1-3	185	0.83	19	13.14	18th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
19th	1-3	185	0.83	19	13.14	19th	1-3	185	0.83	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
20th	1-3	117	0.52	19	13.10	20th	1-3	117	0.52	17	11.72
	4-7	241	0.81	19			4-7	241	0.81	17	
21th	1-3	49	0.22	19	13.14	21th	1-3	49	0.22	17	11.76
	4-7	241	0.81	19			4-7	241	0.81	17	
22th	1-3	-	-	-	13.09	22th	1-3	-	-	-	11.71
	4-7	224	0.75	19			4-7	224	0.75	17	
23th	1-3	-	-	-	12.93	23th	1-3	-	-	-	11.57
	4-7	136	0.45	19			4-7	136	0.45	17	
24th	1-3	-	-	-	13.24	24th	1-3	-	-	-	11.85
	4-7	62	0.21	19			4-7	62	0.21	17	

Table 6.5(2/2) DIVERSION WATER REQUIREMENT FOR BONGA PUMP #1
(FIRMARD-UP SERVICE AREA)

Dry Season						Wet Season					
Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	48	0.32	17	40.80	1st	1-7	48	0.26	17	33.15
2nd	1-7	96	0.40	17	25.50	2nd	1-7	96	0.34	17	21.68
3rd	1-7	145	0.49	17	20.68	3rd	1-7	145	0.42	17	17.73
4th	1-3	203	0.94	17	28.34	4th	1-3	203	0.86	17	12.85
	4-7	57	0.39	17			4-7	57	0.31	17	
5th	1-3	197	0.96	17	14.06	5th	1-3	197	0.86	17	12.40
	4-7	109	0.51	17			4-7	109	0.44	17	
6th	1-3	189	0.96	17	13.60	6th	1-3	189	0.85	17	12.14
	4-7	153	0.61	17			4-7	153	0.55	17	
7th	1-3	145	0.73	17	11.59	7th	1-3	145	0.65	17	10.77
	4-7	153	0.44	17			4-7	153	0.43	17	
8th	1-3	145	0.73	17	12.18	8th	1-3	145	0.65	17	11.12
	4-7	153	0.49	17			4-7	153	0.46	17	
9th	1-3	145	0.73	17	12.64	9th	1-3	145	0.65	17	11.47
	4-7	153	0.53	17			4-7	153	0.49	17	
10th	1-3	145	0.73	17	13.11	10th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
11th	1-3	145	0.73	17	13.11	11th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
12th	1-3	145	0.73	17	13.11	12th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
13th	1-3	145	0.73	17	13.11	13th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
14th	1-3	145	0.73	17	13.11	14th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
15th	1-3	145	0.73	17	13.11	15th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
16th	1-3	145	0.73	17	13.11	16th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
17th	1-3	145	0.73	17	13.11	17th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
18th	1-3	145	0.73	17	13.11	18th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
19th	1-3	145	0.73	17	13.11	19th	1-3	145	0.65	17	11.71
	4-7	153	0.57	17			4-7	153	0.51	17	
20th	1-3	97	0.48	17	13.01	20th	1-3	97	0.43	17	11.65
	4-7	153	0.57	17			4-7	153	0.51	17	
21th	1-3	49	0.25	17	13.11	21th	1-3	49	0.22	17	11.69
	4-7	153	0.57	17			4-7	153	0.51	17	
22th	1-3	-	-	-	13.03	22th	1-3	-	-	-	11.66
	4-7	153	0.57	17			4-7	153	0.51	17	
23th	1-3	-	-	-	13.25	23th	1-3	-	-	-	11.78
	4-7	95	0.36	17			4-7	95	0.32	17	
24th	1-3	-	-	-	12.72	24th	1-3	-	-	-	11.92
	4-7	44	0.16	17			4-7	44	0.15	17	

Table 6.6 DIVERSION WATER REQUIREMENT FOR BONGA PUMP #2
(FIGMED-UP & MAXIMUM SERVICE AREA)

Dry season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	88	0.59	17	41.03
2nd	1-7	169	0.70	17	25.35
3rd	1-7	247	0.83	17	20.57
4th	1-7	336	1.03	17	18.76
5th	1-3	291	1.24	17	11.28
	4-5	126	0.83	17	
	6-7	-	-	-	
6th	1-3	291	1.39	17	11.97
	4-5	218	1.40	17	
	6-7	-	-	-	
7th	1-3	291	1.48	17	12.19
	4-5	293	1.85	17	
	6-7	-	-	-	
8th	1-3	291	1.53	17	12.40
	4-5	218	1.42	17	
	6-7	163	1.05	17	
9th	1-3	291	1.53	17	12.66
	4-5	218	1.57	17	
	6-7	163	1.00	17	
10th	1-3	291	1.53	17	13.08
	4-5	218	1.73	17	
	6-7	163	1.00	17	
11th	1-3	291	1.53	17	13.44
	4-5	218	1.73	17	
	6-7	163	1.14	17	
12th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
13th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
14th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
15th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
16th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
17th	1-3	291	1.53	17	13.83
	4-5	218	1.73	17	
	6-7	163	1.29	17	
18th	1-3	203	1.07	17	13.85
	4-5	218	1.73	17	
	6-7	163	1.29	17	
19th	1-3	122	0.65	17	13.89
	4-5	218	1.73	17	
	6-7	163	1.29	17	
20th	1-3	44	0.23	17	13.84
	4-5	218	1.73	17	
	6-7	163	1.29	17	
21th	1-3	-	-	-	13.85
	4-5	174	1.38	17	
	6-7	163	1.29	17	
22th	1-3	-	-	-	13.85
	4-5	92	0.73	17	
	6-7	163	1.29	17	
23th	1-3	-	-	-	13.84
	4-5	-	-	-	
	6-7	163	1.29	17	
24th	1-3	-	-	-	13.47
	4-5	-	-	-	
	6-7	87	0.67	17	

Wet season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	88	0.48	17	33.38
2nd	1-7	169	0.59	17	21.37
3rd	1-7	247	0.72	17	17.84
4th	1-7	336	0.91	17	16.58
5th	1-3	291	1.18	17	10.40
	4-5	126	0.71	17	
	6-7	-	-	-	
6th	1-3	291	1.28	17	10.92
	4-5	218	1.26	17	
	6-7	-	-	-	
7th	1-3	291	1.34	17	11.44
	4-5	293	1.71	17	
	6-7	-	-	-	
8th	1-3	291	1.36	17	11.37
	4-5	218	1.40	17	
	6-7	163	0.93	17	
9th	1-3	291	1.38	17	11.68
	4-5	218	1.45	17	
	6-7	163	0.97	17	
10th	1-3	291	1.38	17	11.97
	4-5	218	1.56	17	
	6-7	163	0.97	17	
11th	1-3	291	1.36	17	12.13
	4-5	218	1.56	17	
	6-7	163	1.06	17	
12th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
13th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
14th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
15th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
16th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
17th	1-3	291	1.38	17	12.46
	4-5	218	1.56	17	
	6-7	163	1.16	17	
18th	1-3	203	0.91	17	12.50
	4-5	218	1.56	17	
	6-7	163	1.16	17	
19th	1-3	122	0.58	17	12.48
	4-5	218	1.56	17	
	6-7	163	1.16	17	
20th	1-3	44	0.21	17	12.49
	4-5	218	1.56	17	
	6-7	163	1.16	17	
21th	1-3	-	-	-	12.45
	4-5	174	1.24	17	
	6-7	163	1.16	17	
22th	1-3	-	-	-	12.48
	4-5	92	0.66	17	
	6-7	163	1.16	17	
23th	1-3	-	-	-	12.44
	4-5	-	-	-	
	6-7	163	1.16	17	
24th	1-3	-	-	-	12.52
	4-5	-	-	-	
	6-7	88	0.63	17	

Table 6.7 DIVERSION WATER REQUIREMENT FOR BONGA PUMP #3
(FIRMED-UP SERVICE & MAXIMUM SERVICE AREA)

Dry Season						Wet Season					
Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	32	0.23	17	43.99	1st	1-7	32	0.22	17	42.08
2nd	1-7	71	0.34	17	29.31	2nd	1-7	71	0.32	17	27.58
3rd	1-7	96	0.31	17	19.76	3rd	1-7	96	0.30	17	19.13
4th	1-7	127	0.40	17	19.28	4th	1-3	127	0.39	17	18.79
5th	1-4	127	0.43	17	12.95	5th	1-4	127	0.42	17	12.63
	5-7	62	0.36	17			5-7	62	0.35	17	
6th	1-4	140	0.49	24	16.01	6th	1-4	140	0.46	17	10.80
	5-7	106	0.41	24			5-7	106	0.40	17	
7th	1-4	127	0.50	17	12.94	7th	1-4	127	0.46	17	12.25
	5-7	75	0.33	17			5-7	75	0.33	17	
8th	1-4	127	0.50	17	13.46	8th	1-4	127	0.46	17	12.51
	5-7	75	0.37	17			5-7	75	0.35	17	
9th	1-4	127	0.53	17	13.98	9th	1-4	127	0.48	17	12.85
	5-7	75	0.37	17			5-7	75	0.35	17	
10th	1-4	127	0.53	17	14.63	10th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
11th	1-4	127	0.53	17	14.63	11th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
12th	1-4	127	0.53	17	14.63	12th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
13th	1-4	127	0.53	17	14.63	13th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
14th	1-4	127	0.53	17	14.63	14th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
15th	1-4	127	0.53	17	14.63	15th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
16th	1-4	127	0.53	17	14.63	16th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
17th	1-4	127	0.53	17	14.63	17th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
18th	1-4	127	0.53	17	14.63	18th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
19th	1-4	127	0.53	17	14.63	19th	1-4	127	0.48	17	13.24
	5-7	75	0.42	17			5-7	75	0.38	17	
20th	1-4	95	0.40	17	14.71	20th	1-4	95	0.36	17	13.27
	5-7	75	0.42	17			5-7	75	0.38	17	
21th	1-4	56	0.23	17	14.55	21th	1-4	56	0.21	17	13.21
	5-7	75	0.42	17			5-7	75	0.38	17	
22th	1-4	31	0.13	17	14.68	22th	1-4	31	0.12	17	13.36
	5-7	75	0.42	17			5-7	75	0.38	17	
23th	1-4	31	0.13	17	14.45	23th	1-4	31	0.12	17	13.29
	5-7	44	0.24	17			5-7	44	0.22	17	
24th	1-4	-	-	-	14.31	24th	1-4	-	-	-	13.11
	5-7	44	0.24	17			5-7	44	0.22	17	

Table 6.8(1/4) DIVERSION WATER REQUIREMENT FOR ALCALA AMULUNG PIS
(MAXIMUM SERVICE AREA ; Dry Season)

Main Canal

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	188	0.25	24	11.49	18th	1-2	247	1.27	24	12.68
2nd	1-7	427	0.49	24	9.91		3-4	443	2.27	24	
3rd	1-7	581	0.58	24	8.63		5-7	627	2.15	24	
4th	1-2	615	1.59	24	5.84	19th	1-2	63	0.32	24	12.67
	3-4	234	0.41	24			3-4	388	1.99	24	
	5-7	270	0.43	24			5-7	627	2.15	24	
5th	1-2	627	1.99	24	6.71	20th	1-2	-	-	-	12.68
	3-4	338	0.71	24			3-4	388	1.99	24	
	5-7	370	0.62	24			5-7	537	1.84	24	
6th	1-2	626	2.36	24	7.52	21th	1-2	-	-	-	12.69
	3-4	487	1.28	24			3-4	296	1.52	24	
	5-7	402	0.71	24			5-7	449	1.54	24	
7th	1-2	607	2.47	24	8.28	22th	1-2	-	-	-	12.68
	3-4	499	1.36	24			3-4	147	0.76	24	
	5-7	551	1.15	24			5-7	407	1.39	24	
8th	1-2	627	2.49	24	8.52	23th	1-2	-	-	-	12.68
	3-4	634	1.93	24			3-4	115	0.59	24	
	5-7	627	1.40	24			5-7	248	0.85	24	
9th	1-2	435	2.24	24	10.80	24th	1-2	-	-	-	12.60
	3-4	443	1.96	24			3-4	-	-	-	
	5-7	627	1.59	24			5-7	191	0.65	24	
10th	1-2	435	2.24	24	11.47						
	3-4	443	2.04	24							
	5-7	627	1.81	24							
11th	1-2	435	2.24	24	12.05						
	3-4	443	2.27	24							
	5-7	627	1.89	24							
12th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							
13th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							
14th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							
15th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							
16th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							
17th	1-2	435	2.24	24	12.69						
	3-4	443	2.27	24							
	5-7	627	2.15	24							

Lateral A

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	77	0.09	24	10.10	18th	1-2	95	0.43	24	11.16
2nd	1-7	180	0.18	24	8.64		3-4	188	0.85	24	
3rd	1-7	246	0.22	24	7.73		5-7	292	0.88	24	
4th	1-2	282	0.60	24	4.82	19th	1-2	26	0.12	24	11.17
	3-4	164	0.33	24			3-4	155	0.70	24	
	5-7	110	0.13	24			5-7	292	0.88	24	
5th	1-2	254	0.70	24	5.96	20th	1-2	-	-	-	11.19
	3-4	156	0.30	24			3-4	114	0.52	24	
	5-7	191	0.30	24			5-7	292	0.88	24	
6th	1-2	251	0.83	24	6.78	21th	1-2	-	-	-	11.18
	3-4	206	0.50	24			3-4	114	0.52	24	
	5-7	218	0.35	24			5-7	183	0.55	24	
7th	1-2	238	0.86	24	7.35	22th	1-2	-	-	-	11.06
	3-4	192	0.56	24			3-4	62	0.28	24	
	5-7	284	0.47	24			5-7	131	0.39	24	
8th	1-2	242	0.86	24	7.86	23th	1-2	-	-	-	11.07
	3-4	221	0.63	24			3-4	62	0.28	24	
	5-7	330	0.69	24			5-7	74	0.22	24	
9th	1-2	172	0.78	24	9.73	24th	1-2	-	-	-	11.22
	3-4	188	0.74	24			3-4	37	0.17	24	
	5-7	292	0.70	24			5-7	33	0.10	24	
10th	1-2	172	0.78	24	10.24						
	3-4	188	0.74	24							
	5-7	292	0.79	24							
11th	1-2	172	0.78	24	10.68						
	3-4	188	0.78	24							
	5-7	292	0.84	24							
12th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							
13th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							
14th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							
15th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							
16th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							
17th	1-2	172	0.78	24	11.17						
	3-4	188	0.85	24							
	5-7	292	0.88	24							

Table 6.8(2/4) DIVERSION WATER REQUIREMENT FOR ALCALA AMULUNG PIS
(MAXIMUM SERVICE AREA ; Wet Season)

Main Canal

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	188	0.96	24	44.12
2nd	1-7	427	1.46	24	29.54
3rd	1-7	581	1.32	24	19.63
4th	1-2	615	2.84	24	12.73
	3-4	234	1.16	24	
	5-7	270	1.18	24	
5th	1-2	627	2.94	24	12.59
	3-4	338	1.62	24	
	5-7	370	1.50	24	
6th	1-2	626	2.97	24	12.45
	3-4	487	2.29	24	
	5-7	412	1.62	24	
7th	1-2	607	2.88	24	12.23
	3-4	499	2.33	24	
	5-7	551	2.00	24	
8th	1-2	627	2.98	24	12.24
	3-4	634	2.96	24	
	5-7	627	2.28	24	
9th	1-2	435	2.01	24	11.19
	3-4	443	2.01	24	
	5-7	627	1.87	24	
10th	1-2	435	2.01	24	11.26
	3-4	443	2.02	24	
	5-7	627	1.89	24	
11th	1-2	435	2.01	24	11.32
	3-4	443	2.04	24	
	5-7	627	1.90	24	
12th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
13th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
14th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
15th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
16th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
17th	1-2	435	2.01	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
18th	1-2	247	1.14	24	11.39
	3-4	443	2.04	24	
	5-7	627	1.93	24	
19th	1-2	63	0.29	24	11.39
	3-4	388	1.79	24	
	5-7	627	1.93	24	
20th	1-2	-	-	-	11.38
	3-4	388	1.79	24	
	5-7	537	1.65	24	
21th	1-2	-	-	-	12.89
	3-4	296	1.37	24	
	5-7	449	1.68	24	
22th	1-2	-	-	-	11.38
	3-4	147	0.68	24	
	5-7	407	1.25	24	
23th	1-2	-	-	-	11.36
	3-4	115	0.53	24	
	5-7	248	0.76	24	
24th	1-2	-	-	-	11.44
	3-4	-	-	-	
	5-7	191	0.59	24	

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Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	77	0.35	24	39.27
2nd	1-7	180	0.55	24	26.40
3rd	1-7	246	0.50	24	17.56
4th	1-2	282	1.16	24	11.46
	3-4	184	0.78	24	
	5-7	110	0.49	24	
5th	1-2	254	1.05	24	10.99
	3-4	156	0.65	24	
	5-7	191	0.65	24	
6th	1-2	251	1.05	24	10.84
	3-4	206	0.85	24	
	5-7	218	0.71	24	
7th	1-2	238	0.99	24	10.65
	3-4	192	0.80	24	
	5-7	284	0.86	24	
8th	1-2	242	1.01	24	10.65
	3-4	221	0.91	24	
	5-7	330	1.00	24	
9th	1-2	172	0.70	24	9.86
	3-4	188	0.75	24	
	5-7	292	0.77	24	
10th	1-2	172	0.70	24	9.92
	3-4	188	0.75	24	
	5-7	292	0.78	24	
11th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
12th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
13th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
14th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
15th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
16th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
17th	1-2	172	0.70	24	10.01
	3-4	188	0.76	24	
	5-7	292	0.79	24	
18th	1-2	95	0.39	24	10.02
	3-4	188	0.76	24	
	5-7	292	0.79	24	
19th	1-2	26	0.10	24	9.99
	3-4	155	0.63	24	
	5-7	292	0.79	24	
20th	1-2	-	-	-	10.00
	3-4	114	0.46	24	
	5-7	292	0.79	24	
21th	1-2	-	-	-	9.93
	3-4	114	0.46	24	
	5-7	183	0.49	24	
22th	1-2	-	-	-	9.91
	3-4	62	0.25	24	
	5-7	131	0.35	24	
23th	1-2	-	-	-	9.98
	3-4	62	0.25	24	
	5-7	74	0.20	24	
24th	1-2	-	-	-	10.10
	3-4	37	0.15	24	
	5-7	33	0.09	24	

Table 6.8(3/4) DIVERSION WATER REQUIREMENT FOR ALCALA AMULUNG PIS
(FIRMED-UP SERVICE AREA ; Dry Season)

Main Canal

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	158	0.27	19	11.69
2nd	1-7	305	0.43	19	9.64
3rd	1-7	458	0.60	19	8.96
4th	1-2	426	1.30	19	5.66
	3-4	285	0.67	19	
	5-7	263	0.53	19	
5th	1-2	468	1.69	19	6.45
	3-4	356	1.08	19	
	5-7	320	0.67	19	
6th	1-2	456	2.18	19	7.72
	3-4	315	1.06	19	
	5-7	410	0.95	19	
7th	1-2	456	2.35	19	8.52
	3-4	396	1.58	19	
	5-7	456	1.18	19	
8th	1-2	439	2.32	19	9.02
	3-4	445	1.88	19	
	5-7	501	1.46	19	
9th	1-2	328	2.13	19	11.10
	3-4	334	1.79	19	
	5-7	501	1.79	19	
10th	1-2	328	2.13	19	11.64
	3-4	334	1.99	19	
	5-7	501	1.87	19	
11th	1-2	328	2.13	19	12.22
	3-4	334	2.17	19	
	5-7	501	1.98	19	
12th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
13th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
14th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
15th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
16th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
17th	1-2	328	2.13	19	12.70
	3-4	334	2.17	19	
	5-7	501	2.17	19	
18th	1-2	170	1.10	19	12.69
	3-4	334	2.17	19	
	5-7	501	2.17	19	
19th	1-2	65	0.42	19	12.70
	3-4	292	1.90	19	
	5-7	501	2.17	19	
20th	1-2	-	-	-	12.66
	3-4	269	1.74	19	
	5-7	437	1.89	19	
21th	1-2	-	-	-	12.70
	3-4	185	1.20	19	
	5-7	355	1.54	19	
22th	1-2	-	-	-	12.65
	3-4	147	0.95	19	
	5-7	220	0.95	19	
23th	1-2	-	-	-	12.72
	3-4	66	0.43	19	
	5-7	173	0.75	19	
24th	1-2	-	-	-	12.68
	3-4	-	-	-	
	5-7	111	0.48	19	

Lateral A

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	76	0.11	19	9.90
2nd	1-7	150	0.18	19	8.21
3rd	1-7	197	0.22	19	7.64
4th	1-2	150	0.39	19	5.20
	3-4	161	0.43	19	
	5-7	104	0.19	19	
5th	1-2	191	0.66	19	5.69
	3-4	181	0.45	19	
	5-7	159	0.29	19	
6th	1-2	169	0.71	19	7.36
	3-4	189	0.73	19	
	5-7	132	0.27	19	
7th	1-2	193	0.93	19	7.76
	3-4	188	0.73	19	
	5-7	177	0.37	19	
8th	1-2	169	0.77	19	7.82
	3-4	189	0.73	19	
	5-7	223	0.55	19	
9th	1-2	123	0.70	19	9.28
	3-4	189	0.88	19	
	5-7	223	0.64	19	
10th	1-2	123	0.70	19	10.33
	3-4	143	0.82	19	
	5-7	223	0.71	19	
11th	1-2	123	0.70	19	10.39
	3-4	143	0.82	19	
	5-7	223	0.72	19	
12th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
13th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
14th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
15th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
16th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
17th	1-2	123	0.70	19	11.17
	3-4	143	0.82	19	
	5-7	223	0.85	19	
18th	1-2	47	0.27	19	11.19
	3-4	143	0.82	19	
	5-7	223	0.85	19	
19th	1-2	47	0.27	19	11.21
	3-4	69	0.40	19	
	5-7	223	0.85	19	
20th	1-2	-	-	-	11.21
	3-4	69	0.40	19	
	5-7	223	0.85	19	
21th	1-2	-	-	-	11.15
	3-4	52	0.29	19	
	5-7	175	0.67	19	
22th	1-2	-	-	-	11.13
	3-4	-	-	-	
	5-7	137	0.52	19	
23th	1-2	-	-	-	11.07
	3-4	-	-	-	
	5-7	90	0.34	19	
24th	1-2	-	-	-	10.83
	3-4	-	-	-	
	5-7	46	0.17	19	

Table 6.8(4/4) DIVERSION WATER REQUIREMENT FOR ALCALA AMULUNG PIS
(PIRMED-UP SERVICE AREA ; Wet Season)

Main Canal — Lateral A

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	158	1.02	19	44.16	18th	1-2	170	0.99	19	11.38	1st	1-7	76	0.43	19	38.70	18th	1-2	47	0.24	19	9.98
2nd	1-7	305	1.20	19	26.91		3-4	334	1.95	19		2nd	1-7	150	0.53	19	24.17		3-4	143	0.73	19	
3rd	1-7	458	1.47	19	21.95		5-7	501	1.94	19		3rd	1-7	197	0.48	19	16.67		5-7	223	0.76	19	
4th	1-2	426	2.52	19	12.87	19th	1-2	65	0.38	19	11.37	4th	1-2	150	0.79	19	11.21	19th	1-2	47	0.24	19	9.97
	3-4	265	1.62	19			3-4	292	1.70	19			3-4	161	0.84	19			3-4	69	0.35	19	
	5-7	263	1.43	19			5-7	501	1.94	19			5-7	104	0.50	19			5-7	223	0.76	19	
5th	1-2	458	2.79	19	12.68	20th	1-2	-	-	-	11.34	5th	1-2	191	1.02	19	11.37	20th	1-2	-	-	-	9.97
	3-4	356	2.14	19			3-4	269	1.56	19			3-4	181	0.96	19			3-4	69	0.35	19	
	5-7	320	1.66	19			5-7	437	1.69	19			5-7	159	0.74	19			5-7	223	0.76	19	
6th	1-2	456	2.72	19	12.25	21th	1-2	-	-	-	11.40	6th	1-2	168	0.89	19	10.69	21th	1-2	-	-	-	9.99
	3-4	315	1.88	19			3-4	185	1.08	19			3-4	189	0.98	19			3-4	52	0.26	19	
	5-7	410	1.87	19			5-7	355	1.38	19			5-7	132	0.54	19			5-7	175	0.60	19	
7th	1-2	456	2.73	19	12.17	22th	1-2	-	-	-	11.37	7th	1-2	195	1.01	19	10.56	22th	1-2	-	-	-	10.06
	3-4	396	2.34	19			3-4	147	0.86	19			3-4	188	0.97	19			3-4	-	-	-	
	5-7	456	2.05	19			5-7	220	0.85	19			5-7	177	0.69	19			5-7	137	0.47	19	
8th	1-2	439	2.63	19	10.44	23th	1-2	-	-	-	11.33	8th	1-2	169	0.89	19	10.53	23th	1-2	-	-	-	10.10
	3-4	445	2.07	19			3-4	66	0.38	19			3-4	189	0.98	19			3-4	-	-	-	
	5-7	501	1.80	19			5-7	173	0.67	19			5-7	223	0.84	19			5-7	90	0.31	19	
9th	1-2	328	1.91	19	11.23	24th	1-2	-	-	-	11.36	9th	1-2	123	0.63	19	9.97	24th	1-2	-	-	-	10.20
	3-4	334	1.91	19			3-4	-	-	-			3-4	189	0.99	19			3-4	-	-	-	
	5-7	501	1.91	19			5-7	111	0.43	19			5-7	223	0.74	19			5-7	46	0.16	19	
10th	1-2	328	1.91	19	11.27							10th	1-2	123	0.63	19	9.93						
	3-4	334	1.93	19									3-4	143	0.73	19							
	5-7	501	1.91	19									5-7	223	0.75	19							
11th	1-2	328	1.91	19	11.33							11th	1-2	123	0.63	19	9.93						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.92	19									5-7	223	0.75	19							
12th	1-2	328	1.91	19	11.38							12th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							
13th	1-2	328	1.91	19	11.38							13th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							
14th	1-2	328	1.91	19	11.38							14th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							
15th	1-2	328	1.91	19	11.38							15th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							
16th	1-2	328	1.91	19	11.38							16th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							
17th	1-2	328	1.91	19	11.38							17th	1-2	123	0.63	19	9.99						
	3-4	334	1.95	19									3-4	143	0.73	19							
	5-7	501	1.94	19									5-7	223	0.76	19							

Table 6.9(1/2) DIVERSION WATER REQUIREMENT FOR SOLANA PIS
(MAXIMUM SERVICE AREA)

Dry season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	253	0.48	17	11.61	17th	1-2	574	4.16	17	12.68
2nd	1-7	501	0.73	17	9.65		3-4	564	4.09	17	
3rd	1-7	770	1.14	17	9.06		5-7	823	3.98	17	
4th	1-2	797	2.93	17	5.88	18th	1-2	321	2.33	17	12.68
	3-4	420	1.28	17			3-4	564	4.09	17	
	5-7	223	0.42	17			5-7	823	3.98	17	
5th	1-2	817	3.69	17	6.78	19th	1-2	90	0.65	17	12.67
	3-4	593	1.99	17			3-4	547	3.96	17	
	5-7	314	0.67	17			5-7	823	3.98	17	
6th	1-2	819	4.36	17	7.61	20th	1-2	-	-	-	12.68
	3-4	677	2.51	17			3-4	443	3.21	17	
	5-7	487	1.17	17			5-7	823	3.98	17	
7th	1-2	814	4.62	17	8.16	21th	1-2	-	-	-	12.68
	3-4	744	3.22	17			3-4	214	1.55	17	
	5-7	652	1.65	17			5-7	753	3.64	17	
8th	1-2	805	4.50	17	8.62	22th	1-2	-	-	-	12.69
	3-4	735	3.65	17			3-4	137	1.00	17	
	5-7	884	2.47	17			5-7	586	2.83	17	
9th	1-2	573	4.16	17	10.83	23th	1-2	-	-	-	12.66
	3-4	564	3.70	17			3-4	61	0.44	17	
	5-7	823	2.85	17			5-7	412	1.99	17	
10th	1-2	574	4.16	17	11.47	24th	1-2	-	-	-	12.70
	3-4	564	3.92	17			3-4	61	0.44	17	
	5-7	823	3.19	17			5-7	171	0.83	17	
11th	1-2	574	4.16	17	12.09						
	3-4	564	3.92	17							
	5-7	823	3.65	17							
12th	1-2	574	4.16	17	12.68						
	3-4	564	4.09	17							
	5-7	823	3.98	17							
13th	1-2	574	4.16	17	12.68						
	3-4	564	4.09	17							
	5-7	823	3.98	17							
14th	1-2	574	4.16	17	12.68						
	3-4	564	4.09	17							
	5-7	823	3.98	17							
15th	1-2	574	4.16	17	12.68						
	3-4	564	4.09	17							
	5-7	823	3.98	17							
16th	1-2	574	4.16	17	12.68						
	3-4	564	4.09	17							
	5-7	823	3.98	17							

Wet season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	253	1.82	17	44.03	17th	1-2	574	3.73	17	11.37
2nd	1-7	501	2.24	17	27.36		3-4	564	3.67	17	
3rd	1-7	770	2.83	17	22.49		5-7	823	3.57	17	
4th	1-2	797	5.16	17	12.67	18th	1-2	321	2.08	17	11.37
	3-4	420	2.84	17			3-4	564	3.67	17	
	5-7	223	1.61	17			5-7	823	3.57	17	
5th	1-2	817	5.40	17	12.59	19th	1-2	90	0.59	17	11.37
	3-4	593	3.94	17			3-4	547	3.55	17	
	5-7	314	2.05	17			5-7	823	3.57	17	
6th	1-2	819	5.47	17	12.35	20th	1-2	-	-	-	11.37
	3-4	677	4.35	17			3-4	443	2.88	17	
	5-7	487	2.79	17			5-7	823	3.57	17	
7th	1-2	814	5.47	17	12.31	21th	1-2	-	-	-	11.36
	3-4	744	4.93	17			3-4	214	1.39	17	
	5-7	652	3.44	17			5-7	753	3.26	17	
8th	1-2	805	5.40	17	12.18	22th	1-2	-	-	-	11.37
	3-4	735	4.90	17			3-4	137	0.89	17	
	5-7	884	4.39	17			5-7	586	2.54	17	
9th	1-2	573	3.73	17	11.20	23th	1-2	-	-	-	11.40
	3-4	564	3.63	17			3-4	61	0.40	17	
	5-7	823	3.46	17			5-7	412	1.79	17	
10th	1-2	574	3.73	17	11.25	24th	1-2	-	-	-	11.38
	3-4	564	3.65	17			3-4	61	0.40	17	
	5-7	823	3.49	17			5-7	171	0.74	17	
11th	1-2	574	3.73	17	11.32						
	3-4	564	3.65	17							
	5-7	823	3.54	17							
12th	1-2	574	3.73	17	11.37						
	3-4	564	3.67	17							
	5-7	823	3.57	17							
13th	1-2	574	3.73	17	11.37						
	3-4	564	3.67	17							
	5-7	823	3.57	17							
14th	1-2	574	3.73	17	11.37						
	3-4	564	3.67	17							
	5-7	823	3.57	17							
15th	1-2	574	3.73	17	11.37						
	3-4	564	3.67	17							
	5-7	823	3.57	17							
16th	1-2	574	3.73	17	11.37						
	3-4	564	3.67	17							
	5-7	823	3.57	17							

Table 6.9(2/2) DIVERSION WATER REQUIREMENT FOR SOLANA PIS
(FIRMED-UP SERVICE AREA)

Dry season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	155	0.29	17	11.45
2nd	1-7	292	0.45	17	9.43
3rd	1-7	441	0.65	17	9.02
4th	1-2	460	1.59	17	5.66
	3-4	317	0.97	17	
	5-7	125	0.24	17	
5th	1-2	612	1.96	17	5.77
	3-4	411	1.48	17	
	5-7	128	0.24	17	
6th	1-2	434	2.45	17	7.46
	3-4	440	2.07	17	
	5-7	368	0.52	17	
7th	1-2	446	2.36	17	8.12
	3-4	452	2.09	17	
	5-7	345	0.88	17	
8th	1-2	440	2.46	17	6.92
	3-4	447	2.47	17	
	5-7	467	1.32	17	
9th	1-2	319	2.31	17	11.02
	3-4	325	2.35	17	
	5-7	467	1.56	17	
10th	1-2	319	2.31	17	11.54
	3-4	325	2.35	17	
	5-7	467	1.78	17	
11th	1-2	319	2.31	17	12.10
	3-4	325	2.35	17	
	5-7	467	2.02	17	
12th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
13th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
14th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
15th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
16th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
17th	1-2	319	2.31	17	12.67
	3-4	325	2.35	17	
	5-7	467	2.26	17	
18th	1-2	164	1.19	17	12.68
	3-4	325	2.35	17	
	5-7	467	2.26	17	
19th	1-2	27	0.19	17	12.66
	3-4	325	2.35	17	
	5-7	467	2.26	17	
20th	1-2	27	0.19	17	12.67
	3-4	176	1.27	17	
	5-7	467	2.26	17	
21th	1-2	27	0.19	17	12.69
	3-4	41	0.30	17	
	5-7	424	2.05	17	
22th	1-2	-	-	-	12.75
	3-4	-	-	-	
	5-7	249	1.21	17	
23th	1-2	-	-	-	12.68
	3-4	-	-	-	
	5-7	122	0.59	17	
24th	1-2				0.00
	3-4				
	5-7				

Wet season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in m3/day
1st	1-7	155	1.12	17	44.22
2nd	1-7	292	1.26	17	26.41
3rd	1-7	441	1.59	17	22.07
4th	1-2	460	3.03	17	12.64
	3-4	317	2.14	17	
	5-7	125	0.90	17	
5th	1-2	612	2.78	17	10.41
	3-4	411	2.69	17	
	5-7	128	0.92	17	
6th	1-2	434	2.89	17	10.74
	3-4	440	2.85	17	
	5-7	368	1.26	17	
7th	1-2	446	2.81	17	11.99
	3-4	452	2.98	17	
	5-7	345	1.82	17	
8th	1-2	440	2.95	17	12.15
	3-4	447	2.98	17	
	5-7	467	2.32	17	
9th	1-2	319	2.07	17	11.21
	3-4	325	2.11	17	
	5-7	467	1.96	17	
10th	1-2	319	2.07	17	11.25
	3-4	325	2.11	17	
	5-7	467	1.98	17	
11th	1-2	319	2.07	17	11.30
	3-4	325	2.11	17	
	5-7	467	2.00	17	
12th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
13th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
14th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
15th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
16th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
17th	1-2	319	2.07	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
18th	1-2	164	1.06	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
19th	1-2	27	0.17	17	11.37
	3-4	325	2.11	17	
	5-7	467	2.03	17	
20th	1-2	27	0.17	17	11.38
	3-4	176	1.14	17	
	5-7	467	2.03	17	
21th	1-2	27	0.17	17	11.39
	3-4	41	0.27	17	
	5-7	424	1.84	17	
22th	1-2	-	-	-	11.38
	3-4	-	-	-	
	5-7	249	1.08	17	
23th	1-2	-	-	-	11.39
	3-4	-	-	-	
	5-7	122	0.53	17	
24th	1-2				0.00
	3-4				
	5-7				

Table 6.10(1/2) DIVERSION WATER REQUIREMENT FOR LIBMANAN CABUSAO PIS
(MAXIMUM SERVICE AREA)

Dry Season						Wet Season					
Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day	Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	395	0.61	24	13.34	1st	1-7	395	1.72	24	37.62
2nd	1-7	776	0.95	24	10.58	2nd	1-7	776	2.10	24	23.38
3rd	1-7	1,175	1.38	24	10.15	3rd	1-7	1,175	2.64	24	19.41
4th	1-7	1,561	1.77	24	9.80	4th	1-7	1,561	3.04	24	16.83
5th	1-3	1,161	3.05	24	9.02	5th	1-3	1,161	3.56	24	12.68
	4-7	1,097	1.84	24			4-7	1,097	3.13	24	
6th	1-3	1,239	3.61	24	9.53	6th	1-3	1,239	3.84	24	12.29
	4-7	1,480	2.54	24			4-7	1,480	3.89	24	
7th	1-3	1,294	4.42	24	10.89	7th	1-3	1,294	4.05	24	12.08
	4-7	1,705	3.30	24			4-7	1,705	4.30	24	
8th	1-3	1,601	4.70	24	10.70	8th	1-3	1,601	4.76	24	11.54
	4-7	1,844	3.94	24			4-7	1,844	4.48	24	
9th	1-3	1,327	4.39	24	11.95	9th	1-3	1,327	3.42	24	9.42
	4-7	1,757	4.17	24			4-7	1,757	3.32	24	
10th	1-3	1,327	4.08	24	12.04	10th	1-3	1,327	3.39	24	9.32
	4-7	1,757	4.46	24			4-7	1,757	3.28	24	
11th	1-3	1,327	4.92	24	13.34	11th	1-3	1,327	3.35	24	9.24
	4-7	1,757	4.64	24			4-7	1,757	3.26	24	
12th	1-3	1,327	5.04	24	13.82	12th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
13th	1-3	1,327	5.04	24	13.82	13th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
14th	1-3	1,327	5.04	24	13.82	14th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
15th	1-3	1,327	5.04	24	13.82	15th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
16th	1-3	1,327	5.04	24	13.82	16th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
17th	1-3	1,327	5.04	24	13.82	17th	1-3	1,327	3.33	24	9.17
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
18th	1-3	933	3.54	24	13.77	18th	1-3	933	2.34	24	9.15
	4-7	1,757	4.85	24			4-7	1,757	3.23	24	
19th	1-3	608	2.31	24	13.72	19th	1-3	608	1.53	24	9.13
	4-7	1,700	4.68	24			4-7	1,700	3.12	24	
20th	1-3	472	1.79	24	13.65	20th	1-3	472	1.18	24	9.09
	4-7	1,438	3.94	24			4-7	1,438	2.63	24	
21th	1-3	472	1.79	24	13.55	21th	1-3	472	1.18	24	9.02
	4-7	1,052	2.84	24			4-7	1,052	1.90	24	
22th	1-3	472	1.79	24	13.36	22th	1-3	472	1.18	24	8.92
	4-7	660	1.72	24			4-7	660	1.16	24	
23th	1-3	308	1.17	24	13.05	23th	1-3	308	0.77	24	8.74
	4-7	459	1.15	24			4-7	459	0.78	24	
24th	1-3	87	0.33	24	11.92	24th	1-3	87	0.22	24	8.12
	4-7	293	0.67	24			4-7	293	0.46	24	

Table 6.10(2/2) DIVERSION WATER REQUIREMENT FOR LIBMANAN CABUSAO PIS
(FIRMED-UP SERVICE AREA)

Dry season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	225	0.46	17	12.51
2nd	1-7	463	0.82	17	10.84
3rd	1-7	703	1.17	17	10.19
4th	1-7	926	1.48	17	9.78
5th	1-2	756	3.60	17	7.37
	3-5	511	1.42	17	
	6-7	378	1.20	17	
6th	1-2	765	4.63	17	8.46
	3-5	721	2.13	17	
	6-7	417	1.38	17	
7th	1-2	750	4.64	17	9.08
	3-5	876	3.03	17	
	6-7	479	1.74	17	
8th	1-2	762	4.86	17	9.58
	3-5	951	3.50	17	
	6-7	564	2.56	17	
9th	1-2	519	4.16	17	12.04
	3-5	776	3.58	17	
	6-7	543	3.13	17	
10th	1-2	519	4.17	17	12.72
	3-5	776	3.90	17	
	6-7	543	3.35	17	
11th	1-2	519	4.17	17	13.51
	3-5	776	4.12	17	
	6-7	543	3.85	17	
12th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
13th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
14th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
15th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
16th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
17th	1-2	519	4.17	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
18th	1-2	294	2.36	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
19th	1-2	56	0.45	17	14.05
	3-5	776	4.16	17	
	6-7	543	4.36	17	
20th	1-2	-	-	-	14.04
	3-5	592	3.17	17	
	6-7	543	4.36	17	
21th	1-2	-	-	-	14.05
	3-5	508	2.72	17	
	6-7	403	3.24	17	
22th	1-2	-	-	-	14.04
	3-5	302	1.62	17	
	6-7	372	2.98	17	
23th	1-2	-	-	-	14.07
	3-5	132	0.71	17	
	6-7	295	2.37	17	
24th	1-2	-	-	-	14.03
	3-5	21	0.11	17	
	6-7	174	1.40	17	

Wet season

Week	Days	Programed Area(ha)	Requirement in m3/s	Operating hrs	Requirement in mm/day
1st	1-7	225	1.38	17	37.54
2nd	1-7	463	1.83	17	24.19
3rd	1-7	703	2.23	17	19.41
4th	1-7	926	2.52	17	16.65
5th	1-2	756	4.37	17	11.03
	3-5	511	2.50	17	
	6-7	378	2.26	17	
6th	1-2	765	4.28	17	10.80
	3-5	721	3.32	17	
	6-7	417	2.49	17	
7th	1-2	750	4.18	17	10.60
	3-5	876	3.83	17	
	6-7	479	2.84	17	
8th	1-2	762	4.25	17	10.39
	3-5	951	4.01	17	
	6-7	564	3.27	17	
9th	1-2	519	2.76	17	9.59
	3-5	776	2.84	17	
	6-7	543	3.06	17	
10th	1-2	519	2.76	17	9.49
	3-5	776	2.79	17	
	6-7	543	3.03	17	
11th	1-2	519	2.76	17	9.38
	3-5	776	2.76	17	
	6-7	543	2.96	17	
12th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
13th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
14th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
15th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
16th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
17th	1-2	519	2.76	17	9.31
	3-5	776	2.76	17	
	6-7	543	2.89	17	
18th	1-2	294	1.56	17	9.31
	3-5	776	2.75	17	
	6-7	543	2.89	17	
19th	1-2	56	0.30	17	9.32
	3-5	776	2.76	17	
	6-7	543	2.89	17	
20th	1-2	-	-	-	9.31
	3-5	592	2.10	17	
	6-7	543	2.89	17	
21th	1-2	-	-	-	9.29
	3-5	508	1.80	17	
	6-7	403	2.14	17	
22th	1-2	-	-	-	9.30
	3-5	302	1.07	17	
	6-7	372	1.98	17	
23th	1-2	-	-	-	9.32
	3-5	132	0.47	17	
	6-7	295	1.57	17	
24th	1-2	-	-	-	9.42
	3-5	21	0.08	17	
	6-7	174	0.93	17	

Table 6.11 EFFECTIVE RAINFALL FOR BONGA PUMP #1 IRRIGATION SYSTEM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1977	8.36	0.00	0.00	0.00	24.97	99.38	81.40	142.04	194.26	0.00	77.50	0.00	627.9
1978	0.00	0.00	0.00	0.00	98.85	143.51	97.19	149.52	141.90	89.46	41.50	0.00	761.9
1979	0.00	0.00	0.00	8.22	271.50	79.61	130.18	164.47	59.81	29.69	16.31	0.00	759.8
1980	25.07	0.00	0.00	0.00	149.00	48.34	183.77	59.81	112.14	22.59	80.30	0.00	681.0
1981	0.00	0.00	0.00	0.00	180.97	204.60	89.29	164.47	89.64	59.83	31.60	0.00	820.4
1982	0.00	0.00	0.00	0.00	54.35	182.31	159.46	179.42	67.21	14.80	25.21	0.00	682.8
1983	0.00	8.36	8.32	16.64	47.32	99.52	122.92	186.90	89.62	44.99	26.22	0.00	650.8
1984	0.00	0.00	0.00	0.00	139.40	117.26	94.06	157.00	67.19	0.00	0.00	0.00	574.9
1985	0.00	0.00	0.00	0.00	24.97	251.33	42.35	171.95	82.24	52.60	23.80	0.00	649.2
1986	8.06	0.00	0.00	0.00	295.16	66.50	93.64	171.95	127.09	14.92	59.70	0.00	837.0
AVERAGE	4.1	0.8	0.8	2.5	128.6	129.2	109.4	154.8	103.1	32.9	38.2	0.0	704.6
ER/Re(%)	63	68	32	7	68	37	30	25	35	36	101	0	35

Table 6.12 EFFECTIVE RAINFALL FOR BONGA PUMP #2 IRRIGATION SYSTEM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1977	8.79	0.00	0.00	0.00	22.68	88.89	83.95	150.55	206.32	0.00	78.44	0.00	639.6
1978	0.00	0.00	0.00	0.00	88.35	142.57	99.93	158.47	150.72	95.14	41.50	0.00	776.7
1979	0.00	0.00	0.00	8.80	242.85	77.01	133.78	174.32	63.50	31.71	16.12	0.00	748.1
1980	26.13	0.00	0.00	0.00	133.27	51.78	188.35	63.39	119.08	23.87	80.30	0.00	686.2
1981	0.00	0.00	0.00	0.00	162.14	202.68	91.25	174.32	95.18	63.40	31.60	0.00	820.5
1982	0.00	0.00	0.00	0.00	48.39	184.36	163.97	190.17	71.41	15.84	23.29	0.00	697.4
1983	0.00	8.79	8.81	17.61	42.44	112.18	126.27	198.09	95.20	47.65	0.00	0.00	657.0
1984	0.00	0.00	0.00	0.00	123.94	108.22	96.42	166.39	71.38	0.00	0.00	0.00	566.4
1985	0.00	0.00	0.00	0.00	22.68	249.42	43.46	182.24	87.23	55.62	23.80	0.00	664.5
1986	8.05	0.00	0.00	0.00	264.07	66.44	95.74	182.24	134.80	15.85	59.70	0.00	826.9
AVERAGE	4.3	0.9	0.9	2.6	115.1	128.4	112.3	164.0	109.5	34.9	35.5	0.0	708.3
ER/Re(%)	65	71	34	7	61	37	31	26	37	38	94	0	35

Table 6.13 EFFECTIVE RAINFALL FOR BONGA PUMP #3 IRRIGATION SYSTEM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1977	9.30	0.00	0.00	0.00	24.32	96.93	91.68	159.97	218.99	0.00	75.38	0.00	676.6
1978	0.00	0.00	0.00	0.00	106.62	151.54	109.46	168.39	160.07	101.50	41.50	0.00	839.1
1979	0.00	0.00	0.00	9.19	302.18	83.02	146.77	185.23	67.36	33.93	18.63	0.00	846.3
1980	27.90	0.00	0.00	0.00	168.81	58.77	206.89	67.36	126.29	25.01	80.30	0.00	761.3
1981	0.00	0.00	0.00	0.00	204.77	224.39	100.54	185.23	101.08	67.18	31.60	0.00	914.8
1982	0.00	0.00	0.00	0.00	61.82	205.29	179.70	202.07	75.82	16.94	26.87	0.00	768.5
1983	0.00	9.30	9.33	18.67	53.50	125.52	138.54	210.49	101.10	50.25	0.00	0.00	716.7
1984	0.00	0.00	0.00	0.00	158.71	119.45	106.02	176.81	75.84	0.00	0.00	0.00	636.8
1985	0.00	0.00	0.00	0.00	24.32	275.48	47.85	193.65	92.62	58.49	23.80	0.00	716.2
1986	8.89	0.00	0.00	0.00	328.92	72.53	105.38	193.65	143.13	16.90	59.70	0.00	929.1
AVERAGE	4.6	0.9	0.9	2.8	143.4	141.3	123.3	174.3	116.2	37.0	35.8	0.0	780.5
ER/Re(%)	70	76	36	7	76	41	34	28	39	41	94	0	39

Table 6.14 EFFECTIVE RAINFALL FOR ALCALA-AMULUNG PUMP IRRIGATION PROJECT

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1976	0.00	0.00	30.65	0.00	112.96	111.18	89.49	110.83	59.95	63.30	62.94	20.85	662.2
1977	0.00	0.00	0.00	0.00	46.44	81.73	89.81	117.76	150.90	34.73	38.46	0.00	559.8
1978	0.00	0.00	7.71	0.00	107.59	37.89	89.87	145.47	164.73	115.48	60.90	52.58	782.2
1979													
1980	7.71	0.00	15.37	0.00	102.58	43.64	179.39	62.34	109.36	41.69	66.23	27.09	655.4
1981	0.00	0.00	0.00	0.00	93.94	149.33	6.85	117.76	60.87	142.16	73.74	0.00	644.6
1982	0.00	0.00	0.00	0.00	160.12	44.40	13.85	76.20	141.23	55.75	63.08	61.36	616.0
1983	30.86	0.00	7.66	0.00	63.06	29.98	20.74	55.42	58.32	149.10	24.78	0.00	437.9
1984	0.00	0.00	7.71	0.00	186.14	110.99	103.22	138.54	36.46	106.59	55.57	36.14	781.3
1985	0.00	0.00	0.00	0.00	7.66	168.82	27.55	131.61	128.31	108.20	51.04	20.43	643.6
1986	23.14	15.43	15.42	0.00	38.54	52.64	61.95	131.61	85.85	144.00	77.51	59.76	705.8
AVERAGE	6.2	1.5	8.5	0.0	91.9	83.1	68.3	108.8	99.4	96.1	57.4	27.8	648.9
Er/Re(%)	28	18	43	0	64	51	39	34	46	32	28	39	38

Table 6.15 EFFECTIVE RAINFALL FOR SOLANA PUMP IRRIGATION SYSTEM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1976	0.00	0.00	23.68	0.00	90.42	85.28	68.53	84.84	42.38	49.05	49.17	16.01	509.3
1977	0.00	0.00	0.00	0.00	35.44	62.38	68.75	90.14	111.28	26.54	29.86	0.00	424.4
1978	0.00	0.00	5.90	0.00	82.29	28.99	68.82	111.35	121.89	88.66	47.45	40.42	595.8
1979													
1980	5.91	0.00	11.83	0.00	86.55	33.31	137.38	47.72	79.48	32.40	51.88	20.79	507.3
1981	0.00	0.00	0.00	0.00	77.28	114.43	5.24	90.14	42.37	109.14	56.68	0.00	495.3
1982	0.00	0.00	0.00	0.00	130.59	33.85	10.60	58.32	106.01	43.10	48.50	47.11	478.1
1983	23.64	0.00	5.92	0.00	53.69	22.97	15.88	42.42	42.41	114.32	19.34	0.00	340.6
1984	0.00	0.00	5.91	0.00	141.73	84.71	79.05	106.04	26.49	81.54	43.40	27.93	596.8
1985	0.00	0.00	0.00	0.00	5.87	129.20	21.09	100.74	95.40	82.75	39.44	15.65	490.1
1986	17.73	11.82	11.83	0.00	29.46	40.39	47.47	100.74	63.60	110.30	60.46	45.94	539.8
AVERAGE	4.7	1.2	6.5	0.0	73.3	63.6	52.3	83.2	73.1	73.8	44.6	21.4	497.7
Er/Re(%)	22	14	33	0	51	39	30	26	34	24	22	30	29

Table 6.16 EFFECTIVE RAINFALL FOR LIBMANAN-CABUSAO PUMP IRRIGATION SYSTEM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1975	15.5	7.7	45.8	145.5	38.9	104.6	118.0	71.4	98.1	0.0	75.7	102.5	823.7
1976													
1977													
1978	6.7	7.7	46.0	109.0	47.7	81.3	41.0	76.7	101.3	0.0	62.6	48.0	628.0
1979	7.7	15.5	0.0	178.6	75.4	62.6	51.3	30.7	106.2	0.0	69.7	84.7	682.4
1980	92.2	54.1	45.3	42.1	85.7	94.7	133.4	86.8	58.9	0.0	99.4	47.3	839.8
1981	91.1	69.6	15.3	103.1	18.0	71.7	118.0	56.3	33.0	0.0	137.6	85.2	798.8
1982	21.2	92.7	37.5	159.5	83.5	52.3	92.3	56.2	78.9	0.0	45.1	68.1	787.4
1983	45.1	0.0	7.6	7.5	6.8	17.0	118.0	66.5	61.4	0.0	137.6	76.3	543.6
1984	30.9	15.5	61.4	13.1	51.4	31.2	76.9	86.9	37.8	0.0	110.8	38.6	554.4
1985	46.1	38.6	30.6	39.2	51.5	61.1	87.2	25.6	89.5	0.0	43.6	27.7	540.8
1986	30.6	23.2	30.5	49.6	14.2	69.6	66.7	76.7	64.1	0.0	68.1	21.1	514.4
AVERAGE	38.7	32.5	32.0	84.7	47.3	64.6	90.3	63.4	72.9	0.0	85.0	60.0	671.3
Er/Re(%)	40	62	53	81	50	37	27	38	25	0	39	27	31

Table 6.17 PROPOSED EQUIPMENT FOR O & M / MONITORING AND COMMUNICATION

Item	Unit	Bonga #1 Bonga #2 Bonga #3 F.A	Bonga #1 Bonga #2 Bonga #3 M.A	Alcala-Amulung F.A	Alcala-Amulung M.A	Solana F.A	Solana M.A	Libmanan Cabusao F.A	Libmanan Cabusao M.A
O & M Equipment									
1.Heavy Equipment									
1.Backhoe-Crawler.0.4cum	unit	1	1	0	0	1	1	1	1
2.Loader with Backhoe Wheeled.0.5cum	unit	1	1	1	1	0	0	0	0
3.Dump Truck.6t	unit	0	0	0	0	1	1	1	1
4.Spare Parts *(1)	L.S	1	1	1	1	1	1	1	1
2.Light Equipment									
1.Pick-up.3/4 ton	unit	1	1	1	1	1	1	0	0
2.Cargo Truck.6 ton	unit	1	1	1	1	1	1	0	0
3.Motorcycle	unit	9	9	19	19	8	8	12	12
4.Spair Parts *(1)	L.S	1	1	1	1	1	1	1	1
3.Miscellaneous Equipment									
1.Potable Compactor	unit	1	1	1	1	1	1	1	1
2.Centrifugal Pump.100 mm	set	1	1	1	1	1	1	1	1
3.Sand Pump.100 mm	set	1	1	1	1	1	1	1	1
4.Chain Block.5 ton	unit	3	3	2	2	2	2	2	2
5.Maitenance Tools	set	1	1	1	1	1	1	1	1
6.Mearsurement Instrument	set	1	1	1	1	1	1	1	1
7.Spare Parts	L.S	1	1	1	1	1	1	1	1
Monitoring Facilities									
1.Rain Gage(Standard Type)	nos	0	0	0	0	0	0	0	0
2.Staff Gage	nos	18	20	18	18	7	11	26	32
Communication Facilities									
1.Radio Set	set	0	0	0	0	0	0	1	1
2.Spare Parts	L.S	0	0	0	0	0	0	1	1

Remarks F.A : Firmed-up Service Area M.A : Maximum Service Area
(1) : Spare-Parts for proposed equipment and existing equipment.

Table 6.18 DATA BASE FOR PUMP OPERATORS

Number and item of questionnaire	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung				Solana		Libuanan Cabusao	Ratio/4 (%)
	1	2	3	4	5	6	7	8	9	10	
A.General personal background											
1 age	42	54	*	*	*	44	*	65	33	54	
2 education /1	3	3	3	5	5	4	5	4	4	4	
3 daily language /2	3	3	3	1,3,4	2,3	3	3,4	1,3	1,3,4	1,2	
4 service period in NIA(year)	*	12	*	10	13	11	4	13	15	12	
5 status of employment /3	1	1	*	2	2	2	2	1	*	*	
B.Basic knowlidge on water management											(4)
6 annual rainfall at the system area	0	0	0	0	0	0	0	0	0	0	0
7 evaporation at the system area	0	1	0	0	0	0	0	0	0	0	10
8 average discharge at the pump station	0	0	0	0	0	0	0	0	0	0	0
9 Manning formulae	0	0	0	0	0	0	0	0	0	0	0
10 method to estimate ET	0	0	0	0	0	0	0	0	0	0	0
11 roughness coefficient of canal	0	1	0	0	0	0	0	0	0	0	10
12 overall irrigation efficiency	0	1	0	0	0	0	0	0	0	0	10
13 purpose of rotation irrigation	0	0	0	0	0	0	0	0	0	0	0
14 optimum period of terminal irrigation	0	1	0	0	0	0	0	0	0	0	10
C.Basic knowledge on agro.production											(6)
15 growing period of paddy	0	1	0	0	0	0	0	0	0	0	10
16 possibility of direct seeding	0	1	0	0	0	0	0	0	0	0	10
17 period of nursery bed	0	0	0	0	0	0	0	0	0	0	0
18 relation between yield and fertilizer dosage	0	0	0	0	0	0	0	0	0	0	0
19 milling rate	0	1	0	0	0	0	0	0	0	0	10
D.Basic knowledge on pump)											(37)
20 voltage of electricity for pump	1	1	0	1	1	0	0	1	0	0	50
21 frequency of electricity for pump	0	1	0	1	1	0	1	0	1	0	50
22 power factor	0	0	0	0	0	0	1	0	0	0	10
E.Experience on hydro-measurement											(14)
23 experience of measuring evaporation	0	1	0	0	0	0	0	0	0	0	10
24 experience of measuring rainfall	0	1	0	0	0	0	0	0	0	0	10
25 experience of measuring discharge	0	1	0	0	0	0	0	1	1	0	30
26 experience of measurung seepage rate	0	1	0	0	0	0	0	0	0	0	10
27 experience of measuring pump efficiency	0	1	0	0	0	0	0	0	0	0	10
F.Experience on system management											(16)
28 calculation of probable rainfall	1	1	0	0	0	0	0	0	0	0	20
29 calculation of unit crop water requirement	0	1	0	0	0	0	0	0	0	0	10
30 calculation of diversion water requirement	0	1	0	0	0	0	0	0	0	0	10
31 preparation of irrigation schdule	1	1	0	0	0	0	0	0	0	1	20
32 knowing system map or not	0	1	0	0	0	0	0	0	0	1	20
33 knowing rotational area map or not	0	1	0	0	0	0	0	0	0	1	20
34 knowing land ledger or not	0	1	0	0	0	0	0	0	0	0	10
35 knowing master list or not	0	1	0	0	0	0	0	0	0	1	20
G.Exeience on design											(10)
36 experience of designing facilities	0	1	0	0	0	0	0	0	0	0	10
37 estimating O and M cost	0	1	0	0	0	0	0	0	0	0	10
38 estimating cost for rehabilitation works	0	1	0	0	0	0	0	0	0	0	10
H.Work duty and other											
39 having a driving license or not	1	1	1	1	1	0	1	0	1	0	70
40 understanding for own his work duty	0	0	0	1	0	0	0	1	1	0	21
I.Understanding for pump management											(77)
41 understanding of check for operating pump	0	0	1	0	1	0	0	0	1	1	40
42 understanding for periodical check for pump	0	0	1	1	1	0	1	0	1	0	50
43 general knowledge for pump	0	0	0	1	1	0	1	1	1	0	50
44 understanding for consumption of oil	1	0	0	0	0	1	1	1	1	0	50
45 treatment of pump after finishing operation	1	1	1	1	1	1	1	1	1	1	100
46 understanding on clearance of impeller	1	1	1	0	0	0	0	1	1	1	60
47 understanding on motors	1	0	0	1	1	1	1	1	1	1	80
48 understanding on rotation speed of motor	1	1	0	1	1	1	1	1	1	1	90
49 ordinary checking meters	1	1	1	1	1	1	1	1	1	1	100
50 treatment for accident	1	1	1	1	1	1	1	1	1	1	100
51 communication at an urgent accident	1	1	1	1	1	1	1	1	1	1	100
52 experience on treatment for troubles on pumps	1	1	1	1	1	1	1	1	1	1	100

Remarks: 0:not knowing or no experience 1:knowing or having experience *:no data

/1; 1:zero schooling 2:primary 3:intermidiate 4:high 5:collage /2; 1;Tagalog 2:Bicolanos 3:Ilocanos 4:Ibanags

/3; 1:permanent 2:temporary

/4; Ratio of persons who had positive answer. Value in parenthesis shows the average of each question group.

Table 6.19 DATA BASE FOR DITCHTENDERS

Number and item of questionnaire	Alcala-Amulung										Solana				Ratio/4
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	(%)
A.General personal background															
1 age	*	39	29	62	40	36	57	35	*	*	26	49	29	56	
2 education /1	*	4	4	4	2	2	4	4	4	4	4	4	4	4	
3 daily language /2	*	3	1,3	3	1,3	3	3,4	1,3	3,4	3,4	3,4	3,4	4	4	
4 service period in NIA (year)	11	12	1	12	12	11	11	11	11	10	1	14	7	13	
5 status of employment /3	2	2	2	2	2	2	1	2	2	2	2	*	1	*	
B.Basic knowledge on water management															(13)
6 annual rainfall at the system area	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
7 evaporation at the system area	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
8 average discharge at the pump station	0	0	0	0	0	0	0	0	1	1	0	0	0	1	21
9 Manning formulae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7
10 method to estimate ET	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7
11 roughness coefficient of canal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 overall irrigation efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 purpose of rotation irrigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 optimum period of terminal irrigation	1	1	1	1	1	1	1	1	0	0	0	0	0	1	64
C.Basic knowledge on agro.production															(49)
15 growing period of paddy	1	0	1	1	1	1	0	1	1	1	1	1	1	1	86
16 possibility of direct seeding	0	0	1	0	0	1	1	0	0	0	1	1	1	1	50
17 period of nursery bed	0	0	0	1	1	0	0	1	1	1	0	0	0	1	43
18 relation between yield and fertilizer dosage	0	0	0	1	1	0	0	1	0	0	0	1	0	1	36
19 milling rate	1	0	0	0	0	0	0	0	1	1	0	0	0	1	29
D.Basic knowledge on pump															(52)
20 voltage of electricity for pump	0	1	1	1	1	1	1	1	1	1	0	0	0	0	64
21 frequency of electricity for pump	1	1	1	1	1	1	0	1	1	1	0	0	0	1	71
22 power factor	1	0	0	0	0	0	0	0	1	1	0	0	0	0	21
F.Experience on hydro-measurement															(43)
23 experience of measuring evaporation	0	0	1	0	0	0	0	0	0	0	1	1	0	1	29
24 experience of measuring rainfall	0	0	1	0	0	0	0	0	1	1	1	1	1	1	50
25 experience of measuring discharge	1	0	1	0	1	0	1	0	0	0	0	0	1	1	43
26 experience prience of measuring seepage rate	1	1	1	1	1	1	1	1	0	0	0	0	0	1	64
27 experience of measuring pump efficiency	1	0	0	0	1	0	0	0	0	0	0	0	1	1	29
G.Experience on system management															(58)
28 calculation of probable rainfall	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
29 calculation of unit crop water requirement	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
30 calculation of diversion water requirement	0	0	0	0	0	0	0	0	0	0	0	1	0	1	14
31 preparation of irrigaton schdule	1	0	1	1	1	1	1	1	0	0	1	1	1	1	79
32 knowing system map or not	1	0	1	1	1	1	1	1	1	1	1	1	1	1	93
33 knowing rotational area map or not	1	0	1	1	1	1	1	1	1	1	1	1	1	1	93
34 knowing land ledger or not	1	0	1	1	1	1	1	1	1	1	1	1	0	1	86
35 knowing master list or not	1	0	1	1	1	1	1	1	1	1	1	0	1	1	86
H.Experience on design															(10)
36 experience of designing facilities	0	0	1	0	1	1	0	1	0	0	0	0	0	0	29
37 estimating O and M cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38 estimating cost for rehabilitation works	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I.Work duty and other															
39 having a driving license or not	0	0	0	0	0	0	0	1	0	0	0	0	1	0	14
40 understanding for own his work duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Remarks: There are no ditchtenders in the systems of Bonga#1, Bonga #2, Bonga#3 and Libaanan-Cabusao.
0:not knowing or no experience 1:knowing or having experience *:no data
/1; 1:zero schooling 2:primary 3:intermidiate 4:high 5:collage
/2; 1;Tagalog 2:Bicolanos 3:Ilocanos 4:Ibanags /3; 1:permanent 2:temporary
/4; Ratio of persons who had positive answer. Value in parenthesis shows the average of each group.

Table 6.20 DATA BASE FOR WATER MASTERS

Number and items of questionnaire	Bonga #1	Bonga #2	Bonga #3	Alcala-Amulung		Solana		Libmanan-Cabusao		Ratio/4 (%)
	1	2	3	4	5	6	7	8	9	
A. general personal background										
1 age	57	42	43	50	40	45	38	44	31	
2 education /1	*	5	5	5	4	5	5	5	4	
3 daily language /2	*	3	3	1,3	1,2,3,4	3	1,3,4	2	2	
4 service period in NIA (year)	*	12	11	11	2	10	12	15	1	
5 status of employment /3	1	1	1	2	*	1	1	2	2	
B. basic knowledge on water management										(17)
6 annual rainfall at the system area	0	0	0	0	0	0	0	1	0	11
7 evaporation at the system area	0	1	1	1	0	0	0	0	0	33
8 average discharge at the pump station	0	0	0	1	0	0	0	0	0	11
9 Manning formulae	0	0	0	0	0	0	0	0	0	0
10 method to estimate ET	0	0	0	0	0	0	0	1	0	11
11 roughness coefficient of canal	0	0	0	0	0	0	0	0	0	0
12 overall irrigation efficiency	0	0	0	1	0	0	0	1	1	33
13 purpose of rotation irrigation	0	0	1	0	0	0	0	1	0	22
14 optimum period of terminal irrigation	0	1	1	0	0	0	0	1	0	33
C. basic konwledge on agro.production										(56)
15 growing period of paddy	0	0	1	1	1	1	1	1	1	78
16 possibility of direct seeding	0	1	1	0	1	1	1	1	1	78
17 period of nursery bed	1	0	1	1	0	0	0	1	0	44
18 relation between yield and fertilizer dosage	0	0	0	1	1	0	1	1	1	56
19 milling rate	0	0	0	0	0	0	0	1	1	22
D. basic knowledge on pump										(4)
20 voltage of electricity for pump	0	1	0	0	0	0	0	0	0	11
21 frequency of electricity for pump	0	0	0	0	0	0	0	0	0	0
22 power factor	0	0	0	0	0	0	0	0	0	0
E. experience on hydro-measurement										(42)
23 experience of measuring evaporation	0	1	0	0	0	0	1	0	1	33
24 experience of measuring rainfall	0	1	1	1	0	1	1	1	1	78
25 experience of measuring discharge	0	0	0	1	0	1	0	1	1	44
26 experience of measuring seepage rate	0	0	0	1	0	0	0	0	1	22
27 experience of measuring of pump efficiency	0	0	0	1	0	1	0	0	1	33
F. experience on system management										(67)
28 calculation of probable rainfall	0	0	0	1	0	0	0	1	1	33
29 calculation of unit crop water requirement	1	0	0	1	0	0	0	1	1	44
30 calculation fo diversion requirement	0	0	0	1	0	1	0	1	1	44
31 preparation of irrigation schedule	1	1	1	1	1	1	1	1	1	100
32 kowing system map or not	0	1	1	1	1	1	1	1	1	89
33 knowing rotational area map or not	0	0	1	1	1	1	1	1	1	78
34 knowing land ledger	0	1	1	1	1	0	0	1	1	67
35 knowing master list	0	0	1	1	1	1	1	1	1	78
G. expeience on design										(30)
36 experience of designing facilities	0	0	0	0	1	0	0	1	0	22
37 estimating O and M cost	0	0	0	1	1	0	0	1	0	33
38 estimating cost for rehabilitation works	0	0	0	1	1	0	0	1	0	33
H. work duty and other										
39 having a driving license or not	0	1	1	1	1	1	1	1	0	78
40 understanding for own his work duty	0	1	0	1	1	1	1	1	0	67

Remarks: 0:not knowing or no experience 1:knowing or having experience *:no data

/1; 1:zero schooling 2:primary 3:intermidiate 4:high 5:collage /2; 1;Tagalog 2:Bicolanos 3:Ilocanos 4:Ibanags

/3; 1:permanent 2:temporary

/4; Ratio of persons who had positive answer. Value in parenthesis shows the average of each question group.

Table 6.21 NUMBER OF TRAINEE AND TRAINER TO BE REQUIRED FOR O & M STAFF TRAINING

(unit: number)

Name of System	No. to be required in the firmed-up service area					No. to be required in the maximum area				
	Trainee				Trainer	Trainee				Trainer
	WM	DT	PO	total		WM	DT	PO	total	
Bonga #1	1	0	1	2	2	1	0	1	2	2
Bonga #2	1	0	1	2	2	1	0	1	2	2
Bonga #3	1	0	1	2	2	1	0	1	2	2
Alcala-Amulung	2	6	2	10	3	2	6	2	10	3
Solana	-	-	-	-	-	-	-	-	-	-
Libmanan-Cabusao	2	9	1	12	3	3	11	1	15	3

Remarks:
WM: water master
DT: ditch tender
PO: pump operator

Table 6.22 OUTLINE OF STANDARD CURRICULUM OF TRAINING FOR WATER MASTERS

Goal of Training	Training Item	Aims	Contents	Training Method
1. training orientation			- registration	lecture/discussion workshop
			- raising of expectations	-do-
2. to acquire knoeledge of the irrigation plan	on-farm irrigation requirement	to understand approx. amount, constituent factors, seasonal variation of water requirement for paddy and diversified crops	- evapotranspiration	lecture
			- percolation	-do-
			- effective rainfall	-do-
			- irrigation efficiency	-do-
	irrigation requirements for teriary block, major diversion structure and pump	to understand irrigation method such as rotational and simultaneous irrigation	- rotational irrigation and simultaneous irrigation	lecture/discussion
			- farming practice and irrigation method	-do-
		to understand diversion requirement	- seasonal diversion requirements	-do-
	hydrology	to understand regional hydrological characteristics	- general climate	lecture
			- rainfall/available water sources	-do-
		to understand available water sources of the river	- water balance in the river system	-do-
		to understand water balance in the river system	- data bank system	-do-
3. to acquire knowledge of facilities	kind and function of irrigation facilities	to gain knowledge about the kind and function of irrigation facilities	- design criteria for canal and canal	lecture
			- hydraulic features of structures	lecture/field practice
		to gain knowledge about water management facilities	- movable structures such as gate and check structures	-do-
	operation method of water management facilities	to learn how to measure discharge	- measuring device	lecture/field practice
		to learn how to operate water management facilities	- operation rule of water management facilities	-do-
4. to acquire knowledge of organization and responsibilities	organizationl structure, function and responsibilities	to obtain knowledge about organizational structure and function	- organizations of the IA	lecture
			- organization of NIA	-do-
			- other organization	-do-
		to make clear the responsibilities of water master at various level of management	- responsibilities of each level staff	lecture
5. to learn procedures for water management and reporting system	procedure for water management	to obtain knowledge about administrative procedure to determine the irrigation plan	- irrigation committees at various levels if available	-do-
			- determination of annual irrigation plan	-do-
	reporting system	to make clear reporting system	- reporting system for water management	-do-
			- form of reports/communication	-do-
6. to acquire knowledge about monitoring and evaluation	monitoring on practice of water management	to obtain knowledge about monitoring and evaluation on water management	- monitoring and evaluation on water management at main system	lecture/field practice
			- monitoring and evaluation on water management at tertiary block level	-do-
		to obtain knowledge about monitoring and evaluation on economic benefit	- monitoring and evaluation system on economic benefits of project	lecture
			- survey method and forms	lecture,exercise
7. to acquire knowledge on maintenance of project facilities	maintenance of project facilities	to understand the whole aspect related to maintenance of facilities	- maintenance system	lecture
			- maintenance method	-do-
			- responsibility of organization	-do-
			- budget	-do-
8. to acquire Knowledge on the overall management of the irrigation system	overall management	to understand an overall system management	- system management	field visit/lecture
9. to evaluate effect of training		to evaluate effect of training	- Evaluation	lecture/exercise

Table 6.23 OUTLINE OF STANDARD CURRICURUM OF TRAINING FOR PUMP OPERATORS

Goal of Training	Training Item	Aims	Contents	Training Method
1. training orientation			- resistration	lecture/ workshop
			- raising of expectation	-do-
2. to acquire with irrigation plan	on-farm irrigation requirement	to develop understanding the role of pump facilities on irrigation system	- role of pump facilities	lecture/workshop
3. to learn basic knowledge on pump facilities	basic electrical knowledge	to develop basic electrical knowledge about pump facilities	- principle of electricity	-do-
			- function of sub-station, transformer, pump panel,motor	-do-
				-do-
			- pump starting methods	-do-
		to develop basic mechanical knowledge of pump facilities	- naming of parts and devices in pump equipment	-do-
			- mechanical knowledge of pump equipment	
			- function of pump equipment	-do-
4. to acquire operation method on pump equipment	direction and supervision of pump operation	to develop skill in direction and supervision of pump operation in system	- direction and supervision	-do-
			- starting time, operating hours	-do-
	procedure for pump operation	to develop skills in inspection of electrical and mechanical items and their operation	- operation manual of manufacturers	lecture/field practice
			- visual inspection	-do-
			- inspection of gages, vibration, temperature, oil level, leaks	-do-
			- inspection of intake, discharge channel	-do-
		to learn how to operate pump equipment	- starting methods	-do-
			- check items in starting, during running	-do-
	reporting and recording	to learn reporting & recording of pump operation for effective operation and maintenance	- purpose of reporting and recording	-do-
			- form for reporting and recording	-do-
	safety work	to learn the safety work to prevent the labor accidents	- electric shock	lecture
			- mechanical accidents	-do-
			- case study	-do-
5. to acquire knowledge of maintenance work on pump facilities	maintenance	to learn how to maintain pump facilities	- daily, weekly, monthly maintenance	lecture/field practice
			- preventive maintenance	-do-
			- maintenance tools	-do-
			- replacement of spareparts	-do-
6. to acquire knowledge overall management of the irrigation system	system management	to learn an overall system management	- system management	field visit/lecture
7. to evaluate effect of training		to evaluate effect of training	- evaluation	lecture/exercise

Table 6.24 OUTLINE OF STANDARD CURRICULUM OF TRAINING FOR DITCHTENDERS

Goal of Training	Training Item	Aims	Contents	Training Method
1. training orientation			- registration - raising of expectation	lecture/workshop -do-
2. to acquire knowledge of facilities	kind and function of facilities	to gain knowledge about function of irrigation facilities	- hydraulic features of structures	lecture/field practice
	operation method of water management facilities	to learn how to measure discharge and climate data	- measuring rainfall, evaporation, temperature, discharge, etc.	-do-
		to learn how to operate water management facilities	- operation rule of water management facilities	-do-
3. to acquire knowledge about organization and responsibilities	organizational structure, function and responsibilities	to obtain knowledge about organizational structure and function	- organization of the IA - organization of NIA - other organization	lecture -do- -do-
		to make clear the responsibilities of dichtender at various level of management	- responsibilities of ditchtender	-do-
4. to learn procedures for water management and reporting system		to obtain knowledge about procedure for determination of the irrigation plan	- determination of annual irrigation plan	-do-
	reporting system	to make clear reporting system	- reporting system for water management - form of report/communication	-do-
5. to acquire knowledge on maintenance of the project facilities	maintenance of facilities	to understand the whole aspect of maintenance	- maintenance system	lecture
6. to acquire knowledge of overall management of the irrigation system	overall management	to understand the overall system of management	- system management	field visit/lecture
7. to evaluate effect of training		to evaluate effect of training	- evaluation	lecture/exercise

Table 6.25 AVAILABILITY OF LOGISTIC AND EQUIPMENT OF THE TRAINING FACILITIES

	Bonga #1,#2,#3		Solana and Alucala-Amulung					Libaanan-Cabusao	
1. name of training institution	DA.MMSU DEMO Center	Mariano Marcos State Univ.	Agri.Trai.Instit. PRT,ISU Cabagan	MMTC	Dep.Educa.,Cult. & Sports	Agri.Pilot Center Dep.of Agri.	Regional Trai. Center,NIA	BRBDP Trai. Center.NEDA	PCAR Training Center Cam.Sur State Agr. College
2. location	Tabug, Batac Ilocos Norte	Batac, Ilocos Norte	Garita, Canagan Isabela	Tuguegarao Cagayan	Carig,Tuguegarao Cagayan	Minanga Norte Iguig,Cagayan	La Trinidad Iriga, Cam.Sur	Pili Camarines Sur	Pili Camarines Sur
3. logistic facilities									
training room									
a) with air conditioner									
number of room	0	1	0	0	0	0	0	0	0
total area(m2 or person)		150-200 m2							
b) without air conditioner									
number of room	1	3	2	2	3	1	2	1	2
total area(m2 or person)	60 p	550 m2	120 p	91 p	180 p	100 p	200 p	60 p	110 p
lodging facility									
number of beds	50	250	100	60	60	100	44	63	58
canteen facility	1	2	1	1	1	1	1	0	1
4. equipment(number)									
video recorder	0	0	0	0	1	0	0	0	1
colour TV	0	0	0	1	1	1	0	0	1
video camera & tripod	0	0	0	0	1	0	0	0	1
tape recorder	1	4	1	1	1	1	0	0	1
radio set	1	4	0	0	2	0	0	0	1
slide projector	1	4	2	0	1	2	1	0	1
slide projector screen	1	4	1	0	1	1	0	0	1
overhead projector	1	4	2	1	1	2	0	0	1
overhead screen	1	4	1	1	1	1	0	0	1
white board	1	2	1	2	3	0	0	0	1
blackboard	1	4	3	2	3	3	2	2	4
display board	1	4	1	4	1	1	0	0	1
calculator	3	4	10	0	3	2	0	0	2
clipboard	1	4	2	0	2	2	0	0	0
clip chart & stand	1	4	0	1	0	0	0	0	0
table	10	100	25	50	50	10	8	1	4
chair	50	300	140	50	100	100	35	60	80
copboard	1	10	0	4	2	0	0	0	0
filing cabinets	3	8	100	0	0	100	1	0	3
storage rack	1	4	0	1	6	100	0	0	0
5. lodging fee(Peso/day/person)	10	120 (1)	20	70(2)	25	10(3)		14	15
6. meal and snack charge (Peso/day/person)	25		35		57.5				

(1) cost including lodging, meal/snack, materials, etc. (2) cost for meal and lodging (3) laundry cost

Table 6.26 NUMBER OF FARMERS AND TRAINER TO BE REQUIRED FOR TRAINING PROGRAMME

(unit: number)

Name of System	Total number of farmers		25 % of number of farmers*		Number of farmers who received training in the past				Number of farmers to be required for training **		Number of trainer to be requierd for training ***	
	FA	MA	FA	MA	leader-sbip	system management	financial management	total	FA	MA	FA	MA
Bonga #1	1420	2030	355	508	15	27	15	57	298	451	10	15
bonga #2	2500	-	625	-	35	35	25	95	530	-	18	-
Bonga #3	420	420	105	105	0	55	28	83	22	22	1	1
Alcala-Amlung	1970	2570	493	643	0	0	0	0	493	643	16	22
Solana	1040	1850	260	463	0	25	0	25	235	438	8	15
Libmanan-Cabusao	880	1480	220	370	0	0	0	0	220	370	6	13

Remarks:

* Prospective number of farmers for the training programme

** Number of farmers is estimated at balance between 25 % of number of farmers and number of farmers trained in the past.

*** One trainer covers 30 trainees for the training programme.

FA: firmed-up service area MA: maximum service area

Table 6.27 OUTLINE OF CURRUCULUM OF TRAINING FOR FARMERS (LEADERSHIP)

Training Item	Aims	Contents	Training Method
1. training orientation		- registration	lecture/workshop
		- raising of expectation	-do-
		- training design orientation	-do-
2. NIA and institutional development programmes	to understand NIA organization	- NIA and its objectives, powers and structures	lecture
		- farmers participation irrigation development	-do-
		- theoretical framework	-do-
3. irrigation association	to understand famers' organization	- farmers association	-do-
		- IA objectives, function and benefits	-do-
		- IA organizational structure	-do-
		- IA standards and indications	-do-
4. leadership	to understand leadership	- leadership styles	-do-
		- IA leadership function and qualities	-do-
		- organizational discipline	-do-
5. basic knowledge and skills in IA leadership	to improve quality for leadership	- communicatin/group mobilization	-do-
		- problem solving/decision making	-do-
		- facilitating meeting	-do-
		- action reflection	-do-
		- roles and function of ICO/FID at different stages of IA development	-do-
6. training evaluation		- evaluation	lecture/exercise

Table 6.28 OUTLINE OF CURRICULUM OF TRAINING FOR FARMERS (SYSTEM MANAGEMENT)

Training Item	Aims	Contents	Training Method
1. training orientation		- registration	lecture/workshop
		- levelling of expectation	-do-
2. overview of irrigation system management	to understand an overall system management	- irrigation facilities	lecture
		- irrigation schedule (pre-, normal- and post-irrigation)	-do-
3. operation method of water management on facilities	to learn how to measure discharge	- measuring devices	lecture/field practice
	to learn how to operate water management of facilities	- operation rule of water management facilities	-do-
		- cropping pattern	-do-
		- water distribution plan	
4. maintenance of facilities	to maintain project facilities	- maintenance system	lecture
5. monitoring system	to obtain knowledge of procedure of monitoring	- reporting system	-do-
		- form of reports/communication	-do-
6. irrigation sevice fee collection	to collect fee efficiently	- procedure of fee collection	-do-
		- incentive of fee collection	-do-
		- fee collection plan	-do-
7. conflict of management	to solve conflict of water management	- sample exercise	lecture/exercise
8. organizational structure, function and responsibilities	to obtain knowledge about organizational structure and function	- organizations of IA and NIA	-do-
		- other organizations	-do-
			-do-
	to make clear the responsibilities of IA farmers and NIA staff	- responsibility of farmers and NIA staff	-do-
9. training evaluation	to evaluate training	- training exercise	lecture/exercise

Table 6.29 OUTLINE OF CURRICULUM OF TRAINING FOR FARMERS (FINANCIAL MANAGEMENT)

Training Item	Aims	Contents	Training Methods
1. training orientation		- registration	lecture/workshop
		- raising of expectation	-do-
2. theories and concept of financial management	to develop understanding of overall financial management	- concept of financial management tool	lecture
		- importance of financial management	-do-
		- component of IA-financial management	-do-
3. accounting	to simplify accounting system	- accounting as a financial management tool	-do-
		- function of accounting	-do-
		- simplified accounting	-do-
4. recording system	to understand recording system	- form and use	-do
		- recording of IA transaction	-do-
5. book of accounts	to improve book of account	- book of accounts and use	-do-
		- accomplishment of each of book of accounts	-do-
6. method of fee collection	to improve collection method	- steps in ISF collection	-do-
		- steps in ccash disbursement	-do-
		- steps in auditing	-do-
		- systems and procedures in collection, cash disbursement and auditing	-do-
7. reporting system	to understand and improve reporting systems	- importance and components of financial report	-do-
		- preparation of cash statement	-do-
		- preparation of balance sheet	-do-
8. NIA amortization scheme and financial planning	to understand amortization	- concept of amortization	-do-
		- calculation of amortization	-do-
		- financial planning	-do-
9. duties and responsibilities of IA personnel	to understand duties and responsibilities	- responsibilities	-do-
10. evaluation	to evaluate training	- training exercise	lecture/exercise

Fig. 1.1(1/12) SCHEMATIC DIAGRAH BY IRRIGATED AREA
FOR WET SEASON (1984-1987)
BONGA PUMP #1

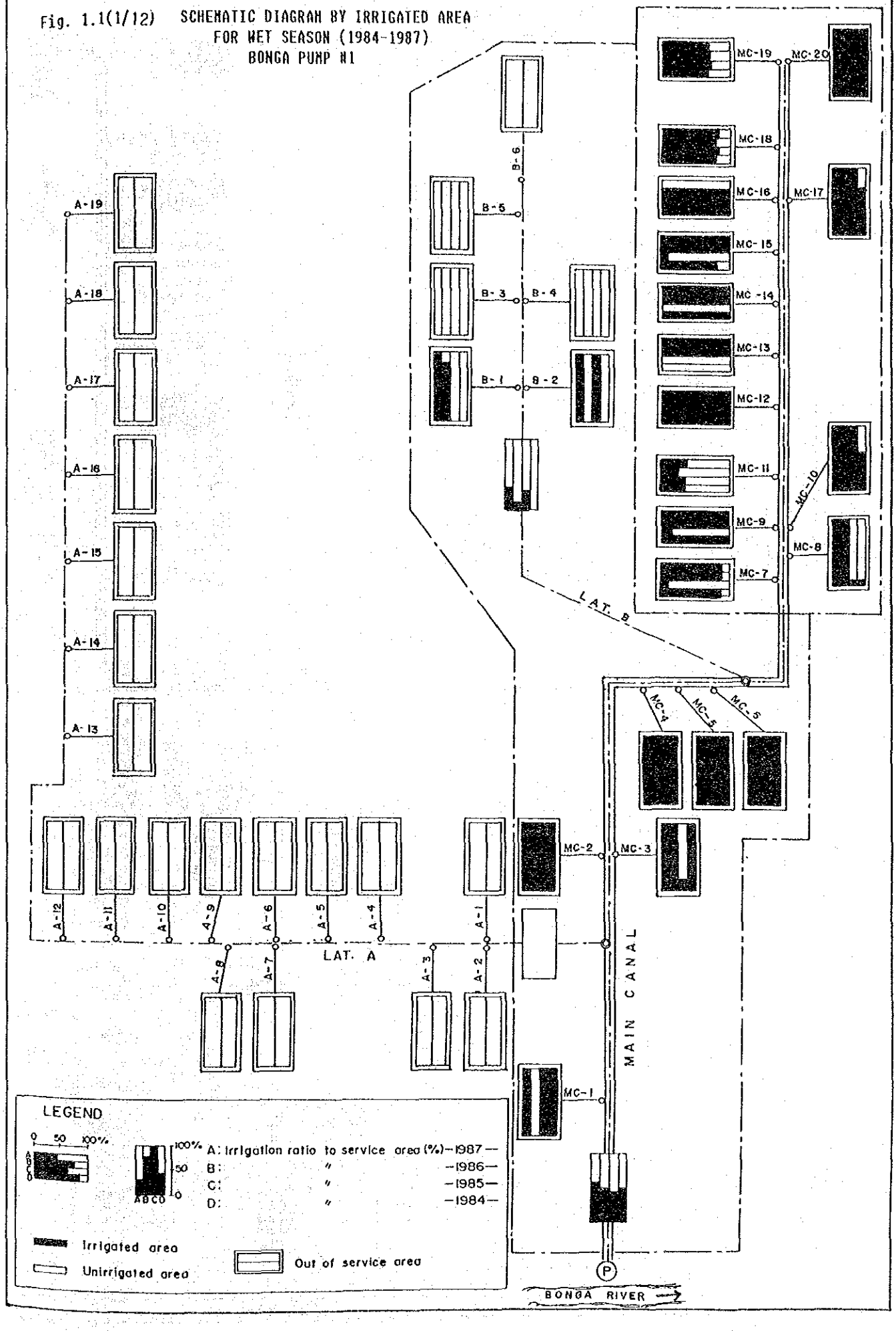


Fig. 1.1(2/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA FOR DRY SEASON (1984-1987) BONGA PUMP #1

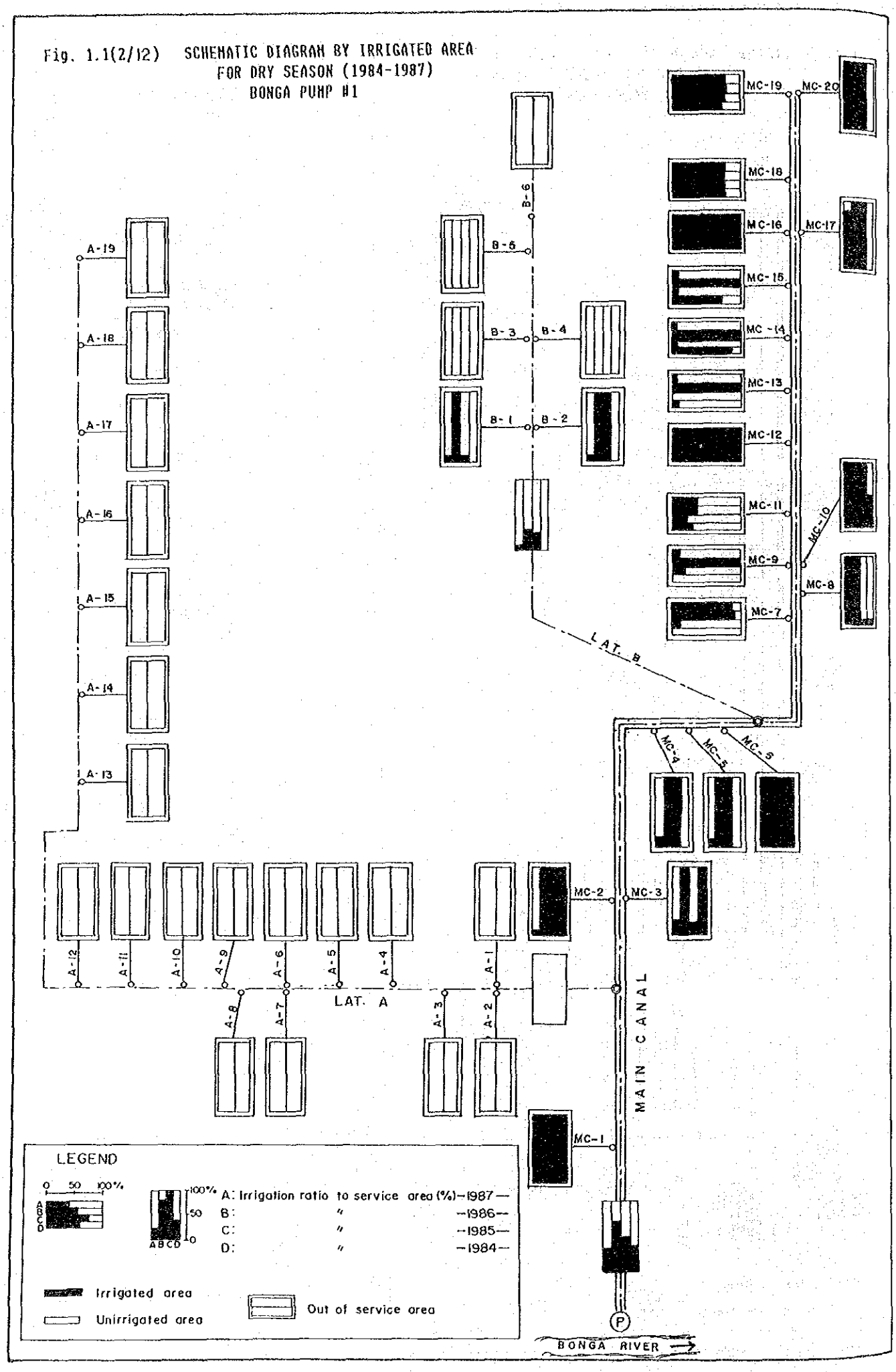


Fig. 1.1(3/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR WET SEASON (1984-1987)
BONGA PUMP #2

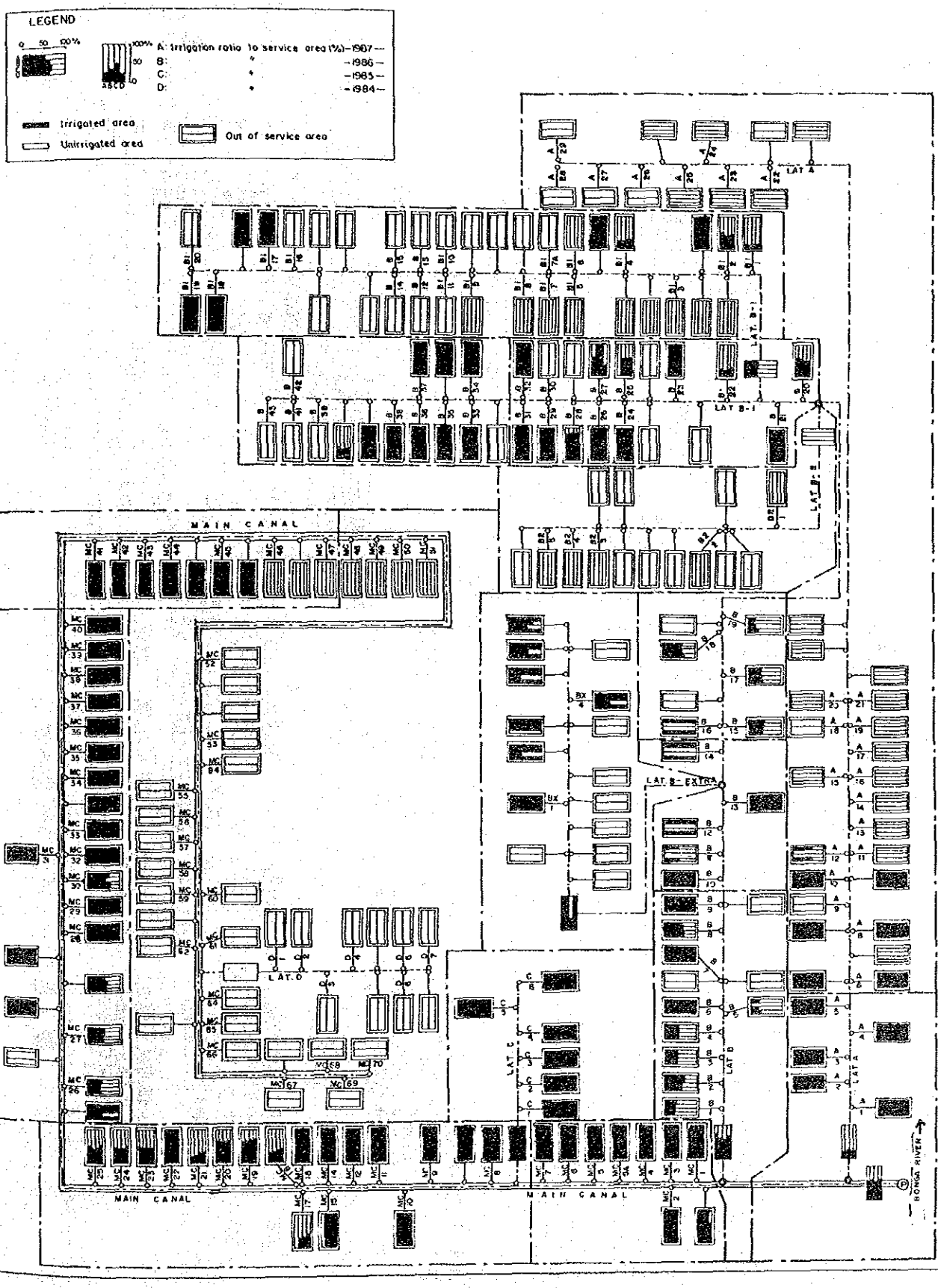


Fig. 1.1(4/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR DRY SEASON (1984-1987)
BONGA PUMP #2

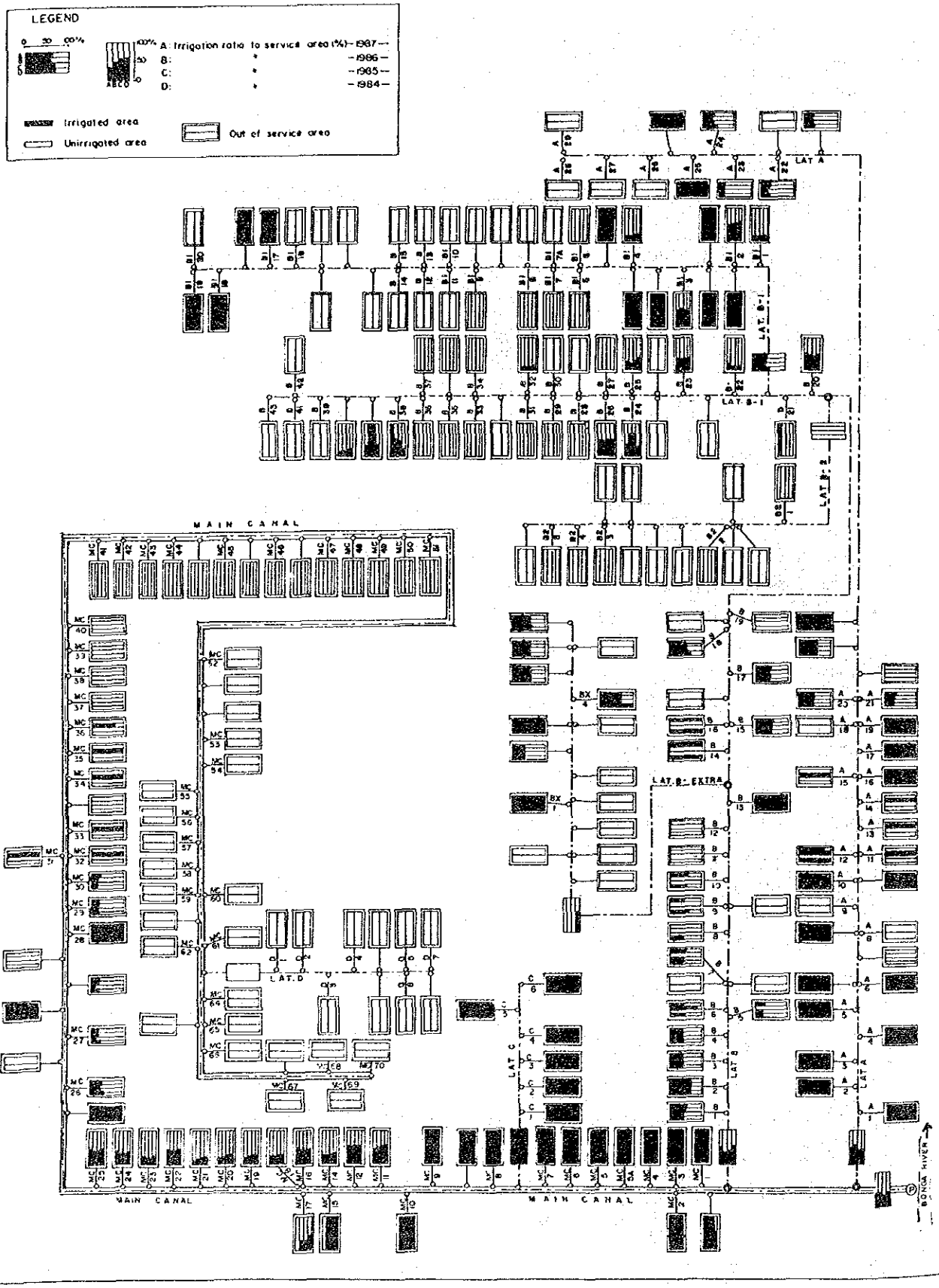


Fig. 1.1(5/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR WET SEASON (1984-1987)
BONGA PUMP #3

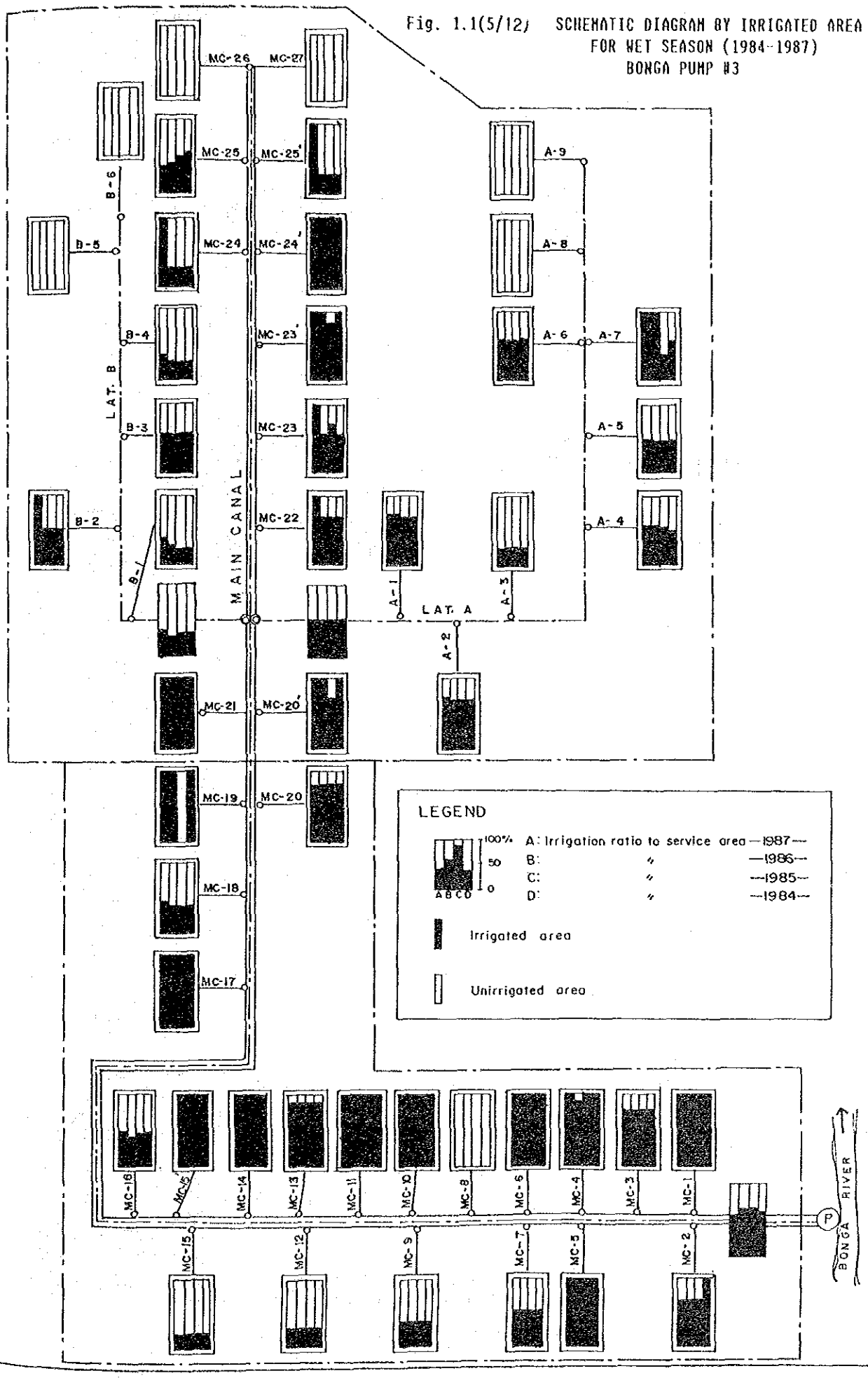


Fig. 1.1(6/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA FOR DRY SEASON (1984-1987) BONGA PUMP #3

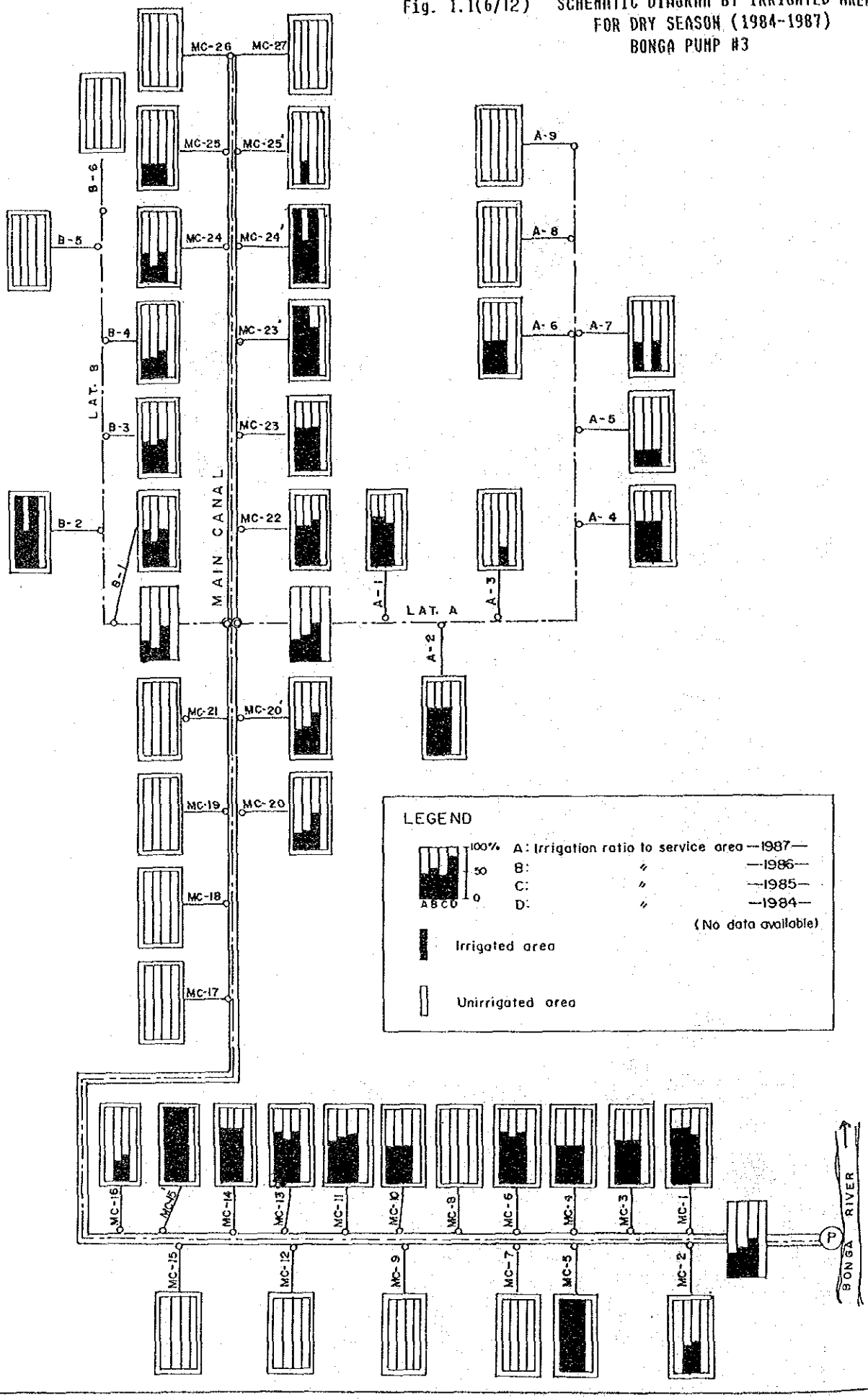


Fig. 1.1(7/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR WET SEASON (1985-1987)
ALCALA-AHULUNG

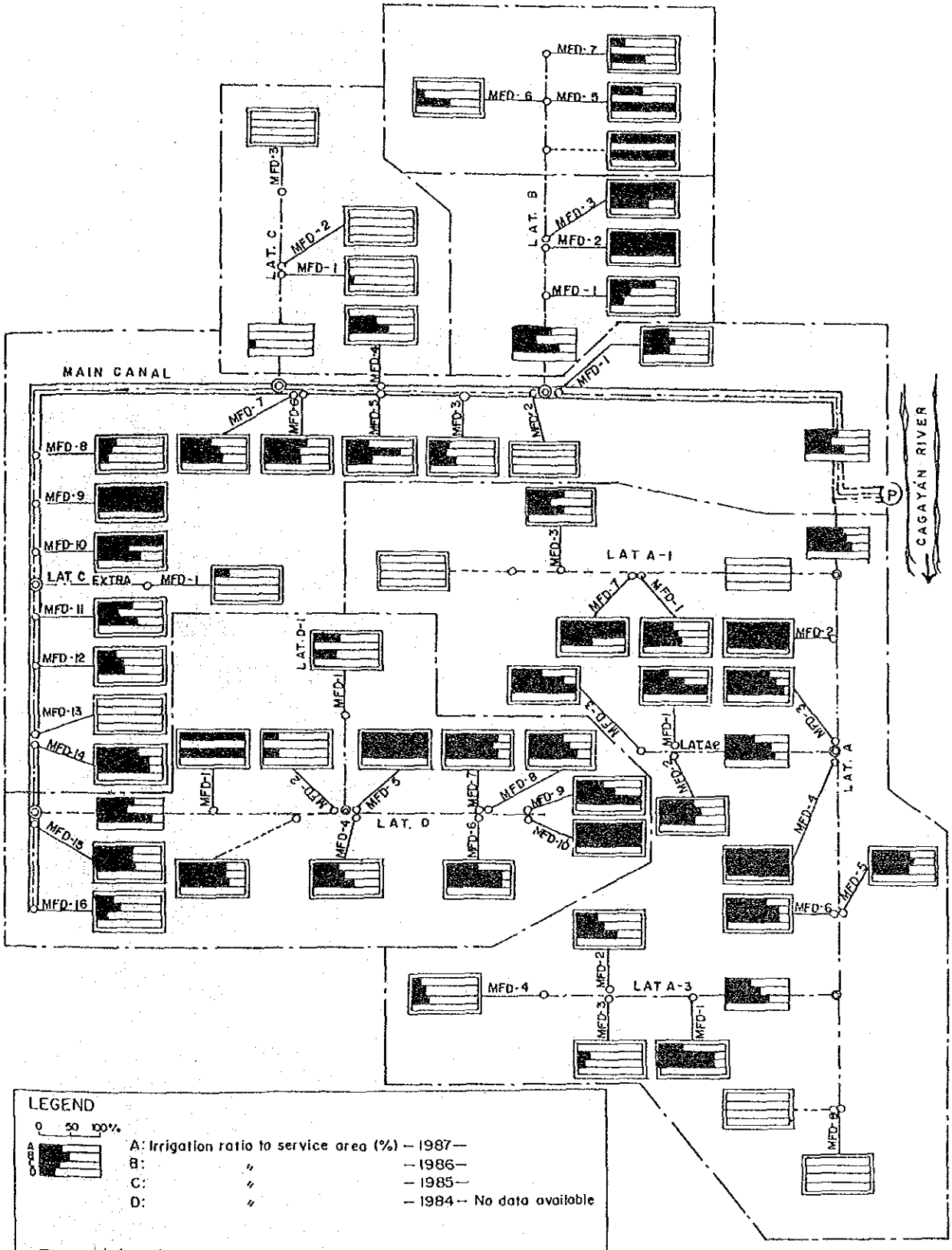


Fig. 1.1(8/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR DRY SEASON (1985-1987)
ALCALA-AMULUNG

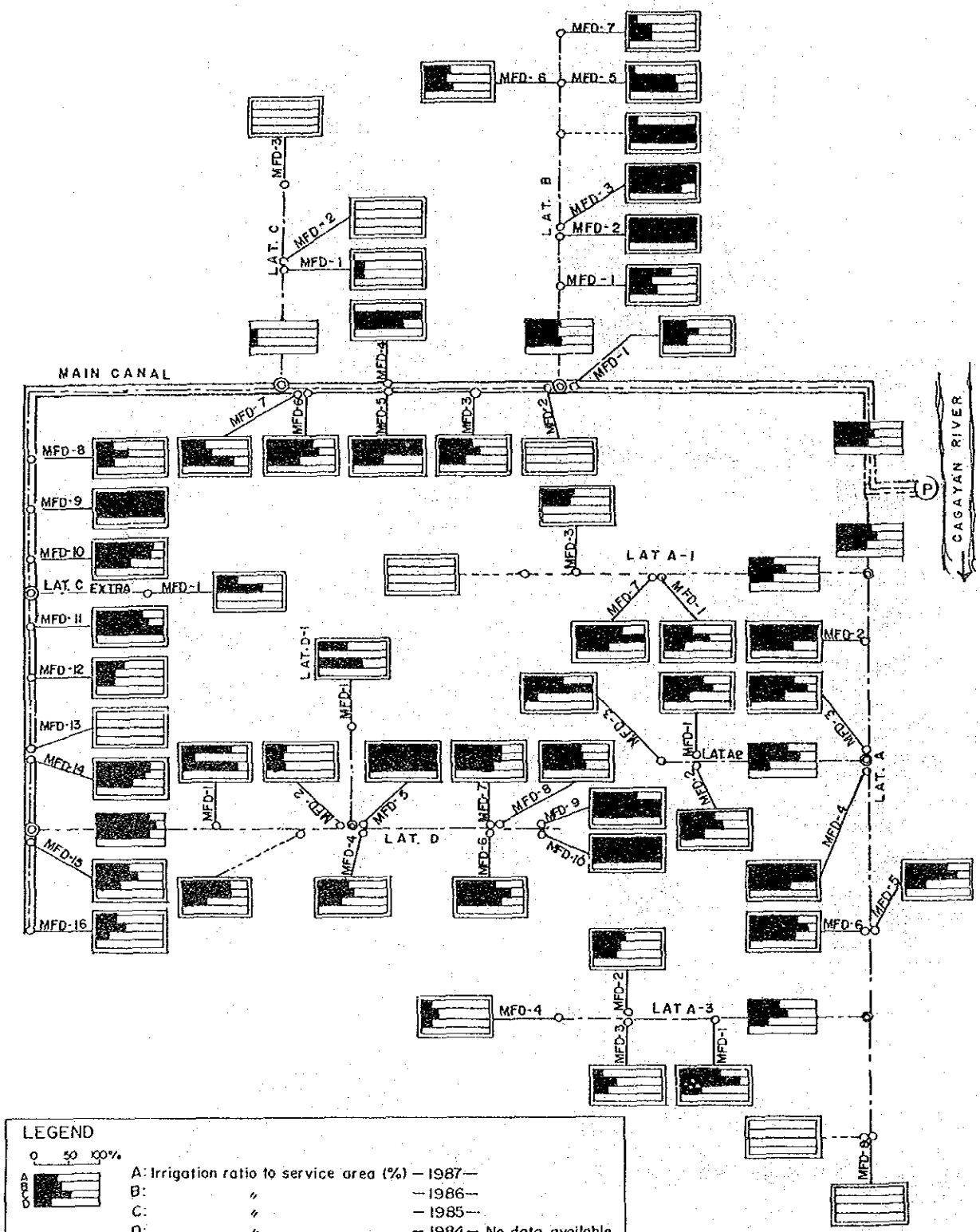


Fig. 1.1(9/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR WET SEASON (1983-1986) SOLANA

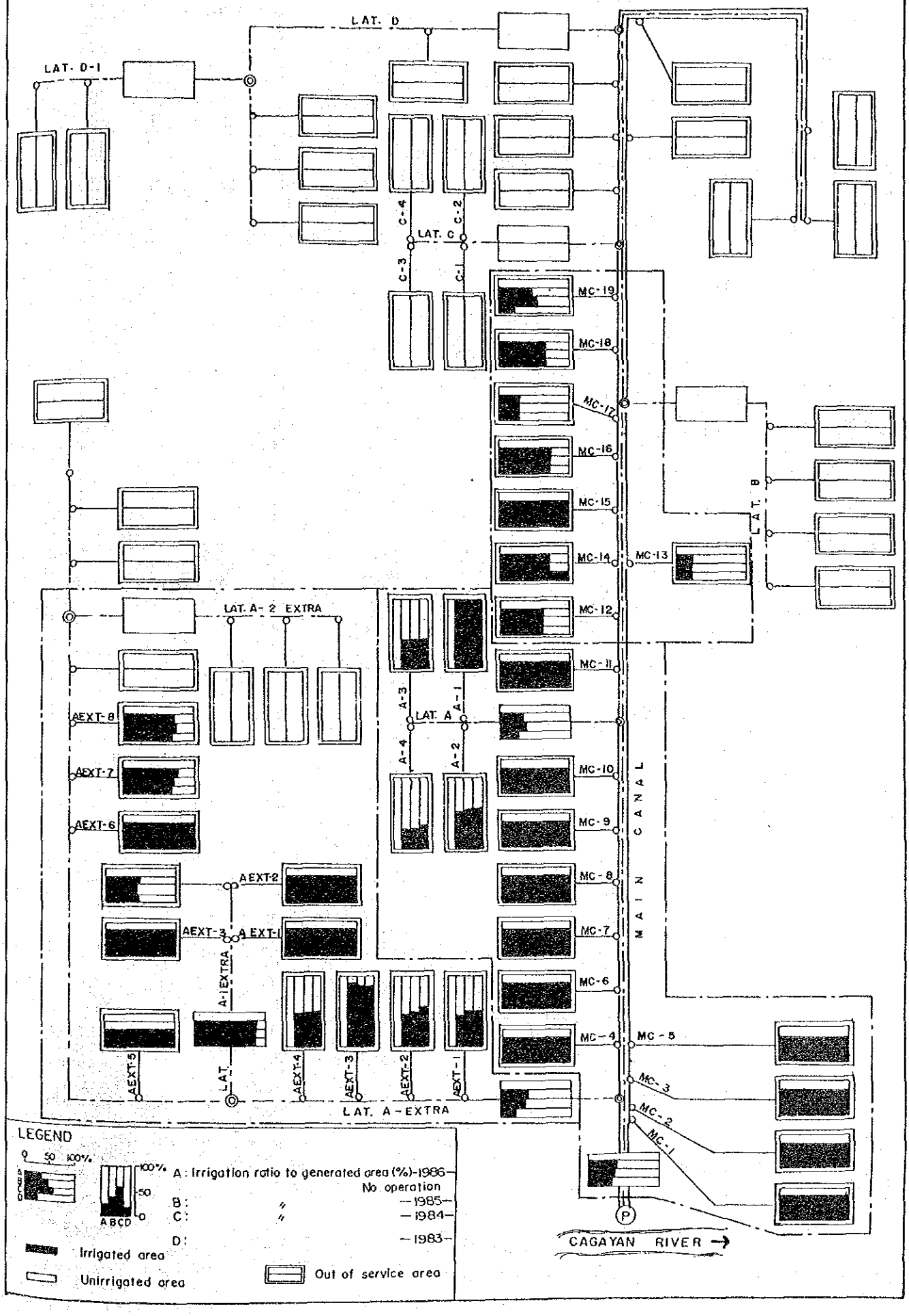


Fig. 1.1(10/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR DRY SEASON (1984-1987) SOLANA

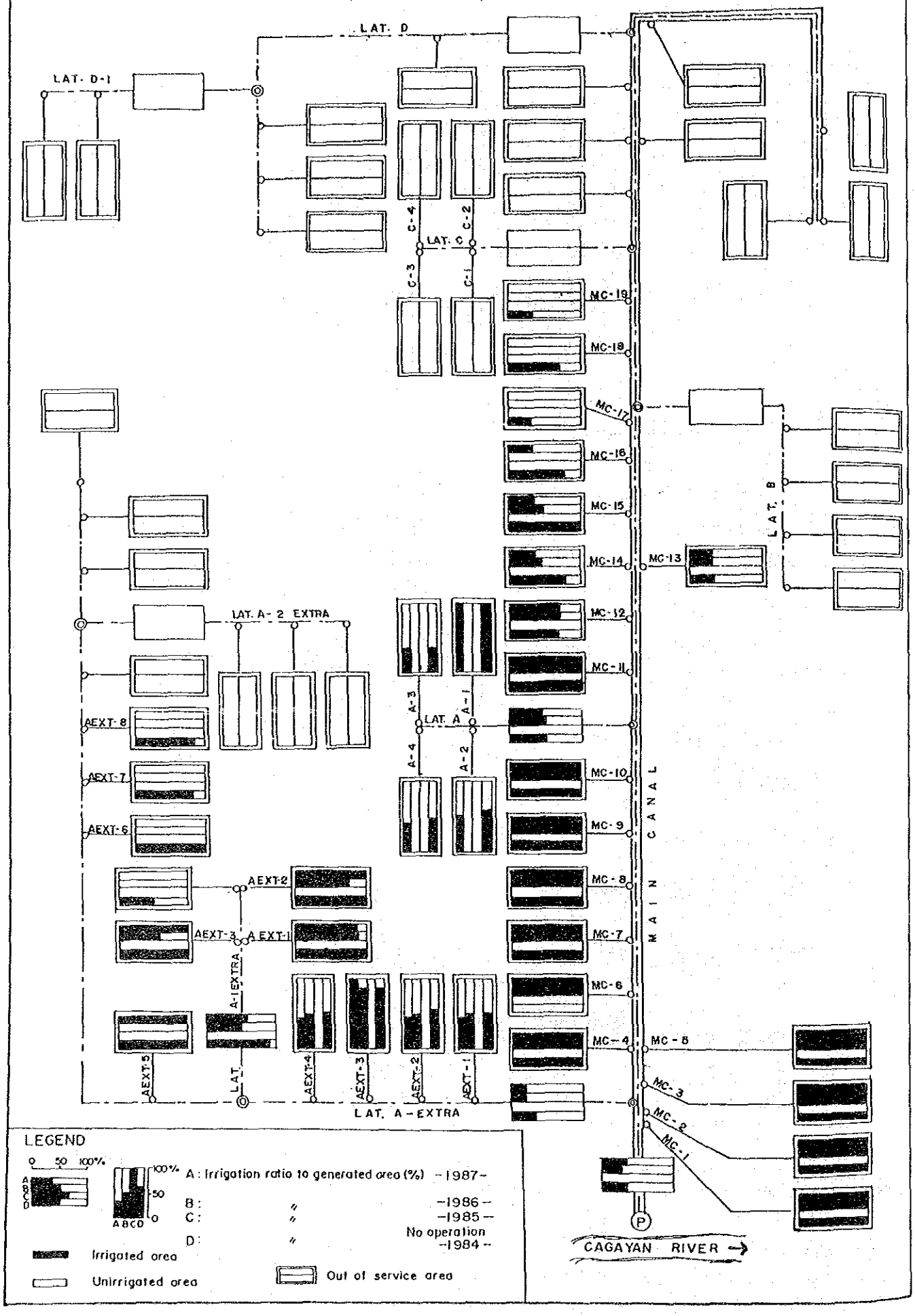


Fig. 1.1(11/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR WET SEASON (1983-1986)
LIBMANAN-CABUSAO

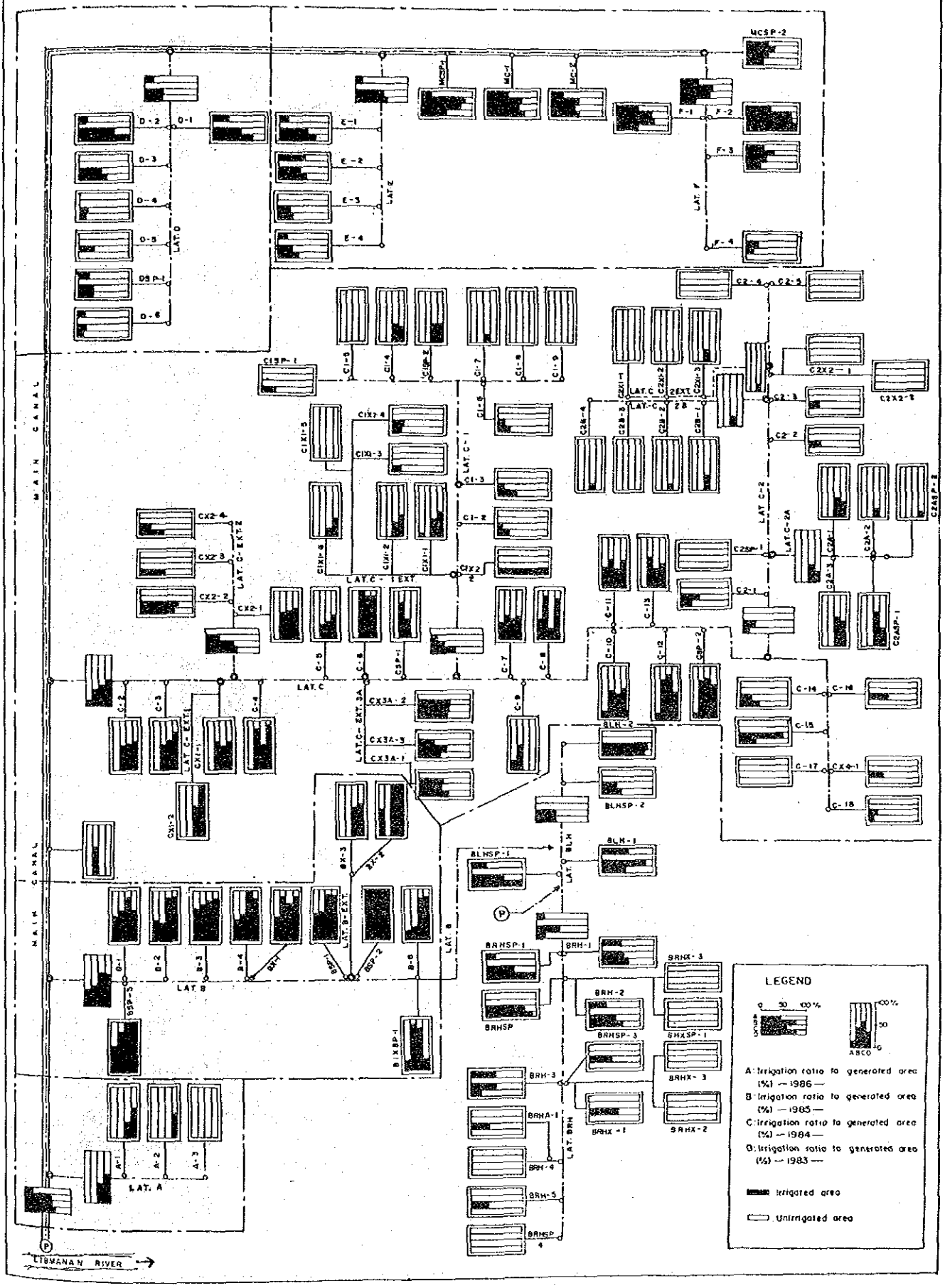


Fig. 1.1(12/12) SCHEMATIC DIAGRAM BY IRRIGATED AREA
FOR DRY SEASON (1983-1986)
LIBKANAN-CABUSAO

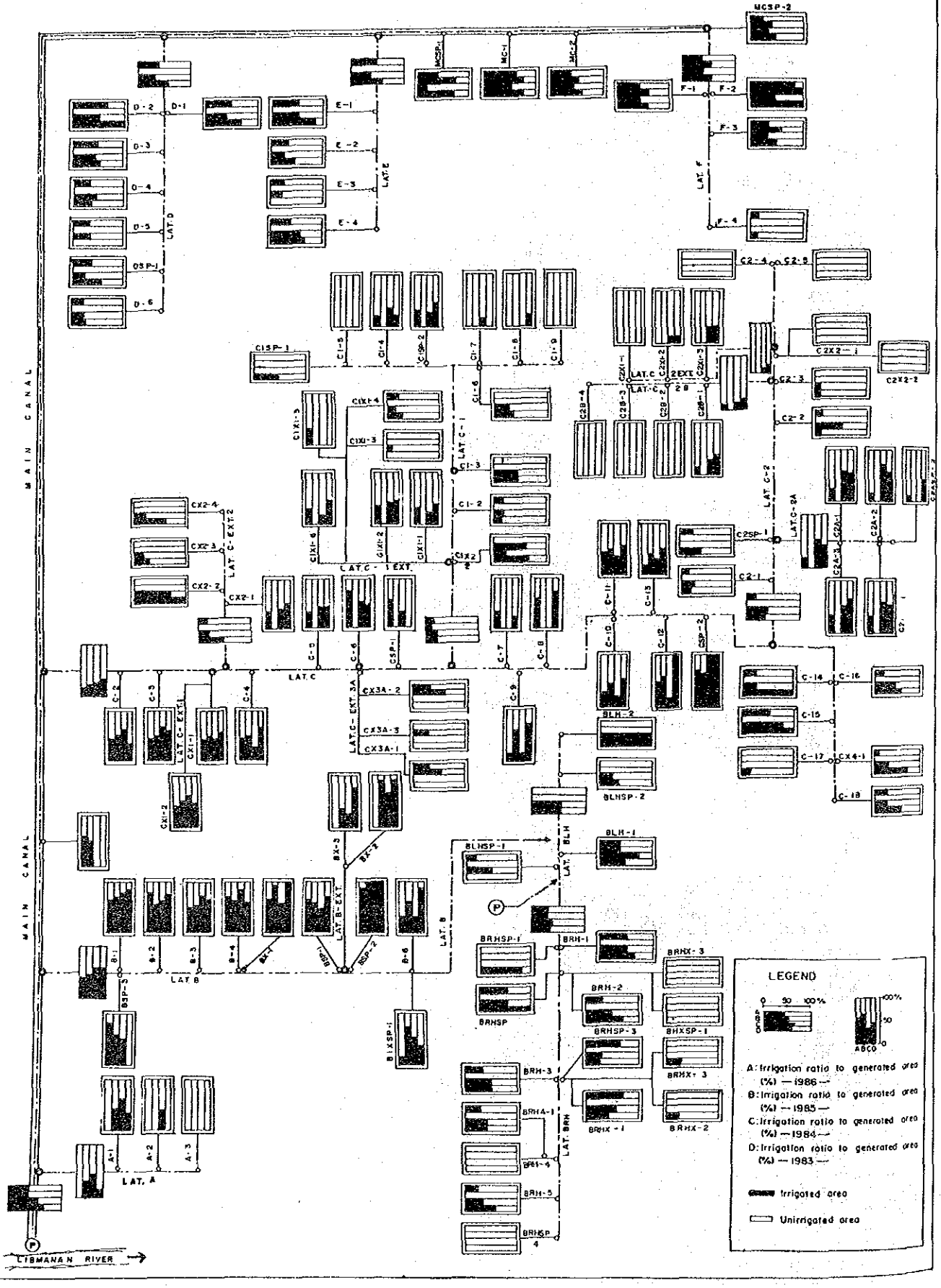
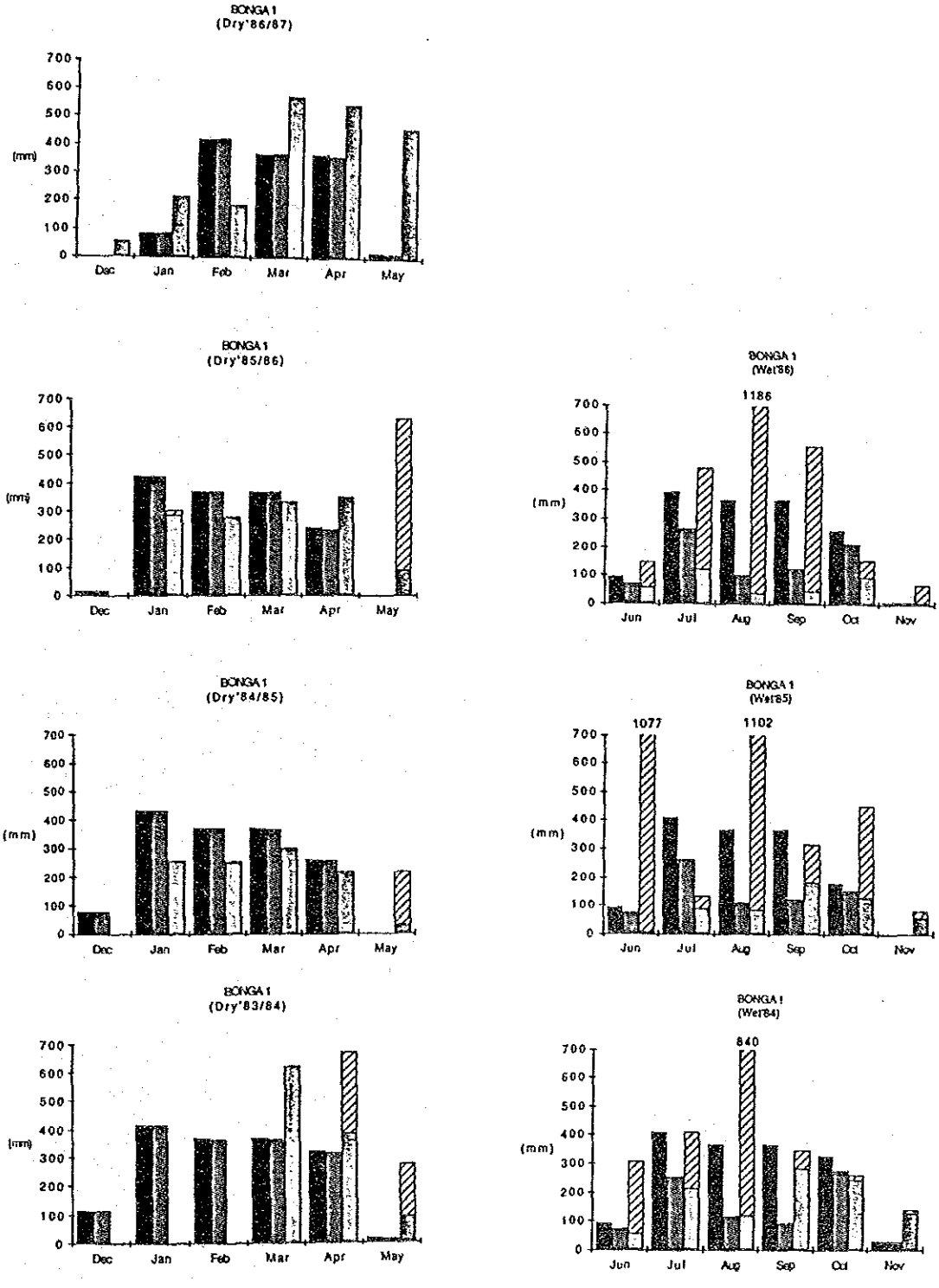
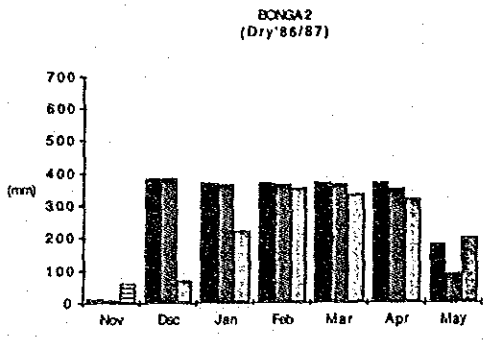


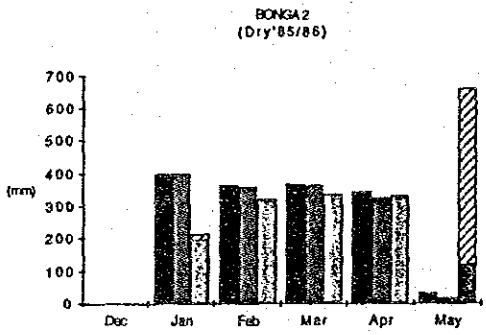
Fig 1.2 (1/6) COMPARISION BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Bonga Pump #1 Irrigation System

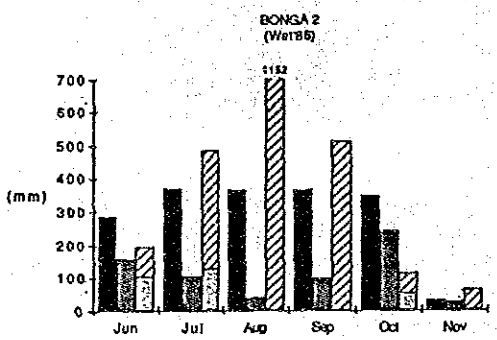


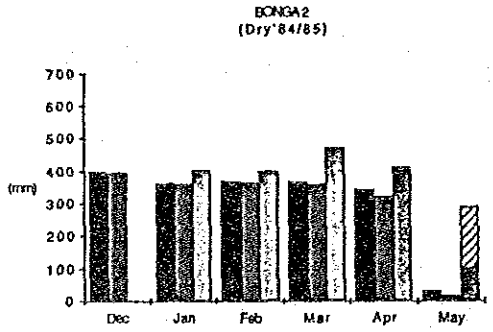
Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data

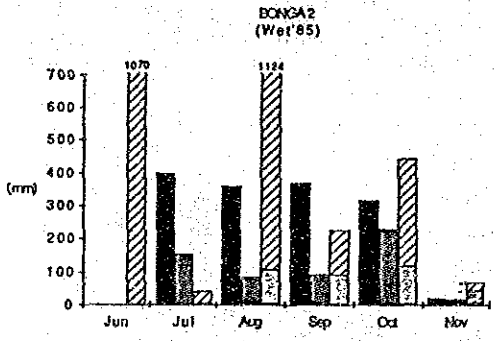
Fig 1.2 (2/6) COMPARISION BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Bonga Pump #2 Irrigation System





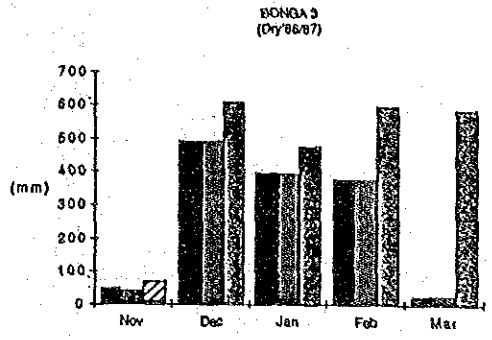


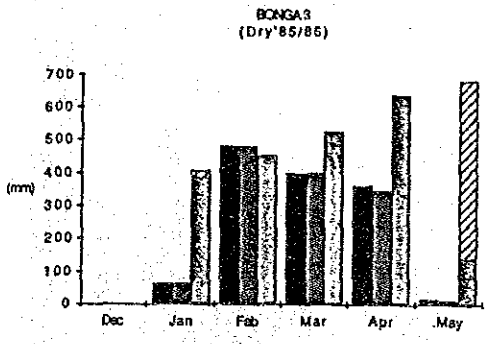


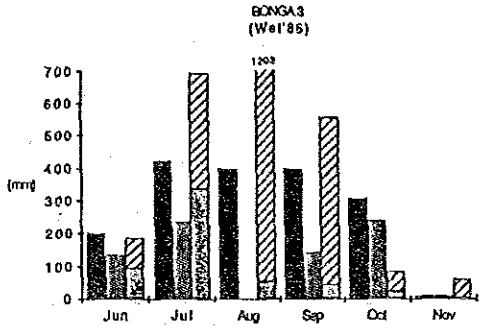


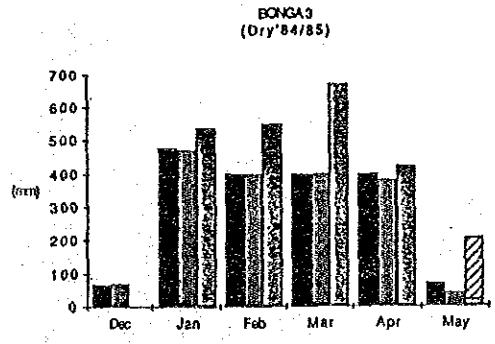
Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data

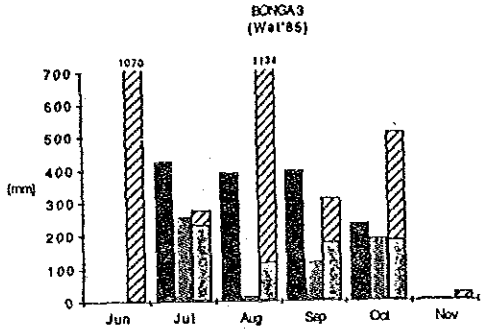
Fig 1.2 (3/6) COMPARISION BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Bonga Pump #3 Irrigation System





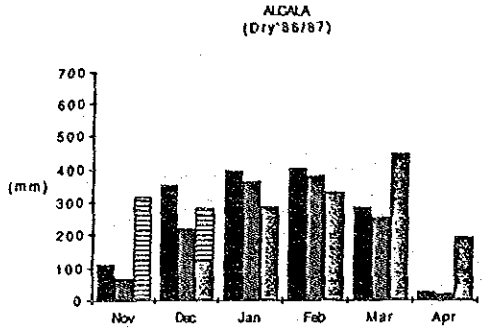


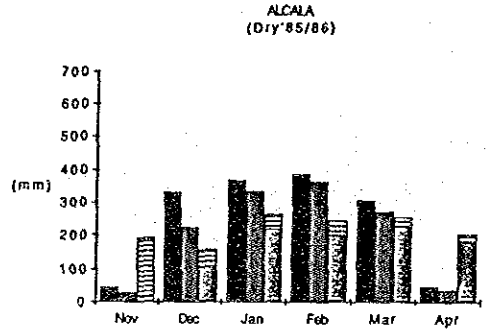


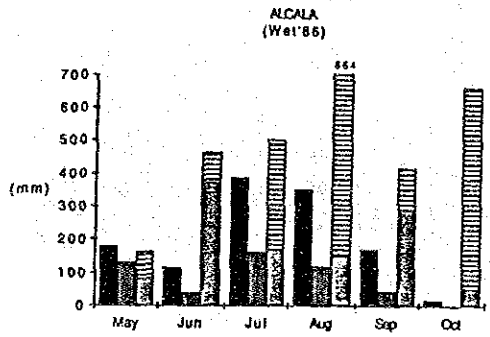


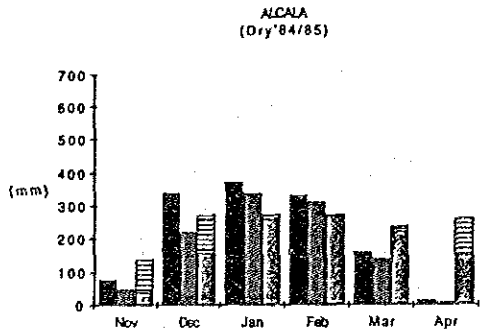
Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data

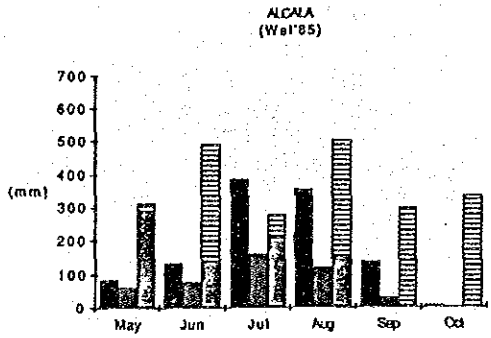
Fig 1.2 (4/6) COMPARISON BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Alcala-Amulung Pump Irrigation System





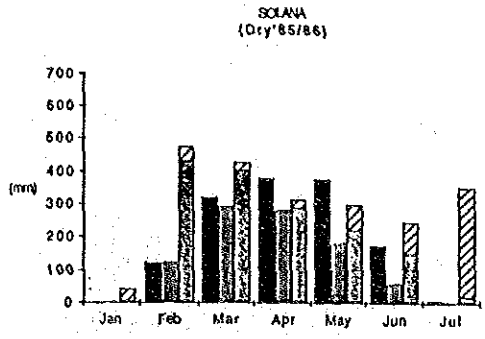


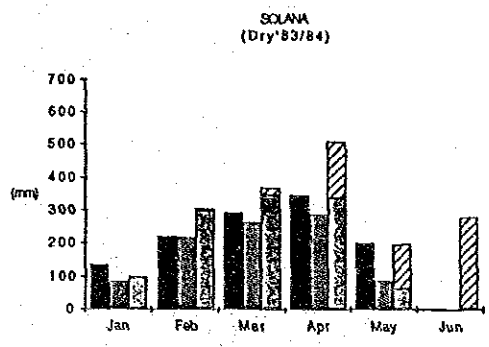


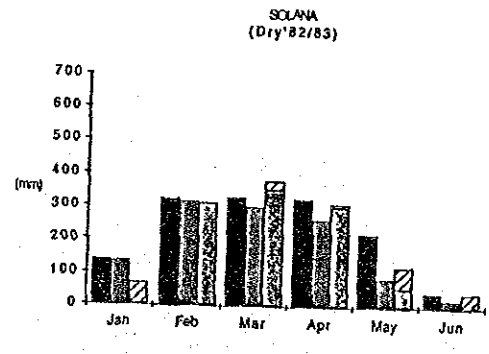


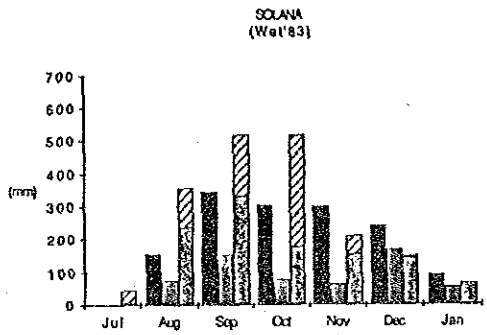
Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data

Fig 1.2 (5/6) COMPARISION BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Solana Pump Irrigation System



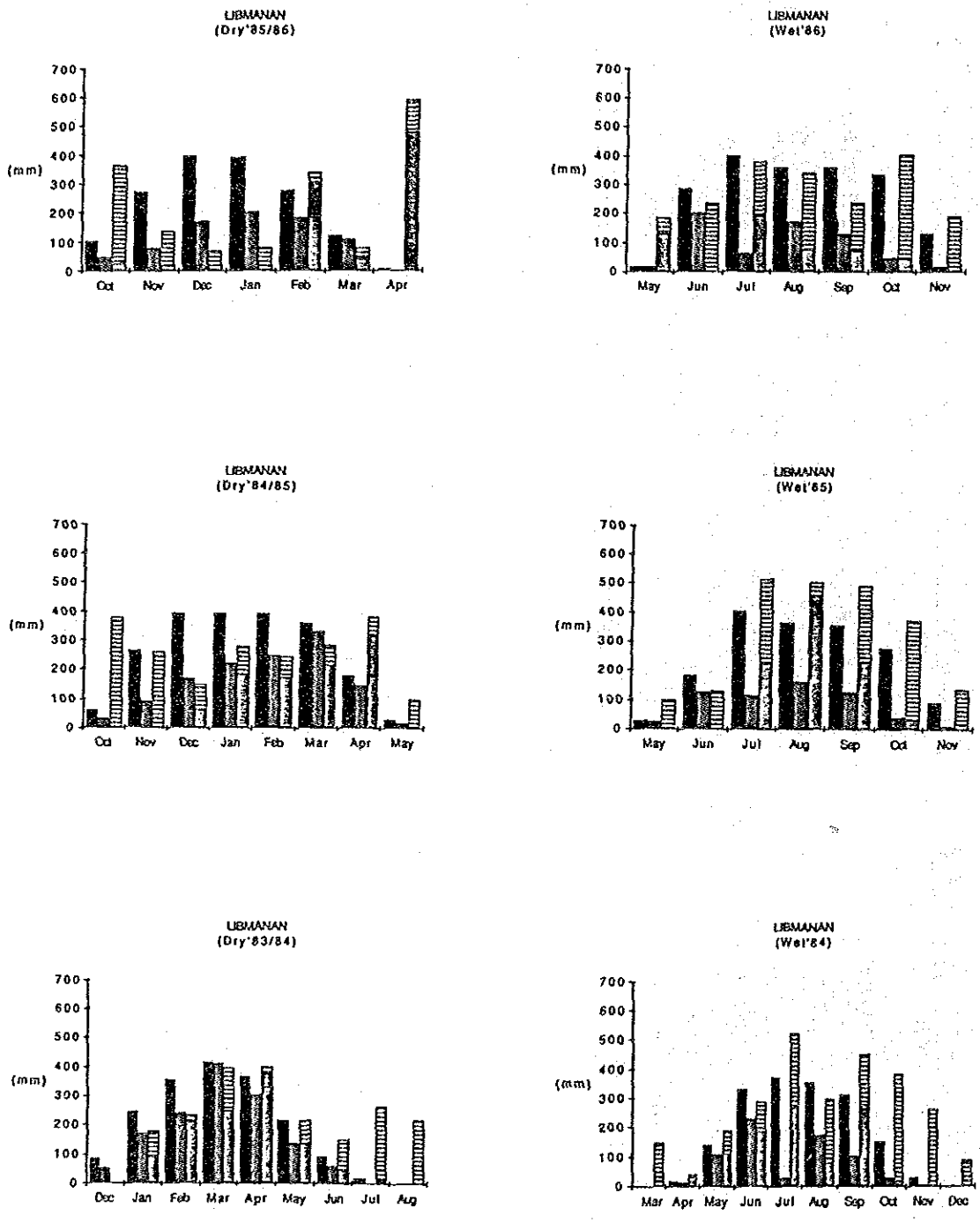






Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data

Fig 1.2 (6/6) COMPARISON BETWEEN WATER REQUIREMENT AND WATER DIVERTED
Libmanan-Cabusao Pump Irrigation System



Diversion Water Requirement(No effective rainfall is considered)
Diversion Water Irrigation Requirement
Irrigation Water Diverted
Rainfall
NRD: No Rainfall Data