第8章　勧　　告

(1) 南スラウェシ州中部地域の予備調査が１９７３年に国際協力事業団によって着手されてから約７年が経過した。調査開始以来，関係者はこの地域の開発事業が早期に実施されることを熱望している。マスタープランは，南スラウェシ州中部の地域開発の先駆として，ランケメかんがい開発計画に重要な役割を与えた。種々の現地調査を基に，本計画のフィージビリティスタディが行なわれ，この先駆事業の実施が技術的，経済的に妥当であることが明らかにされた。以上のことから，調査団は，本計画の早期着工を強く勧告する。

(2) 本計画の実施を首尾よく進めるために，本計画の次の段階である詳細設計と施工のために，かなりの補足調査が必要となる。必要な補足調査は，計画取水地点の地質（ボーリング）調査，幹線，連絡水路および附帯構造物の基礎と建設材料に関する土質調査，計画水路の路線測量と水路構造物地点の地形測量，必要に応じた取水堰の模型実験などである。本計画の建設工事着工を早めるために，上記の補足調査はできる限り早く実施すべきである。

(3) 本計画の水源となる，ランケメ，セロ両河川およびワラナエ川の７小支川の流域約５４０km^2の内森林はわずか３５％にすぎない。しかも，無制限な開墾と放牧によって，その森林資源もしだいに涸渇しつつある。このような状況をふまえて，土地および水源保全のために流域内の植林事業の推進を強く勧告する。この植林事業は関連流域における流況の安定，洪水調節，および土壌浸食の防止等に著しい貢献をするものと思われる。

問題となる流域に関して，現在縮尺の１／５,０００の地形図がないが植林および土壌保全のための施設計画に当って，適当な縮尺の地形図が早急に準備されるべきである。

(4) 水位観測所の不足のため，計画地区内およびその周辺の水文資料が非常に少ない。本計画の詳細設計，将来の施設維持，管理運営および，将来の水資源開発のために，計画地区と流域を含む周辺地域と水位観測所および雨量観測所を新設するなどして，既存の水文観測網を整備強化しなければならない。

(5) 比較的発達した農業の現状を考慮して，本計画では作付体系として，稲作－水田裏作物－稲作という三毛作が取り入れられた。この作付体系を実践するには，近代的な耕種法と適確な水管理が必要である。このことは，現行のかんがいおよび耕種法を徹底的に改良せねばならない。地区内に試験農場を設置し，本計画で導入される作付体系を計画地区に定着させることが不可欠と思われる（試験農場についての詳細は付録－１に示す）。

(6) 集約的農耕を容易にするためには，農道の整備がその基本となる，約６７kmにおよぶ管理用道路がランケメ幹線水路と二次水路（連絡水路）に沿って建設される。計画地区

の道路網は，本計画の実施により整備され，その設置密度は１７ｍ／haから２６ｍ／haに引き上げられる。

既存道路の舗装率は約７０％で，道路密度も比較的低いが，現在の人力耕作が続けられる限り，特に問題はない。しかし計画地区周辺の地域経済構造が将来，機械化により漸次変化し，上記の道路網の一層の開発が必要となることも予想される。

このためには，特別の開発資金の措置がなされねばならない。

(7) 農業開発を促進するために，現行の農業普及組織の充実を計る必要がある。このためには普及員の増員と充分な予算の配分が必要となろう。特に，効果的な農業普及制度のもとに，共同組合の拡充がなされるべきである。１９７９年に開始されたインスス計画は，現地農業普及員の徹底した指導によって，自発的に組織された農民グループの共同耕作に助力した。このインスス計画の実施によって，１９７９／８０年には平均収量が1ton当たり7tonを上まわった地域もある。本計画のかんがい地区においても，上記のインスス計画の導入が強く求められる。

(8) 計画地区内の既存Desaかんがい地区は全て計画に組込まれる。これらDesaかんがい地区のウルウル制度は先進的な水利組合であるP_3Aに再編される。限られた水資源の有効な利用が，事業成功のカギとなる。従って，事業実施に先立って，近代的な水利組合が設立され，スムーズに事業の運営ができるようにすべきである。

(9) 政府の方策に従って，本計画の作付体系に水田裏作を取り入れた。本計画地区における水田裏作は小規模に行われ，ある程度の経験があるが，更に耕作技術の研究によって，畑作の一層の改良が必要となる。これらの研究の成果は，現行の普及組織を通じて，地域農民に宣伝普及されなければならない。

(10) 既存の精米機の容量は，米の増収に十分対応できるが，大部分の精米機はもみすりと精白を同時に行なう単行程方式であるため砕米が多くなる。米の市場価値をたかめるため，もみ乾燥をも含めた精米施設の改良が必要である。

(11) 計画地区内での内水面漁業，特に幹線水路や，取水堰直上流における淡水漁の養殖は，農民に農家経営の拡大の良い機会を与え，その可能性も高い。しかし，水田内での養魚は，水稲栽培の方法（稲の成熟期に落水する），農薬の使用，加えて養魚に適した水深の確保など種々の問題があり，その実現はかなり困難である。

これらの状況をふまえて，今後の内水面漁業の調査，研究が積極的に進められるべきである。

付　　表

表 4.5.1　既存かんがい施設

Inventory of Scheme	Name of Scheme	Grade of System	Net Irrigable Area (ha)	Canal Density (m/ha)	Inventory of Intake Structure	Grade of Intake Structure
2.	Cennae	Semi-Technical	210	20	2	C
3.	(Madenra-I)	Non-Technical	9	50	3	C
4.	(Madenra kanan)	Non-Technical	23	50	3,4	C
5.	Madenra	Non-Technical	26	30	4	C
6.	(Tokebbeng kiri)	Non-Technical	14	40	5,6	C
7.	Tokebbeng	Non-Technical	106	20	5,8	C
8.	(Congko I)	Non-Technical	61	10	7,9	C
9.	(Congko II)	Non-Technical	37	20	10	C
10.	(Pakkali kanan)	Non-Technical	50	30	11,12,13,15	A(11), C(12,13,15)
11.	Pakkali	Semi-Technical	65	100	11,14,16,17	A(11), C(14,16,17)
12.	(Labessi kanan)	Non-Technical	45	20	18	C
13.	Labessi-I	Semi-Technical	186	50	19,20,23	A(20,23), C(19)
14.	Latasi	Semi-Technical	43	50	20,21,22	A(22), C(20,21)
15.	Kadeppe	Non-Technical	54	50	33	C
17.	Timusu	Non-Technical	131	60	34,35	C
18.	Tenga Padange-I	Non-Technical	70	50	36,37	C
19.	Tenga Padange-II	Non-Technical	204	30	38	C
20.	Kalempang	Non-Technical	113	40	39	C
21.	Attebunge	Non-Technical	156	40	40	C
22.	Labessi-II	Semi-Technical	118	20	24,26	A(24, Aqueduct), C(26)
23.	(Kalempang-I)	Non-Technical	18	30	41	C
24.	(Jawi-Jawie)	Non-Technical	86	40	42,43,44	C
25.	(Pattojo)	Non-Technical	29	90	45	A
26.	Tossiabeng	Non-Technical	97	30	50	C
27.	Latana	Non-Technical	236	30	48,49,51,52	C
28.	Lamogo	Semi-Technical	478	30	54	A
29.	Ompo Pattojo	Semi-Technical	175	10	46,47	C
30.	Rompe Cadung	Semi-Technical	90	30	53	C
31.	Cenranae	Semi-Technical	41	20	28,29	C
32.	(Lamanggarae)	Non-Technical	26	20	30	C
33.	Togigi	Non-Technical	60	50	55	C
34.	(Kubba kanan)	Non-Technical	93	30	56	C
35.	Kubba	Non-Technical	46	20	57	C
36.	Talagae	Non-Technical	60	80	58	C
37.	Maccope-I	Non-Technical	377	20	60,64	C
38.	Maccope-II	Non-Technical	24	40	60	C
39.	Passammeng	Non-Technical	64	40	61,65	C
40.	Talagae	Non-Technical	196	20	58	C
41.	Mattimpajoe	Non-Technical	180	10	32	C
42.	Akampeng-I	Semi-Technical	80	70	67	C
43.	Belo	Semi-Technical	82	50	59	A
44.	(Soppeng)	Non-Technical	48	60	63	C
45.	(Passammeng kiri)	Non-Technical	72	30	62	C
50.	Akampeng-II	Semi-Technical	868	30	68	A
51.	Lalange	Semi-Technical	700	20	25,27	A(27), B(25)
52.	Cangadi	Non-Technical	60	10	-	-
53.	Lagarigi	Semi-Technical	332	20	31	A
55.	Malanroe	Non-Technical	46	60	66	C

Summary

	Scheme	Grade of System	Nos. of Scheme	Net Irrigable Area
1.	Desa Irrigation	Non-Technical	34	2,900
		Semi-Technical	10	1,400
	(Sub-Total)		44	4,300
2.	DPU Irrigation	Semi-Technical	4	2,100
	(Total)		48	6,400

表4.5.2　既存かんがい施設の水路密度

Inventory of Scheme	Name of Scheme	Irrigation Area	Tertiary Canal Length	Quarternary Canal Length	Total Canal Length	Canal Density
		(ha)	(m)	(m)	(m)	(m/ha)
2.	Cennae	210	1,140	3,060	4,200	20
3.	(Madenra I)	9	420	0	420	50
4.	(Madenra Kanan)	23	1,240	0	1,240	50
5.	Madenra	26	770	0	770	30
6.	(Tokebbeng kiri)	14	580	0	580	40
7.	Tokebbeng	106	2,510	0	2,510	20
8.	(Congko I)	61	340	520	860	10
9.	(Congko II)	37	820	0	820	20
10.	(Pakkali Kanan)	50	240	1,200	1,440	30
11.	Pakkali	65	4,550	2,070	6,620	100
12.	(Labessi kanan)	45	670	170	840	20
13.	Labessi-I	186	3,380	5,670	9,050	50
14.	Latasi	43	1,740	360	2,100	50
15.	Kadeppe	54	880	1,700	2,580	50
17.	Timusu	131	5,600	1,960	7,560	60
18.	Tenga Padange-I	70	3,320	0	3,320	50
19.	Tenga Padange-II	204	2,720	3,350	6,070	30
20.	Kalempang	113	3,700	620	4,320	40
21.	Attebunge	156	3,010	2,700	5,710	40
22.	Labessi-II	118	2,400	120	2,520	20
23.	(Kalempang I)	18	600	0	600	30
24.	(Jawi-Jawie)	86	2,100	1,530	3,630	40
25.	(Pattojo)	29	2,170	280	2,450	90
26.	Tossiabeng	97	1,970	750	2,720	30
27.	Latana	236	6,570	920	7,490	30
38.	Lamogo	478	1,080	13,400	14,480	30
29.	Ompo Pattojo	175	1,120	180	1,300	10
30.	Rompe Gading	90	2,510	140	2,650	30
31.	Cenranae	41	630	0	630	20
32.	(Lamanggarae)	26	420	110	530	20
33.	Togigi	60	2,950	0	2,950	50
34.	(Kubba kanan)	93	870	1,980	2,850	30
35.	Kubba	46	340	530	870	20
36.	Talagae	60	3,650	880	4,530	80
37.	Maccope-I	377	6,580	1,540	8,120	20
38.	Maccope-II	24	1,050	0	1,050	40
39.	Passammeng	64	2,820	0	2,820	40
40.	Talagae	196	3,470	190	3,660	20
41.	Mattimpajoe	180	1,870	540	2,410	10
42.	Akampeng-I	80	1,500	4,080	5,580	70
43.	Belo	82	2,640	1,630	4,270	50
44.	(Soppeng)	48	2,660	230	2,890	60
45.	(Passammeng kiri)	72	1,830	320	2,150	30
50.	Akampeng-II	868	6,330	8,500	14,830	30
51.	Lalange	700	2,720	3,210	5,930	20
52.	Cangadi	60	190	200	390	10
53.	Lagarigi	332	4,330	1,960	6,290	20
55.	Malanroe	46	1,210	1,490	2,700	60

表4.6.1. 過去5年間の米生産量（6,400 ha）

Year	Desa Non-technical Area			Desa Semi-technical Area			D.P.U. Semi-technical Area			Total		
	Planted Area (ha)	Unit Yield (ton/ha)	Production (ton)	Planted Area (ha)	Unit Yield (ton/ha)	Production (ton)	Planted Area (ha)	Unit Yield (ton/ha)	Production (ton)	Planted Area (ha)	Unit Yield (ton/ha)	Production (ton)
Wet Season Paddy												
1975	2,830	4.00	11,320	1,360	4.00	5,440	1,990	4.09	8,140	6,180	4.03	24,900
1976	2,830	4.19	11,860	1,050	4.29	4,500	2,020	4.85	9,790	5,900	4.42	26,150
1977	2,880	4.45	12,820	1,330	4.50	5,980	2,040	4.50	9,180	6,250	4.48	27,980
1978	2,900	4.77	13,830	1,400	4.77	6,680	2,100	4.75	9,980	6,400	4.76	30,490
1979	2,650	5.49	14,550	1,290	5.44	7,020	2,020	5.09	10,280	5,960	5.36	31,850
Average	2,818	4.57	12,880	1,286	4.59	5,930	2,034	4.64	9,470	6,138	4.60	28,280
Dry Season Paddy												
1975	2,260	4.78	10,800	1,170	4.86	5.690	1,410	5.33	7,510	4,840	4.95	24,000
1976	2,190	4.01	8,780	1,050	4.12	4,330	1,490	4.84	7,210	4,730	4.28	20,320
1977	1,870	4.38	8,190	870	4.51	3,920	1,220	5.12	6,250	3,960	4.62	18,360
1978	1,430	4.88	6,980	430	4.98	2,140	1,070	5.25	5,620	2,930	5.02	14,740
1979	1,890	5.18	9,790	1,020	5.18	5,280	1,400	4.54	6,360	4,310	4.99	21,430
Average	1,928	4.62	8,910	907	4.71	4,770	1,318	5.00	6,590	4,153	4.75	19,770
Total	4,746	-	21,790	2,193	-	10,200	3,352	-	16,060	10,291	-	48,050

Source: Agriculture Office, Kab. Soppeng and Kecamatan Office, Liliriaja, Lalabata, Marioriwawo and Lilirilau

表4.6.2　収量調査の結果（雨期作）

	Variety	Sampling Place (Kampung/Desa)	Nos. of Hills per m^2	Nos. of Panicles per Hill	Nos. of Grains per Panicle	1000 Grain Weight	% of Ripened Grains	Unit Yield/1 (paddy)	Unit Yield/2 (Dry Stalk Paddy)
			(Nos)	(Nos)	(Nos)	(gr.)	(%)	(ton/ha)	(ton/ha)
1.	IR36	Timparaja/Pattojo	21.0	22.8	52.6	22.8	72.0	4.13	5.40
2.	IR36	Tengngapa/Pattojo	22.3	18.0	96.2	23.7	80.6	7.38	9.65
3.	IR36	Janpu/Jampu	16.0	22.3	84.1	22.8	65.6	4.49	5.87
4.	IR26	Akampeng/Maccile	21.0	14.3	99.0	24.1	83.4	6.33	8.27
5.	C4-63	Kallanroe/Maccile	18.7	15.0	111.3	25.1	58.0	4.54	5.93
6.	IR30	Belo/Belo	16.3	25.9	93.5	21.8	66.0	5.68	7.44
7.	IR36	Launga/Calung	20.7	16.3	101.4	21.5	64.8	4.77	6.24
8.	Local	Kubba/Lalabatarilau	14.7	8.0	168.1	26.0	68.7	3.53	4.61
9.	IR36	Lawara/Pattojo	20.3	18.8	71.6	24.0	77.3	5.07	6.63
10.	IR36	Awo/Jennae	20.3	20.0	86.6	21.4	55.9	4.21	5.50
11.	IR36	Tokebbeng/Watu	20.7	20.2	109.2	21.7	73.6	7.29	9.53
12.	IR36	Tokebbeng/Watu	20.3	22.0	77.8	21.3	77.8	5.76	7.53
13.	IR36	Toddalobo/Pattojo	18.7	20.3	58.5	20.1	78.7	3.51	5.59
14.	IR26	Makuntung/Botto	19.7	13.4	93.7	21.4	60.8	3.22	4.21
15.	Local	Malaka/Ompo	12.4	7.2	185.3	22.5	76.9	2.86	3.74
16.	Local	Salokaraja/Ompo	15.1	7.3	172.4	26.5	60.0	3.02	3.95
17.	IR36	Cangadi/Ompo	22.0	27.8	61.9	20.8	61.9	4.87	6.37
18.	C4-63	Cenrana/Ompo	15.3	12.6	66.4	30.5	85.1	3.32	4.34
19.	Citarum	Paoe/Ompo	11.3	25.7	89.1	26.7	69.8	5.16	6.77
20.	IR36	Pattojo/Pattojo	21.7	15.3	81.1	22.0	68.0	4.03	5.27
21.	IR38	Mallanroe/Maccile	16.6	17.5	94.6	21.2	62.9	3.66	4.78
22.	IR36	Mallanroe/Maccile	17.3	23.5	85.2	21.2	68.2	4.98	6.51

/1 : Unit Yield (Paddy) = Nos. of hills per m^2 x Nos. of panicles per hill x Nos. of grains per panicle x % of ripened grains x 1,000 grain weight ÷ 1,000 x 10,000 m^2

/2 : Conversion rate of paddy / Dry stalk paddy = 76.5/100

表 4.6.3　収量調査の結果（乾期作）

	Variety	Sampling Place (Desa/Kecamatan)	Nos.of Hills per m^2	Nos.of Panicles per Hill	Nos.of Grains per Panicle	1000 Grain Weight	% of Ripened Grains	Unit Yield/1 (paddy)	Unit Yield/2 (Dry Stalk Paddy)
			(Nos)	(Nos)	(Nos)	(gr.)	(%)	(ton/ha)	(ton/ha)
1.	C4 - 63	Baru/Lalabata	15.2	10	61.4	21.5	69.2	1.39	1.62
2.	IR - 30	Labessi/Marioriwawo	20.0	22	57.7	24.7	53.9	3.38	4.42
3.	IR - 30	Galung/Liliriaja	17.3	26	115.9	21.1	73.6	8.12	10.61
4.	IR - 32	Otting/Dua Pitue	18.8	20	75.8	23.7	77.6	5.23	6.84
5.	Local 46	Otting/Dua Pitue	15.3	14	120.4	22.5	75.0	4.40	5.75
6.	IR - 32	Lanairang/Dta Pitue	15.3	23	90.6	24.3	80.3	6.22	8.13
7.	IR - 26	Baru/Lalabata	16.0	20	114.6	21.3	64.5	5.03	6.57
8.	IR - 26	Baru/Lalabata	16.0	17	99.8	20.8	73.7	4.17	5.45
9.	IR - 5	Patangkai/Lappariaja	13.4	21	67.3	21.9	77.0	3.21	4.20
10.	IR - 5	Samaenre/Lappariaja	21.0	15	65.6	22.7	76.5	3.59	4.69
11.	C4 - 63	Maddumpa/Lalabata	16.0	15	63.1	22.1	70.4	2.35	3.07
12.	IR - 26	Attangsolo/Marioriawa	21.8	26	104.8	21.0	66.4	8.29	10.48
13.	IR - 5	Jenreng Palie/Lappariaja	16.0	16	105.1	26.8	76.2	5.49	7.18

/1 : Unit Yield = Nos.of hills per m^2 x Nos.of panicles per hill x Nos.of grains per panicle x % of ripened grains x 1,000 grain weight ÷ 1,000 x 10,000 m^2

/2 : Conversion rate of paddy / Dry stalk paddy = 76.5/100

Source : Supporting Report (volume 2) of Master Plan for The Central South Sulawesi Water Resources Development Project, March 1980

表4.6.4　標準農家における農家経済の現状

Total Farm Land : 1.03 ha
- Paddy field : 0.61
- Up-land field : 0.42

Family Size : 5.53 persons

(Rp)

1. Gross Farm Income	
Wet season paddy	231,400
Dry season paddy	172,400
Polowijo crops	1,600
Up-land crops	19,900
Non-farm income	20,200
Sub-total	445,500
2. Gross Out-go	
Farming expenses	
Paddy	68,800
Polowijo crops/1	100
Up-land crops	1,700
Irrigation expenses	11,800
IPEDA tax, others	4,200
Sub-total	86,600
3. Net Farm Income	
(1 - 2)	358,900
4. Family Living Expenses	
Food	208,700
Residence	46,900
Clothing	38,300
Luxury	22,900
Education	18,600
Social-expenses	15,800
Miscellaneous	6,800
Sub-total	358,000
5. Net Reserve	
(3 - 4)	900

/1 : Polowijo crops planted after harvest of wet season paddy

表 5.3.1　水稲の耕種法

1.	Varieties	IR-28/IR-36
2.	Growing Period	105-110 days
3.	Amount of Seed	30 kg/ha
4.	Nursery Period	15 - 20 days
5.	Area of Nursery Bed	1/20 of paddy field
6.	Land Preparation	One time of ploughing and 2 time hallowing/puddling
7.	Planting Method	Transplanting
8.	Planting Density	30 cm x 15 cm, 3 seedlings/hill
9.	Planting Depth	3 cm from the surface
10.	Fertilization	
	- Nursery bed	5 kg or Urea
	- Paddy field	195 kg of Urea/ha 50 kg of TSP/ha 50 kg of KCl/ha
	Time in Paddy Field	
	All TSP and KCl	Basic dressing at land preparation time
	35% Urea	Basic dressing at land preparation time
	35% Urea	First top dressing at 15 days after transplanting time
	30% Urea	2nd top dressing in the late period of a young panicle formation stage
11.	Weeding	at 15th, 30th and 50th day after transplanting
12.	Application of Chemicals	Insecticide 3 lt/ha Fungicide 1 lt/hr Rodenticide 100 gr/ha
13.	Water Control	
	. Transplanting to rooting period	Deep water depth
	. Most tillering period	Shallow water depth with intermitted irrigation
	. Neck-node differentiation period upto panicle formation period	Drying method
	. Full ripening period to harvested	Water drained
14.	Harvesting	By sickle

Note : This table compiled on the basis of data obtained from Central Research Institute for Agriculture, Bogor and Agriculture Office in Kab. Soppeng.

表5.3.2　水田裏作物の耕種法

	Maize	Groundnuts	Greenbeans	Soybeans
1. Varieties	BAKU BAKU, IMPA IMPA KURETEK KUNING, MENADO KUNING	GAJAH SWARCH	BAKTI B - 129 SIWALIK	ORBA DAVROS RINGGIT
2. Growing Period	75 - 90 days	85 - 100 days	65 - 75 days	80 - 95 days
3. Amount of Seed	30 - 50 kg/ha	80 - 100 kg/ha	25 - 30 kg/ha	40 - 50 kg/ha
4. Land Preparation	———	2 times of Ploughing and Hallowing		———
5. Planting Method	———	Direct seeding		———
6. Planting Density	50 cm x 100 cm	25 cm x 25 cm	30 cm x 50 cm	30 cm x 50 cm
7. Fertilization				
Basic dressing	100 kg/ha of Urea 100 kg/ha of TSP	50 kg/ha of Urea 100 kg/ha of TSP	50 kg/ha of Urea 100 kg/ha of TSP	50 kg/ha of Urea 100 kg/ha of TSP
Top dressing	150 kg/ha of Urea	25 kg/ha of Urea	50 kg/ha of Urea	50 kg/ha of Urea
8. Weeding	———	at 10th, 30th and 60th day after seeding		———
9. Application of Chemicals				
Insecticide	2 lt/ha	2 lt/ha	2 lt/ha	2 lt/ha
Rodenticide	100 gr/h	100 gr/ha	100 gr/ha	100 gr/ha
10. Water Control	———	Intermittent Irrigation (5 - 10 day Interval)		———

Note : This table compiled on the basis of data obtained from Central Research Institute for Agriculture, Bogor and Agriculture Office in Kab. Soppeng.

表5.3.3　計画地区内外の米の単位収量（1975—1979）

Unit : dry stalk paddy (tons/ha)

Kec./Desa	Wet Season Paddy						Dry Season Paddy					
	1975	1976	1977	1978	1979	Ave.	1974/75	75/76	76/77	77/78	78/79	Ave.
Lalabata												
Maccile	3.85	3.65	4.85	5.11	5.25	4.54	3.15	3.15	3.74	3.73	4.56	3.67
Lalabatarilau	3.75	3.49	4.67	4.95	5.16	4.40	3.04	3.62	3.62	3.73	4.43	3.69
Lilirilau												
Pajalesang	4.30	3.80	4.64	5.58	5.85	4.83	4.90	5.07	5.30	5.38	3.42	4.41
Macanre	-	-	3.04	4.08	4.35	3.82	-	-	-	-	-	-
Liliriaja												
Ganra	3.29	4.98	4.33	4.62	4.62	4.37	5.56	4.37	5.01	5.19	5.02	5.03
Belo	3.79	4.98	4.33	4.62	4.62	4.47	5.26	4.57	5.01	5.11	5.02	4.99
Galung	4.72	4.98	4.53	4.62	4.86	4.74	5.26	5.17	5.01	5.19	5.15	5.16
Pattojo	3.99	4.98	4.53	4.62	5.03	4.43	5.46	4.37	5.01	5.19	5.21	5.05
Jennae	3.99	5.18	4.93	4.79	5.03	4.79	5.54	4.97	5.51	5.53	5.21	5.35
Marioriwawo												
Labessi	3.29	2.68	3.96	4.78	5.93	3.47	3.73	3.39	4.43	4.88	5.98	4.48
Tet. rarae	3.59	2.10	3.95	4.32	6.54	4.12	5.22	3.11	4.02	4.79	6.67	4.79
Watu	3.69	3.02	3.02	4.88	7.06	4.44	5.32	3.59	3.59	4.78	7.06	4.98
Goarie	3.60	2.68	3.96	4.71	6.96	4.26	5.23	3.39	4.43	4.79	7.06	4.84
Average	3.82	3.88	4.21	4.74	5.48	4.43	4.81	4.06	4.56	4.86	5.40	4.74

Source : Agriculture Office, Kab. Soppeng and Kecamatan Offices;
Liliriaja, Lalabata, Marioriwawo and Lilirilau.

表5.3.4　事業実施と実施しない場合の年間米収量（6,400ha）

	Without Project			With Project			Increment		
	W.S.P./1	D.S.P./2	Total	W.S.P./1	D.S.P./2	Total	W.S.P./1	D.S.P./2	Total
1. Planted Area (ha)									
- Desa non-tech. irri. area	2,818	1,928	4,746	2,900	2,900	5,800	82	972	1,054
- Desa semi-tech. irri. area	1,286	907	2,193	1,400	1,400	2,800	114	593	707
- D.P.U. semi-tech. irri. area	2,034	1,318	3,352	2,100	2,100	4,200	66	682	748
Total	6,138	4,153	10,291	6,400	6,400	12,800	262	2,247	2,509
2. Unit Yield (ton/ha)/3									
- Desa non-tech. irri. area	4.57	4.62	-	6.0	6.0	-	1.43	1.38	-
- Desa semi-tech. irri. area	4.59	4.71	-	6.0	6.0	-	1.41	1.29	-
- D.P.U. semi-tech. irri. area	4.64	5.00	-	6.0	6.0	-	1.36	1.00	-
3. Production (ton)/3									
- Desa non-tech. irri. area	12,900	8,900	21,800	17,400	17,400	34,800	4,500	8,500	13,000
- Desa semi-tech. irri. area	5,900	4,300	10,200	8,400	8,400	16,800	2,500	4,100	6,600
- D.P.U. semi-tech. irri. area	9,400	6,500	15,900	12,600	12,600	25,200	3,200	6,100	9,300
Total	28,200	19,700	47,900	38,400	38,400	76,800	10,200	18,700	28,900

/1 : Wet Season Paddy

/2 : Dry Season Paddy

/3 : Dry Stalk Paddy

表5.3.5　計画地区内の乾燥穂付き籾の経済価格

- Import substitution price -

(Unit : Rp/ton)

1.	International Market Price (F.O.B. Bangkok)/1 US$368	230,000
2.	External Transportation Cost (Bangkok - Ujung Pandang)	8,125
3.	Port Handling Charge and Storing Cost (including cost of sacks)/2	5,290
4.	Inland Transportation Cost (Ujung Pandang - Watan Soppeng)	4,000
5.	Selling Price of Rice at Ex-mill Gate	247,415
6.	Conversion to the Price of Dry Stalk Paddy (0.52)	128,656
7.	Milling Charge	- 6,000
8.	Handling and Transportation Cost (Farm gate to mill)	- 2,700
9.	Economic Farm Gate Price of Dry Stalk Paddy	119,956 ≒ 120,000

Note; /1 : Source - Price prospects for Major Primary Commodities, IBRD, 1980

Projected price to 1985 in 1977 constant US dollars.

/2 : Handling charge at harbor 30 Rp/ton

Storing charge 7 Rp/ton/day x 180 days

Cost of sacks 4000 Rp/ton

表5.3.6　事業実施と実施しない場合の総生産費

	Without Project			With Project			Increment of Total Production Cost
	Planted area	Unit Production Cost	Total Production Cost	Planted Area	Unit Production Cost	Total Production Cost	
	(ha)	(Rp/ha)	(10^6Rp)	(ha)	(Rp/ha)	(10^6Rp)	(10^6Rp)
1. Wet Season Paddy							
- technical area	-	-	-	6,400	191,000	1,222.4	1,222.4
- semi-technical area	3,320	183,000	607.5	-	-	-	-607.5
- non-technical area	2,818	150,000	422.7	-	-	-	-422.7
Sub-total	6,138	-	1,030.2	6,400	-	1,222.4	192.2
2. Dry Season Paddy							
- technical area	-	-	-	6,400	199,000	1,273.6	1,273.6
- semi-technical area	2,225	192,000	427.2	-	-	-	-427.2
- non-technical area	1,928	162,000	312.3	-	-	-	-312.3
Sub-total	4,153	-	739.5	6,400	-	1,273.6	534.1
3. Polowijo Crops							
- maize							
- groundnuts	350	72,500	25.4	6,400	124,500	796.9	771.5
- soybeans							
Total (1+2+3)	10,641	-	1,795.1	19,200	-	3,292.9	1,497.8
Production cost per ha per year	-	280,500	-	-	514.500	-	234.000 (83.4%)
Production cost per ha per crop	-	168,700	-	-	171,500	-	2,800 (1.7%)

表5.5.1　ランケメ取水堰の設計諸元

Location	2.5 Km upstream of the confluence of the Sero river
Geology (observation)	Clay stone breccia
Riverbed Elevation	168.4 m
Weir Type	Fixed type Weir of Stone masonry
Crest EL.	170.0 m
Max. Weir Height	4.2 m
Crest Length	37.5 m
Scouring Sluice	2 m width x 2 nos.
Intake	2 m width x 2 nos.
Inverted Syphon	- Barrel type of reinforced concrete barrel - Barrel length of 46 m - Barrel section of 1.2 m x 1.2 m (1.8 m x 1.8m)

表5.5.2　セロ導水路上の取水堰の設計諸元

	Jupang	Unyi	Pising
Location	7.5 Km upstream of the confluence of the Pising river	0.5 Km upstream of the confluence of the Jupang river	3 Km upstream of the confluence of the Jupang river
Geology (observation)	breccia	breccia	breccia
Riverbed Elevation	176.2 m	175.4 m	172.8 m
Weir Type	tirol type weir	gabion weir	gabion weir
Crest Elevation	176.6 m	176.3 m	174.7 m
Crest Length	38 m	29 m	25 m
Intake	-	1 m x 2 nos.	1 m x 2 nos.

表 5.7.1 事業の財務費用

(US$)

Work Item	Local Currency	Foreign Currency	Total
I. Construction Cost			
(Work Division I)			
Preparation	260,000	-	260,000
Weir in Tributeries	417,000	100,000	517,000
Link Canal in NT Area	1,266,000	240,000	1,506,000
Tertiary Development	412,000	-	412,000
Land Aquisition	163,000	-	163,000
Sub-total	2,518,000	340,000	2,858,000
(Work Division II)			
Preparation	803,000	-	803,000
Langkemme Intake Weir	195,000	99,000	294,000
Langkemme Canal	1,875,000	3,631,000	5,506,000
Link Canal in ST Area	85,000	23,000	108,000
Tertiary Development	1,702,000	-	1,702,000
Land Aquisition	415,000	-	415,000
Sub-total	5,075,000	3,753,000	8,828,000
(Work Division III)			
Preparation	440,000	-	440,000
Sero Intake Weirs	108,000	26,000	134,000
Sero Diversion Canal	1,062,000	2,014,000	3,076,000
Link Canal in DPU Area	126,000	27,000	153,000
Tertiary Development	889,000	-	889,000
Land Aquisition	149,000	-	149,000
Sub-total	2,774,000	2,067,000	4,841,000
Total	10,367,000	6,160,000	16,527,000
II. Engineering Service	464,000	3,238,000	3,702,000
III. Administration Cost	384,000	-	384,000
IV. Physical Contingency (15%)	1,682,000	1,410,000	3,092,000
V. Price Contingency (L-10%, F-7%)	7,162,000	3,708,000	10,870,000
Grand Total	20,059,000	14,516,000	34,575,000

表5.7.2 修復費および維持管理費

Item	Amount (x 10^3 US$)		
	L/C	F/C	Total
I. Replacement Cost			
1) Gate incl. 15% of physical contingency (Durable period: 25 years)	39	78	117
2) Wooden bar, Gabion, Screen & Metal Works incl. 15% of physical contingency (Durable period: 10 years)	119	34	153
II. O/M Cost			
1) Personnel Costs	189	-	189
2) Depreciation Cost of O/M Equipment			
- Vehicle	30		
- O/M Equipment	103	-	
Sub-Total	133		133
3) Maintenance Cost for Facilities	22	-	22
4) Office & General Expenses			
- Gasoline	64		
- Office	15	-	
- General Expenses	32		
Sub-Total	111		111
5) Physical Contingency (15%)	68	-	68
Total	523	-	523

Note: Replacement cost above is amount per one replacement.

表7.2.1　事業実施と実施しない場合の純生産量

	Without Project			With Project			Increment		
	Paddy		Polowijo Crops	Paddy		Polowijo Crops	Paddy		Polowijo Crops
	W.S.P./1	D.S.P./2		W.S.P./1	D.S.P./2		W.S.P./1	D.S.P./2	
1. Planted Area (ha)	6,138	4,153	350	6,400	6,400	6,400	262	2,247	6,050
2. Gross Production Value (x 10^6Rp)	3,386.3	2,362.3	81.0	4,608.0	4,608.0	2,193.2	1,221.7	2,235.9	2,112.2
3. Total Production Cost (x 10^6Rp)	1,030.2	739.5	25.4	1,222.4	1,273.6	777.9	192.2	534.1	752.5
4. Net Production Value (x 10^6Rp)	2,356.1	1,632.8	55.6	3,385.6	3,334.4	1,415.3	1,029.5	1,701.6	1,359.7
5. Annual Net Production Value (x 10^6Rp)		4,044.5			8,135.3			4,090.8	
6. Proportion of Net Production Value by Each Crop (%)	58.4	40.4	1.3	41.6	41.0	17.4	25.2	41.6	33.2

/1 : Wet Season Paddy

/2 : Dry Season Paddy

表 7.2.2 かんがい便益

Description	W/O Project	W/Project	Increment
1. Planted Area (ha)			
- Wet season paddy	6,138	6,400	262
- Dry season paddy	4,153	6,400	2,247
- Polowijo crops	350	6,400	6,050
2. Unit Yield (ton/ha)			
- Wet season paddy			
non-technical irri. area	4.57	6.0	1.43
semi-technical irri. area	4.59	6.0	1.41
D.P.U. semi-tech. irri. area	4.64	6.0	1.36
- Dry season paddy			
non-technical irri. area	4.62	6.0	1.38
semi-technical irri. area	4.71	6.0	1.29
D.P.U. semi-tech. irri. area	5.00	6.0	1.00
- Polowijo crops			
maize	0.79	2.0	1.21
groundnuts	0.81	1.2	0.39
greenbeans	0.83	1.2	0.37
soybeans	0.67	1.2	0.53
3. Projected Prices of Paddy and Polowijo Crops (Rp/ha)			
- Dry stalk paddy	120,000	120,000	-
- Polowijo crops			
maize	92,000	92,000	-
groundnuts	351,000	351,000	-
greenbeans	310,000	310,000	-
soybeans	328,000	328,000	-
4. Unit Production Cost (Rp/ha)			
- Wet season paddy			
non-technical irri. area	150,000	191,000	41,000
semi-technical irri. area	183,000	191,000	8,000
- Dry season paddy			
non-technical irri. area	162,000	199,000	37,000
semi-technical irri. area	192,000	199,000	7,000
- Polowijo crops			
maize	34,000	113,000	79,000
groundnuts	96,000	142,000	46,000
greenbeans	80,000	122,000	42,000
soybeans	80,000	121,000	41,000
5. Gross Production Value ($x10^6$Rp) (1 x 2 x 3)	5,839.6	11,409.2	5,569.6
- Wet season paddy	3,386.3	4,608.0	1,221.7
- Dry season paddy	2,362.3	4,608.0	2,235.7
- Polowijo crops	81.0	2,193.2	2,112.2
6. Total Production Cost ($x10^6$Rp) (1 x 4)	1,795.1	3,273.9	1,478.8
- Wet season paddy	1,030.2	1,222.4	192.2
- Dry season paddy	739.5	1,273.6	534.1
- Polowijo crops	25.4	777.9	752.5
7. Net Production Value ($x10^6$Rp) (5 - 6)	4,044.5	8,135.3	4,090.8
- Wet season paddy	2,356.1	3,385.6	1,029.5
- Dry season paddy	1,632.8	3,334.4	1,701.6
- Polowijo crops	55.6	1,415.3	1,359.7
8. Crop Damages Due to Water Shortage ($x10^6$Rp)	0	274.8	274.8
- Wet season paddy	0	19.3	19.3
- Dry season paddy	0	47.5	47.5
- Polowijo crops	0	208.0	208.0
9. Adjusted Net Production Value (7 - 8) ($x10^6$Rp)	4,044.5	7,860.5	3,816.0
- Wet season paddy	2,356.1	3,366.3	1,010.2
- Dry season paddy	1,632.8	3,286.9	1,654.1
- Polowijo crops	55.6	1,207.3	1,151.7

表7.4.1　年次別事業費と便益

(× 10^3 US$)

Year	Economic Project Cost	O & M Cost	Replacement Cost	Total Cost (A)	Benefits (B)	Balance (B) - (A)
1982	1,022	-	-	1,022	-	-1,022
1983	4,461	-	-	4,461	-	-4,461
1984	5,851	94	-	5,945	9	-5,936
1985	4,981	189	-	5,170	162	-5,008
1986	5,192	283	-	5,475	478	-4,997
1987	205	378	-	583	1,246	663
1988	-	472	-	472	2,292	1,820
1989	-	472	-	472	3,319	2,847
1990	-	472	-	472	4,230	3,758
1991	-	472	-	472	5,115	4,643
1992	-	472	138	610	5,475	4,865
1993	-	472	-	472	5,660	5,188
1994	-	472	-	472	5,844	5,372
1995	-	472	-	472	6,003	5,531
1996	-	472	-	472	6,106	5,634
.	.	.	.	.	.	.
.	.	.	.	.	.	.
2002	-	472	138	610	6,106	5,496
2003	-	472	-	472	6,106	5,634
.	.	.	.	.	.	.
.	.	.	.	.	.	.
2007	-	472	105	577	6,106	5,529
2008	-	472	-	472	6,106	5,634
.	.	.	.	.	.	.
.	.	.	.	.	.	.
2012	-	472	138	610	6,106	5,496
2013	-	472	-	472	6,106	5,634
.	.	.	.	.	.	.
.	.	.	.	.	.	.
2022	-	472	138	610	6,106	5,496
2023	-	472	-	472	6,106	5,634
.	.	.	.	.	.	.
.	.	.	.	.	.	.
2031	-	472	-	472	6,106	5,634
Total	21,712	21,712	657	44,081	259,649	215,568

表7.4.2 経 済 便 益

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
A. Planted Area (ha)														
Desa non-technical irrigation area														
Wet season paddy	-	370	1,640	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
Dry season paddy	370	1,640	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
Polowijo crops	-	-	900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
Desa semi-technical irrigation area														
Wet season paddy	-	-	-	-	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Dry season paddy	-	-	-	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Polowijo crops	-	-	-	-	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
D.P.U. semi-technical irrigation area														
Wet season paddy	-	-	-	-	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Dry season paddy	-	-	-	200	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Polowijo crops	-	-	-	-	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
B. Direct Benefit by Crop ($\times 10^6$Rp)														
Desa non-technical irrigation area														
Wet season paddy	-	0.8	25.7	100.9	176.1	262.0	341.8	397.3	402.7	402.7	402.7	402.7	402.7	402.7
Dry season paddy	-	5.1	60.1	132.4	276.7	423.3	564.8	656.4	730.6	732.8	732.8	732.8	732.8	732.8
Polowijo crops	-	-	15.4	65.2	117.7	170.3	222.9	275.4	328.0	380.4	433.0	485.5	522.6	525.4
Desa semi-technical irrigation area														
Wet season paddy	-	-	-	-	52.7	105.4	158.0	210.7	263.4	263.4	263.4	263.4	263.4	263.4
Dry season paddy	-	-	-	-	75.0	151.1	227.2	303.3	379.4	380.5	380.5	380.5	380.5	380.5
Polowijo crops	-	-	-	-	24.5	49.1	73.6	99.5	124.0	148.6	173.1	197.6	222.2	245.3
D.P.U. semi-technical irrigation area														
Wet season paddy	-	-	-	-	5.7	74.6	143.4	212.3	281.1	344.3	344.3	344.3	344.3	344.3
Dry season paddy	-	-	-	-	12.2	120.4	228.5	336.7	444.8	540.8	540.8	540.8	540.8	540.8
Polowijo crops	-	-	-	-	38.1	76.2	114.3	152.3	190.4	228.5	266.6	304.7	342.7	380.8
C. Annual Direct Benefits ($\times 10^6$Rp)														
Desa non-technical irrigation area	-	5.9	101.2	298.5	570.5	855.6	1,129.5	1,329.1	1,461.3	1,515.9	1,568.5	1,621.0	1,658.1	1,660.9
Desa semi-technical irrigation area	-	-	-	-	152.2	305.6	458.8	613.5	766.8	792.5	817.0	841.5	866.1	889.2
D.P.U. semi-technical irrigation area	-	-	-	-	56.0	271.2	486.2	701.3	916.3	1,113.6	1,151.7	1,189.8	1,227.8	1,265.9
Total		5.9	101.2	298.5	778.7	1,432.4	2,074.5	2,643.9	3,144.4	3,422.0	3,537.2	3,652.3	3,752.0	3,816.0

表 7.5.1 事業実施と実施しない場合の標準農家における農家経済

Total Farm Land : 1.03 ha
- Paddy field : 0.61/1
- Up-land field : 0.42

Family Size : 5.53 persons

(Rp)

	Without Project	With Project	Increment
1. Gross Farm Income			
Wet season paddy	285,300	369,200	
Dry season paddy	212,500	356,300	
Polowijo crops/2	2,500	216,100	
Up-land crops	30,500	30,500	
Non-farm income	28,400	10,400	
Sub-total	559,200	982,500	423,300
2. Gross Out-go			
Farming expenses			
Paddy	90,200	147,600	
Polowijo crops	200	32,700	
Up-land crops	2,400	2,400	
Irrigation expenses	15,300	15,300	
IPEDA tax, others	5,300	9,700	
Sub-total	113,400	207,700	94,300
3. Net Farm Income			
(1 - 2)	445,800	774,800	329,000
4. Family Living Expenses			
Food	258,900	336,500	
Residence	58,200	75,600	
Clothing	47,500	61,800	
Luxury	28,400	36,900	
Education	23,100	30,000	
Social-expenses	19,500	25,400	
Miscellaneous	8,400	11,000	
Sub-total	444,000	577,200	133,200
5. Net Reserve			
(3 - 4)	1,800	197,600	195,800

/1 : Out of 0.61 ha of paddy field, 0.50 ha will be put under the project

/2 : Polowijo crops planted after harvest of wet season paddy

表7.6.1 キャッシュフロー

x 10^3 US$)

Year	Cash Outflow				Cash Inflow				Balance
	Project Cost	O/M Replacement Cost	Loan Repayment	Total Outflow (A)	Foreign Loan	Government Budget	Government Subsidy/1	Total Inflow (B)	(B) - (A)
1982	1,206	-	-	1,206	1,042	164	-	1,206	0
1983	6,189	-	-	6,189	3,745	2,444	-	6,189	0
1984	8,984	-	-	8,984	5,303	3,681	-	8,984	0
1985	8,210	-	-	8,210	5,356	2,854	-	8,210	0
1986	9,576	87	-	9,663	5,104	4,559	-	9,663	0
1987	410	174	-	584	187	397	-	584	0
1988		262	-	262	(23,413)/2	262	-	262	0
1989		349	1,650	1,999		349	1,650	1,999	0
1990		436	1,650	2,086		436	1,650	2,086	0
1991		523	1,650	2,173		523	1,650	2,173	0
1992		676	1,650	2,326		676	1,650	2,326	0
1993		523	1,650	2,173		523	1,650	2,173	0
1994		523	1,650	2,173		523	1,650	2,173	0
1995		523	1,650	2,173		523	1,650	2,173	0
1996		523	1,650	2,173		523	1,650	2,173	0
1997		523	1,650	2,173		523	1,650	2,173	0
1998		523	1,650	2,173		523	1,650	2,173	0
1999		523	1,650	2,173		523	1,650	2,173	0
2000		523	1,650	2,173		523	1,650	2,173	0
2001		523	1,650	2,173		523	1,650	2,173	0
2002		676	1,650	2,326		676	1,650	2,326	0
2003		523	1,650	2,173		523	1,650	2,173	0
2004		523	1,650	2,173		523	1,650	2,173	0
2005		523	1,650	2,173		523	1,650	2,173	0
2006		523	1,650	2,173		523	1,650	2,173	0
2007		640	1,650	2,290		640	1,650	2,290	0
2008		523	1,576	2,099		523	1,576	2,099	0
2009		523		523		523		523	0
2010		523		523		523		523	0

/1 : Government subsidy to be allocated for the repayment

/2 : Accumulated foreign loan including 3.5% of interest per annum within 7 years of grace period

付　　図

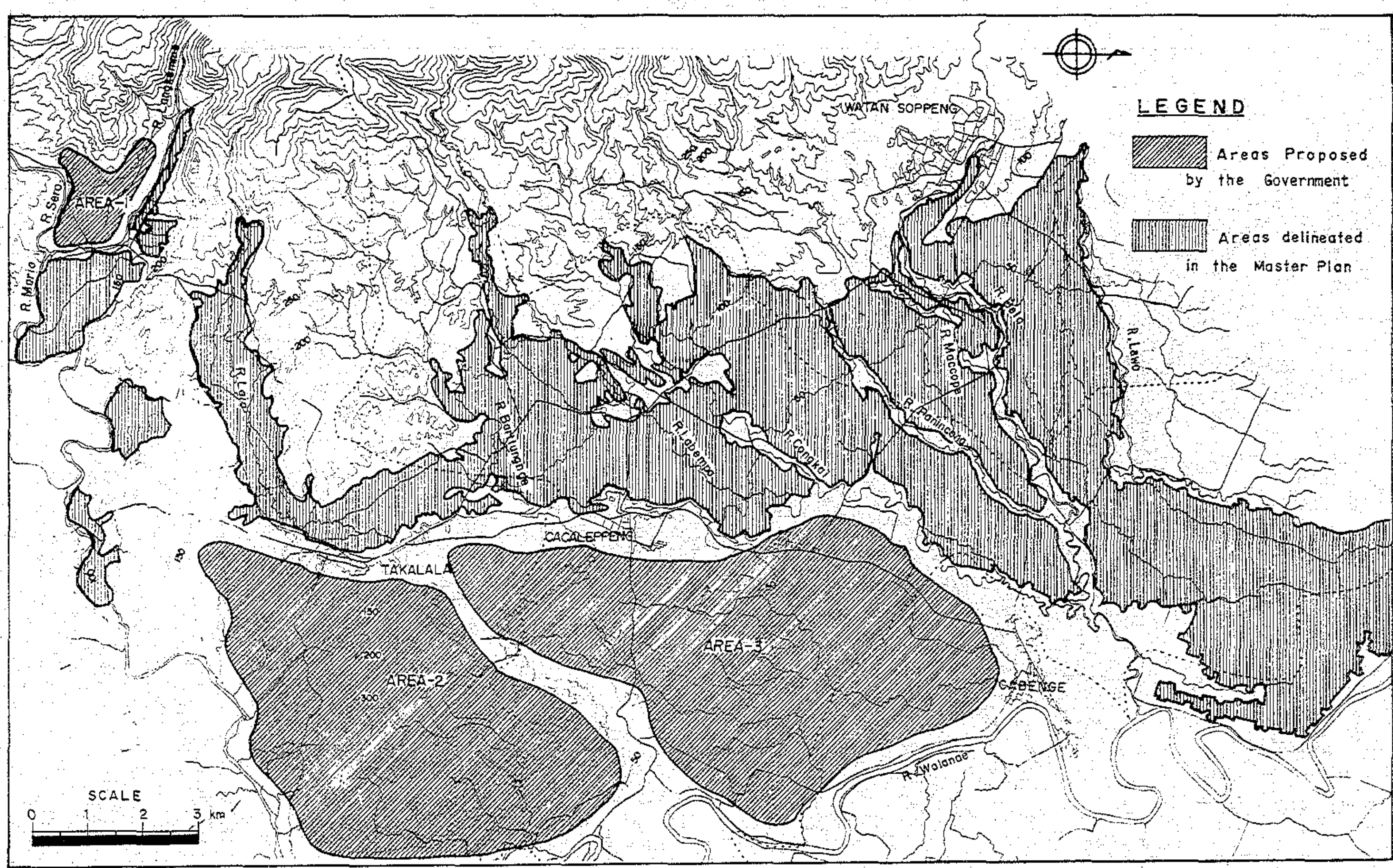

LEGEND
Areas Proposed by the Government
Areas delineated in the Master Plan
WATAN SOPPENG
R. Lawo
R. Maccope
R. Paninccong
R. Congkai
R. Labempa
R. Bettunginge
R. Laju
R. Sero
R. Mario
AREA-1
AREA-2
AREA-3
CACALEPPENG
TAKALALA
CABENGE
R. Walanae
SCALE
0 1 2 3 km

図 3.1　調査地区

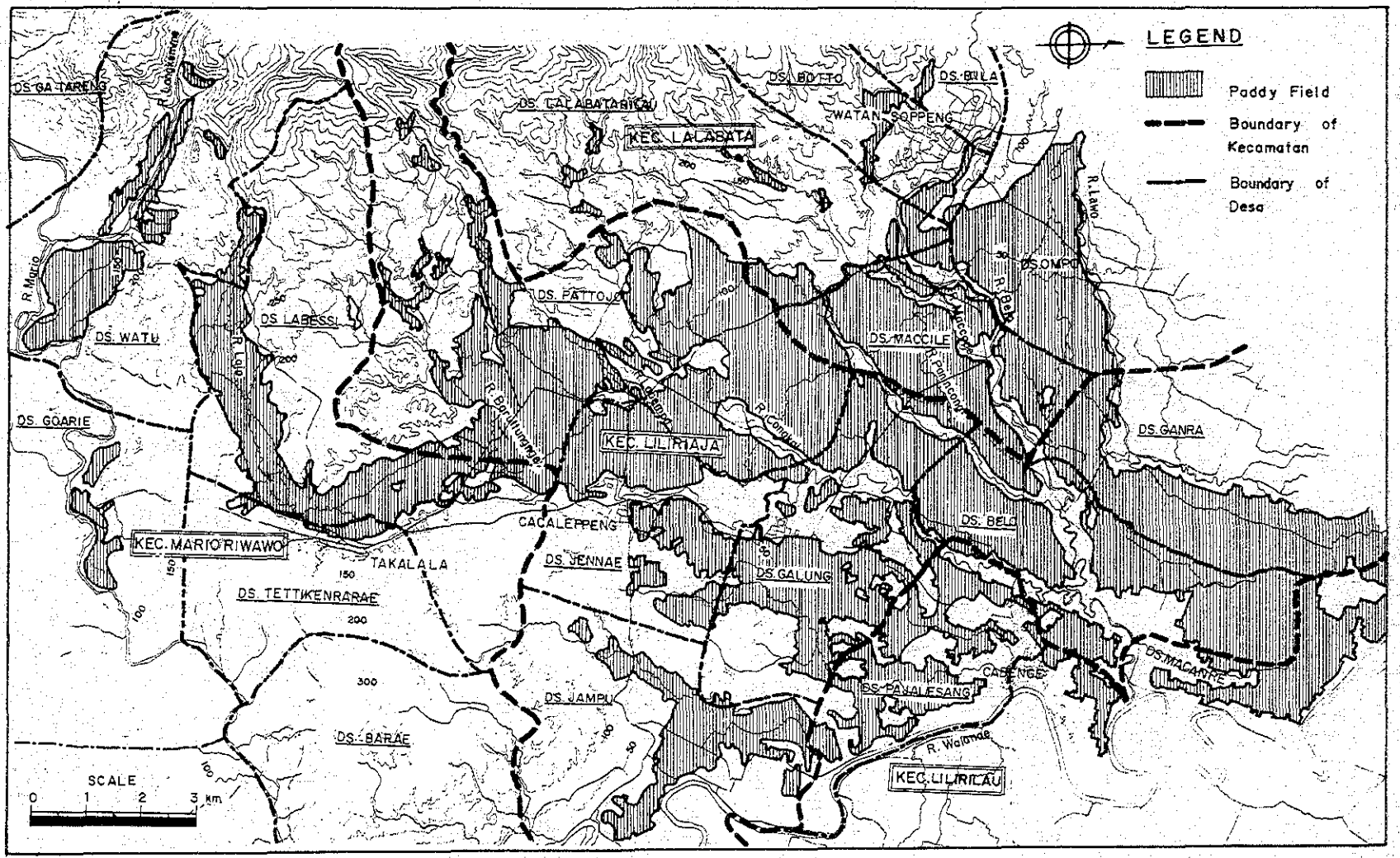


図 4.1.1　計画地区の行政区分

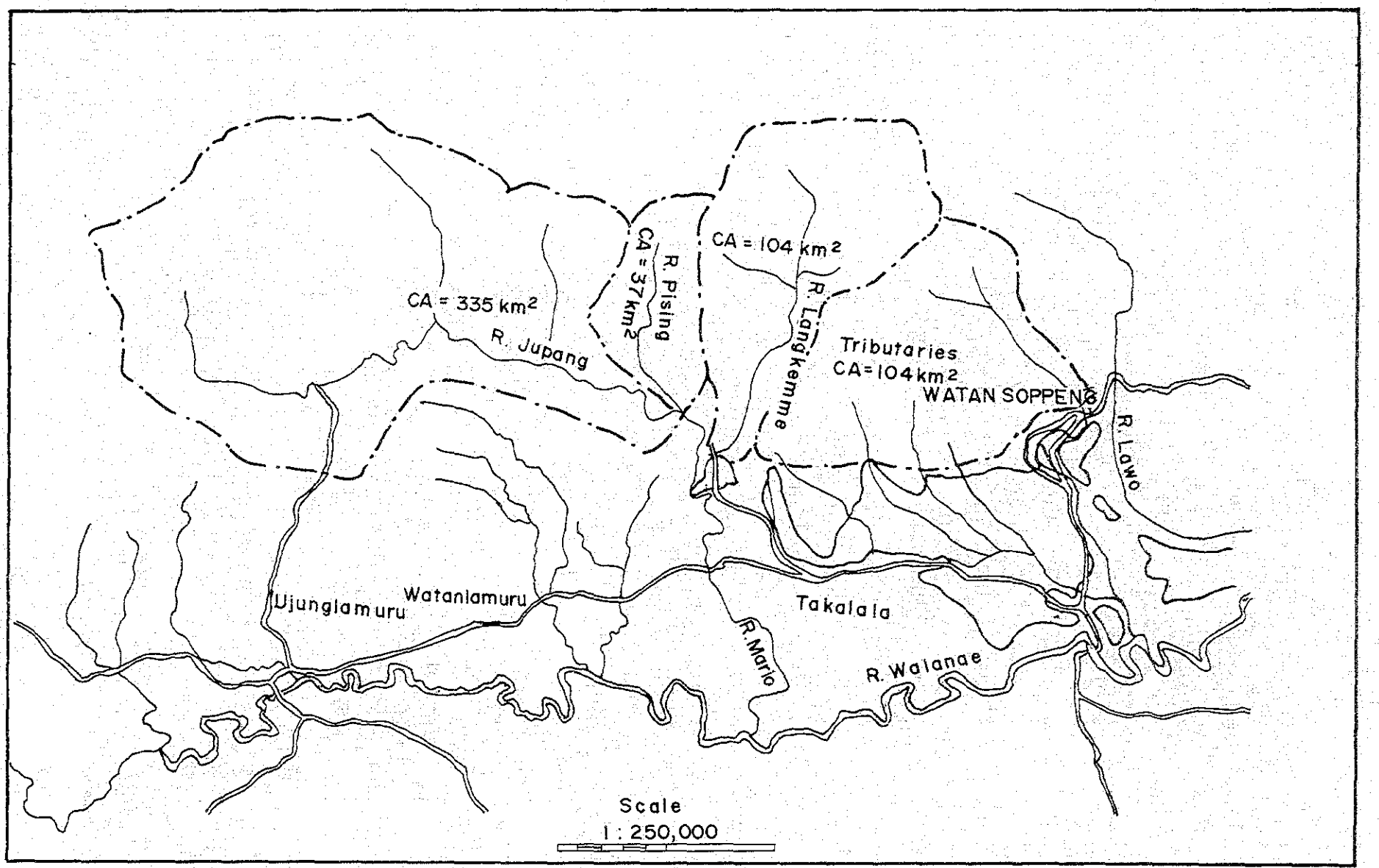


図 4.3.1　主要河川の流域

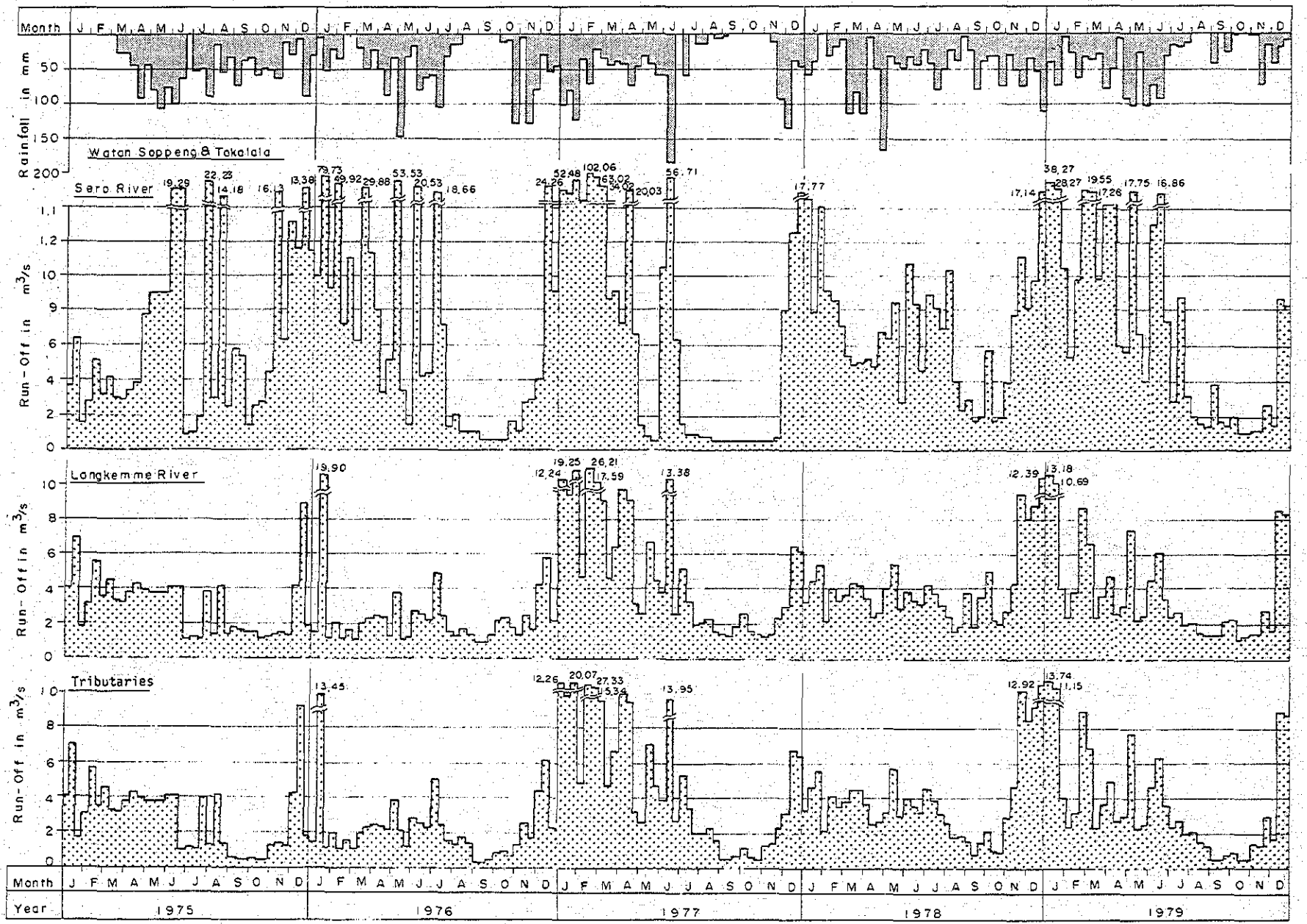
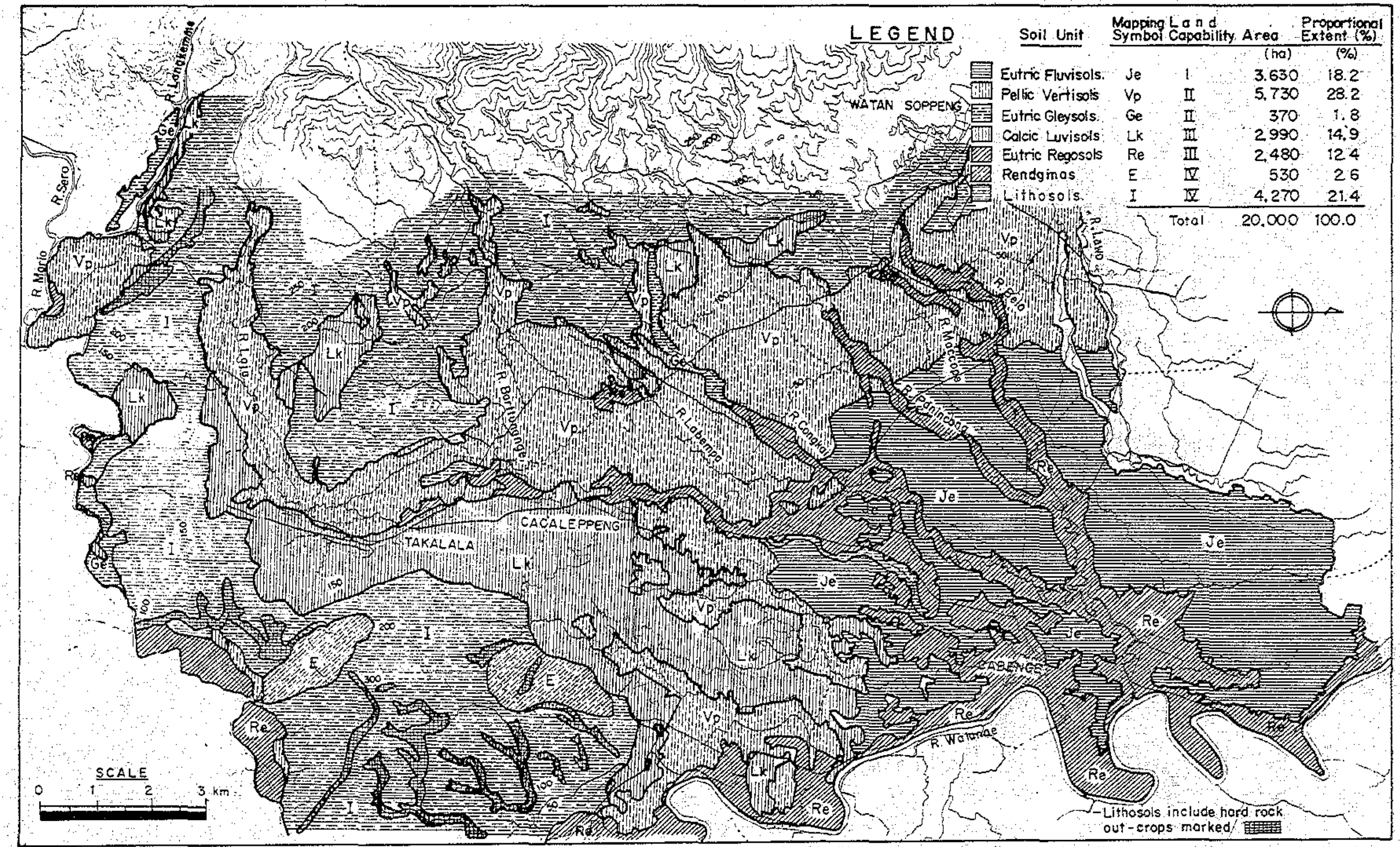

Month
J F M A M J J A S O N D
Rainfall in mm
Watan Soppeng & Takalala
Sero River
Run-Off in m³/s
19.29 22.23 14.18 16.13 13.38 79.73 69.92 29.88 53.53 20.53 18.66 24.26 52.48 102.06 63.02 34.02 20.03 56.71 17.77 17.14 38.27 28.27 19.55 17.26 17.75 16.86
Langkemme River
Run-Off in m³/s
19.90 12.24 19.25 26.21 7.59 13.38 12.39 13.18 10.69
Tributaries
Run-Off in m³/s
13.45 12.26 20.07 27.33 15.34 13.95 12.92 13.74 11.15
Month
Year
1975
1976
1977
1978
1979

図 4. 3. 2　旬別流出量



LEGEND
Soil Unit
Mapping Symbol
Land Capability
Area (ha)
Proportional Extent (%)
Eutric Fluvisols. Je I 3,630 18.2
Pellic Vertisols Vp II 5,730 28.2
Eutric Gleysols. Ge II 370 1.8
Calcic Luvisols Lk III 2,990 14.9
Eutric Regosols Re III 2,480 12.4
Rendginas E IV 530 2.6
Lithosols. I IV 4,270 21.4
Total 20,000 100.0
Lithosols include hard rock out-crops marked
WATAN SOPPENG
CACALEPPENG
TAKALALA
CABENGE
R. Langkemme
R. Sero
R. Mario
R. Lawo
R. Pelo
R. Maccope
R. Paninca
R. Congkai
R. Labempa
R. Bartiungnge
R. Lgig
R. Walanae
SCALE
0 1 2 3 km

図4.4.1　土壌図

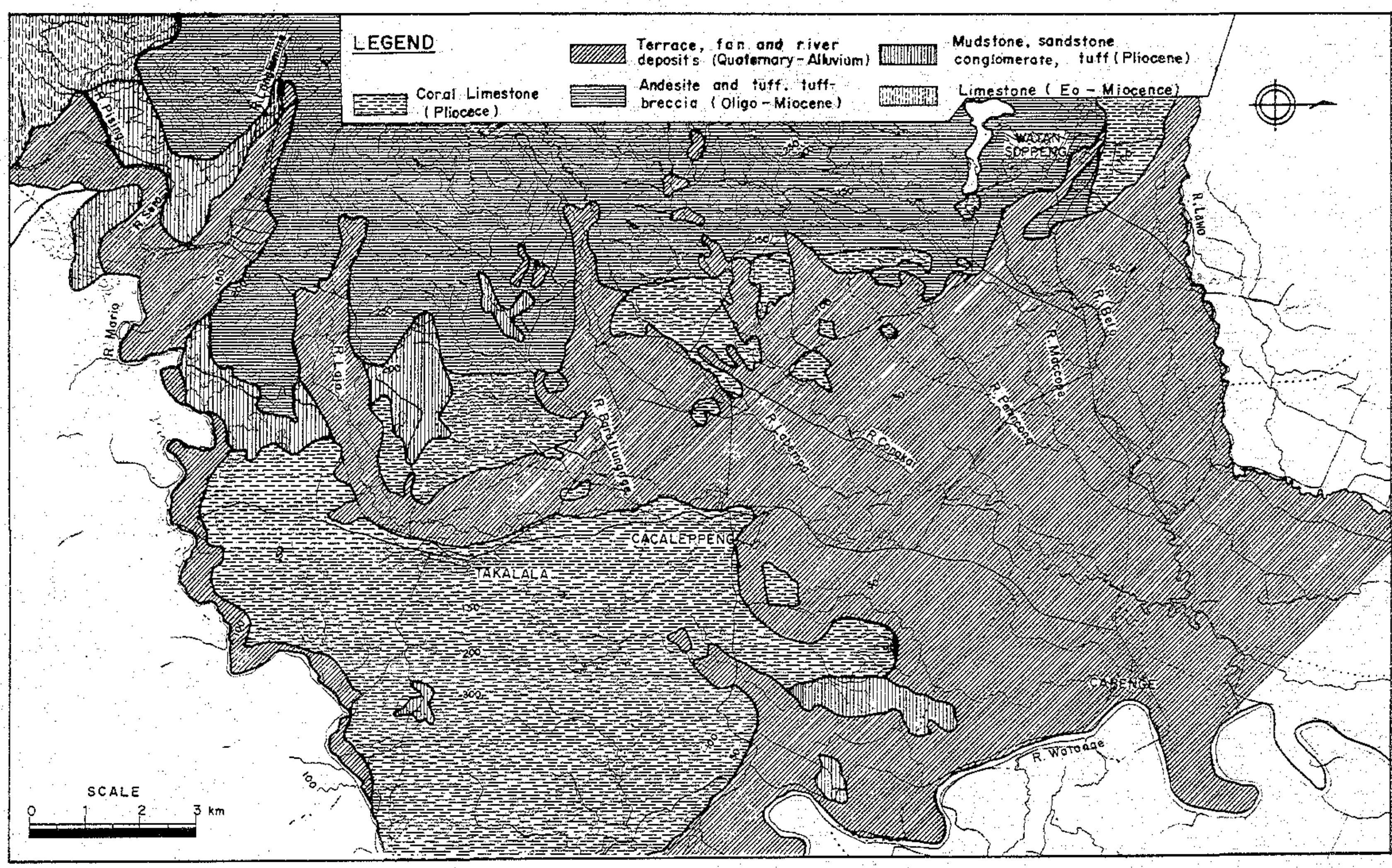

LEGEND
Coral Limestone (Pliocece)
Terrace, fan and river deposits (Quaternary - Alluvium)
Andesite and tuff. tuff-breccia (Oligo - Miocene)
Mudstone, sandstone conglomerate, tuff (Pliocene)
Limestone (Eo - Miocence)
R. Pising
R. Mario
R. Laja
R. Barallungnge
R. Lawo
R. Belo
R. Maccopa
R. Copaka
R. Wotange
WATAN SOPPENG
CACALEPPENG
TAKALALA
CABENGE
SCALE
0 1 2 3 km

図 4. 4. 2　地質図

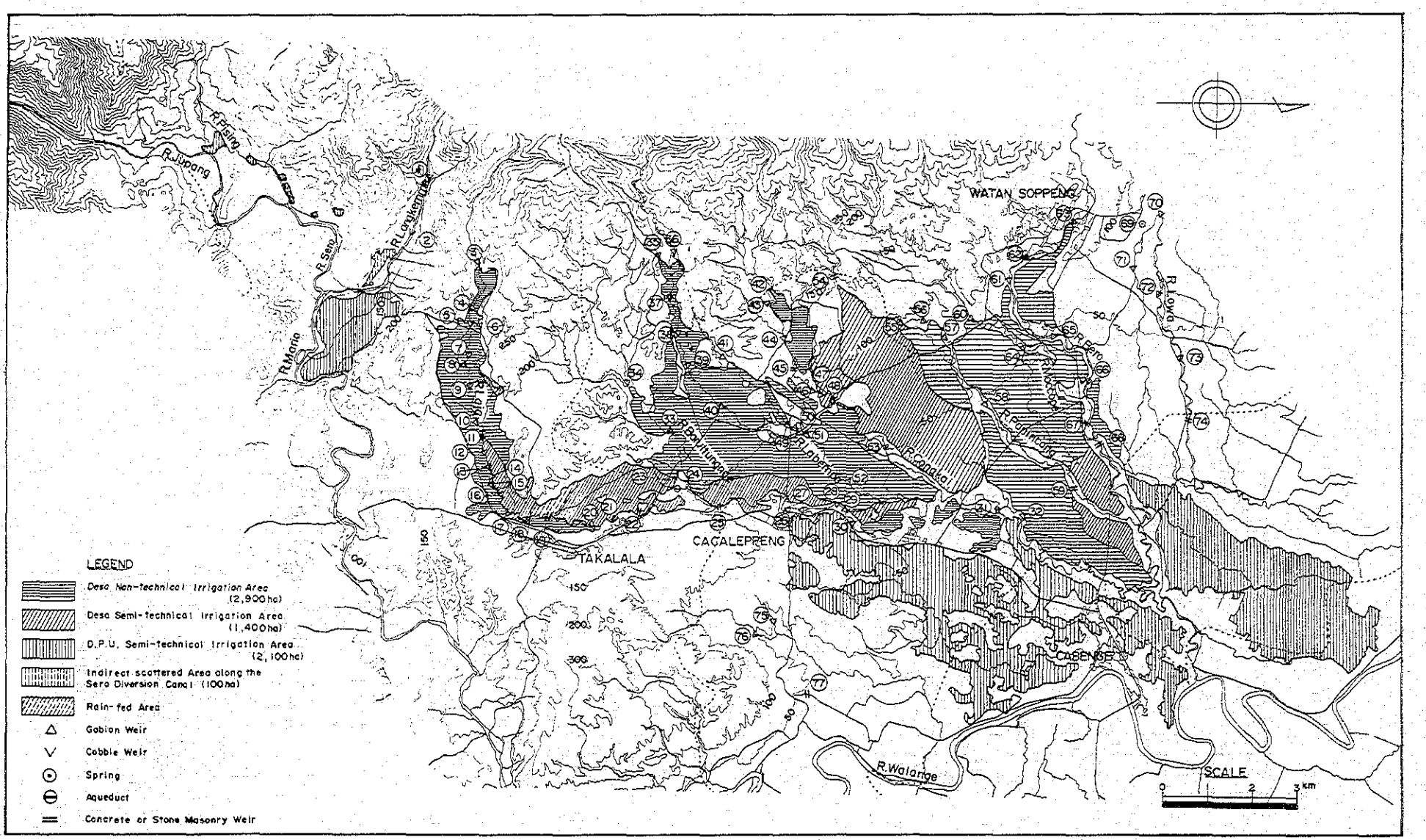


図 4.5.1　既存かんがい施設

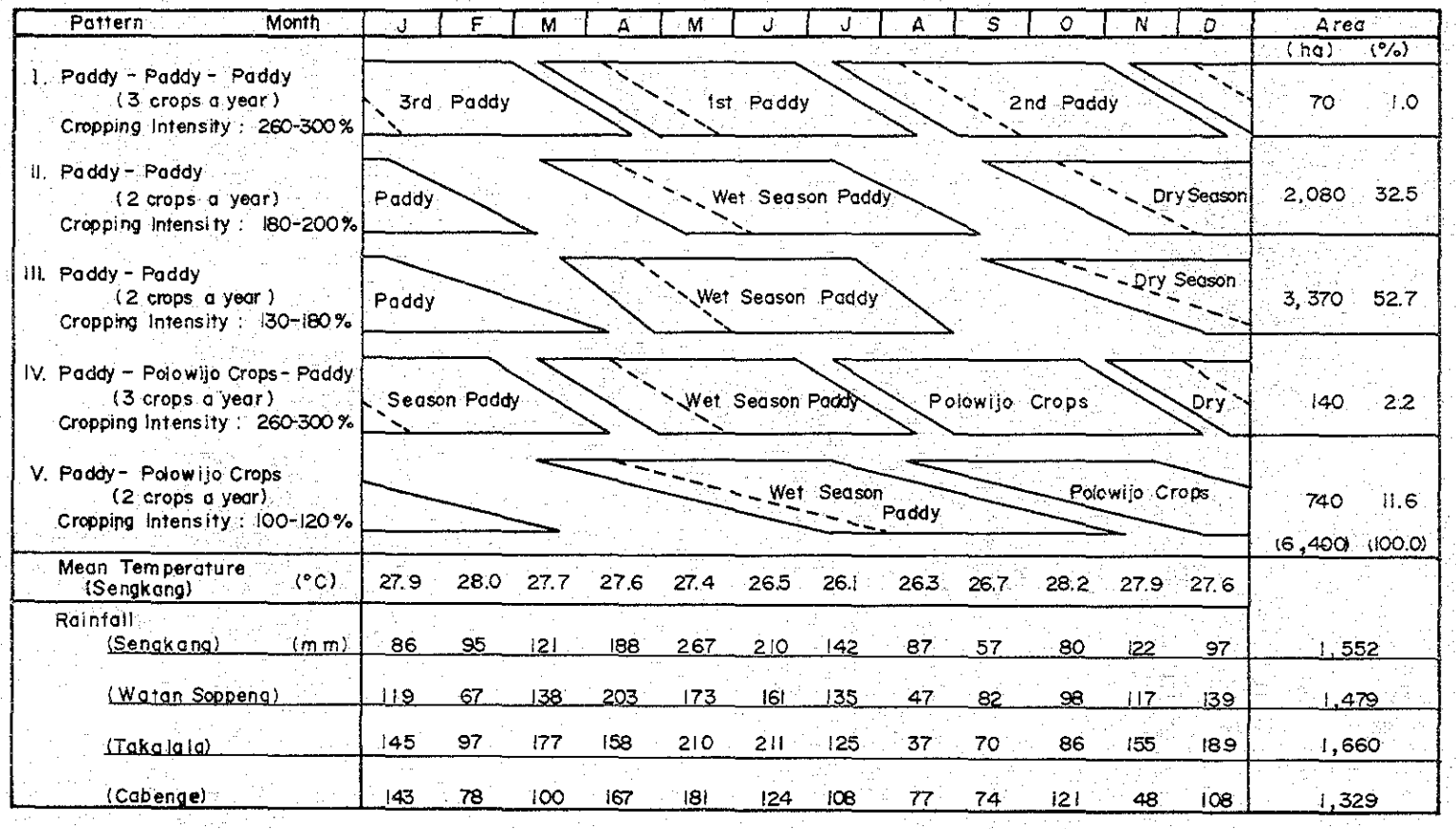


図 4.6.1　計画地区内における現状の作付体系

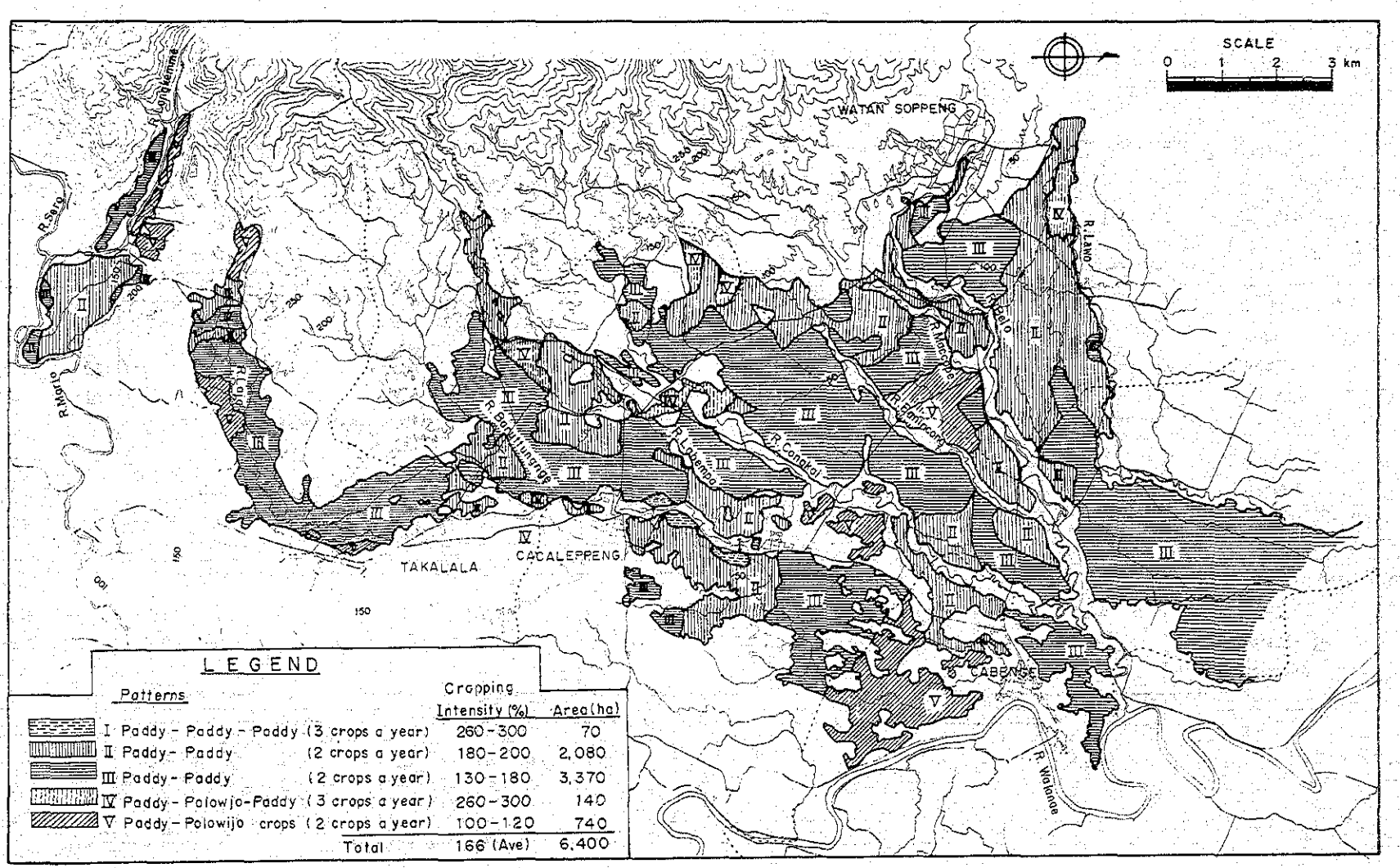


図 4.6.2　既存水田における現状の土地利用体型

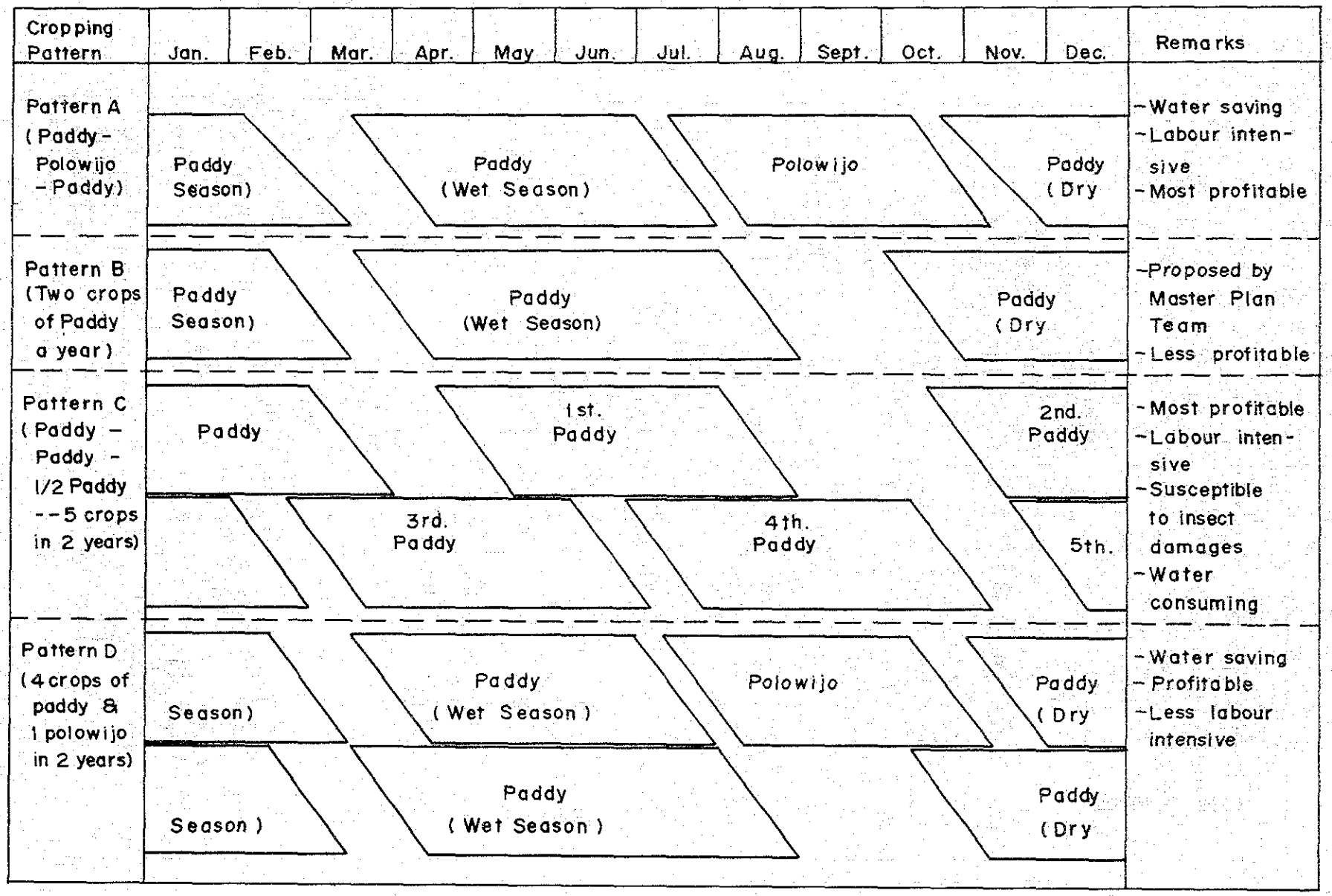


図 5.3.1　作付体系の比較案

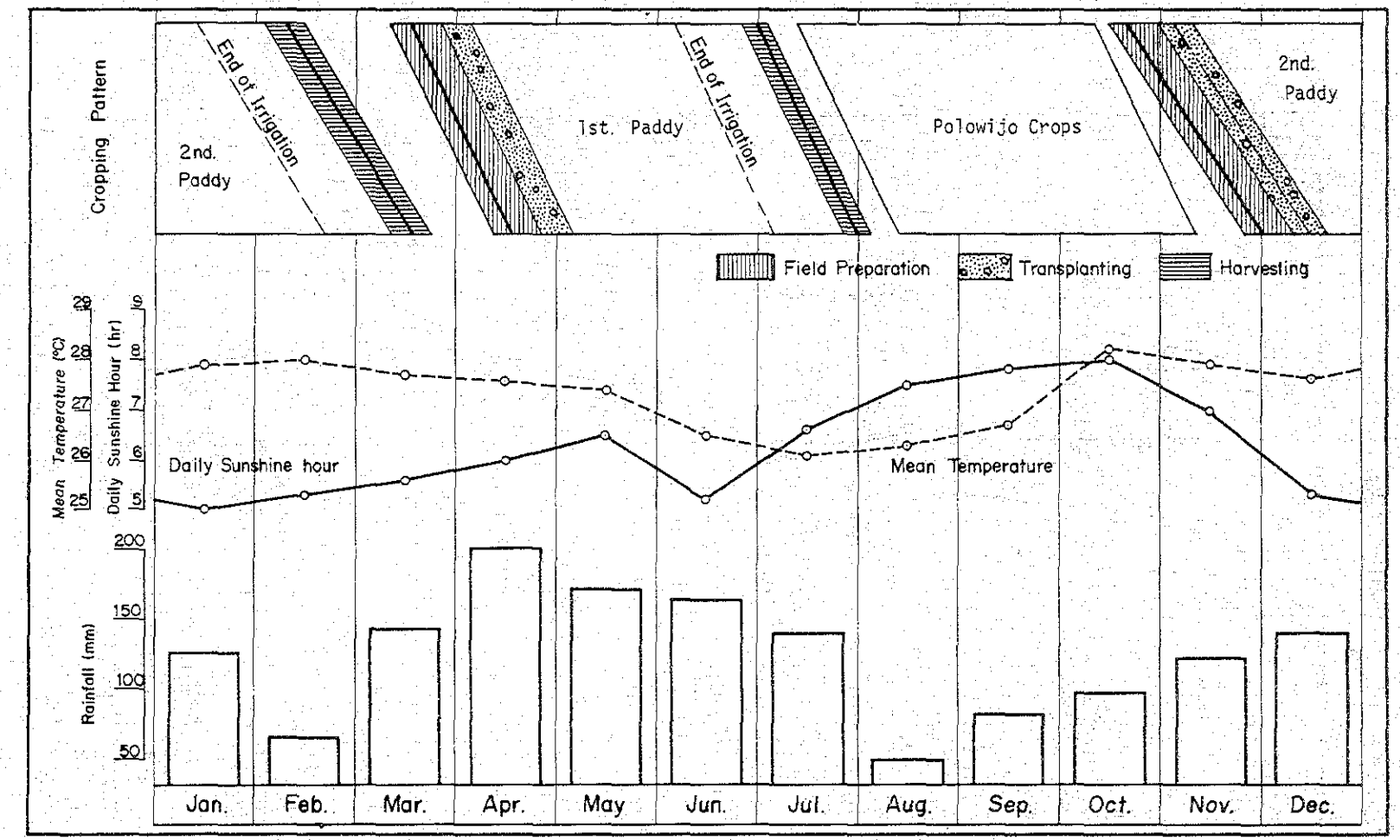


図 5.3.2　計画作付体系（A案）

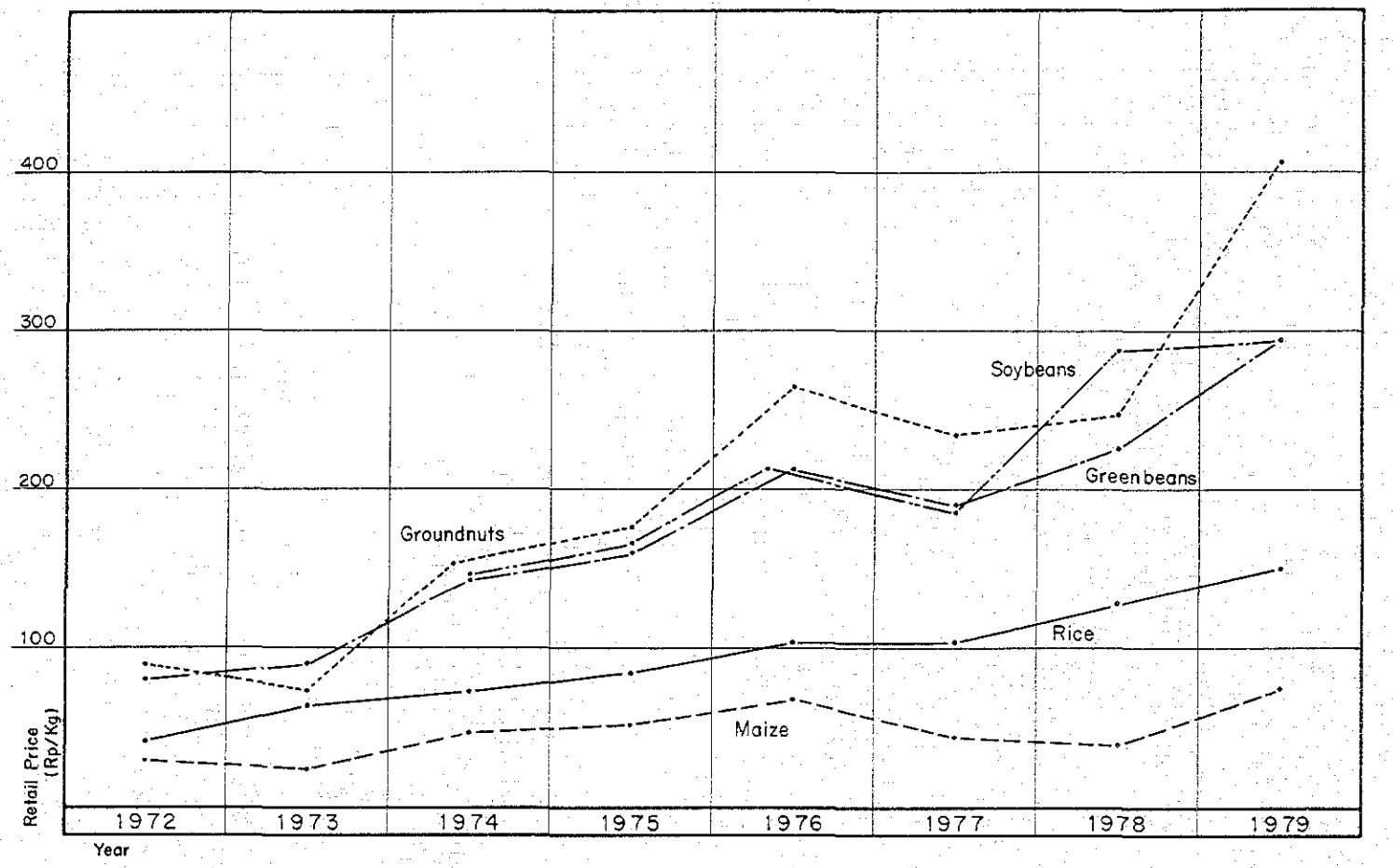


図 5. 3. 3　ソッペン県における作物の小売価格

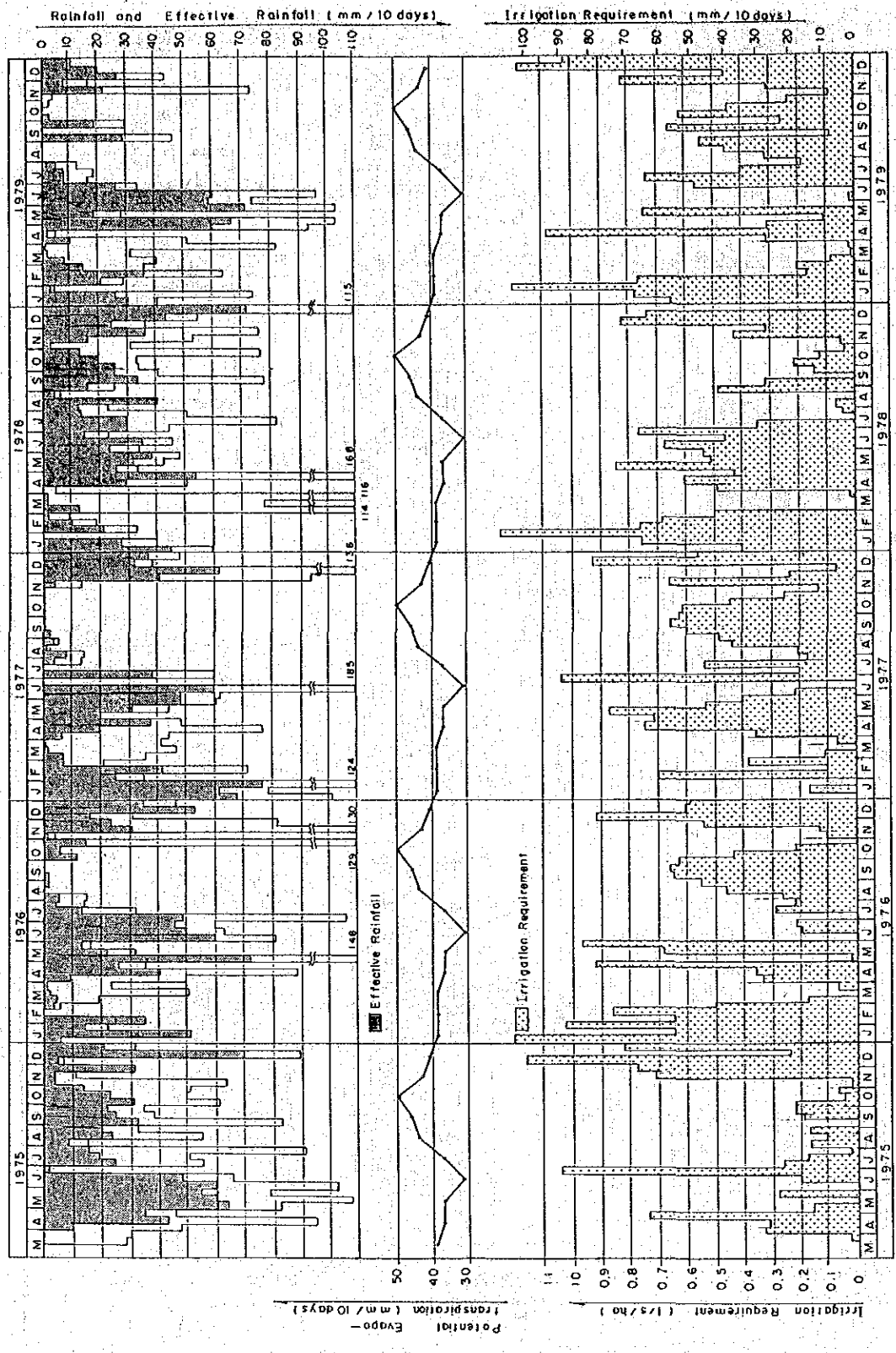


図 5.4.1　かんがい用水量の季別変動

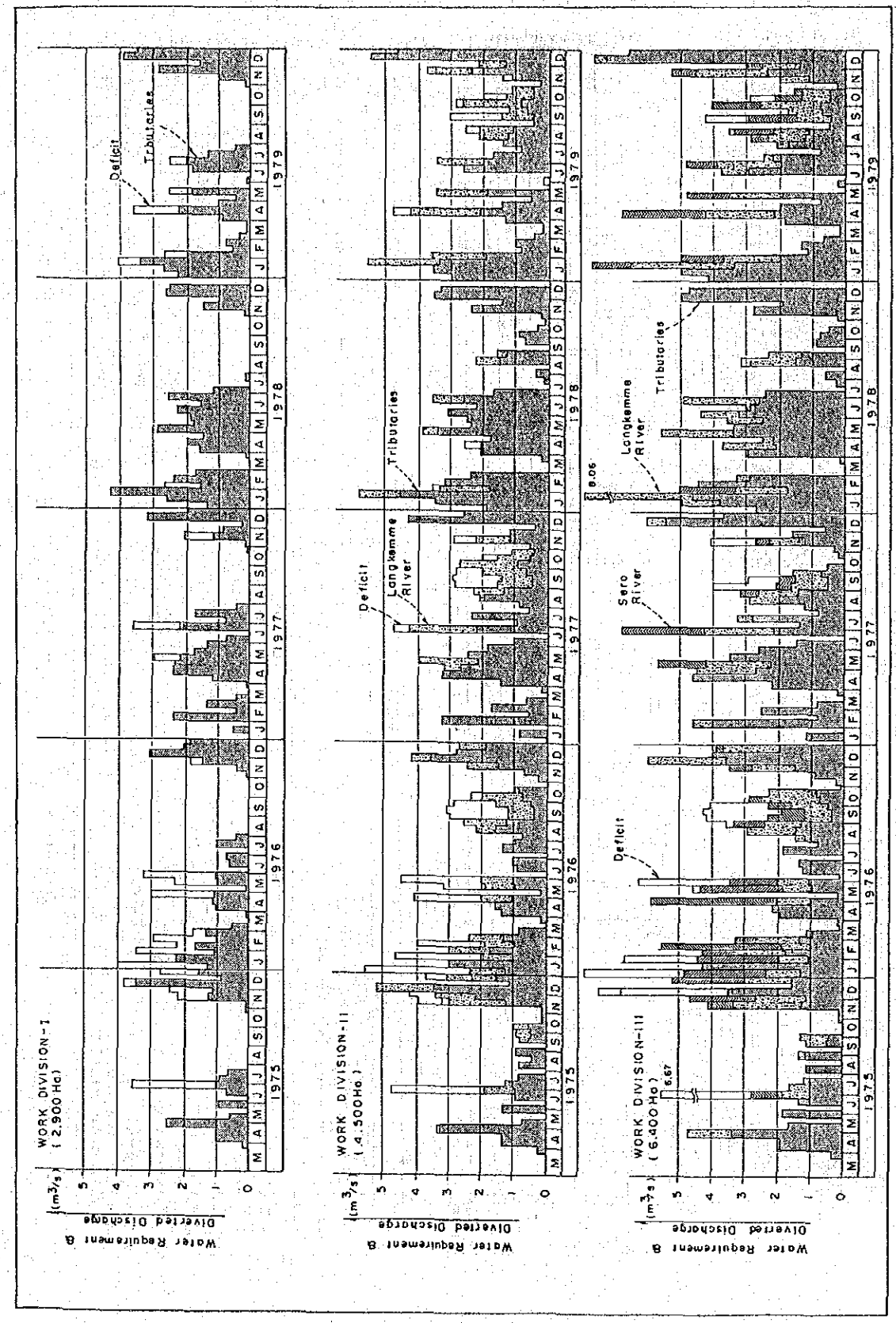


図 5.4.2　取水要量の季別変動と取水量

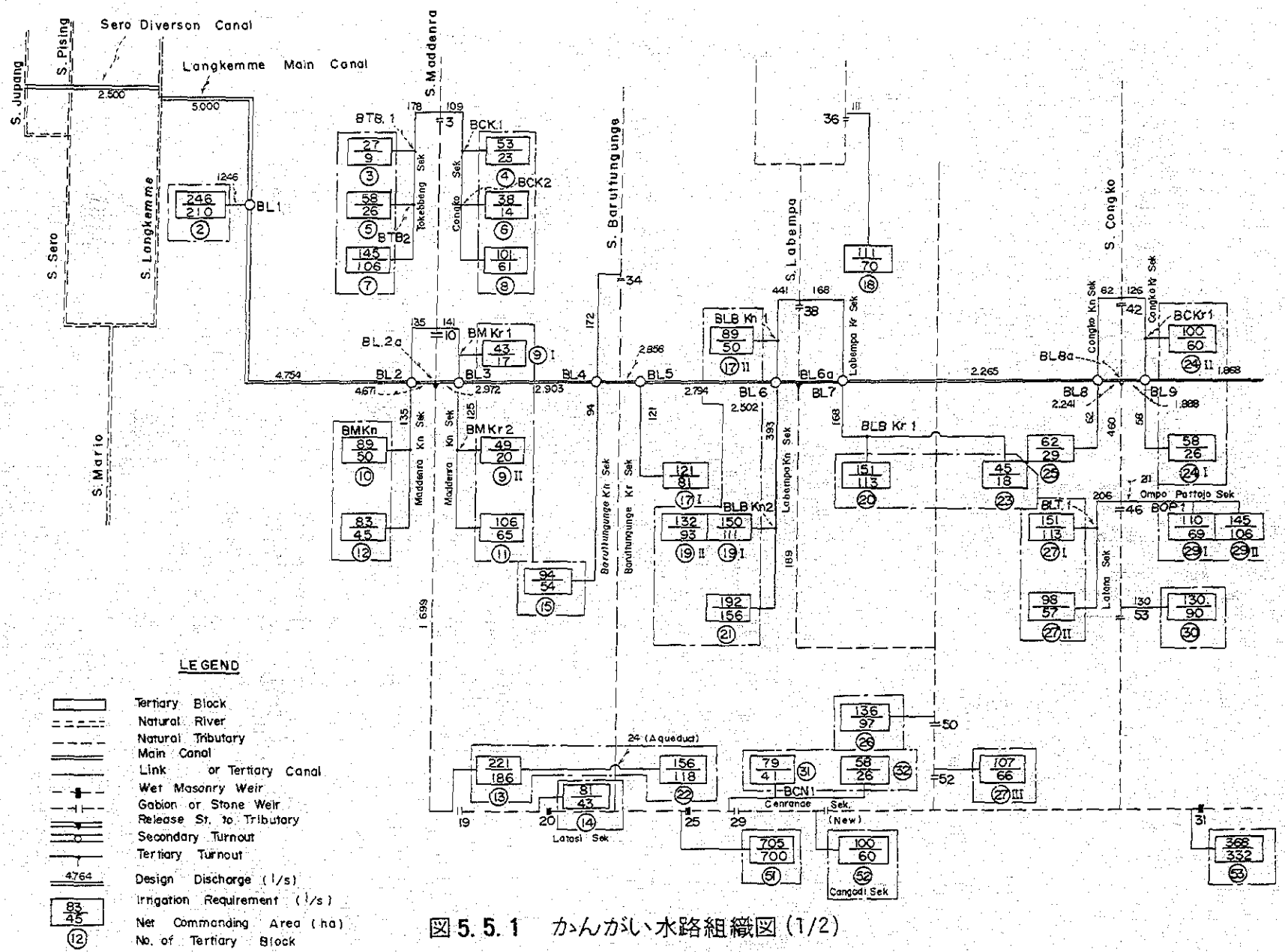
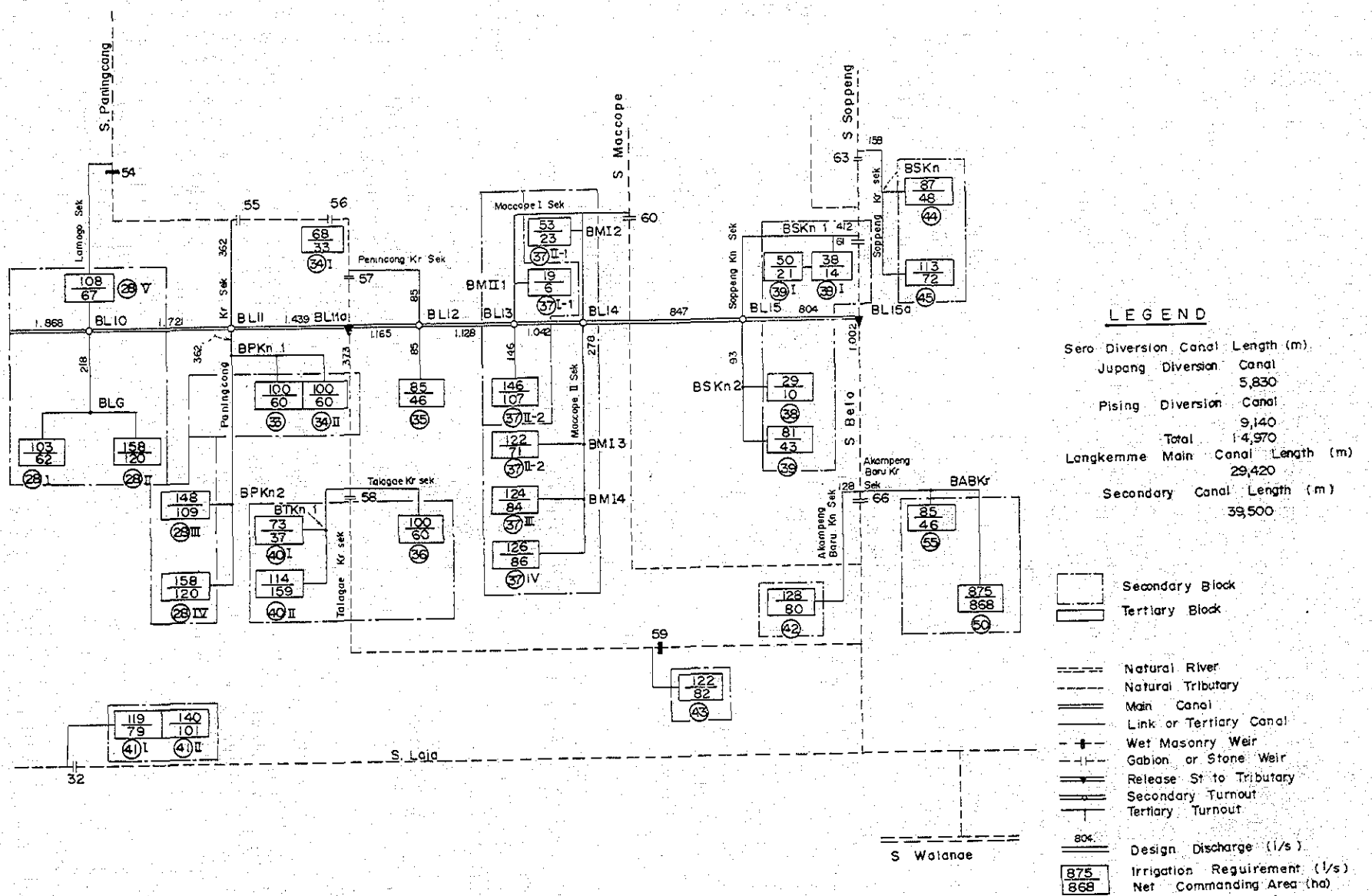


図 5. 5. 1　かんがい水路組織図 (1/2)



LEGEND

Sero Diversion Canal Length (m)
5,830
Jupang Diversion Canal
9,140
Pising Diversion Canal
Total 14,970
Langkemme Main Canal Length (m)
29,420
Secondary Canal Length (m)
39,500

Secondary Block
Tertiary Block
Natural River
Natural Tributary
Main Canal
Link or Tertiary Canal
Wet Masonry Weir
Gabion or Stone Weir
Release St to Tributary
Secondary Turnout
Tertiary Turnout
804 Design Discharge (l/s)
875 / 868 Irrigation Requirement (l/s) / Net Commanding Area (ha)
50 No. of Tertiary Block

図 5. 5. 1　かんがい水路組織図 (2/2)

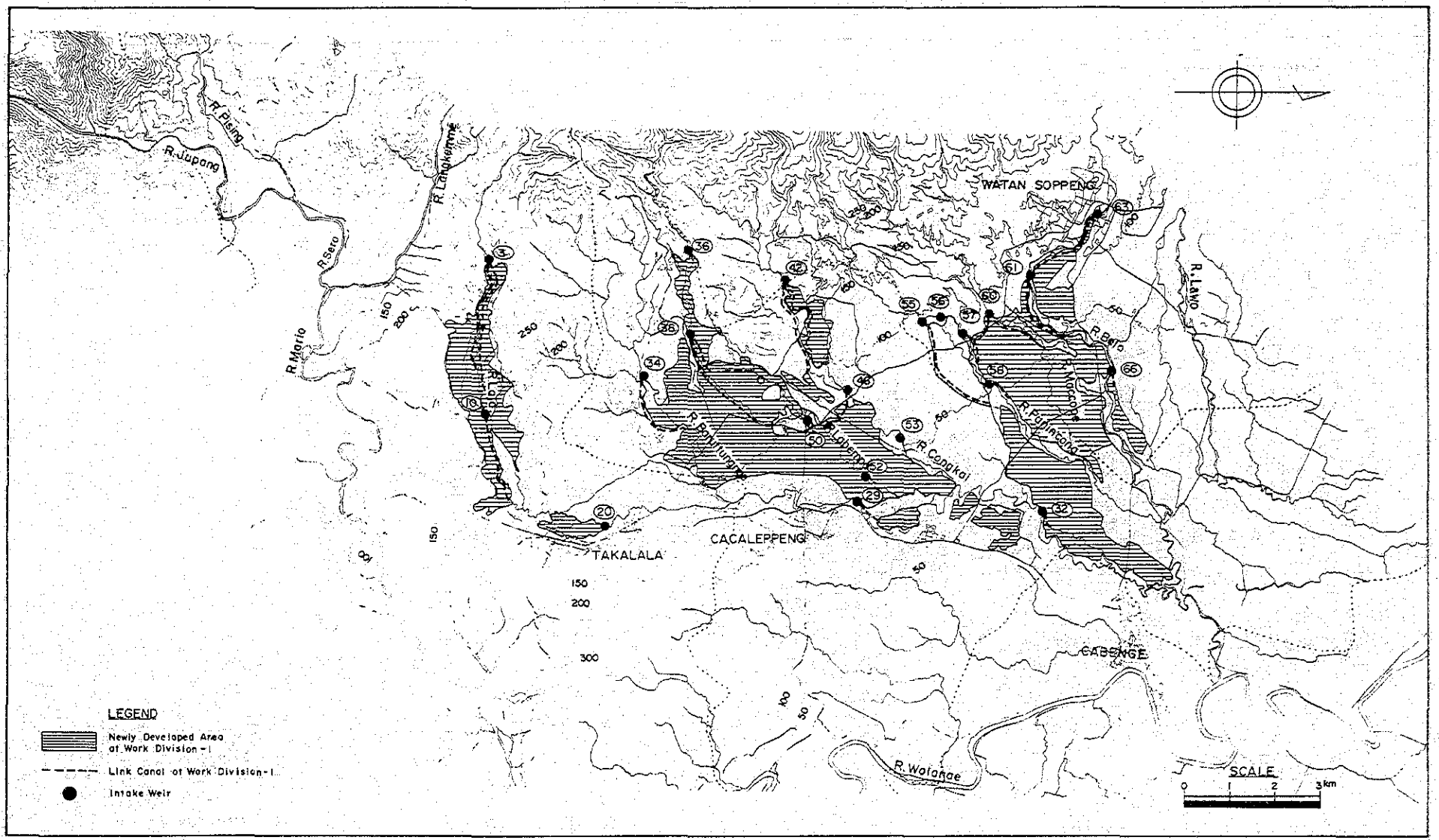


図 5.5.2　計画施設（第一工事区）

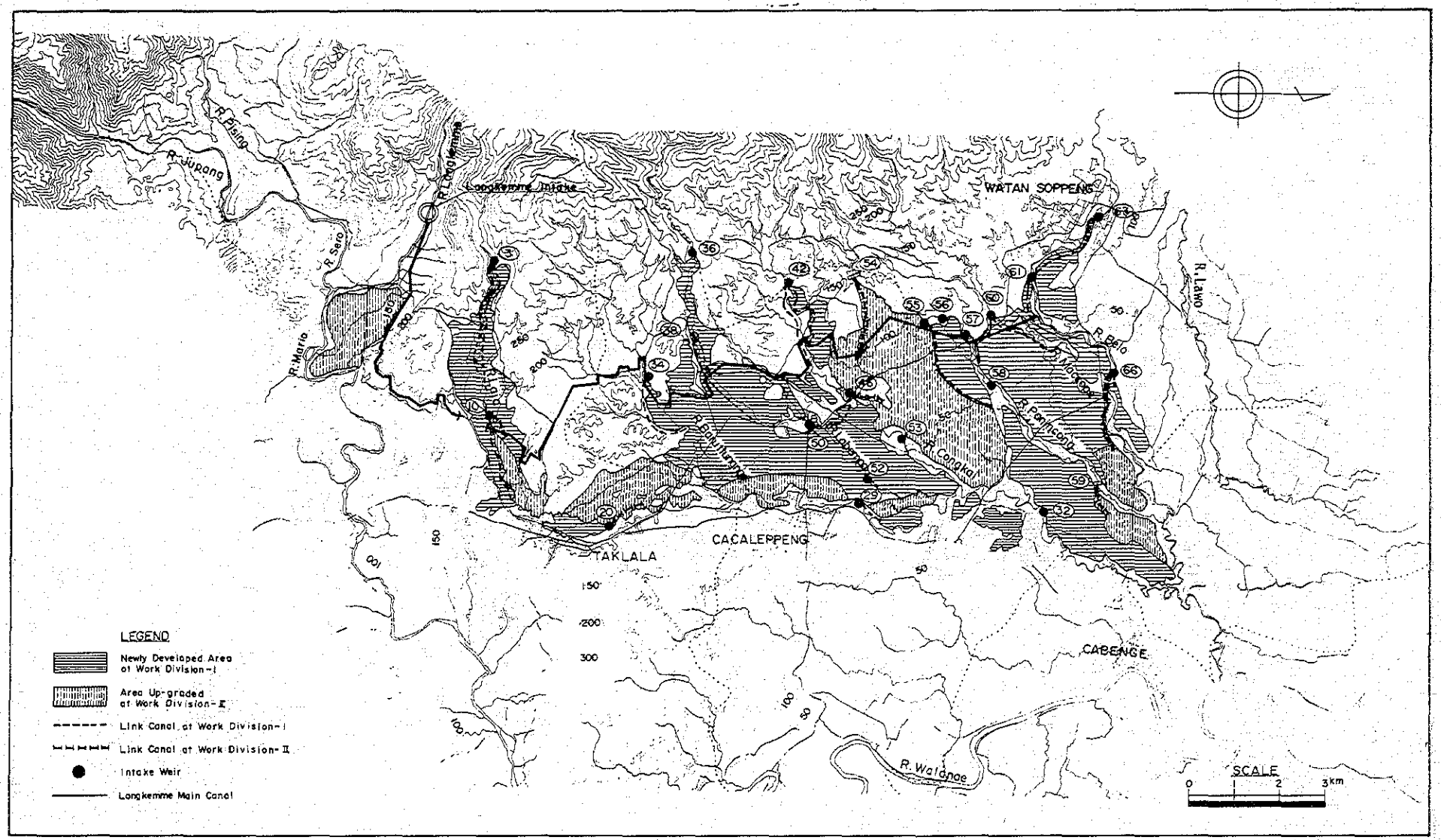


図 5.5.3　計画施設（第二工事区）

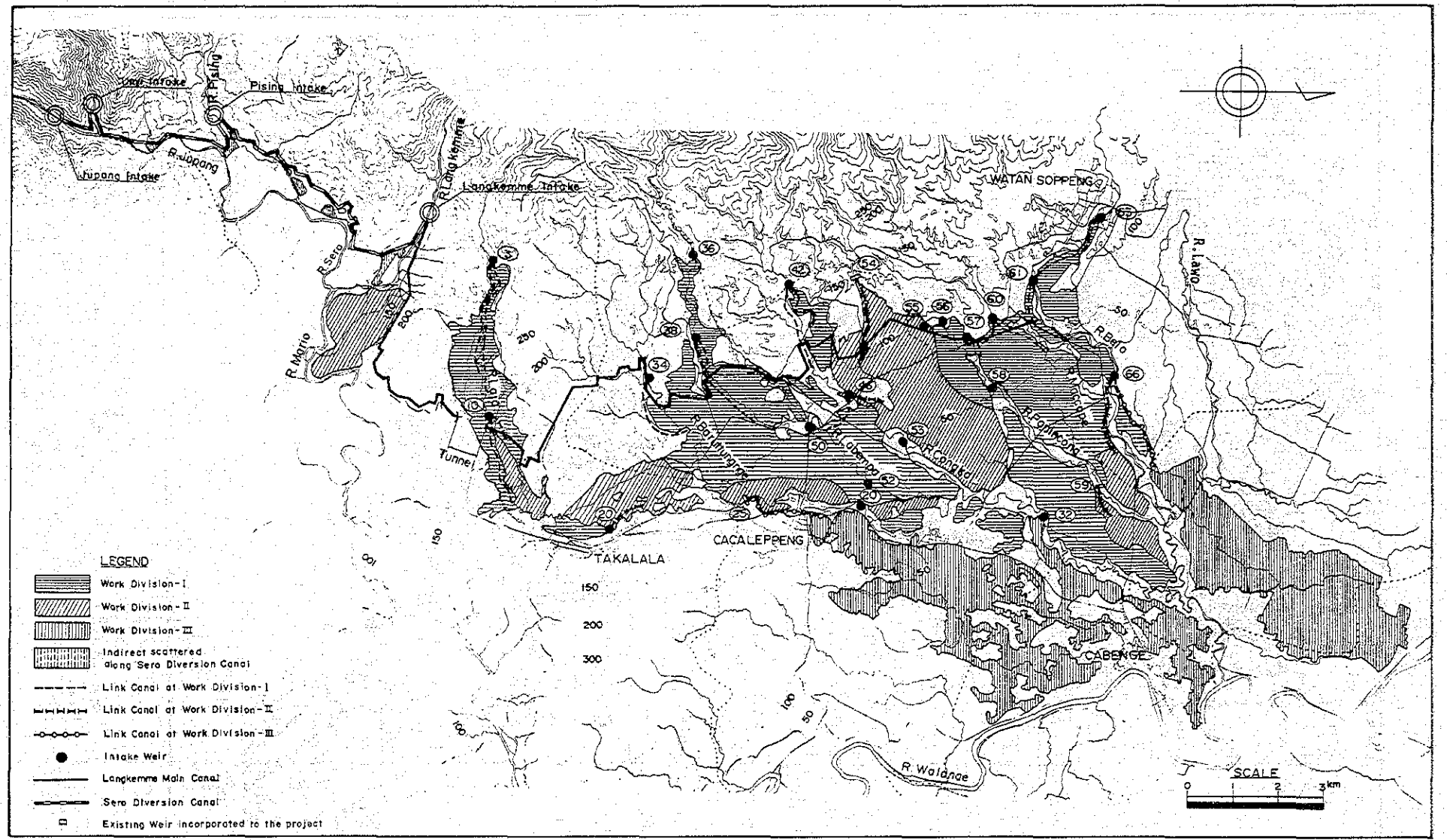


図 5.5.4　かんがい開発計画（第三工事区）

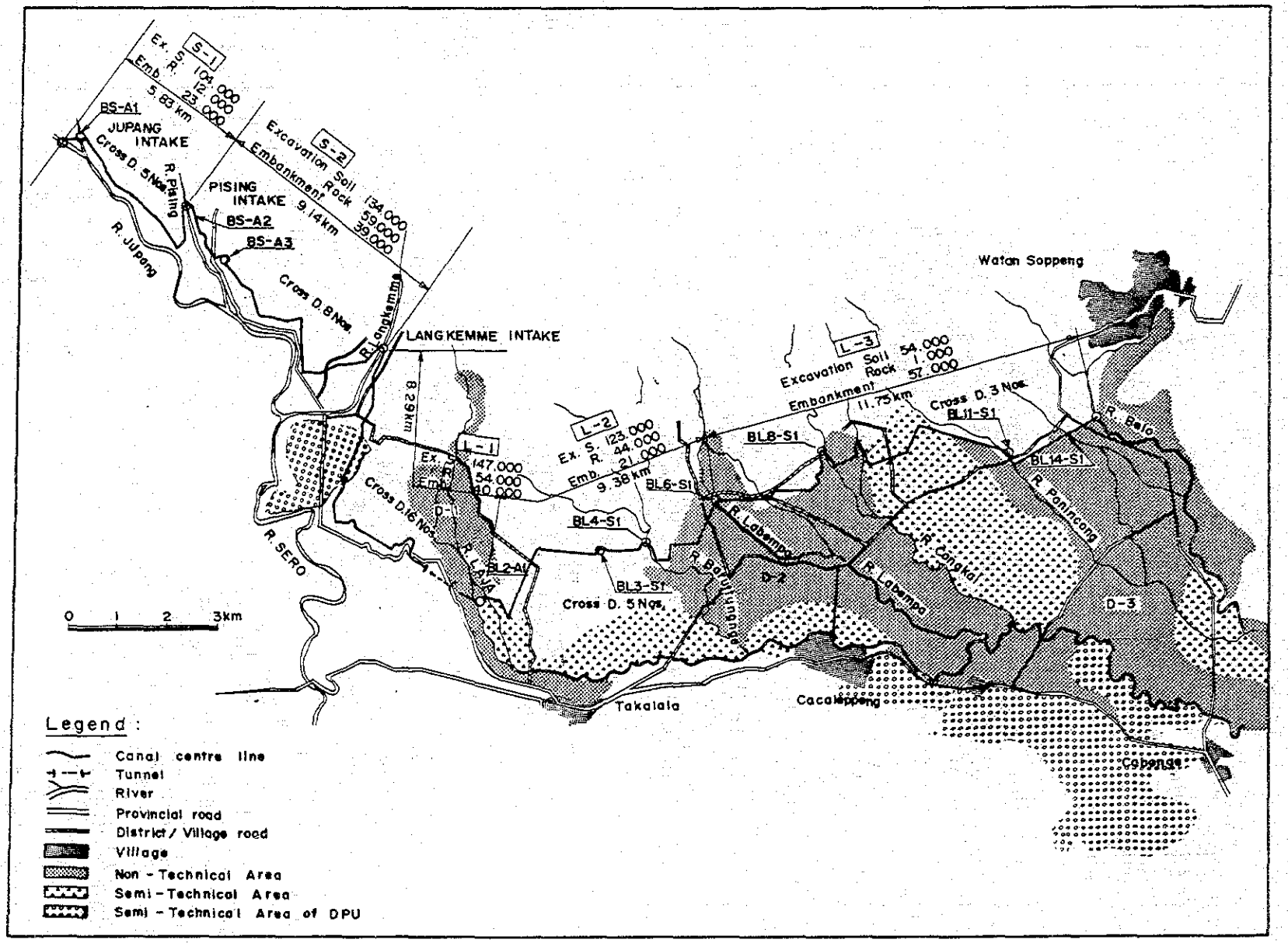


図 5.6.1　建設計画概要図

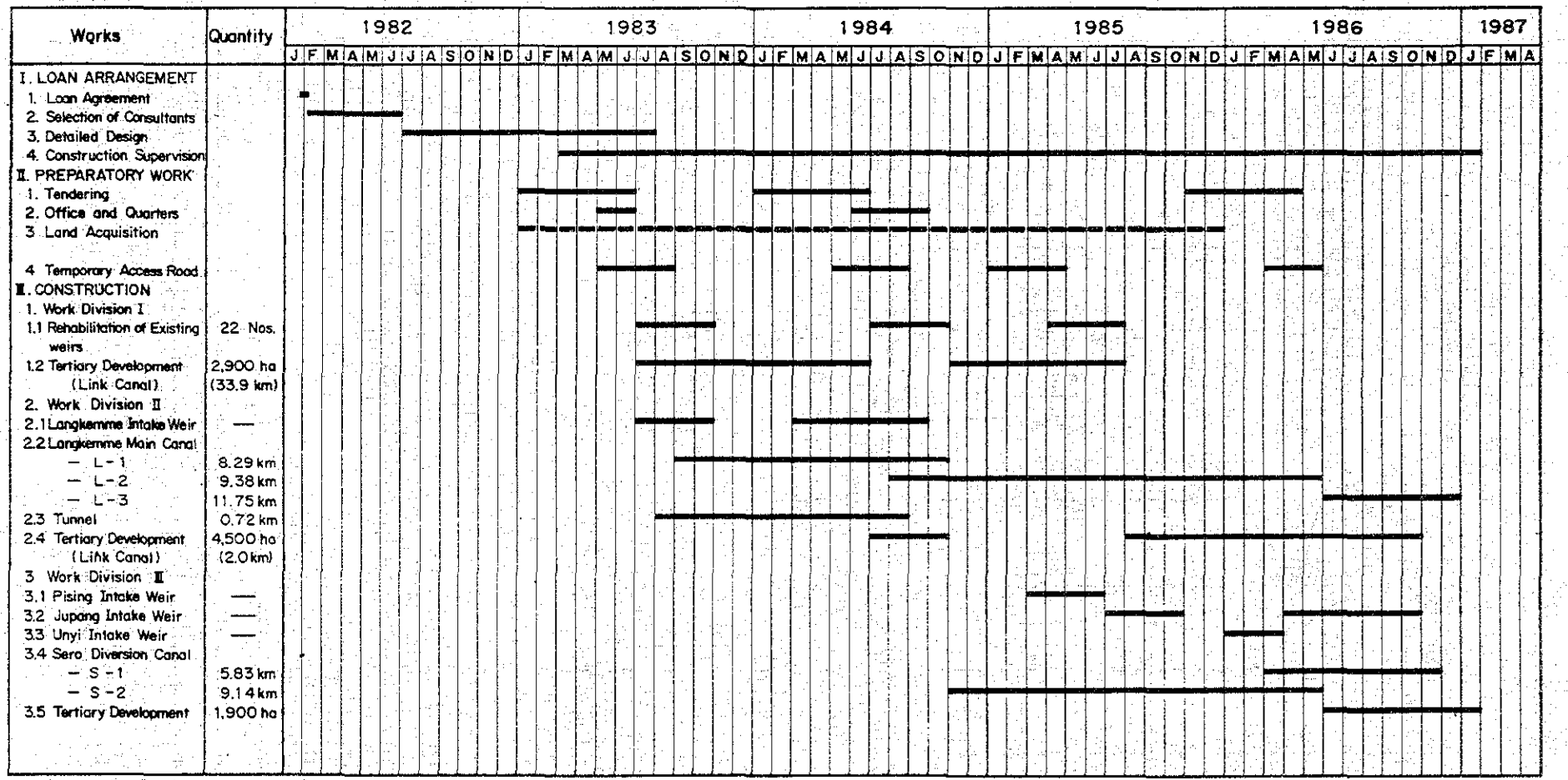

Works
Quantity
1982
1983
1984
1985
1986
1987
J F M A M J J A S O N D
I. LOAN ARRANGEMENT
1. Loan Agreement
2. Selection of Consultants
3. Detailed Design
4. Construction Supervision
II. PREPARATORY WORK
1. Tendering
2. Office and Quarters
3 Land Acquisition
4 Temporary Access Road
III. CONSTRUCTION
1. Work Division I
1.1 Rehabilitation of Existing weirs
22 Nos.
1.2 Tertiary Development (Link Canal)
2,900 ha (33.9 km)
2. Work Division II
2.1 Langkemme Intake Weir
—
2.2 Langkemme Main Canal
— L-1
8.29 km
— L-2
9.38 km
— L-3
11.75 km
2.3 Tunnel
0.72 km
2.4 Tertiary Development (Link Canal)
4,500 ha (2.0 km)
3 Work Division III
3.1 Pising Intake Weir
—
3.2 Jupang Intake Weir
—
3.3 Unyi Intake Weir
—
3.4 Sero Diversion Canal
— S-1
5.83 km
— S-2
9.14 km
3.5 Tertiary Development
1,900 ha

図 5. 6. 2　建設計画

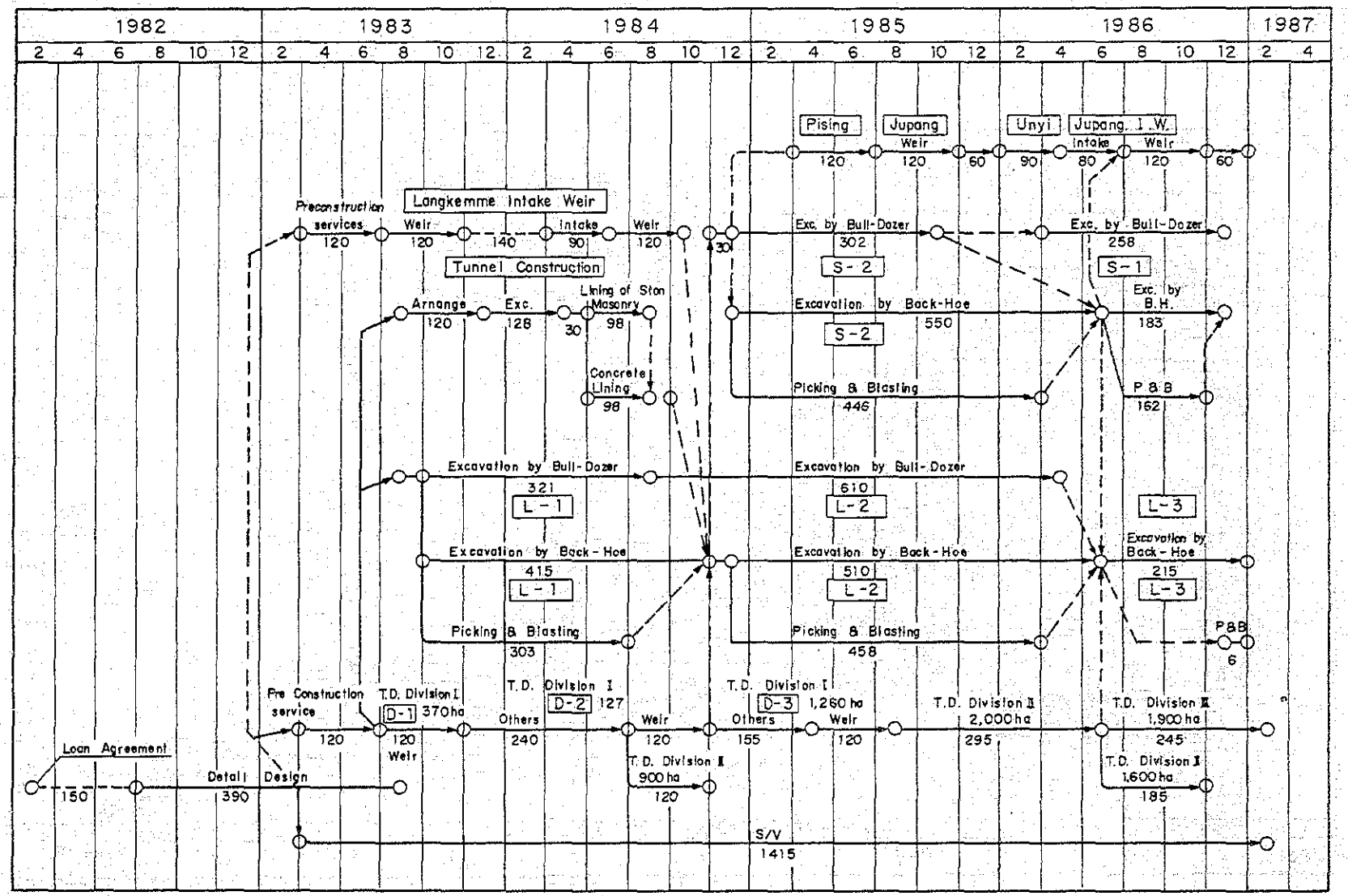


図 5.6.3　ランケメかんがい開発計画実施図

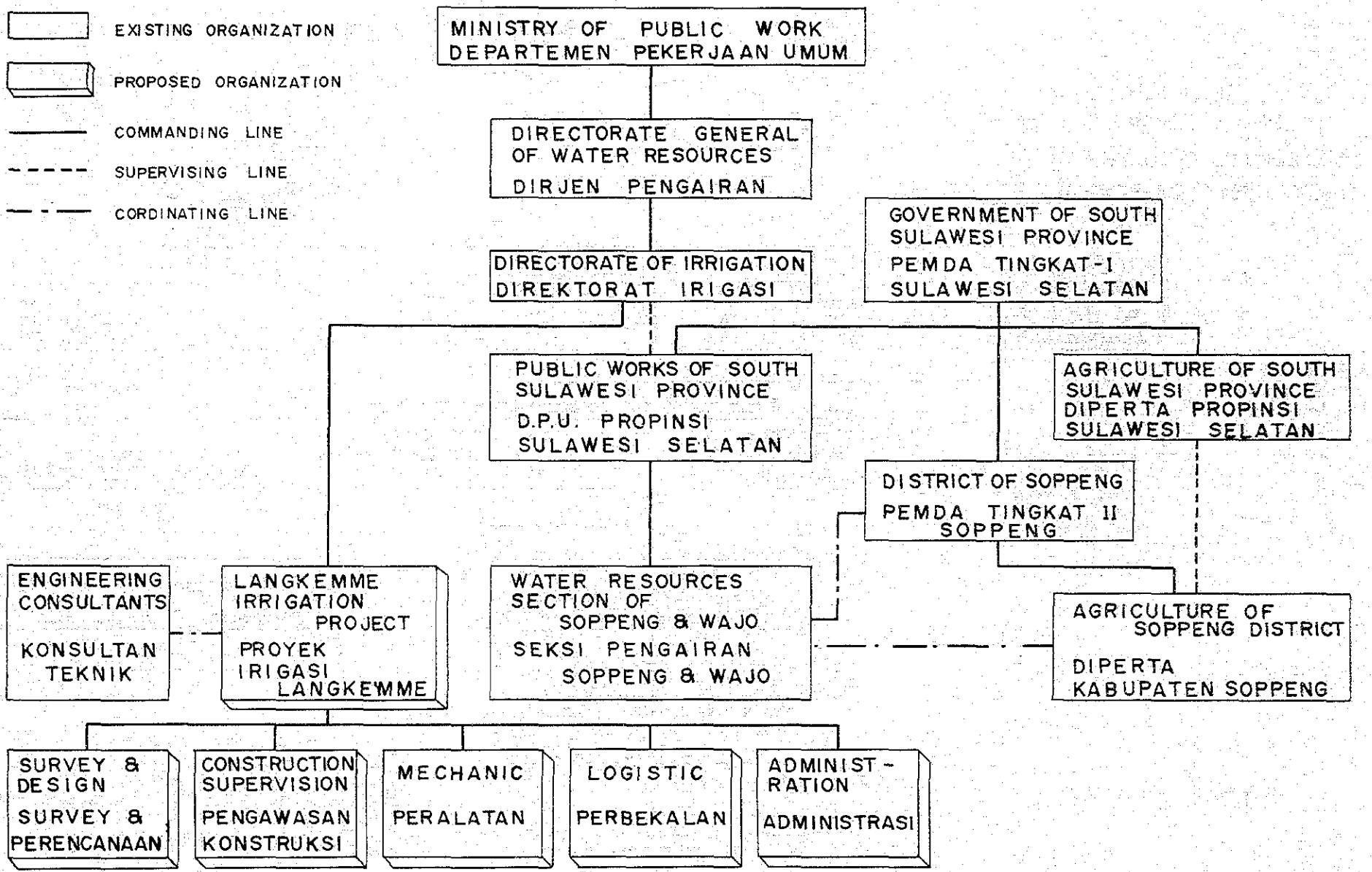

EXISTING ORGANIZATION
PROPOSED ORGANIZATION
COMMANDING LINE
SUPERVISING LINE
CORDINATING LINE
MINISTRY OF PUBLIC WORK
DEPARTEMEN PEKERJAAN UMUM
DIRECTORATE GENERAL
OF WATER RESOURCES
DIRJEN PENGAIRAN
DIRECTORATE OF IRRIGATION
DIREKTORAT IRIGASI
GOVERNMENT OF SOUTH
SULAWESI PROVINCE
PEMDA TINGKAT-I
SULAWESI SELATAN
PUBLIC WORKS OF SOUTH
SULAWESI PROVINCE
D.P.U. PROPINSI
SULAWESI SELATAN
AGRICULTURE OF SOUTH
SULAWESI PROVINCE
DIPERTA PROPINSI
SULAWESI SELATAN
DISTRICT OF SOPPENG
PEMDA TINGKAT II
SOPPENG
ENGINEERING
CONSULTANTS
KONSULTAN
TEKNIK
LANGKEMME
IRRIGATION
PROJECT
PROYEK
IRIGASI
LANGKEMME
WATER RESOURCES
SECTION OF
SOPPENG & WAJO
SEKSI PENGAIRAN
SOPPENG & WAJO
AGRICULTURE OF
SOPPENG DISTRICT
DIPERTA
KABUPATEN SOPPENG
SURVEY &
DESIGN
SURVEY &
PERENCANAAN
CONSTRUCTION
SUPERVISION
PENGAWASAN
KONSTRUKSI
MECHANIC
PERALATAN
LOGISTIC
PERBEKALAN
ADMINIST-
RATION
ADMINISTRASI

図 6.1.1　事業実施組織

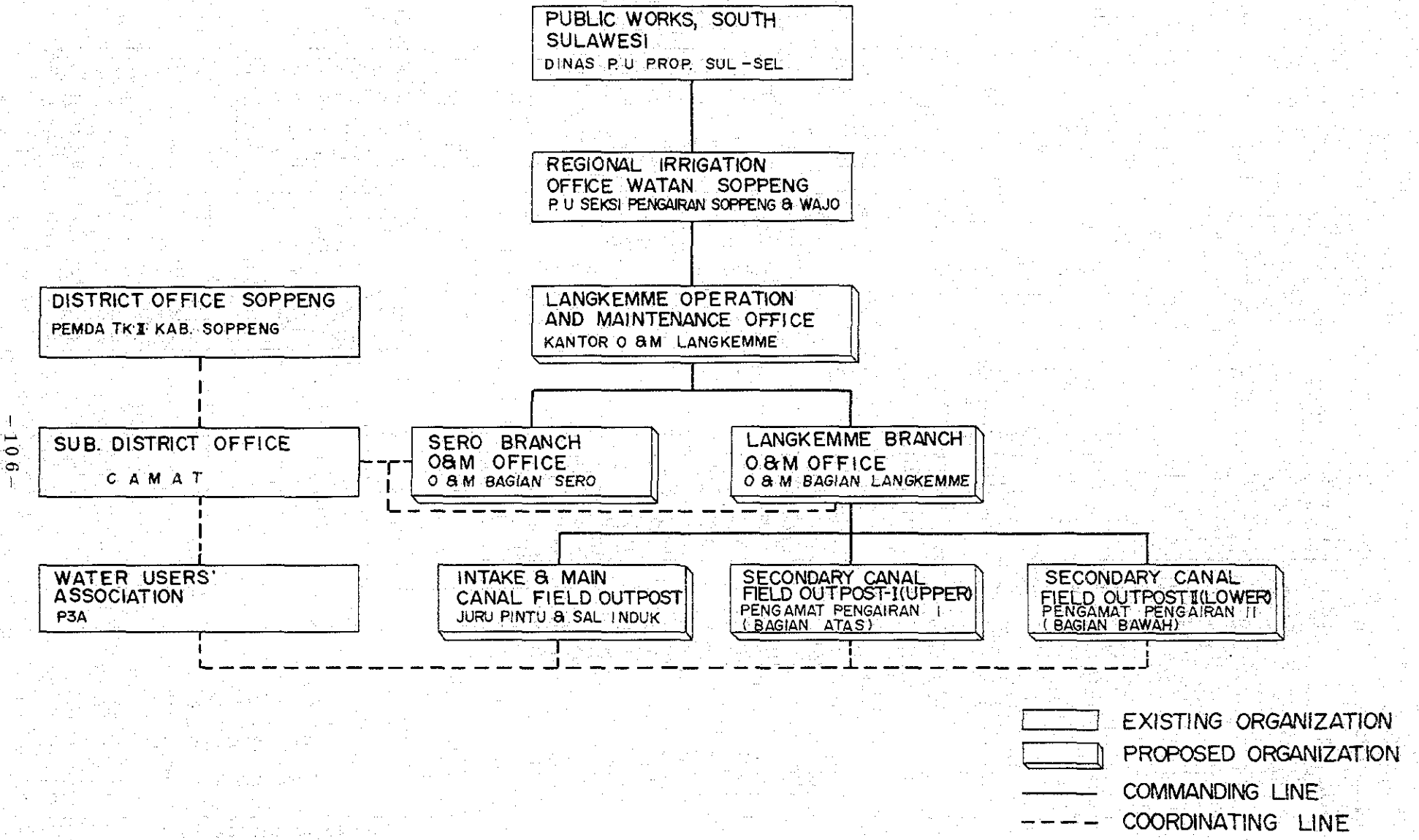

PUBLIC WORKS, SOUTH SULAWESI
DINAS P.U PROP. SUL-SEL
REGIONAL IRRIGATION OFFICE WATAN SOPPENG
P.U SEKSI PENGAIRAN SOPPENG & WAJO
DISTRICT OFFICE SOPPENG
PEMDA TK.II KAB. SOPPENG
LANGKEMME OPERATION AND MAINTENANCE OFFICE
KANTOR O&M LANGKEMME
SUB. DISTRICT OFFICE
C A M A T
SERO BRANCH O&M OFFICE
O&M BAGIAN SERO
LANGKEMME BRANCH O&M OFFICE
O&M BAGIAN LANGKEMME
WATER USERS' ASSOCIATION
P3A
INTAKE & MAIN CANAL FIELD OUTPOST
JURU PINTU & SAL INDUK
SECONDARY CANAL FIELD OUTPOST-I(UPPER)
PENGAMAT PENGAIRAN I
(BAGIAN ATAS)
SECONDARY CANAL FIELD OUTPOST II(LOWER)
PENGAMAT PENGAIRAN II
(BAGIAN BAWAH)
EXISTING ORGANIZATION
PROPOSED ORGANIZATION
COMMANDING LINE
COORDINATING LINE

図 6. 2. 1　維持・管理組織

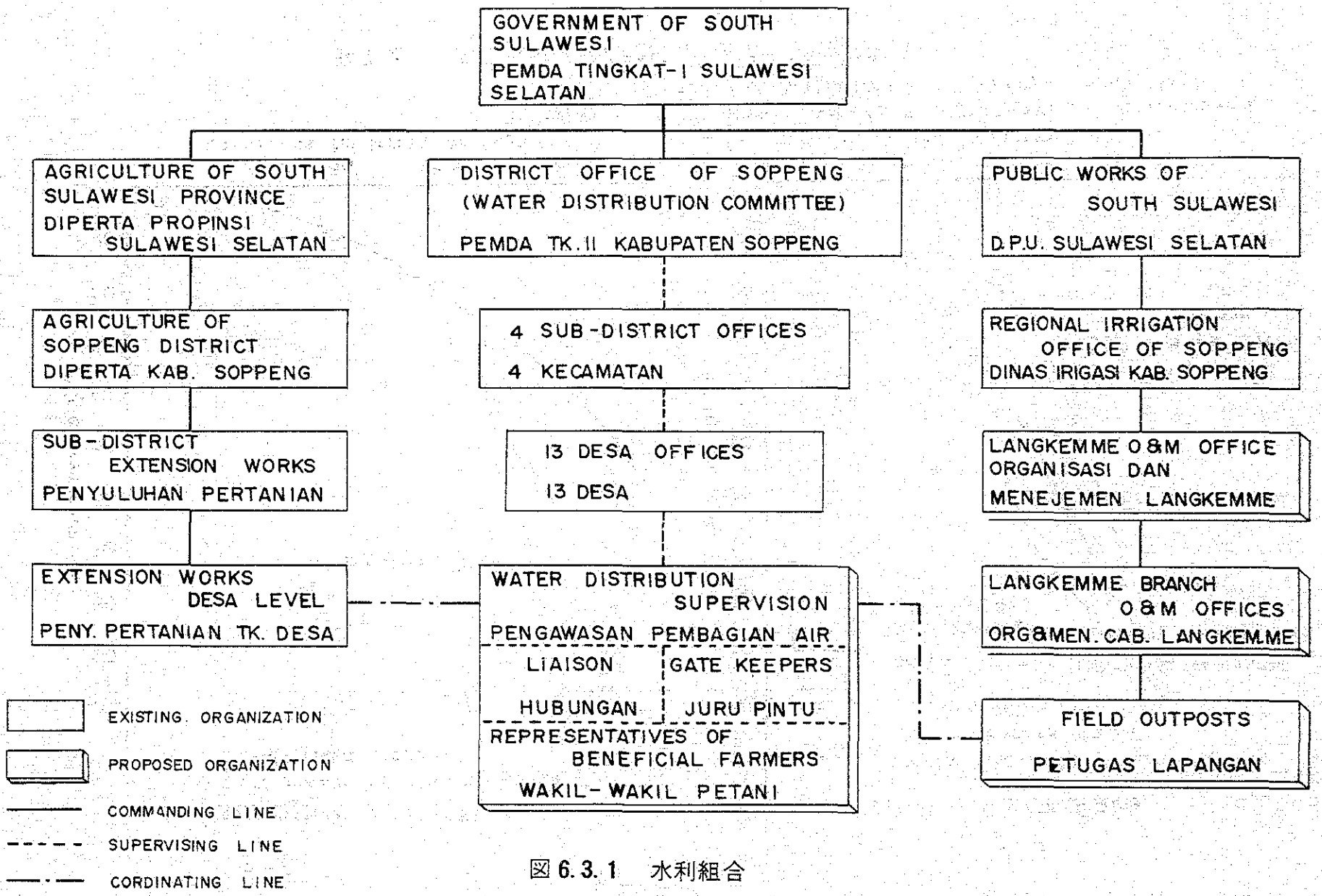
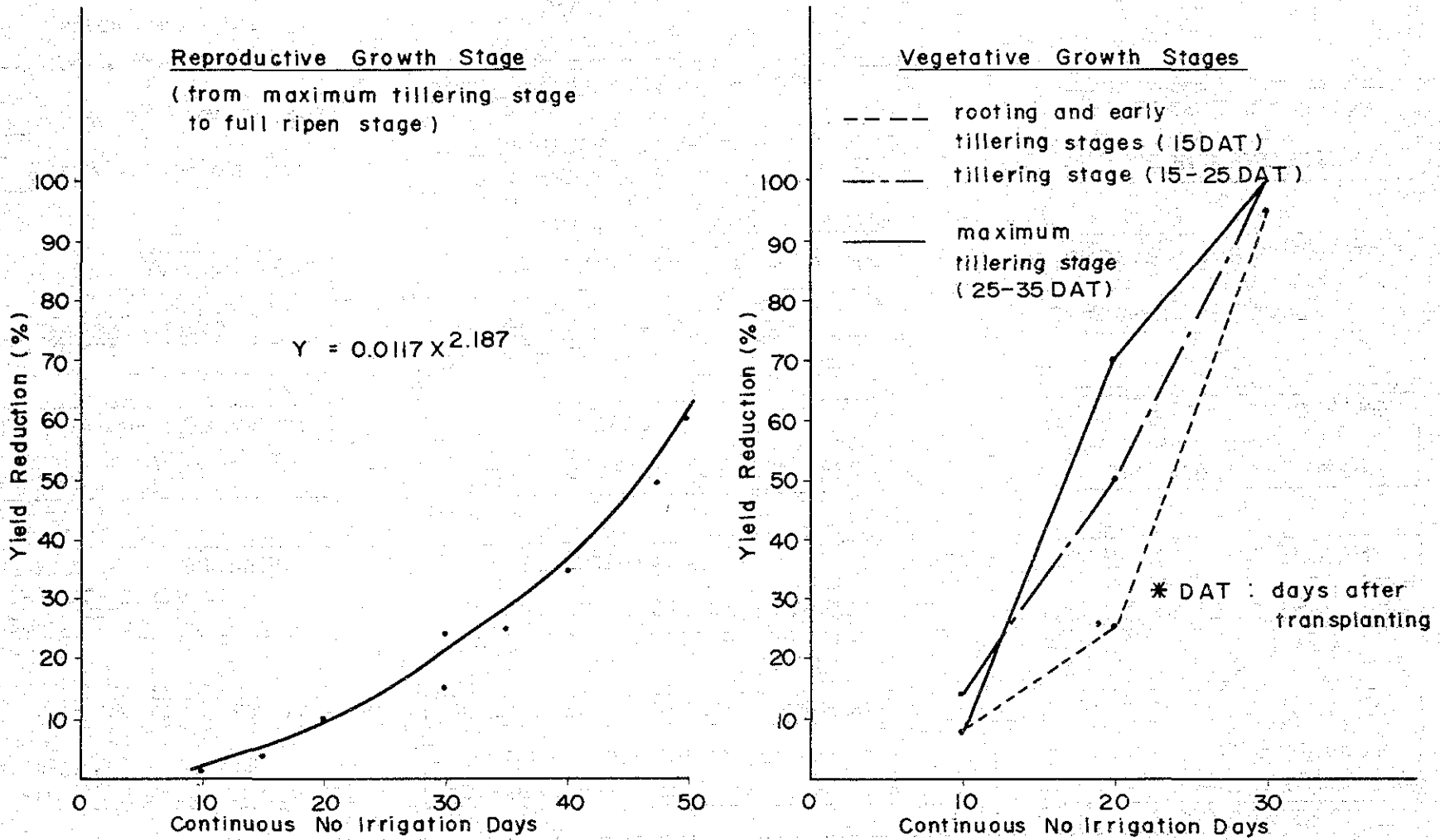

GOVERNMENT OF SOUTH SULAWESI
PEMDA TINGKAT-I SULAWESI SELATAN
AGRICULTURE OF SOUTH SULAWESI PROVINCE
DIPERTA PROPINSI SULAWESI SELATAN
DISTRICT OFFICE OF SOPPENG
(WATER DISTRIBUTION COMMITTEE)
PEMDA TK. II KABUPATEN SOPPENG
PUBLIC WORKS OF SOUTH SULAWESI
D.P.U. SULAWESI SELATAN
AGRICULTURE OF SOPPENG DISTRICT
DIPERTA KAB. SOPPENG
4 SUB-DISTRICT OFFICES
4 KECAMATAN
REGIONAL IRRIGATION OFFICE OF SOPPENG
DINAS IRIGASI KAB. SOPPENG
SUB-DISTRICT EXTENSION WORKS
PENYULUHAN PERTANIAN
13 DESA OFFICES
13 DESA
LANGKEMME O&M OFFICE
ORGANISASI DAN MENEJEMEN LANGKEMME
EXTENSION WORKS DESA LEVEL
PENY. PERTANIAN TK. DESA
WATER DISTRIBUTION SUPERVISION
PENGAWASAN PEMBAGIAN AIR
LIAISON
HUBUNGAN
GATE KEEPERS
JURU PINTU
REPRESENTATIVES OF BENEFICIAL FARMERS
WAKIL-WAKIL PETANI
LANGKEMME BRANCH O&M OFFICES
ORG&MEN. CAB. LANGKEMME
FIELD OUTPOSTS
PETUGAS LAPANGAN
EXISTING ORGANIZATION
PROPOSED ORGANIZATION
COMMANDING LINE
SUPERVISING LINE
CORDINATING LINE

図 6.3.1　水利組合



Source : NATSUSAKU GENSYU SUITEI SHAKUDO (in Japanese)
Ministry of Agriculture and Forestry, Japan, 1975.

図 7. 2. 1　米の収量被害と連続非かんがい日数の関連

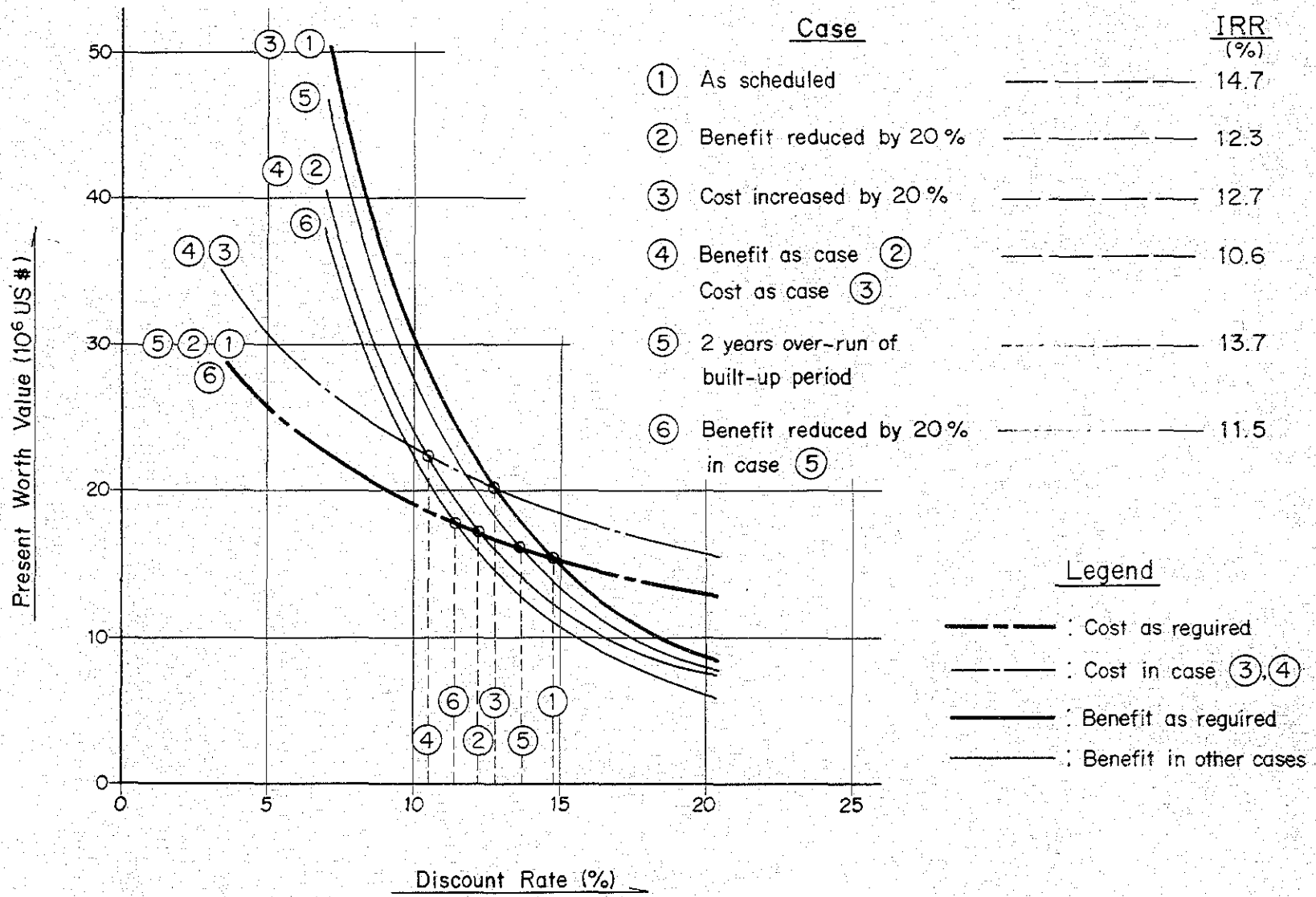

Present Worth Value (10^6 US $)
Discount Rate (%)
0
10
20
30
40
50
0
5
10
15
20
25
Case
IRR (%)
① As scheduled 14.7
② Benefit reduced by 20 % 12.3
③ Cost increased by 20 % 12.7
④ Benefit as case ② Cost as case ③ 10.6
⑤ 2 years over-run of built-up period 13.7
⑥ Benefit reduced by 20 % in case ⑤ 11.5
Legend
: Cost as reguired
: Cost in case ③,④
: Benefit as reguired
: Benefit in other cases

図 7. 4. 1　感度分析