表 3.16　Walanae川およびBila川支流の確率高水流量

River System	River Name	Catch-ment area (km^2)	Discharge (m^3/s)					
			1/2	1/5	1/10	1/20	1/50	1/100
Lawo	Lawo	168	362	453	522	612	713	789
Batubatu	Batubatu	113	291	363	422	497	584	649
Gilirang	Gilirang	518	672	847	957	1,106	1,259	1,376
Walanae	Belo	216	416	521	598	698	810	893
	Mario	485	648	816	924	1,068	1,218	1,332
	Langkemme	104	278	347	404	475	560	622
	Menraleng	515	670	844	955	1,103	1,256	1,372
	Sanrego	230	430	539	619	722	838	921
Bila	Lancirang	180	376	470	542	634	739	816
	Kalola	167	361	451	521	610	711	787
	Boya	536	685	863	975	1,126	1,281	1,399

表 3.17　Cenranae川の確率高水流量

(Catchment area: 6,138 km^2)

Return period (Year)	2	5	10	20	50	100
Water level of L.Tempe (EL.m)	8.0	8.9	9.4	9.9	11.0	12.0
Discharge at Sengkang (m^3/s)	487	646	744	849	1,105	1,367
Specific discharge ($m^3/s/km^2$)	0.079	0.105	0.121	0.138	0.180	0.223

表 4.1　各かんがい計画地区の土地利用状況

(Unit: ha)

Name of Project	Present Land Use			Total Project Area
	Irrigated Land	Rainfed	Upland	
Langkemme (Kab.Soppeng)	220	4,780	0	5,000
Bila	520	9,780	200	10,500
(Kab.Sidrap)	(0)	(3,960)	(100)	(4,060)
(Kab.Wajo)	(520)	(5,820)	(100)	(6,440)
Sanrego (Kab.Bone)	430	7,670	1,900	10,000
Lawo (Kab.Soppeng)	500	2,500	0	3,000
Boya	8,180	1,820	0	10,000
(Kab.Sidrap)	(6,550)	(1,220)	(0)	(7,770)
(Kab.Wajo)	(1,630)	(600)	(0)	(2,230)
Gilirang (Kab.Wajo)	0	10,000	0	10,000
Walanae	5,310	15,590	5,100	26,000
In Walanae Basin	3,370	4,330	2,500	10,200
(Kab.Soppeng)	(3,370)	(2,230)	(1,800)	(7,400)
(Kab.Wajo)	(0)	(2,100)	(700)	(2,800)
In Cenranae Basin	1,940	11,260	2,600	15,800
(Kab.Wajo	(240)	(5,560)	(700)	(6,500)
(Kab.Bone)	(1,700)	(5,700)	(1,900)	(9,300)
Padangeng (Kab.Soppeng)	2,350	1,730	120	4,200
Cenranae (Kab.Wajo)	0	2,300	0	2,300
Total	17,510	56,170	7,320	81,000

表 4.2　土地利用計画

Name of Kecamatan	Land Use in the Future					Land Use at Present				
	Total Paddy Field (ha) (1)	Technical Irrigation Area (ha) (2)	Rainfed Area (ha) (3)	Rate of Irrigation Facilities (4)=(2)/(1)	Upland Area (ha) (5)	Total Paddy Field (ha) (6)	Technical Irrigation Area (ha) (7)	Rainfed Area (ha) (8)	Rate of Irrigation Facilities (9)=(7)/(6)	Upland Area (ha) (10)
Panca Lautang	5,080	2,320	2,760	0.45	1,240	5,080	2,320	2,760	0.45	1,240
Tellulimpoe	2,670	1,250	1,420	0.48	140	2,670	1,250	1,420	0.48	140
Maritengae	11,930	10,390	1,540	0.87	220	11,930	10,390	1,540	0.87	220
Dua Pitue	12,520	11,830(11,830)	690	0.95	3,220	12,420	6,550 (6,550)	5,870 (5,180)	0.52	3,320 (100)
Cenranae	5,080	0	5,080	0	940	5,080	0	5,080	0	940
Ajangale	5,750	5,400 (5,400)	350	0.93	60	4,750	0	4,750 (4,400)	0	1,060 (1,000)
Dua Boccoe	3,960	3,900 (3,900)	60	0.98	120	3,060	1,700 (1,700)	1,360 (1,300)	0.55	1,020 (900)
Tellusiatinge	4,990	640	4,350	0.12	590	4,990	640	4,350	0.12	590
Ponre	1,890	0	1,890	0	700	1,890	0	1,890	0	700
Ulaweng	920	0	920	0	4,010	920	0	920	0	4,010
Lamuru	1,530	0	1,530	0	4,740	1,530	0	1,530	0	4,740
Lappariaja	5,400	740	4,660	0.13	4,270	5,400	740	4,660	0.13	4,270
Libureng	6,760	3,700 (3,700)	3,060	0.45	140	5,300	0	5,300 (2,240)	0	1,600 (1,460)
Kahu	7,750	6,300 (6,300)	1,450	0.82	280	7,310	430 (430)	6,880 (5,430)	0.05	720 (440)
Bonto Cani	1,600	0	1,600	0	840	1,600	0	1,600	0	840
Lalabata	6,850	6,650 (6,650)	200	0.83	4,980	6,780	2,800 (2,800)	3,980 (3,780)	0.41	5,050 (70)
Liliriaja	7,160	7,160 (7,160)	0	1.00	4,530	6,640	2,560 (2,560)	4,080 (4,080)	0.39	5,050 (520)
Marioriawa	4,200	4,200 (850)	0	1.00	2,830	4,150	3,400 (50)	750 (750)	0.82	2,880 (50)
Marioriwawo	1,780	1,080 (1,080)	700	0.61	6,070	1,750	220 (220)	1,530 (830)	0.12	6,100 (30)
Lilirilau	4,170	3,860 (3,860)	310	0.93	9,820	2,920	810 (810)	2,110 (1,800)	0.28	11,070 (1,250)
Tempe	280	90 (90)	190	0.32	2,070	280	0	280 (90)	0	2,070
Tanasitolo	4,020	1,800 (1,800)	2,220	0.45	2,360	4,020	0	4,020 (1,800)	0	2,360
Maniang Pajo	7,050	4,400 (4,400)	2,650	0.62	2,850	7,000	520 (520)	6,480 (3,830)	0.07	2,900 (50)
Belawa	4,660	3,680 (3,680)	980	0.78	5,910	4,610	1,630 (1,630)	2,980 (2,000)	0.35	5,960 (50)
Sabang Paru	3,210	2,800 (2,800)	410	0.88	5,410	2,510	0	2,510 (2,100)	0	6,110 (700)
Pammana	6,500	6,500 (6,500)	0	1.00	2,390	5,800	240 (240)	5,560 (5,560)	0.04	3,090 (700)
Takkalalla	12,920	90 (90)	12,830	0.01	2,470	12,920	0	12,920 (90)	0	2,470
Majauleng	10,350	4,110 (3,890)	6,240	0.40	2,570	10,350	220	10,130 (3,890)	0.19	2,570
Sajoanging	15,790	7,020 (7,020)	8,770	0.44	2,630	15,790	0	15,790 (7,020)	0	2,630
Total or Average	166,770	99,910(81,000)	66,860	0.60	78,400	159,450	36,420(17,510)	123,030(56,170)	0.23	85,720 (7,320)

Note: The figures shown in parentheses indicate the areas related to the proposed nine irrigation projects.

表 4.3　かんがい計画実施後の作物生産量

(Unit: tons)

Summary	With Project(A)	Without Project(B)	Increment (A) - (B)
Paddy			
Irrigated land			
wet season	486,000	93,400	392,600
dry season	438,000	84,200	353,800
Rainfed area			
wet season	0	137,800	-137,800
dry season	0	17,000	- 17,000
Upland rice	0	790	- 790
Sub-total	924,000	331,190	590,810
Maize	0	10,100	- 10,100
Peanuts	0	3,810	- 3,810
Soybeans	0	570	- 570
Green beans	0	1,050	- 1,050
Cassava	0	2,630	- 2,630

表 4.4 (1) かんがい可能水量 (1/2)

	Bila			Boya			Batu Batu		
	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
Jan.	10.1	18.3	5.6	17.1	28.3	10.4	6.9	13.3	3.3
Feb.	13.2	28.7	3.5	20.3	38.9	11.9	5.8	12.8	2.1
Mar.	14.4	27.2	3.7	25.1	33.4	5.0	3.4	4.4	2.2
Apr.	19.3	34.0	7.8	29.4	46.1	13.7	4.3	7.2	1.4
May	27.2	45.2	17.2	36.1	69.3	16.2	3.3	3.5	2.8
Jun.	21.8	26.6	14.5	28.5	36.1	21.4	6.4	10.1	2.8
Jul.	28.0	50.7	10.6	40.2	68.8	7.9	5.0	8.2	3.6
Aug.	20.5	33.3	11.8	26.8	45.2	13.4	2.6	3.3	2.1
Sep.	28.6	54.2	2.5	39.2	73.5	2.6	2.1	4.8	0.6
Oct.	16.8	28.9	2.4	17.5	38.2	0.5	2.2	4.6	0.0
Nov.	12.3	18.3	2.5	15.4	24.8	7.6	2.2	3.9	0.9
Dec.	18.5	31.0	9.5	23.1	38.1	15.9	4.9	9.1	2.2
Annual	19.2	54.2	2.4	26.6	73.5	0.5	4.1	13.3	0.0

	Padangeng			Lawo			Langkemme		
	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
Jan.	7.5	12.9	4.6	5.1	7.9	2.9	7.0	12.7	4.9
Feb.	6.6	13.8	3.1	4.6	9.2	2.5	6.5	14.7	2.0
Mar.	4.8	6.0	3.1	3.7	5.4	2.0	4.8	7.5	2.1
Apr.	5.1	7.9	2.1	3.5	5.4	1.7	5.2	8.0	2.9
May	3.6	4.7	2.9	2.4	3.6	1.7	3.8	6.0	2.4
Jun.	6.4	13.4	3.2	4.0	10.3	0.9	4.1	7.1	1.6
Jul.	4.1	5.8	3.1	2.0	2.4	1.1	3.8	4.6	2.5
Aug.	2.2	2.7	1.2	1.0	1.5	0.2	2.7	3.1	2.5
Sep.	2.3	4.0	0.9	1.5	2.2	0.6	2.0	2.3	1.4
Oct.	2.1	4.1	0.3	1.2	2.6	0.3	2.9	4.4	1.5
Nov.	2.0	2.7	1.1	1.1	1.7	0.5	2.5	2.9	1.9
Dec.	5.4	8.1	4.4	3.7	4.5	3.1	5.5	6.0	5.1
Annual	4.3	13.8	0.3	2.8	10.3	0.2	4.2	14.7	1.4

Note:

	Catchment area	Record period
Bila river discharge	379 km^2	5 yrs. Apr. 1973 to Mar. 1978
Boya river discharge	514	5 yrs. Apr. 1973 to Mar. 1978
Batu Batu river discharge	113	4 yrs. May 1974 to Mar. 1978
Padangeng river discharge	107	4 yrs. May 1974 to Mar. 1978
Lawo river discharge	63	4 yrs. May 1974 to Mar. 1978
Langkemme river discharge	104	4 yrs. May 1974 to Apr. 1978

表 4.4 (2) かんがい可能水量 (2/2)

	Sanrego			Walanae			Gilirang		
	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.
Jan.	9.4	11.4	7.9	174.0	289.6	114.2	13.5	24.5	1.1
Feb.	8.8	10.3	7.1	162.1	361.9	69.1	11.5	33.0	0.4
Mar.	8.8	10.4	7.1	96.3	151.9	71.9	16.1	37.5	1.5
Apr.	9.5	11.3	8.5	82.4	144.6	38.3	19.4	35.2	3.3
May	9.5	14.6	7.0	135.1	317.3	34.3	41.9	68.3	27.0
Jun.	12.8	20.8	8.8	176.7	366.4	94.5	34.1	56.1	7.5
Jul.	8.5	10.7	6.3	106.0	198.9	48.3	48.5	62.3	23.3
Aug.	9.6	14.6	5.9	63.0	123.0	25.2	17.1	23.1	11.1
Sep.	9.3	15.5	5.4	44.5	88.1	12.4	25.2	59.7	0.8
Oct.	7.4	9.2	5.6	42.6	89.5	13.2	16.7	22.2	11.9
Nov.	8.3	10.5	5.4	44.5	111.4	18.2	2.7	3.8	2.0
Dec.	8.9	10.7	6.8	72.5	129.2	36.8	2.3	3.8	1.0
Annual	9.2	20.8	5.4	100.0	366.4	12.4	20.8	68.3	0.4

Note:

	Catchment area	Record period
Sanrego river discharge	176 km^2	5 yrs. Apr. 1973 to Mar. 1978
Walanae river discharge	2,684	4 yrs. Apr. 1974 to Dec. 1978
Gilirang river discharge	300	3 yrs. Sep. 1975 to Jul. 1978

表 4.5　期別用水量および最大用水量

Irrigation Project	Irrigation Area (ha)	Seasonal water requirement		Maximum water requirement	
		Wet season (10^6m^3)	Dry season (10^6m^3)	Unit (l/s/ha)	Total (m^3/sec)
Northern area					
Bila Irrigation Project	10,500	43	58	1.31	13.76
Boya Irrigation Project	10,000	46	88	1.28	12.80
Southern area of Lake Tempe					
Langkemme Irrigation Project	5,000	20	28	1.15	5.75
Western area of Lake Tempe					
Lawo Irrigation Project	3,000	11	15	1.15	3.45
Padangeng Irrigation Project	4,200	16	34	1.15	4.83
Eastern area					
Cenranae Irrigation Project	2,300	12	23	1.42	3.27
Northeastern area					
Gilirang Irrigation	10,000	34	85	1.39	13.90
Southern inland					
Sanrego Irrigation Project	10,000	18	65	1.04	10.40
Walanae project area	26,000	121	234	-	-
Southern area of Lake Tempe	(10,200)	(40)	(56)	(1.15)	(11.73)
Eastern area	(15,800)	(81)	(178)	(1.42)	(22.44)
Total	81,000	321	630	-	-
Total Seasonal Requirement					
Walanae Basin; 8 projects	71,000	287	545	-	-
; Existing	3,150	25	22	-	-
Gilirang Basin	10,000	34	85	-	-

表 4.6　重力式かんがい面積

Irrigation Project	Irrigation Area (ha)						
	1973/74	1974/75	1975/76	1976/77	1977/78	Average	Minimum
Langkemme Project							
Wet season							
Available	-	8,600	5,200	8,600	6,400		
Limited	-	5,000	5,000	5,000	5,000	5,000	5,000
Dry season							
Available	-	3,600	2,800	5,600	3,500		
Limited	-	3,600	2,800	5,000	3,500	3,700	2,800
Bila Project							
Wet season							
Available	60,400	18,800	42,300	24,600	12,600		
Limited	10,500	10,500	10,500	10,500	10,500	10,500	10,500
Dry season							
Available	6,600	7,500	4,800	9,000	6,300		
Limited	6,600	7,500	4,800	9,000	6,300	6,800	4,800
Sanrego Project							
Wet season							
Available	47,100	35,300	28,800	18,500	9,500		
Limited	10,000	10,000	10,000	10,000	9,500	9,900	9,500
Dry season							
Available	12,900	7,000	13,300	8,400	7,700		
Limited	10,000	7,000	10,000	8,400	7,700	8,600	7,000
Lawo Project							
Wet season							
Available	-	3,800	3,100	3,600	3,600		
Limited	-	3,000	3,000	3,000	3,000	3,000	3,000
Dry season							
Available	-	2,300	1,300	4,500	700		
Limited	-	2,300	1,300	3,000	700	1,800	700
Boya Project							
Wet season							
Available	84,900	14,700	100,000	15,800	9,800		
Limited	10,000	10,000	10,000	10,000	9,800	10,000	9,800
Dry season							
Available	9,100	10,400	15,400	15,600	14,900		
Limited	9,100	10,000	10,000	10,000	10,000	9,800	9,100

表 4.7　計画高水流量の経済比較

Item	Unit	Return Period of Flood			
		5-yr	10-yr	20-yr	50-yr
Bila River					
- Average annual benefit/1	US$1,000	1,661	1,923	2,086	2,208
- Construction cost	US$1,000	12,640	14,400	15,520	17,920
- Annual O/M cost/2	US$1,000	58	65	70	81
- B/C ratio/3					
Discount rate 8%		1.29	1.31	1.32	1.21
Discount rate 10%		1.04	1.06	1.07	0.98
Discount rate 12%		0.87	0.89	0.89	0.82
Walanae River					
- Average annual benefit/1	US$1,000	2,150	2,733	3,170	3,570
- Construction cost	US$1,000	21,280	26,400	28,320	35,200
- Annual O/M cost/2	US$1,000	96	118	128	158
- B/C ratio/3					
Discount rate 8%		0.99	1.01	1.10	0.99
Discount rate 10%		0.80	0.82	0.89	0.80
Discount rate 12%		0.67	0.69	0.74	0.67

/1: The benefits are estimated as effects of decrease in flood damages under the conditions of the proposed irrigation projects.

/2: The annual O/M cost is assumed at 0.5% of construction cost excluding engineering & administration cost.

/3: The B/C ratios are calculated only for comparative purpose taking up the improvement of the mainstream of the Bila and the Walanae Rivers. They would be different, if all the benefits and the construction costs including the improvement of tributaries would be taken into account.

表 4.8　インドネシアにおける河川の計画高水流量

No.	Name of River	Province	Catchment Area (km^2)	Design Flood (m^3/s)	Return Period (yr)	Remarks
1	Sungai Cimanuk	West Jawa	3,006	1,440	25	
2	Kali Serang	Central Jawa	937	900	25	
3	Sungai Citunduy	West Jawa	3,680	1,900	25	
4	Sungai Ular	North Sumatera	1,080	800	25	
5	Kali Pemali	Central Jawa	1,228	1,300	25	
6	Sungai Cipanas	West Jawa	220	385	25	
7	Bengawan Solo	Central/East Jawa	3,400	1,500	10	1st stage
				2,000	40	2nd stage
8	Kali Madiun	East Jawa	2,400	1,100	10	1st stage
				2,300	40	2nd stage
9	Sungai Wampu	North Sumatera	3,840	1,320	20	
10	Sungai Arakundo	Aceh	5,495	1,800	20	
11	Sungai Kring Aceh	Aceh	1,775	1,300	20	
12	Kali Brantas	East Jawa	10,000	1,350	10	1st stage
				1,500	50	2nd stage
13	Sungai Bah Bolon	North Sumatera	2,776	1,220	20	

表 4.9 ダムによる洪水調節効果

Item	Unit	Probability						
		1/1.1	1/2	1/5	1/10	1/20	1/50	1/100
Discharge and Water Level								
(1) Without Dam (Present Condition)								
- Discharge at Cabenge	m^3/s	900	1,700	2,200	2,400	2,700	3,000	3,200
- W.L. of L.Tempe	EL.m	6.8	8.0	8.9	9.4	9.9	11.0	12.0
- Discharge at Sengkang	m^3/s	310	490	650	750	850	1,110	1,370
(2) With Flood Regulation by Mong Dam (V = 50 million m^3)								
Walanae River								
- Discharge at Cabenge	m^3/s	800	1,490	1,910	2,080	2,330	2,880	3,120
- Discharge Reduction	m^3/s	80	210	290	320	370	120	80
(3) With Flood Regulation by Walimpong Dam (V = 100 million m^3)								
Walanae River								
- Discharge at Cabenge	m^3/s	760	1,320	1,690	1,820	2,040	2,740	3,020
- Discharge Reduction	m^3/s	140	380	510	580	660	260	180
Lake Tempe								
- W.L. of L.Tempe	EL.m	6.78	7.96	8.84	9.33	9.82	10.90	11.89
- W.L. of Lowering	m	0.02	0.04	0.06	0.07	0.08	0.10	0.11
(4) With Flood Regulation by Walimpong Dam (V = 200 million m^3)								
Walanae River								
- Discharge at Cabenge	m^3/s	640	1,050	1,310	1,410	1,570	2,540	2,900
- Discharge Reduction	m^3/s	260	650	890	990	1,130	460	300
Lake Tempe								
- W.L. of L.Tempe	EL.m	6.75	7.92	8.80	9.28	9.77	10.85	11.84
- W.L. of Lowering	m	0.05	0.08	0.10	0.12	0.13	0.15	0.16
(5) With Flood Regulation by Walimpong Dam (V = 300 million m^3)								
Walanae River								
- Discharge at Cabenge	m^3/s	580	880	1,140	1,230	1,360	2,500	2,860
- Discharge Reduction	m^3/s	320	820	1,060	1,170	1,340	500	340
Lake Tempe								
- W.L. of L.Tempe	EL.m	6.75	7.91	8.79	9.27	9.75	10.83	11.81
- W.L. of Reduction	m	0.06	0.09	0.11	0.13	0.15	0.17	0.19

表 4.10　Cenranae川のしゅんせつ効果

Discharge and Water Level

Item	Unit	Present condition	Dredging volume (10^3 m^3)		
			500	2,000	18,800
1975					
- Water level of L.Tempe					
HWL	EL.m	8.37	8.17	7.82	6.84
Lowering	m	-	0.20	0.55	1.53
- Discharge at Sengkang					
Peak	m^3/s	549	545	553	813
1977					
- Water level of L.Tempe					
HWL	EL.m	8.97	8.82	8.67	7.89
Lowering	m	-	0.13	0.30	1.06
LWL	EL.m	3.42	2.50	1.74	1.35
Lowering	m	-	0.92	1.68	2.07
- Discharge at Sengkang					
Peak	m^3/s	659	649	681	1,085
Lowest	m^3/s	25	25	25	25
1978					
- Water level of L.Tempe					
HWL	EL.m	7.51	7.27	7.01	6.00
Lowering	m	-	0.24	0.50	1.51
LWL	EL.m	4.08	3.02	2.15	1.58
Lowering	m	-	1.06	1.93	2.50
- Discharge at Sengkang					
Peak	m^3/s	409	418	442	619
Lowest	m^3/s	55	44	38	38

表 4.1.1(1) 治水計画地区の工事数量および建設費

Item	Quantity	Cost (US$1,000)
1. Improvement of Bila River		
- Main Civil Works		14,592
Embankment (L = 72 km)	1,371,000 m^3	
Excavation	4,672,000 m^3	
- Acquisition & Compensation		288
Land	260 ha	
House	100 houses	
- Contingency		2,976
- Engineering & Administration		1,824
- Total		19,680
2. Improvement of Walanae River		
Without Dam		
- Main Civil Works		23,344
Embankment (L = 84 km)	3,020,000 m^3	
Excavation	7,630,000 m^3	
- Acquisition & Compensation		576
Land	390 ha	
House	330 houses	
- Contingency		4,800
- Engineering & Administration		2,960
- Total		31,680
With Mong Dam		
- Main Civil Works		21,952
Embankment (L = 84 km)	2,730,000 m^3	
Excavation	7,030,000 m^3	
- Acquisition & Compensation		560
Land	380 ha	
House	320 houses	
- Contingency		4,528
- Engineering & Administration		2,720
- Total		29,760

表 4.1 1 (2)　治水計画地区の工事数量および建設費

Item	Quantity	Cost (US$1,000)
With Walimpong Dam (V = 100 million m^3)		
- Main Civil Works		19,768
Embankment (L = 82 km)	2,410,000 m^3	
Excavation	6,270,000 m^3	
- Acquisition & Compensation		536
Land	360 ha	
House	310 houses	
- Contingency		4,064
- Engineering & Administration		2,432
- Total		26,800
With Walimpong Dam (V = 200 million m^3)		
- Main Civil Works		16,288
Embankment (L = 80 km)	1,850,000 m^3	
Excavation	5,130,000 m^3	
- Acquisition & Compensation		512
Land	340 ha	
House	300 houses	
- Contingency		3,328
- Engineering & Administration		1,952
- Total		22,080
With Walimpong Dam (V = 300 million m^3)		
- Main Civil Works		15,696
Embankment (L = 78 km)	2,290,000 m^3	
Excavation	4,720,000 m^3	
- Acquisition & Compensation		512
Land	340 ha	
House	300 houses	
- Contingency		3,248
- Engineering & Administration		1,944
- Total		21,400

表 4.1 1 (3)　治水計画地区の工事数量および建設費

Item	Quantity	Cost (US$1,000)
3. Improvement of Cenranae River		
- Main Civil Works		11,704
Embankment (L = 37 km)	1,250,000 m^3	
Excavation	1,250,000 m^3	
Dredging	2,000,000 m^3	
Barrage (11 m x 3 gates)	1 site	
- Acquisition & Compensation		243
Land	144 ha	
House	160 houses	
- Contingency		2,389
- Engineering & Administration		1,456
- Total		15,792

表 4.12 各治水計画地区の建設費，維持管理費および便益

(Unit: US$1,000)

Plan	Const. Cost for River Improvement	Annual O/M Cost	Annual Benefit	
			Existing Condition	Proposed/1 Condition
1. Bila River Improvement Plan	19,680	89	2,397	2,987
2. Walanae River Flood Control Plan				
- Without Dam	31,680	144	2,557	-
- With Mong Dam	29,760	134	-	3,856
- With Walimpong Dam ($V = 100$ million m^3)	26,800	121	-	3,920
- With Walimpong Dam ($V = 200$ million m^3)	22,080	99	-	4,413
- With Walimpong Dam ($V = 300$ million m^3)	21,400	96	-	4,497
3. Cenranae River Improvement Plan	15,792	72	2,046	-

/1: Under the condition of the proposed irrigation project.

表 4.13　内水面漁業開発計画の費用および便益/1

(Unit: 10^6Rp.)

Plan	Benefit	Cost
Lake Fishing (Protection area)	3,494.9	131.0
Paddy Culture	893.0	182.6
Lake Culture	279.7	0.0
Total	4,667.6	313.6

/1: Discount rate = 12.0%
Project life = 50 years

表 4.14　内水面漁業開発計画の収支

(1) Lake Fishing: Setting Protection Area

Project	Production (t)	Growth Income (10^6Rp)	Fishing Expenditure (10^6Rp)	Net Income (10^6Rp)	Net Income/1 per household (Rp)
With	17,500	3,253.3	1,615.5	1,637.8	360,253
Without	13,500	2,509.7	1,246.2	1,263.5	274,116

/1: Including the share to the auction winner for using the fishing ground owned by regional government.

(2) Paddy Field Culture: Construction of Hatchery Pond

Project	Production (t)	Growth Income (10^6Rp)	Culturing Expenditure (10^6Rp)	Net Income (10^6Rp)	Net Income per household (Rp)
With	2,700	491.4	208.7	192.7	18,018/1
Without	27	4.9	3.0	1.9	18,018

/1: The survival ratio of fish fry is assumed to be seen between with and without project.

(3) Lake Culture: Fish Culture by Net Pond

Projcet	Production (t)	Growth Income (10^6Rp)	Culturing Expenditure (10^6Rp)	Net Income (10^6Rp)	Net Imcome per household (Rp)
With	3,300	600.6	540.9	59.7	16,415
Without	-	-	-	-	-

表 4.15 Walimpongダムの諸元

Items	Unit	Case-1	Case-2	Case-3
(Dam)				
Type of Dam	m	Rockfill	Rockfill	Rockfill
Top Elevation of Dam	m	82.00	82.00	82.00
Height of Dam	m	71.00	71.00	71.00
Length of Dam (incl. spillway)	m	900	900	900
Top Width of Dam	m	10	10	10
Dam Volume (incl. cofferdam)	10^3m^3	3,520	3,520	3,520
Overflow Elevation	m	67.00	67.00	67.00
Sediment Elevation	m	61.00	61.00	61.00
Riverbed Elevation	m	24.00	24.00	24.00
(Reservoir)				
Catchment Area	km^2	2,199	2,199	2,199
Reservoir Surface Area	km^2	55	55	55
N.H.W.L.	m	77.00	77.00	77.00
Spillway Desigh Flood W.L.	m	78.30	78.30	78.30
L.W.L.	m	61.00	61.00	61.00
Rule W.L. for Flood Control	m	75.00	73.00	70.50
Gross Reseroir Storage	10^6m^3	705	705	705
Effective Reservoir Storage	10^6m^3	540	540	540
Flood Control Storage Capacity	10^6m^3	100	200	300
Storage for Irrigation & Hydropower	10^6m^3	440	340	240
Sediment Volume	10^6m^3	165	165	165
(Discharge & Installment)				
Spillway Design Flood	m^3/s	7,000	7,000	7,000
River Maintenance Flow	m^3/s	12.3	12.3	12.3
Crest Gates	set	9	9	9
Intake Gates/1	set	4	4	4
River Outlet Gate	set	1	1	1

Note: /1: For irrigation and hydropower generation

表 5. 1　各開発計画の経済評価

(Unit: 10^3 US$)

Project	Construction Cost	O & M Cost	Annual Benefit	Cost & Benefit (Discount Rate - 12%) B	C	B - C	B/C	IRR
(I) Sectoral Project								
Irrigation								
(1) Bila	42,000	511	11,760	46,404	31,762	14,641	1.46	16.0
(2) Boya	23,900	372	3,803	16,742	20,080	-3,338	0.83	10.0
(3) Langkemme	22,400	272	4,603	21,857	18,420	3,437	1.19	13.5
(4) Lawo	10,500	133	1,959	10,363	9,188	1,175	1.13	13.0
(5) Cenranae	13,600	220	3,456	14,679	11,536	3,143	1.27	14.5
(6) Gilirang	65,200	782	15,712	59,538	49,253	10,285	1.21	14.0
(7) Walanae (Walimpong dam)	215,868	2,660	36,504	47,769	153,455	-35,686	0.77	10.0
(8) Sanrego	37,500	456	15,782	59,803	28.357	31,446	2.11	18.5
(9) Padangeng	20,900	282	2,935	13,938	17,338	-3,400	0.80	9.5
Flood Control								
(1) Bila (without irrigation plan)	19,680	89	2,397	11,266	13,614	-2,348	0.82	10.0
(2) Bila (with irrigation plan)	19,680	89	2,987	13,600	13,614	-14	1.00	12.0
(3) Walanae (with Walimpong dam)	36,000	266	4,413	15,420	25,267	-9,847	0.61	8.2
(4) Walanae (without Walimpong dam)	31,680	144	2,557	12,018	21,917	-9,899	0.55	6.5
(5) Cenranae	15,792	72	2,046	9,616	10,925	-1,309	0.88	10.5
Hydropower								
(1) Walanae (Walimpong dam)	35,381	393	3,548	15,690	25,147	-9,457	0.62	7.3
(II) Compound Project								
(1) Bila-Boya irrigation/flood control	85,580	972	18,550	76,746	65,456	11,289	1.17	13.5
(III) Multipurpose Dam Project								
(1) Walimpong Dam Plan 1	298,097	3,341	44,811	150,935	211,164	-60.229	0.71	9.3
Irrigation	214,476	2,644	36,504	117 769	152,415	-34,646	0.77	10.0
Flood control	39,328	271	3,920	13,529	27,389	-13,858	0.49	6.6
Hydropower	44,293	426	4,387	19,637	31,362	-11,725	0.63	7.4
(2) Walimpong Dam Plan 2	287,249	3,319	44,465	148,879	203,869	-54,990	0.73	9.5
Irrigation	215,868	2,660	36,504	117,769	153,455	-35,686	0.77	10.0
Flood control	36,000	266	4,413	15,420	25,267	-9,847	0.61	8.2
Hydropower	35,381	393	3,548	15,690	25,147	-9,457	0.62	7.3
(3) Walimpong Dam Plan 3	286,569	3,316	44,309	148,059	203,384	-55,325	0.73	9.4
Irrigation	217,260	2,677	36,504	117,769	154,503	-36,734	0.76	9.9
Flood control	35,320	263	4,497	15,725	24,812	-9,087	0.63	8.2
Hydropower	33,989	376	3,308	14,565	24,069	-9,504	0.61	7.0

表 5.2(1) 開発計画の効果（郡別）

Name of Kabupaten	Name of Kecamatan	Number of farm household	Average land holding per farm household	Number of farmer and its percentage benefited from proposed irrigation projects	Land Use: Total paddy field (ha)		Technical irrigation area (ha)		Rainfed area (ha)		Upland area (ha)	
					Present condition	With project	Present condition	With project	Present condition	With project	Present condition	With project
Kab. Sidrap	Panca Lautang	2,902	2.18	0	5,080	*[1]	2,320	*	2,760	*	1,240	*
	Tellulimpoe	2,518	1.12	0	2,670	*	1,250	*	1,420	*	140	*
	Maritengae	6,011	2,02	0	11,930	*	10,390	*	1,540	*	220	*
	Dua Pitue	7,743	2.03	7,331 (95)	12,420	12,520	6,550	11,830	5,870	690	3,320	3,220
Kab. Bone	Cenranae	3,145	1.92	0	5,080	*	0	*	5,080	*	940	*
	Ajangale	6,366	0.92	5,934 (93)	4,750	5,750	0	5,400	4,750	350	1,060	60
	Dua Boccoe	5,366	0.76	5,132 (96)	3,060	3,960	1,700	3,900	1,360	60	1,020	120
	Tellusiatinge	5,810	0.96	0	4,990	*	640	*	4,350	*	590	*
	Ponre	1,972	1.31	0	1,890	*	0	*	1,890	*	700	*
	Ulaweng	6,444	0.76	0	920	*	0	*	920	*	4,010	*
	Lamuru	4,881	1.28	0	1,530	*	0	*	1,530	*	4,740	*
	Lappariaja	5,786	1.67	0	5,400	*	740	*	4,660	*	4,270	*
	Libureng	2,648	2.60	1,423 (53)	5,300	6,760	0	3,700	5,300	3,060	1,600	140
	Kahu	3,371	2.38	2,700 (80)	7,310	7,750	430	6,300	6,880	1,450	720	280
	Bonto Cani	1,610	1.51	0	1,600	*	0	*	1,600	*	840	*
Kab. Soppeng	Lalabata	8,694	1.36	8,436 (97)	6,780	6,850	2,800	6,650	3,980	200	5,050	4,980
	Liliriaja	6,975	1.68	6,975 (100)	6,640	7,160	2,560	7,160	4,080	*	5,050	4,530
	Marioriawa	4,648	1.51	988 (21)	4,150	4,200	3,400	4,200	750	*	2,880	2,830
	Marioriwawo	6,207	1.26	3,750 (60)	1,750	1,780	220	1,080	1,530	700	6,100	6,070
	Lilirilau	7,247	1.93	6,525 (90)	2,920	4,170	810	3,860	2,110	310	11,070	9,820
Kab. Wajo	Tempe	5,029	0.47	1,800 (36)	280	*	0	90	280	190	2,070	*
	Tanasitolo	4,166	1.53	1,875 (45)	4,020	*	0	1,800	4,020	2,220	2,360	*
	Maniang Pajo	2,405	4.12	1,495 (62)	7,000	7,050	520	4,400	6,480	2,650	2,900	2,850
	Belawa	4,467	2.36	3,524 (79)	4,610	4,660	1,630	3,680	2,980	980	5,960	5,910
	Sabang Paru	4,714	1.83	4,714 (100)	2,510	3,210	0	2,800	2,510	410	6,110	5,410
	Pammana	4,474	1.99	4,474 (100)	5,800	6,500	240	6,500	5,560	0	3,090	2,390
	Takkalalla	5,788	2.66	40 (2)	12,920	*	0	90	12,920	12,830	2,470	*
	Majauleng	5,077	2.54	1,906 (38)	10,350	*	220	4,110	10,130	6,240	2,570	*
	Sajoanging	4,394	4.19	1,955 (44)	15,790	*	0	7,020	15,790	8,770	2,630	*
Total or average		140,858	1.74	70,977 (50.4)	159,450	166,770	36,420	99,910	123,030	66,860	85,720	78,400

[1]: Marks of asterisk indicate value as same as present condition.

- to be continued

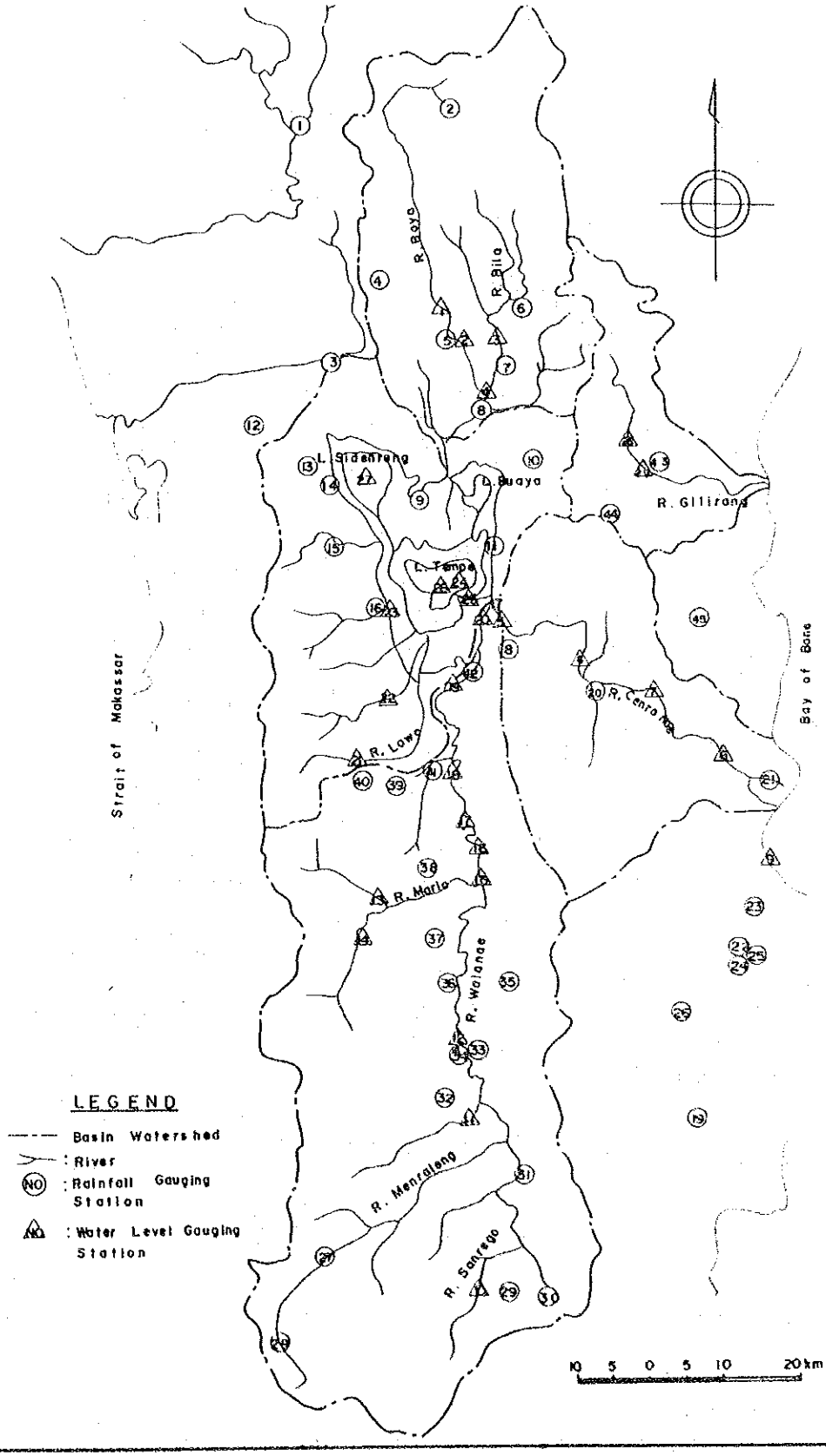
表 5.2 (2)　開発計画の効果（郡別）

Name of Kabupaten	Name of Kecamatan	Ratio of technical irrigation area for total paddy field		Total annual production of paddy (ha)		Net farm income per farmer (Rp)			Name of projects related to each kecamatan
		Present condition	With project	Present condition	With project	Present condition	With project EA/3	With project BA/4	
Kab. Sidrap	Panca Lautang	0.45	*[1]	16,100	16,100	245,000	*		
	Tellulimpoe	0.48	*	8,600	8,600	144,000	*		
	Maritengae	0.87	*	64,200	64,200	455,000	*		
	Dua Pitue	0.52	0.95	60,700	144,000	315,000	350,000	(783,000)	Bila-Boya compound project
Kab. Bone	Cenranae	0	*	6,400	*	62,000	*		
	Ajangale	0	0.93	6,200	64,800	41,000	413,000	(440,000)	Walimpong dam project
	Dua Boccoe	0.55	0.98	3,900	46,800	30,000	353,000	(367,000)	Walimpong dam project
	Tellusiatinge	0.12	*	6,600	*	36,000	*		
	Ponre	0	*	3,600	*	97,000	*		
	Ulaweng	0	*	1,400	*	27,000	*		
	Lamuru	0	*	6,600	*	111,000	*		
	Lappariaja	0.13	*	16,600	*	176,000	*		
	Libureng	0	0.45	7,000	41,900	189,000	763,000	(1,256,000)	Sanrego irr. project
	Kahu	0.05	0.82	5,300	69,700	183,000	980,000	(1,178,000)	Sanrego irr. project
	Bonto Cani	0	*	3,700	*	97,000	*		
Kab. Soppeng	Lalabata	0.41	0.83	43,100	73,600	208,000	381,000	(387,000)	Langkemme and Lawo irr. projects and Walimpong dam project
	Liliriaja	0.39	1.00	48,600	78,200	304,000	507,000	(495,000)	Langkemme and Lawo irr. projects and Walimpong dam project
	Marioriawa	0.82	1.00	11,800	16,000	260,000	295,000	(424,000)	Walimpong dam project
	Marioriwawo	0.12	0.61	10,500	14,400	175,000	216,000	(243,000)	Langkemme irr. project and Walimpong dam project
	Lilirilau	0.28	0.93	6,600	46,300	48,000	273,000	(298,000)	Walimpong dam project
Kab. Wajo	Tempe	0	0.32	400	1,200	9,000	16,000	(30,000)	Cenranae irr. project
	Tanasitolo	0	0.45	3,900	18,200	70,000	263,000	(499,000)	Cenranae irr. project and Bila-Boya compound project
	Maniang pajo	0.07	0.62	8,500	45,700	236,000	1,034,000	(1,521,000)	Gilirang irr. project and Bila-Boya compound project
	Belawa	0.35	0.78	11,600	40,400	127,000	444,000	(529,000)	Bila-Boya compound project
	Sabang Paru	0	0.88	4,100	33,600	81,000	523,000	(523,000)	Walimpong dam project
	Pammana	0.04	1.00	6,700	78,000	116,000	725,000	(725,000)	Walimpong dam project
	Takkalalla	0	0.01	28,800	29,600	215,000	221,000	(1,097,000)	Cenranae irr. project
	Majauleng	0.19	0.40	17,800	51,500	168,000	485,000	(1,013,000)	Gilirang and Cenranae irr. projects
	Sajoanging	0	0.44	26,000	93,300	262,000	940,000	(1,786,000)	Gilirang and Cenranae irr. projects
Total or average		0.23	0.60	445,300	1,121,000 (924,000)[2]	155,000	367,000	(715,000)	

/1: Marks of asterisk indicate value as same as present condition.
/2: 924,000 tons of dry stalk paddy is produced from nine proposed projects having the irrigable area of 81,000 ha.
/3: Average net farm income for each kecamatan
/4: Average net farm income for farmer benefited from the projects

付　図

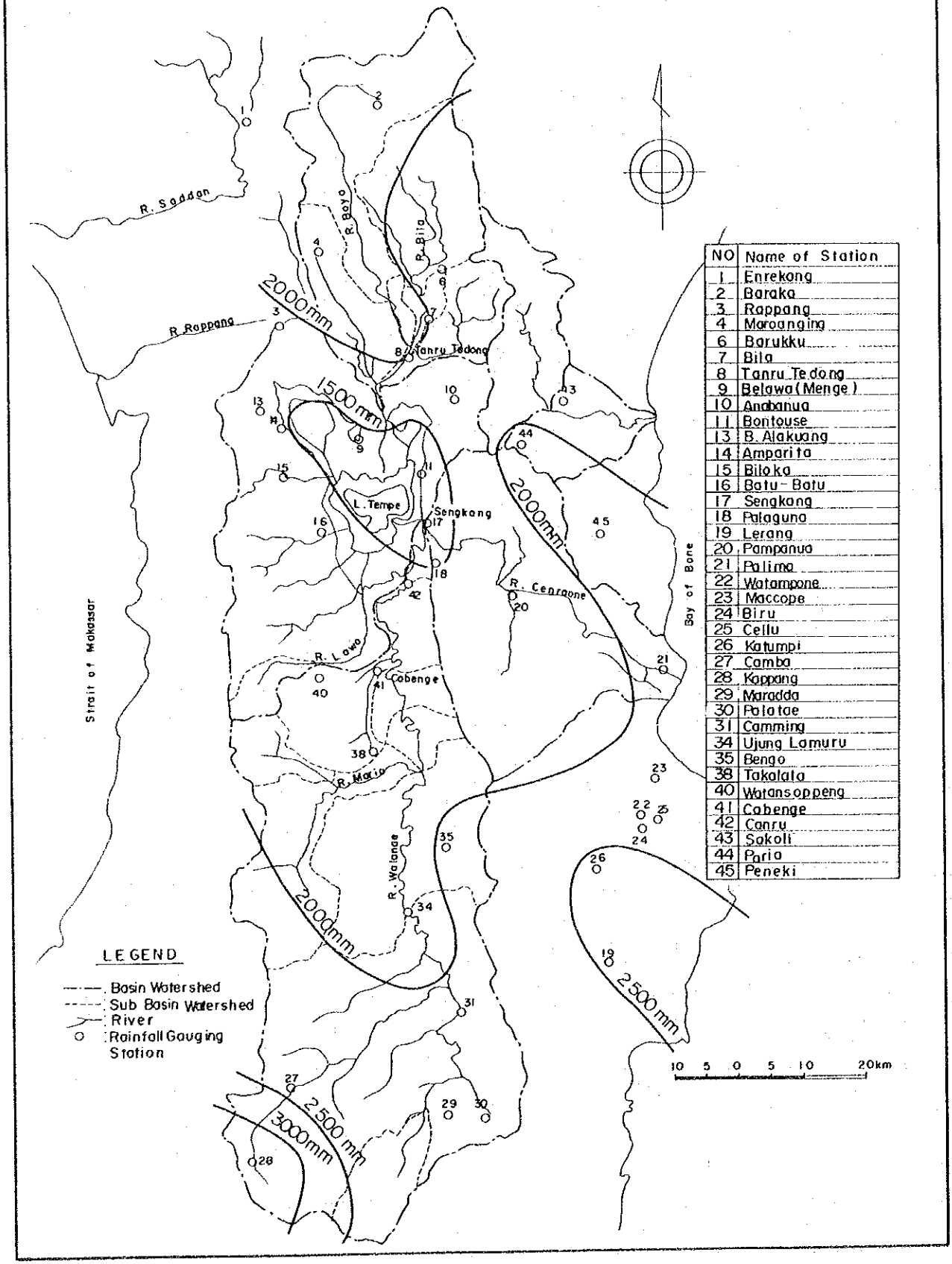
図 3. 1　水文観測所位置図



NO	Rainfall Gauging Station
1	Enrekang
2	Baraka
3	Rappang
4	Maroanging
5	Bulu Cenrana
6	Barukku
7	Bila
8	Tanru Tedong
9	Belawa(Menge)
10	Anabanua
11	Bontouse
12	Bulutimorang
13	B. Alakuong
14	Amparita
15	Biloka
16	Batu - Batu
17	Sengkang
18	Palaguna
19	Lerang
20	Pampanua
21	Palima
22	Watampone
23	Maccope
24	Biru
25	Cellu
26	Katumpi
27	Camba
28	Kappang
29	Maradda
30	Palatae
31	Camming
32	Parigi
33	Matango
34	Ujung Lamuru
35	Bengo
36	Paciro
37	Turucinnae
38	Takalala
39	B.B. Malanroe
40	Watansoppeng
41	Cabenge
42	Canru
43	Sakoli
44	Pariq
45	Peneki

NO	Water Level Gauging Station
1	Bulu Cenrana(1)
2	Bulu Cenrana(2)
3	Bila
4	Tanru Tedong
5	Seng Kang
6	Kampiri
7	Sala
8	Cenranae
9	Tg. Palletc
10	Sanrego
11	Batupute
12	Ujung Lamuru
13	Lang kemme
14	Sero
15	Kalempang
16	Pantjan Kang
17	Lakibong
18	Cabenge
19	Canru
20	Wage
21	Lawo
22	Padangeng
23	Batu - Batu
24	L. Tempe (Auto)
25	- do - (Nomal)
26	Laringgi
27	L. Sidenreng
28	Gilirang
29	Tarumpakkae

図 3.2　計画対象地域の等雨量線図



NO	Name of Station
1	Enrekang
2	Baraka
3	Rappang
4	Maroanging
6	Barukku
7	Bila
8	Tanru Tedong
9	Belawa (Menge)
10	Anabanua
11	Bontouse
13	B. Alakuang
14	Amparita
15	Biloka
16	Batu-Batu
17	Sengkang
18	Palaguna
19	Lerang
20	Pampanua
21	Palima
22	Watampone
23	Maccope
24	Biru
25	Cellu
26	Katumpi
27	Camba
28	Kappang
29	Maradda
30	Palatae
31	Camming
34	Ujung Lamuru
35	Bengo
38	Takalala
40	Watansoppeng
41	Cabenge
42	Canru
43	Sokoli
44	Paria
45	Peneki

図 3. 3 (1)　月平均流量図

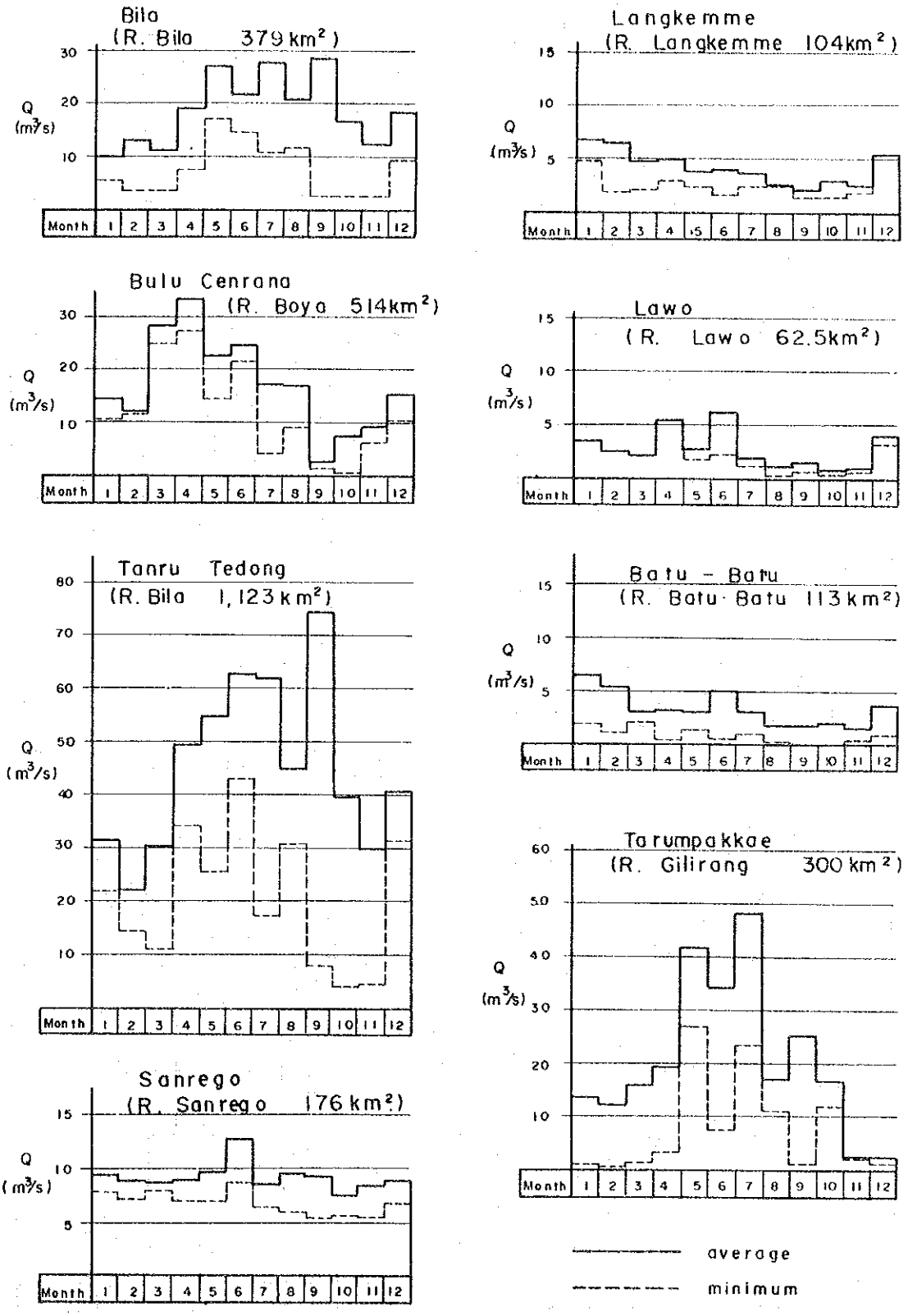

Bila
(R. Bila 379 km²)
Langkemme
(R. Langkemme 104km²)
Bulu Cenrana
(R. Boya 514km²)
Lawo
(R. Lawo 62.5km²)
Tanru Tedong
(R. Bila 1,123 km²)
Batu - Batu
(R. Batu-Batu 113 km²)
Tarumpakkae
(R. Gilirang 300 km²)
Sanrego
(R. Sanrego 176 km²)
Q (m³/s)
Month
1 2 3 4 5 6 7 8 9 10 11 12
average
minimum

図 3.3(2)　月平均流量図

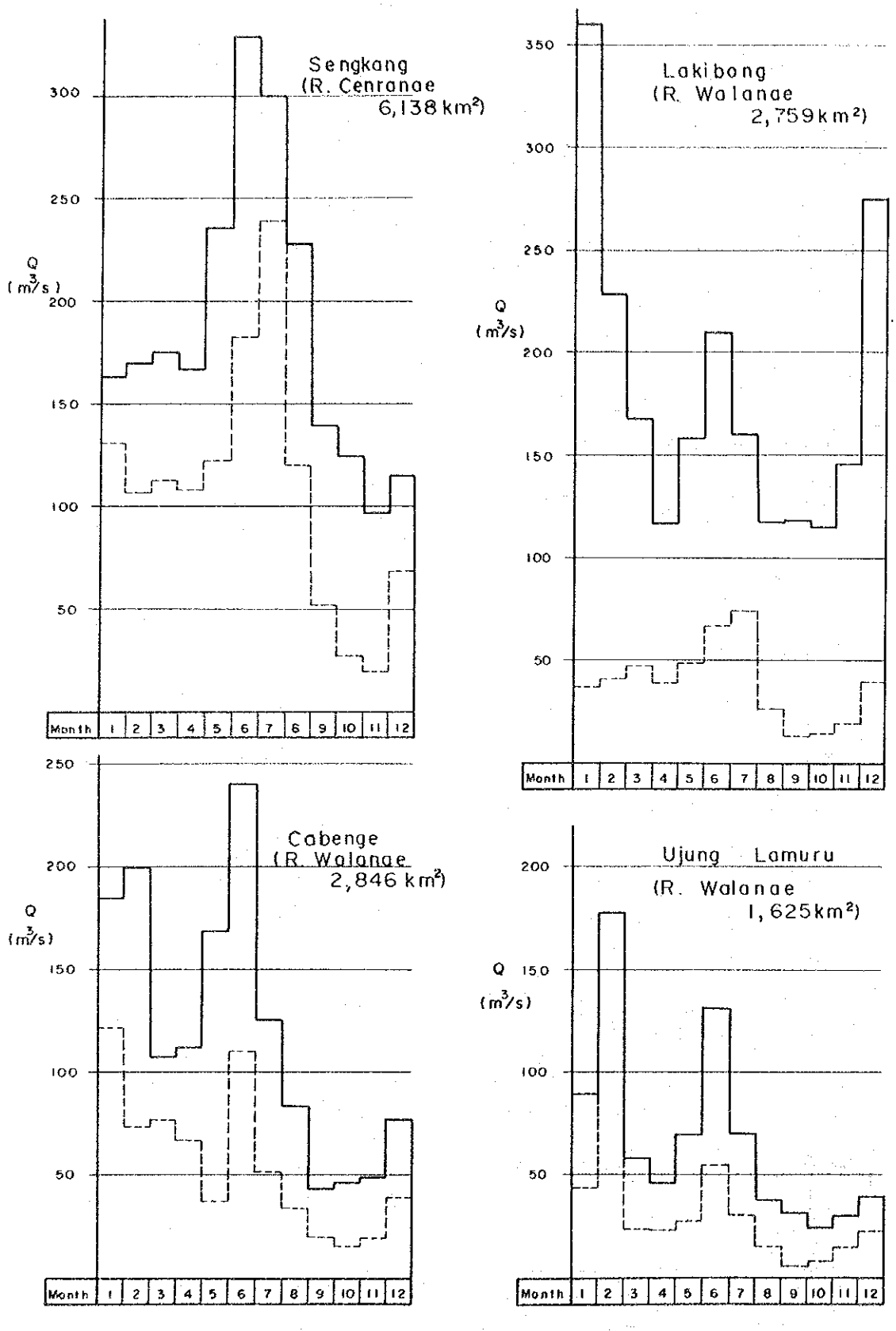

Sengkang
(R. Cenranae
6,138 km²)
Lakibong
(R. Walanae
2,759 km²)
Cabenge
(R. Walanae
2,846 km²)
Ujung Lamuru
(R. Walanae
1,625 km²)
Q
(m³/s)
Month
1 2 3 4 5 6 7 8 9 10 11 12

図 3.4 (1)　流域内期別平均月雨量分布図

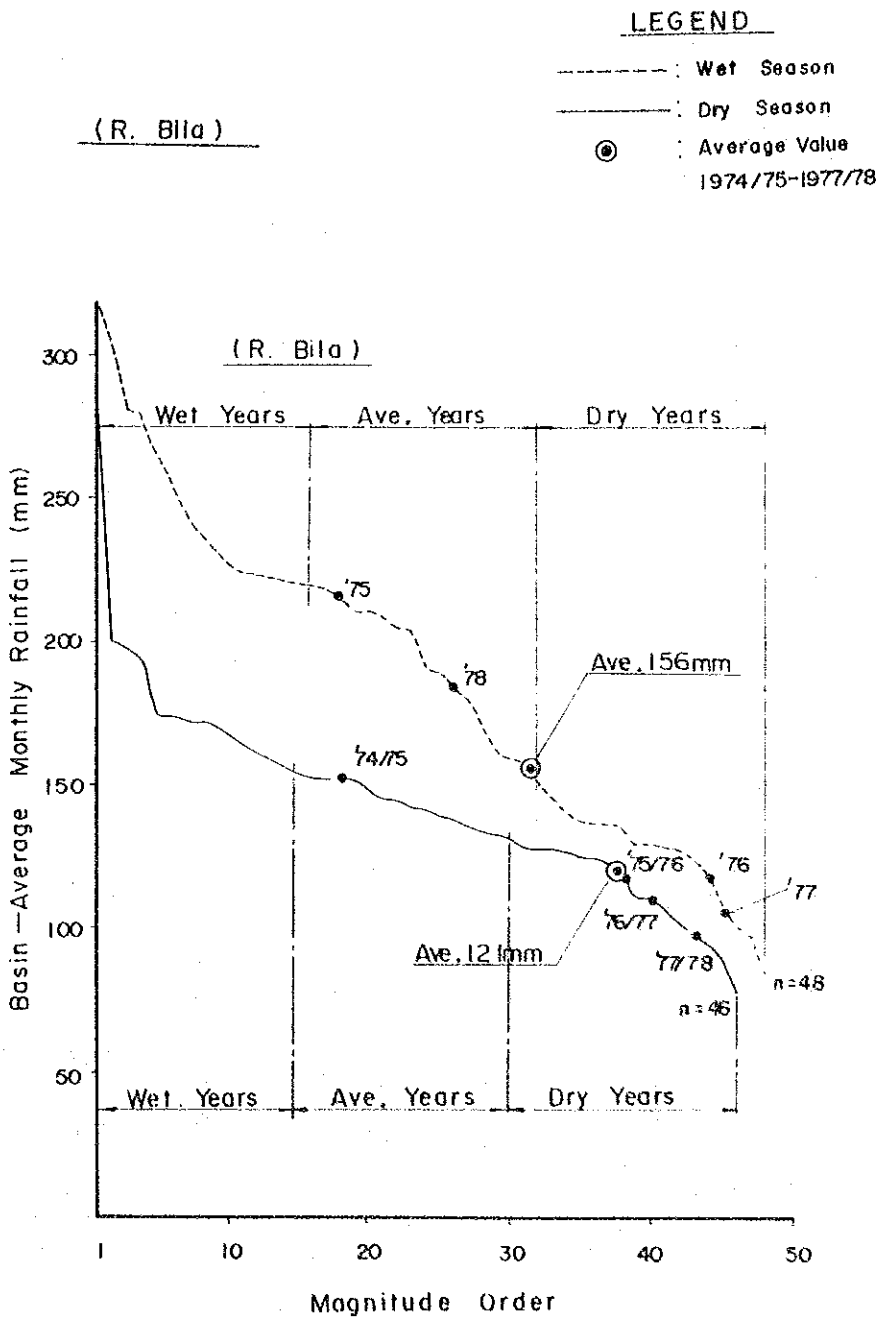


図 3. 4 (2)　流域内期別平均月雨量分布図

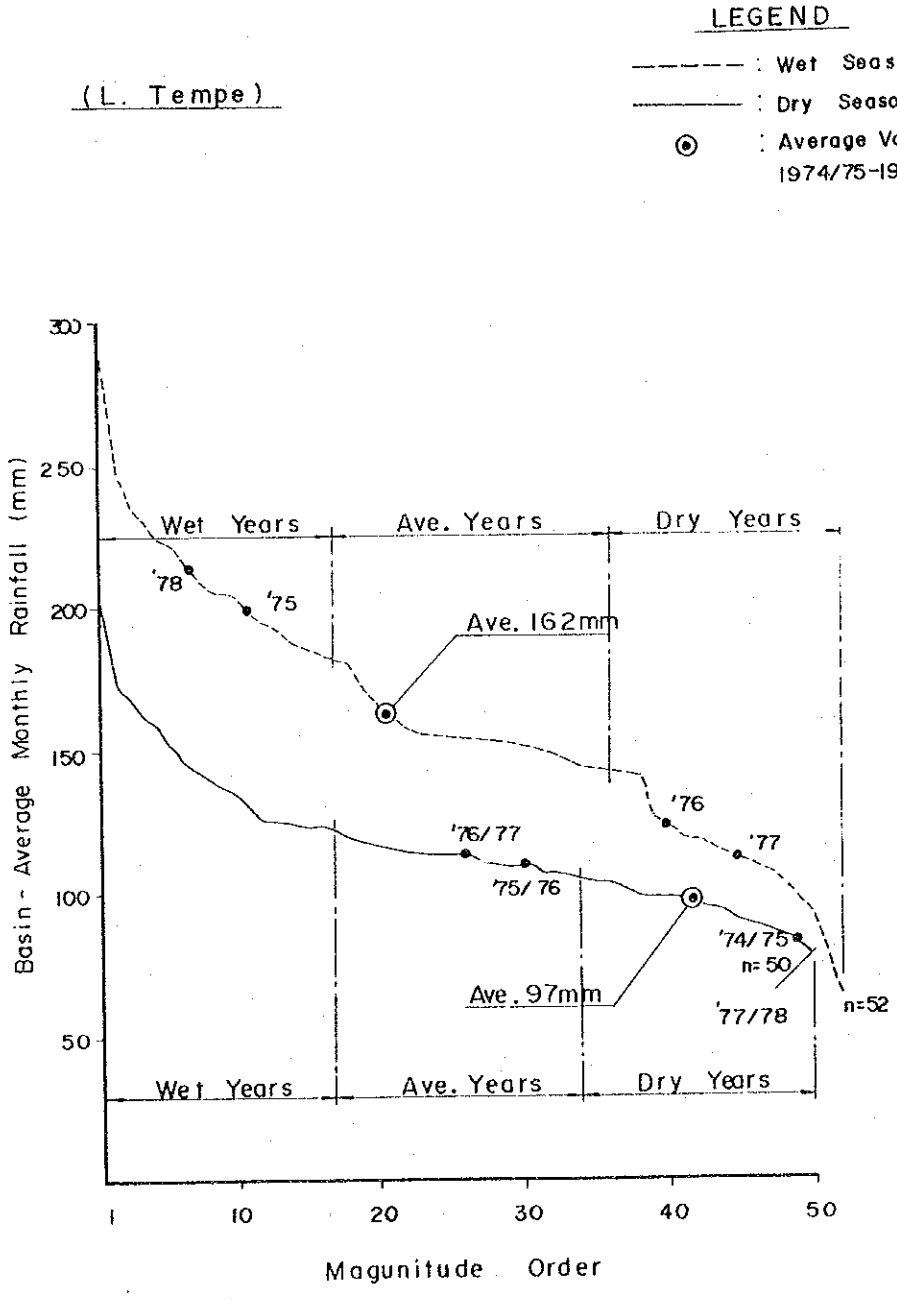


図 3. 4 (3)　流域内期別平均月雨量分布図

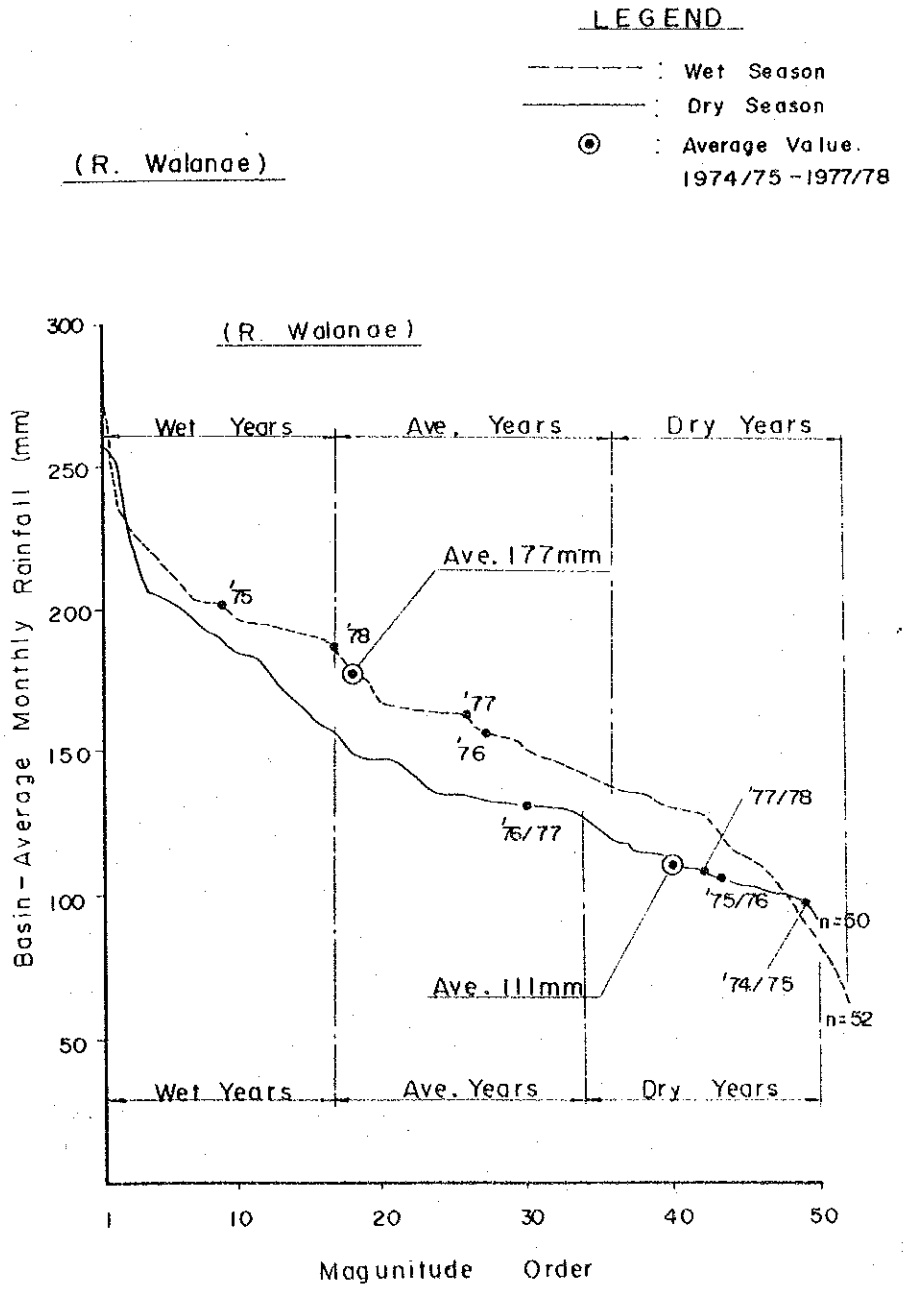


図 3.4 (4)　流域内期別平均月雨量分布図

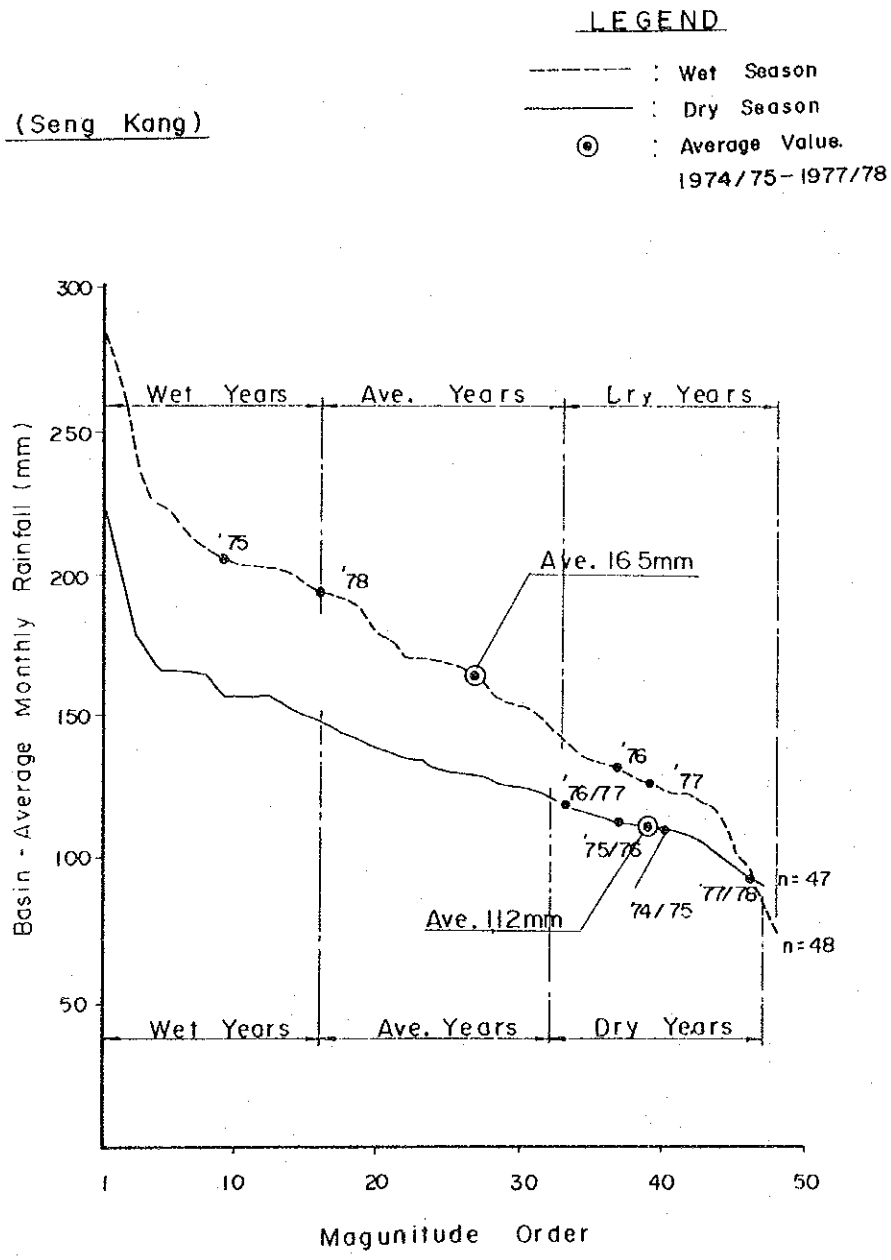


図 3. 4 (5)　流域内期別平均月雨量分布図

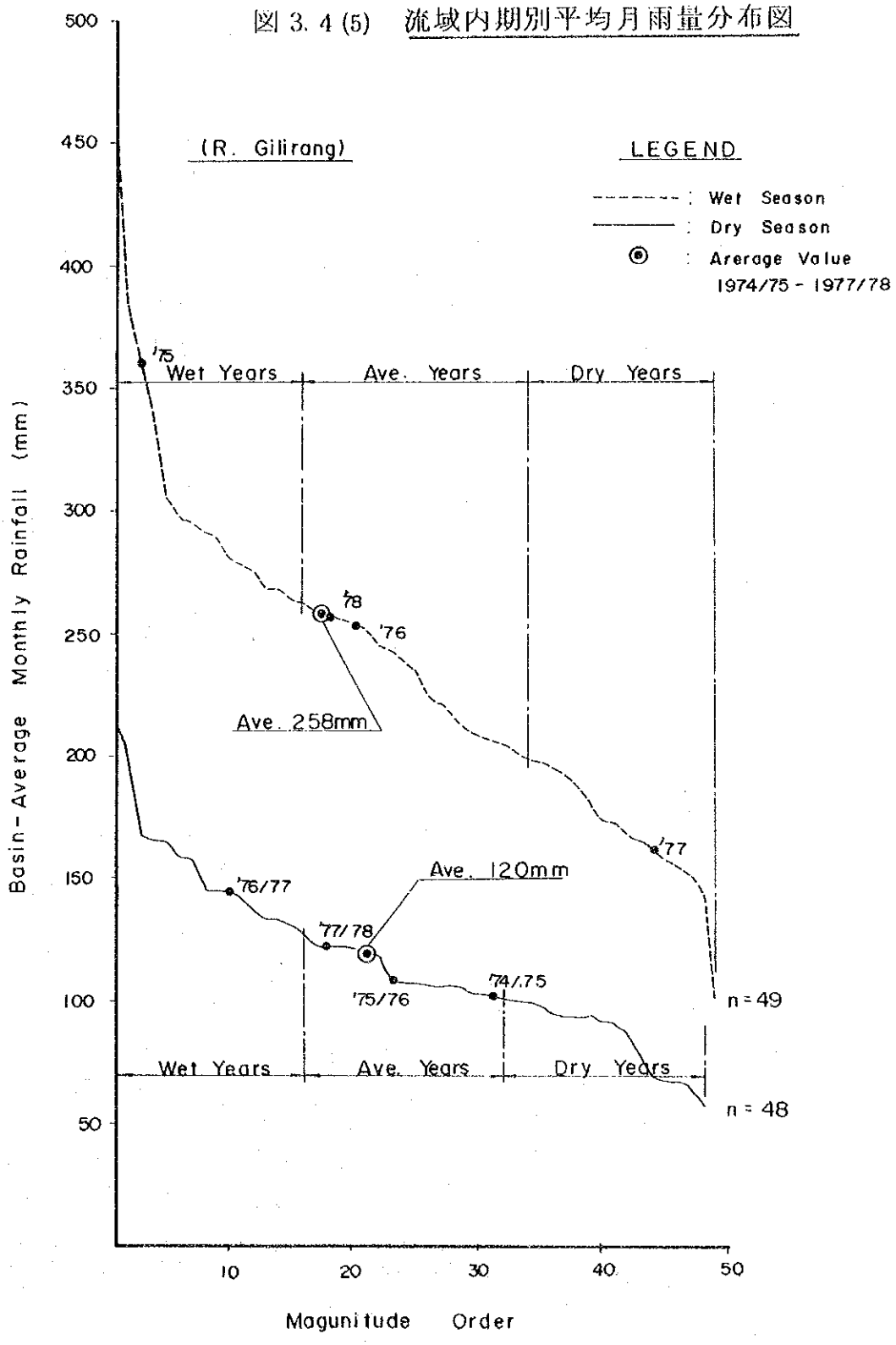


図 3.5　インドネシアにおける米の輸入量

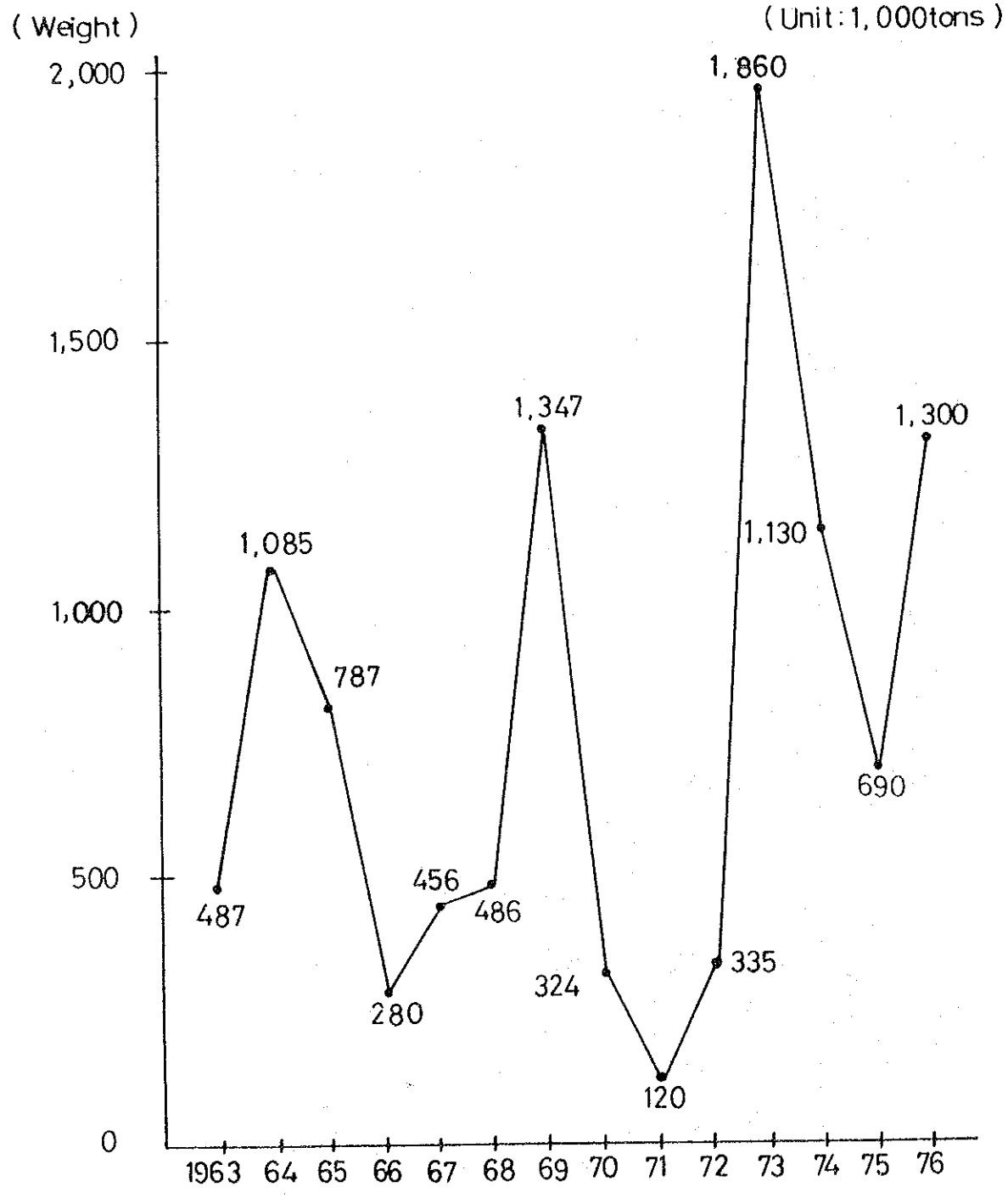


図 3.6　インドネシアにおける米の需給状況分布図

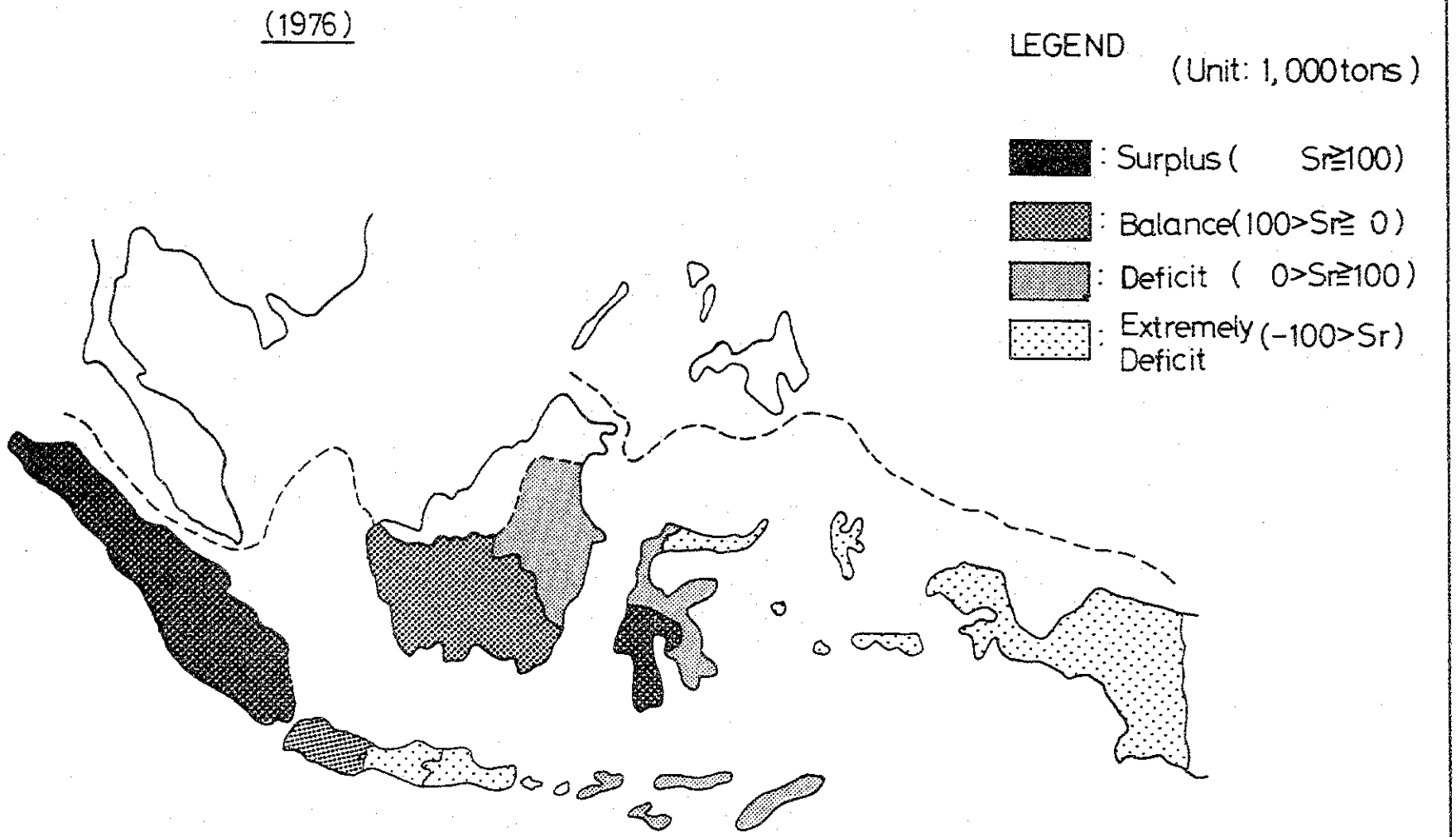


図 3.7　南スラウェシ州食糧事務所（DOLOG）の他地域への米の移出量およびその流れ

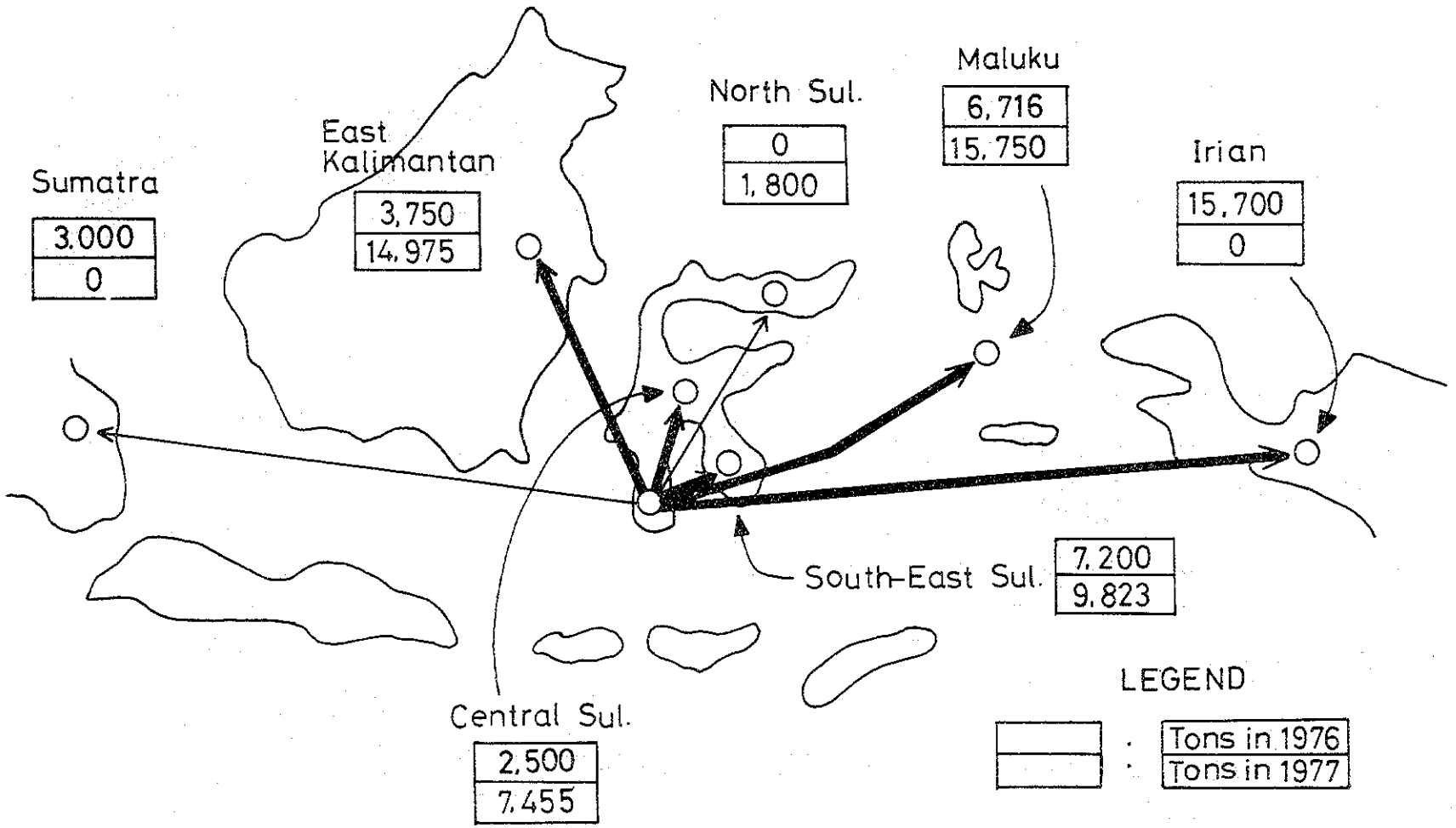
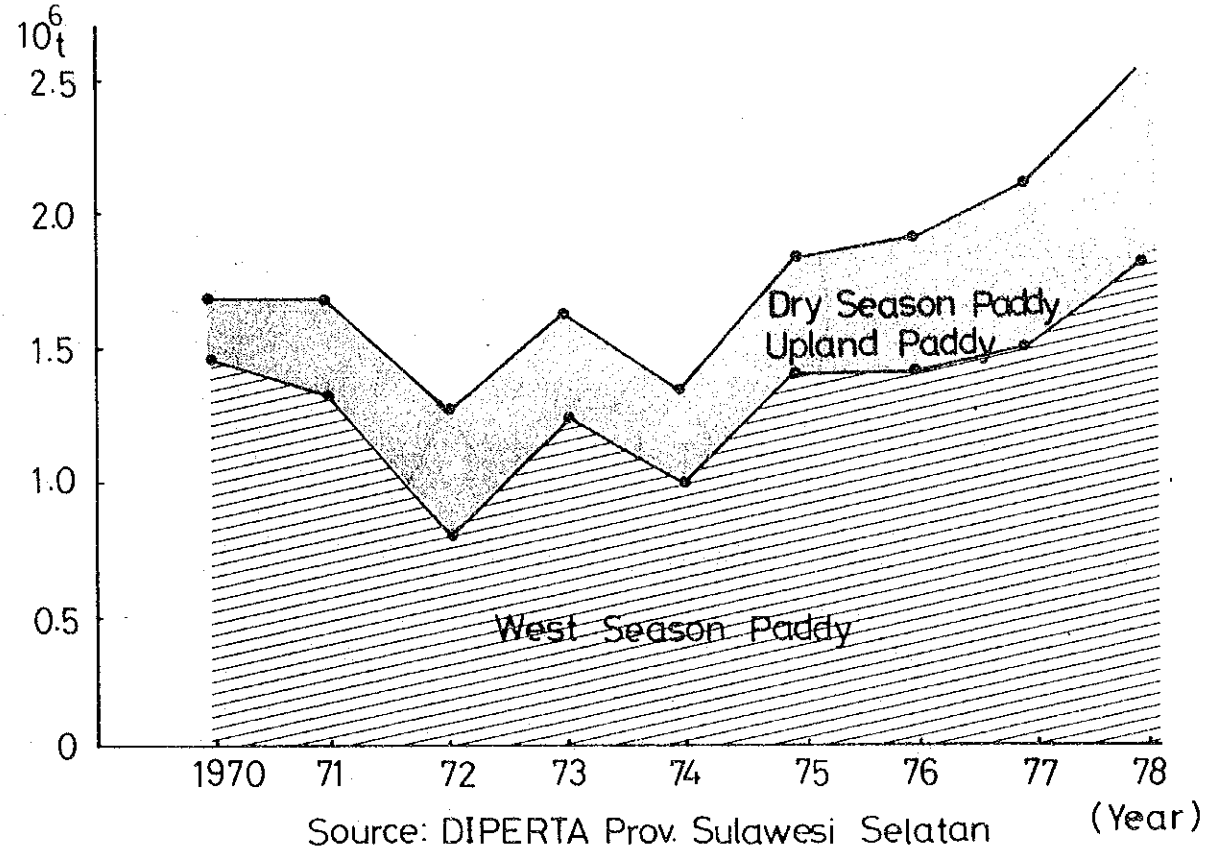
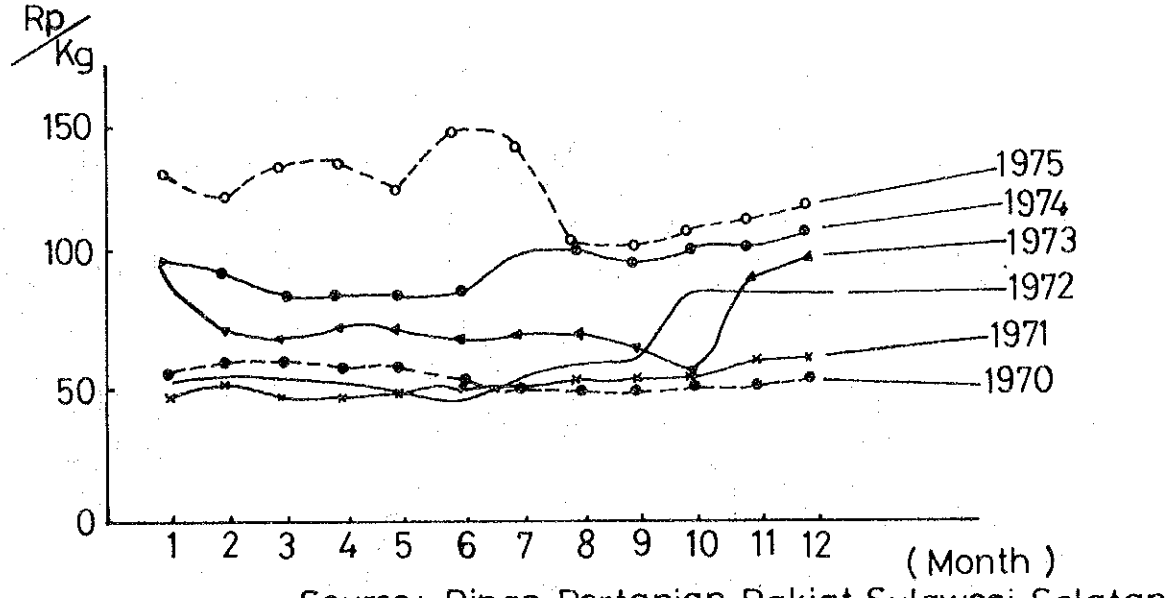


図 3. 8　年次別モミ生産量



Source: DIPERTA Prov. Sulawesi Selatan

図 3. 9　年次別モミ価格



Source: Dinas Pertanian Rakjat Sulawesi Selatan

図 3. 10　計画対象地域の位置図

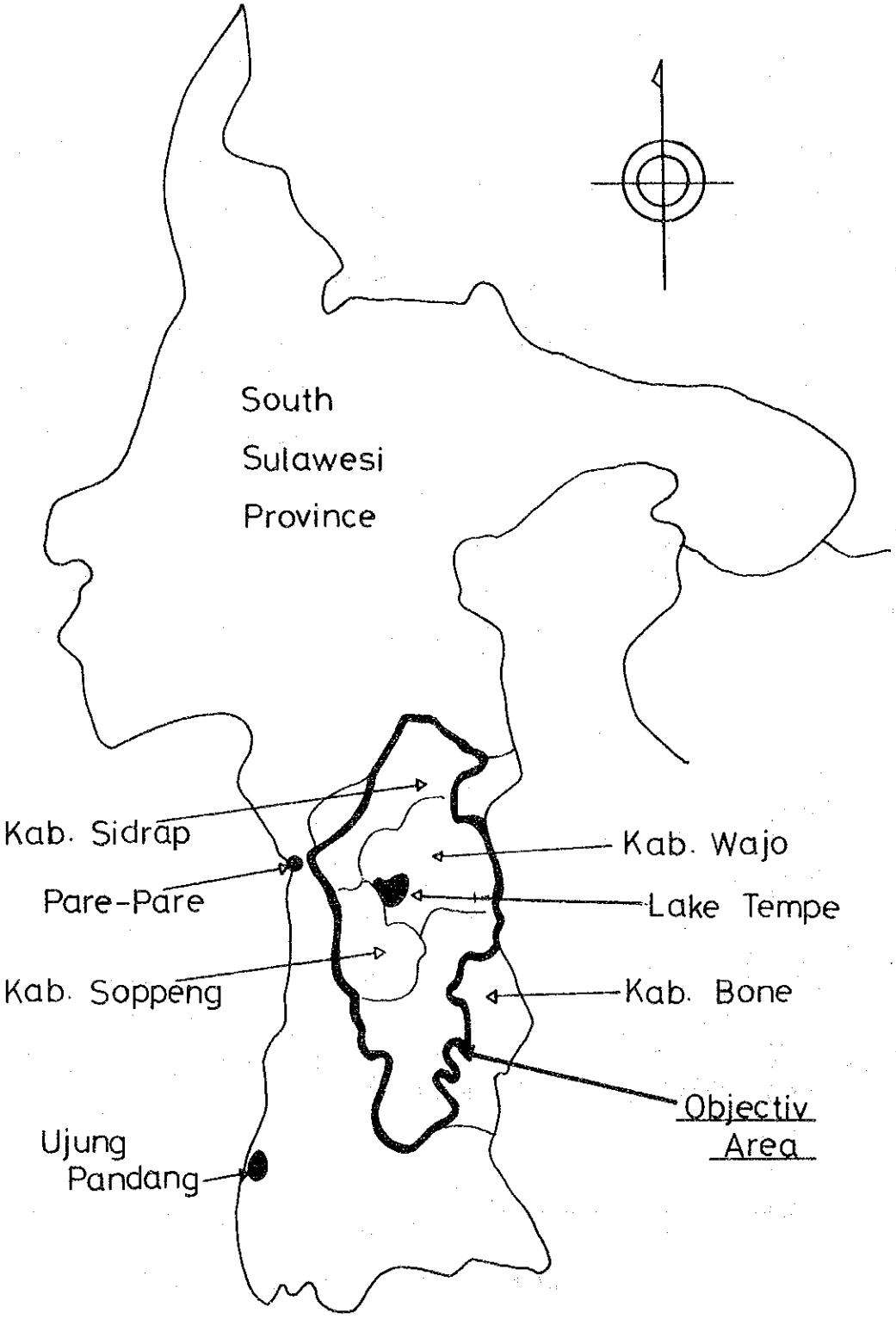


図 3. 11　南スラウェシ州における主要食糧の消費傾向

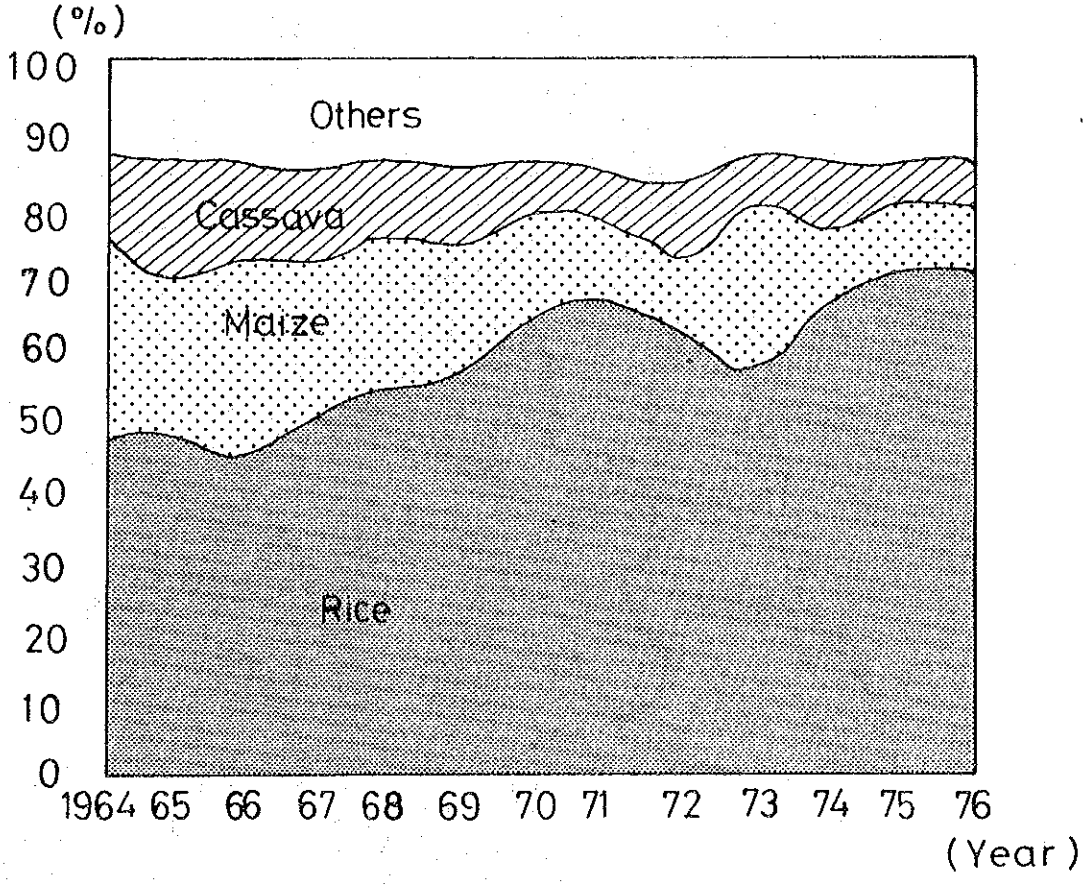


図 3.12　Wajo, Bone, Soppengおよび
Sidrap県における郡境界図

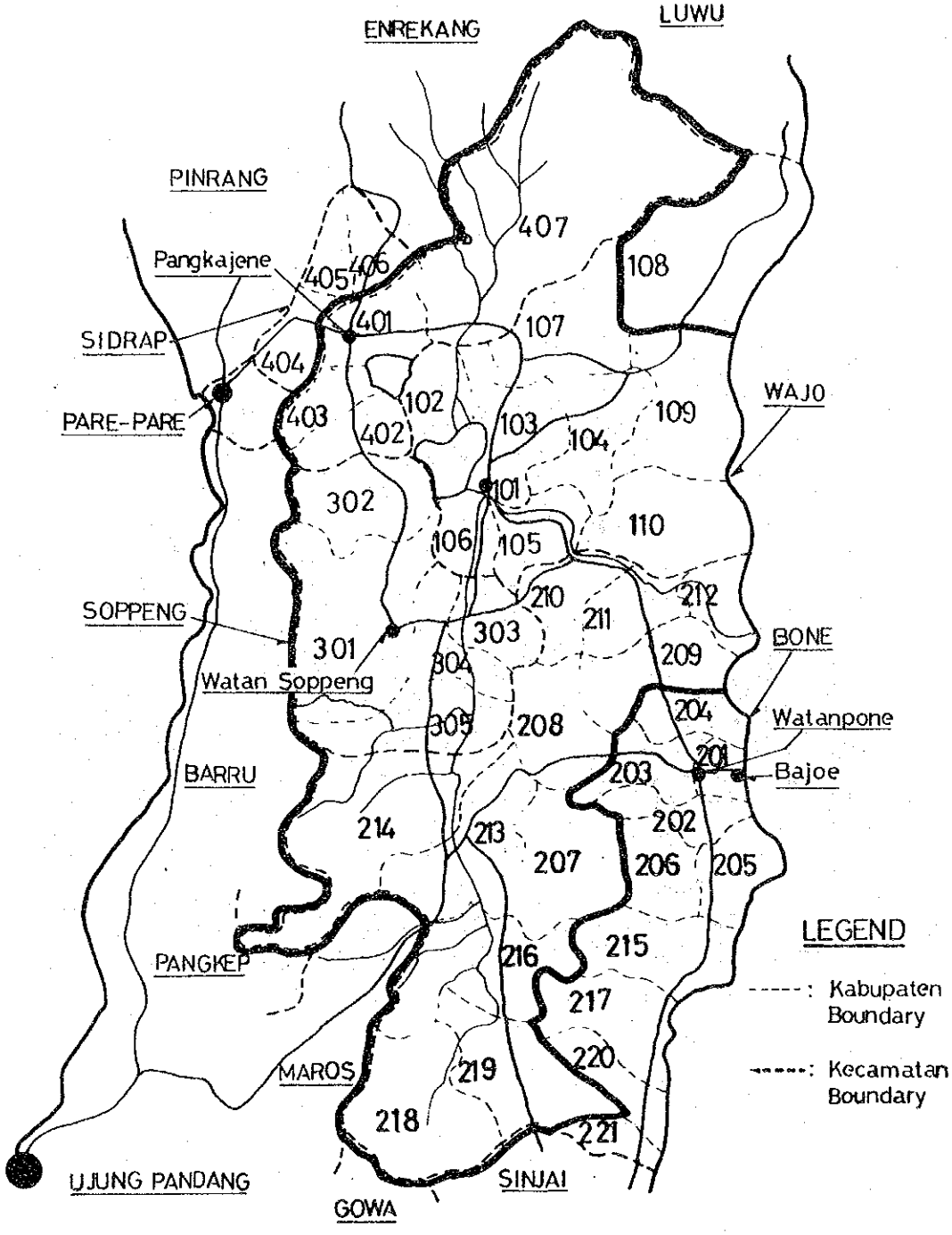


図 3. 13　郡別の人口密度（1977年）

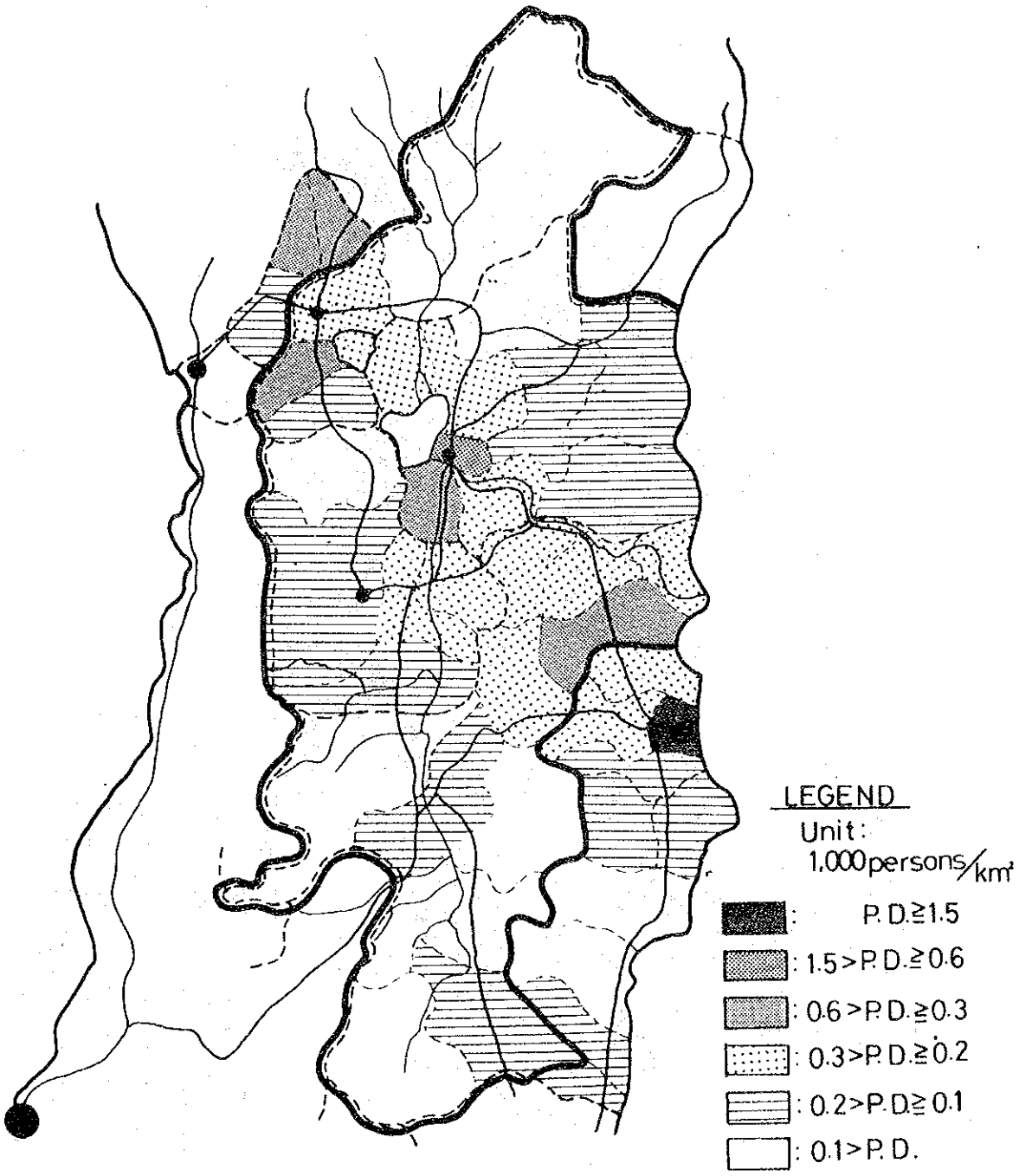


図 3. 14　郡別の雨期稲生産量（1977年）

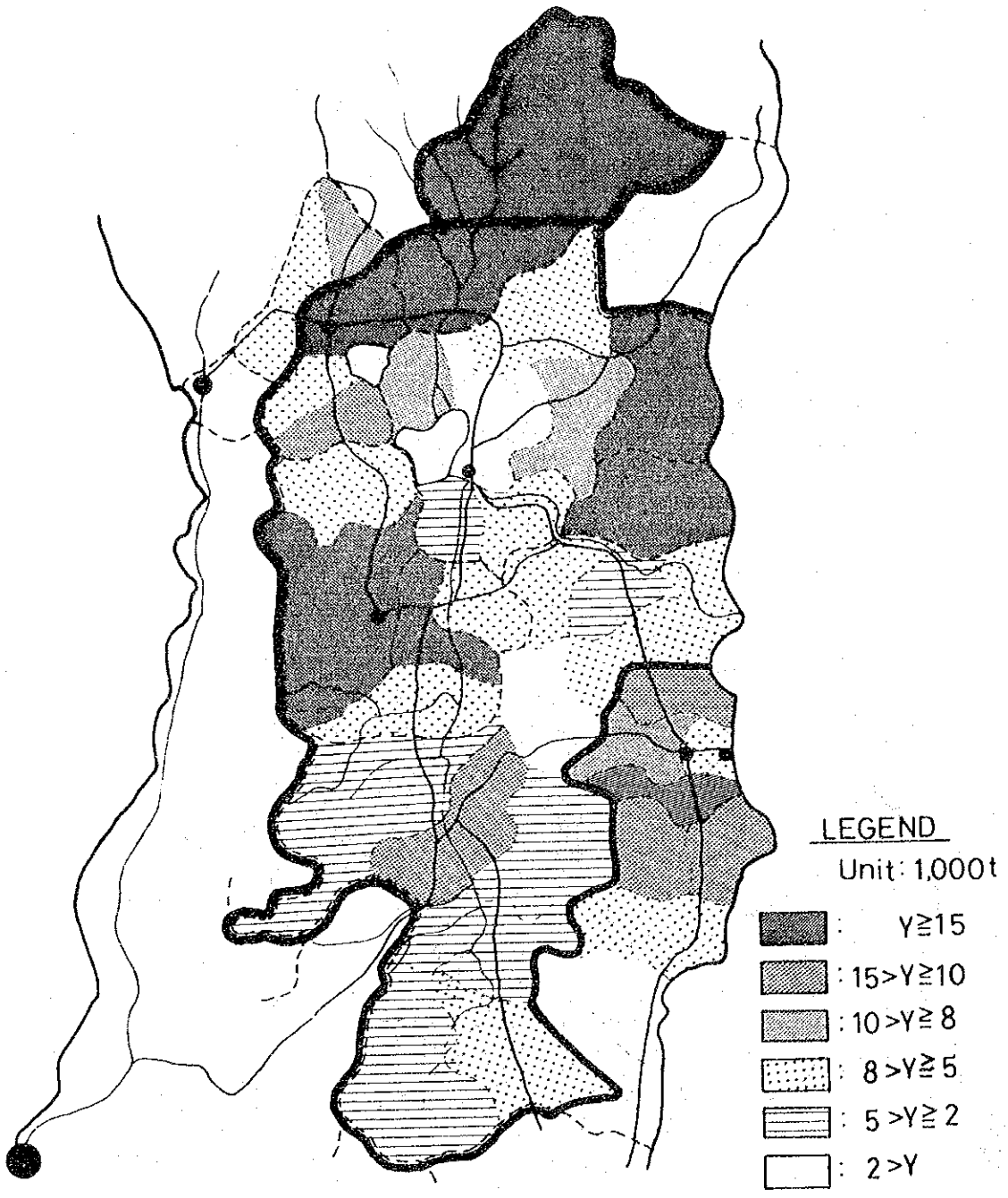


図 3. 15　郡別の幹期稲生産量（1977年）

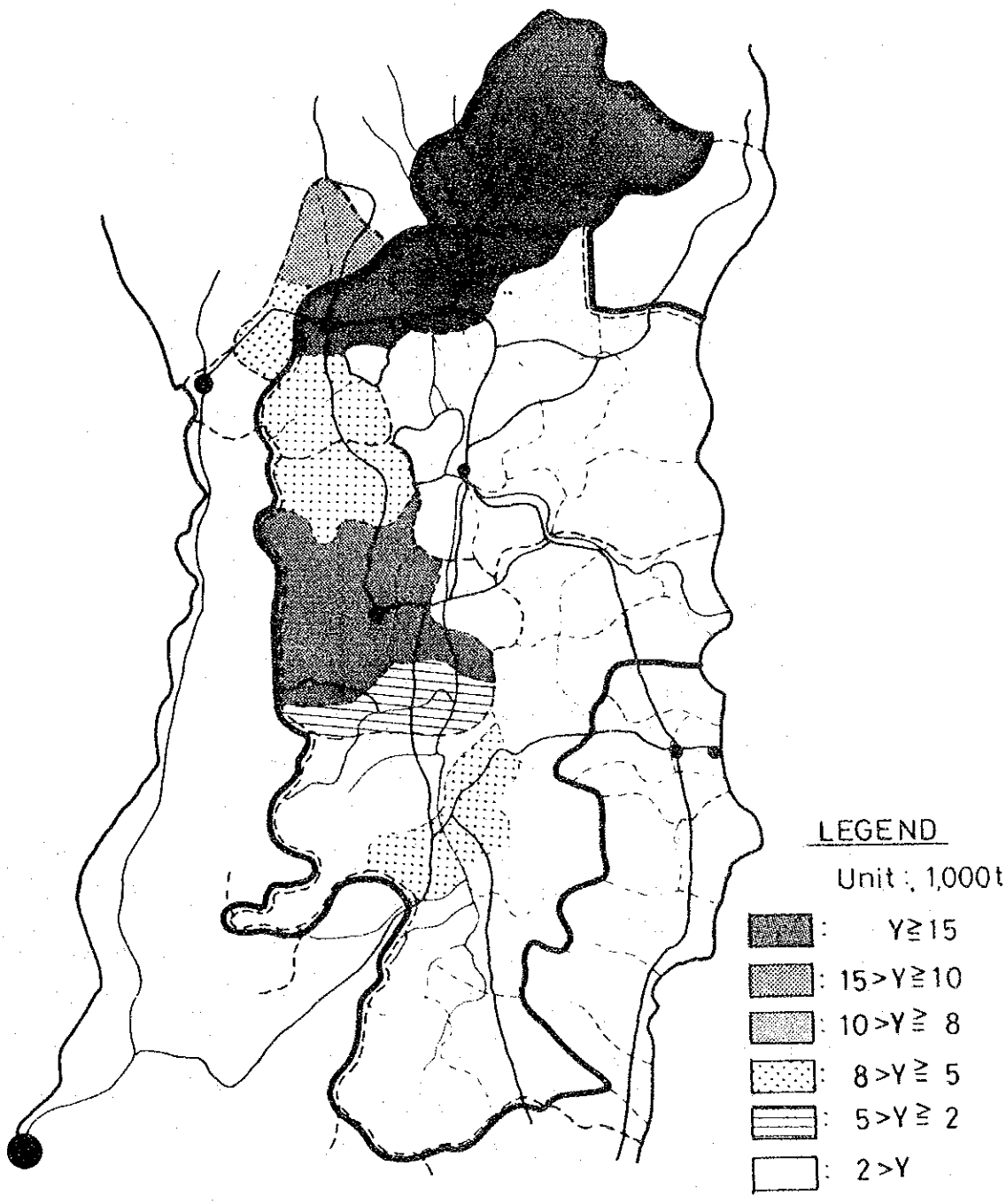


図 3. 16　郡別の既設かんがい水田面積

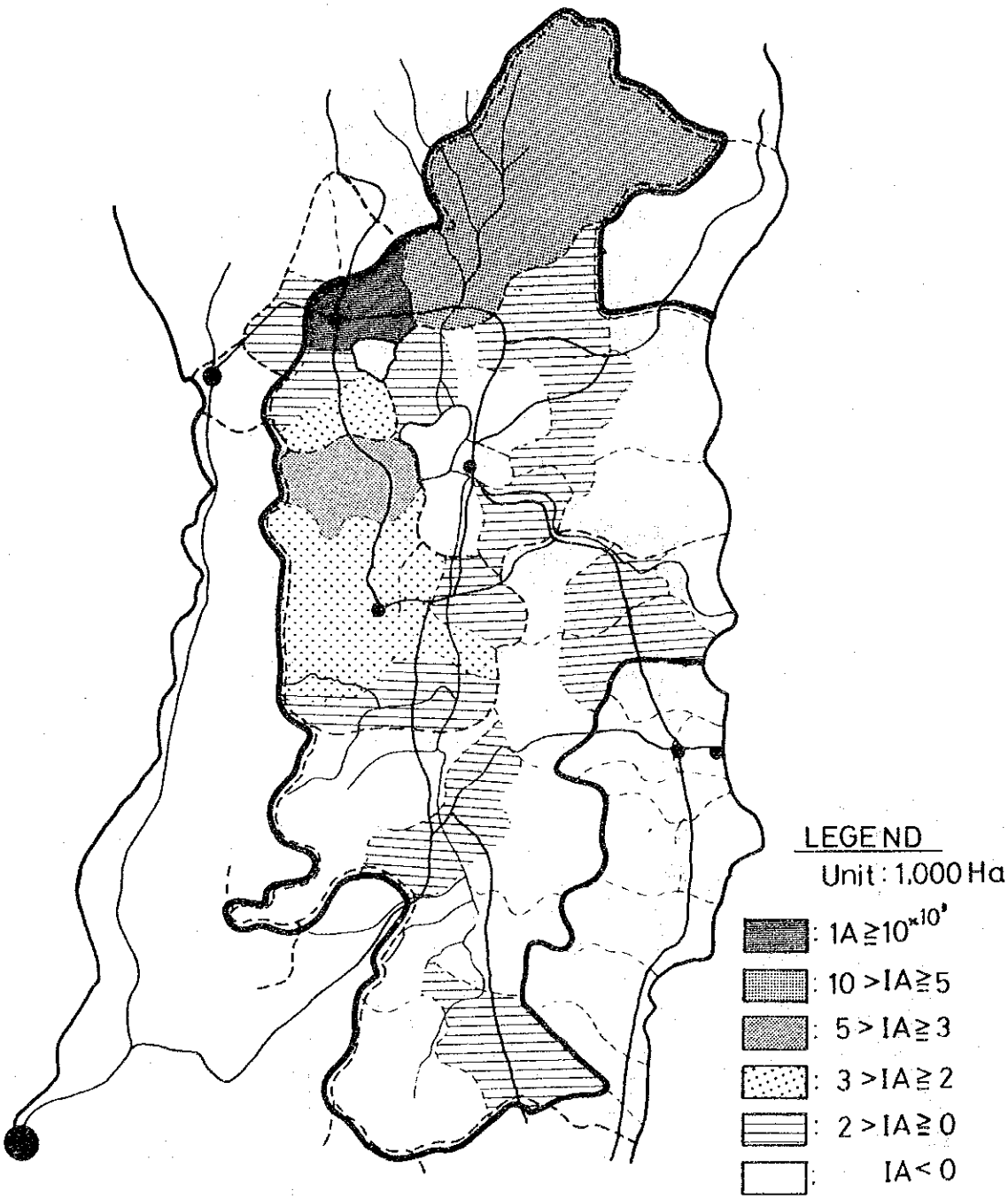


図 3. 17　郡別の雨期稲収獲面積における単位当収量（1977年）

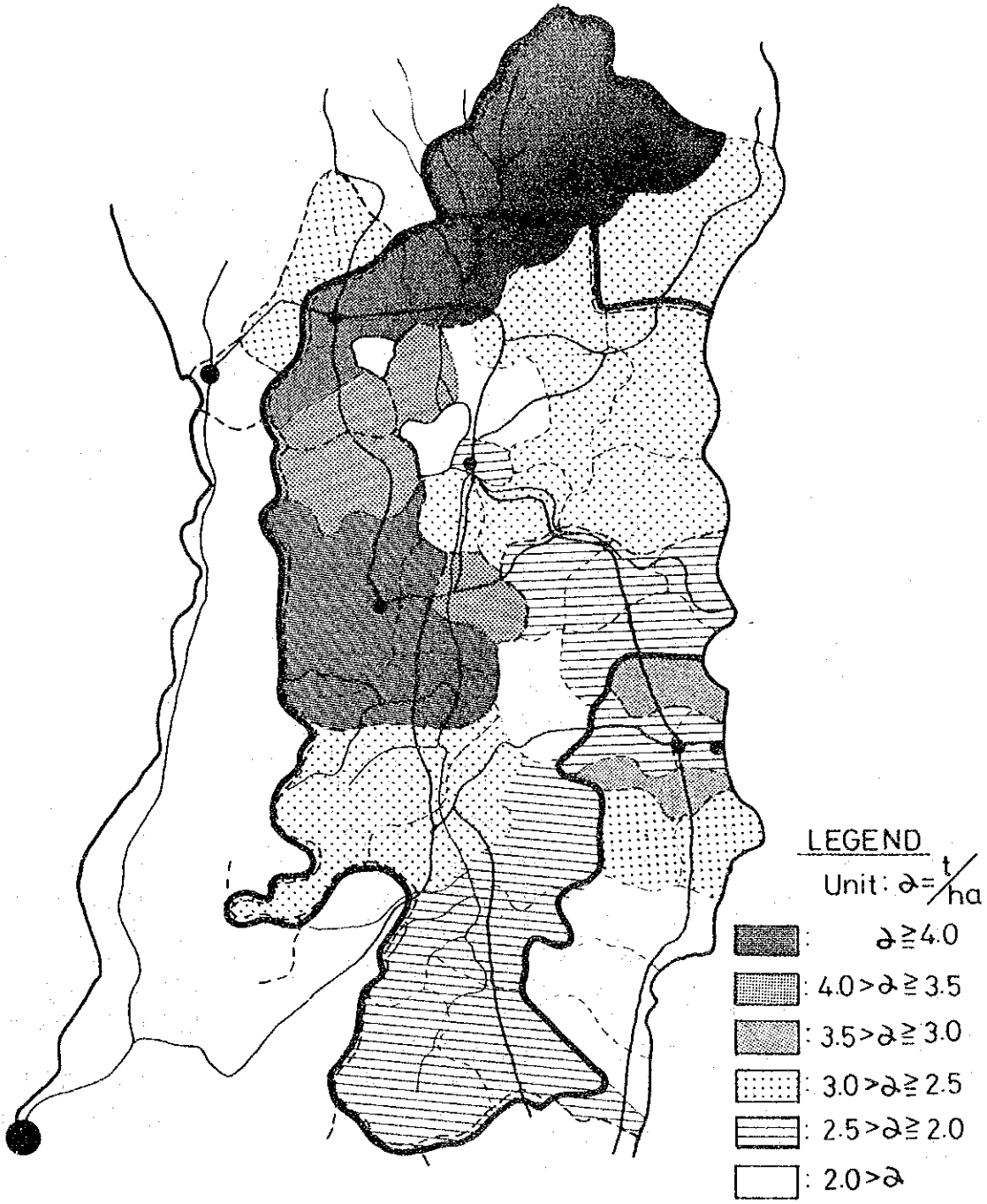


図 3. 18　郡別年次別の雨期稲生産量（１９７７年～１９７７年）

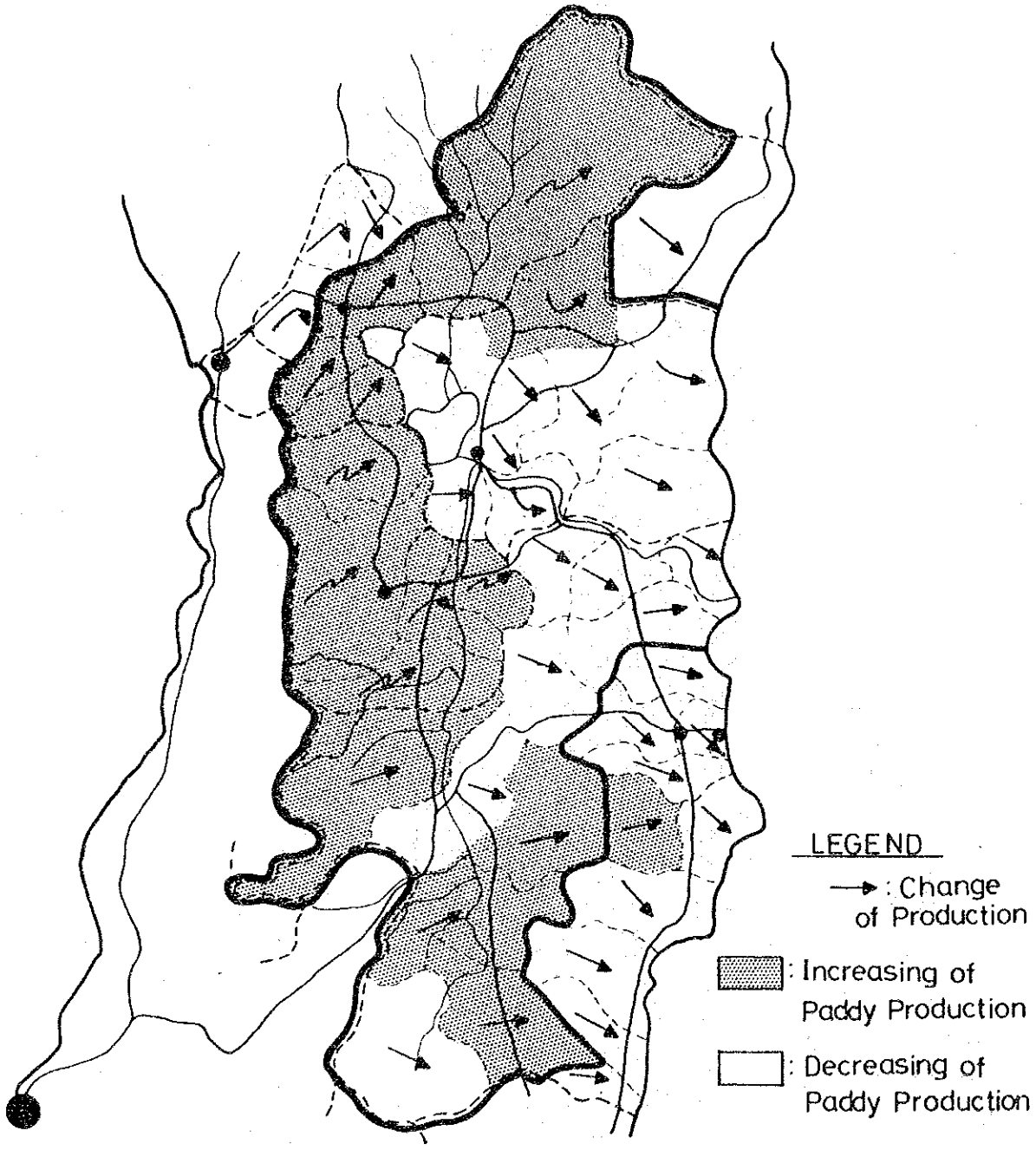


図 3. 19　郡別の雨期稲被害率（1977年）

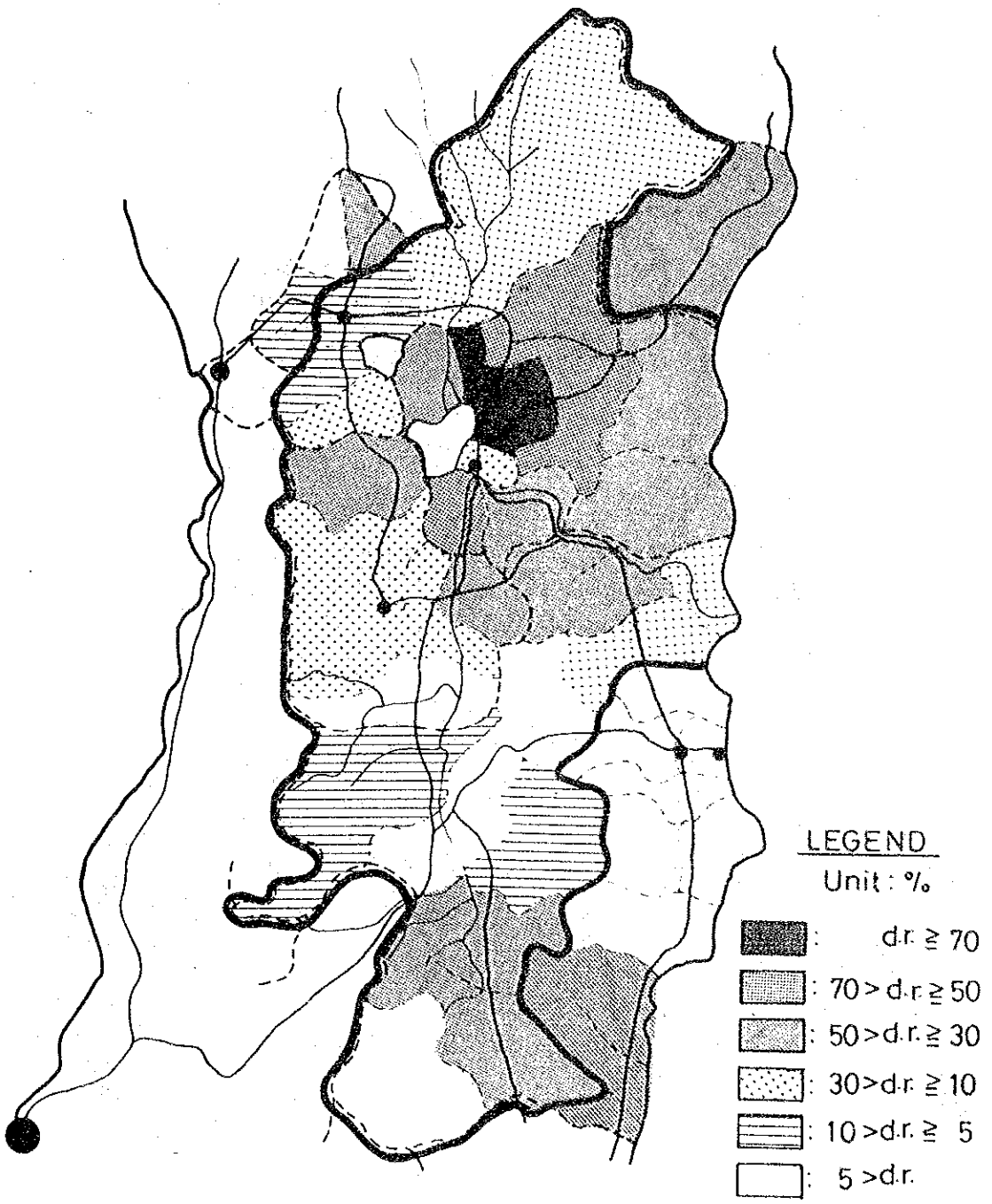


図 3. 20　郡別の雨期稲被害原因（1977年）

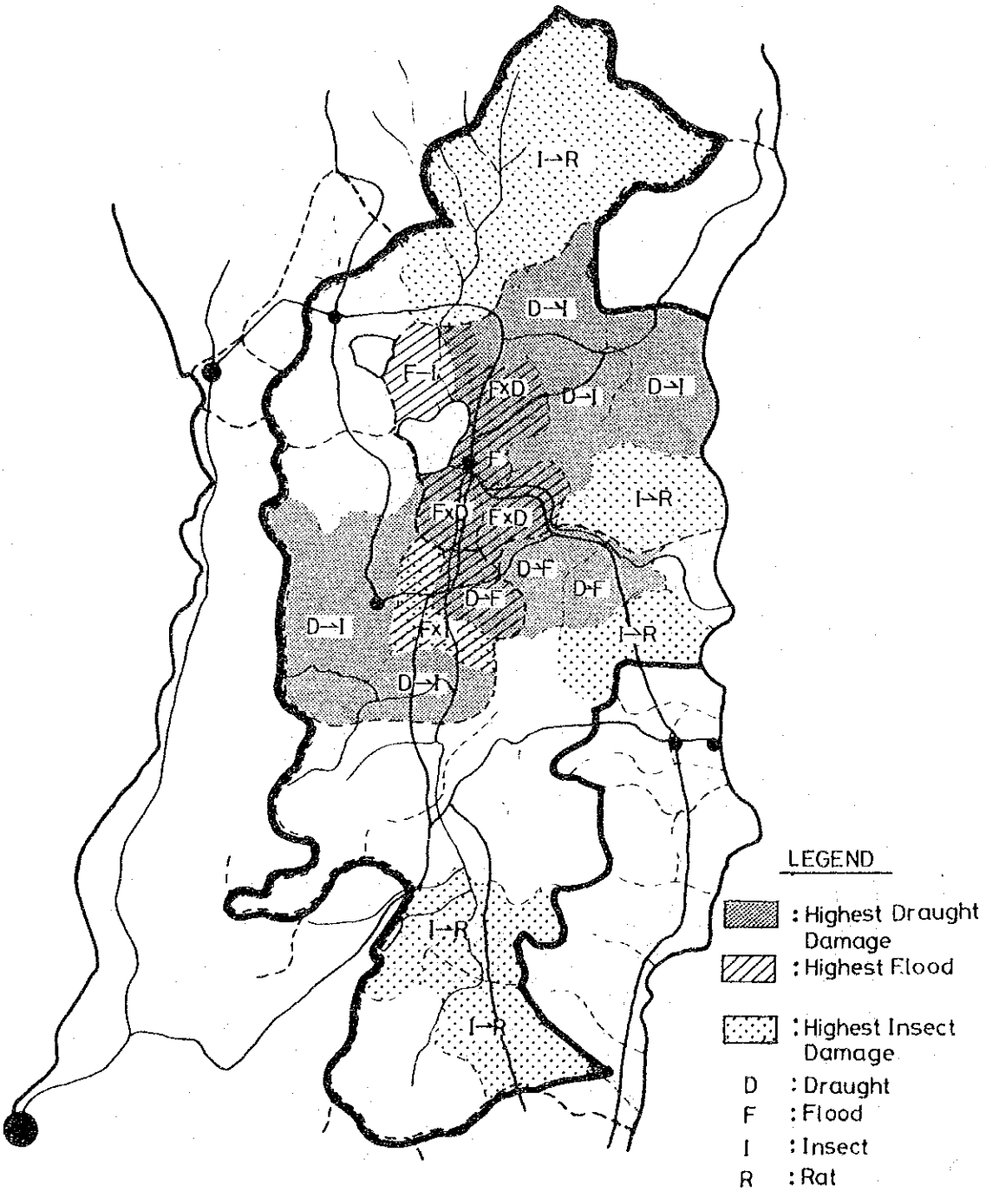


図 3. 21　郡別の標準農家収益

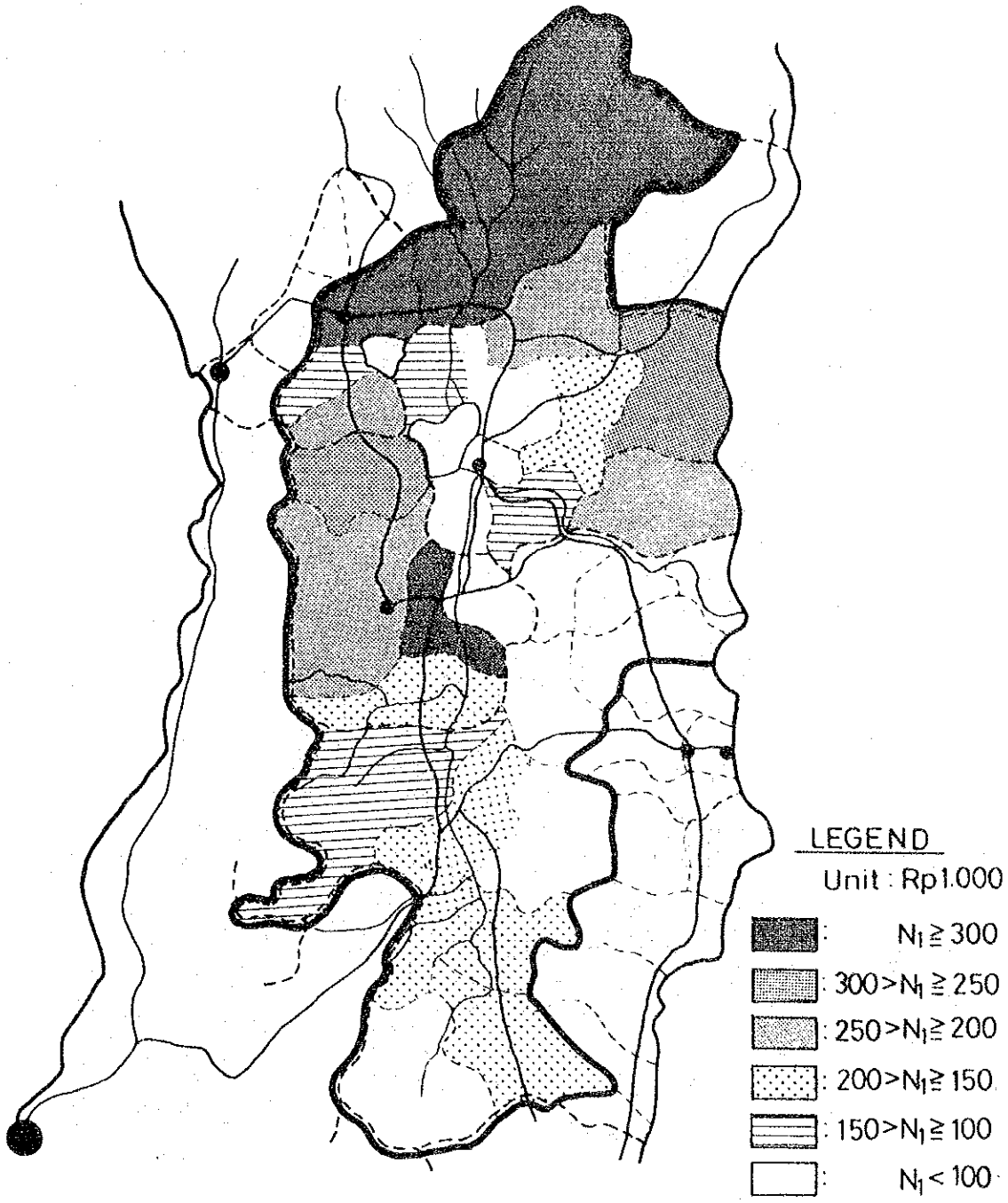


図 3.2.2(1)　都別の雨期稲の植付面積当りの延従人口（１９７７年）

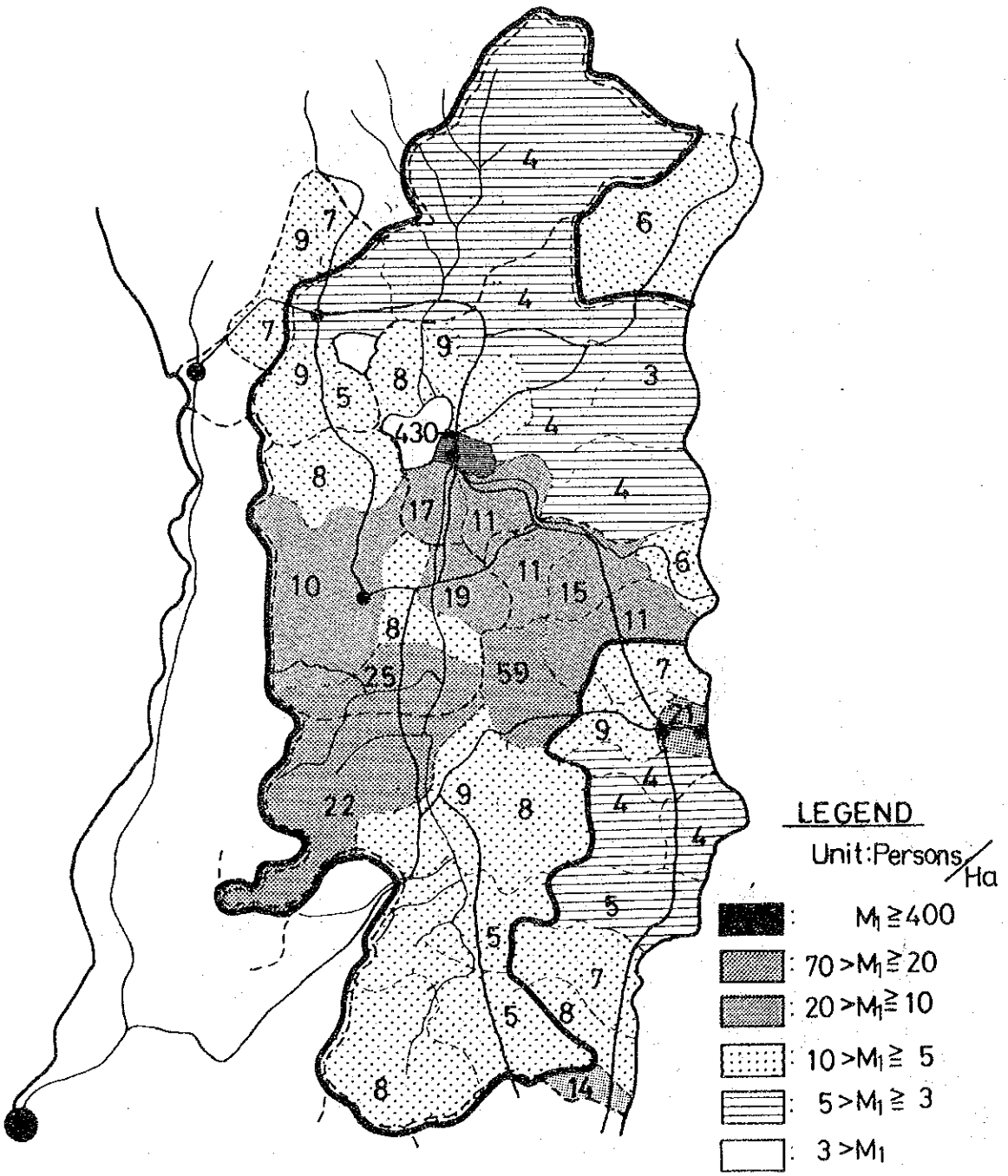


図 3.2.2(2)　郡別の雨期稲の植付面積当りの延従人口（１９７７年）

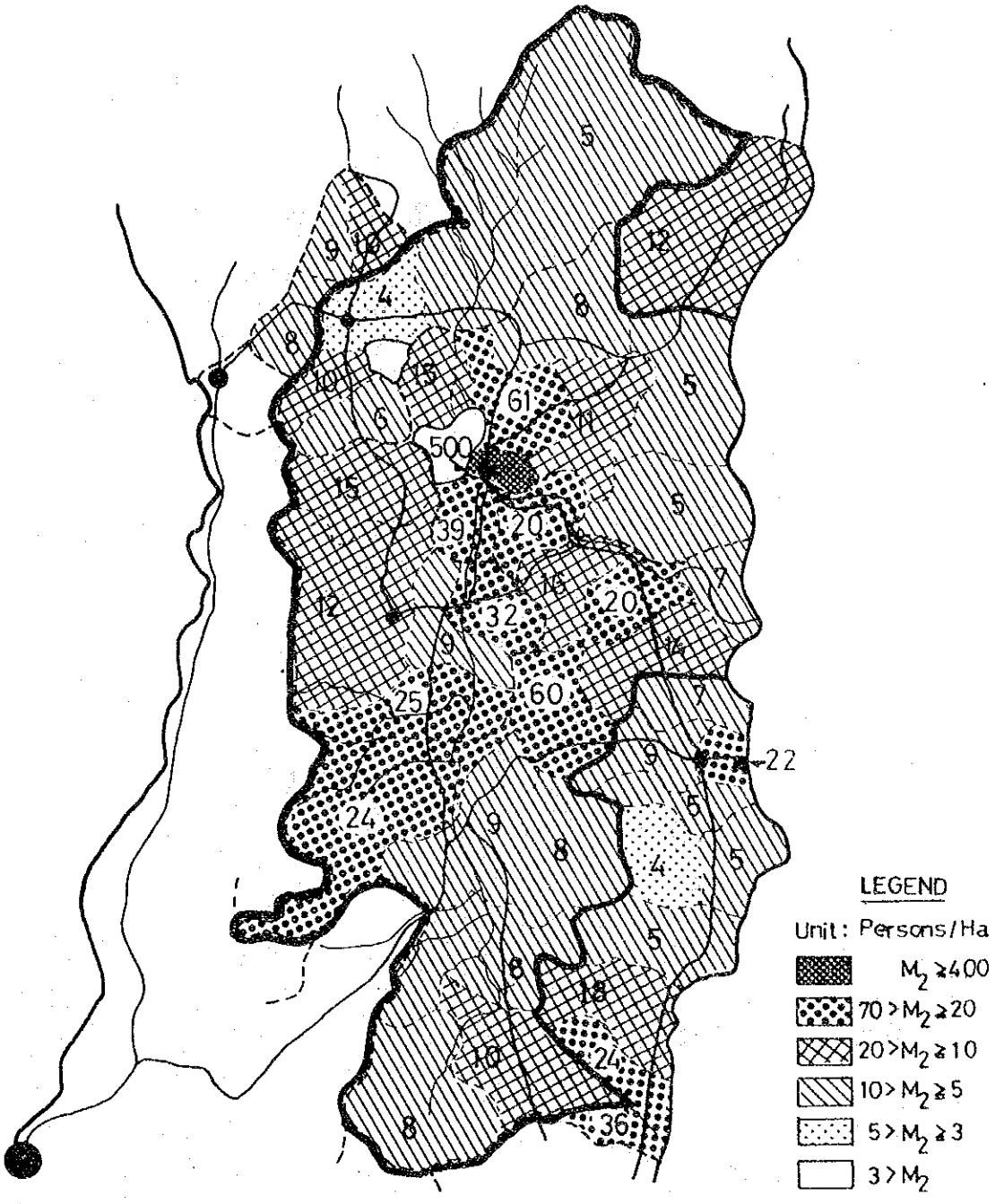


図 3. 23　郡別のモミの需給状況

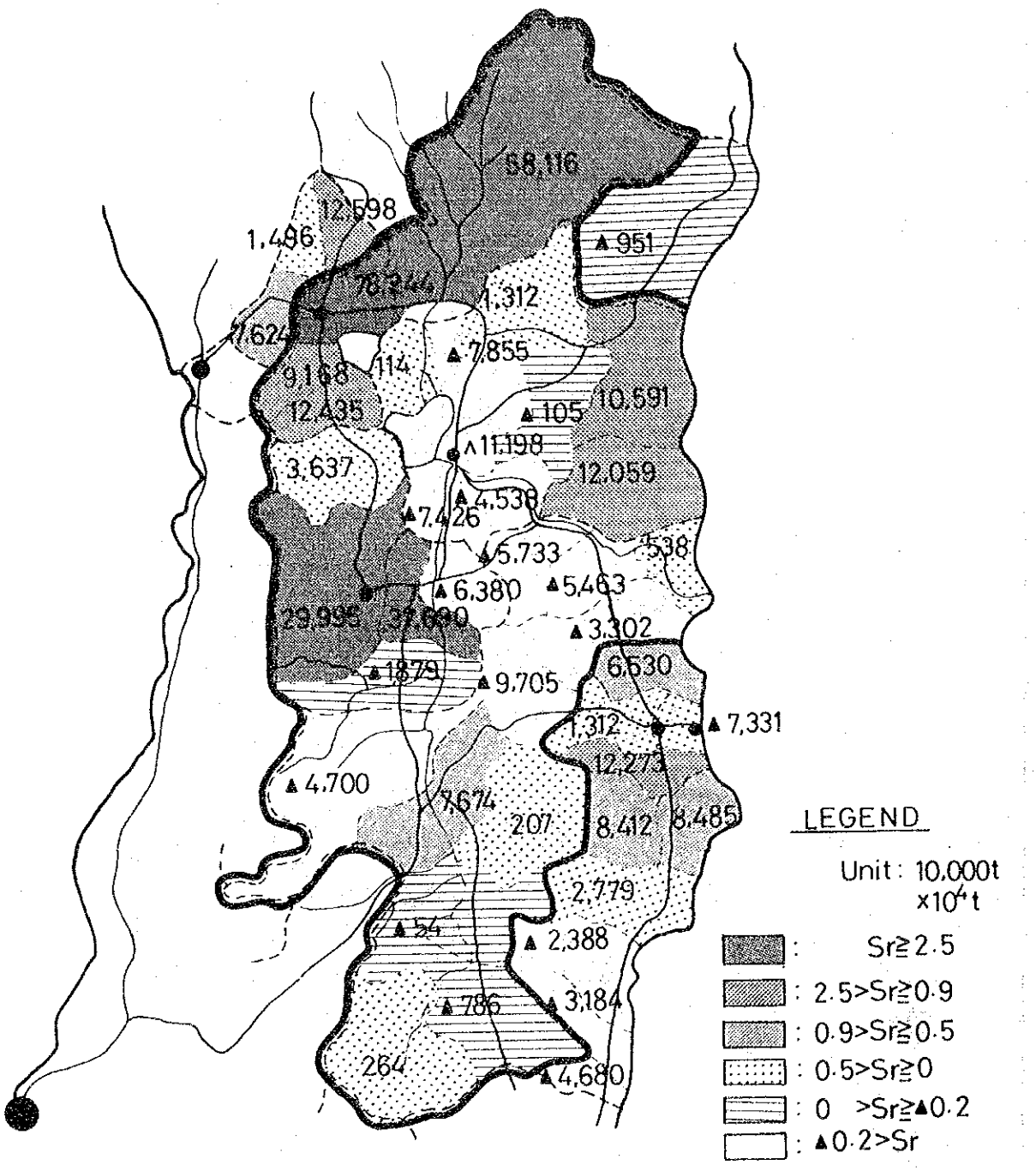


図 3. 24　計画対象地域の道路網

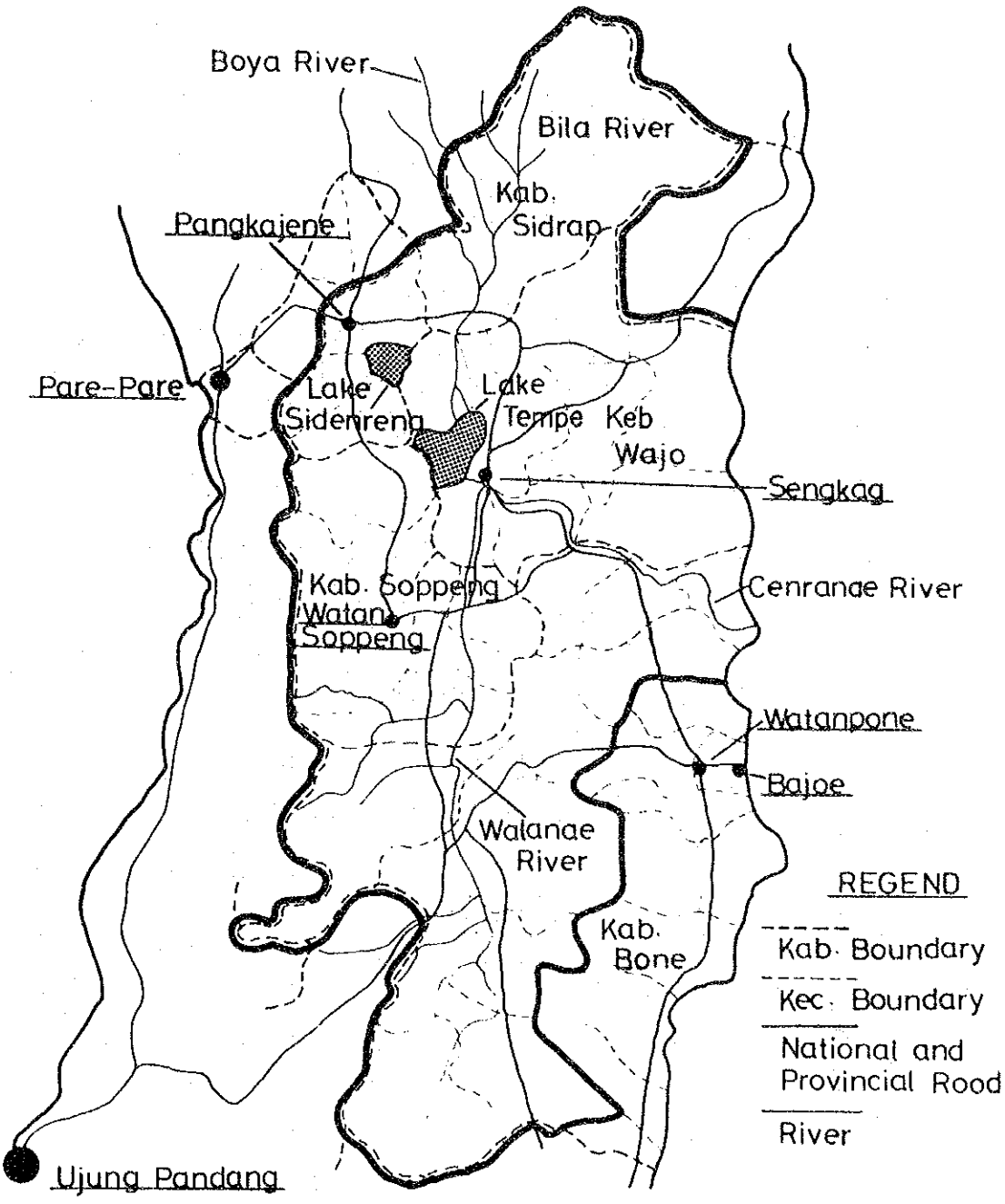


図 3. 25　各郡からのUjung Pandangおよび
Pare Pareへの所要時間および距離

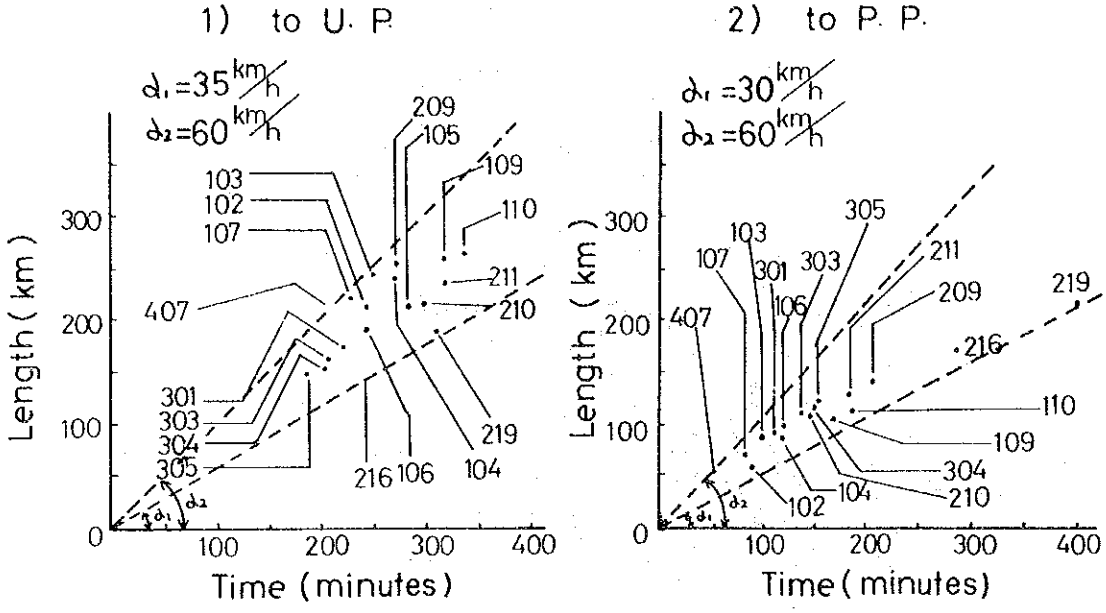


図 3. 26　各郡からのUjung Pandangおよび
Pare Pareまでの道路状況比較

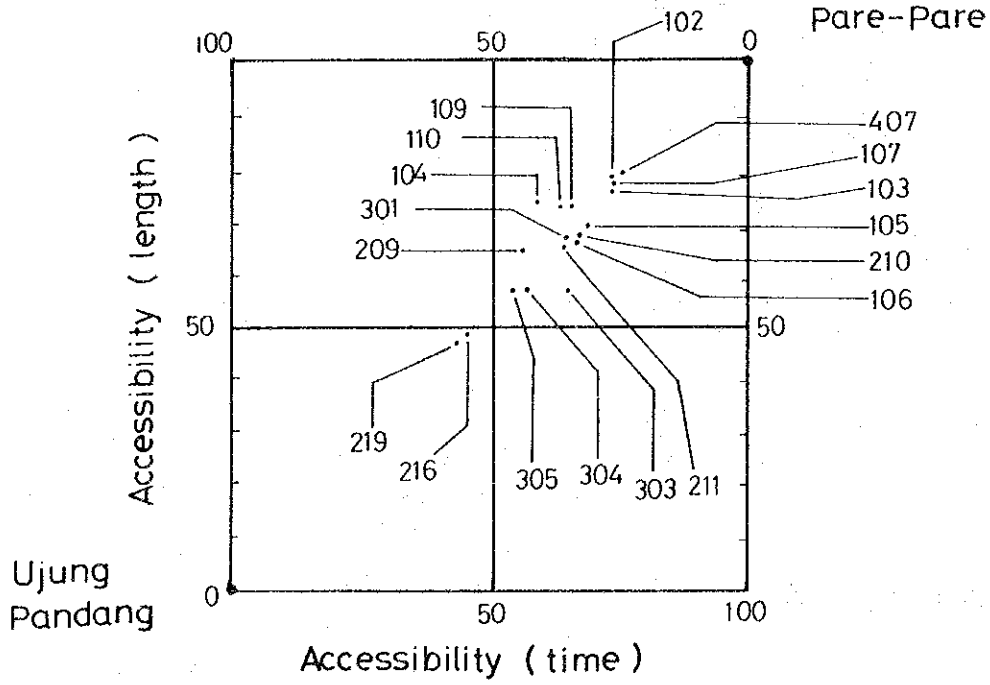
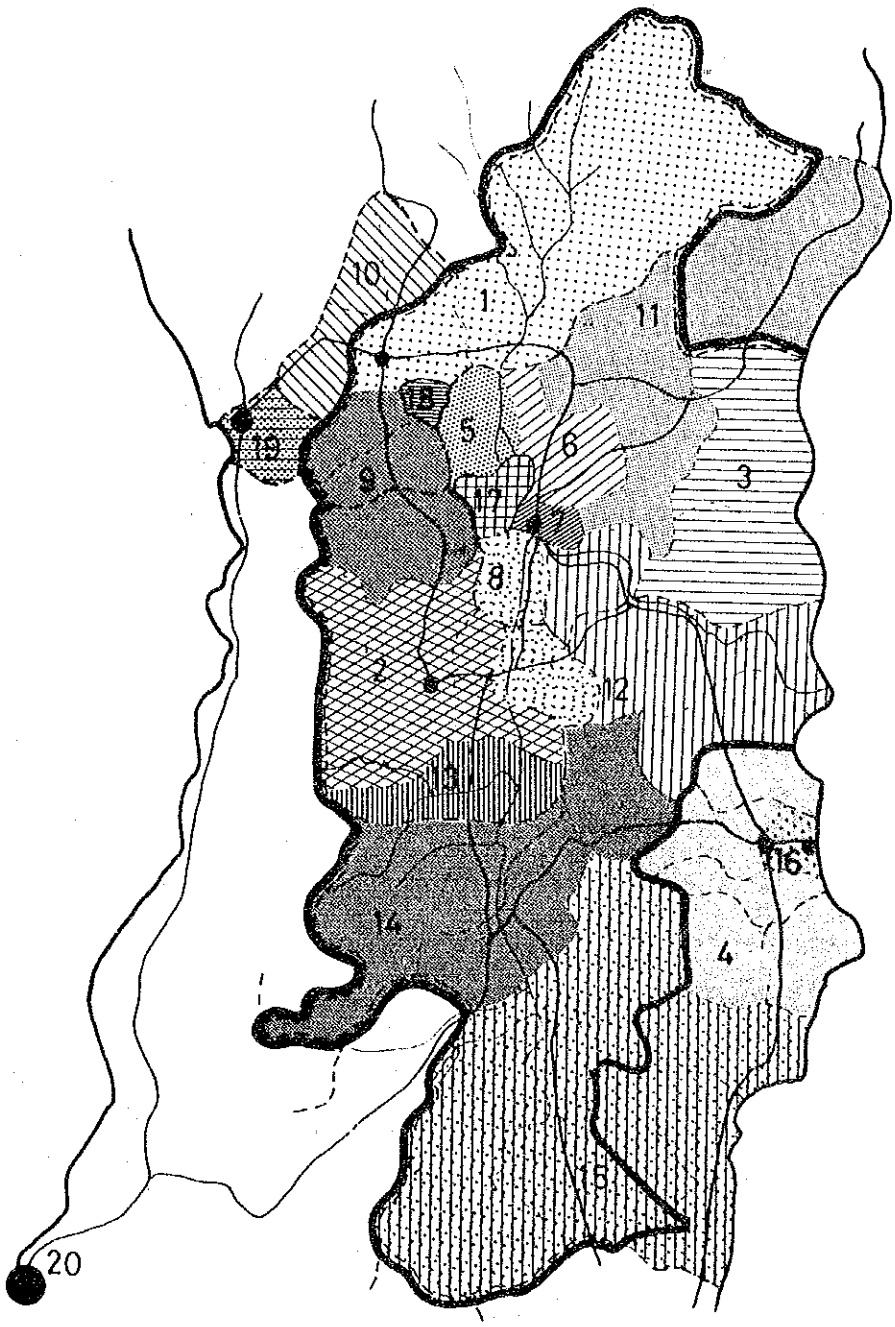


図 3. 27　ミクロ社会・経済分析のためのゾーン区分



Remark: The meaning of each zone is described in page 39-43

図3.28 地 質 図

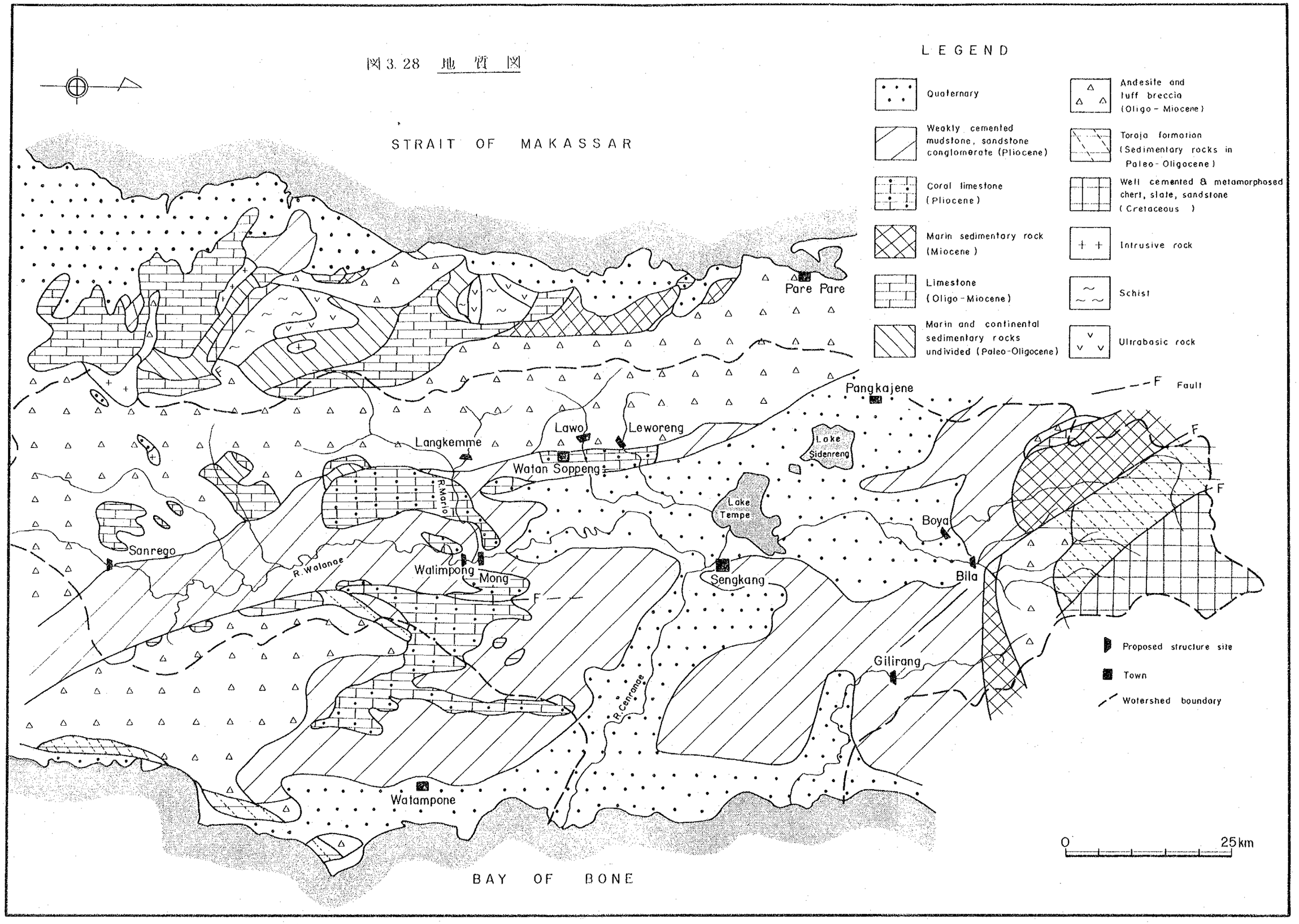

STRAIT OF MAKASSAR
LEGEND
Quaternary
Andesite and tuff breccia (Oligo - Miocene)
Weakly cemented mudstone, sandstone conglomerate (Pliocene)
Toraja formation (Sedimentary rocks in Paleo - Oligocene)
Coral limestone (Pliocene)
Well cemented & metamorphosed chert, slate, sandstone (Cretaceous)
Marin sedimentary rock (Miocene)
Intrusive rock
Limestone (Oligo - Miocene)
Schist
Marin and continental sedimentary rocks undivided (Paleo-Oligocene)
Ultrabasic rock
F Fault
Proposed structure site
Town
Watershed boundary
0 25km
Pare Pare
Pangkajene
Lawo
Leworeng
Langkemme
Watan Soppeng
Lake Sidenreng
Lake Tempe
Boya
Bila
Sengkang
Sanrego
R. Walanae
R. Mario
Walimpong
Mong
Gilirang
R. Cenrana
Watampone
BAY OF BONE

図 3. 29　既設かんがい水田地区

NO	NAME OF SYSTEM	CLASS	LOCATION	IRR AREA IN OBJ. AREA
I	NORTH OF L. TEMPE			
1.	BULU CENRANA	TECHNIC	SIDRAP	6.261 HA
2.	LANCIRANG	S. TECH.	SIDRAP	417 HA 1/
3.	BELAWA	S. TECH.	WAJO	1.500 HA.
4.	SALO DUA	S. TECH	WAJO	524 HA
II	NORTH & WEST OF L. SIDENRENG.			
5	BULU TIMORANG	TECHNIC	SIDRAP	5.337 HA
6	SADANG	TECHNIC	SIDRAP	8.050 HA
7	BILOKKA	S. TECH.	SIDRAP	931 HA.
8	WETTEE	S. TECH.	SIDRAP	510 HA.
III	WEST & SOUTE OF L. TEMPE.			
9.	LATENRENG	S. TECH	SOPPENG	800 HA 2/
10	LAJAROKO	TECHNIC	SOPPENG	1.250 HA
11	SALO BUNNE	TECHNIC	SOPPENG	2.100 HA.
12	TOWELENG	S.TECH	SOPPENG	450 HA.
13.	LEWORENG KANAN	S.TECH.	SOPPENG	708 HA.
14.	LEWORENG KIRI	S.TECH.	SOPPENG	1.192 HA.
15	TENCO	S.TECH.	SOPPENG	500 HA.
16	TALUMAE	S.TECH.	SOPPENG	340 HA.
17.	AKAMPENG	S.TECH.	SOPPENG	1.100 HA.
18	LALANGE	S.TECH	SOPPENG	1.000 HA
19.	LAGARIGI	S.TECH.	SOPPENG	200 HA
20	CENNAE	S.TECH.	SOPPENG	214 HA
21	PAROTO	S.TECH	SOPPENG	270 HA
22.	TAKKU	S.TECH.	SOPPENG	460 HA
IV	HILLY IRLAND			
23.	MARADDA	S.TECH.	BONE	430 HA.
24	BONGO	S.TECH.	BONE	500 HA
25	TODANG JOMPI	S.TECH.	BONE	240 HA.
V	EAST AREA			
26	BULU PATILA	S.TECH	WAJO	240 HA
27	UNYI	S.TECH	BONE	1.700 HA

NOTE 1/ CONSISTING OF 292 HA IN KAB. SIDRAP AND 125HA IN KAB. WAJO

2/ PROPOSED IRRIGABLE AREA

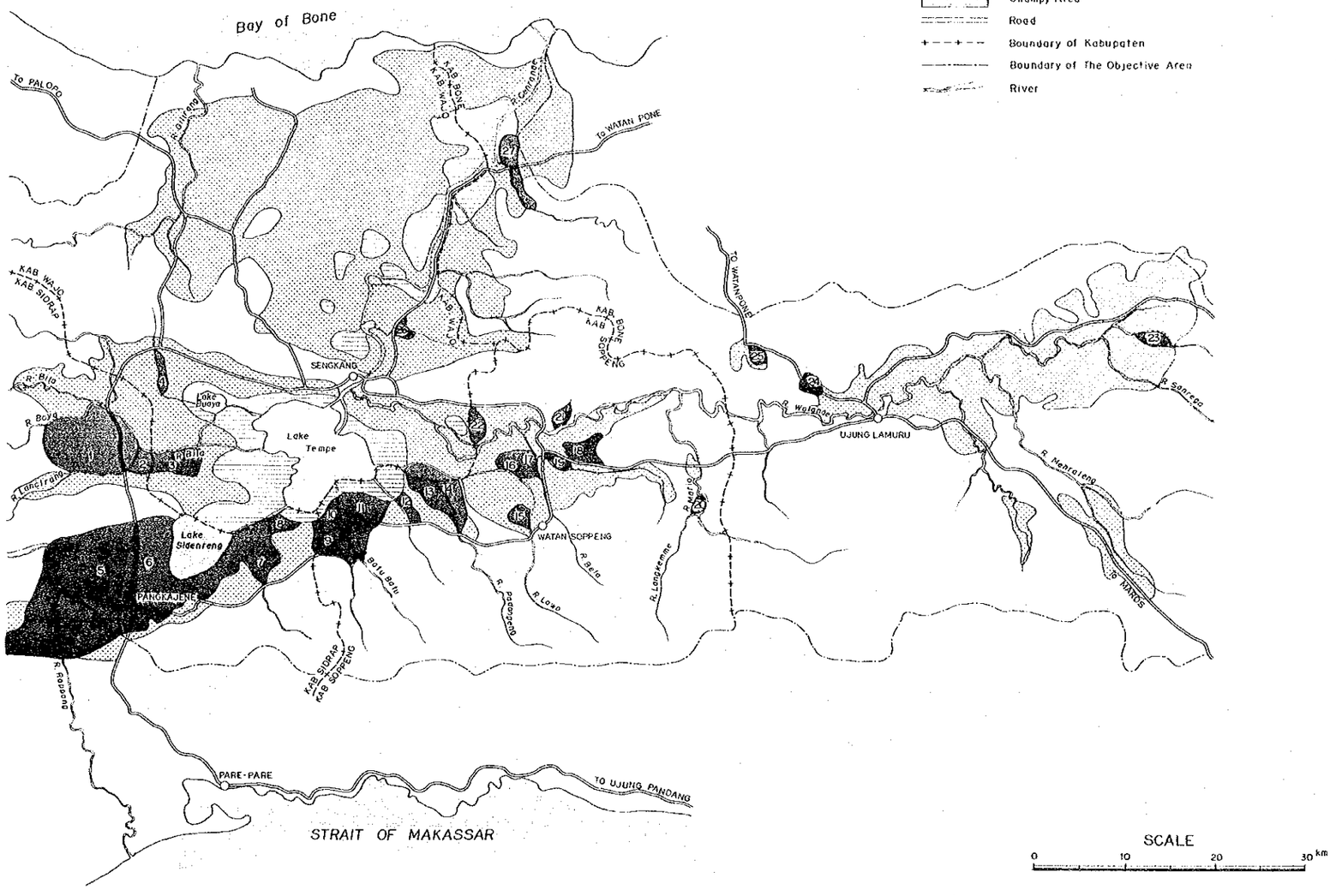


図 3. 30　計画対象地域の河川水系

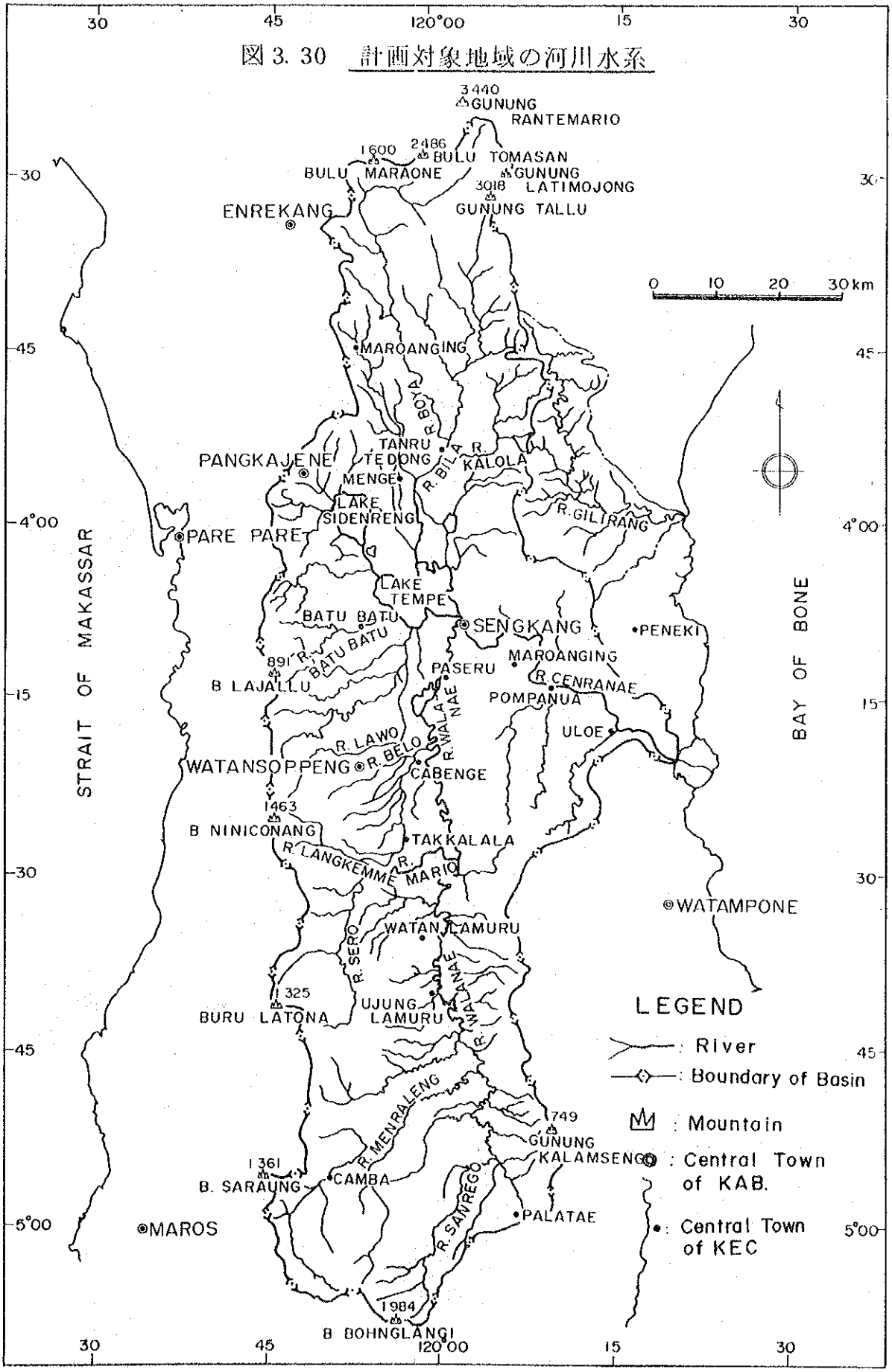
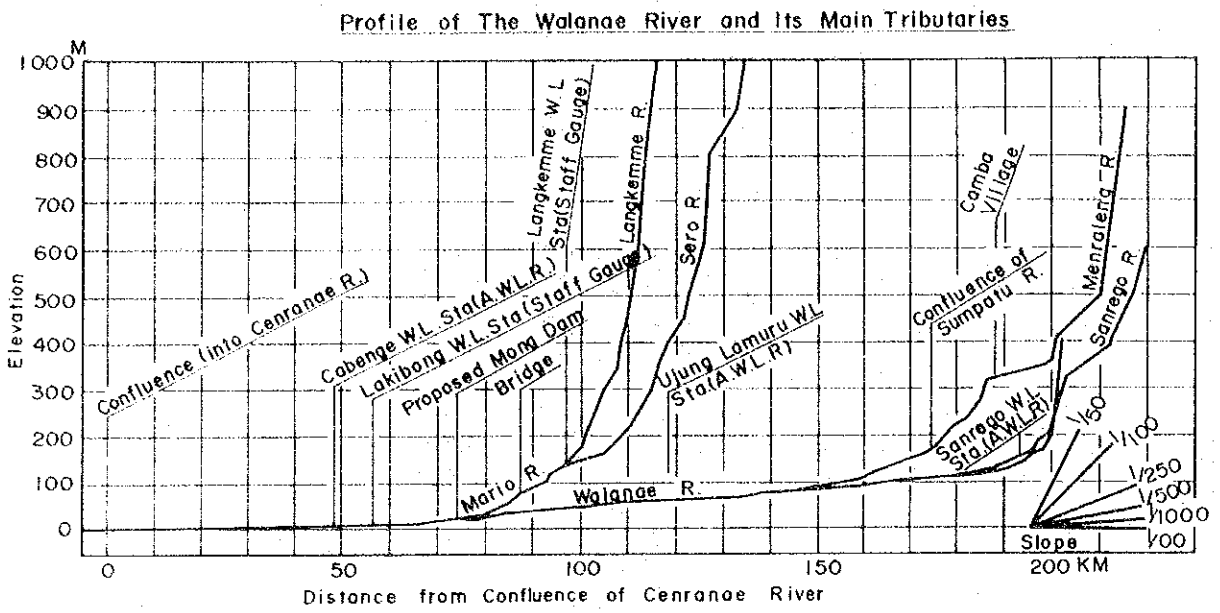
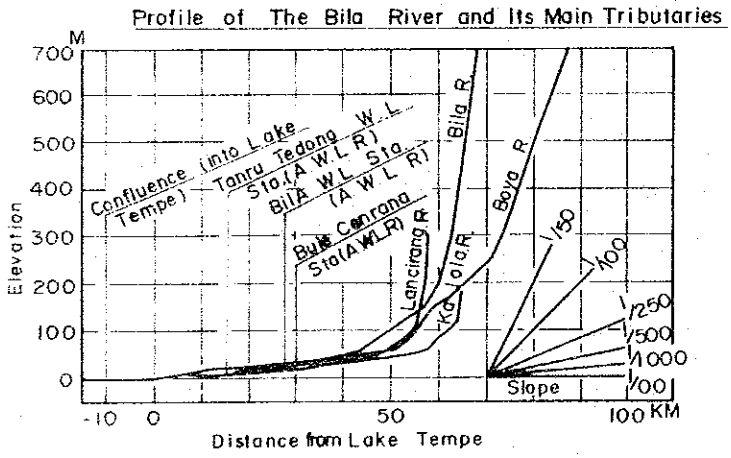
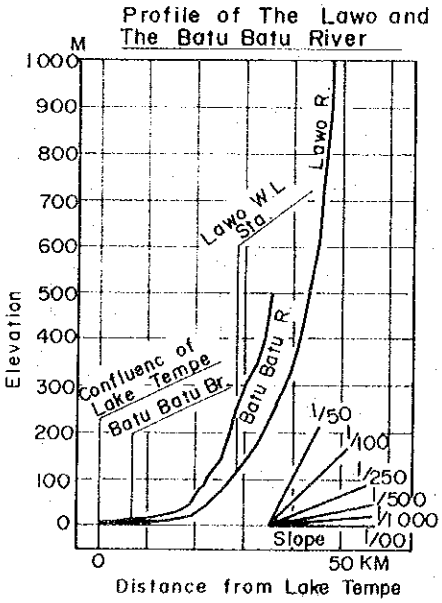


図 3.31　河川の縦断形状







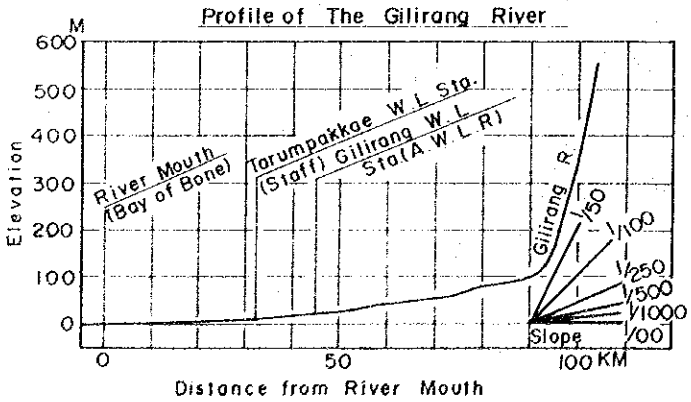


図 3. 32　Tempe 湖の地形図

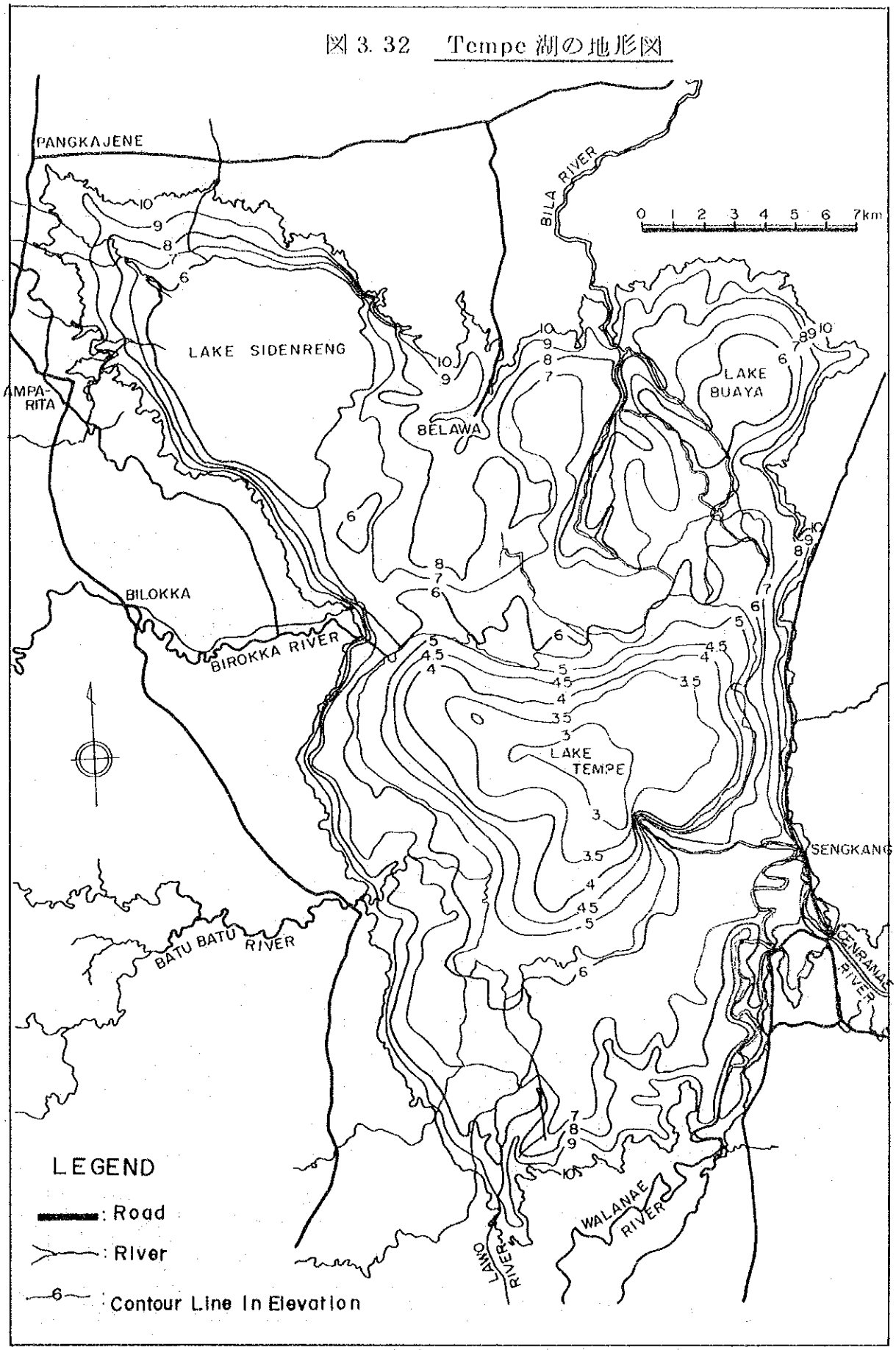
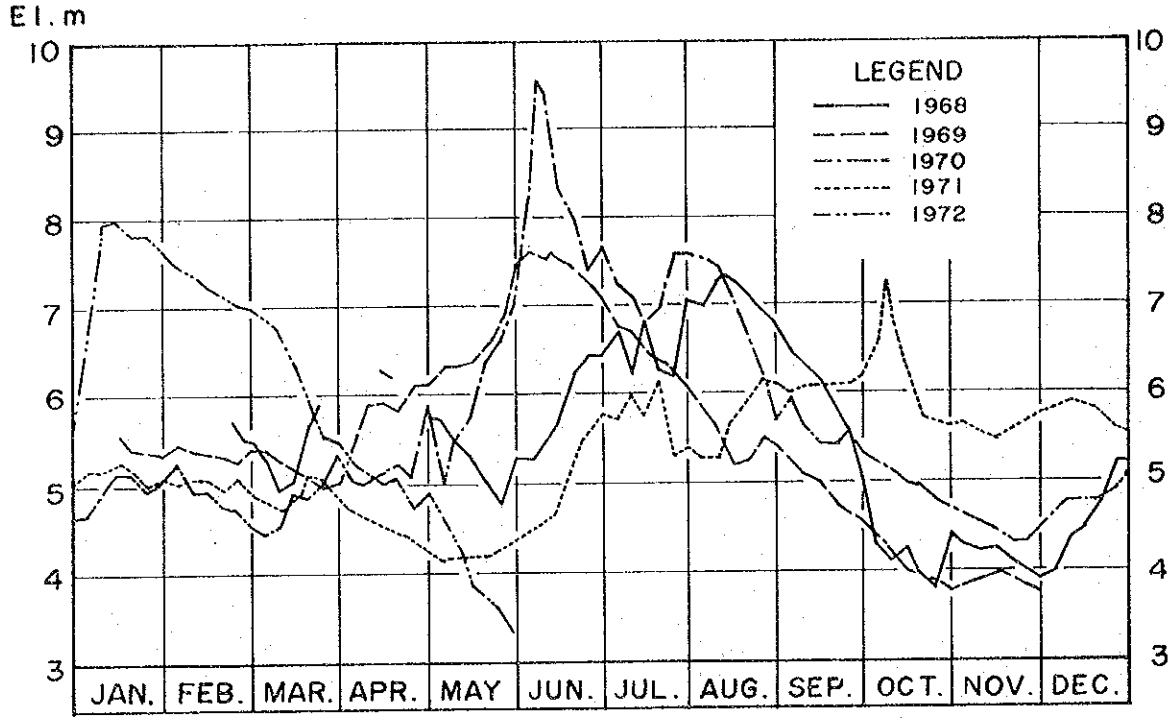


図 3. 32　Tempe 湖のハイドログラフ

(1968 — 1971　observed by Dinas Perikanan)



(1975 — 1978　observed by P3SA)

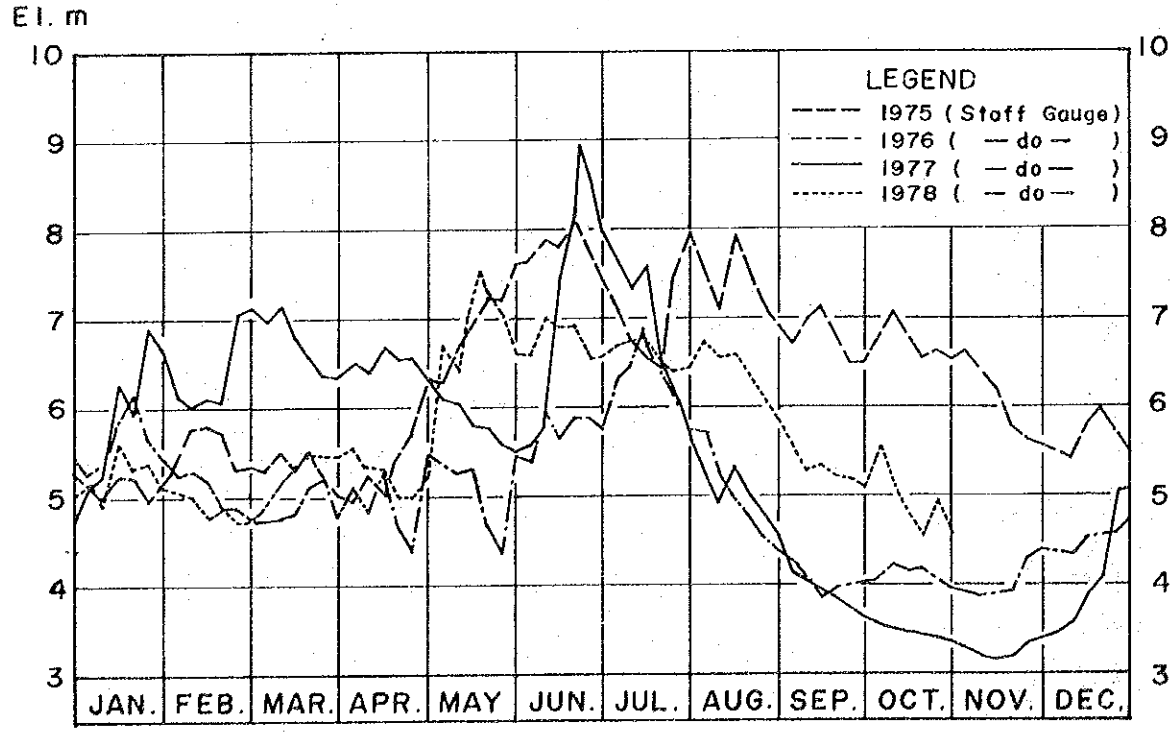


図 3. 34　洪水はんらん区域

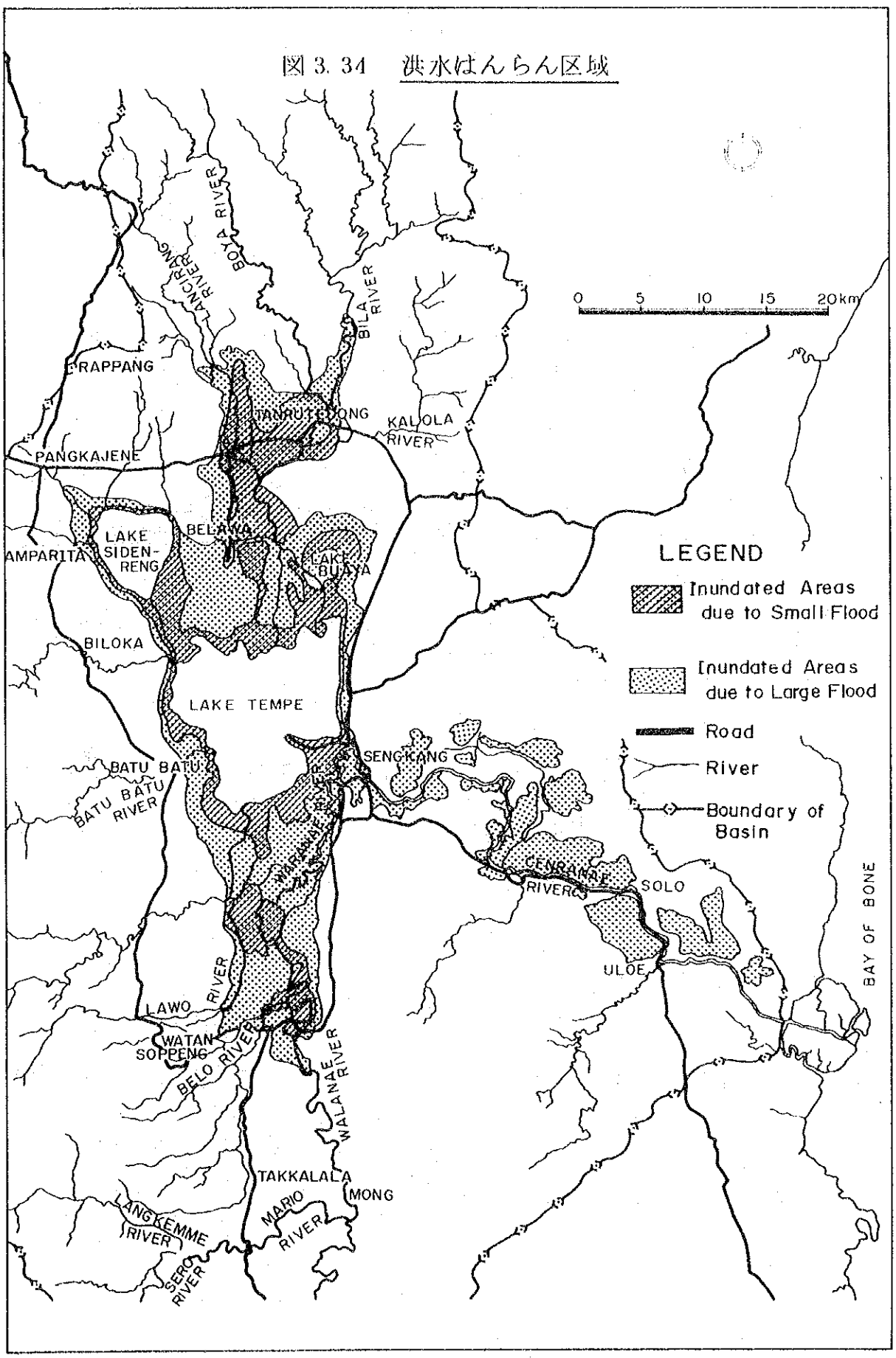
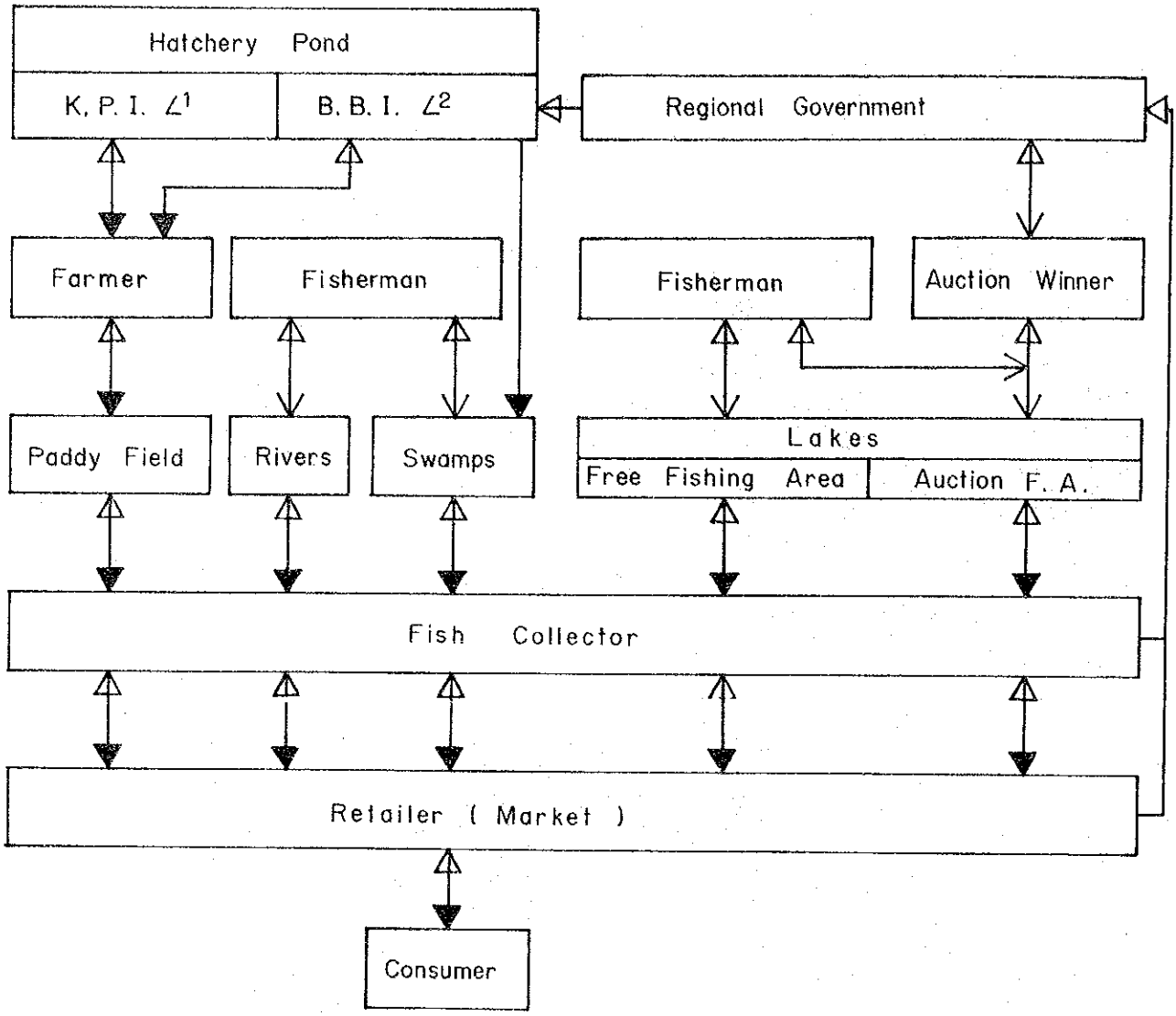


図 3.35　計画対象地域における内水面漁業の現況



∠1 : K. P. I. = Private hatchery Pond

∠2 : B. B. I. = Public hatchery Pond

LEGEND

⟶ : Relation with each item

⟶ : Streams of fish

⟶ : Streams of money

図 4. 1　作付体系計画

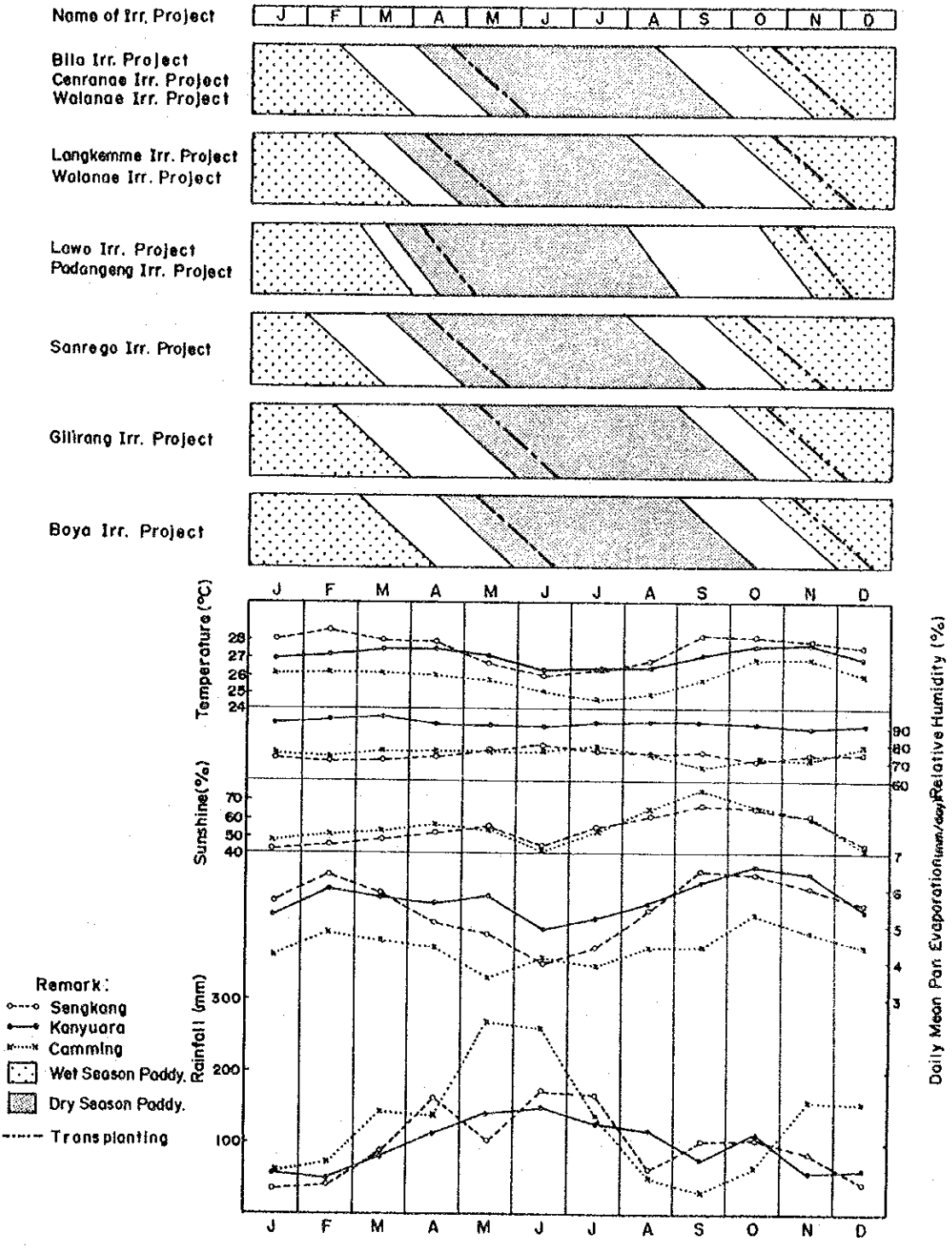

Name of Irr. Project
J F M A M J J A S O N D
Bila Irr. Project
Cenranae Irr. Project
Walanae Irr. Project
Langkemme Irr. Project
Walanae Irr. Project
Lawo Irr. Project
Padangeng Irr. Project
Sanrego Irr. Project
Gilirang Irr. Project
Boya Irr. Project
Temperature (°C)
28
27
26
25
24
Sunshine (%)
70
60
50
40
Rainfall (mm)
300
200
100
90
80
70
60
7
6
5
4
3
Relative Humidity (%)
Daily Mean Pan Evaporation (mm/day)
Remark:
Sengkang
Kanyuara
Camming
Wet Season Paddy.
Dry Season Paddy.
Transplanting

図 4. 2　かんがい計画地区

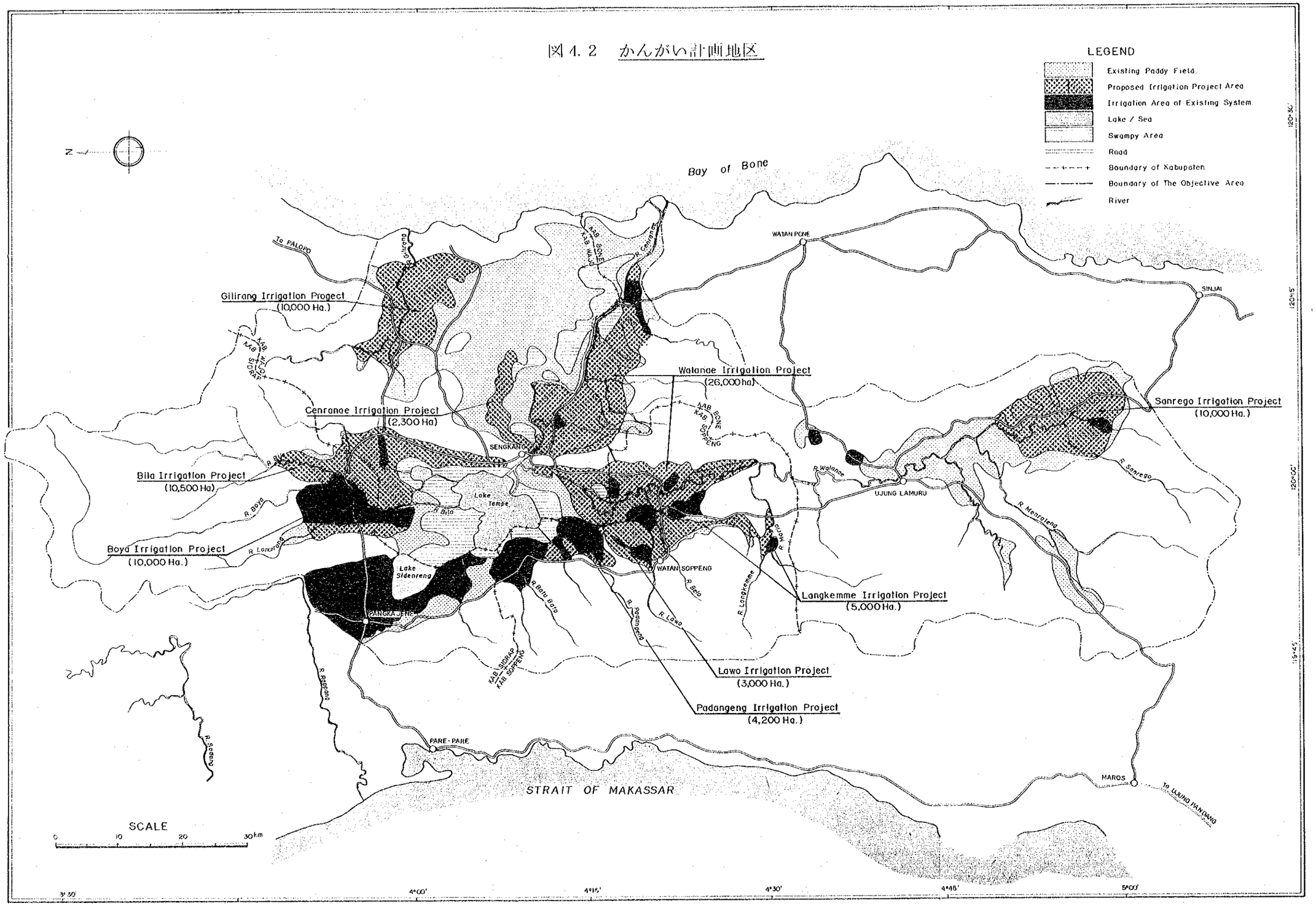
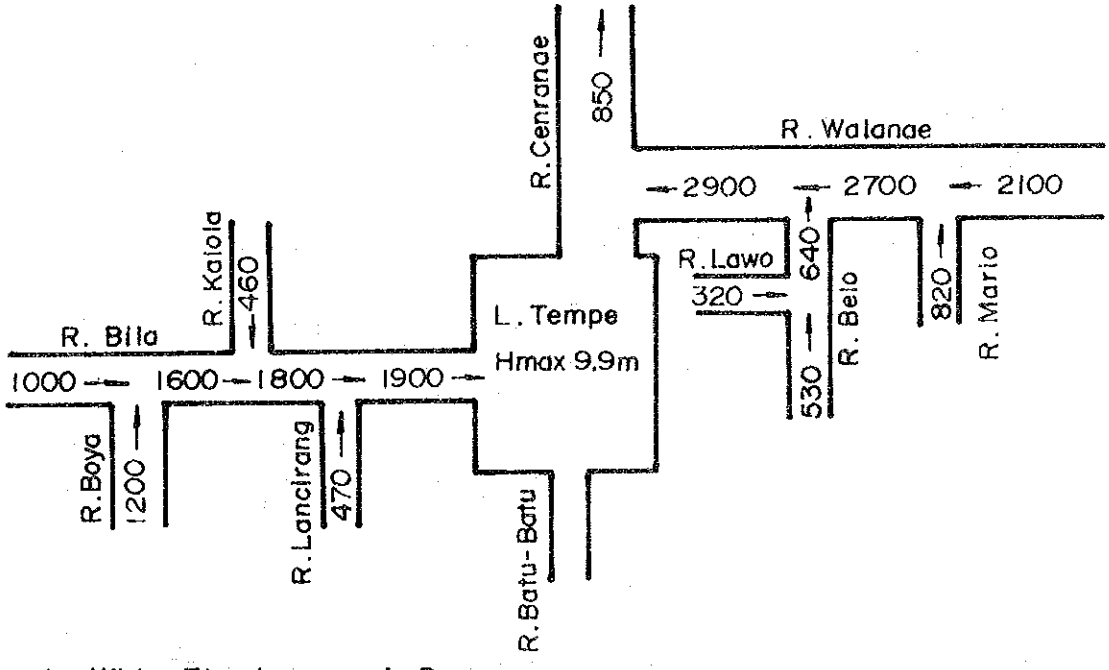


図 4.3　計画高水流量配分

(Unit : m^3/sec)

(a). Without Floodway and Dam



(b). With Floodway and Dam

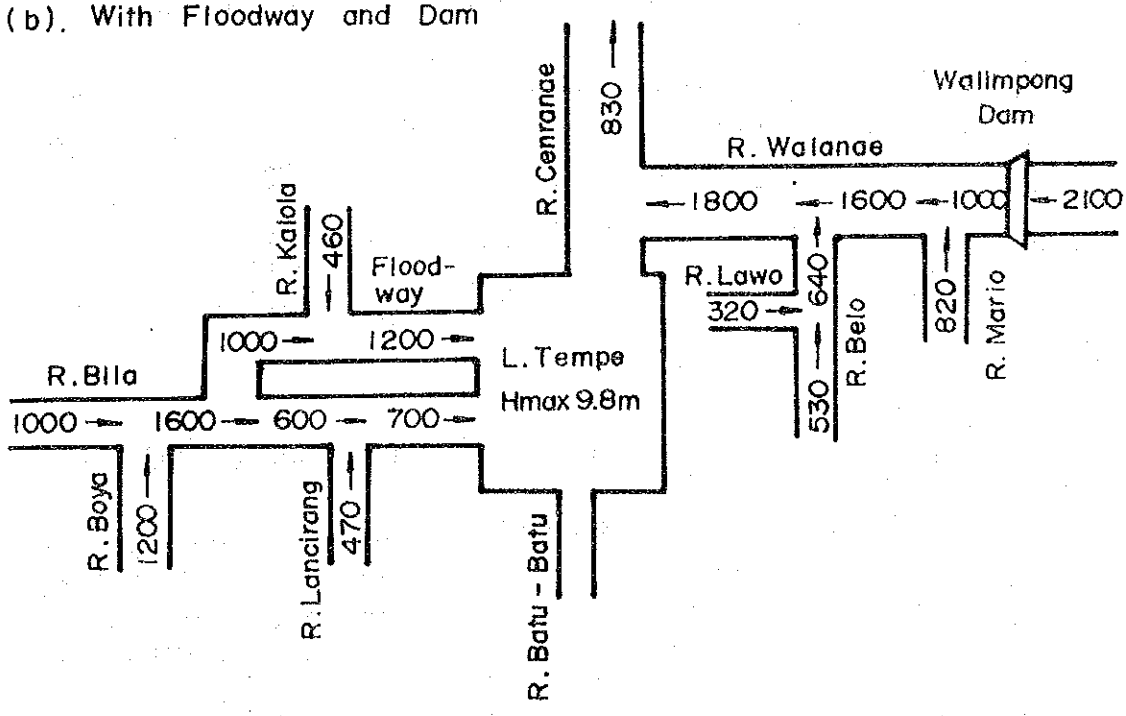


図 4.4　ダム調節によるWalanae川高水流量配分

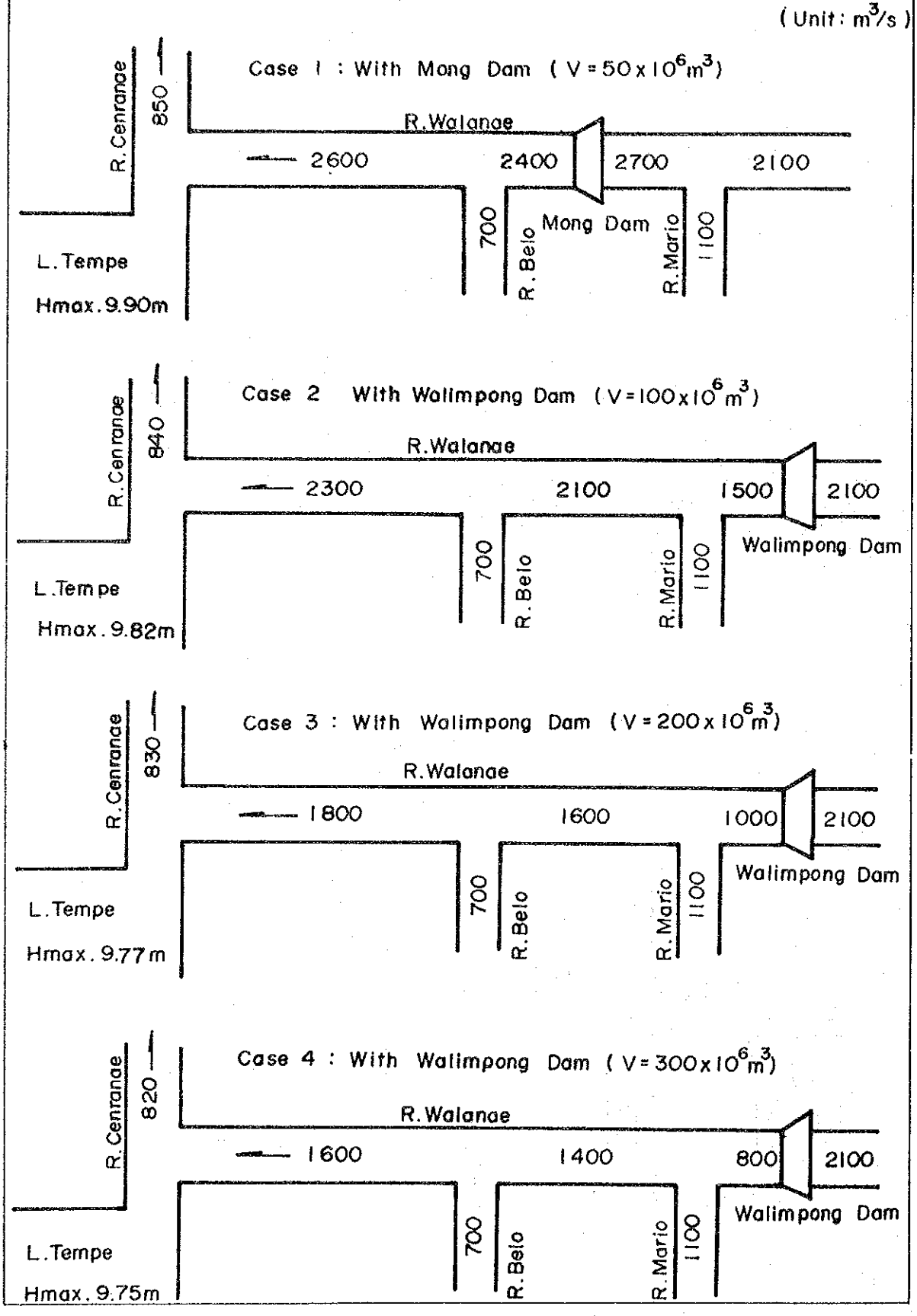


図 4.5　治水計画地区

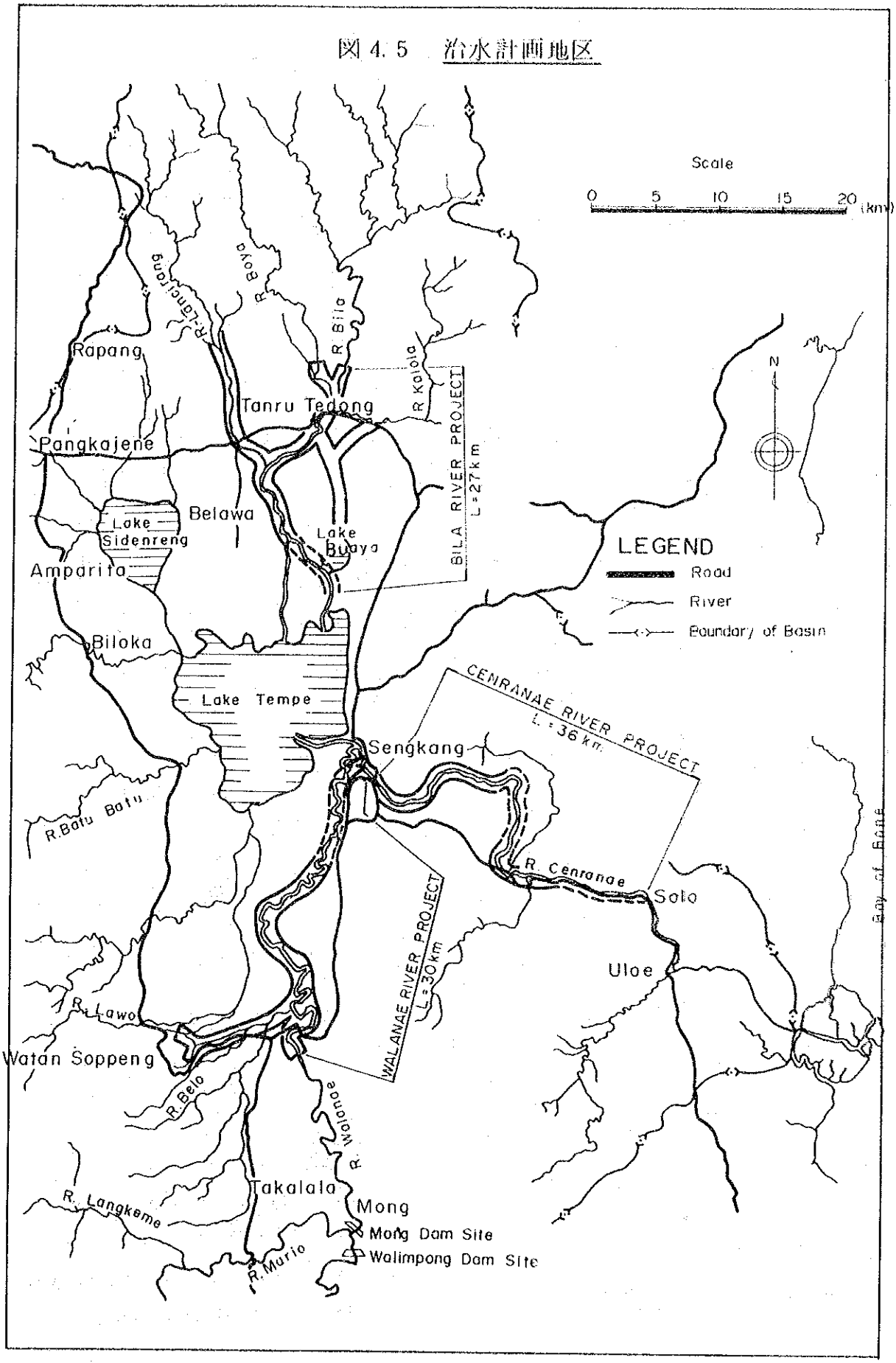
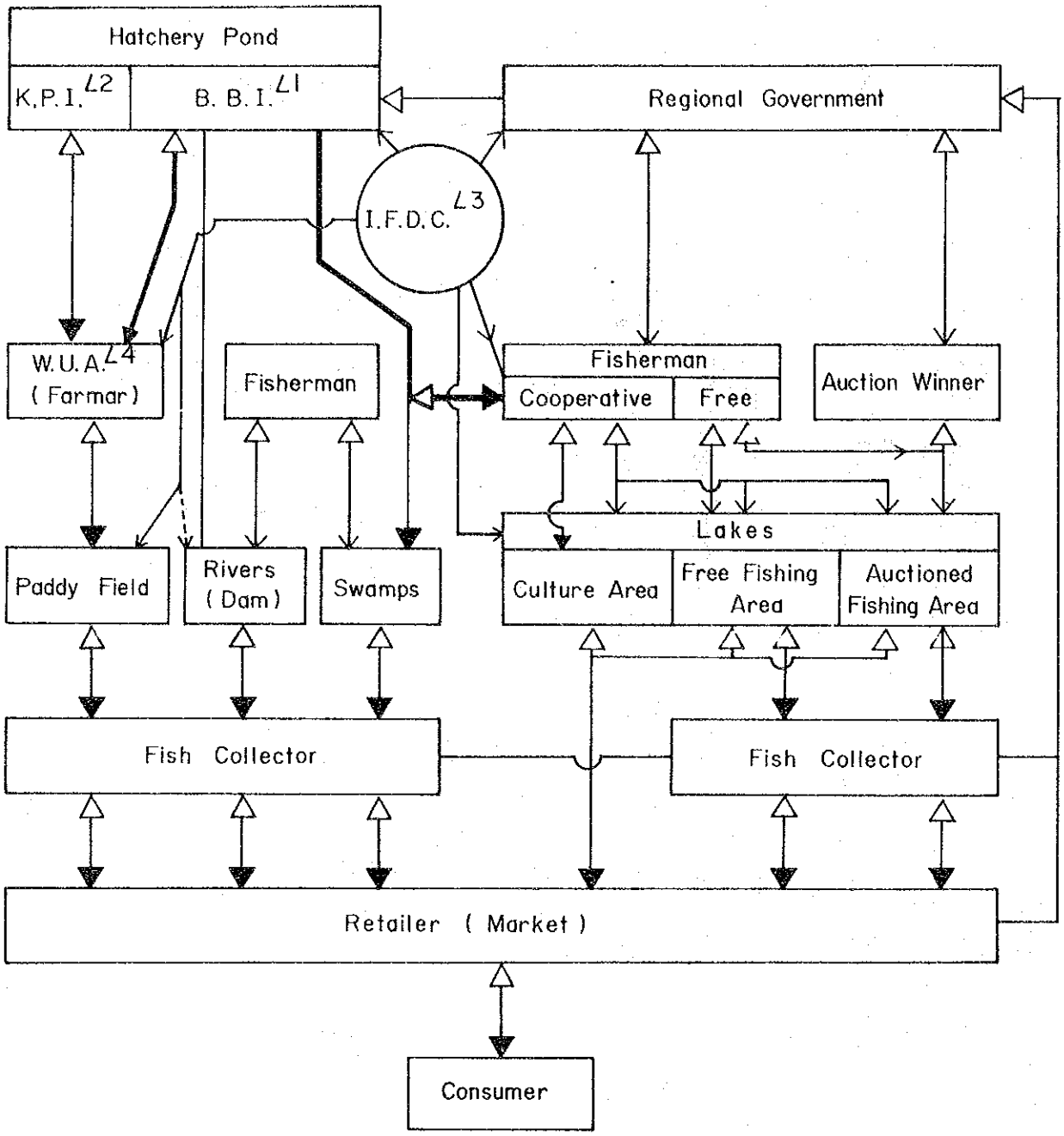

Scale
0 5 10 15 20 (km)
N
LEGEND
Road
River
Boundary of Basin
R. Langkang
R. Bola
R. Bila
R. Kaloia
Rapang
Tanru Tedong
Pangkajene
BILA RIVER PROJECT
L=27km
Belawa
Lake Sidenreng
Lake Buaya
Amparita
Biloka
Lake Tempe
CENRANAE RIVER PROJECT
L=36km
Sengkang
R. Batu Batu
R. Cenranae
Soto
WALANAE RIVER PROJECT
L=30km
Uloe
Bay of Bone
R. Lawo
Watan Soppeng
R. Belo
R. Walanae
Takalala
Mong
R. Langkeme
Mong Dam Site
Walimpong Dam Site
R. Mario

図 4. 6　内水面漁業開発計画の組織図

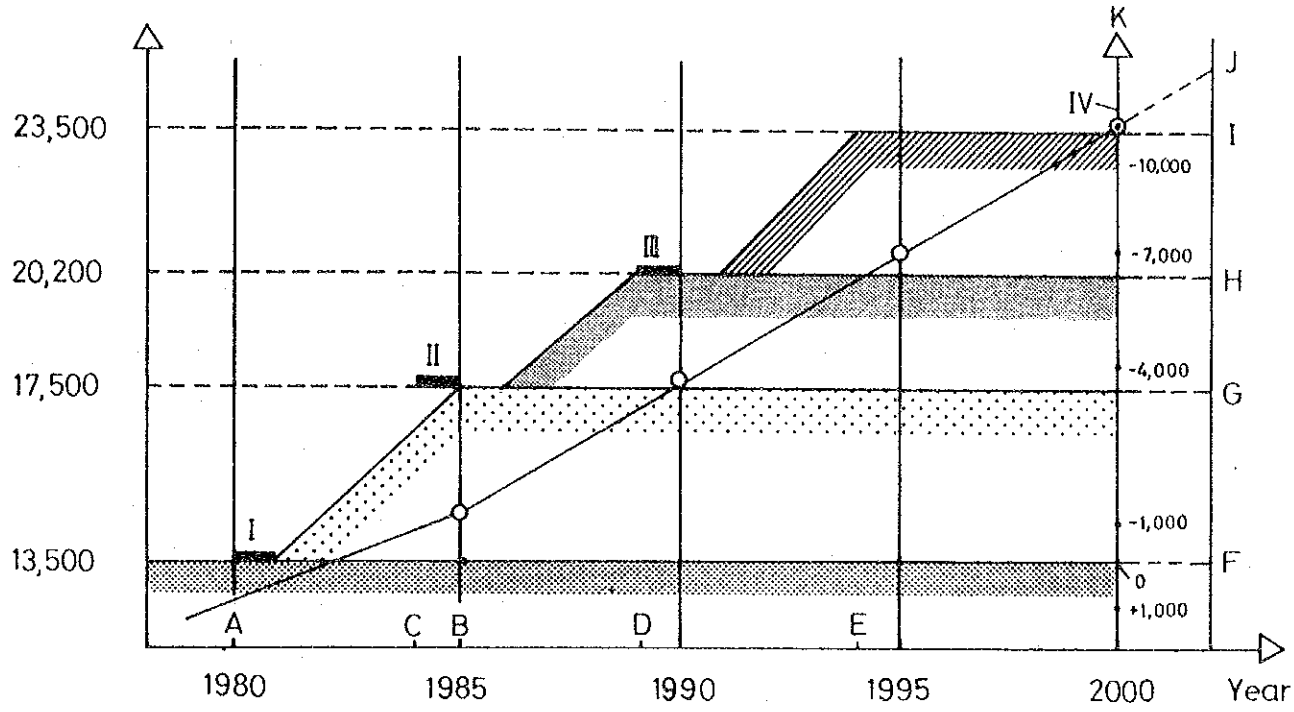


∠1 : B.B.I. = Public hatchery Pond
∠2 : K.P.I. = Private hatchery Pond
∠3 : W.U.A. = Water User's Association
∠4 : I.F.D.C. = Inland Fisheries Development Center

LEGEND

→ : Relation with each item
→ : Streams of fish
➡ : Higher priority stream of fish
⇢ : Streams of Money

図 4. 7　内水面漁業開発の年次計画



LEGEND

I : Construction period of protection area
II : Construction period of hatchery pond and 1 year of technical transfer ∠2
III : Preparation and testing period of lake culture ∠2
IV : Target year
A-B : 4 years to reach target production by fishing
C-D : 4 years to reach target production by paddy culture
D-E : 5 years to reach target production by lake culture
F : Max. production by fishing without plan
G : Max. production by fishing with plan
H : Max. production by paddy culture with plan
I : Max. production by lake culture with plan
J : Curve of deficient amount of inland fish
K : Total dificient amount of inland fish production (t)

∠1 : Production amount in earch is intended to keep about 2,000 3,000 tons bigger than the deficient amount

∠2 : Period of technical transferring is secured

図 4.8　Walimpong ダム（第 2 案）のマスカーブ

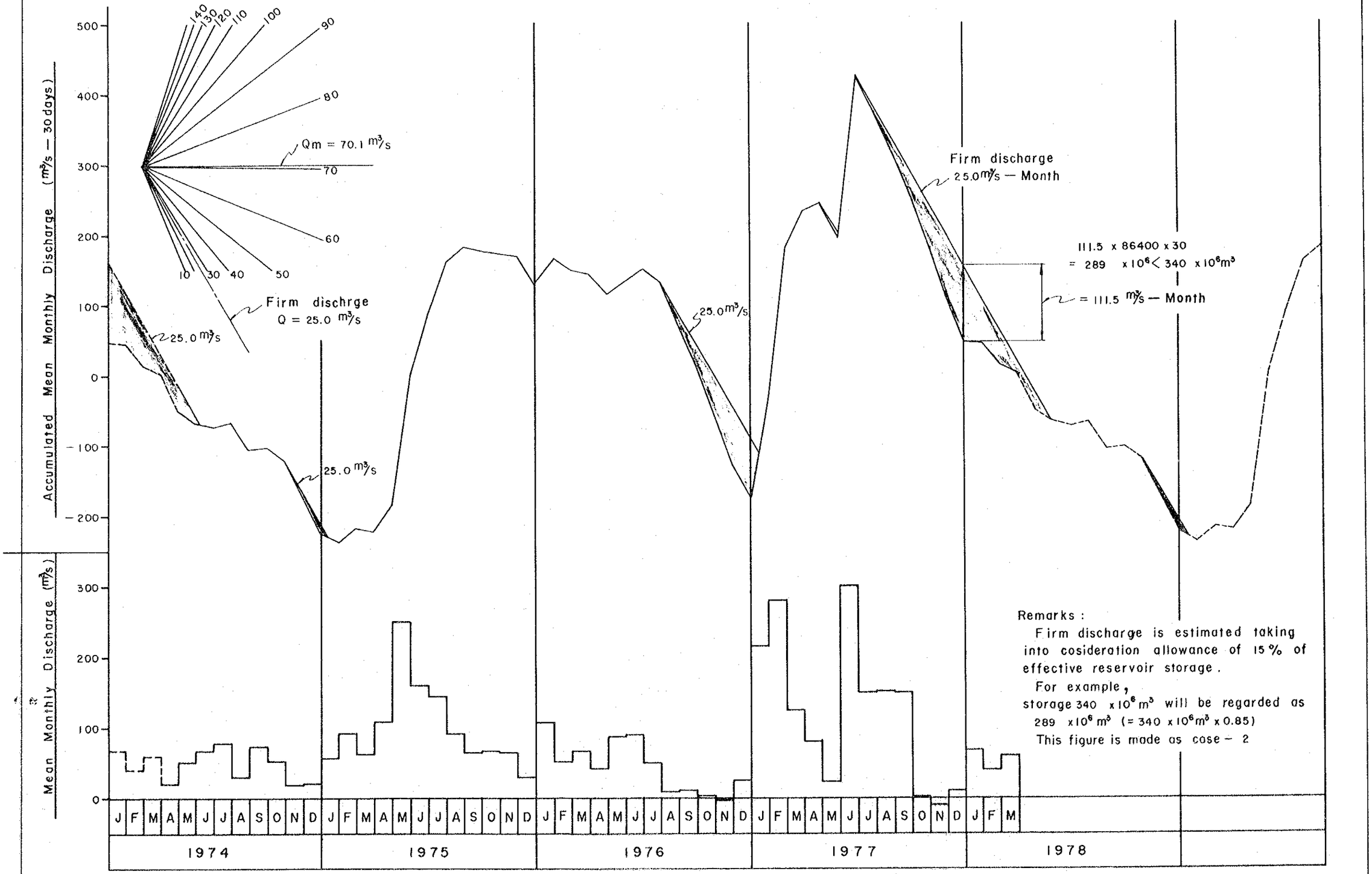


図 4.9　Walimpong ダム（第２案）の水量配分計画

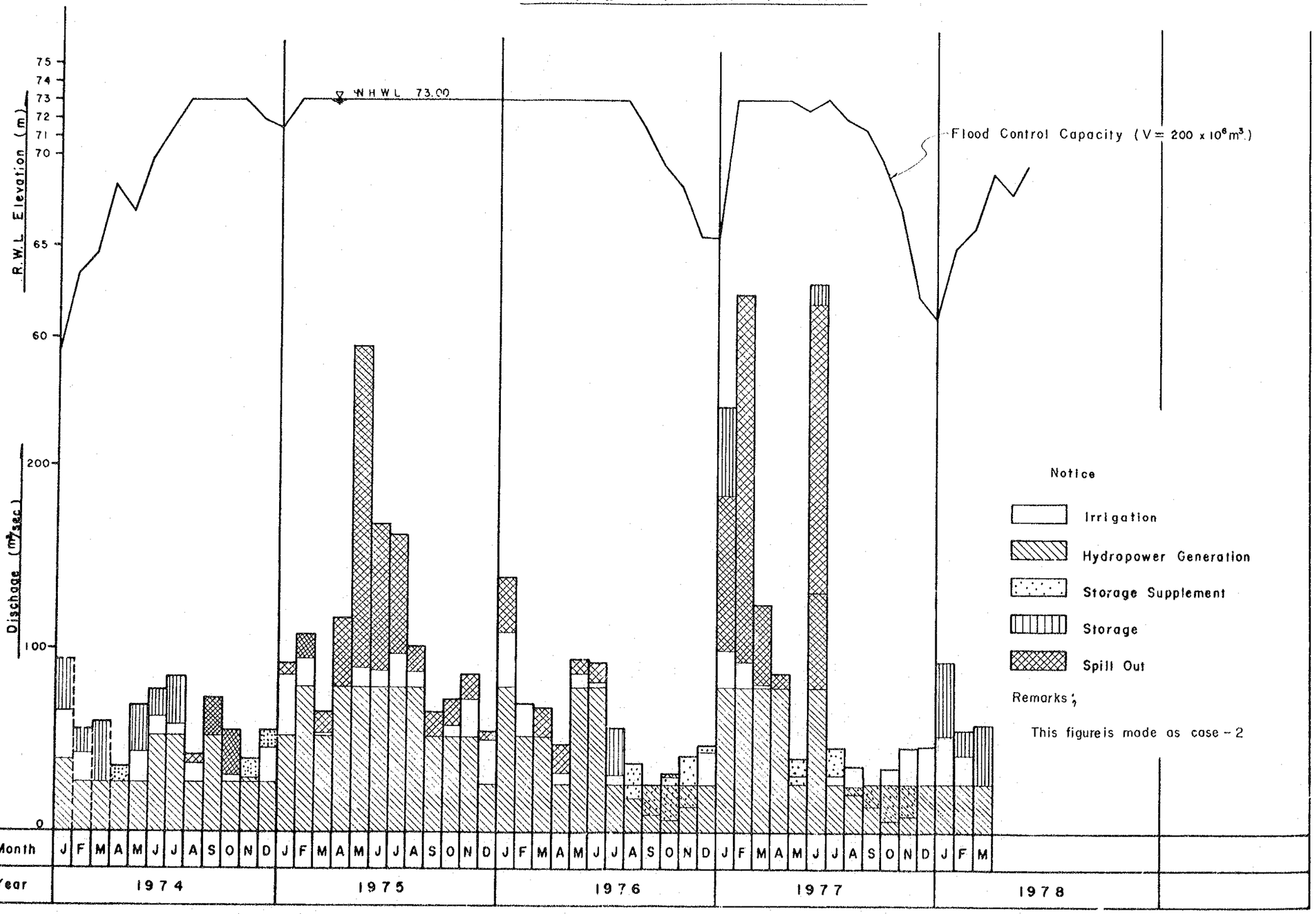


図 4.10　Walimpongダム（第２案）の貯水容量および貯水面積

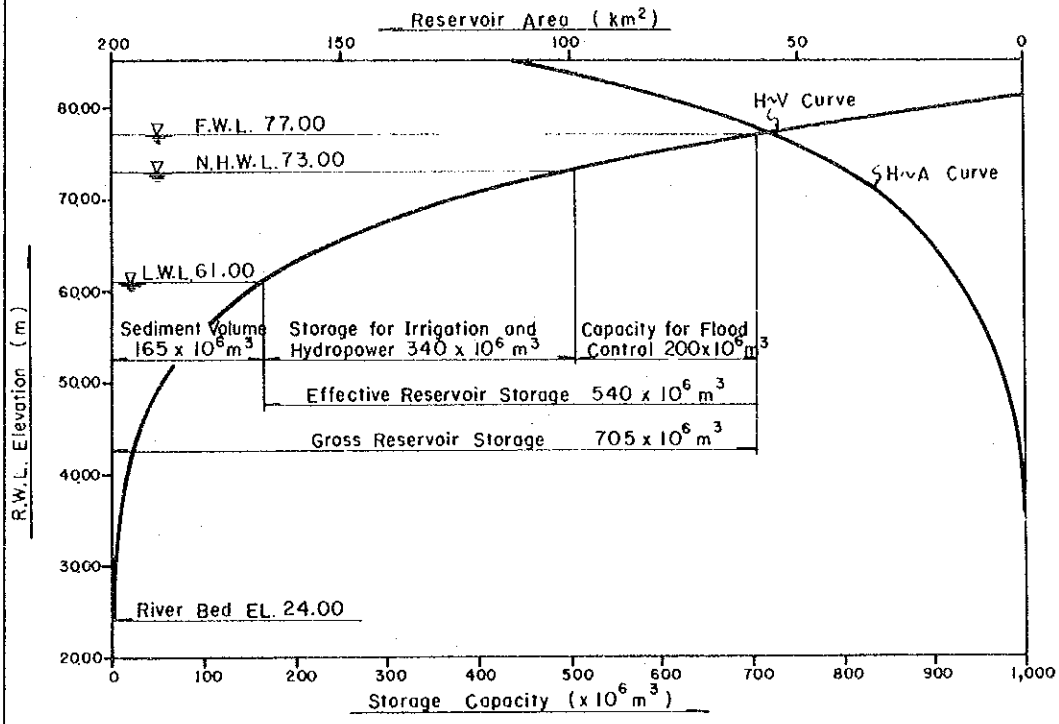


図 4.11　Walimpongダム（第２案）の計画洪水ハイドログラフ

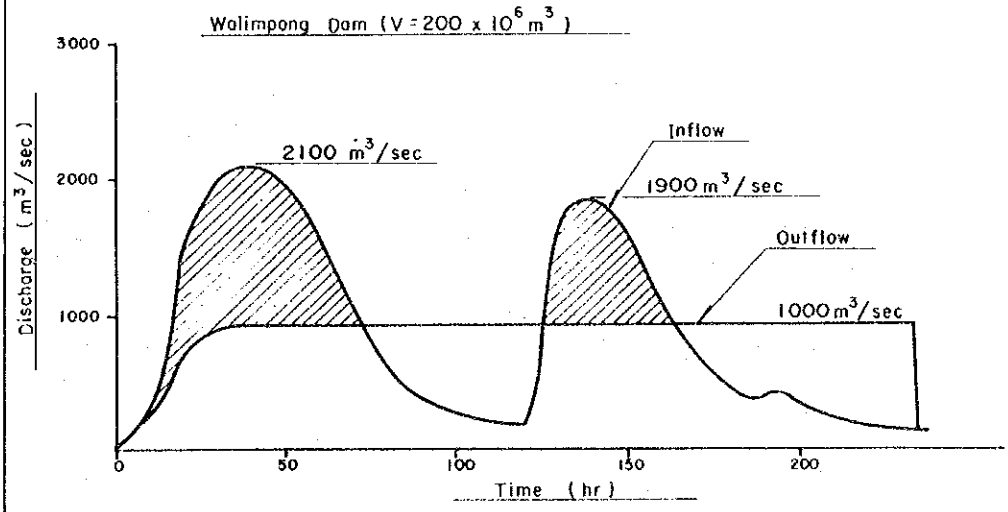


図 4.12　Walimpong ダムの平面図

Scale 1: 5,000

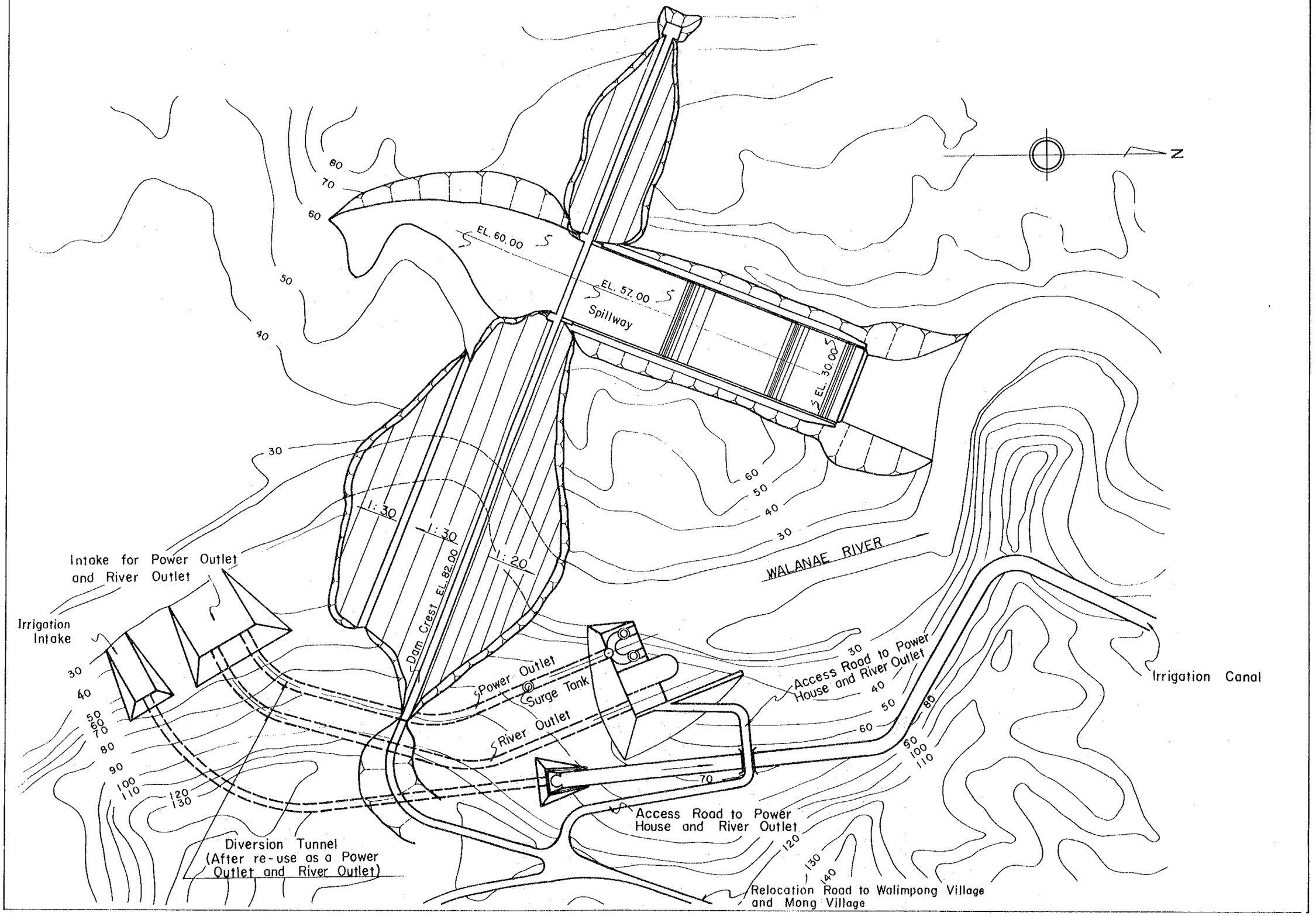


図 4. 13　Walimpongダムの正面図

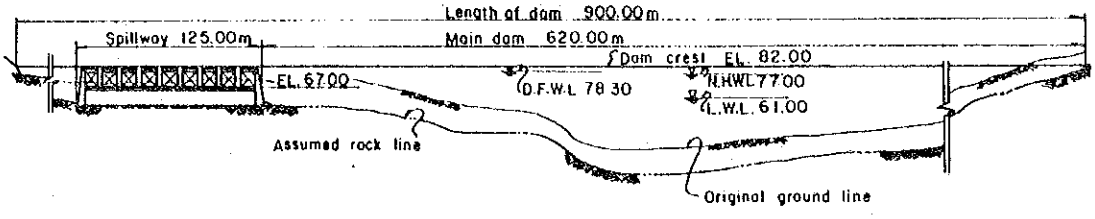


図 4. 14　Walimpongダムの断面図

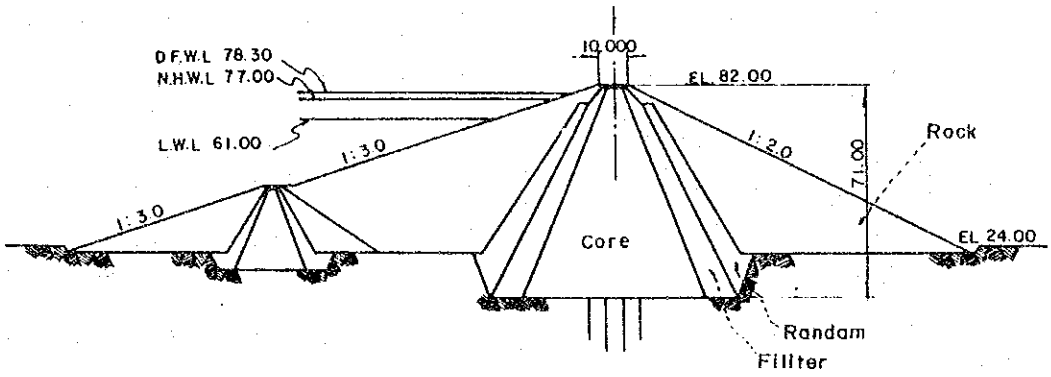


図 4. 15　砂防計画地区

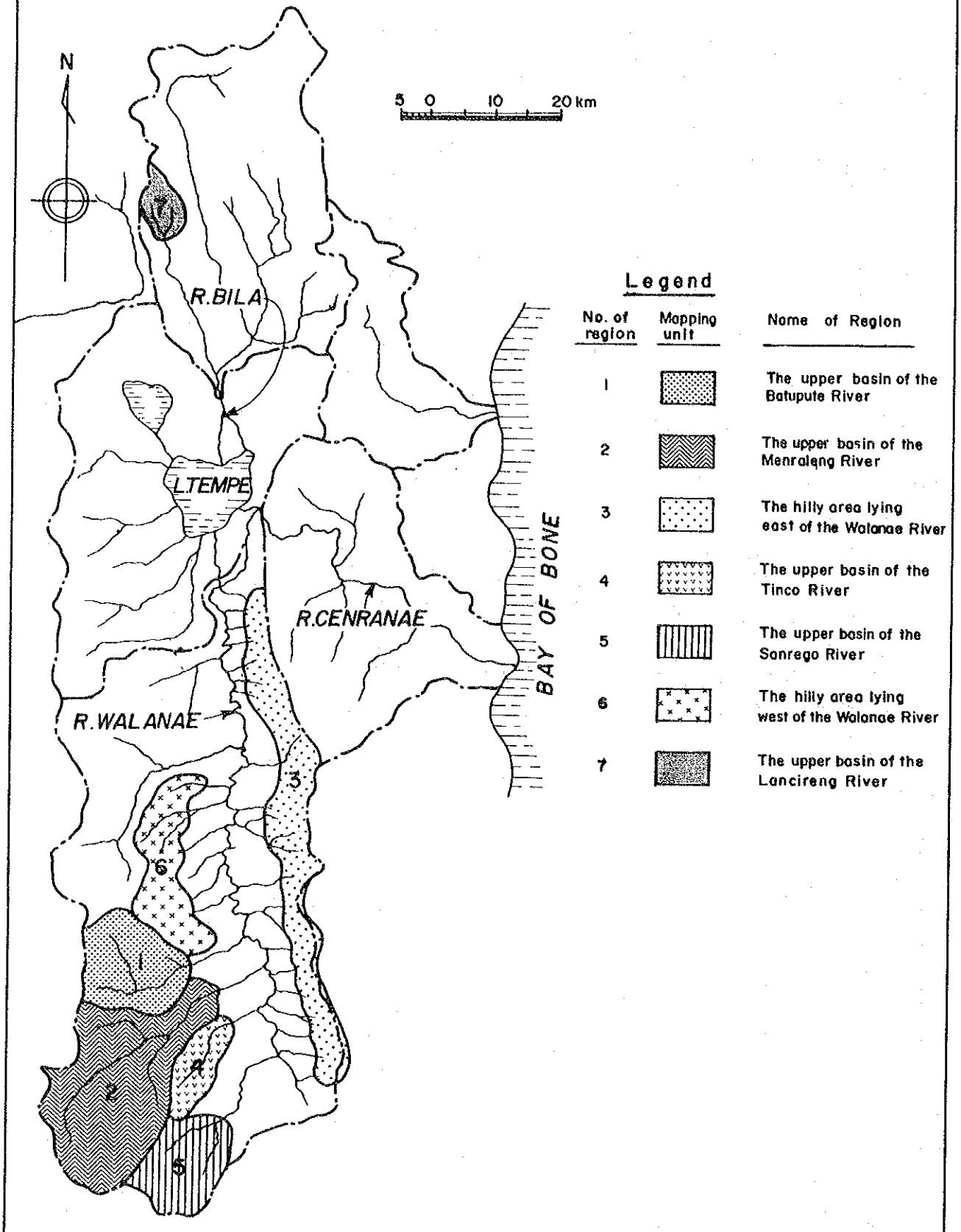

N
5 0 10 20 km
R.BILA
LTEMPE
R.CENRANAE
R.WALANAE
BAY OF BONE
Legend
No. of region
Mapping unit
Name of Region
1 The upper basin of the Batupute River
2 The upper basin of the Menraleng River
3 The hilly area lying east of the Walanae River
4 The upper basin of the Tinco River
5 The upper basin of the Sanrego River
6 The hilly area lying west of the Walanae River
7 The upper basin of the Lancireng River

図 4. 16　送電線の位置図

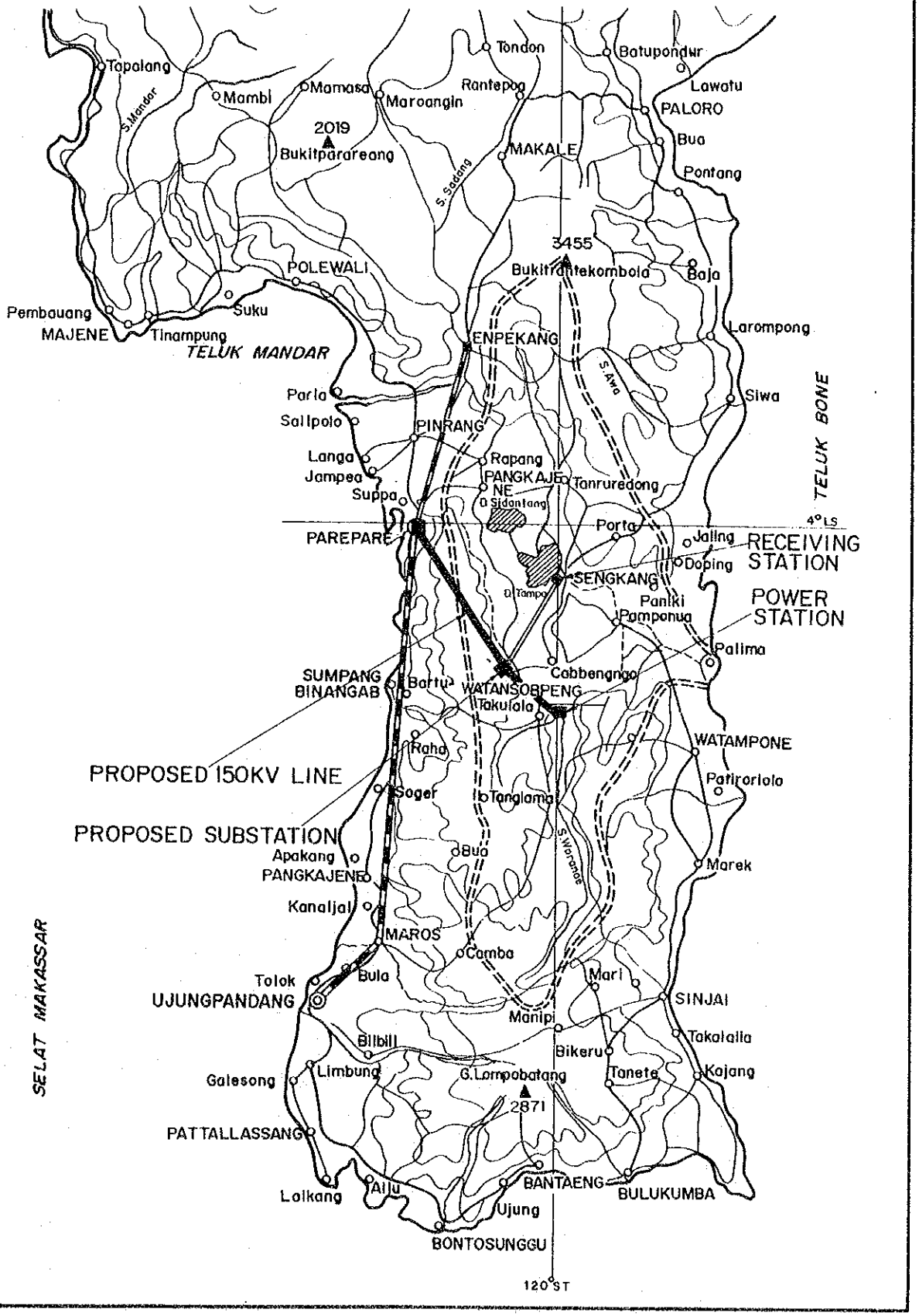
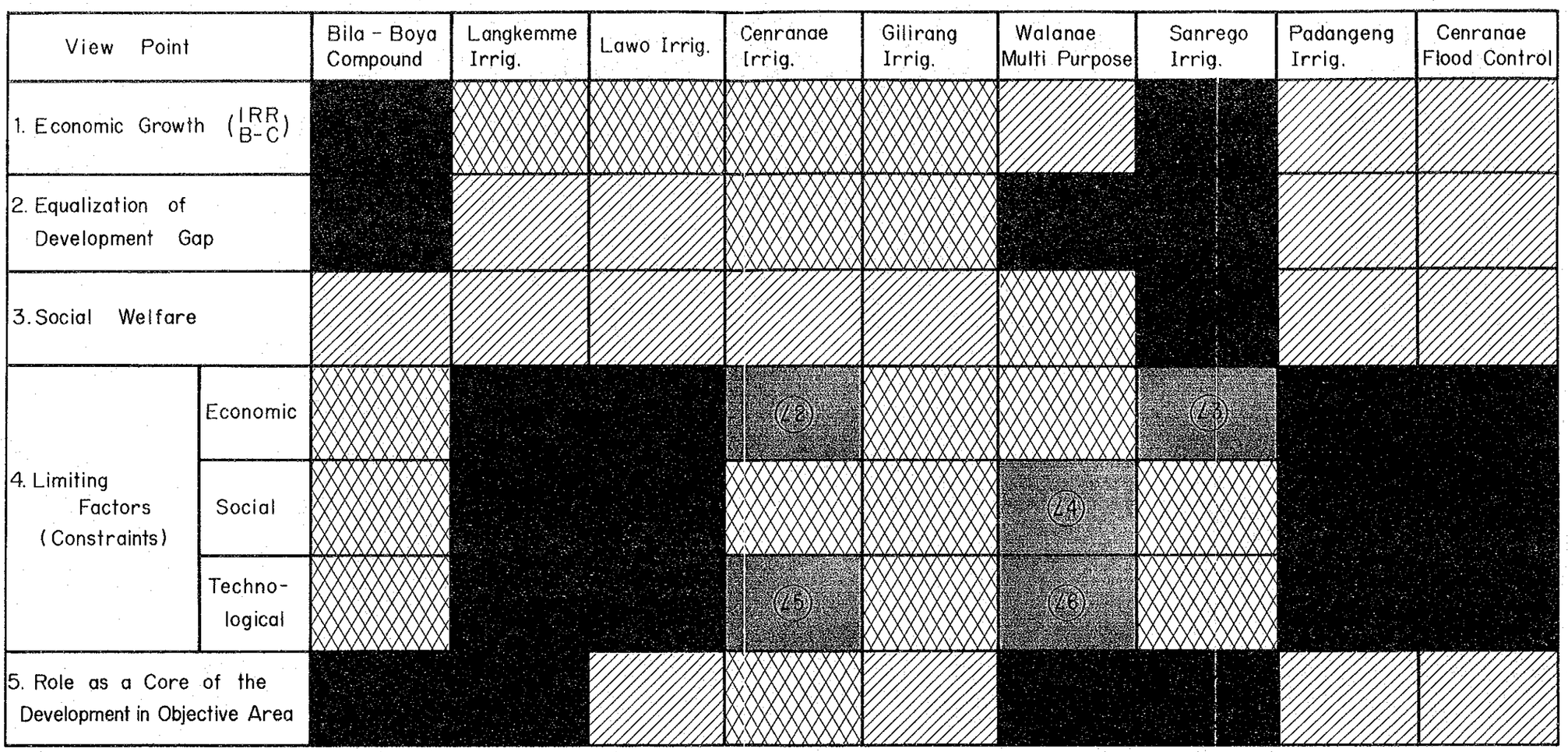


図 5. 1　開発順位決定のための評価図



1) Basic theory of project priority
   View Point 1 : High IRR = High priority
   View Point 2 : More depressed = High priority
   View Point 3 : Worse conditioned = High priority
   View Point 4 : Less constraints = High priority
   View Point 5 : Area in the optimum location for the technological transfer (in the advanced region or in the depressed region) = High priority

2) ∠1 : Isolated
   ∠2 : Power
   ∠3 : Road
   ∠4 : Resettlement
   ∠5 : Pump
   ∠6 : Dam

LEGEND

- First project priority in each view point
- Second pro. priority
- Third pro. priority
- Fourth pro. priority

Ranking by the color indicates project priority among proposed development projects to each view point.