

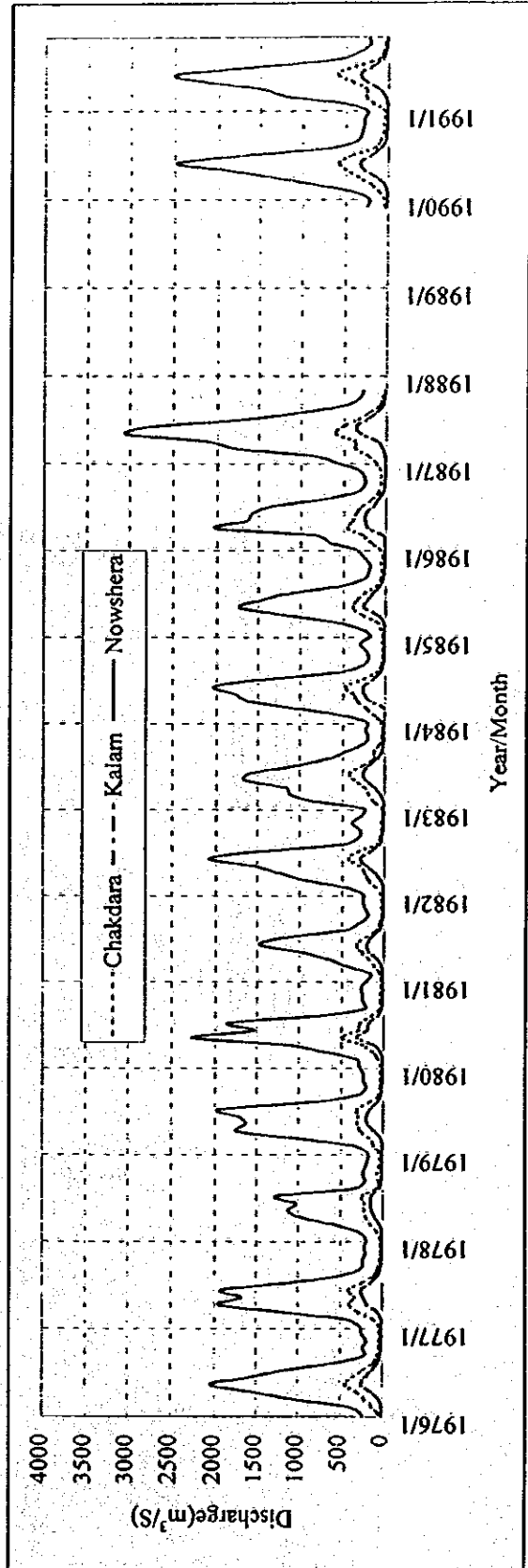
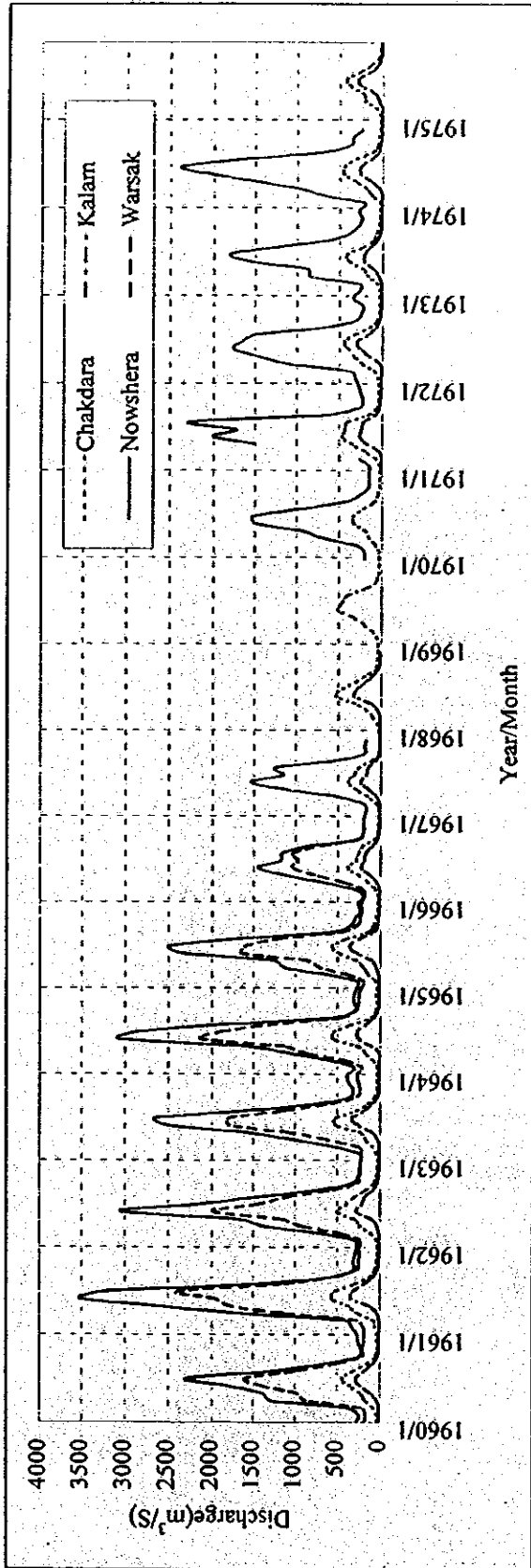
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図 3.3.1

スワット川流域の既存水文気象観測所

	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	Data sources	
1. Temperature, Pressure, Humidity, Wind																																								
1. Peshawar (Monthly Av)																																								IRR(F)
2. Saidu Sharif																																								PMS
3. Kalam																																								SWHP
4. Mardan																																								SWHP
2. Rainfall Daily																																								
1. Kalam																																							SWHP	
2. Charbagh																																							IRR(F)	
3. Kulangi																																							IRR(F)	
4. Abazai																																							IRR(F)	
5. Peshawar																																							IRR(F)	
6. Utmanzai																																							IRR(F)	
7. Amandirra																																							IRR(F)	
8. Malakand																																							IRR(F)	
9. Saidu Sharif																																							PMS	
10. Mardan																																							SWHP	
11. Karora																																							IRR(F)	
12. Totakan																																							IRR(F)	
Hourly																																								
1. Kalam																																								SWHP
2. Mardan																																								SWHP
3. Saidu Sharif																																								PMS
3. Evaporation Daily																																								
1. Kalam																																								SWHP
2. Mardan																																								SWHP

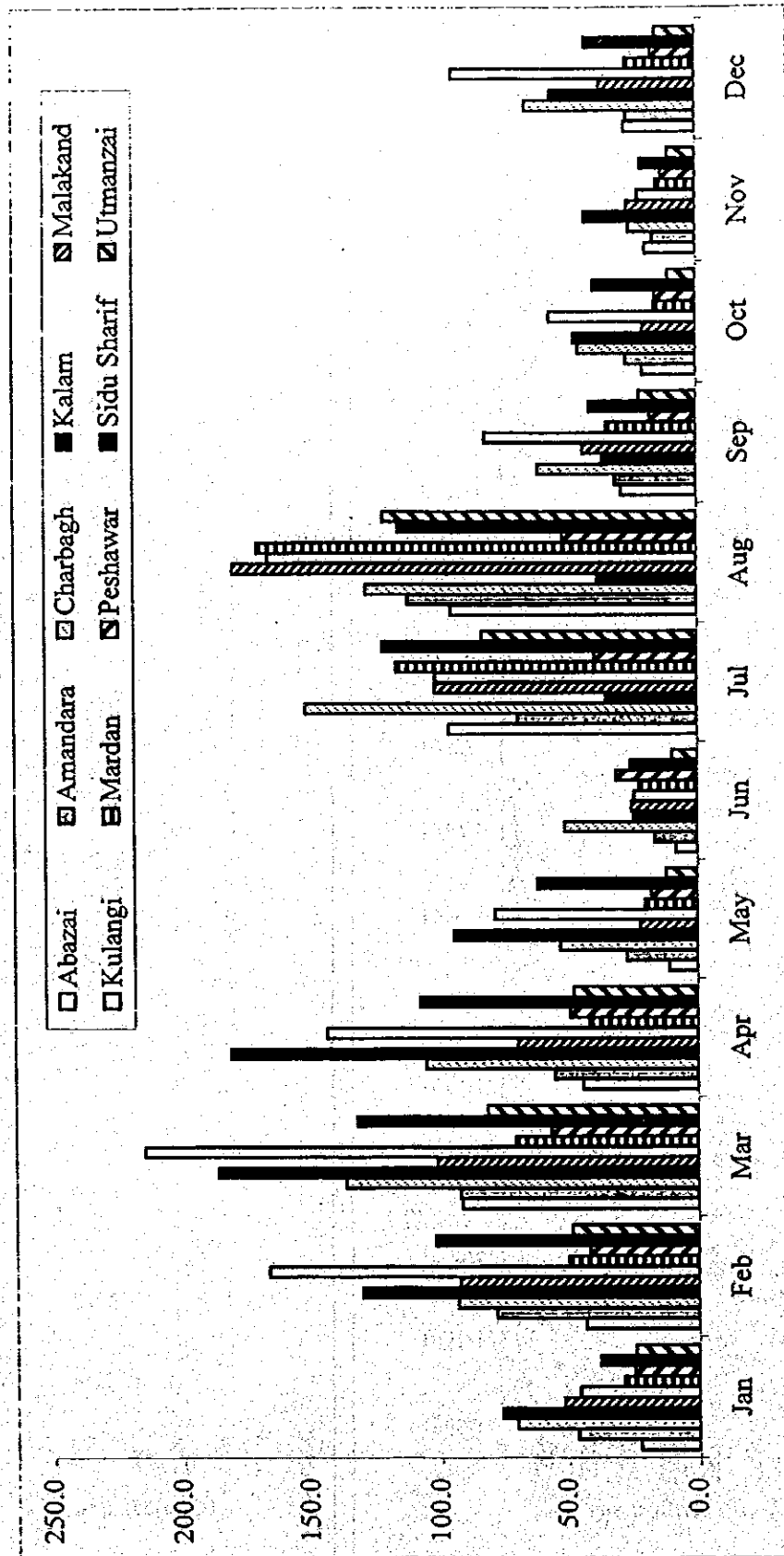
Data available from Pre F/S on Average Monthly Basis (ref. 4)
 Data collected during Field Investigation Stages
 Data Sources:
 IRR(F) Irrigation Department NWFP
 SWHP Surface Water Hydrology Project WAPDA
 PMS Pakistan Meteorological Services



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図 3.3.4

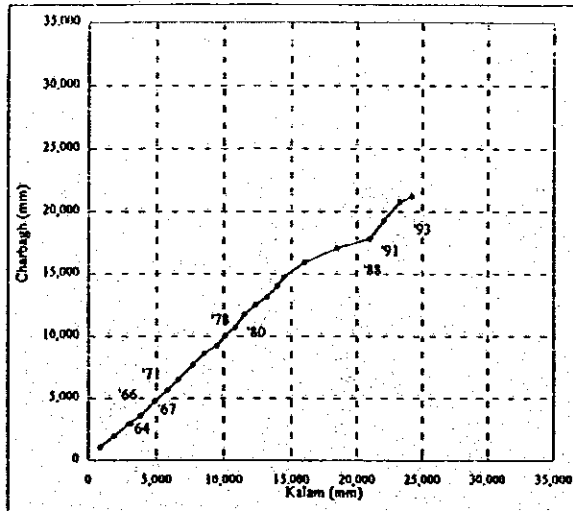
各観測所間の月間平均流量



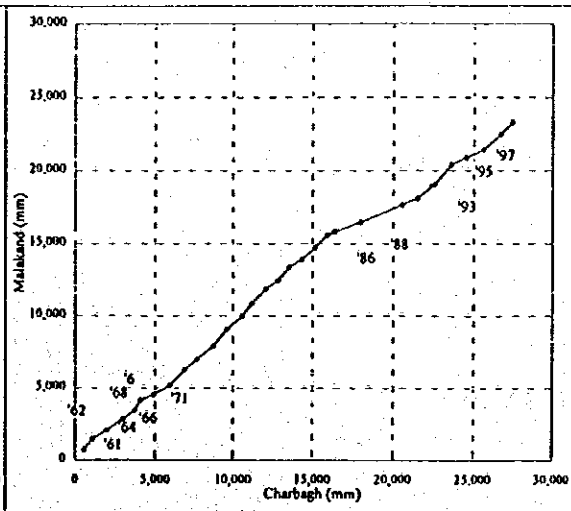
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図 3.3.5

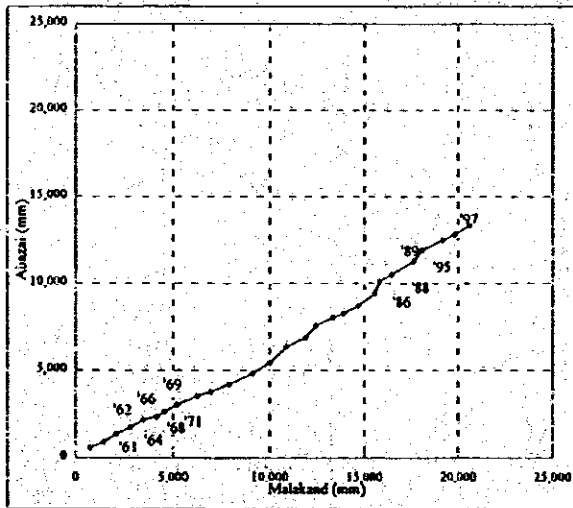
各観測所の月間平均雨量 (1961-1997)



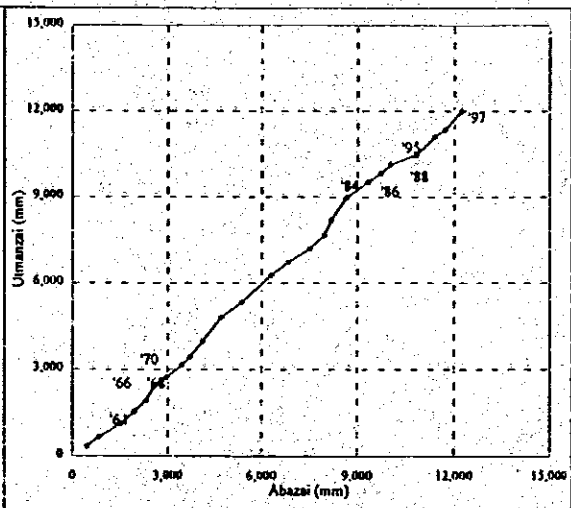
(a) Kalam and Charbagh



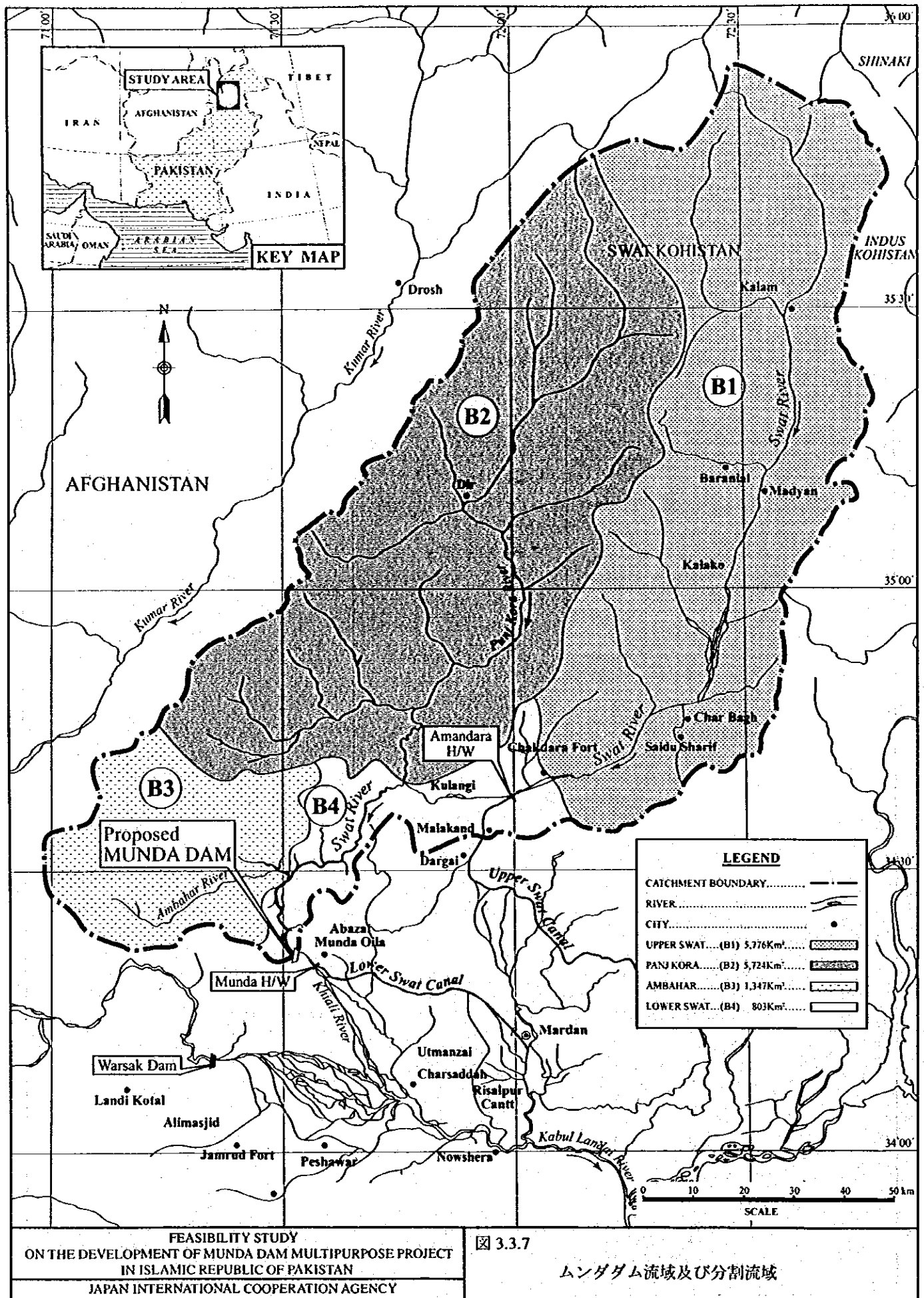
(b) Charbagh and Malakand

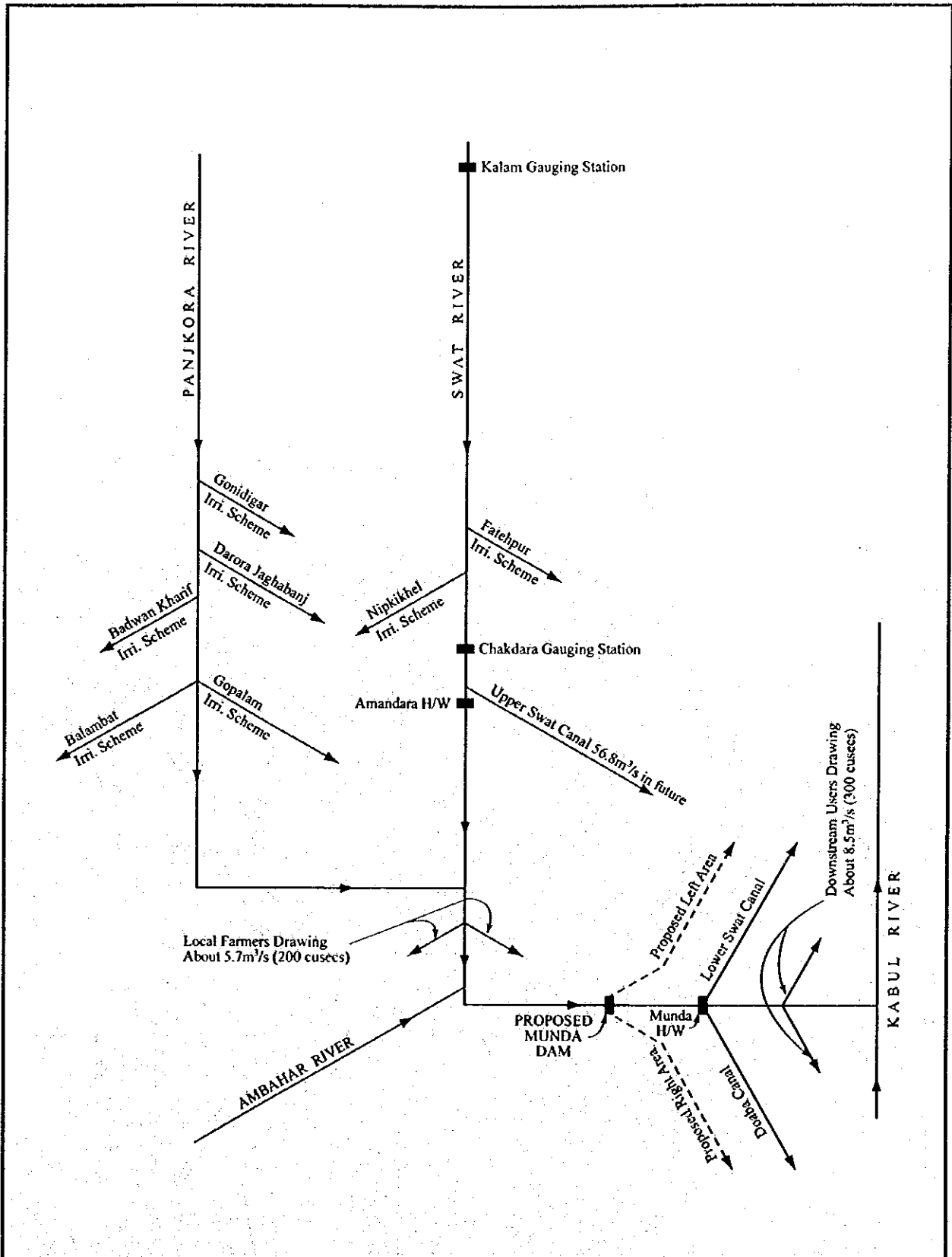


(c) Malakand and Abazai

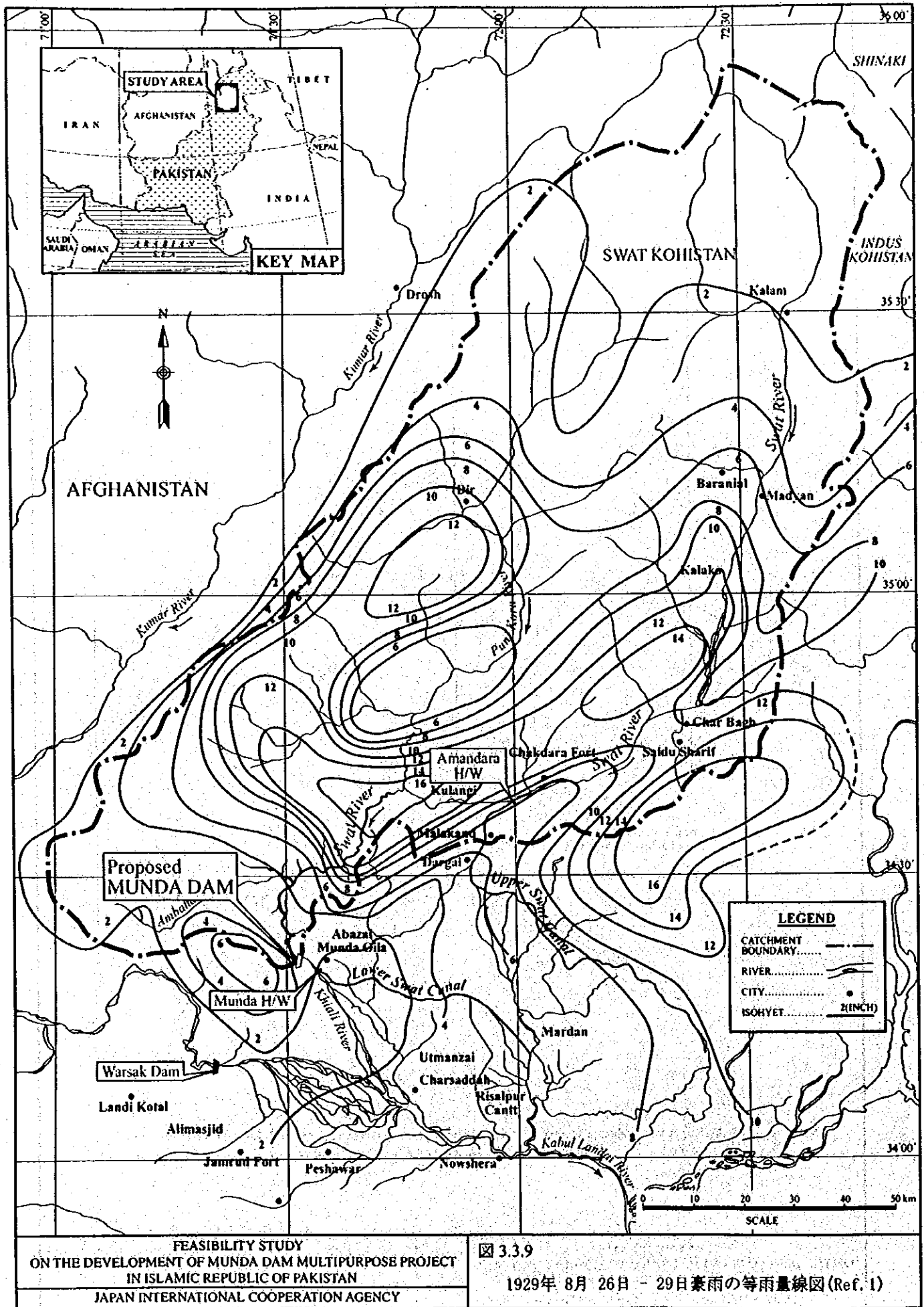


(d) Abazai and Utmanzai





Notes : 1) Intake discharges for the about irrigation schemes and canals are presented in Tables C4.1, C4.4 and C4.6 in Appendix C.
 2) Future intake discharge for both of LSC and Doaba canal is 37.4m³/s on annual average.



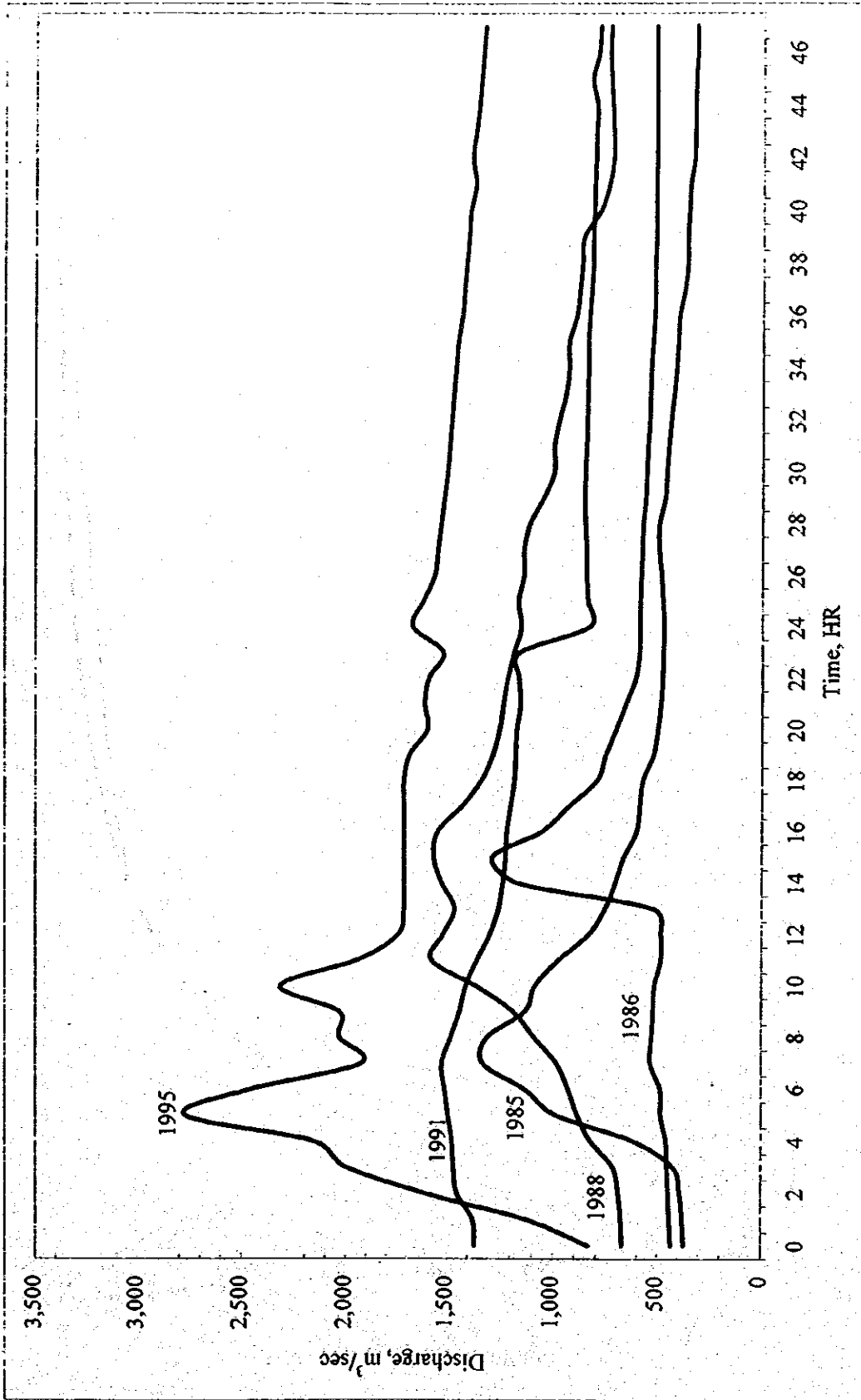
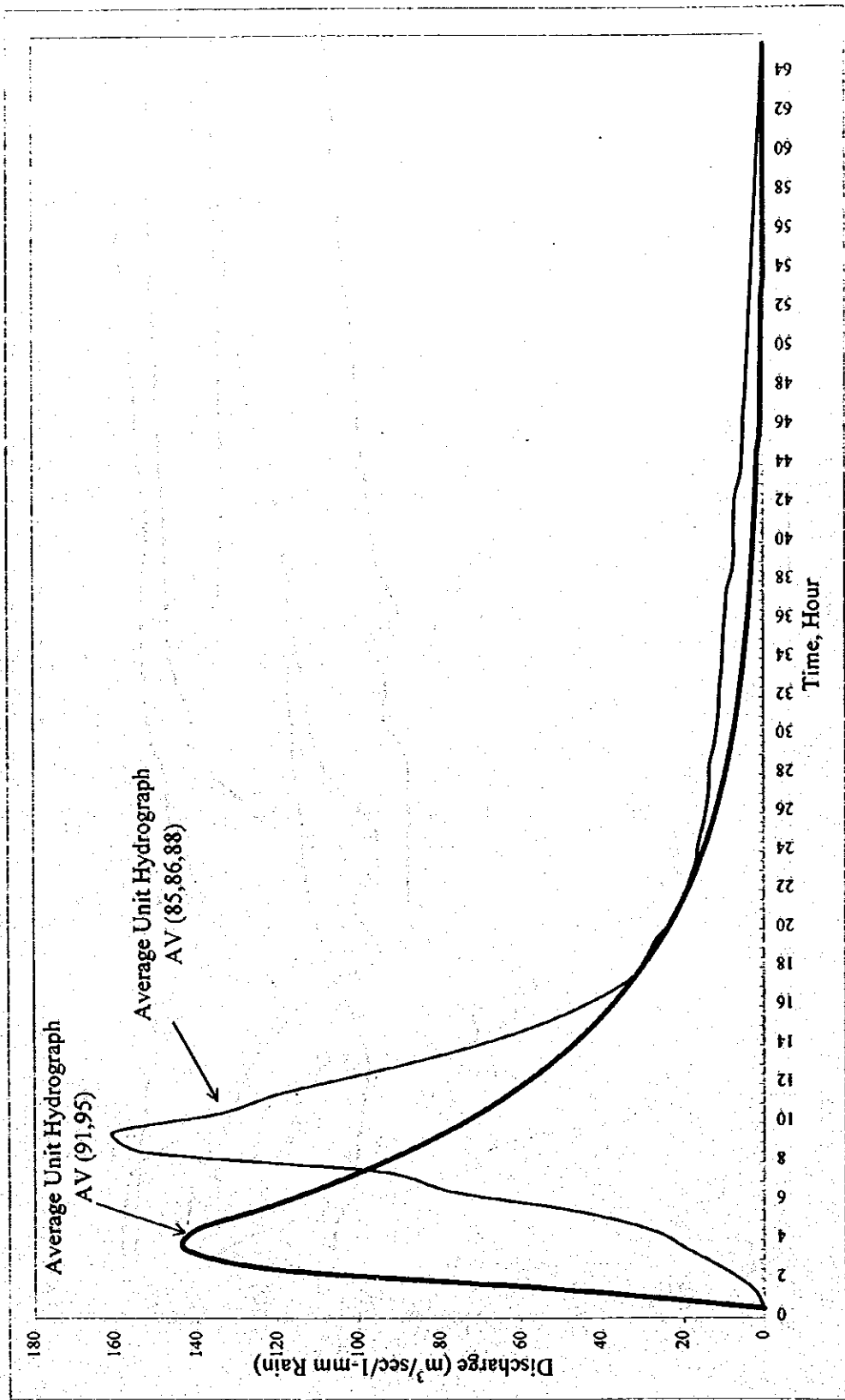


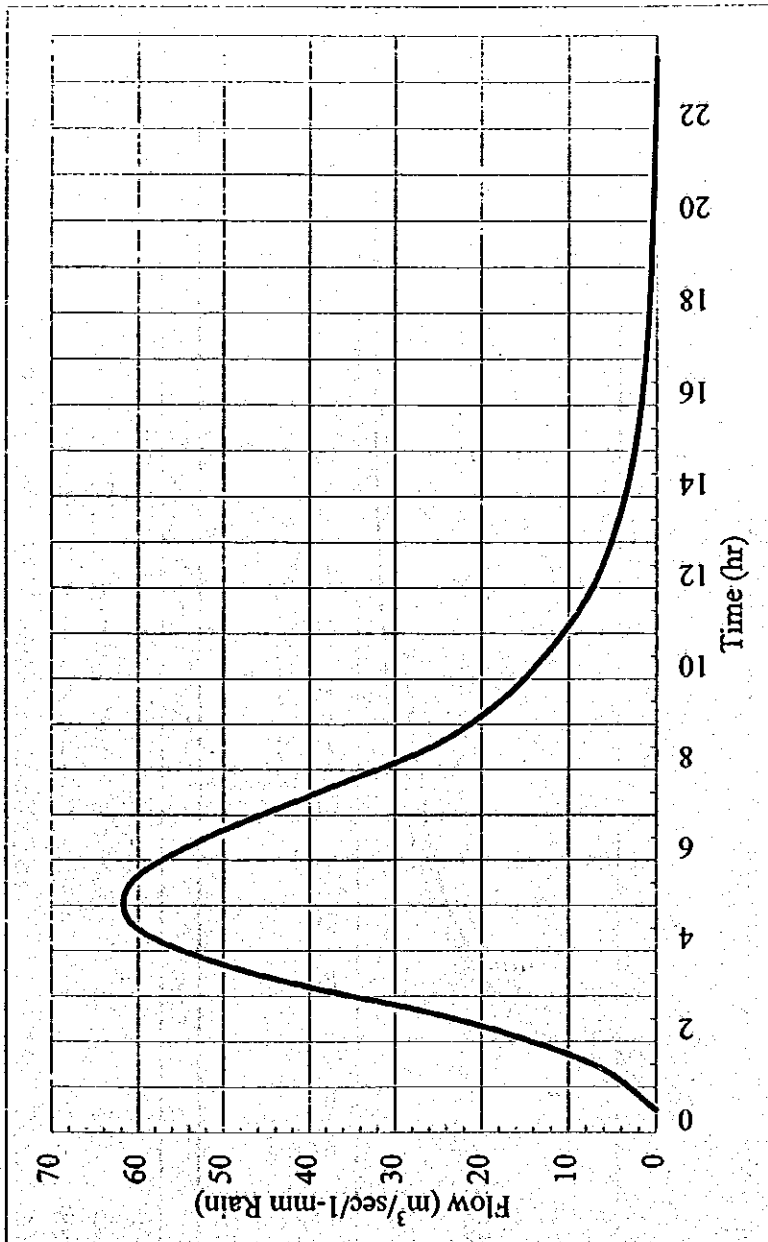
図 3.3.10
 チャクダラでの48時間洪水ハイドログラフ



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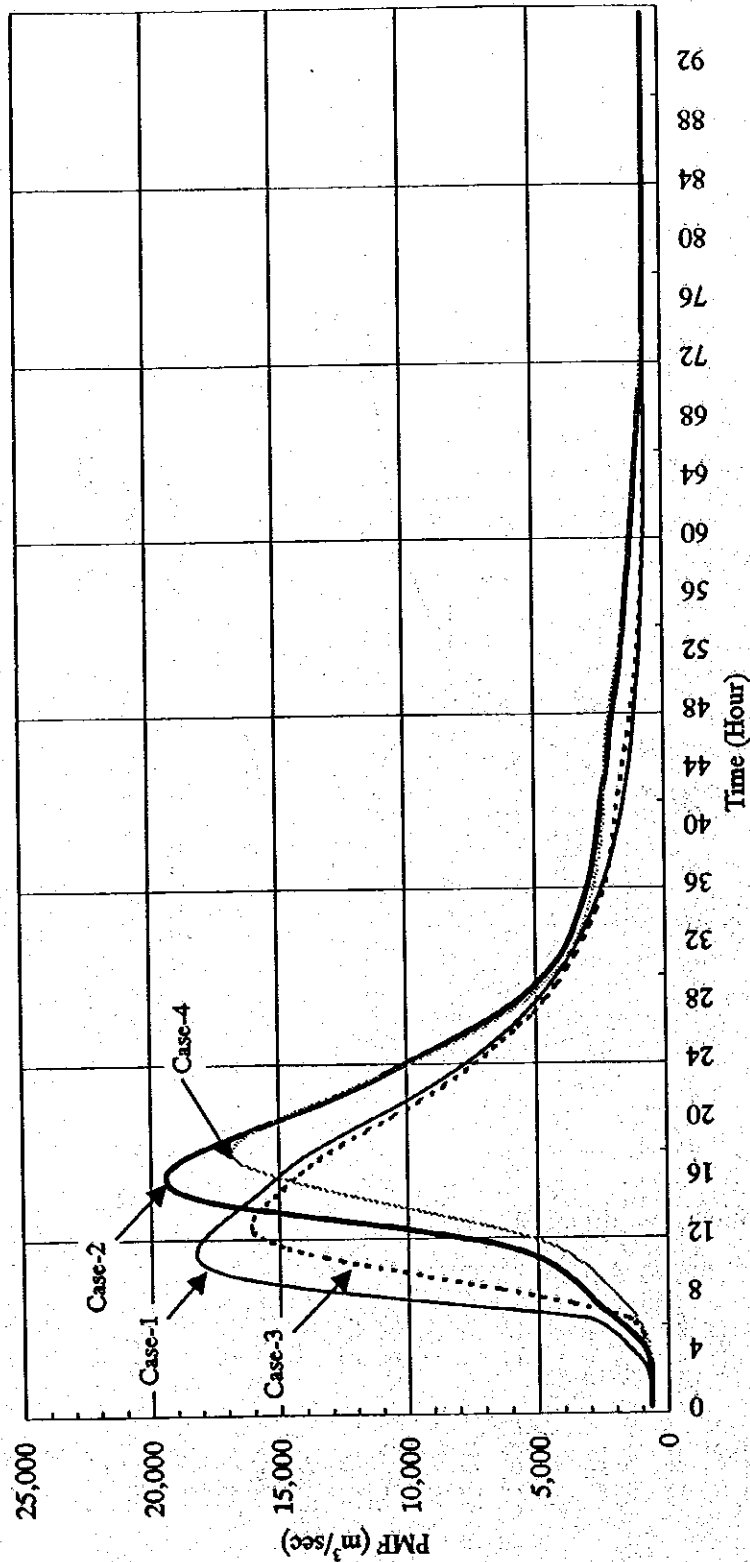
図 3.3.11

採用されたユニットハイドログラフ



Time to Concentration 4.05 hour
 Time to Peak 4.55 hour
 Peak flow 61.67 m³/sec/1-mm Rain

TIME	UHamb
0.00	0
1.00	7.24
2.00	22.95
3.00	46.42
4.00	60.11
5.00	60.88
6.00	51.96
7.00	38.98
8.00	25.78
9.00	17.89
10.00	12.78
11.00	8.82
12.00	6.24
13.00	4.35
14.00	3.03
15.00	2.13
16.00	1.50
17.00	1.04
18.00	0.73
19.00	0.55
20.00	0.38
21.00	0.24
22.00	0.10
23.00	0.00

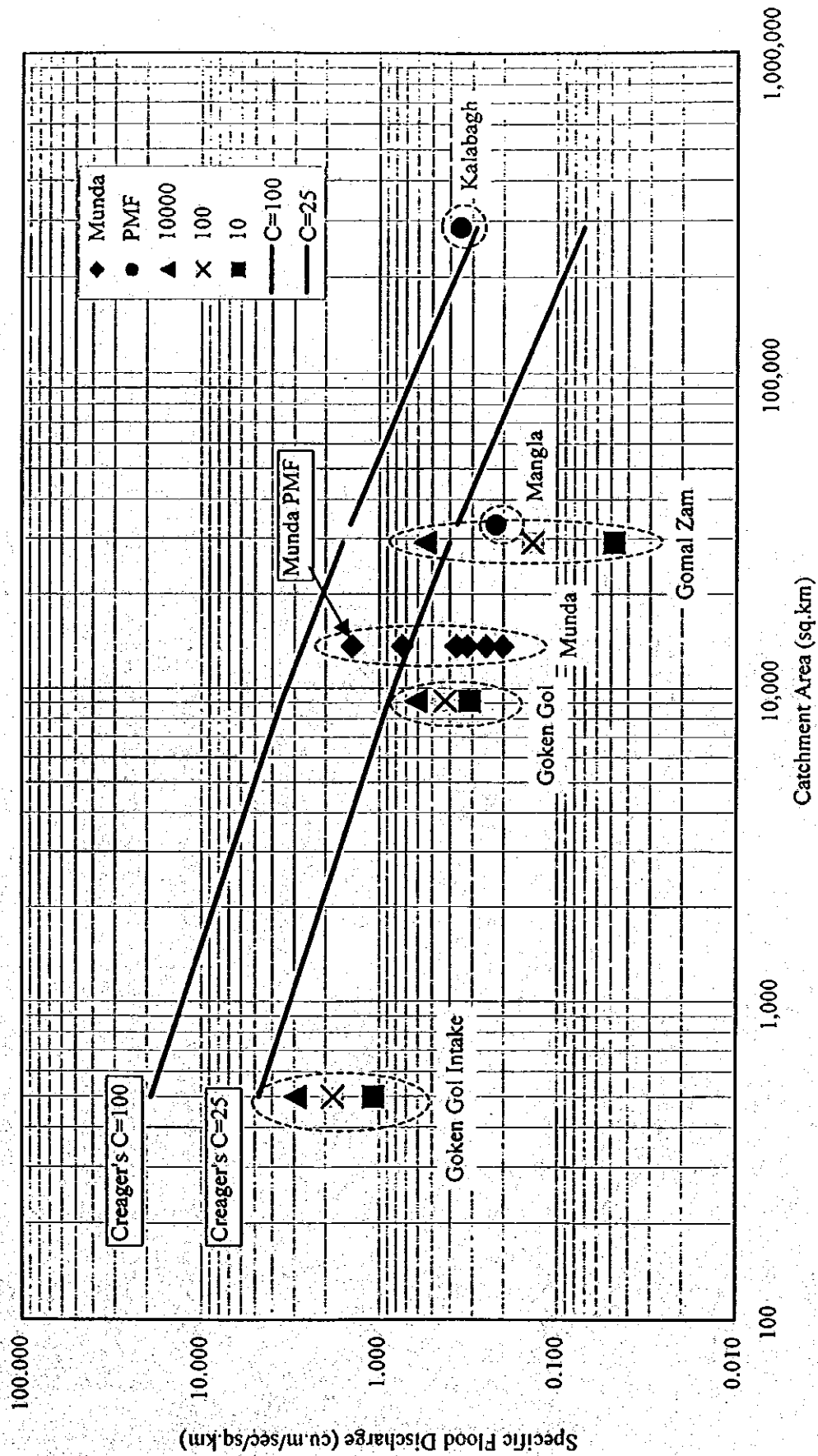


Qp	Tp	Case	Unit Hydrograph Condition	PMP
18,169	11	1	Average Unit Hydrograph 1991 and 1995	24-PMP
19,393	16	2	Average Unit Hydrograph 1985, 1986 and 1988	24-PMP
15,988	13	3	Average Unit Hydrograph 1991 and 1995	72-PMP
16,706	18	4	Average Unit Hydrograph 1985, 1986 and 1988	72-PMP

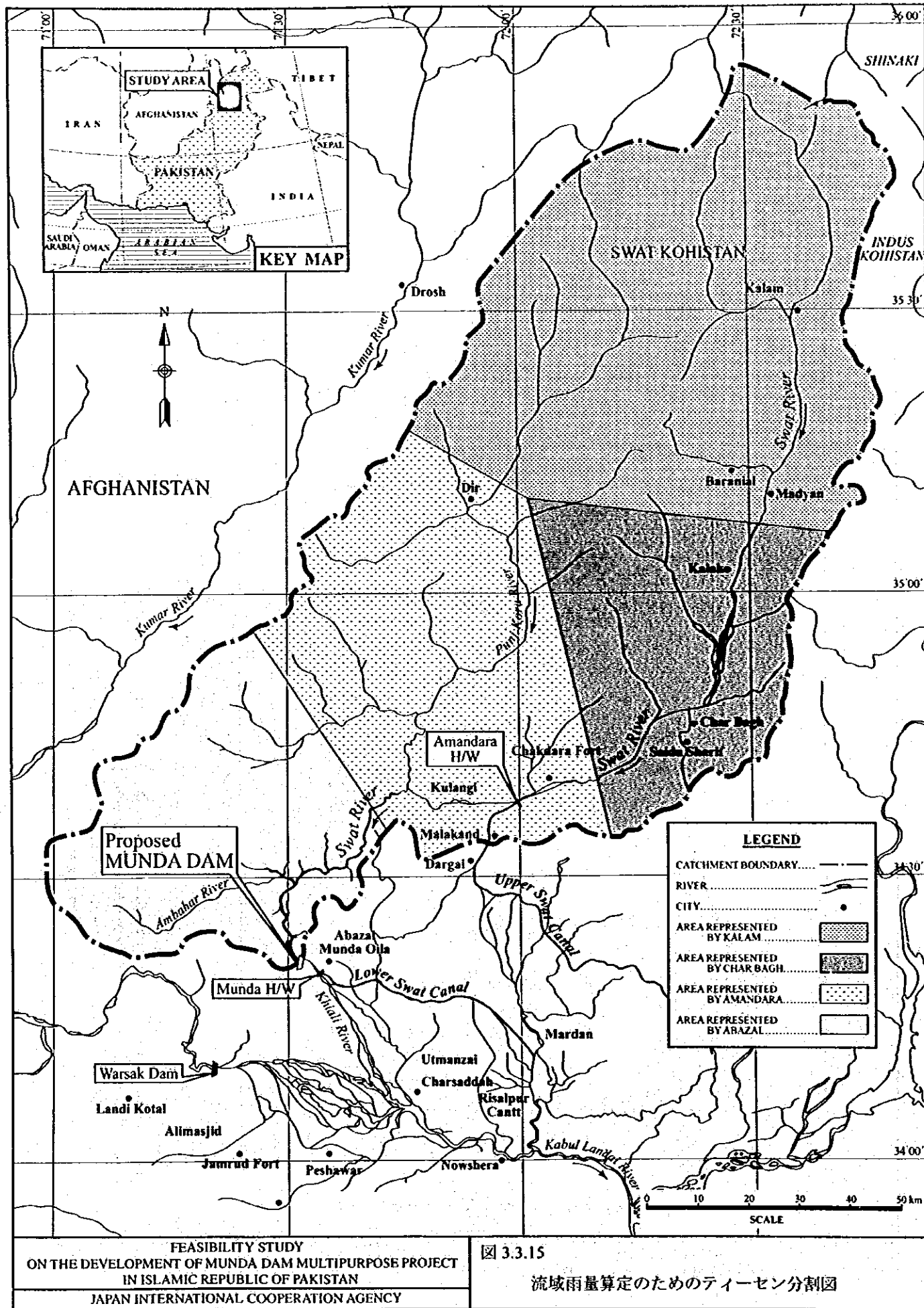
Qp Peak Flow, m³/sec
 Tp Time to Peak, hours

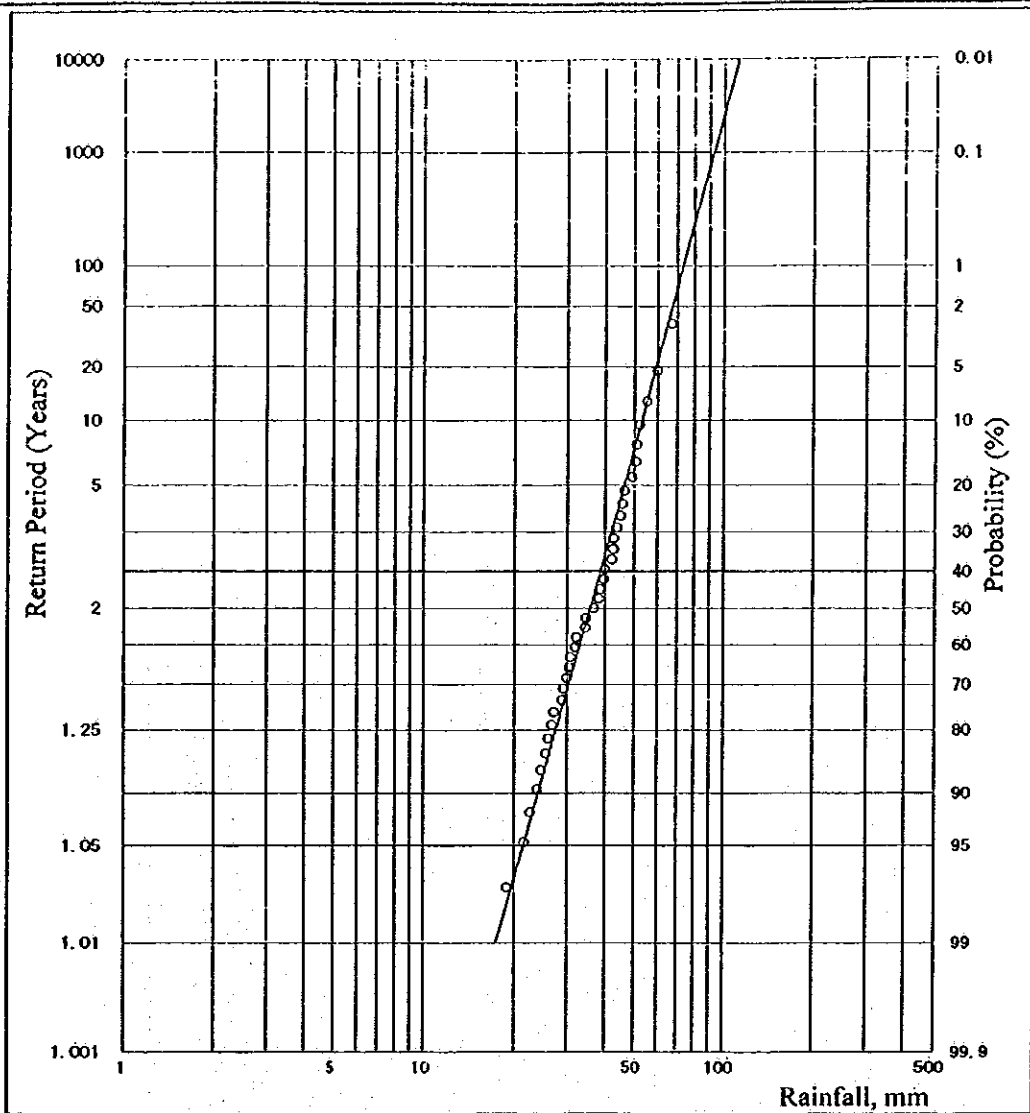
図 3.3.13

ムンダダムサイトでの可能最大洪水



Sources: Project planning report for Kalabagh Dam, Volume IV, Technical memorandum 23, 1984
 Completion report for Mangla Dam Project, Volume III, 1971
 PC-1 Proforma, Gomal Zam Dam Project, 1996
 Main report of feasibility study (Updated) for Golen Gol project, Volume 2 of 5, 1997





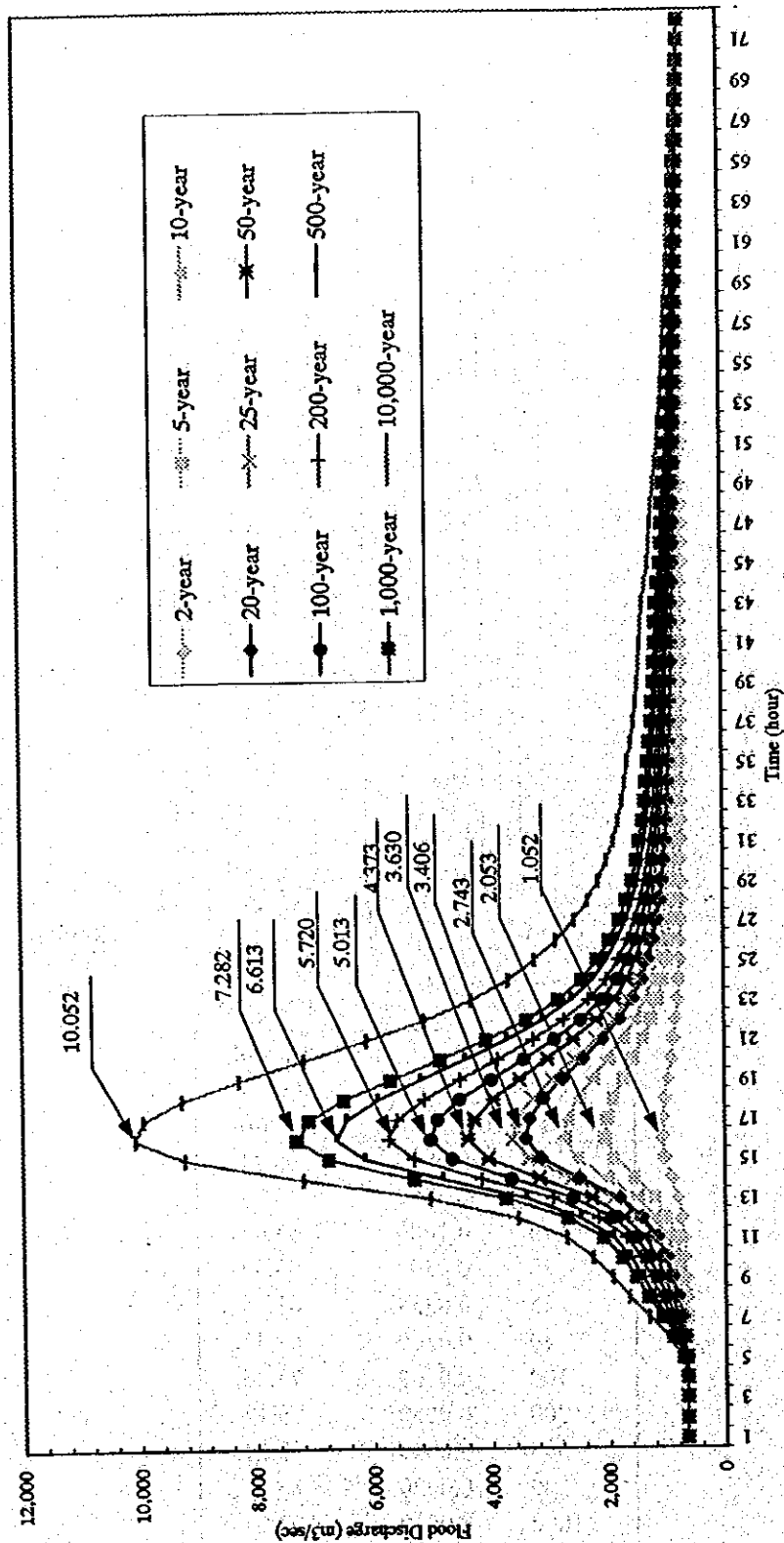
Return Period (Year)	Probability	Probable Rainfall (mm)
2	0.5000	35.74
5	0.2000	46.34
10	0.1000	53.07
20	0.0500	59.37
25	0.0333	61.15
50	0.0200	67.35
100	0.0100	73.26
200	0.0050	79.12
300	0.0033	82.54
500	0.0020	86.85
1000	0.0010	92.73
2000	0.0005	98.64
5000	0.0002	106.53
10000	0.0001	112.58

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図 3.3.16

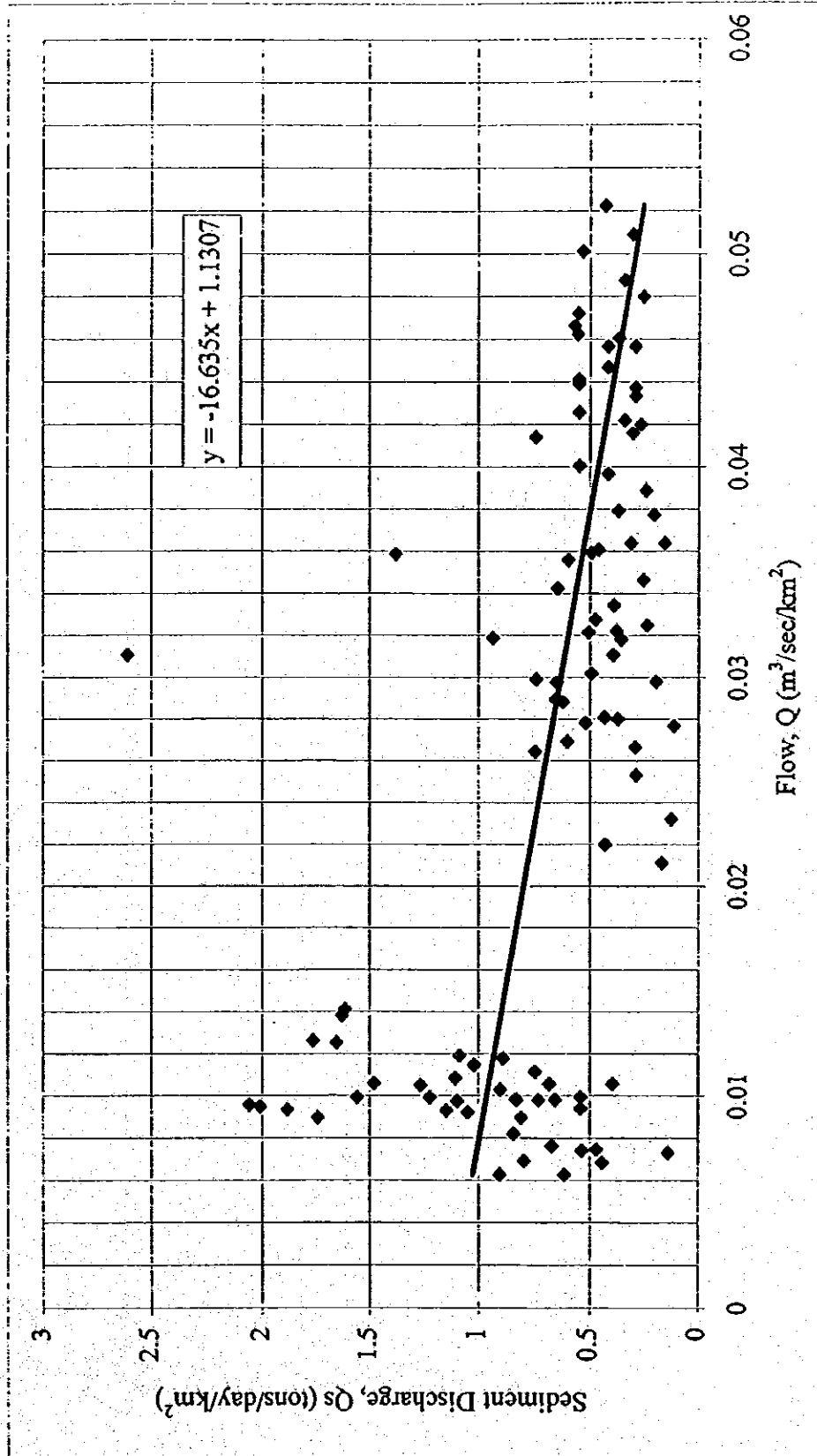
24時間年最大流域雨量の超過確率曲線
(Pearson Type III)

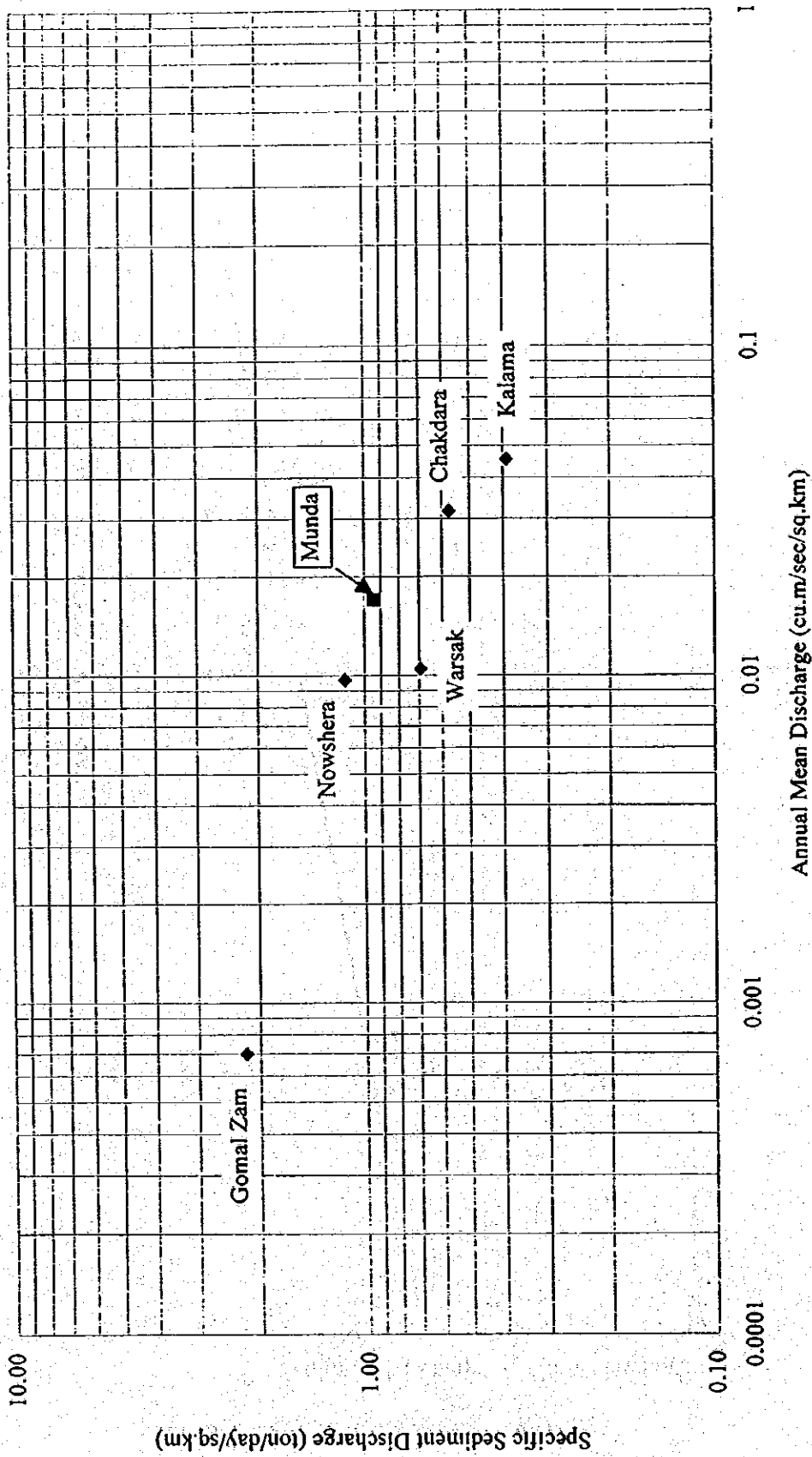


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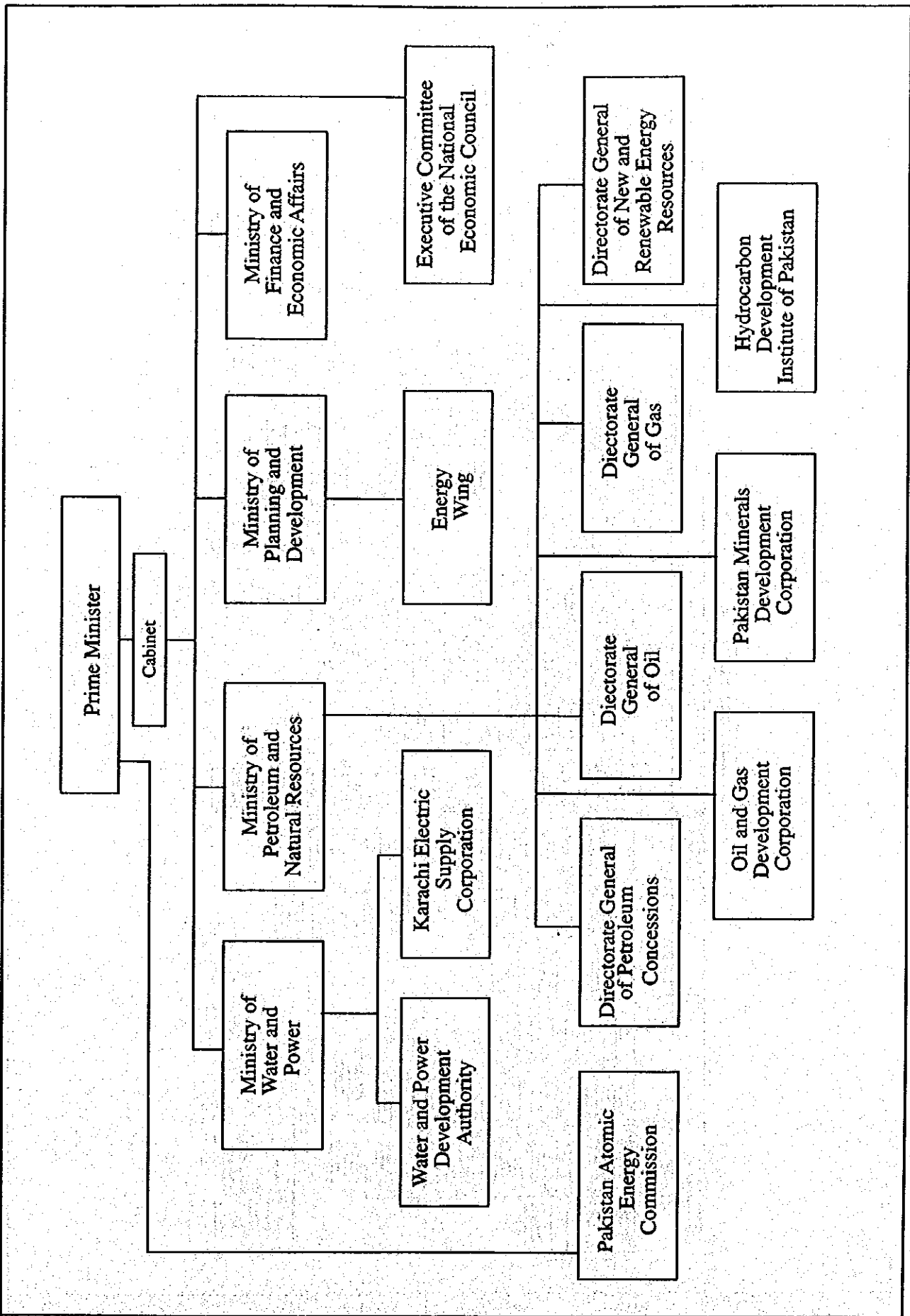
図 3.3.17

ムンダダム地点での洪水ハイドログラフ





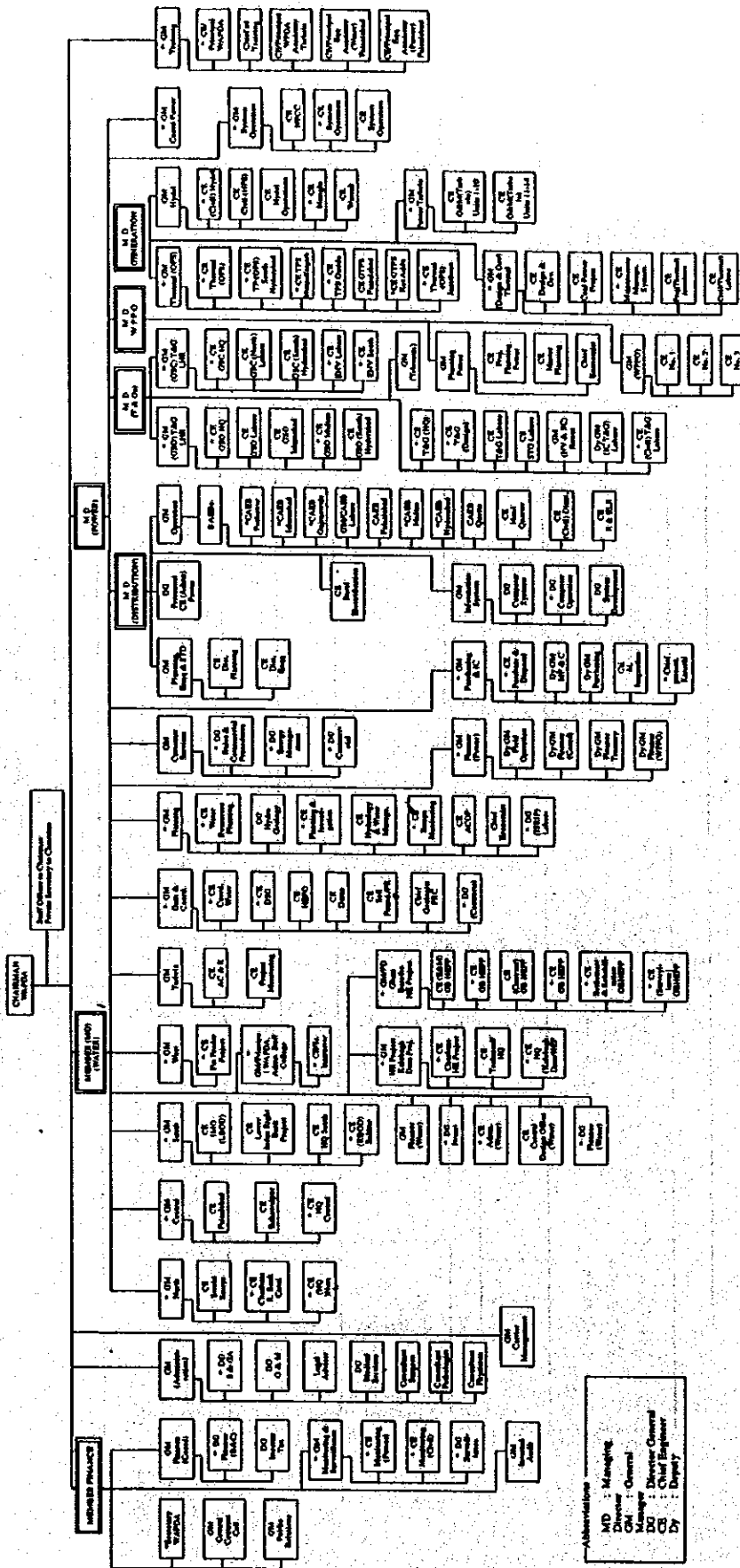
Sources: Suspended sediment data of at Kalam and Chakdara
 Annual sediment loading records for Kalam, Chakdara and Nowshera stations (1961-1990)
 Annual sediment loading records for Warsak station (1961-1970)
 PC-I Proforma, Gomal Zam Dam Project, 1996



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図 4.1.1

政府のエネルギー部門組織図

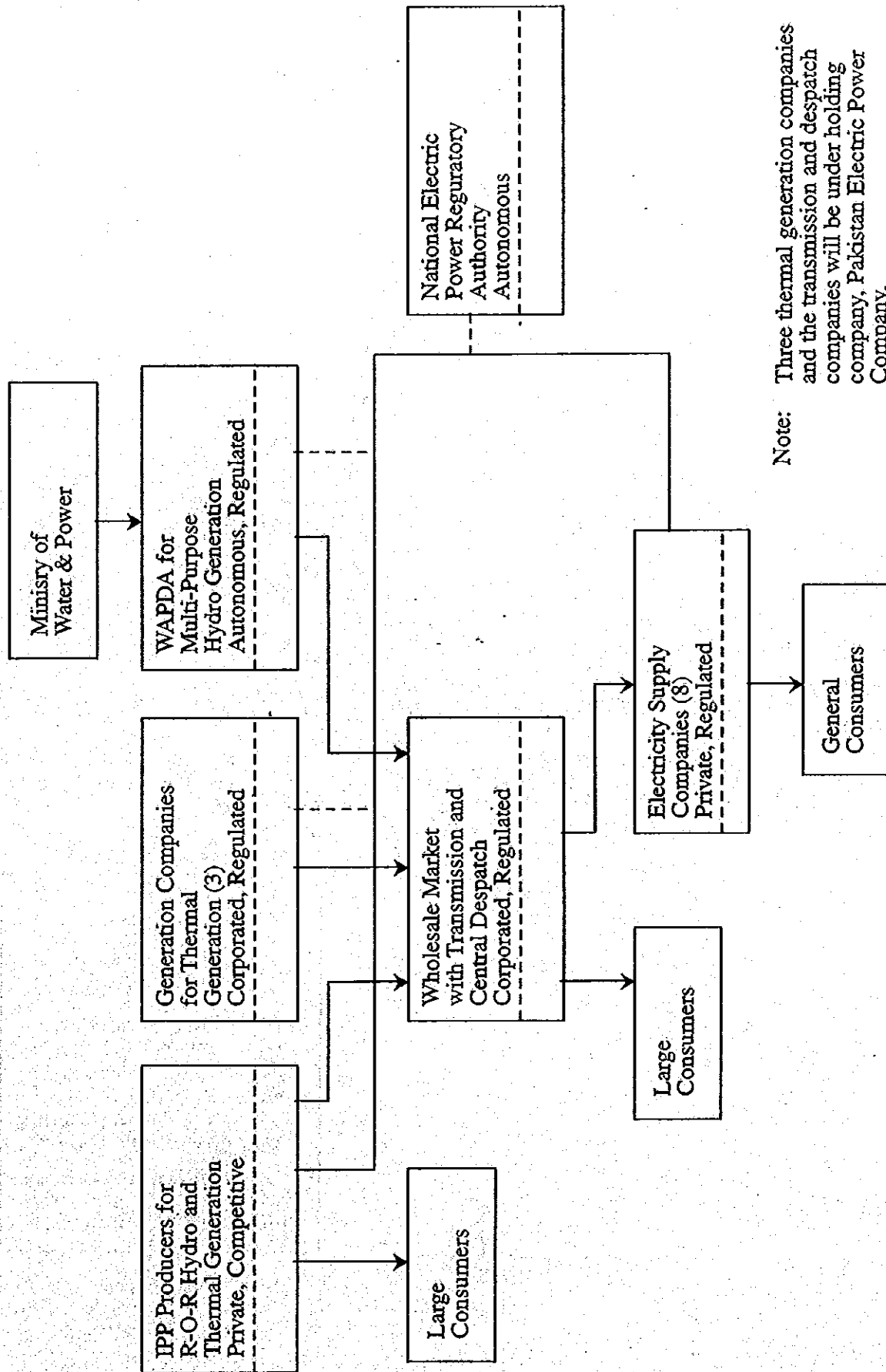


Abbreviations
 MD : Managing Director General
 SA : Senior Assistant Director General
 DA : Deputy Assistant Director General
 DO : Director General
 CS : Chief Engineer
 Z : Deputy

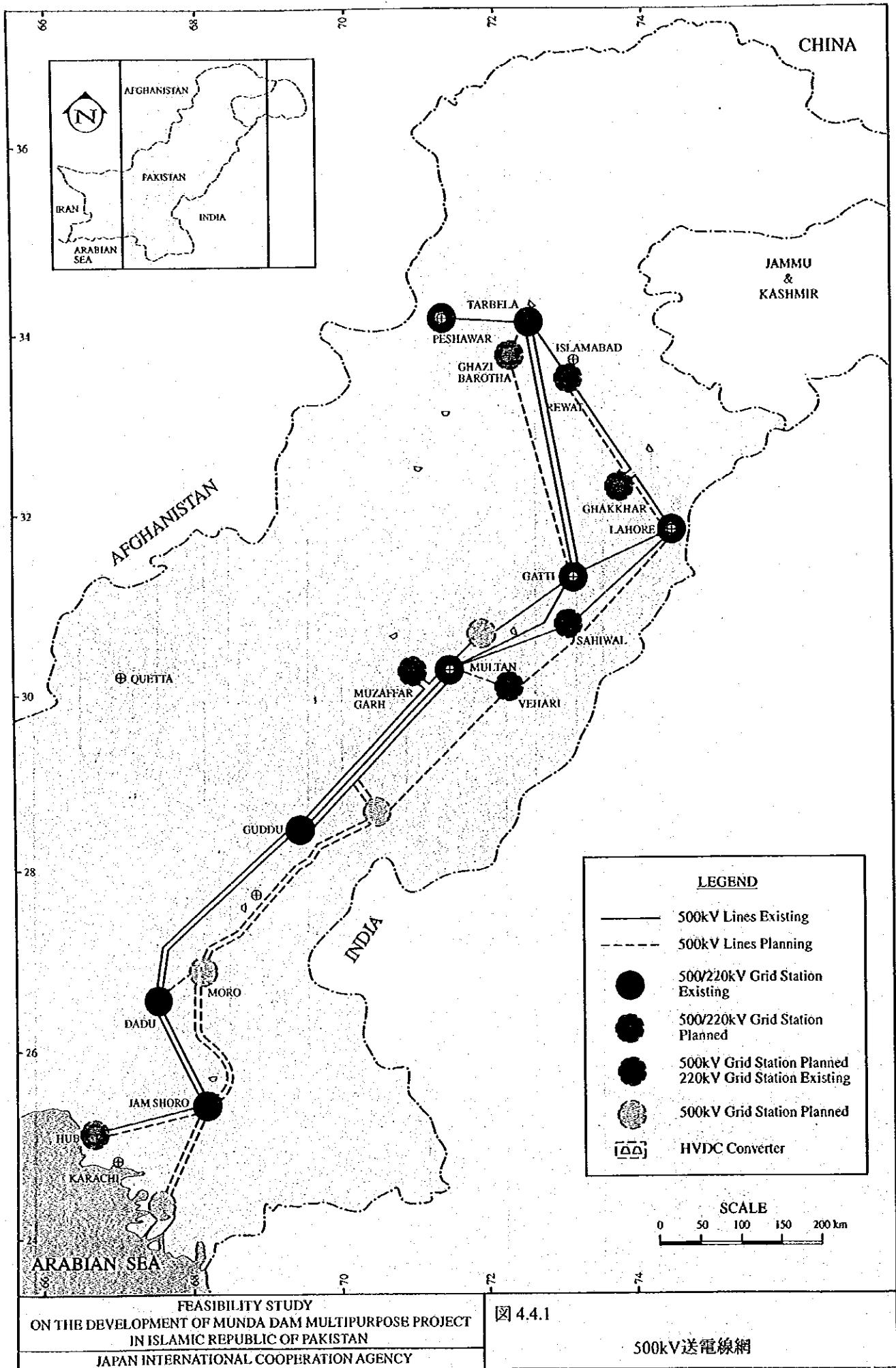
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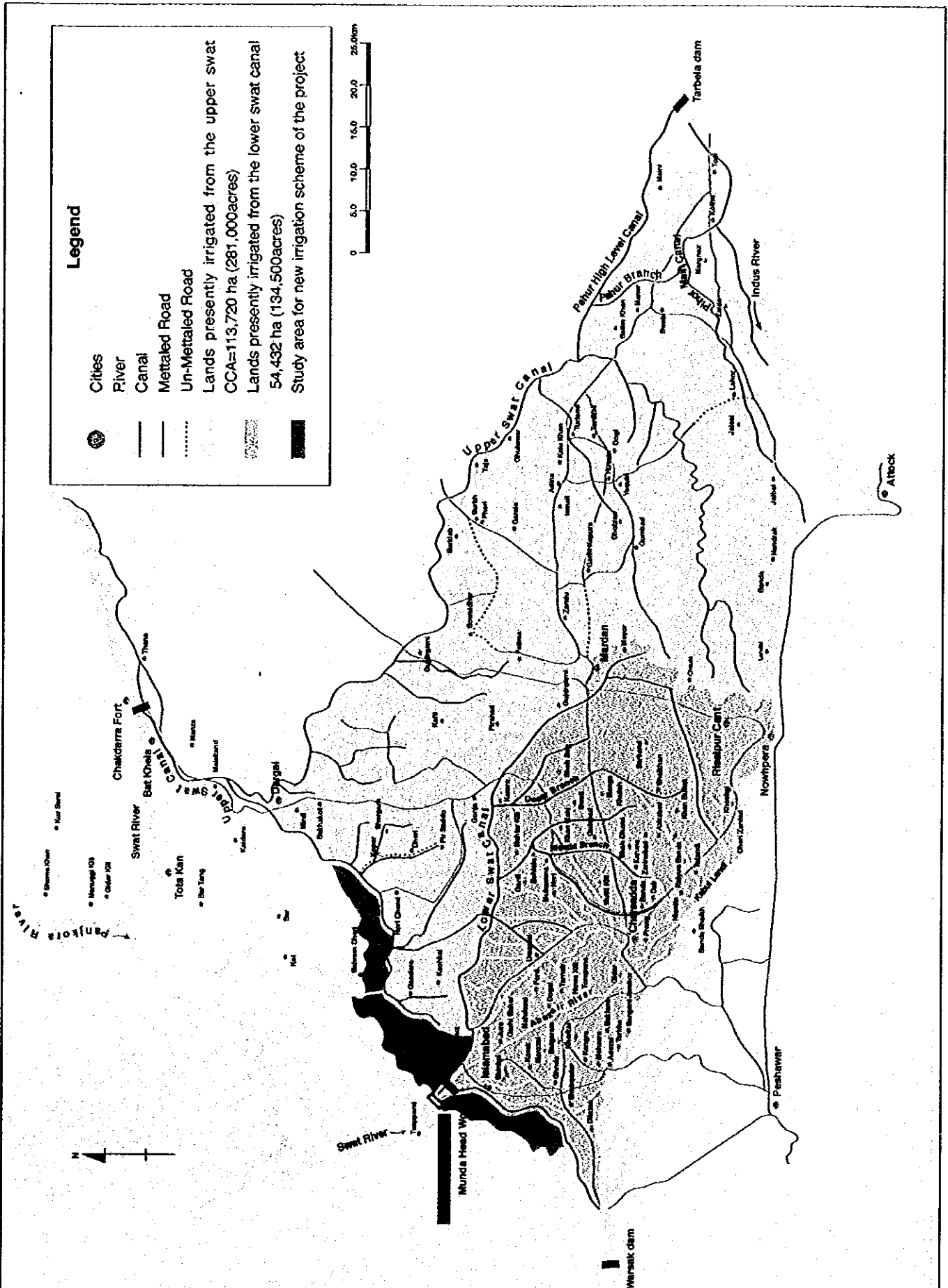
☑ 4.1.2

WAPDA 組織概要(電力部門)



Note: Three thermal generation companies and the transmission and despatch companies will be under holding company, Pakistan Electric Power Company.





Legend

- Cities
- River
- Canal
- Metalled Road
- Un-Metalled Road
- Lands presently irrigated from the upper swat CCA=113,720 ha (281,000acres)
- Lands presently irrigated from the lower swat canal 54,432 ha (134,500acres)
- Study area for new irrigation scheme of the project

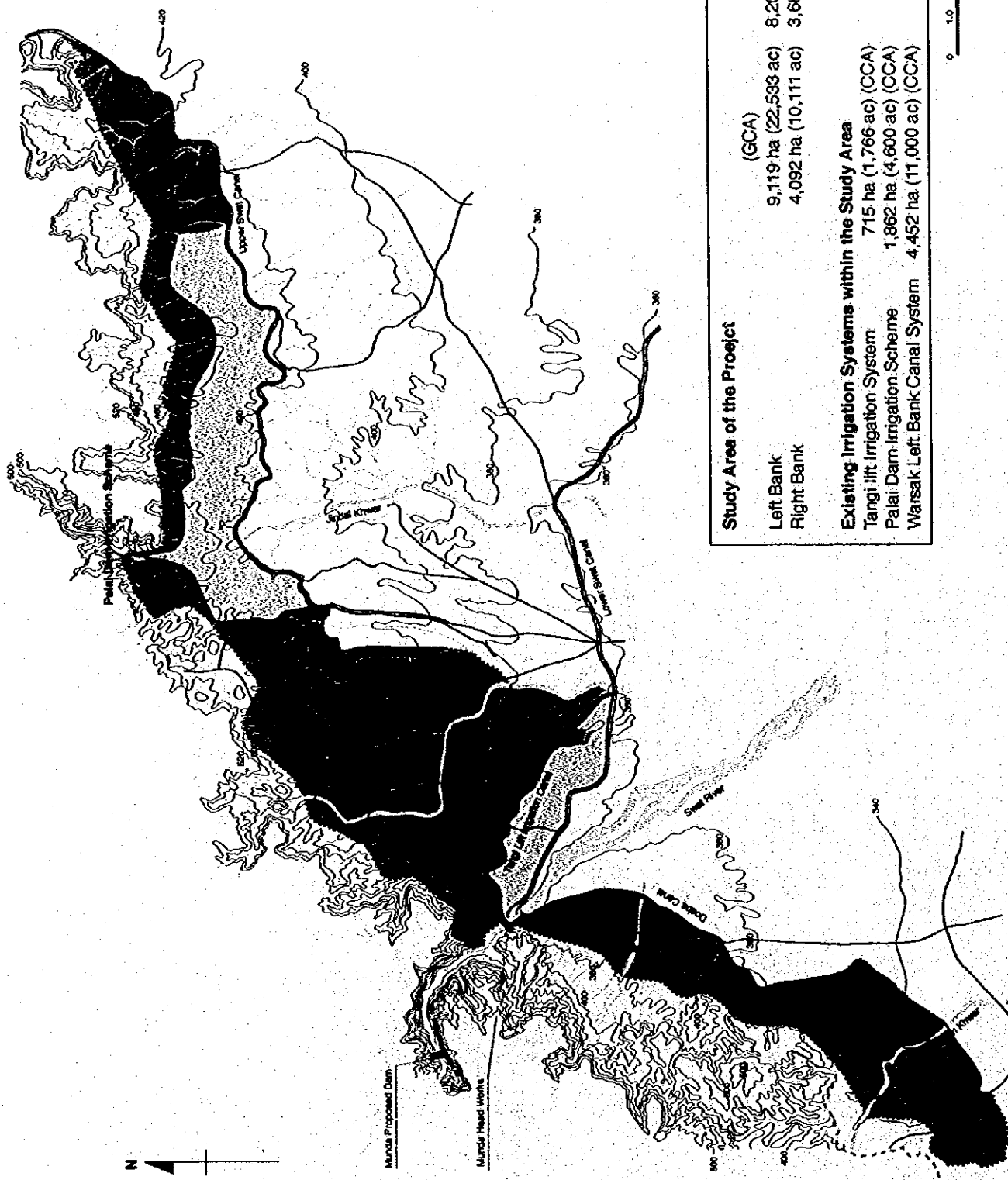
0 5.0 10.0 15.0 20.0 25.0km

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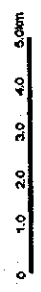
JAPAN INTERNATIONAL COOPERATION AGENCY

图 5.2.1

灌溉計画調査範囲

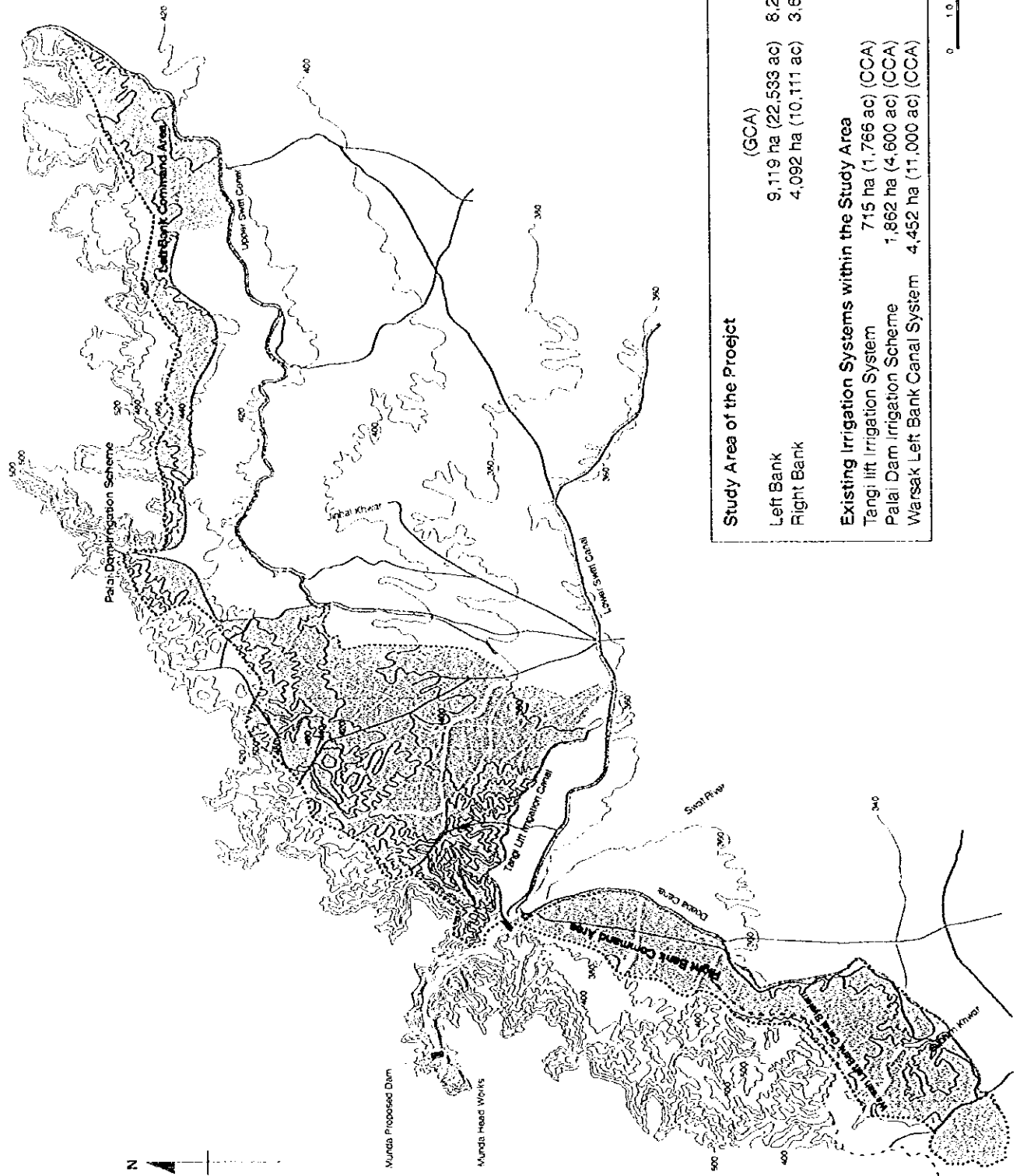


Study Area of the Project		(GCA)	(CCA)
Left Bank		9,119 ha (22,533 ac)	8,207 ha (20,280 ac)
Right Bank		4,092 ha (10,111 ac)	3,683 ha (9,100 ac)
Existing Irrigation Systems within the Study Area			
Tangi lift Irrigation System		715 ha (1,766 ac)	(CCA)
Palai Dam Irrigation Scheme		1,862 ha (4,600 ac)	(CCA)
Warsak Left Bank Canal System		4,452 ha (11,000 ac)	(CCA)



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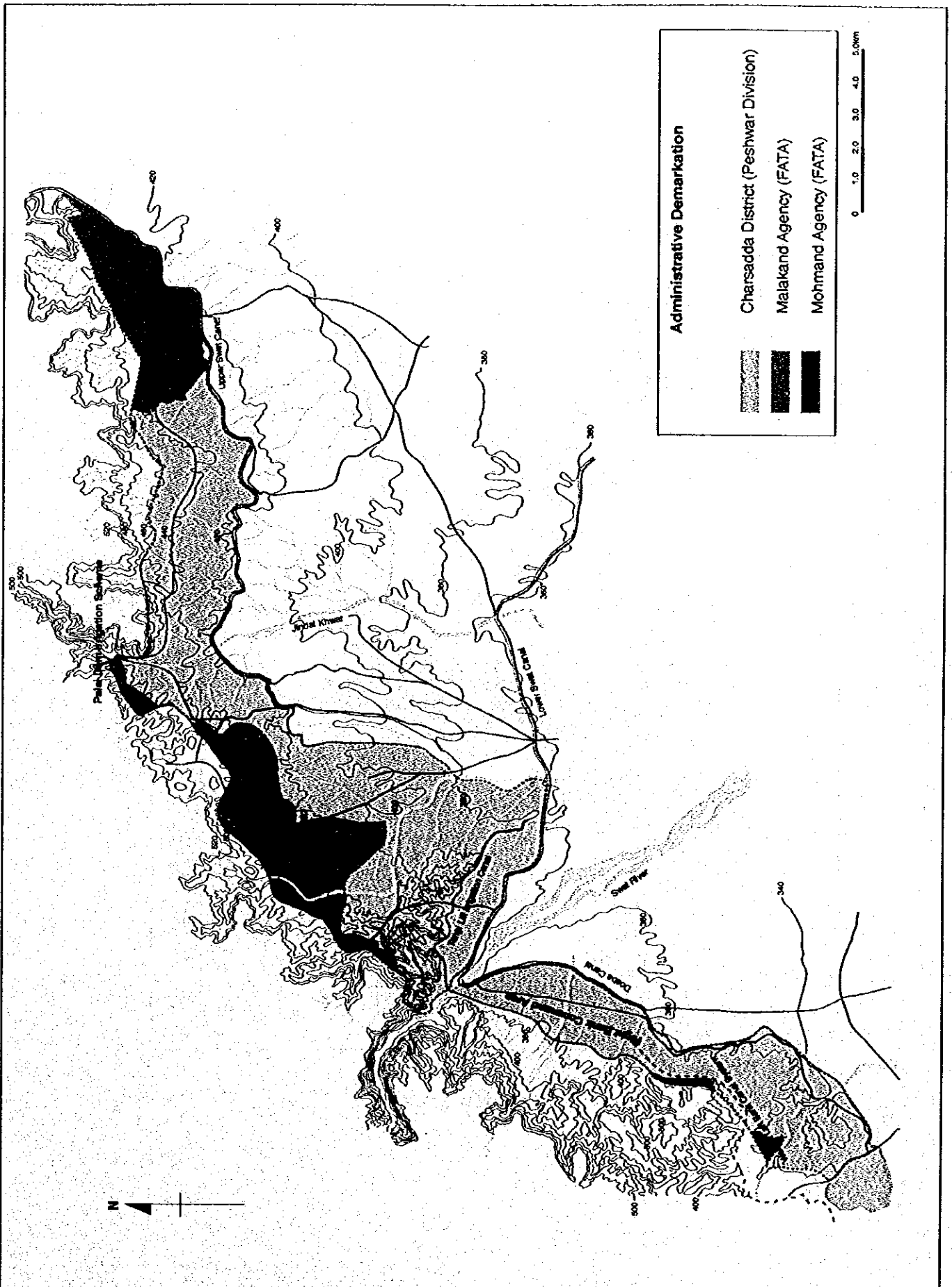
図 5.2.2 灌漑計画調査対象地域



Study Area of the Project		(GCA)	(CCA)
Left Bank		9,119 ha (22,533 ac)	8,207 ha (20,280 ac)
Right Bank		4,092 ha (10,111 ac)	3,683 ha (9,100 ac)
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図 5.2.2
 灌溉計画調査対象地域



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図 5.2.3
 灌溉計画調査対象地域の行政区分

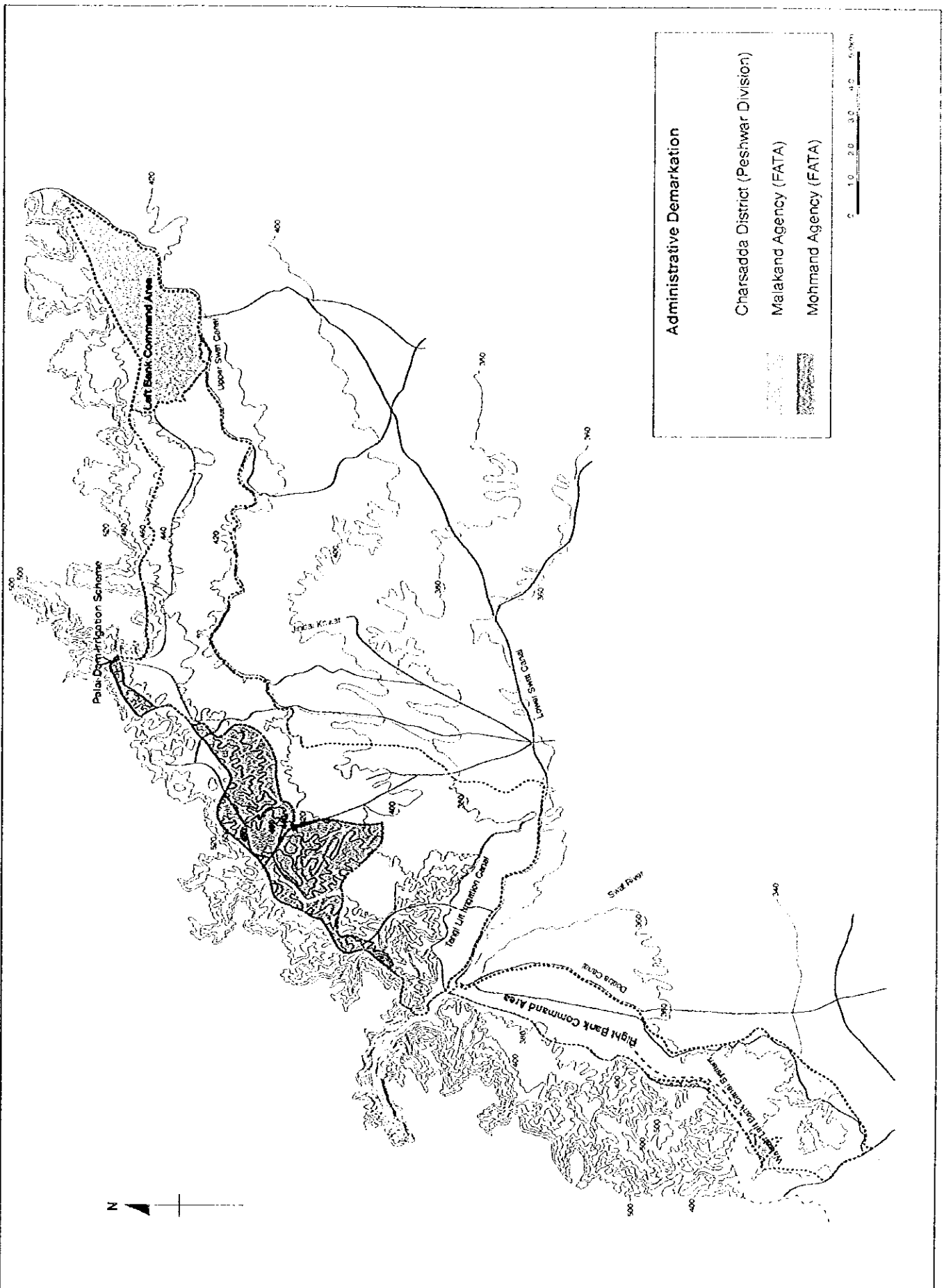
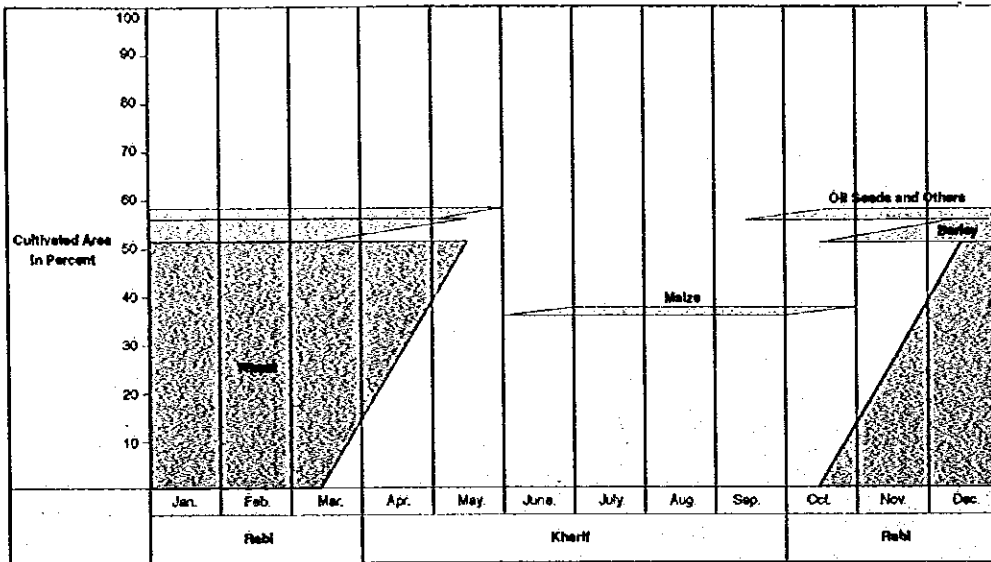
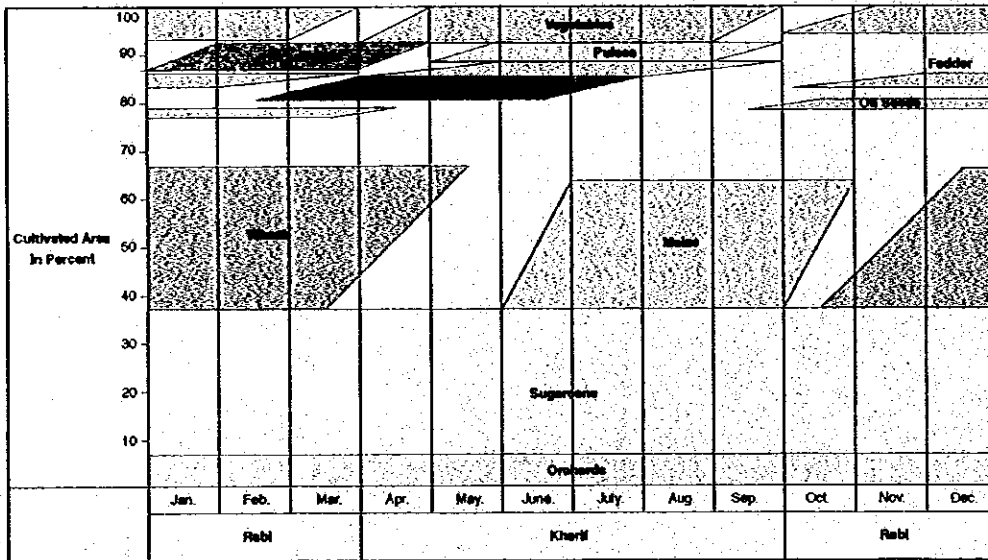


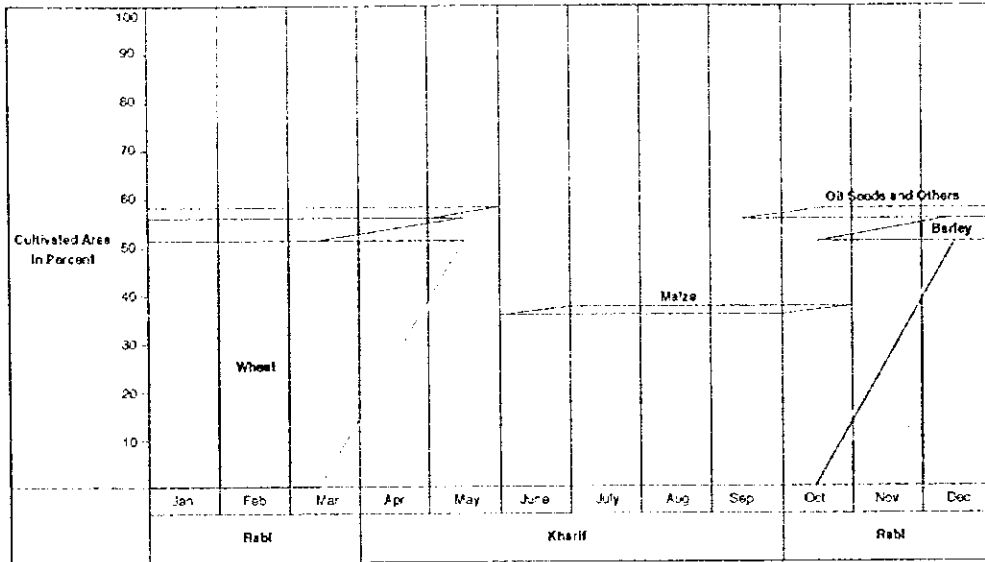
図 5.2.3
 灌漑計画調査対象地域の行政区分



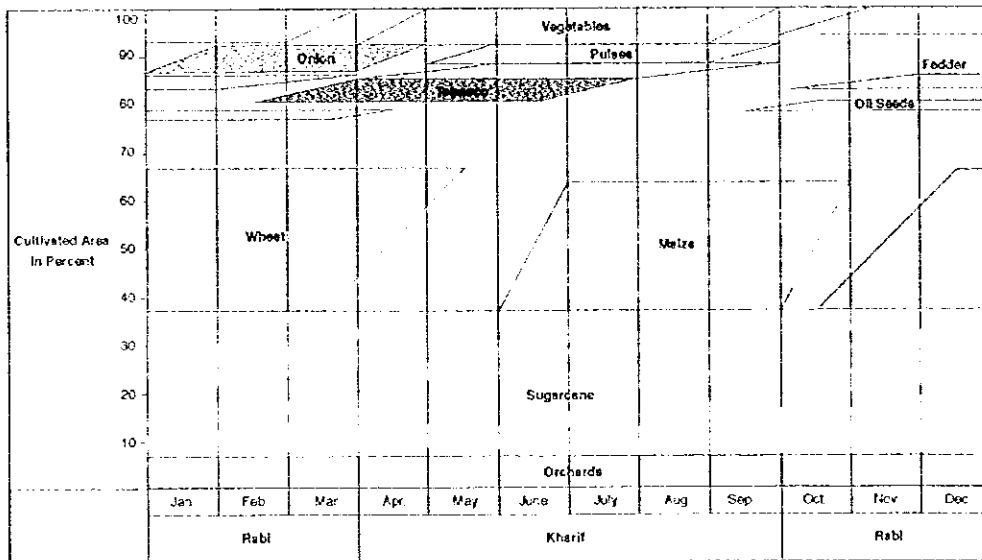
Present Cropping Pattern



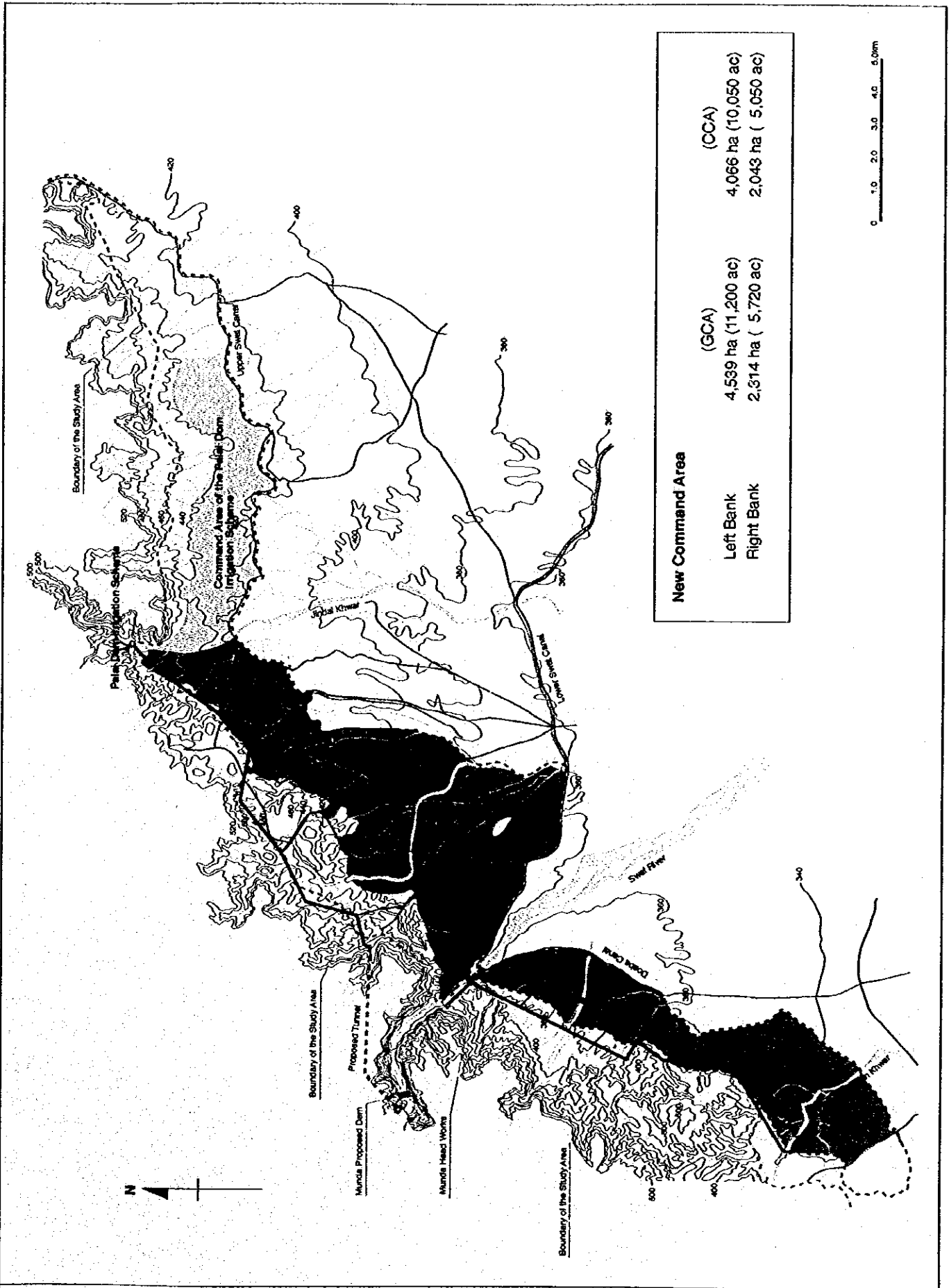
Proposed Cropping Pattern



Present Cropping Pattern

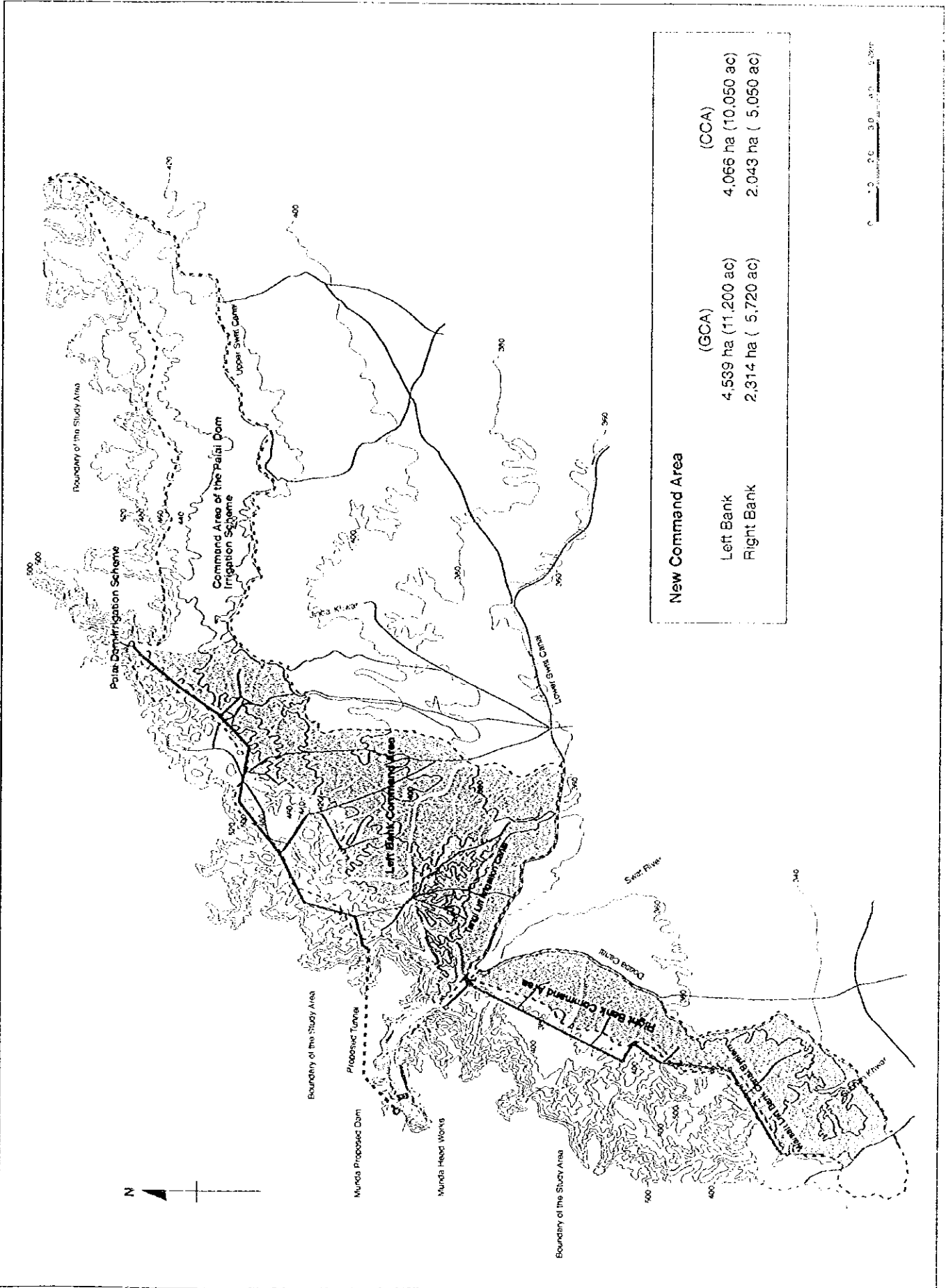


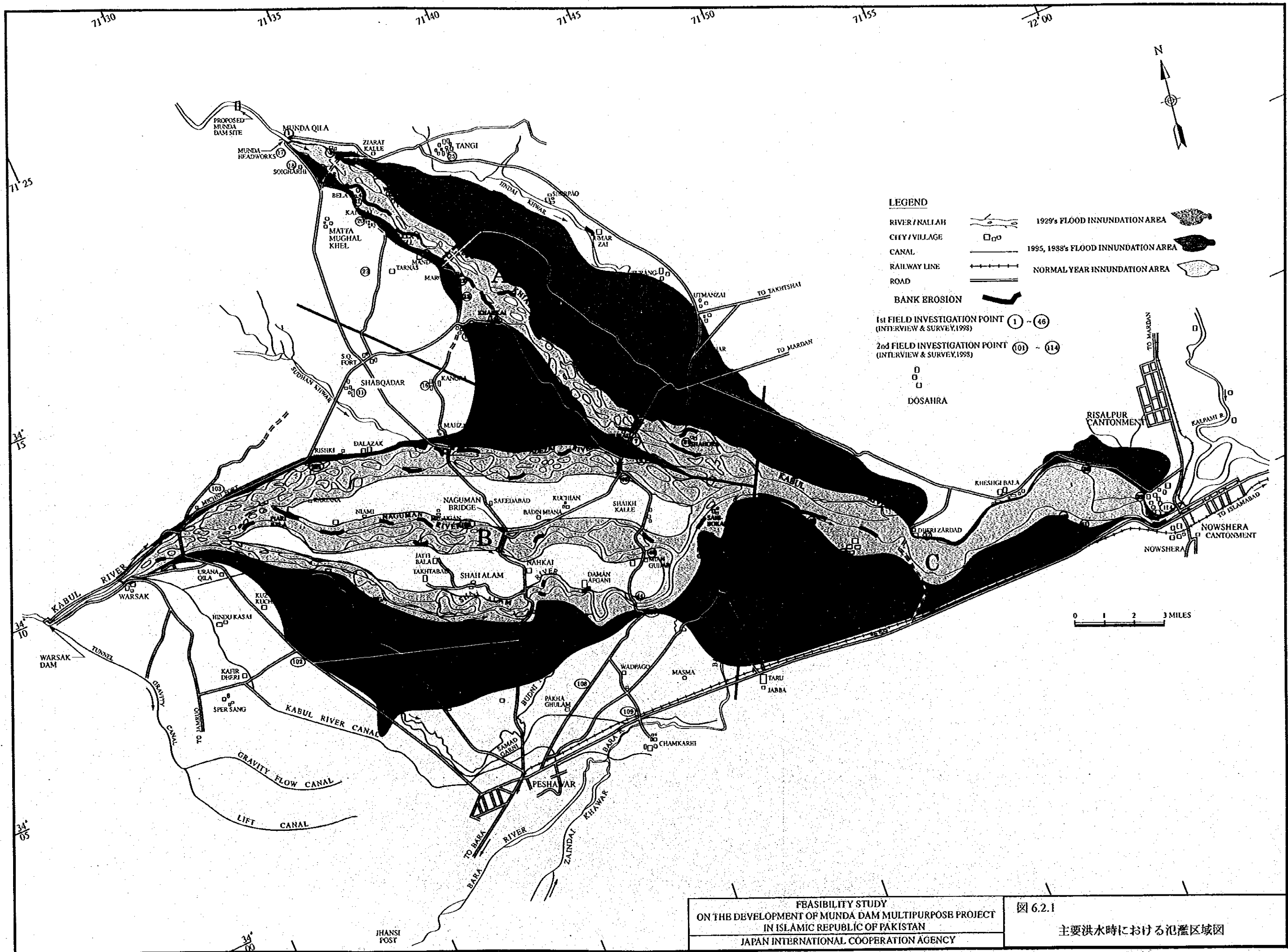
Proposed Cropping Pattern

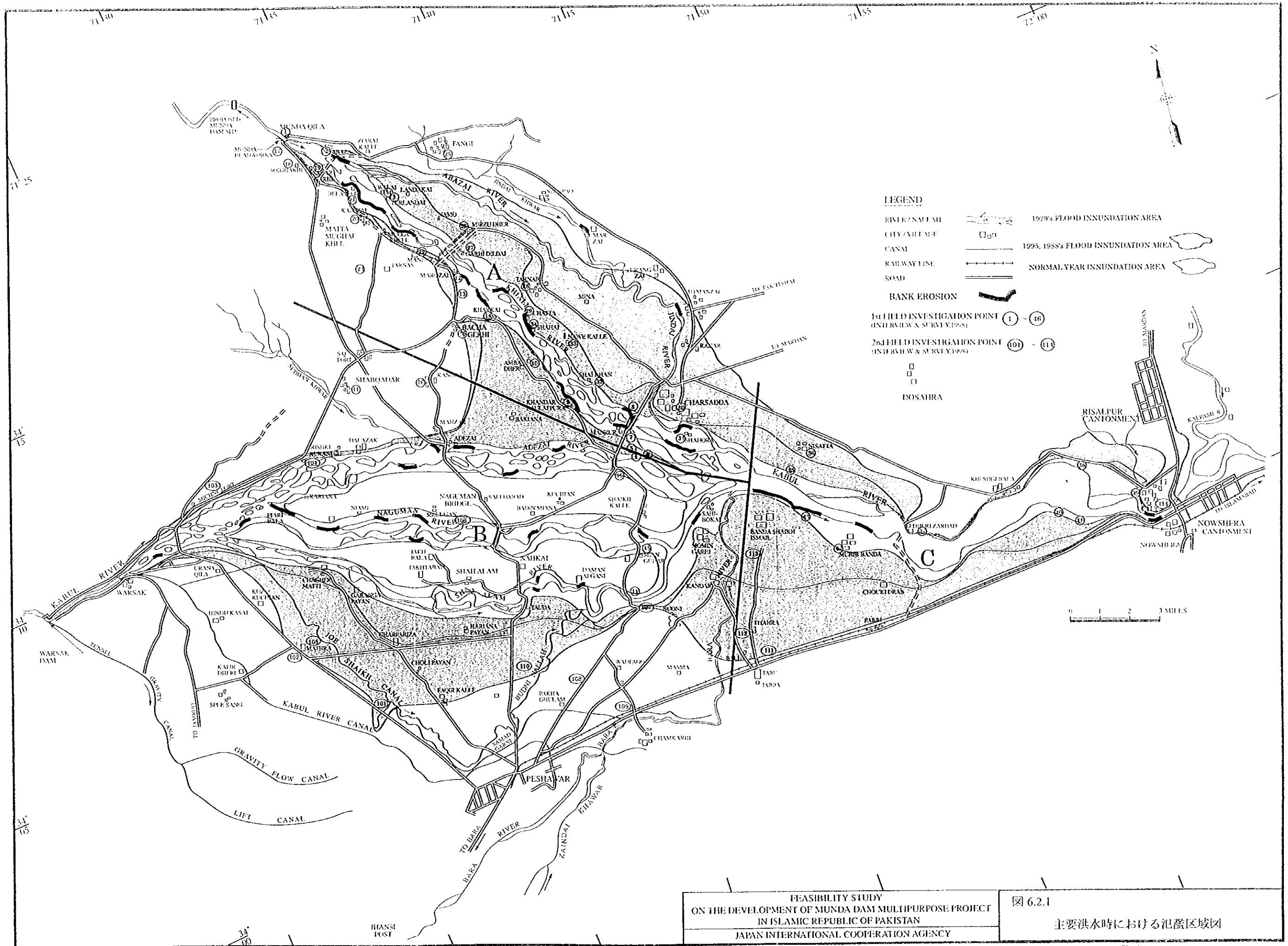


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図 5.2.5
 本件の灌漑計画対象地区







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図 6.2.1
 主要洪水時における氾濫区域図

