TABLES

I METEOROLOGY AND HYDROLOGY

Table I.1.1 INVENTORY OF METEOROLOGICAL AND RAINFALL STATIONS AND DATA AVAILABLE

No	Code	Station Name	Operation		Eleva-tion(m)	Year																					
						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
	(1) GENERAL METEOROLOGICAL DATA																											
	RIAU PROVINCE (No.20)																											
1		Simpangtiga-Pekan	BMG	05107	70												B	B	B	B	B	B	B	B	B	A		
2		Japura-Rengat	BMG	05109	19												B	B	B	B	B	B	B	B	B	A		
	WEST SUMATRA PROVINCE (No.19)																											
3		Tabing-Padang	BMG	03106	6												B	B	B	B	B	B	A	A	A	B		
4		Sukarami Kebun P	DR-SB	03137	928												B		B	B	B	B						
	(2) DAILY RAINFALL DATA																											
	RIAU PROVINCE (No.20)																											
	CLIMATOLOGICAL STATION (No.0)																											
1	1	Pasar Kampar	DPMA	20001	50			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B
2	2	Sentajo	DPUP	20002	40										A	A	A	A	A	A	A	A	A	A	A	A	A	A	
3	2	Tembilahan	DPUP	20004	3											A	A	A	A	A	A	A	A	A	A				
4	7	Sorek I	DPUP	20007	18												A	A	A	A	A	A	A	A	A	A	A	A	A
5	9	Buatan	DPUP	20009	6													A	A	A	A	A	A	A	A	A	A	A	A
6	10	Siberuang	PHBD	20010	140															A	A	A	A	A	A	A	A	A	
7	11	Koto Baru	PHBD	20011	111																A	A	A	A	A	A	A	A	A
	AUTOMATIC RAINFALL RECORDER (No.1)																											
8	3	Lirik	DPUP	20103	25												A	A	A	A	A	A	A	A	A	A	A	A	A
9	6	Lipat Kain	DPUP	20106	50										A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
10	7	Talang Jerinjing	DPUP	20107	78												A	A	A	A	A	A	A		A	A	A	A	
11	8	Muara Lembu	DPUP	20108	60												A	A	A	A	A	A	A	A	A	A	A	A	A
12	11	Pangkalan kasai	DPUP	20111	20															B	A	A	A	A	A	A	A	A	B
13		Japura-Rengat	BMG	05109	19															A	A	A	A	A	A	A	A	A	A
14		PK.Kotobaru	BMG	20200	144													A	A	A	A	A	A	A	A	A	A	A	
	WEST SUMATRA PROVINCE (No.19)																											
	CLIMATOLOGICAL STATION (No.0)																											
15	1	Tanjung Pati	DPMA	19001	515											A	A	A	A	A	A	A	A	A	A	A	A	A	B
16	4	Jambak	DPMA	19004	294										B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
17	9	Saning Bakar	P3SA	19009	366											B	A	A	A	A	A	A	A	B	B	A	A	A	B	B
18	10	Kandang Empat	P3SA	19010	460		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
19	14	Sijunjung	DPMA	19014	160		B		B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	A	A	A	A	B
20	15	Buo	PHBD	19015	200													B	A	A	A	A	A	A	A	A	A	A	B
21	16	Koto Tinggi	DPMA	19016	950														B	A	A	A	A	A	B	A	A	A	A
22	17	Danau Diatas	DPMA	19017	1,500											B	A	A	A	A	A	A	A	B	B	A	A	A	A	B
	AUTOMATIC RAINFALL RECORDER (No.1)																											
23	1	Rao Mtx	DPUP	19101	300														A	A	A	A	A	A	A	A	A	A	B
24	14	Sumani	DPUP	19114	370												B	A	A	A	A	A	A	A	A	A	A	A	A
25	16	Suliki	DPUP	19116	527													A	A	A	A	A	A	A	A	A	A	A	B
26		Sukarami Kebun P	DR-SB	03137	928															A	B		B	A	A	A	A	A	A
	(3) HOURLY RAINFALL DATA																											
	RIAU PROVINCE																											
	CLIMATOLOGICAL STATION																											
1		Pasar Kampar	DPMA	20001	50												A	A	A	A	B'	A	A	A	A	B	A	A	A	
2		Buatan	DPUP	20009	6												B	A	A	B	A	B	A	B	B	A	A	A	A	
3		Japura-Rengat	BMG	05109	19															A	A	A	A	A	A	A	A	A	A	A
	WEST SUMATRA PROVINCE (No.19)																											
	CLIMATOLOGICAL STATION																											
4		Sijunjung	DPMA	19014	160													B	B	B	A	A	B						
5		Koto Tinggi	DPMA	19016	950														B	B	B	B	A	B					
6		Tabing-Padang	BMG	03106	6										B	A	A	A	A	B	A	A	A	A	A	B	B	A	A	B
7		Sukarami Kebun P	DR-SB	03137	928															A	B		B	A	A	A	A	A	A	A

NOTES: DPUP: Dinas Pekerjaan Umum Propinsi
DPMA: Direktorat Penyelidikan Masalah Air
P3SA: Proyek Perencayaan dan Pengembangan Sumber-Sumber Air
PHBD: Proyek Hydrologi Bantuan Bank Dunia
IHE:Institute Hydraulic Engineering
BMG: Badan Meteorologi dan Geofisika
DR-SB: Deperta Prop. Sumatera Barat
A: Complete Data B: Partial Data

Table I.1.2 INVENTORY OF AUTOMATIC WATER LEVEL GAGING STATIONS AND DATA AVAILABLE

No	Code	River	Station Name	Operation		Area	Daily Data																						Hourly Data		
							Year																								
						(km^2)	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	86	89	91
	(1) KAMPAR RIVER																														
	RIAU PROVINCE																														
1	3	Kampar Kanan	Dansu Bingkuang	DPMA	010620001	4,000						A	A		B	A	A	A	B			A	A	A	A	A		A	A	A
2	4	Kampar Kiri	Lipat Kain	DPUP	010620002	3,431								B	A	A	A	A	A			A	A	A	A	B		A	B	A
3	11	Lipai	Kebun Durian	P3SA	010620004	557									B	A	A	A	B			A	A	A	A	B		A	B	
4	12	Siagiagi	Kota baru	P3SA	010620005	1,168									B	B	B	B											A		
5	21	Kampar Kanan	Muara Mahat	PHBD	010620009	3,174																		A	A	A	A	A	A	A	A
6	34	Kampar Kanan	Muara Takus	DPUP	010620011	1,675																	A	A	A	A			A		A
	WEST SUMATRA PROVINCE																														
	No Station																														
	(2) INDRAGIRI RIVER																														
	RIAU PROVINCE																														
7	6	Kuantan	Lubuk Ambacang	DPUP	010660002	7,350							A	A	A	B	A	B					A	A					A	A	A
8	26	Kuantan	Pulau Berhala	DPUP	010660008	8,526																	A	A	B	A			A	A	A
	WEST SUMATRA PROVINCE																														
9	16	Sinamar	Paya kumbuh	DPMA	010660006	1,421								B	A	B	B	A	B	A	A	B		A	A			A			
10	20	Ombilin	Tj. Ampalu	DPMA	010660004	2,215						B	A	B	B	B	B	B	A	A		A	A	A	A			A			
11	33	Sumani	Bandar Padang	DPMA	010660005	537						B	B	A	B	B	B	B	B	A	A								A			
12	34	Agam	Padang Tarab	DPUP	010660007	272													A	A	A	A	A	A	A	A			A	A	A
13	38	Bt. Selo	Saruaso	DPMA	010660008	326												A	A	A	A	A	A		A				A		A

NOTES:
DPUP: Dinas Pekerjaan Umum Propinsi
DPMA: Direktorat Penyelidikan Masalah Air
P3SA: Proyek Perencayaan dan Pengembangan Sumber-Sumber Air
PHBD: Proyek Hydrologi Bantuan Bank Dunia
A: Complete Data B: Partial Data

Table I.2.1 GENERAL CLIMATOROGICAL FEATURES IN KAMPAR-INDRAGIRI RIVER BASIN

Particulars	Unit	Station			
		Pekanbaru	Rengat	Padang	Sukarami
Elevation	EL m	31	19	2	928
Temperature					
Maximum	°C	34	35	32	26
Average	°C	26	26	26	21
Minimum	°C	20	19	21	17
Annual Rainfall	mm	2,702	2,342	4,499	3,180
Average Daily Sunshine Duration	%	52	46	56	-
Monthly Mean Atmospheric Pressure	Hp	1,010	1,008	1,007	-
Monthly Mean Humidity of the Air	%	83	84	83	82
Mean Velocity of Wind	knot	7.0	4.9	2.4	2.5
Maximum Velocity of Wind	knot	48	17	35	-
Direction of Wind in Rainy Season		NE/NW	N/NW	SW/W	NE
Direction of Wind in Dry Season		S/SW	S/SW	W	SW
Annual Evaporation	mm	-	1,517	-	1,446

Notes : Fegures are averages of data from 1980 to 1989

Table I.2.2 (1/2) MONTHLY CLIMATOLOGICAL DATA

Monthly Maximum Temperature Unit: °C

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
Pekanbaru	31.9	32.8	34.1	33.4	33.4	34.1	33.2	33.0	32.9	33.1	33.0	31.8	34.1
Rengat	31.1	32.1	33.3	32.6	32.7	34.8	32.4	33.0	32.2	32.7	32.0	31.2	34.8
Padang	31.4	32.0	31.7	31.7	31.3	31.4	31.1	30.8	30.6	30.7	30.5	31.1	32.0
Sukarami	24.1	25.2	25.1	26.0	26.0	26.0	25.4	25.6	25.0	25.0	24.3	25.0	26.0

Monthly Mean Temperature Unit: °C

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	25.4	26.0	26.3	26.4	26.6	26.7	26.1	26.2	26.0	26.3	26.2	25.7	26.2
Rengat	25.5	26.1	26.4	26.6	26.9	26.8	26.4	26.4	26.1	26.3	26.3	25.5	26.3
Padang	26.2	26.1	26.3	26.3	26.5	26.1	25.7	25.6	25.6	25.8	25.7	26.1	26.0
Sukarami	20.1	20.6	20.9	21.2	21.3	21.4	20.7	20.5	20.6	20.7	20.8	20.5	20.8

Monthly Minimum Temperature Unit: °C

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Min.
Pekanbaru	20.5	20.2	20.7	20.5	22.3	21.5	21.3	21.3	20.8	20.8	20.8	21.0	20.2
Rengat	21.2	18.9	21.8	21.7	21.5	21.6	20.9	21.7	21.0	21.7	21.7	21.4	18.9
Padang	21.8	21.8	22.0	22.2	21.8	21.2	20.7	21.1	21.2	21.0	21.5	21.5	20.7
Sukarami	17.2	17.5	18.0	18.6	18.4	18.0	17.6	17.0	17.7	18.0	18.3	18.0	17.0

Monthly Rainfall Unit: mm

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Pekanbaru	175	217	241	285	234	214	128	162	226	254	295	270	2,702
Rengat	257	195	205	259	164	142	160	121	200	184	211	246	2,342
Padang	315	258	481	377	301	193	323	313	447	546	578	368	4,499
Sukarami	396	170	287	387	204	116	186	103	146	226	488	473	3,180

Daily Sunshine Duration Unit: %

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	35.7	55.8	50.9	53.7	58.3	60.4	52.6	58.6	48.8	52.3	56.6	42.3	52.2
Rengat	49.8	49.8	46.6	43.5	46.6	58.4	49.2	49.0	48.3	41.3	44.7	27.9	46.3
Padang	56.2	61.5	53.1	56.1	64.6	66.5	62.5	57.9	47.3	48.9	45.0	57.4	56.4
Sukarami				26.0				50.0	35.0	42.0			

Monthly Mean Atmospheric Pressure Unit: +1,000 Hp

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	10.6	10.1	10.0	9.2	9.1	9.3	9.7	9.8	10.1	10.3	10.1	10.7	9.9
Rengat	8.9	8.9	8.8	8.7	8.6	8.5	8.3	8.1	7.9	7.7	7.7	7.7	8.3
Padang	7.3	7.1	7.0	6.9	6.8	6.6	6.5	6.4	6.3	6.1	6.1	6.1	6.6
Sukarami													

Table I.2.2 (2/2) MONTHLY CLIMATOLOGICAL DATA

Monthly Mean Humidity Unit: %

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	84.3	83.1	83.1	83.1	84.4	82.0	82.2	81.5	81.9	83.2	83.6	84.0	83.0
Rengat	85.5	81.5	84.7	85.1	85.3	83.7	83.4	82.3	80.1	84.4	84.4	85.1	83.8
Padang	81.4	82.1	84.1	83.7	83.2	82.0	82.3	81.3	82.1	85.0	84.1	82.8	82.8
Sukarami	86.3	81.6	83.8	83.3	82.3	77.5	78.8	79.7	80.8	82.3	84.3	83.0	82.0

Monthly Mean Velocity of Wind Unit: knots

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	7.4	7.0	6.8	7.0	6.8	6.9	6.9	6.9	6.6	6.9	7.2	7.4	7.0
Rengat	5.8	5.1	4.9	5.0	5.3	4.9	4.3	4.6	4.9	4.3	4.8	5.0	4.9
Padang	2.3	2.2	2.0	2.1	2.1	2.1	2.2	1.9	5.1	2.1	2.2	2.2	2.4
Sukarami	2.3	2.2	2.3	2.3	2.3	2.8	2.8	3.0	2.5	3.0	2.7	2.5	2.5

Monthly Maximum Velocity of Wind Unit: knots

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Pekanbaru	44.0	44.0	53.0	51.0	37.0	55.0	42.0	47.0	53.0	49.0	54.0	52.0	48.4
Rengat	14.0	12.0	20.0	20.0	15.0	15.0	20.0	18.0	20.0	15.0	18.0	18.0	17.1
Padang	30.0	29.0	32.0	44.0	32.0	36.0	38.0	36.0	33.0	35.0	31.0	39.0	34.6
Sukarami													

Monthly Mean Direction of Wind

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
Pekanbaru	NE	NE	NE	NW	S	S	S	S	S	NW	NW	NE	
Rengat	N	N	NW	S	SW	S	S	S	S	SW	W	N	
Padang	SW	SW	SW	W	W	W	W	W	W	W	W	W	
Sukarami	NE	NE	SW	SW	SW	SW	SW	SW	SW	SW	NE	-	

Monthly Evaporation Unit: mm

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Pekanbaru													
Rengat	112	132	135	122	134	136	130	137	125	125	126	105	1,517
Padang													
Sukarami	99	110	110	132	134	143	134	139	122	120	105	100	1,446

Table I.2.3 MONTHLY MAXIMUM HOURLY MEAN WIND VELOCITY

Unit : Knots

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
1973	15	15	15	15	**17**	12	10	14	13	16	13	15	17
1974	12	**20**	16	15	18	12	18	18	17	14	16	15	20
1975	15	**18**	18	18	14	15	17	18	14	14	15	15	18
1976	14	15	16	13	10	15	17	15	12	**20**	12	13	20
1977	17	13	15	12	**25**	20	18	20	18	15	14	15	25
1978	20	14	15	16	15	14	28	28	30	**60**	37	38	60
1979	26	30	37	18	43	41	34	39	42	**46**	31	31	46
1980	35	41	48	43	36	**55**	28	47	43	36	44	52	55
1981	**44**	39	33	32	40	34	29	35	15	25	20	29	44
1982	15	12	24	31	38	35	38	30	**44**	30	38	30	44
1983	34	**46**	-	35	37	31	42	43	30	25	17	48	48
1984	27	**43**	40	35	35	34	34	18	42	21	20	20	43
1985	**98***	22	37	45	28	27	26	45	33	54	33	44	54
1986	**64**	44	38	31	60	37	26	35	44	34	20	30	64
1987	29	24	38	51	32	44	-	41	**51**	48	46	25	51
1988	38	**58**	29	40	33	40	38	30	15	-	48	36	58
1989	44	25	28	14	22	28	22	22	**49**	25	36	30	49
1990	-	28	28	-	-	-	42	**46**	43	34	41	42	46
1991	57	42	40	40	**58**	40	49	37	39	33	24	32	58
1992	29	**46**	28	43	30	36	44	20	46	36	38	44	46
1993	47	40	**48**	44	36	29	32	36	30	22	38	27	48
Max.	64	58	48	51	60	55	49	47	51	60	48	52	64
Average	31	30	30	30	31	30	30	30	32	30	29	30	

Note 98* : This huge number is omitted, since it could not be checked with original recorder data sheet.

Table I.3.1 LIST OF RAINFALL STATIONS AND THEIR ANNUAL RAINFALL

Unit : mm

Year	Station Number																						Year
	19001	19004	19010	19014	19015	19016	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	20200	05109	
1961				2034																				1961
1962				2718																				1962
1963				1902																				1963
1964				2516																				1964
1965				1769																				1965
1966				2278																				1966
1967				1683																				1967
1968				1959																				1968
1969																								1969
1970			6582							2930														1970
1971			5432							2567								2573						1971
1972			4743							2678								1636						1972
1973			5676	2531						3695								1747						1973
1974				2160						2905								1723						1974
1975			5355	2009						2214								1779						1975
1976			6408	2253						2672														1976
1977			5272	2486						2111														1977
1978			5289	2277						2130	3999							2880						1978
1979		2917	5118	2565						2099	3055	1798						3110		2629				1979
1980		3088	5998	2014					2435	2243	3216	1977	2399				2486	2947	2416	2124				1980
1981	1887	3064	5267	2667			1832	1464	1045	2303	2710	1165	2229	2128			2266	2644	1930	2686		3064		1981
1982	1949	3204	5337	2335	2071		2192	2062	1760	2521	3027	1169	2623	2065			2173	3417	1725	3292		3960		1982
1983	1520	3136	4661	2056	1923	1714	1862	1388	2002	1892	2944	1796	1865	1800	2903	2574	1680	2726	1981	2108		3158	2068	1983
1984	2295	3925	5504	2115	2430	2683	1924	2215	2013	2443	3163	1971	2769	2717	2480	3323	2591	3528	2465	3435	3145	4089	2575	1984
1985	2210	3894	5311	1882	1858	1883	1612	1889	1894	2332	2610	1153	2548	1633	3433	2878	2392	2874	1795	2581	2709	2893	2094	1985
1986	2307	2968	4953	2467	1901	2028	1732	2042	1449	2618	3056	2247	2248	2172	1620	3687	2681	3484	1677	2827	3201	3288	2635	1986
1987	2175	4082	5389		1844	2162	1932	2133		2308	1834	1739	2367	1746	3749	2415	2878	2485	1354	2453	1771	3392	1981	1987
1988	2467	3230	5362		2510		1462	3438		2741	1724	2096	2567	2090	3363	2851	2555	2276		2298	2438	3585	2123	1988
1989	2264	2281	5886	2751	2161	2217	1476	3203	1267	2309	2633		2317	1128	2269	3489	2365	2604	2233	2785	3440	3272	2239	1989
1990	2258	3041	4773	2228	1911	2499	1525	3825	1128	2433	2184		2008	1346	1958	2961		2821	2383	2394	3015	3251	1775	1990
1991	2761	4158	6666	2406	2216	2338	3664	2974	1425	2493	2641		1857	1618	1695	2610	1402	2346	2164	2181	2514	4112	2176	1991
1992	2457	3028	3978	2618	1782	2002	3076	3222	2636	2258	2366		1905	1809	1636	2431	1814	2384	2386	2282	2740	3180	2855	1992
1993		3787				2444	4110																2491	1993
Ave.	2213	3320	5407	2257	2055	2197	2185	2488	1732	2474	2744	1711	2285	1854	2511	2922	2274	2599	2042	2577	2775	3437	2274	Ave.
Max.	2761	4158	6666	2751	2510	2683	4110	3825	2636	3695	3999	2247	2769	2717	3749	3687	2878	3528	2465	3435	3440	4112	2855	Max.
Min.	1520	2281	3978	1683	1782	1714	1462	1388	1045	1892	1724	1153	1857	1128	1620	2415	1402	1636	1354	2108	1771	2893	1775	Min.

Table I.3.2 (1/2) CORRELATION OF RAINFALL BETWEEN EACH STATION

(1) 1-DAY RAINFALL

Y / X	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	0.18	0.38	0.05	0.36	0.25	0.41	0.23	0.16	0.24	0.21	0.06	0.18	0.09	0.14	0.12	0.2	0.11	0.09	0.22	0.04	0.23	0.12	0.06	0.25	0.414
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19004	0.18	1	0.12	0.27	0.18	0.32	0.17	0.29	0.35	0.37	0.08	0.2	0.08	0.13	0.21	0.26	0.06	0.32	0.02	0.12	0.09	0.3	0.09	0.18	0.13	0.371
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19009	0.38	0.12	1	0.06	0.42	0.2	0.48	0.19	0.18	0.26	0.15	0.08	0.14	0.12	0.11	0.06	0.12	0.16	0.06	0.19	0.05	0.1	0.16	0.05	0.13	0.478
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19010	0.05	0.27	0.06	1	0.08	0.15	0.04	0.14	0.19	0.14	0.06	0.15	0.13	0.01	0.16	0.13	-0.02	0.17	0.04	0.13	0.07	0.16	0.07	0.14	0.06	0.268
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19014	0.36	0.18	0.42	0.08	1	0.32	0.44	0.24	0.22	0.32	0.31	0.16	0.29	0.21	0.16	0.16	0.21	0.28	0.22	0.37	0.18	0.32	0.23	0.12	0.09	0.437
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19015	0.25	0.32	0.2	0.15	0.32	1	0.17	0.27	0.49	0.32	0.15	0.21	0.12	0.27	0.12	0.24	0.23	0.28	0.17	0.29	0.26	0.33	0.12	0.12	0.25	0.487
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19016	0.41	0.17	0.48	0.04	0.44	0.17	1	0.25	0.19	0.3	0.19	0.09	0.21	0.1	0.16	0.11	0.15	0.13	0.13	0.29	0.03	0.15	0.11	0.12	0.17	0.478
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19101	0.23	0.29	0.19	0.14	0.24	0.27	0.25	1	0.21	0.3	0.08	0.15	0.03	0.06	0.08	0.11	0.18	0.23	0.02	0.19	0.07	0.28	-0.01	0.15	0.09	0.295
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19114	0.16	0.35	0.18	0.19	0.22	0.49	0.19	0.21	1	0.26	0.08	0.14	0.07	0.11	0.07	0.08	0.1	0.19	0.1	0.1	0.09	0.25	0.06	0.12	0.15	0.487
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19116	0.24	0.37	0.26	0.14	0.32	0.32	0.3	0.3	0.26	1	0.22	0.11	0.17	0.2	0.17	0.19	0.22	0.28	0.14	0.19	0.06	0.25	0.2	0.16	0.13	0.371
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
19017	0.21	0.08	0.15	0.06	0.31	0.15	0.19	0.08	0.08	0.22	1	0.1	0.25	0.06	0.11	0.12	0.05	0.17	0.08	0.21	0.14	0.2	0.25	0.06	0.07	0.305
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20001	0.06	0.2	0.08	0.15	0.16	0.21	0.09	0.15	0.14	0.11	0.1	1	0.08	0.11	0.17	0.29	0.13	0.29	0.17	0.17	0.15	0.25	0.08	0.1	0.06	0.292
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20002	0.18	0.08	0.14	0.13	0.29	0.12	0.21	0.03	0.07	0.17	0.25	0.08	1	0.19	0.14	0.16	0.12	0.07	0.16	0.5	0.16	0.1	0.31	0.05	-0.02	0.496
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20004	0.09	0.13	0.12	0.01	0.21	0.27	0.1	0.06	0.11	0.2	0.06	0.11	0.19	1	0.11	0.14	0.16	0.11	0.08	0.22	0.14	0.12	0.14	0.19	-0.05	0.268
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20007	0.14	0.21	0.11	0.16	0.16	0.12	0.16	0.08	0.07	0.17	0.11	0.17	0.14	0.11	1	0.33	0.19	0.19	0.14	0.08	0.15	0.17	0.15	0.29	0.04	0.326
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20009	0.12	0.26	0.06	0.13	0.16	0.24	0.11	0.11	0.08	0.19	0.12	0.29	0.16	0.14	0.33	1	0.05	0.16	0.1	0.09	0.15	0.14	0.04	0.11	0.07	0.326
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20010	0.2	0.06	0.12	-0.02	0.21	0.23	0.15	0.18	0.1	0.22	0.05	0.13	0.12	0.16	0.19	0.05	1	0.11	0.07	0.19	0.11	0.18	0.17	0.15	0.1	0.234
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20011	0.11	0.32	0.16	0.17	0.28	0.28	0.13	0.23	0.19	0.28	0.17	0.29	0.07	0.11	0.19	0.16	0.11	1	0.09	0.16	0.19	0.58	0.06	0.19	0.08	0.577
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20103	0.09	0.02	0.06	0.04	0.22	0.17	0.13	0.02	0.1	0.14	0.08	0.17	0.16	0.08	0.14	0.1	0.07	0.09	1	0.2	0.19	0.13	0.21	0.17	0.06	0.224
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20106	0.22	0.12	0.19	0.13	0.37	0.29	0.29	0.19	0.1	0.19	0.21	0.17	0.5	0.22	0.08	0.09	0.19	0.16	0.2	1	0.16	0.2	0.26	0.12	0.06	0.496
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20107	0.04	0.09	0.05	0.07	0.18	0.26	0.03	0.07	0.09	0.06	0.14	0.15	0.16	0.14	0.15	0.15	0.11	0.19	0.19	0.16	1	0.16	0.23	0.18	0	0.262
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20108	0.23	0.3	0.1	0.16	0.32	0.33	0.15	0.28	0.25	0.25	0.2	0.25	0.1	0.12	0.17	0.14	0.18	0.58	0.13	0.2	0.16	1	0.05	0.2	0.15	0.577
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
20111	0.12	0.09	0.16	0.07	0.23	0.12	.106 -	0.01	0.06	0.2	0.25	0.08	0.31	0.14	0.15	0.04	0.17	0.06	0.21	0.26	0.23	0.05	1	0.12	0.04	0.312
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
05109	0.06	0.18	0.05	0.14	0.12	0.12	0.12	0.15	0.12	0.16	0.06	0.1	0.05	0.19	0.29	0.11	0.15	0.19	0.17	0.12	0.18	0.2	0.12	1	0.08	0.294
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	337	
03137	0.25	0.13	0.13	0.06	0.09	0.25	0.17	0.09	0.15	0.13	0.07	0.08	-0.02	-0.05	0.04	0.07	0.1	0.08	0.06	0.06	0	0.15	0.04	0.08	1	0.248
	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	

(2) 3-DAY RAINFALL

Y / X	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	0.34	0.51	0.14	0.54	0.52	0.6	0.42	0.42	0.52	0.33	0.26	0.32	0.23	0.24	0.22	0.33	0.3	0.17	0.37	0.23	0.39	0.28	0.23	0.45	0.601
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19004	0.34	1	0.23	0.42	0.31	0.47	0.38	0.35	0.44	0.56	0.22	0.27	0.32	0.31	0.3	0.34	0.19	0.41	0.09	0.35	0.11	0.37	0.18	0.19	0.24	0.562
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19009	0.51	0.23	1	0.15	0.56	0.56	0.61	0.31	0.65	0.47	0.25	0.13	0.25	0.28	0.13	0.09	0.29	0.24	0.18	0.22	0.18	0.28	0.23	0.16	0.27	0.649
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19010	0.14	0.42	0.15	1	0.18	0.27	0.14	0.22	0.25	0.19	0.09	0.2	0.29	0.09	0.18	0.26	-0.08	0.19	0.11	0.2	0.12	0.16	0.13	0.16	0.08	0.419
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19014	0.54	0.31	0.56	0.18	1	0.61	0.55	0.44	0.48	0.54	0.46	0.37	0.48	0.44	0.28	0.27	0.4	0.44	0.29	0.54	0.23	0.53	0.41	0.27	0.21	0.611
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19015	0.52	0.47	0.56	0.27	0.61	1	0.55	0.38	0.63	0.58	0.31	0.34	0.4	0.4	0.29	0.33	0.4	0.44	0.27	0.48	0.37	0.52	0.28	0.27	0.39	0.632
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19016	0.6	0.38	0.61	0.14	0.55	0.55	1	0.42	0.59	0.56	0.31	0.21	0.28	0.24	0.27	0.18	0.31	0.25	0.22	0.36	0.14	0.34	0.24	0.17	0.34	0.608
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19101	0.42	0.35	0.31	0.22	0.44	0.38	0.42	1	0.36	0.45	0.23	0.3	0.22	0.12	0.26	0.2	0.29	0.37	0.19	0.34	0.11	0.44	0.12	0.12	0.28	0.452
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19114	0.42	0.44	0.65	0.25	0.48	0.63	0.59	0.36	1	0.46	0.21	0.23	0.25	0.26	0.15	0.14	0.23	0.28	0.16	0.24	0.12	0.34	0.15	0.18	0.31	0.649
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19116	0.52	0.56	0.47	0.19	0.54	0.58	0.56	0.45	0.46	1	0.36	0.23	0.41	0.41	0.34	0.37	0.42	0.5	0.2	0.41	0.22	0.41	0.34	0.27	0.3	0.576
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
19017	0.33	0.22	0.25	0.09	0.46	0.31	0.31	0.23	0.21	0.36	1	0.3	0.39	0.17	0.21	0.32	0.17	0.39	0.16	0.38	0.22	0.43	0.41	0.14	0.13	0.463
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20001	0.26	0.27	0.13	0.2	0.37	0.34	0.21	0.3	0.23	0.23	0.3	1	0.28	0.27	0.23	0.34	0.28	0.38	0.25	0.46	0.21	0.37	0.26	0.2	0.16	0.464
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20002	0.32	0.32	0.25	0.29	0.48	0.4	0.28	0.22	0.25	0.41	0.39	0.28	1	0.37	0.33	0.31	0.24	0.43	0.24	0.62	0.32	0.47	0.39	0.27	0.14	0.616
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20004	0.23	0.31	0.28	0.09	0.44	0.4	0.24	0.12	0.26	0.41	0.17	0.27	0.37	1	0.3	0.25	0.33	0.35	0.22	0.42	0.35	0.34	0.33	0.37	0.07	0.435
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20007	0.24	0.3	0.13	0.18	0.28	0.29	0.27	0.26	0.15	0.34	0.21	0.23	0.33	0.3	1	0.36	0.32	0.34	0.27	0.26	0.24	0.27	0.32	0.46	0.05	0.455
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20009	0.22	0.34	0.09	0.26	0.27	0.33	0.18	0.2	0.14	0.37	0.32	0.34	0.31	0.25	0.36	1	0.08	0.34	0.22	0.29	0.18	0.28	0.19	0.14	0.08	0.372
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20010	0.33	0.19	0.29	-0.08	0.4	0.4	0.31	0.29	0.23	0.42	0.17	0.28	0.24	0.33	0.32	0.08	1	0.34	0.21	0.35	0.21	0.4	0.35	0.24	0.23	0.423
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20011	0.3	0.41	0.24	0.19	0.44	0.44	0.25	0.37	0.28	0.5	0.39	0.38	0.43	0.35	0.34	0.34	0.34	1	0.26	0.47	0.32	0.65	0.32	0.23	0.2	0.650
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20103	0.17	0.09	0.18	0.11	0.29	0.27	0.22	0.19	0.16	0.2	0.16	0.25	0.24	0.22	0.27	0.22	0.21	0.26	1	0.3	0.24	0.3	0.29	0.44	0.17	0.441
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20106	0.37	0.35	0.22	0.2	0.54	0.48	0.36	0.34	0.24	0.41	0.38	0.46	0.52	0.42	0.26	0.29	0.35	0.47	0.3	1	0.35	0.54	0.44	0.31	0.2	0.616
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20107	0.23	0.11	0.18	0.12	0.23	0.37	0.14	0.11	0.12	0.22	0.22	0.21	0.32	0.35	0.24	0.18	0.21	0.32	0.24	0.35	1	0.26	0.51	0.34	0.12	0.512
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20108	0.39	0.37	0.28	0.16	0.53	0.52	0.34	0.44	0.34	0.41	0.43	0.37	0.47	0.34	0.27	0.28	0.4	0.65	0.3	0.54	0.26	1	0.27	0.28	0.35	0.650
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
20111	0.28	0.18	0.23	0.13	0.41	0.28	0.24	0.12	0.15	0.34	0.41	0.26	0.39	0.33	0.32	0.19	0.35	0.32	0.29	0.44	0.51	0.27	1	0.45	0.09	0.512
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
05109	0.23	0.19	0.16	0.16	0.27	0.27	0.17	0.12	0.18	0.27	0.14	0.2	0.27	0.37	0.46	0.14	0.24	0.23	0.44	0.31	0.34	0.28	0.45	1	0.14	0.455
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	333	
03137	0.45	0.24	0.27	0.08	0.21	0.39	0.34	0.28	0.31	0.3	0.13	0.16	0.14	0.07	0.05	0.08	0.23	0.2	0.17	0.2	0.12	0.35	0.09	0.14	1	0.449
	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	

Note: Upper Row: Correlation Coefficient
Lower Row: Sample Number

Table I.3.2 (2/2) CORRELATION OF RAINFALL BETWEEN EACH STATION

(3) 7-DAY RAINFALL

X \ Y	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	0.44	0.6	0.17	0.61	0.66	0.7	0.5	0.57	0.62	0.38	0.41	0.38	0.42	0.34	0.32	0.43	0.36	0.29	0.49	0.41	0.46	0.37	0.31	0.64	0.704
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19004	0.44	1	0.3	0.52	0.39	0.53	0.46	0.38	0.46	0.63	0.3	0.33	0.5	0.4	0.47	0.47	0.29	0.52	0.18	0.51	0.22	0.42	0.32	0.35	0.3	0.626
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19009	0.6	0.3	1	0.14	0.68	0.69	0.76	0.43	0.81	0.64	0.27	0.24	0.37	0.47	0.21	0.18	0.49	0.34	0.3	0.4	0.3	0.39	0.36	0.28	0.38	0.811
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19010	0.17	0.52	0.14	1	0.21	0.33	0.17	0.29	0.21	0.27	0.13	0.27	0.41	0.15	0.35	0.37	-0.03	0.33	0.17	0.36	0.23	0.24	0.28	0.37	0.15	0.521
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19014	0.61	0.39	0.68	0.21	1	0.71	0.66	0.55	0.62	0.66	0.61	0.56	0.59	0.56	0.39	0.46	0.49	0.52	0.43	0.62	0.43	0.64	0.6	0.38	0.3	0.708
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19015	0.66	0.53	0.69	0.33	0.71	1	0.71	0.5	0.73	0.71	0.41	0.46	0.56	0.56	0.42	0.5	0.57	0.57	0.37	0.67	0.54	0.63	0.48	0.41	0.47	0.732
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19016	0.7	0.46	0.76	0.17	0.66	0.71	1	0.5	0.77	0.69	0.29	0.27	0.37	0.39	0.35	0.33	0.41	0.32	0.3	0.46	0.24	0.38	0.3	0.24	0.44	0.765
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19101	0.5	0.38	0.43	0.29	0.55	0.5	0.5	1	0.42	0.54	0.36	0.41	0.37	0.24	0.4	0.33	0.39	0.44	0.34	0.51	0.25	0.54	0.27	0.21	0.41	0.552
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19114	0.57	0.46	0.81	0.21	0.62	0.73	0.77	0.42	1	0.6	0.26	0.27	0.39	0.42	0.21	0.21	0.44	0.36	0.28	0.45	0.27	0.41	0.28	0.3	0.43	0.811
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19116	0.62	0.63	0.64	0.27	0.66	0.71	0.69	0.54	0.6	1	0.44	0.34	0.59	0.58	0.51	0.48	0.54	0.59	0.29	0.56	0.38	0.54	0.5	0.36	0.43	0.713
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
19017	0.38	0.3	0.27	0.13	0.61	0.41	0.29	0.36	0.26	0.44	1	0.46	0.54	0.29	0.28	0.5	0.25	0.56	0.32	0.55	0.37	0.62	0.54	0.15	0.24	0.618
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20001	0.41	0.33	0.24	0.27	0.56	0.46	0.27	0.41	0.27	0.34	0.46	1	0.53	0.46	0.36	0.48	0.36	0.56	0.44	0.65	0.42	0.56	0.48	0.32	0.29	0.653
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20002	0.38	0.5	0.37	0.41	0.59	0.56	0.37	0.37	0.39	0.59	0.54	0.53	1	0.45	0.5	0.6	0.37	0.62	0.34	0.77	0.46	0.61	0.53	0.34	0.28	0.769
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20004	0.42	0.4	0.47	0.15	0.56	0.56	0.39	0.24	0.42	0.58	0.29	0.46	0.45	1	0.43	0.32	0.53	0.49	0.35	0.51	0.49	0.5	0.5	0.48	0.23	0.575
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20007	0.34	0.47	0.21	0.35	0.39	0.42	0.35	0.4	0.21	0.51	0.28	0.36	0.5	0.43	1	0.54	0.35	0.43	0.31	0.38	0.29	0.37	0.36	0.45	0.11	0.540
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20009	0.32	0.47	0.18	0.37	0.46	0.5	0.33	0.33	0.21	0.48	0.5	0.48	0.6	0.32	0.54	1	0.18	0.58	0.27	0.55	0.3	0.49	0.42	0.2	0.21	0.597
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20010	0.43	0.29	0.49	-0.03	0.49	0.57	0.41	0.39	0.44	0.54	0.25	0.36	0.37	0.53	0.35	0.18	1	0.46	0.31	0.48	0.34	0.55	0.38	0.3	0.31	0.572
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20011	0.36	0.52	0.34	0.33	0.52	0.57	0.32	0.44	0.36	0.59	0.56	0.56	0.62	0.49	0.43	0.58	0.46	1	0.39	0.63	0.46	0.75	0.49	0.27	0.27	0.748
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20103	0.29	0.18	0.3	0.17	0.43	0.37	0.3	0.34	0.28	0.29	0.32	0.44	0.34	0.35	0.31	0.27	0.31	0.39	1	0.44	0.26	0.45	0.44	0.53	0.33	0.529
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20106	0.49	0.51	0.4	0.36	0.62	0.67	0.46	0.51	0.45	0.56	0.55	0.65	0.77	0.51	0.38	0.55	0.48	0.63	0.44	1	0.51	0.7	0.6	0.39	0.4	0.769
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20107	0.41	0.22	0.3	0.23	0.43	0.54	0.24	0.25	0.27	0.38	0.37	0.42	0.46	0.49	0.29	0.3	0.34	0.46	0.26	0.51	1	0.45	0.58	0.39	0.32	0.580
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20108	0.46	0.42	0.39	0.24	0.64	0.63	0.38	0.54	0.41	0.54	0.62	0.56	0.61	0.5	0.37	0.49	0.55	0.75	0.45	0.7	0.45	1	0.44	0.33	0.44	0.748
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
20111	0.37	0.32	0.36	0.28	0.6	0.48	0.3	0.27	0.28	0.5	0.54	0.48	0.53	0.5	0.36	0.42	0.38	0.49	0.44	0.6	0.58	0.44	1	0.56	0.23	0.602
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
05109	0.31	0.35	0.28	0.37	0.38	0.41	0.24	0.21	0.3	0.36	0.15	0.32	0.34	0.48	0.45	0.2	0.3	0.27	0.53	0.39	0.39	0.33	0.56	1	0.28	0.555
	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	330	
03137	0.64	0.3	0.38	0.15	0.3	0.47	0.44	0.41	0.43	0.43	0.24	0.29	0.28	0.23	0.11	0.21	0.31	0.27	0.33	0.4	0.32	0.44	0.23	0.28	1	0.637
	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	

Table I.3.3 COEFFICIENT OF DAILY RAINFALL SUPPLEMENTATION

Station to be Supplemented Y	Status	Original Station X	Coefficient A
19001	with complete data		
19004	with complete data		
19010	with complete data		
19014		19001	1.019
19015		19001	0.853
19016		19001	0.905
19017		19114	1.089
19114	with complete data		
19116		19001	1.080
20001	with complete data		
20002	with complete data		
20004		20111	0.640
20007	with complete data		
20009	with complete data		
20010		19015	1.068
20011		20108	1.055
20103		5109	0.927
20106	with complete data		
20107		20111	0.677
20108	with complete data		
20111		20107	1.253
20200		20106	1.159
05109		20107	0.981

Table I.3.4 ANUAL RAINFALL AFTER SUPPLEMENTATION

Unit: mm

Year	Station No.																					
	19001	19004	19010	19014	19015	19016	19017	19114	19116	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	20200	05109
1981	1,887	3,064	5,267	2,667	1,928	1,715	1,045	1,832	1,464	2,303	2,710	1,165	2,229	2,128	2,052	2,835	2,266	2,644	1,930	2,686	2,424	3,064	1,904
1982	1,949	3,204	5,337	2,335	2,071	1,859	1,760	2,192	2,062	2,521	3,027	1,169	2,623	2,065	2,198	3,474	2,173	3,417	1,725	3,292	2,171	3,960	1,702
1983	1,520	3,136	4,661	2,056	1,923	1,714	2,002	1,862	1,388	1,892	2,944	1,796	1,865	1,800	2,903	2,574	1,680	2,726	1,981	2,108	2,488	3,159	2,068
1984	2,295	3,925	5,504	2,115	2,430	2,683	2,013	1,924	2,215	2,443	3,163	1,971	2,769	2,717	2,480	3,323	2,591	3,528	2,465	3,435	3,145	4,089	2,575
1985	2,210	3,894	5,311	1,882	1,858	1,883	1,894	1,612	1,889	2,332	2,610	1,153	2,548	1,633	3,433	2,878	2,392	2,874	1,795	2,581	2,709	2,893	2,094
1986	2,307	2,968	4,953	2,467	1,901	2,028	1,449	1,732	2,042	2,618	3,056	2,247	2,248	2,172	1,620	3,687	2,681	3,484	1,677	2,827	3,201	3,288	2,635
1987	2,175	4,082	5,389	2,494	1,844	2,162	1,927	1,932	2,133	2,308	1,834	1,739	2,367	1,746	3,749	2,415	2,878	2,485	1,354	2,453	1,771	3,392	1,981
1988	2,467	3,230	5,362	2,763	2,510	2,155	1,719	1,462	3,438	2,741	1,724	2,096	2,567	2,090	3,363	2,851	2,555	2,276	1,648	2,298	2,438	3,585	2,123
1989	2,264	2,281	5,886	2,751	2,161	2,217	1,267	1,476	3,203	2,309	2,656	2,206	2,317	1,128	2,269	3,489	2,365	2,604	2,233	2,785	3,440	3,272	2,239
1990	2,258	3,041	4,773	2,228	1,911	2,499	1,128	1,525	3,825	2,433	2,184	1,932	2,008	1,346	1,958	2,961	1,472	2,821	2,383	2,394	3,015	3,251	1,775
1991	2,761	4,158	6,666	2,406	2,216	2,338	1,425	3,664	2,974	2,493	2,641	1,612	1,857	1,618	1,695	2,610	1,402	2,346	2,164	2,181	2,514	4,112	2,176
1992	2,457	3,028	3,978	2,618	1,782	2,002	2,636	3,076	3,222	2,258	2,366	1,760	1,905	1,809	1,636	2,431	1,814	2,384	2,386	2,282	2,740	3,180	2,855
Average	2,213	3,334	5,257	2,399	2,045	2,105	1,689	2,024	2,488	2,388	2,576	1,737	2,275	1,854	2,446	2,961	2,189	2,799	1,978	2,610	2,671	3,437	2,177
Maximum	2,761	4,158	6,666	2,763	2,510	2,683	2,636	3,664	3,825	2,741	3,163	2,247	2,769	2,717	3,749	3,687	2,878	3,528	2,465	3,435	3,440	4,112	2,855
Minimum	1,520	2,281	3,978	1,882	1,782	1,714	1,045	1,462	1,388	1,892	1,724	1,153	1,857	1,128	1,620	2,415	1,402	2,276	1,354	2,108	1,771	2,893	1,702

Note: : Data Supplemented

Table I.3.5 (1/2) CORRELATION OF DAILY RAINFALL DURING STORMS

(1) Flood in 1986

Y / X	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	-0.071	0.724	0.066	0.552	0.219	0.705	0.108	0.719	0.136	0.487	0.312	0.544	0.358	0.603	0.582	-0.193	0.733	0.291	0.604	0.338	0.736	0.325	0.403	0.194	0.736
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19004	-0.071	1	-0.136	0.361	-0.172	0.739	-0.316	0.642	-0.090	0.185	0.170	-0.097	-0.271	-0.255	-0.275	-0.264	0.323	-0.007	-0.044	-0.244	0.013	0.119	-0.166	-0.136	-0.184	0.739
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19009	0.724	-0.136	1	-0.117	0.864	0.215	0.883	0.066	0.972	0.502	0.568	0.178	0.473	0.614	0.675	0.654	-0.088	0.594	0.358	0.730	0.435	0.668	0.249	0.501	-0.067	0.972
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19010	0.066	0.361	-0.117	1	-0.259	0.595	-0.348	0.139	-0.101	0.186	0.136	0.112	-0.088	-0.154	-0.399	-0.353	-0.393	0.348	0.160	-0.253	-0.284	0.352	-0.218	-0.058	-0.064	0.595
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19014	0.552	-0.172	0.864	-0.259	1	0.076	0.783	0.178	0.811	0.530	0.764	0.029	0.528	0.622	0.481	0.446	0.026	0.520	0.176	0.740	0.091	0.569	0.146	0.350	-0.087	0.864
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19015	0.219	0.739	0.215	0.595	0.076	1	-0.032	0.487	0.307	0.573	0.429	0.119	0.029	0.041	-0.067	-0.163	-0.017	0.503	0.248	-0.136	0.019	0.427	0.047	0.174	-0.189	0.739
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19016	0.705	-0.316	0.883	-0.348	0.783	-0.032	1	0.021	0.853	0.483	0.512	0.293	0.534	0.632	0.829	0.720	-0.028	0.496	0.359	0.716	0.596	0.454	0.592	0.598	0.222	0.883
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19101	0.108	0.642	0.066	0.139	0.178	0.487	0.021	1	0.110	0.371	0.508	0.294	-0.334	-0.286	-0.132	-0.267	-0.041	0.086	-0.163	-0.231	-0.171	0.248	0.069	-0.230	0.350	0.642
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19114	0.719	-0.090	0.972	-0.101	0.811	0.307	0.853	0.110	1	0.537	0.517	0.312	0.464	0.542	0.710	0.573	-0.066	0.685	0.319	0.581	0.420	0.660	0.330	0.479	-0.026	0.972
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19116	0.136	0.185	0.502	0.186	0.530	0.573	0.483	0.371	0.537	1	0.698	0.224	0.263	0.480	0.272	0.054	-0.057	0.469	0.372	0.165	0.171	0.273	0.475	0.471	0.019	0.698
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
19017	0.487	0.170	0.568	0.136	0.764	0.429	0.512	0.508	0.517	0.698	1	0.019	0.413	0.466	0.145	0.133	-0.117	0.551	0.232	0.505	-0.120	0.570	0.182	0.303	0.064	0.764
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20001	0.312	-0.097	0.178	0.112	0.029	0.119	0.293	0.294	0.312	0.224	0.019	1	-0.066	-0.231	0.341	-0.069	-0.177	0.409	0.049	-0.304	0.155	0.233	0.526	-0.028	0.676	0.676
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20002	0.544	-0.271	0.473	-0.088	0.528	0.029	0.534	-0.334	0.464	0.263	0.413	-0.066	1	0.815	0.621	0.556	0.002	0.625	0.515	0.642	0.220	0.171	0.427	0.736	-0.472	0.815
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20004	0.358	-0.255	0.614	-0.154	0.622	0.041	0.632	-0.286	0.542	0.480	0.466	-0.231	0.815	1	0.643	0.735	-0.146	0.338	0.746	0.754	0.412	0.040	0.366	0.893	-0.611	0.893
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20007	0.603	-0.275	0.675	-0.399	0.481	-0.057	0.829	-0.132	0.710	0.272	0.145	0.341	0.621	0.643	1	0.825	-0.046	0.406	0.526	0.511	0.744	0.097	0.718	0.753	-0.074	0.829
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20009	0.582	-0.264	0.654	-0.353	0.446	-0.163	0.720	-0.267	0.573	0.054	0.133	-0.069	0.556	0.735	0.825	1	-0.171	0.139	0.663	0.764	0.747	0.080	0.360	0.771	-0.326	0.825
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20010	-0.193	0.323	-0.088	-0.393	0.026	-0.017	-0.028	-0.041	-0.066	-0.057	-0.117	-0.177	0.002	-0.146	-0.046	-0.171	1	-0.107	-0.433	0.050	0.157	-0.039	-0.007	-0.225	0.026	0.323
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20011	0.733	-0.007	0.594	0.348	0.520	0.503	0.496	0.086	0.685	0.469	0.551	0.409	0.625	0.338	0.406	0.139	-0.107	1	0.197	0.281	0.007	0.721	0.354	0.340	0.096	0.733
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20103	0.291	-0.044	0.358	0.160	0.176	0.248	0.359	-0.163	0.319	0.372	0.232	0.049	0.515	0.746	0.526	0.663	-0.433	0.197	1	0.407	0.508	-0.102	0.378	0.872	-0.558	0.872
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20106	0.604	-0.244	0.730	-0.253	0.740	-0.136	0.716	-0.231	0.581	0.165	0.505	-0.304	0.642	0.754	0.511	0.764	0.050	0.281	0.407	1	0.392	0.408	0.077	0.551	-0.296	0.764
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20107	0.338	0.013	0.435	-0.284	0.091	0.019	0.596	-0.171	0.420	0.171	-0.120	0.155	0.220	0.412	0.744	0.747	0.157	0.007	0.508	0.392	1	-0.043	0.584	0.641	-0.023	0.747
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20108	0.736	0.119	0.668	0.352	0.569	0.427	0.454	0.248	0.660	0.273	0.570	0.233	0.171	0.040	0.097	0.080	-0.039	0.721	-0.102	0.408	-0.043	1	-0.101	-0.062	0.293	0.736
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
20111	0.325	-0.166	0.249	-0.218	0.146	0.047	0.592	0.069	0.330	0.475	0.182	0.526	0.427	0.366	0.718	0.360	-0.007	0.354	0.378	0.077	0.584	-0.101	1	0.615	0.394	0.718
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
05109	0.403	-0.136	0.501	-0.058	0.350	0.174	0.598	-0.230	0.479	0.471	0.303	-0.028	0.736	0.893	0.753	0.771	-0.225	0.340	0.872	0.551	0.641	-0.062	0.615	1	-0.481	0.893
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	
03137	0.194	-0.184	-0.067	-0.064	-0.087	-0.189	0.222	0.350	-0.026	0.019	0.064	0.676	-0.472	-0.611	-0.074	-0.326	0.026	0.096	-0.558	-0.296	-0.023	0.293	0.394	-0.481	1	0.676
	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	

(2) Flood in 1989

Y / X	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	0.038	-0.099	-0.283	0.018	0.372	0.553	0.193	-0.257	0.481	-0.218	0.608	0.192	0.000	0.098	0.487	0.156	0.387	0.598	0.150	0.500	-0.160	0.678	0.201	0.588	0.678
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19004	0.038	1	-0.182	0.139	-0.154	-0.412	0.062	0.050	-0.306	-0.057	0.510	0.210	0.028	0.000	-0.069	-0.068	-0.076	0.094	0.137	0.586	0.055	-0.360	0.037	-0.121	0.011	0.586
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19009	-0.099	-0.182	1	-0.434	0.397	0.199	0.123	0.087	-0.121	-0.343	0.022	0.365	0.143	0.000	0.050	-0.588	0.669	0.352	-0.189	-0.318	0.253	0.295	0.340	0.551	0.070	0.669
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19010	0.283	0.139	-0.434	1	0.086	-0.153	0.213	-0.229	0.576	0.222	-0.139	-0.245	-0.341	0.000	0.342	0.203	-0.476	-0.226	-0.105	0.365	-0.405	0.271	-0.494	-0.322	-0.055	0.576
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19014	0.018	-0.154	0.397	0.086	1	0.423	0.498	0.499	0.238	0.196	-0.404	0.249	0.571	0.000	0.363	-0.242	0.330	0.587	-0.109	0.022	0.495	0.031	0.392	0.734	0.305	0.734
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19015	0.372	-0.412	0.199	-0.153	0.423	1	0.447	0.547	-0.009	0.207	-0.261	0.063	0.240	0.000	-0.121	0.109	0.418	0.542	0.207	-0.216	0.233	-0.161	0.460	0.189	0.612	0.612
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19016	0.553	0.062	0.123	0.213	0.498	0.447	1	0.152	-0.006	0.235	-0.218	0.539	0.095	0.000	0.295	0.010	-0.032	0.483	0.134	0.047	0.276	-0.239	0.473	0.407	0.656	0.656
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19101	0.193	0.050	0.087	-0.229	0.499	0.547	0.152	1	0.024	0.380	0.153	0.299	0.737	0.000	0.115	0.287	0.654	0.624	0.309	0.060	0.707	-0.302	0.554	0.468	0.298	0.737
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19114	-0.257	-0.306	-0.121	0.576	0.238	-0.009	-0.006	0.024	1	0.465	-0.130	0.053	-0.106	0.000	0.801	0.411	0.029	-0.084	0.142	0.275	-0.069	0.587	-0.215	0.065	0.103	0.801
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19116	0.481	-0.057	-0.343	0.222	0.196	0.207	0.235	0.380	0.465	1	-0.003	0.334	0.445	0.000	0.496	0.804	0.176	0.000	0.280	0.145	0.461	0.194	0.173	0.171	0.255	0.804
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19017	-0.218	0.510	0.022	-0.139	-0.404	-0.261	-0.218	0.153	-0.130	-0.003	1	0.093	-0.010	0.000	-0.113	0.043	0.206	-0.299	-0.110	-0.082	-0.080	-0.221	-0.222	-0.211	-0.250	0.510
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20001	0.608	0.210	0.365	-0.245	0.249	0.063	0.539	0.299	0.053	0.334	0.093	1	0.314	0.000	0.591	0.236	0.487	0.564	0.487	0.238	0.717	0.013	0.769	0.665	0.546	0.769
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20002	0.192	0.028	0.143	-0.341	0.571	0.240	0.095	0.737	-0.106	0.445	-0.010	0.314	1	0.000	0.096	0.102	0.480	0.429	-0.092	-0.158	0.849	-0.294	0.507	0.715	0.148	0.849
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20007	0.098	-0.069	0.050	0.342	0.363	-0.121	0.295	0.115	0.801	0.496	-0.113	0.591	0.096	0.000	1	0.391	0.159	0.228	0.351	0.411	0.343	0.424	0.233	0.464	0.322	0.801
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20009	0.487	-0.068	-0.588	0.203	-0.242	0.109	0.010	0.287	0.411	0.804	0.043	0.236	0.102	0.000	0.391	1	0.055	-0.059	0.601	0.288	0.264	0.152	0.124	-0.172	0.191	0.804
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20010	0.156	-0.076	0.669	-0.476	0.330	0.418	-0.032	0.654	0.029	0.176	0.206	0.487	0.480	0.000	0.159	0.055	1	0.527	0.283	-0.054	0.618	0.232	0.566	0.503	0.211	0.669
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20011	0.387	0.094	0.352	-0.226	0.587	0.542	0.483	0.624	-0.084	0.000	-0.299	0.564	0.429	0.000	0.228	-0.059	0.527	1	0.490	0.332	0.655	-0.269	0.880	0.642	0.722	0.880
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20103	0.598	0.137	-0.189	-0.105	-0.109	0.207	0.134	0.309	0.142	0.280	-0.110	0.487	-0.092	0.000	0.351	0.601	0.283	0.490	1	0.662	0.319	0.069	0.560	-0.014	0.488	0.662
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20106	0.150	0.586	-0.318	0.365	0.022	-0.216	0.047	0.060	0.275	0.145	-0.082	0.238	-0.158	0.000	0.411	0.288	-0.054	0.332	0.662	1	0.062	0.090	0.180	-0.109	0.289	0.662
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20107	0.500	0.055	0.253	-0.405	0.495	0.233	0.276	0.707	-0.069	0.461	-0.080	0.717	0.849	0.000	0.343	0.264	0.618	0.655	0.319	0.062	1	-0.161	0.815	0.816	0.375	0.849
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20108	-0.160	-0.360	0.295	0.271	0.031	-0.161	-0.239	-0.302	0.587	0.194	-0.221	0.013	-0.294	0.000	0.424	0.152	0.232	-0.269	0.069	0.090	-0.161	1	-0.271	-0.077	-0.282	0.587
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20111	0.678	0.037	0.340	-0.494	0.392	0.460	0.473	0.554	-0.215	0.173	-0.222	0.769	0.507	0.000	0.233	0.324	0.566	0.880	0.560	0.180	0.815	-0.271	1	0.696	0.721	0.880
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
05109	0.201	-0.121	0.551	-0.322	0.734	0.189	0.407	0.468	0.065	0.171	-0.211	0.665	0.715	0.000	0.464	-0.172	0.503	0.642	-0.014	-0.109	0.816	-0.077	0.696	1	0.375	0.816
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
03137	0.588	0.011	0.070	-0.055	0.305	0.612	0.656	0.298	0.103	0.255	-0.250	0.546	0.148	0.000	0.322	0.191	0.211	0.722	0.488	0.289	0.375	-0.282	0.721	0.375	1	0.722
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	

Note: Upper Row: Correlation Coefficient
Lower Row: Sample Number

Table I.3.5 (2/2) CORRELATION OF DAILY RAINFALL DURING STORMS

(3) Flood in 1991

X \ Y	19001	19004	19009	19010	19014	19015	19016	19101	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	05109	03137	Max.
19001	1	0.710	0.465	0.640	0.653	-0.367	0.697	-0.221	0.364	-0.017	0.200	0.753	0.054	0.000	-0.037	0.569	0.141	0.830	0.768	-0.309	-0.501	0.421	-0.204	0.507	-0.039	0.830
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19004	0.710	1	0.429	0.462	0.699	-0.243	0.888	-0.022	0.408	0.132	-0.106	0.538	-0.113	0.000	-0.092	0.117	0.312	0.323	0.755	-0.178	-0.303	-0.127	0.113	0.099	-0.030	0.888
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19009	0.465	0.429	1	0.289	0.797	-0.242	0.671	-0.052	0.923	-0.386	0.584	0.348	-0.224	0.000	-0.310	-0.002	0.237	0.566	0.563	-0.442	-0.296	-0.034	-0.367	0.138	0.208	0.923
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19010	0.640	0.462	0.289	1	0.453	-0.010	0.580	-0.223	0.236	0.274	0.182	0.924	-0.048	0.000	-0.522	0.538	0.261	0.518	0.796	-0.292	-0.132	0.475	0.098	0.314	-0.372	0.924
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19014	0.653	0.699	0.797	0.453	1	-0.319	0.863	-0.189	0.654	-0.100	0.405	0.573	-0.058	0.000	-0.179	0.011	0.163	0.622	0.764	-0.369	-0.345	0.026	-0.259	0.304	0.223	0.863
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19015	-0.367	-0.243	-0.242	-0.010	-0.319	1	-0.201	0.611	-0.436	0.131	0.102	-0.122	0.044	0.000	-0.312	-0.165	-0.110	-0.208	-0.182	-0.225	0.102	-0.294	0.049	-0.260	-0.188	0.611
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19016	0.697	0.888	0.671	0.580	0.863	-0.201	1	-0.029	0.586	-0.022	0.129	0.696	-0.311	0.000	-0.212	-0.017	0.239	0.501	0.921	-0.297	-0.326	-0.063	-0.191	0.180	-0.049	0.921
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19101	-0.221	-0.022	-0.052	-0.223	-0.189	0.611	-0.029	1	-0.176	-0.224	-0.315	-0.202	-0.202	0.000	-0.233	-0.338	0.171	-0.239	-0.094	-0.104	-0.425	-0.292	-0.200	-0.331	-0.390	0.611
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19114	0.364	0.408	0.923	0.236	0.654	-0.436	0.586	-0.176	1	-0.377	0.385	0.240	-0.287	0.000	-0.270	0.015	0.299	0.363	0.472	-0.306	-0.128	-0.072	-0.170	0.092	0.210	0.923
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19116	-0.017	0.132	-0.386	0.274	-0.100	0.131	-0.022	-0.224	-0.377	1	-0.155	0.158	0.315	0.000	-0.067	-0.009	-0.161	-0.281	-0.045	-0.157	0.016	-0.191	0.671	-0.383	-0.345	0.671
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
19017	0.200	-0.106	0.584	0.182	0.405	0.102	0.129	-0.315	0.385	-0.155	1	0.206	0.093	0.000	-0.178	0.223	0.032	0.551	0.134	-0.417	-0.010	0.168	-0.324	0.106	0.288	0.584
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20001	0.753	0.538	0.348	0.924	0.573	-0.122	0.696	-0.202	0.240	0.158	0.206	1	-0.247	0.000	-0.278	0.442	0.266	0.643	0.893	-0.339	-0.349	0.475	-0.189	0.374	-0.402	0.924
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20002	0.054	-0.113	-0.224	-0.048	-0.058	0.044	-0.311	-0.202	-0.287	0.315	0.093	-0.247	1	0.000	-0.202	0.326	-0.319	0.094	-0.322	0.189	0.188	0.210	0.452	0.112	0.408	0.452
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20007	-0.037	-0.092	-0.310	-0.522	-0.179	-0.312	-0.212	-0.233	-0.270	-0.067	-0.178	-0.278	-0.202	0.000	1	-0.157	-0.338	-0.065	-0.295	-0.074	-0.089	-0.267	-0.212	0.244	0.276	0.276
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20009	0.569	0.117	-0.002	0.538	0.011	-0.165	-0.017	-0.338	0.015	-0.009	0.223	0.442	0.326	0.000	-0.157	1	0.319	0.491	0.209	-0.097	-0.054	0.705	0.177	0.474	-0.049	0.705
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20010	0.141	0.312	0.237	0.261	0.163	-0.110	0.239	0.171	0.299	-0.161	0.032	0.266	-0.319	0.000	-0.338	0.319	1	-0.099	0.243	0.004	-0.243	0.222	0.103	-0.268	-0.433	0.319
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20011	0.830	0.323	0.566	0.518	0.622	-0.208	0.501	-0.239	0.363	-0.281	0.551	0.643	0.094	0.000	-0.065	0.491	-0.099	1	0.632	-0.339	-0.380	0.525	-0.539	0.656	0.179	0.830
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20103	0.768	0.755	0.563	0.796	0.764	-0.182	0.921	-0.094	0.472	-0.045	0.134	0.893	-0.322	0.000	-0.295	0.209	0.243	0.632	1	-0.253	-0.303	0.255	-0.265	0.362	-0.192	0.921
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20106	-0.309	-0.178	-0.442	-0.292	-0.369	-0.225	-0.297	-0.104	-0.306	-0.157	-0.417	-0.339	0.189	0.000	-0.074	-0.097	0.004	-0.339	-0.253	1	0.480	0.300	0.073	-0.160	0.093	0.480
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20107	-0.501	-0.303	-0.296	-0.132	-0.345	0.102	-0.326	-0.425	-0.128	0.016	-0.010	-0.349	0.188	0.000	-0.089	-0.054	-0.243	-0.380	-0.303	0.480	1	-0.094	0.392	0.021	0.474	0.480
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20108	0.421	-0.127	-0.034	0.475	0.026	-0.294	-0.063	-0.292	-0.072	-0.191	0.168	0.475	0.210	0.000	-0.267	0.705	0.222	0.525	0.255	0.300	-0.094	1	-0.241	0.428	-0.191	0.705
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
20111	-0.204	0.113	-0.367	0.098	-0.259	0.049	-0.191	-0.200	-0.170	0.671	-0.324	-0.189	0.452	0.000	-0.212	0.177	0.103	-0.539	-0.265	0.073	0.392	-0.241	1	-0.310	-0.022	0.671
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
05109	0.507	0.099	0.138	0.314	0.304	-0.260	0.180	-0.331	0.092	-0.383	0.106	0.374	0.112	0.000	0.244	0.474	-0.268	0.656	0.362	-0.160	0.021	0.428	-0.310	1	0.445	0.656
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	
03137	-0.039	-0.030	0.208	-0.372	0.223	-0.188	-0.049	-0.390	0.210	-0.345	0.288	-0.402	0.408	0.000	0.276	-0.049	-0.433	0.179	-0.192	0.093	0.474	-0.191	-0.022	0.445	1	0.474
	12	12	12	12	12	12	12	12	12	12	12	12	12	0	12	12	12	12	12	12	12	12	12	12	12	

Table I.3.6 THIESSEN COEFFICIENTS BY SUB-BASIN

Kampar River Basin

Station	Sub-Basin No.																	
	KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10	KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18
19001																		
19004	0.231	0.237	0.188															
19009																		
19010																		
19014																		
19015																		
19016																		
19017																		
19101																		
19114																		
19116																		
20001				0.821							0.523		0.347					
20002								0.009				0.294		0.024	0.178			
20004																		0.385
20007				0.059									0.081	0.509	0.481	0.839	0.177	0.467
20009				0.065										0.156		0.157		
20010	0.571	0.660																
20011					0.186	0.190		0.213	0.683			0.407	0.090	0.297	0.015			
20103															0.326	0.004	0.823	0.148
20106					0.242	0.758			0.317	0.670	0.351	0.160	0.482	0.015				
20107																		
20108					0.090		1.000	0.777				0.138						
20111																		
05109																		
03137																		
20200	0.198	0.103	0.812	0.054	0.482	0.051				0.330	0.126							

Indaragiri River Basin

Station	Sub-Basin No.																	
	IB-1	IB-2	IB-3	IB-4	IB-5	IB6	IB-7	IB-8	IB-9	IB-10	IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19
19001	0.347	0.105	0.627																
19004	0.033																		
19009																			
19010							0.303	0.012											
19014				0.158				0.071	0.525	0.379	1.000	0.708							
19015		0.016	0.373	0.842				0.419				0.084							
19016	0.059	0.855					0.105	0.189											
19017					0.763	0.319			0.475	0.268									
19101																			
19114					0.237	0.681	0.592	0.309		0.352									
19116	0.561	0.024																	
20001																			
20002												0.103	0.908	0.984	0.930	0.032			
20004																			0.665
20007																			
20009																			
20010																			
20011																			
20103														0.016		0.205			
20106																			
20107																	0.618	0.176	0.335
20108												0.106	0.092						
20111															0.070	0.412	0.038	0.824	
05109																0.351	0.345		
03137																			
20200																			

Note: Figures may not add up to totals sue to rounding

Table I.3.7 PROBABLE DAILY RAINFALL AT EACH STATION

unit : mm

Annual Maximum Daily Rainfall (Recorded)

Year	Station Number																						Year
	19001	19004	19010	19014	19015	19016	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	20200	05109	
1961				109																				1961
1962				169																				1962
1963				112																				1963
1964				125																				1964
1965				83																				1965
1966				114																				1966
1967				75																				1967
1968				143																				1968
1969																								1969
1970			149							115														1970
1971			112							85								75						1971
1972			104							103								88						1972
1973			187	84						125								80						1973
1974				130						160								76						1974
1975			131	84						75								76						1975
1976			138	84						117														1976
1977			105	85						107														1977
1978			132	97						76	194							97						1978
1979		69	140	121						56	132	128						110		76				1979
1980		67	164	82					110	98	140	80	64				109	110	100	90				1980
1981	66	82	121	128			77	74	103	109	114	68	100	86			78	100	80	104		116		1981
1982	55	82	135	130	61		90	76	55	95	172	61	115	81			125	142	85	110		165		1982
1983	80	113	242	81	89	81	104	52	53	89	128	86	101	86	90	75	130	97	102	86		112	117	1983
1984	58	99	127	64	74	107	80	70	39	211	96	85	124	110	85	94	90	107	143	90	115	124	101	1984
1985	77	81	134	53	91	95	84	60	45	170	105	93	108	67	103	95	183	111	60	87	105	82	149	1985
1986	97	79	136	114	64	65	75	78	69	81	100	100	65	108	102	148	97	137	65	105	109	120	88	1986
1987	95	84	182		100	101	64	85		102	73	88	84	99	100	93	220	79	54	121	56	125	113	1987
1988	74	115	145		61		41	85		90	79	119	130	80	100	134	152	88		73	92	93	147	1988
1989	57	84	165	95	113	70	93	106	49	84	73		104	54	29	125	94	113	87	105	114	87	108	1989
1990	60	65	127	58	63	74	67	110	27	101	78		87	69	44	93		100	130	125	139	129	88	1990
1991	93	94	253	94	79	145	198	174	81	129	84		84	91	64	130	60	104	87	100	60	160	96	1991
1992	149	76	130	117	83	74	196	51	64	120	77		86	65	60	73	59	126	82	80	59	88	100	1992
1993		77				105	200																101	1993
Max.	149	115	253	169	113	145	200	174	110	211	194	128	130	110	103	148	220	142	143	125	139	165	149	Max.
Min.	55	65	104	53	61	65	41	51	27	56	73	61	64	54	29	73	59	75	54	73	56	82	88	Min.

unit : mm

Probable Daily Rainfall

Return Period (Year)	Station Number																						Return Period (Year)
	19001	19004	19010	19014	19015	19016	19114	19116	19017	20001	20002	20004	20007	20009	20010	20011	20103	20106	20107	20108	20111	20200	05109	
2	76	82	142	97	77	88	98	80	64	103	104	88	93	81	80	103	110	98	86	94	90	113	107	2
3	91	90	162	111	87	102	127	99	77	120	124	100	104	90	93	117	136	108	100	103	108	128	119	3
5	107	99	183	126	98	117	160	119	92	139	146	113	117	101	107	134	166	119	116	112	127	144	131	5
8	121	107	202	139	107	130	188	137	106	155	164	124	127	110	119	148	192	128	130	120	143	158	143	8
10	127	110	210	145	111	136	202	145	112	163	173	129	132	114	124	154	203	133	137	124	151	165	148	10
20	147	121	236	163	124	155	241	169	130	186	199	145	147	127	141	174	239	146	156	136	174	184	163	20
25	153	124	244	168	128	161	254	177	136	193	208	150	151	131	147	180	250	150	162	139	181	191	168	25
30	158	127	251	173	132	165	264	183	141	199	215	154	155	134	151	186	260	154	167	142	187	196	172	30
50	172	134	269	186	141	179	293	201	154	215	233	165	166	143	163	200	285	163	181	150	203	210	183	50
70	181	139	282	195	147	187	311	212	162	226	246	173	173	149	171	209	302	169	190	156	214	219	191	70
80	184	141	286	198	149	191	319	217	166	230	251	175	176	151	174	213	309	172	194	158	218	223	194	80
100	191	145	294	204	153	196	331	225	172	238	259	180	180	155	180	219	320	176	200	162	226	229	199	100
150	202	151	309	214	161	207	354	239	182	251	274	189	189	163	189	230	340	183	211	168	239	240	207	150
200	209	155	319	221	166	214	369	248	189	260	284	196	194	168	196	238	355	189	218	173	248	248	214	200

Table I.3.8 (1/2) PROBABLE RAINFALL BY BASIN

Kotapanjang Dam Basin (KB-5)

(A) Annual Maximum Rainfall Unit: mm

Year	1-day	2-day	3-day	5-day	7-day	10-day
1981	65.3	90.9	114.0	159.9	173.4	229.1
1982	63.2	97.1	105.8	135.3	201.3	247.0
1983	48.1	79.1	92.4	133.1	189.0	209.8
1984	57.4	100.3	131.8	164.9	191.8	225.7
1985	48.2	71.9	102.0	160.5	212.6	267.2
1986	60.7	80.7	114.5	180.2	227.8	267.6
1987	70.3	113.0	134.4	182.8	254.7	303.3
1988	52.8	87.6	110.8	168.3	217.4	285.9
1989	38.0	72.6	84.0	113.1	142.1	165.1
1990	49.8	61.9	87.9	142.4	182.4	199.9
1991	68.0	108.6	145.1	177.9	221.6	264.1
1992	38.6	65.9	84.1	106.8	136.0	164.9

(B) Probable Rainfall and Amplification Rate for Model Hyetograph Unit: mm & Ratio

Return Period (Year)	1-DAY (1)	(1)/(a)	2-DAY (2)	(2)/(a)	3-DAY (3)	(3)/(a)	5-DAY (4)	(4)/(a)	7-DAY (5)	(5)/(a)	10-DAY (6)	(6)/(a)
2	53.5	0.79	83.5	0.77	106.1	0.73	148.5	0.83	191.0	0.86	229.6	0.87
3	59.4	0.87	92.5	0.85	117.2	0.81	162.5	0.91	209.9	0.95	254.0	0.96
5	66.0	0.97	102.6	0.94	129.5	0.89	178.1	1.00	230.9	1.04	281.3	1.07
8	71.7	1.05	111.3	1.02	140.1	0.97	191.6	1.08	248.9	1.12	304.7	1.15
10	74.3	1.09	115.3	1.06	145.0	1.00	197.8	1.11	257.2	1.16	315.5	1.19
20	82.3	1.21	127.5	1.17	159.9	1.10	216.6	1.22	282.6	1.28	348.3	1.32
25	84.8	1.25	131.3	1.21	164.7	1.14	222.5	1.25	290.6	1.31	358.7	1.36
30	86.9	1.28	134.4	1.24	168.5	1.16	227.4	1.28	297.1	1.34	367.2	1.39
50	92.6	1.36	143.2	1.32	179.2	1.24	240.9	1.35	315.3	1.42	390.8	1.48
70	96.3	1.42	148.9	1.37	186.2	1.28	249.8	1.40	327.2	1.48	406.3	1.54
80	97.8	1.44	151.2	1.39	189.0	1.30	253.3	1.42	332.0	1.50	412.4	1.56
100	100.3	1.48	155.0	1.43	193.7	1.33	259.2	1.46	339.8	1.53	422.7	1.60
150	104.8	1.54	161.9	1.49	202.1	1.39	269.8	1.52	354.2	1.60	441.2	1.67
200	108.0	1.59	166.7	1.53	208.0	1.43	277.4	1.56	364.3	1.64	454.4	1.72
1000	125.8	1.85	193.9	1.79	241.4	1.66	319.5	1.80	420.9	1.90	527.9	2.00
Actual (a)	68.0		108.6		145.1		177.9		221.6		264.1	
Date	Dec.14		Dec.14-15		Dec.13-15		Dec.13-17		Dec.11-17		Dec.7-16	

Kampar Kiri River Basin (Lipat Kain)

(A) Annual Maximum Rainfall Unit: mm

Year	1-day	2-day	3-day	5-day	7-day	10-day
1981	82.1	114.3	115.9	160.3	162.0	199.9
1982	77.7	121.0	155.0	187.9	233.0	282.6
1983	68.4	88.8	119.1	165.4	218.3	239.7
1984	58.3	113.4	126.5	163.3	189.6	230.9
1985	61.8	80.9	101.1	127.9	165.5	225.1
1986	71.4	110.3	130.8	190.3	226.6	279.9
1987	59.8	74.7	91.9	117.5	135.8	164.9
1988	64.2	77.6	96.0	140.2	173.6	204.7
1989	54.2	91.0	107.2	156.5	204.4	263.8
1990	71.7	88.5	112.6	166.7	236.1	299.1
1991	69.8	80.7	97.7	107.2	140.0	168.4
1992	46.4	67.4	89.5	111.6	132.2	185.8

(B) Probable Rainfall and Amplification Rate for Model Hetograph Unit: mm & Ratio

Return Period (Year)	1-DAY (1)	(1)/(a)	2-DAY (2)	(2)/(a)	3-DAY (3)	(3)/(a)	5-DAY (4)	(4)/(a)	7-DAY (5)	(5)/(a)	10-DAY (6)	(6)/(a)
2	64.0	0.92	89.9	1.11	109.3	1.12	145.6	1.36	179.4	1.28	222.4	1.32
3	69.5	1.00	99.6	1.23	119.7	1.23	161.1	1.50	200.4	1.43	247.2	1.47
5	75.6	1.08	110.5	1.37	131.2	1.34	178.3	1.66	223.9	1.60	274.9	1.63
8	80.9	1.16	119.8	1.48	141.2	1.45	193.1	1.80	244.1	1.74	298.7	1.77
10	83.3	1.19	124.1	1.54	145.8	1.49	199.9	1.86	253.4	1.81	309.6	1.84
20	90.7	1.30	137.2	1.70	159.7	1.63	220.7	2.06	281.7	2.01	343.0	2.04
25	93.0	1.33	141.4	1.75	164.2	1.68	227.3	2.12	290.7	2.08	353.5	2.10
30	94.9	1.36	144.8	1.79	167.7	1.72	232.7	2.17	298.0	2.13	362.1	2.15
50	100.2	1.44	154.2	1.91	177.8	1.82	247.6	2.31	318.3	2.27	386.1	2.29
70	103.6	1.48	160.3	1.99	184.3	1.89	257.4	2.40	331.6	2.37	401.8	2.39
80	105.0	1.50	162.8	2.02	187.0	1.91	261.2	2.44	336.9	2.41	408.0	2.42
100	107.3	1.54	166.9	2.07	191.3	1.96	267.7	2.50	345.7	2.47	418.4	2.48
150	111.5	1.60	174.3	2.16	199.2	2.04	279.5	2.61	361.8	2.58	437.3	2.60
200	114.4	1.64	179.5	2.22	204.8	2.10	287.8	2.68	373.1	2.67	450.7	2.68
1000	130.9	1.88	208.8	2.59	236.0	2.42	334.3	3.12	436.4	3.12	525.3	3.12
Actual(A)	69.8		80.7		97.7		107.2		140.0		168.4	
Date 1991	Dec.14		Dec.14-15		Dec.13-15		Dec.13-17		Dec.11-17		Dec.7-16	

Table I.3.8 (2/2) PROBABLE RAINFALL BY BASIN

Kuantan Dam Basin

(A) Annual Maximum Rainfall — Unit: mm

Year	1-day	2-day	3-day	5-day	7-day	10-day
1981	44.3	58.2	71.6	93.9	106.3	146.6
1982	51.3	67.6	78.6	98.4	126.3	158.7
1983	26.9	46.0	57.3	79.9	94.8	121.9
1984	40.4	59.4	77.5	104.5	125.1	151.1
1985	35.9	52.5	67.6	91.9	154.9	247.8
1986	53.8	90.7	112.6	174.0	223.4	249.6
1987	57.4	78.2	101.8	127.4	164.3	184.8
1988	35.8	58.5	86.6	115.9	149.0	185.4
1989	35.5	58.6	87.7	145.1	186.8	232.3
1990	28.9	49.8	65.6	89.6	121.3	160.4
1991	70.8	84.1	115.2	182.8	207.8	258.4
1992	53.4	75.4	94.7	116.6	170.1	209.9

(B) Probable Rainfall and Amplification Rate for Model Hyetograph — Unit: mm & Ratio

Return Period (Year)	1-DAY		2-DAY		3-DAY		5-DAY		7-DAY		10-DAY	
	(1)	(1)/(a)	(2)	(2)/(a)	(3)	(3)/(a)	(4)	(4)/(a)	(5)	(5)/(a)	(6)	(6)/(a)
2	42.7	0.79	62.9	0.69	82.1	0.73	113.7	0.65	185.8	0.83	242.3	0.97
3	49.8	0.93	70.7	0.78	92.3	0.82	131.9	0.76	211.1	0.94	272.8	1.09
5	57.7	1.07	79.3	0.87	103.5	0.92	152.2	0.87	239.2	1.07	306.7	1.23
8	64.6	1.20	86.7	0.96	113.2	1.01	169.6	0.97	263.4	1.18	335.8	1.35
10	67.7	1.26	90.2	0.99	117.7	1.05	177.6	1.02	274.6	1.23	349.3	1.40
20	77.2	1.43	100.6	1.11	131.3	1.17	202.0	1.16	308.5	1.38	390.1	1.56
25	80.3	1.49	103.9	1.15	135.6	1.20	209.8	1.21	319.3	1.43	403.1	1.61
30	82.7	1.54	106.6	1.18	139.1	1.24	216.1	1.24	328.0	1.47	413.6	1.66
50	89.6	1.67	114.1	1.26	148.8	1.32	233.7	1.34	352.5	1.58	443.0	1.77
70	94.1	1.75	119.0	1.31	155.2	1.38	245.2	1.41	368.4	1.65	462.3	1.85
80	95.9	1.78	120.9	1.33	157.8	1.40	249.8	1.44	374.8	1.68	469.9	1.88
100	98.9	1.84	124.2	1.37	162.0	1.44	257.4	1.48	385.4	1.73	482.7	1.93
150	104.3	1.94	130.0	1.43	169.7	1.51	271.2	1.56	404.6	1.81	505.8	2.03
200	108.1	2.01	134.2	1.48	175.1	1.56	281.0	1.61	418.2	1.87	522.2	2.09
1000	129.5	2.41	157.5	1.74	205.5	1.83	335.7	1.93	494.1	2.21	613.6	2.46
Actual(A)	53.8		90.7		112.6		174.0		223.4		249.6	
Date 1991	Jan.5		Jan.4-5		Jan.4-6		Jan.4-8		Jan.3-9		Jan.1-10	

Indragiri River Basin (Japura)

(A) Annual Maximum Rainfall — Unit: mm

Year	1-day	2-day	3-day	5-day	7-day	10-day
1981	43.2	50.9	58.6	85.3	115.2	140.4
1982	50.4	77.2	92.1	128.2	162.2	219.0
1983	38.4	56.6	87.4	110.9	126.6	166.2
1984	38.5	54.2	67.3	88.1	122.7	175.4
1985	32.4	41.6	53.8	81.8	128.9	215.6
1986	38.5	67.6	94.0	151.6	192.8	222.7
1987	36.0	55.6	65.4	90.4	107.9	142.4
1988	35.7	56.7	71.2	111.1	139.2	165.5
1989	39.2	62.4	81.8	132.6	171.5	209.9
1990	33.4	50.6	56.1	88.1	106.8	151.6
1991	43.6	68.9	90.5	139.7	185.0	221.6
1992	40.0	55.0	82.8	103.0	126.0	178.6

(B) Probable Rainfall and Amplification Rate for Model Hetograph — Unit: mm & Ratio

Return Period (Year)	1-DAY		2-DAY		3-DAY		5-DAY		7-DAY		10-DAY	
	(1)	(1)/(a)	(2)	(2)/(a)	(3)	(3)/(a)	(4)	(4)/(a)	(5)	(5)/(a)	(6)	(6)/(a)
2	38.4	1.00	56.8	0.84	73.0	0.78	105.9	0.70	136.2	0.71	179.6	0.81
3	41.1	1.07	62.0	0.92	81.1	0.86	118.9	0.78	152.5	0.79	197.1	0.89
5	44.1	1.15	67.8	1.00	90.0	0.96	133.4	0.88	170.7	0.89	216.5	0.97
8	46.7	1.21	72.8	1.08	97.7	1.04	145.8	0.96	186.3	0.97	233.2	1.05
10	47.8	1.24	75.1	1.11	101.3	1.08	151.6	1.00	193.5	1.00	240.9	1.08
20	51.4	1.34	82.1	1.21	112.1	1.19	169.0	1.11	215.4	1.12	264.3	1.19
25	52.6	1.37	84.3	1.25	115.5	1.23	174.6	1.15	222.4	1.15	271.7	1.22
30	53.5	1.39	86.1	1.27	118.3	1.26	179.1	1.18	228.0	1.18	277.8	1.25
50	56.1	1.46	91.2	1.35	126.1	1.34	191.6	1.26	243.8	1.26	294.6	1.32
70	57.8	1.50	94.5	1.40	131.2	1.40	199.8	1.32	254.1	1.32	305.6	1.37
80	58.4	1.52	95.8	1.42	133.2	1.42	203.1	1.34	258.2	1.34	310.0	1.39
100	59.6	1.55	97.9	1.45	136.6	1.45	208.5	1.38	265.0	1.37	317.3	1.42
150	61.6	1.60	101.9	1.51	142.7	1.52	218.4	1.44	277.4	1.44	330.6	1.48
200	63.0	1.64	104.7	1.55	147.0	1.56	225.4	1.49	286.2	1.48	339.9	1.53
1000	71.1	1.85	120.4	1.78	171.2	1.82	264.4	1.74	335.2	1.74	392.3	1.76
Actual(A)	38.5		67.6		94.0		151.6		192.8		222.7	
Date 1991	Jan.5		Jan.4-5		Jan.4-6		Jan.4-8		Jan.3-9		Jan.1-10	

Table I.3.9 (1/2) RAINFALL DEPTH - DURATION CURVES

(1) PASAR KAMPAR RAINFALL STATION

Return Period (Year)	Rainfall Duration (min)	Observed Data (1) (mm/hr)	Rainfall Intensities Estimated				Difference of Rainfall Intensities			
			Eq. of Talbot (2) (mm/hr)	Eq. of Sherman (3) (mm/hr)	Eq. of Kano (4) (mm/hr)	Eq. of Horner (5) (mm/hr)	(1)-(2) (mm/hr)	(1)-(3) (mm/hr)	(1)-(4) (mm/hr)	(1)-(5) (mm/hr)
2	60	61.1	62.5	71.6	95.8	66.1	1.4	10.5	34.7	5.0
	120	42.1	41.2	39.9	35.2	40.6	0.9	2.2	6.9	1.5
	180	31.6	30.7	28.3	23.7	29.6	0.9	3.3	7.9	2.0
	360	17.4	17.4	15.8	13.7	16.6	0.0	1.6	3.7	0.8
	720	8.8	9.3	8.8	8.5	9.1	0.5	0.0	0.3	0.3
	1440	4.5	4.8	4.9	5.6	4.9	0.3	0.4	1.1	0.4
	2880	2.7	2.5	2.7	3.7	2.6	0.2	0.0	1.0	0.1
	AVERAGE						0.6	2.6	7.9	1.4
5	60	75.9	81.5	95.5	132.3	82.4	5.6	19.6	56.4	6.5
	120	56.5	55.2	53.8	48.8	55.3	1.3	2.7	7.7	1.2
	180	45.1	41.7	38.5	32.9	41.7	3.4	6.6	12.2	3.4
	360	25.1	24.1	21.7	18.9	24.0	1.0	3.4	6.2	1.1
	720	12.6	13.1	12.2	11.8	13.0	0.5	0.4	0.8	0.4
	1440	6.3	6.8	6.9	7.7	6.8	0.5	0.6	1.4	0.5
	2880	3.6	3.5	3.9	5.2	3.5	0.1	0.3	1.6	0.1
	AVERAGE						1.8	4.8	12.3	1.9
10	60	85.7	94.3	111.1	157.9	93.6	8.6	25.4	72.2	7.9
	120	66.0	64.5	62.8	57.8	64.7	1.5	3.2	8.2	1.3
	180	54.0	49.0	45.0	38.9	49.4	5.0	9.0	15.1	4.6
	360	30.1	28.5	25.5	22.4	28.7	1.6	4.6	7.7	1.4
	720	15.0	15.5	14.4	14.0	15.5	0.5	0.6	1.0	0.5
	1440	7.5	8.1	8.2	9.1	8.0	0.6	0.7	1.6	0.5
	2880	4.2	4.1	4.6	6.1	4.1	0.1	0.4	1.9	0.1
	AVERAGE						2.6	6.3	15.4	2.3
20	60	95.1	106.8	126.0	183.4	104.6	11.7	30.9	88.3	9.5
	120	75.1	73.5	71.5	66.6	73.7	1.6	3.6	8.5	1.4
	180	62.6	56.0	51.4	44.7	56.8	6.6	11.2	17.9	5.8
	360	35.0	32.7	29.2	25.7	33.3	2.3	5.8	9.3	1.7
	720	17.4	17.8	16.6	16.0	18.0	0.4	0.8	1.4	0.6
	1440	8.6	9.3	9.4	10.5	9.3	0.7	0.8	1.9	0.7
	2880	4.8	4.8	5.3	7.0	4.6	0.0	0.5	2.2	0.2
	AVERAGE						3.3	7.7	18.5	2.8
25	60	98.0	110.6	130.5	191.3	108.0	12.6	32.5	93.3	10.0
	120	78.0	76.3	74.2	69.4	76.5	1.7	3.8	8.6	1.5
	180	65.3	58.2	53.4	46.6	59.1	7.1	11.9	18.7	6.2
	360	36.6	34.1	30.4	26.8	34.8	2.5	6.2	9.8	1.8
	720	18.1	18.6	17.3	16.7	18.8	0.5	0.8	1.4	0.7
	1440	9.0	9.8	9.8	10.9	9.7	0.8	0.8	1.9	0.7
	2880	5.0	5.0	5.6	7.3	4.8	0.0	0.6	2.3	0.2
	AVERAGE						3.6	8.1	19.4	3.0
50	60	107.2	122.8	144.9	216.6	118.9	15.6	37.7	109.4	11.7
	120	86.9	85.1	82.7	77.9	85.2	1.8	4.2	9.0	1.7
	180	73.7	65.1	59.5	52.3	66.2	8.6	14.2	21.4	7.5
	360	41.3	38.2	34.0	30.0	39.2	3.1	7.3	11.3	2.1
	720	20.4	20.9	19.4	18.7	21.2	0.5	1.0	1.7	0.8
	1440	10.1	11.0	11.1	12.2	10.9	0.9	1.0	2.1	0.8
	2880	5.6	5.6	6.3	8.2	5.4	0.0	0.7	2.6	0.2
	AVERAGE						4.4	9.4	22.5	3.5
100	60	116.3	134.9	159.1	242.0	129.6	18.6	42.8	125.7	13.3
	120	95.7	93.8	91.0	86.5	93.9	1.9	4.7	9.2	1.8
	180	82.0	71.9	65.7	58.0	73.2	10.1	16.3	24.0	8.8
	360	46.1	42.3	37.6	33.2	43.6	3.8	8.5	12.9	2.5
	720	22.7	23.2	21.5	20.7	23.7	0.5	1.2	2.0	1.0
	1440	11.2	12.2	12.3	13.5	12.1	1.0	1.1	2.3	0.9
	2880	6.2	6.3	7.0	9.1	6.0	0.1	0.8	2.9	0.2
	AVERAGE						5.1	10.8	25.6	4.1
200	60	125.4	147.4	173.7	269.4	140.0	22.0	48.3	144.0	14.6
	120	104.5	102.6	99.4	95.1	102.5	1.9	5.1	9.4	2.0
	180	90.3	78.7	71.7	63.5	80.4	11.6	18.6	26.8	9.9
	360	50.8	46.3	41.1	36.3	48.2	4.5	9.7	14.5	2.6
	720	25.0	25.4	23.5	22.6	26.1	0.4	1.5	2.4	1.1
	1440	12.3	13.3	13.5	14.8	13.2	1.0	1.2	2.5	0.9
	2880	6.7	6.8	7.7	9.9	6.4	0.1	1.0	3.2	0.3
	AVERAGE						5.9	12.2	29.0	4.5
1000	60	146.5	175.7	206.5	330.3	165.1	29.2	60.0	183.8	18.6
	120	124.9	122.9	118.7	115.0	122.3	2.0	6.2	9.9	2.6
	180	109.5	94.5	85.8	76.6	96.6	15.0	23.7	32.9	12.9
	360	61.7	55.8	49.3	43.7	58.3	5.9	12.4	18.0	3.4
	720	30.3	30.7	28.4	27.2	31.7	0.4	1.9	3.1	1.4
	1440	14.8	16.1	16.3	17.7	16.0	1.3	1.5	2.9	1.2
	2880	8.1	8.3	9.4	11.9	7.8	0.2	1.3	3.8	0.3
	AVERAGE						7.7	15.3	36.3	5.8

Table I.3.9 (2/2) RAINFALL DEPTH - DURATION CURVES

(2) SIJUNJUNG RAINFALL STATION

Return Period (Year)	Rainfall Duration (min)	Observed Data (1) (mm/hr)	Rainfall Intensities Estimated				Difference of Rainfall Intensities			
			Eq. of Talbot (2) (mm/hr)	Eq. of Sherman (3) (mm/hr)	Eq. of Kuno (4) (mm/hr)	Eq. of Horner (5) (mm/hr)	(1)-(2) (mm/hr)	(1)-(3) (mm/hr)	(1)-(4) (mm/hr)	(1)-(5) (mm/hr)
2	60	40.5	39.7	45.0	49.6	40.1	0.8	4.5	9.1	0.4
	120	27.2	27.7	26.5	24.6	27.6	0.5	0.7	2.6	0.4
	180	20.7	21.3	19.5	17.8	21.0	0.6	1.2	2.9	0.3
	360	12.9	12.5	11.5	10.9	12.4	0.4	1.4	2.0	0.5
	720	6.7	6.9	6.8	7.1	6.9	0.2	0.1	0.4	0.2
	1440	3.7	3.6	4.0	4.7	3.7	0.1	0.3	1.0	0.0
	2880									
	AVERAGE						0.4	1.4	3.0	0.3
5	60	59.6	58.0	65.5	71.6	57.4	1.6	5.9	12.0	2.2
	120	39.4	40.6	38.8	36.1	40.4	1.2	0.6	3.3	1.0
	180	29.4	31.2	28.6	26.2	31.2	1.8	0.8	3.2	1.8
	360	19.7	18.5	16.9	16.1	18.5	1.2	2.8	3.6	1.2
	720	10.0	10.2	10.0	10.5	10.2	0.2	0.0	0.5	0.2
	1440	5.4	5.3	5.9	7.0	5.4	0.1	0.5	1.6	0.0
	2880									
	AVERAGE						1.0	1.8	4.0	1.1
10	60	72.3	70.0	79.0	86.1	69.1	2.3	6.7	13.8	3.2
	120	47.5	49.2	46.9	43.7	48.8	1.7	0.6	3.8	1.3
	180	35.1	37.9	34.6	31.7	37.8	2.8	0.5	3.4	2.7
	360	24.3	22.4	20.6	19.6	22.5	1.9	3.7	4.7	1.8
	720	12.1	12.4	12.2	12.7	12.4	0.3	0.1	0.6	0.3
	1440	6.6	6.5	7.3	8.5	6.6	0.1	0.7	1.9	0.0
	2880									
	AVERAGE						1.5	2.1	4.7	1.6
20	60	84.4	81.6	92.0	100.1	80.0	2.8	7.6	15.7	4.4
	120	55.2	57.4	54.7	51.0	57.0	2.2	0.5	4.2	1.8
	180	40.6	44.2	40.4	37.1	44.2	3.6	0.2	3.5	3.6
	360	28.7	26.2	24.0	22.9	26.4	2.5	4.7	5.8	2.3
	720	14.2	14.5	14.3	14.9	14.6	0.3	0.1	0.7	0.4
	1440	7.7	7.6	8.5	10.0	7.7	0.1	0.8	2.3	0.0
	2880									
	AVERAGE						1.9	2.3	5.4	2.1
25	60	88.2	85.3	96.2	104.7	83.5	2.9	8.0	16.5	4.7
	120	57.7	59.9	57.2	53.3	59.5	2.2	0.5	4.4	1.8
	180	42.3	46.2	42.2	38.7	46.2	3.9	0.1	3.6	3.9
	360	30.0	27.4	25.1	23.9	27.6	2.6	4.9	6.1	2.4
	720	14.8	15.1	14.9	15.5	15.2	0.3	0.1	0.7	0.4
	1440	8.0	7.9	8.8	10.4	8.0	0.1	0.8	2.4	0.0
	2880									
	AVERAGE						2.0	2.4	5.6	2.2
50	60	100.1	96.7	108.9	118.5	94.4	3.4	8.8	18.4	5.7
	120	65.3	68.0	64.8	60.4	67.5	2.7	0.5	4.9	2.2
	180	47.7	52.4	47.8	43.9	52.4	4.7	0.1	3.8	4.7
	360	34.3	31.1	28.4	27.1	31.3	3.2	5.9	7.2	3.0
	720	16.8	17.1	16.9	17.6	17.3	0.3	0.1	0.8	0.5
	1440	9.1	9.0	10.1	11.8	9.0	0.1	1.0	2.7	0.1
	2880									
	AVERAGE						2.4	2.7	6.3	2.7
100	60	111.9	107.9	121.4	132.1	105.2	4.0	9.5	20.2	6.7
	120	72.8	75.9	72.3	67.5	75.3	3.1	0.5	5.3	2.5
	180	53.0	58.6	53.4	49.1	58.6	5.6	0.4	3.9	5.6
	360	38.5	34.7	31.8	30.4	35.0	3.8	6.7	8.1	3.5
	720	18.8	19.2	18.9	19.7	19.3	0.4	0.1	0.9	0.5
	1440	10.2	10.1	11.3	13.2	10.1	0.1	1.1	3.0	0.1
	2880									
	AVERAGE						2.8	3.1	6.9	3.2
200	60	123.6	119.2	134.1	145.9	115.6	4.4	10.5	22.3	8.0
	120	80.3	83.8	79.8	74.5	83.2	3.5	0.5	5.8	2.9
	180	58.3	64.7	59.0	54.2	64.8	6.4	0.7	4.1	6.5
	360	42.7	38.3	35.1	33.5	38.8	4.4	7.6	9.2	3.9
	720	20.8	21.1	20.9	21.8	21.4	0.3	0.1	1.0	0.6
	1440	11.2	11.1	12.4	14.6	11.1	0.1	1.2	3.4	0.1
	2880									
	AVERAGE						3.2	3.4	7.6	3.7
1000	60	150.7	145.2	163.1	177.3	140.2	5.5	12.4	26.6	10.5
	120	97.6	102.2	97.2	90.8	101.3	4.6	0.4	6.8	3.7
	180	70.6	78.9	71.8	66.1	79.1	8.3	1.2	4.5	8.5
	360	52.5	46.8	42.8	40.9	47.5	5.7	9.7	11.6	5.0
	720	25.4	25.8	25.5	26.6	26.1	0.4	0.1	1.2	0.7
	1440	13.7	13.6	15.2	17.8	13.6	0.1	1.5	4.1	0.1
	2880									
	AVERAGE						4.1	4.2	9.1	4.8

Table I.3.10 MODEL HYETOGRAPH

(1) Pasar Kampar Rainfall Station

Time (hour)	Return Period								
	2-year (mm)	5-year (mm)	10-year (mm)	20-year (mm)	25-year (mm)	30-year (mm)	50-year (mm)	100-year (mm)	200-year (mm)
1	1.2	1.5	1.4	1.7	1.9	1.9	1.9	2.2	2.4
2	1.5	2.1	2.2	2.7	3.0	3.0	3.2	3.7	4.1
3	2.1	3.4	3.7	4.6	5.2	5.2	5.6	6.6	7.5
4	3.4	6.1	7.2	9.1	10.0	10.1	11.0	13.0	15.1
5	7.6	14.9	18.0	22.5	24.6	24.8	27.3	31.7	36.6
6	66.1	84.3	91.5	103.7	109.4	110.5	116.6	128.6	140.9
7	15.2	29.2	34.8	42.4	45.8	46.2	50.4	57.6	65.6
8	4.8	9.1	10.9	13.7	15.1	15.2	16.7	19.6	22.7
9	2.6	4.4	5.1	6.4	7.0	7.1	7.7	9.1	10.5
10	1.8	2.7	2.8	3.5	3.9	3.9	4.2	4.9	5.5
11	1.3	1.8	1.8	2.1	2.4	2.4	2.4	2.8	3.1
12	1.1	1.3	1.2	1.4	1.5	1.6	1.5	1.7	1.8
Total	108.8	160.8	180.7	213.7	229.7	232.1	248.4	281.5	315.9

(2) Sijunjung Rainfall Station

Time (hour)	Return Period								
	2-year (mm)	5-year (mm)	10-year (mm)	20-year (mm)	25-year (mm)	30-year (mm)	50-year (mm)	100-year (mm)	200-year (mm)
1	1.0	1.3	1.6	1.9	1.9	2.0	2.2	2.5	2.7
2	1.4	1.9	2.4	2.8	2.8	3.0	3.3	3.7	4.1
3	2.1	3.0	3.7	4.4	4.5	4.8	5.3	5.9	6.7
4	3.6	5.4	6.7	8.1	8.2	8.8	9.7	10.9	12.4
5	8.2	12.6	15.4	18.8	19.1	20.5	22.5	25.2	28.8
6	40.7	57.0	68.6	80.4	82.4	86.6	94.6	105.2	117.6
7	15.3	23.2	28.3	34.2	34.9	37.2	40.7	45.5	51.8
8	5.2	7.9	9.7	11.9	12.0	12.9	14.1	15.9	18.2
9	2.7	3.9	4.9	5.9	5.9	6.4	7.0	7.9	8.9
10	1.7	2.4	2.9	3.5	3.5	3.8	4.1	4.6	5.2
11	1.2	1.6	1.9	2.2	2.3	2.4	2.7	3.0	3.3
12	0.9	1.1	1.4	1.6	1.6	1.7	1.8	2.1	2.3
Total	84.1	121.2	147.5	175.8	179.0	190.3	207.9	232.3	262.0

Table I.3.11 PROBABLE MAXIMUM PRECIPITATION (PMP) BY HERSHFIELD METHOD

KAMPAR KIRI No.1 DAM Description		1-day Rainfall	2-day Rainfall	3-day Rainfall
1. Annual Maximum Mean Rainfall of Kampar Kiri No.1 Dam Catchment Area	Year			
	1981	79.0 mm	123.0 mm	125.4 mm
	1982	69.8 mm	117.4 mm	153.8 mm
	1983	67.4 mm	91.8 mm	120.1 mm
	1984	58.9 mm	113.8 mm	129.7 mm
	1985	56.9 mm	88.7 mm	110.7 mm
	1986	67.6 mm	108.9 mm	133.4 mm
	1987	51.0 mm	61.8 mm	85.2 mm
	1988	74.0 mm	88.6 mm	93.8 mm
	1989	60.2 mm	110.6 mm	124.9 mm
	1990	53.1 mm	100.2 mm	128.0 mm
	1991	64.1 mm	79.2 mm	100.4 mm
	1992	60.2 mm	86.7 mm	111.2 mm
2. Average of Annual Maximum Mean Rainfall				
2.1 For all data series (Xn, n=12)		63.5	97.6	118.1
2.2 Exclude the highest data (Xm, m=11)		62.1	95.2	114.8
2.3 Xm/Xn		0.98	0.98	0.97
3. Adjustment of Xn				
3.1 Adjustment factor effected by the highest observed data		1.04	1.04	1.01
3.2 Adjustment factor effected by the observed data length		1.04	1.04	1.05
3.3 Adjustment Xn ((2.1)x(3.1)x(3.2))		68.7	105.5	125.2
4. Standard Deviation of Observed Annual Maximum Rainfall				
4.1 For all data series (Sn, n=11)		8.0	17.2	18.1
4.2 Exclude the highest data (Sm, m=10)		6.8	16.8	15.2
4.3 Sm/Sn		0.85	0.98	0.84
5. Adjustment of Sn				
5.1 Adjustment factor effected by the highest observed data		1.02	1.07	1.02
5.2 Adjustment factor effected by the observed data length		1.20	1.20	1.20
5.3 Adjustment Sn ((4.1)x(5.1)x(5.2))		9.8	22.0	22.2
6. Probable Maximum Precipitation				
6.1 Statistical Coefficient Km		15.8	15.8	15.8
6.2 PMP ((3.3)+(6.1)x(5.3))		224.0 mm	453.8 mm	475.3 mm

UPPER SINAMAR DAM Description		1-day Rainfall	2-day Rainfall	3-day Rainfall
1. Annual Maximum Mean Rainfall of Sinamar Dam Catchment Area	Year			
	1981	46.1 mm	73.9 mm	84.9 mm
	1982	44.2 mm	79.0 mm	93.6 mm
	1983	45.1 mm	62.6 mm	72.5 mm
	1984	44.9 mm	71.8 mm	85.0 mm
	1985	38.7 mm	57.1 mm	71.5 mm
	1986	57.4 mm	101.3 mm	129.2 mm
	1987	74.8 mm	79.1 mm	91.5 mm
	1988	46.8 mm	78.7 mm	111.8 mm
	1989	60.9 mm	98.4 mm	148.1 mm
	1990	44.1 mm	62.6 mm	89.5 mm
	1991	68.4 mm	109.4 mm	132.2 mm
	1992	65.4 mm	92.8 mm	106.5 mm
2. Average of Annual Maximum Mean Rainfall				
2.1 For all data series (Xn, n=12)		53.1	80.6	101.4
2.2 Exclude the highest data (Xm, m=11)		51.1	77.9	97.1
2.3 Xm/Xn		0.96	0.97	0.96
3. Adjustment of Xn				
3.1 Adjustment factor effected by the highest observed data		1.03	1.04	1.03
3.2 Adjustment factor effected by the observed data length		1.04	1.04	1.04
3.3 Adjustment Xn ((2.1)x(3.1)x(3.2))		56.8	87.1	108.6
4. Standard Deviation of Observed Annual Maximum Rainfall				
4.1 For all data series (Sn, n=11)		11.3	16.0	23.5
4.2 Exclude the highest data (Sm, m=10)		9.6	14.0	19.6
4.3 Sm/Sn		0.85	0.88	0.84
5. Adjustment of Sn				
5.1 Adjustment factor effected by the highest observed data		1.02	1.05	1.02
5.2 Adjustment factor effected by the observed data length		1.20	1.20	1.20
5.3 Adjustment Sn ((4.1)x(5.1)x(5.2))		13.8	20.1	28.7
6. Probable Maximum Precipitation				
6.1 Statistical Coefficient Km		17.2	17.0	17.0
6.2 PMP ((3.3)+(6.1)x(5.3))		294.0 mm	428.9 mm	596.8 mm

Table I.3.12 ANNUAL MAXIMUM 10-DAY RAINFALL AT JAPURA, RENGAT

Year	Date and Daily Rainfall										
1981	Apr-29	Apr-30	May-1	May-2	May-3	May-4	May-5	May-6	May-7	May-8	Total
	9	15	8	2	78	0	0	18	0	39	169
1982	Dec-15	Dec-16	Dec-17	Dec-18	Dec-19	Dec-20	Dec-21	Dec-22	Dec-23	Dec-24	Total
	19	10	17	8	18	2	17	39	13	55	198
1983	Nov-26	Nov-27	Nov-28	Nov-29	Nov-30	Dec-1	Dec-2	Dec-3	Dec-4	Dec-5	Total
	23	23	12	3	43	4	29	0	54	7	198
1984	Apr-7	Apr-8	Apr-9	Apr-10	Apr-11	Apr-12	Apr-13	Apr-14	Apr-15	Apr-16	Total
	23	2	14	5	16	59	7	17	0	49	192
1985	Nov-27	Nov-28	Nov-29	Nov-30	Dec-1	Dec-2	Dec-3	Dec-4	Dec-5	Dec-6	Total
	27	0	27	2	0	149	1	0	1	10	217
1986	Apr-29	Apr-30	May-1	May-2	May-3	May-4	May-5	May-6	May-7	May-8	Total
	85	0	16	0	7	0	33	0	0	74	215
1987	Apr-21	Apr-22	Apr-23	Apr-24	Apr-25	Apr-26	Apr-27	Apr-28	Apr-29	Apr-30	Total
	16	5	12	0	3	12	17	1	0	113	179
1988	Jan-17	Jan-18	Jan-19	Jan-20	Jan-21	Jan-22	Jan-23	Jan-24	Jan-25	Jan-26	Total
	52	7	11	12	0	4	1	147	0	21	255
1989	Nov-29	Nov-30	Dec-1	Dec-2	Dec-3	Dec-4	Dec-5	Dec-6	Dec-7	Dec-8	Total
	34	3	5	17	24	0	2	0	52	44	181
1990	Nov-19	Nov-20	Nov-21	Nov-22	Nov-23	Nov-24	Nov-25	Nov-26	Nov-27	Nov-28	Total
	47	2	74	16	10	2	12	2	5	5	175
1991	Mar-7	Mar-8	Mar-9	Mar-10	Mar-11	Mar-12	Mar-13	Mar-14	Mar-15	Mar-16	Total
	4	87	0	0	0	69	0	72	0	22	254
1992	Oct-25	Oct-26	Oct-27	Oct-28	Oct-29	Oct-30	Oct-31	Nov-1	Nov-2	Nov-3	Total
	44	35	1	0	16	10	30	9	100	0	245
1993	Apr-28	Apr-29	Apr-30	May-1	May-2	May-3	May-4	May-5	May-6	May-7	Total
	33	101	0	19	0	11	1	2	89	0	256

Table I.4.1 DIVISION OF BASINS

No.	River Name	Catchment Area				Flow Chart	Highest Elevation (EL. m)
		Area (km^2)	Rate (%)	Accumulation (km^2)	Accumulation (%)		
	KAMPAR RIVER SYSTEM						
K-1	Kampar	1,593	6.5	1,593	6.5		2,274
K-2	Kapur	699	2.8	2,292	9.3		2,060
K-3	Mahat	1,045	4.3	3,337	13.6		1,930
K-4	Kampar Kanan	1,894	7.7	5,231	21.3		212
K-5	Sibayang 1	1,187	4.8	1,187	4.8		1,172
K-6	Sibayang 2	419	1.7	1,606	6.5		1,172
K-7	Singingi 1	552	2.2	552	2.2		736
K-8	Singingi 2	708	2.9	1,260	5.1		927
K-9	Singingi 3	418	1.7	1,678	6.8		143
K-10	Setingkai	828	3.4	4,112	16.8		700
K-11	Lipai	613	2.5	4,725	19.2		397
K-12	Teso	1,258	5.1	5,983	24.4		176
K-13	Kampar Kiri	1,070	4.4	12,284	50.0		126
K-14	Kampar 1	1,351	5.5	13,635	55.5		
K-15	Nilo	3,133	12.8	16,768	68.3		176
K-16	Kampar 2	3,267	13.3	20,035	81.6		
K-17	Kerumitan	1,462	6.0	21,497	87.6		73
K-18	Kampar 3	3,051	12.4	24,548	100.0		176
	Sub-total	**24,548**	100.0				
	INDRAGIRI RIVER SYSTEM						
I-1	Sinamar 1	828	5.1	828	5.1		1,930
I-2	Agam	450	2.8	1,278	7.9		2,262
I-3	Sinamar 2	501	3.1	1,779	10.9		2,262
I-4	Sinamar 3	713	4.4	2,492	15.3		
I-5	Lembang 1	156	1.0	156	1.0		2,597
I-6	Sumani	203	1.2	359	2.2		2,597
I-7	Lembang 2	717	4.4	1,076	6.6		2,891
I-8	Ombilin	1,111	6.8	2,187	13.4		2,891
I-9	Palangki	614	3.8	614	3.8		1,933
I-10	Lawas	391	2.4	1,005	6.2		2,032
I-11	Sukam	485	3.0	1,490	9.2		1,243
I-12	Kuantan 1	1,284	7.9	7,453	45.8		1,199
I-13	Kuantan 2	586	3.6	8,039	49.4		392
I-14	Kuantan 3	1,043	6.4	9,082	55.8		188
I-15	Peranap	1,803	11.1	10,885	66.9		438
I-16	Kuantan 4	1,435	8.8	12,320	75.7		167
I-17	Kuantan 5	989		13,309	81.8		
I-18	Cenako	1,791	11.0	15,100	92.8		830
I-19	Indragiri	1,168	7.2	16,268	100.0		87
	Sub-total	**16,268**	100.0				
	DELTA in-between the Kampar-Indragiri Rivers	**10,580**					
	GRAND TOTAL	**51,396**					

Table I.4.2 (1/2) CONSTANTS OF STORAGE FUNCTION MODEL

Kampar River Basin

Kampar River Sub-Basin No.	Catchment Area (km2)	River Length (km)	Elevation		Primary Run-off Ratio f	Saturation Rainfall Rsa (mm)	Saturation Rainfall Ratio f1	Base Flow Discharge (m^3/s)	Parameters			
			Highest (m)	Lowest (m)					K	p	Tλ	1
KB-1	1,593	154	2,274	50	1.0	0	1.0	63.7	42.7	0.6	6.68	0.0144
KB-2	699	68	2,060	90	1.0	0	1.0	28.0	34.7	0.6	2.64	0.0290
KB-3	1,045	106	1,930	60	1.0	0	1.0	41.8	40.2	0.6	4.42	0.0176
KB-4	1,894	182	212	8	1.0	0	1.0	75.8	92.0	0.6	7.99	0.0011
KB-5	1,187	60	1,172	45	1.0	0	1.0	47.5	39.5	0.6	2.26	0.0188
KB-6	419	46	1,172	19	1.0	0	1.0	16.8	36.2	0.6	1.60	0.0251
KB-7	552	48	736	55	1.0	0	1.0	22.1	43.0	0.6	1.70	0.0142
KB-8	708	45	927	45	1.0	0	1.0	28.3	39.0	0.6	1.56	0.0196
KB-9	418	43	143	19	1.0	0	1.0	16.7	69.3	0.6	1.46	0.0029
KB-10	828	70	700	17	1.0	0	1.0	33.1	48.1	0.6	2.73	0.0098
KB-11	613	62	276	10	1.0	0	1.0	24.5	61.5	0.6	2.35	0.0043
KB-12	1,258	86	176	10	1.0	0	1.0	50.3	78.2	0.6	3.48	0.0019
KB-13	1,070	118	126	5	1.0	0	1.0	42.8	94.4	0.6	4.99	0.0010
KB-14	1,351	75	176	5	1.0	0	1.0	54.1	74.3	0.6	2.97	0.0023
KB-15	3,133	241	176	5	1.0	0	1.0	125.3	105.5	0.6	10.74	0.0007
KB-16	3,267	125	76	5	1.0	0	1.0	130.7	112.8	0.6	5.32	0.0006
KB-17	1,462	103	73	4	1.0	0	1.0	58.5	107.4	0.6	4.28	0.0007
KB-18	3,051	100	5	1	1.0	0	1.0	122.0	250.0	0.6	4.14	0.0000

Kampar River Channel Code No.	Channel Length (km)	Elevation		Channel Slope	Channel Width (m)	Manning's Roughness Coefficient	Parameters		
		Higher (m)	Lower (m)				K	p	Tλ
KC-1	77.0	134	50	0.0011	100	0.04	151.4	0.61	1.72
KC-2	34.0	190	90	0.0029	100	0.04	49.6	0.61	0.46
KC-3	53.0	105	60	0.0008	100	0.04	112.3	0.61	1.34
KC-4	182.0	50	8	0.0002	300	0.04	884.9	0.60	8.82
KC-5	30.0	95	45	0.0017	50	0.04	39.4	0.62	0.54
KC-6	46.0	45	19	0.0006	300	0.04	171.0	0.60	1.42
KC-7	24.0	110	55	0.0023	50	0.04	28.6	0.62	0.37
KC-8	45.0	60	45	0.0003	100	0.04	126.3	0.61	1.81
KC-9	43.0	55	19	0.0008	150	0.04	107.6	0.61	1.09
KC-10	35.0	40	17	0.0007	150	0.04	94.2	0.61	1.00
KC-11	28.0	19	10	0.0003	300	0.04	123.3	0.60	1.15
KC-12	31.0	23	10	0.0004	100	0.04	81.2	0.61	1.11
KC-13	43.0	35	10	0.0006	100	0.04	102.1	0.61	1.31
KC-14	118.0	10	5	0.0000	300	0.04	927.1	0.60	12.72
KC-15	45.0	5	4	0.0000	400	0.04	609.9	0.60	9.94
KC-16	55.1	5	4	0.0000	300	0.04	707.3	0.60	13.46
KC-17	80.0	4	3	0.0000	2,000	0.04	1764.1	0.60	13.60
KC-18	27.5	13	1	0.0004	200	0.04	93.9	0.60	0.97
KC-19	70.0	3	1	0.0000	5,000	0.04	1962.6	0.60	9.64

Table I.4.2 (2/2) CONSTANTS OF STORAGE FUNCTION MODEL

Indragiri River Basin

Kampar River Sub-Basin No.	Catchment Area (km2)	River Length (km)	Elevation		Primary Run-off Ratio f	Saturation Rainfall Rsa (mm)	Saturation Rainfall Ratio f1	Base Flow Discharge (m^3/s)	Parameters			
			Highest (m)	Lowest (m)					K	p	Tλ	I
IB- 1	828	65	1,930	490	1.0	0	1.0	33.1	34.3	0.6	2.50	0.0222
IB- 2	450	40	1,340	490	1.0	0	1.0	18.0	34.7	0.6	1.32	0.0213
IB- 3	501	40	2,262	300	1.0	0	1.0	20.1	27.0	0.6	1.32	0.0491
IB- 4	713	44	2,597	125	1.0	0	1.0	28.5	25.9	0.6	1.51	0.0562
IB- 5	156	30	2,597	390	1.0	0	1.0	6.2	23.9	0.6	0.85	0.0736
IB- 6	203	22	2,891	390	1.0	0	1.0	8.1	21.0	0.6	0.47	0.1137
IB- 7	717	15	2,891	362	1.0	0	1.0	28.7	18.7	0.6	0.15	0.1686
IB- 8	1,111	67	2,891	125	1.0	0	1.0	44.4	28.4	0.6	2.57	0.0416
IB- 9	614	76	1,933	100	1.0	0	1.0	24.6	33.4	0.6	3.01	0.0241
IB-10	391	53	2,032	110	1.0	0	1.0	15.6	29.6	0.6	1.93	0.0363
IB-11	485	44	1,243	100	1.0	0	1.0	19.4	32.7	0.6	1.51	0.0260
IB-12	1,284	59	1,199	67	1.0	0	1.0	51.4	35.8	0.6	2.21	0.0192
IB-13	586	63	392	48	1.0	0	1.0	23.4	52.1	0.6	2.38	0.0055
IB-14	1,043	96	188	20	1.0	0	1.0	41.7	73.4	0.6	3.95	0.0018
IB-15	1,803	100	438	20	1.0	0	1.0	72.1	56.6	0.6	4.14	0.0042
IB-16	1,435	65	167	16	1.0	0	1.0	57.4	67.4	0.6	2.50	0.0023
IB-17	989	60	87	45	1.0	0	1.0	39.5	96.7	0.6	2.26	0.0007
IB-18	1,791	165	830	8	1.0	0	1.0	71.6	53.7	0.6	7.20	0.0050
IB-19	1,168	60	45	3	1.0	0	1.0	46.7	96.7	0.6	2.26	0.0007

Kampar River Channel Code No.	Channel Length (km)	Elevation		Channel Slope	Channel Width (m)	Manning's Roughness Coefficient	Parameters		
		Higher (m)	Lower (m)				K	p	Tλ
IC- 1	32.5	535	490	0.0014	50	0.04	45.1	0.62	0.64
IC- 2	20.0	700	490	0.0105	50	0.04	15.1	0.62	0.14
IC- 3	40.0	490	300	0.0048	100	0.04	50.6	0.61	0.43
IC- 4	54.0	300	100	0.0037	100	0.04	73.6	0.61	0.65
IC- 5	22.0	300	125	0.0080	50	0.04	18.1	0.62	0.18
IC- 6	15.0	750	390	0.0240	50	0.04	8.8	0.62	0.07
IC- 7	11.0	600	390	0.0191	50	0.04	6.9	0.62	0.06
IC- 8	22.5	390	362	0.0012	100	0.04	42.5	0.61	0.47
IC- 9	7.5	700	362	0.0451	50	0.04	3.7	0.62	0.03
IC-10	66.5	362	125	0.0036	100	0.04	91.7	0.61	0.82
IC-11	38.0	125	100	0.0007	50	0.04	65.9	0.62	1.09
IC-12	26.5	250	110	0.0053	50	0.04	24.6	0.62	0.27
IC-13	22.0	125	100	0.0011	50	0.04	32.4	0.62	0.48
IC-14	59.0	100	67	0.0006	600	0.04	289.2	0.60	1.83
IC-15	62.5	67	48	0.0003	600	0.04	372.9	0.60	2.68
IC-16	96.0	48	20	0.0003	600	0.04	572.7	0.60	4.12
IC-17	50.0	35	20	0.0003	100	0.04	144.8	0.60	2.12
IC-18	65.0	20	16	0.0001	600	0.04	607.1	0.60	5.89
IC-19	82.5	16	8	0.0001	600	0.04	694.2	0.60	6.28
IC-20	60.0	25	3	0.0004	100	0.04	163.6	0.60	2.31
IC-21	82.5	8	0	0.0001	1,000	0.04	842.2	0.60	6.17

Table I.4.3 (1/2) EXTENSION RATE FROM ACTUAL MEAN RAINFALL VOLUME TO PROBABLE RAINFALL VOLUME

1

Kapoeman	A.M.R.	EXTENSION RATE		
YEAR	3-day	RETURN	P.R.	(P.R.)/(A)
1981	93.9	2	106.5	1.20
1982	112.4	3	123.9	1.40
1983	110.3	5	143.3	1.62
1984	151.7	8	160.0	1.81
1985	144.5	10	167.7	1.90
1986	143.7	20	191.0	2.16
1987	134.1	25	198.4	2.24
1988	141.9	30	204.5	2.31
1989	64.6	50	221.3	2.50
1990	74.5	70	232.3	2.63
1991	88.4	80	236.7	2.68
1992	71.2	100	243.9	2.76
		150	257.2	2.91
		200	266.5	3.01
		1000	318.9	3.61
		Actual(A)	88.4	
		Date 1991 Dec.14-16		

2

Kotapanjan	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	159.9	2	148.5	0.83
1982	135.3	3	162.5	0.91
1983	133.1	5	178.1	1.00
1984	164.9	8	191.6	1.08
1985	160.5	10	197.8	1.11
1986	180.2	20	216.6	1.22
1987	182.8	25	222.5	1.25
1988	168.3	30	227.4	1.28
1989	113.1	50	240.9	1.35
1990	142.4	70	249.8	1.40
1991	177.9	80	253.3	1.42
1992	106.8	100	259.2	1.46
		150	269.8	1.52
		200	277.4	1.56
		1000	319.5	1.80
		Actual(A)	177.9	
		Date 1991 Dec.11-15		

3

Kiri No.1	A.M.R.	EXTENSION RATE		
YEAR	3-day	RETURN	P.R.	(P.R.)/(A)
1981	125.4	2	115.4	1.60
1982	153.8	3	125.7	1.74
1983	120.1	5	137.2	1.90
1984	129.7	8	147.1	2.04
1985	110.7	10	151.6	2.10
1986	133.4	20	165.5	2.30
1987	85.2	25	169.9	2.36
1988	93.8	30	173.5	2.41
1989	124.9	50	183.4	2.54
1990	128	70	189.9	2.63
1991	100.4	80	192.5	2.67
1992	111.2	100	196.8	2.73
		150	204.7	2.84
		200	210.2	2.92
		1000	241.2	3.35
		PMP	477.0	6.62
		Actual(A)	72.1	
		Date 1991 Dec.12-14		

4

Kiri No.2	A.M.R.	EXTENSION RATE		
YEAR	3-day	RETURN	P.R.	(P.R.)/(A)
1981	111.0	2	178.5	1.28
1982	157.0	3	196.8	1.41
1983	120.0	5	217.3	1.55
1984	163.0	8	234.8	1.68
1985	121.0	10	242.9	1.74
1986	144.0	20	267.6	1.91
1987	178.0	25	275.4	1.97
1988	148.0	30	281.8	2.01
1989	166.0	50	299.5	2.14
1990	174.0	70	311.1	2.22
1991	140.0	80	315.7	2.26
1992	136.0	100	323.4	2.31
		150	337.3	2.41
		200	347.2	2.48
		1000	402.3	2.87
		Actual(A)	140.0	
		Date 1991 Dec.16-18		

5

Lipat Kain	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	160.3	2	145.6	1.36
1982	187.9	3	161.1	1.50
1983	165.4	5	178.3	1.66
1984	163.3	8	193.1	1.80
1985	127.9	10	199.9	1.86
1986	190.3	20	220.7	2.06
1987	117.5	25	227.3	2.12
1988	140.2	30	232.7	2.17
1989	156.5	50	247.6	2.31
1990	166.7	70	257.4	2.40
1991	107.2	80	261.2	2.44
1992	111.6	100	267.7	2.50
		150	279.5	2.61
		200	287.8	2.68
		1000	334.3	3.12
		Actual(A)	107.2	
		Date 1991 Dec.12-17		

6

Kiri+Kana	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	153.9	2	120.8	1.08
1982	144.1	3	129.3	1.16
1983	138.1	5	138.7	1.25
1984	121.9	8	146.8	1.32
1985	120.7	10	150.5	1.35
1986	129.9	20	161.9	1.45
1987	113.2	25	165.5	1.49
1988	105.5	30	168.4	1.51
1989	113.9	50	176.6	1.59
1990	118.0	70	181.9	1.63
1991	111.4	80	184.1	1.65
1992	105.1	100	187.6	1.68
		150	194.0	1.74
		200	198.6	1.78
		1000	224.0	2.01
		Actual(A)	111.4	
		Date 1991 Dec.12-16		

7

Kerinci	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	138.3	2	112.9	1.09
1982	131.3	3	121.6	1.17
1983	121.3	5	129.8	1.25
1984	109.5	8	137.8	1.33
1985	105.3	10	141.9	1.37
1986	121.2	20	151.2	1.46
1987	101.8	25	155.3	1.50
1988	113.7	30	159.7	1.54
1989	117.8	50	164.1	1.58
1990	111.1	70	168.5	1.63
1991	103.6	80	170.5	1.65
1992	99.5	100	175.0	1.69
		150	180.0	1.74
		200	184.4	1.78
		1000	209.3	2.02
		Actual(A)	103.6	
		Date 1991 Dec.12-14		

8

Telukmeru	A.M.R.	EXTENSION RATE		
YEAR	7-day	RETURN	P.R.	(P.R.)/(A)
1981	131.4	2	147.4	1.33
1982	172.4	3	159.8	1.44
1983	131.2	5	170.5	1.53
1984	138.1	8	175.4	1.58
1985	133.2	10	190.4	1.71
1986	153.6	20	195.2	1.76
1987	131.7	25	199.0	1.79
1988	158.6	30	209.8	1.89
1989	168.6	50	216.9	1.95
1990	131.2	70	219.7	1.98
1991	111.2	80	224.4	2.02
1992	107.7	100	232.8	2.09
		150	238.8	2.15
		200	272.4	2.45
		1000	350.0	3.15
		Actual(A)	111.2	
		Date 1991 Dec.12-18		

Notes: A.M.R.: Annual Maximum Rainfall (mm)
RETURN: Return Period (Year)
P.R.: Probable Rainfall (mm)

Table I.4.3 (2/2) EXTENSION RATE FROM ACTUAL MEAN RAINFALL VOLUME TO PROBABLE RAINFALL VOLUME

1

Sinamar	A.M.R.	EXTENSION RATE		
YEAR	3-day	RETURN	P.R.	(P.R.)/(A)
1981	79.3	2	102.0	1.06
1982	101.0	3	117.2	1.22
1983	66.5	5	134.2	1.39
1984	101.3	8	148.8	1.54
1985	79.1	10	155.6	1.61
1986	128.7	20	176.0	1.83
1987	98.6	25	182.5	1.89
1988	105.5	30	187.8	1.95
1989	169.4	50	202.5	2.10
1990	112.0	70	212.2	2.20
1991	134.4	80	216.0	2.24
1992	94.8	100	222.4	2.31
		150	234.0	2.43
		200	242.2	2.51
		1000	288.0	2.99
		Actual(A)	96.4	
		Date 1986 Jan.7-9		

2

Low.Sinamar	A.M.R.	EXTENSION RATE		
YEAR	3-day	RETURN	P.R.	(P.R.)/(A)
1981	84.9	2	97.9	1.11
1982	93.6	3	111.3	1.26
1983	72.5	5	126.2	1.43
1984	85	8	139.0	1.57
1985	71.5	10	144.9	1.64
1986	129.2	20	162.8	1.84
1987	91.5	25	168.5	1.91
1988	111.8	30	173.2	1.96
1989	148.1	50	186.1	2.11
1990	89.5	70	194.5	2.20
1991	132.2	80	197.9	2.24
1992	106.5	100	203.5	2.30
		150	213.6	2.42
		200	220.8	2.50
		1000	261.0	2.96
		PMP	597.0	6.76
		Actual(A)	88.3	
		Date 1986 Jan.4-6		

3

Low.Kuamas	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	93.9	2	113.7	0.65
1982	98.4	3	131.9	0.76
1983	79.9	5	152.2	0.87
1984	104.5	8	169.6	0.97
1985	91.9	10	177.6	1.02
1986	174	20	202.0	1.16
1987	127.4	25	209.8	1.21
1988	115.9	30	216.1	1.24
1989	145.1	50	233.7	1.34
1990	89.6	70	245.2	1.41
1991	182.8	80	249.8	1.44
1992	116.6	100	257.4	1.48
		150	271.2	1.56
		200	281.0	1.61
		1000	335.7	1.93
		Actual(A)	174.0	
		Date 1986 Jan.4-8		

4

Pemapa	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	90.3	2	113.7	0.71
1982	140.5	3	127.0	0.79
1983	120.6	5	142.4	0.89
1984	93.9	8	154.6	0.97
1985	89.4	10	160.0	1.00
1986	160.0	20	178.4	1.12
1987	97.6	25	184.0	1.15
1988	119.6	30	188.7	1.18
1989	138.8	50	201.6	1.26
1990	96.9	70	209.9	1.31
1991	146.1	80	213.3	1.33
1992	111.2	100	219.2	1.37
		150	228.8	1.43
		200	236.8	1.48
		1000	276.8	1.73
		Actual(A)	160.0	
		Date 1986 Jan.4-8		

5

Japura	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	85.3	2	105.9	0.70
1982	128.2	3	118.9	0.78
1983	110.9	5	133.4	0.88
1984	88.1	8	145.8	0.96
1985	81.8	10	151.6	1.00
1986	151.6	20	169.0	1.11
1987	90.4	25	174.6	1.15
1988	111.1	30	179.1	1.18
1989	132.6	50	191.6	1.26
1990	88.1	70	199.8	1.32
1991	139.7	80	203.1	1.34
1992	103	100	208.5	1.38
		150	218.4	1.44
		200	225.4	1.49
		1000	264.4	1.74
		Actual(A)	151.6	
		Date 1986 Jan.4-8		

6

Kualeomake	A.M.R.	EXTENSION RATE		
YEAR	5-day	RETURN	P.R.	(P.R.)/(A)
1981	90.3	2	106.0	0.70
1982	106.3	3	119.6	0.79
1983	100.3	5	136.3	0.90
1984	99.0	8	149.9	0.99
1985	77.3	10	155.9	1.03
1986	151.4	20	174.1	1.15
1987	81.8	25	180.2	1.19
1988	114.3	30	186.2	1.23
1989	134.2	50	198.3	1.31
1990	82.7	70	207.4	1.37
1991	136.5	80	208.9	1.38
1992	102.6	100	215.0	1.42
		150	225.6	1.49
		200	234.7	1.55
		1000	274.0	1.81
		Actual(A)	151.4	
		Date 1986 Jan.4-8		

Notes: A.M.R.: Annual Maximum Rainfall (mm)
RETURN: Return Period (Year)
P.R.: Probable Rainfall (mm)

Table I.4.4 PEAK DISCHARGE OF EACH RETURN PERIOD AT REFERENCE POINTS AND PROPOSED DAMSITES

Kampar River Basin			Peak Discharge (m^3/s)						Specific
Reference Point		C.A.	Return Period (Year)						Discharge
Name	No.	(km^2)	2	5	10	25	50	100	($m^3/s/km^2$)
Kapoernan	6	699	538	780	956	1,184	1,365	1,550	2.22
Kotapanjang	12	3,337	2,201	2,766	3,145	3,639	3,997	4,642	1.39
Kiri No.1	20	1,187	785	1,033	1,207	1,444	1,630	1,834	1.55
Kiri No.2	28	552	548	747	892	1,085	1,235	1,399	2.53
Lipat Kain	37	3,284	1,442	1,916	2,254	2,718	3,101	3,513	1.07
Kiri+Kanan	54	12,284	4,216	5,014	5,593	6,286	6,790	7,354	0.60
Kerinci	58+61	16,768	4,434	5,290	5,916	6,605	7,034	7,630	0.46
Telukmeraniti	65+70	21,497	5,140	5,992	6,800	7,176	7,951	8,651	0.40

Note : Specific discharge is calculated for 100-year return period.

Indragiri River Basin			Peak Discharge (m^3/s)						Specific
Reference Point		C.A.	Return Period (Year)						Discharge
Name	No.	(km^2)	2	5	10	25	50	100	($m^3/s/km^2$)
Simulated by Hyetograph on Flood 1986									
Sinamar	3+6	1,278	934	1,285	1,527	1,844	2,094	2,353	1.84
Low.Sinamar	12	1,779	1,144	1,529	1,798	2,153	2,421	2,677	1.50
Low.Kuantan	53	7,453	2,762	3,907	4,727	5,793	6,545	7,356	0.99
Pernapa	61+64	10,885	3,203	4,272	5,037	6,111	6,777	7,529	0.69
Japura	67	12,320	3,308	4,480	5,188	6,180	6,998	7,840	0.64
Kualacenake	72+75	15,100	3,593	4,757	5,614	6,751	7,659	8,534	0.57
Simulated by Model Hyetograph									
Sinamar	3	828	611	949	1,209	1,555	1,840	2,102	2.54
Agam	6	450	384	578	734	947	1,107	1,272	2.83
Sukarami	24	534	305	624	887	1,204	1,482	1,761	3.30
Sukam	44	485	534	786	962	1,211	1,414	1,605	3.31

Note : Specific discharge is calculated for 100-year return period.

Dam Point			Peak Discharge (m^3/s)								Specific
Location of	Type of	C.A.	Return Period (Year)								Discharge
Dam Site	Dam	(km^2)	2	5	10	25	50	100	1000	PMF	($m^3/s/km^2$)
Kapoernan	Concrete	699	538	780	956	1,184	1,365	1,550	2,181		3.12
Kiri No.1	Rockfill	1,187	785	1,033	1,207	1,444	1,630	1,834	2,537	7,274	2.14
Kiri No.2	Concrete	552	548	747	892	1,085	1,235	1,399	1,992		3.61
Sukam	Concrete	360	396	583	714	899	1,050	1,191	1,755		4.88
Up. Sinamar	Rockfill	1,580	1,016	1,358	1,597	1,912	2,150	2,378	3,180	8,383	2.01
Low. Kuantan	Concrete	7,453	2,762	3,907	4,727	5,793	6,545	7,356	10,047		1.35

Note : Specific discharge is calculated for 1,000-year return period.

Table I.4.5 ANNUAL MAXIMUM DISCHARGE AT WATER LEVEL GAGING STATIONS

unit: m^3/s

Station	Bingkuang		Lipat Kain		Berhara	
Area	4,000km^2		3,431km^2		8,526km^2	
No.	Year	Max.Dis	Year	Max.Dis	Year	Max.Dis
1	1977	891	1979	992	1985	1,031
2	1978	1,314	1980	794	1986	3,836
3	1980	664	1981	870	1987	1,345
4	1981	847	1982	996	1988	1,382
5	1982	1,024	1983	937	1989	1,370
6	1983	1,008	1984	827	1990	979
7	1984	1,078	1988	646	1991	2,297
8	1988	1,181	1989	1,153	1992	1,426
9	1989	1,516	1990	1,125	1993	1,540
10	1990	1,263	1991	1,053		
11	1991	1,474	1992	891		
12	1992	1,016				
R.P.=2		1,071		914		1,500
C		4.47		4.05		4.74
R.P.=20		1,744		1,319		2,500
C		7.28		5.85		7.91

Probable Peak Discharge at Damsite

unit: m^3/s

Dam Site	Kapoeman	Kampar Kiri No.1	Kampar Kiri No.2	Sukam	Upper Sinamar	Kuantang
Area(km^2)	699	1,187	552	360	1,580	7,453
C=5 R.P.=2	560	720	500	400	820	1,510
C=8 R.P.=20	900	1,150	800	640	1,310	2,410

Note: R.P.: Return Period (Year)
C : Creager Number

Table I.5.1 DRY SEASON RAINFALL AND PROBABILITY

Unit: mm

Year	Dry Season Rainfall (April-September)	
	Sijunjung (19014)	Pasar Kampar (20001)
1961	758	
1962	956	
1963	447	
1964	971	
1965	598	
1966	1,075	
1967	784	
1968	621	
1969	686	
1970		1,250
1971		1,181
1972	985	1,100
1973	1,344	1,624
1974	1,539	1,793
1975	1,246	1,122
1976	892	1,362
1977	933	709
1978	676	946
1979	1,154	927
1980	932	959
1981	1,521	1,130
1982	1,116	1,385
1983	819	816
1984	1,004	1,284
1985	798	627
1986	689	739
1987		946
1988		1,234
1989	936	752
1990	610	971
1991	690	815
1992	952	811
1993		889

Unit: mm

Return Period (Year)	Non-exceeding Probability Value	
	Sijunjung (19014)	Pasar Kampar (20001)
20	548	664
15	571	688
10	607	727
8	630	752
5	688	814
4	722	850
3	775	906
2	879	1,016

Table I.5.2 ANNUAL RAINFALL BY SUB-BASIN

Kampar River Basin

Unit: mm

Year	Sub-Basin No.																		All Basin
	KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10	KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18	
1981	2,486	2,396	3,062	2,328	2,885	2,702	2,686	2,718	2,774	2,782	2,518	2,747	2,509	2,411	2,336	2,213	2,259	1,825	2,405
1982	2,778	2,617	3,814	2,575	3,676	3,455	3,292	3,328	3,456	3,595	3,016	3,308	3,047	2,810	2,561	2,534	2,253	1,997	2,781
1983	3,005	2,983	3,146	1,952	2,846	2,719	2,108	2,215	2,622	2,865	2,343	2,643	2,353	2,104	2,007	1,854	1,713	1,811	2,243
1984	3,131	2,987	4,051	2,568	3,748	3,517	3,435	3,409	3,388	3,710	3,030	3,324	3,072	2,946	2,789	2,760	2,623	2,435	2,983
1985	3,431	3,485	3,078	2,329	2,856	2,876	2,581	2,645	2,877	2,879	2,593	2,758	2,659	2,506	2,509	2,397	2,418	1,984	2,590
1986	2,262	2,111	3,228	2,603	3,368	3,513	2,827	3,012	3,623	3,419	3,006	3,350	3,102	2,701	2,555	2,238	2,604	2,312	2,692
1987	3,755	3,791	3,522	2,333	2,906	2,518	2,453	2,439	2,437	2,784	2,507	2,261	2,408	2,273	2,439	2,272	2,788	2,201	2,588
1988	3,376	3,354	3,518	2,734	3,014	2,450	2,298	2,408	2,661	2,708	2,684	2,346	2,512	2,549	2,417	2,492	2,557	2,384	2,646
1989	2,470	2,375	3,086	2,285	3,107	2,806	2,783	2,932	3,208	2,824	2,534	2,998	2,558	2,491	2,406	2,131	2,357	2,281	2,511
1990	2,464	2,348	3,212	2,381	3,016	2,870	2,394	2,513	2,917	2,963	2,672	2,632	2,633	2,204	1,879	1,902	1,567	1,899	2,278
1991	2,743	2,528	4,121	2,486	3,231	2,486	2,181	2,277	2,526	2,929	2,645	2,518	2,381	2,070	1,860	1,818	1,483	1,695	2,264
1992	2,263	2,125	3,151	2,258	2,767	2,433	2,282	2,314	2,416	2,646	2,418	2,384	2,306	2,065	1,965	1,890	1,830	1,836	2,176
Ave.	2,847	2,758	3,416	2,403	3,118	2,862	2,610	2,684	2,909	3,009	2,664	2,772	2,628	2,428	2,310	2,208	2,204	2,055	2,513
Max.	3,755	3,791	4,121	2,734	3,748	3,517	3,435	3,409	3,623	3,710	3,030	3,350	3,102	2,946	2,789	2,760	2,788	2,435	2,983
Min.	2,262	2,111	3,062	1,952	2,767	2,433	2,108	2,215	2,416	2,646	2,343	2,261	2,306	2,065	1,860	1,818	1,483	1,695	2,176

Indaragiri River Basin

Unit: mm

Year	Sub-Basin No.																			All Basin
	IB-1	IB-2	IB-3	IB-4	IB-5	IB6	IB-7	IB-8	IB-9	IB-10	IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19	
1981	1,678	1,730	1,902	2,045	1,206	1,570	2,861	1,951	1,880	1,929	2,667	2,611	2,708	2,703	2,690	2,218	1,940	2,337	1,421	2,217
1982	2,056	1,879	2,008	2,113	1,857	2,052	3,110	2,126	2,059	2,129	2,335	2,486	3,051	3,013	2,967	2,034	1,734	2,093	1,355	2,276
1983	1,511	1,689	1,670	1,944	1,969	1,907	2,695	1,907	2,030	1,973	2,056	2,142	2,867	2,924	2,912	2,190	2,030	2,399	1,858	2,234
1984	2,327	2,627	2,345	2,380	1,992	1,952	3,088	2,336	2,067	2,020	2,115	2,389	3,188	3,154	3,163	2,842	2,530	3,045	2,136	2,646
1985	2,066	1,917	2,079	1,858	1,827	1,702	2,761	1,828	1,876	1,781	1,859	2,013	2,607	2,607	2,617	2,425	1,933	2,548	1,368	2,178
1986	2,164	2,056	2,156	1,990	1,506	1,638	2,739	1,950	1,977	1,932	2,467	2,518	3,035	3,050	3,066	2,891	2,065	2,933	2,056	2,499
1987	2,214	2,158	2,052	1,947	1,928	1,930	3,004	2,020	2,225	2,144	2,494	2,367	1,891	1,851	1,830	2,074	1,586	1,698	1,610	2,002
1988	3,019	2,227	2,483	2,550	1,658	1,544	2,717	2,172	2,267	2,025	2,763	2,585	1,777	1,737	1,774	2,329	1,842	2,299	1,946	2,210
1989	2,789	2,245	2,226	2,254	1,317	1,409	2,890	2,047	2,046	1,904	2,751	2,693	2,647	2,629	2,689	2,772	2,281	3,228	2,215	2,546
1990	3,161	2,495	2,129	1,961	1,222	1,398	2,611	1,960	1,706	1,686	2,228	2,214	2,203	2,173	2,242	2,237	2,197	2,904	2,083	2,273
1991	2,902	2,396	2,558	2,246	1,956	2,950	4,434	2,753	1,940	2,586	2,406	2,390	2,599	2,621	2,632	2,165	2,175	2,452	1,797	2,501
1992	2,878	2,076	2,205	1,914	2,705	2,921	3,237	2,309	2,605	2,772	2,618	2,486	2,358	2,357	2,392	2,536	2,520	2,678	1,970	2,472
Ave.	2,397	2,125	2,151	2,100	1,762	1,914	3,012	2,113	2,056	2,074	2,397	2,408	2,578	2,568	2,581	2,393	2,069	2,551	1,818	2,338
Max.	3,161	2,627	2,558	2,550	2,705	2,950	4,434	2,753	2,605	2,772	2,763	2,693	3,188	3,154	3,163	2,891	2,530	3,228	2,215	2,646
Min.	1,511	1,689	1,670	1,858	1,206	1,398	2,611	1,828	1,706	1,686	1,859	2,013	1,777	1,737	1,774	2,034	1,586	1,698	1,355	2,002

Table I.5.3 MONTHLY AVERAGE RAINFALL BY SUB-BASIN

Kampar River Basin

Unit: mm

Month	Sub-Basin No.																		All Basin
	KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10	KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18	
Jan.	273	264	333	216	309	261	231	245	279	284	243	278	235	220	218	188	205	189	233
Feb.	197	192	228	163	209	174	204	202	185	189	173	181	166	163	162	153	162	143	172
Mar.	288	279	344	247	317	288	293	293	289	304	273	288	267	241	241	219	235	209	257
Apr.	291	276	384	231	341	318	266	274	310	338	275	286	280	267	245	256	213	220	267
May	273	269	300	213	277	246	257	261	262	258	230	262	229	232	220	214	199	176	231
June	102	102	102	108	100	102	88	95	114	97	104	111	104	105	99	98	92	89	100
July	141	137	168	136	155	157	112	122	158	158	146	145	147	135	128	125	124	118	135
Aug.	138	133	174	121	150	141	123	125	136	150	134	126	131	111	99	100	92	97	118
Sep.	258	251	302	168	255	221	225	227	230	238	194	207	195	200	186	188	192	171	206
Oct.	248	237	313	268	285	276	234	242	272	285	278	248	269	231	216	212	224	197	240
Nov.	289	282	337	248	317	313	274	284	316	316	280	301	284	258	244	233	226	233	265
Dec.	348	336	431	284	404	363	303	314	357	393	333	339	322	265	252	223	240	213	290
Year	2,847	2,758	3,416	2,403	3,118	2,862	2,610	2,684	2,909	3,009	2,664	2,772	2,628	2,428	2,310	2,208	2,204	2,055	2,513
Max.	348.0	336.0	431.0	284.0	404.0	363.0	303.0	314.0	357.0	393.0	333.0	339.0	322.0	267.0	252.0	256.0	240.0	233.0	290.3
Min.	102.0	102.0	102.0	108.0	100.0	102.0	88.0	95.0	114.0	97.0	104.0	111.0	104.0	105.0	99.0	98.0	92.0	89.0	99.5

Indragiri River Basin

Unit: mm

Month	Sub-Basin No.																			All Basin
	IB-1	IB-2	IB-3	IB-4	IB-5	IB-6	IB-7	IB-8	IB-9	IB-10	IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19	
Jan.	262	213	225	251	166	172	229	221	208	201	250	252	288	293	291	223	191	235	178	237
Feb.	154	128	153	148	118	141	221	149	150	156	191	185	165	161	161	152	142	150	123	157
Mar.	250	211	214	238	210	242	341	244	231	246	266	268	284	282	280	226	183	231	174	244
Apr.	219	216	211	202	168	184	294	206	207	207	250	247	253	250	253	243	230	262	186	234
May	207	225	218	220	171	196	296	222	208	213	253	251	263	262	261	207	185	229	140	226
June	72	88	75	77	67	71	143	81	85	82	102	99	112	114	116	125	101	131	79	103
July	115	114	110	102	82	94	192	108	99	102	121	119	133	135	134	125	96	116	94	119
Aug.	112	104	103	90	78	71	141	87	88	80	93	97	109	107	108	105	82	110	87	101
Sep.	198	157	164	168	135	137	243	160	143	142	150	160	158	152	155	191	157	186	136	167
Oct.	240	205	179	159	155	151	258	168	186	175	212	209	212	210	215	244	213	268	183	213
Nov.	277	212	231	217	211	242	356	234	229	244	259	259	282	282	287	271	237	319	231	266
Dec.	289	252	267	229	199	213	298	233	224	226	252	262	319	319	321	280	254	316	207	273
Year	2,397	2,125	2,151	2,100	1,762	1,914	3,012	2,113	2,056	2,074	2,397	2,408	2,578	2,568	2,581	2,393	2,069	2,551	1,818	2,338
Max.	289.0	252.0	267.0	251.0	211.0	242.0	356.0	244.0	231.0	246.0	266.0	268.0	319.0	319.0	321.0	280.0	254.0	319.0	231.0	272.9
Min.	72.0	88.0	75.0	77.0	67.0	71.0	141.0	81.0	85.0	80.0	93.0	97.0	109.0	107.0	108.0	105.0	82.0	110.0	79.0	100.5

Table I.5.4 ANNUAL AVERAGE DISCHARGE BY SUB-BASIN

Kampar River Basin

Unit: m^3/s

Year	Sub-Basin No.																		All Basin
	KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10	KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18	
1981	64.3	26.9	58.5	73.0	61.4	19.8	26.8	34.9	20.8	40.3	26.1	61.8	44.9	53.4	118.7	116.4	52.3	79.8	980.1
1982	72.6	28.9	77.5	79.4	84.1	27.3	32.9	42.8	27.0	56.9	32.6	77.3	57.7	64.2	132.5	133.5	51.4	84.4	1,163.0
1983	83.9	36.5	59.9	51.3	58.1	18.8	19.5	26.1	18.3	39.9	21.6	55.9	38.4	43.7	93.6	89.4	37.8	73.1	865.8
1984	91.0	37.4	85.5	74.5	86.7	27.6	36.1	45.0	26.0	58.2	31.7	77.3	57.3	66.1	139.4	140.6	58.1	102.8	1,241.3
1985	106.8	47.4	64.8	73.6	64.6	22.7	22.8	31.1	22.6	44.9	28.0	62.3	51.0	56.9	123.1	124.6	51.5	79.7	1,078.4
1986	68.4	28.0	66.2	82.8	78.0	29.1	27.3	38.5	29.6	55.7	34.0	81.2	62.0	61.4	128.5	107.2	57.4	100.1	1,135.4
1987	113.3	49.9	72.7	68.4	62.7	18.2	22.1	28.5	17.1	40.8	25.8	46.5	43.0	46.4	120.9	105.3	73.2	89.8	1,044.6
1988	105.0	45.3	75.1	81.8	67.4	17.1	19.5	27.5	18.9	39.5	27.1	47.1	42.9	56.1	123.5	126.0	66.8	107.4	1,094.0
1989	70.6	29.0	64.1	66.6	68.8	20.1	25.0	35.0	24.1	40.9	25.6	64.5	44.4	51.8	108.0	92.6	50.7	90.9	972.7
1990	68.9	28.0	67.0	68.8	68.7	21.4	22.8	31.3	21.9	44.7	27.5	56.1	46.5	44.7	77.6	79.8	28.9	73.9	878.5
1991	77.5	30.1	88.9	76.0	74.8	18.0	18.1	26.3	19.6	43.8	27.6	57.3	41.9	41.0	78.7	68.2	24.1	63.2	875.1
1992	59.7	23.2	67.6	67.2	62.7	17.4	18.8	25.0	16.6	39.7	25.3	48.6	40.0	38.6	78.4	74.7	29.9	63.6	797.0
Ave.	81.8	34.2	70.6	72.0	69.8	21.5	24.3	32.7	21.9	45.4	27.7	61.3	47.5	52.0	110.2	104.9	48.5	84.1	1,010.4
Max.	113.3	49.9	88.9	82.8	86.7	29.1	36.1	45.0	29.6	58.2	34.0	81.2	62.0	66.1	139.4	140.6	73.2	107.4	1,241.3
Min.	59.7	23.2	58.5	51.3	58.1	17.1	18.1	25.0	16.6	39.5	21.6	46.5	38.4	38.6	77.6	68.2	24.1	63.2	797.0

Indragiri River Basin

Unit: m^3/s

Year	Sub-Basin No.																			All Basin
	IB-1	IB-2	IB-3	IB-4	IB-5	IB-6	IB-7	IB-8	IB-9	IB-10	IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19	
1981	19.0	10.9	13.3	21.3	3.0	4.7	35.3	31.2	19.3	12.2	24.8	60.6	27.5	48.6	83.7	51.0	29.8	70.4	20.5	587.1
1982	24.2	11.2	13.8	20.4	3.8	6.0	38.4	33.5	17.3	12.0	17.9	51.3	33.0	57.7	97.8	44.3	24.5	59.3	17.2	583.6
1983	14.1	9.6	10.8	20.9	3.9	5.3	34.1	30.2	16.5	10.7	14.8	40.9	29.1	53.1	91.1	47.3	27.7	68.6	26.0	554.7
1984	26.1	17.7	16.4	26.2	3.9	5.3	39.1	38.9	16.7	10.5	14.5	46.9	33.1	57.6	100.5	64.2	35.9	88.4	31.2	673.1
1985	25.3	12.2	14.6	18.3	3.8	4.7	35.4	28.5	14.8	9.2	11.6	35.8	25.8	45.4	80.0	53.6	25.2	76.4	16.1	536.7
1986	27.4	13.8	16.7	20.8	2.4	3.8	34.0	30.6	15.7	9.7	18.2	52.5	34.2	61.0	106.0	70.0	27.2	91.5	31.0	666.5
1987	26.8	13.2	14.4	20.4	3.9	5.0	37.9	30.1	19.0	11.4	18.6	47.3	16.4	28.6	49.0	44.9	18.1	42.6	22.0	469.6
1988	43.1	13.7	18.6	27.5	2.8	3.3	33.0	33.4	19.0	10.1	21.2	52.8	13.7	24.1	42.6	51.7	21.1	58.9	26.3	516.9
1989	41.9	14.9	16.3	23.8	2.4	3.0	36.3	31.3	17.9	9.8	22.0	57.1	23.8	41.6	74.3	61.9	29.1	95.7	30.5	633.6
1990	48.1	16.4	15.5	19.9	1.3	2.5	31.3	27.7	12.8	7.8	17.3	45.6	18.9	32.5	60.0	49.3	28.8	90.6	30.5	556.8
1991	41.5	16.9	20.0	24.2	3.4	9.3	63.9	49.3	15.6	15.3	18.9	50.1	26.4	47.5	83.8	49.6	33.1	77.2	27.6	673.6
1992	41.1	14.4	16.9	19.4	6.2	9.9	46.7	41.1	25.2	18.1	21.8	54.4	20.8	36.8	66.2	55.9	36.4	77.8	26.4	635.5
Ave.	31.5	13.7	15.6	21.9	3.4	5.2	38.8	33.8	17.5	11.4	18.5	49.6	25.2	44.6	77.9	53.7	28.1	74.8	25.4	590.6
Max.	48.1	17.7	20.0	27.5	6.2	9.9	63.9	49.3	25.2	18.1	24.8	60.6	34.2	61.0	106.0	70.0	36.4	95.7	31.2	673.6
Min.	14.1	9.6	10.8	18.3	1.3	2.5	31.3	27.7	12.8	7.8	11.6	35.8	13.7	24.1	42.6	44.3	18.1	42.6	16.1	469.6

Table I.5.5 MONTHLY AVERAGE DISCHARGE BY SUB-BASIN

Kampar River Basin

Unit: m^3/s

Month	Sub-Basin No.																		All Basin
	KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10	KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18	
Jan.	104.1	43.3	90.4	93.5	92.8	26.4	27.5	38.9	28.2	58.0	35.9	82.3	61.6	69.5	154.5	136.7	65.8	120.3	1,329.7
Feb.	80.9	34.0	66.8	66.0	67.1	18.6	26.2	34.1	19.6	41.1	25.3	57.7	38.5	43.0	92.3	84.2	43.8	68.4	907.6
Mar.	97.6	40.9	83.2	88.1	82.8	24.6	32.4	41.8	24.6	53.0	33.1	73.7	50.4	54.8	130.9	116.8	64.6	95.2	1,188.5
Apr.	103.5	42.0	99.8	89.1	95.9	29.5	32.7	44.0	29.0	62.9	36.5	81.7	63.8	72.4	147.7	154.1	54.7	111.2	1,350.5
May	101.4	43.4	77.8	75.7	79.2	24.4	30.1	40.7	26.5	50.0	29.8	76.1	53.8	66.7	134.3	131.3	51.4	91.4	1,184.0
June	44.1	18.7	33.6	41.2	33.1	10.6	12.4	16.5	11.2	21.3	14.7	32.1	25.5	29.1	60.5	59.2	25.3	43.1	532.2
July	35.8	15.2	31.2	39.1	31.7	11.2	10.5	14.6	11.8	21.9	14.0	30.3	24.6	27.7	57.3	60.1	25.2	44.3	506.5
Aug.	40.3	16.8	36.5	38.1	33.2	10.4	11.4	14.8	10.2	22.5	13.5	26.6	22.6	22.1	44.5	43.4	21.3	34.9	463.1
Sep.	71.1	29.9	62.8	46.8	55.8	16.2	20.7	26.7	16.6	35.7	19.4	42.4	33.4	39.1	82.2	85.1	41.2	63.1	788.2
Oct.	82.7	34.3	74.1	83.7	69.4	21.5	24.1	32.3	21.7	45.5	30.0	58.8	48.9	53.3	113.1	110.9	56.3	90.0	1,050.6
Nov.	107.8	45.3	90.7	110.9	93.2	32.2	31.2	42.9	31.2	65.0	42.2	85.1	69.5	68.4	139.8	134.4	61.0	118.9	1,369.7
Dec.	112.8	46.8	100.8	90.6	103.6	31.7	32.6	44.7	31.7	68.1	38.4	88.4	76.4	77.4	163.9	140.8	70.6	126.6	1,445.9
Ave.	81.8	34.2	70.6	72.0	69.8	21.5	24.3	32.7	21.9	45.4	27.7	61.3	47.5	52.0	110.2	104.9	48.5	84.1	1,010.4
Max.	112.8	46.8	100.8	110.9	103.6	32.2	32.7	44.7	31.7	68.1	42.2	88.4	76.4	77.4	163.9	154.1	70.6	126.6	1,445.9
Min.	35.8	15.2	31.2	38.1	31.7	10.4	10.5	14.6	10.2	21.3	13.5	26.6	22.6	22.1	44.5	43.4	21.3	34.9	463.1

Indragiri River Basin

Unit: m^3/s

Month	Sub-Basin No.																			All Basin
	IB-1	IB-2	IB-3	IB-4	IB-5	IB-6	IB-7	IB-8	IB-9	IB-10	IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19	
Jan.	47.7	19.6	22.6	34.7	4.4	6.2	37.8	47.7	23.9	14.6	25.3	68.8	38.7	69.6	120.7	72.0	37.6	96.8	38.3	827.0
Feb.	29.1	11.4	15.7	23.0	3.0	4.8	35.8	33.2	17.6	11.4	20.7	54.1	21.0	36.5	63.4	42.3	22.4	53.9	20.0	519.3
Mar.	37.8	16.1	18.8	29.2	5.0	8.1	53.8	47.5	23.3	16.4	23.9	65.8	30.1	53.0	90.8	54.4	26.6	71.2	27.2	699.0
Apr.	36.5	18.0	18.8	26.7	4.1	6.4	50.2	43.1	22.5	14.7	24.7	66.8	33.1	57.9	100.9	65.1	37.9	91.6	31.2	750.2
May	31.9	17.2	19.0	29.3	4.0	6.7	48.7	45.3	23.4	15.4	26.6	70.5	31.9	56.1	97.5	56.3	32.2	79.1	23.4	714.5
June	13.1	7.3	8.1	10.4	1.8	2.8	23.7	17.8	9.1	6.0	9.7	26.2	13.7	24.3	42.4	32.5	15.5	43.8	11.6	319.8
July	13.0	6.9	7.0	9.5	1.5	2.5	23.2	15.2	7.2	4.9	7.9	21.0	12.5	22.3	38.3	24.9	11.1	31.8	11.7	272.4
Aug.	13.6	6.0	7.9	9.9	1.3	1.8	16.7	13.2	6.8	4.0	6.7	18.5	10.9	19.7	34.1	22.8	10.0	33.2	11.0	248.1
Sep.	25.5	10.2	11.6	18.1	2.4	3.2	30.3	23.7	10.4	6.4	9.9	28.0	15.0	26.3	46.0	42.1	20.2	51.5	16.7	397.5
Oct.	37.3	15.6	14.8	17.9	3.3	4.2	38.8	29.0	17.8	10.1	17.5	45.8	21.5	37.5	67.6	61.9	30.2	91.2	27.0	589.0
Nov.	49.5	18.6	21.1	28.0	5.6	9.1	59.7	48.9	26.2	18.2	26.4	68.5	31.8	56.2	99.9	77.0	42.0	115.8	42.3	844.8
Dec.	43.1	17.6	21.7	26.0	4.5	6.9	46.9	41.2	21.6	14.5	22.5	61.2	42.0	74.1	131.2	91.6	50.7	135.9	44.3	897.5
Year	31.5	13.7	15.6	21.9	3.4	5.2	38.8	33.8	17.5	11.4	18.5	49.6	25.2	44.6	77.9	53.7	28.1	74.8	25.4	590.6
Max.	49.5	19.6	22.6	34.7	5.6	9.1	59.7	48.9	26.2	18.2	26.6	70.5	42.0	74.1	131.2	91.6	50.7	135.9	44.3	897.5
Min.	13.0	6.0	7.0	9.5	1.3	1.8	16.7	13.2	6.8	4.0	6.7	18.5	10.9	19.7	34.1	22.8	10.0	31.8	11.0	248.1

Table I.5.6 SUMMARY OF SIMULATED DISCHARGE BY SUB-BASIN

Kampar River Basin

Item	Unit	Sub-Basin No.									
		KB-1	KB-2	KB-3	KB-4	KB-5	KB-6	KB-7	KB-8	KB-9	KB-10
Rainfall	mm	2,847.0	2,758.4	3,415.6	2,402.8	3,118.2	2,862.0	2,610.0	2,684.2	2,908.8	3,008.8
Average Discharge	m^3/s	81.8	34.2	70.6	72.0	69.8	21.5	24.3	32.7	21.9	45.4
Catchment Area	km^2	1,593	699	1,045	1,894	1,187	419	552	708	418	828
Specific Discharge	$m^3/s/100km^2$	5.14	4.90	6.76	3.80	5.88	5.12	4.40	4.61	5.23	5.49
Run-off Height	mm	1,621.4	1,545.2	2,133.5	1,198.8	1,856.7	1,616.3	1,389.4	1,455.8	1,650.7	1,731.9
Evapotranspiration	mm	1,225.6	1,213.2	1,282.1	1,204.0	1,261.5	1,245.7	1,220.6	1,228.4	1,258.1	1,276.9

Item	Unit	Sub-Basin No.									All Basin
		KB-11	KB-12	KB-13	KB-14	KB-15	KB-16	KB-17	KB-18		
Rainfall	mm	2,663.9	2,772.4	2,628.3	2,427.6	2,310.3	2,208.3	2,204.2	2,055.0		2,513.0
Average Discharge	m^3/s	27.7	61.3	47.5	52.0	110.2	104.9	48.5	84.1		1,010.4
Catchment Area	km^2	613	1,258	1,070	1,351	3,133	3,267	1,462	3,051		24,548
Specific Discharge	$m^3/s/100km^2$	4.53	4.87	4.44	3.85	3.52	3.21	3.32	2.76		4.12
Run-off Height	mm	1,428.0	1,538.2	1,400.4	1,215.3	1,110.4	1,013.0	1,047.1	869.6		1,298.0
Evapotranspiration	mm	1,235.9	1,234.2	1,227.9	1,212.3	1,199.9	1,195.3	1,157.1	1,185.4		1,215.0

Indragiri River Basin

Item	Unit	Sub-Basin No.									
		IB-1	IB-2	IB-3	IB-4	IB-5	IB-6	IB-7	IB-8	IB-9	IB-10
Rainfall	mm	2,396.9	2,124.5	2,151.0	2,100.2	1,761.9	1,914.5	3,012.2	2,113.2	2,056.4	2,073.5
Average Discharge	m^3/s	31.5	13.7	15.6	21.9	3.4	5.2	38.8	33.8	17.5	11.4
Catchment Area	km^2	828	450	501	713	156	203	717	1,111	614	391
Specific Discharge	$m^3/s/100km^2$	3.81	3.05	3.12	3.07	2.18	2.58	5.41	3.04	2.85	2.91
Run-off Height	mm	1,202.0	962.8	983.3	969.7	689.0	815.6	1,707.1	960.3	898.6	919.8
Evapotranspiration	mm	1,194.9	1,161.7	1,167.7	1,130.5	1,072.9	1,098.9	1,305.1	1,152.9	1,157.8	1,153.7

Item	Unit	Sub-Basin No.									All Basin
		IB-11	IB-12	IB-13	IB-14	IB-15	IB-16	IB-17	IB-18	IB-19	
Rainfall	mm	2,396.6	2,407.9	2,577.6	2,568.2	2,581.3	2,392.7	2,069.4	2,551.0	1,818.0	2,337.7
Average Discharge	m^3/s	18.5	49.6	25.2	44.6	77.9	53.6	28.1	74.8	25.4	590.5
Catchment Area	km^2	485	1,284	586	1,043	1,803	1,435	989	1,791	1,168	16,268
Specific Discharge	$m^3/s/100km^2$	3.81	3.86	4.31	4.27	4.32	3.74	2.84	4.18	2.18	3.63
Run-off Height	mm	1,202.6	1,219.1	1,358.6	1,348.2	1,363.8	1,179.8	895.7	1,317.8	687.3	1,144.7
Evapotranspiration	mm	1,194.0	1,188.8	1,219.0	1,220.0	1,217.5	1,212.9	1,173.7	1,233.2	1,130.7	1,193.0

Table I.7.1 LENGTH OF SALT WEDGE AT KAMPAR AND INDRAGIRI RIVER MOUTHS

River	Status	Q	B	H	U_o	F_{do}	η	h_{1c}	h_{1m}	Ψ	f_i	L
		(m^3/s)	(m)	(m)								(km)
Kampar at Blandong	at Present	275	1,570	7.45	0.024	0.017	0.067	0.50	3.98	349.2	0.0107	229.2
	future without Project	300	1,630	7.45	0.025	0.018	0.069	0.52	3.98	402.6	0.0100	222.8
	with Kiri No.1	336	1,700	7.45	0.027	0.020	0.073	0.54	4.00	493.9	0.0090	213.9
	with Kiri No.2	316	1,660	7.45	0.026	0.019	0.071	0.53	3.99	443.5	0.0095	218.6
	with Kiri No.1 & No.2	352	1,730	7.45	0.027	0.020	0.074	0.55	4.00	536.6	0.0086	210.4
Indragiri at Kuala Lajau	at Present	170	745	6.90	0.033	0.025	0.086	0.60	3.74	920.9	0.0066	160.9
	future without Project	108	660	6.90	0.024	0.018	0.069	0.48	3.69	356.2	0.0106	195.1
	with Kuantan	187	785	6.90	0.033	0.027	0.089	0.61	3.76	1,040.4	0.0062	156.9

FIGURES

I METEOROLOGY AND HYDROLOGY

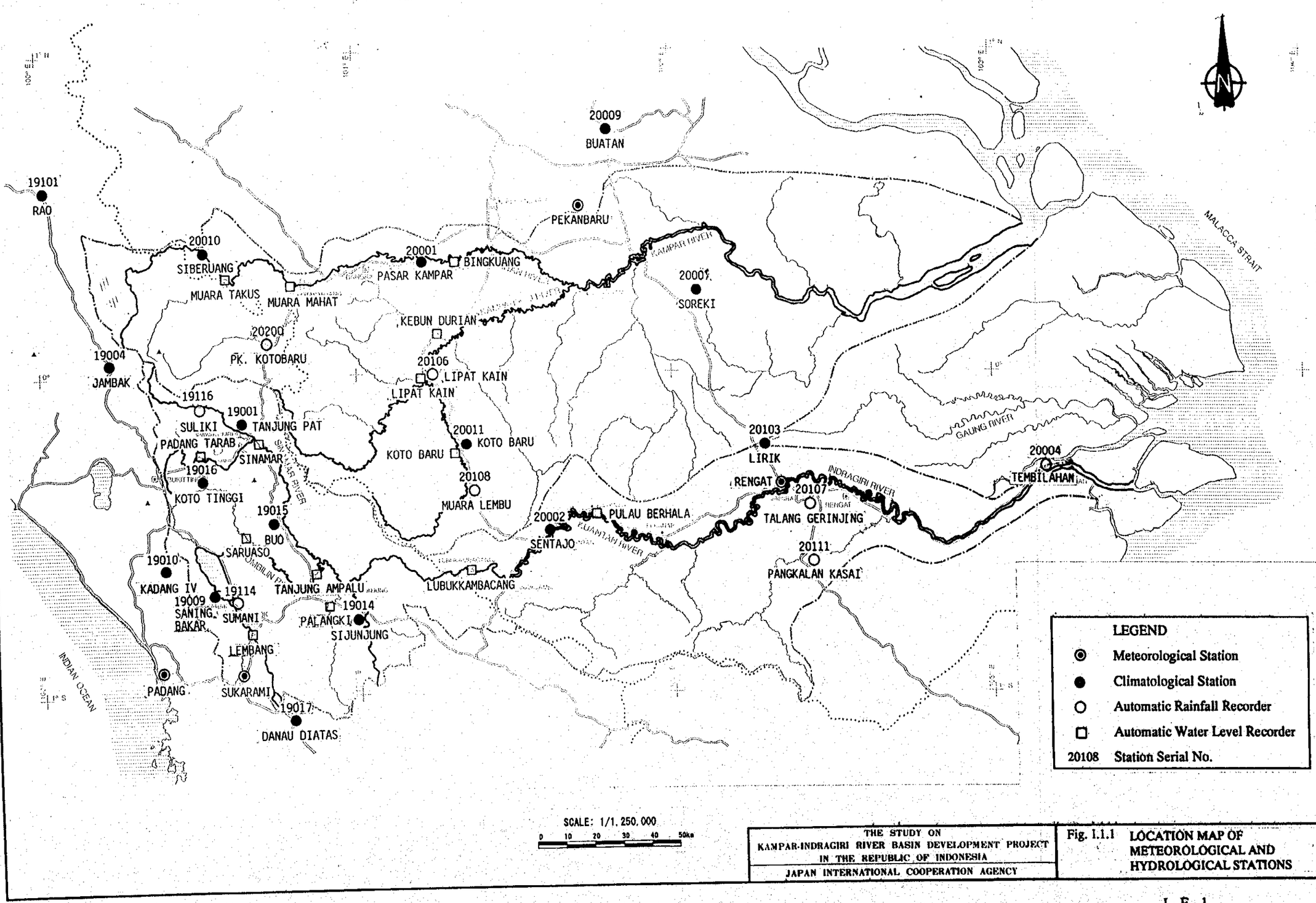

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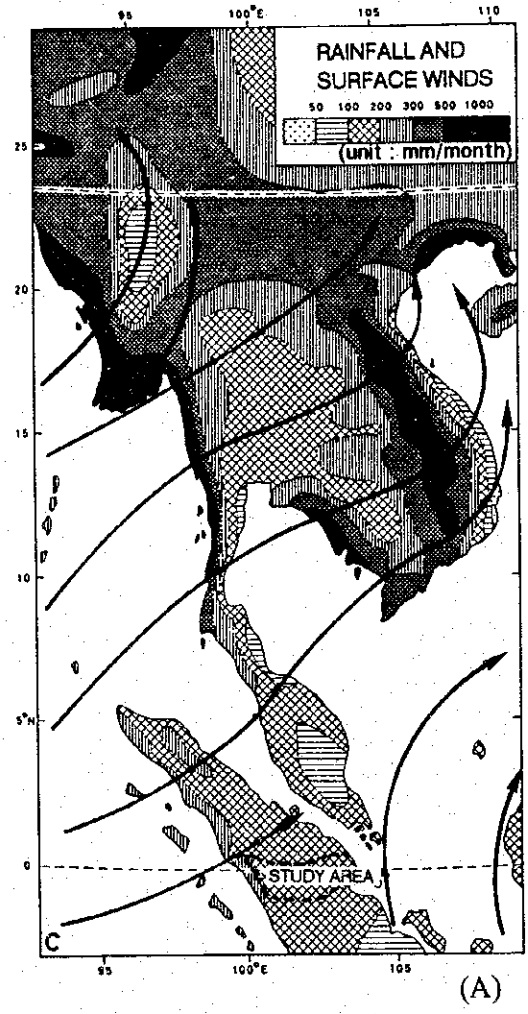
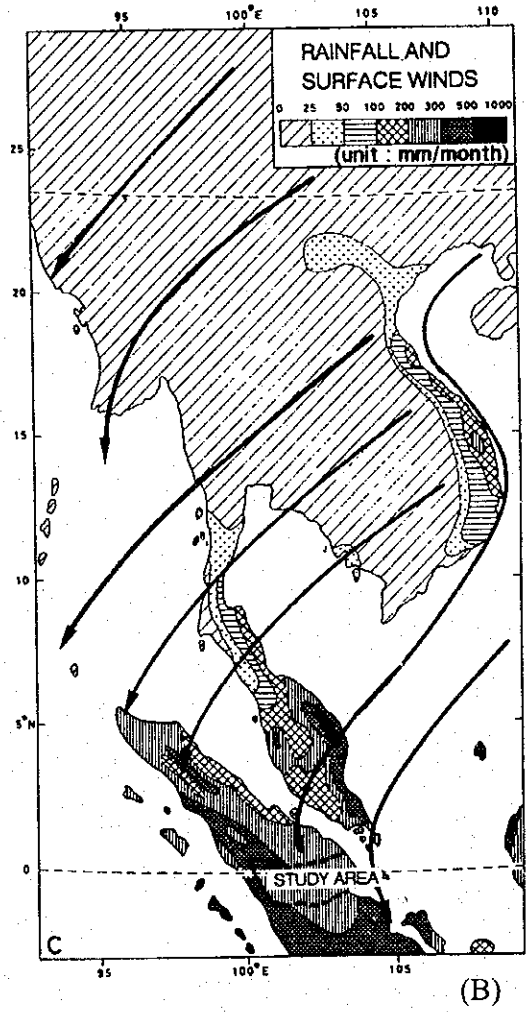
Fig. I.1.1 LOCATION MAP OF METEOROLOGICAL AND HYDROLOGICAL STATIONS

SOUTHWEST MONSOON
(JULY)



(A)

NORTHEAST MONSOON
(JUNUARY)

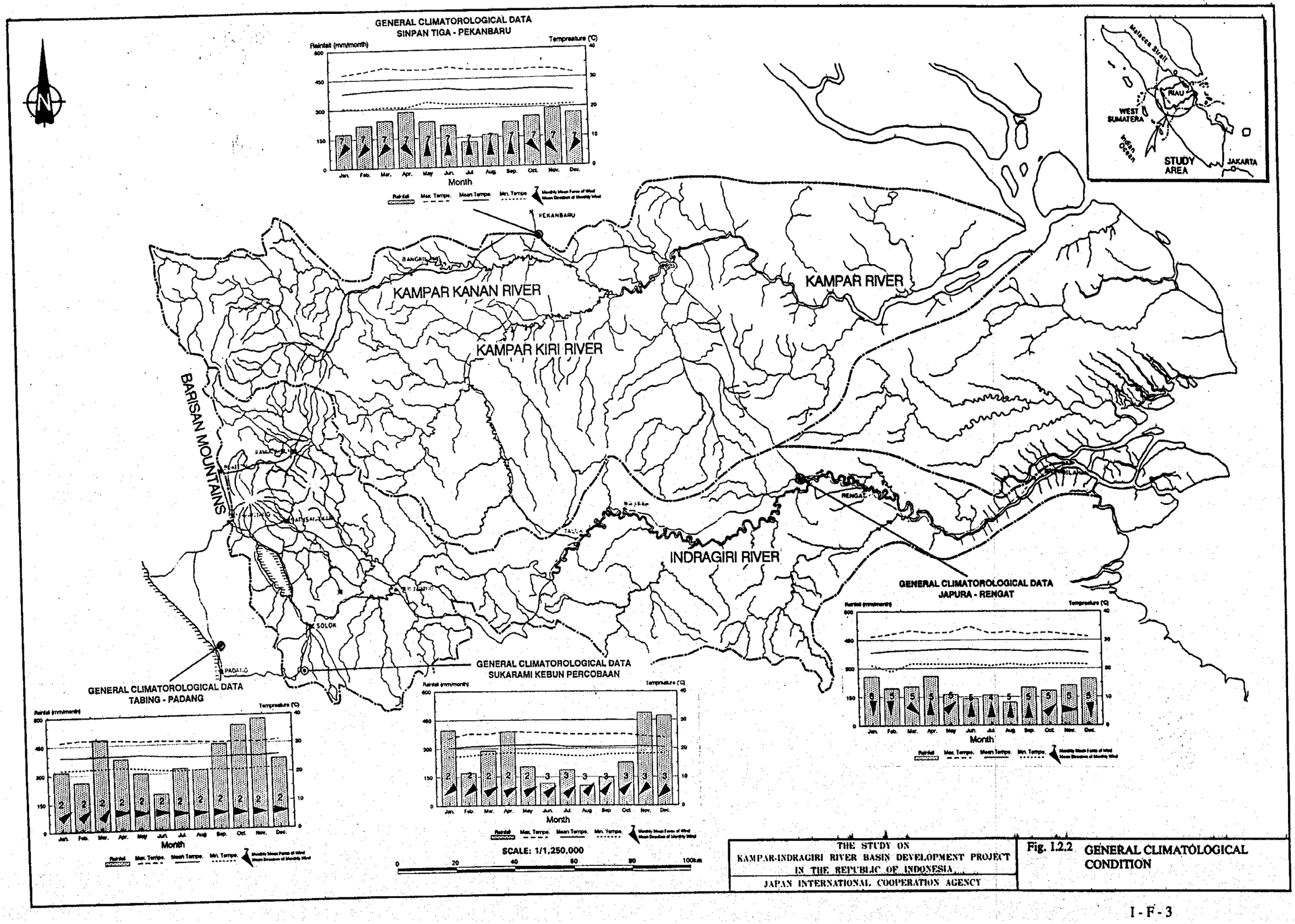


(B)

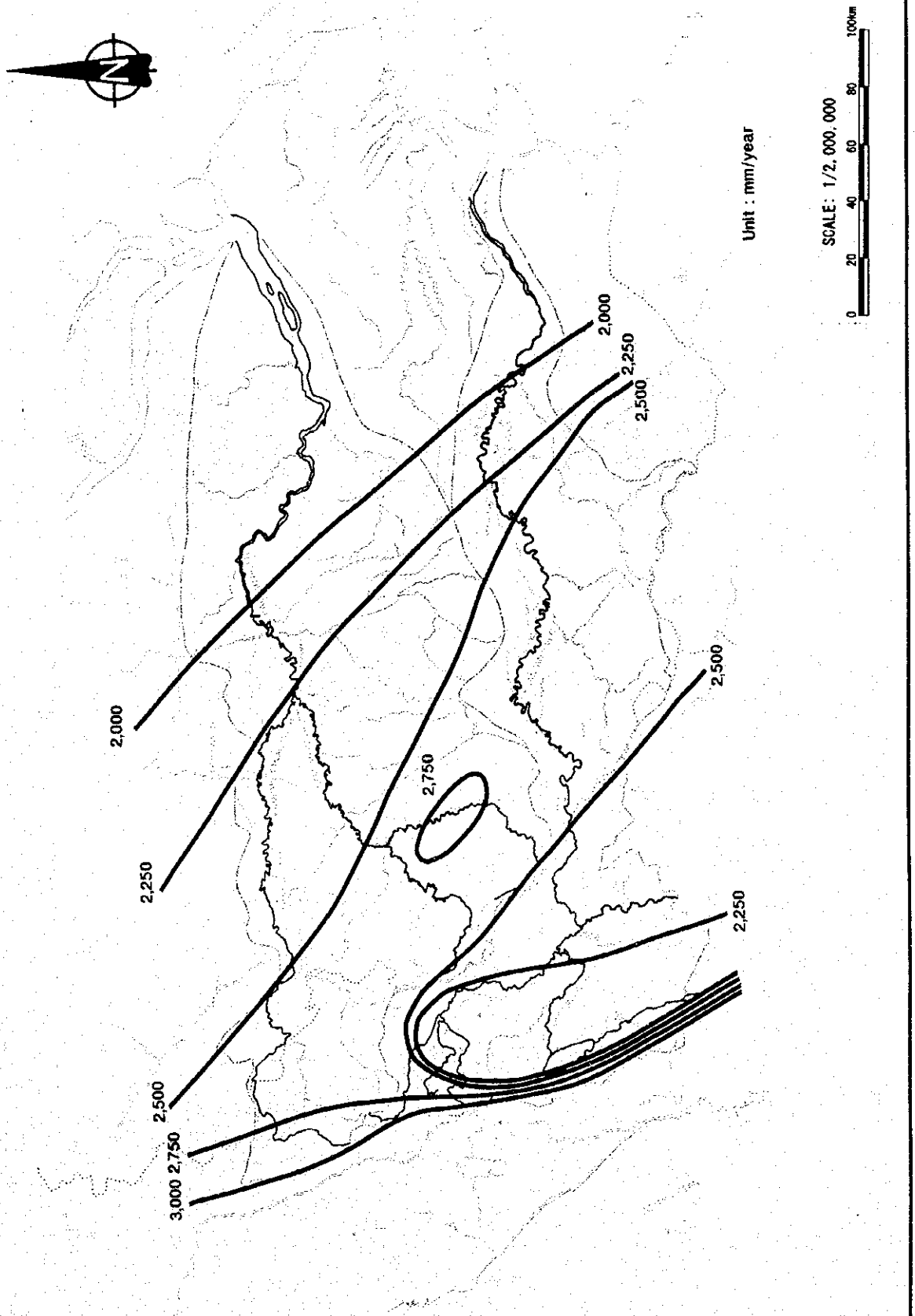
LEGEND

: SURFACE WIND DIRECTION

THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.2.1 RAINFALL DEPTH AND WIND DIRECTION DURING MONSOONS



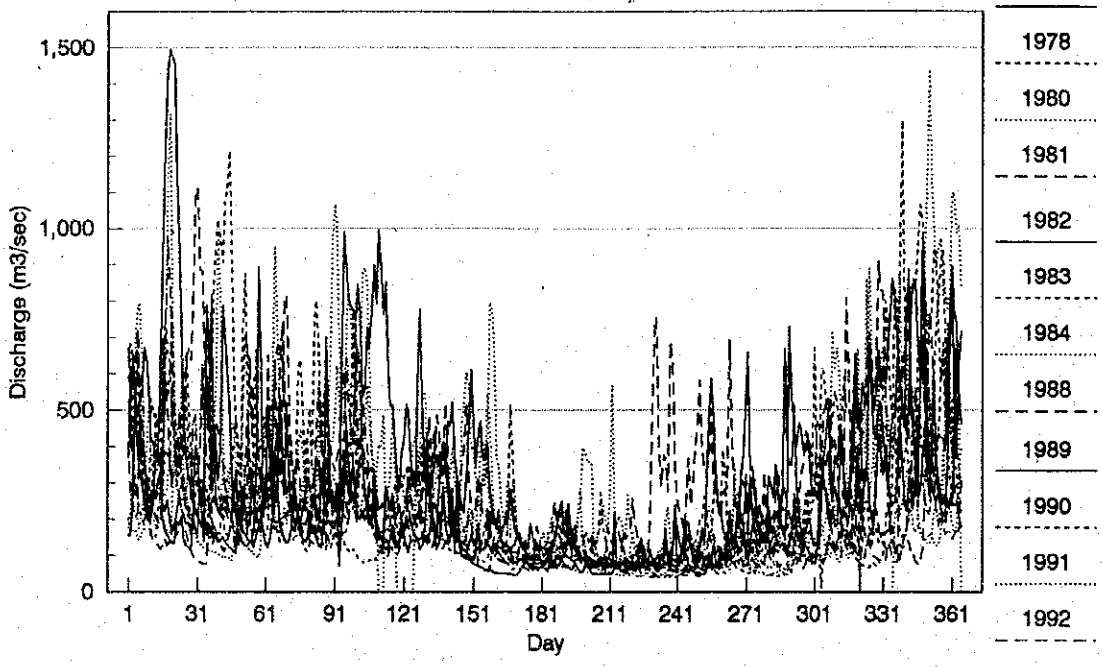
THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA	Fig. 1.2.2 GENERAL CLIMATOLOGICAL CONDITION
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.2.3 ISOHYETAL MAP OF ANNUAL RAINFALL

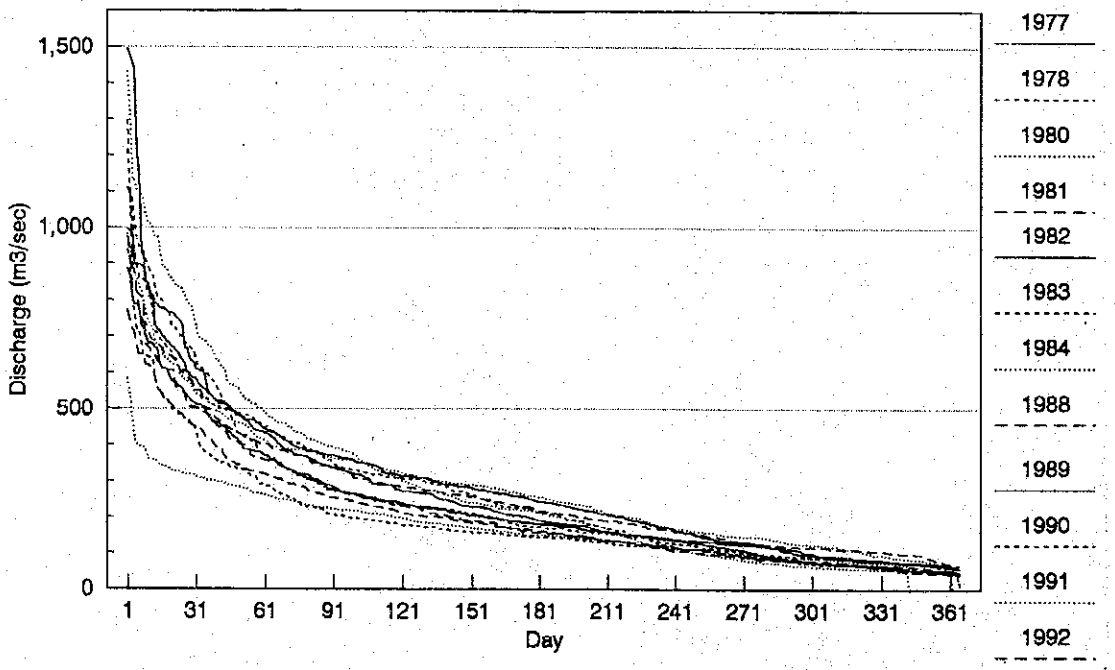
DAILY DISCHARGE DATA

KAMPAR KANAN RIVER - DANAU BINGKUANG



DISCHARGE-DURATION CURVE

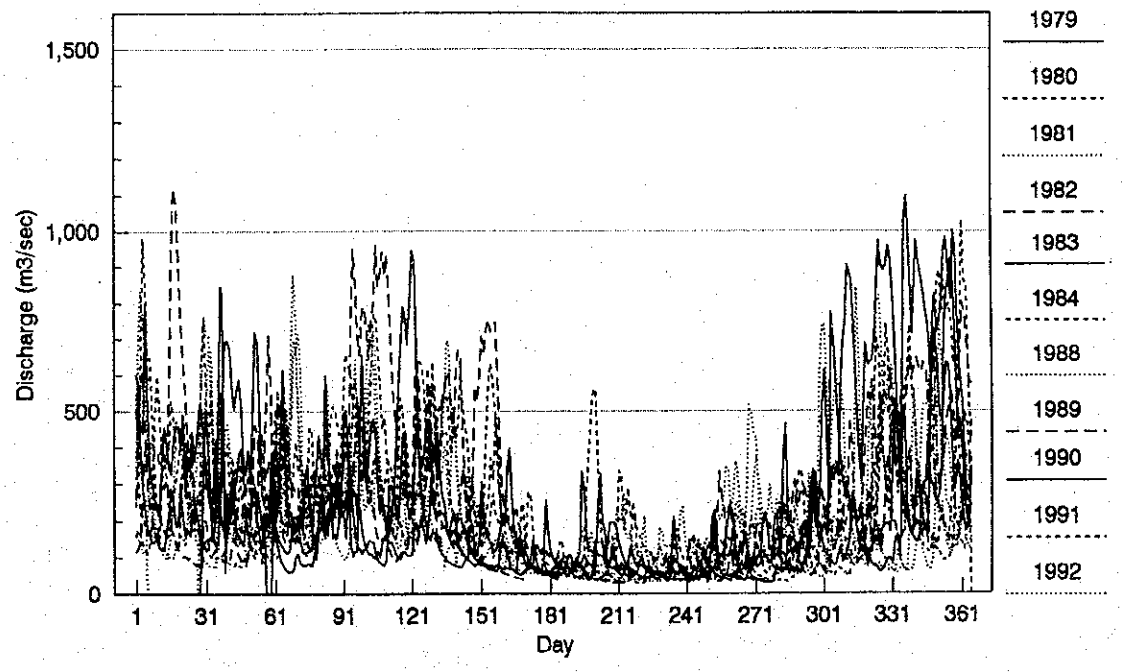
KAMPAR KANAN RIVER - DANAU BINGKUANG



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.2.4 (1/3) DAILY DISCHARGE AND DISCHARGE DURATION CURVES

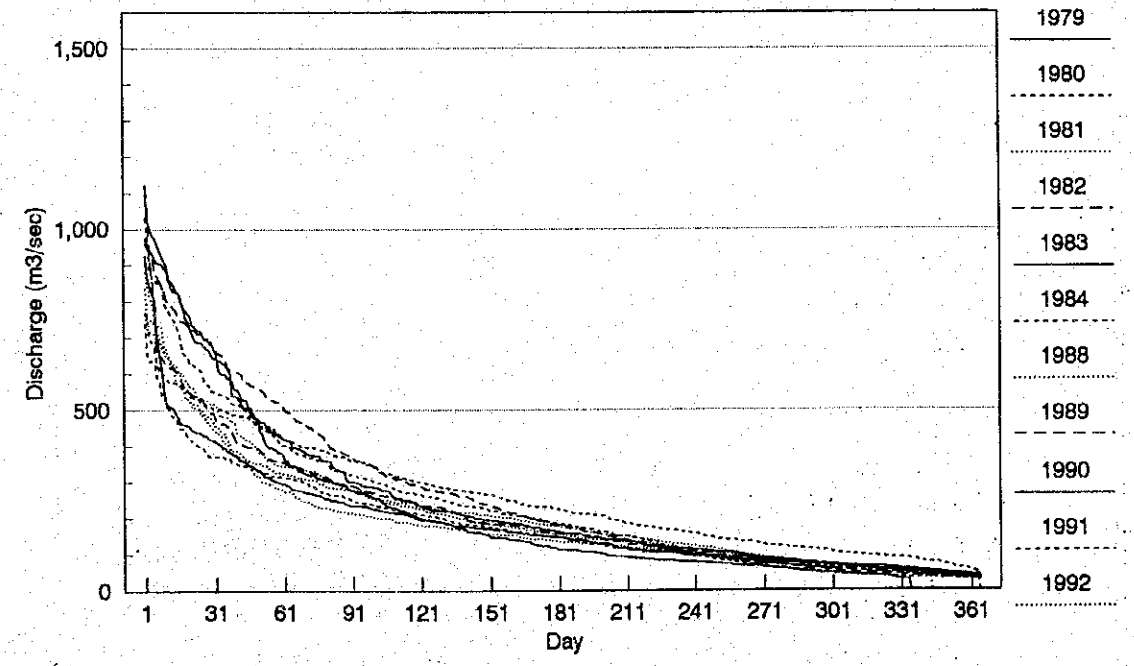
DAILY DISCHARGE DATA

KAMPAR KIRI RIVER - LIPAT KAIN



DISCHARGE DURATION CURVE

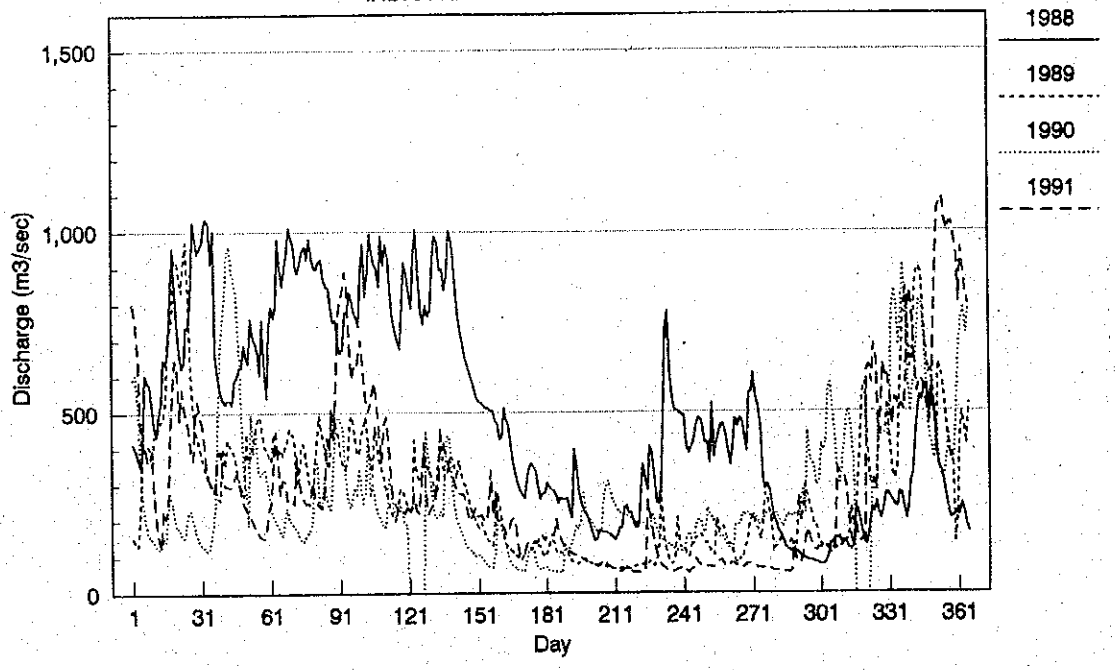
KAMPAR KIRI RIVER - LIPAT KAIN



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.2.4 (2/3) DAILY DISCHARGE AND DISCHARGE DURATION CURVES

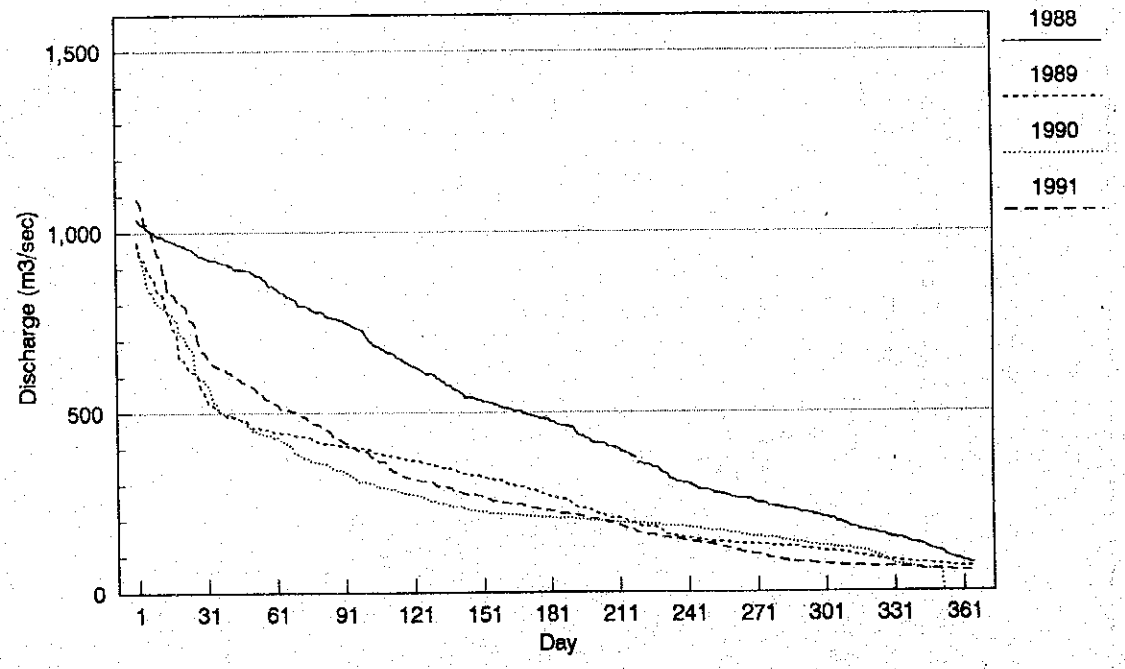
DAILY DISCHARGE DATA

INDRAGIRI RIVER - PULAU BERHALO



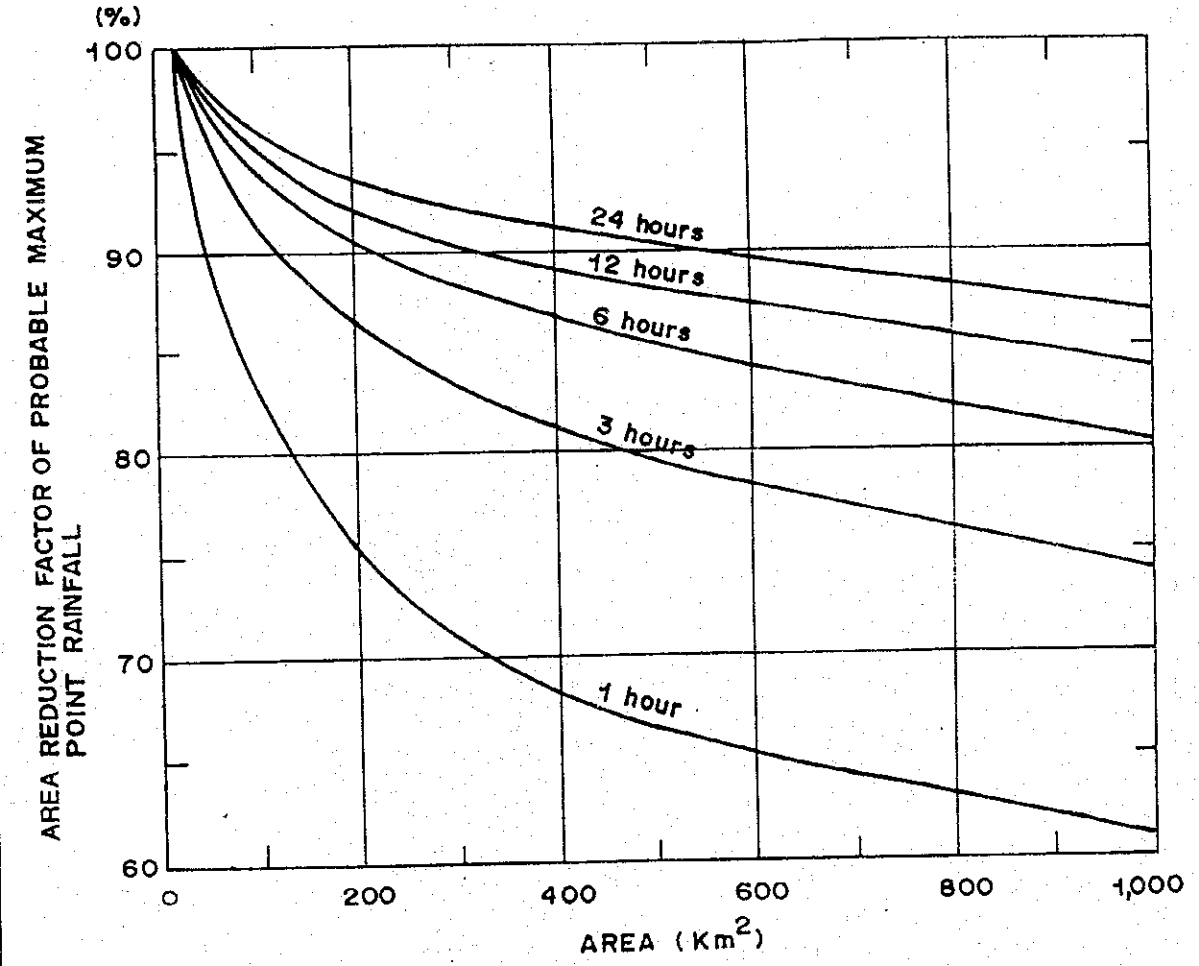
DISCHARGE DURATION CURVE

INDRAGIRI RIVER - PULAU BERHALO



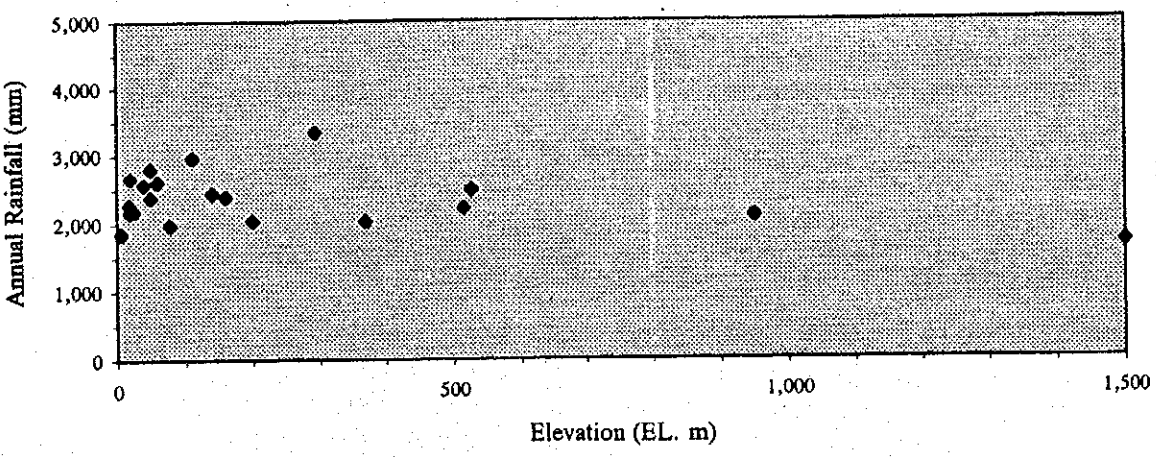
THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.2.4 (3/3) DAILY DISCHARGE AND DISCHARGE DURATION CURVES

THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.3.1 THIESSEN POLYGON FOR KAMPAR AND INDRAGIRI RIVER BASINS

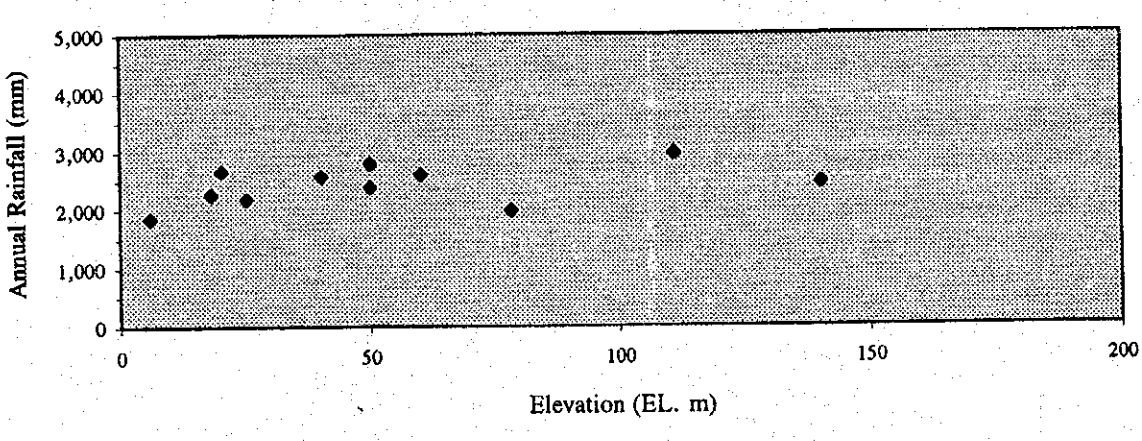


THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.3.2 AREA REDUCTION FACTOR FOR DESIGN RAINFALL

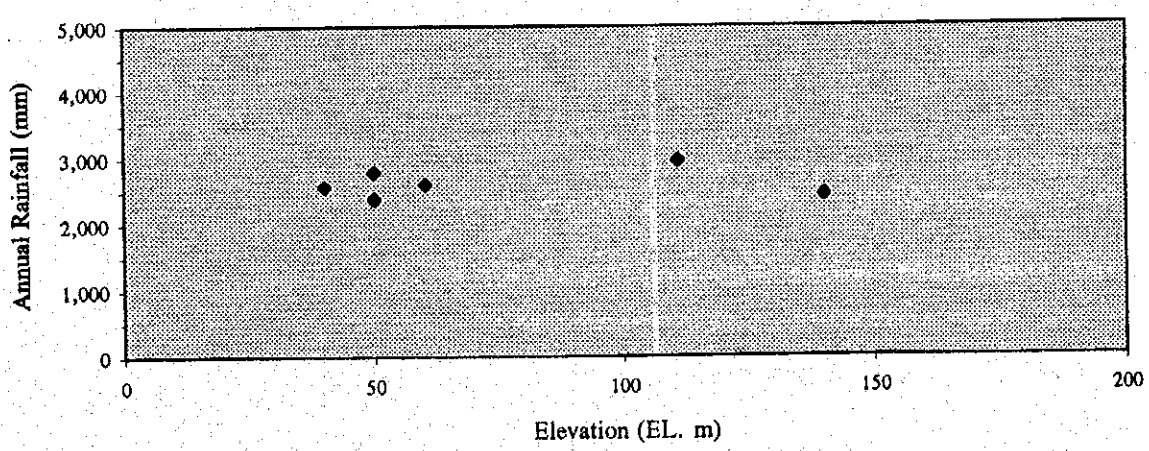
All Stations



Stations in Riau Province



Stations in Kampar River Basin



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.3.3 ANNUAL RAINFALLS VERSUS STATION ALTITUDES

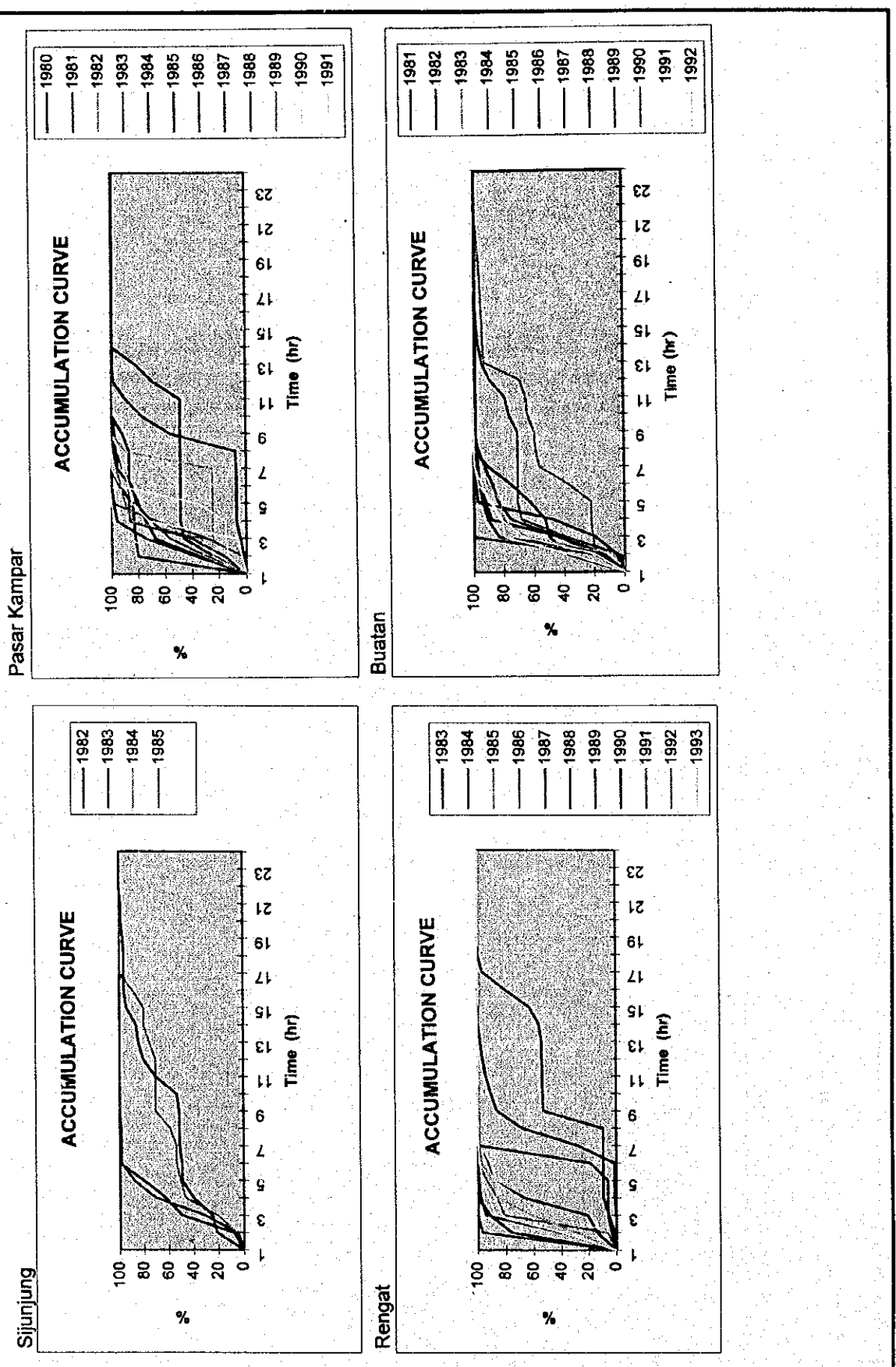


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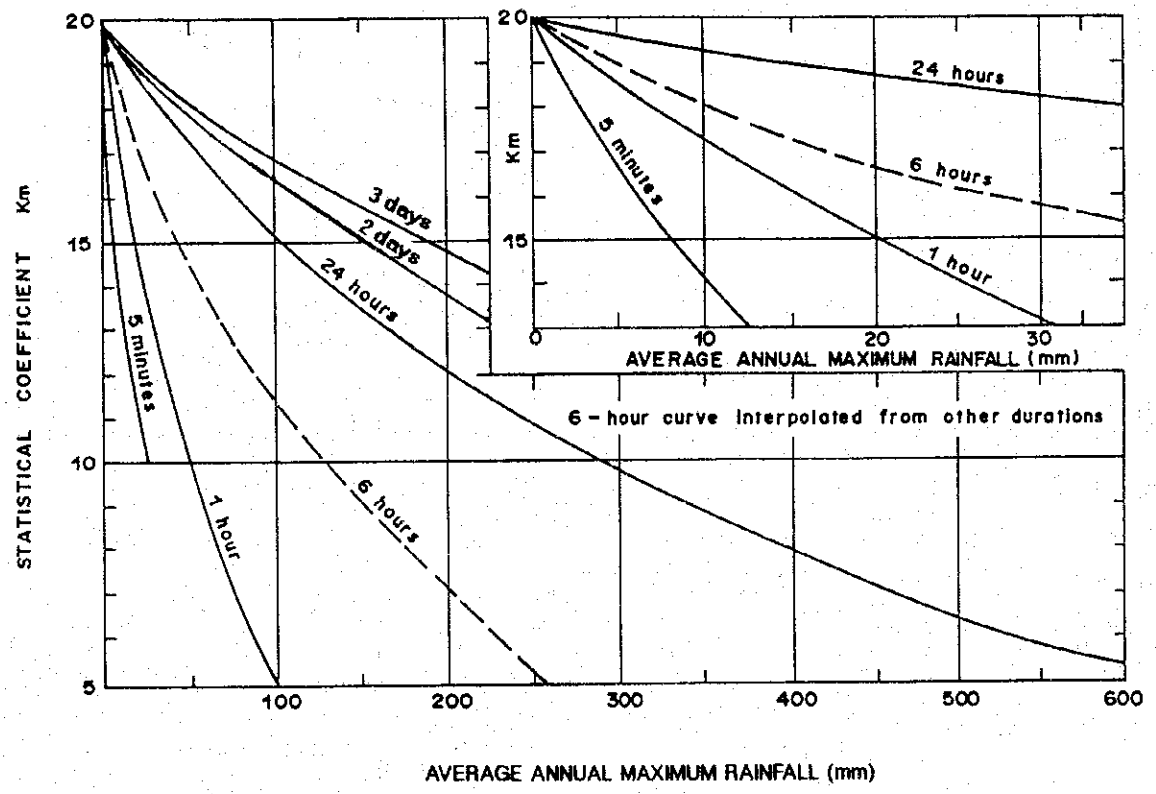
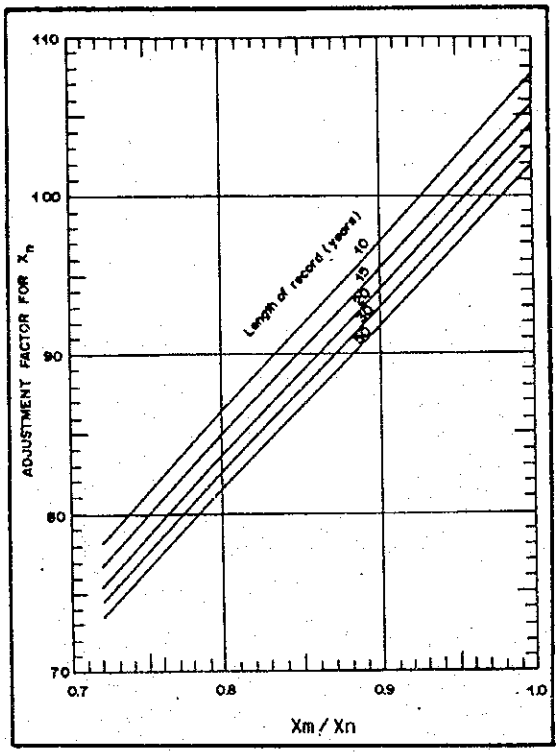
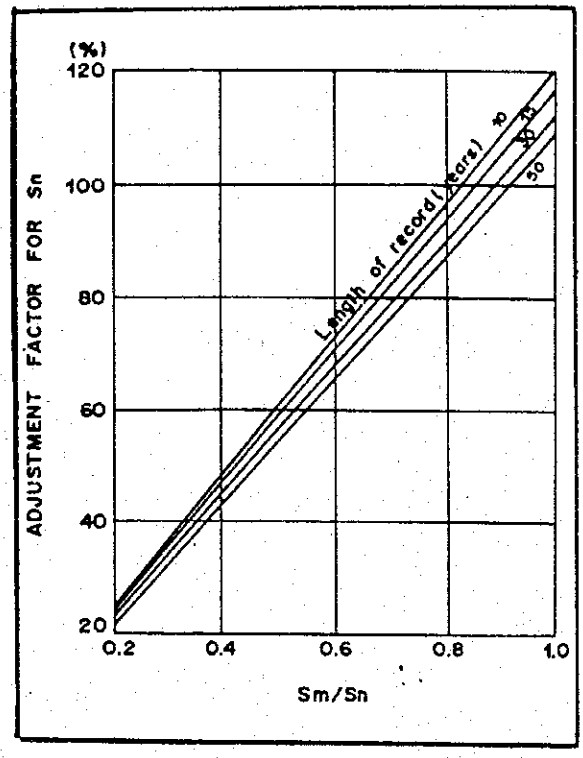
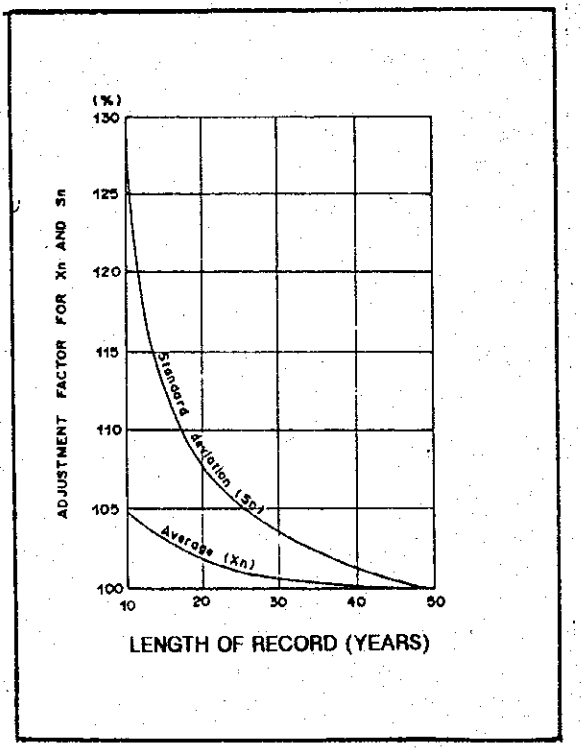
Fig. I.3.4 ACCUMULATION CURVE OF HOURLY RAINFALL DURING STORMS



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. 1.3.5 (1/2) ADJUSTMENT FACTOR DEVELOPED BY HERSHFIELD FOR ESTIMATION OF PMP







NOTE:

Xn : Unadjusted average of a series of annual maximum precipitation.

Xm : Unadjusted average of a series of annual maximum precipitation excluding the highest value.

Sn : Unadjusted standard deviation of a series of annual maximum precipitation.

Sm : Unadjusted standard deviation of a series of annual maximum precipitation excluding the highest value.

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Fig. I.3.5 (2/2) ADJUSTMENT FACTOR DEVELOPED BY HERSHFIELD FOR ESTIMATION OF PMP

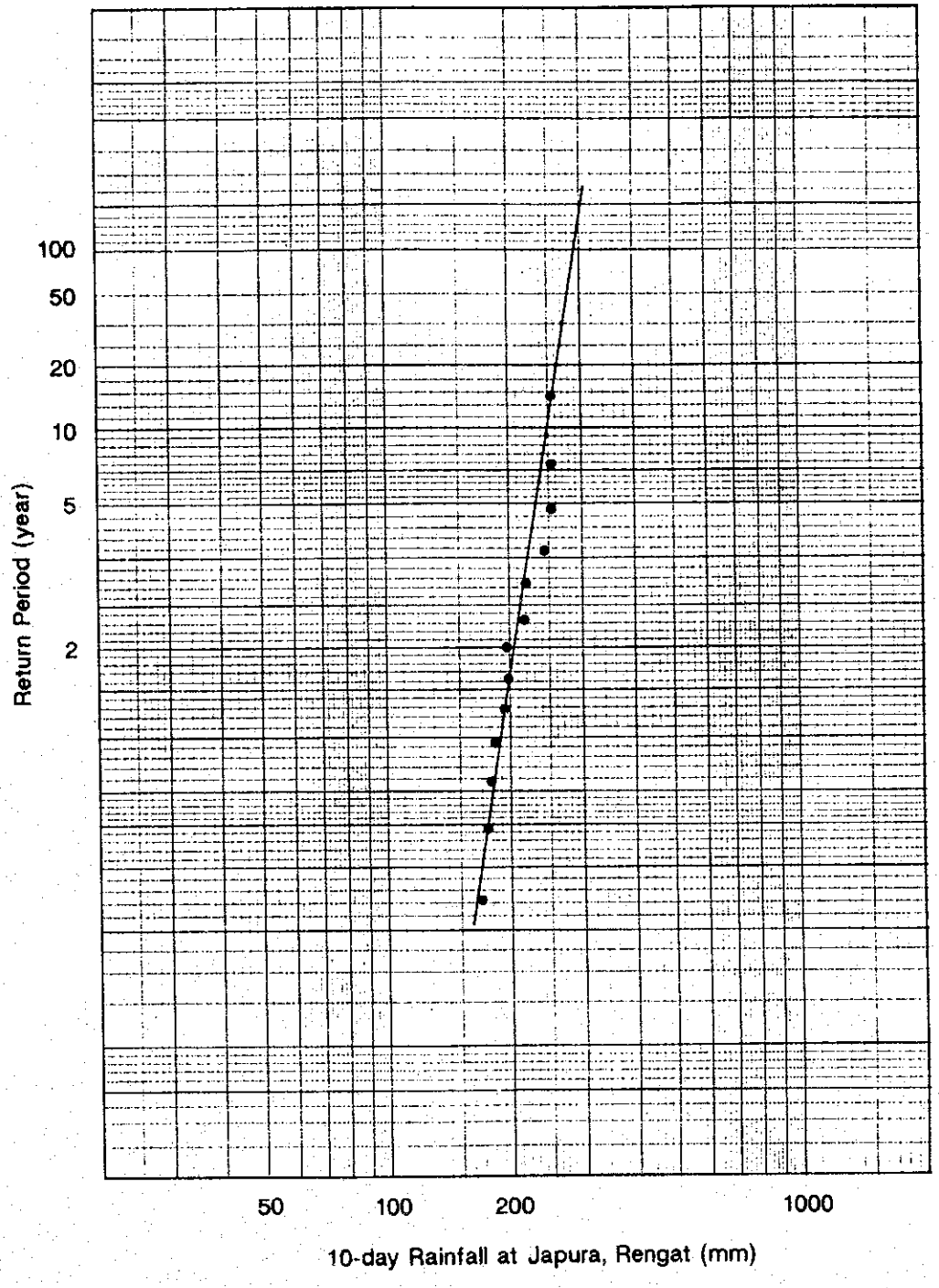

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Fig. I.3.6 PROBABILITY PLOT FOR 10-DAY RAINFALL AT JAPURA, RENGAT

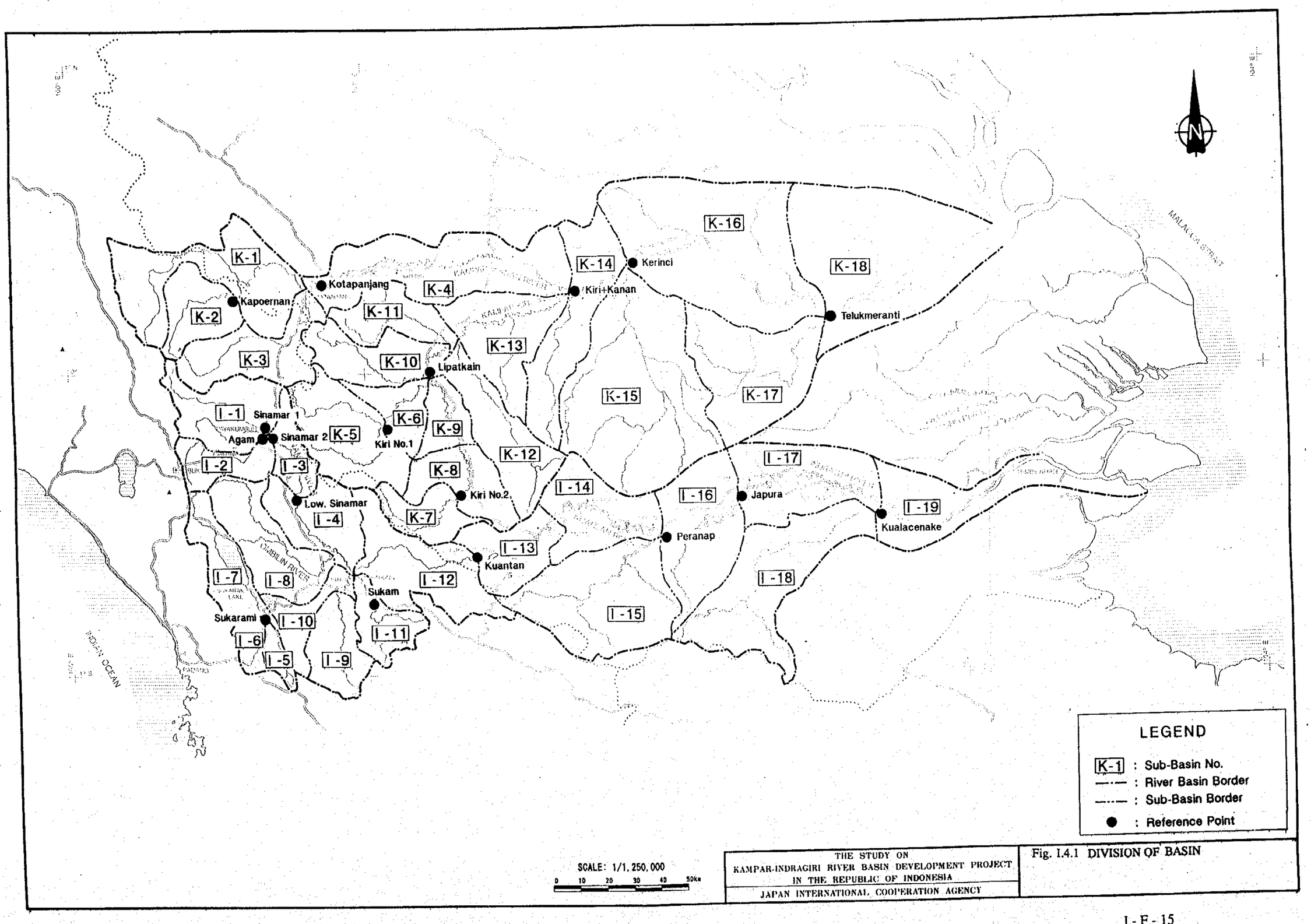

Fig. I.4.1 DIVISION OF BASIN

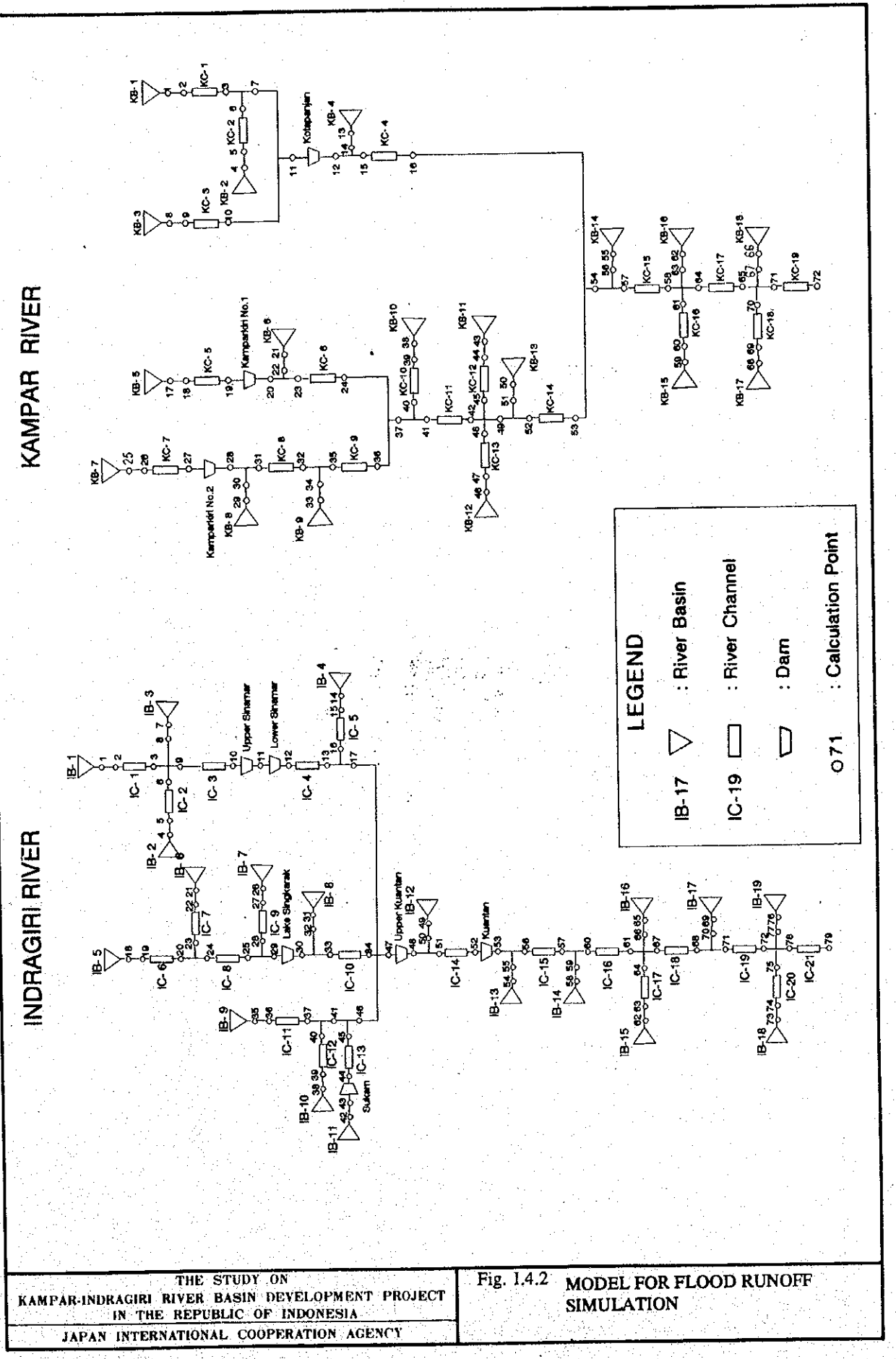

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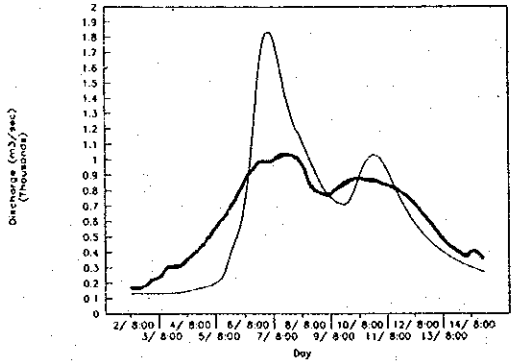
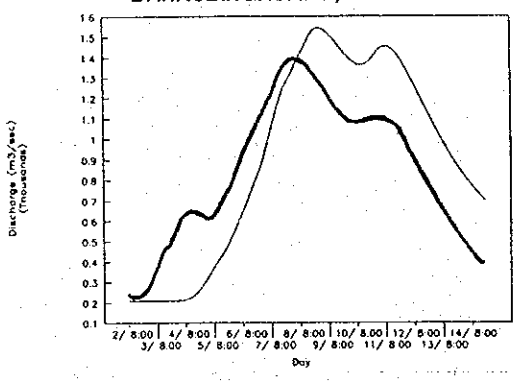
Fig. I.4.2 MODEL FOR FLOOD RUNOFF SIMULATION

KAMPAR KIRI AND KAMPAR KANAN RIVER

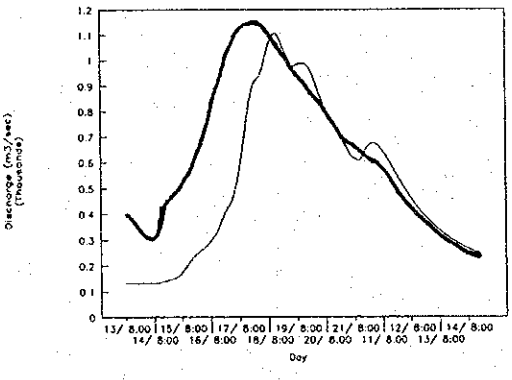
LIPAT KAIN, JAN 1986



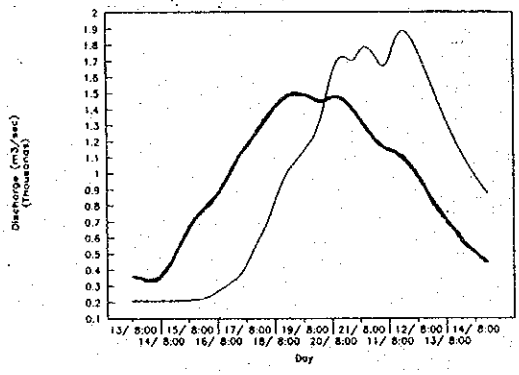
DANAUBINGKUANG, JAN 1986



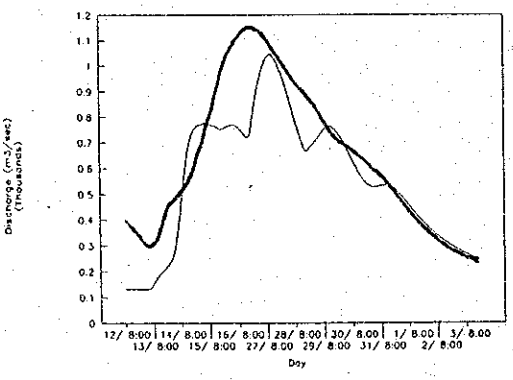
LIPAT KAIN, JAN 1989



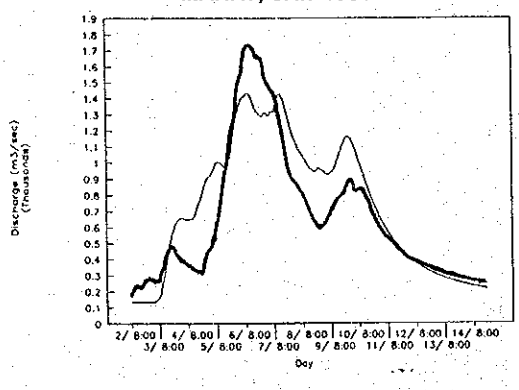
DANAUBINGKUANG, JAN 1989



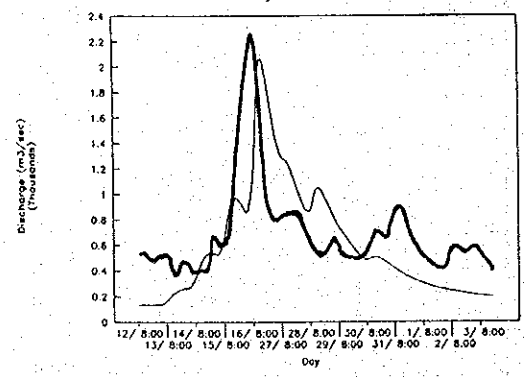
LIPAT KAIN, JAN 1991



MAHAT, JAN 1986



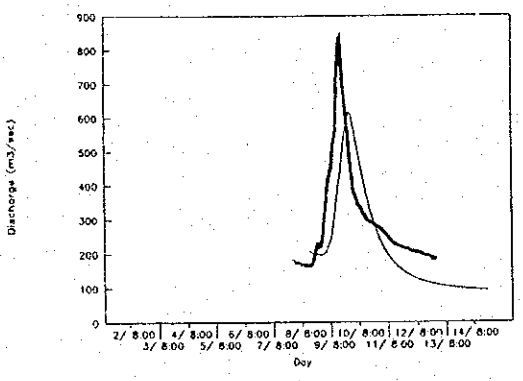
MAHAT, JAN 1991



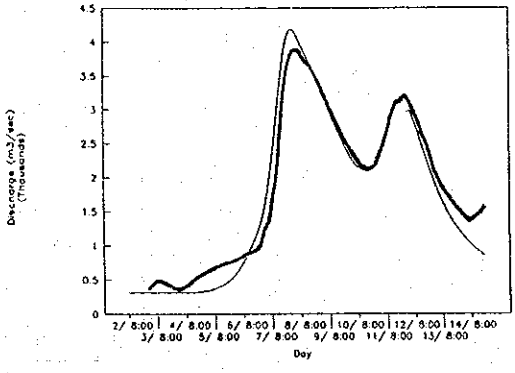
THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. I.4.3 (1/2) VERIFICATION OF FLOOD RUNOFF SIMULATION MODEL

INDRAGIRI RIVER

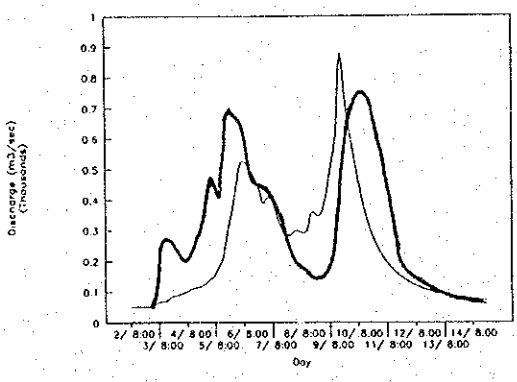
OMBILIN, JAN 1986



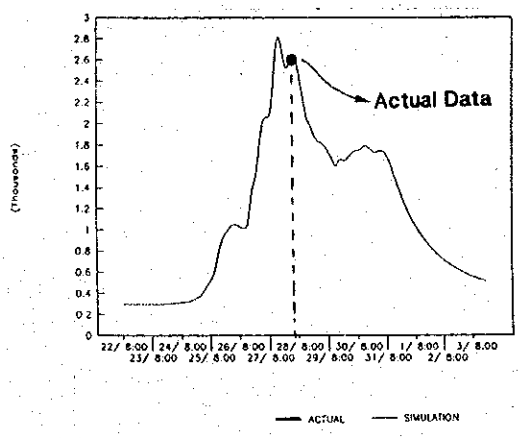
BERHARA, JAN 1986



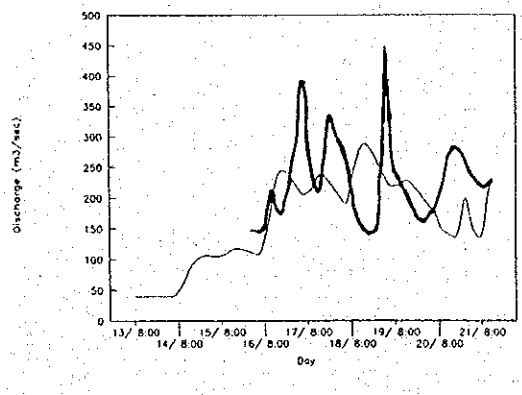
SINAMAR, JAN 1986



BERHARA, JAN 1991



PALANGKI, JAN 1989



THE STUDY ON KAMPAR-INDRAGIRI RIVER BASIN DEVELOPMENT PROJECT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. 1.4.3 (2/2)	VERIFICATION OF FLOOD RUNOFF SIMULATION MODEL