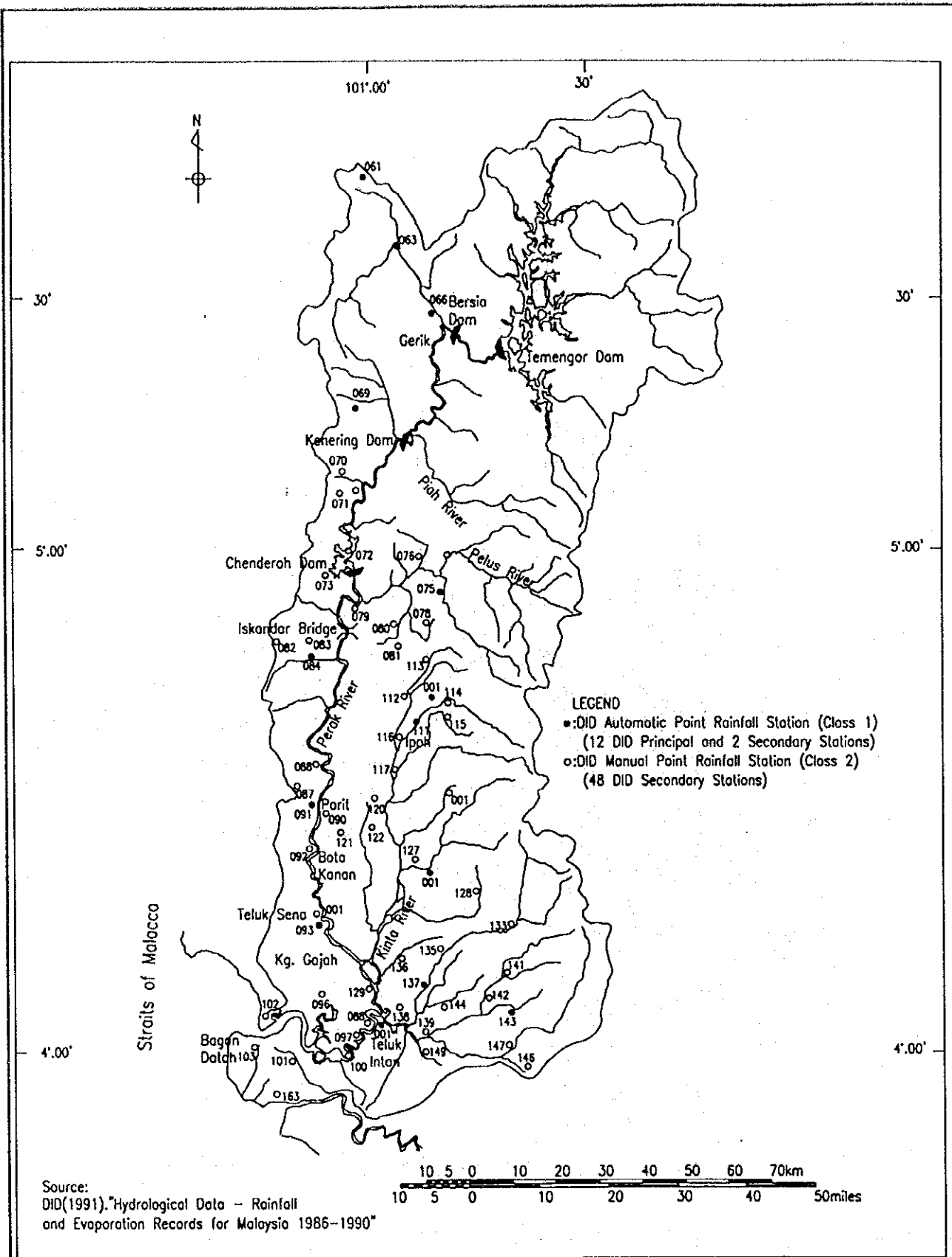


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-1 LOCATION OF REAL-TIME
HYDROLOGICAL STATIONS FOR
OPERATIONAL SYSTEM

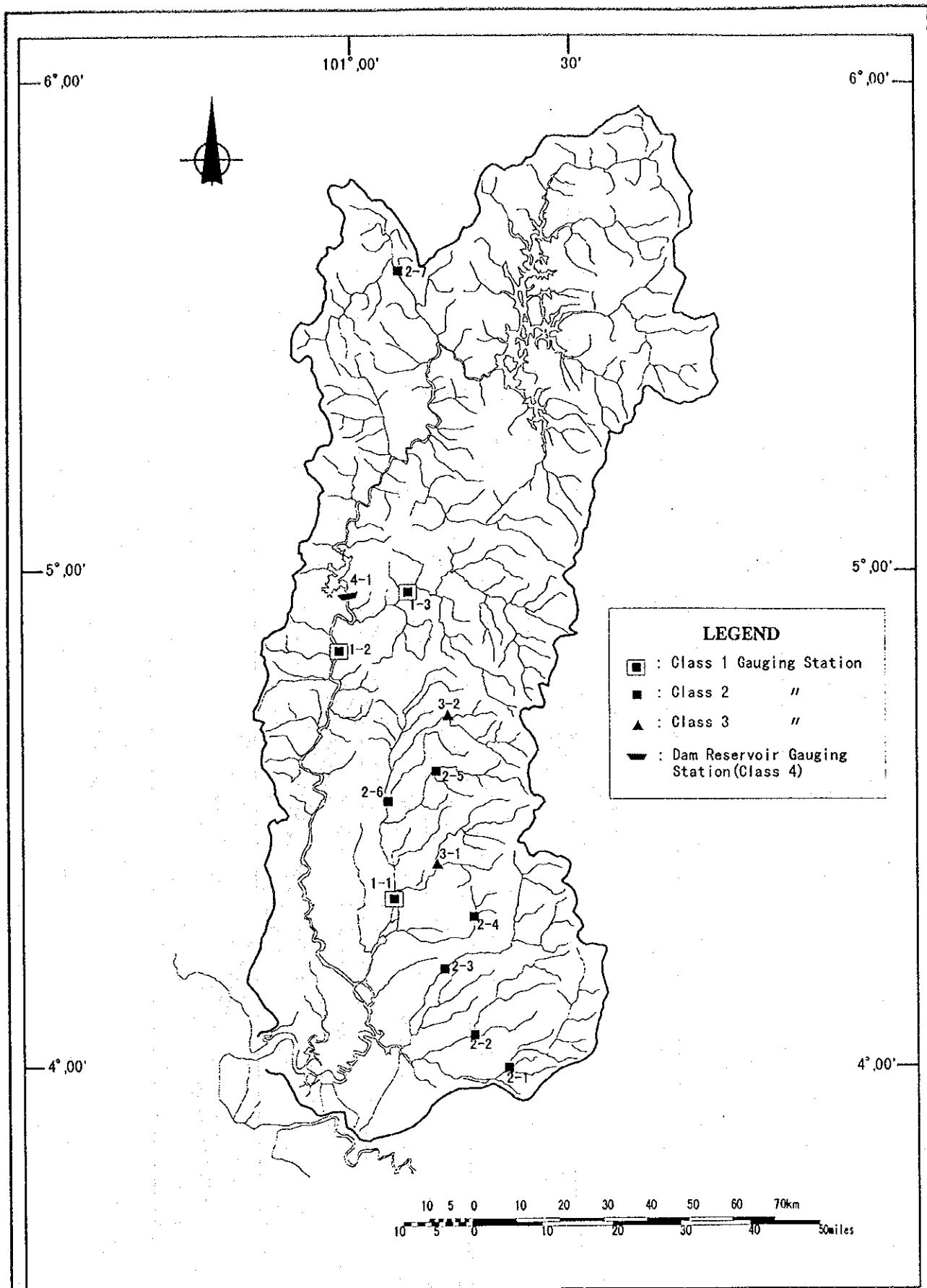


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-2

LOCATION OF NON REAL-TIME
RAINFALL STATIONS FOR
OPERATIONAL SYSTEM

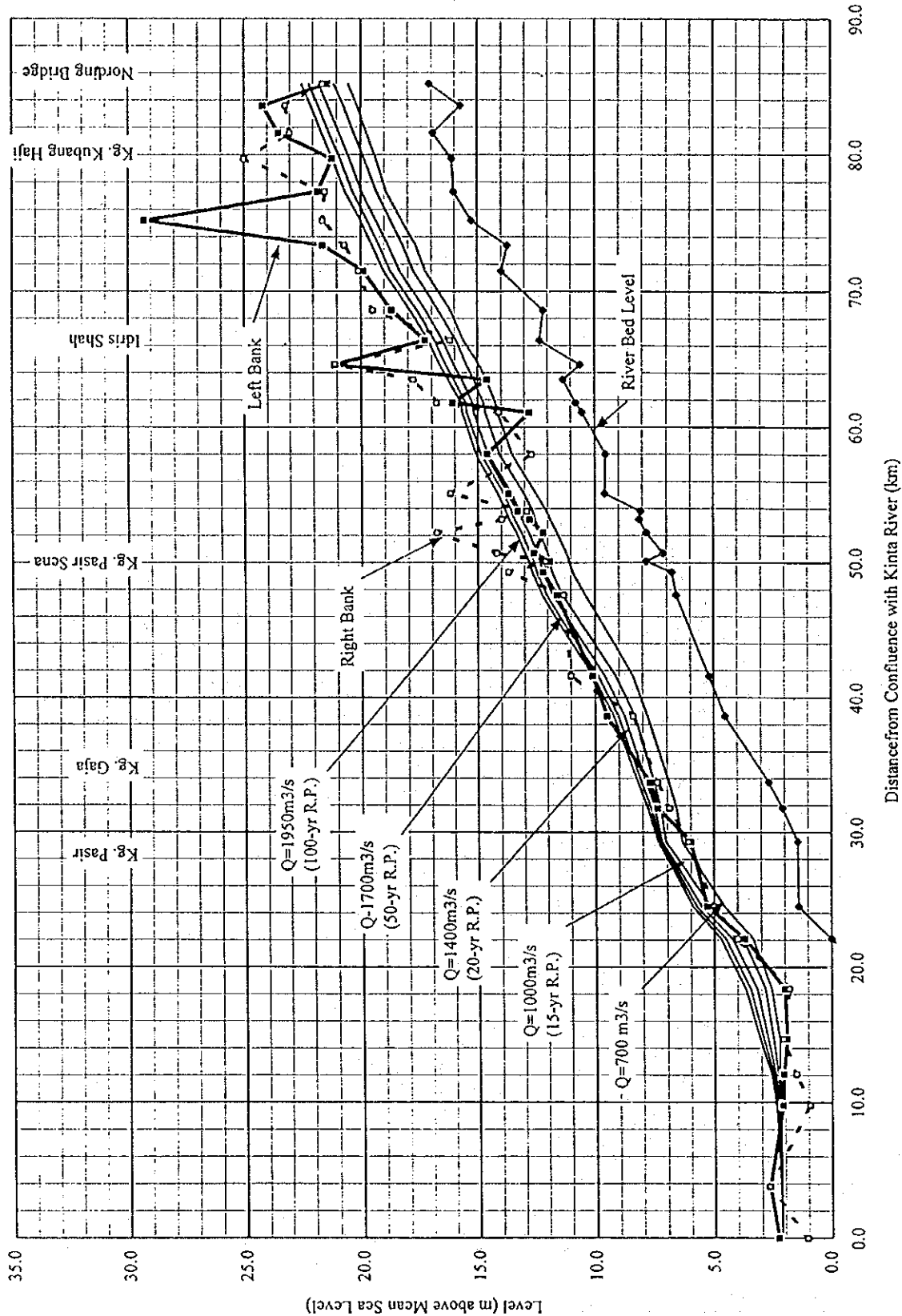


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-3

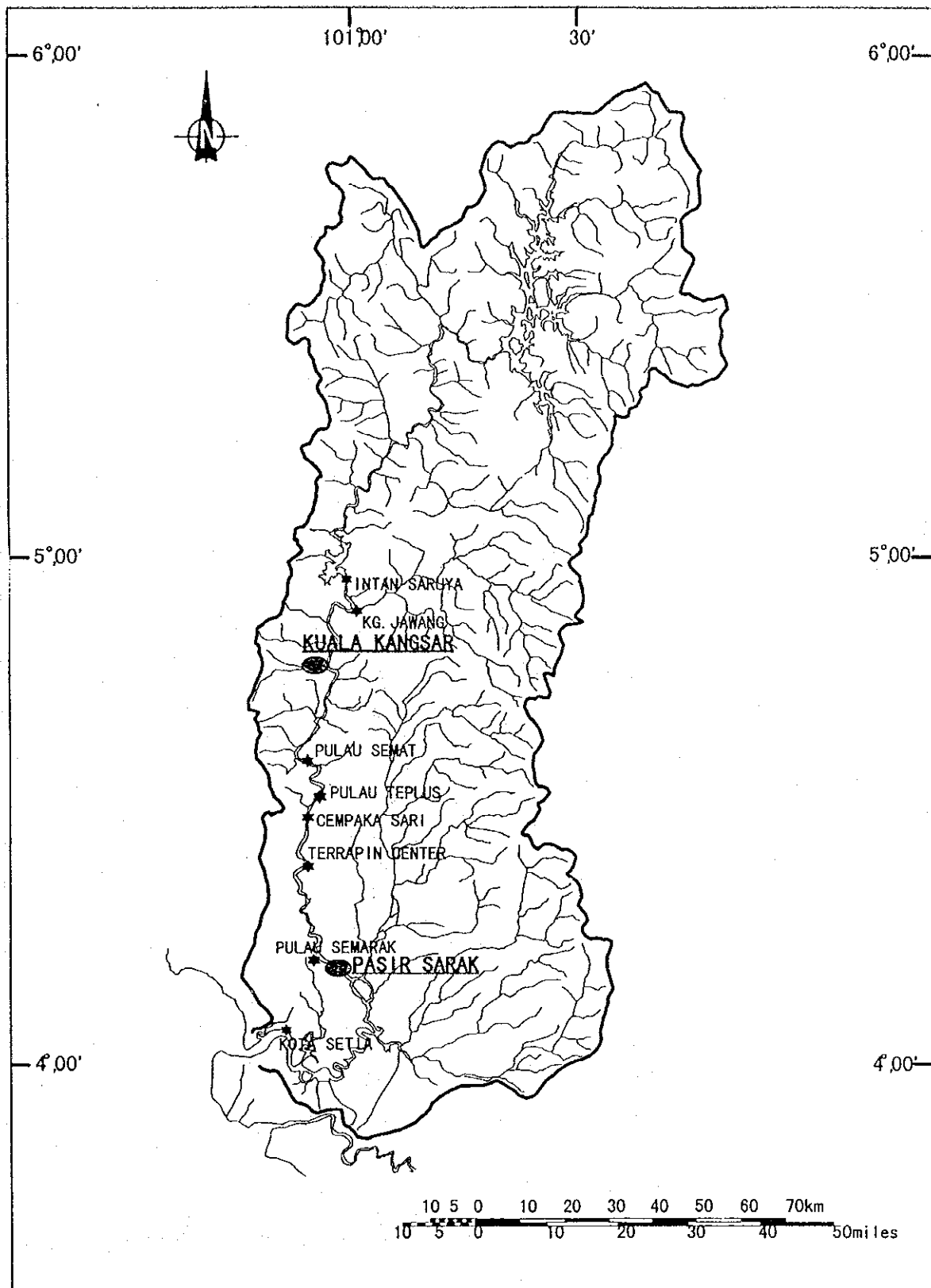
LOCATION OF NON REAL-TIME
STREAM GAUGING STATIONS FOR
OPERATIONAL SYSTEM



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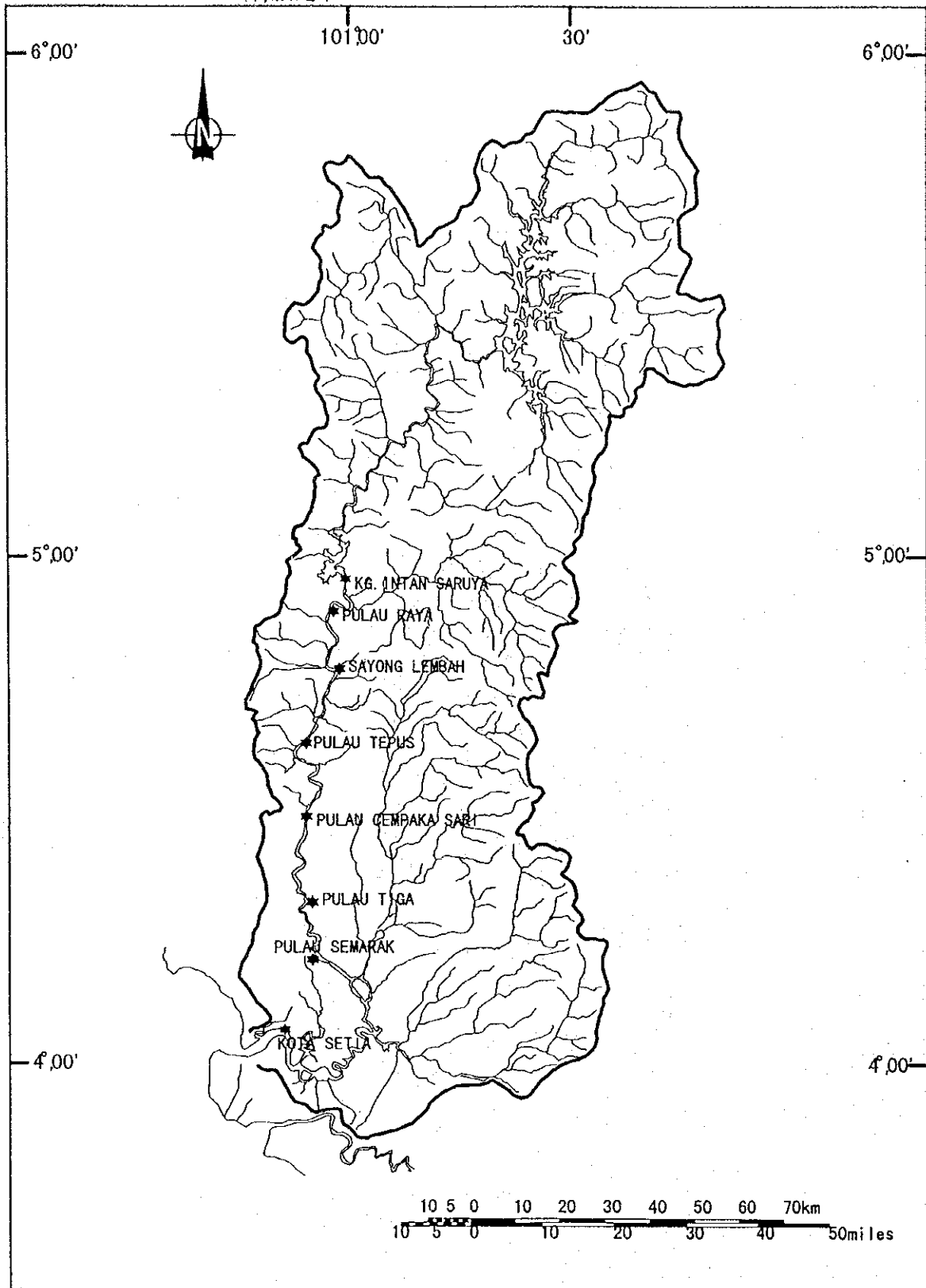
Fig. 7-4 PROFILE OF RIVER CHANNEL AND
PROBABLE WATER LEVEL



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

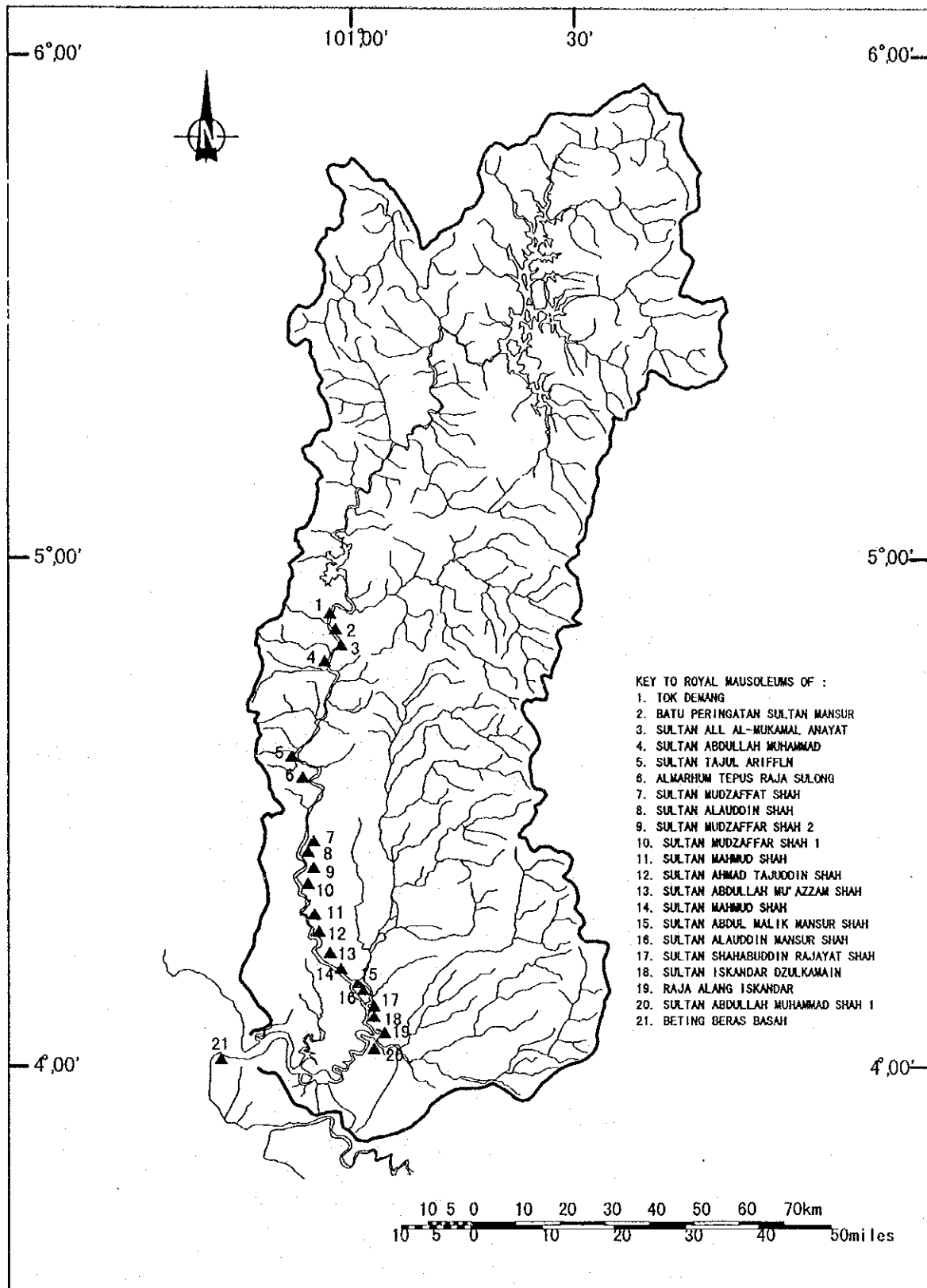
Fig. 7-5 LOCATION OF RIVER PARKS



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

Fig. 7-6 LOCATION OF CAMP SITES

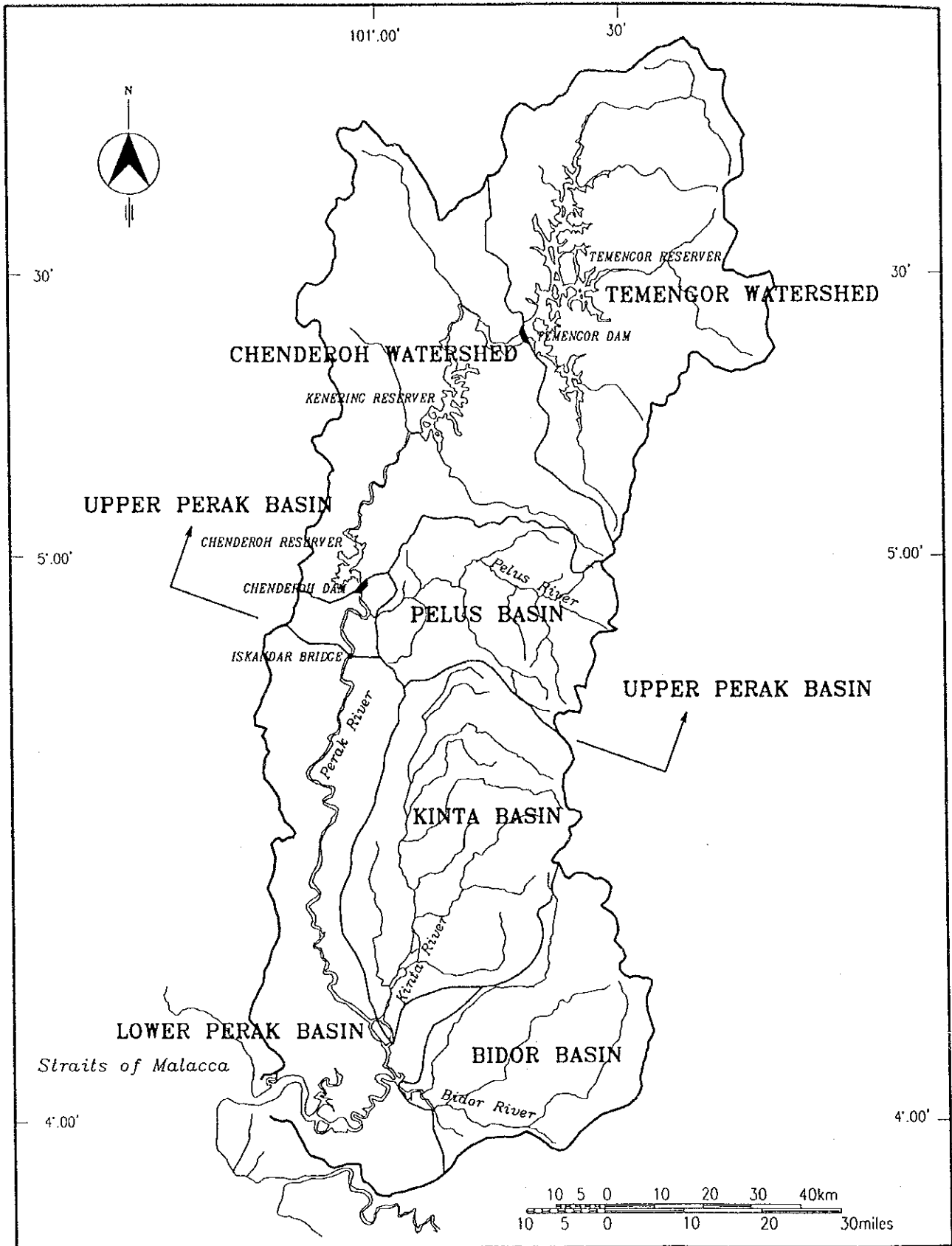
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BASIN INFORMATION SYSTEM IN MALAYSIA

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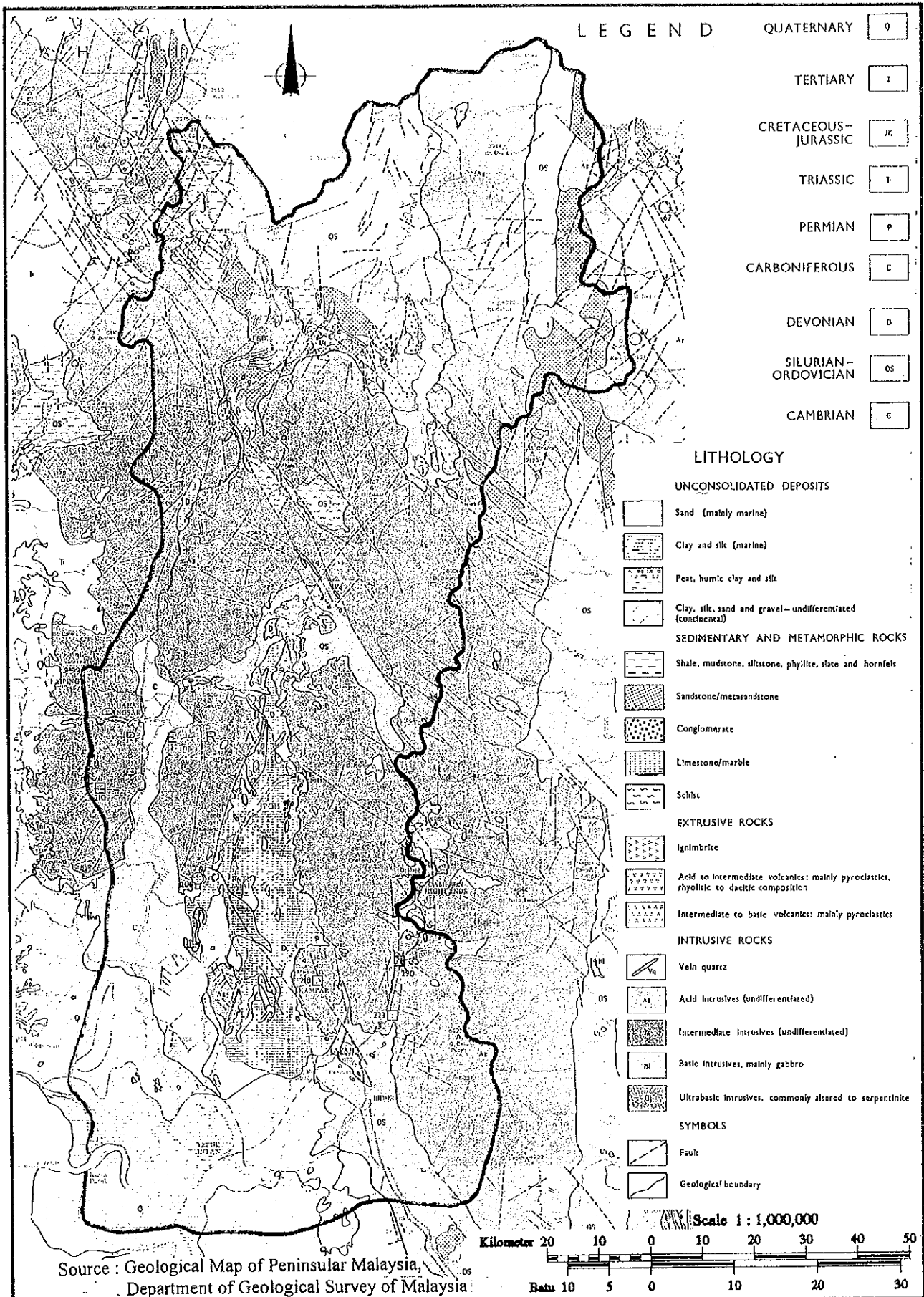
Fig. 7-7 LOCATION OF ROYAL
MAUSOLEUMS



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

Fig. 7-8 PERAK RIVER BASIN DIVIDE

JAPAN INTERNATIONAL COOPERATION AGENCY

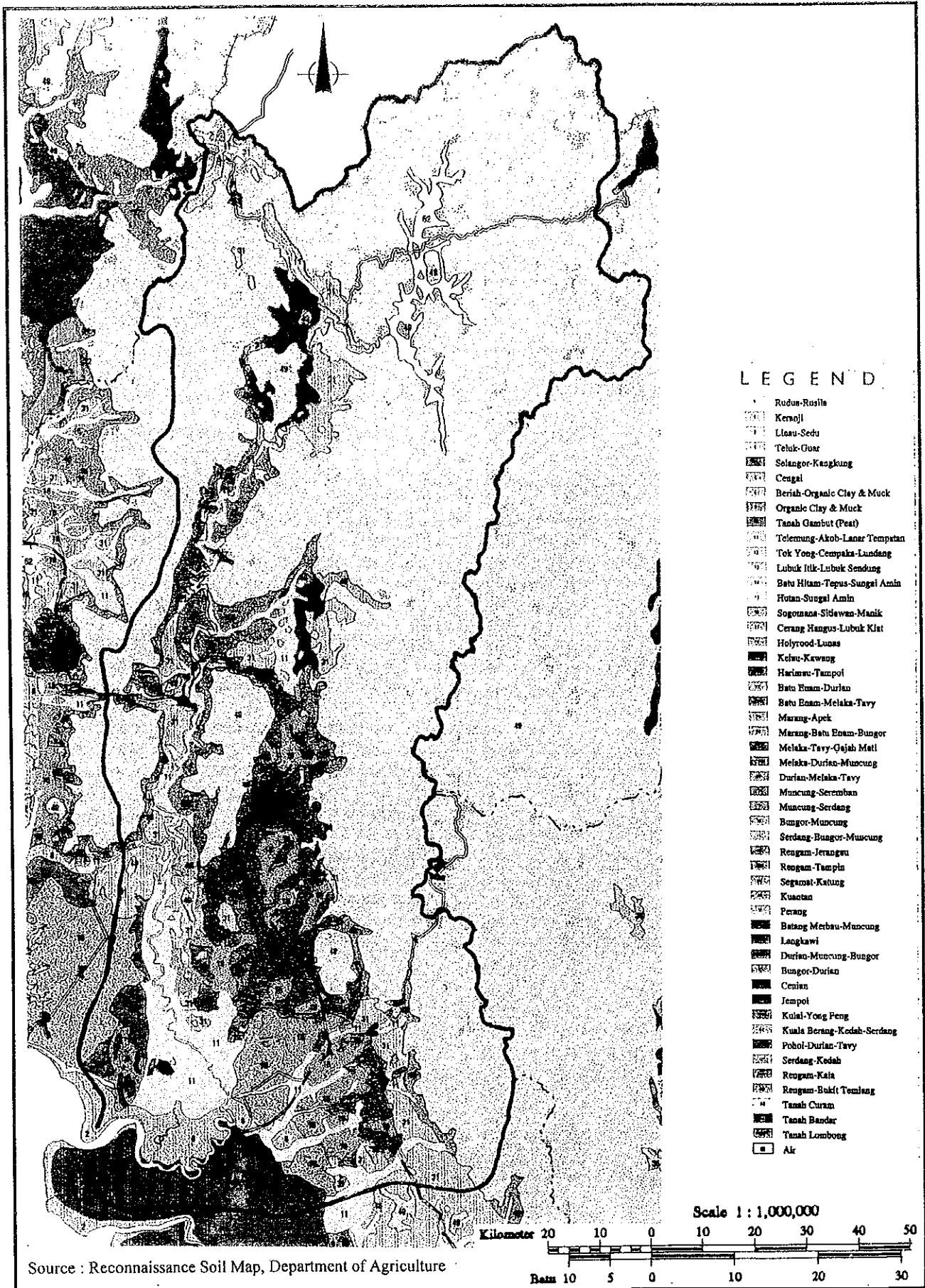


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-9

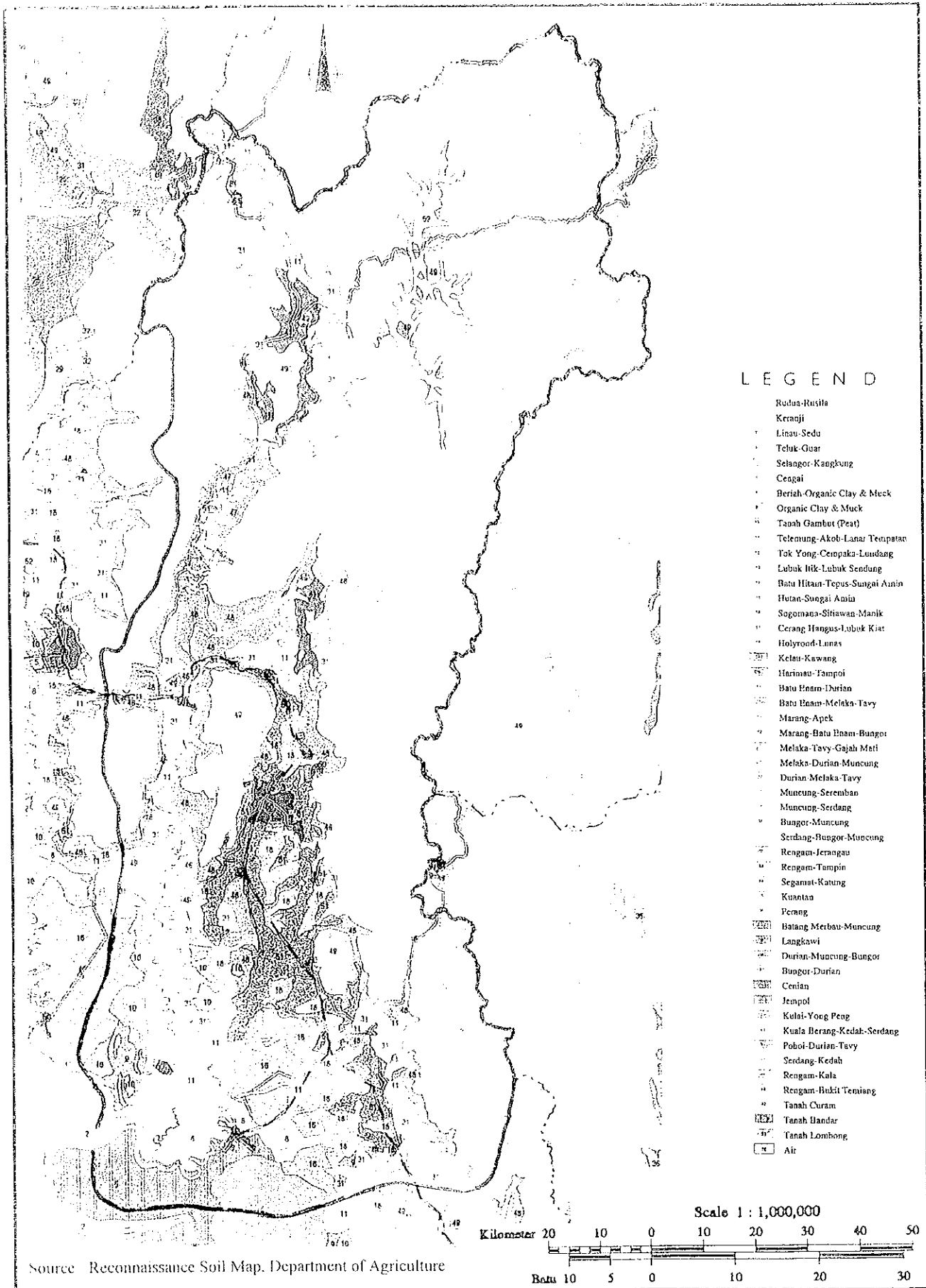
GEOLOGICAL MAP OF PERAK RIVER
BASIN



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BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

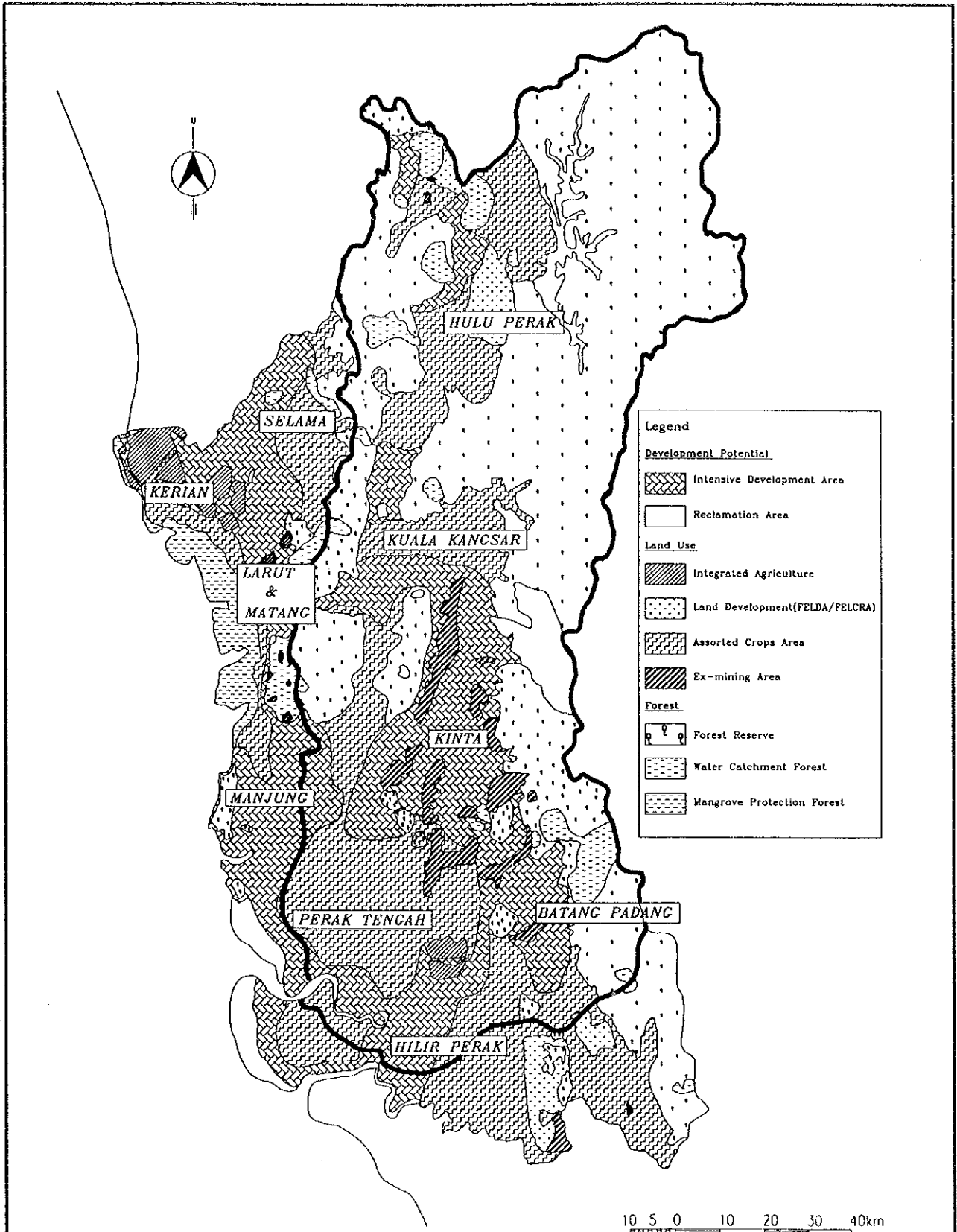
Fig. 7-10 SOIL COVER OF PERAK RIVER
BASIN



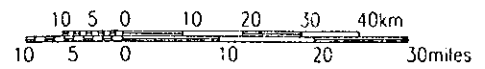
THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-10 SOIL COVER OF PERAK RIVER
BASIN



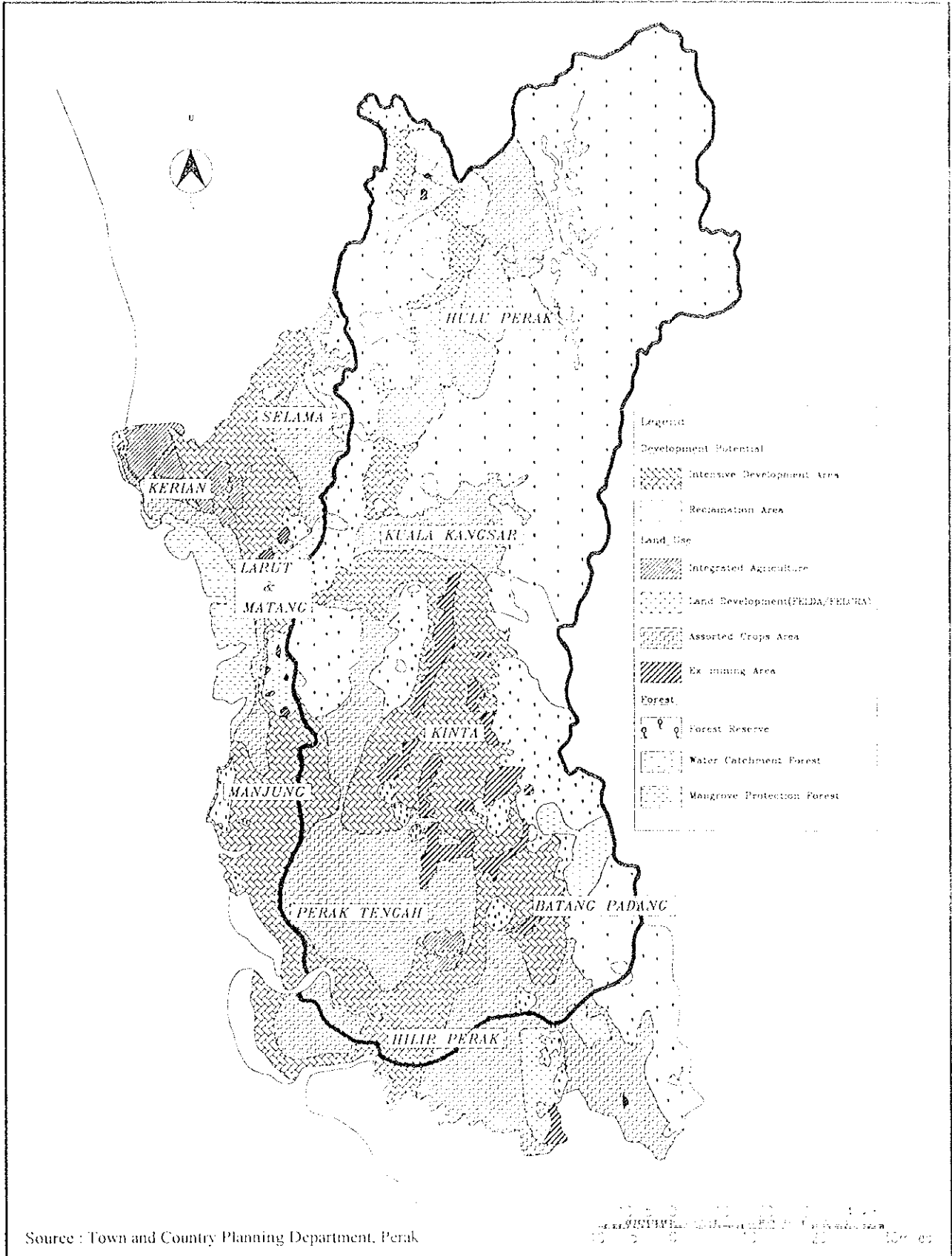
Source : Town and Country Planning Department, Perak



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-11 FUTURE LAND USE PLAN IN PERAK RIVER BASIN



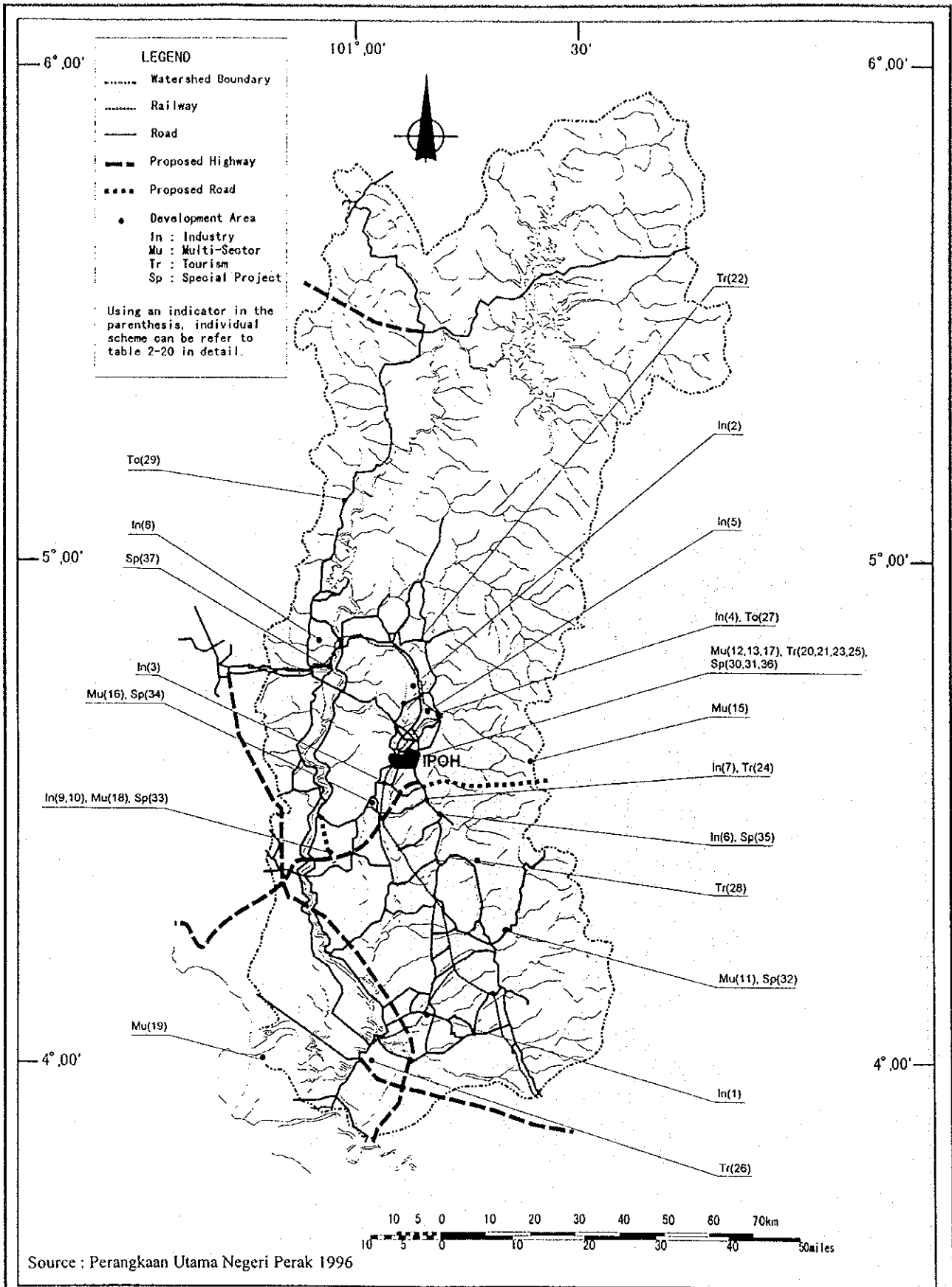
Source : Town and Country Planning Department, Perak

1:100,000
 100 0 100 200 300 400 500 600 700 800 900 1000
 Kilometers
 100 0 100 200 300 400 500 600 700 800 900 1000
 Miles

THE STUDY ON THE ESTABLISHMENT OF THE RIVER
 BASIN INFORMATION SYSTEM IN MALAYSIA

Fig. 7-11 FUTURE LAND USE PLAN IN PERAK
 RIVER BASIN

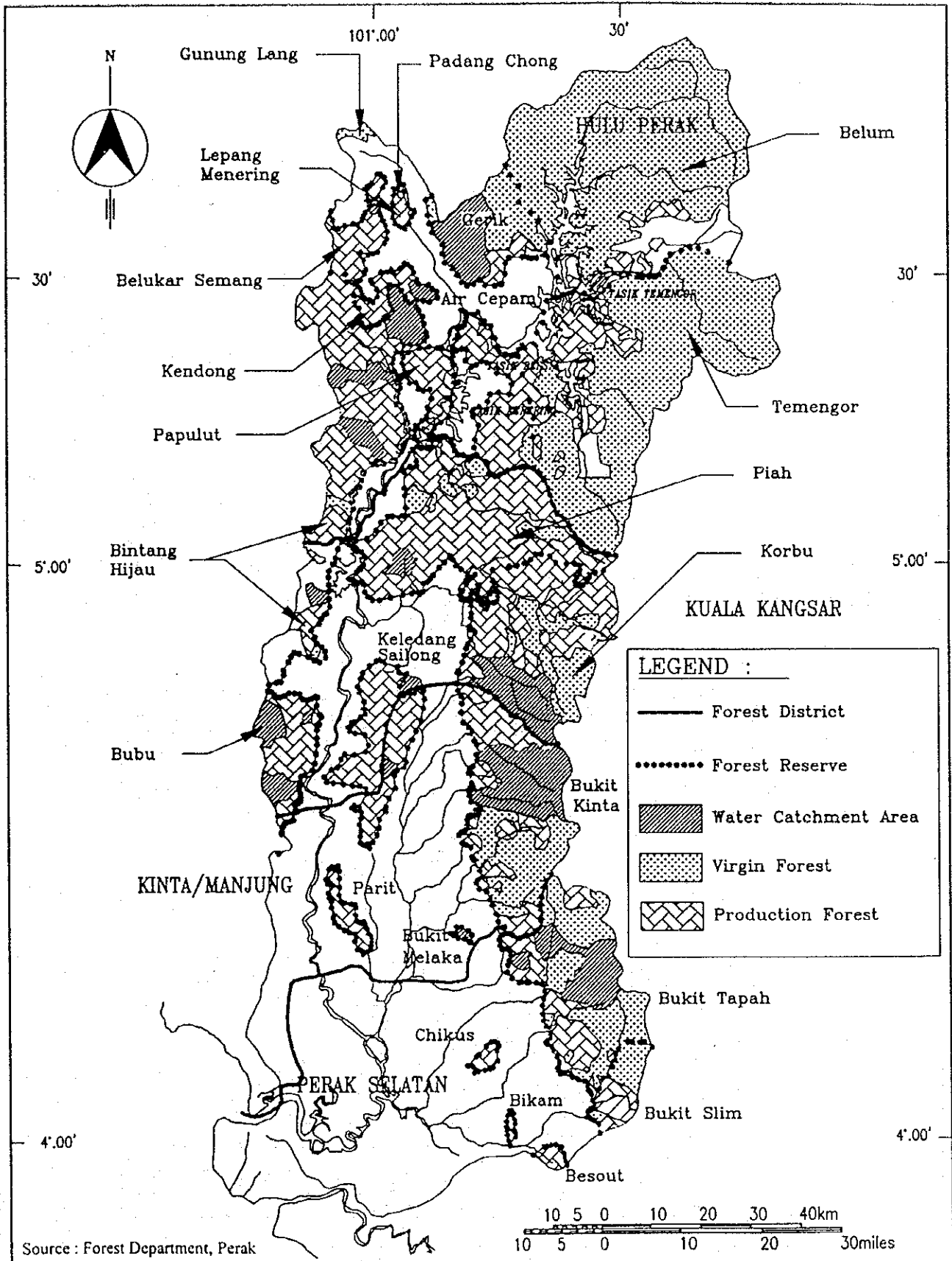
JAPAN INTERNATIONAL COOPERATION AGENCY



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

Fig. 7-12 MAJOR DEVELOPMENT SCHEMES
IN PERAK RIVER BASIN

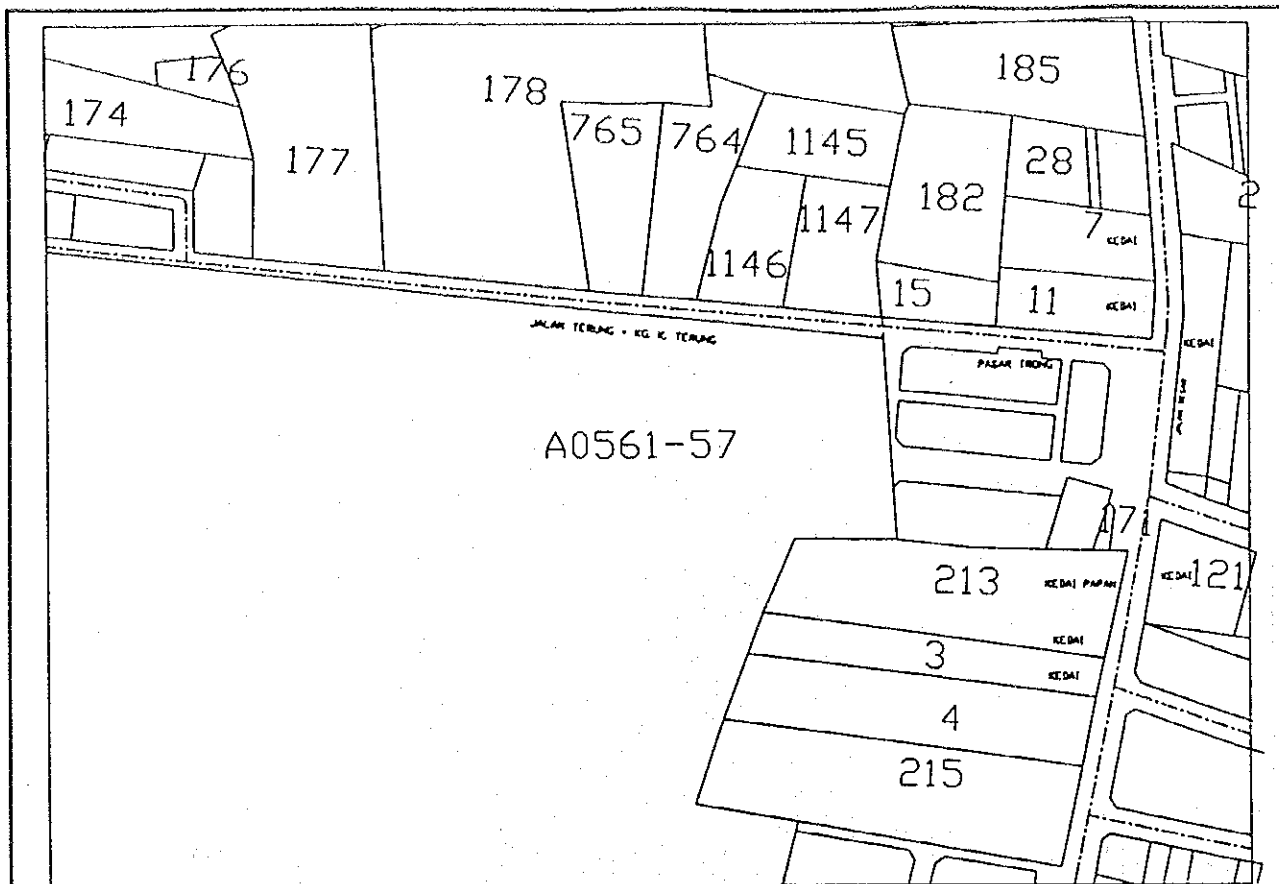
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Fig. 7-13 FOREST RESERVE AND CLASSIFICATION IN PERAK RIVER BASIN



PIXEL OF CADASTRAL MAP (500 m x 700m)

Source : Perak Water Board

Attributes of Land Parcels

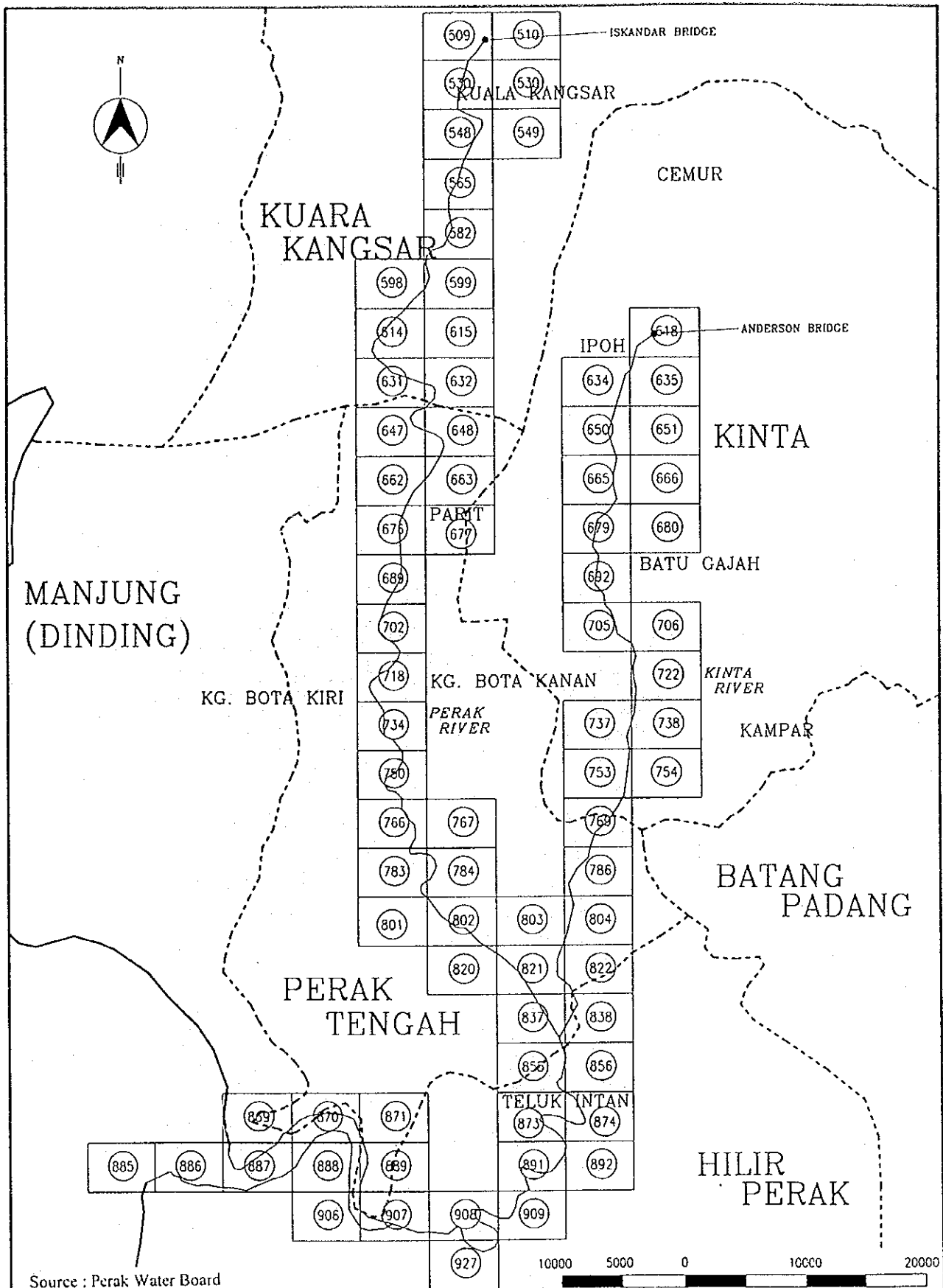
No.	Attribute	Explanation
1	UPI	Parcel-key (it consists of the following eight attributes.)
1-1	Negeri	State Code
1-2	Daerah	District Code
1-3	Mukim	Sub-District Code
1-4	Seksyen	Section Code
1-5	Kod Lot	Lot Code
1-6	Apdate	Date when parcel was created
1-7	Kuluasan	Area of Land Parcel
1-8	Unit	Unit of Measurement
2	Nombor Lot	Lot Number
3	Jenis Hakmilik	Type of Title (Grant, Lease, etc.)
4	Nombor Hakmilik	Title Number
5	Tarikh Daftar	Registration Date of Title
6	Tempoh Pajakan	Duration of Lease
7	Kategori Tanah	Category of Land Use
8	Syarat Nyata	Expressed Condition Imposed on Land Use
9	Sekatan Kepentingan	Restriction on Land Usage
10	Cukai Tanah	Yearly Land Tax (RM)
11	Status Tanah	Land Status
12	Bilangan Pemilik	Number of Persons/Organizations Owning the Land
13	Urusan	Department of Land and Mines

Source : NaLIS Secretariat

THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 7-14 CADASTRAL MAP AND
ATTRIBUTES

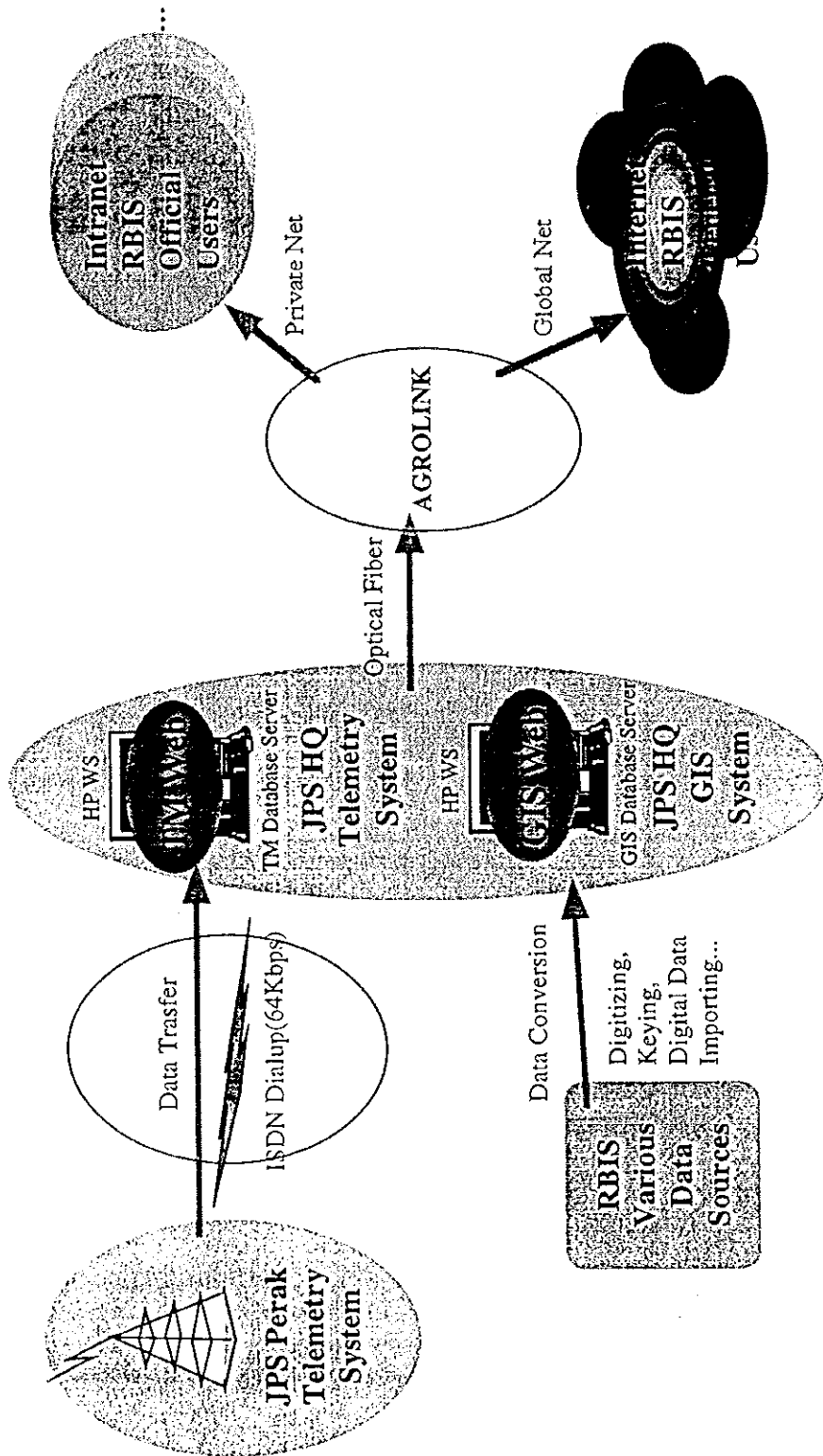


Source : Perak Water Board

THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-15 RIVER RESERVE STRETCH AND
RELATED CADASTRAL MAP INDEX



THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-16 RBIS SYSTEM CONFIGURATION

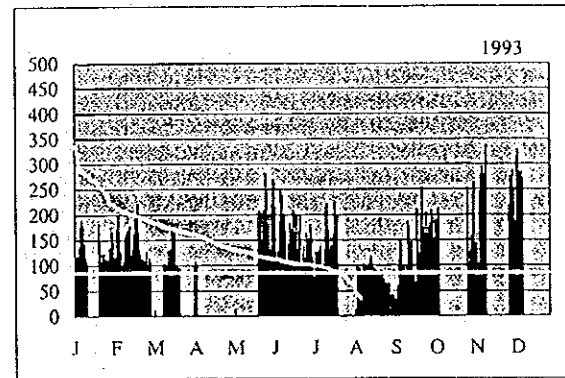
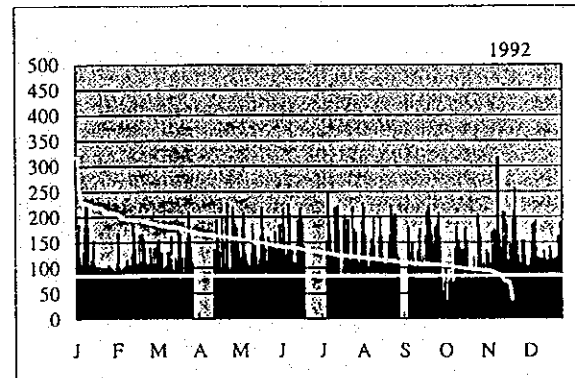
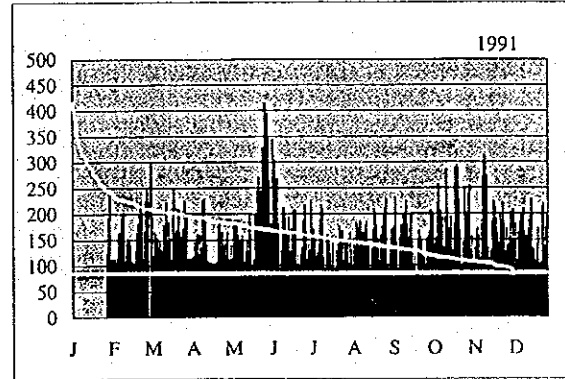
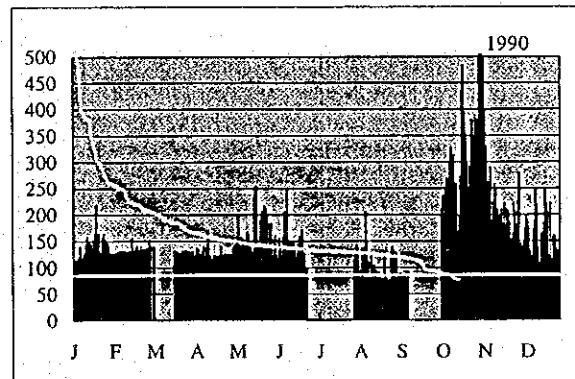
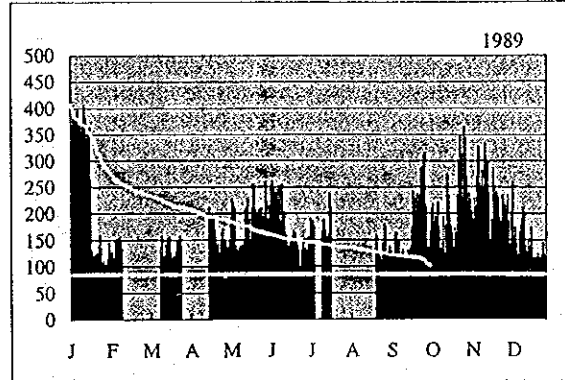
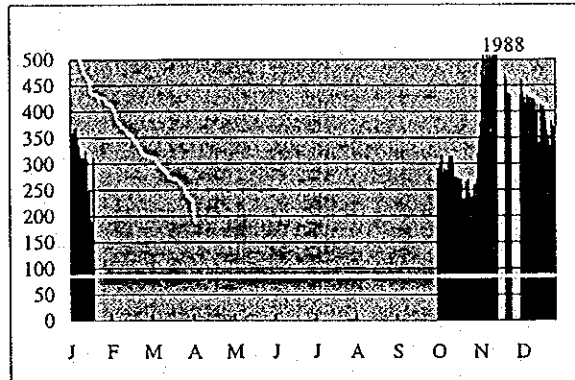
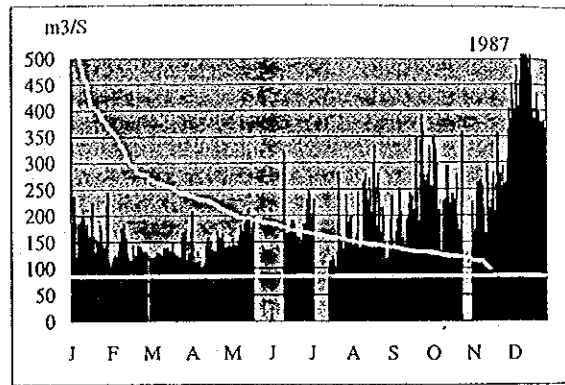
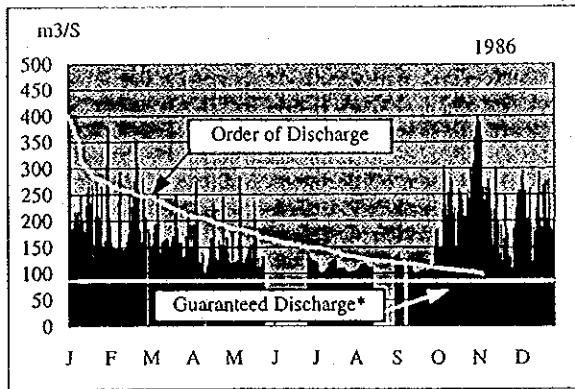


Period	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month	7th Month	9th Month	10th Month	11th Month	12th Month
Undertaken by											
JICA						Tendering					
Supplier						Procurement, Delivery and Installation & Adjustment of Hardware and Software					
DID						Preparatory					
Study Team	System Planning						Training for System Operation and Maintenance				
			System Design				Hardware Setup				
							Software Installation				
								Web Server Set up			
								Database Input Work Adoption			
								Database			
								Program Design			
								Programming			

THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA

Fig. 7-18 IMPLEMENTATION SCHEDULE FOR SETUP OF OPERATIONAL SYSTEM

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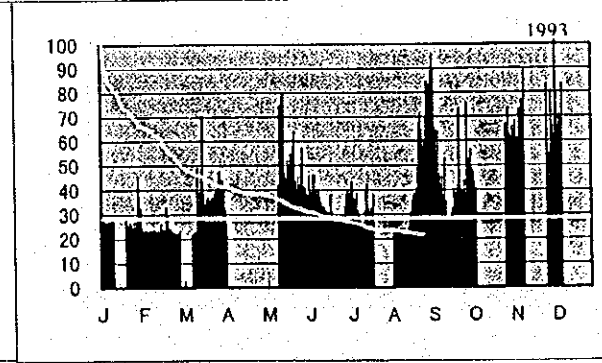
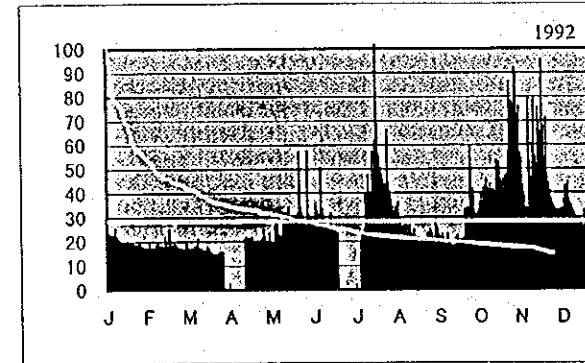
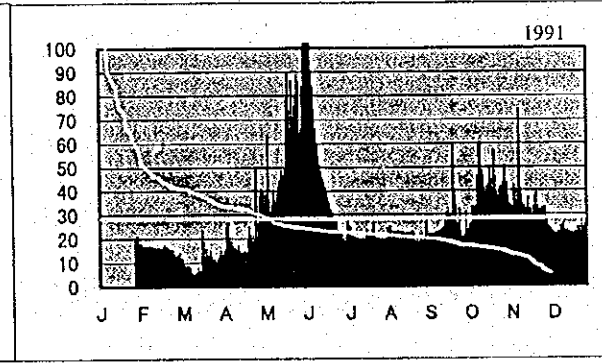
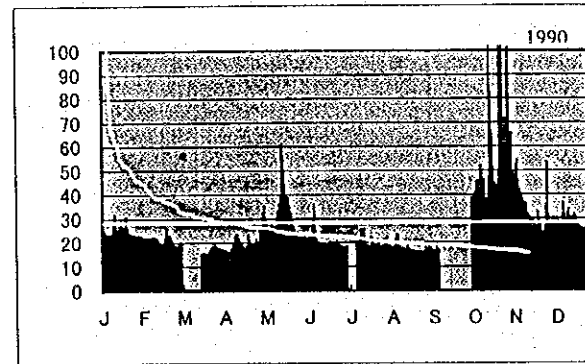
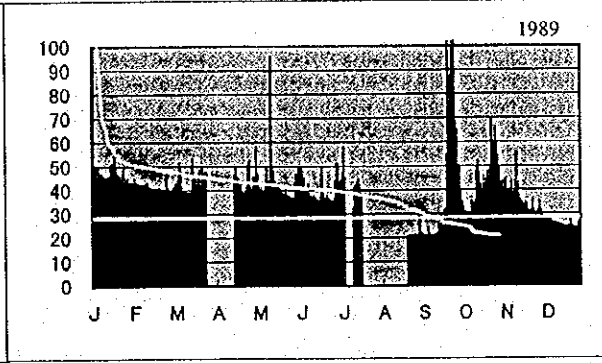
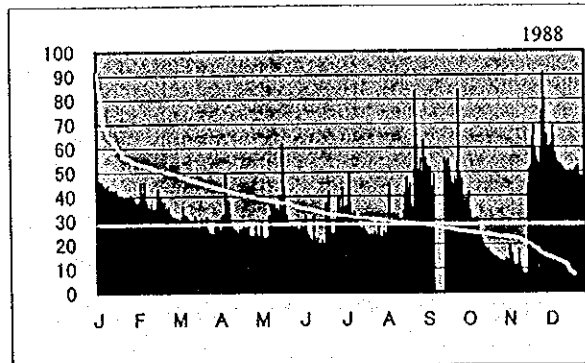
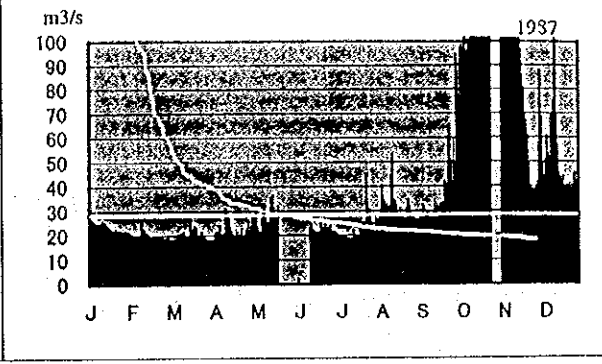
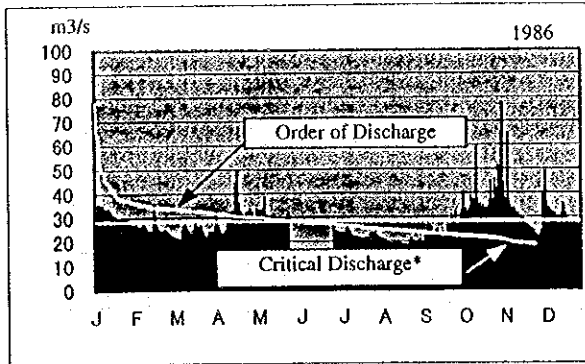


* Guaranteed Discharge from Chenderoh Dam (3000cusec or 84.9m3/s)

THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

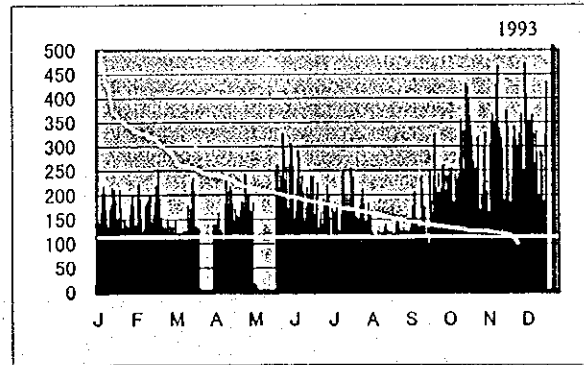
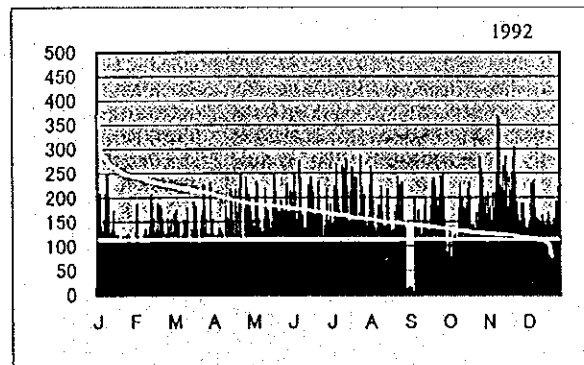
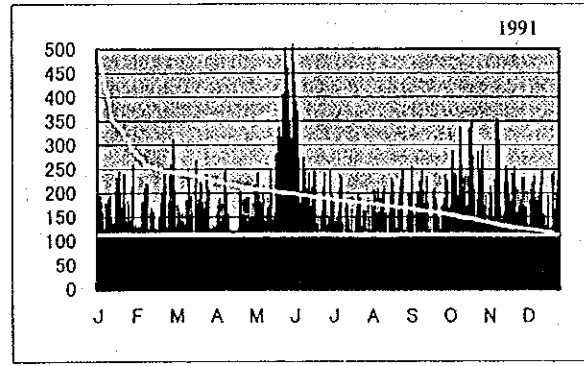
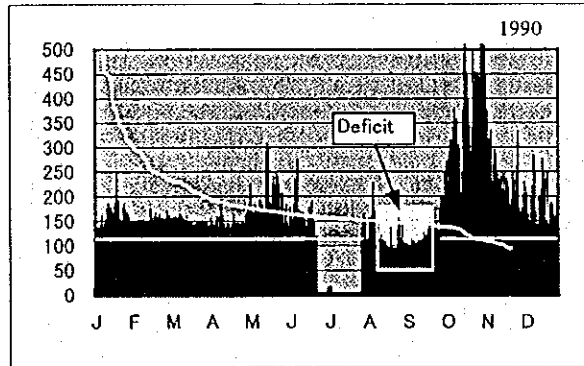
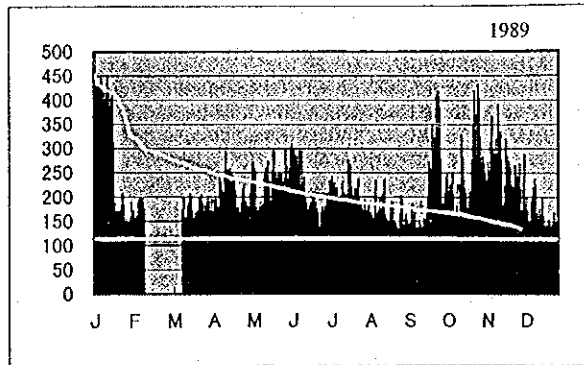
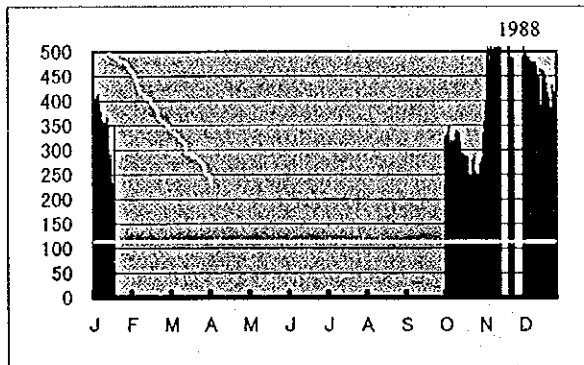
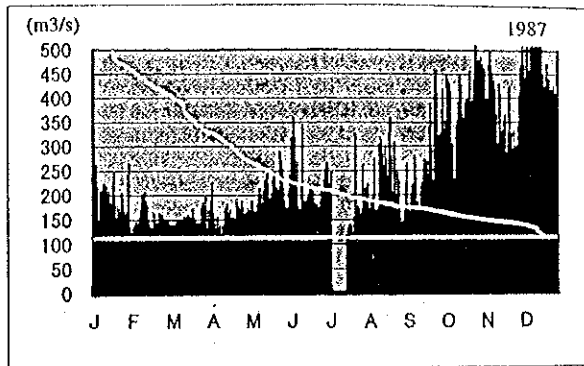
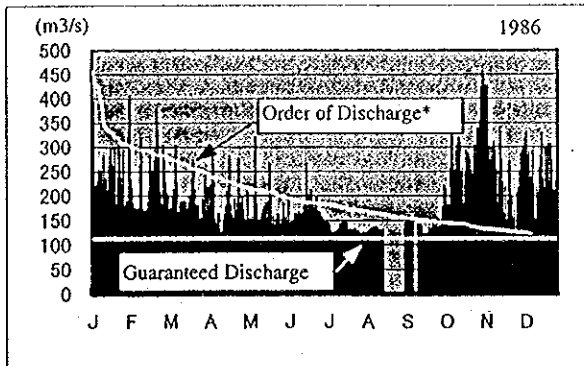
Fig. 9-1 DAILY AVE. OUTFLOW DISCHARGE
FROM CHENDEROH DAM



* Critical discharge (1000cusec or 28.3 m³/s) to guarantee the flow discharge at Iskandar Bridge in case of dam outflow of 3000cusec

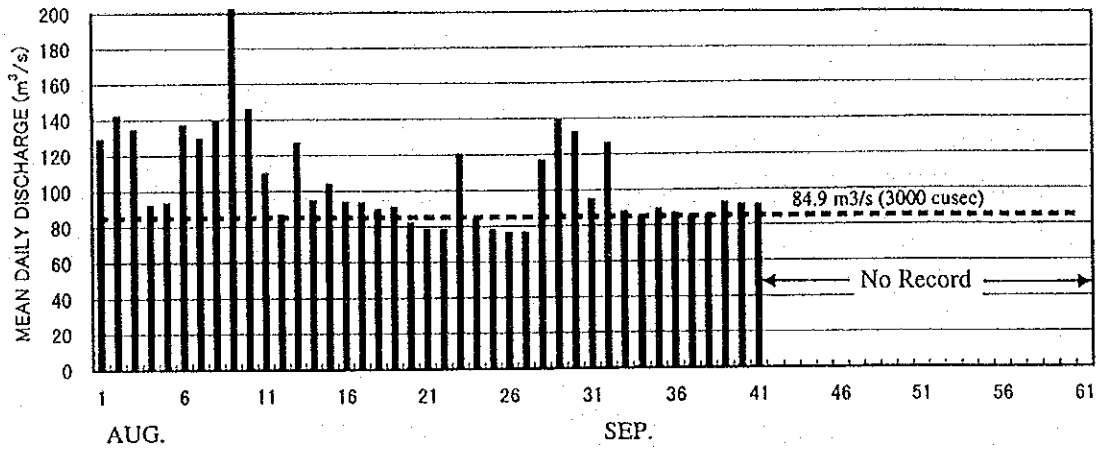
THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 9-2 DAILY AVE. RUNOFF DISCHARGE FROM PELUS RIVER

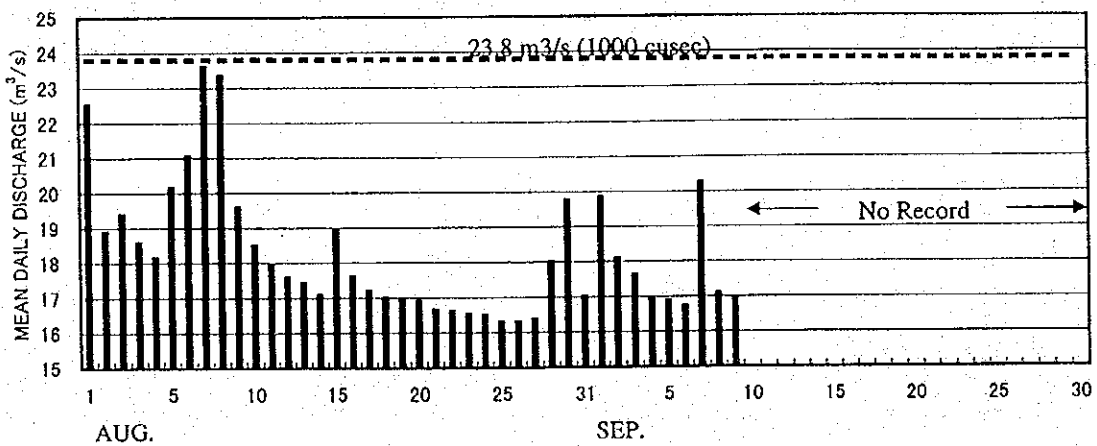


* Guaranteed Discharge at Iskandar Bridge by Chenderoh Dam (4000cosec or 113.2 m3/s)

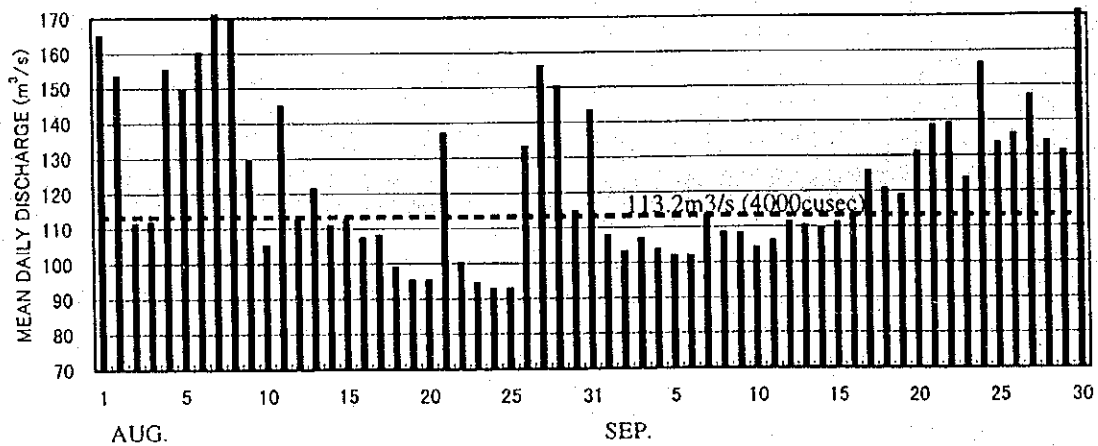
OUTFLOW DISCHARGE FROM CHENDEROH DAM IN 1990



RUNOFF DISCHARGE FROM PELUS RIVER IN 1990



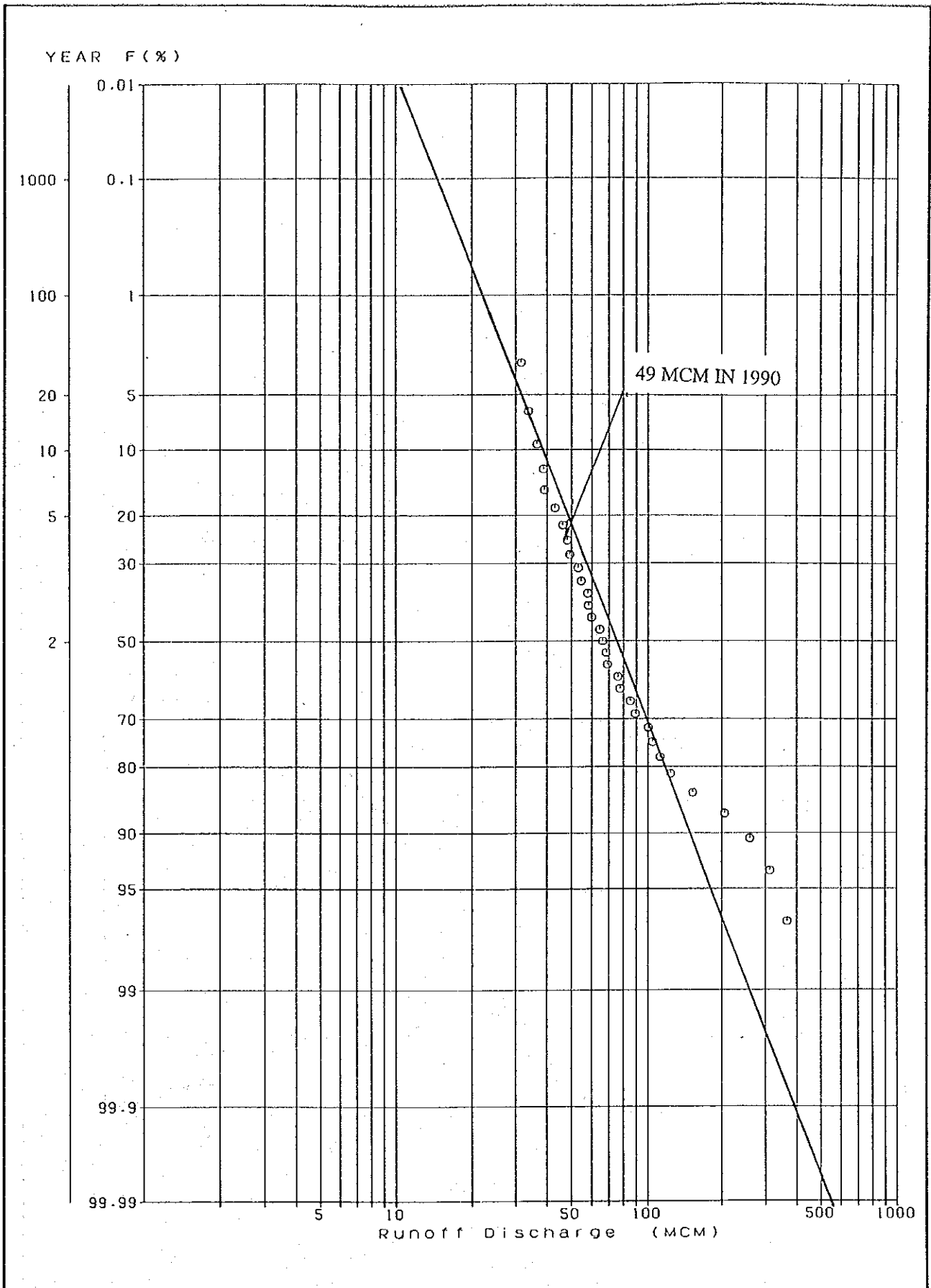
WATER DEFICIT AT ISKANDAR BRIDGE IN 1990



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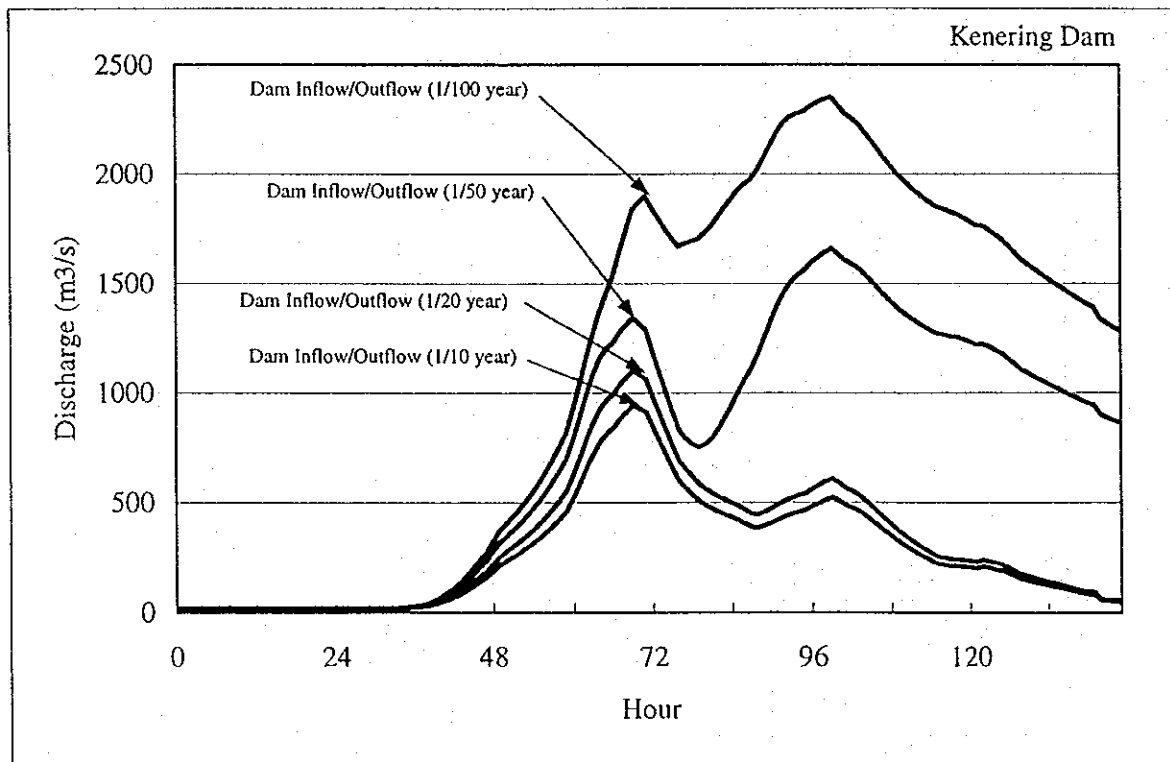
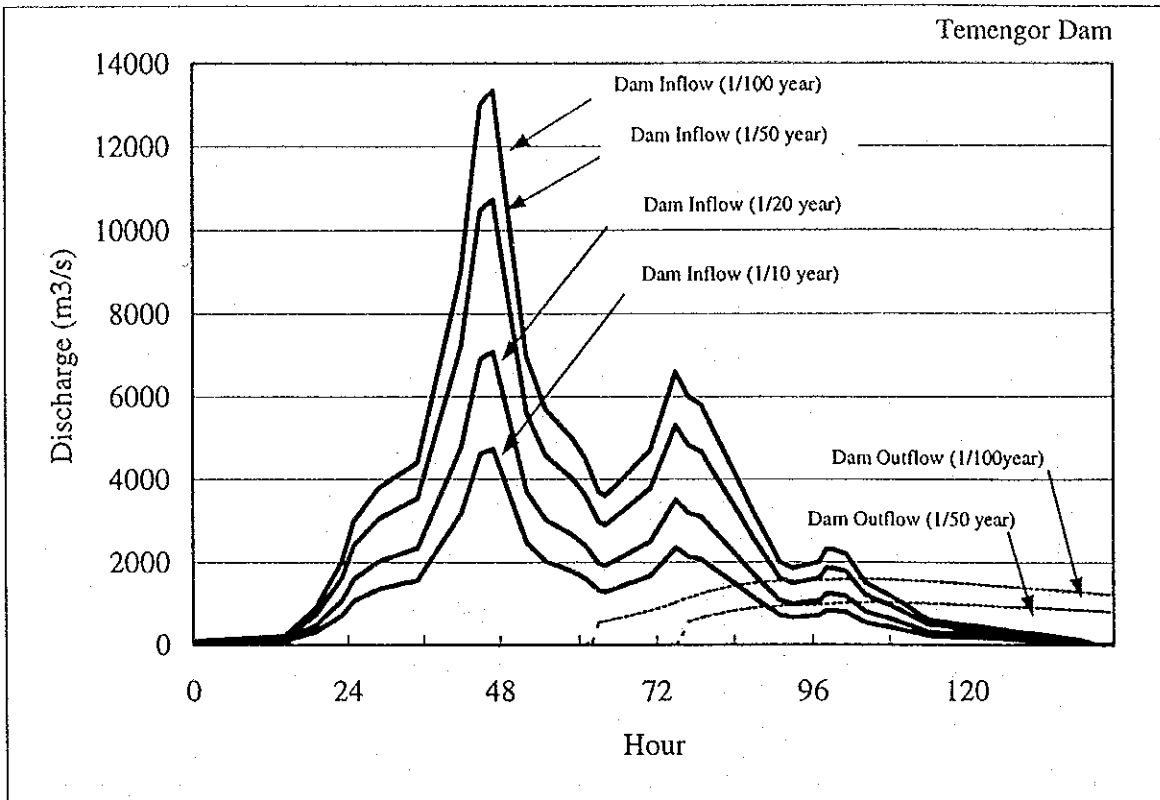
Fig. 9-4 RIVER FLOW CONDITIONS DURING
WATER DEFICIT IN 1990



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BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

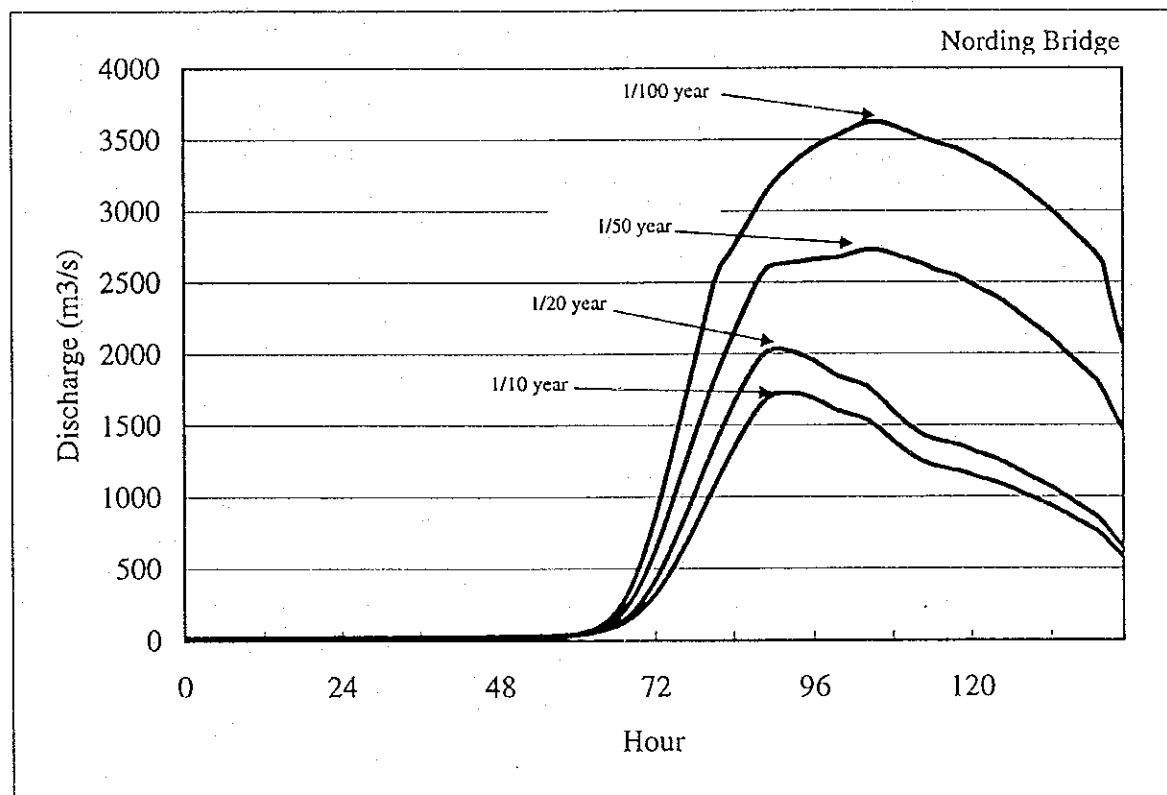
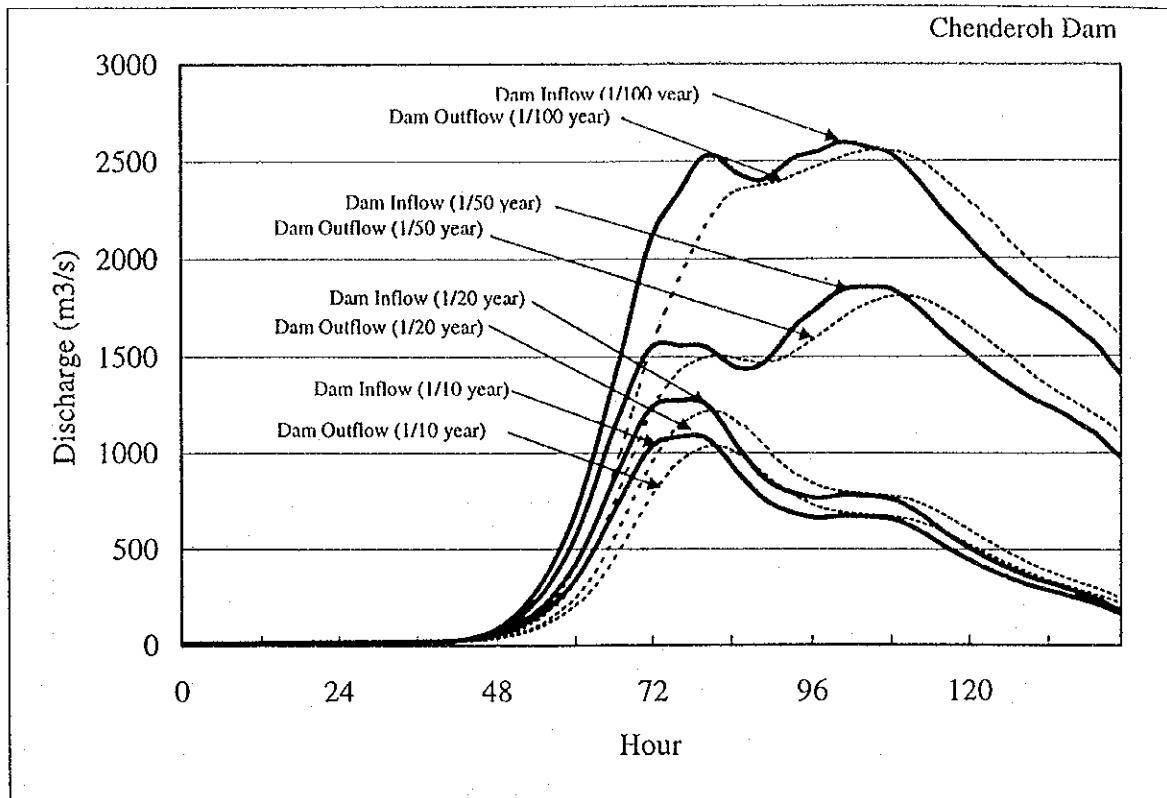
Fig. 9-5 : PROBABILITY OF ONE-MONTH
MINIMUM RUNOFF VOLUME FROM
PELUS RIVER IN AUGUST



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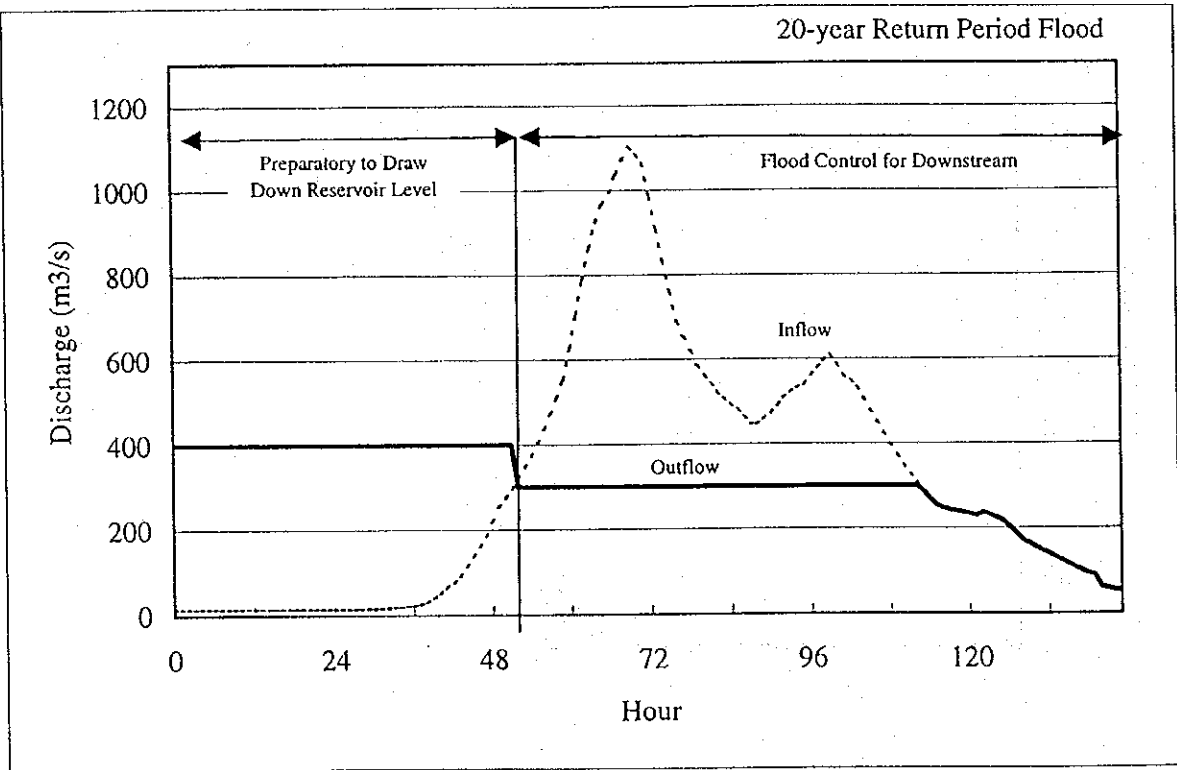
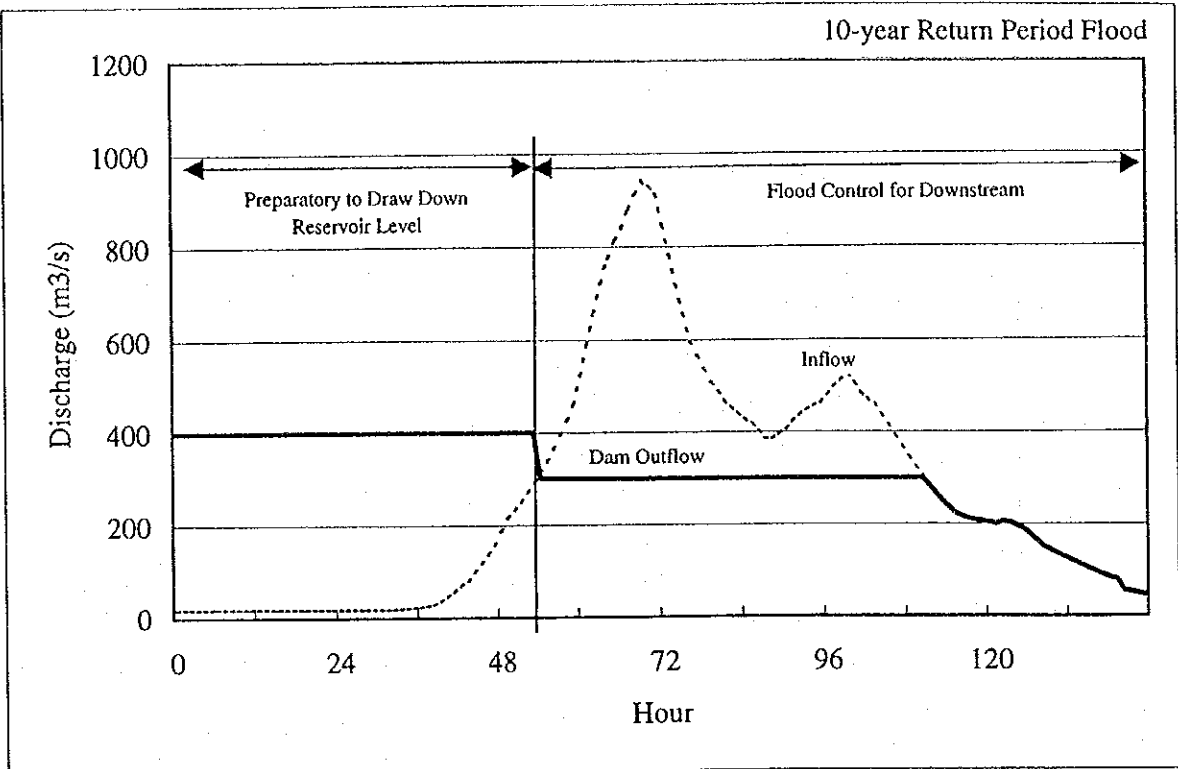
Fig. 9-6 PROBABLE FLOOD HYDROGRAPH UNDER PRESENT DAM OPERATION (1/2)

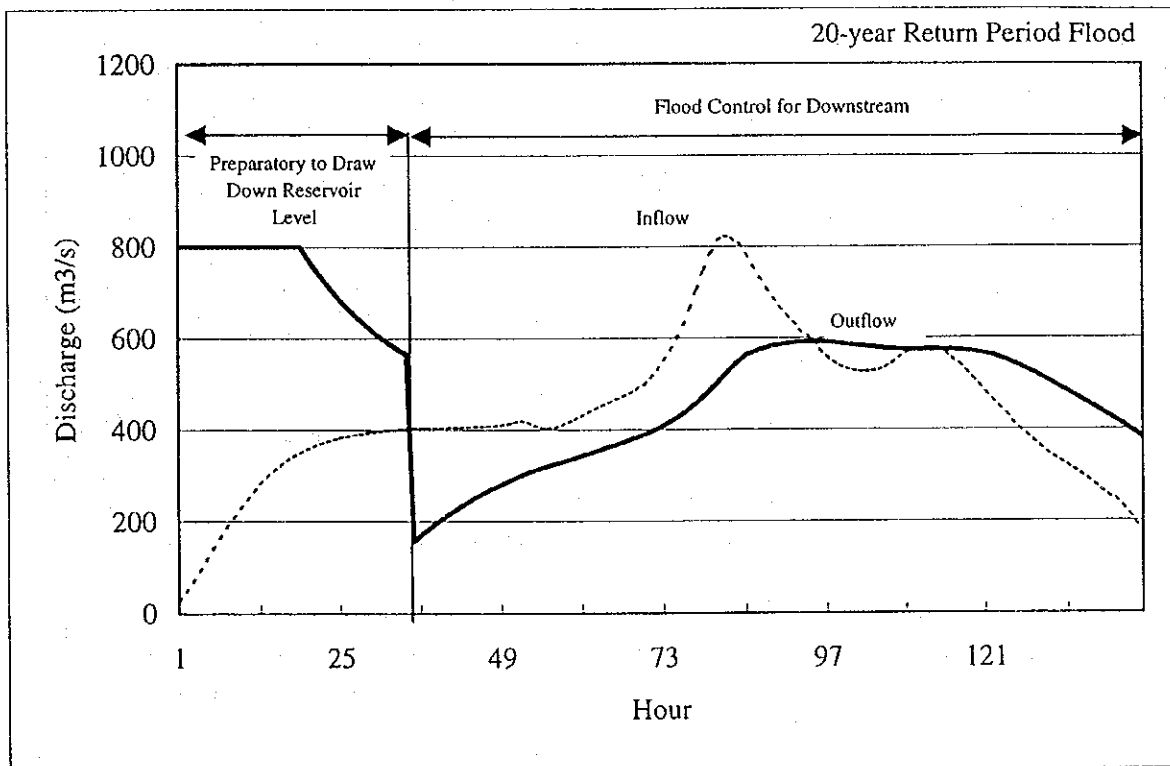
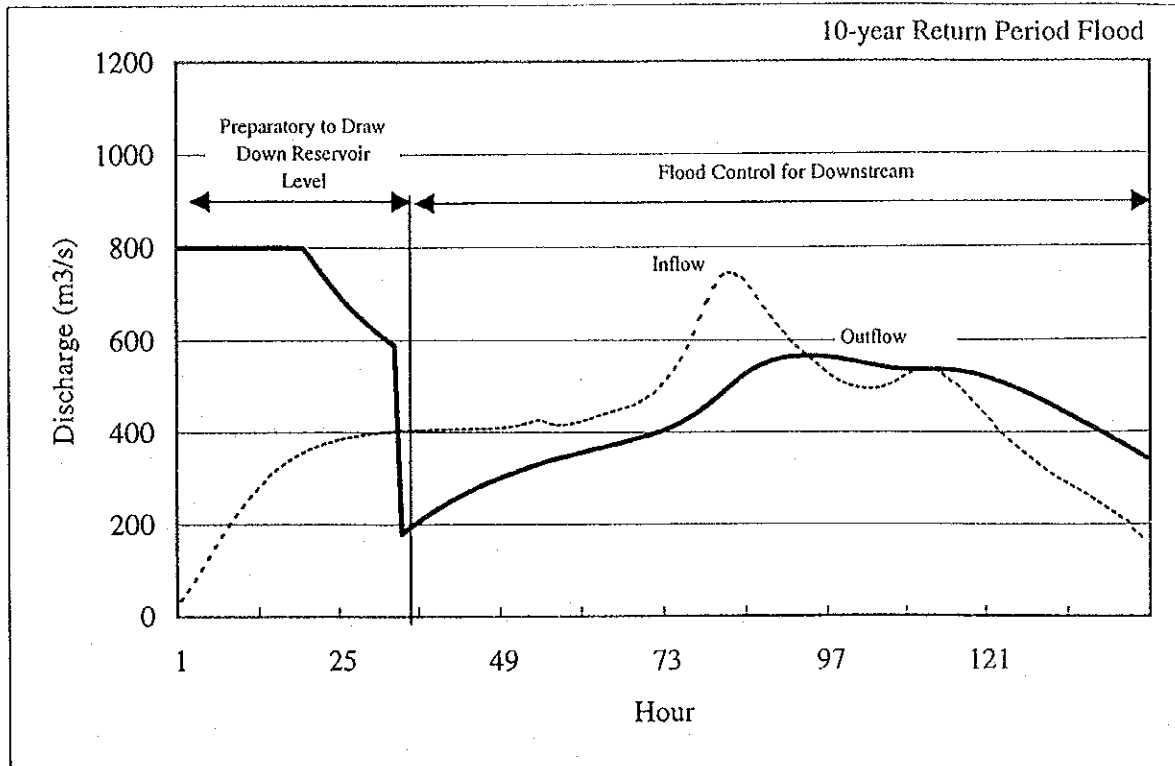


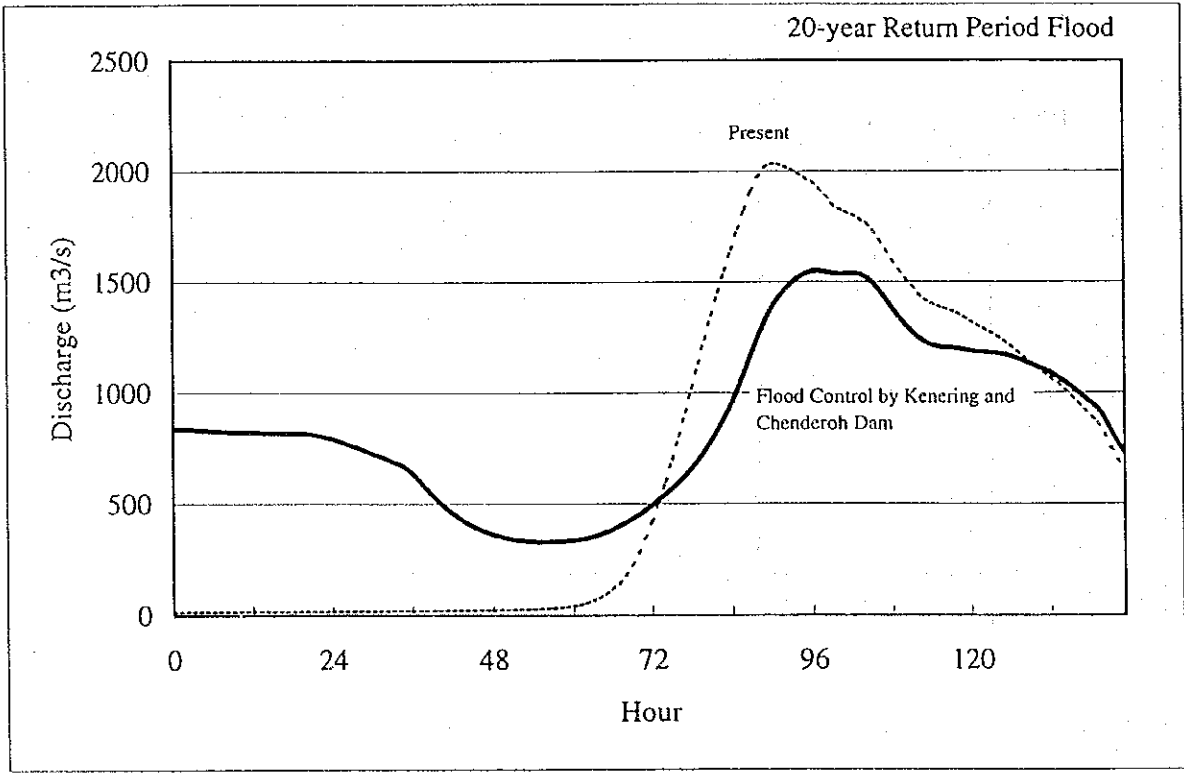
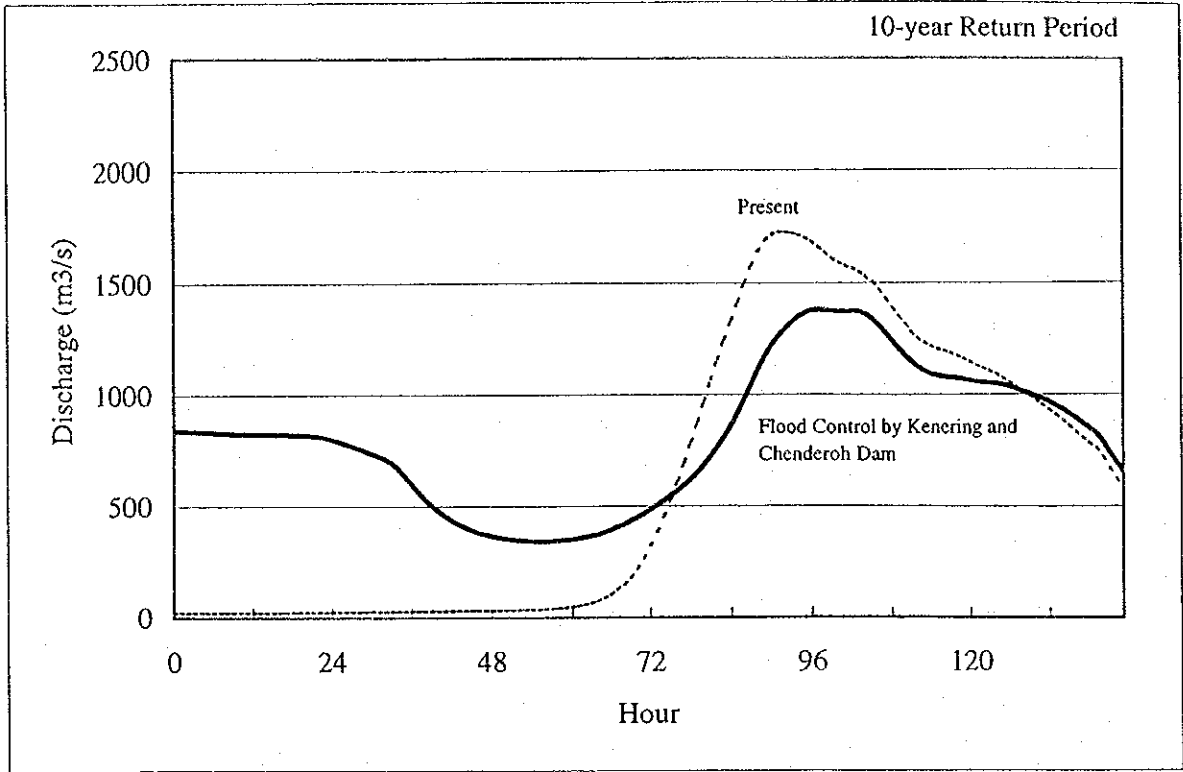
THE STUDY ON THE ESTABLISHMENT OF THE RIVER
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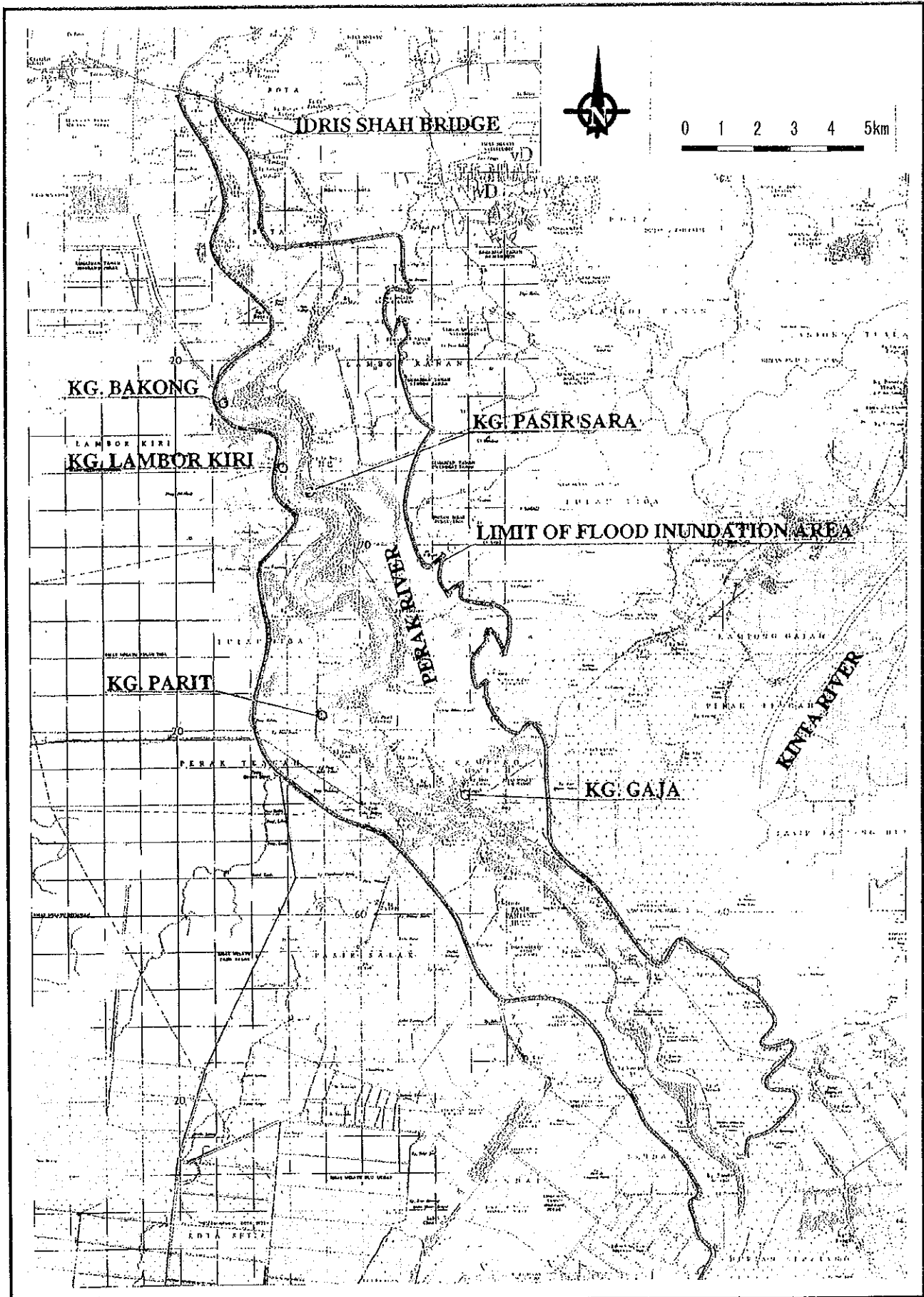
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 9-6 PROBABLE FLOOD HYDROGRAPH UN-
DER PRESENT DAM OPERATION (2/2)





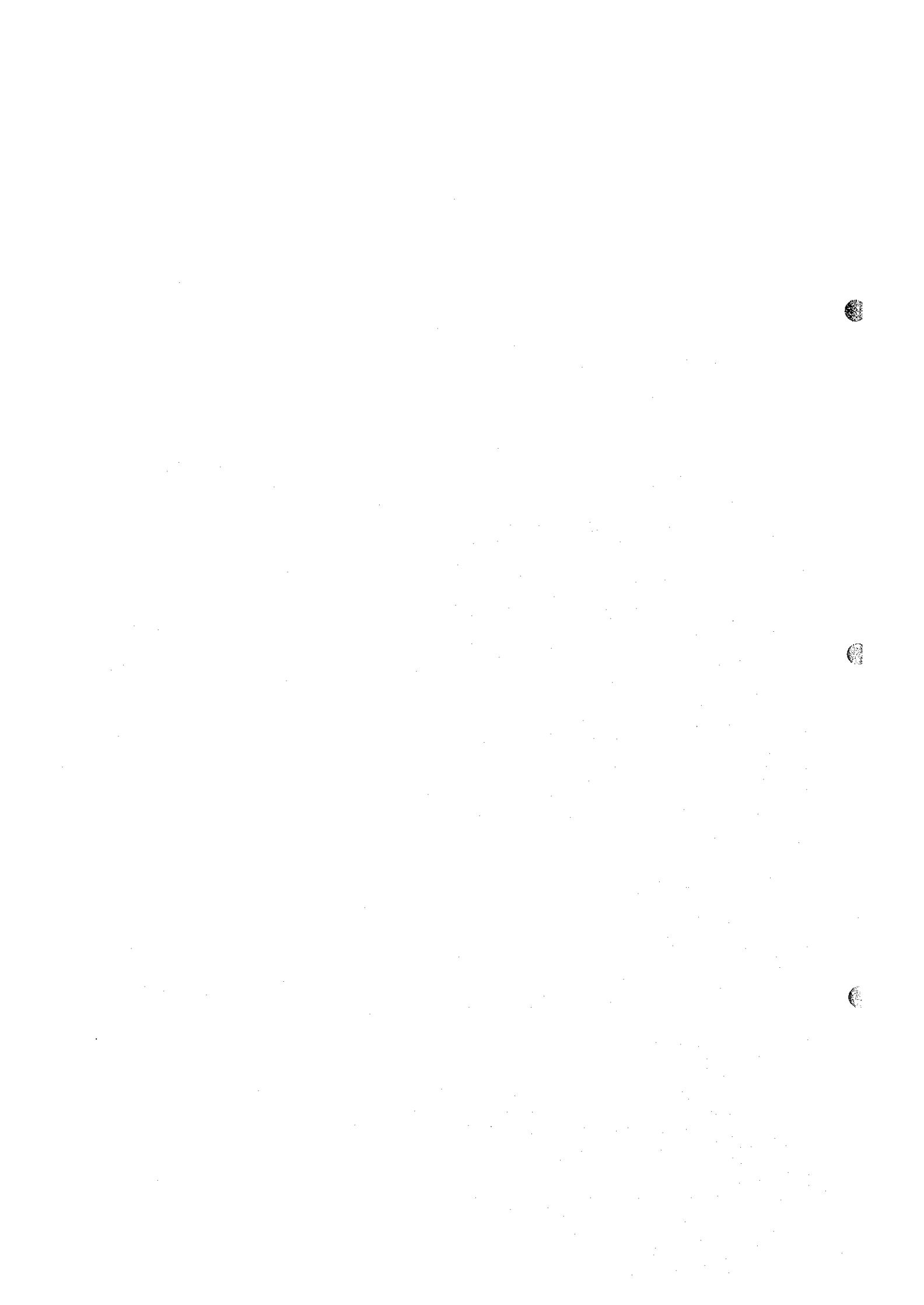




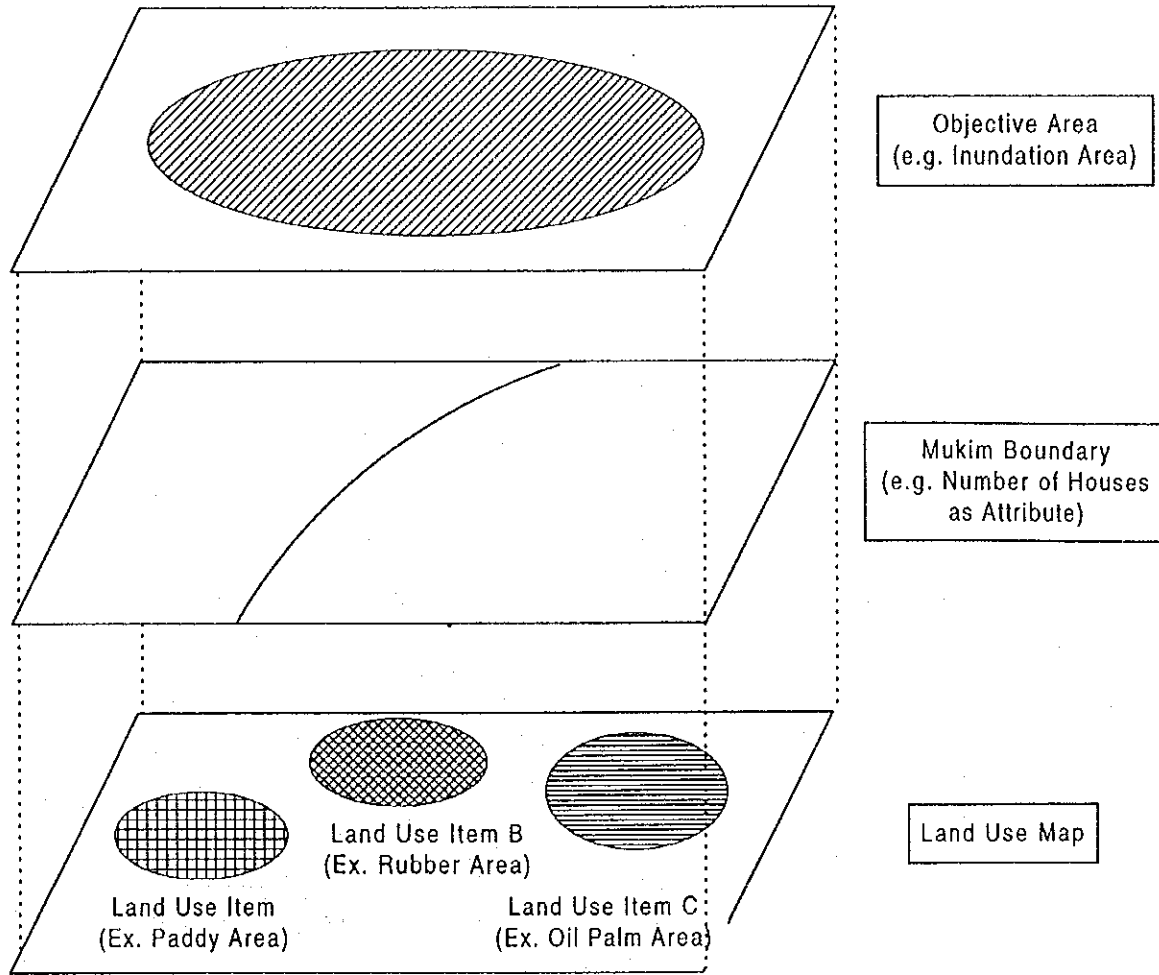
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Fig. 9-10 HABITUAL FLOOD INUNDATION AREA



Conceptual Schematics of GIS Overlay

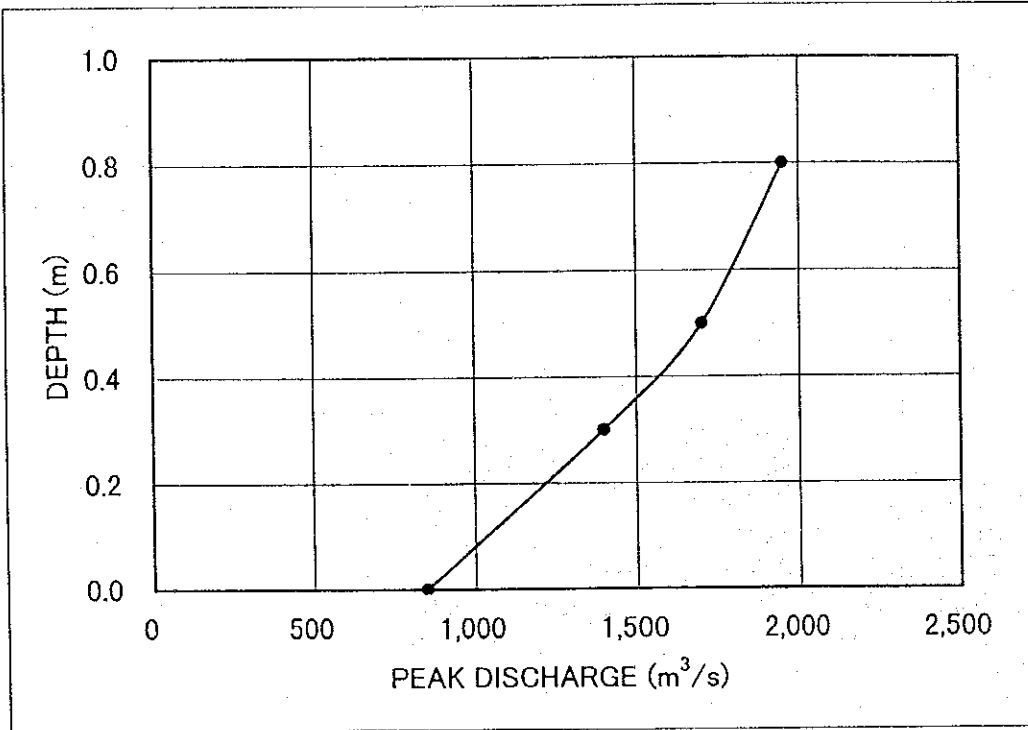


$$N_h = D_h(1) \times A_m(1) + D_h(2) \times A_m(2) + \dots + D_h(i) \times A_m(i) + \dots$$

$$D_n = N_h \times D_{hf} \times V_h$$

$$D_a = A_a(1) \times D_{af}(1) \times V_a(1) + A_a(2) \times D_{af}(2) \times V_a(2) + \dots + A_a(i) \times D_{af}(i) \times V_a(i) + \dots$$

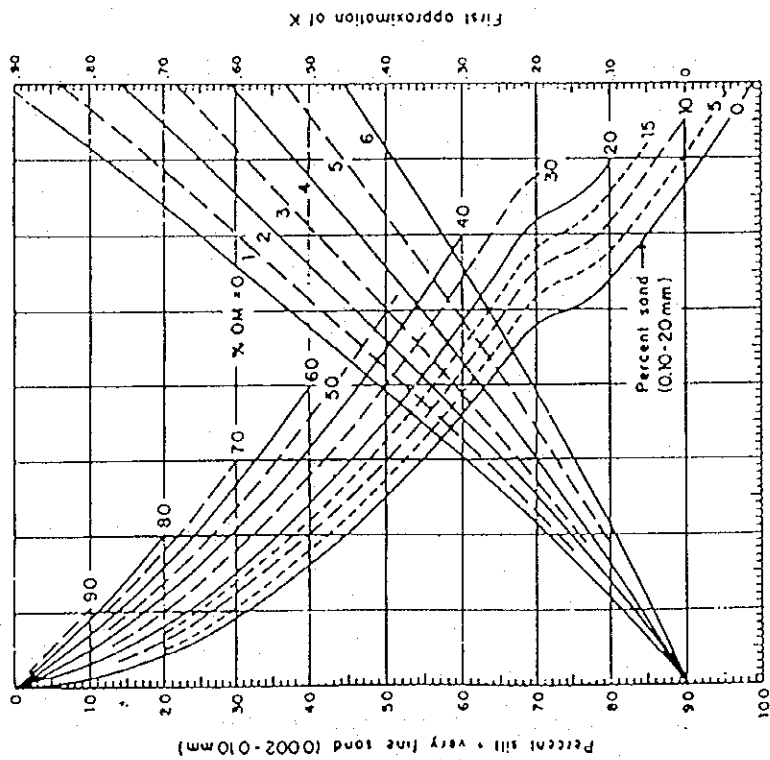
- where N_h : Total number of house in Flood Inundation Area
 $D_h(i)$: Housing Density in Mukim i
 $A_m(i)$: Area of Mukim i
 D_n : Total housing damage value
 D_{hf} : Damage factor of house
 V_h : Unit value of house
 D_a : Agricultural damage
 A_a : Area of Agricultural land
 D_{af} : Damage factor of agricultural crop
 V_a : Unit value of agricultural crop



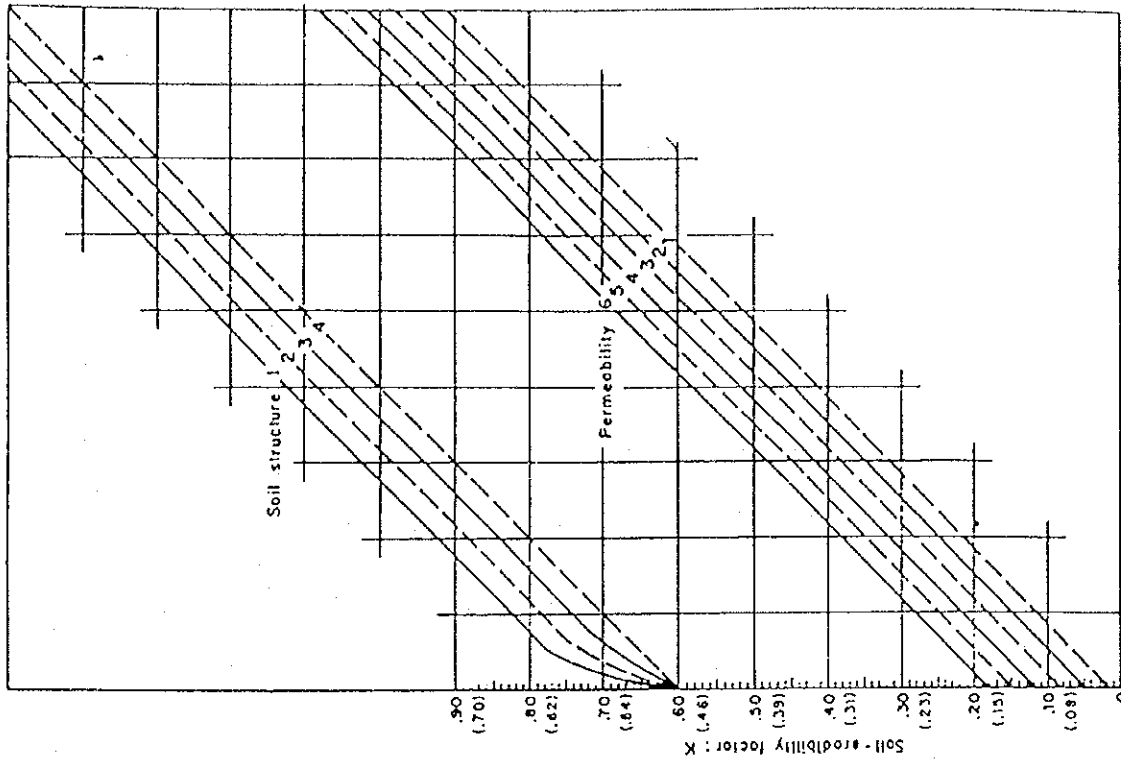
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Fig. 9-12 RELATIONSHIP BETWEEN PEAK DIS-
CHARGE AT NORDING BRIDGE AND
MAX. FLOOD INUNDATION DEPTH



SOIL-ERODIBILITY NOMOGRAPH
(METRIC SYSTEM)

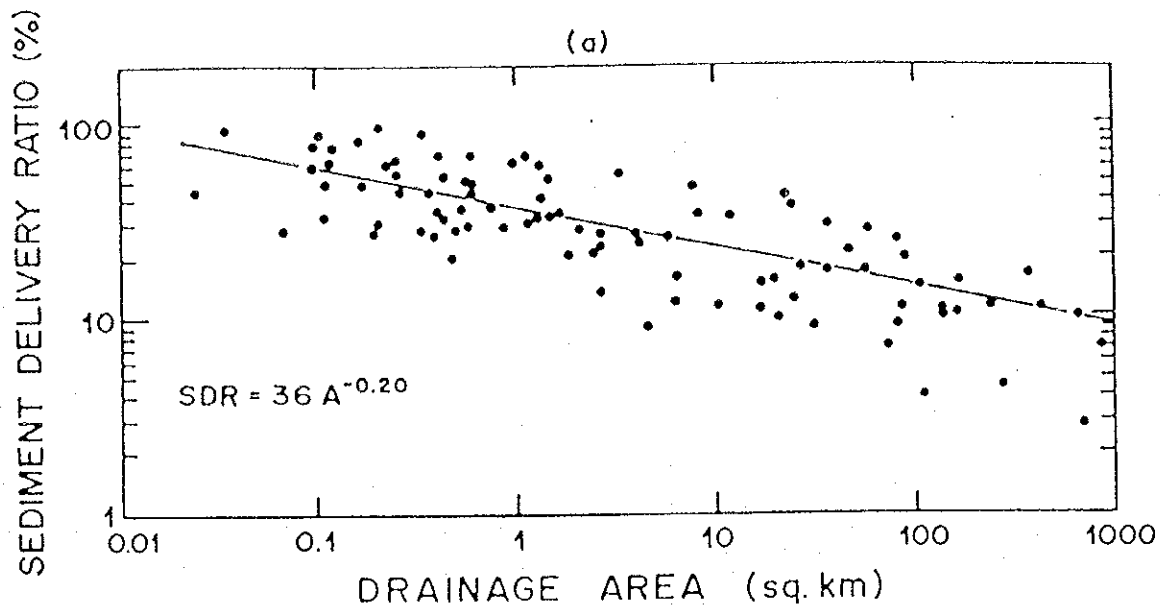


Source: A Soil Erodibility Nomograph for Farmland and Construction Site, Vol. 26, Journal Soil and Water Conservation, 1971

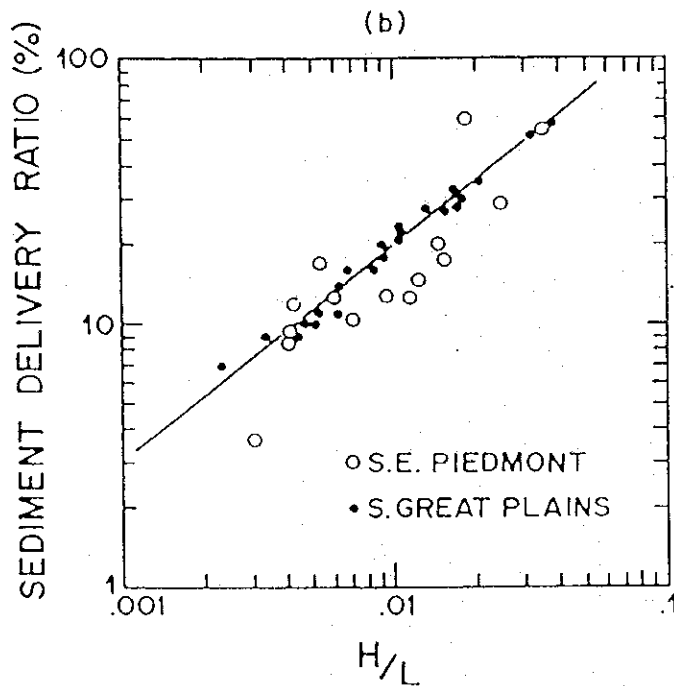
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Fig. 9-13 SOIL ERODIBILITY NOMOGRAPH

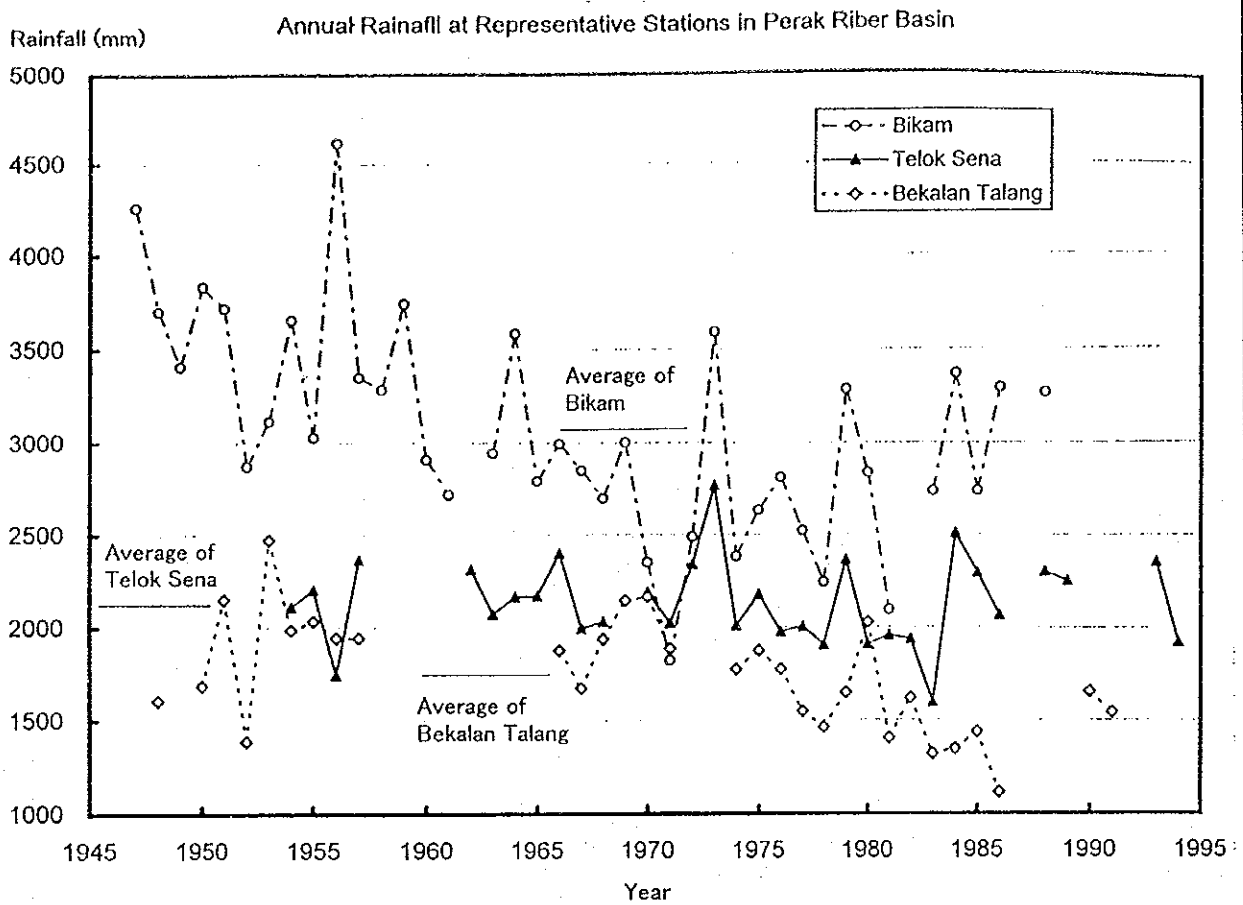


(a) Relation of Sediment Delivery Ratio to Catchment Size



(b) Relation of Sediment Delivery Ratio to Catchment Relief (H) and Mainstream Length (L)

Source: Sediment Source Areas, Delivery Ratios and Influencing Morphological Factors, International Association of Scientific Hydrology Publication 59, 1962



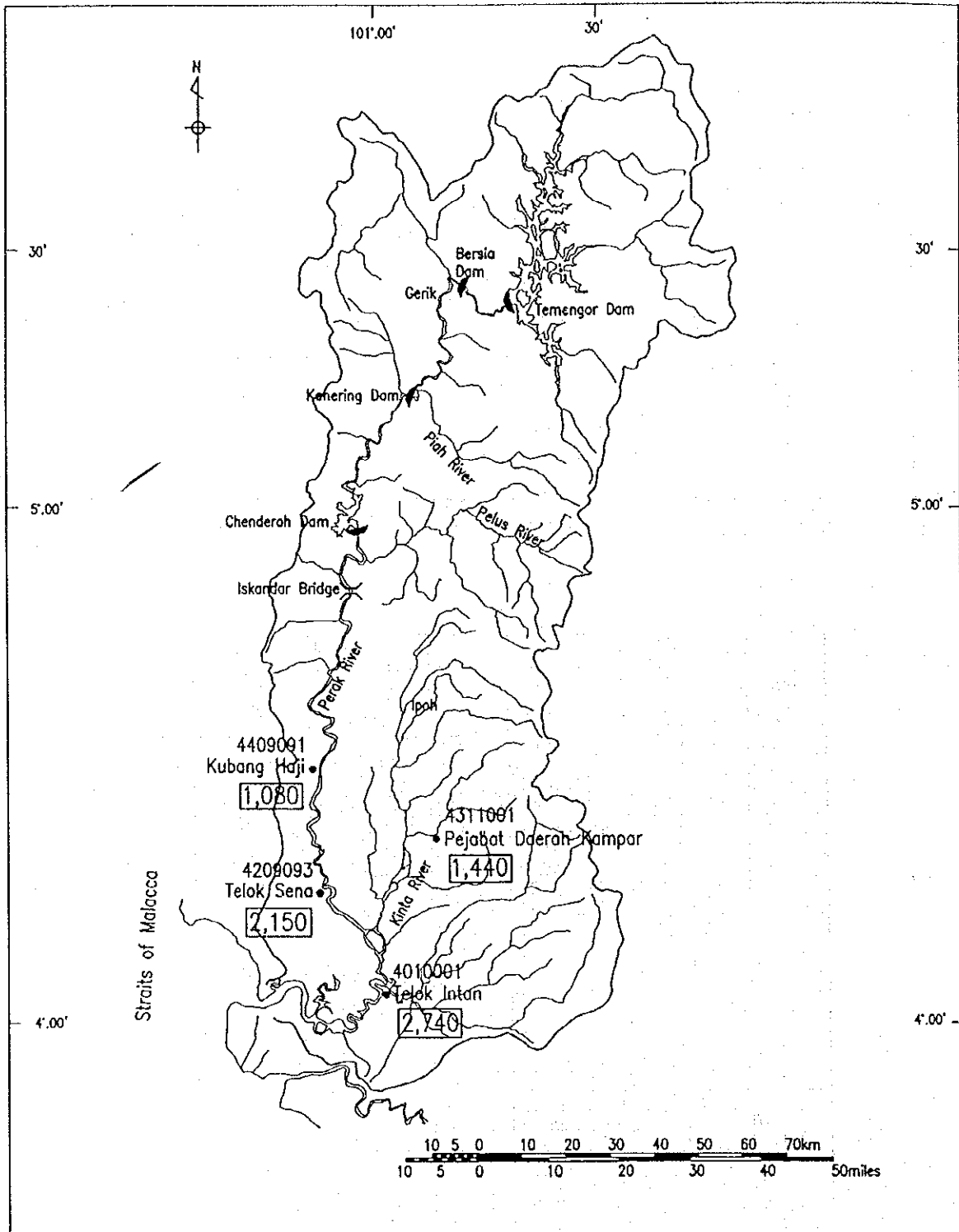
Annual Rainfall							
Year	Rainfall Station			Year	Rainfall Station		
	4012143 Bikam	4209093 Telok Sena	4708084 Bekalan Talang		4012143 Bikam	4209093 Telok Sena	4708084 Bekalan Talang
1947	4260.8			1972	2487.8	2338.7	
1948	3701.9		1607.2	1973	3592.3	2766.8	
1949	3409.8			1974	2382.5	2006.4	1772.7
1950	3836.8		1686.8	1975	2632.1	2175.5	1872.8
1951	3720.8		2149.7	1976	2811.0	1974.0	1772.2
1952	2872.7		1390.0	1977	2520.0	2002.5	1546.3
1953	3117.8		2471.4	1978	2241.8	1904.0	1461.4
1954	3656.4	2109.1	1984.2	1979	3286.7	2363.5	1647.6
1955	3031.2	2200.3	2032.7	1980	2836.1	1907.8	2024.8
1956	4617.8	1743.4	1943.1	1981	2093.3	1955.2	1405.5
1957	3351.2	2363.4	1942.7	1982		1934.8	1618.0
1958	3287.0			1983	2737.0	1594.5	1319.0
1959	3744.6			1984	3369.0	2508.0	1346.0
1960	2907.4			1985	2739.0	2295.0	1437.0
1961	2716.4			1986	3294.5	2067.0	1112.5
1962		2310.3		1987			
1963	2944.0	2069.1		1988	3269.0	2301.5	
1964	3585.3	2162.8		1989		2251.5	
1965	2791.7	2166.2		1990			1654.0
1966	2993.1	2396.1	1876.0	1991			1543.5
1967	2849.2	1992.8	1673.3	1992			
1968	2697.0	2029.7	1935.9	1993		2355.5	
1969	3002.2		2142.6	1994		1923.0	
1970	2349.7	2184.4	2162.8	1995			
1971	1821.6	2021.6	1884.4	1996			
				Average	3065.6	2136.7	1747.2

Note: Annual values in the blanks consist of missing data in some parts.

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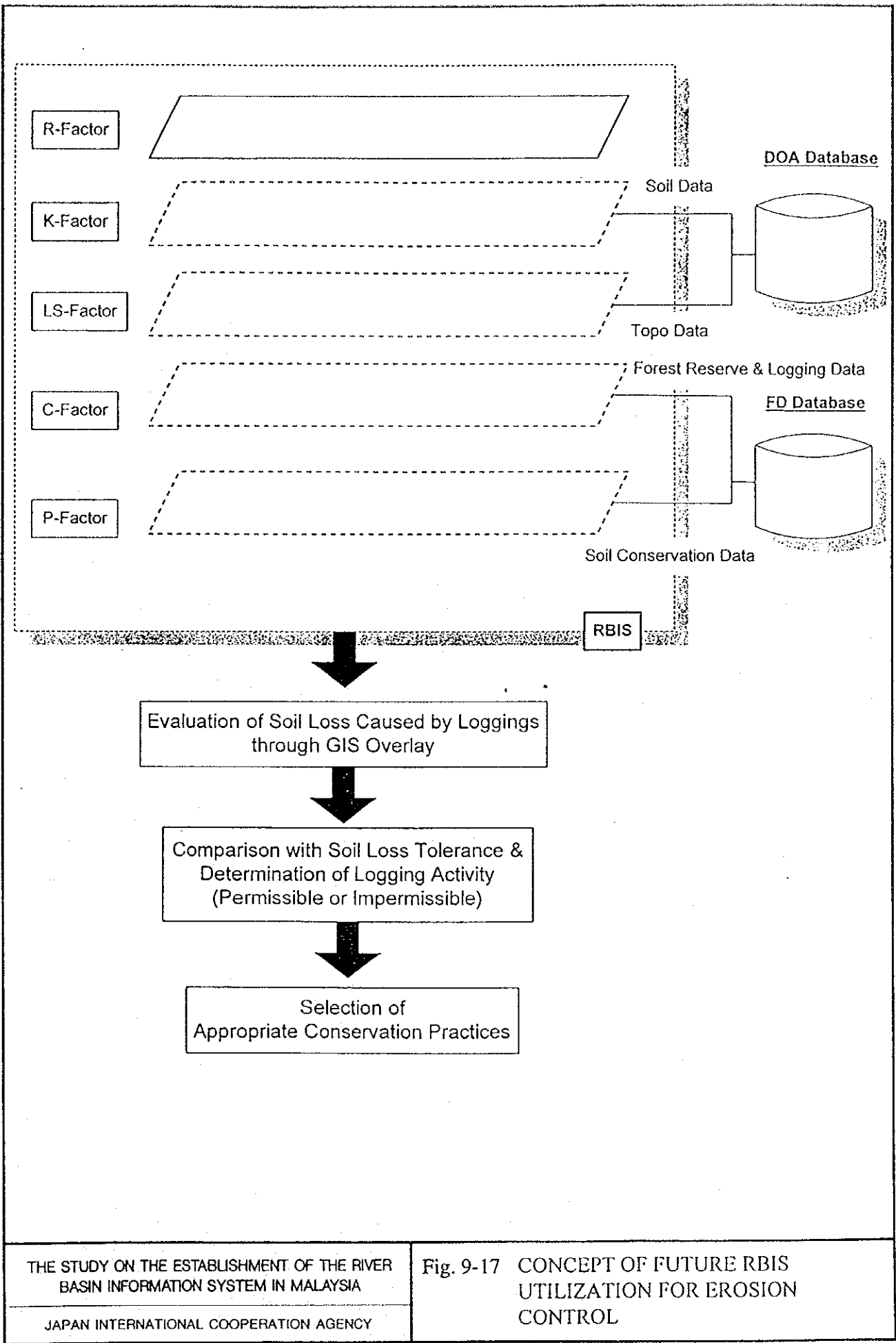
Fig. 9-15 ANNUAL RAINFALL SERIES
AT REPRESENTATIVE STATIONS

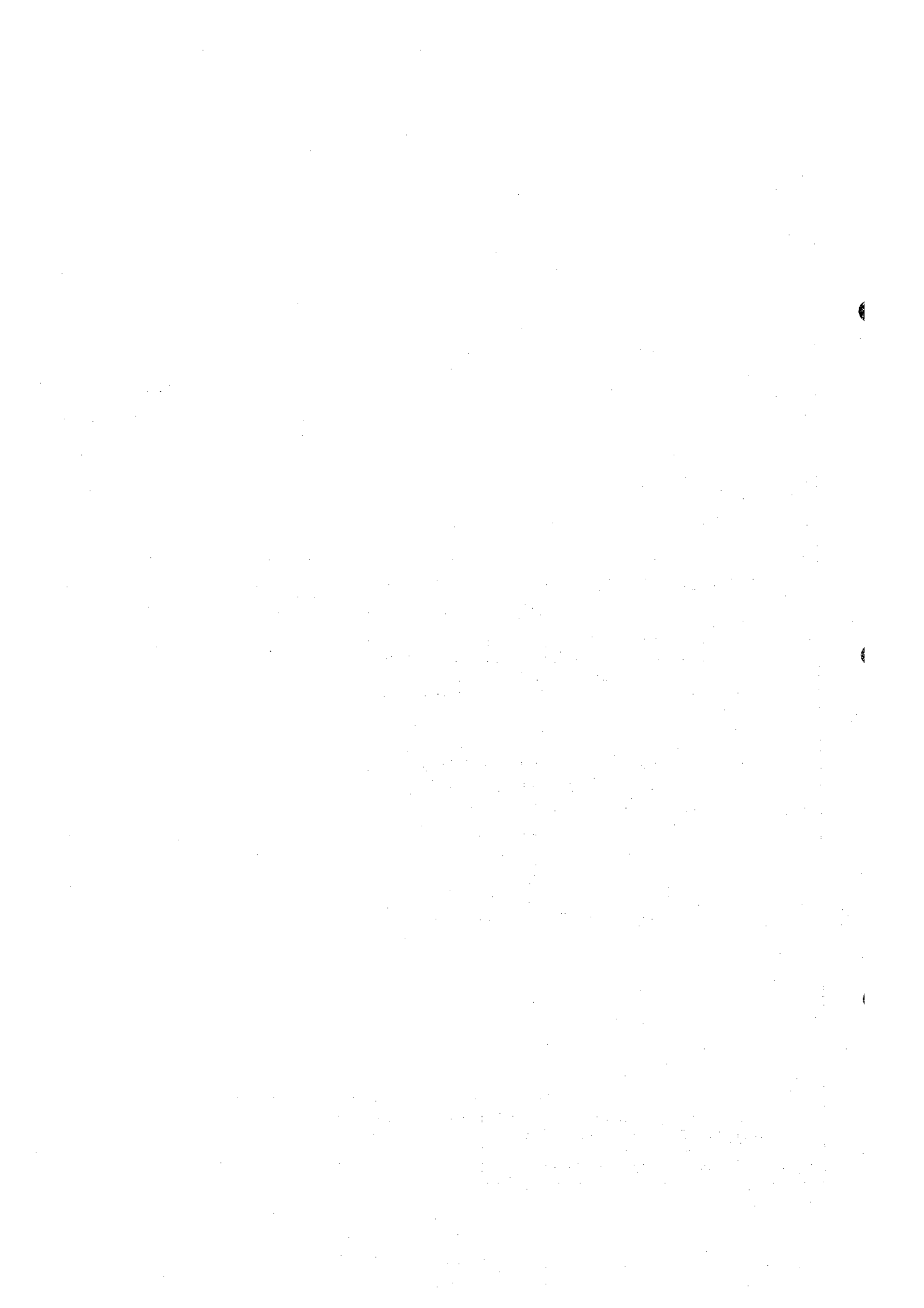


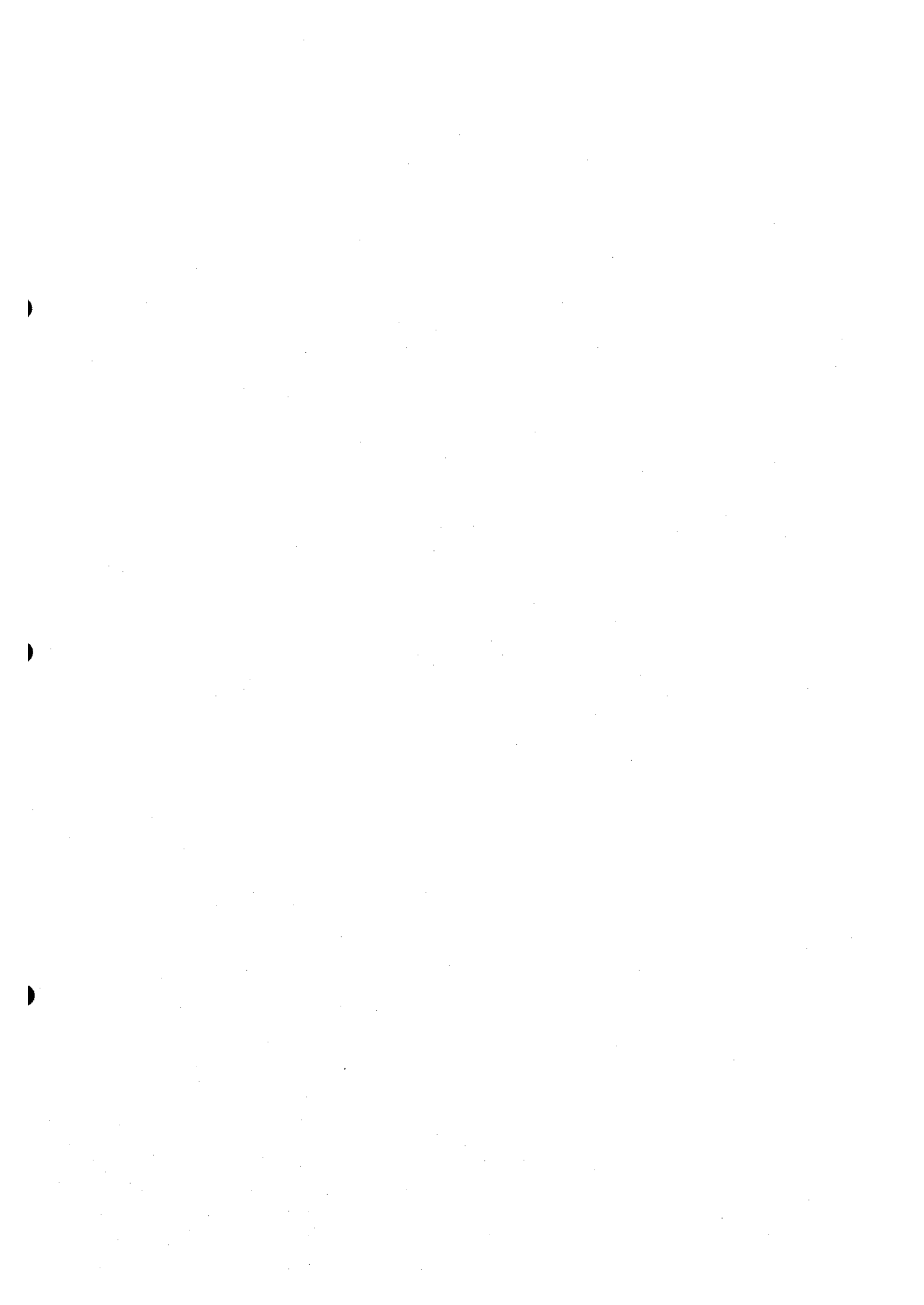
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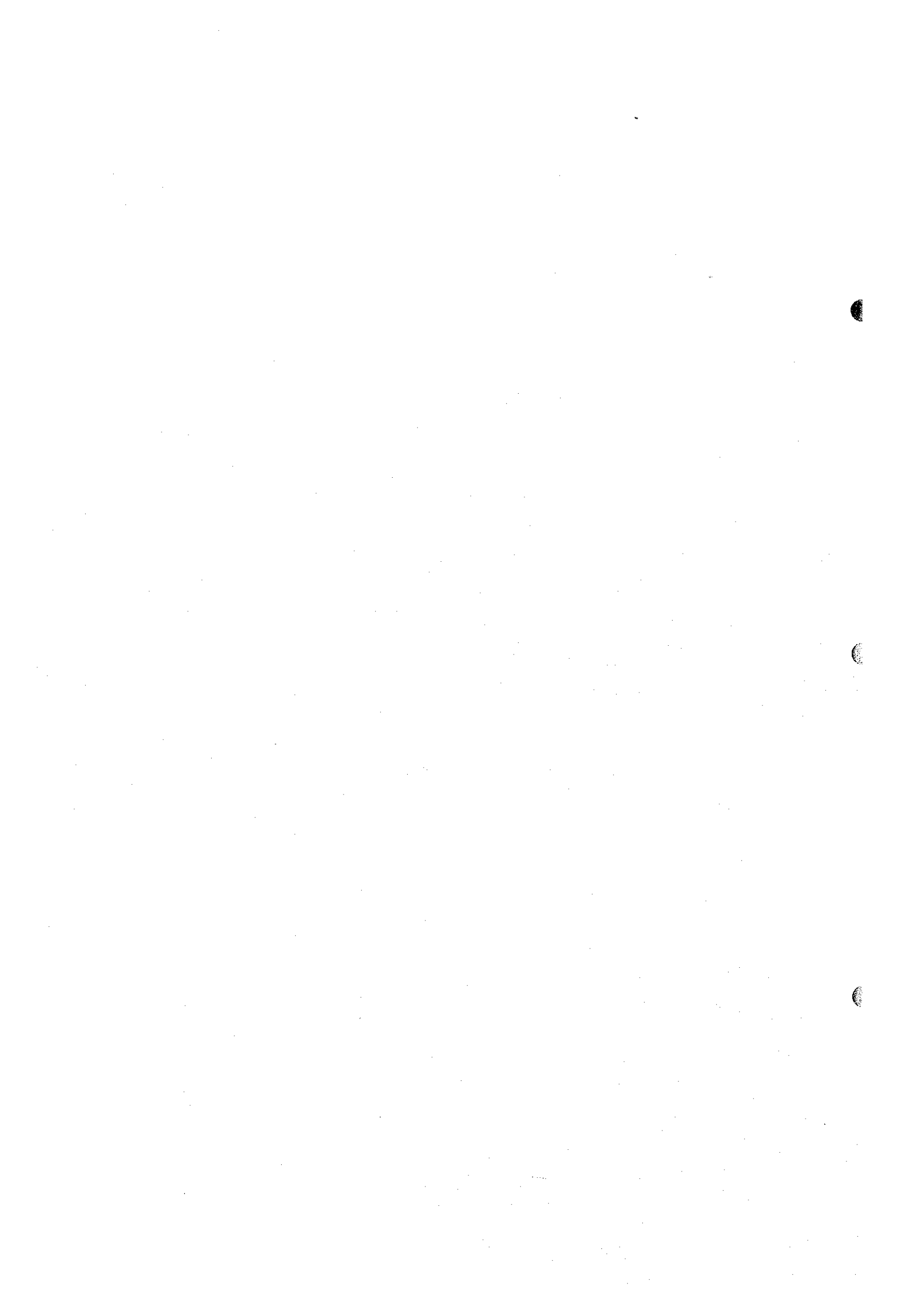
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Fig. 9-16 ESTIMATED ANNUAL RAINFALL
FACTOR









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