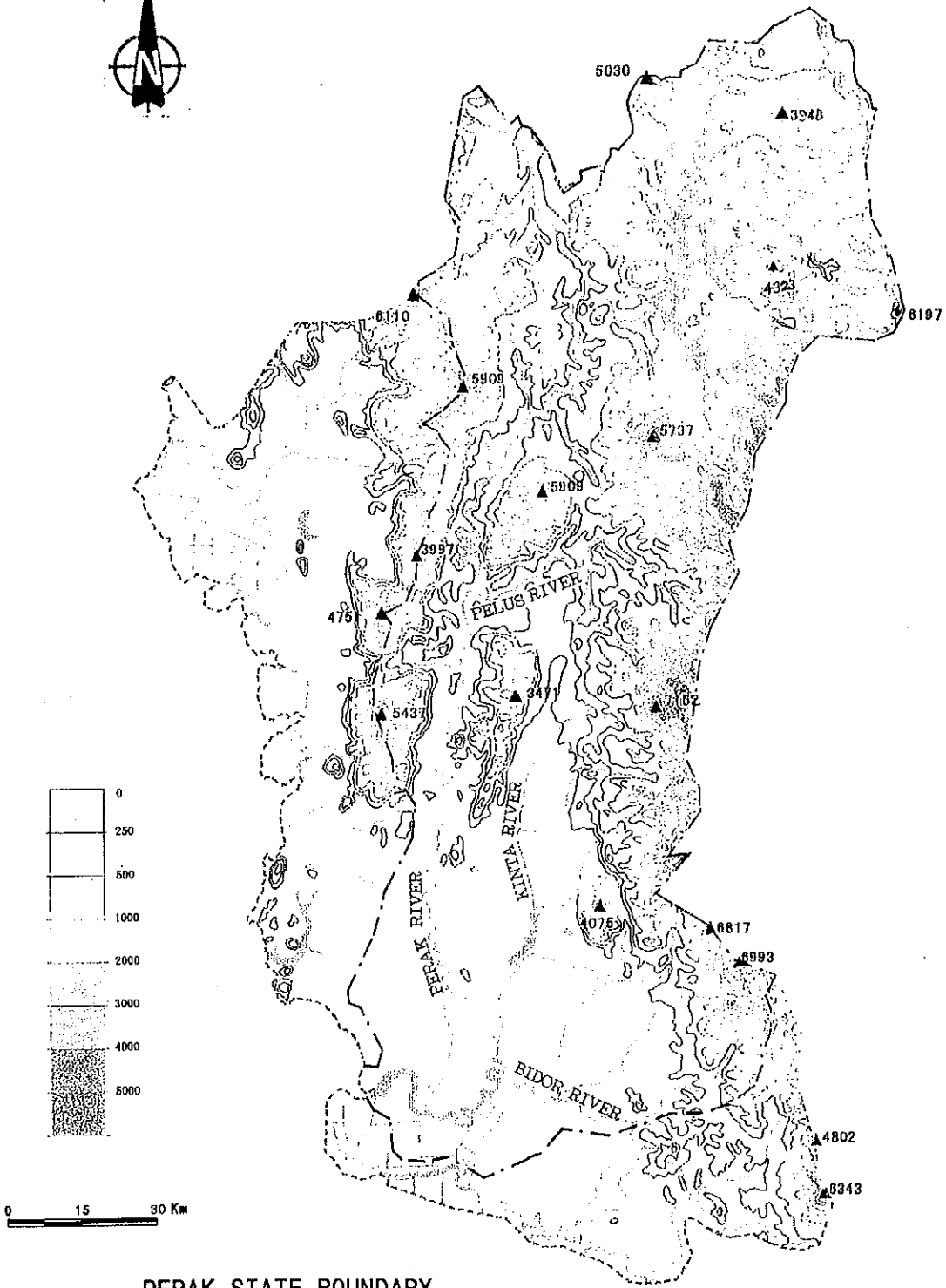


FIGURE



----- PERAK STATE BOUNDARY
----- WATERSHED BOUNDARY
NOTE : ELEVATIONS IN FEET

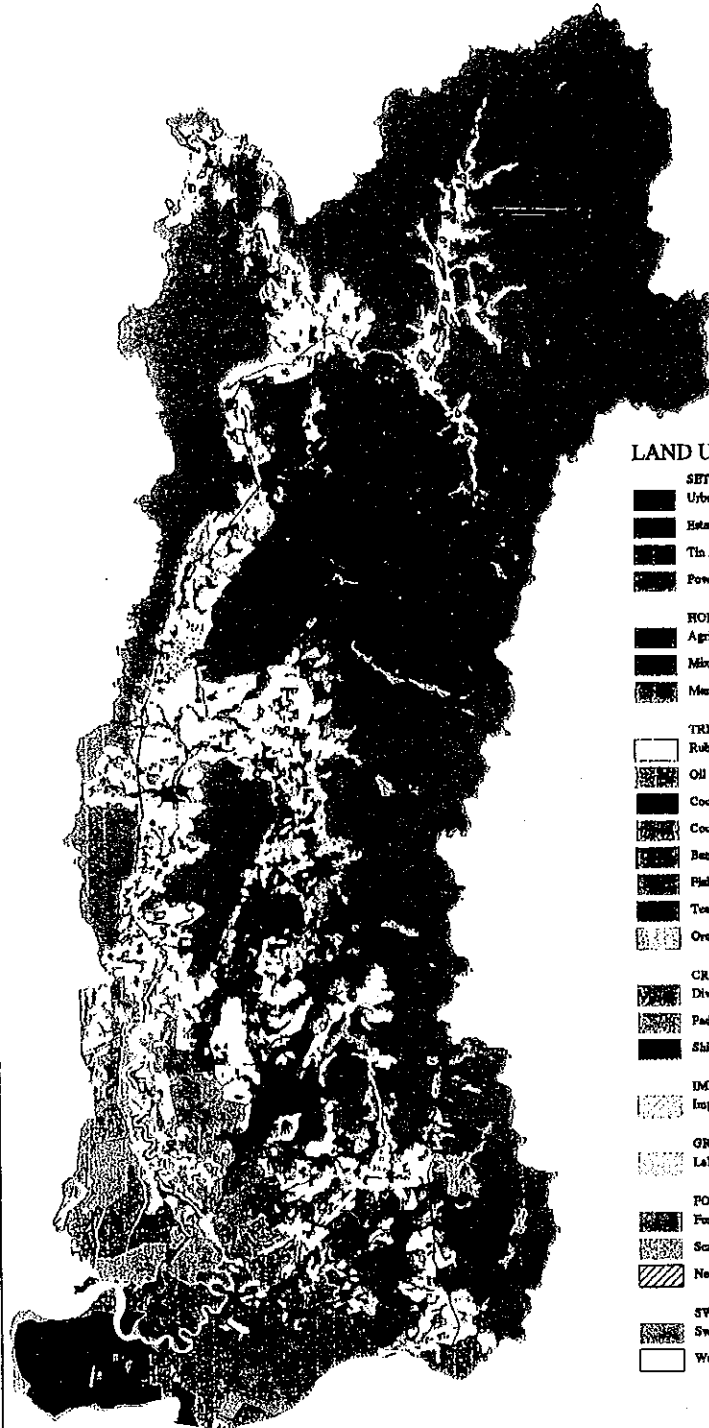
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Fig. 2-1 TOPOGRAPHIC MAP OF PERAK
RIVER BASIN

LAND USE 1990 PERAK RIVER BASIN

Scale 1 : 700,000



LAND USE CLASSIFICATION LEGEND

- SETTLEMENTS AND ASSOCIATED NON-AGRICULTURAL AREAS**
 - Urban and Associated Areas
 - Estate Buildings and Associated Areas
 - Tin Mining Areas
 - Power Line Right of Way
- HORTICULTURAL LANDS**
 - Agricultural Stations
 - Mixed Horticulture
 - Market Gardening
- TREE, PALM AND OTHER PERMANENT CROPS**
 - Rubber
 - Oil Palm
 - Cocunut
 - Cocos
 - Betanus
 - Fish and Hyacinth Ponds
 - Tea
 - Orchards
- CROPLAND**
 - Diversified Crops
 - Paddy
 - Shifting Cultivation
- IMPROVED PERMANENT PASTURE**
 - Improved Permanent Pasture
- GRASSLANDS**
 - Lalang and/or Scrub Grassland
- FOREST LAND**
 - Forest
 - Scrub
 - Newly Cleared Land
- SWAMPS, MARSHLANDS AND WETLAND FORESTS**
 - Swamps etc.
 - Water

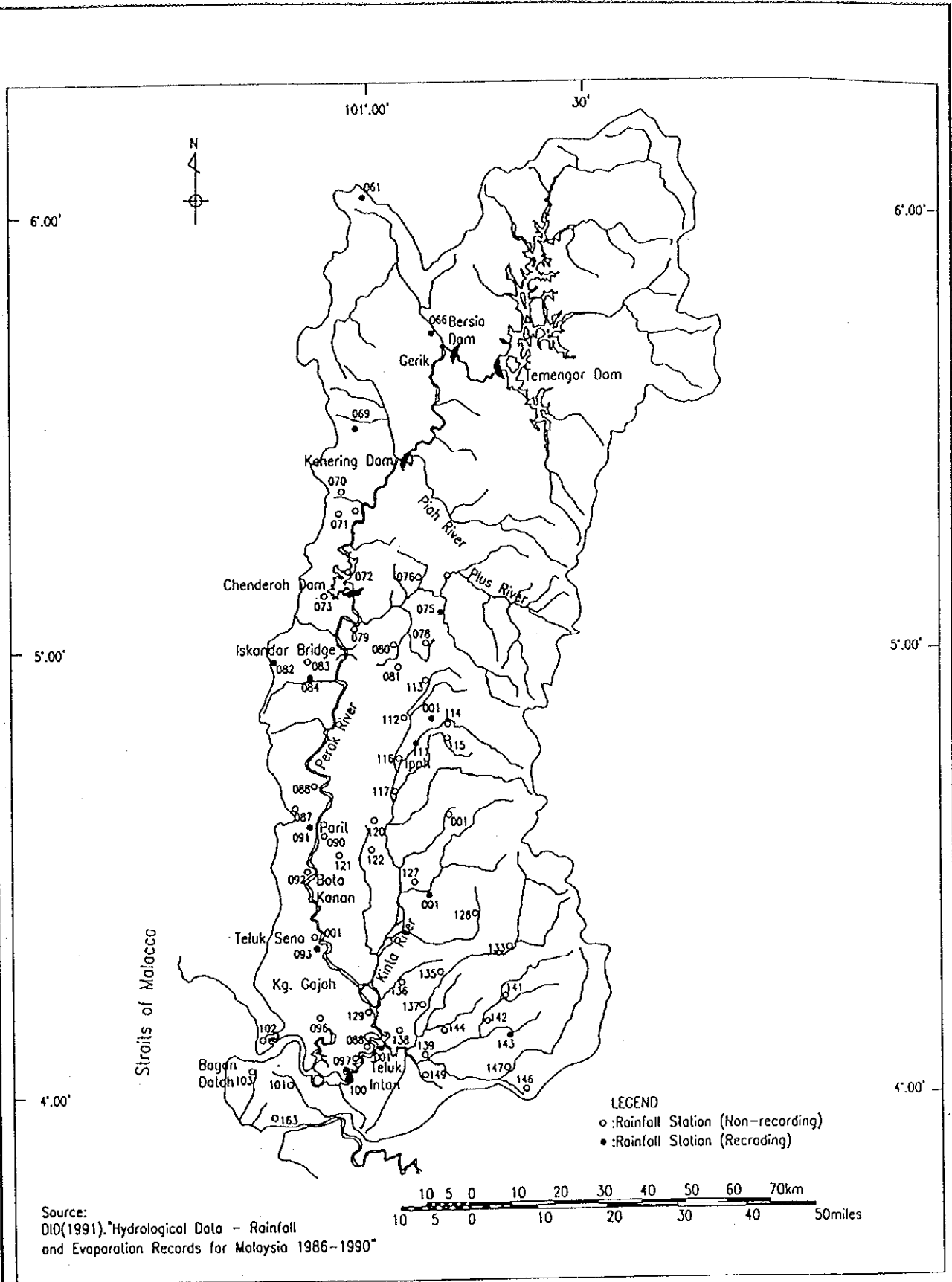
Prepared by G.I.S. Section on 5th June 1997

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Fig. 2-2

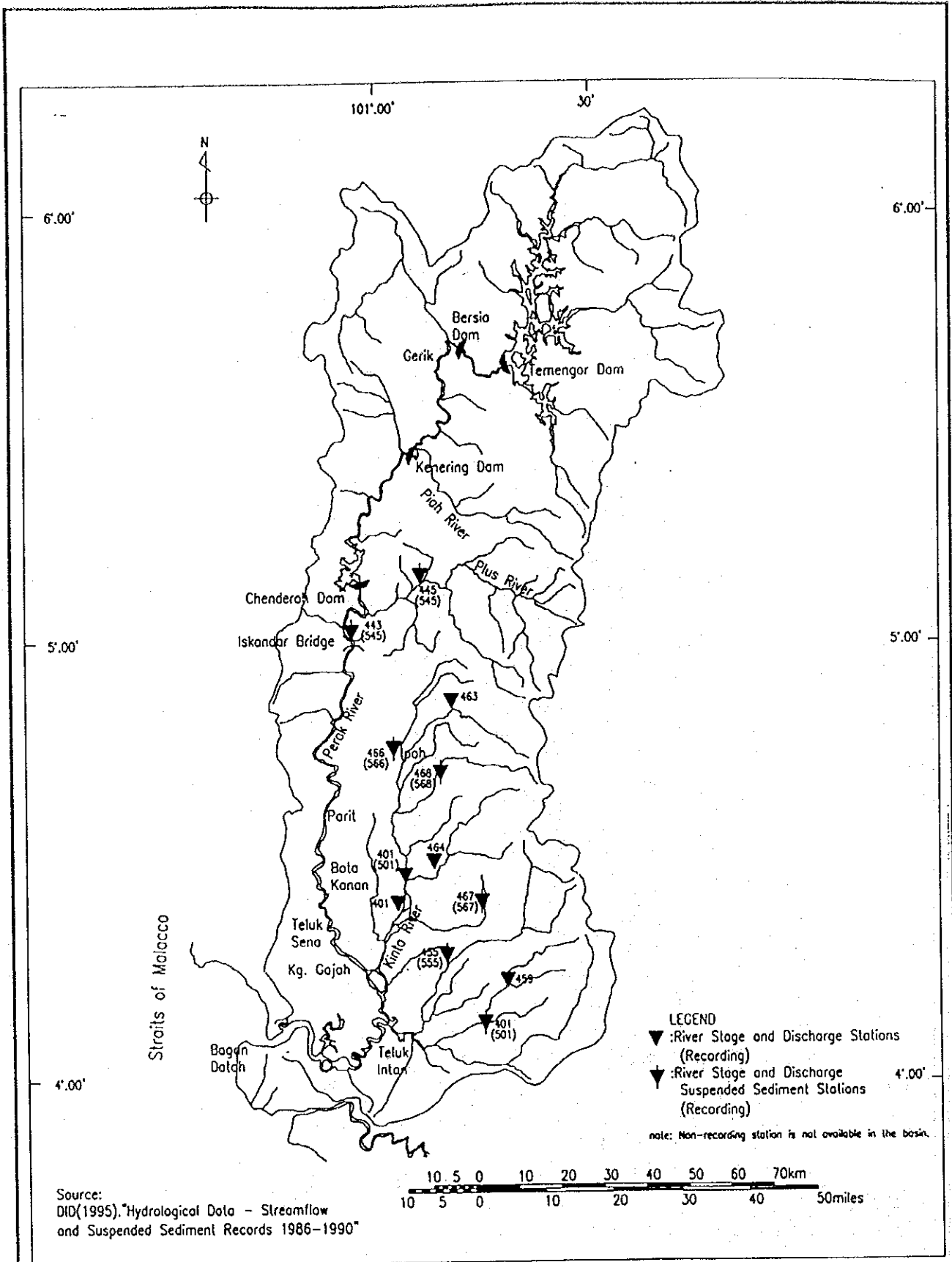
PRESENT LAND USE OF PERAK
RIVER BASIN



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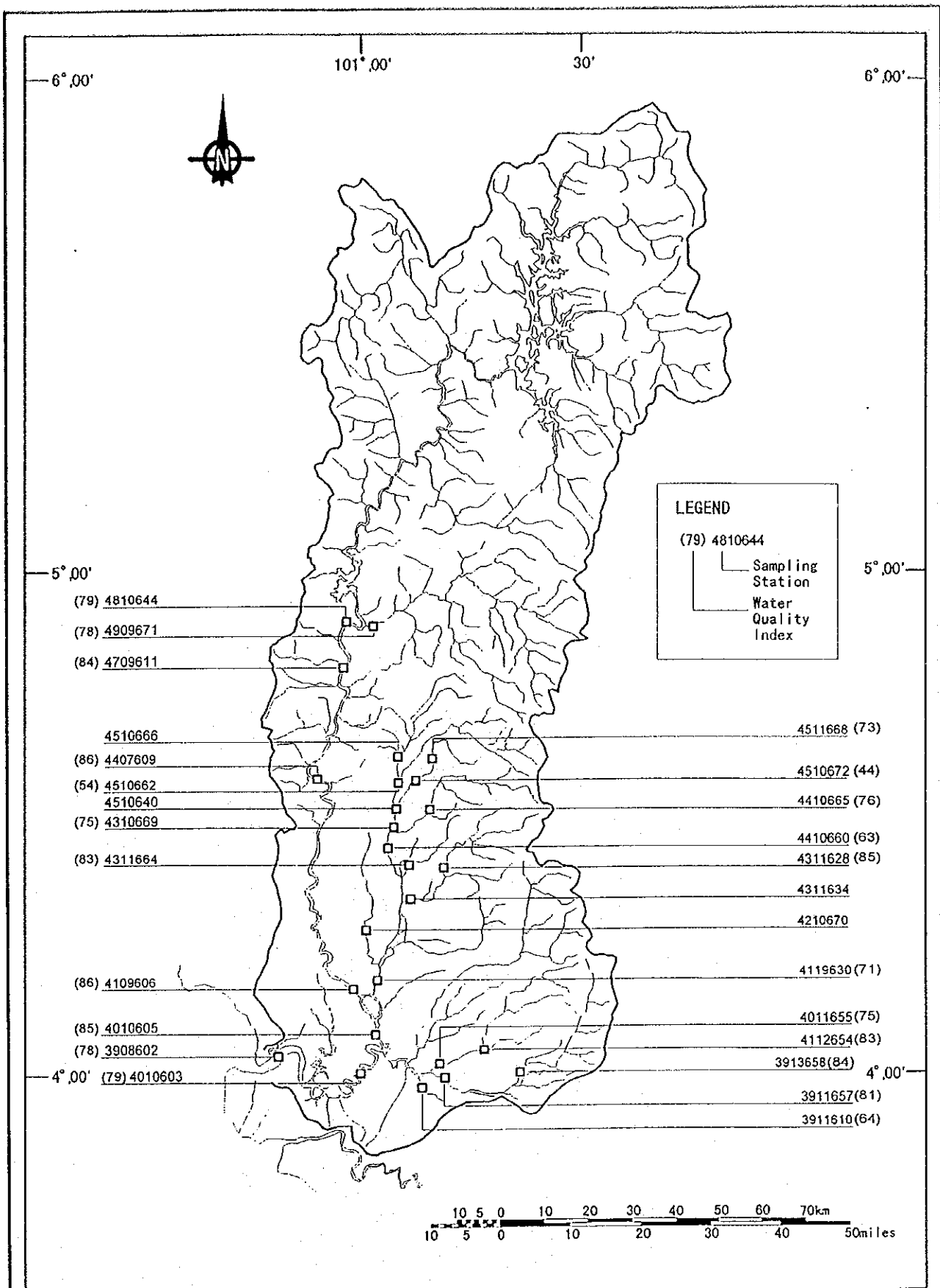
Fig. 4-1 LOCATION OF EXISTING DID RAIN-
FALL STATIONS



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Fig. 4-2 LOCATION OF EXISTING DID RIVER
DISCHARGE AND SUSPENDED
SEDIMENT GAUGING STATIONS

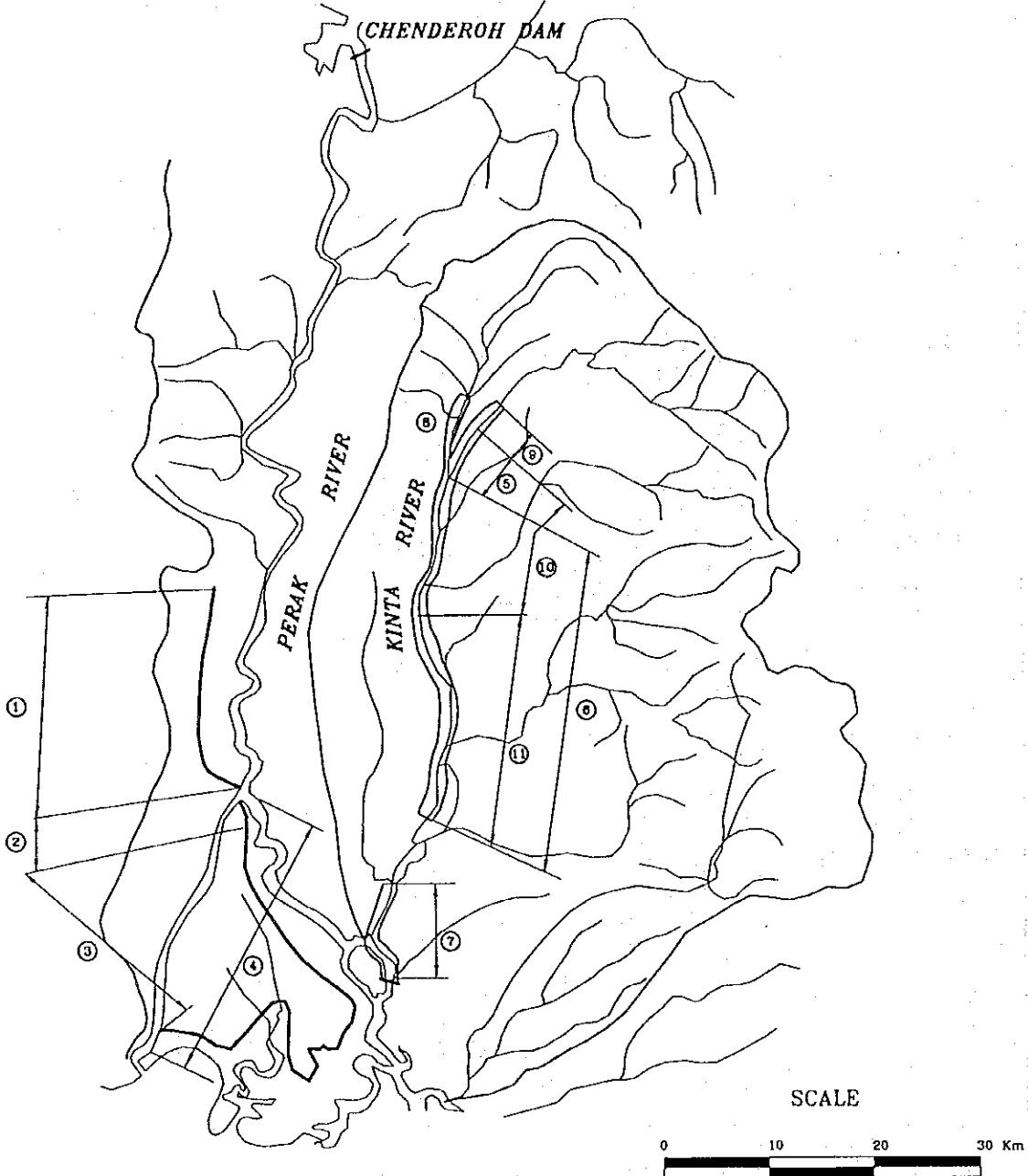


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Fig. 4-3 EXISTING DOE WATER SAMPLING
POINT AND WQI MONITORED AT
THE SAMPLING POINTS

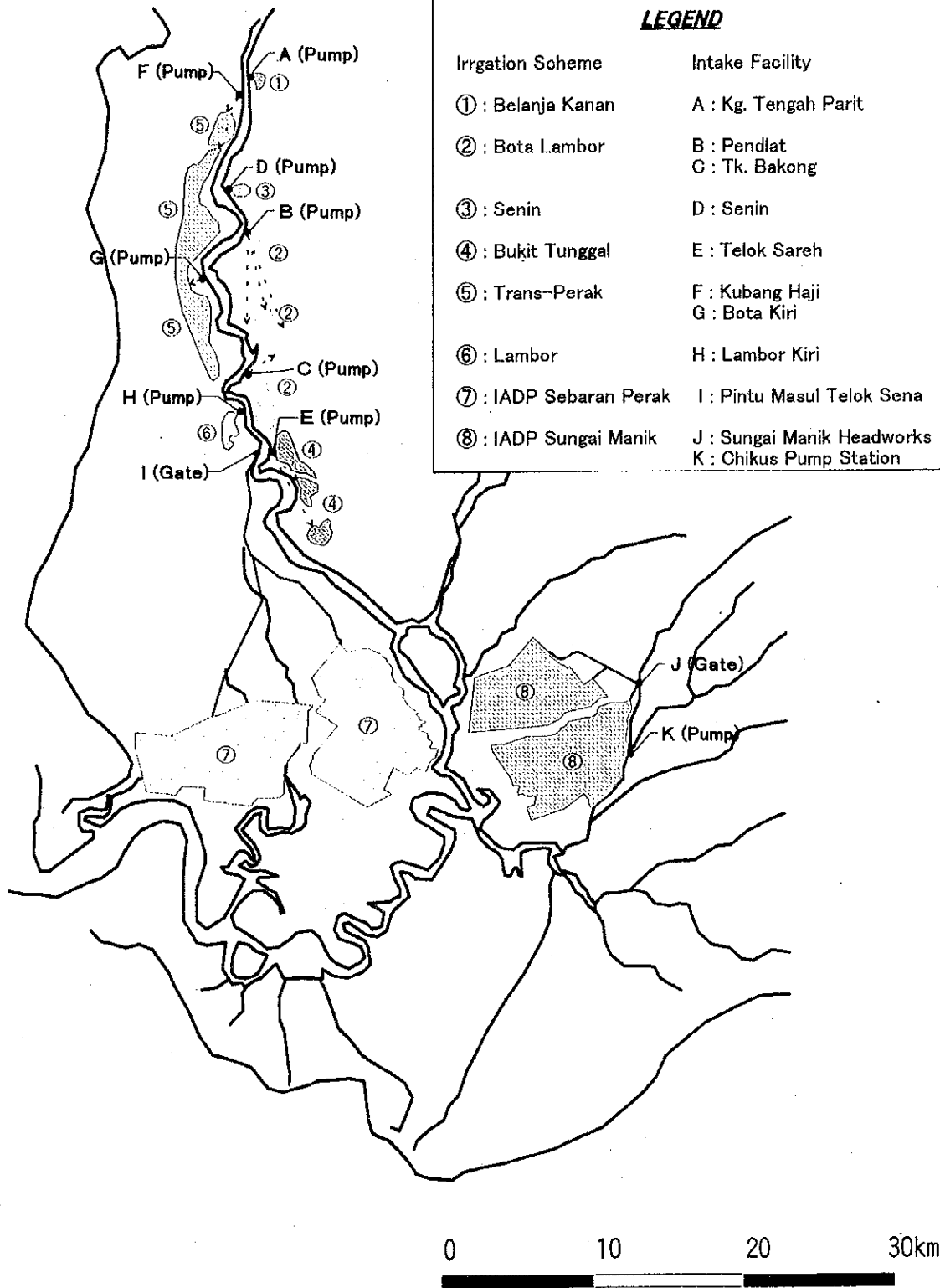
River	No.	Name of Scheme	Existing/ Proposed
Perak	①	Tran-Perak Stage IV Embankment	Existing
	②	Lambor Kiri Embankment	Existing
	③	Stage 1 Drain Embankment	Existing
	④	Perak Flood Bypass	Proposed
Kinta	⑤	Ipoh Flood Mitigation Scheme	Existing
	⑥	Kinta Conservancy Scheme	Existing
	⑦	Malaysia Mining Company Diversion	Existing
	⑧	Pari Scheme	Existing
	⑨	Dg. Kinta Upgrading Scheme	Proposed
	⑩	Bund Upgrading (1)	Proposed
	⑪	Bund Upgrading (2)	Proposed



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Fig. 4-4 LOCATION MAP OF EXISTING AND
PROPOSED FLOOD MITIGATION
WORKS

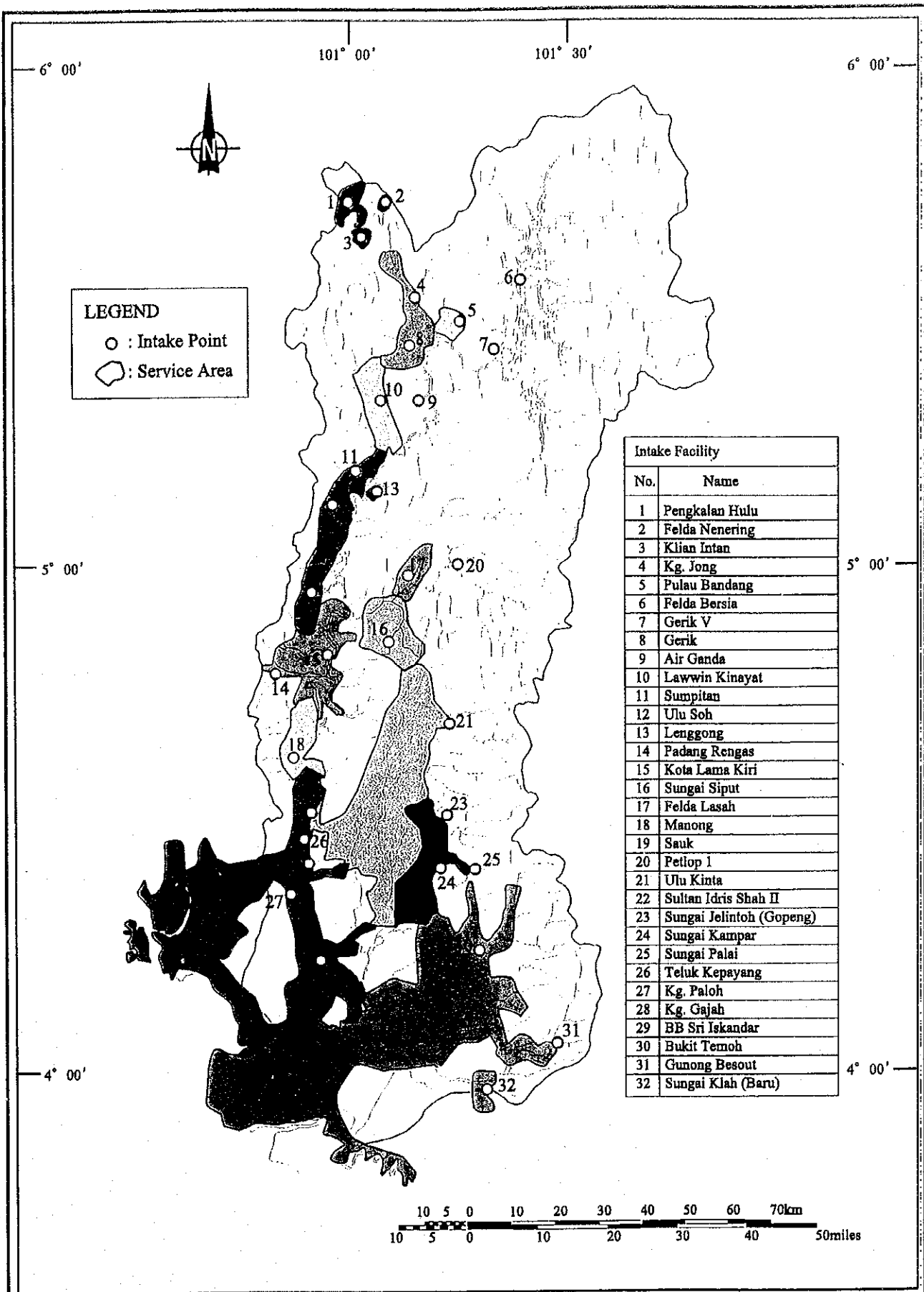


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Fig. 4-5 LOCATION MAP OF IRRIGATION
SCHEME

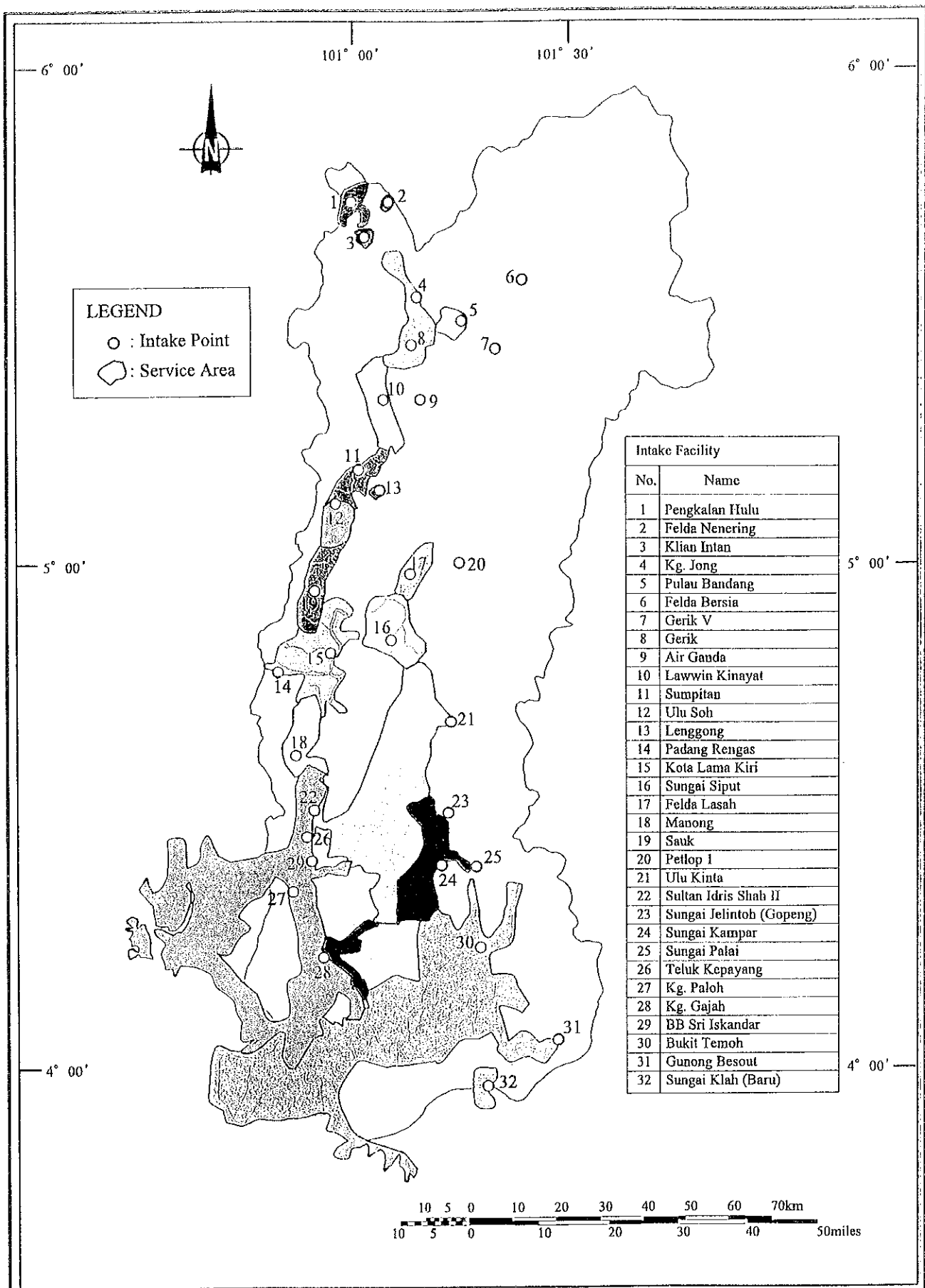




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Fig. 4-6 LOCATION MAP OF INTAKE POINTS
AND SERVICE AREA FOR DOMESTIC
AND INDUSTRIAL WATER SUPPLY

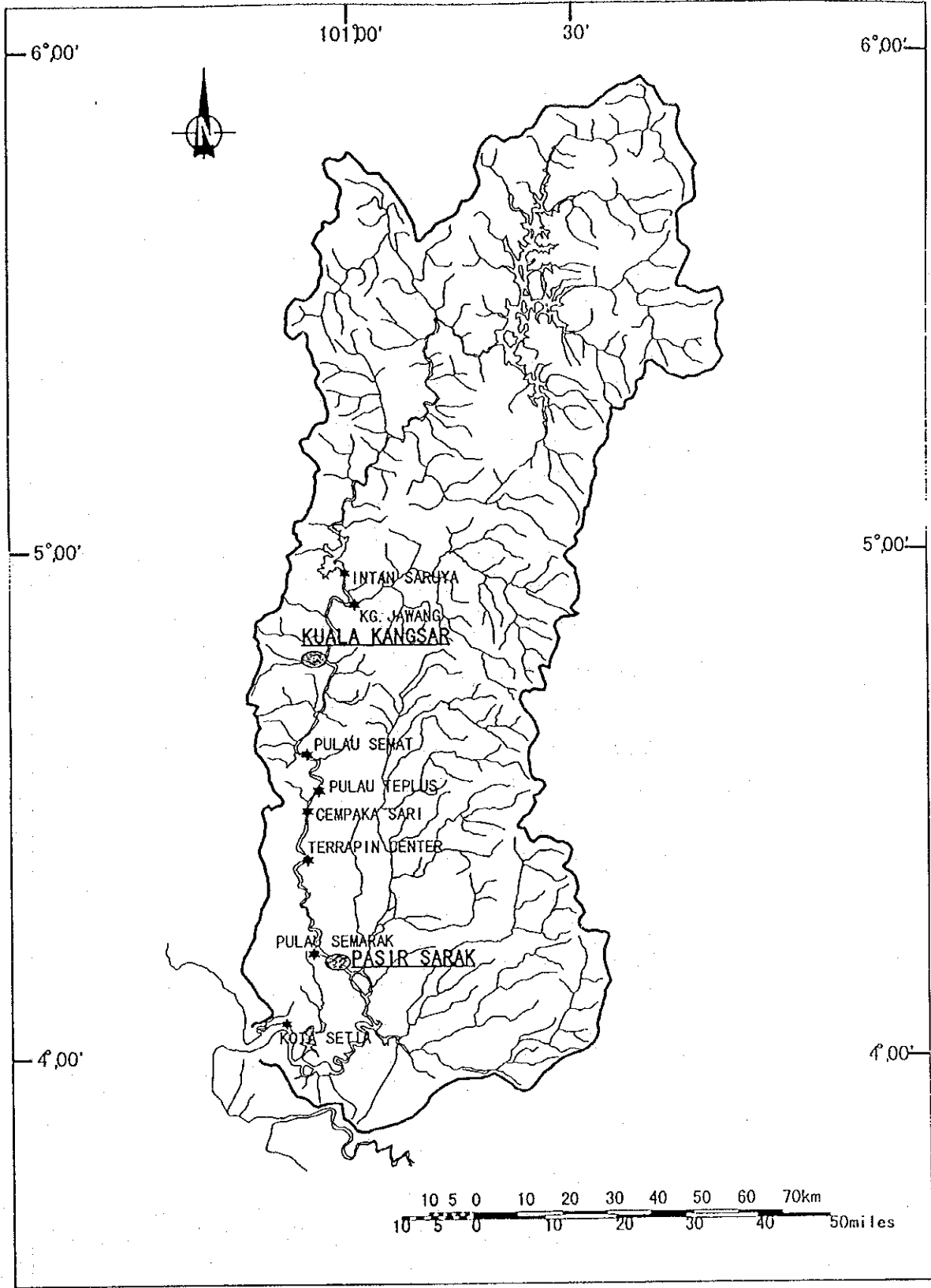


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 4-6 LOCATION MAP OF INTAKE POINTS
AND SERVICE AREA FOR DOMESTIC
AND INDUSTRIAL WATER SUPPLY



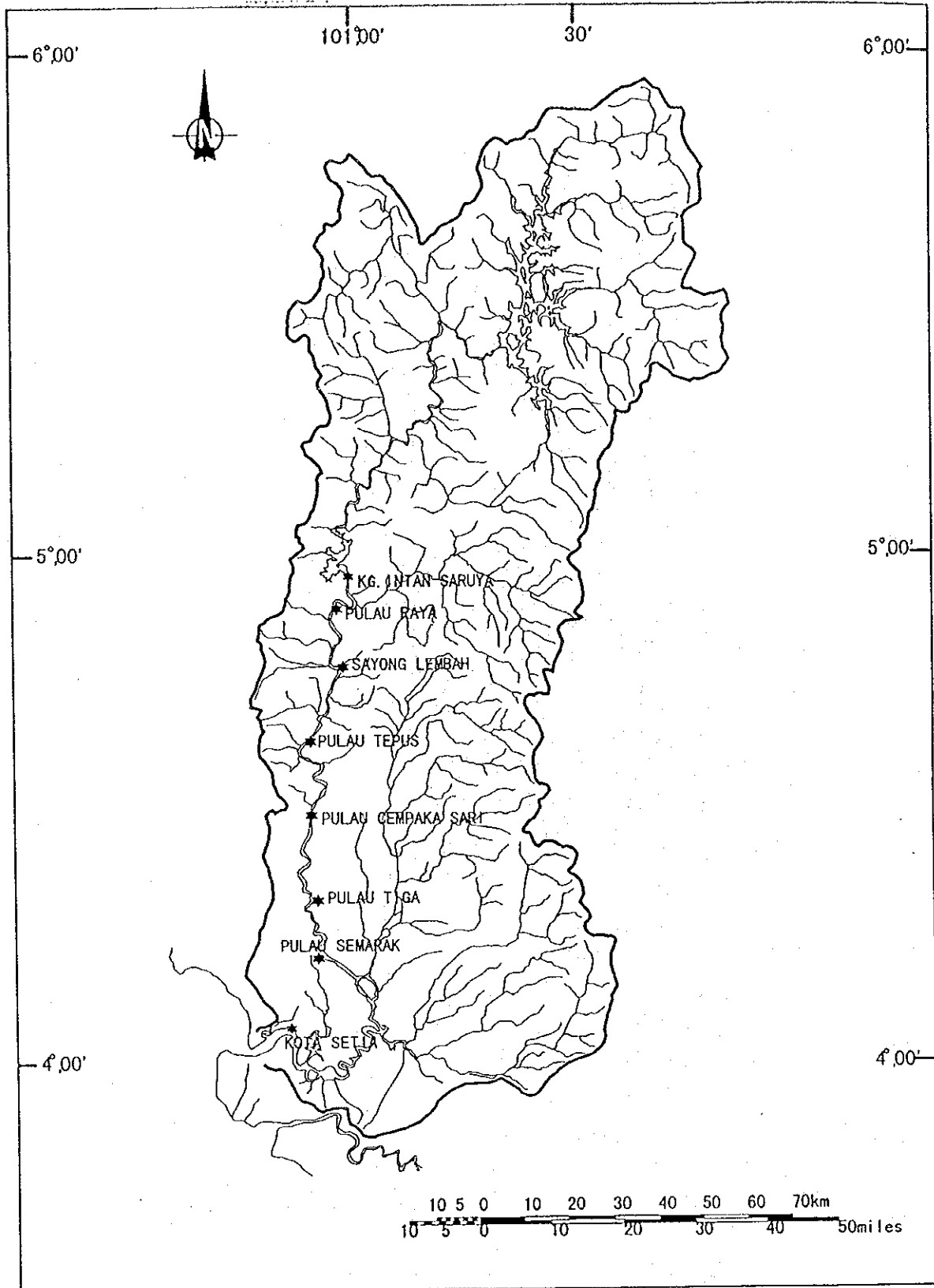


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Fig. 4-7

LOCATION OF RIVER PARKS

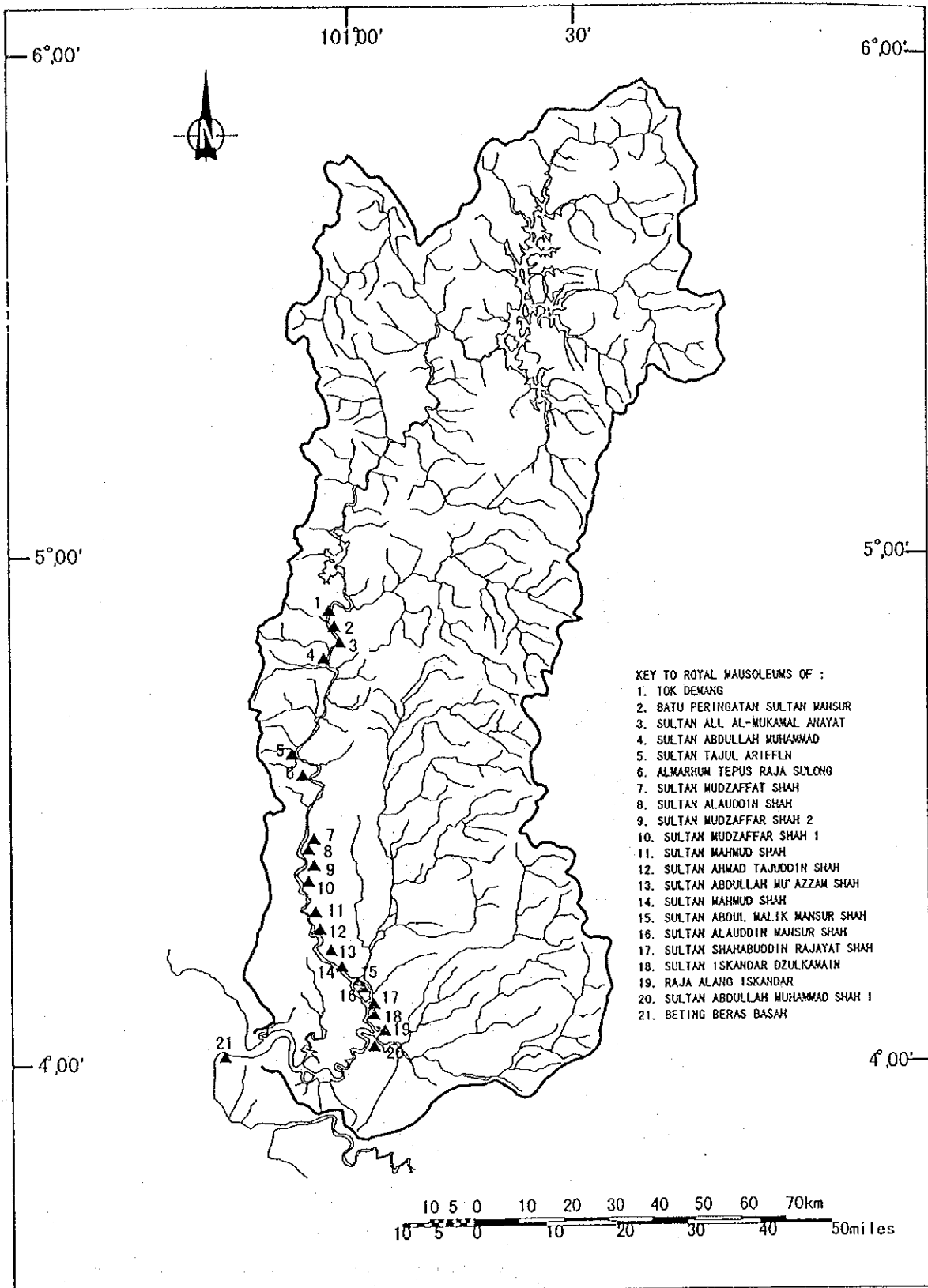


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Fig. 4-8

LOCATION OF CAMP SITES

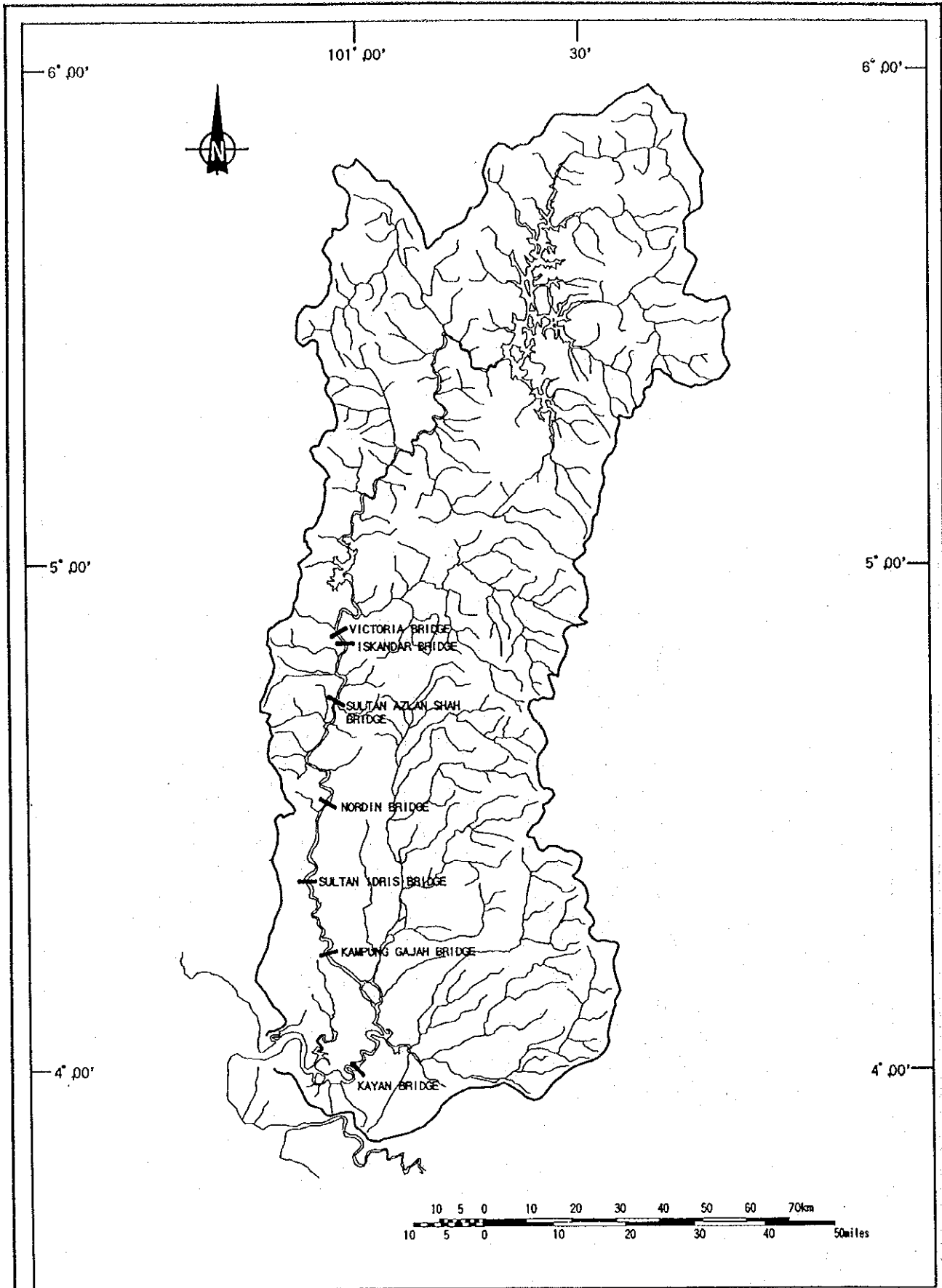


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Fig. 4-9

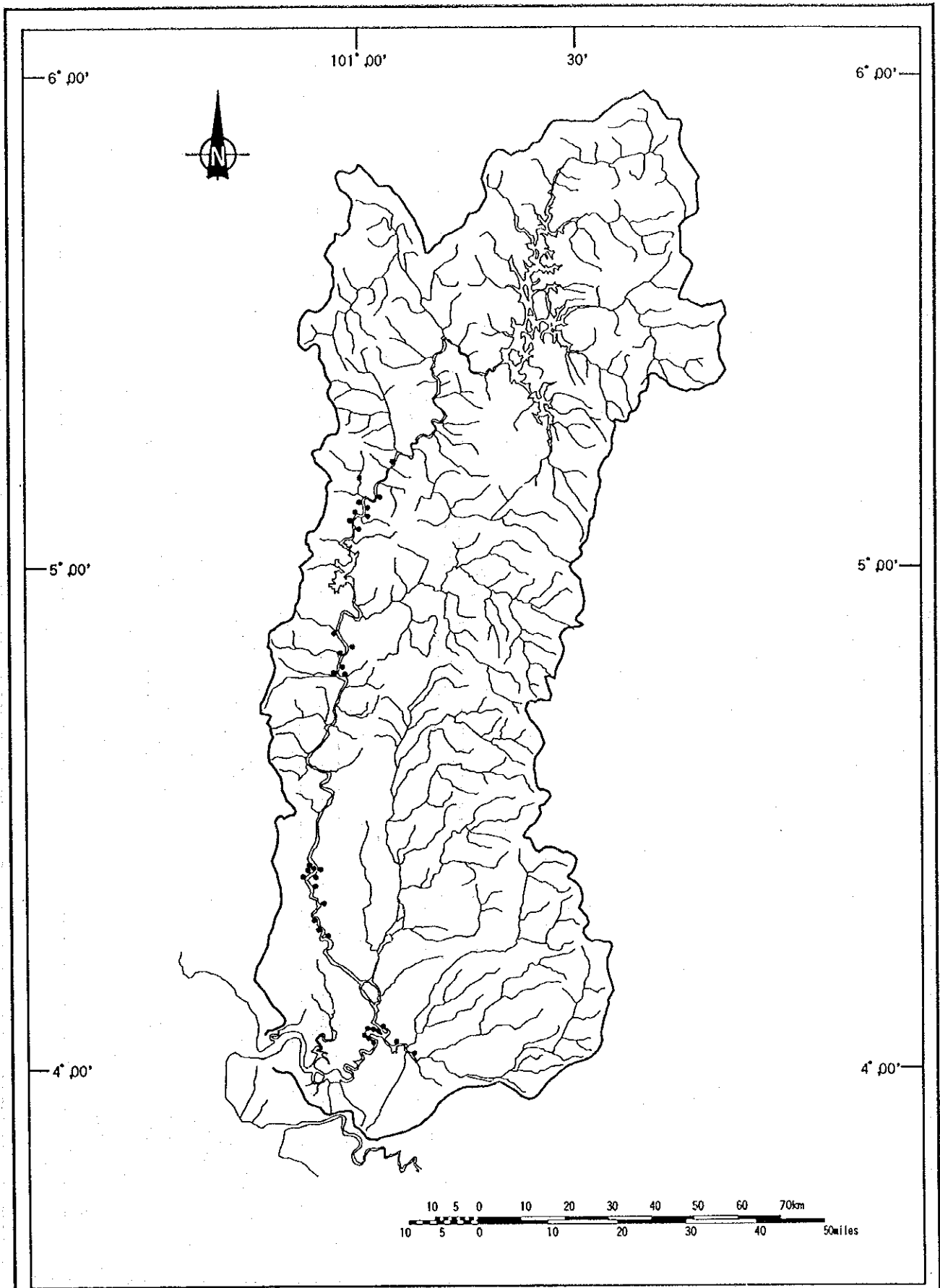
LOCATION OF ROYAL
MAUSOLEUMS



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BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 4-10 LOCATION MAP OF EXISTING MAJOR
BRIDGES OVER PERAK RIVER



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BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 4-11

LOCATION MAP OF SAND MINING SITES

AgroLink Network

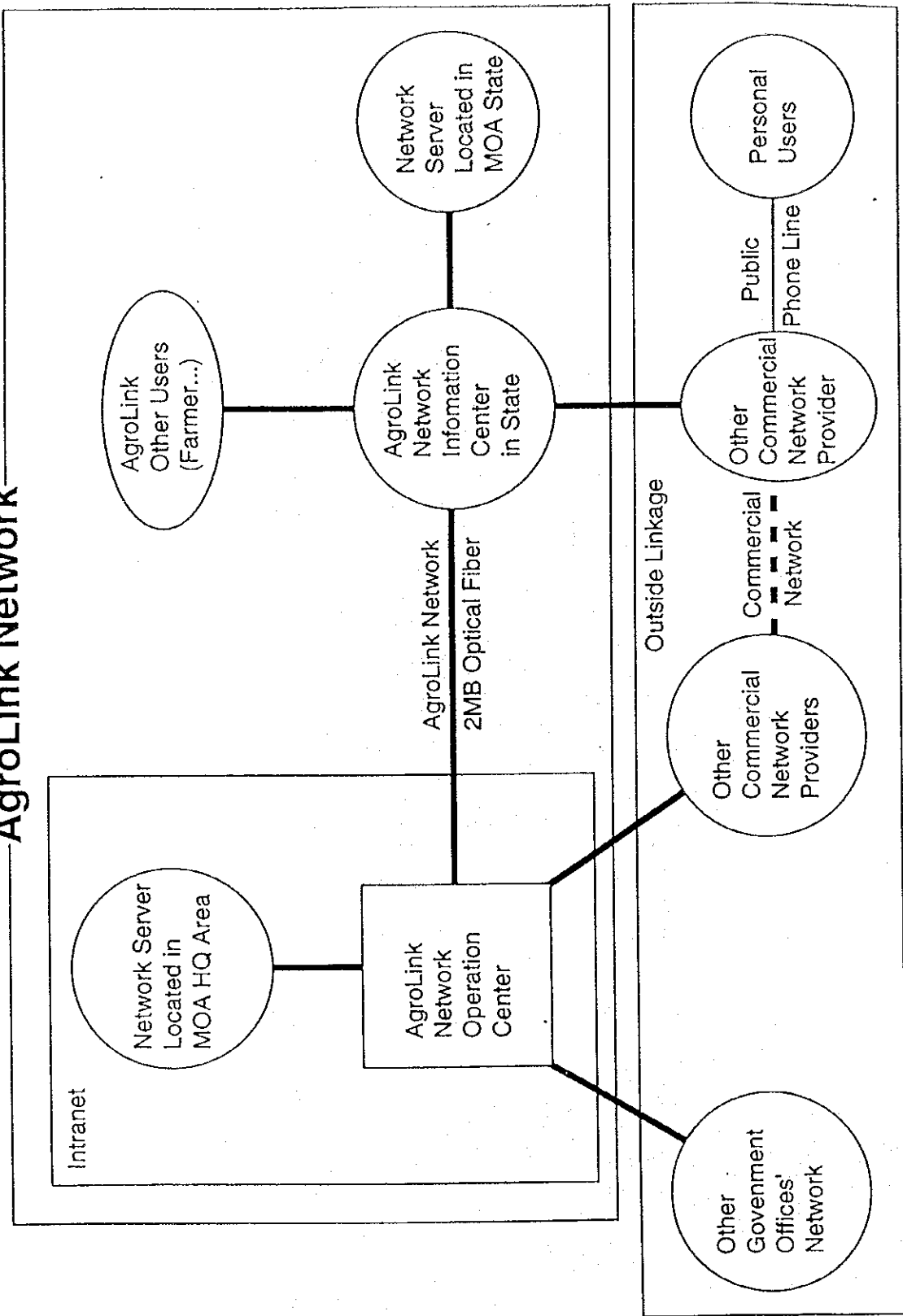
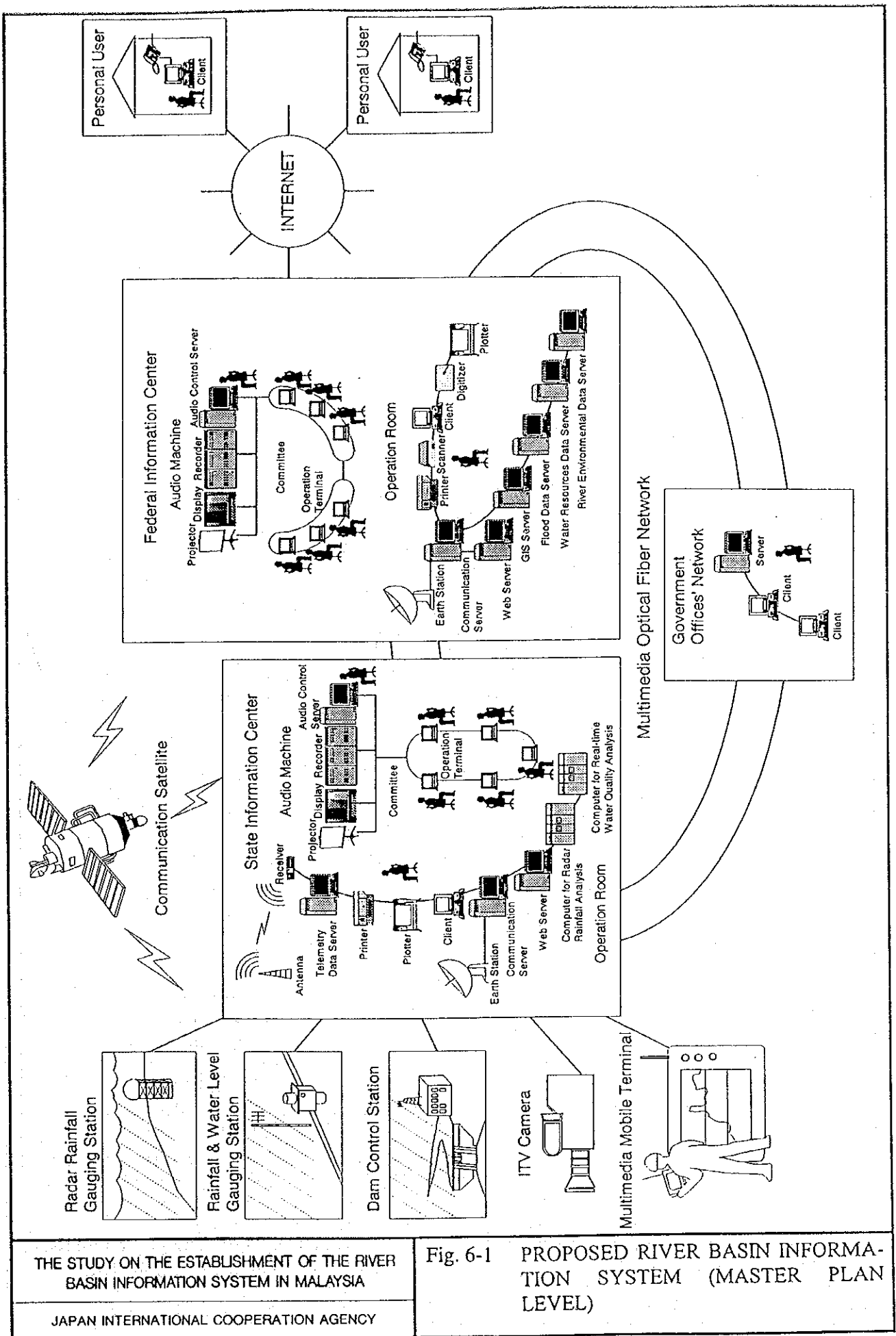


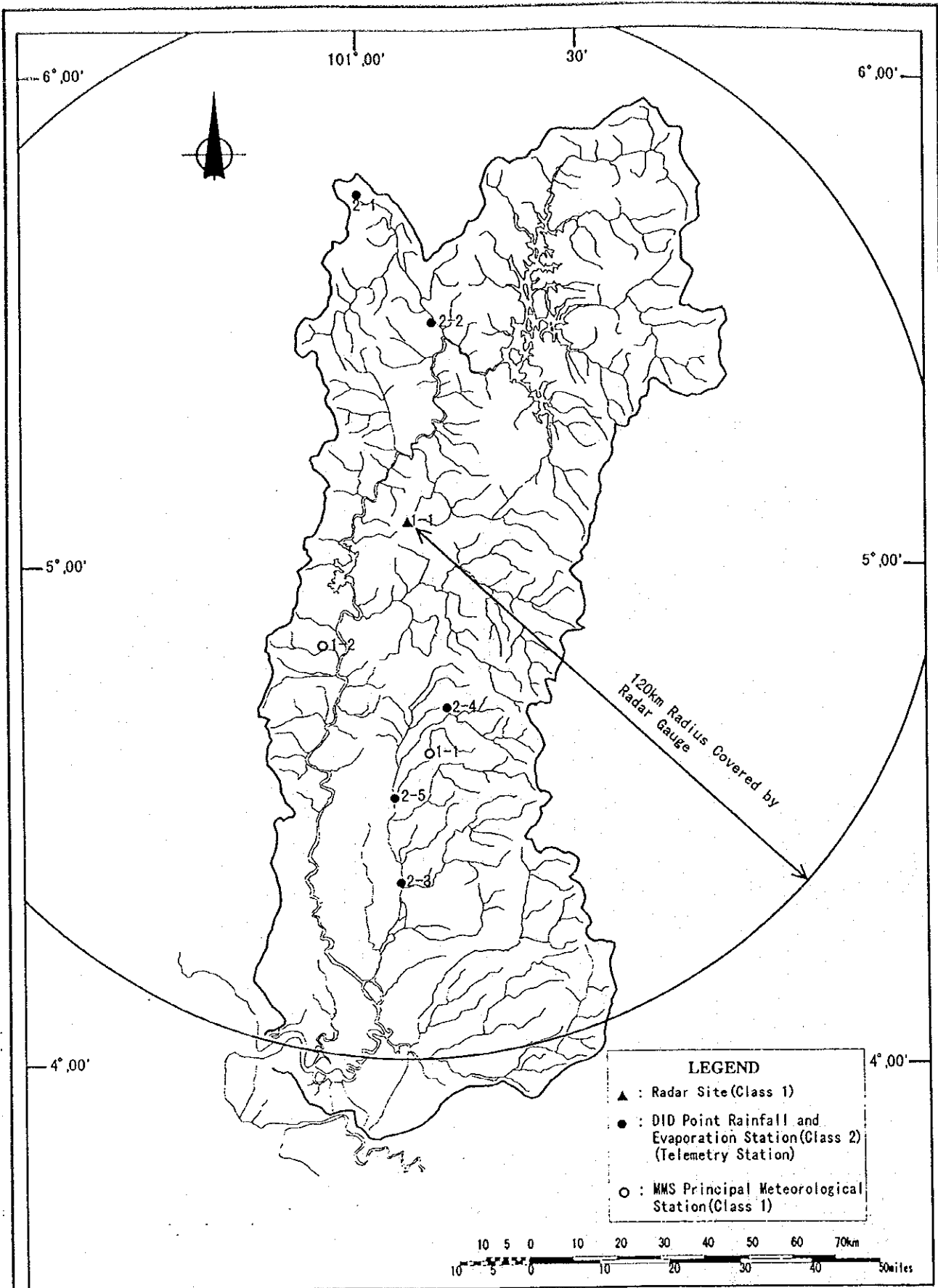
Fig. 5-1 AGROLINK NETWORK CONFIGURATION



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

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 6-1 PROPOSED RIVER BASIN INFORMATION SYSTEM (MASTER PLAN LEVEL)

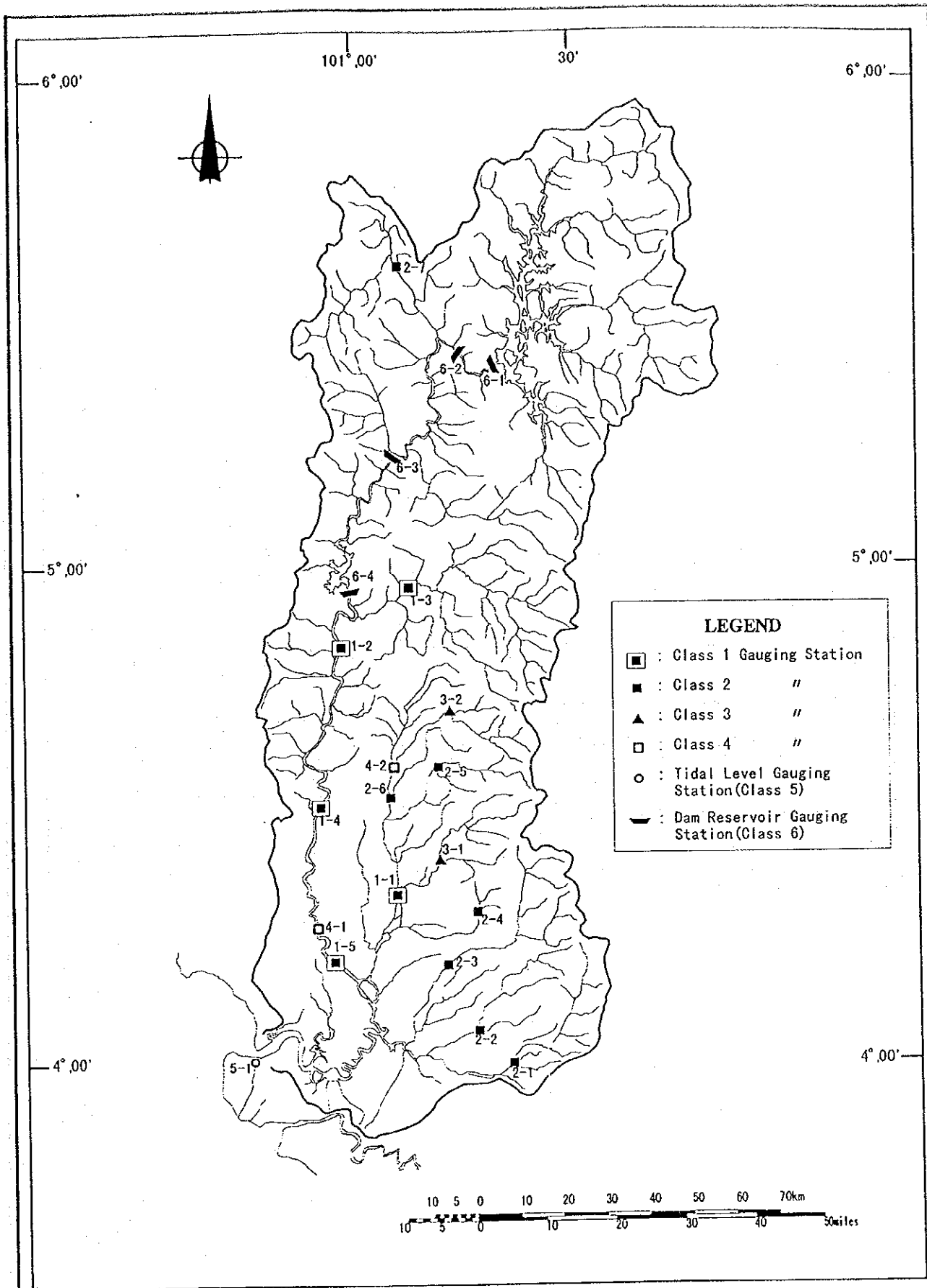


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 6-2

LOCATION OF RAINFALL STATIONS
PROPOSED FOR MASTER PLAN



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BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

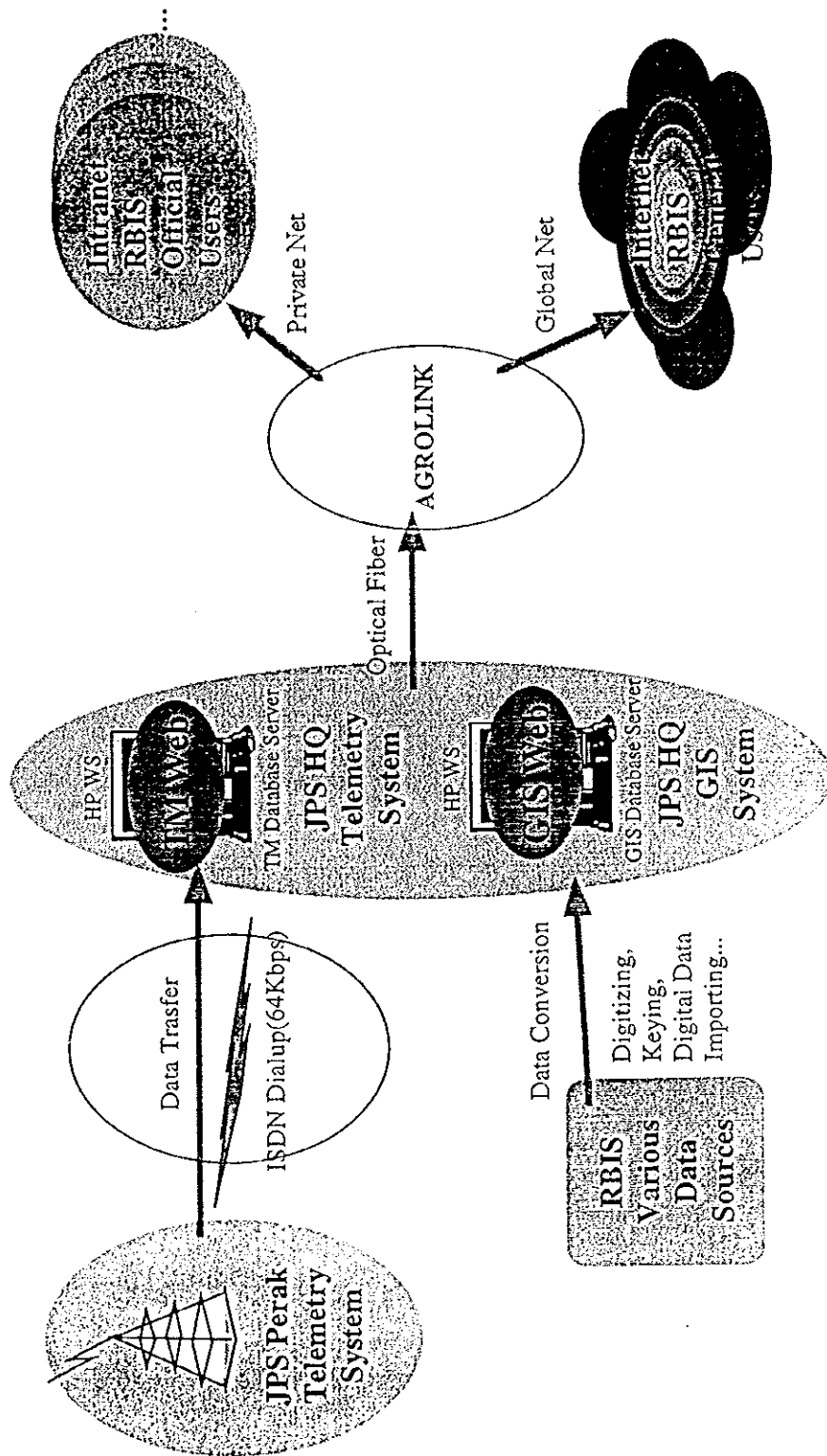
Fig. 6-3 LOCATION OF STREAM GAUGING
STATIONS PROPOSED FOR MASTER
PLAN

Items to be Established	8th MP	9th MP	10th MP	11th MP
	(2001-2005)	(2006-2010)	(2011-2015)	(2016-2020)
1. Gauging/Monitoring System				
(1) Water stage gauging (expansion of the existing network)	●			
(2) Portable information terminal (PIT)	●			
(3) Automatic water quality gauge		●		
(4) Radar rainfall gauge			●	
(5) Industrial television (ITV)				●
2. Processing System				
(1) Data base server	●			
(2) Input/output devices	●			
(3) Computer for analysis of real-time water quality data		●		
(4) Computer for analysis of radar rainfall gauge data			●	
(5) Audio Control Server				●
3. Data Transmission System				
(1) Telemetry system (expansion of the existing system)	●			
(2) Optical fiber network (between KL - Ipoh and within the area of KL)	●			
(2) Telemetry system (for real-time water quality)		●		
(3) Multiplex radio wave system (for radar rainfall gauge)			●	
(4) Optical fiber network (within Perak river basin)				●

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BASIN INFORMATION SYSTEM IN MALAYSIA

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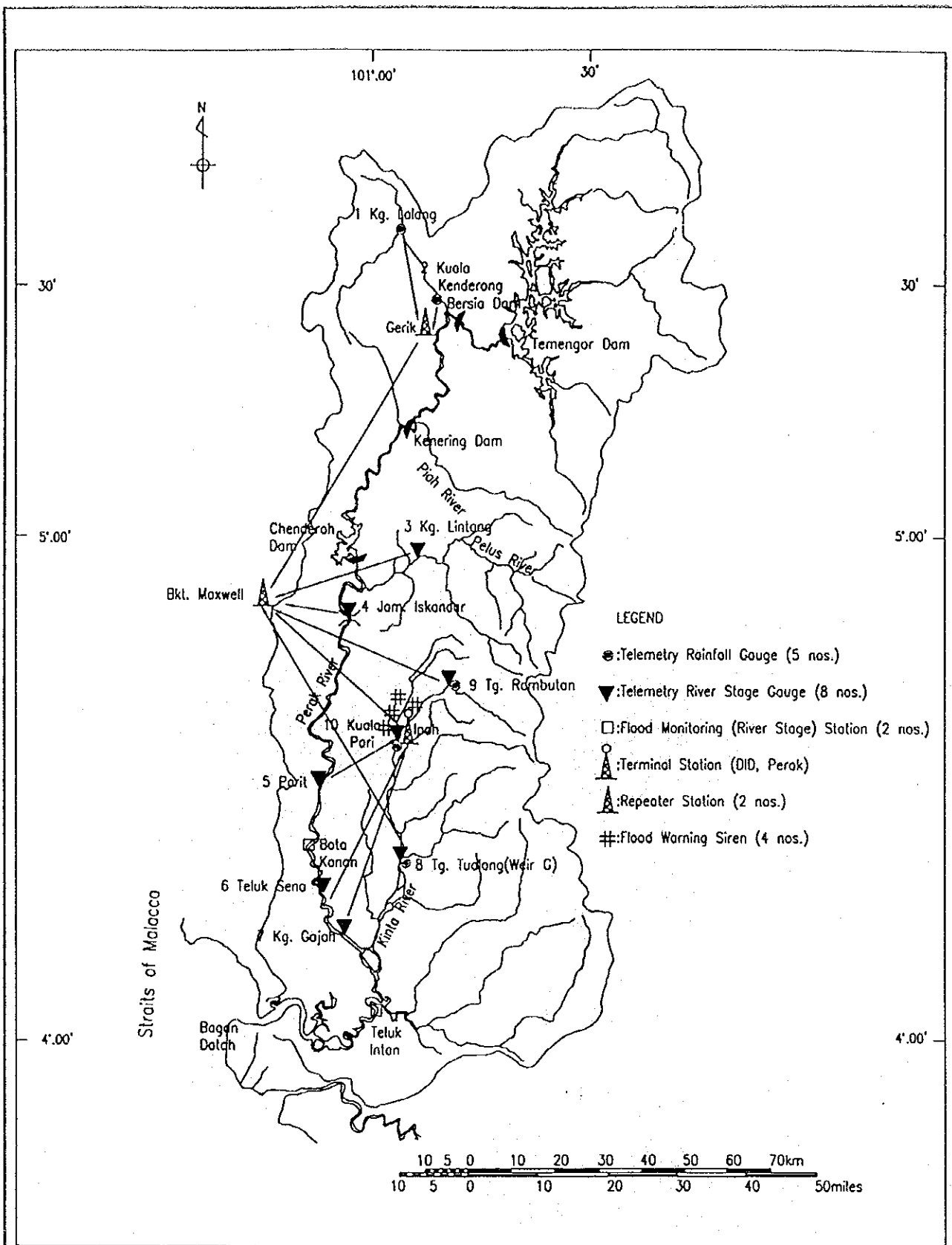
Fig. 6-4 PROJECT IMPLEMENTATION
SCHEDULE



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

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-1 SYSTEM NETWORK ON FOR THE
OPERATIONAL SYSTEM

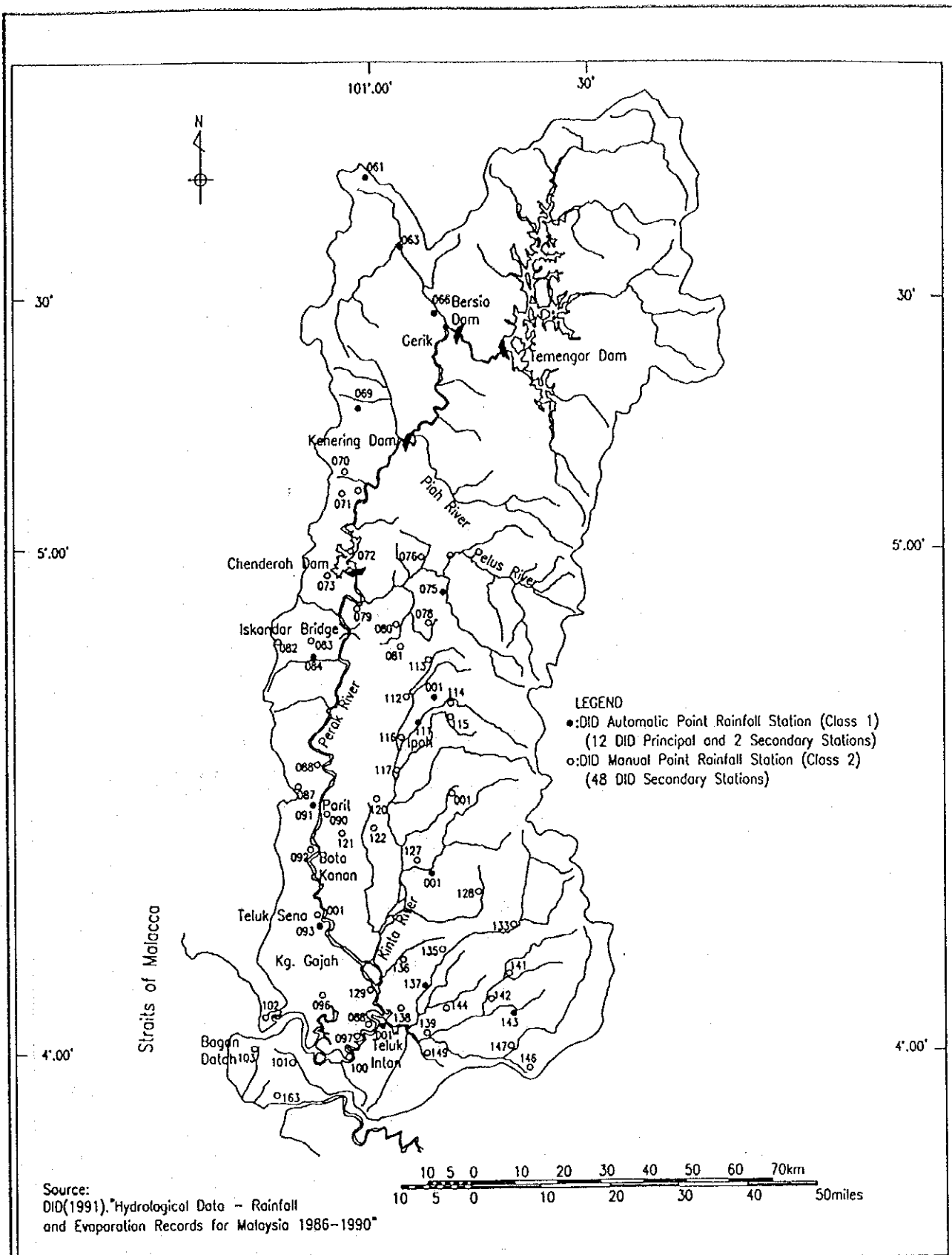


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 7-2

LOCATION OF REAL-TIME
HYDROLOGICAL STATIONS FOR
OPERATIONAL SYSTEM

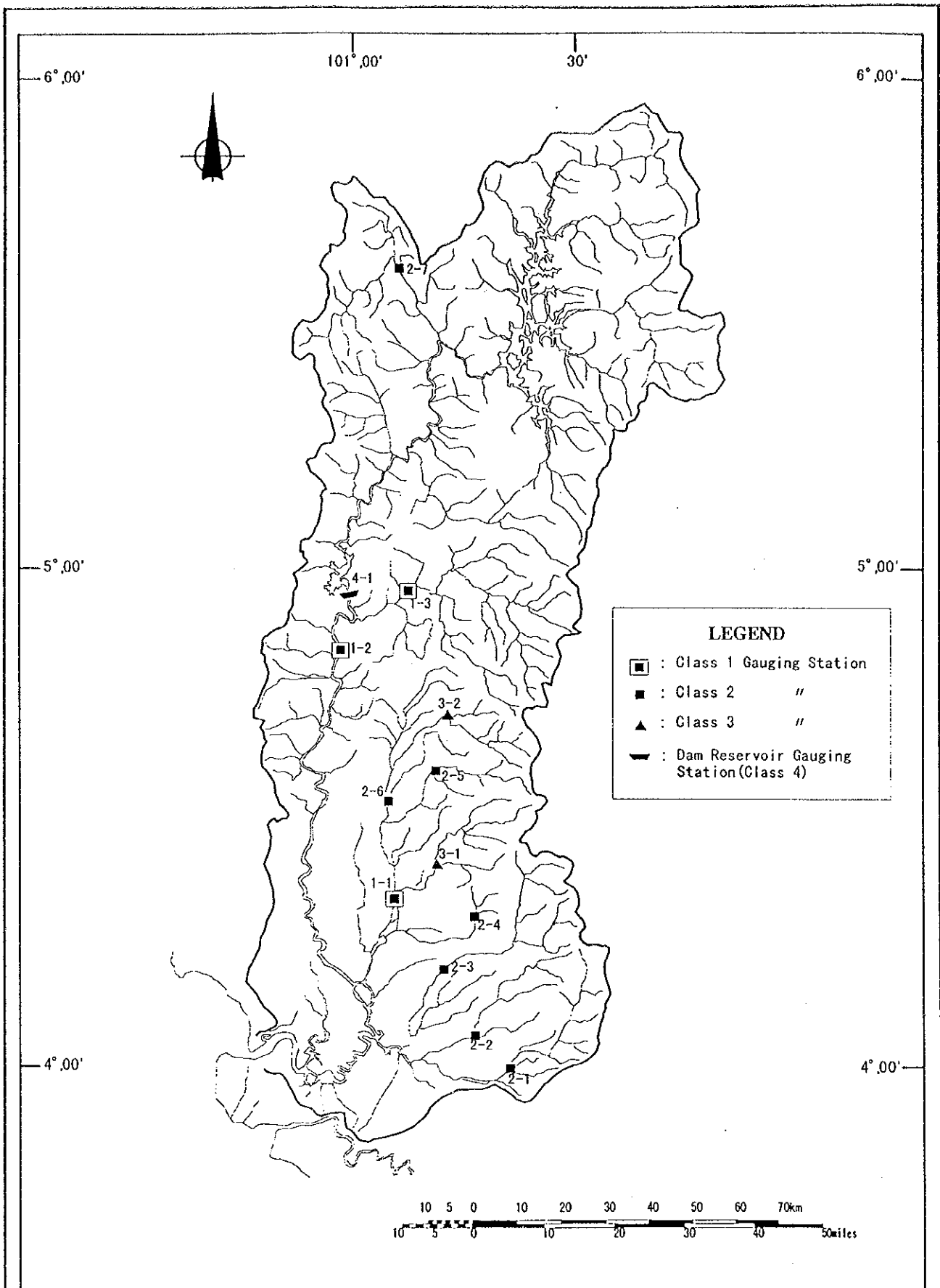


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA.

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 7-3

LOCATION OF NON REAL-TIME
RAINFALL STATIONS FOR
OPERATIONAL SYSTEM



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

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Fig. 7-4

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



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BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

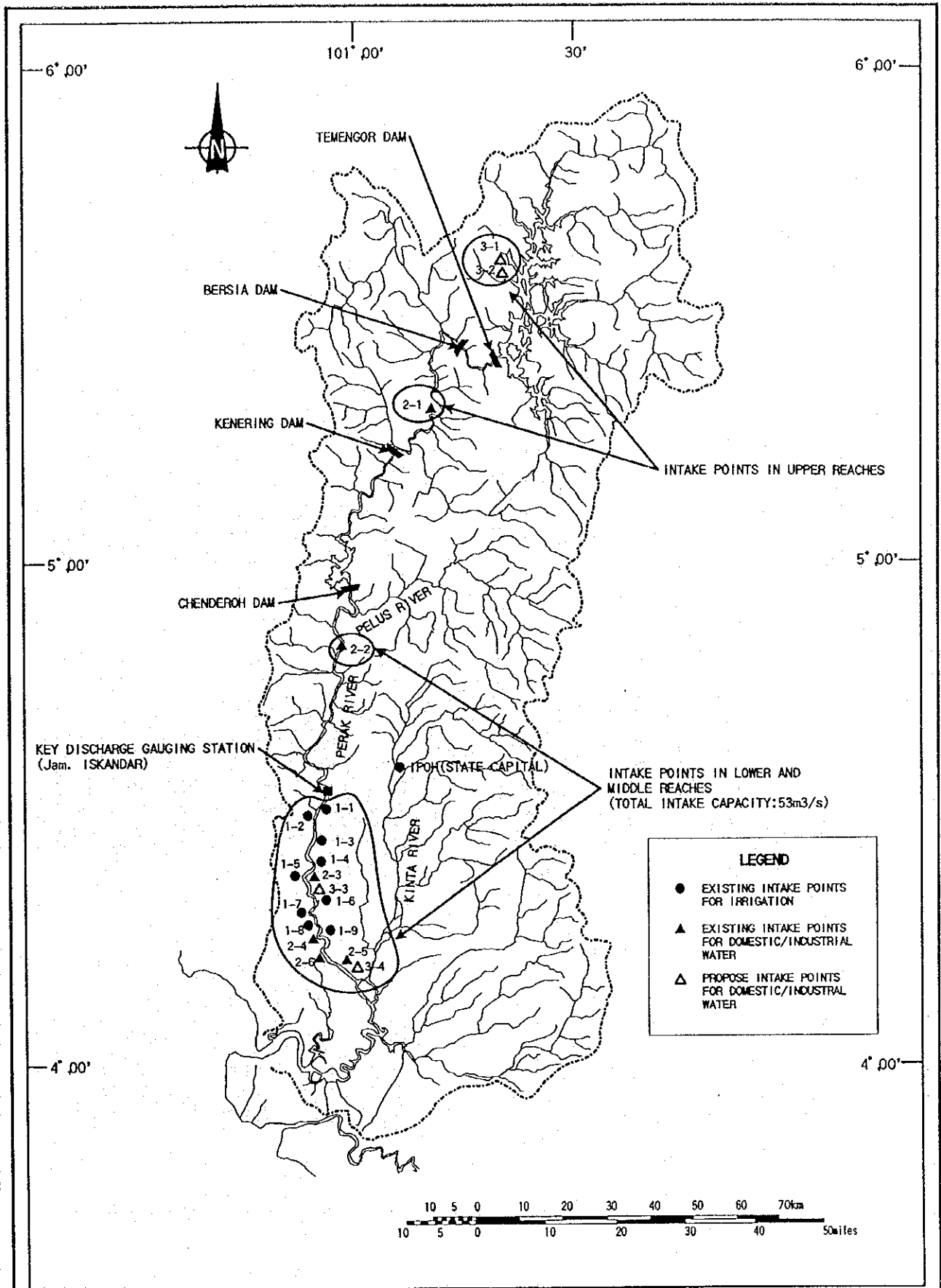
Fig. 7-5 GIS WEB APPLICATION MAIN
HOMEPAGE

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

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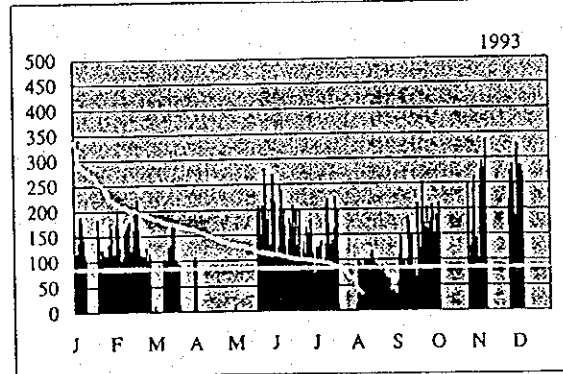
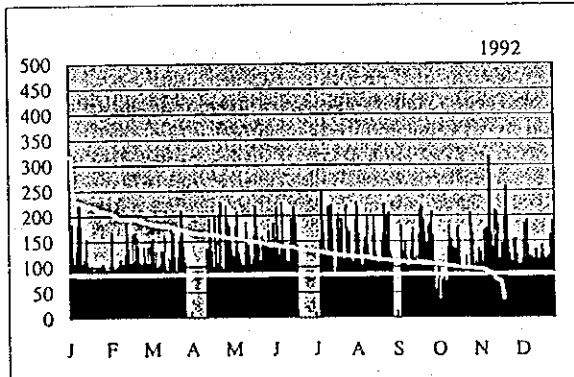
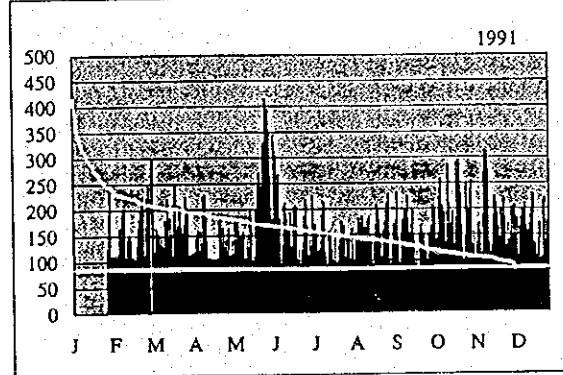
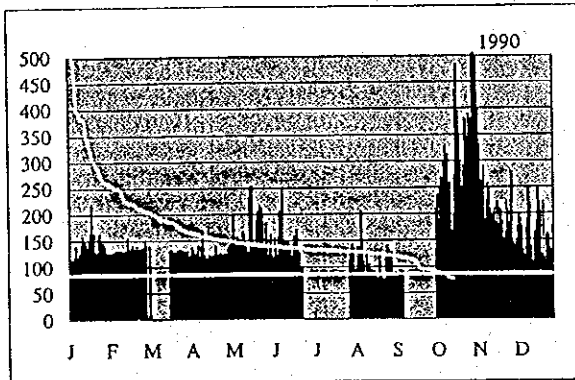
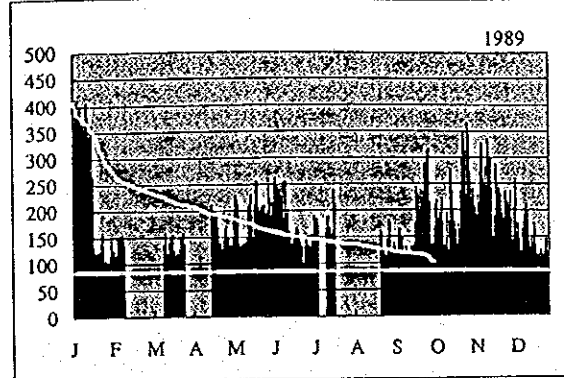
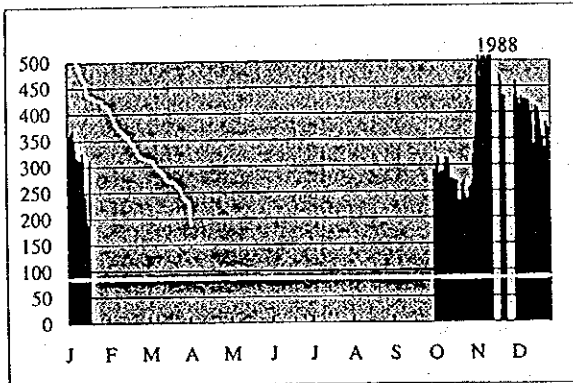
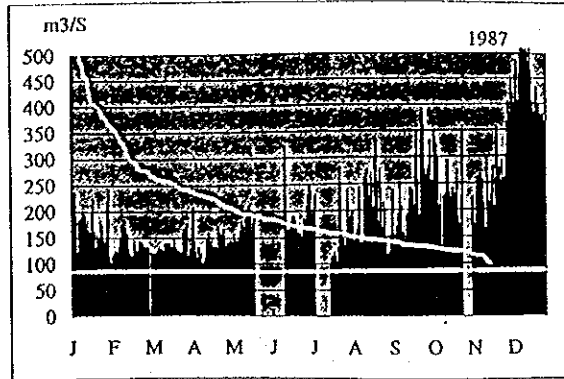
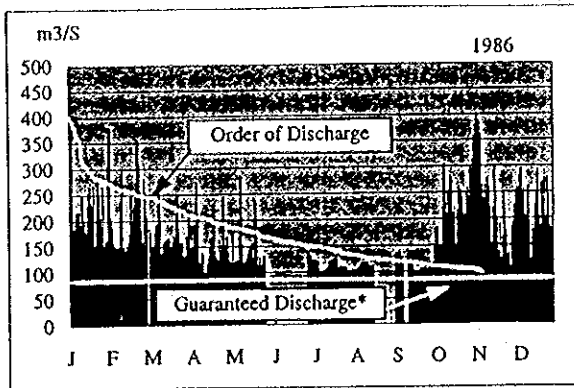
Fig. 7-6 IMPLEMENTATION SCHEDULE FOR SETUP OF OPERATIONAL SYSTEM



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

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Fig. 9-1 EXISTING WATER INTAKE POINTS
ALONG MAIN STREAM OF PERAK
RIVER

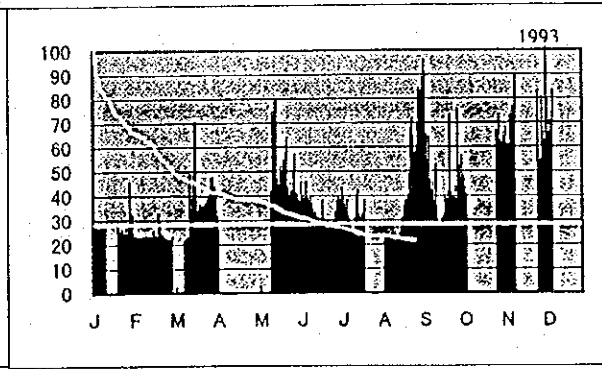
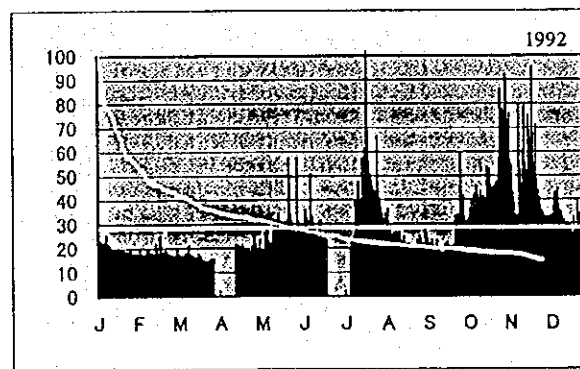
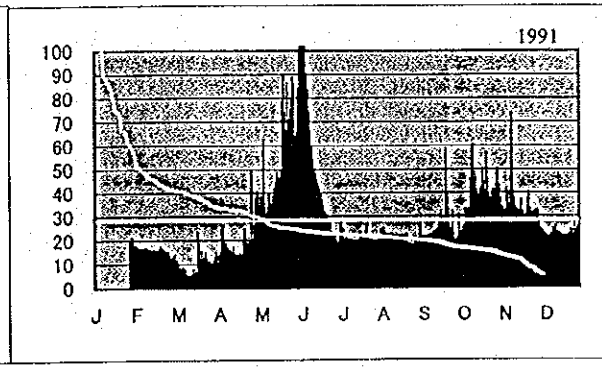
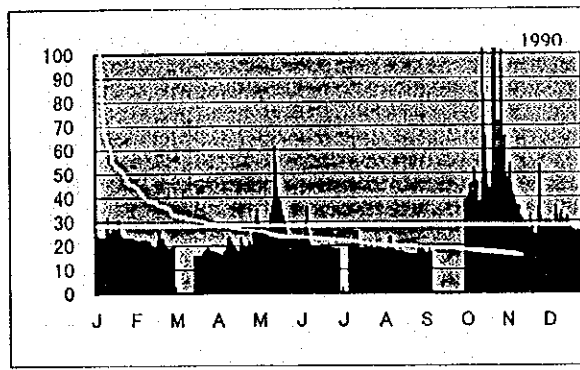
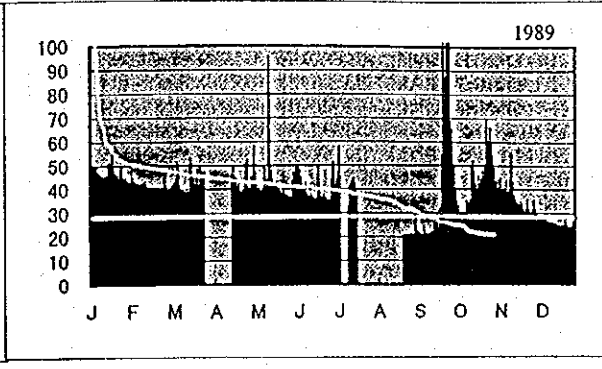
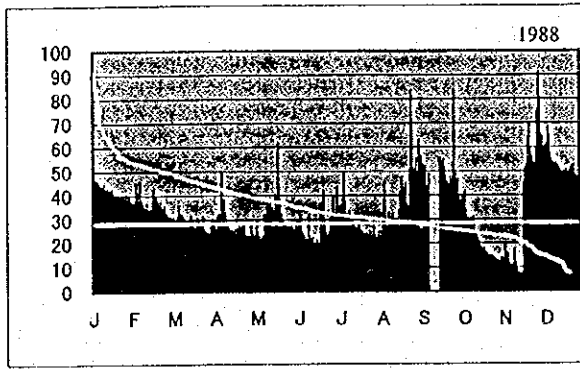
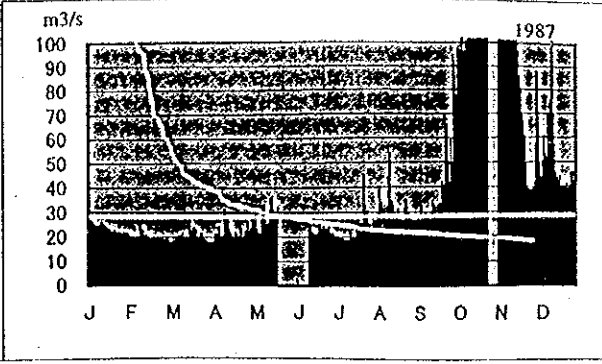
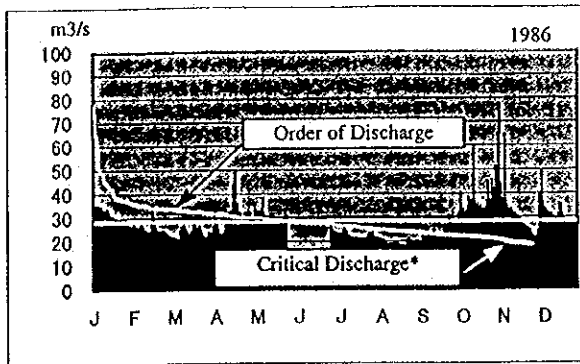


* Guaranteed Discharge from Chenderoh Dam (3000cusec or 84.9m3/s)

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

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Fig. 9-2 DAILY AVE. OUTFLOW DISCHARGE
FROM CHENDEROH DAM

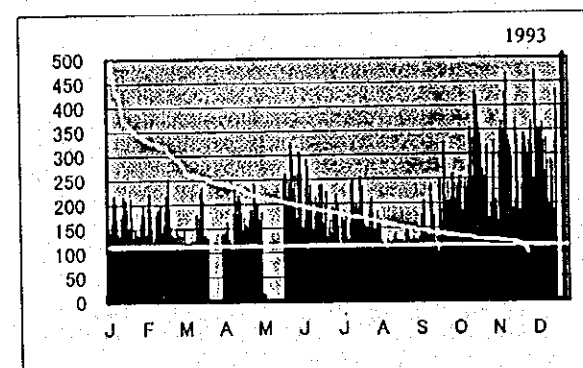
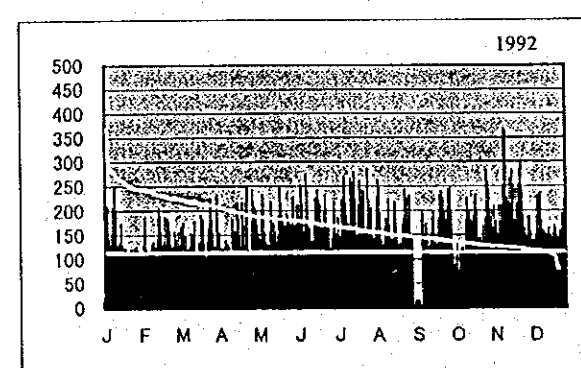
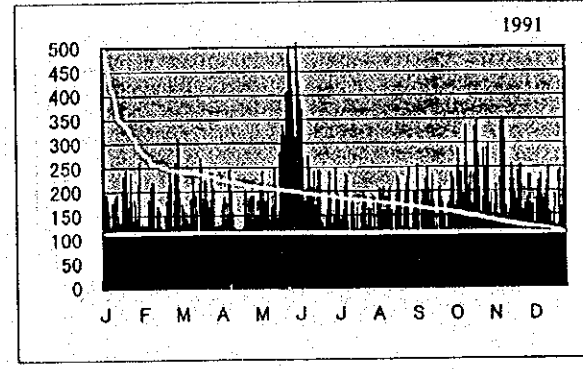
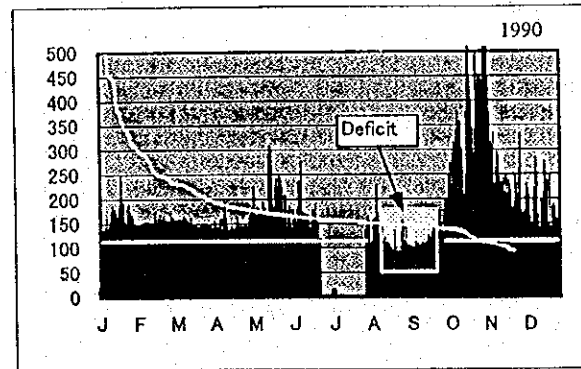
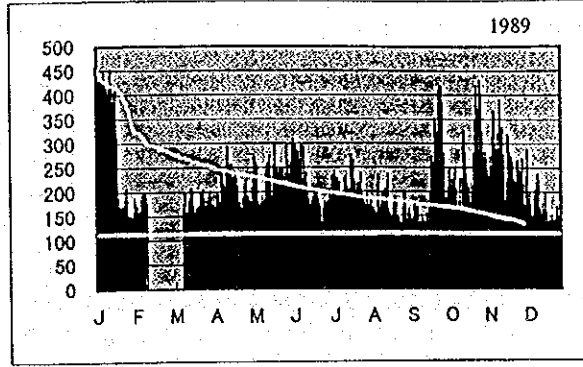
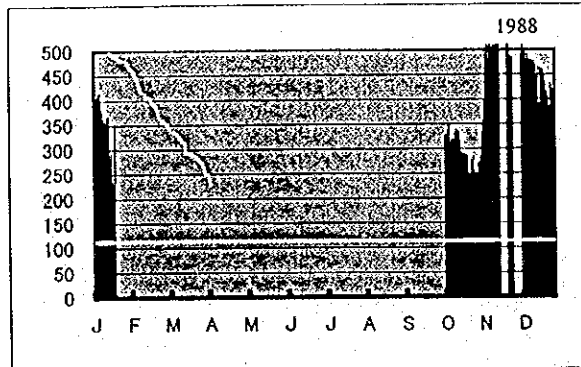
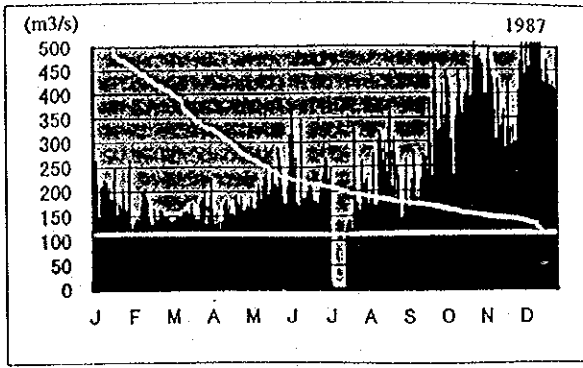
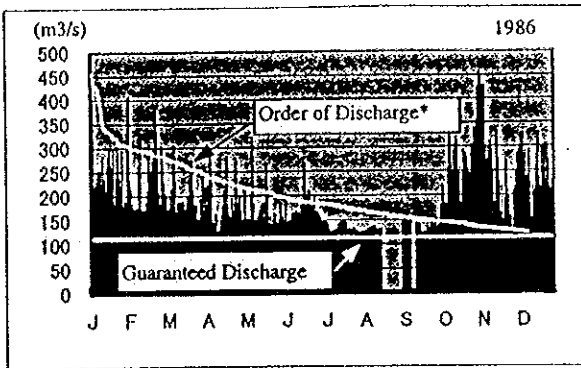


* Critical discharge (1000cusec or 28.3 m3/s) to guarantee the flow discharge at Iskandar Bridge in case of dam outflow of 3000cusec

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

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Fig. 9-3 DAILY AVE. RUNOFF DISCHARGE FROM PELUS RIVER



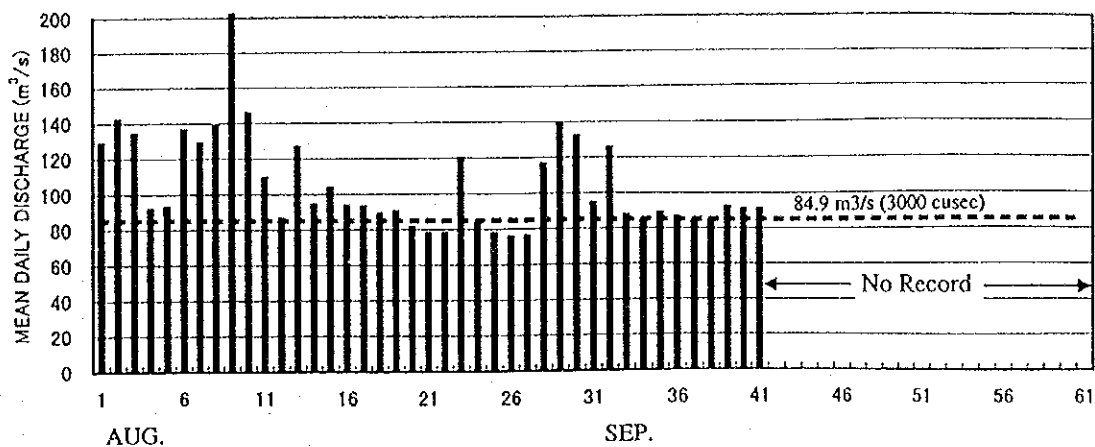
* Guaranteed Discharge at Iskandar Bridge by Chenderoh Dam (4000cosec or 113.2 m3/s)

THE STUDY ON THE ESTABLISHMENT OF THE RIVER
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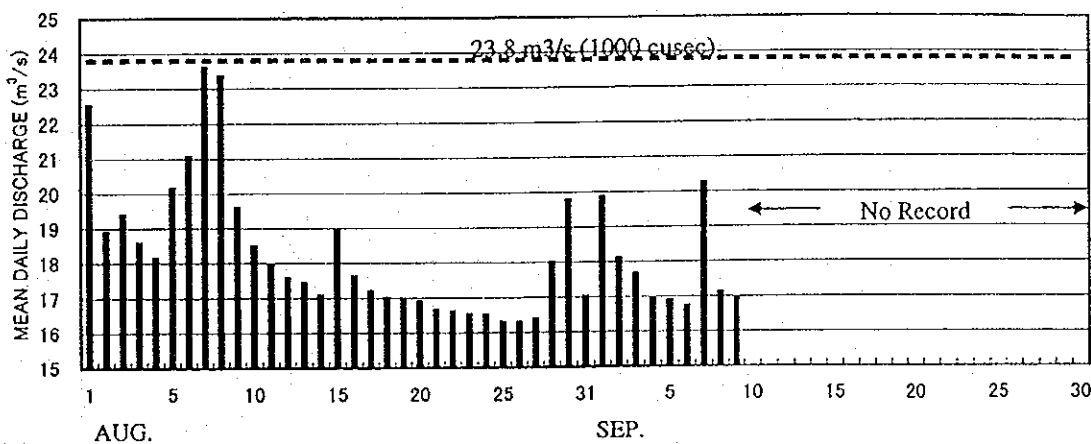
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Fig. 9-4 DAILY AVE. FLOW DISCHARGE AT
ISKANDAR BRIDGE

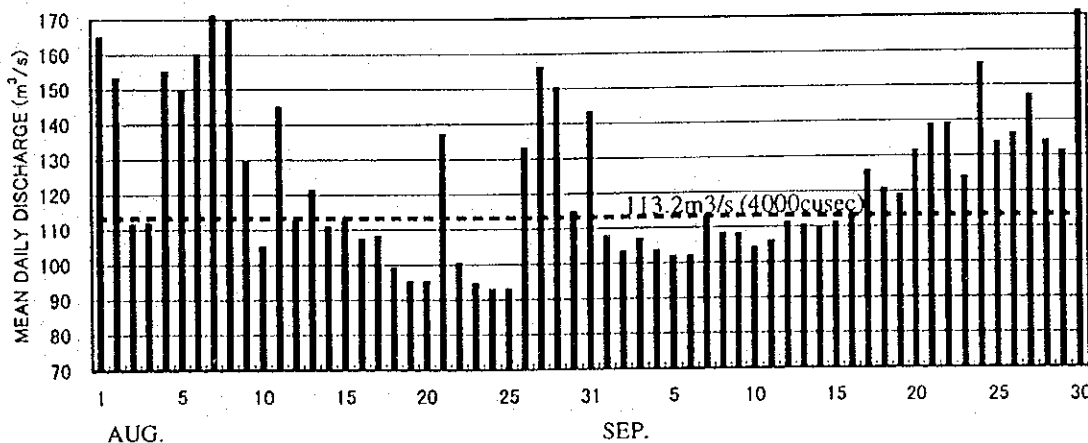
OUTFLOW DISCHARGE FROM CHENDEROH DAM IN 1990



RUNOFF DISCHARGE FROM PELUS RIVER IN 1990



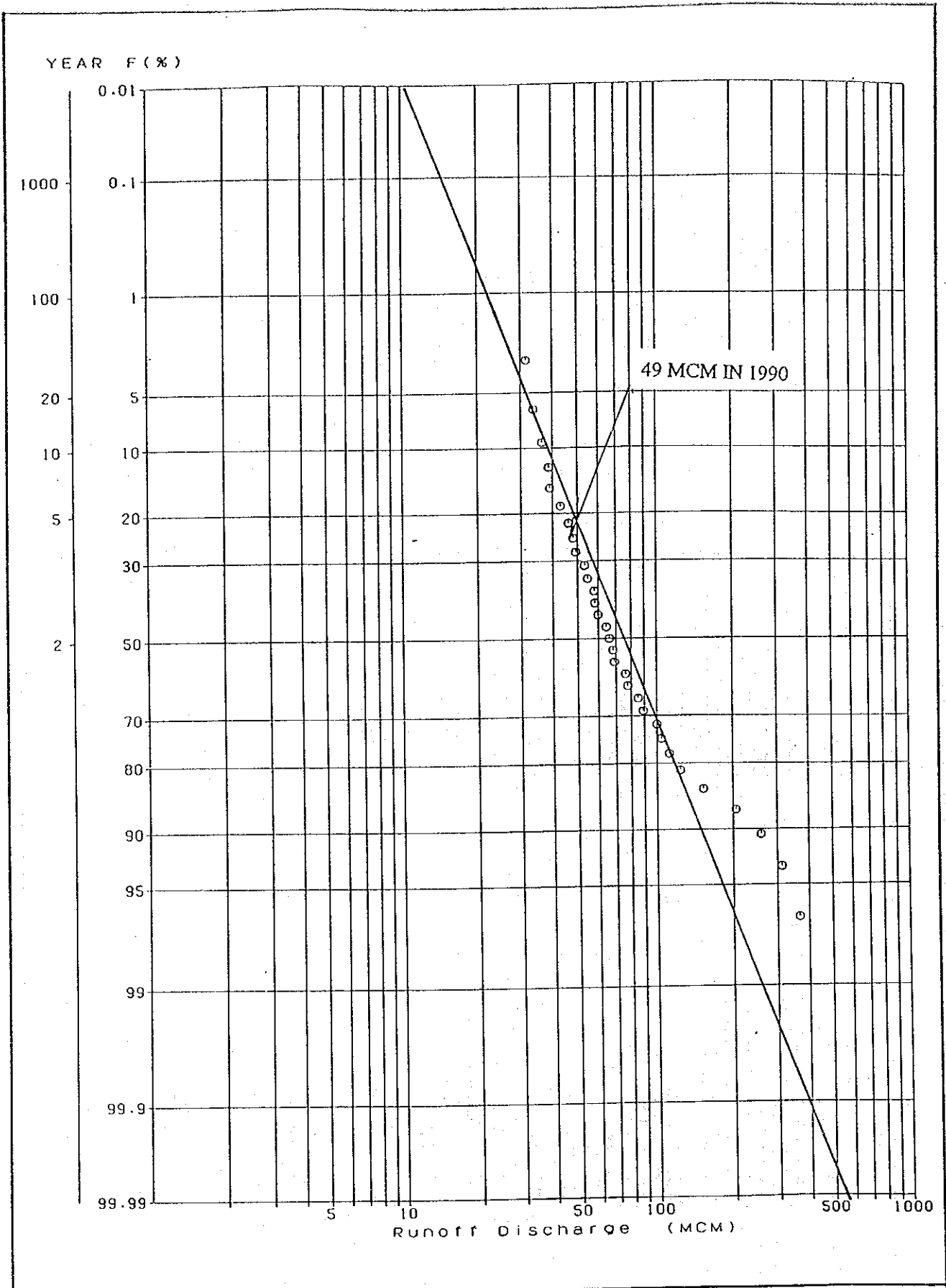
WATER DEFICIT AT ISKANDAR BRIDGE IN 1990



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BASIN INFORMATION SYSTEM IN MALAYSIA

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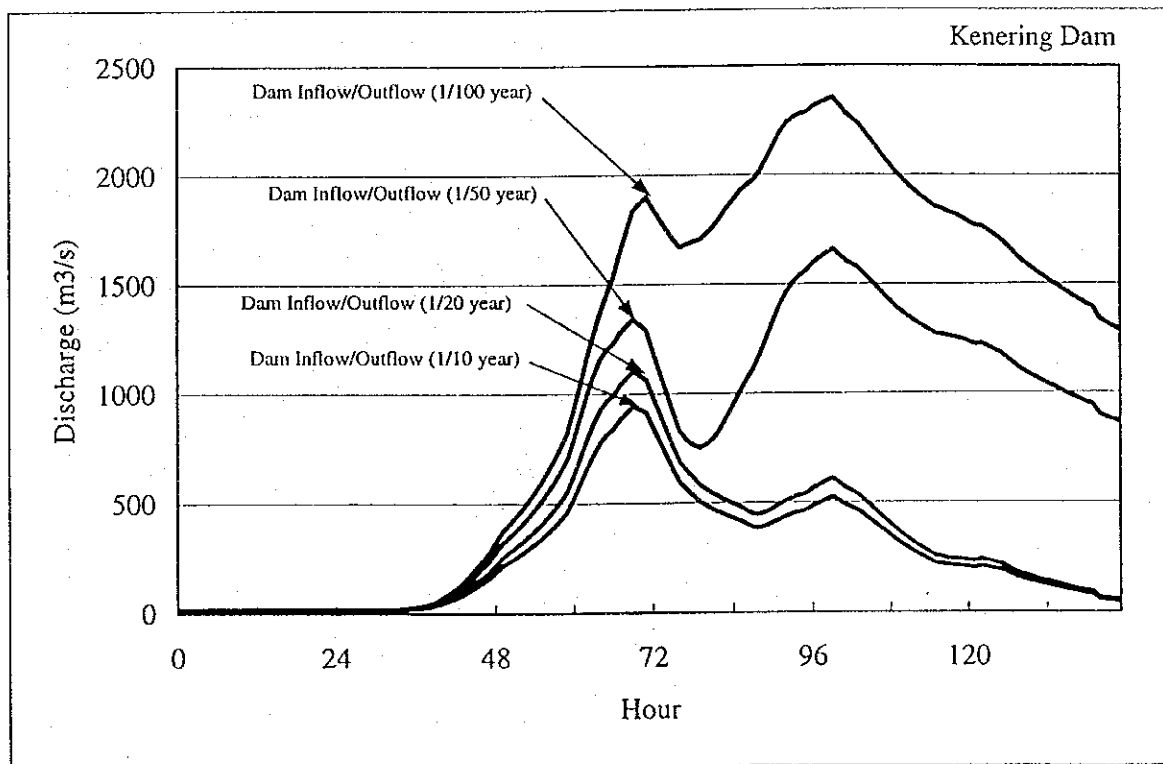
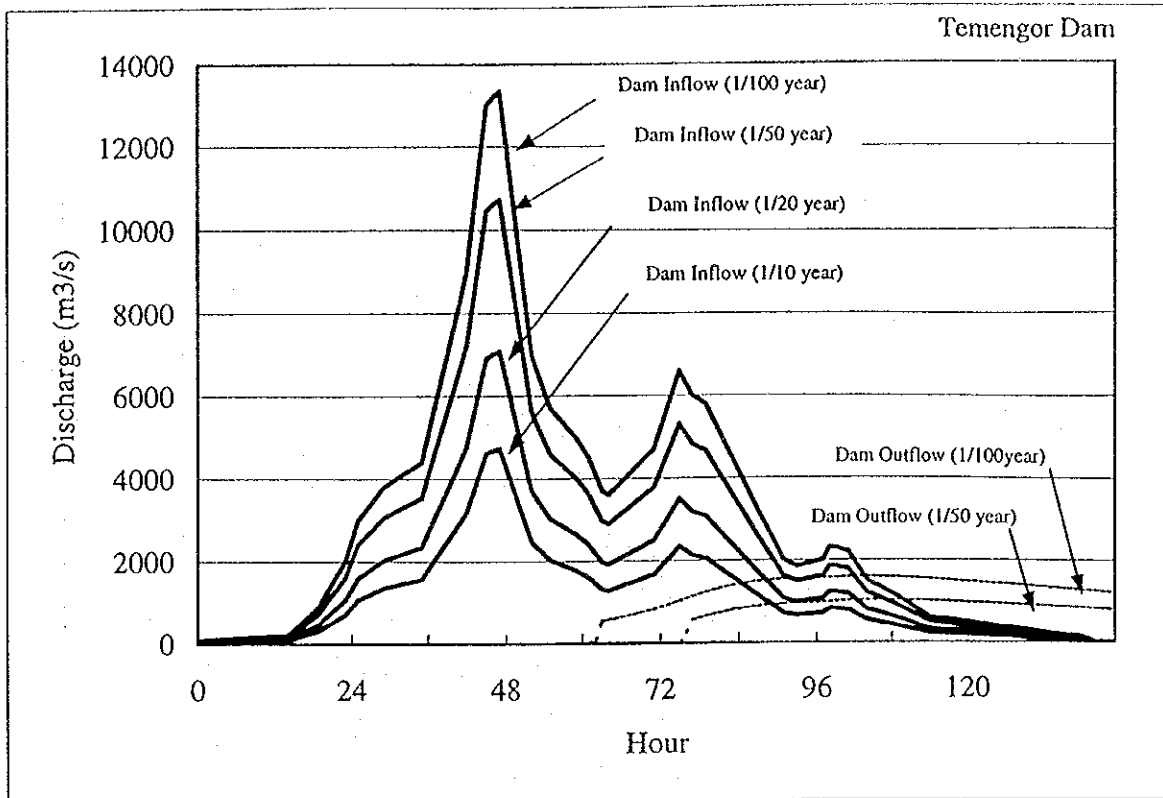
Fig. 9-5 RIVER FLOW CONDITIONS DURING
WATER DEFICIT IN 1990



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

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Fig. 9-6 PROBABILITY OF ONE-MONTH
RUNOFF VOLUME FROM PELUS
RIVER IN AUGUST

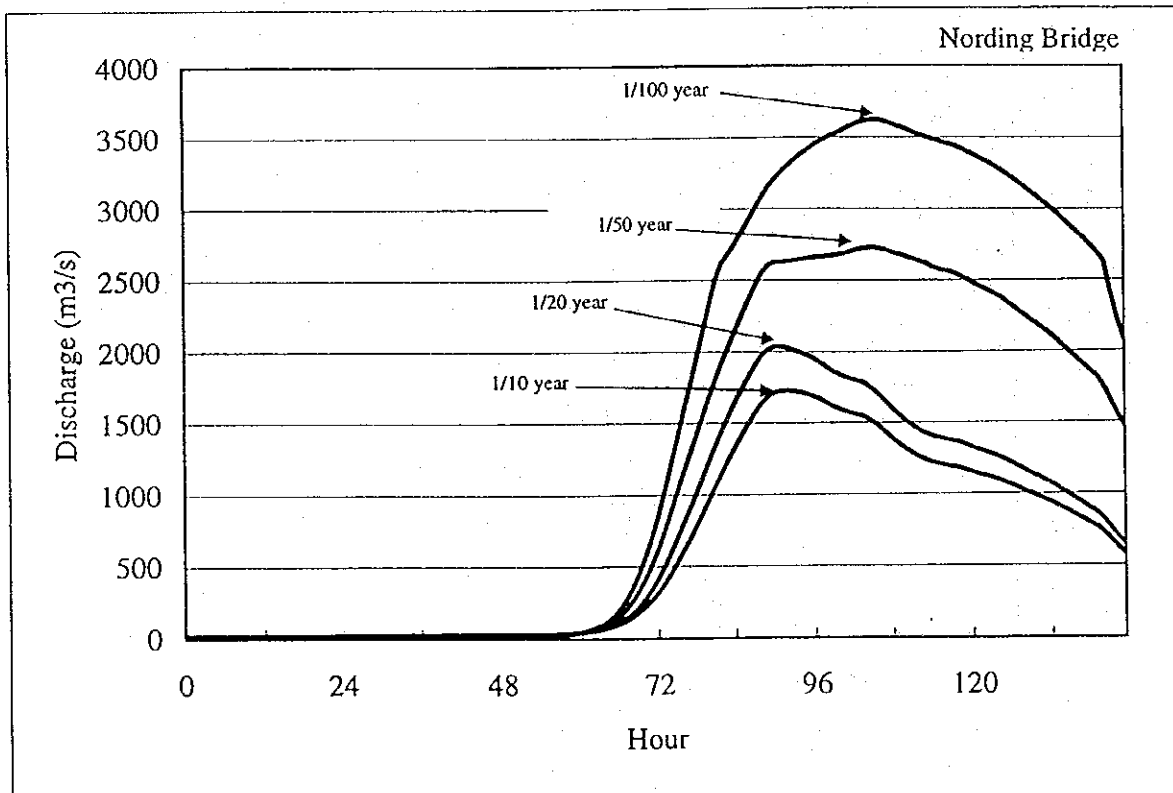
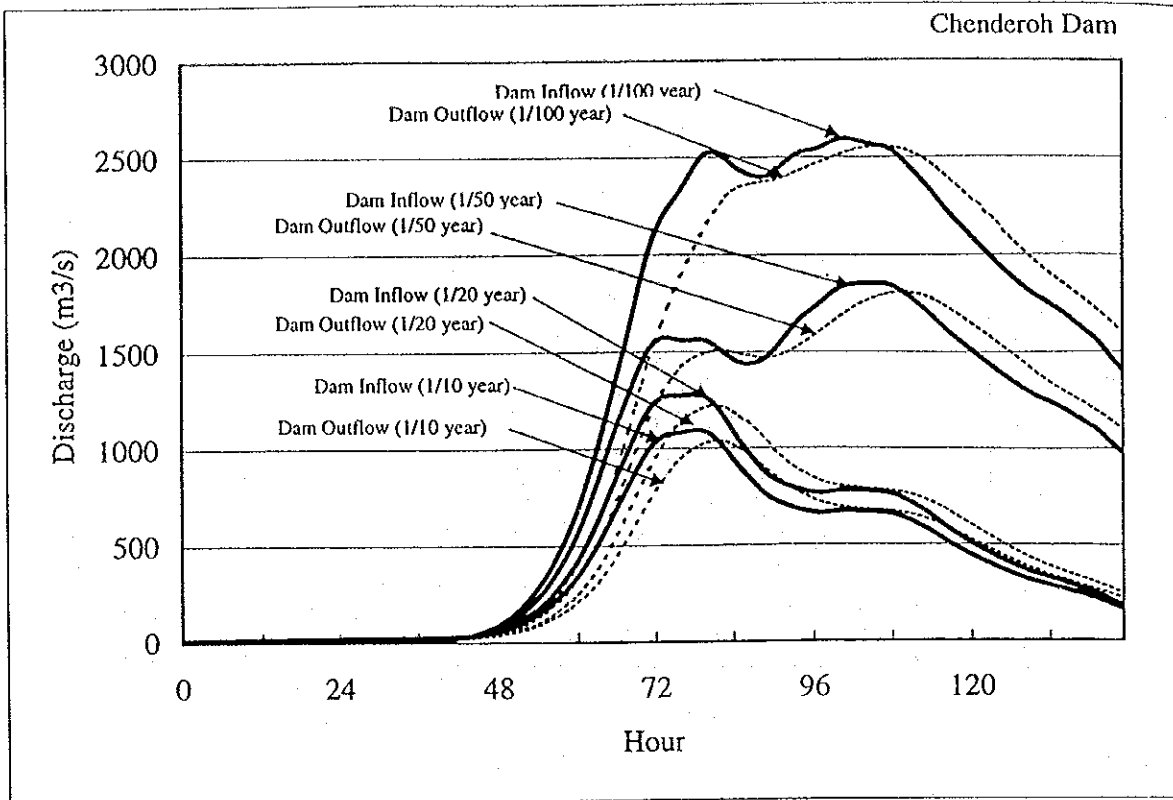


THE STUDY ON THE ESTABLISHMENT OF THE RIVER
BASIN INFORMATION SYSTEM IN MALAYSIA

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Fig. 9-7

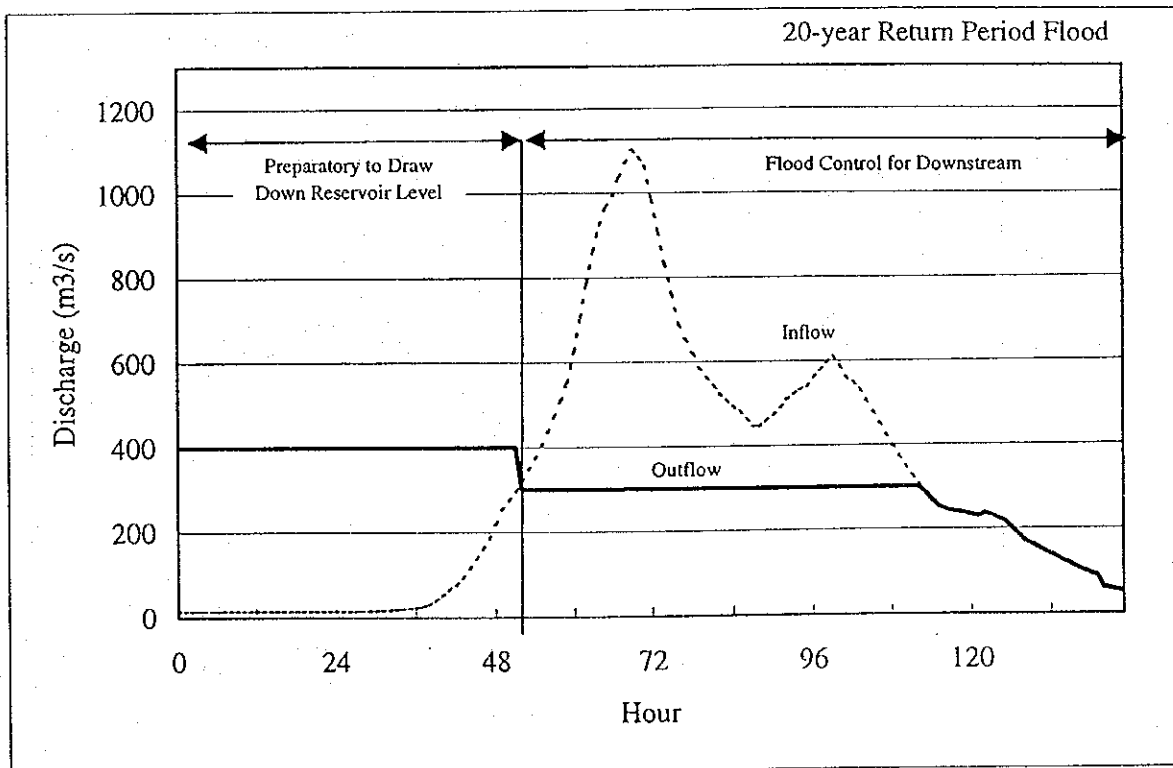
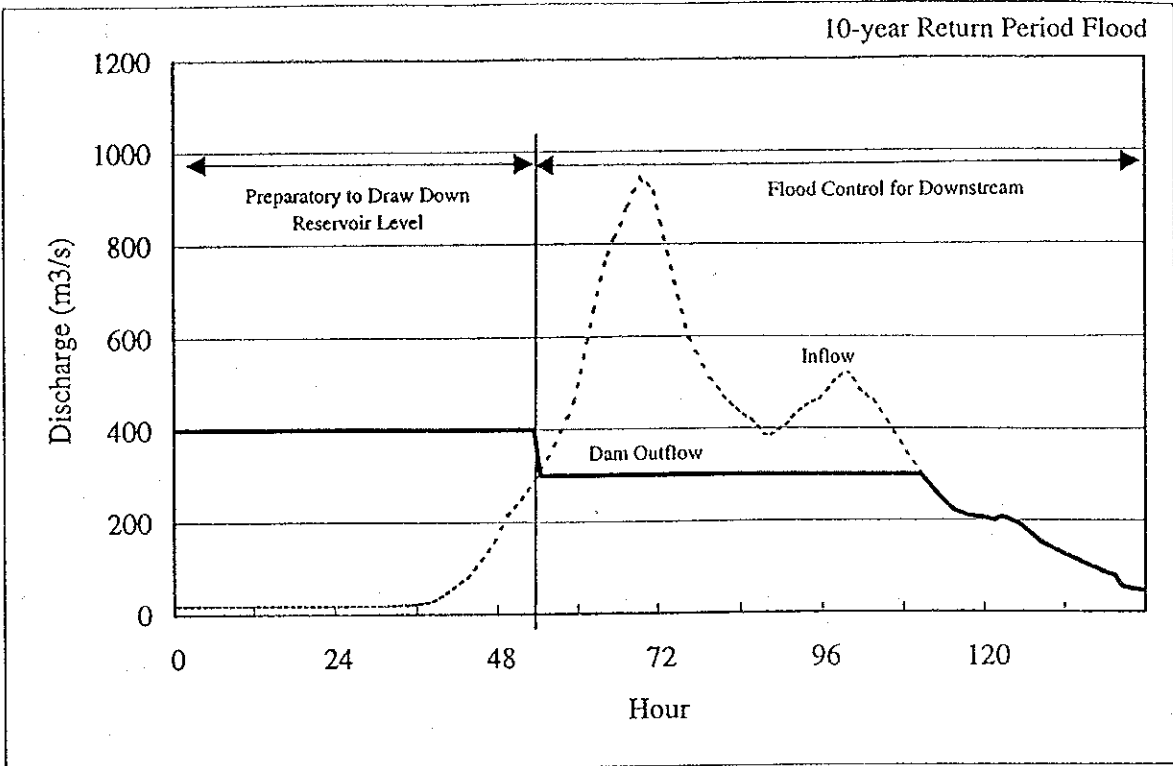
PROBABLE FLOOD HYDROGRAPH UN-
DER PRESENT DAM OPERATION (1/2)



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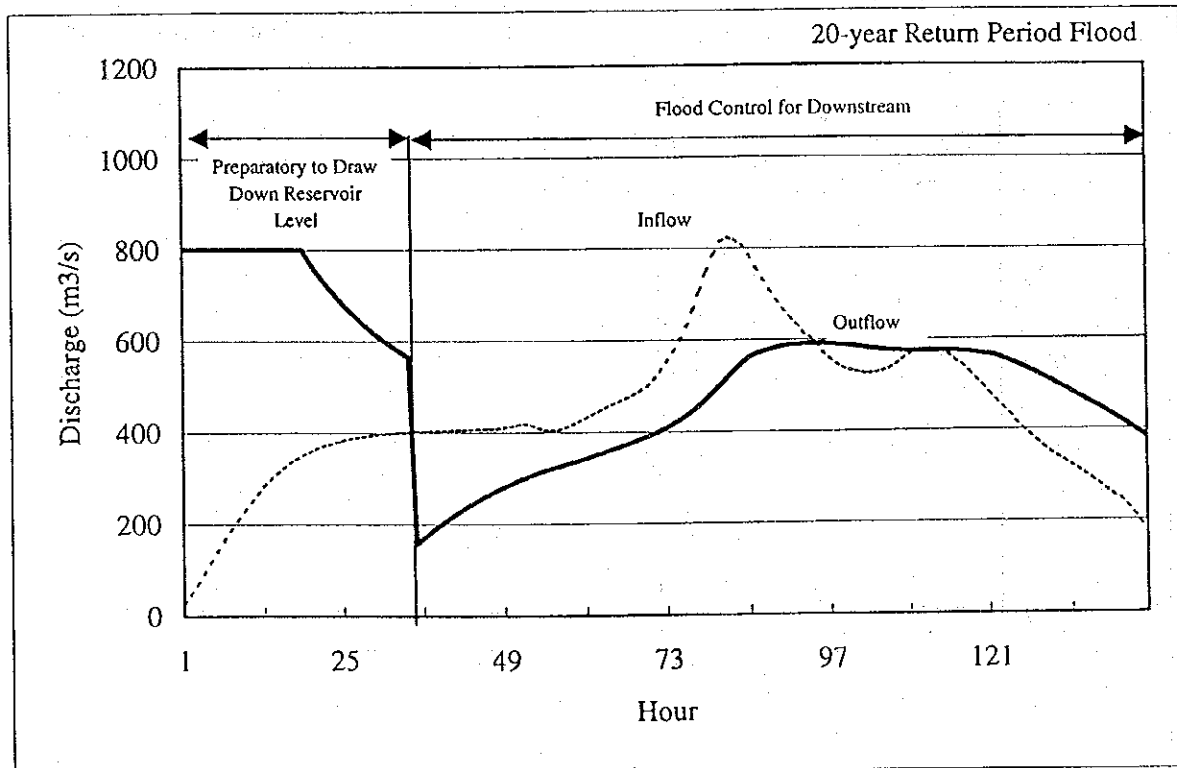
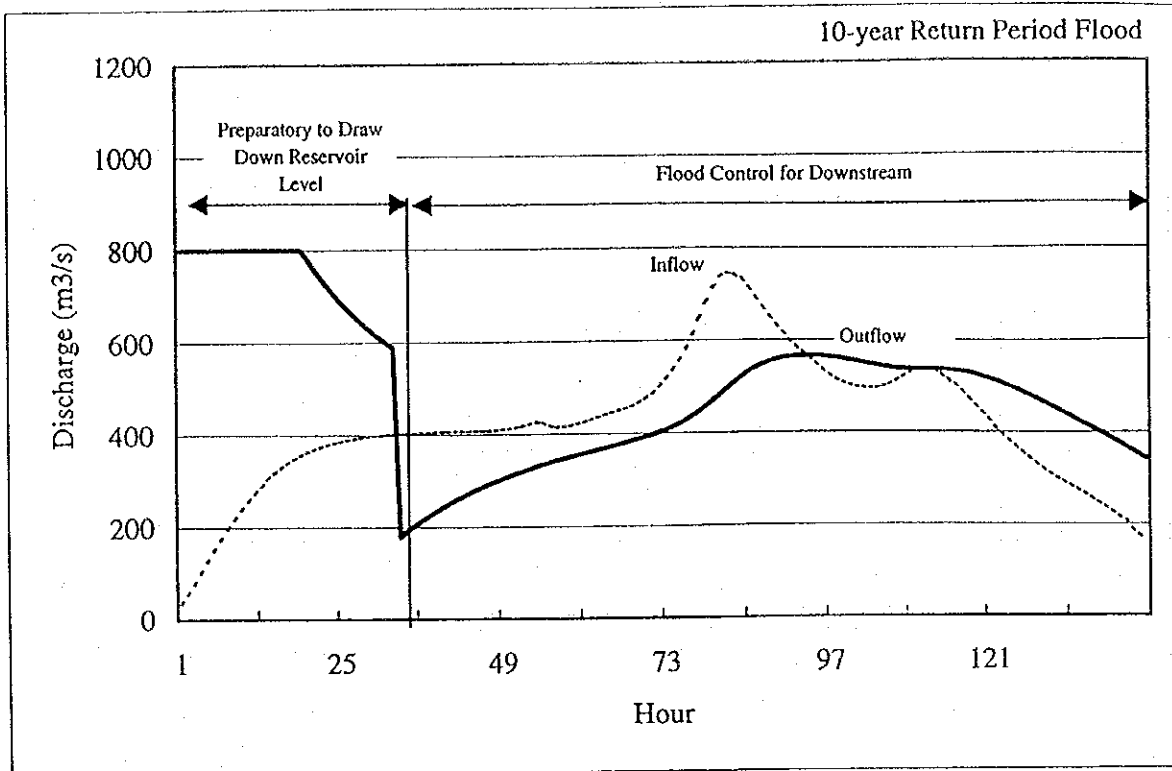
Fig. 9-7 PROBABLE FLOOD HYDROGRAPH UNDER PRESENT DAM OPERATION (2/2)



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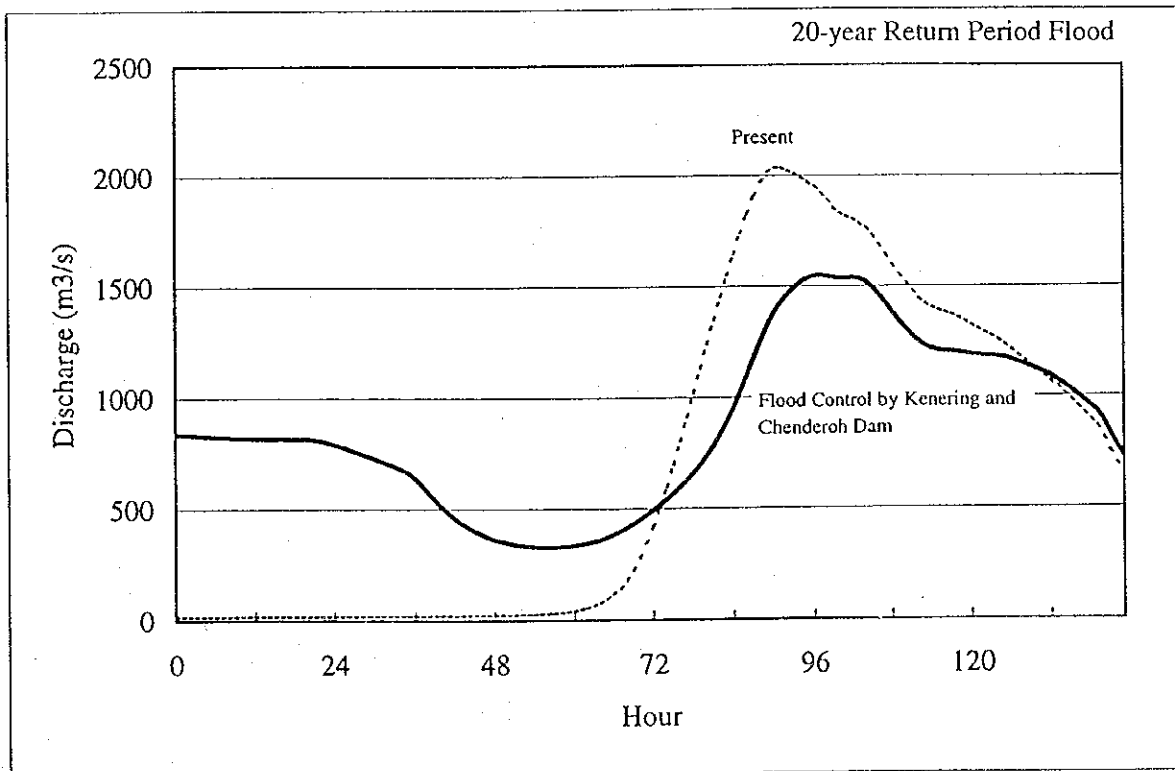
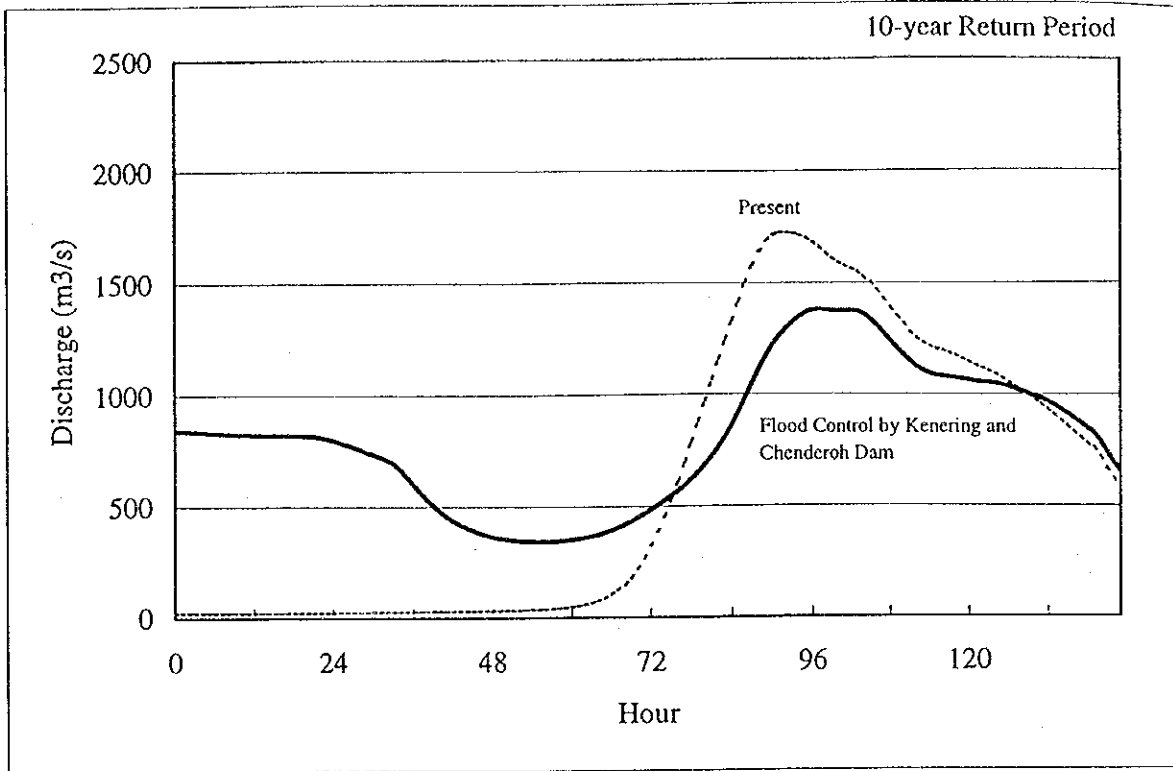
Fig. 9-8 FLOOD CONTROL BY KENERING DAM



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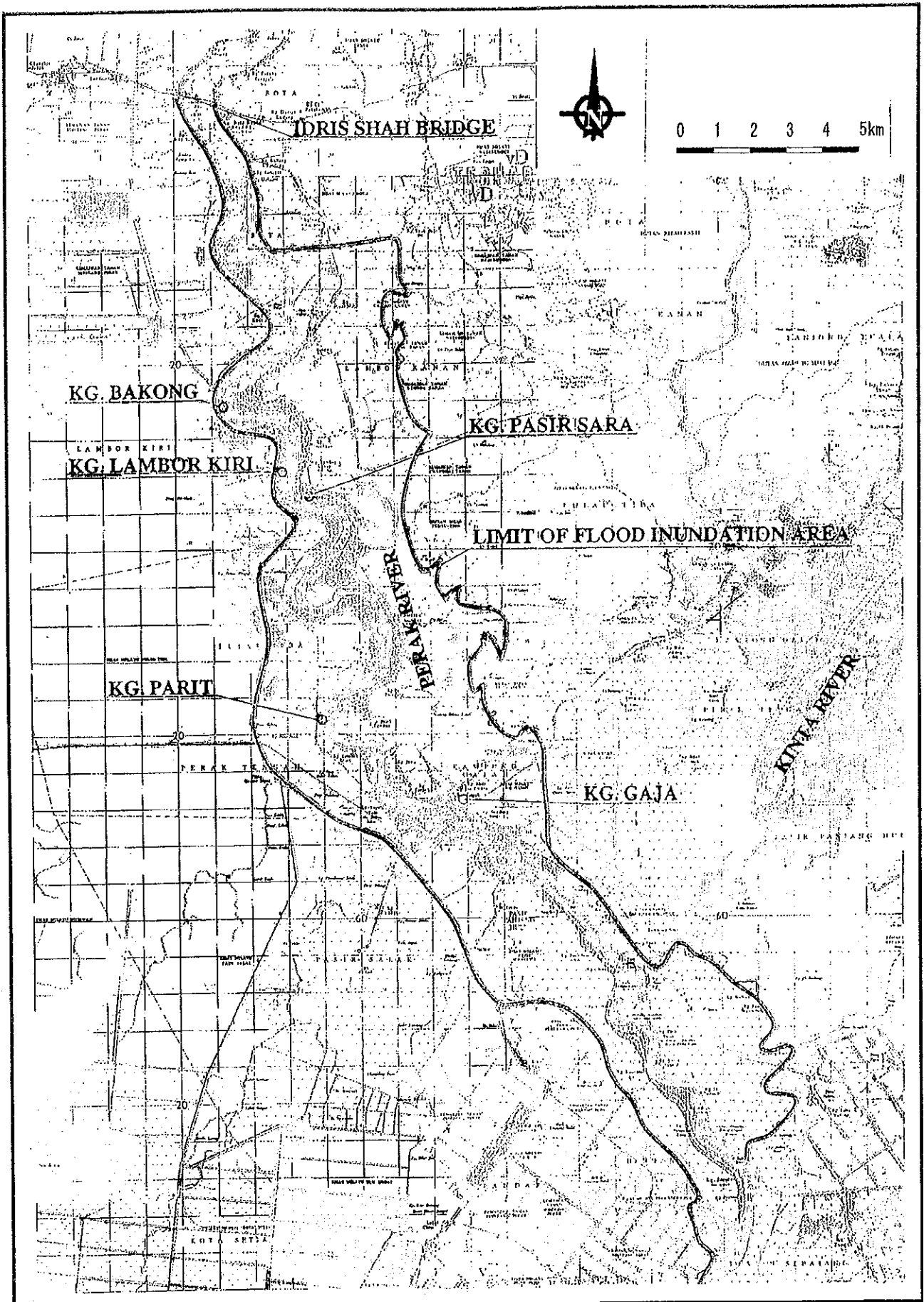
Fig. 9-9 FLOOD CONTROL BY CHENDEROH
DAM



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Fig. 9-10 FLOOD HYDROGRAPH AT NORDIN
BRIDGE

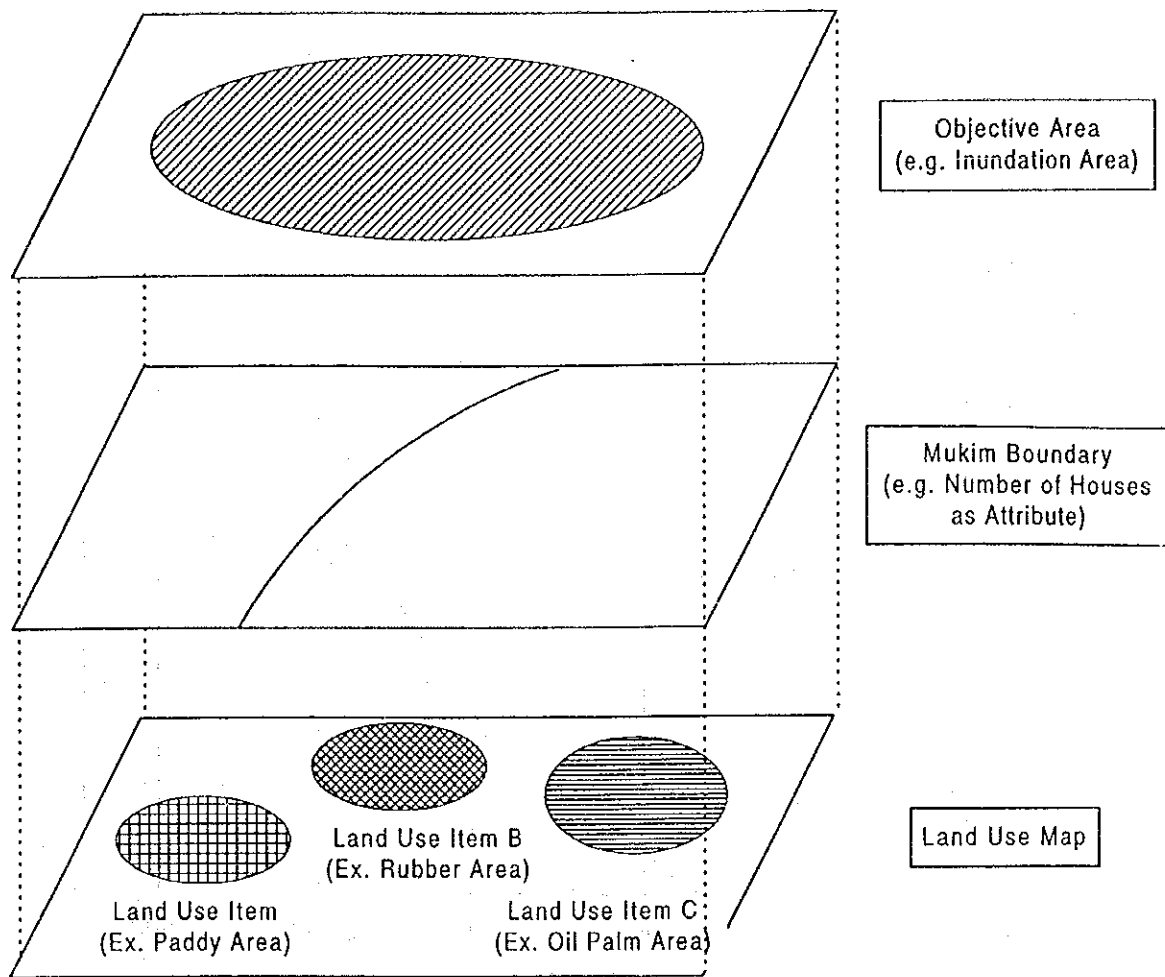


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Fig. 9-11 HABITUAL FLOOD INUNDATION AREA

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Conceptual Schematics of GIS Overlay



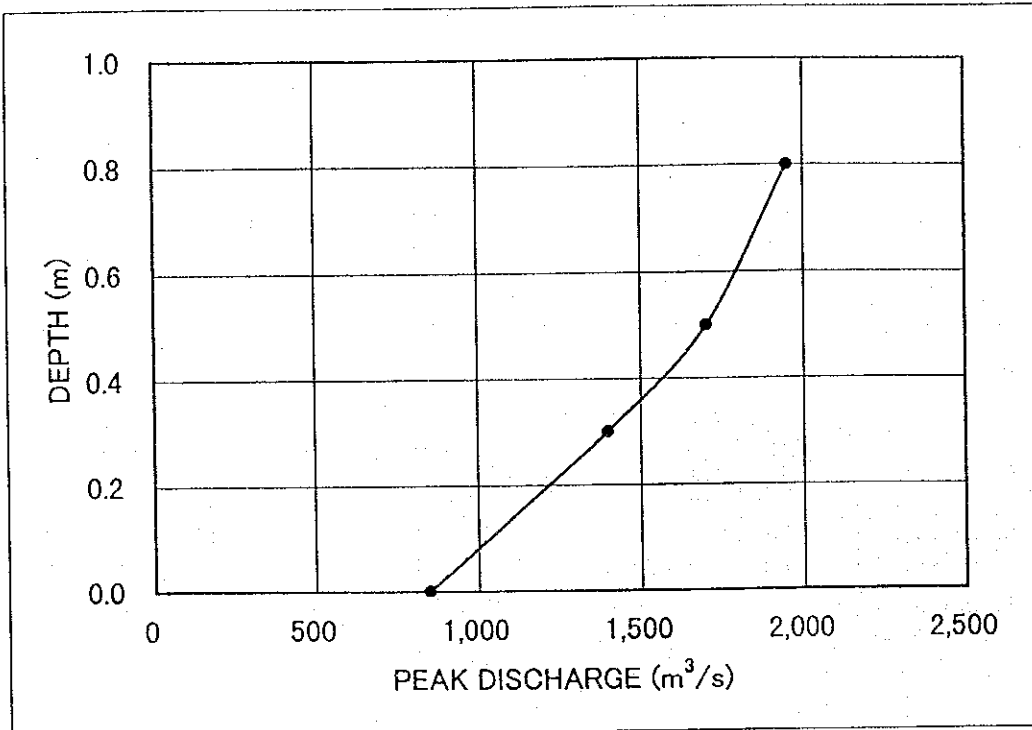
$$N_h = D_h(1) \times A_m(1) + D_h(2) \times A_m(2) + \dots + D_h(i) \times A_m(i) + \dots$$

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

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

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

Fig. 9-12 CONCEPTUAL SCHEMATICS ON ESTIMATION OF POTENTIAL FLOOD DAMAGE

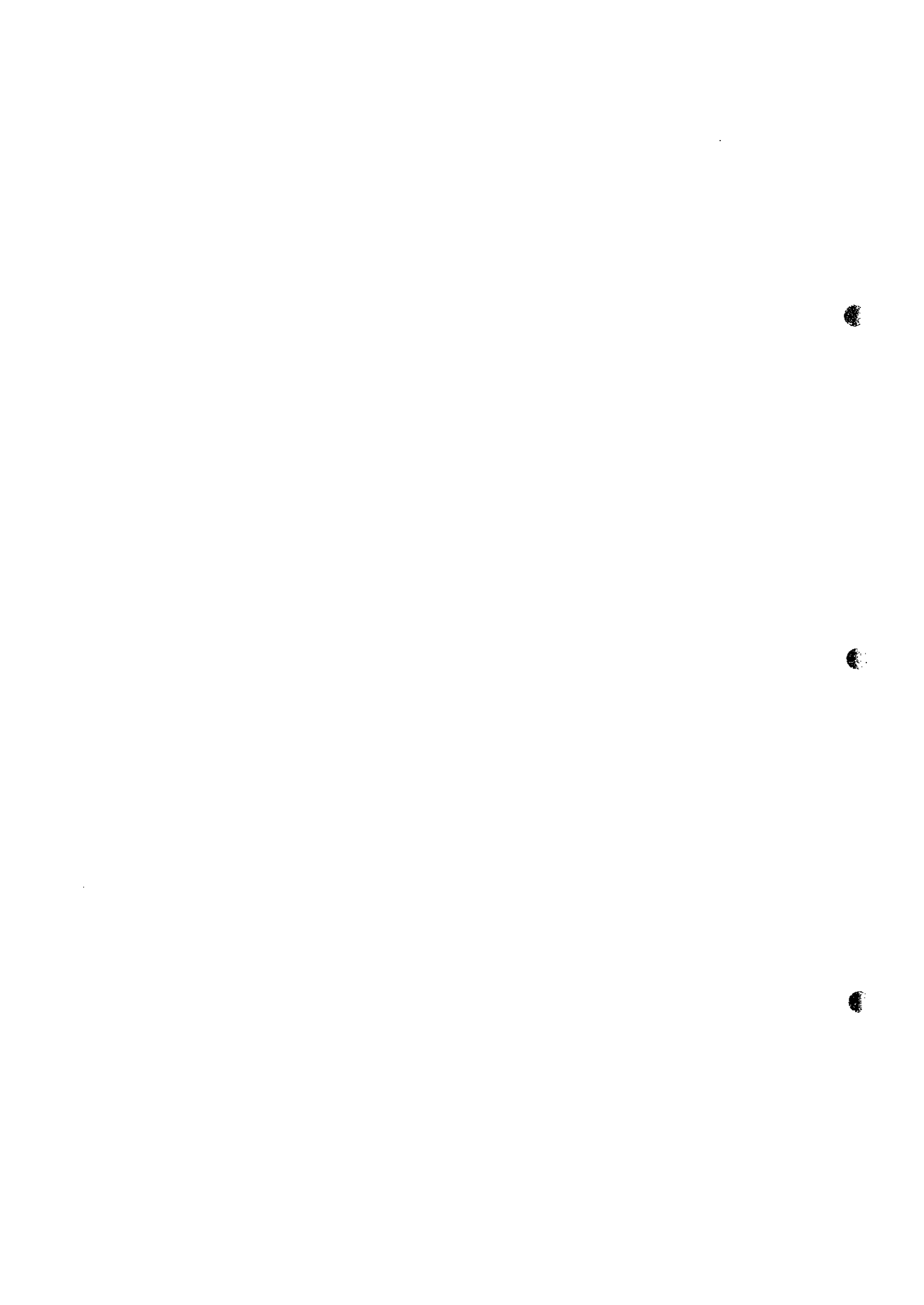


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Fig. 9-13 RELATIONSHIP BETWEEN PEAK DIS-
CHARGE AT NORDING BRIDGE AND
MAX. FLOOD INUNDATION DEPTH





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