表6-7　　河川流域情報システム構築マスタープランにおける経済評価結果

(Unit: RM million)

Year	(1) Investment Cost	(2) Accumulated Investment Cost	(3) Maintenance Cost *	(4) Total Cost (1)+(3)	(5) Full Benefit	(6) Actual Benefit	(7) (1)-(6)	Remarks
2001	0.390	0.39	0.37	0.76	0.84	0.02	0.75	8th Malaysia Plan
2002	0.393	0.78	0.44	0.83	0.95	0.04	0.79	- ditto-
2003	0.396	1.18	0.51	0.91	1.09	0.07	0.83	- ditto-
2004	0.399	1.58	0.58	0.98	1.24	0.11	0.87	- ditto-
2005	0.403	1.98	0.65	1.05	1.41	0.16	0.89	- ditto-
2006	0.409	2.39	0.72	1.13	1.60	0.22	0.91	9th Malaysia Plan
2007	0.415	2.80	0.79	1.21	1.82	0.29	0.92	- ditto-
2008	0.421	3.23	0.87	1.29	2.07	0.38	0.91	- ditto-
2009	0.427	3.65	0.94	1.37	2.36	0.49	0.88	- ditto-
2010	0.434	4.09	1.02	1.45	2.68	0.62	0.83	- ditto-
2011	0.697	4.78	1.14	1.83	3.05	0.83	1.00	10th Malaysia Plan
2012	1.120	5.90	1.33	2.45	3.48	1.16	1.29	- ditto-
2013	1.800	7.70	1.64	3.44	3.96	1.73	1.71	- ditto-
2014	2.893	10.60	2.14	5.04	4.50	2.71	2.33	- ditto-
2015	4.649	15.25	2.95	7.60	5.12	4.43	3.17	- ditto-
2016	1.581	16.83	3.41	4.99	5.83	5.56	-0.58	11th Malaysia Plan
2017	0.537	17.36	3.50	4.04	6.63	6.53	-2.50	- ditto-
2018	0.183	17.55	3.53	3.71	7.55	7.51	-3.80	- ditto-
2019	0.062	17.61	3.54	3.60	8.59	8.58	-4.98	- ditto-
2020	0.021	17.63	3.54	3.57	9.78	9.78	-6.21	Project Completed
2021			3.54	3.54	9.78	9.78	-6.23	
2022			3.54	3.54	9.78	9.78	-6.23	
2023			3.54	3.54	9.78	9.78	-6.23	
2024			3.54	3.54	9.78	9.78	-6.23	
2025			3.54	3.54	9.78	9.78	-6.23	
2026			3.54	3.54	9.78	9.78	-6.23	
2027			3.54	3.54	9.78	9.78	-6.23	
2028			3.54	3.54	9.78	9.78	-6.23	
2029			3.54	3.54	9.78	9.78	-6.23	
2030			3.54	3.54	9.78	9.78	-6.23	
Total	17.63	153.28	69.06	86.69	172.33	149.01		
						EIRR=	10.8%	

Note :
Maintenance Cost includes the followings

(1) Maintenance cost of equipment (=15% of the accumulated economic investment cost)
(2) Man-power cost for system operation
(= The financial cost (RM 0.46 million) x economic conversion factor (0.9)) x (Accumulated investment cost) / (total investment cost)
(3) Lease cost of optical fiber system (=The financial lease cost (RM 0.34 million) x economic conversion factor (0.9))
(4) Lease cost of satellite communication system (The financial lease cost (RM 0.2 million) x economic conversion factor (0.9))
only during 11th Malaysia Plan

表7-1(1/5)　システム配信情報一覧(地図情報)

Category	Name of Map and Scale of Original Map	Contents in the Map			Renewal Interval of Information	Agency as Data Source	Dissemination Level*
		Name of Data	Type of Data	Attribute			
General Information	1 Base Map (Scale: 1/500,000)	1.1.1 Basin Boundary	Polygon	Name of sub-basin	As required	DSMM	Level 2
		1.1.2 River Line	Line	Name of river			
		1.1.3 District Boundary	Polygon	Extent of sub-basin			
		1.1.4 Major Road	Line	Name of road			
		1.1.5 Major Town	Point	Name of town			
		1.1.6 Major Bridge	Point	Name of bridge			
				Organization to maintain			
				Structural features			
Hydrological Information	2 Location Map of Gauging Point (Scale: 1/500,000)	2.1.1 Gauging Point	Point	Name of station	As required	DID and MMS	Level 2
				Type of station			
				Gauging period			
				Current equipment			
				Catchment area (for water level St.)			
				Gauging data			
Information on Flood Mitigation	3 Location Map of Flood Mitigation Scheme (Scale: 1/500,000)	3.1.1 Stretch of channel works	Line	Name of scheme	As required	DID	Level 2
				Type of work			
				Design flood level			
				Competent agency			
		3.1.2 Dam and Other Flood Mitigation Structure	Point	Completion year	As required	DID and TNB	Level
				Name of scheme			
				Type of work			
				Design flood level			
				Competent agency			
	3 Flood Inundation Area (Scale: 1/500,000)	3.2.1 Flood Inundation Area	Polygon	Flood Scale (recurrence probability)	Annually	DID	Level 1
		3.2.2 Major Town Area	Polygon	Name of town			
		3.2.3 Mukim Boundary	Polygon	Name of Mukim			
Information on Water Supply Management	4 Location Map of Intake Point (Scale: 1/500,000)	4.1.1 Intake Point	Point	Name of intake facility	Annually	PWB and DID	Level 2
				Purpose of intake			
				Structural type of intake			
				Intake capacity			
				Monthly average intake discharge			
				Name of supply area			
				Extent of supply area (ha)			
		4.1.2 Irrigation Scheme	Polygon	Name of irrigation scheme	Annually	DID	Level 2
				Name of intake point			
				Intake capacity			
				Clopping schedule			
				Monthly average intake discharge			
		4.1.3 Domestic and Industrial Supply Area	Polygon	Name of service area	Annually	PWB	Level 2
				Name of intake point			
				Intake capacity			
				Daily average water demand			

*: Level1 disseminates to the government agency only, while Level 2 opens to Public

表7-1(2/5)　システム配信情報一覧(地図情報)

Category	Name of Map and Scale of Original Map	Contents in the Map: Name of Data	Type of Data	Attribute	Renewal Interval of Information	Agency as Data Source	Dissemination Level*
Information on River Environmental Management	5.1 Location Map of River Water Quality Sampling Station (Scale: 1/500,000)	5.1.1 Sampling Station	Point	Name of sampling station	Annually	DOE	Level 2
	5.2 Location Map of Major Pollutant Sources (Scale: 1/500,000)	5.2.1 Major Pollutant Sources	Point	Type of industry Code of pollutant sources	Annually	DOE	Level 1
	6.1 Location Map of Protected Area (Scale: 1/500,000)	6.1.1 Protected Area	Polygon	Name of Protected Area Extent of protected area (ha)	Once/ 3 years	DWNP	Level 2
	7.1 Location Map of River Parks (Scale: 1/500,000)	7.1.1 River Parks	Point	Name of River Parks	Annually	LOCAL AUTHORITY	Level 2
	7.2 Location Map of Camp Sites (Scale: 1/500,000)	7.2.1 Camp Sites	Point	Name of Camp Sites	Annually	Yayasan Perak	Level 2
	7.3 Location Map of Royal Mausoleums (Scale: 1/500,000)	7.3.1 Royal Mausoleums	Point	Name of Royal Mausoleums	Annually	Yayasan Perak	Level 2
Information on Watershed Management	8.1 Geological Map (Scale: 1/500,000)	8.1.1 Geological Classification	Polygon Line	Name of class Fault	Non	DGSM	Level 2
	9.1 Reconnaissance Soil Map (Scale: 1/500,000)	9.1.1 Soil Classification	Polygon	Name of class	5 year (Only Urban Area)	DOA	Level 2
	10 Land Use Map (Scale: 1/50,000)	10.1.1 Land Use Classification	Raster	Name of Class	5 year in Principle	DOA	Level 2
			Polygon	Name of Class			Level 1
	11 Structure Plan (Scale : Variable)	11.1.1 Development Corridors	Raster	Name of Corridor	Target Year : 2020	TCPD	Level 2
		11.1.2 Future Land Use 11.1.3 Major Projects	Polygon Point	Name of Class Explanation Table			Level 1
	12 Forest Reserve Map (Scale: 1/50,000)	12.1.1 Forest Reserve and Protection Forest	Raster	Name of Protection Forest	Non	FD	Level 2
			Polygon Point	Name of Forest Reserve Name of Protection Forest and Area			Level 1
	13 Cadastral Map (Scale : 1/790)	13.1.1 Land Parcel Boundary 13.1.2 Land Parcel No.	Line Point	- Land Registration	Occasion at Need	DOLM, PWB	Level 1

*: Level1 disseminates to the government agency only, while Level 2 opens to Public

表7-1(3/5)　システム配信情報一覧(表形式情報)

Category	Name of Table	Renewal Interval of Information	Agency as Data Source	Dissemination Level*
Hydrological Information	1.1 Inventory of gauging station	Annually	DID	Level 2
	1.2 Hourly rainfall in northeast monsoon period (Oct. - Jan.)**	Annually & Real-time	DID	Level 2
	1.3 Daily and monthly rainfall	Annually	DID	Level 2
	1.4 Annual maximum rainfall	Annually	DID	Level 2
	1.5 Hourly river stage/discharge in northeast monsoon period(Oct. - Jan.)**	Annually & Real-time	DID	Level 2
	1.6 Daily and monthly river stage/discharge	Annually	DID	Level 2
	1.7 Annual maximum and minimum river stage/discharge	Annually	DID	Level 2
	1.8 Discharge rating table	Annually	DID	Level 2
	1.9 Monthly suspended sediment	Annually	DID	Level 2
	1.10 Annual maximum and minimum suspended sediment	Annually	DID	Level 2
	1.11 Sediment rating table	Annually	DID	Level 2
	1.12 Hourly and/or daily dam outflow discharge	Real-time	TNB	Level 2
	1.13 Monthly meteorological information	Annually	MMS (statistical book)	Level 2
	1.14 Tidal levels	Annually	Royal Malaysian Navy	Level 2
Information on Flood Mitigation	2.1 Inventory of Existing Flood Mitigation Scheme	As required	DID	Level 2
	2.2 Inventory of Projected Flood Mitigation Scheme	As required	DID	Level 2
	2.3 Probable Flood Peak Discharge	As required	DID	Level 2
	2.4 Longitudinal Profile of River Channel and Probable Flood Level	As required	DID	Level 2
	2.5 River Channel Flow Capacity	As required	DID	Level 2
	2.6 Flood Damage Record	Annually	DID	Level 2
Information on Water Supply Management	3.1 Inventory of Intake Facility		PWB and DID	Level 2
	3.2 Inventory of Irrigation Scheme		DID	Level 2
	3.3 Inventory of Domestic and Industrial Water Supply		PWB	Level 2
	3.4 Monthly Water Demand		PWB and DID	Level 2

*: Level1 disseminates to the government agency only, while Level 2 opens to Public

**: Include the real-time information

表7-1(4/5)　システム配信情報一覧(表形式情報)

Category	Name of Table	Renewal Interval of Information	Agency as Data Source	Dissemination Level*
Information on River Environmental Management	4.1 Inventory of River Water Quality Sampling Station	Once a year	DOE	Level 2
	4.2 Inventory of Pollutant Sources	Once a year	DOE	Level 1
	4.3 River Water Quality Results on human life	3 times a year	DOE	Level 2
	4.4 River Water Quality Results on other items	3 times a year	DOE	Level 2
	4.5 Effluent Water Quality & Discharge survey data	3 times a year	DOE	Level 2
	4.6 General Rating Scale for WQI	Database	DOE	Level 2
	4.7 Effluent Water Quality Standards	Database	DOE	Level 2
Information on Watershed Management	5.1 Major Projects (Development Category, Name, Owner, Location, Area, Cost)	Target Year : 2020	TCPD	Level 1
	6.1 Forest Compartment Relational Table	Non	FD	Level 1
	6.2 Forest Management Record Table	Yearly		
	6.3 Logging Volume (Computation Result)	-		
	7.1 Land Registration Table	Occasion at Need	DOLM	Level 1

*: Level1 disseminates to the government agency only, while Level 2 opens to Public

表7-1(5/5)　システム配信情報一覧(図形式情報)

Category	Name of Graph	Renewal Interval of Information	Agency as Data Source	Dissemination Level*
Hydrological Information	1.1 Rainfall intensity curve at Ipoh	-	DID	Level 2
	1.2 Mean monthly rainfalls at sub-regions	-	DID	Level 2
Information on Flood Mitigation	2.1 Longitudinal channel profile and probable water level		DID	Level 2
	2.2 Profile of river channel flow capacity		DID	Level 2
Information on River Environmental Management	3.1 Water Quality Results of each sampling point	Once a year	DOE	Level 2
	3.2 Effluent Load of Major Pollutant Sources	Once a year	DOE	Level 1
	3.3 Longitudinal Variation of River Water Quality	Once a year	DOE	Level 2
	3.4 Annual Trend of Water Quality at Class 1 point (3 points)	Once a year	DOE	Level 2
	4.1 Distribution of Aquatic Wildlife	Once per 3 years	DWNP	Level 2
Information on Watershed Management	5.1 Historical Logging Volume	1 Year	FD	Level 1

*: Level1 disseminates to the government agency only, while Level 2 opens to Public

表7-2(1/2)　試験運用システムに必要なハードウェア一覧

Hardware Name	Function	Specification	Location
HP C200 UNIX WORKSTATION	• GIS Database Server • GIS Private Web Server • GIS Global Web Server • Internet Map Server	• RISC CPU: 200 MHz • Memory: 128 MB • Hard Disk: 9 GB • Two Network Cards	DID HQ in KL
HP C200 UNIX WORKSTATION	• TM Data Server • TM Private Web Server • TM Global Web Server	• RISC CPU: 200 MHz • Memory: 128 MB • Hard Disk: 8 GB • Two Network Cards	DID HQ in KL
HP Kayak XA Pentium II Personal Computer	• GIS Database Creation Machine • CD-R Backup Machine	• Intel Pentium II 233 MHz CPU • 64 MB Memory • 2.5 GB Hard disk	DID HQ in KL
HP Vectra VL 6 Pentium II Personal Computer	• Real-time Data Transmission Machine	• Intel Pentium II 233 MHz CPU • 64 MB Memory • 2.5 GB Hard disk	DID PERAK in IPOH
Calcomp Drawing Board III Digitizer Model34480	• GIS Graphic Data Input	• A0 Size Tablet • 16 Button Cordless Courser	DID HQ in KL
HP DesignJet 750C Plotter	• Map Output Device	• A0 Size Paper • Color Ink Jet	DID HQ in KL
HP LaserJet 6MP Printer	• Document Output Device	• A4 Size Paper • Post Scrip	DID HQ in KL
HP LaserJet 6MP Printer	• Document Output Device	• A4 Size Paper • Post Scrip	DID PERAK in IPOH
3COM Superstack II PS HUB 40 TP	• Private Net Connect HUB in KL	• 12 Ports • 100 MB • Optical Fiber Transceiver	DID HQ in KL
3COM Superstack II PS HUB 40 TP	• Global Net Connect HUB in KL	• 12 Ports • 100 MB	DID HQ in KL
3COM Office Connect HUB	• Private Net Connect HUB in IPOH	• 8 Ports • 10 MB	DID PERAK in IPOH
Cisco 2503 Router	• ISDN Link in KL	• 128 kbps ISDN Line Modem	Agrolink in KL
Cisco 2503 Router	• ISDN Link in IPH	• 128 kbps ISDN Line Modem	DID PERAK in IPOH

表7-2(2/2)　試験運用システムに必要なハードウェア一覧

Hardware Name	Function	Specification	Location
HP SureStore DAT	• Server Backup Driver	• 4mm Tape	DID HQ in KL
Yamaha CDR400tx	• CD Recorder for Distributing Data	• 4X Write / 6X Read	DID HQ in KL
PK 600 AVR	• To save unstable power supply for Digitizer	• 600 VA	DID HQ in KL
PK 600 AVR	• To save unstable power supply for PC and Printer	• 600 VA	DID HQ in KL
PK 1052C/CX UPS	• Back up power for the GIS server computer	• 4 hours full load	DID HQ in KL
PK 1052C/CX UPS	• Back up power for the TM server computer	• 4 hours full load	DID HQ in KL
PK 1052C/CX UPS	• Back up power for the Real-time system in IPOH	• 4 hours full load	DID PERAK in IPOH
3COM Ethernet Card	• Upgrading exist TeleWin PC in IPOH	• 10/100 BaseT	DID PERAK in IPOH
Arc Info	• GIS Database Management • GIS Analysis tools	• Full Option • Version 7.1.2	DID HQ in KL
Arc View PC	• GIS Database Input Tool	• Version 3	DID HQ in KL
Arc View IMS	• GIS Information Distribution Tool	• Version 1	DID HQ in KL
Netscape Suitespot	• Web Server Software for GIS Server	• Version 3.1	DID HQ in KL
Netscape Suitespot	• Web Server Software for TM Server	• Version 3.1	DID HQ in KL
HP JetDirect Printer Server	• Unix Printer Utilities Software	• Full Version	DID HQ in KL

表7-3　　試験運用システムのハードおよびソフト・ウェアの購入費用

Item	Quantities	Unit Cost RM	Cost RM
1. Hardware			
(1) Workstation	2 units	111,490	222,980
(2) Personal Computer	2 units	10,980	21,960
(3) Digitizer	1 unit	15,480	15,480
(4) Plotter	1 unit	23,300	23,300
(5) Laser Jet Printer	2 units	3,760	7,520
(6) HUB(10Mb)	2 units	690	1,380
(7) HUB(100Mb)	1 unit	2,940	2,940
(8) Modular Router	2 units	11,700	23,400
(9) 4 mm Type Driver	1 unit	4,930	4,930
(10) CD-R Driver	1 unit	2.650	2,650
(11) AVR	2 units	260	520
(12) UPS	3 units	4,980	14,940
(13) Ethernet Cable	16 units	50	800
(14) Power Supply Cable	3 meters x 3	25	75
(15) Power Supply Cable	5 meters x 3	40	120
(16) Ethernet Card	1 unit	440	440
(17) Consumption	Plotter Ink x 5 sets	690	
(18) Consumption	Plotter Paper x 5 sets	245	
(19) Consumption	CD-R disc x 20 pices	20	
(20) Consumption	Printer toner x 2 set	380	
(21) Consumption	DAT/DDS Type x 1 set	340	
Sub-total			347,660
2. Software			
(1) Arc/Info	1	350,310	350,310
(2) Arc/View	1	36,110	36,110
(3) Web Server Soft	2	33,000	66,000
(4) Printer Server Soft	2	480	960
(5) Installation	1	15,000	15,000
Sub-total			468,380
Grand Total			816,040

表7-4　　テレメータ・システムのためのアプリケーション・プログラム開発費用

Description	Unit Cost (YEN)	Cost (YEN)
1. Data Transmission Application: a. Reprogramming Telewin to enable: • Manual key-in dam data. • Calculating all station's discharge data. • Alarm generation. • Data feeding. b. Installation, Testing and Commissioning. c. Creation of manual.	1,500,000	1,500,000
2. Web Server Communication: a. To write data transfer scheduler program. b. Installation, Testing and Commissioning. c. Creation of manual.	900,000	900,000
3. Web Viewer Application: a. Web-page design with generation and web server data integration and application. b. Installation, Testing and Commissioning. c. Creation of manual.	2,390,000	2,390,000
Total (YEN)		4,790,000
Total (RM) (100 yen = 2.8RM)		134,120

表7-5(1/2)　初期データ入力のための費用

Description	Quantities	Unit Cost (YEN)	Cost (YEN)
1. Digitizing and Data Import of Map Information			
(1) Basin Boundary	28 sheets	85,000	2,380,000
(2) Contour	28 sheets	195,000	5,460,000
(3) River	28 sheets	195,000	5,460,000
(4) District Boundary	28 sheets	120,000	3,360,000
(5) Major Road and Railway	28 sheets	100,000	2,800,000
(6) Major Town	13 sheets	100,000	1,300,000
(7) Major Bridge	9 sheets	85,000	765,000
(8) Real-time Gauging Station	12 sheets	85,000	1,020,000
(9) Non-real time Gauging Station	23 sheets	85,000	1,955,000
(10) Mean Monthly Rainfall	5 sheets	100,000	500,000
(11) Location of Channel Stretch	10 sheets	100,000	1,000,000
(12) Flood Mitigation Scheme	10 sheets	85,000	850,000
(13) Flood Inundation Area	6 sheets	110,000	660,000
(14) Intake Point	2 sheets	85,000	170,000
(15) Domestic/Industrial Supply Area	2 sheets	110,000	220,000
(16) Water Quality Sampling Points	2 sheets	85,000	170,000
(17) Major Pollutant Sources	2 sheets	85,000	170,000
(18) Protected Area	2 sheets	85,000	170,000
(19) Distribution of Aquatic Wildlife	2 sheets	85,000	170,000
(20) River Parks	9 sheets	85,000	765,000
(21) Camp Sites	9 sheets	85,000	765,000
(22) Royal Mausoleums	9 sheets	85,000	765,000
(23) Geology	2 sheets	195,000	390,000
(24) Soil	2 sheets	115,000	230,000
(25) Land Use	2 sheets	115,000	230,000
(26) Structure Plan	1 sheets	115,000	115,000
(27) Future Land Use Plan	1 sheets	115,000	115,000
(28) Forest Reserve	2 sheets	115,000	230,000
(29) Cadastral Map (data conversion)	1,203 files	350	421050
Sub Total			32,606,050

表7-5(2/2)　初期データ入力のための費用

Description	Quantities	Unit Cost (YEN)	Cost (YEN)
2. Data Import and Input of Tabular Information			
(1) Hydrological Information	1,095 files	350	383,250
(2) Dam Reservoir Information	1 files	350	350
(3) Tidal Level Information	1 files	350	350
(4) Proposed Flood Mitigation Scheme	2 files	200	400
(5) Existing Flood Mitigation Scheme	2 files	200	400
(6) Flood Damage Record	4 files	200	800
(7) Water Intake Facilities	2 files	200	400
(8) Irrigation Scheme	2 files	200	400
(9) Design Capacity	2 files	200	400
(10) Water Quality Sampling Points	3 files	250	750
(11) Major Pollutant Sources	3 files	250	750
(12) Sewage and Industrial Effluents	2 files	250	500
(13) Major Projects	1 files	200	200
(14) Forest Compartment Relational Table	1 files	200	200
(15) Forest Management Record Table	1 files	200	200
(16) Logging Volume Table	1 files	200	200
(17) Land Registration Table	500 records	215	107,500
Sub Total			497,050
3. Input of Graphic Information			
(1) Rainfall Intensity Curve at IPOH	1 sheet	9,500	9,500
(2) Channel Profile I	1 sheet	9,500	9,500
(3) Profile of River Channel Flow Capacity	1 sheet	9,500	9,500
(4) Annual Trend of Water Quality	3 sheets	9,500	28,500
(5) Historical Logging Volume	1 sheet	9.500	9,500
Sub Total			66,500
Grand Total (yen)			33,169,600
Grand Total (RM) (100 yen = 2.81RM)			928,749

表7-6　　試験運用システムに対する経済評価結果

(Unit: RM million)

Year	(1) Investment Cost	(2) Accumulated Investment Cost	(3) Maintenance Cost *	(4) Total Cost (1)+(3)	(5) Full Benefit	(6) Actual Benefit	(7) (1)-(6)
1998	2.92	2.92		2.92			2.92
1999			0.21	0.21	0.00	0.84	-0.63
2000			0.21	0.21	0.00	0.84	-0.63
2001			0.21	0.21	0.00	0.84	-0.63
2002			0.21	0.21	0.00	0.84	-0.63
2003			0.21	0.21	0.00	0.84	-0.63
2004			0.21	0.21	0.00	0.84	-0.63
2005			0.21	0.21	0.00	0.84	-0.63
2006			0.21	0.21	0.00	0.84	-0.63
2007			0.21	0.21	0.00	0.84	-0.63
2008			0.21	0.21	0.00	0.84	-0.63
Total	2.92	2.92	2.10	5.02	0.00	8.40	

EIRR=　17.1%

表8-1　　河川流域情報システム構築・運用のための運営委員会の構成(案)

Designation	Name of Government Agencies
Chairman	Secretary General of Ministry of Agriculture
Secretariat	Information Technology Unit, Ministry of Agriculture and River Division, Department of Irrigation and Drainage, Ministry of Agriculture
Members	(a) Economic Planning Unit, Prime Minister's Department (b) Malaysian Administrative & Management Unit, Prime Minister's Department (as the representative of National Data Processing Committee) (c) Department of Survey and Mapping (as the representative of National Mapping Committee) (d) Ministry of Land Cooperative Development (as the representative of the NaLIS Central Council) (e) Malaysian Institute of Micro-electric Systems (as the representative of the National Information Technology Council)) (f) Malaysian Center for Remote Sensing (as the representative of the National Remote Sensing Committee) (g) National Hydraulic Research Institute, Malaysia (h) Department of Irrigation and Drainage (as the Secretariat of the Steering Committee)

表8-2　　河川流域情報システム構築・運用のための技術検討委員会の構成(案)

Designation	Name of Government Agencies
Chairman	Director General of Department of Irrigation and Drainage, Ministry of Agriculture
Secretariat	River Division, Department of Irrigation and Drainage, Ministry of Agriculture
Members of Federal Agency	(a) Department of Irrigation and Drainage (Hydrology Division); (b) Department of Survey and Mapping, Malaysia as the data source of topographic map information; (c) Department of Agriculture as the data source of land use and soil map; (d) Department of Environment as the data source of river water quality and basin pollutant source; (e) Malaysia Meteorological Service as the data source of meteorological information source; (f) Department of Geological Survey of Malaysia as the data source of geographic map information; (g) Department of Statistics as the source of socio-economic census data; and (h) Public Work Department as the data source of bridges.
Members of State Agency	(a) Economic Planning Unit as the data source of state development plan; (b) Department of Irrigation and Drainage as the data source of telemetry gauging data, and at the same time, as the water user for irrigation; (c) Perak Water Board as the water user of domestic and industrial water supply; (d) Forest Department as the data source on basin forest conditions; (e) Yayasan Perak as the data source of echo-tourism on Perak river; (f) TNB as the data source of dam information; (g) Department of Environment as the data source of river water quality and basin pollutant source; and (h) Town and Country Planning Department as the data source of structural plans.

表 8-1　河川流域情報システム構築･運用のための運営委員会の構成　(案)

Designation	Name of Government Agencies
Chairman	Secretary General of Ministry of Agriculture
Secretariat	Information Technology Unit, Ministry of Agriculture and River Division, Department of Irrigation and Drainage, Ministry of Agriculture
Members	(a) Economic Planning Unit, Prime Minister's Department (b) State Representatives (c) Malaysian Administrative & Management Unit, Prime Minister's Department (as the representative of National Data Processing Committee) (d) Department of Survey and Mapping (as the representative of National Mapping Committee) (e) Ministry of Land Cooperative Development (as the representative of the NaLIS Central Council) (f) Malaysian Institute of Micro-electric Systems (as the representative of the National Information Technology Council)) (g) Malaysian Center for Remote Sensing (as the representative of the National Remote Sensing Committee) (h) National Hydraulic Research Institute, Malaysia (i) Department of Irrigation and Drainage

表 8-2　河川流域情報システム構築･運用のための技術検討委員会の構成　(案)

Designation	Name of Government Agencies
Chairman	Director General of Department of Irrigation and Drainage, Ministry of Agriculture
Secretariat	River Division, Department of Irrigation and Drainage, Ministry of Agriculture
Members of Federal Agency	(a) Department of Irrigation and Drainage (Hydrology Division); (b) Department of Survey and Mapping, Malaysia as the data source of topographic map information; (c) Department of Agriculture as the data source of land use and soil map; (d) Department of Environment as the data source of river water quality and basin pollutant source; (e) Malaysia Meteorological Service as the data source of meteorological information source; (f) Department of Geological Survey of Malaysia as the data source of geographic map information; (g) Department of Statistics as the source of socio-economic census data; and (h) Public Work Department as the data source of bridges.
Members of State Agency	(a) Economic Planning Unit as the data source of state development plan; (b) Department of Irrigation and Drainage as the data source of telemetry gauging data, and at the same time, as the water user for irrigation; (c) Perak Water Board as the water user of domestic and industrial water supply; (d) Forest Department as the data source on basin forest conditions; (e) Yayasan Perak as the data source of echo-tourism on Perak river; (f) TNB as the data source of dam information; (g) Department of Environment as the data source of river water quality and basin pollutant source; and (h) Town and Country Planning Department as the data source of structural plans. (i) All other state authorities designated as data source and/or data user of RBIS (j) All local authorities designated as data source and/or data users of RBIS

表9-3　イスカンダール橋における確保流量維持のための貯水池放流量

Date			(1) Observed Outflow from Dam (m^3/s)	(2) Observed Discharge at Iskandar Bridge (m^3/s)	(3) Observed Deficit * at Iskandar Bridge (m^3/s)	(4) Revised ** Outflow from Dam (m^3/s)	(5) Reservoir Volume Used to Supply the Deficit ((4)-(1)) x 86,400 (10^3 m^3)
Year	Mon.	Day					
1990	Aug.	16	94.1	111.2	2.0	96.1	172.8
1990	Aug.	17	93.7	112.7	0.5	94.2	47.5
1990	Aug.	18	89.9	107.5	5.7	95.5	489.9
1990	Aug.	19	91.2	108.4	4.8	96.0	414.7
1990	Aug.	20	82.2	99.3	13.9	96.2	1203.6
1990	Aug.	21	78.5	95.5	17.7	96.2	1528.4
1990	Aug.	22	78.5	95.4	17.8	96.3	1534.5
1990	Aug.	23	120.8	137.5	0.0	96.5	-2095.2
1990	Aug.	24	84.0	100.7	12.5	96.5	1081.7
1990	Aug.	25	78.2	94.8	18.4	96.6	1588.9
1990	Aug.	26	76.5	93.1	20.1	96.7	1738.4
1990	Aug.	27	76.9	93.3	19.9	96.9	1720.2
1990	Aug.	28	117.1	133.5	0.0	96.9	-1749.6
1990	Aug.	29	140.0	156.4	0.0	96.8	-3735.1
1990	Aug.	30	132.6	150.6	0.0	95.2	-3231.4
1990	Aug.	31	95.2	115.0	0.0	93.4	-158.1
1990	Sep.	1	126.5	143.6	0.0	96.1	-2622.2
1990	Sep.	2	88.1	108.0	5.2	93.3	452.7
1990	Sep.	3	85.3	103.5	9.7	95.1	838.9
1990	Sep.	4	89.4	107.1	6.1	95.5	527.0
1990	Sep.	5	87.0	104.0	9.2	96.2	796.6
1990	Sep.	6	85.2	102.2	11.0	96.3	953.0
1990	Sep.	7	85.4	102.2	11.0	96.4	951.3
1990	Sep.	8	92.8	113.1	0.1	92.9	8.6
1990	Sep.	9	91.4	108.6	4.6	96.1	398.3
1990	Sep.	10	91.4	108.4	4.8	96.2	415.6
1990	Sep.	11	84.9	104.4	8.8	93.7	756.9
1990	Sep.	12	84.9	106.3	6.9	91.8	594.4
1990	Sep.	13	84.9	111.7	1.6	86.5	133.9
1990	Sep.	14	84.9	110.6	2.6	87.5	222.0
1990	Sep.	15	84.9	109.7	3.5	88.4	302.4
1990	Sep.	16	84.9	111.4	1.9	86.8	159.8
			Ave. 92.5	Ave. 111.2	Ave. 6.9	Ave. 94.5	Total 5440.6 ***

*: Deficit to the guaranteed discharge of 4,000cusec (113.2 m3/s)

**: Outflow discharge to guarantee the discharge of 4,000cusec (113.2m3/s) at Iskandar Bridge

***: Corresponds to about 11cm in deference of reservoir water level of Temengor Dam

Table 9 表9-4 洪水被害率 CTOR

Item	Flood Depth	Flood Duration	Damage Factor (%)	Remarks
Paddy (Production loss)	less than 0.5m	less than 2 days	30	
		3 to 4 days	37	
		5 to 6 days	40	
		more than 7 days	45	
	0.5 to 0.9 m	less than 2 days	33	
		3 to 4 days	40	
		5 to 6 days	43	
		more than 7 days	49	
	more than 1 m	less than 2 days	60	
		3 to 4 days	80	
		5 to 6 days	86	
		more than 7 days	96	
Rubber (Mortality of young tree)	more than 0.25 m	less than 7 days	5	Assume 9% of total planted area to be subject to mortality
		8 to 14 days	15	
		15 to 21 days	60	
		more than 22 days	100	
Oil Palm/Coconuts Palm (Mortality of young tree)	more than 0.25 m	less than 7 days	10	Assume 9% of total planted area to be subject to mortality
		8 to 14 days	20	
		15 to 21 days	70	
		more than 22 days	100	
Other Tree Crops (Mortality of young tree)	more than 0.25 m	less than 4 days	10	Assume 10% of total planted area to be subject to mortality
		5 to 8 days	25	
		9 to 12 days	60	
		more than 13 days	70	
House/Building	less than 0.5 m		3	
	0.5 to 1.0 m		5	
	1.0 to 2.0 m		7	
	2.0 to 3.0 m		11	
	more than 3 m		15	

Source: National Water Resources Study, Malaysia , Sectoral Report Vol. 5, Oct. 1982

表9-5　現状のダム運用条件下での洪水規模別想定被害額

Item of Damage	Area Inundated	Quantity Damaged	Unit Value	10-year Flood		20-year-Flood		50-year Flood		100-year Flood	
				Duration (days) [1]	2.4	Duration (days) [1]	2.6	Duration (days) [1]	3.8	Duration (days) [1]	5.4
				Depth (m) [2]	0.5	Depth (m) [2]	0.9	Depth (m) [2]	1.7	Depth (m) [2]	2.8
				Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)
1. Direct Agricultural Damage											
1.1 Paddy	1,200 ha	1,200 ha	1,500 RM/ha	0.40	720	0.40	720	0.80	1,440	0.86	1,548
1.2 Rubber (Production Loss)	2,800 ha	2,800 ha	47 [3] RM/ha	1.19 [4]	156	1.31 [4]	173	1.92 [4]	252	2.71 [4]	356
1.3 Rubber (Mortality Loss)	2,800 ha	252 ha	5,200 RM/ha	0.05	66	0.05	66	0.05	66	0.05	66
1.4 Oil Palm (Mortality Loss)	2,500 ha	225 ha	3,500 RM/ha	0.10	79	0.10	79	0.10	79	0.10	79
1.5 Coconut Palm (Mortality Loss)	1,000 ha	60 ha	6,200 RM/ha	0.10	37	0.10	37	0.25	93	0.25	93
1.6 Other Tree Crop (Mortality Loss)	1,200 ha	120 ha	6,400 RM/ha	0.10	77	0.10	77	0.25	192	0.25	192
1.7 Mix Horticulture	4,000 ha	4,000 ha	4,699 RM/ha	0.10	1,880	0.10	1,880	0.25	4,699	0.25	4,699
Sub-Total (for 1.)					3,014		3,031		6,821		7,033
2. Direct Non-Agriculture Damage											
2.1 Private House		5,000 houses	11,000 RM/house	0.05	2,750	0.05	2,750	0.07	3,850	0.11	6,050
2.2 Shops & Commercial Sites		250 sites	13,000 RM/sites	0.05	163	0.05	163	0.07	228	0.11	358
2.3 Industrial Facilities		60,000 m^2	800 RM/m^2	0.05	2,400	0.05	2,400	0.07	3,360	0.11	5,280
2.4 Road		40 km	15,000 RM/km	1.00	600	1.00	600	1.00	600	1.00	600
Sub-Total (for 2.)					5,913		5,913		8,038		12,288
3. Indirect Damage											
3.1 Agricultural Damage [4]					603		606		1,364		1,407
3.2 Private/Public Houses [5]					4,369		4,369		6,116		9,611
3.3 Transportation [6]					600		600		600		600
Sub-total (for 3.)					5,572		5,575		8,080		11,618
Damage Total					14,498		14,518		22,938		30,938

Note:
(1): Duration of flood discharge over 850m3/s
(2): Maximum flood inundation depth
(3): 9.4kg/ha/day x RM5/kg
(4): Flood duration x 1/2
(5): 20% of "1. Direct Agricultural Damage"
(6): 150% of ("2.1 Direct Damage of Private House" + "2.2 Shops & Commercial Sites")
(7): 100% of "2.4 Direct Damage of Road"

表9-6　新たなダム運用条件下での洪水規模別想定被害額

Item of Damage	Area Inundated	Quantity Damaged	Unit Value	10-year Flood		20-year-Flood		50-year Flood		100-year Flood	
				Duration (days) [1]	2.3	Duration (days) [1]	2.4	Duration (days) [1]	3.8	Duration (days) [1]	5.4
				Depth (m) [2]	0.3	Depth (m) [2]	0.4	Depth (m) [2]	1.4	Depth (m) [2]	2.5
				Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)	Damage Factor	Flood Damage (10^3RM)
1. Direct Agricultural Damage											
1.1 Paddy	1,200 ha	1,200 ha	1,500 RM/ha	0.37	666	0.37	666	0.80	1,440	0.86	1,548
1.2 Rubber (Production Loss)	2,800 ha	2,800 ha	47 [3] RM/ha	1.13 [4]	148	1.21 [4]	159	1.92 [4]	252	2.71 [4]	356
1.3 Rubber (Mortality Loss)	2,800 ha	252 ha	5,200 RM/ha	0.05	66	0.05	66	0.05	66	0.05	66
1.4 Oil Palm (Mortality Loss)	2,500 ha	225 ha	3,500 RM/ha	0.10	79	0.10	79	0.10	79	0.10	79
1.5 Coconut Palm (Mortality Loss)	1,000 ha	60 ha	6,200 RM/ha	0.10	37	0.10	37	0.25	93	0.25	93
1.6 Other Tree Crop (Mortality Loss)	1,200 ha	120 ha	6,400 RM/ha	0.10	77	0.10	77	0.25	192	0.25	192
1.7 Mix Horticulture	4,000 ha	4,000 ha	4,699 RM/ha	0.10	1,880	0.10	1,880	0.25	4,699	0.25	4,699
Sub-Total (for 1.)					2,952		2,963		6,821		7,033
2. Direct Non-Agriculture Damage											
2.1 Private House		5,000 houses	11,000 RM/house	0.03	1,650	0.03	1,650	0.07	3,850	0.11	6,050
2.2 Shops & Commercial Sites		250 sites	13,000 RM/sites	0.03	98	0.03	98	0.07	228	0.11	358
2.3 Industrial Facilities		60,000 m^2	800 RM/m^2	0.03	1,440	0.03	1,440	0.07	3,360	0.11	5,280
2.4 Road		40 km	15,000 RM/km	1.00	600	1.00	600	1.00	600	1.00	600
Sub-Total (for 2.)					3,788		3,788		8,038		12,288
3. Indirect Damage											
3.1 Agricultural Damage [4]					590		593		1,364		1,407
3.2 Private/Public Houses [5]					2,621		2,621		6,116		9,611
3.3 Transportation [6]					600		600		600		600
Sub-total (for 3.)					3,812		3,814		8,080		11,618
Damage Total					10,551		10,564		22,938		30,938

Note:
(1): Duration of flood discharge over 850m3/s
(2): Maximum flood inundation depth
(3): 9.4kg/ha/day x RM5/kg
(4): Flood duration x 1/2
(5): 20% of "1. Direct Agricultural Damage"
(6): 150% of ("2.1 Direct Damage of Private House" + "2.2 Shops & Commercial Sites")
(7): 100% of "2.4 Direct Damage of Road"

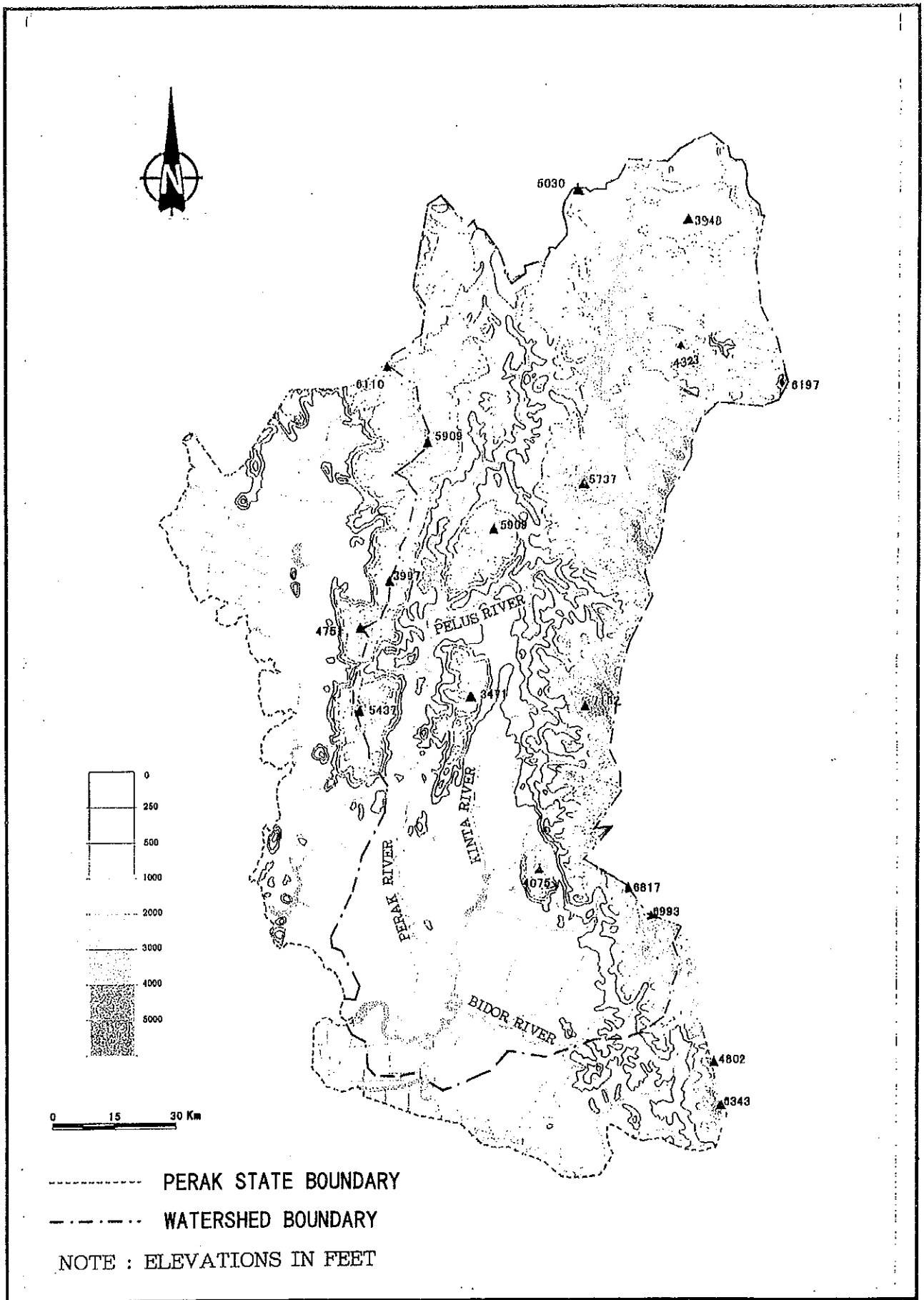
表9-7　　年平均被害額

Under Condition of Present Dam Operation

(1) Return Period	(2) Occurrence Probability 1/(1)	(3) Probable Damage	(4) Occurrence Probability between $D_{(i-1)}$ and $D_{(i)}$ ($P_{(i-1)} - P_{(i)}$)	(5) Average Damage between $D_{(i-1)}$ and $D_{(i)}$ $(D_{(i-1)} + D_{(i)})/2$	(6) Probable Damage between $D_{(i-1)}$ and $D_{(i)}$ (4) x (5)
		(10^3 RM)		(10^3 RM)	(10^3 RM)
2 -year	$P_{(1)}$= 0.50	$D_{(1)}$= 0	-	-	
10 -year	$P_{(2)}$= 0.10	$D_{(2)}$= 14,498	0.40	7,249	2,900
20 -year	$P_{(3)}$= 0.05	$D_{(3)}$= 14,518	0.05	14,508	725
50 -year	$P_{(4)}$= 0.02	$D_{(4)}$= 22,938	0.03	18,728	562
100 -year	$P_{(5)}$= 0.01	$D_{(5)}$= 30,938	0.01	26,938	269
Annual Average Flood Damage (Total of (6))					4,456

Under Condition of Proposed Dam Operation

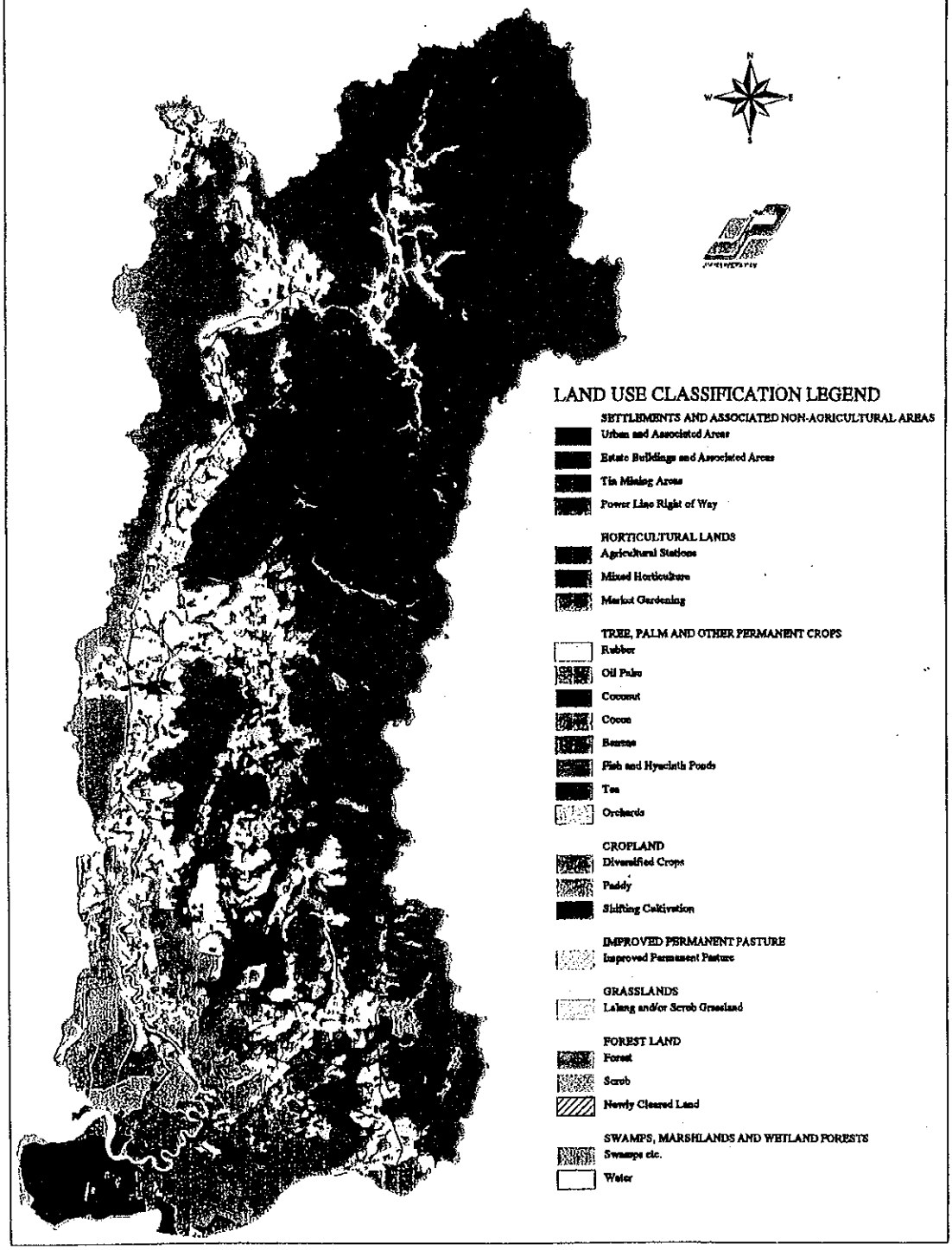
(1) Return Perio	(2) Occurrence Probability 1/(1)	(3) Probable Damage	(4) Occurrence Probability between $D_{(i-1)}$ and $D_{(i)}$ ($P_{(i-1)} - P_{(i)}$)	(5) Average Damage between $D_{(i-1)}$ and $D_{(i)}$ $(D_{(i-1)} + D_{(i)})/2$	(6) Probable Damage between $D_{(i-1)}$ and $D_{(i)}$ (4) x (5)
		(10^3 RM)		(10^3 RM)	(10^3 RM)
2 -year	$P_{(1)}$= 0.50	$D_{(1)}$= 0			
10 -year	$P_{(2)}$= 0.10	$D_{(2)}$= 10,551	0.40	5,276	2,110
20 -year	$P_{(3)}$= 0.05	$D_{(3)}$= 10,564	0.05	10,558	528
50 -year	$P_{(4)}$= 0.02	$D_{(4)}$= 22,938	0.03	16,751	503
100 -year	$P_{(5)}$= 0.01	$D_{(5)}$= 30,938	0.01	26,938	269
Annual Average Flood Damage (Total of (6))					3,410



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図2-1　ペラ川流域の地形
JAPAN INTERNATIONAL COOPERATION AGENCY	

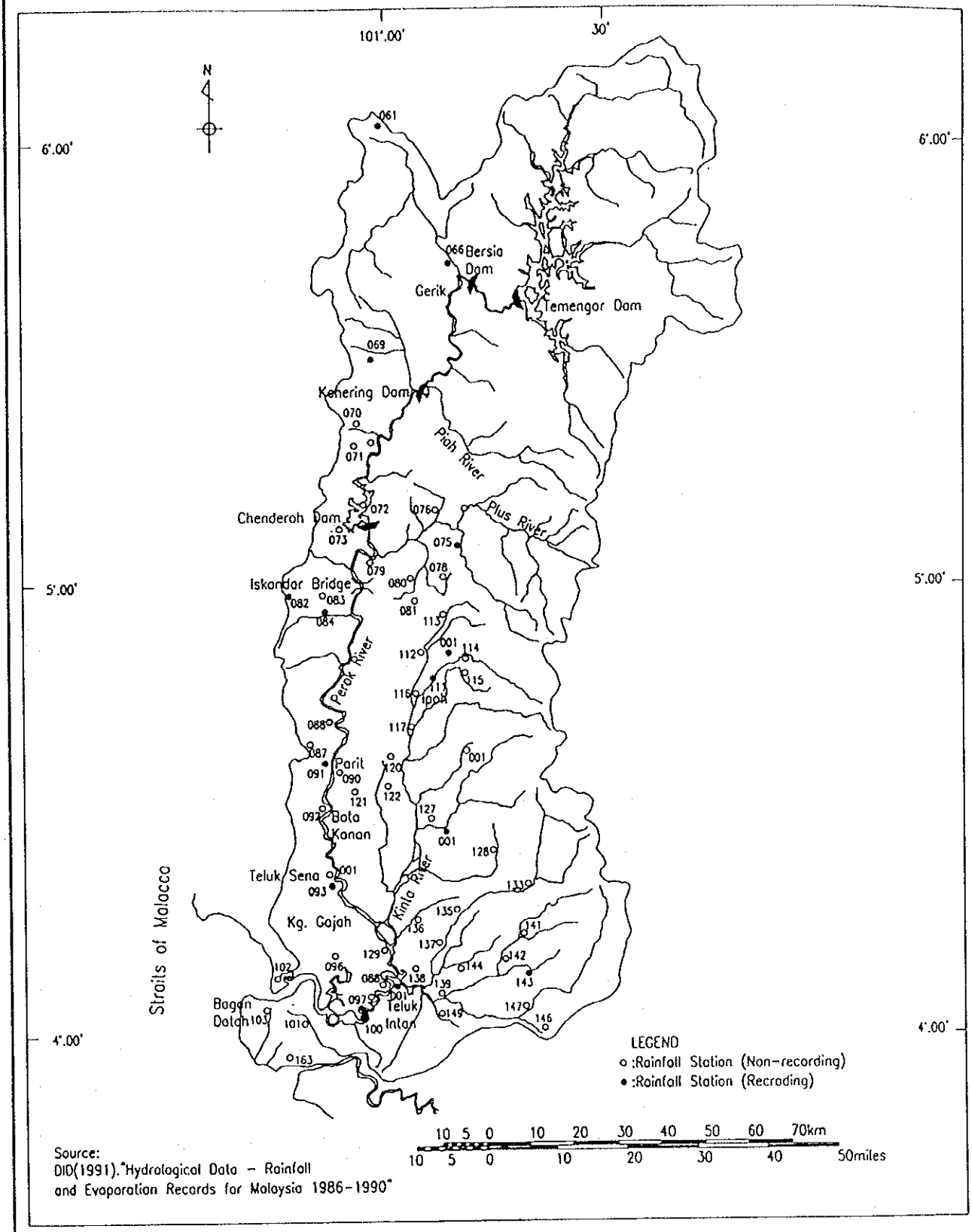
LAND USE 1990
PERAK RIVER BASIN

Scale 1 : 700,000

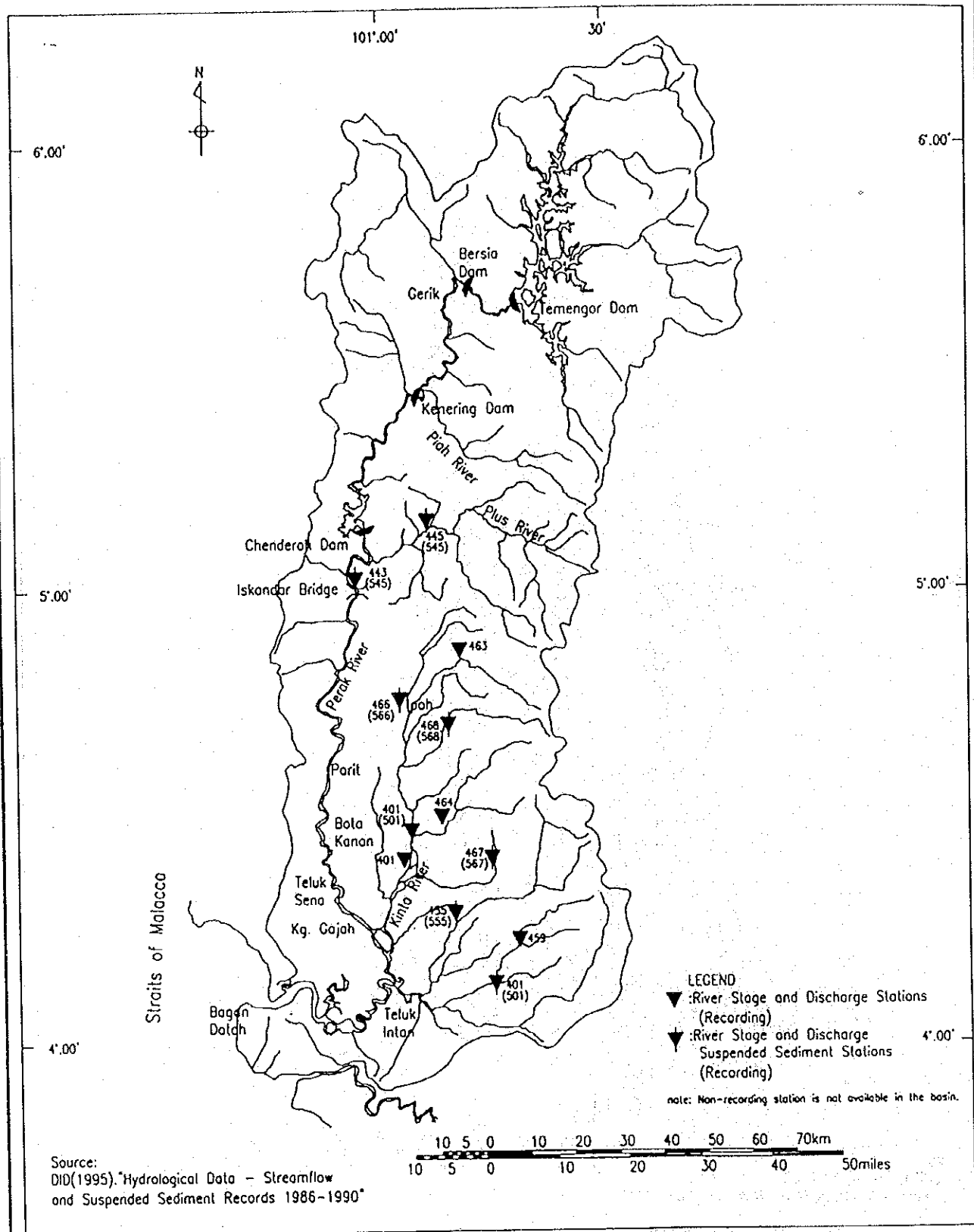


Prepared by G.I.S. Section on 5th June 1997

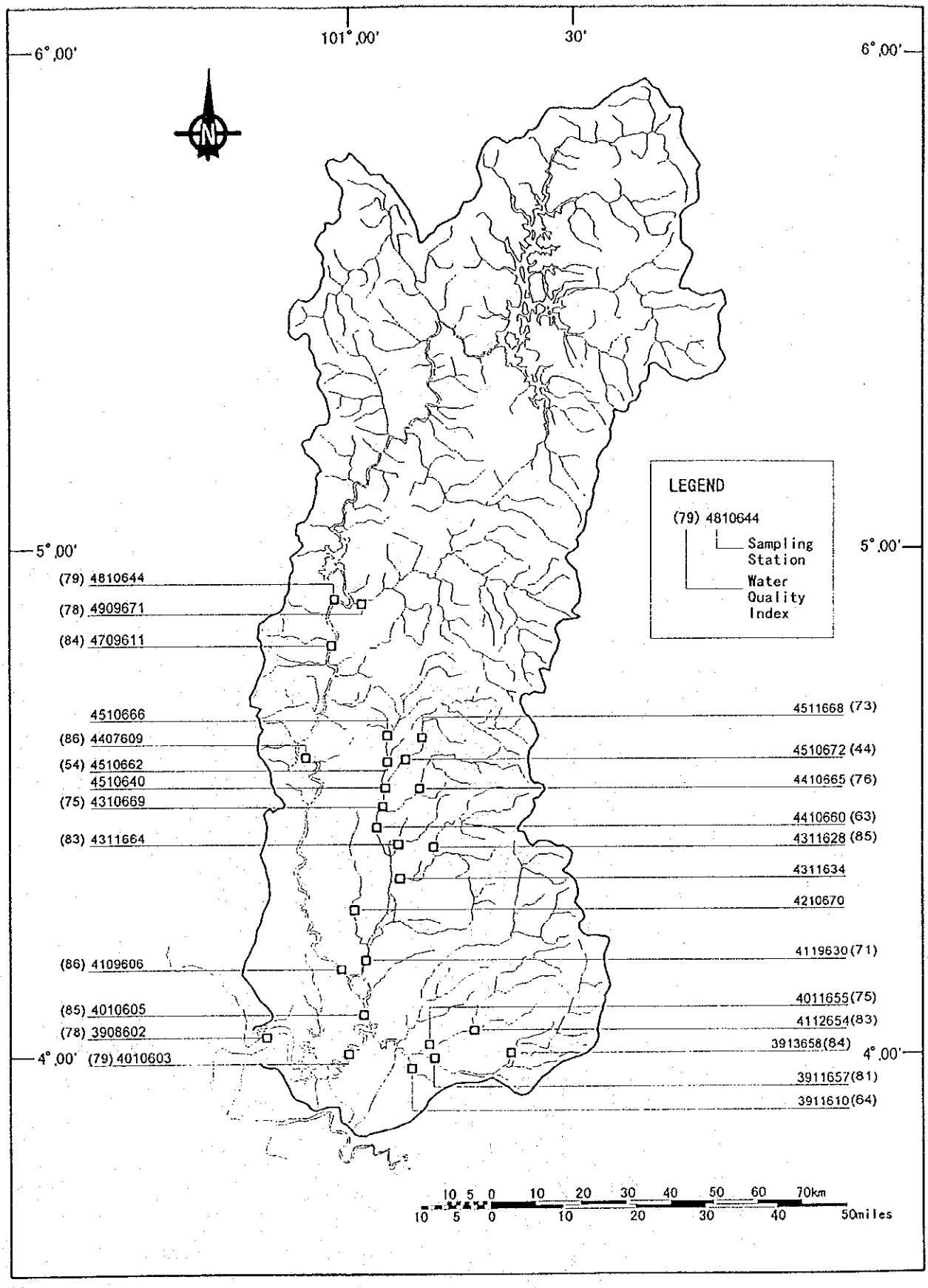
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図2-2　ペラ川流域土地利用状況 (1990年)
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-1　　潅漑排水局による雨量観測所網
JAPAN INTERNATIONAL COOPERATION AGENCY	

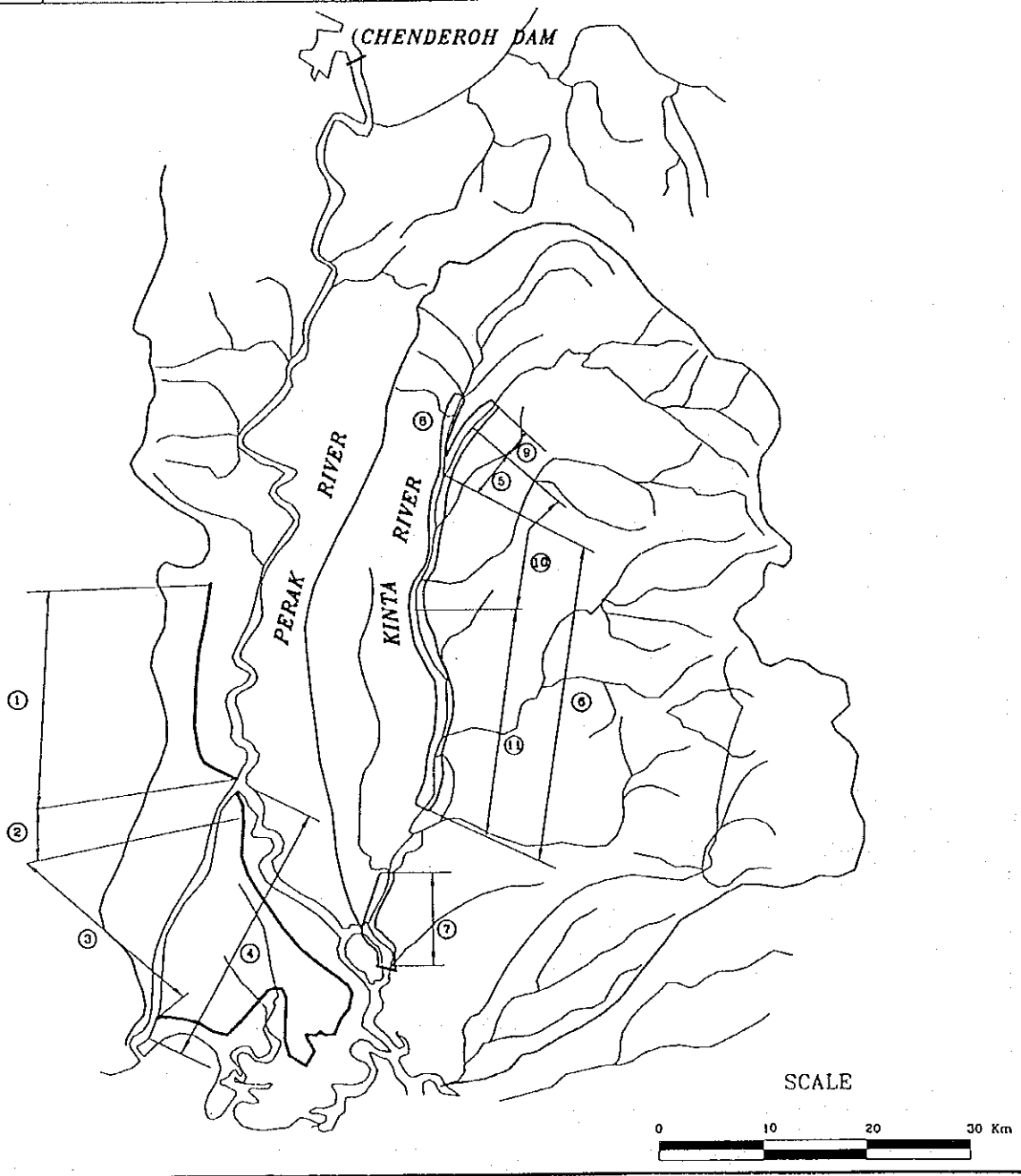


THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-2 灌漑排水局による河川水位・流量、流送土砂観測所
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図4-3　環境局よる水質サンプリング地点と測定された水質インデックス

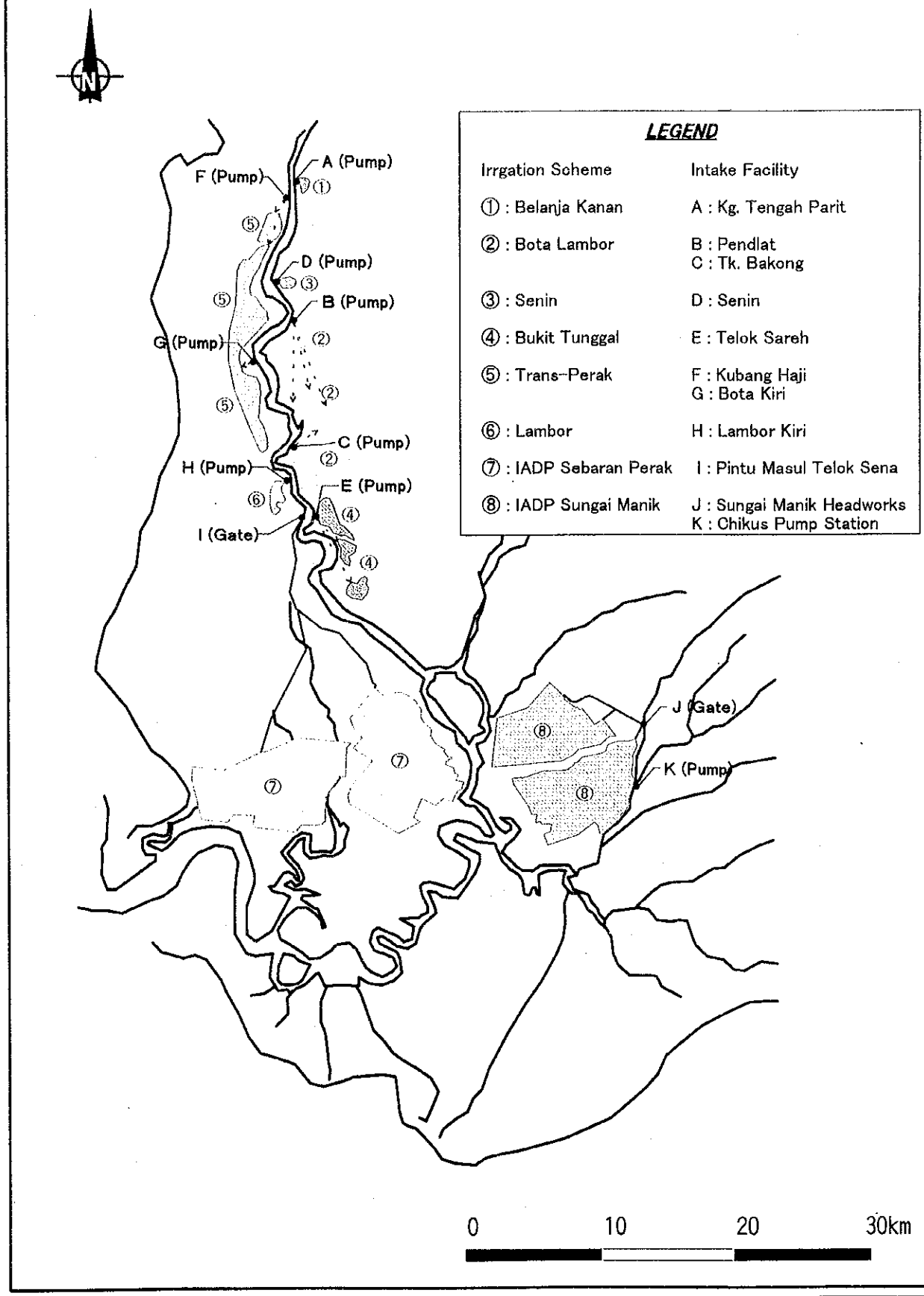
River	No.	Name of Scheme	Existing/ Proposed
Perak	①	Tran-Perak Stage IV Embankment	Existing
	②	Lambor Kiri Embankment	Existing
	③	Stage 1 Drain Embankment	Existing
	④	Perak Flood Bypass	Proposed
Kinta	⑤	Ipoh Flood Mitigation Scheme	Existing
	⑥	Kinta Conservancy Scheme	Existing
	⑦	Malaysia Mining Company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



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

JAPAN INTERNATIONAL COOPERATION AGENCY

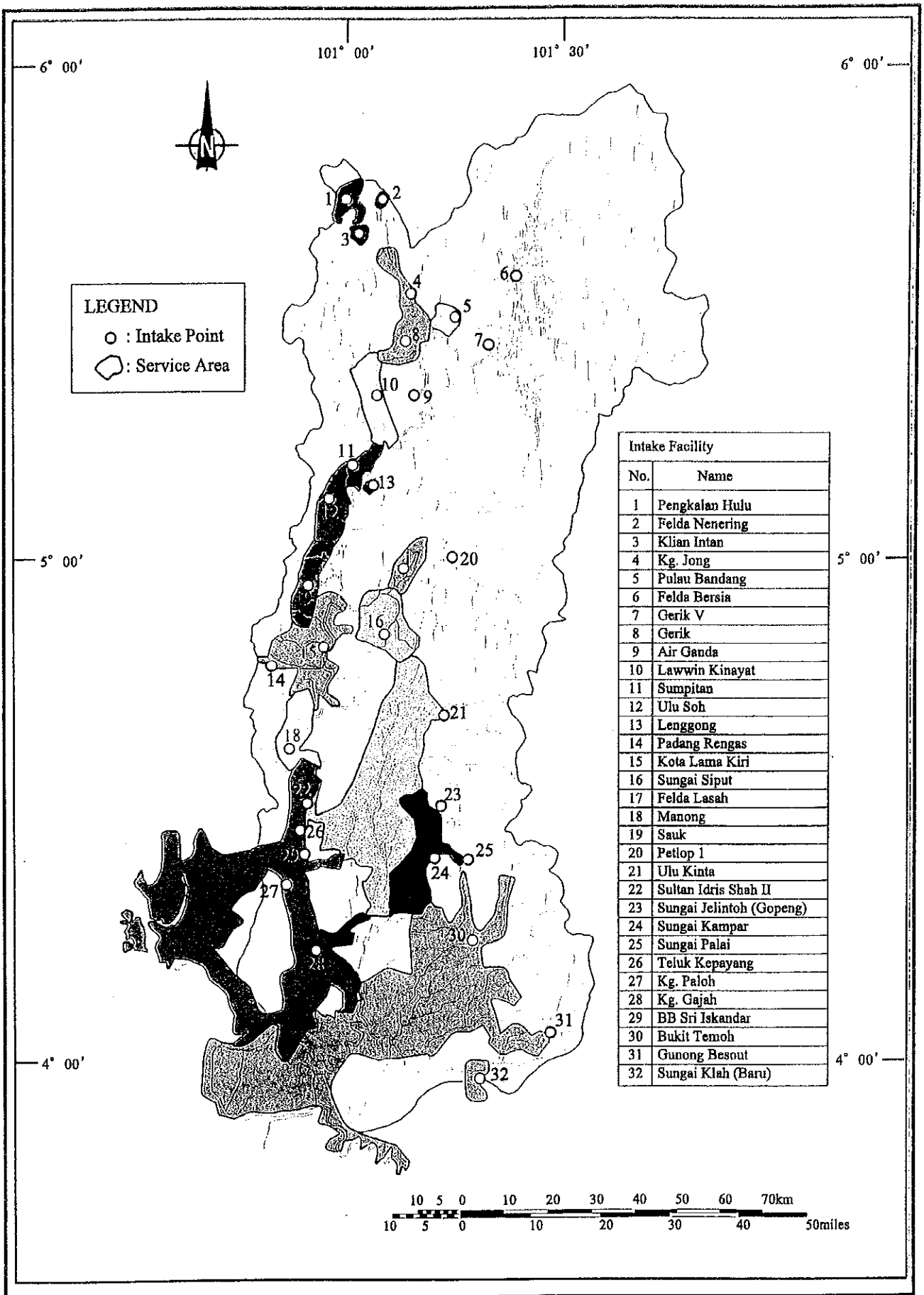
図4-4　現況および計画洪水防御施設



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

JAPAN INTERNATIONAL COOPERATION AGENCY

図4-5　灌漑施設および対象区域

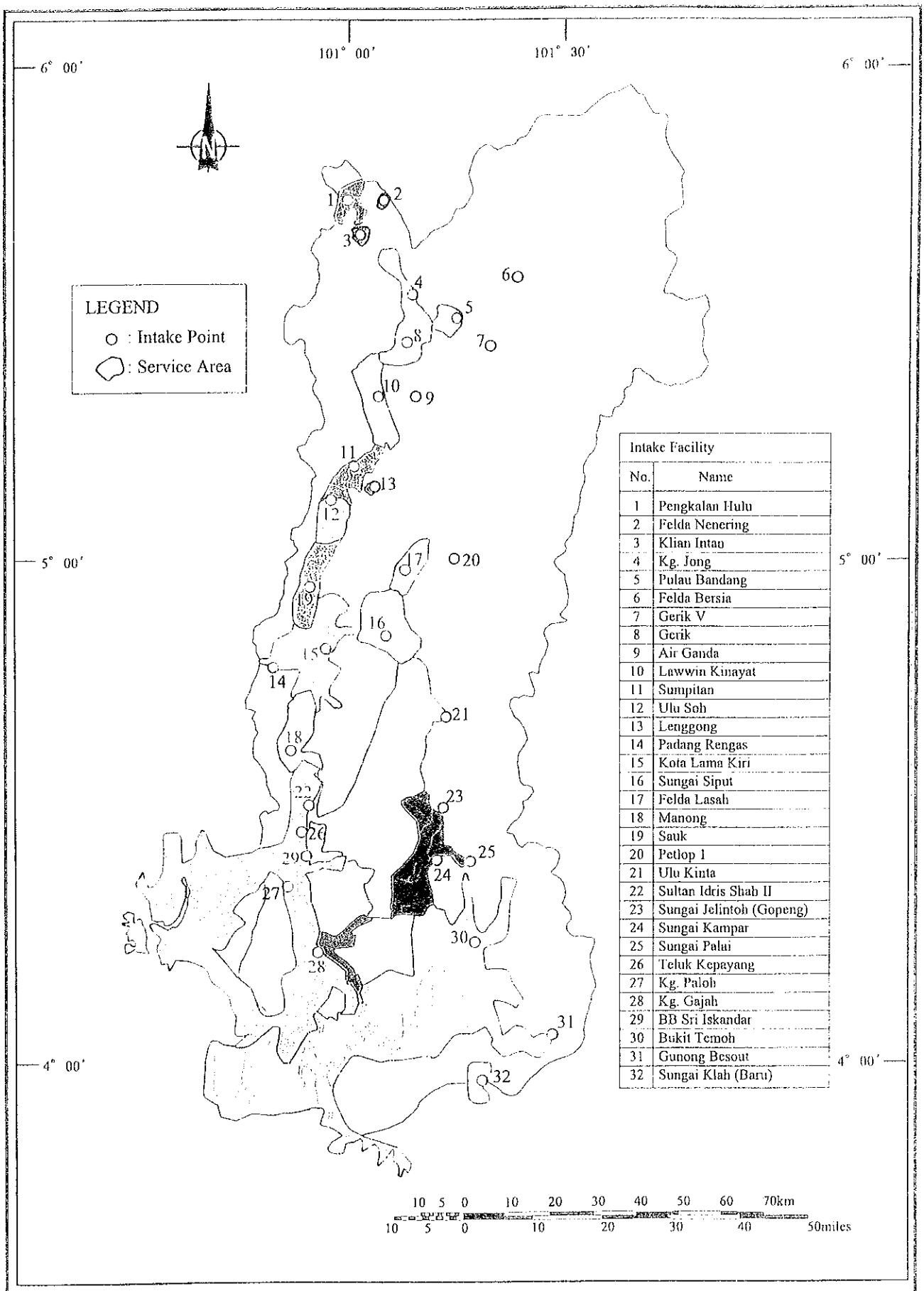


Intake Facility	
No.	Name
1	Pengkalan Hulu
2	Felda Nenering
3	Klian Intan
4	Kg. Jong
5	Pulau Bandang
6	Felda Bersia
7	Gerik V
8	Gerik
9	Air Ganda
10	Lawwin Kinayat
11	Sumpitan
12	Ulu Soh
13	Lenggong
14	Padang Rengas
15	Kota Lama Kiri
16	Sungai Siput
17	Felda Lasah
18	Manong
19	Sauk
20	Petlop 1
21	Ulu Kinta
22	Sultan Idris Shah II
23	Sungai Jelintoh (Gopeng)
24	Sungai Kampar
25	Sungai Palai
26	Teluk Kepayang
27	Kg. Paloh
28	Kg. Gajah
29	BB Sri Iskandar
30	Bukit Temoh
31	Gunong Besout
32	Sungai Klah (Baru)

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

JAPAN INTERNATIONAL COOPERATION AGENCY

図4-6　上工水供給のための取水施設と配水区域

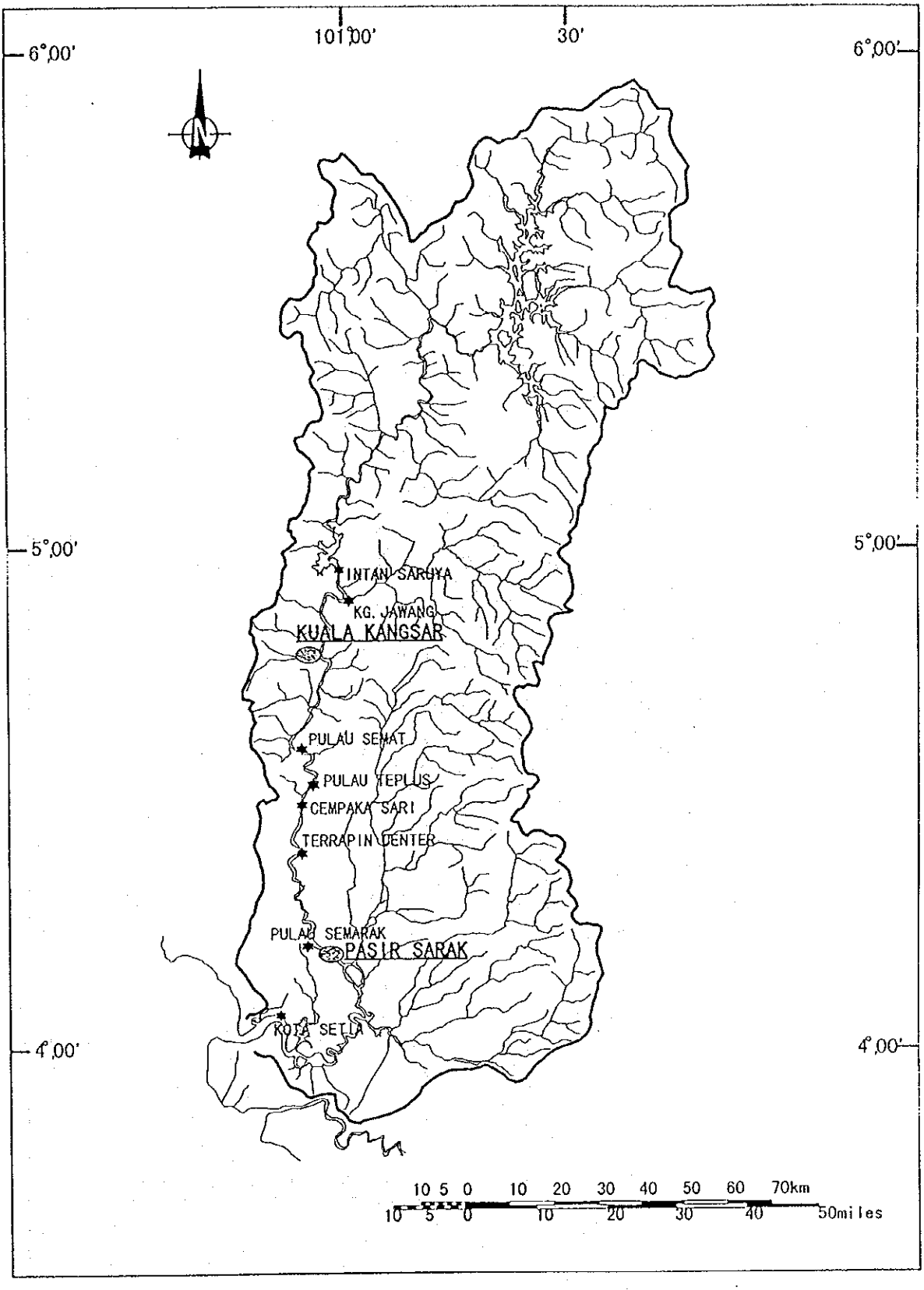


Intake Facility	
No.	Name
1	Pengkalan Hulu
2	Felda Nenering
3	Klian Intan
4	Kg. Jong
5	Pulau Bandang
6	Felda Bersia
7	Gerik V
8	Gerik
9	Air Ganda
10	Lawwin Kinayat
11	Sumpitan
12	Ulu Soh
13	Lenggong
14	Padang Rengas
15	Kota Lama Kiri
16	Sungai Siput
17	Felda Lasah
18	Manong
19	Sauk
20	Petlop 1
21	Ulu Kinta
22	Sultan Idris Shah II
23	Sungai Jelintoh (Gopeng)
24	Sungai Kampar
25	Sungai Palai
26	Teluk Kepayang
27	Kg. Paloh
28	Kg. Gajah
29	BB Sri Iskandar
30	Bukit Temoh
31	Gunong Besout
32	Sungai Klah (Baru)

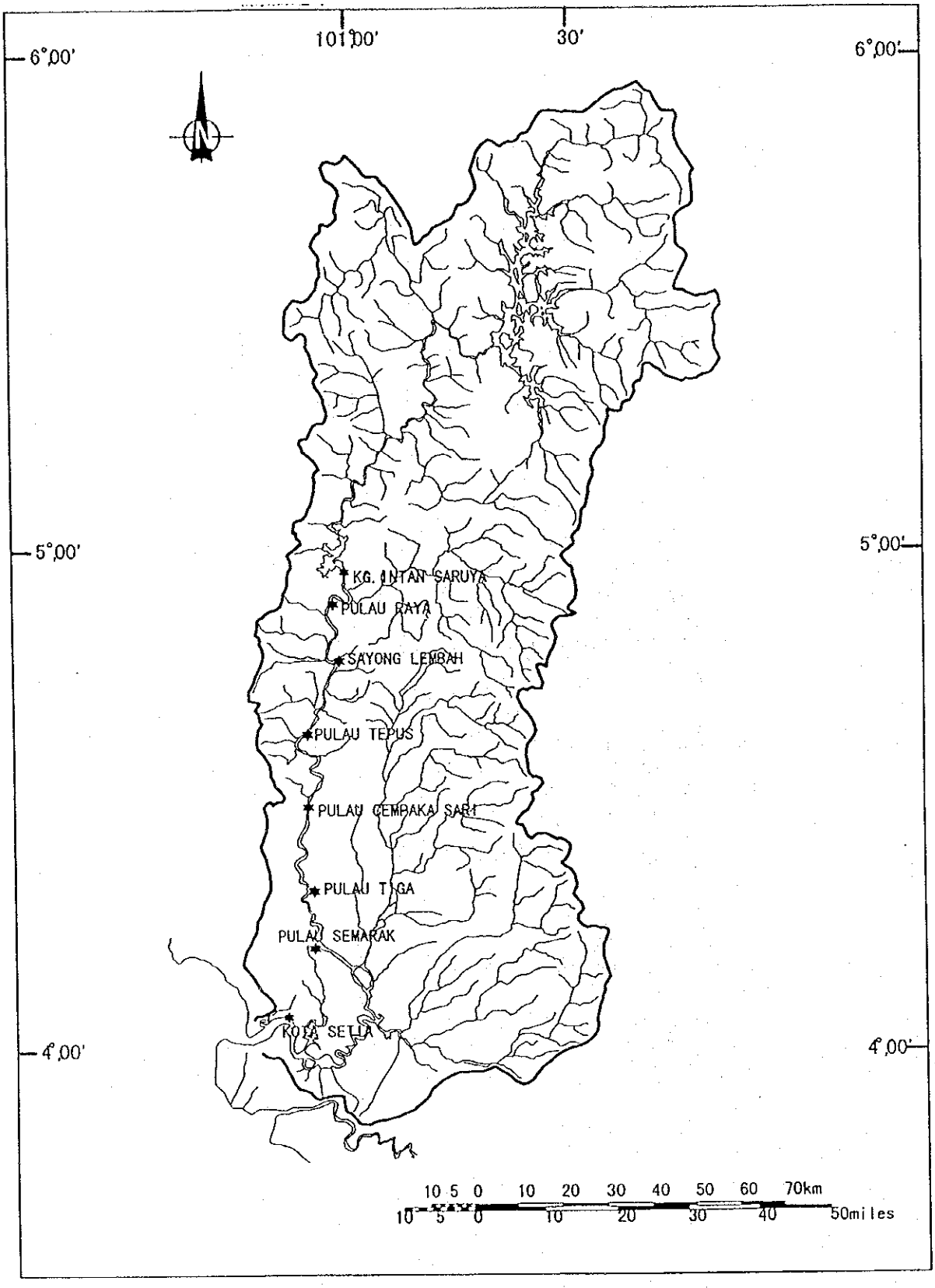
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

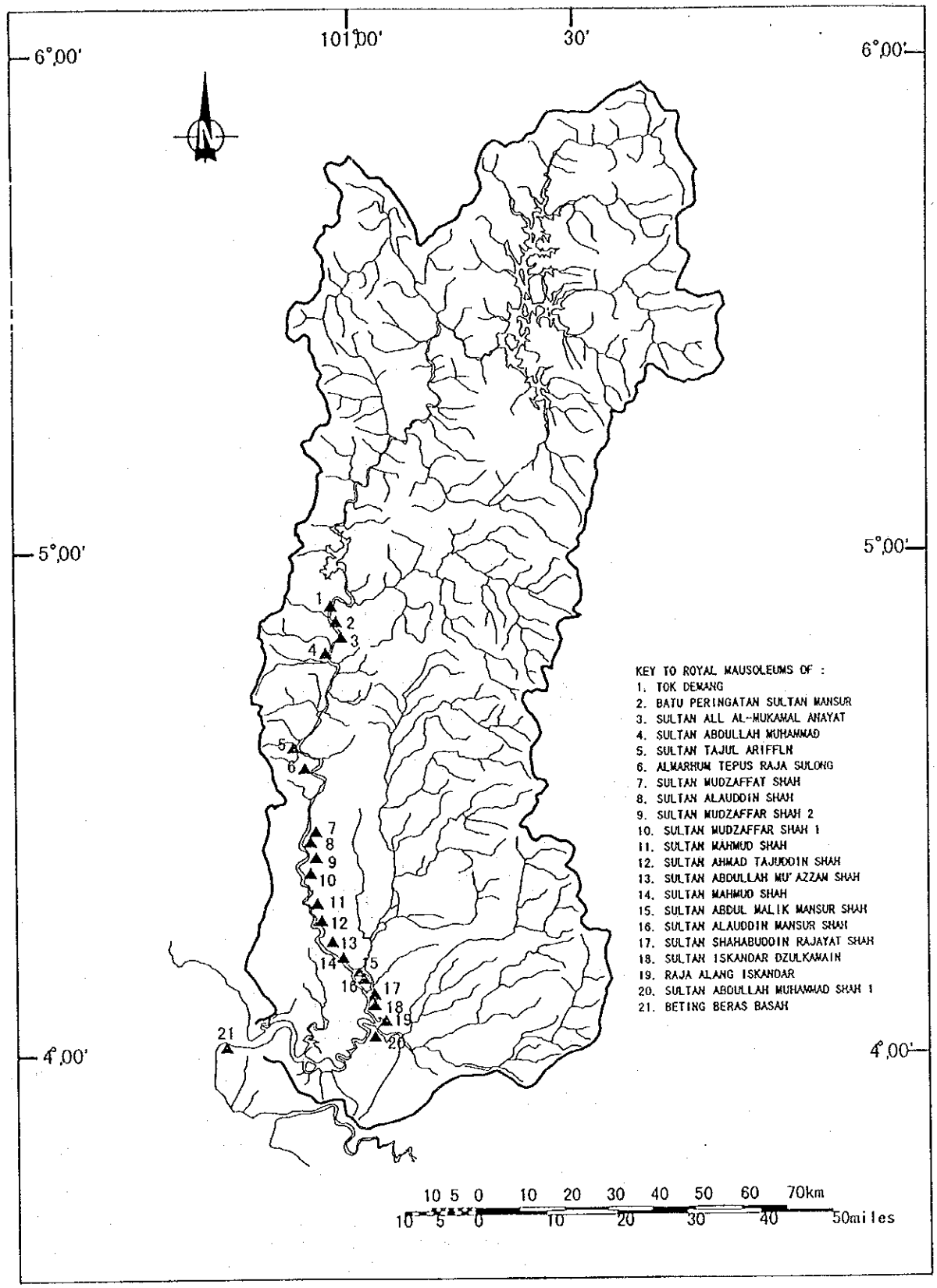
図4-6　上工水供給のための取水施設と配水区域



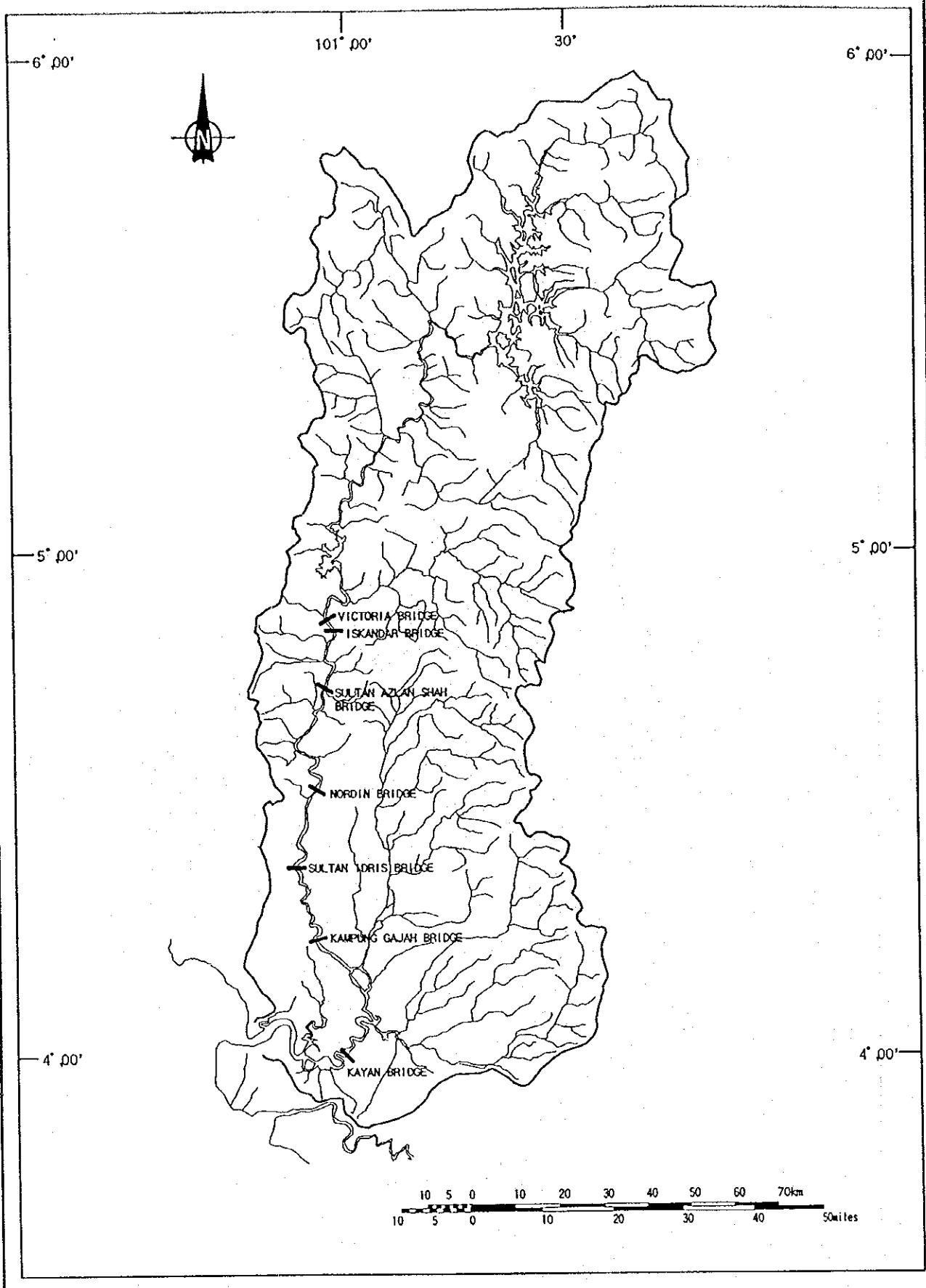
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-7　河川公園位置図
JAPAN INTERNATIONAL COOPERATION AGENCY	



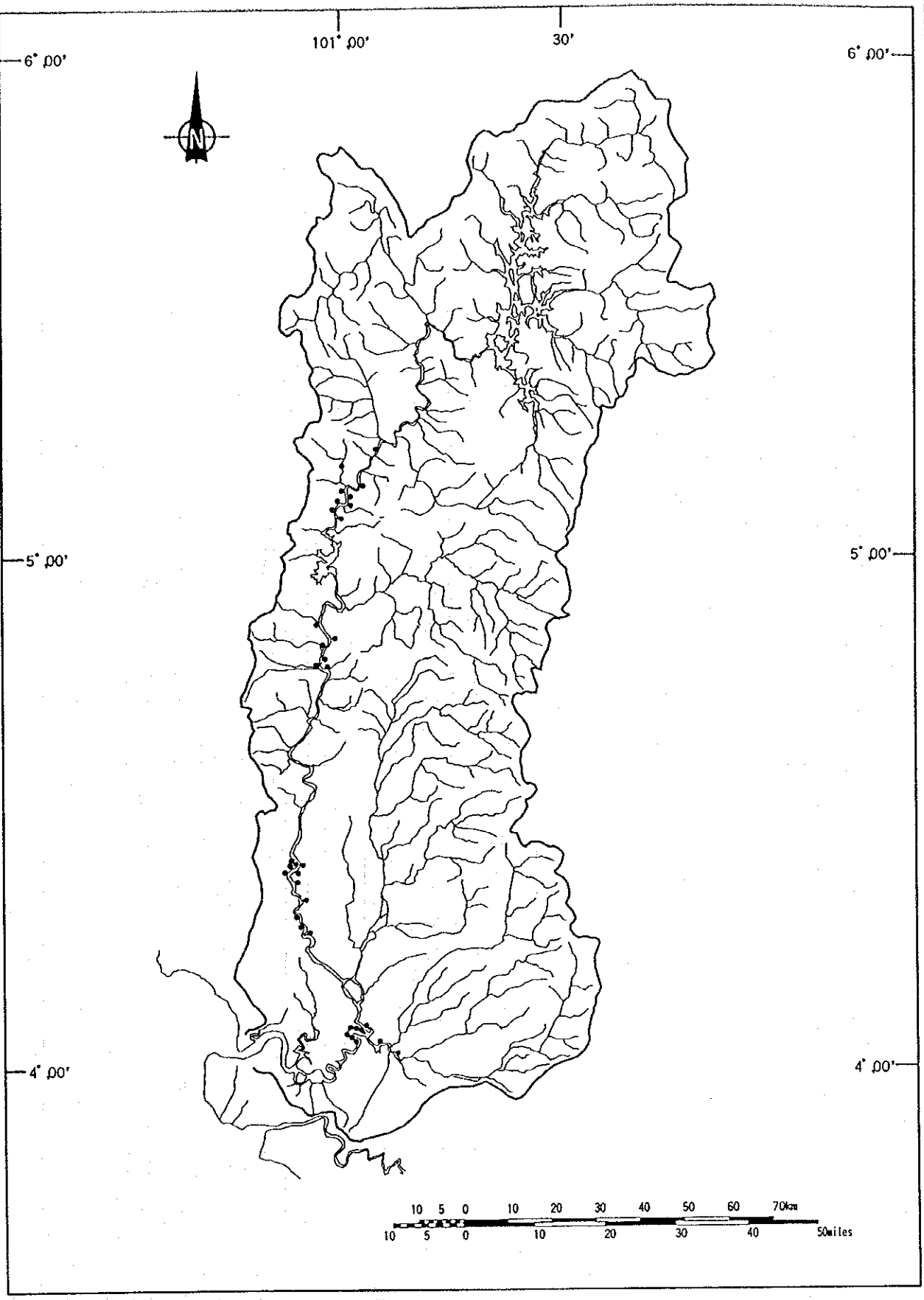
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-8　キャンプ場位置図
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-9　霊廟位置図
JAPAN INTERNATIONAL COOPERATION AGENCY	



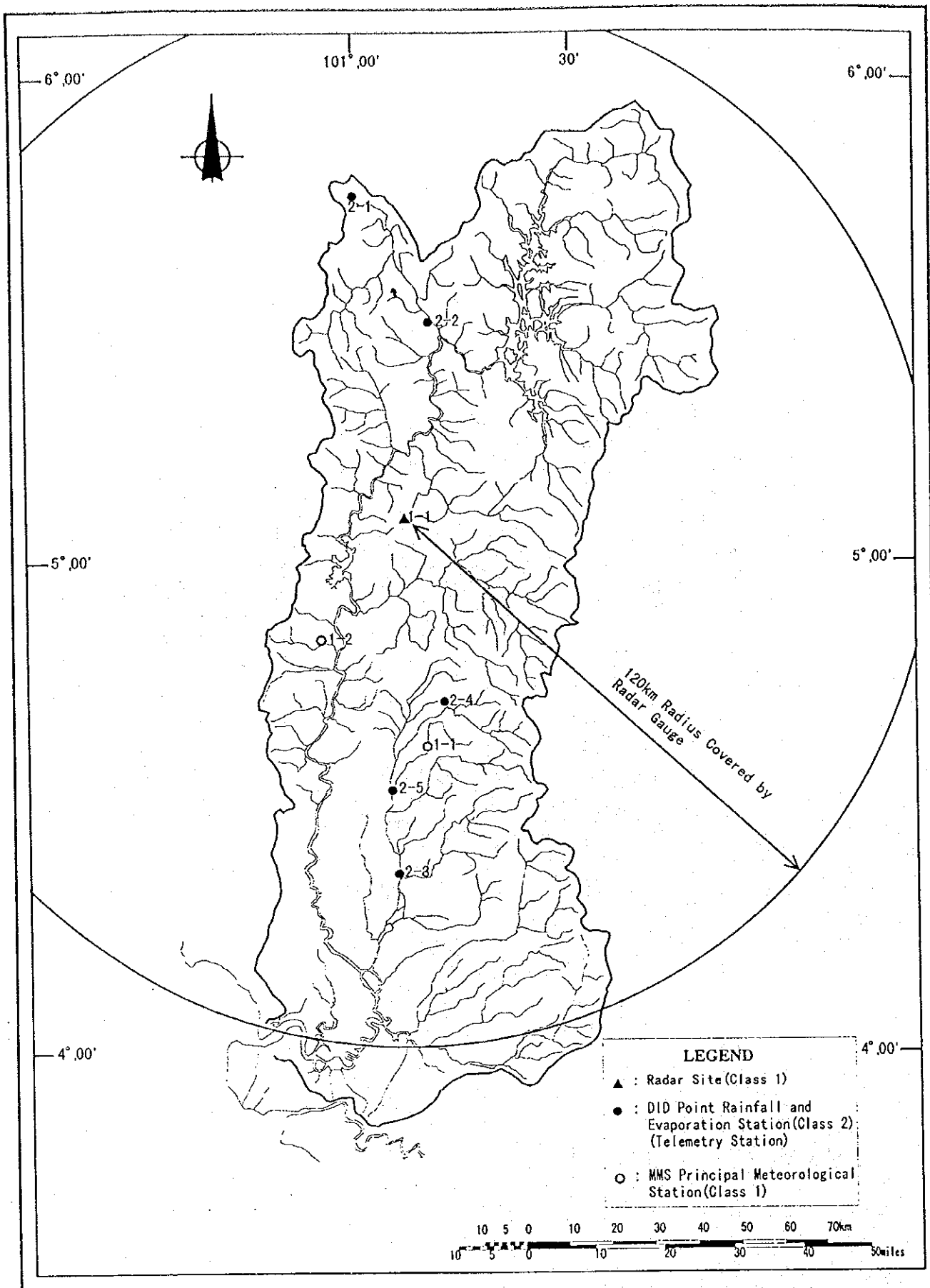
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-10　主要橋梁位置図
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図4-11　砂利採取地点位置図
JAPAN INTERNATIONAL COOPERATION AGENCY	

THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図5-1　アグロリンクの概要
JAPAN INTERNATIONAL COOPERATION AGENCY	

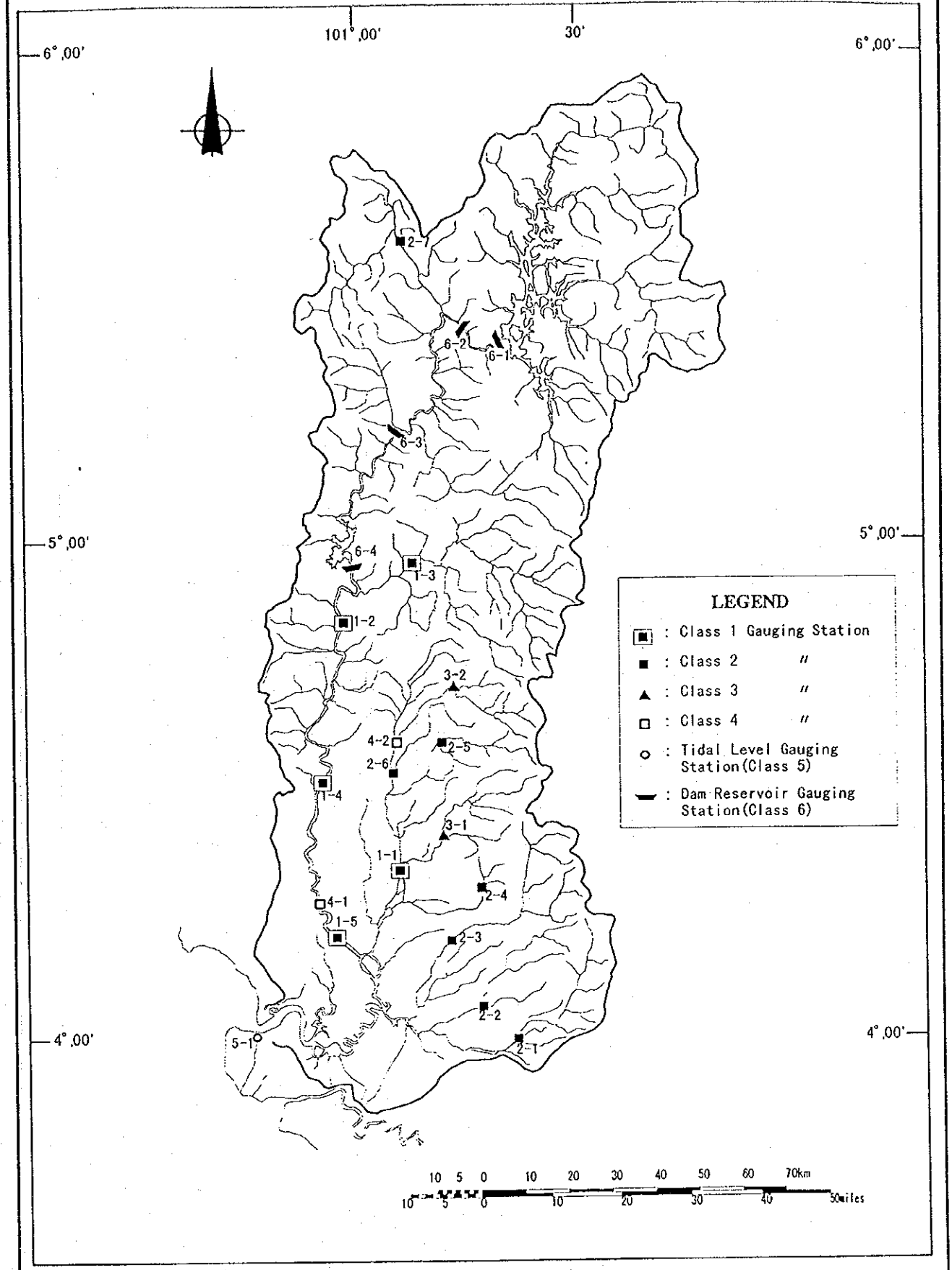
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図6-1　河川流域情報システム全体構想
JAPAN INTERNATIONAL COOPERATION AGENCY	



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

JAPAN INTERNATIONAL COOPERATION AGENCY

図6-2　マスタープランにおける雨量観測網の整備構想



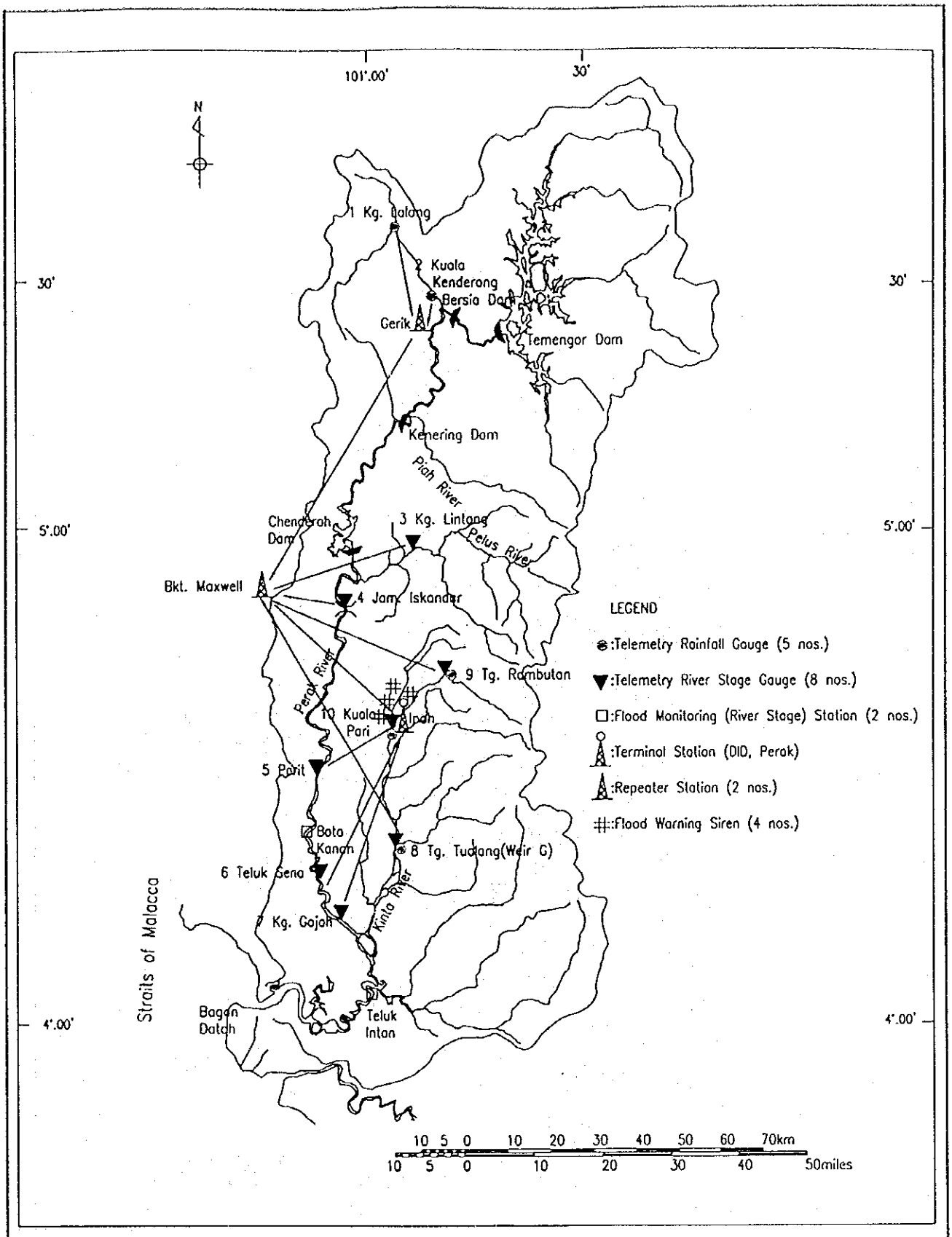
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図6-3　マスタープランにおける河川水位・流量および流送土砂観測網の整備構想
JAPAN INTERNATIONAL COOPERATION AGENCY	

Items to be Estbalished	8th MP (2001-2005)	9th MP (2006-2010)	10th MP (2011-2015)	11th MP (2016-2020)
1. Gauging/Monitoring System				
(1) Water stage gauging (expansion of the existing netwok)	●			
(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) Maltiplex radio wave system (for radar rainfall gauge)			●	
(4) Optical fiber network (within Perak river nasin)				●

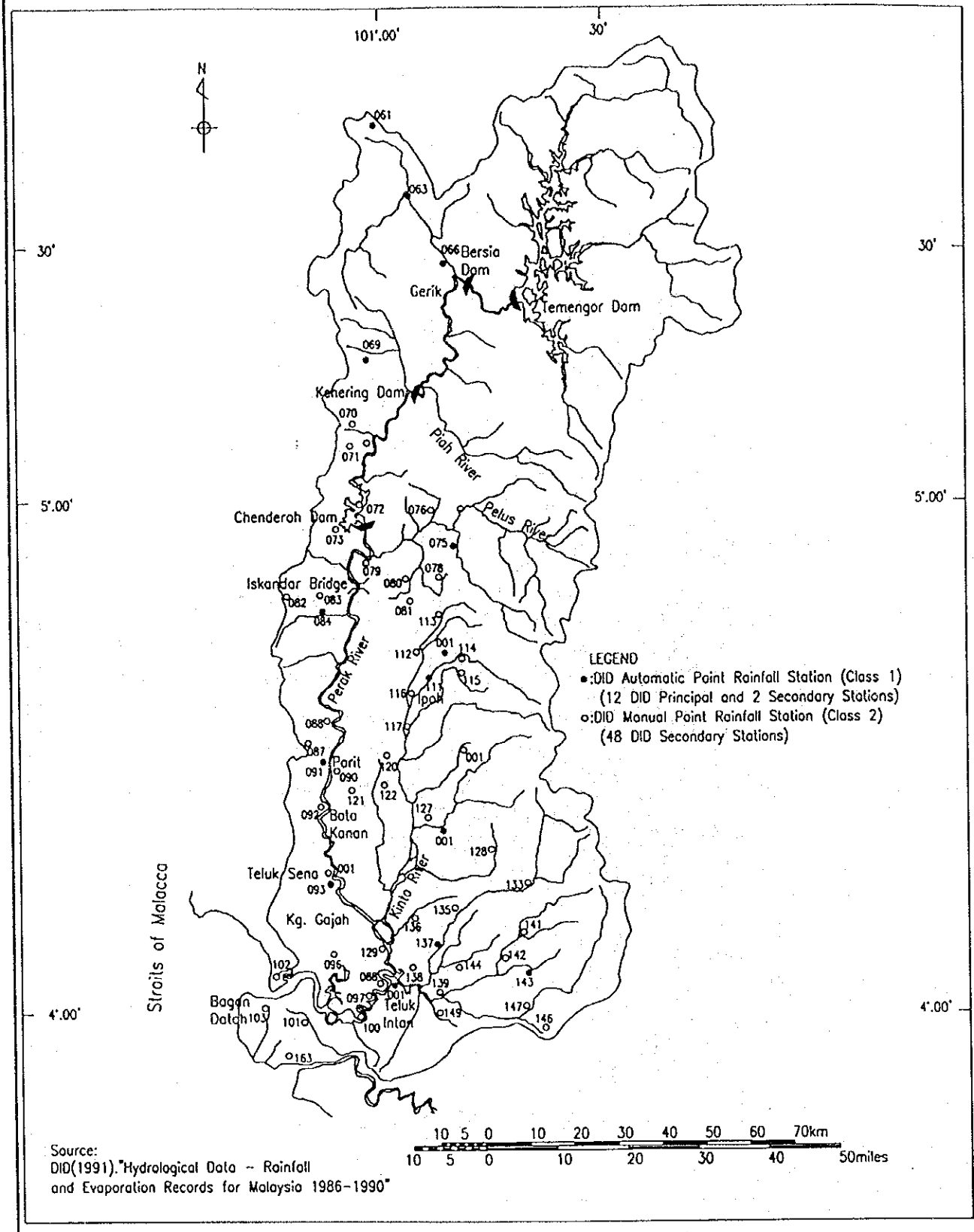
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

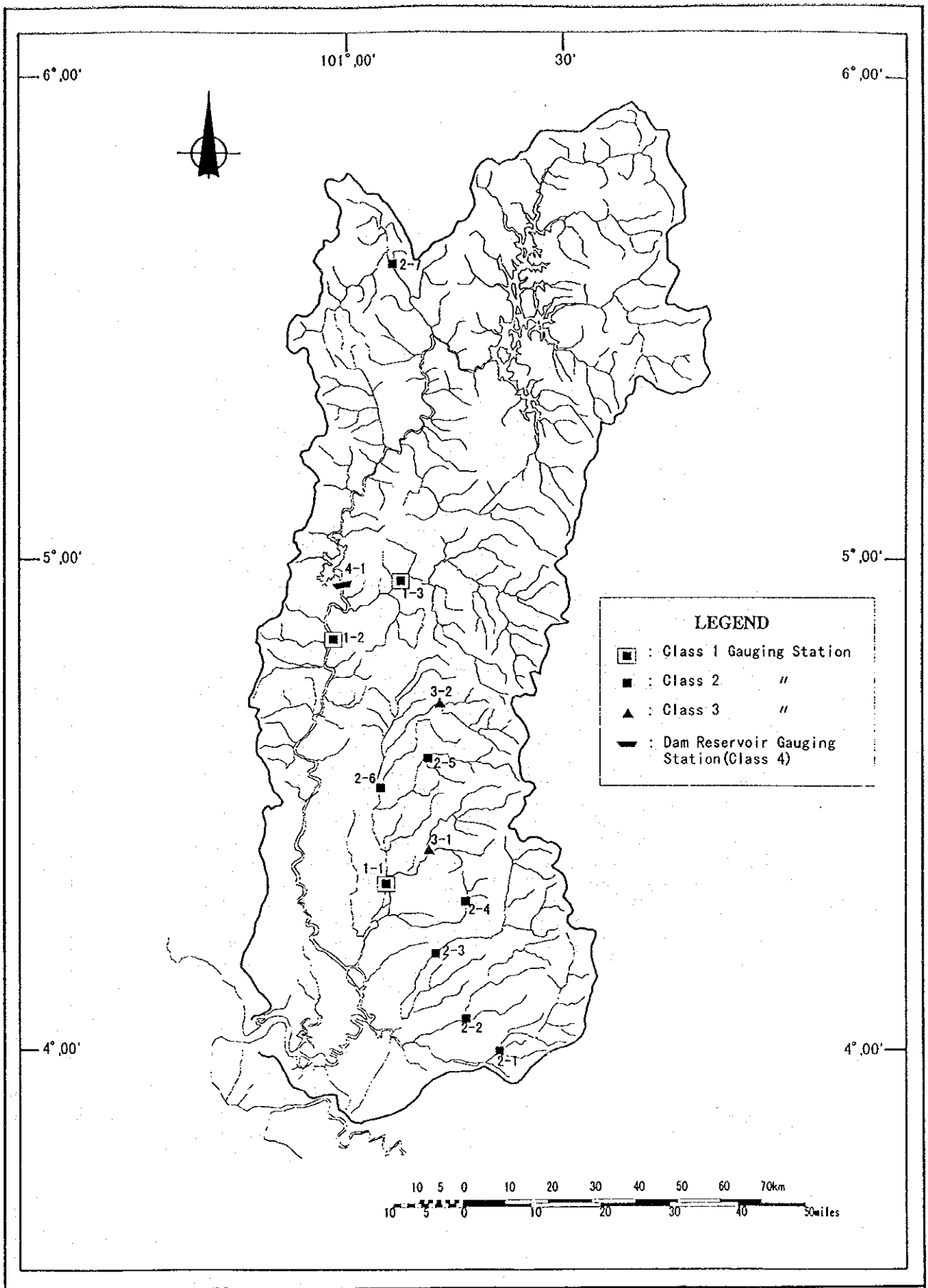
図6-4　事業実施計画



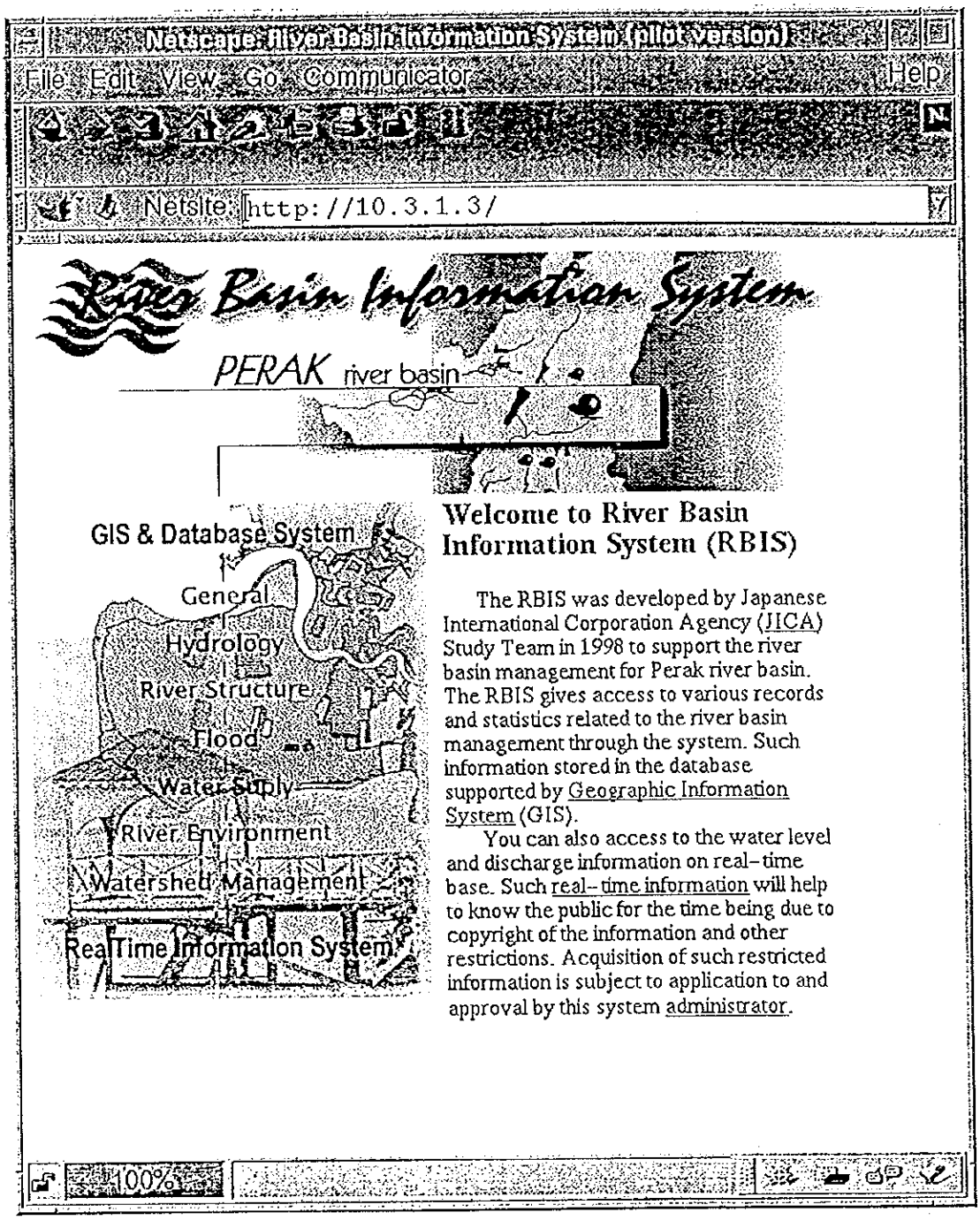
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図7-1　試験運用システムに取り込む リアルタイム系の水文観測システム



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図7-2 試験運用システムに取り込む ノン・リアルタイム系の雨量観測システム
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図7-3 試験運用システムに取り込むノン・リアルタイム系の水位観測システム
JAPAN INTERNATIONAL COOPERATION AGENCY	

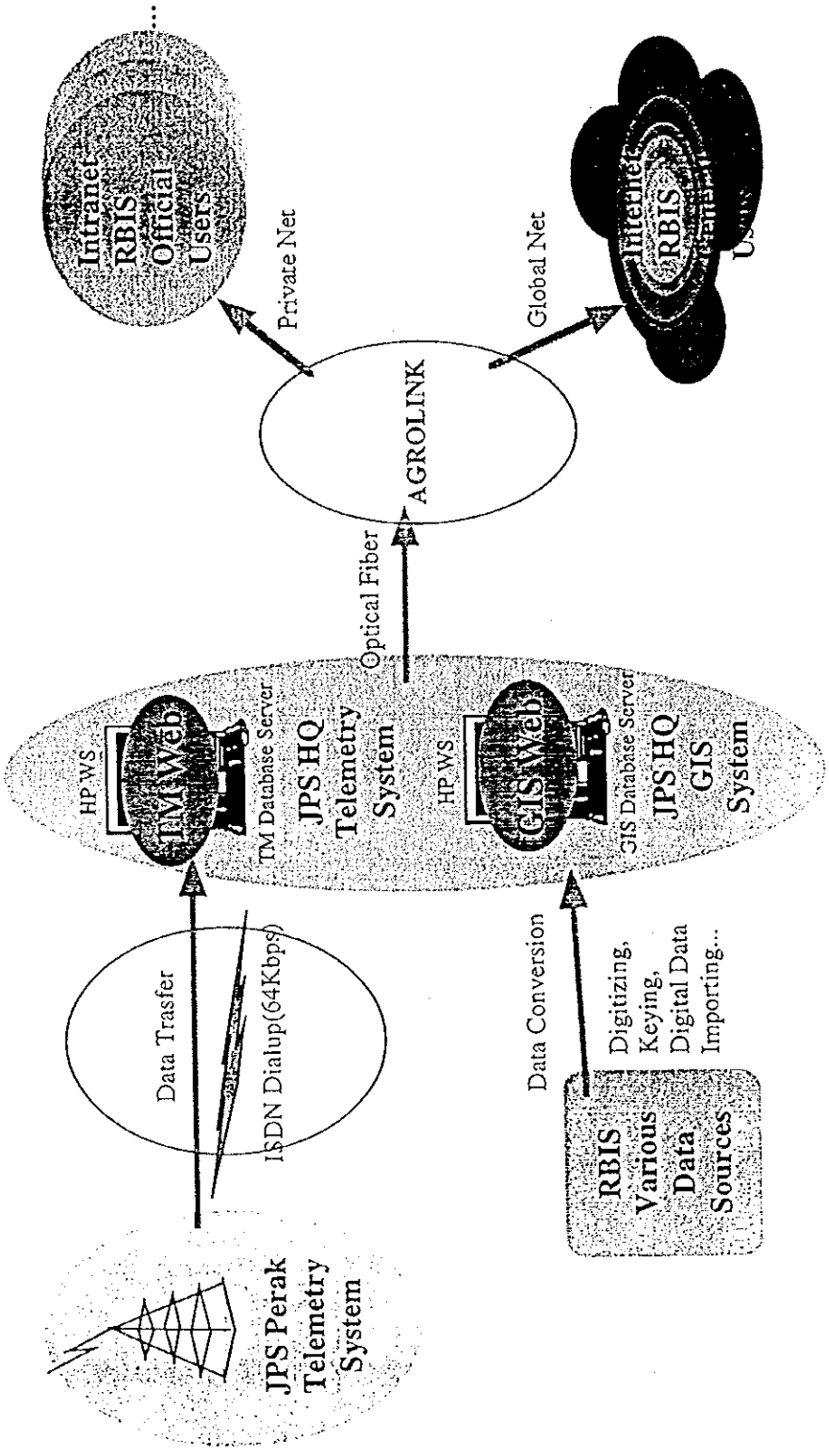


THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図7-4 GISデータベースのホームページ(メイン)
JAPAN INTERNATIONAL COOPERATION AGENCY	

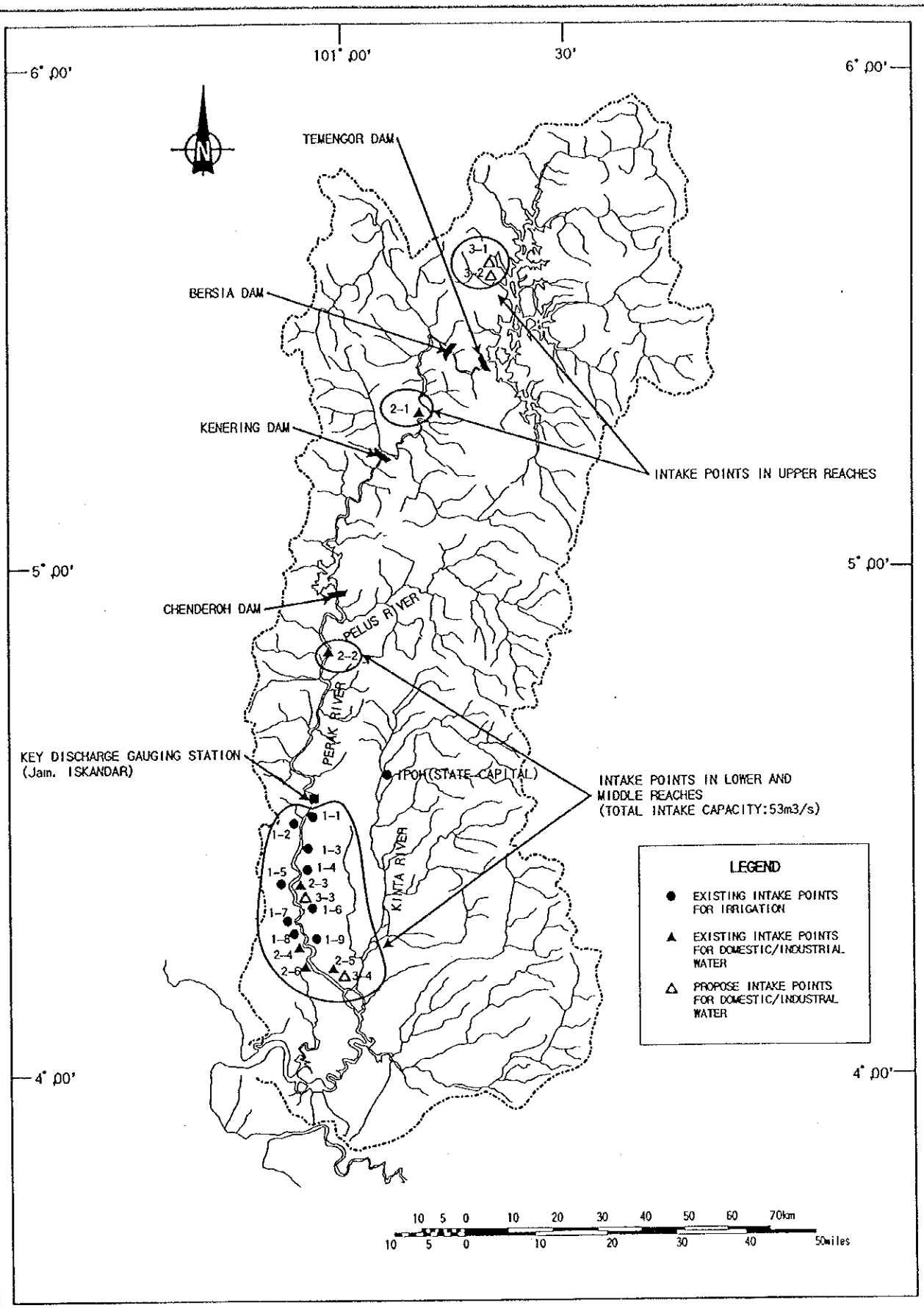
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA

JAPAN INTERNATIONAL COOPERATION AGENCY

図7-5　試験運用システム構築スケジュール



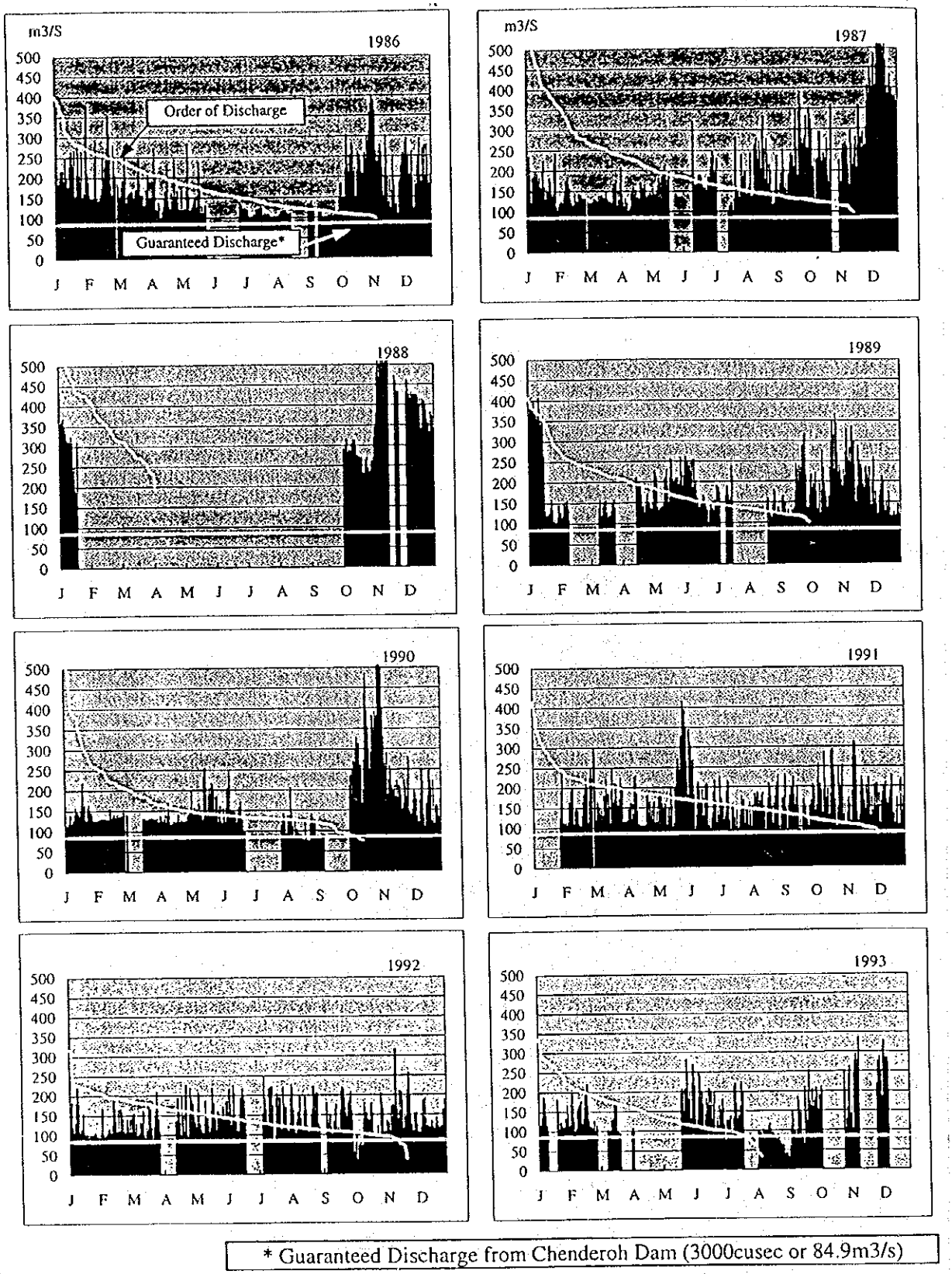
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図7-6　河川流域情報システム構成
JAPAN INTERNATIONAL COOPERATION AGENCY	



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

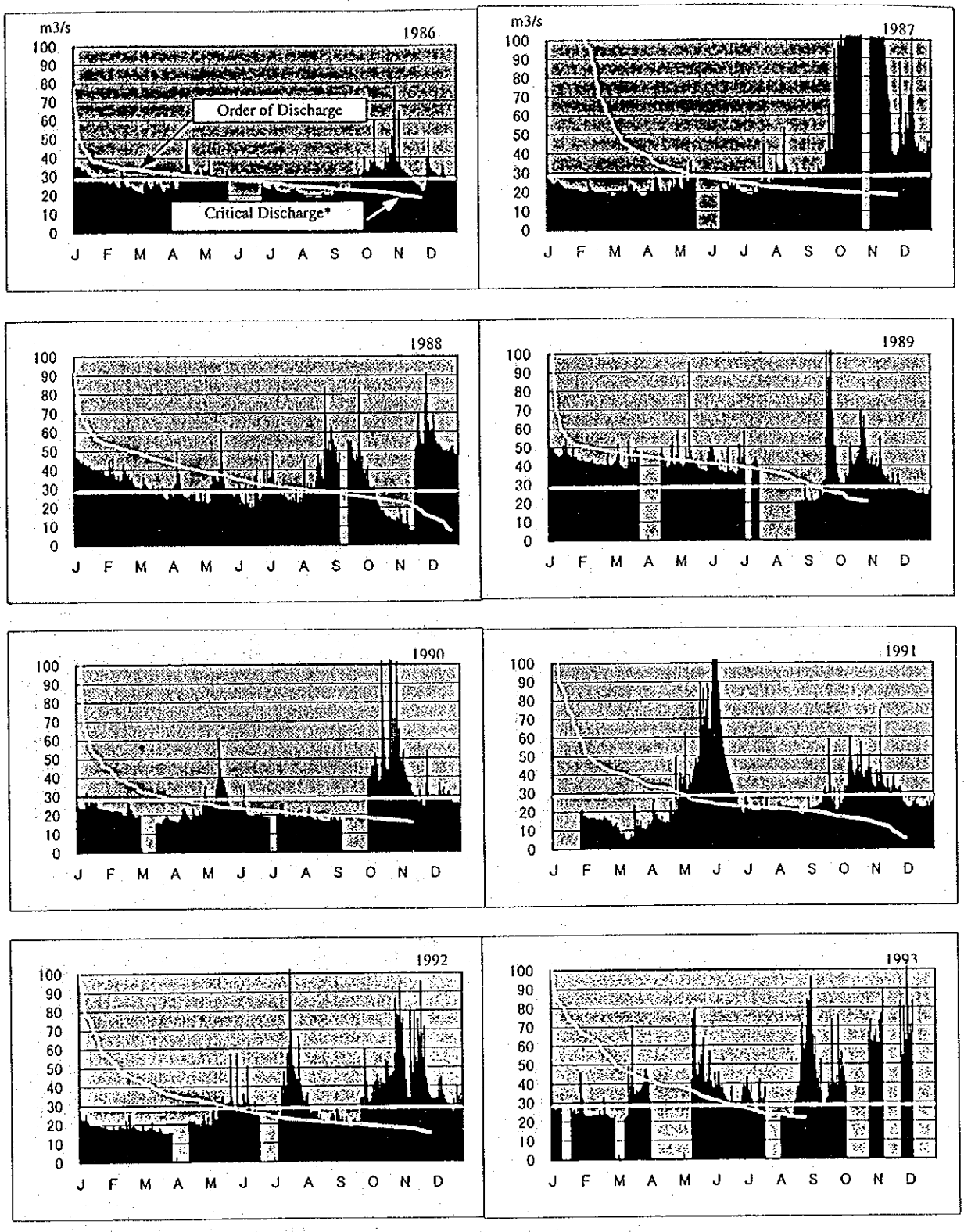
JAPAN INTERNATIONAL COOPERATION AGENCY

図9-1　　ペラ本川沿いの取水施設位置図



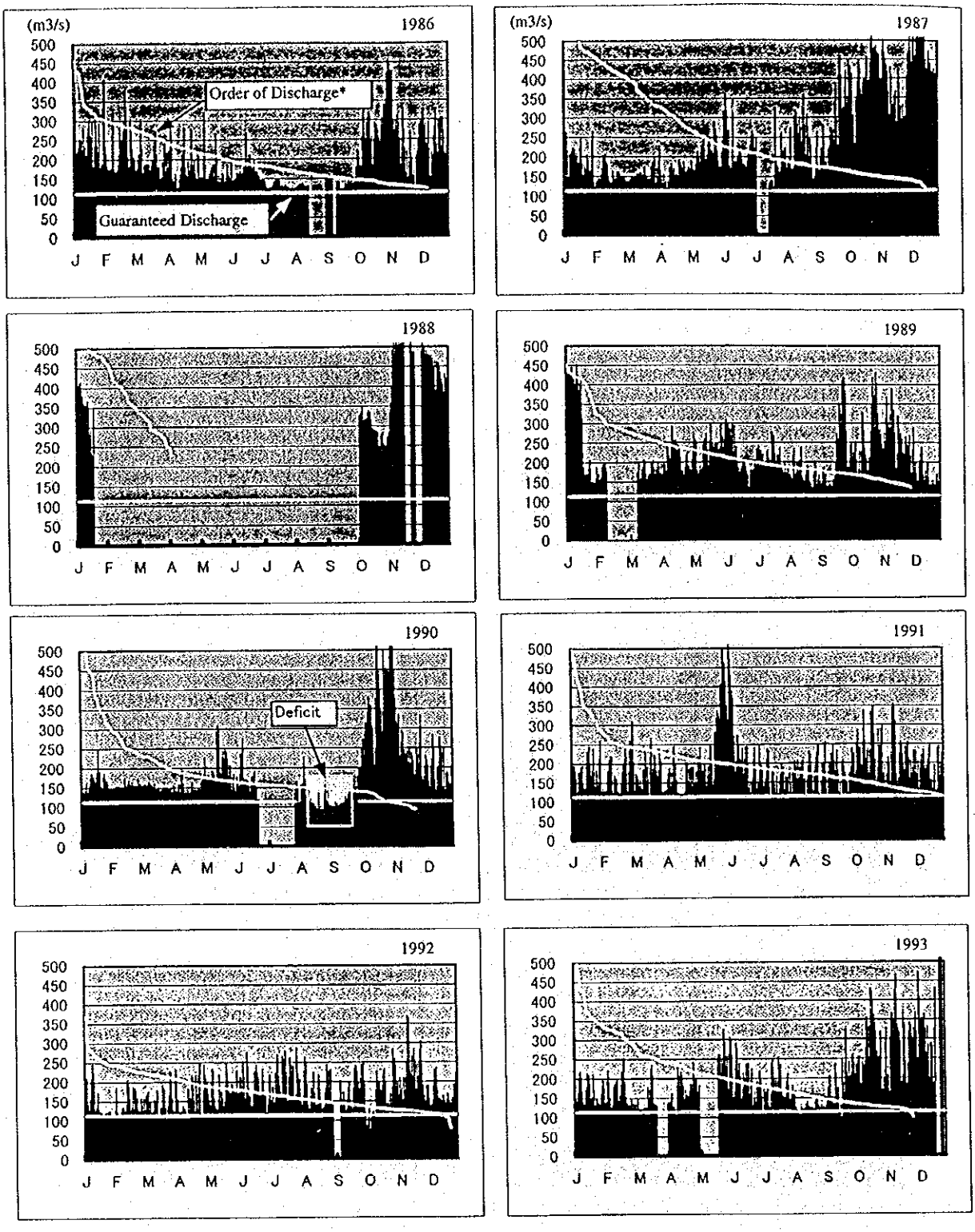
* Guaranteed Discharge from Chenderoh Dam (3000cusec or 84.9m3/s)

THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-2　チェンドロ・ダムからの日平均放流量



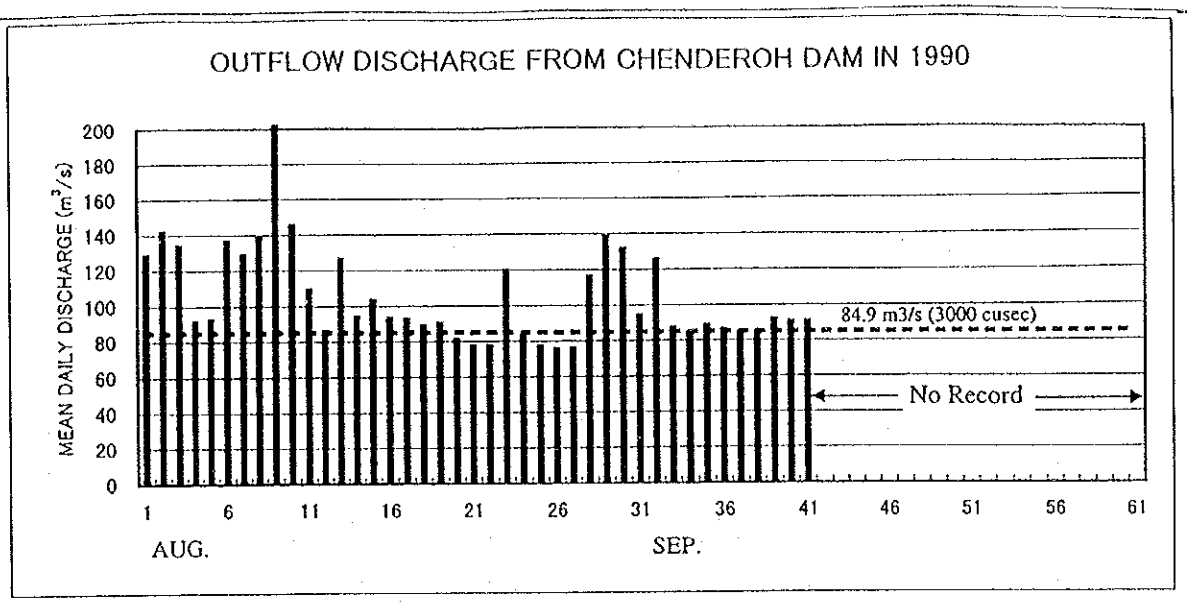
* Critical discharge (1000cusec or 28.3 m3/s) to guarantee the flow discharge at Iskandar Bridge in case of dam outflow of 3000cusec

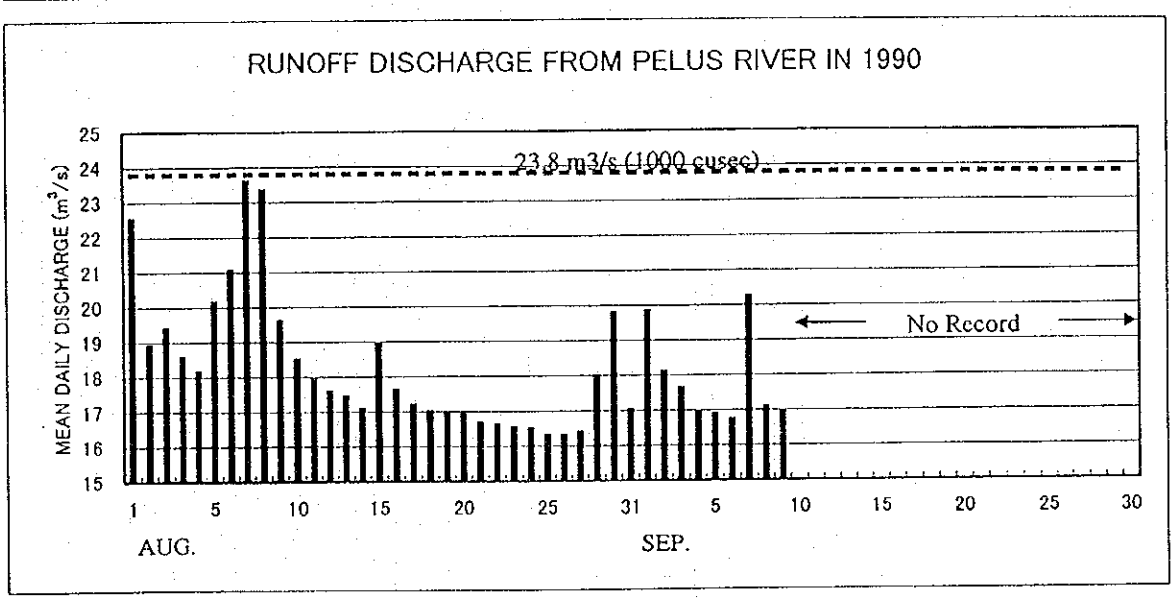
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図9-3　プルス川の日流況
JAPAN INTERNATIONAL COOPERATION AGENCY	

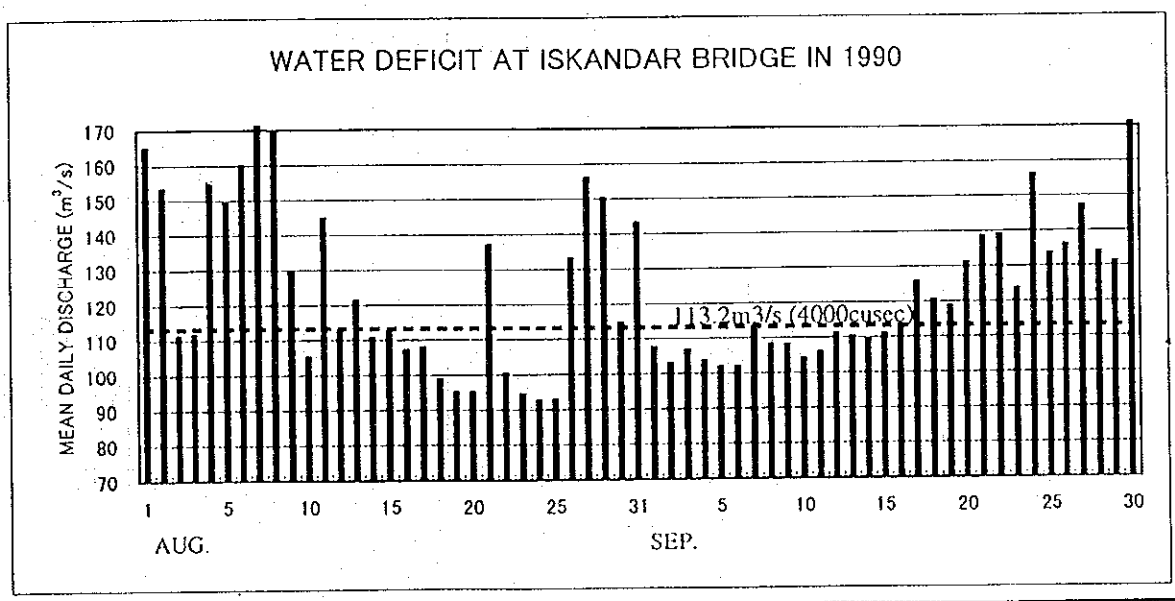


* Guaranteed Discharge at Iskandar Bridge by Chenderoh Dam (4000cosec or 113.2 m3/s)

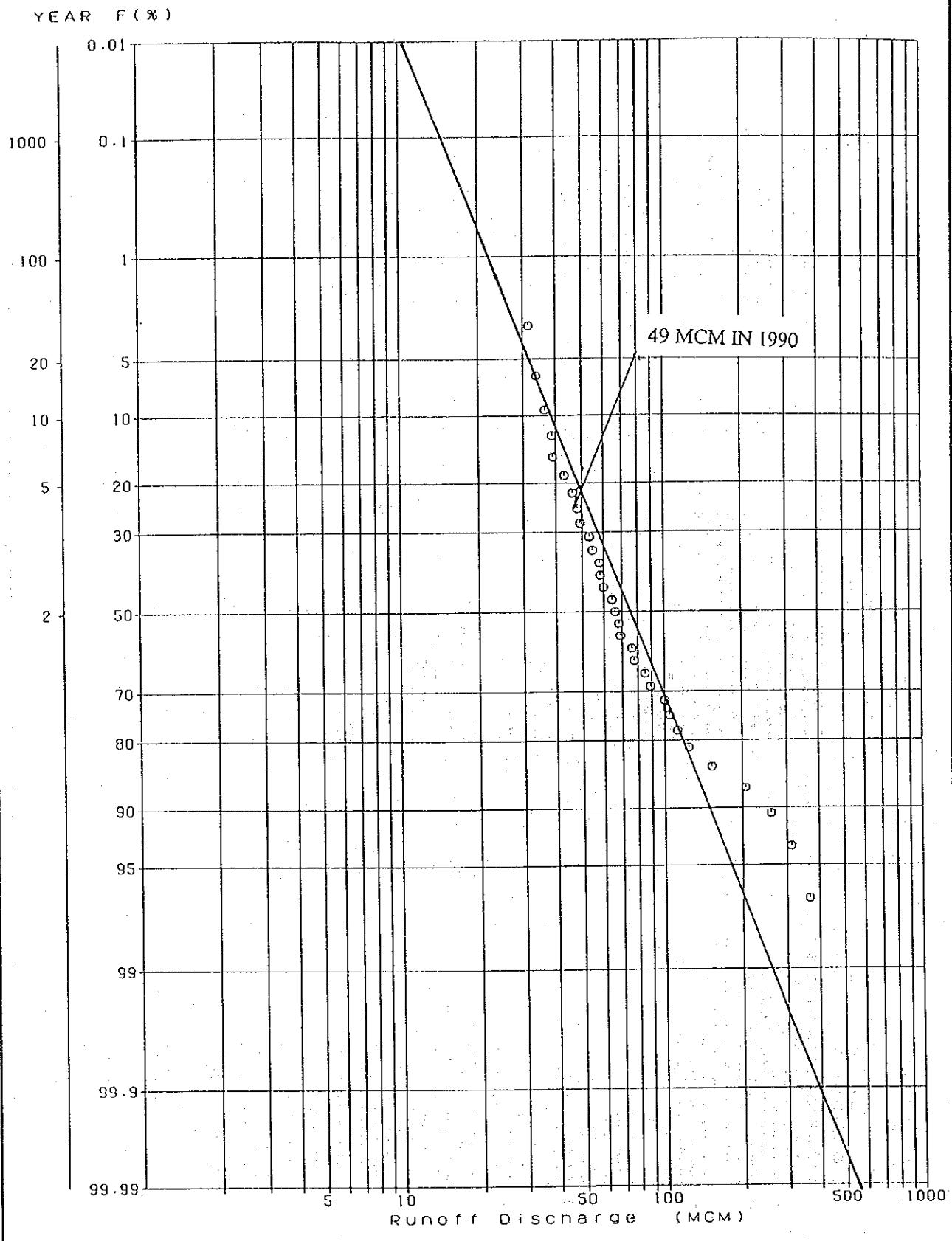
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-4　イスカンダール橋の日流況



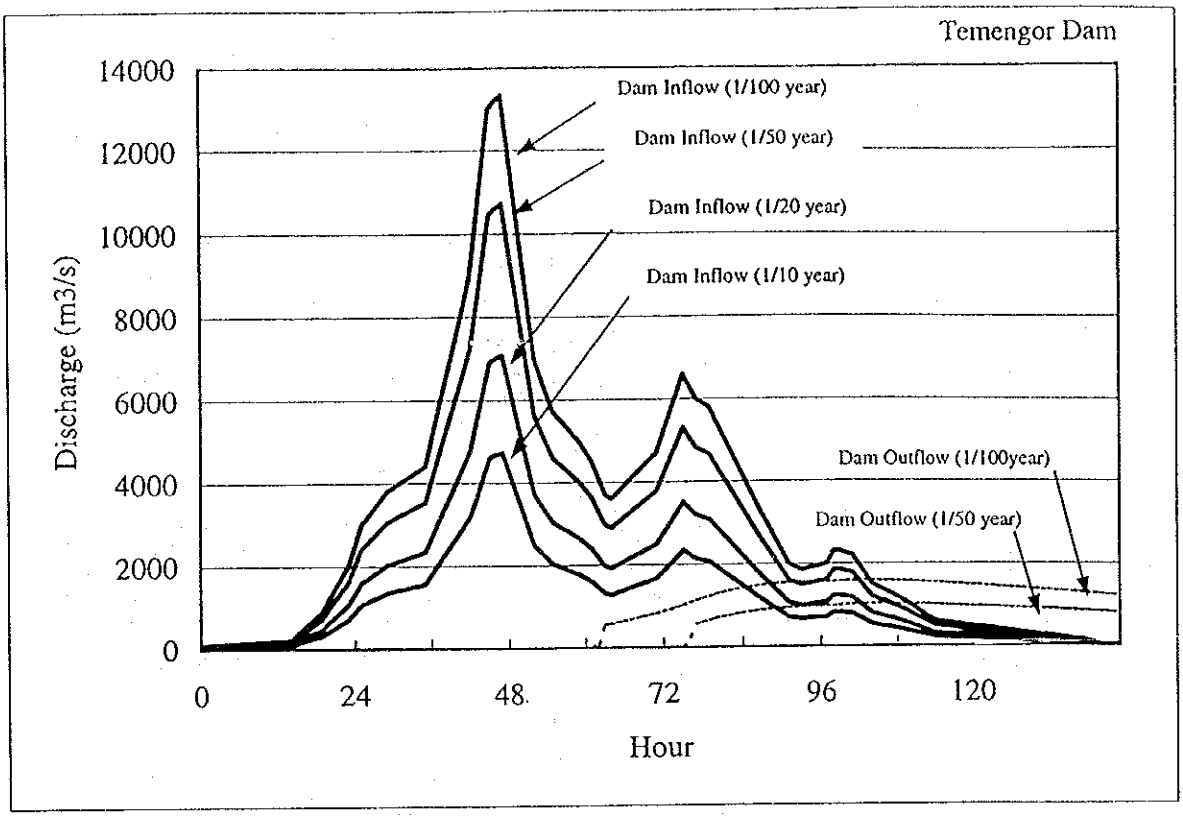


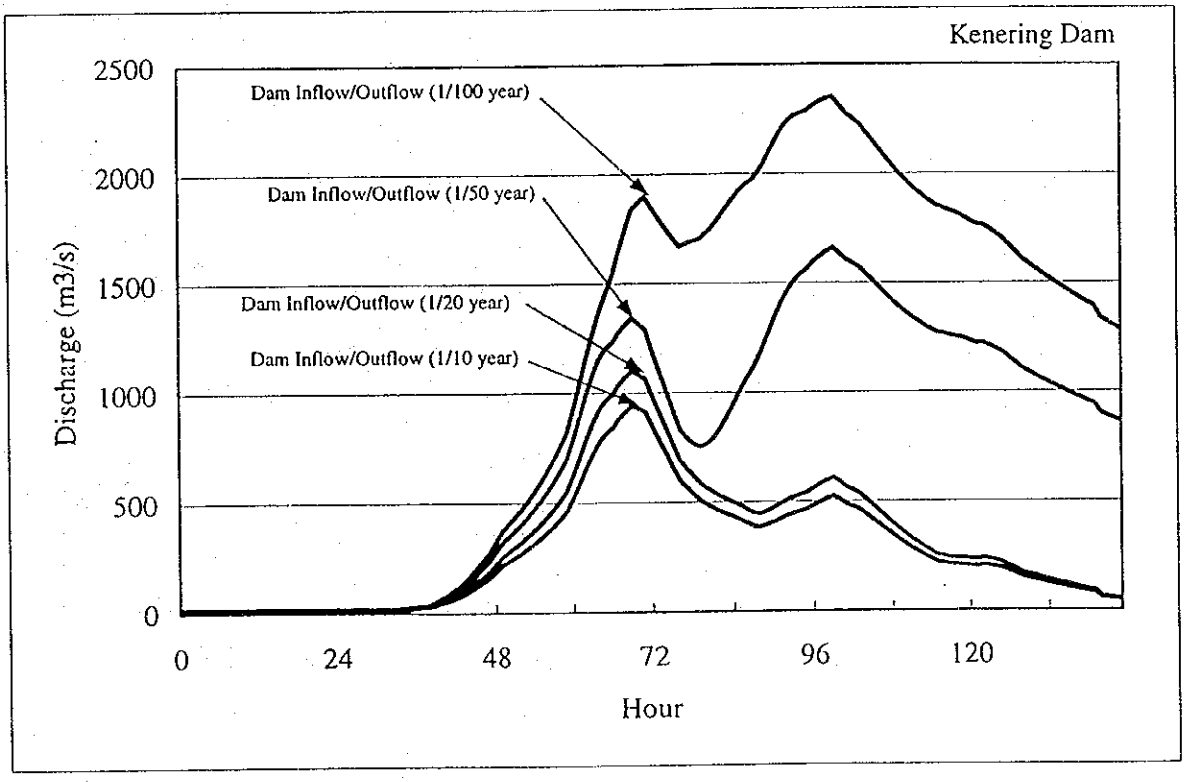


THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図9-5　1990年渇水時の地点別流況
JAPAN INTERNATIONAL COOPERATION AGENCY	

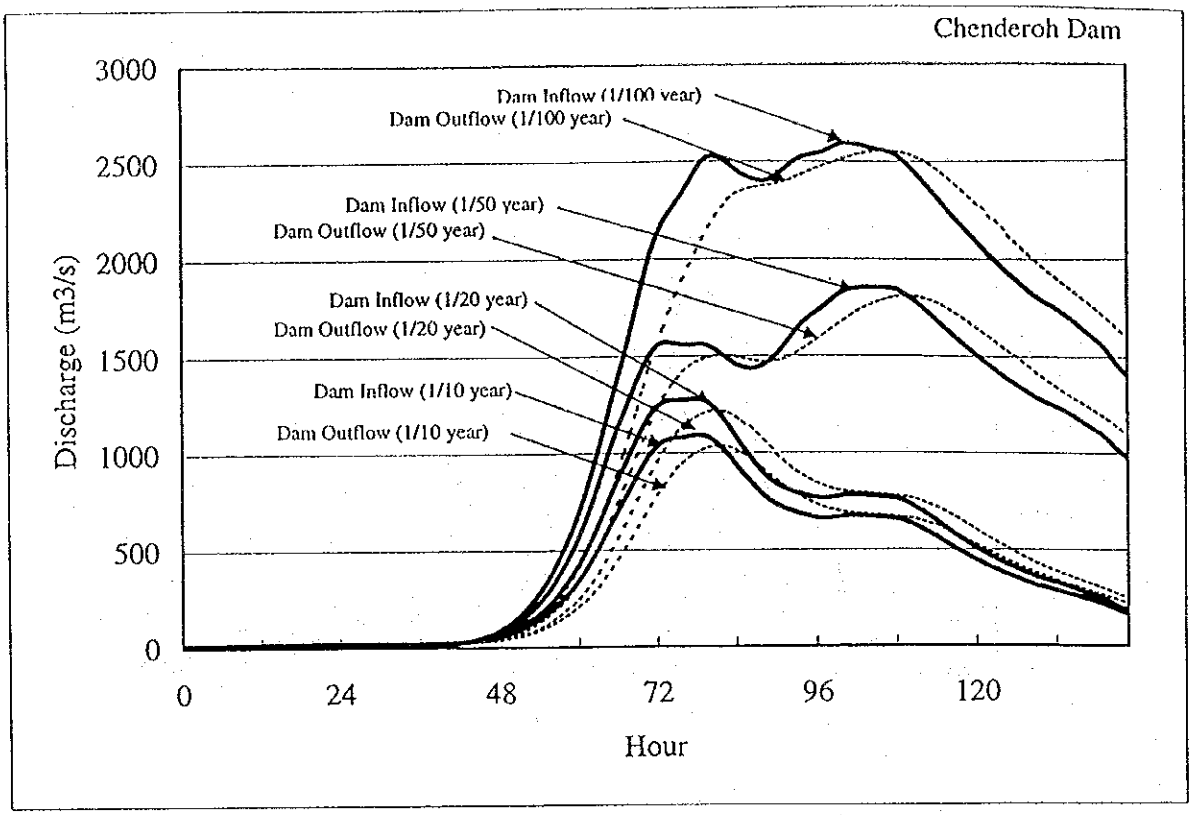


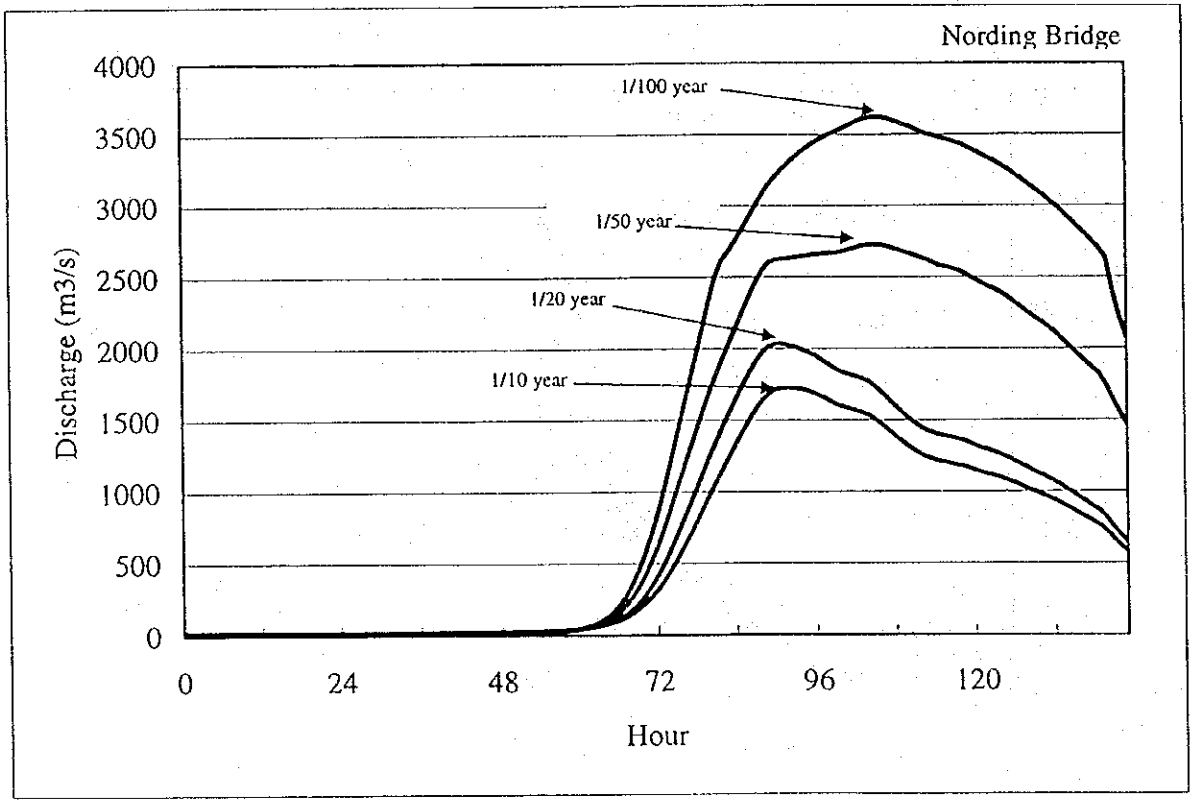
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図9-6 プルス川の8月における月流出量の確率分布
JAPAN INTERNATIONAL COOPERATION AGENCY	



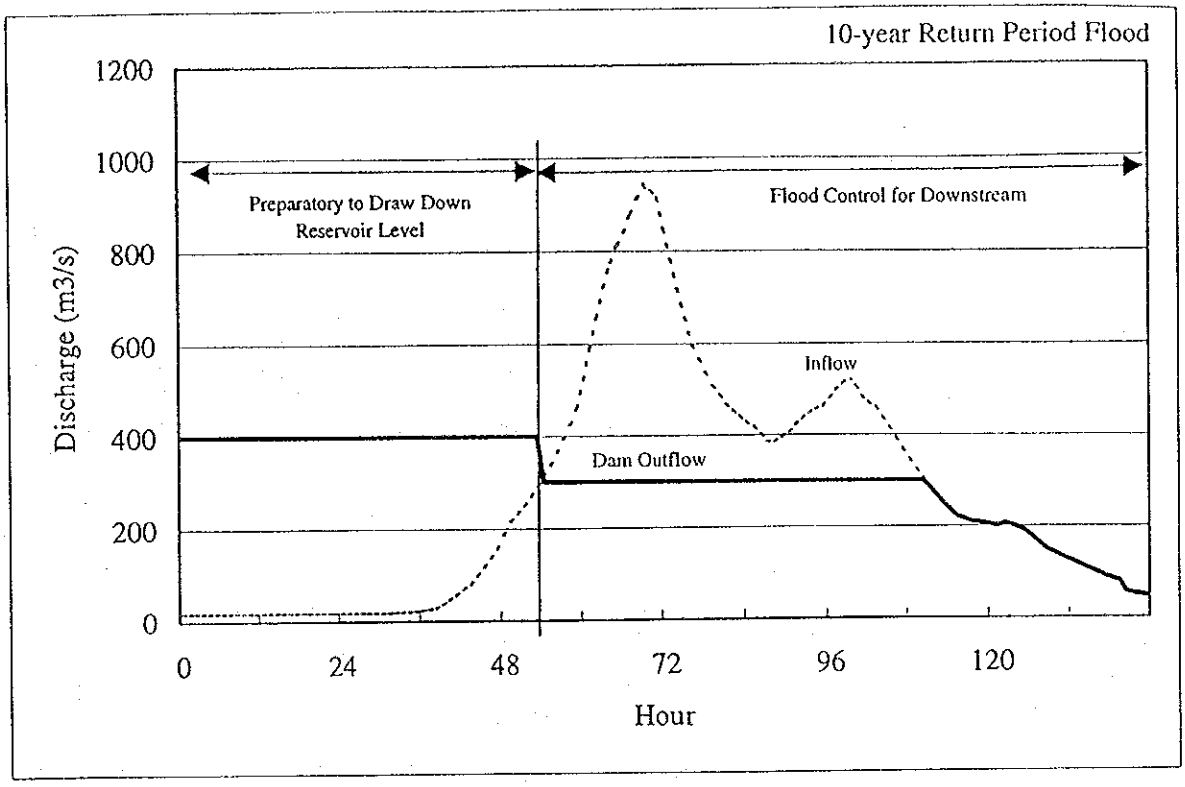


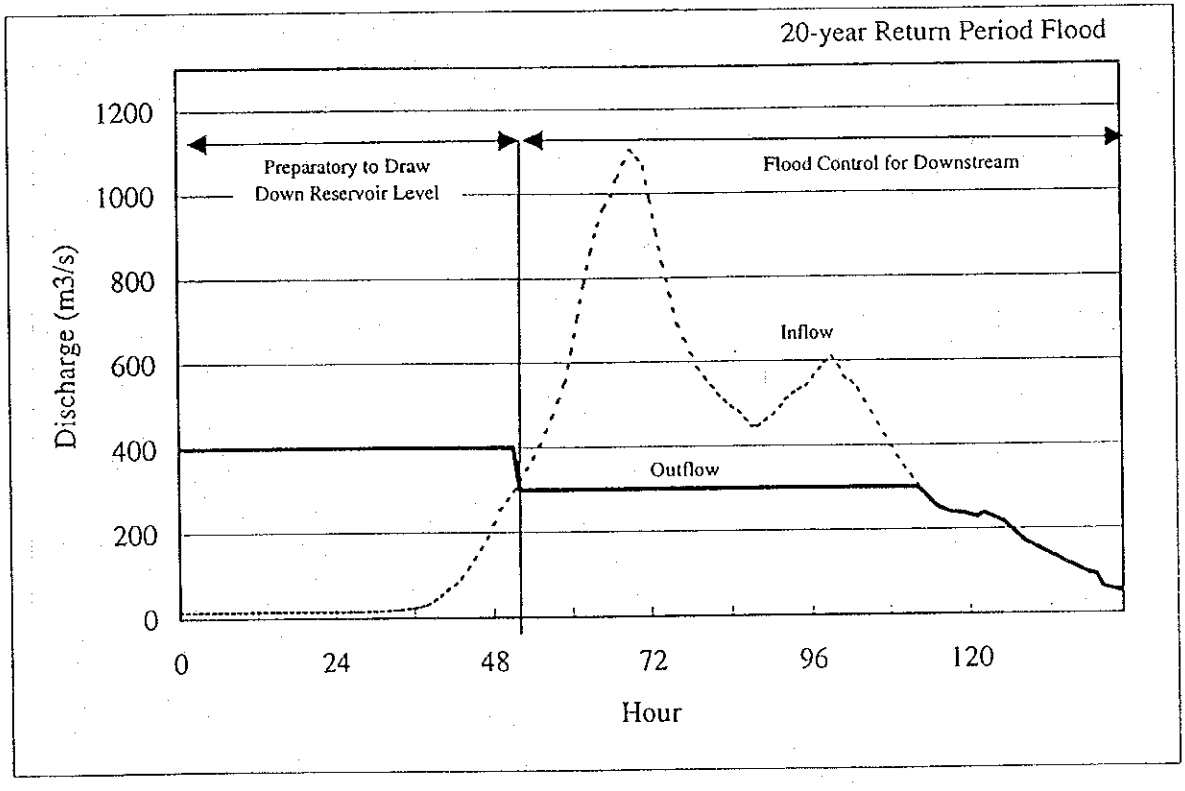
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-7(1/2) 現状のダム運用条件下での確率洪水流量波形



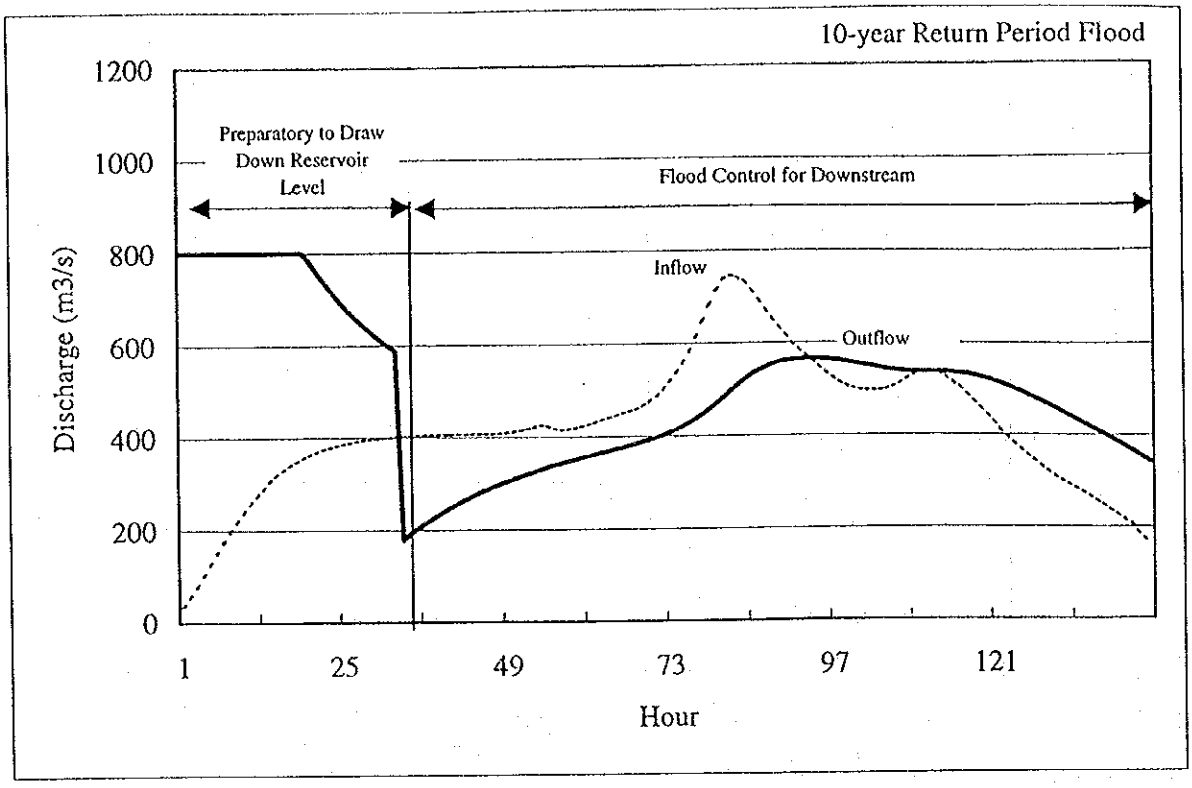


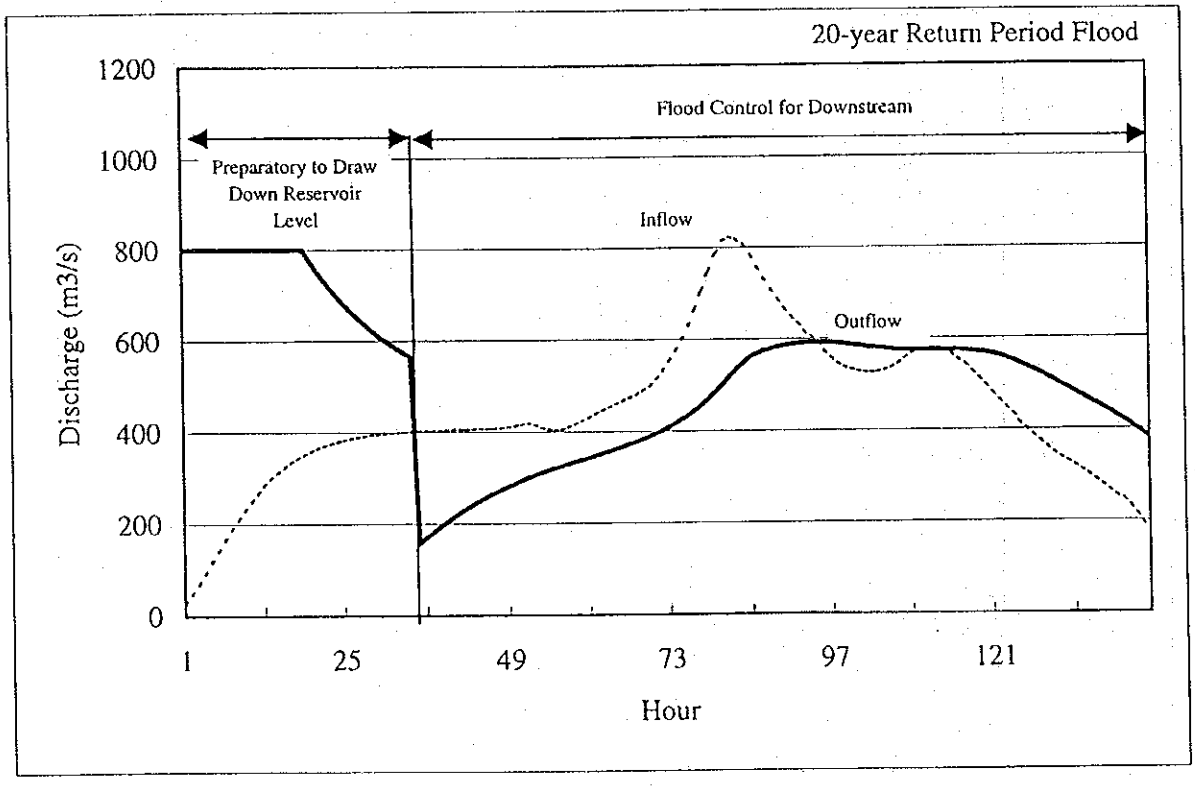
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-7(2/2) 現状のダム運用条件下での確率洪水流量波形



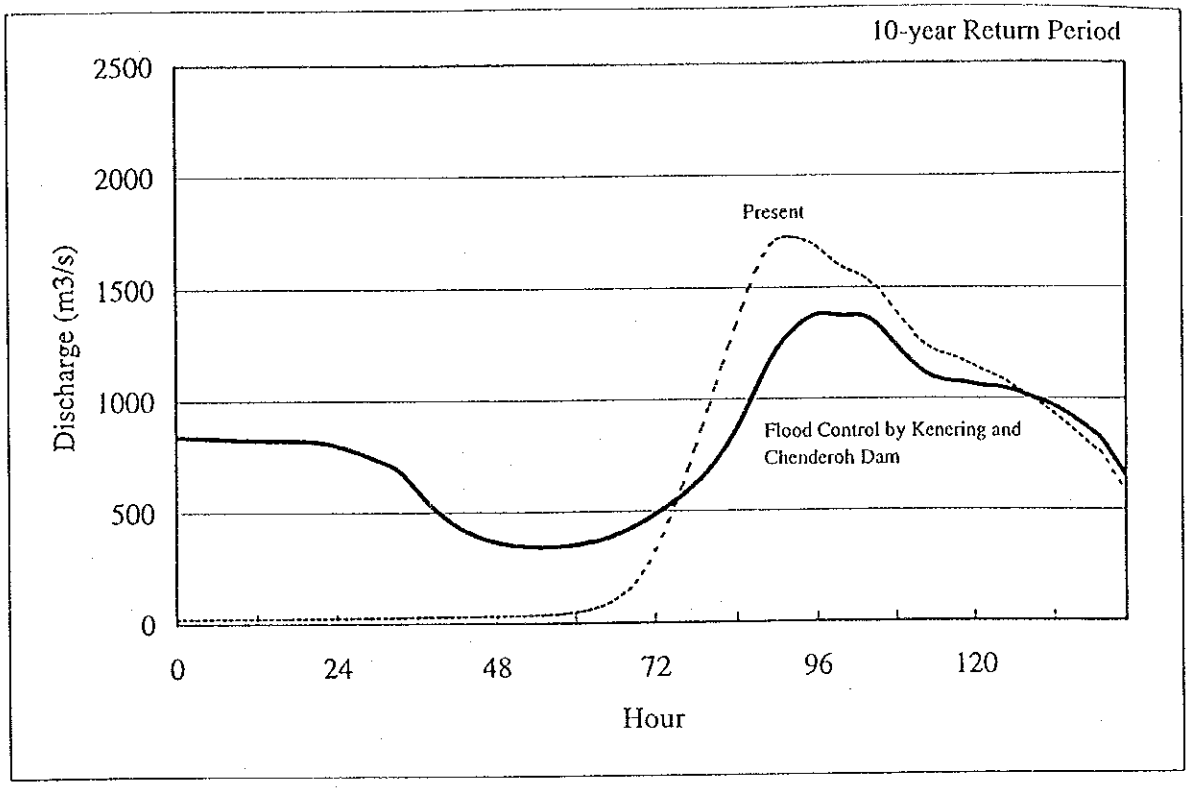


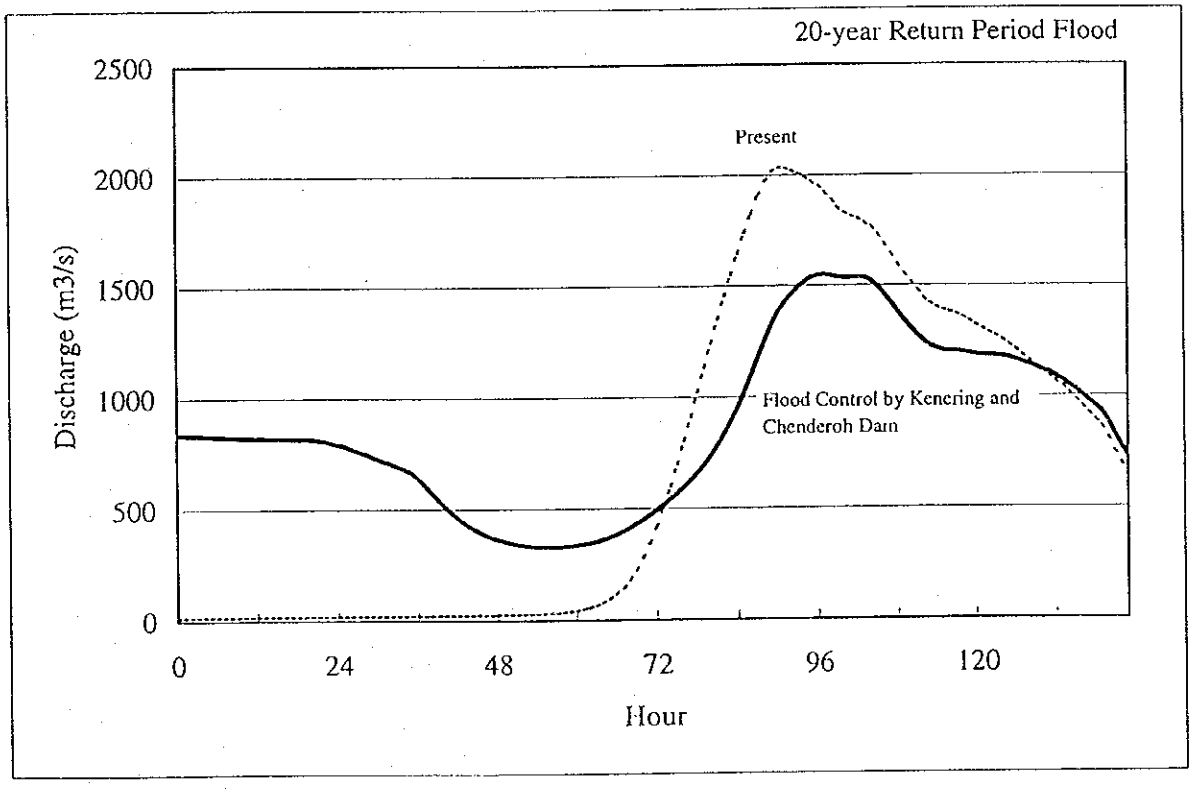
THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-8　クネリン・ダムによる洪水調節状況



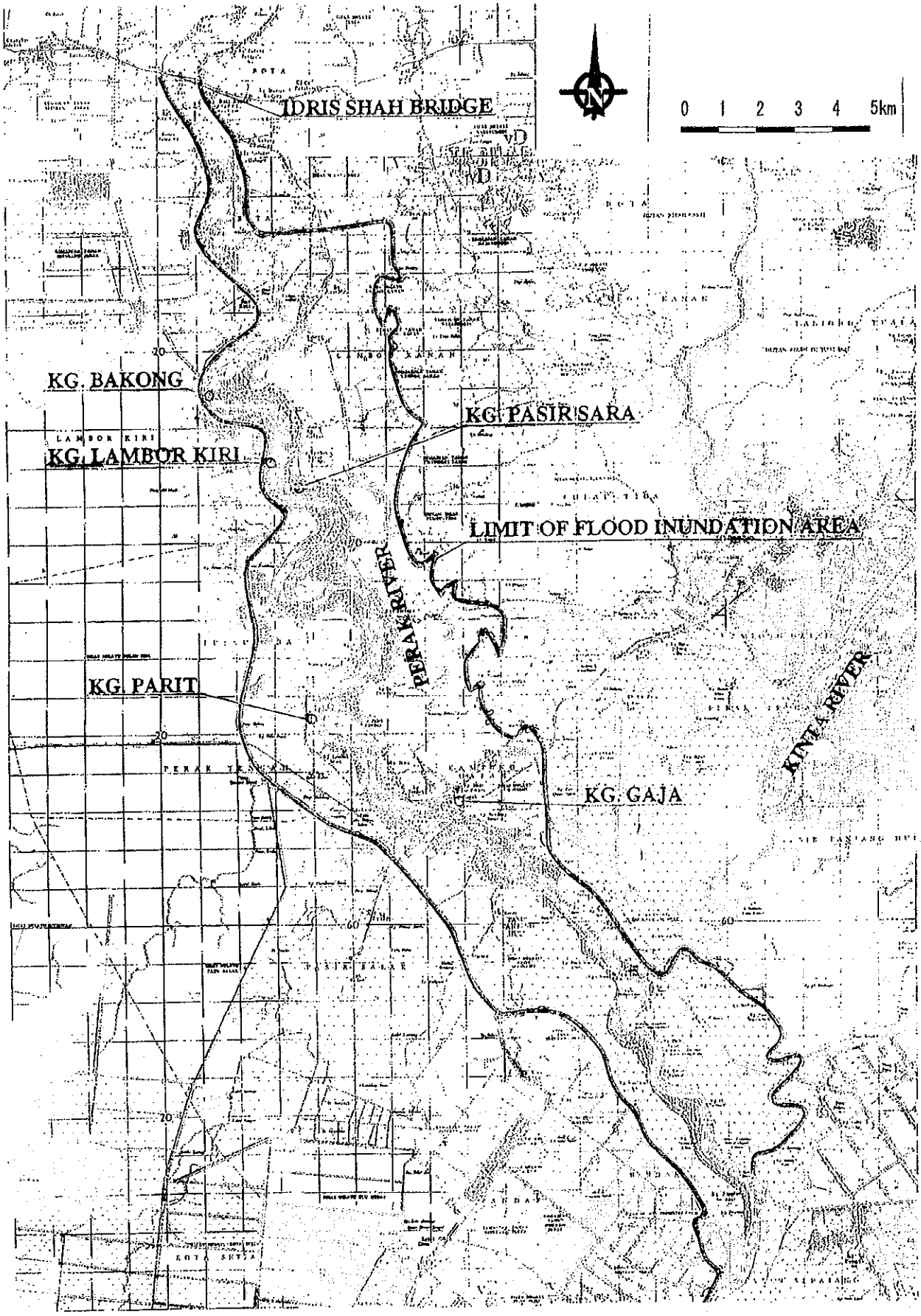


THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図9-9　チュンドロ・ダムによる洪水調節状況
JAPAN INTERNATIONAL COOPERATION AGENCY	



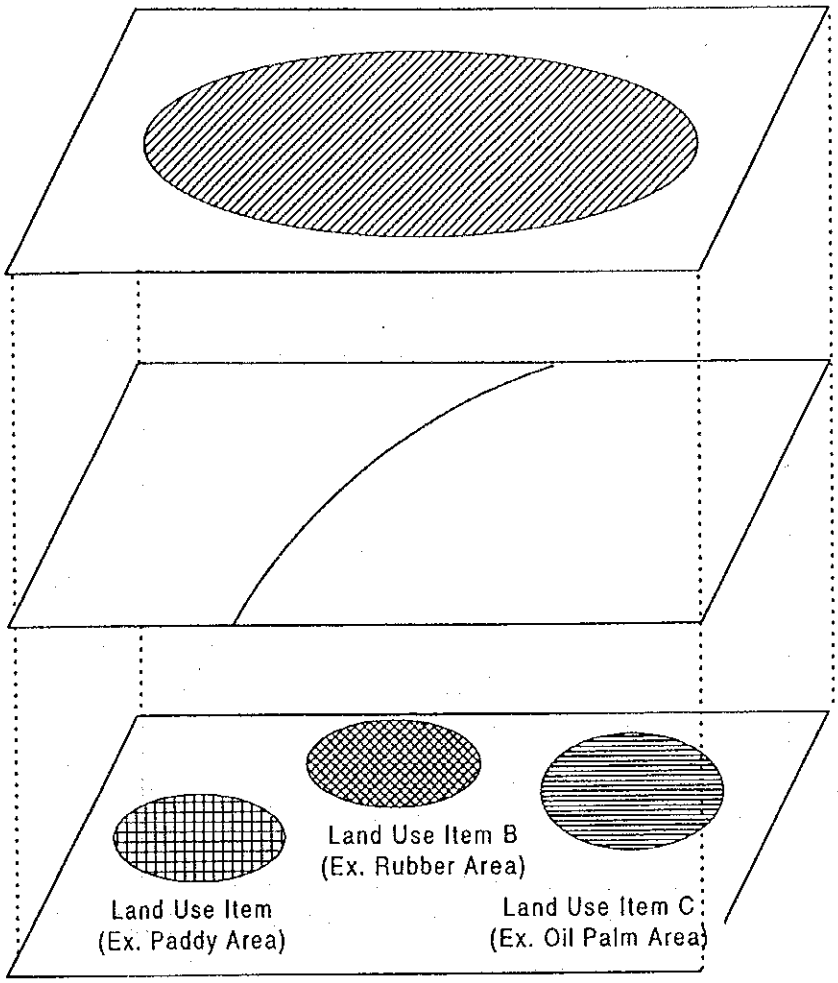


THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-10　ノルディン橋における洪水流量波形



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA	図9-11　洪水氾濫常習区域
JAPAN INTERNATIONAL COOPERATION AGENCY	

Conceptual Schematics of GIS Overlay



$$Nh = Dh(1) \times Am(1) + Hd(2) \times Am(2) + \cdots\cdots + Hd(i) \times Am(i) + \cdots\cdots$$

$$Dn = Nh \times Dhf \times Vh$$

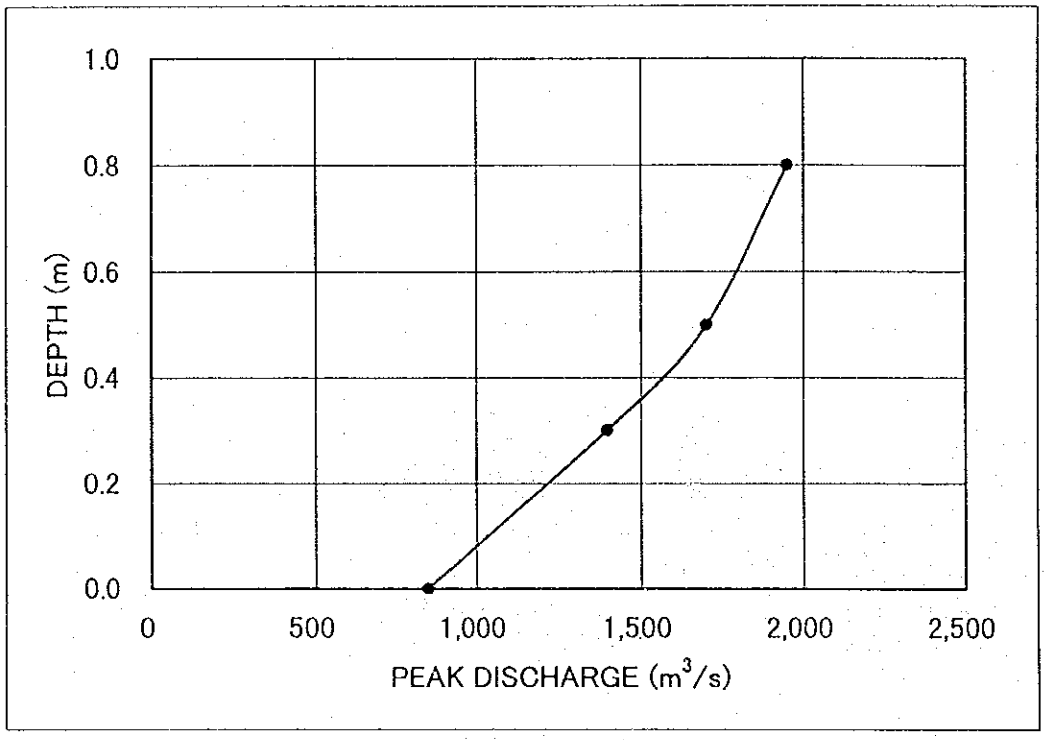
$$Da = Aa(1) \times Daf(1) \times Va(1) + Aa(2) \times Daf(2) \times Va(2) + \cdots\cdots + Aa(i) \times Daf(i) \times Va(i) + \cdots\cdots$$

where Nh : Total number of house in Flood Inundation Area
Hd(i) : Housing Density in Mukim i
Am(i) : Area of Mukim i
Dn : Total housing damage value
Dhf : Damage factor of house
Vh : Unit value of house
Da : Agricultural damage
Aa : Area of Agricultural land
Daf : Damage factor of agricultural crop
Va : Unit value of agricultural crop

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

JAPAN INTERNATIONAL COOPERATION AGENCY

図9-12　GISを用いた洪水被害額算出の概念図



THE STUDY ON THE ESTABLISHMENT OF THE RIVER BASIN INFORMATION SYSTEM IN MALAYSIA JAPAN INTERNATIONAL COOPERATION AGENCY	図9-13　ノルディン橋の洪水ピーク流量と最大氾濫湛水深との関係