III.13.4 Problems in Formulating of Beneficiaries' Participation

The survey results indicated that the following points are the major problems in formulating the community and beneficiaries' participation in the Brantas river basin.

(1) Farmers' Unwillingness for Attending HIPPA Meetings

In the Brantas river basin, HIPPA is working as Water Users' Associations (WUA), this HIPPA was established in 1993. Presently, there are 3,030 HIPPAs in 2, 718 villages in the basin. In some irrigation areas, HIPPA members are not attending the meetings regularly in the Brantas river basin. Reasons for not attending the HIPPA meeting vary considerably between areas. In Warujayeng, Widas and Turi Tunggorono, nonattendance at HIPPA meeting is likely due to no interest, or because of not being invited. In the Brantas Delta irrigation area, the absence of farmers at HIPPA meeting may result in a number of reasons i.e. no direct benefit and doing something in the city area to earn cash money.

(2) Non Existence of Fishery Water Users' Association

Presently, problems and issues are dealt individually or discussed in a small group of fish farmers. Some of the fish farmers seem to be less interested in establishing a fishery water users' association. Possible explanation is that they are still not sure whether such an association will be helpful since they have experience that the existing formal agencies did not function as they expected. The most serious problems encountered are associated with water shortage in the dry season. The brackish water fish farmers are presently consuming a considerable amount of water, which is mainly derived from the Brantas river basin. It is identified that there is the need to improve fishery water management system.

(3) Farmers' Lack of Awareness to Efficient Use of Irrigation Water

Due to the lack of awareness, water taken by the farmers' from the irrigation canals are not efficiently utilized in the Brantas river basin. Inefficient and ineffective use of irrigation water by the farmers in the basin is an acute problem for the irrigation water supply systems. Some farmers are taking more water than their actual needs. As a result, the farmers in down-stream are facing water shortage problems in the dry season. The surplus water is spilled out from their paddy fields to the drainage canal. In most of the irrigation area in the basin, the farmers do not have a clear idea about how much water they are taking.

(4) Problems in Implementation of Beneficiary-Pay Concept

There has never been any specific and rationale charges imposed for irrigation and fishery water users in the Brantas river basin area. Therefore, most of the irrigation and fishery water users still keep the old perception that the charge of water used is included in the tax they pay and it is the duty of the government to supply the water. There are still a small percentage of farmers who do not understand this concept. Some more efforts for spreading this concept may be required before introducing.

The fish farmers in the Brantas river basin area are not used to paying for the fishery water they use for the fish farming. The failure to understand the beneficiary-pay concept may result the water users' decades old perception that the water is not a commodity rather a free natural resource and gift from the God.

Table III.1 Meteorological and Hydrological Observation in the Brantas River Basin

• Meteorological Observation

Observation Agency		Number of Observatories	Remarks
PJT	ASA I (Division of upstream water service)	*68*	63 stations observe only rainfall.
	ASA II (Division of downstream water)	*41*	38 stations observe only rainfall.
	Total	109	
DPU Pengairan	Coordination office of region I, Malang	*59*	Rainfall only.
	Coordination office of region II, Kediri	*112*	Rainfall only.
	Coordination office of region III, Jombang	*98*	Rainfall only.
	Coordination office of region IV, Mojokerto	*59*	Rainfall only.
	Total	328	
BRLKT		6	Rainfall only.
DIPERTA		3	Rainfall only.

• Hydrological Observation

Observation Agency		Number of Observatories	Remarks
PJT	ASA I	*28*	
	ASA II	*24*	
	Total	52	
BRLKT		6	
PGK		5	Bed load only.

Source : Surveyed by the Study Team

Remarks : Within the Brantas river basin, several agency such as BMG, the sugar factories, the universities observe rainfall in addition to the above table.

Table III.2 Critical Land of Erosion

Class	Definition and Characteristics of Critical Lands	Selected Critical Land by the Team
C1	Critical aldn due to combination of presence of very shallow soils, very high inherent relative erodibility, localized occurrence of rock outcrops, stoniness and marginalty critical agrocrimate. Non critical land is confined only to valley bottoms with deep soils. On the farm erosion causes a major hazard.	○
C2	Critical land due to combination of presence of very shallow soils, very high inherent relative erodibility, localized occurrence of rock outcrops, stoniness. Non critical land is confined only to valley bottoms with deep soils. On the farm erosion causes a major hazard. On recent volcanic terrain includes land with high occurrence of boulders (>60% by volume) and shallow soils.	○
C3	Critical land due to combination of presence of very shallow soils, very high inherent relative erodibility, localized occurrence of rock outcrops, stoniness and steep slopes. Non critical land is confined only to valley bottoms with deep soils. On the farm erosion causes a major hazard.	○
C4	Critical land due to presence of coarse texture soils with low water holding capacity restricting land use, very high inherent erodivility and low stability. On the farm, stream bank and river bank erosion cause a major hazard.	○
C5	Critical land due to presence of cinders, ashes, gravel, rocks and sandy soils associated with volcanic craters and very recent lava flows.	–
C6	Critical land due to very high stream bank erosion hazard and occurrence of flush floods during peak rainfall events of rainy season. Effects generally only land adjacent to streams and rivers only.	○
C7	Critical land due to permanent flooding or inundation and very poor drainage, swamp or marsh.	–
P	Potentially critical land consisting of C1 to C3 class conditions but under the present land utilization is not being degraded, damaged or misused. Generally forested, agroforestry, tree crops or soil conservation measures effective.	○
P1	Potentially critical land consisting of C4 class conditions but under the present land utilization is not being degraded, damaged or misused. Generally forested, agroforestry, tree crops cover or Soil Conservation measures generally effective.	○
P2	Potentially critical land consisting of C5 class conditions but under the present land utilization is not being degraded, damaged or misused. Use for recreation and as a national reserve.	–
SC	Seasonally critical land due to regular annual flooding and poor drainage restricting growing season and or causing crop damage during high water flows.	–
SC1	Seasonally critical land due to regular annual flooding and poor drainage restricting land utilization and or causing crop damage during high water flows. In dry season subject to salt water intrusion and effects of high salinity and alkalinity.	–

Source; Class, Definition and Characteristics: Screening Study Brantas Watershed, Volume III, Konto River Proejct, Phase III, 1988, DGRLR

Table III.3 Present Water Quality Monitoring System in The Brantas River Basin

Organizations	Monitoring points	Monitoring items	Monitoring organizations	Purposes	O&M Cost
PJT	River water : 51	21 (physical and chemical items, not include heavy metal and microbiological items)	Sampling and Analysis : PJT laboratory Data compilation and Reporting : PJT	Water resource management	O&M: 75 million Rp./year Personal expense : 78 million Rp./year
	Industrial waste water : 41	13 (physical and chemical items, not include heavy metal and microbiological items)	ditto		
PROKASIH	River water : 29	BOD, COD, SS	Sampling : DPU Analysis : BTKL Data compilation and Reporting : Work team of PROKASIH	Clean river campaign in accordance with direction by BAPEDAL	385 million Rp./year (1996/97) *including staff training, supports for river cleaning activities and so on. *not all for the Brantas river basin
	Industrial waste water : 58	5-32 items (depend on type of industry). BOD, COD are reported by PROKASIH report	Sampling : DPRIND (Municipal Industrial Services) Analysis : BTKL, Laboratory of Kanwil PU, BPPI Data compilation and Reporting : Work team of PROKASIH		
Kanwil PU	River water : 12	About 60 *including heavy metals and microbiological items	Sampling : DPU Analysis, Data compilation and Reporting: Laboratory of Kanwil PU	Water resource management	3 million Rp./year (1996/97) *Analisis only

Sources : PJT, PROKASIH report, Laboratory of Kanwil PU.

Table III.4 Problem and Countermeasure related to River Facilities

Name of Facilities	Problem	Countermeasure	Remarks
Dam/Reservoir			
Wlingi Dam	Sedimentation	Countermeasure is studied in this study.	
	Enceng Gondok (Water hyacinth)	Continuous removal of Enceng Gondok will be required and treatment/disposal method of removed Enceng Gondok shall be established.	In addition, decrease of Enceng Gondok shall be researched/developed.
Sutami Dam	Sedimentation	Countermeasure is studied in this study.	
	No operation of hollow jet valve	Trial operation will be required to examine its function.	
Sengguruh Dam	Sedimentation	Countermeasure is studied in this study.	
	Enceng Gondok	Continuous removal of Enceng Gondok will be required and treatment/disposal method of removed rubbbish shall be established.	In addition, decrease of Enceng Gondok shall be researched/developed.
Bening Dam	Shortage of inflow	Operation pattern including cropping pattern and power generation pattern shall be studied according to the abailable water.	
Weir			
Bangil Tak Spillway Gate	No use (No excess flood, No operation rule)	Operation rule shall be prepared, considering land use of the Bangil Tak canal and flood discharge of the main river.	In addition, the Bangil Tak canal shall be designated legally as the floodway/retarding pond by the DGWRD.
New Lengkong Dam	Enceng Gondok	Removal by public oriented activities led by Governor shall be continued.	In addition, decrease of Enceng Gondok shall be researched/developed.
Jatimlerek Rubber Dam	Frequent deflation of rubber weir		Rehabilitation finished.
Lodoyo Dam	Unregulated outflow (sedimentation, operation rule)	Countermeasure for sedimentation is studied in this study. Operation shall be done according to the operation rule.	
	Enceng Gondok	Continuous removal of Enceng Gondok will be required and treatment/disposal method of removed Enceng Gondok shall be established.	In addition, one of the gate will be recommendable to replace to the sluice with flap gate type in order to flush the rubbishes smoothly.
Jagir Dam	Impounding water level over normal HWL due to the request of PDAM	PDAM should strengthen own intake capacity.	
	Superannuated gate system	Gate system shall be renovated and lowering of impounding water level shall be studied.	
	Rubbish	Continuous removal of rubbish and PROKASIH campain, simultaneously.	
Gunungsari Dam	Sedimentation	Continuous excavation and flushing of sediment will be required.	
	Enceng Gondok	It is desiable to conduct the same activities as those in New Lengkong Dam.	In addition, decrease of Enceng Gondok shall be researched/developed.
Mlirip Gate	Superannuated stoplog (insufficient operation of intake discharge)	Under renovation to gate system by PKB (Wonorejo Project).	
	Enceng Gondok	Removal by public oriented activities led by Governor.	In addition, decrease of Enceng Gondok shall be researched/developed.
Gubeng Dam	Sedimentation	Continuous excavation and flushing of sediment will be required.	
	Rubbish	Continuous removal of rubbish and PROKASIH campain, simultaneously.	
Tulungagung Gate	No use (no function before construction of Wonorejo Dam)	Under construction of Wonorejo Dam.	
Dike			
Dike from Ploso Town to Kediri City	Small-scale collapses and cutting of foot	Dikes shall be repaired.	
Revetment			
Downstream site of Jagir Dam	Collapses	Collapsed revetment shall be rehabilitated.	
Downstream site of Mentarus Rubber	Broken	Broken parts of revetment shall be repaired.	
Retarding Basin			
All natural Retarding Basin	Possibilities of development.	Publicity activities/legal control seem to be required for easy implementation of the future	
Groundsill			
Downstream site of Porong Toll Road Bridge	No function (concrete blocks are washed out)	Concrete blocks shall be re-installed.	
Bridge			
Most of old bridge	Group of piles type pier	In case of renovation/reconstruction, the piers of elliptic type shall be used.	
Ploso Railway Bridge	No use	Facilities shall be demolished by PERUMKA.	
Downstream site of Porong Railway	Wrecked piers	Facilities shall be demolished.	
Intake/Pump			
Losari, Gedek, Gumbongan, Watespinggir (P), Keboan, Bebekan, Tapen (P), Gotan, Tunggorono, Turipinggir, Banjarsari, Old Mrican	Their roles already finished.	Facilities shall be demolished.	
Gempolkerep (P), Kedungsari (P), Penyhot, Buncer II (P), Besuk	cannot be used	Intake/pump facilities shall be renovated.	
Voor I canal, Voor II canal	Insufficient control of intake discharge	Sure operation in accordance with POLA is required.	Reallocation of water among all intake facilities shall be considered.
Sabo/check dam			
Wonokerto check dam	silting up with sediment	It is desiable to study and conduct the method of sediment removal by community	
Sea Dike Gate			
Six (6) gates	corrosion of metal parts	Gate system shall be rehabilitated by DPU Pengairan.	

Table III.5 Existing and Proposed Station of FFWS

Existing Stations

No.	STATION	RF	WL	OF	RC	WQ
1	Malang (Master Station)				1	
2	Gadang		1			
3	Poncokusumo	1				
4	Tangkil	1				
5	Dampit	1				
6	Tawangrejeni		1			
7	Sengguruh Dam (Monitoring Station)	1	1	1	1	
8	Wagir	1				
9	Lahor Dam		1			
10	Sutami Dam	1	1	1	1	
11	Pondokkobong (Relay Station)					
12	Birowo	1				
13	Tunggorono	1				
14	Doko	1				
15	Wates Wlingi	1				
16	Semen	1				
17	Sumberagung	1				
18	Wlingi Dam (Monitoring Station)	1	1	1	1	
19	Lodoyo Dam		1	1	1	
20	Tulungagung (Sub-Master Station)				1	
21	Inlet Gate		1	1		
22	Kampak	1				
23	Tugu	1				
24	Bendo		1			
25	Tanggung (Relay Station)					
26	Pagerwojo	1				
27	Jeli	1	1			
28	Wates	1				
29	Wilis (Relay Station)	1				
30	Kediri (Sub-Master Station)	1			1	
31	Kediri		1			
32	Mrican Barrage		1	1	1	
33	Kertosono	1	1			
34	Ploso		1			
35	Pujon (Relay Station)	1			1	
36	Selorejo Dam	1	1	1	1	
37	Bening Dam		1	1	1	
38	Wates Sawahan	1				
39	Berbek	1				
40	Lengkong Widas		1			
41	Tampung	1				
42	New Lengkong Dam		1	1	1	
43	Porong		1		1	
44	Perning		1			
45	Gunungsari Dam		1	1	1	
	Total	26	21	10	14	

Proposed Stations and Facilities in Wonorejo Project

No.	STATION	RF	WL	OF	RC	WQ
A	Wonorejo Dam (Monitoring station)	1	2		1	
B	Segawe Weir		1		1	
C	Tiudan Headworks		2	1	1	
D	Tulungagung Pump Station (Sub-Master Station : New)			1	1*	
E	Jatimlerek Rubber Gate		1	1	1	
F	Menturus Rubber Gate		1	1	1	
G	Ngujang		1			
H	MliripGate			1		
I	Porong Canal		1			
J	Mangetan Canal		1			
K	Karangpilang					1
L	Pelayaran					1
M	Mrican Kiri		1			
N	Mrican Kanan		1			
18	Wlingi Dam (Monitoring station : Existing)			1		
	Total	1	12	6	5	2

RF : Rainfall Gauging facility
WL : Water Level Gauging facility
OF : Outflow Setting Panel
RC : Radio Communication Equipment
WQ : Water Quality Sensor
* : use existing equipment
Wonorejo Project : Wonorejo Multipurpose Dam Construction Project

Table III.6 Proposed Monitoring for Low Flow Management (Wonorejo Project)

LOCATION	MONITORING SUBJECT		REMARKS
(Flow control)			
Sutami dam	Reservoir WL, OF	existing	
Wlingi dam	Reservoir WL, OF	existing	
Lodoyo dam	Reservoir WL, OF	existing	
Mrican barrage	Reservoir WL, OF	existing	
Jatimlerek rubber dam	Reservoir WL	proposed	
Menturus rubber dam	Reservoir WL	proposed	
New Lengkong dam	Reservoir WL, OF	existing	
Mlirip gate	Reservoir OF	proposed	setting panel
Gunungsari dam	Reservoir WL, OF	existing	
(Flow control/ the Ngrowo water conveyance system)			
Segawe weir and connection tunnel	Intake weir WL	proposed	
	Connection tunnel discharge	proposed	setting panel
Wonorejo dam	Reservoir and tailrace WL	proposed	
	RF	proposed	
Tiudan headworks and canal	Intake weir and canal WL	proposed	
	Canal discharge	proposed	setting panel
Tulungagung pump station	Pumping up discharge	proposed	setting panel
Tulungagung inlet gate	Reservoir WL, OF	existing	
(Observation of subjective river stretch)			
Ngujang	River WL	proposed	
Jeli	River WL	existing	
Kediri	River WL	existing	
Kertosono	River WL	existing	
Ploso	River WL	existing	
Perning	River WL	existing	
(Observation of Intake discharge for irrigation system)			
Lodagung	Intake OF	proposed	setting panel
Mrican Kanan	Canal WL	proposed	
Mrican Kiri	Canal WL	proposed	
Brantas Kiri Jombang	Intake OF	proposed	setting panel
Brantas Kiri Mojokerto	Intake OF	proposed	setting panel
Delta Brantas			
Prong canal	Canal WL	proposed	
Mangetan canal	Canal WL	proposed	
(Observation of water quality)			
Karangpilang	Water temperature, pH, DO, Conductivity, Turdidity	proposed	providing automatic cleaning device for sensors
Pelayaran	Water temperature, pH, DO, Conductivity, Turdidity	proposed	providing automatic cleaning device for sensors

WL: Water level
OF : Outflow
proposed : proposed in the Wonorejo Multipurpose Dam Constriction Project

Table III.7 Organizations Related to the Water Resources Management in the Brantas (1/2)

	Name of Organization			Year of Estab.	Main Tasks & Responsibilities
1	DGWRD (MPW)	Direktorat Jenderal Pengairan	Directorate General of Water Resources Development (M. of Public Works)	1945	Responsible for planning, development and management of water resources in the nation excluding ground water -Responsible for all river works and flood control in rural and urban areas and for drainage works in urban areas
2	DPU Cipta Karya		Directorate General of Human Settlements (M. of Public Works)	1945	Responsible for planning and development of human settlements in rural and municipal areas
3	Kanwil PU	Kantor Wilayah PU Prop. Dati I. Jatim	East Java Representative Office of MPW	1950	Give technical assistance to the related Provincial Govt Units in the fields of MPW except irrigation
4	P4B	Projek Pembangunan Wilayah Sungai Kali Brantas	Brantas River Basin Development Project	1961	Responsible for planning, design and construction of river structures in the Brantas -Responsible for other improvement works in the Brantas
5	PGKS	Projek Pengendalian Lahar G. Kelud dan G. Semeru	Volcanic Disaster Prevention Project of Mt Kelud and Mt Semeru	1969	Responsible for planning, design and construction of sabo facilities and maintenance works of tributary rivers in the Mt. Kelud area
6	PJT	Perum Jasa Tirta	Jasa Tirta Public Corporation	1990	Responsible for O&M of W.R. infrastructures, W.R. dealings, River basin management and Rehabilitation of W.R. infrastructures
7	DGRLR (M. of Forestry)		Directorate General of Reforestation and Land Rehabilitation (M. of Forestry)		Responsible for soil conservation and land rehabilitation inside natural forest areas and productive forest areas
8	Kanwil Kehutanan	Kantor Wilayah Kehutanan Prop. Dati I. Jatim	East Java Representative Office of M. of Forestry	1950	Responsible for technical recommendation and guidance to watershed related agencies in the Province including long term planning (25 years) of land rehabilitation and soil conservation
9	BRLKT	Balai Rehabilitasi Lahan dan Konservasi Tanah	Agency of Land Rehabilitation and Soil Conservation, Surabaya	1950	-Responsible for middle term(5 years) planning of land rehabilitation and soil conservation based on the long term plan of Kanwil. -Responsible for reforestation, construction of check dams and demonstration farms
10	DPKT	Dinas Perlindungan Konservasi Tanah	Forestry and Soil Conservation Service, East Java		-Responsible for implementation of reforestation and soil conservation -Preparing annual program based on the middle term planning of BRLKT
11	Perum Perhutani		Forestry Public Corporation		Responsible for the same activities as DPKT within the area in charge -Implementing commercial forestry business
12	Kanwil Pertanian	Kantor Wilayah Pertanian Prop. Dati I. Jatim	East Java Representative Office of M. of Agriculture	1950	Responsible for guidance and monitoring of agriculture, horticulture, livestock and fishery productions -Responsible for training and agricultural extension service
13	Dinas Pengairan	Dinas PU Pengairan Daerah Prop. Dati I Jatim	Provincial Water Resources Service, East Java (Secretariat of WMO)	1945	Responsible for development and O&M of irrigation facilities from primary to secondary canals -Responsible for the same to the point of diversion for other users than irrigation
14	Dinas Pertanian	Dinas Pertanian Daerah Prop Dati I Jatim.	Provincial Agriculture Service, East Java	1945	-to identify problems, give guidance, carry out spatial mapping and to carry out planning on the utilization of land resources so as to be appropriate with agroecosystem -to provide reference for monitoring plant intruder organism
15	PIET	Projek Irigasi Jawa Timur	East Java Irrigation Project		Irrigation development project managed directly by DGWRD -Major efforts are concentrated into village irrigation and rehabilitation of the existing irrigation facilities recently
16	PIAT	Projek Irigasi Air Tanah	East Java Ground Water Irrigation Project		Irrigation development project using ground water development -Most of sub projects are small scale of less than 50 ha of command area -Manged directly by DGWRD
17	DPERIKAN	Dinas Perikanan Daerah Prop. Dati I Jatim.	Provincial Fishery Service, East Java	1945	-Responsible for regulation, controlling and assessment of fishery development -Responsible for maintenance of main canals (District Govt is responsible for maintenance of 2ndary canals)
18	MIT	Kementerian Perindustri dan Perdagangan	Ministry of Industry and Trade	1945	-Responsible for managing and controlling of all industries and trade in Indonesia
19	DPERIND	Dinas Perindustri Daerah Prop. Dati I Jatim.	Provincial Industry Service, East Java	1945	To provide technical guidance to small industries in the field of production, marketing and environmental protection

Table III.7 Organizations Related to the Water Resources Management in the Brantas (2/2)

	Name of Organization			Year of Estab.	Main Tasks & Responsibilities
20	MME	Kementerian Pertambangan dan Energi	Ministry of Mining and Energy	1945	Gives technical advice to provincial govt. ·Gives approval of G.W. exploitation ·Oversees PT.PLN activities in coordination with DGWRD which controls water licensing for hydro use
21	DISTAMB	Dinas Pertambangan Daerah Prop. Dati I Jatim	Provincial Mining Service, East Java	1945	Determines the allocation and extraction schedules after getting approval of MME
22	MOE	Kementerian Lingkungan Hidup	Ministry of Environment	1966	Responsible for policy making of environmental prevention ·Technical advice and support to related government agencies ·Management of environmental programs to be implemented by government agencies
23	BAPEDAL	Badan Pengendalian Dampak Lingkungan	Environmental Impact Management Agency	1991	To assist the President in managing environmental impacts including prevention of and control over pollution and environmental damage ·To assist the President in rehabilitating environment quality
24	BAPEDALDA	BAPEDAL Daerah Prop. Dati I Jatim.	Provincial Agency for Environmental Impact Management	November 1997	Had replaced BPLH ·Responsible for monitoring, inspecting and controlling quality of water, air and soil ·Coordinating for environmental damages
25	BPLH	Biro Bina Lingkungan Hidup Prop. Dati I Jatim.	Bureau of Environmental Service, East Java	1945-October 1997	Responsible for coordination of implementing environmental programs at the provincial level as secretariate of the committee for controlling and overcoming environmental pollution in East Java ·Had been reformed to BAPEDALDA
26	MOH		Ministry of Health		Responsible for managing and controlling of public health services in Indonesia
27	Dinas Kebersihan		Sanitation Service, East Java		Responsible for clean water demand in East Java Province
29	MDA	Kementerian Dalam Negeri	Ministry of Home Affairs	1945	Responsible for implementation of public services in Indonesia
29	BAPPEDA, Local Govt.	Badan Perencanaan Pembangunan Daerah	Provincial Development Planning Agency (Tk I & Tkll)	1945	Responsible for detailed land use planning at the provincial level.
30	PT PLN	Perusahaan Terbatas Perusahan Listrik Negara	State Electric Power Company	1945	Responsible for power generation, transmission and distribution of electricity ·Responsible for planning, construction and operation of power supply facilities
31	PDAM Surabaya and Sidoarjo	Perusahaan Daerah Air Minum	Regional Drinking Water Supply Company (Surabaya and Sidoarjo)	1976	Responsible for providing municipal and industrial water. ·Surface water of the Brantas is withdrawn for Surabaya and Sidoarjo and mainly groundwater is pumped up for other areas than these two
32	Dam Safety Unit		Dam Safety Unit		·Responsible for preventing negative impact of dams in Indonesia
33	PWMC		Provincial Water Management Committee		·To assist Governor in coordinating water management of the Province ·To give technical support and recommendation to Governor in relation to water coordination problems
34	SATKORLAK PB	Satuan Koordinasi Pelaksana Penanggulangan Bencana	Disaster Countermeasure Coordination Unit		Be in charge of coordinating and controlling disaster countermeasure activities in East Java ·Functions are to perform coordination, advice, direction and guidance covering planning, implementation as well as evaluation.

Other related (indirectly) Organizations

35	DKK	Dinas Kebersihan Kotamadya Dati II Surabaya	Public Cleansing Service, Kotamadya Surabaya		Responsible for domestic and industrial wastes disposal, incinerator plant, night soil treatment plant, composting and recycling in the administrative area of Kotamadya Surabaya
36	BPPT	Badan Pengkajian dan Penerapan Teknologi	Technology Evaluation and Application Agency		·Preparing human resources to take innovative steps for future demand

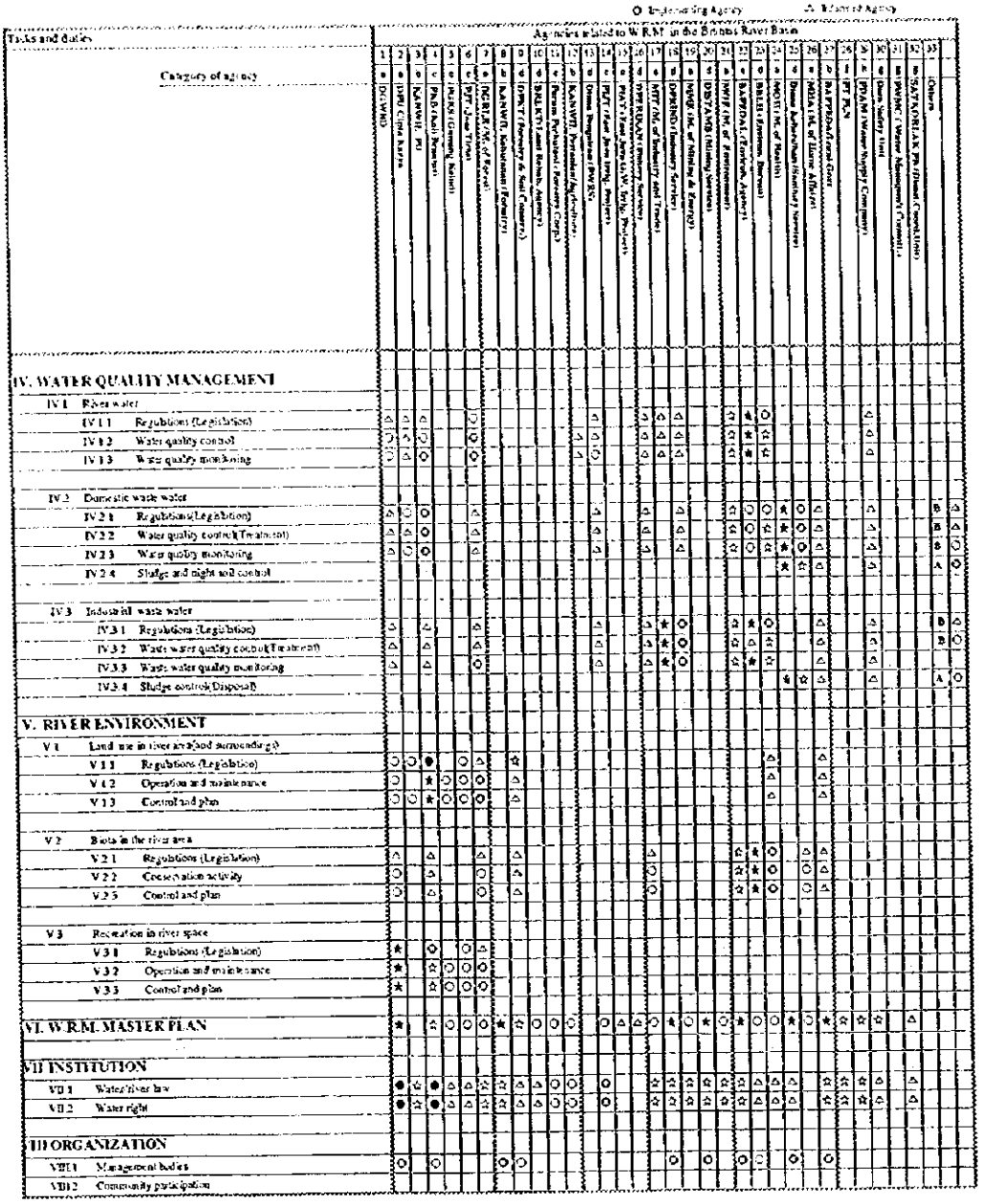
Table III.8 Tasks and Duties of Agencies Related to W.R.M. in the Brantas (Present Status) (1/2)

● Super. & Implem. Agency ○ Cooperating Agency
★ Supervising Agency ☆ Coordinating Agency
O Implementing Agency △ Informed Agency

Tasks and duties	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Category of agency	a	a	b	c	c	c	a	b	d	d	c	b	d	c	c	d	a	d	a	d	a	d	d	a	d	a	b	f	f	a	a	e	
Agencies related to W.R.M. in the Brantas River Basin	DGWRD	DPU Cipta Karya	KANWIL PU	PKB (Bali Brantas)	POKS (Gunung Kelud)	PJT (Jasa Tirta)	DG RLR (M. of Forest)	KANWIL Kehutanan (Forestry)	DPKT (Forestry & Soil Conserv.)	BRLKT (Land Rehab. Agency)	Perum Perhutani (Forestry Corp.)	KANWIL Pertanian (Agriculture)	Dinas Pengairan (PWRS)	PLIT (East Java Irrig. Project)	PLAT (East Java G.W. Irrig. Project)	DPERIKANAN (Fishery Service)	MIT (M. of Industry and Trade)	DPKIND (Industry Service)	MMIE (M. of Mining & Energy)	DISTAMB (Mining Service)	MOE (M. of Environment)	BAPEDAL (Environ. Agency)	BBLB (Environ. Bureau)	MOH (M. of Health)	Dinas Kesehatan (Sanitary Service)	MHA (M. of Home Affairs)	BAPPEDA/Local Govt	PT PLN	PDAM (Water Supply Company)	Dam Safety Unit	PWMC (Water Management Committee)	SATKORLAK PB (Disast. Cont. Activ.)	Others
I. WATERSHED MANAGEMENT (Mountainous area)																																	
I.1 Water conservation																																	
I.1.1 Regulations (Legislation)	△		△	△	△	○	●	○	△	○	○																☆						
I.1.2 Land use inventory survey	△		△	△	△	△	★	O	○	○	O	○															☆						
I.1.3 Evaluation of land use	△		△	△	△	○	★	★	○	O	○	○															☆						
I.1.4 Land development plan	△		△	△	△	△	★	O	○	O	O	○															☆						
I.1.5 Implementation	△		△	△	△	△	★	△	O	○	O																☆						
I.1.6 Commercial forest management							★	○			O																						
I.2 Land slide and erosion prevention management																																	
I.2.1 Regulations (Legislation)	○		△	△	△	○	●	△	△	○	O																△						
I.2.2 Regular inspection survey	○		△	△	△	△	★	O	○	O	O																△						
I.2.3 Landslide inventory survey	○		△	△	△	△	★	O	○	O	O																△						
I.2.4 Landslide prevention plans	△		△	△	△	△	★	○	○	O	O																△						
I.2.5 Implementation	△		△	△	△	△	★	O	○	O	O																△						
I.3 Sediment control																																	
I.3.1 Regulations (Legislation)	○		△	△	△	○	●	O	△	○	O																△						
I.3.2 Sedimentation in rivers/reservoirs	★		☆	O	△	O							☆							O								☆					
I.3.3 Countermeasures of sedimentation	○		☆	○	○	O	★	O	☆	○	O	△															△						
I.3.4 Implementation	△		△	△	△	O	★	O	○	O	O									O							△						
I.4 G. Kelud debris control																																	
I.4.1 Regulations (Legislation)	●		△	△	△	○	△	△	△	○	O		△							☆							△						
I.4.2 Sedimentation in the existing Sand pocket	★		△	△	O	△	△	△	△	○	O		△							★							△						
I.4.3 Countermeasures of sedimentation	★		△	△	O	△	△	△	△	○	O		△							☆							△						
I.4.4 Implementation	★		△	△	O	△	△	△	△	○	○		△							☆							△						
II. FLOOD MANAGEMENT (incl. River Management)																																	
II.1 Regulations (Legislation)	●		☆	○		○				○			△									★					△						
II.2 Flood control works																																	
II.2.1 Existing flood control works	★		☆	O	○	O				○			O									★					△						
II.2.2 Flood forecasting and warning system	★		☆	○	○	O							○																				
II.2.3 Rehabilitation plans	★		☆	O		○		○		○	○		○									★					△						
II.2.4 Flood control plans	★		☆	O		○		○		○	○		△									★					△						
II.2.5 Implementation	★		☆	O		O		☆		O	O		△			△						★					△	△	△				
II.3 Flood damages management																																	
II.3.1 Flood forecasting/warning operation	★		☆	○	○	O																											
II.3.2 Reservoir operation rule	★		☆	○		O										○																	
II.3.3 Rescue service			○	○	○	○	☆	○					○			○				○			○			★	○	△	△			☆	
II.3.4 Flood damage report	△		☆	○	○	○	☆	○					O			○				○			○			★	○	△	△			☆	
II.3.5 Implementation			☆	○	○	○	☆	○					○			○				○			○			★	○	△	△			☆	
III. WATER SUPPLY MANAGEMENT																																	
III.1 Regulations (Legislation)	●	○	☆	○		○		△					O			○		○					○			★	☆	○	○		☆		
III.2 Water supply																																	
III.2.1 Domestic water	★	●	☆	○		●		△	△				△			△		△					△			★	△	△	O		☆		
III.2.2 Irrigation water	★	△	☆	○		●		△	△			○	●	O	O	△		△					△				△	△	△		☆		
III.2.3 Brackish fisheries water	★	△	☆	○		●		△	△			○	△			●		△					△				△	△	△		☆		
III.2.4 Industrial water	★	△	☆	○		●		△	△				△			△		●					△				△	△	△		☆		
III.2.5 River maintenance water	★	△	☆	○		●		△	△				△			△		△					△				△	△	△		☆		
III.2.6 Hydro electric power	★	△	☆	○		●		△	△				△			△		△					△				△	O	△		☆		
III.3 Water resources																																	
III.3.1 Existing surface waters	★	△	★	△		O							△			△		△					△					○	△		☆		
III.3.2 Existing ground waters	△	△	★										△		O			△	★	O			△					O	△		☆		
III.3.3 Water resources development plans	★	○	★	O		○	○	△	△	○	○		O	O	O	○		○	★	O			☆			△	○	○	O				
III.3.4 Management of implementation	★		★	O		△	△	△	△	○	○		○	O	O			△	★	O			△					○	△				
III.4 Water balance																																	
III.4.1 Present water balance		○		△		O		△					○	○	O	○		○					○					O	○		O		
III.4.2 Mid term water balance	★	○	★	○		O		△					○	○	O	○		○					○					○	○		O		
III.4.3 Long term water balance	★	○	★	○		O		△					○	○	○	○		○					○					○	○		O		
III.5 Low water management system (LWMS)																																	
III.5.1 Regular inspection of existing LWMS	△		△			O		△					△															△					
III.5.2 Rehabilitation plans	★		★	○		O		△					△															△					
III.5.3 Expansion/Upgrading plans of LWMS	★		★	O		O		△					△															△					
III.5.4 Operation of LWMS	★		★	△		O		△					○										△					O			△		
III.5.5 Coordination of water allocation		○	△	△		O		△				○	○			○		○					○					O			O		
III.5.6 Regulation	★		★			O		△					○			○		○					○					○			○		

Table III.8 Tasks and Duties of Agencies Related to W.R.M. in the Brantas (Present Status) (2/2)

● Supervising & Implementing Agency ○ Cooperating Agency
★ Supervising Agency ☆ Coordinating Agency
○ Implementing Agency △ Related Agency



Note "Others" A: DKK (Public Cleansing Service, Kotamadya Surabaya)
B: BPPT (Technology Evaluation and Application Agency)
"Category of Agency": Refer to 1.1 Categories of Agencies

Table III.9 Balance Sheet of Latest 3 Years

(Rp. million)

	1994	1995	95-'94	1996	96-'95
Cash & Deposit	10,266	8,230	-2,036	9,436	1,206
Account Receivable	2,925	3,029	104	1,838	-1,191
(Bad Debt Reserve)	-91	-122	-31	-181	-59
Advance Payment	65	16	-49	216	200
Prepaid Tax	657	817	160		-817
Income Receivable	540	2,753	2,213	2,536	-217
Others	378	175	-203	67	-108
Current Assets	14,740	14,898	158	13,912	-986
Land	799	934	135	1,275	341
Construction & Building	5,412	7,833	2,421	7,995	162
Machine & equipment	8,480	8,966	486	9,749	783
Furniture & Equipment	612	783	171	1,221	438
Fixed Assets	15,303	18,516	3,213	20,240	1,724
(Depreciation)	-6,916	-8,186	-1,270	-9,726	-1,540
NetFixed Assets	8,387	10,330	1,943	10,514	184
Const. in Progress	285	87	-198	517	430
Others	2,144	2,403	259	2,616*	213
Total Assets	25,556	27,718	2,162	27,559	-159
Account Payable	1,338	1,490	152	3,165	1,675
Tax Debt	1,744	1,215	-529	371	-844
Develop Fund Debt	1,513	1,118	-395	0	-1,118
Other Short Term Debt	54	1,444	1,390	216	-1,228
Production Service	5	0	-5	4	4
Advance Received	258	260	2	308	48
Current Liabilities	4,912	5,527	615	4,064	-1,463
Government Capital	17,500	17,500	0	17,500	0
Reserve	1,339	1,791	452	2,516	725
Net Profit of the Year	1,805	2,900	1,095	3,479	579
Shareholders' Equity	20,644	22,191	1,547	23,495	1,304
Liabilities & Equity	25,556	27,718	2,162	27,559	-159

Table III.10 Profit & Loss Statement of Latest 3 Years

(Rp. million)

	1994	1995	%/Revenue	95-'94	%/Increase	1996	%/Revenue	96-'95	%/Increase
Revenue	14,638	18,765	100.0	4,127	28.2	21,049	100.0	2,284	12.2
1. Water Resources	11,545	16,336	87.1	4,791	41.5	17,715	84.2	1,379	8.4
PLN	6,131	9,673	51.5	3,542	57.8	9,898	47.0	225	2.3
PDAM (City Water)	2,201	2,597	13.8	396	18.0	3,683	17.5	1,086	41.8
Industry	3,189	4,066	21.7	877	27.5	4,134	19.6	68	1.7
Clean Water & Water Treatment	24	19	0.1	-5	-20.8	0	0.0	-19	-100.0
2. Non Water Resources	3,093	2,429	12.9	-664	-21.5	3,334	15.8	905	37.3
Tourism	320	389	2.1	69	21.6	479	2.3	90	23.1
Equipment Rental	559	798	4.3	239	42.8	1,332	6.3	534	66.9
Construction Service	1,369	952	5.1	-417	-30.5	1,364	6.5	412	43.3
Other Service	845	290	1.5	-555	-65.7	159	0.8	-131	-45.2
Operating Expense	12,913	16,389	87.3	3,476	26.9	18,062	85.8	1,673	10.2
O & M	4,843	7,832	41.7	2,989	61.7	8,881	42.2	1,049	13.4
Personnel Cost	3,443	3,863	20.6	420	12.2	3,996	19.0	133	3.4
General Expense	782	940	5.0	158	20.2	940	4.5	0	0.0
Business Trip Expense	346	425	2.3	79	22.8	424	2.0	-1	-0.2
Depreciation	1,954	2,004	10.7	50	2.6	1,644	7.8	-360	-18.0
Marketing Cost	104	150	0.8	46	44.2	149	0.7	-1	-0.7
Supervisory Expense	119	169	0.9	50	42.0	200	1.0	31	18.3
Advisory Expense	181	200	1.1	19	10.5	199	0.9	-1	-0.5
Other Cost	1,141	806	4.3	-335	0	1,629	7.7	823	102.1
Operating Income	1,725	2,376	12.7	651	37.7	2,987	14.2	611	25.7
Other Income	1,566	1,627		61	3.9	1,783		156	9.6
PGPS Salary	468	553		85	18.2	585		32	5.8
Bank Interest	951	1,033		82	8.6	1,150		117	11.3
Others	147	41		-106	-72.1	48		7	17.1
Other Expense	42	4		-38	-90.5	176		172	4300.0
Non Operating Income	1,524	1,623		99	6.5	1,607		-16	-1.0
Income before tax	3,249	3,999	21.3	750	23.1	4,594	21.8	595	14.9
Income Tax	1,444	1,099		-345	-23.9	1,115		16	1.5
Net Income	1,805	2,900	15.5	1,095	60.7	3,479	16.5	579	20.0

Table III.11 Appropriation of Earnings

	1994	(%)	1995	(%)	1996	(%)
Net Profit	1,805	(100)	2,900	(100)	3,479	(100)
General/Aim Reserve	451	(25)	725	(25)	N/A	
Development Fund	939	(52)	1,450	(50)	N/A	
Production Service	54	(3)	87	(3)	N/A	
Social and Education Fund	361	(20)	580	(20)	N/A	
Welfare Fund	0		58	(2)	N/A	

Table III.12 Company Performance Trend

Capital Adequacy	1994	1995		1996	
	Actual	Actual	Target	Actual	Target
Equity (Rp. Million)	20,644	22,191		23,495	
Equity Ratio	80.8	80.1		85.3	
Solvability (Total Asset/Debt)	520.2	501.5	467.1	678.1	660.1
Profitability					
Rentability (Pre-tax Profit/	-	16.4	13.9	18.4	15.5
Working Asset)	12.7	14.4		16.7	
ROA (pre-tax)	8.7	13.1		14.8	
ROE (after-tax)	22.2	21.3	19.3	21.8	20.8
Profit Margin (pre-tax)	113.4	114.5	116.3	116.5	117.6
Operational Ratio (Revenue/ Operating Expense)					
Productivity					
Revenue per person (Rp. Million)	32.7	42.6	40.9	48.4	42.8
Liquidity					
Current Ratio	300	270	261	342	366
Others					
Collection Period (months)	2.8	3.7		2.5	
Payables Period (months)	1.2	1.1		2.1	
Difference (months)	-1.6	-2.6		-0.4	
Assets Turnover (Revenue/Total Assets)	0.6	0.7		0.8	

Table III.13 Fund Application Statement

(Rp. million)

	1994	1995	1996
Fund Source			
1. Business Fund			
Net Profit after Tax	1,805	2,900	3,479
Depreciation	1,954	2,004	1,540
Total Business Fund	3,759	4,904	5,019
2. Fund Outside Business			
Selling Fixed Asset	-	86	-
Reduction Fixed Asset in Progress	-	199	-
Change of General/Aim Reserve	770	451	725
Total Fund Outside Business	770	736	725
Total Fund Achievement	4,529	5,640	5,744
Fund Using			
Fixed Asset Investment	806	3,955	1,724
Other Asset Investment	1,750	337	213
Increase Fixed Asset in Progress	259	-	430
Reduction of Pension Fund	107	-	
Net Sharing	3,305	1,805	2,900
Total Fund Using	6,227	6,097	5,267
Fund Surplus/Shortage	-1,698	-457	477
Starting Working Capital	11,526	9,828	9,371
Final Working Capital	9,828	9,371	9,848
Changes in Working Capital			
Current Assets	14,740	14,897	13,912
Current Liabilities	4,913	5,527	4,064
Net Working Capital	9,827	9,370	9,848
Increase/Decrease	-1,698	-457	478

Table III.14 Annual Revenue by Source

(Unit : amount in Rp.million, unit price in Rp.)

	Annual Revenue (Unit price)		
	<1994>	<1995>	<1996>
(1) Water Resources Management and Water Use			
a. PLN water service for Hydro electric power generation	6,131 (7.7/kwh)	9,673 (10.20/kwh)	9,898 (11.20/kwh)
b. PDAM (city water) raw water service	2,201 (18/m^3)	2,597 (18/m^3)	3,683 (30/m^3)
c. Raw Water Service for Industry along Kali Brantas	3,189 (30/m^3)	4,066 (30/m^3)	4,134 (51/m^3)
(2) Water Quality Management			
Clean Water & Water Treatment (i)	24	19	23
(3) River Environment Management			
a. Tourism <visitors in 1,000>			
Selorejo	215 <150>	259 <130>	322 <117>
Karangkatas	105 <139>	190 <116>	157 <96>
Total	320	389	479
b. Sand Utilization (ii)	388	145	33
c. Land Use			
Land rental fee	109	126	104
(4) Others			
a. Equipment Rental (iii)	559	798	1,332
b. Construction Service (iv)	1,369	691	1,048
c. Consulting Service (v)	348	261	316
Total	14,638	18,765	21,050

(5) Other water resources infrastructure service without revenue.

a. Irrigation Service (PJT Annual Report 1995 Chapter 4)
Waters allocation to irrigation covers area of 78,811 ha. Such irrigation area are Lodoyo, Turi Tunggurono, Jatimlerek, Brantas Kiri Mojokerto, Delta Brantas, Selorejo and Widas.

b. Flood Control (PJT Annual Report 1995 Chapter 4)
With the availability of flood control structure such as dam, weir and embankment and the operation of flood control equipment (FFWS) there are quite a number of flood prone area along the Kali Brantas where is free from annual flood disturbance.

Remarks: (i) Facilities developed for workers' drinking water supply during construction of Karangkates Dam.
(ii) Dredged sand of Wlingi, Tlocor, reservoirs sold to cement company
(iii) Equipment rental to private construction companies
(iv) Contractor business for factory and office building.
(v) Technical man power business

Table III.15 Details of Annual Expenses

(Rp. million)

	1994	1995		1996	
Direct Cost					
- Operation and Maintenance Cost	4,838	7,833		8,881	
- Employee Cost	1,337	1,167		790	(4.4%)
- General Cost		205		214	
- Business Trip Cost		66		85	
- Depreciation Cost	1,596	1,575		1,027	
- Other Cost		764		1,405	
Total Direct Cost	**9,180**	**11,612**	**(70.9%)**	**12,402**	**(68.7%)**
Indirect Cost					
- Employee Cost	2,105	2,696		3,206	(17.8%)
- General Affairs Expense	592	735		726	
- Business Trip Cost	287	356		339	
- Depreciation & Amortization Cost	361	428		618	
- Marketing Cost	85	150		149	
- Supervision Committee Cost	120	169		200	
- Guidance Cost	181	192		199	
- Others	2	50		224	
Total Indirect Cost	**3,732**	**4,776**	**(29.1%)**	**5,661**	**(31.3%)**
Operating Expense	**12,913**	**16,388**	**(100%)**	**18,061**	**(100%)**

Table III.16 Summary of the PJT's Public Campaign Activities in the Brantas River Basin Area (1/2)

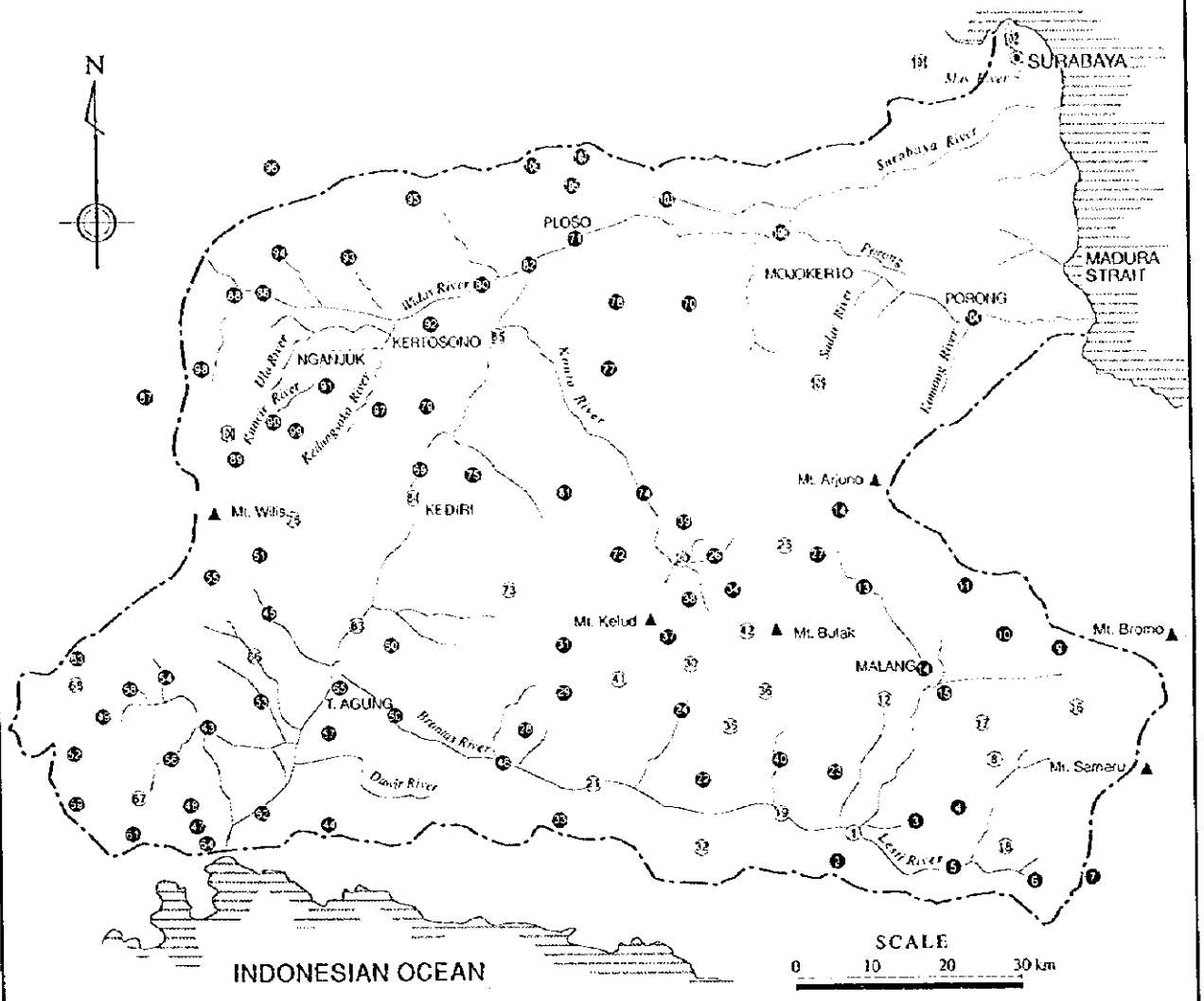
SL. No.	Name of the Program	Purpose	Number of Participants	Fund Sources		Time Schedule	Location	Activities
				Rp.(mil.)	Percentage			
1	Training for trainer of Muslim Boarding School	Awareness building on Environment	41	30	100%	6-7 September1997	Gondanglegi, Malang	To increase Participants in Environment
2	Training for High School Teachers on Water Resources Management	Increase Attention to Water Resources	28 High Schools in the Basin	58	PJT 45% IKIP 55%	September 1996 to Aug.1997	Malang, Kediri, Agung, Jombang, Mojokerto	Preparing Teachers' Guideline & work-sheet for student
3	Public Education for Muslim Boarding School in the Brantas River Basin	Public Awareness on Environment	3,000	35	100%	15 June 1996	Kediri	Increase Participation in Environment
4	Public Education for Muslim Boarding School	Increase Public Awareness on Environment	100	35	100%	December 1996	Bangkalan, Madura	Increase Participation in Environment
5	Conducting Seminar and Workshop on River Basin Management	To increase comprehension the concept for WRM	50	31	BBPT 55% PJT 45%	3-6 December 1997	PJT Head Office Malang	To increase perception & skill for WRM operation
6	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	917.2	BBLH 6% DPU C.K.67% PJT 27%	FY 1991/1992	Brantas R. Basin & Beng. Solo River Basin	Public education and Clean up the river
7	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	712	BBLH 11% DPU C.K.54% PJT 35%	FY 1992/1993	Brantas R. Basin & Beng. Solo River Basin	Public Education & Clean up the river
8	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	750	BBLH 13% DPU C.K.53% PJT 34%	FY 1993/1994	Brantas R. Basin & Beng. Solo River Basin	Public Education & Clean up the river
9	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	1160.12	BBLH 11% DPU C.K.63% PJT 26%	FY 1994/1995	Brantas R. Basin & Beng. Solo River Basin	Public Education & Clean up the river
10	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	271.8	BBLH 5% DPU C.K.84% PJT 11%	FY 1995/1996	Brantas R. Basin & Beng. Solo River basin	Public Education and Clean up the river

Table III.16 Summary of the PJT's Public Campaign Activities in the Brantas River Basin Area (2/2)

SL. No.	Name of the Program	Purpose	Number of Participants	Fund Sources		Time Schedule	Location	Activities
				Rp.(mil.)	Percentage			
11	To implement the Clean River Program (Prokasih) periodically in 12 DATI II	Increase Public Awareness on Environment	1000	4130	BBLH 4% DPU C.K.57% PJT7%, LG.32	FY 1996/1997	Brantas R. Basin & Beng. Solo River Basin	Public Education & Clean up the river
12	Water Resources Conservation	Realization WR. Conservation & balance on Ecology	300	66	PJT 90% DPKT 10%	1-31 December 1997	Kec. Gedangan , Sumbermanjing Kab. Malang	To build 10 check Dam (5 unit in Kec.) Sumbermajing W.
13	Training for Water Quality Monitoring by Biological Analysis	To increase Public Awareness on Water Conservation	50	13.26	Local Government 5%, PJT 95%	May, 1996	Wilayah Kerja Pembantu G. W IV, Malang	Preparing the Guideline to detect Water Quality
14	Training & Workshop for Scout Leader on Pollution Control Campaign	To increase Public Awareness on Environment	71	n.a	PJT Arrange the equipment and Lectures	9-11 December 1997	Sedati, Sidoaarjo and Surabaya River	Communication Discussion in the River Edge
15	Training on Environment Kodya DATI II Malang	To improve Public Awareness on Environment	149	n.a	PJT decides the Subject and Lectures	18 September 1996	Conference room "Mojopahit" Kodya. Malang	Training and Discussion on Environment
16	Training for Entrepreneur Guide (special for PKL)	Increase Public Education for Entrepreneur	23	n.a	PJT Arrange the Equipment	16 October 1996	Selorejo	Training
17	Training for water quality Monitoring by Biological Analysis	To increase public awareness on water conservation	50	13.26	PJT 95% and Local Govt. 5%	May-1996	Pembantu and Gubernur Malang	Preparing guidelines to detect water quality by P. kit
18	Clean River Program (Program Saluran Bersih)	To increase Public Awareness on Environment	500	n.a	PJT arrange Equipment & Manpower	August 1996	Gadang Malang	Voluntary Activities
19	River Clean Service (Brantas river)	Support Prokasih	1000	n.a	PJT arrange Equipments	October 1996	Brantas River Basin	Voluntary Activities

Table III.17 PJT's Community Improvement Activities in the Brantas River Basin Area

No.	Community Improvement	Purpose	Number of participant	Fund Sources		Time Schedule	Location	Activities
				Rupiah (million)	PJT			
1	Poverty Alleviation of the Community in the Brantas River Basin	Establish of Small Scale Enterprise & Cooperation	Cooperatives 4 and 42 Households	42.42	100%	1993	Malang Kotamadya and Regency	To lend the capital to the Cooperative and Small Enterprise
2	Poverty Alleviation of the Community in the Brantas River Basin	Establish of Small Scale Enterprise & Cooperation	Cooperatives 6 and 155 Households	75.69	100%	August 1994	Malang Regency	To lend the capital to the Cooperative and Small Enterprise
3	Poverty Alleviation of the Community in the Brantas River Basin	Establish of Small Scale Enterprise & Cooperation	Cooperatives 5 and 32 Households	103.15	100%	1995	Malang Kodya. Malang Regency Bliter Regency	To lend the capital to the Cooperative and Small Enterprise
4	Total	-	229 households and 15 Cooperatives	Rupiah 221.21 (million)	-	-	-	-



BRANTAS UPSTREAM AREA

① Sengguruh
② Pagak
③ Gondanglegi
④ Turen
⑤ Tawangrejeni
⑥ Srimulyo
⑦ Ampel Gading/Tirtoyudo
⑧ Patok Picis
⑨ Gubug klakah
⑩ Jabung
⑪ Singosari
⑫ Wagir
⑬ Dau
⑭ Sumber Brantas
⑮ Malang
a. Perum Jasa Tirta
b. Agriculture Brawijaya
⑯ Poncokusumo
⑰ Tangkil
⑱ Dampit

HYDROELECTRIC AREA

⑲ Sutami Dam
⑳ Selorejo Dam
㉑ Wlingi Dam
㉒ Jajagan
㉓ Talangagung
㉔ Babadan
㉕ Pujon

㉖ Kedungrejo
㉗ Batu
㉘ Blitar
㉙ Garum
㉚ Semen
㉛ Badak
㉜ Birowo
㉝ Sutojayan
㉞ Bendosari
㉟ Doko
㊱ Tunggorono
㊲ Nyunyur
㊳ Pagersari
㊴ Jomblok
㊵ Bangelan
㊶ Sumber Agung
㊷ Wates Wlingi

TULUNGAGUNG AREA

㊸ Bendo Dam
㊹ TumpakMargo
㊺ Sendang
㊻ Jimbe Kademangan
㊼ Keboireng Besuki
㊽ Karangtuwo
㊾ Jati Karangan
㊿ Gandekan
(51) Jaeyan
(52) Pule
(53) Paingan Dam
(54) Bagong Dam
(55) Sumber Pandan

(56) Widoro Dam
(57) Boyolangu
(58) Prambon Dam
(59) Dongko
(60) Salam
(61) Watulimo
(62) Campurdarat
(63) Pangkal
(64) Tangkilan (Besuki-Neyama)
(65) Tapan
(66) Pagerwojo
(67) Kampak
(68) Tugu

BRANTAS MIDDLE REACH AREA

(69) Mrican Barrage
(70) Mojoagung
(71) Ploso
(72) Siman
(73) Wates
(74) Kandangan
(75) Pagu Menang
(76) Mojo Besuki/Wilis
(77) Blimbing
(78) Jombang
(79) Prambon
(80) Lengkong
(81) Pare
(82) Begendeng
(83) Jeli
(84) Kediri
(85) Kertosono

WIDAS AREA

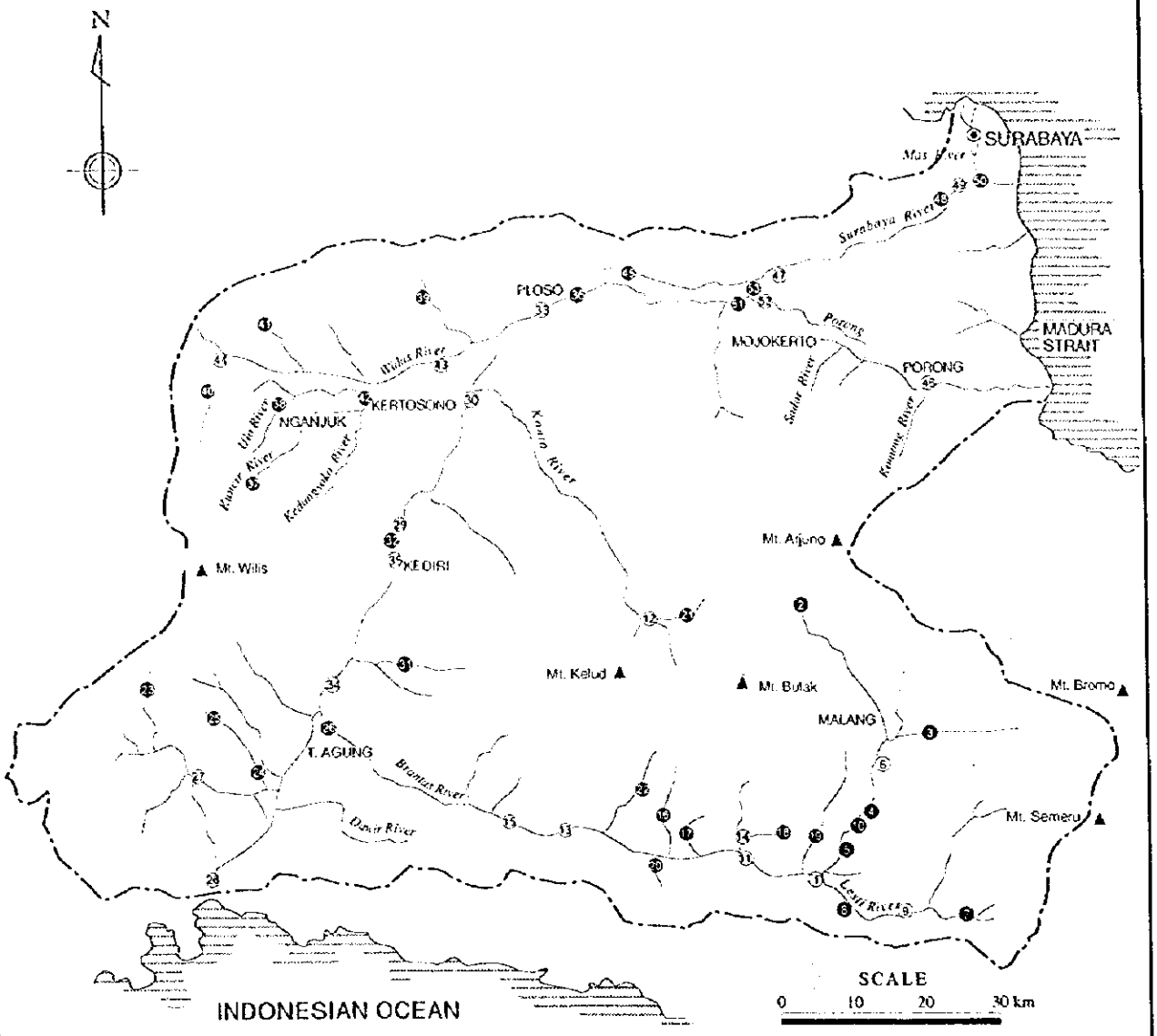
(86) Ngudikan
(87) Gemarang
(88) Widas/Bening Dam
(89) Ngliman
(90) Sawahan
(91) Loceret
(92) Kalimati
(93) Ngrambek
(94) Semantok
(95) Ngluyu
(96) G.Lengko
(97) Pace
(98) Tunglur
(99) Berbek
(100) Wates Sawahan

BRANTAS DOWNSTREAM AREA

(101) Semini
(102) Gubeng Dam
(103) Memung
(104) Porong
(105) Kabuh
(106) Sumberaji
(107) Sukodadi
(108) Mojokerto
(109) Tampung

LEGEND :
③ Telemeter Station
● Others

Figure III.1 Location Map of Meteorological Stations Observed by PJT



BRANTAS UPSTREAM AREA

① Sengguruh Dam
② Kali Lanang (Pandanpuro)
③ Kali Amprong (Madyopuro)
④ Kali Manten (Wandanrejo)
⑤ Kedung Pedaringan
⑥ Gadang
⑦ Genteng
⑧ Clumprit
⑨ Tawangrejeni
⑩ Blobo

HYDRO ELECTRIC AREA

⑪ Sutami Dam
⑫ Selorejo Dam
⑬ Wlingi Dam
⑭ Lahor Dam
⑮ Lodoyo Barrage
⑯ Kali Bambang
⑰ Kali Legi
⑱ Kali Biru
⑲ Kali Metro
⑳ Kali Jugo
㉑ Kedungrejo (Kali Konto)
㉒ Tangkil (Kali Lekso)

TULUNGAGUNG AREA

㉓ Bendungan
㉔ Paingan Dam
㉕ Kali Song
㉖ Ngujang
㉗ Bendo
㉘ Inlet Gate

BRANTAS MIDDLE REACH AREA

㉙ Mrican Barrage
㉚ Kertosono
㉛ Keras
㉜ Jongbiru
㉝ Ploso
㉞ Jeli
㉟ Kediri
㊱ Menturus

WIDAS AREA

㊲ Sawahan
㊳ Keringan
㊴ Ketandan
㊵ Petung
㊶ Semantok
㊷ Kedung Suko
㊸ Lengkong
㊹ Bening Dam/Widas

BRANTAS DOWNSTREAM AREA

㊺ Memung Upstream
㊻ Porong
㊼ Perning
㊽ Sepanjang
㊾ Gunungsari
㊿ Jagir Upstream
(51) Mojokerto
(52) New Lengkong
(53) Mrilip Gate

LEGEND :
① Telemeter Station
● Others

Figure III.2 Location Map of Hydrological Stations Observed by PJT

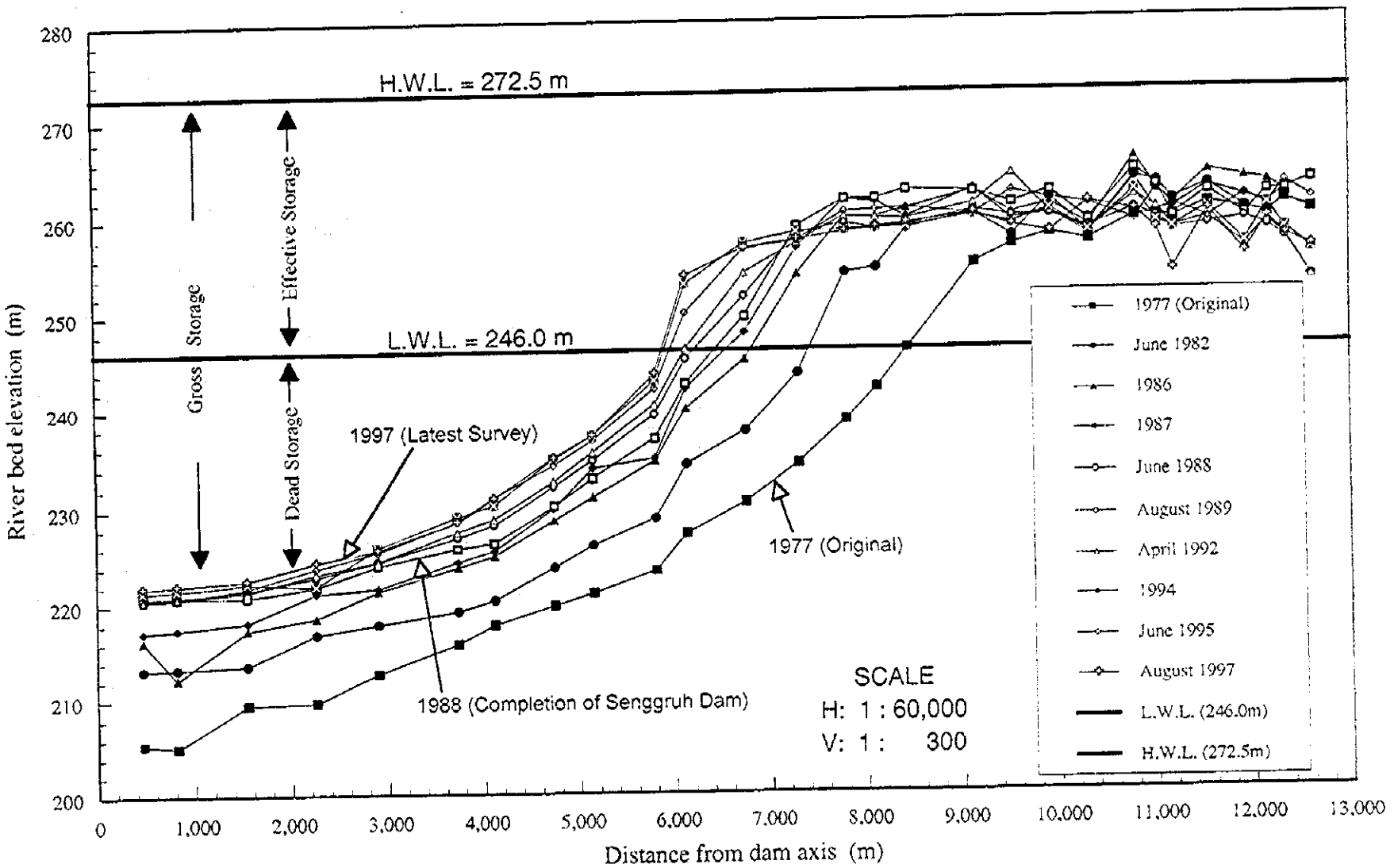
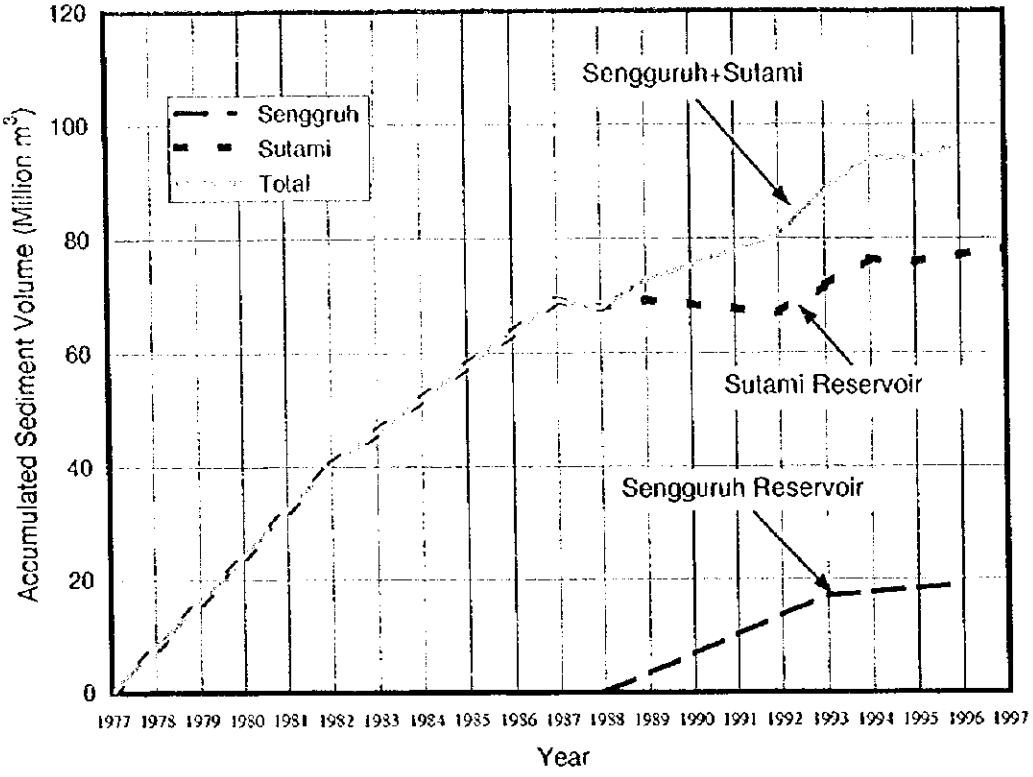


Figure III.3 Longitudinal Sections in Sutami Reservoir (Brantas River)



Year	Accumulated Sediment Volume (m^3)			Sediment Volume per Year (m^3)			Remarks
	Sengguruh	Sutami	(Total)	Sengguruh	Sutami	Total	
1977	-	0	0	-	-	-	
1978	-	-	8,076,501	-	8,076,501	8,076,501	
1979	-	-	16,153,002	-	8,076,501	8,076,501	
1980	-	-	24,229,503	-	8,076,501	8,076,501	
1981	-	-	32,306,004	-	8,076,501	8,076,501	
1982	-	40,382,505	40,382,505	-	8,076,501	8,076,501	
1983	-	-	46,159,430	-	5,776,925	5,776,925	
1984	-	-	51,936,355	-	5,776,925	5,776,925	
1985	-	-	57,713,279	-	5,776,925	5,776,925	
1986	-	-	63,490,204	-	5,776,925	5,776,925	
1987	-	69,267,129	69,267,129	-	5,776,925	5,776,925	
1988	0	67,857,166	67,857,166	-	-1,409,963	-1,409,963	Completion of Sengguruh Dam.
1989	-	69,282,230	72,686,297	3,404,067	1,425,064	4,829,131	
1990	-	-	75,337,320	3,404,067	-753,044	2,651,023	
1991	-	-	77,988,342	3,404,067	-753,044	2,651,023	
1992	-	67,023,097	80,639,365	3,404,067	-753,044	2,651,023	
1993	17,020,335	-	88,735,542	3,404,067	4,692,110	8,096,177	
1994	-	76,407,316	94,096,326	668,675	4,692,110	5,360,785	
1995	-	75,898,161	94,255,847	668,675	-509,155	159,520	
1996	19,026,361	-	96,102,373	668,675	1,177,851	1,846,526	
1997	-	78,253,862	-	-	1,177,851	-	

Remarks :

(1) Sediment volume of Sengguruh reservoir is calculated by the Study Team in accordance with the survey report by PJT.

(2) Sediment volume of Sutami reservoir is calculated by the Study Team in accordance with the original survey data.

(3) The sediment volume in 1977 is set at 0 m^3 due to the lack of applicable survey result before 1977.

Figure III.4 Transition of Sediment Volume in Sengguruh and Sutami Reservoir

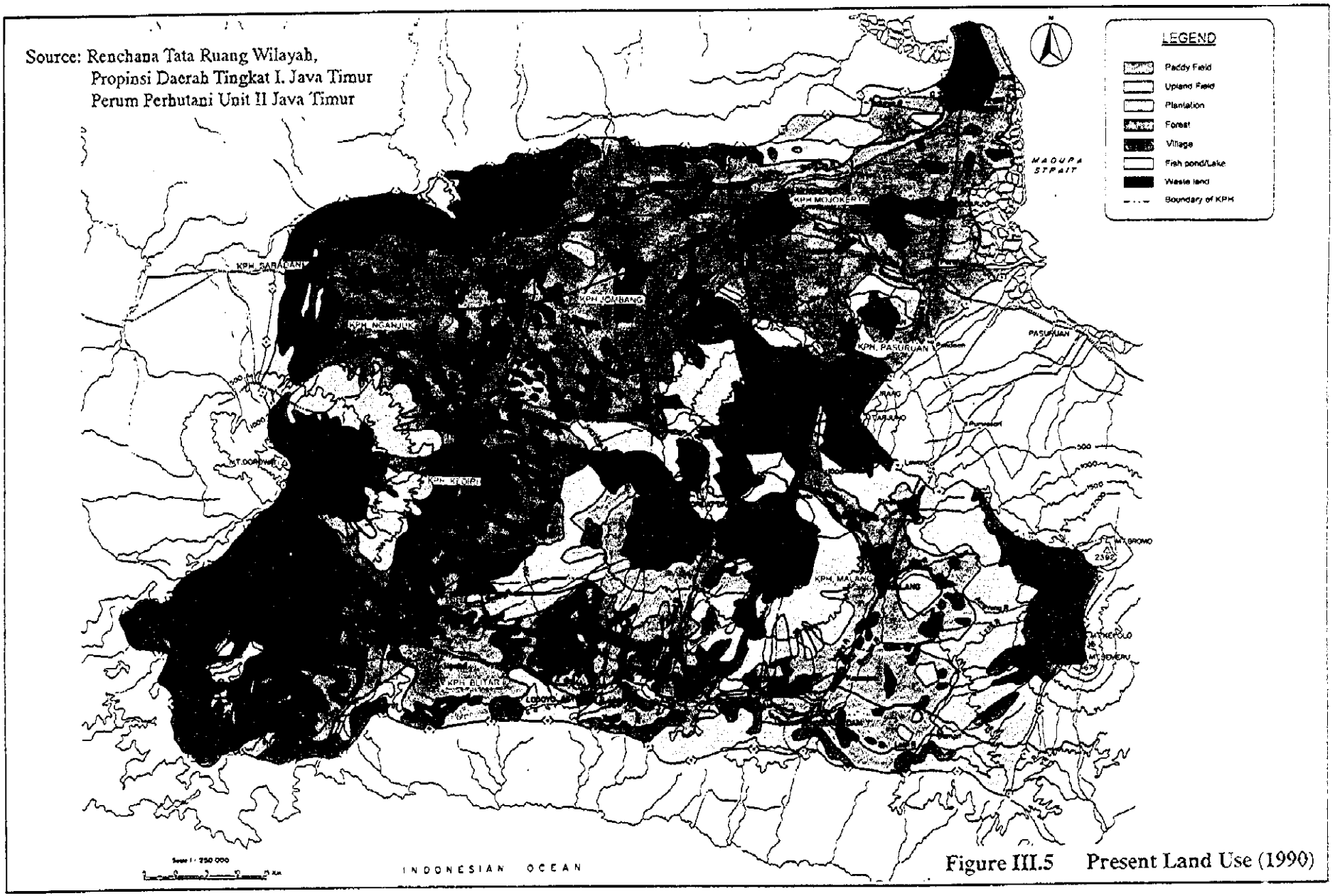


Figure III.5 Present Land Use (1990)

Source: Rencbana Tata Ruang Wilayah,
Propinsi Daerah Tingkat I Jawa Timur
Perum Perhutani Unit II Jawa Timur

Figure III.5 — Present Land Use (1990)

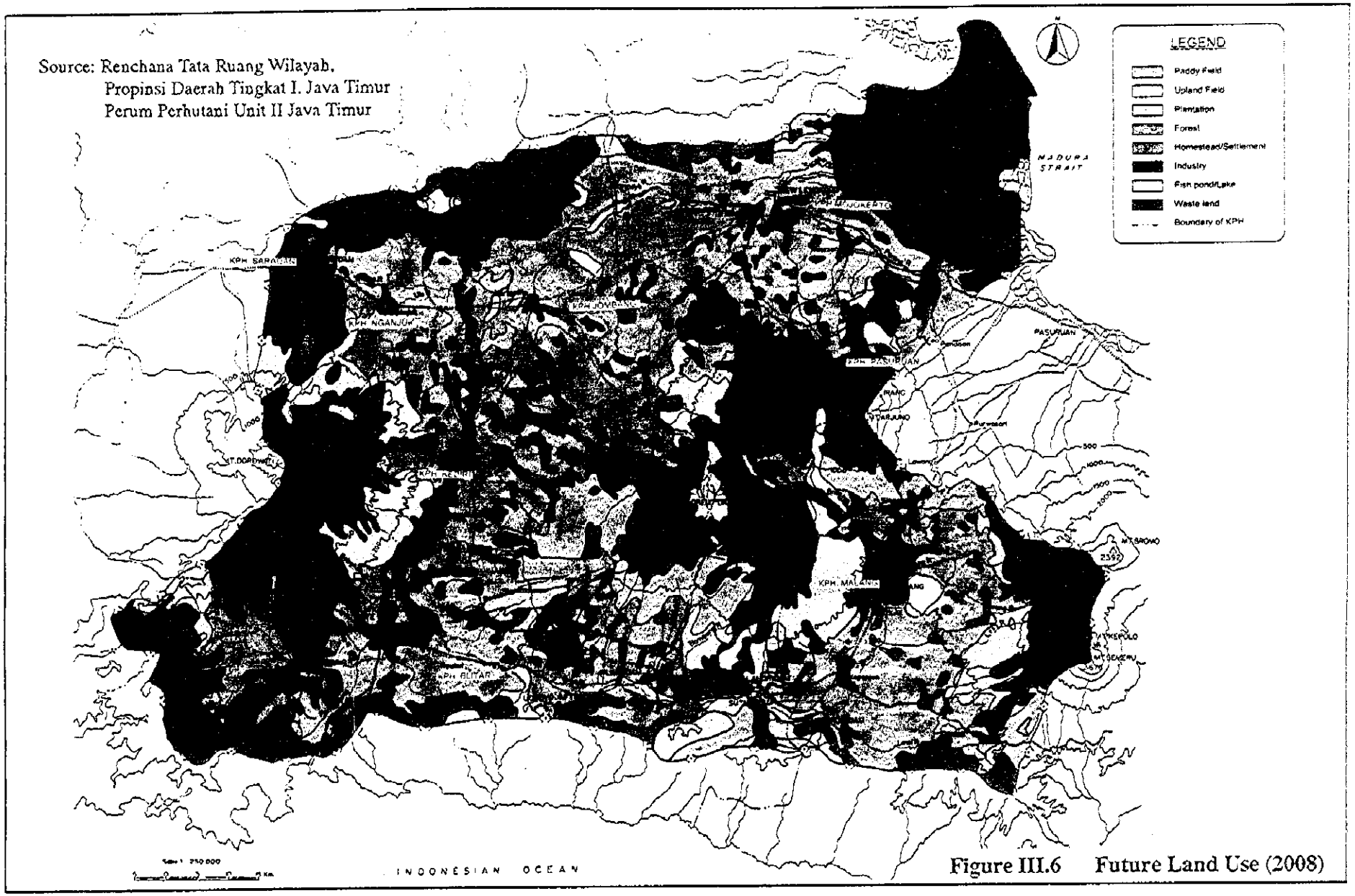


Figure III.6 Future Land Use (2008)

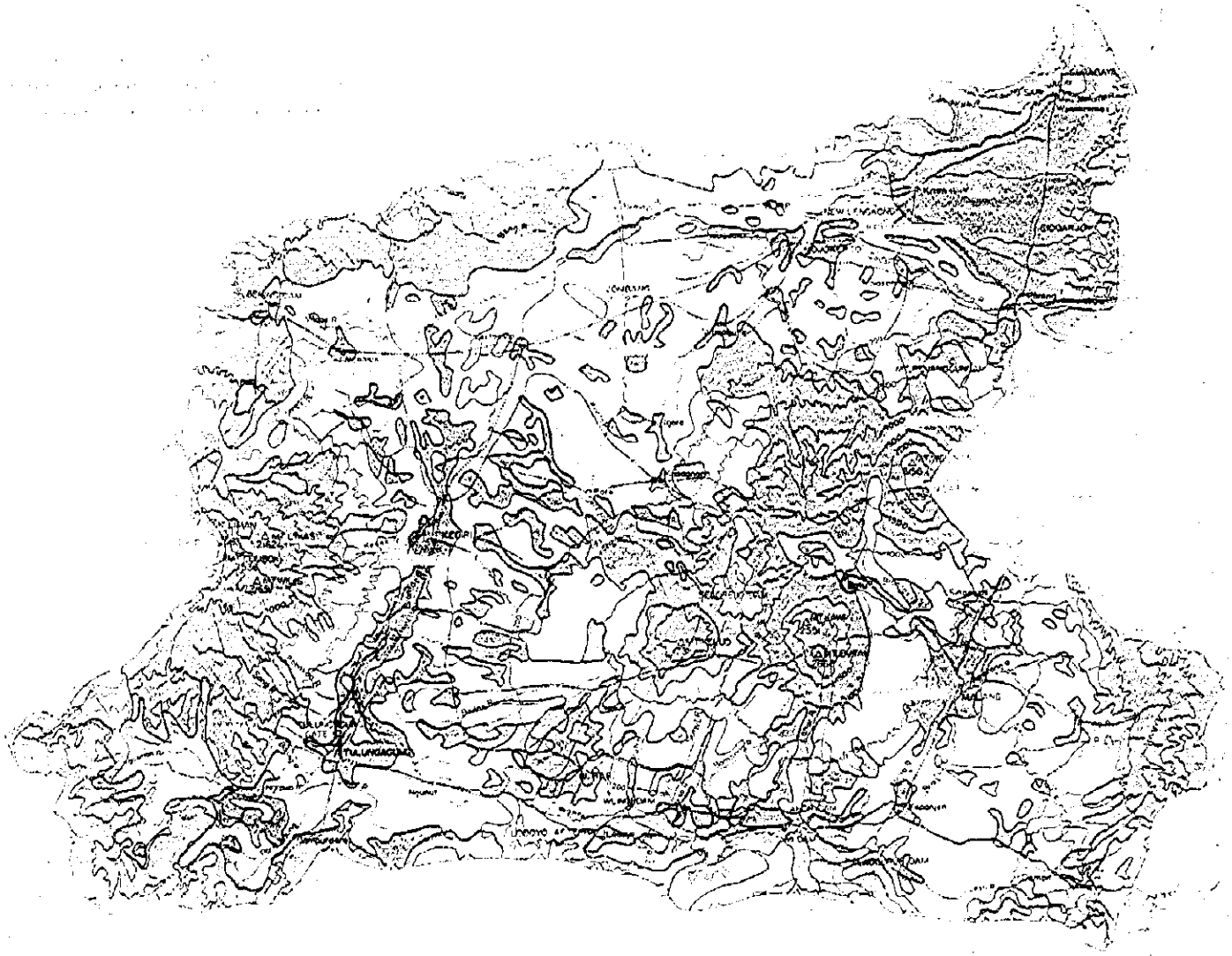


Figure III.6 — Future Land Use 2008

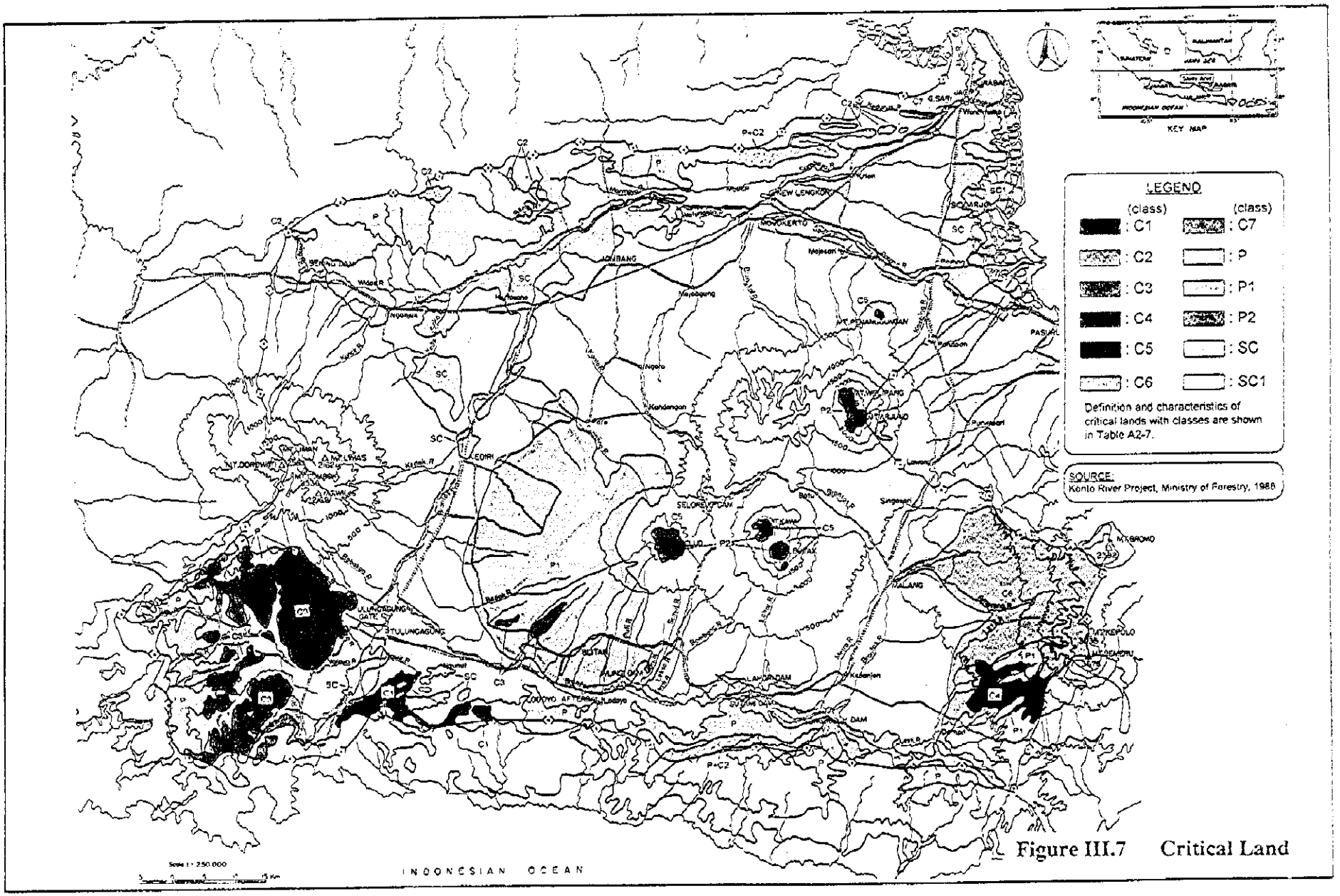
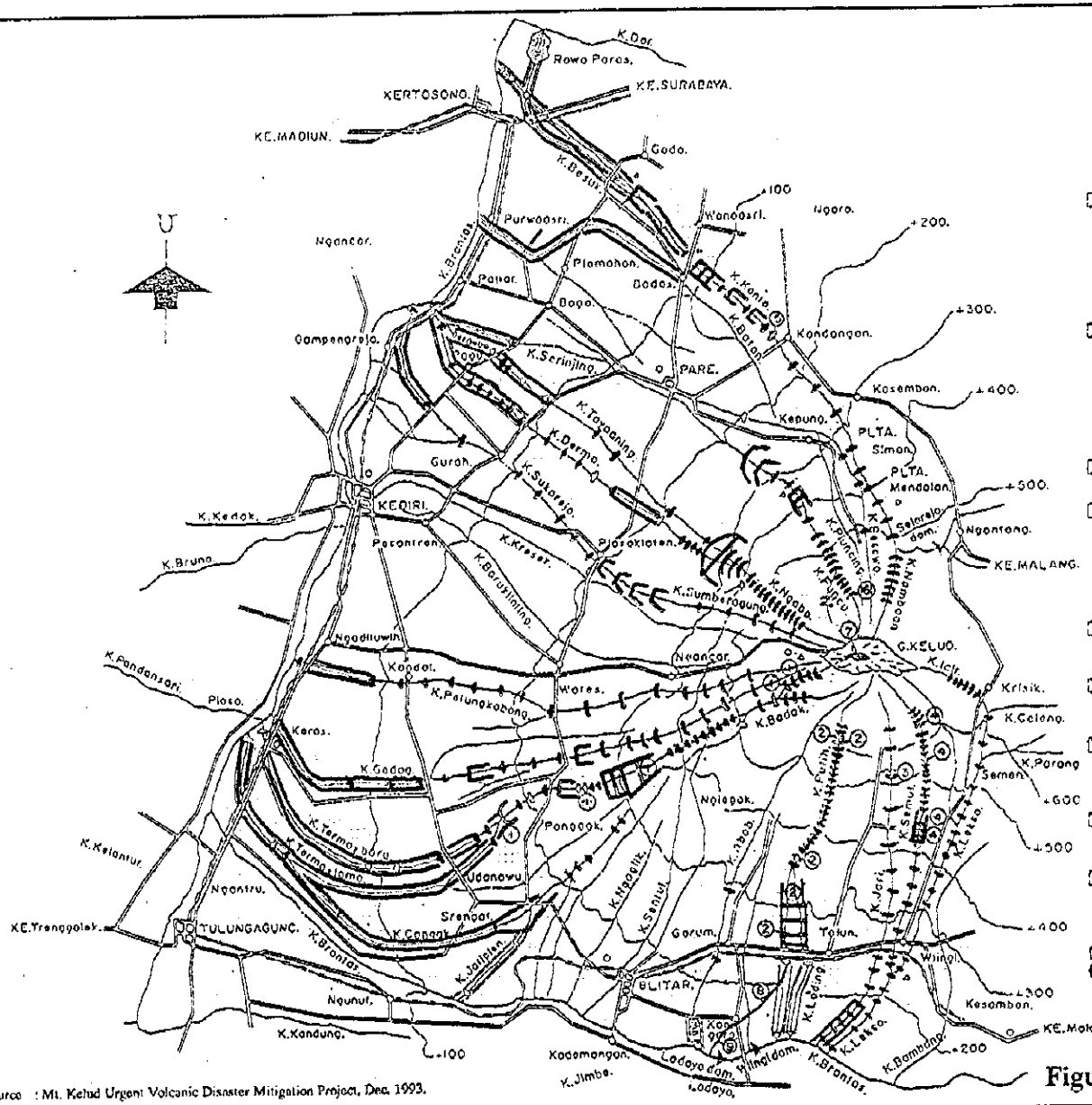


Figure III.7 Critical Land



Source : Mt. Kelud Urgent Volcanic Disaster Mitigation Project, Dec. 1993.

Figure III.8 Mt.Kelud Sabo Project

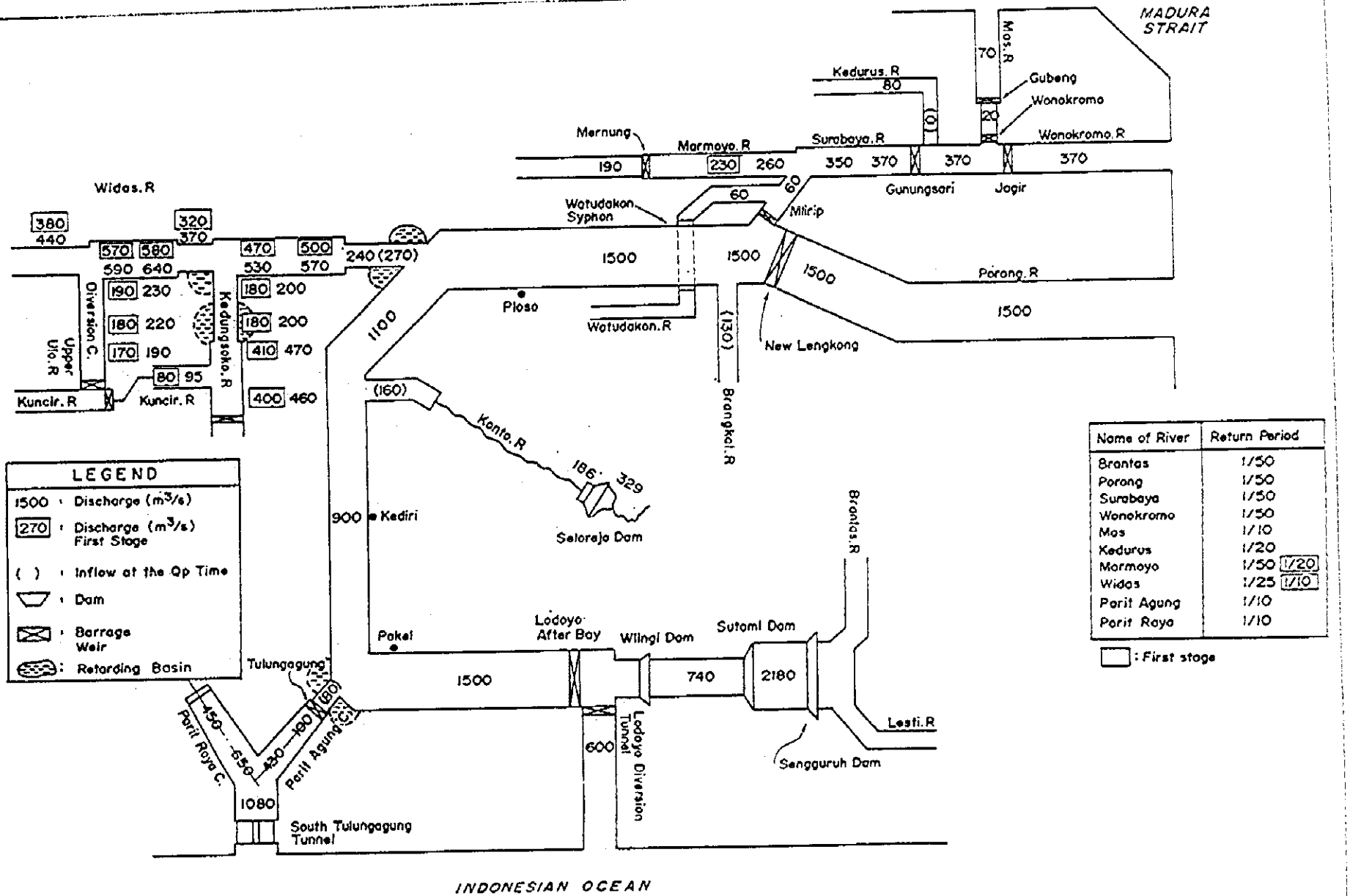


Figure III.9 Design Discharge Distribution in Whole Brantas River Basin

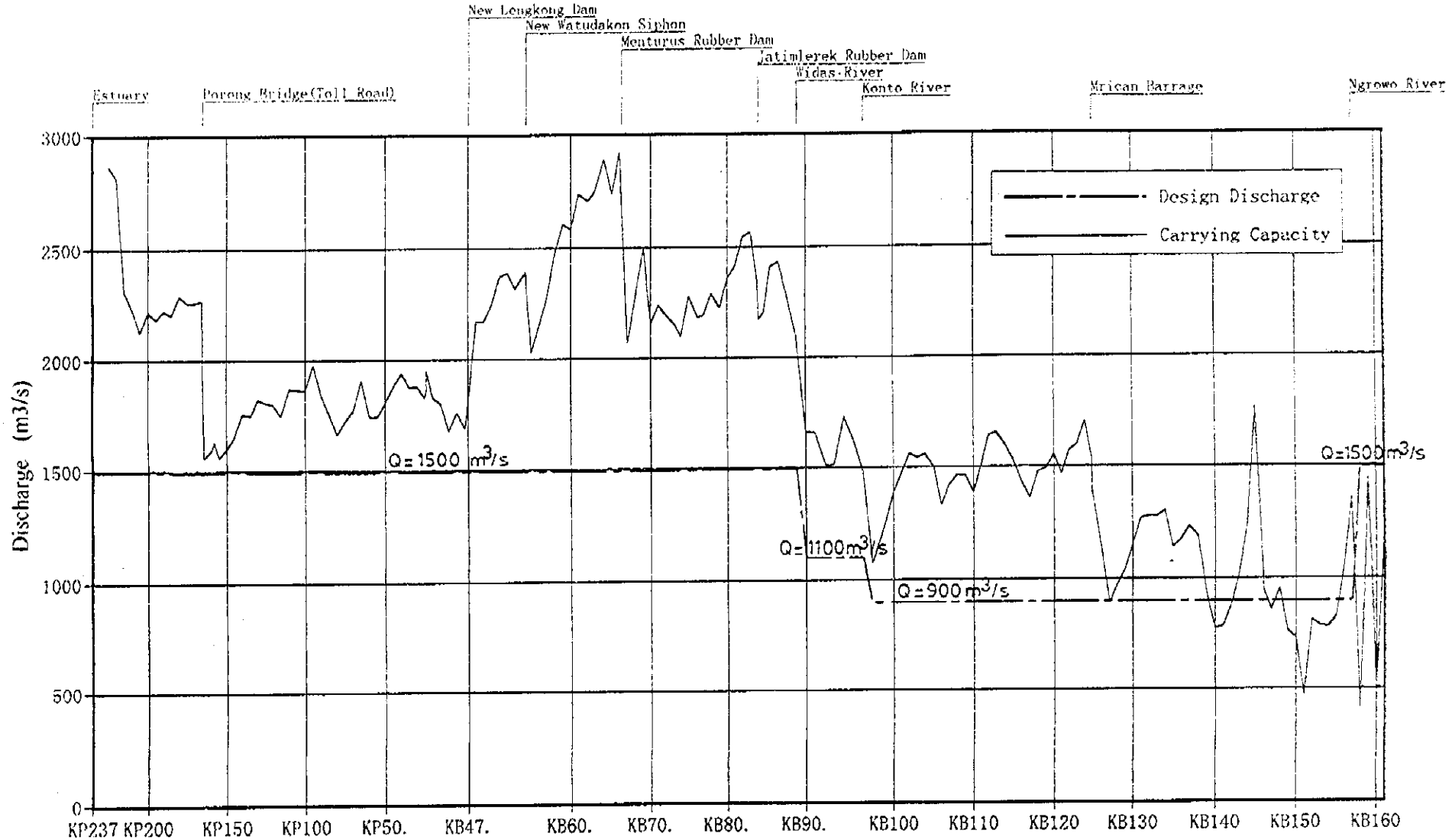
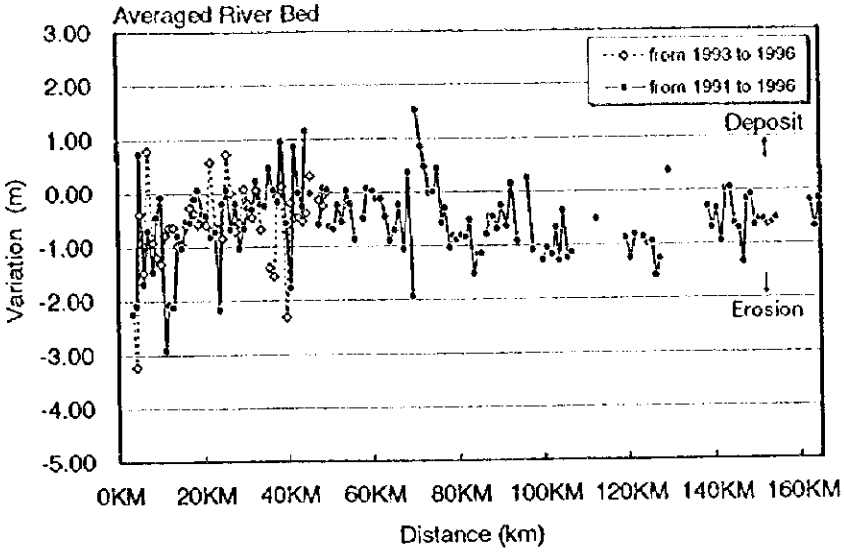
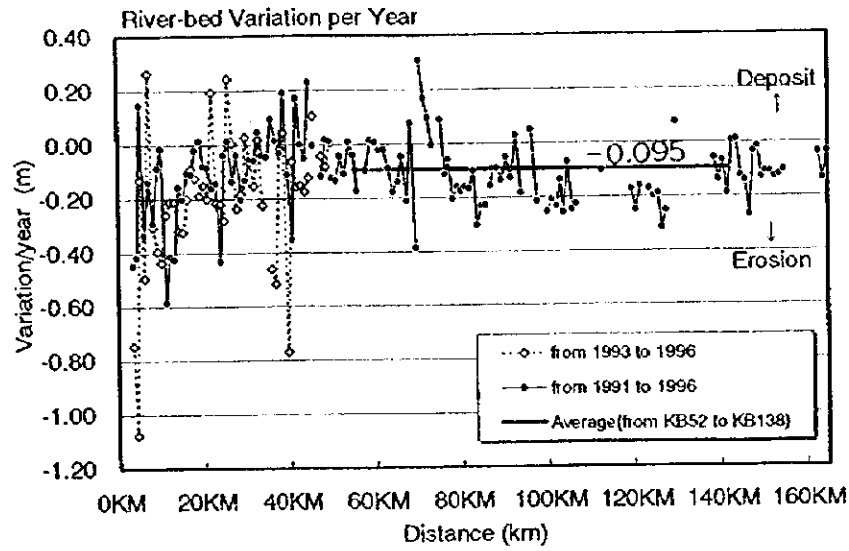


Figure III.10 Discharge Capacity of Brantas River (1996)





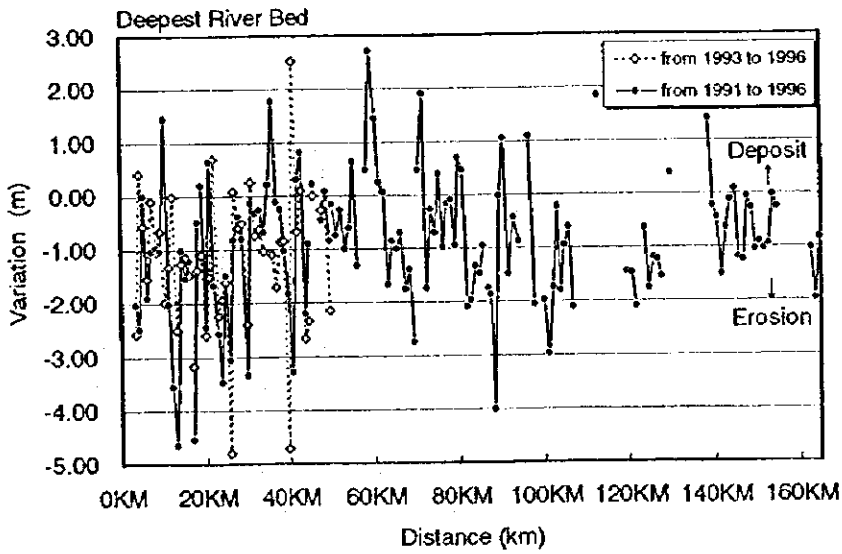
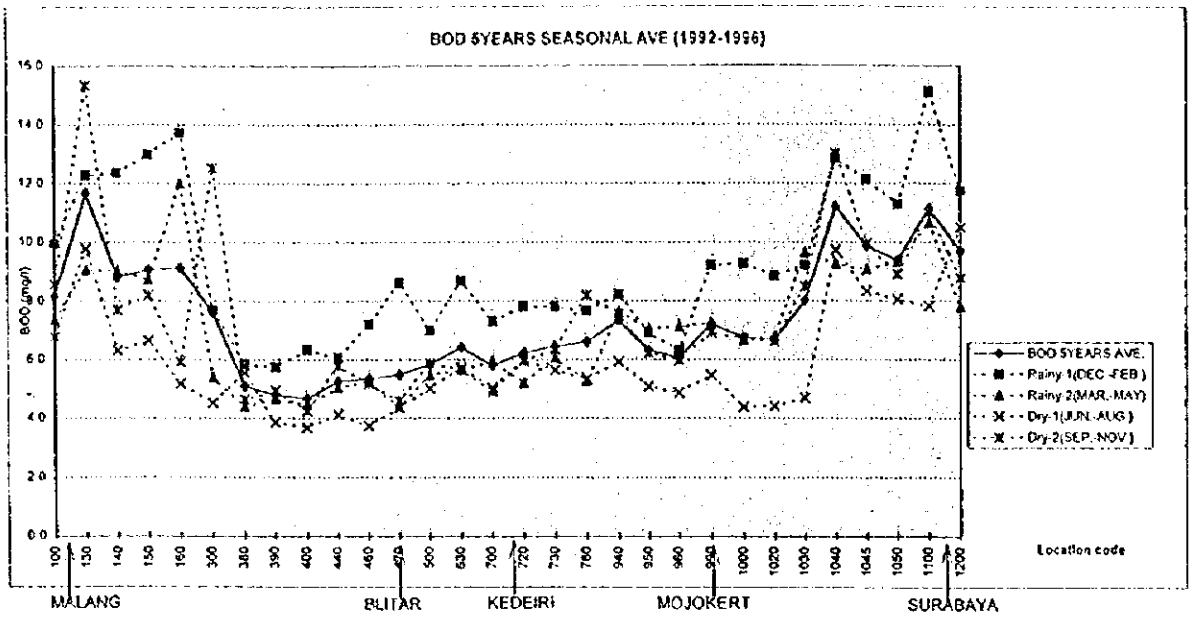


Figure III.11 River Bed Variation of Brantas River



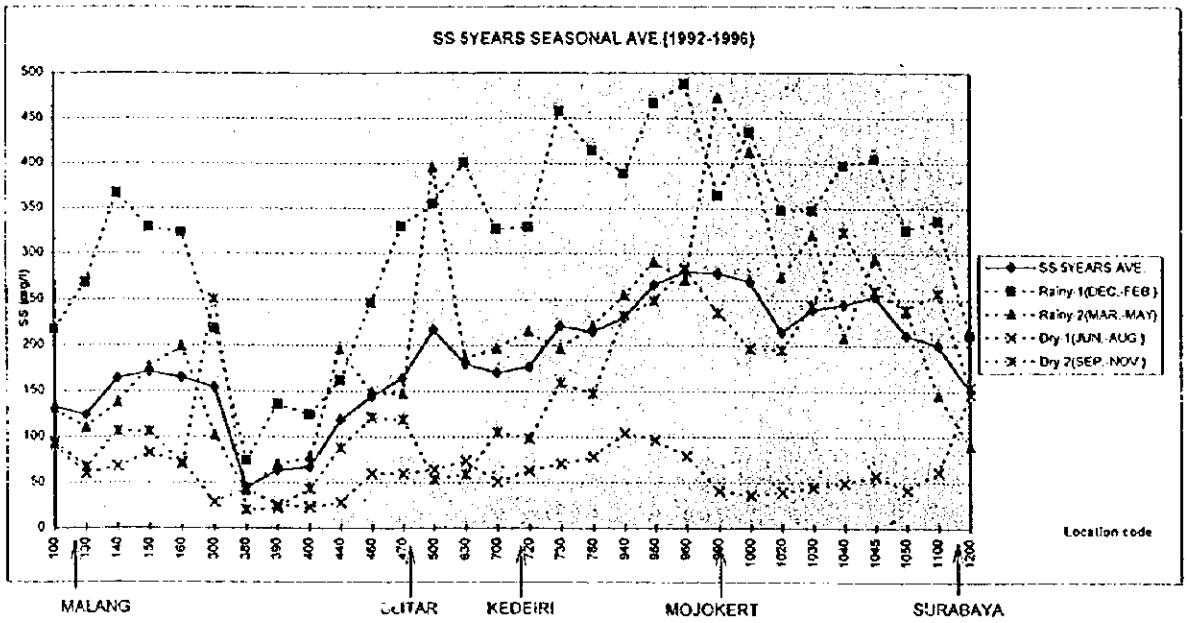


Figure III.12 Seasonal Variation and Geographical Distribution of BOD and SS in the Brantas, Surabaya and Mas Rivers

Source : PJT

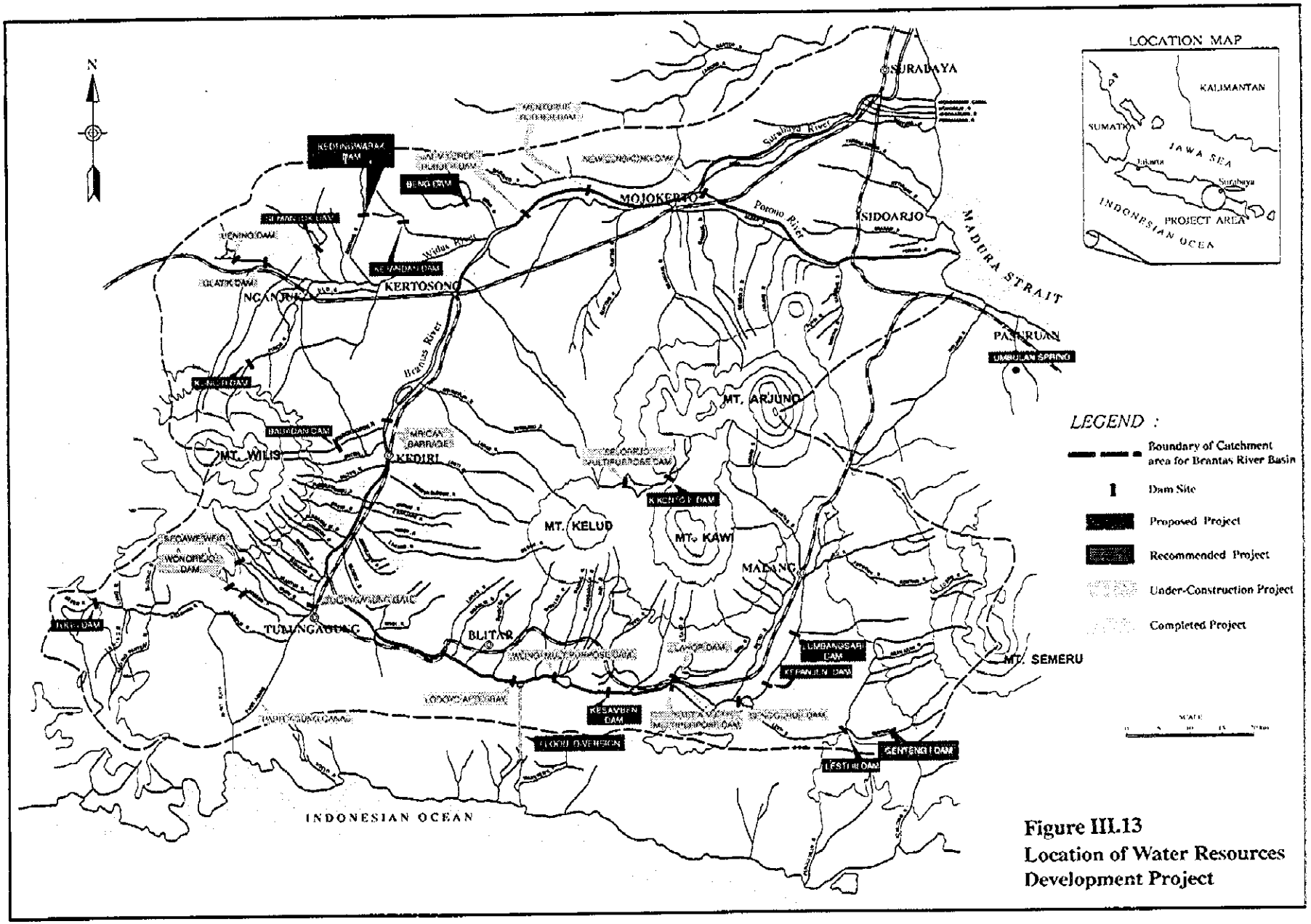
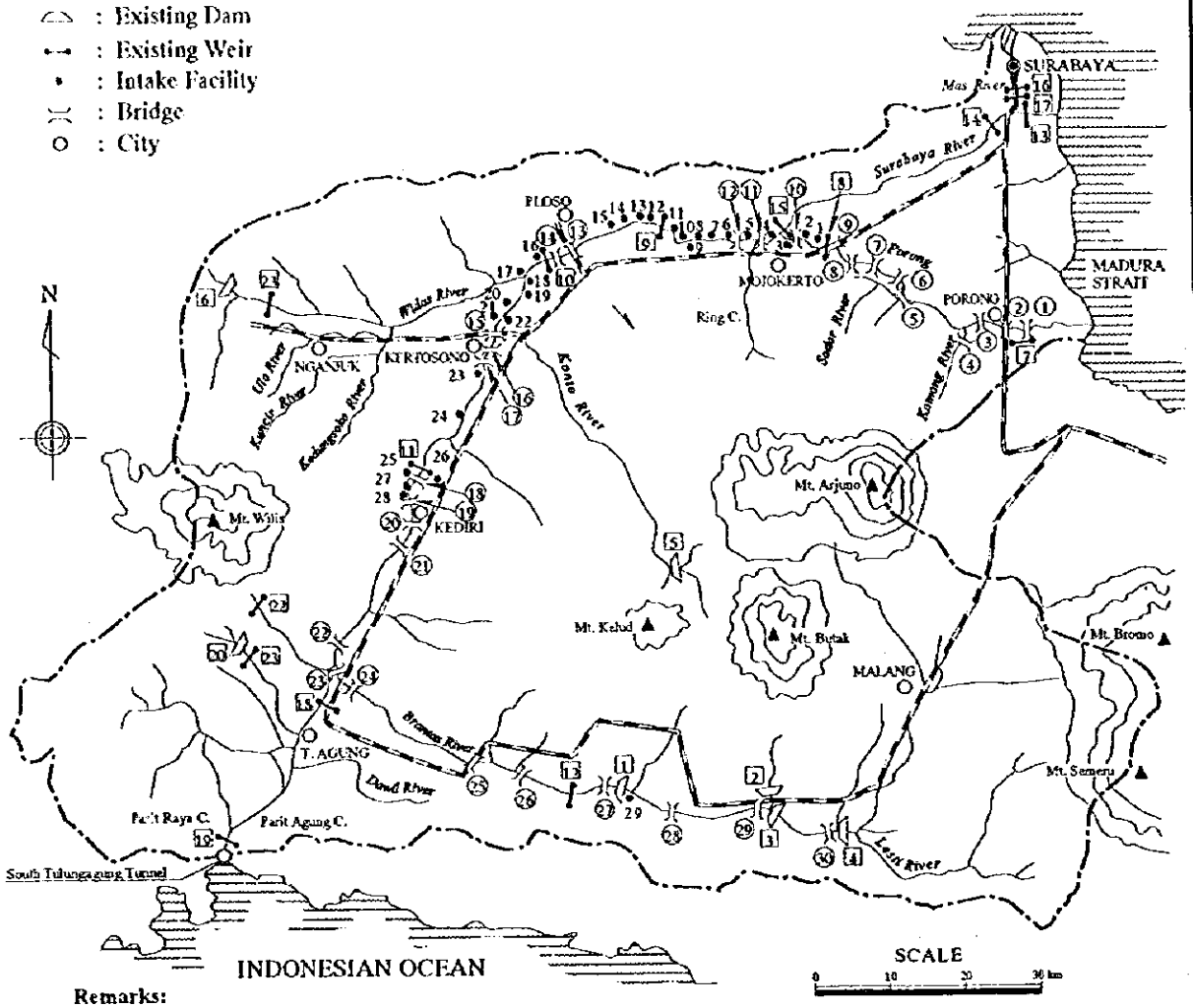


Figure III.13
Location of Water Resources Development Project



Remarks:

Dam

1. Wlingi
2. Lahor
3. Sutami
4. Sengguruh
5. Selorejo
6. Bening
20. Wonorejo

Weir

7. Bangil Tak
8. New Lengkong
9. Menturus
10. Jatimlerek
11. Mrican
12. Lodoyo
13. Jagir
14. Gunungsari
15. Mlirip
16. Gubeng
17. Wono Kromo
18. Tulungagung
19. Tulungagung Tunnel
21. Glatik
22. Segawe Weir
23. Tiudan

Bridge

1. Porong (Toll)
2. Porong (Railway)
3. Porong (Road)
4. Inspection
5. Trolley
6. Trolley
7. Ngrame (Road)
8. Footpath
9. Cepiples (Railway)
10. New Mojokerto (Road)
11. Moojokerto (Road)
12. Watudakon (Trolley)
13. Ploso (Road)
14. Ploso (Railway)
15. Kertosono (Railway)
16. Kertosono (Road)
17. New Kertosono (Road)
18. Jongbiru (Trolley)
19. New Kediri II (Road)
20. Kediri (Road)
21. New Kediri (Road)
22. Jeli (Trolley)
23. Jeli (Railway)
24. Jeli (Road)
25. Railway
26. Kedemangan (Road)
27. Grondong (Road)
28. Ngembul (Road)
29. Belly (Road)
30. Sengguruh (Road)

Intake

1. Voor II canal
2. Voor I canal
3. Jatikulon
4. Ajinomoto (P)
5. Losari
6. Gedek Intake
7. Gempolkerep (P)
8. Gembongan
9. Sotowuluh
10. Kedungsari (P)
11. Keboan
12. Menturus
13. Bebekan
14. Tunggorono
15. Tapen (P)
16. Jatimlerek
17. Bunder (P)
18. Tunggorono
19. Turipinggir
20. Pengkol
21. Kedungkudi
22. Bunder II (P)
23. Besuk
24. Banjarsari
25. Warujayeng Intake
26. Turitunggorono
27. (P)
28. Mrican
29. Lodagung

Figure III.14 Location Map of Major River Facilities (1/2) Dam, Weir, Bridge and Water Intake

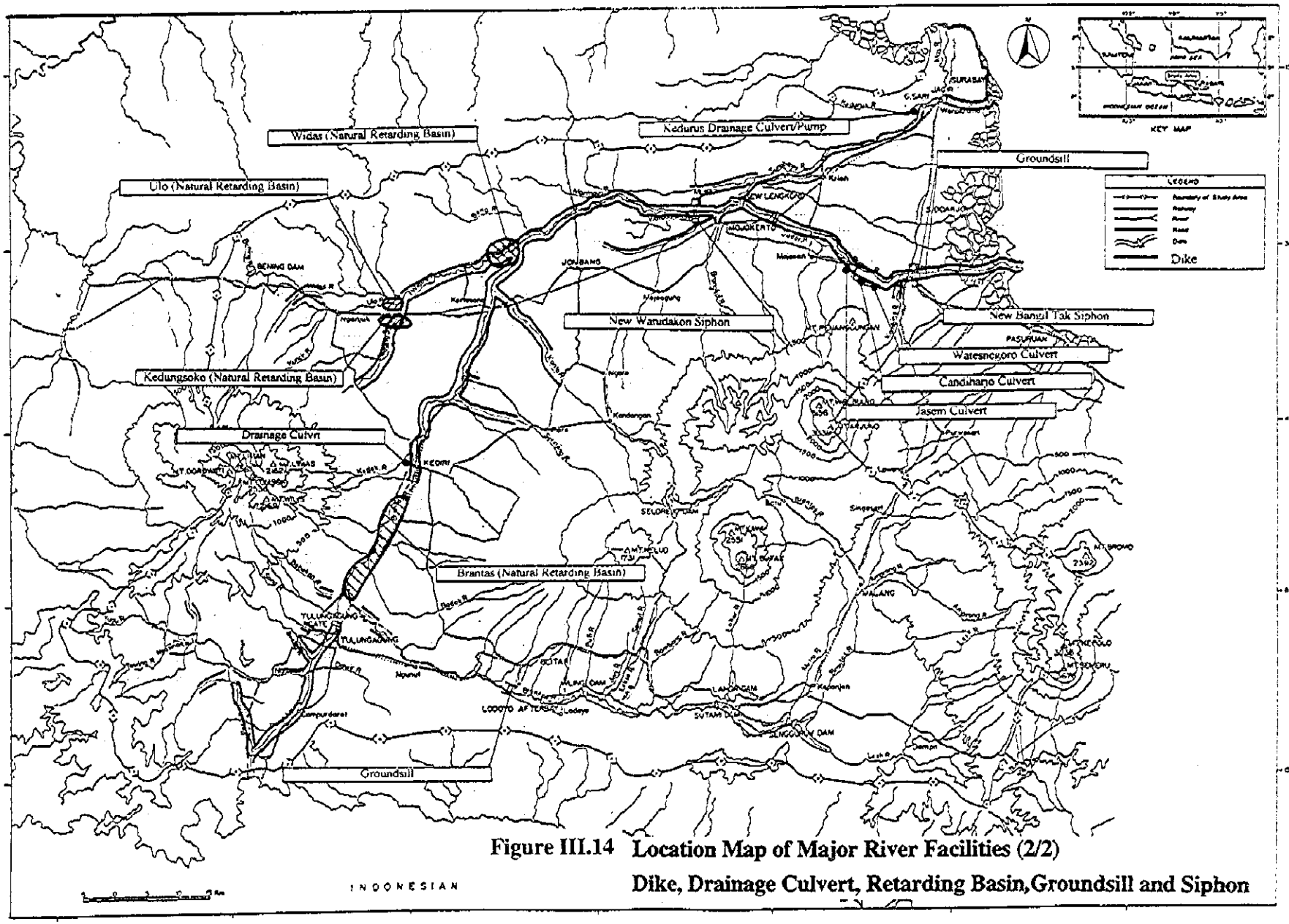


Figure III.14 Location Map of Major River Facilities (2/2)

Dike, Drainage Culvert, Retarding Basin,Groundsill and Siphon

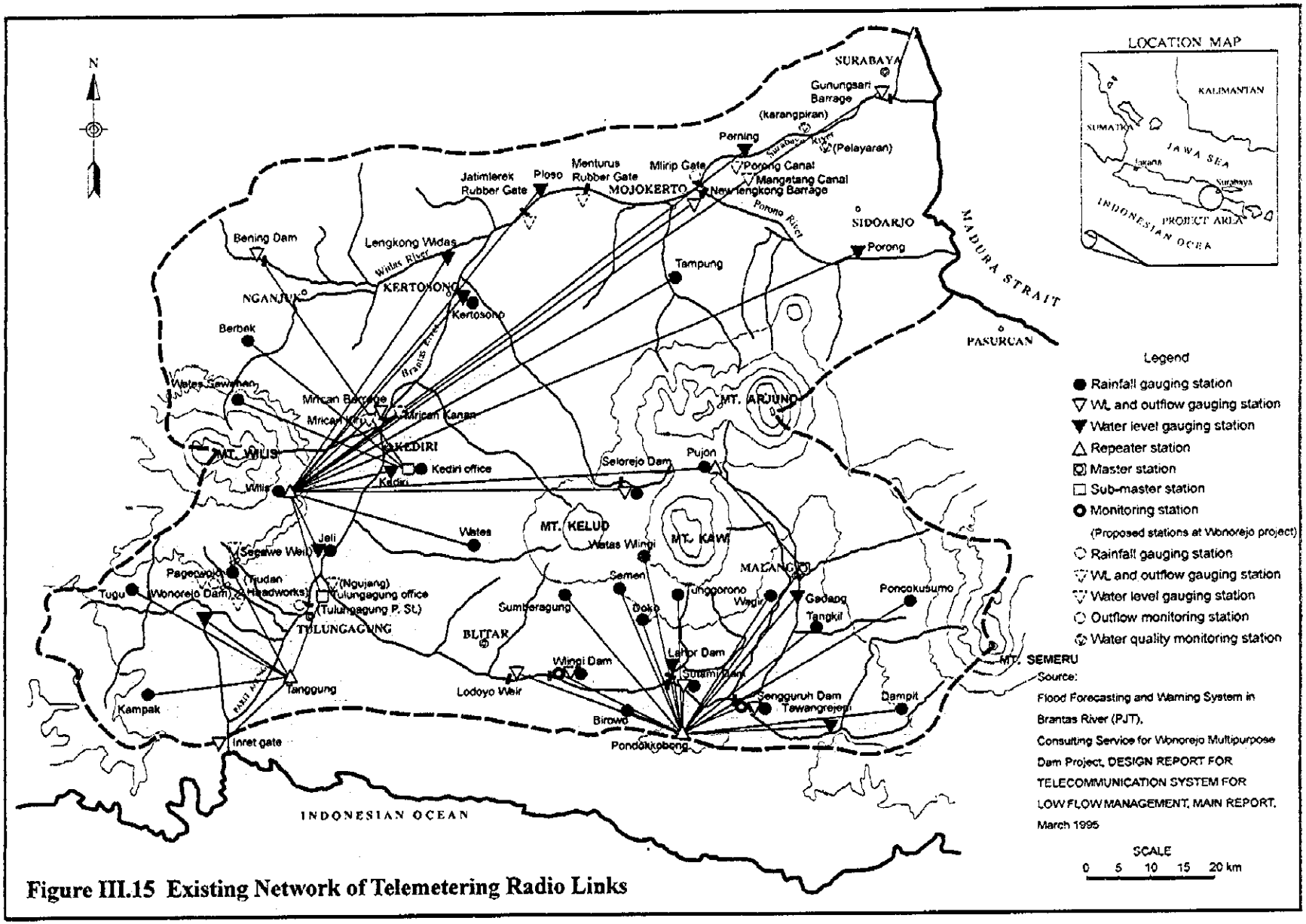


Figure III.15 Existing Network of Telemetering Radio Links

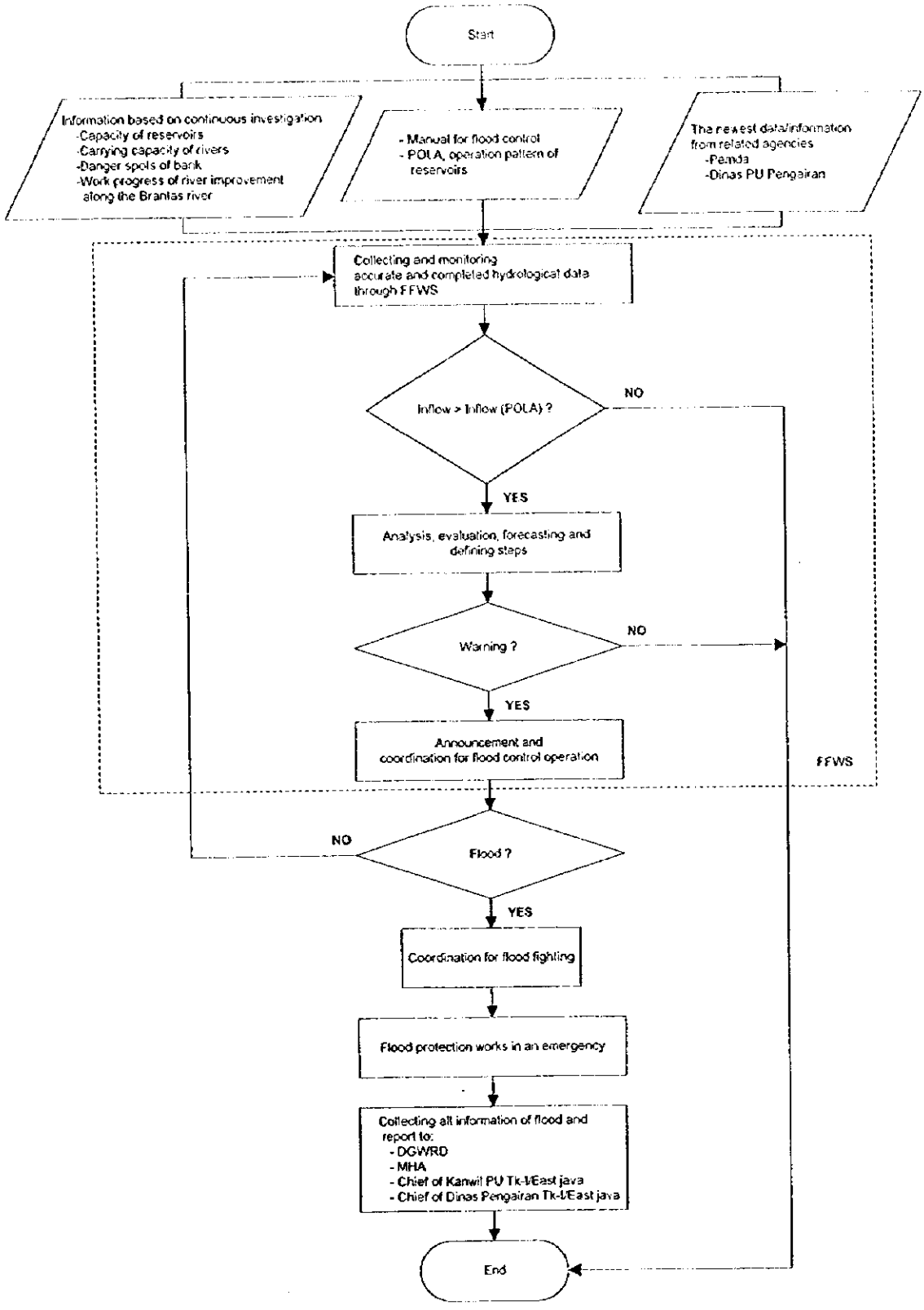


Figure III.16 Main Flow of Flood Control

SOURCE:PJT

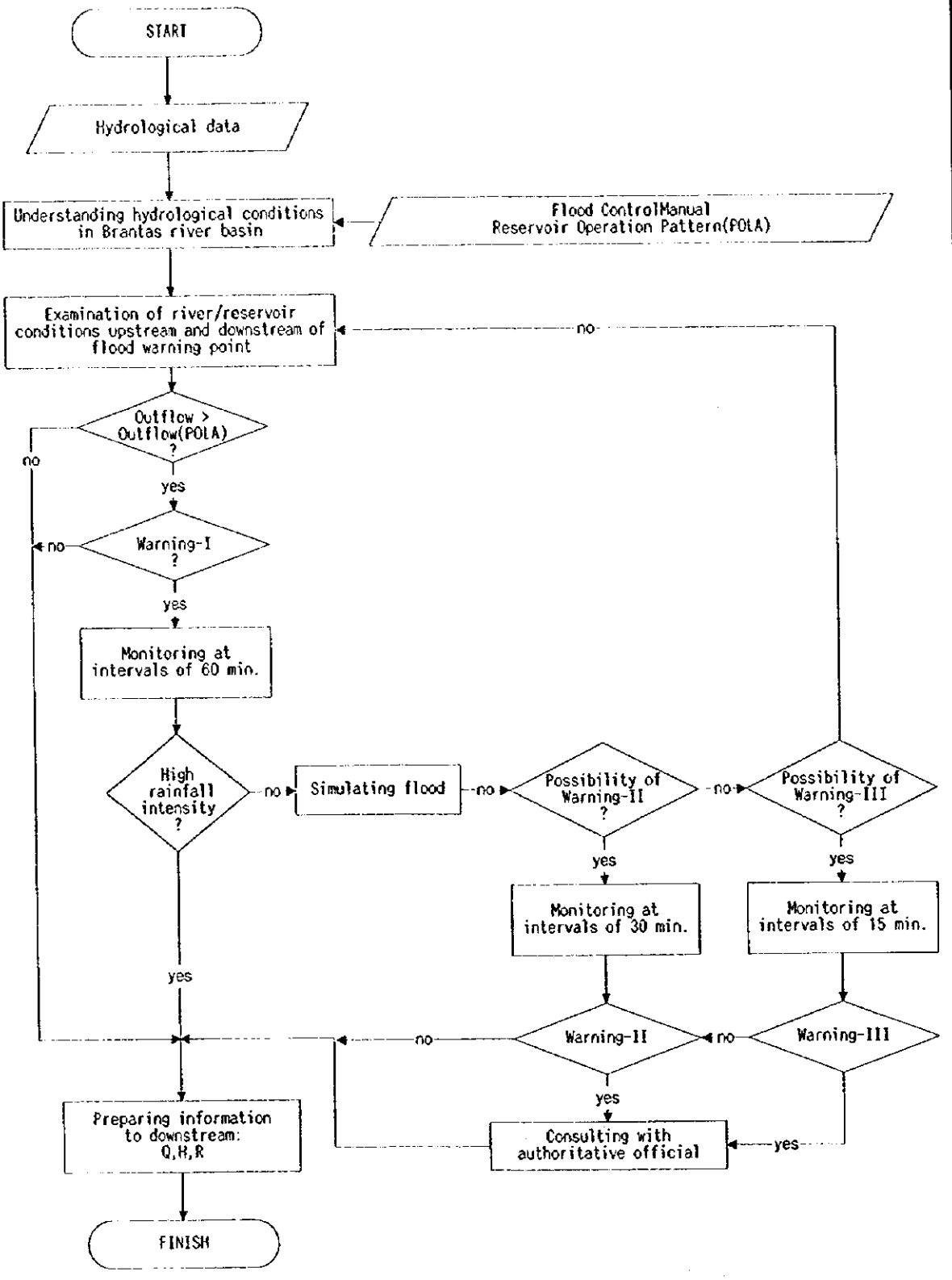


Figure III.17 Flow of Procedures for Analysis, Evaluation, Prediction and Establishment of Flood Warning Levels

SOURSE:PJT

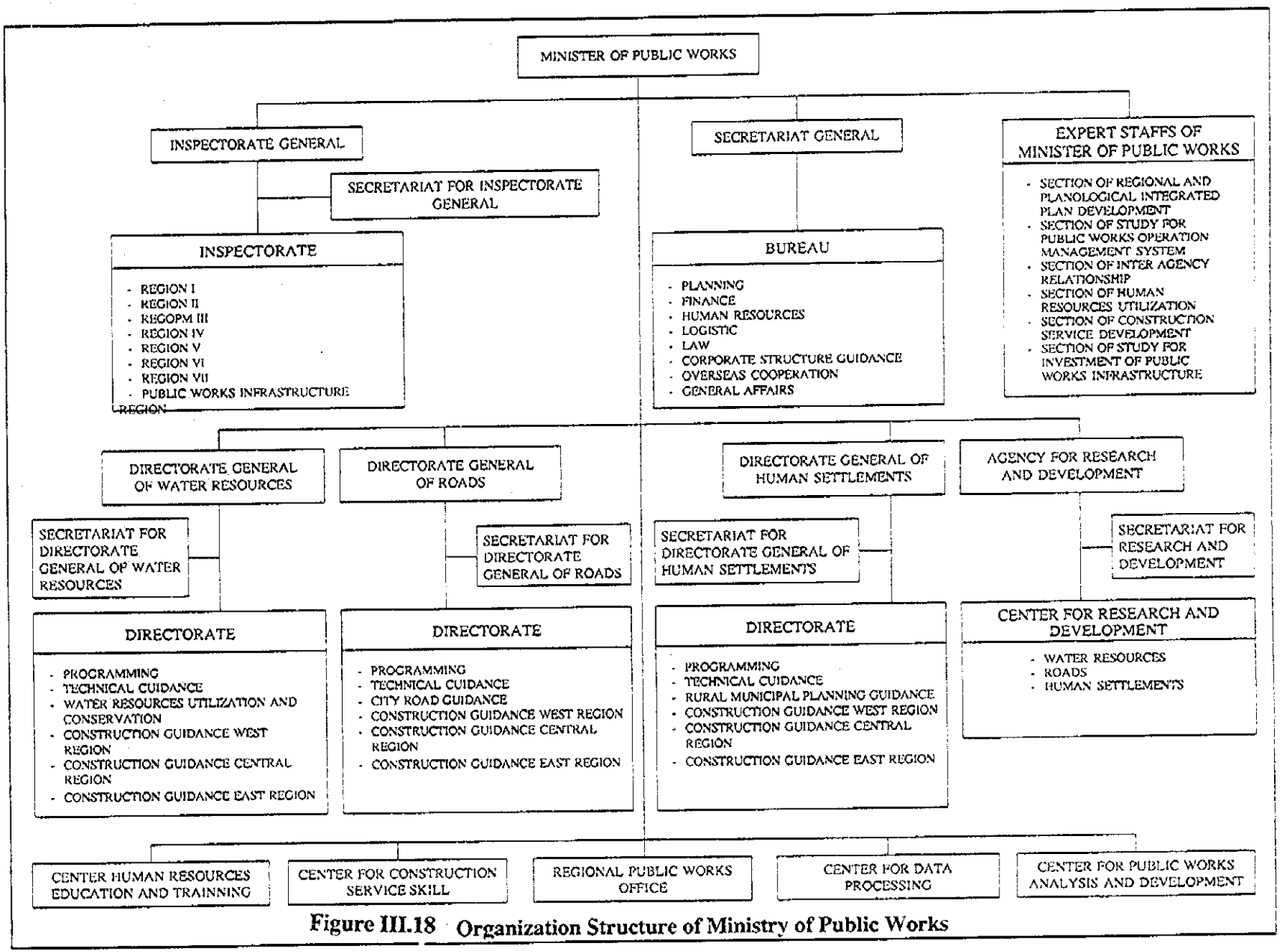


Figure III.18 Organization Structure of Ministry of Public Works

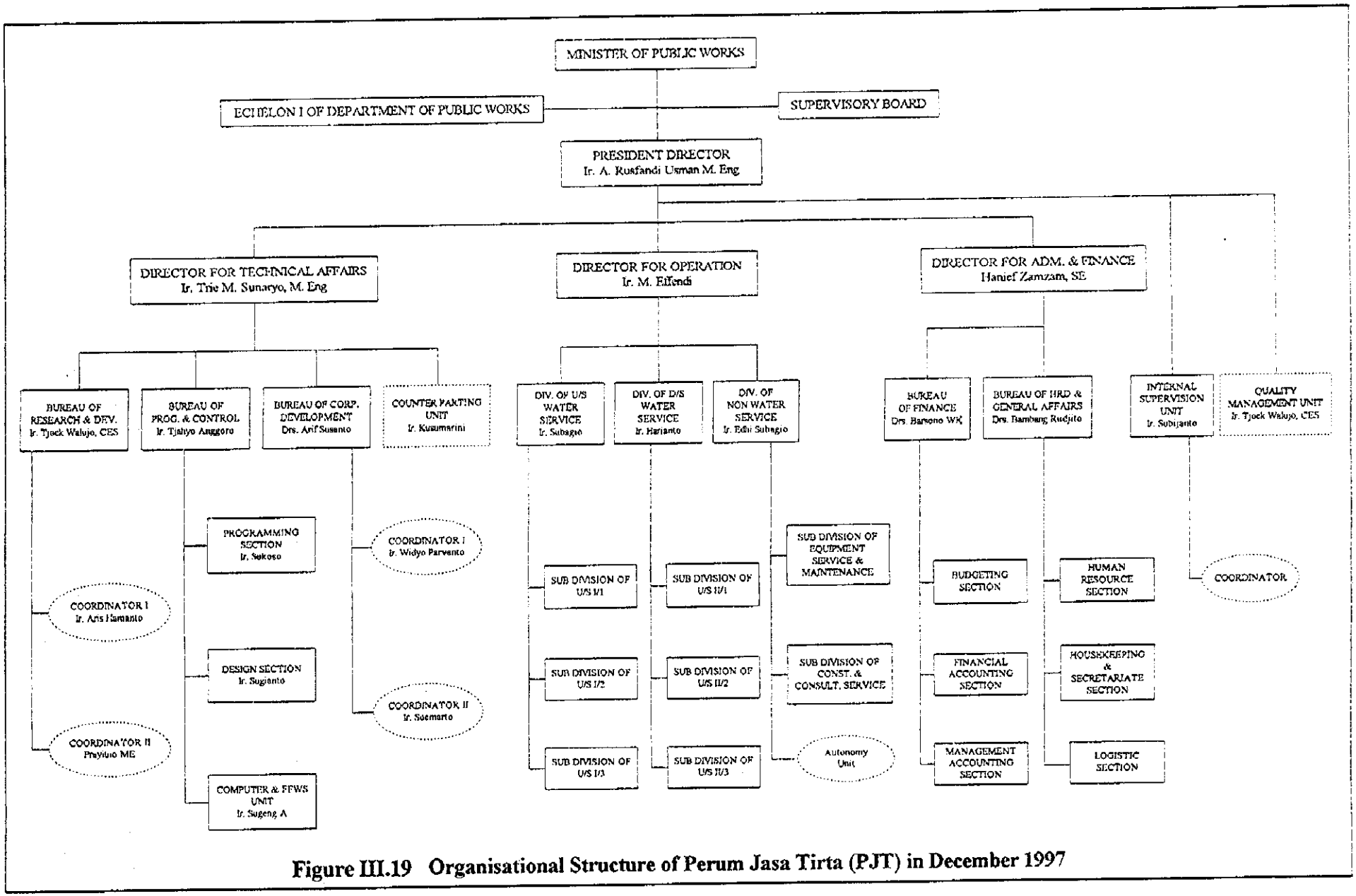


Figure III.19 Organisational Structure of Perum Jasa Tirta (PJT) in December 1997

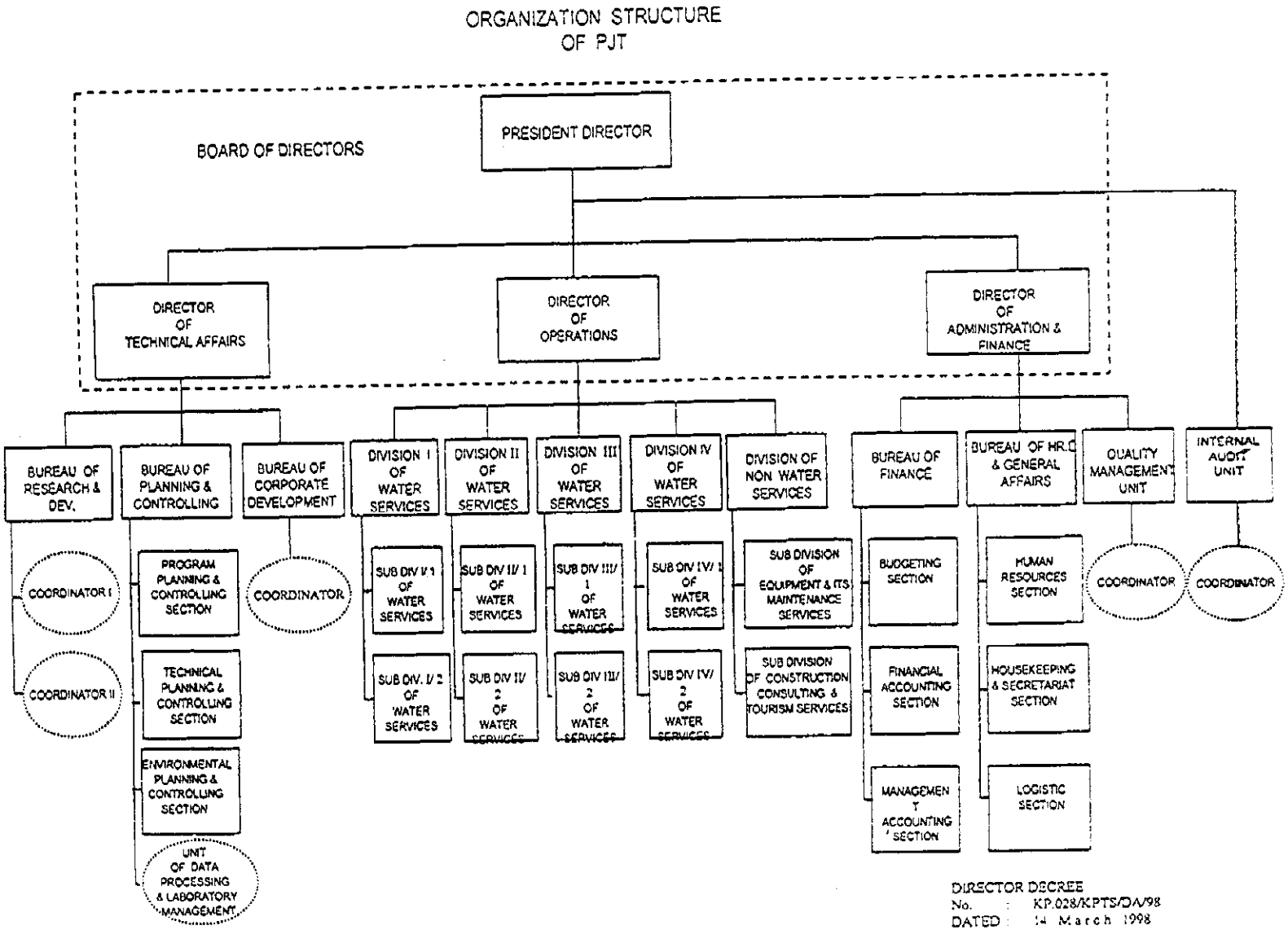


Figure III.20 Organizational Structure of Perum Jasa Tirta (PJT) in March 1998

IV BASIC CONCEPT OF THE WATER RESOURCES MANAGEMENT

IV BASIC CONCEPT OF THE WATER RESOURCES MANAGEMENT

The basic concept of water resources management for the Brantas river basin is presented herein. This is prepared in due considerations of the present condition and problems encountered in the currently adopted management system , required tasks of the management and detailed scope of works in view of technical and managerial aspects.

The basic concept presented is a proposal by the Study Team and subject to final decision based on the further discussion within the Indonesian Government.

IV.1 Understanding of Nature of Water

There were various opinions about the nature of water expressed in the discussion meetings held on September 1997 attended by Indonesian Government Officials in charge and JICA Study Team. Therefore, prior to setting up the basic concept of water resources management, general understanding on the nature of water and river is better to be confirmed hereunder. For the help of understanding the nature of water, a general model of hydrological cycle and hydrosocial cycle is depicted in Figure IV.1.

(1) Water is vital for all the life on the Earth

Water is essentially needed for human and all the life to live. Minimum water requirement to sustain human life is said to be about 1.2 litter/day to maintain its blood . However, man consumes water dozens of times of the minimum for keeping its living.

(2) Water is a natural grace given by God

The constitution of the Republic of Indonesia (1945) stipulates that water and water resources are the gift of God, and water resources shall be controlled by the State and utilized for the optimum welfare of the people.

(3) Water resources is economic goods as well as social goods

Water has manifold functions to be used for direct use for various purposes such as drinking, cooking, bathing, gardening, social and public use, etc. for direct use. In this view, water may be recognized as a social goods. Water is also used for hydropower generation, irrigation, timber, watery goods. Almost all the industrial products needs water in the process of manufacturing. This means that water creates salable goods having value added. In this view, water should be recognized to be economic goods. The debate if water is social goods or economic goods seems to be not fruitful. Because the nature of water varies by the development stage of the society and/or demand-supply conditions in the society. But it can be said in the current Indonesian society that, if there is no water charge, an equitable and effective water distribution cannot be maintained.

(4) Water is limited resources

With the development of society and high economic activities, water consumption has increased and people come to the recognition of the limited resources more strictly .

(5) River water varies in its quantity with season and place

A river carries flood which is sometimes recognized as the grace of God being a requisite to convey fertile nutrition to farmland. However, with the development of society, flood is recognized to be a source of natural disaster. On the other hand, drought water in the river threatens people with shortage of water. The Brantas carries in drought year about 5.8 billion m^3 of water per annum, of which almost 82% discharges out during rainy season from November to April next year.

(6) Water demand and consumption increase with the development of society

The development of society and its economic activities bring an increase of water requirement for not only domestic use but also irrigation use, industrial use, and for sustaining river environment.

(7) Water resources development is necessitated to cope with flood and water demand increase

To cope with flood and water shortage, artificial water resources development as well as water saving will be necessitated. A proper management is also essential to sustain environmental condition.

(8) Water resources development needs some costs

Water resources development can be assumed to contribute to the society to get water in time and at place when and where they need it. This development needs some costs. This cost is not recognized as the cost to create water substance itself, but service cost to distribute water as required. Water resources development in the Brantas has taken place since 1958 and total investment to date reached to more than US$ 2 billion equivalent, which should be the basis of water cost and water charge.

Besides the above, Mt. Kelud is one of the special condition to be considered in the water resources management in this river basin. MT. Kelud which is a volcano located in the center of the Brantas river basin has erupted once in 15 years interval on average and each eruption has extruded a huge amount of debris, which together with flood has brought about destructive damages to the people and properties. MT. Kelud is thus obliged to be included in formulating the water resources management plan of the Brantas.

With the understanding on all the nature of water described above, the basic concept of water resources management is discussed in this chapter.

IV.2 Objective of Water Resources Management

Objective of water resources management is to manage "Water and River" in order to support sustainable society building by means of its impartial and effective uses.

With the development of society and high economic activities, such water-related problems as described below have been brought about.

1) Shortage of water in a serious drought year

In case of unexpected drought year, shortage of water would become more serious for meeting the expanded water demand. Water resources is a limited resources and therefore effective and efficient uses of water including water saving has become inevitable for sustainable society.

2) Water struggle

The increase of water demand has sometimes brought about struggle for water because of its limited resources. The equitable development should be considered. The proper water allocation has become essential.

3) Needs of sustainable water conservation

The land development for farmland and cutting trees in the mountainous area has brought about increase of flood magnitude in the downstream, decrease of drought runoff, land erosion, land slide, and thus debris discharge increase. The watershed conservation would take much time and cost to realize but is essential.

4) Increase of flood damage potential

Flood control works such as the construction of dikes, revetments, and other river facilities have brought about accumulation of people and properties in surrounding area of river. This means increase of flood damage potential. The more safety is required to protect those people and properties from flood.

5) Deterioration of water quality

The increase of water consumption due to economic development causes water quality deterioration. This would result in the destruction of ecosystem and thus the destruction of natural environment. The environmental protection to hand over sound natural resources to the next generation would be a responsibility of currently living generation.

6) Worsening of river environment

Almost all the people wish to play in water front and river area by boating, fishing, regatta, river festival etc. for the purpose of getting relaxation and rest in its living circumstances. However, if a river becomes dirty and much polluted, water and river

will give less incentives to the people. Furthermore, ecosystem in and surrounding areas of rivers is suffered from water quality deterioration. The ecosystem should be maintained as much as possible.

In order to solve these problems described above, the water resources management system should be established.

IV.3 Tasks of Water Resources Management

From the above considerations, tasks of water resources management are set extending to five (5) water resources management sectors as follows.

(1) Watershed management

1) Water resources conservation management
2) Landslide and erosion prevention management
3) Sediment control management
4) Mt. Kelud debris control management

(2) Flood control management

1) Flood control works management
2) Flood damage management

(3) Water quantity management

1) Water supply management
2) Water resources development management
3) Water balance management
4) Low water management

(4) Water quality management

1) River water quality management
2) Domestic waste water management
3) Industrial waste water management

(5) River environment management

1) Land use in river area management
2) Biota in the river area management
3) Recreational use in river space management

These tasks should be accomplished through the following principal activities.

a) Monitoring present condition and data collection and compilation

b) Preliminary analysis to grasp the present condition and problems encountered

c) Preparation of master plan on water resources management

d) Feasibility study and detailed design of the projects identified in the master plan including the incidental requirement for maintenance and repairing.

e) Implementation of the projects

f) Follow-up monitoring and evaluation which should be reflected to the next program formulation

These works in each step should be executed in consideration of community and beneficiaries participation reflecting their needs and requirement to the water resources management activities.

IV.4 Present Condition and Problems

The present condition and problems in each sector of the water resources management in the Brantas river basin were described in the preceding Chapter III. In this sub-chapter, fundamental problems are picked up and presented to support the building of the basic concept for water resources management in the Brantas.

IV.4.1 Fundamental Problems on Water Resources Management

Fundamental problems on water resources management of the Brantas are pointed out hereunder. These problems are topmost important in relation to each task of water resources management.

(1) Lack of man power with sufficient experiences

This is the fundamental problem of PJT's operation. PJT has never conducted any of the following: updating overall water resources development master plan, flood control plan, reservoir operation rule, maintenance manual and flood discharge distribution all of which were prepared more than 10 years ago. Needless to say, all the master plan and rules should be updated in consideration of changes of conditions. This seems to be due to the lack of technical staffs who have enough experience and capability.

(2) Need of further water resources development

The explanation below is based on the result of the study presented in Chapter III.3 Water Resources Development .

1) The Brantas river basin has surface water resources of about 5.8 billion m^3 per annum in the drought year (year of 1977: 2nd drought year out of 20 years from1977 to1996) of which about 82% discharges out during rainy season from November to April next year.

2) The natural flow is still sufficient in terms of total annual flow to fulfill the water requirement in terms of annual total water volume. However, because of uneven seasonal distribution of water, water is insufficient to fulfill the water requirement in the dry season.

Total water resources potential to supply water to the Brantas, Surabaya, and Madura is thus estimated at the sum of the projects as summarized below.

a) Natural water available

i) Total	5,808.4 million m^3	184.2	m^3/sec
ii) Dry season water	818.9	52.7	

Additional water available in dry season

b) Existing reservoirs	176.2 million m^3	11.3	m^3/sec
c) Wonorejo	106.0	6.8	
d) Total a)+b)+c)	1,101.1	70.8	
e) Brantas potential			
i) Prospect	376.0	24.2	
ii) (Total)	(521.4)	(33.5)	
f) Total d)+e)	(1,622.5)	(104.3)	
g) Umbulan spring	59.1	3.8	
h) Sembayat barrage	108.9	7.0	
i) Total f)+g)+h)	(1,790.5)	115.1)	

3) Water demand comprising irrigation, fisheries, domestic, industry, and river maintenance water is estimated at 2,401 million m^3 /annum in 1996 (1,280 million m^3 for dry season), and 2,642 million m^3/annum in 2020 (1,310 million m^3 for dry season). If water saving is counted for, water demand is estimated at 2,370.8 million m^3 in 2020 (1,198 million m^3 for dry season)

4) To cope with water demand increase in further future, there would be still a potential of water resources development in the Brantas. However, water resources potential would be better to be retained for future development as much as possible. This would be the time to consider water saving to minimize water consumption. More precise study should be conducted including environmental assessment before implementation of any project(s) above presented.

(3) To prepare master plan of water resources management incorporated with water resources development

1) It passed already 12 years after setting up the Water Resources Development Master Plan (formulated in July, 1985). During those period, basin condition has been changed remarkably in terms of economic and social conditions, specifically, increase of population, increase of water consumption and deterioration of river water quality due to economic and social development. Besides that, reservoir sedimentation has been progressed resulting in decrease of available water resources during dry season,

2) The said Master Plan should be updated taking into account such changes of basin conditions. The master plan of water resources management should be formulated incorporating water resources development master plan.

(4) To formulate comprehensive plan in due consideration of competitive components by sector

1) As mentioned in the previous sub-chapter, tasks of water resources management are divided into 5 sectors, as 1) watershed management, 2) flood control management, 3) water quantity management, 4) water quality management, 5) river environment management. The master plan by sector has been formulated by each responsible agency but no comprehensive master plan covering all the above sectors is available.

2) The water resources management is related to many agencies directly and/or indirectly. All the related agencies should be involved for formulating the comprehensive plan taking into account of the following contradictory or competitive components each other.

   a) Forest reserve for water conservation and economic production by forestry, plantation, farm land, etc.

   b) River maintenance and sand mining in the river area

   c) Water demand and water supply capacity

   d) Water pollution and river maintenance flow

   e) River environment preservation and water supply

(5) To undertake more elaborate and serious operation and maintenance works of completed projects/structures

1) Many water related infrastructures have been constructed and are now in operation. However, operation and maintenance of these facilities are not always sufficient, e.g. some examples of principal matters among others are,

a) Operation and maintenance manual should be updated in accordance with the requirement under present and expected future conditions.

b) Complete ledger (inventory) of facilities subject to operation and management are to be prepared.

c) Recording and reporting system should be established.

2) Reservoir operation rule should be checked every year if this is still effective or not and it should be updated if necessary.

3) Maintenance works of river channel of the main Brantas and Porong rivers should be conducted more intensively.

(6) Organization of operation and maintenance

1) PJT is an authorized water resources corporation for the Brantas river basin. According to the provision of MPW Regulation No.56 of 1991, major tasks of PJT are as follows.

a) Operation and maintenance of water resources infrastructure

b) Dealings in water and water resources

c) River basin management i.e. conservation, development and utilization of water and water resources, and

d) Rehabilitation of water resources infrastructure

2) Many agencies are involved in the water resources management for the Brantas as mentioned in Chapter III.9. Duties and tasks of those agencies are not always definitive. There are some duplication and some shortage of tasks which is not obligated to any agency.

3) According to the currently validated regulations, water resources management of the Brantas is to be undertaken by many agencies. This has caused sometimes and in some cases the confusions and irresponsibility among the related agencies.

(7) Finance and budget

1) The PJT's operation budget has been born from the beneficiaries in principle. However, its basis is not clear. Dare say, PJT seeks some fund source which has a capacity to pay, and receives payment accordingly. This implies that proper cost allocation to the beneficiaries in consideration of specified or unspecified beneficiaries is not applied. This would bring about some problems in the future for the operation of PJT.

2) The full cost recovery principle, including beneficiaries pay principle, and government obligation to pay principle should be considered.

3) The annual revenue of PJT seems not to be always appropriately equivalent to the services PJT extended.

4) Water resources related facilities which have been handed over from PKB to PJT are not always registered in the balance sheet. This implies that actual cost of water service inclusive O/M cost and depreciation cost of the facilities are not counted for. For future operation of PJT, it is strongly suggested that property management system is to be established properly .

IV.5 Basic Concept of Water Resources Management

IV.5.1 Basic Principle of Water Resources Management

In due consideration of the present condition and problems encountered as described in Chapter III whose fundamental ones are stated in the previous sub-chapter, following basic principles are proposed to be adopted for water resources management of the Brantas river basin.

(1) Purpose and scope of water resources management

1) Primary objective of water resources management is to support the sustainable society building by means of distributing water in time and in place as required.(Refer to sub-chapter IV.2)

2) Water resources management shall cover the tasks of 1) water resources conservation, 2) flood control, 3) water quantity control, 4) water quality control, and 5) river environment protection.

3) Environmental capacity shall be considered for the whole river basin. Water resources development and water use shall be limited to an extent to retain the natural environmental capacity as a whole river basin.

(2) One River-One Plan-One Management principle

1) One river shall be developed and managed in accordance with one comprehensive development and management plans, which shall cover the following factors :

a) "One Plan" is defined as a comprehensive water resources development and management plans (so called Master Plan for water resources management).

b) The master Plan shall include the following basic requirement

i) Consistency with the Government policy and program which are directly and/or indirectly related to water resources management

ii) Consistency with Government law and regulations

iii) All the sector program consisting of watershed management, flood control, water quantity control, water quality control, and river environment

iv) Water demand forecast by sector; domestic water , irrigation water, industrial water, river maintenance water, and other water requirement if needed.

v) Water resources development program

vi) Water allocation criteria including priority basis

vii) Water allocation plan by sector

viii) Comprehensive program for realizing the impartial welfare from water to all the inhabitants living in the basin by physically possible means

ix) Environmental assessment and protection requirement and method.

2) One river shall be managed by one management system

a) "One Management system" is defined as one responsible line organization and institution in principle.

b) Management system shall be established with unified management organization and coordinating agencies which are closely related to water resources management.

c) Water resources management shall be implemented in accordance with Master Plan

d) One management system shall be applied for coordinating and harmonizing water use

e) Coordination shall be done especially to eliminate the following conceivable problems which are contradictory and competitive each other.

i) Land development for farm land, plantation, and forestry in view of economic development and watershed management for water conservation, prevention of landslide and land erosion

ii) Water allocation among different water users

iii) Water use and waste water treatment

iv) Water use and river environment

(3) Full cost recovery principle

All the cost required for water resources development and management shall be recovered in the following principles.

1) Beneficiaries pay principle

All the beneficiaries are obligated to pay water service fee. Provided the following shall be considered.

a) Specified beneficiaries who have a capacity to pay shall pay the water service fee corresponding to the services that they receive. (hydroelectric power generation, domestic water , industrial water, and irrigation water : At present it is said that farmer has no capacity to pay, however he will have the capacity in future)

b) Specified beneficiaries who have no capacity to pay but need water services in view of basic human need shall be subsidized by the Government in line with the Government policy (A part of Irrigation water, a part of domestic water)

A standard criteria to evaluate if the beneficiaries have a capacity to pay or not should be decided by the Government separately.

2) Government obligation principle

In case many unspecified beneficiaries are not attributable to specific benefits such as those of flood control, water quality control, river environment etc., the cost shall be born by the Government.

(4) Polluters pay principle

1) People and industries which utilize public sewerage system including waste water treatment plant shall pay "sewerage service charge".

2) Polluters of industrial manufacturing, if the waste water from the industry is beyond the specified water quality determined by the Government, shall pay "penalty".

3) Polluters of industry shall pay polluters fee before the waste water treatment system is established. This regulation, if issued, should be limited in terms of validity. Polluters fee will be used for building waste water treatment plants

Regarding the above-mentioned "sewerage service charge" and "penalty", more details are presented in sub-chapter V.3 Water Quality.

(5) Service to receive principle

1) Needless to say, implementing agency shall provide proper and adequate services of water resources management.

2) Implementing agency of water resources management shall receive the service fee corresponding to the cost and fee of services that the implementing agency renders.

These basic concepts of water resources management is summarized and tabulated in Table IV.1. In the same table, proposals/adoptions of the Study Team are denoted corresponding to each item of basic concepts of water resources management. These basic concepts are also embodied in the proposed organization of water resources management depicted in Figure IV.2. Details of these proposals will be explained in Chapter V for the technical aspects and in Chapter VI for the managerial aspects.

Table IV.1 Summary of Basic Concept of W.R.M. for the Brantas River Basin and Proposals/Adoptions in the Study

Basic Concept	Proposals/Adoptions of Study Team
1. Objective	
To support sustainable society building by means of distributing water in time and in place as demanded.	
2. Basic Principle: One River, One Plan, One Management.	:Establishment of MPW-PJT administrative line.
3. Areas and Rivers of PJT Responsibility:	:Adopted in the Study.
1) All the Brantas river basin including its tributaries	"Balai" should not be built in the basin.
2) Basin area of 11,800 km2	
4. Work Field of PJT's Responsiblity	:All the field covered in the Study.
1) Watershed management	
2) Flood control management	
3) Water supply including water resources development	
4) Water quality management	
5) River environment management	
5. Scope of Works of PJT	:Adopted in the Study. Consolidation of PKB, PGKS and PJT is proposed.
1) Operation and maintenance of water resources infrastructure	
2) Dealings in water and water resources	
3) River basin management , i.e. conservation, development and utilization of water and water resources	
4) Consultation on water related activities by other organization	
5) Water resources development	
6. Self-supporting Body (In terms of Finance and Budget)	
1) Full cost recovery principle	:Adopted in the Study.
a) Beneficiary-to-pay principle	:In case beneficiaries can be specified. Water charge system is proposed.
b) Government obligation principle	:In case beneficiaries can not be specified.
2) Service-to-receive principle	:Adopted in the Study.
a) Business through contract basis	Water charge system is proposed.
b) Cost allocation system	Water charge system is proposed.
7. Operational Strategy	
1) Cooperation and coordination with other related agencies	
a) Delegation of duty and task	:Proposed in watershed and water quality sectors.
b) Basin Water Resources Management Committee (BWRMC)	:Proposed to be established.

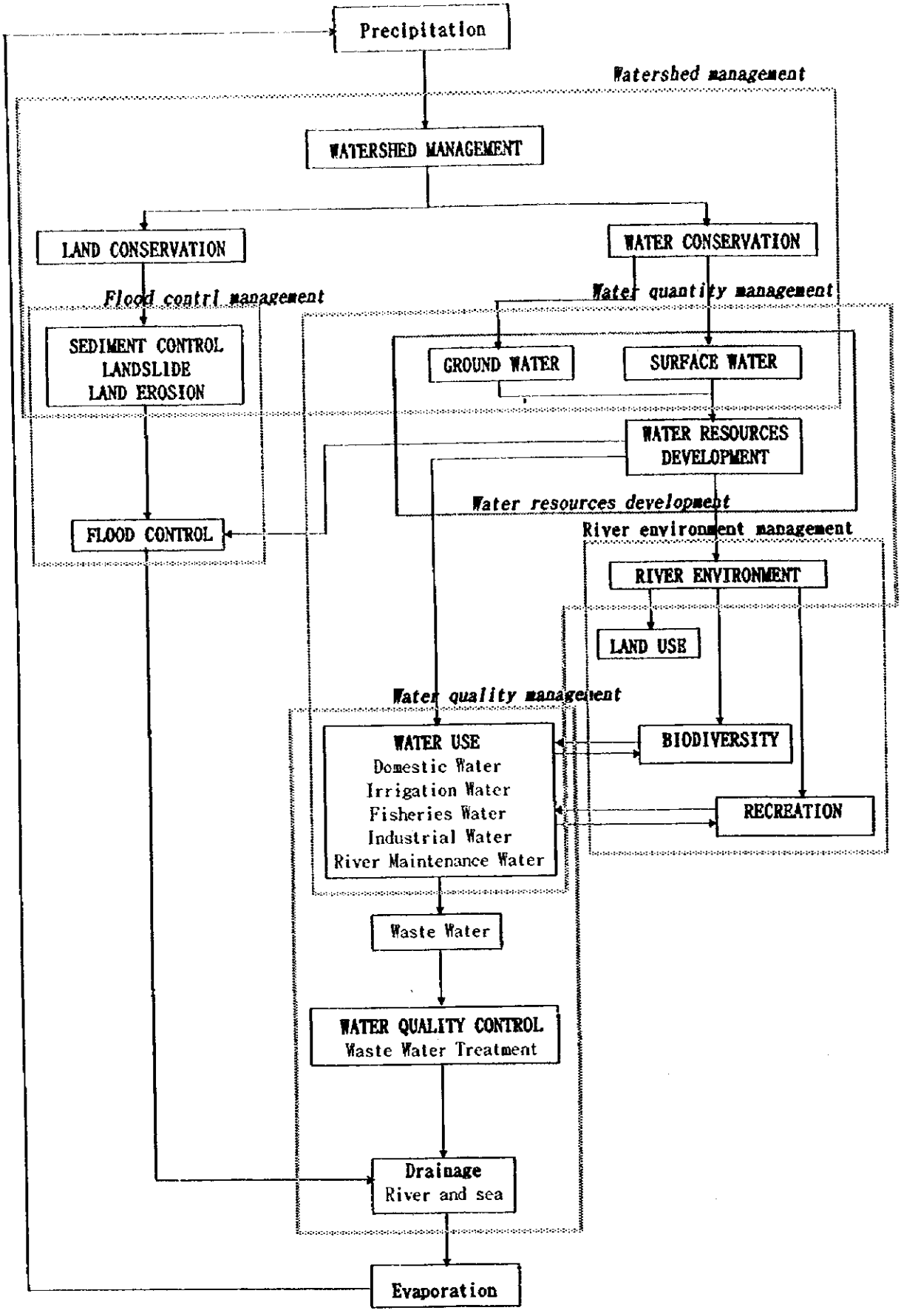


Figure IV.1 A General Model of Hydrological Cycle and Hydrosocial Cycle

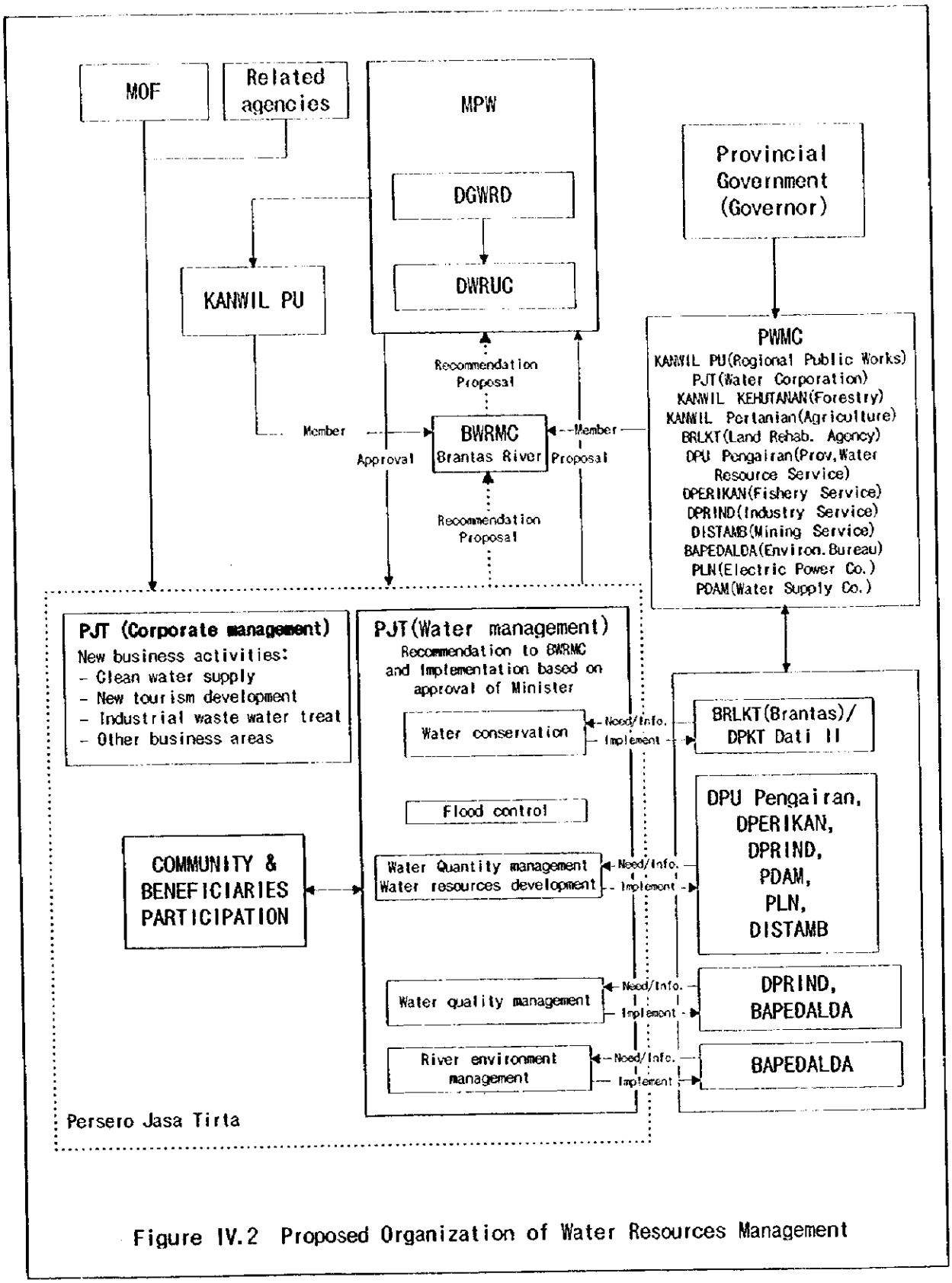


Figure IV.2 Proposed Organization of Water Resources Management