社会開発調査部報告書

JAPAN INTERNATIONAL COOPERATION AGENCY

DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
MINISTRY OF PUBLIC WORKS
THE REPUBLIC OF INDONESIA

THE STUDY
ON
COMPREHENSIVE MANAGEMENT PLAN
FOR
THE WATER RESOURCES OF THE BRANTAS RIVER BASIN
IN
THE REPUBLIC OF INDONESIA

FINAL REPORT

VOLUME IV

SUPPORTING REPORT II

OCTOBER 1998

NIPPON KOEI CO., LTD.
NIKKEN CONSULTANTS, INC.

THE STUDY
ON
COMPREHENSIVE MANAGEMENT PLAN
FOR
THE WATER RESOURCES OF THE BRANTAS RIVER BASIN
IN
THE REPUBLIC OF INDONESIA

COMPOSITION OF REPORTS

Volume I : ***Executive Summary***

Volume II : ***Main Report***

Volume III : ***Supporting Report I***

Annex
1. Meteorology and Hydrology
2. Watershed Conservation, Sabo, and Flood Control
3 Water Quality.
4. Water Demand Forecast
5. Water Balance Study
6. Water Resources Development
7. River Facility
8. Effective Operation of Water Resources
9. Monitoring and Information System
10. River Environment

Volume IV : ***Supporting Report II***

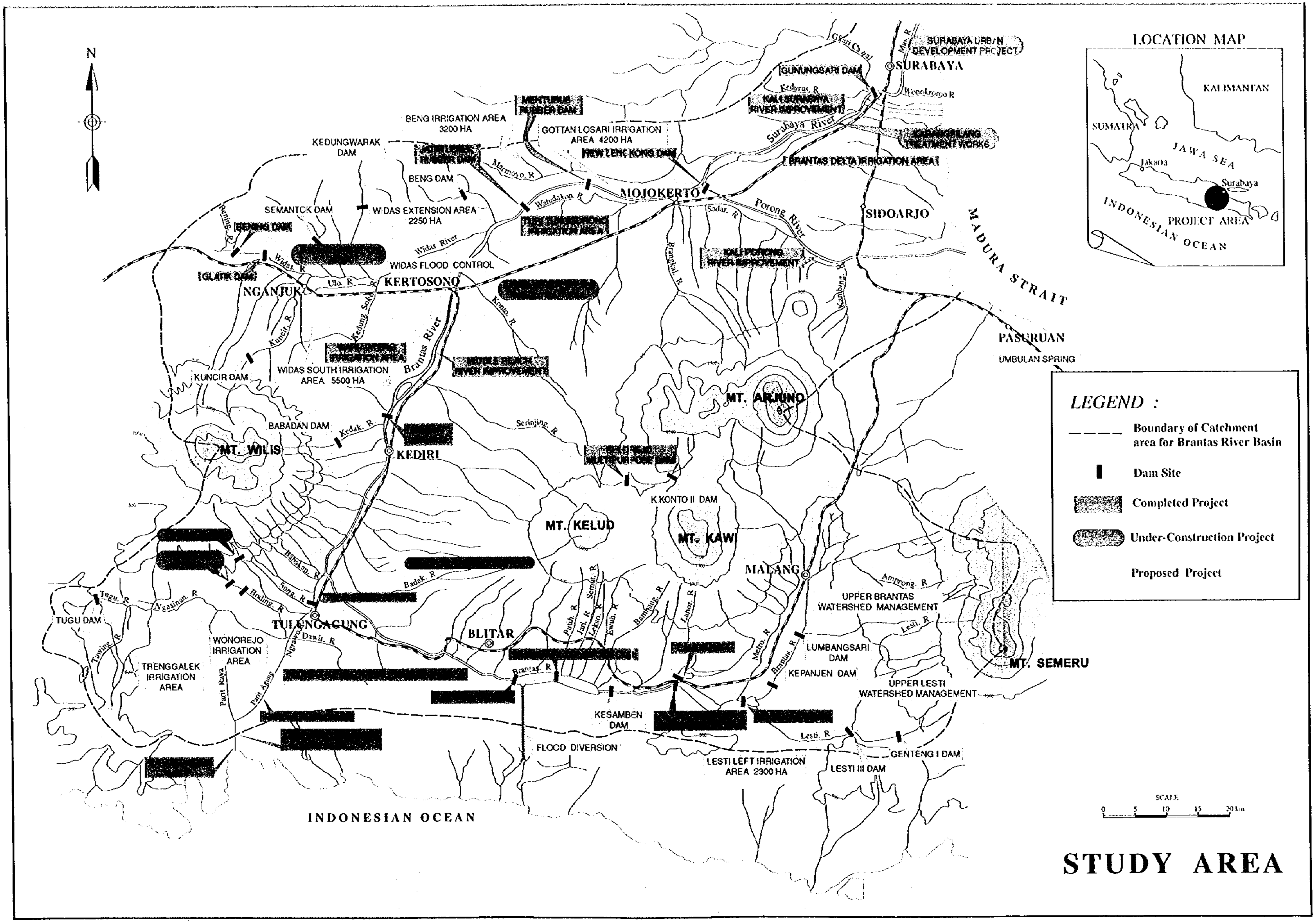
Annex
11. Institutional Study
12. Organization and Management
13. Human Resources Development
14. Financial Plan and Budget Resources
15. Water Charge Mechanism
16. Economic Evaluation
17. Socio-economic Framework

Volume V : ***Data Book***

MH Meteorology and Hydrology
WQ Water Quality
IR Irrigation Water Demand
RS River Survey
CB Community and Beneficiaries' Participation Survey
BI Biodiversity Inventory Survey
AR PJT's Annual Report

EXCHANGE RATE

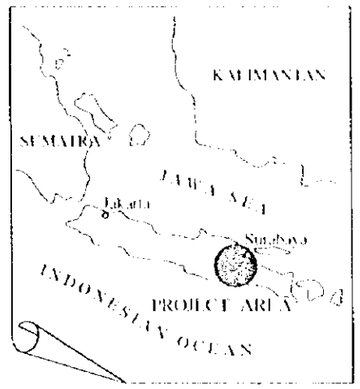
The exchange rates used in this Study are:
US Dollar(US$) 1.00 = Indonesia Rupiah(Rp.) 2,446.6
Japanese Yen(¥) = Indonesia Rp.21.4
as of June, 1997


N
LOCATION MAP
KALIMANTAN
SUMATRA
JAWA SEA
Jakarta
Surabaya
PROJECT AREA
INDONESIAN OCEAN
SURABAYA URBAN DEVELOPMENT PROJECT
SURABAYA
GUNUNGSARI DAM
Kedurus R
Wonokromo R
KALI SURABAYA RIVER IMPROVEMENT
Surabaya River
MENTURUS RUBBER DAM
BENG IRRIGATION AREA 3200 HA
GOTTAN LOSARI IRRIGATION AREA 4200 HA
NEW LENGKONG DAM
BRANTAS DELTA IRRIGATION AREA
KEDUNGWARAK DAM
Marmoyo R
BENG DAM
MOJOKERTO
Porong River
SIDOARJO
MADURA STRAIT
SEMANTOK DAM
WIDAS EXTENSION AREA 2250 HA
Watudakon R
Widas River
WIDAS FLOOD CONTROL
KALI PORONG RIVER IMPROVEMENT
GLATIK DAM
NGANJUK
Ulo R
KERTOSONO
Konto R
Brangkal R
PASURUAN
UMBULAN SPRING
Kuncir R
Brantas River
WIDAS SOUTH IRRIGATION AREA 5500 HA
MIDDLE REACH RIVER IMPROVEMENT
KUNCIR DAM
MT. ARJUNO
BABADAN DAM
Kedak R
Serinjing R
MT. WILIS
KEDIRI
K KONTO II DAM
MT. KELUD
MT. KAWI
MALANG
Song R
Badak R
Amprong R
TUGU DAM
Tugu R
Ngasinan R
TULUNGAGUNG
BLITAR
UPPER BRANTAS WATERSHED MANAGEMENT
WONOREJO IRRIGATION AREA
Dawir R
Lesti R
TRENGGALEK IRRIGATION AREA
Ngrowo R
LUMBANGSARI DAM
KEPANJEN DAM
MT. SEMERU
UPPER LESTI WATERSHED MANAGEMENT
KESAMBEN DAM
FLOOD DIVERSION
Lesti R
GENTENG I DAM
LESTI LEFT IRRIGATION AREA 2300 HA
LESTI III DAM
INDONESIAN OCEAN
LEGEND :
Boundary of Catchment area for Brantas River Basin
Dam Site
Completed Project
Under-Construction Project
Proposed Project
SCALE
0 5 10 15 20 km

STUDY AREA

N

LOCATION MAP



SURABAYA URBAN DEVELOPMENT PROJECT
SURABAYA
GUNUNGSARI DAM
KALI SURABAYA RIVER IMPROVEMENT
KARANGPILANG TREATMENT WORKS
BRANTAS DELTA IRRIGATION AREA
MENTURUS RUBBER DAM
BENG IRRIGATION AREA 3200 HA
GOTTAN LOSARI IRRIGATION AREA 4200 HA
KEDUNGWARAK DAM
JATIM LEREK RUBBER DAM
NEW LENGKONG DAM
BENG DAM
MOJOKERTO
SEMANTOK DAM
WIDAS EXTENSION AREA 2250 HA
BENING DAM
TURI TUNGGORONO IRRIGATION AREA
SIDOARJO
MADURA STRAIT
WIDAS IRRIGATION AREA
WIDAS FLOOD CONTROL
KALI PORONG RIVER IMPROVEMENT
GLATIK DAM
NGANJUK
KERTOSONO
PAPAR PETERONGAN IRRIGATION AREA
PASURUAN
JMBULAN SPRING
WARUJAYENG IRRIGATION AREA
WIDAS SOUTH IRRIGATION AREA 5500 HA
MIDDLE REACH RIVER IMPROVEMENT
KUNCIR DAM
MT. ARJUNO
BABADAN DAM
MRICAN BARRAGE
MT. WILIS
KEDIRI
SELOREJO MULTIPURPOSE DAM
K KONTO II DAM
MT. KELUD
MT. KAWI
SEGAWE WEIR
WONOREJO DAM
(MT. KELUD DEBRIS CONTROL)
MALANG
UPPER BRANTAS WATERSHED MANAGEMENT
TULUNGAGUNG GATE
TUGU DAM
TULUNGAGUNG
BLITAR
WONOREJO IRRIGATION AREA
LAHOR DAM
LUMBANGSARI DAM
MT. SEMERU
TRENGGALEK IRRIGATION AREA
LODOYO TULUNGAGUNG IRRIGATION AREA
WLINGI MULTIPURPOSE DAM
KEPANJEN DAM
UPPER LESTI WATERSHED MANAGEMENT
LODOYO AFTERBAY
PARIT AGUNG CANAL
KESAMBEN DAM
SUTAMI MULTIPURPOSE DAM
SENGGURUH DAM
SOUTH TULUNGAGUNG TUNNEL
FLOOD DIVERSION
GENTENG I DAM
TULUNGAGUNG HEPP
LESTI LEFT IRRIGATION AREA 2300 HA
LESTI III DAM

INDONESIAN OCEAN

LEGEND :

- Boundary of Catchment area for Brantas River Basin
- Dam Site
- Completed Project
- Under-Construction Project
- Proposed Project

STUDY AREA

THE STUDY
ON
COMPREHENSIVE MANAGEMENT PLAN
FOR
THE WATER RESOURCES OF THE BRANTAS RIVER BASIN
IN
THE REPUBLIC OF INDONESIA

FINAL REPORT

VOLUME IV
SUPPORTING REPORT II

Annex-11 Institutional Study

Annex-12 Organization and Management

Annex-13 Human Resources Development

Annex-14 Financial Plan and Budget Resources

Annex-15 Water Charge Mechanism

Annex-16 Economic Evaluation

Annex-17 Socio-economic Framework

ABBREVIATIONS

1 UNIT

Length		Weight	
mm	millimeter	gr	gram
cm	centimeter	kg	kilogram
m	meter	t, ton	metric ton
km	kilometer		
Area		**Time**	
mm^2	square millimeter	sec	second
cm^2	square centimeter	min	minute
m^2	square meter	hr	hour
km^2	square kilometer	yr	year
ha	hectare		
Volume		**Others**	
cm^3	cubic centimeter	%	percent
m^3	cubic meter	℃	degree centigrade
Ltr	liter	10^3	thousand
		10^6	million
		10^9	billion

2 PLAN

ADIPURA	Kota Bersih *(Clean City)*
PROKASIH	Program Kali Bersih *(Clean River Program)*
REPELITA VI	Rencana Pembangunan Lima Tahun Tahap VI *(Sixth Five Year Development Plan)*

3 ORGANIZATION

BAPEDAL	Badan Pengendalian Dampak Lingkungan *(Environmental Impact Management Agency)*
BAPEDALDA	Badan Pengendalian Dampak Lingkungan Daerah *(Provincial Office of Environmental Impact Management Agency)*
BAPPEDA	Badan Perencanaan Pembangunan Daerah *(Regional Development Planning Agency)*
BAPPENAS	Badan Perencanaan Pembangunan Nasional *(National Development Planning Agency)*
BBLH	Biro Bina Lingkungan Hidup *(Bureau of Environmental Guidance, East Java)*
BKPMD	Badan Koordinasi Penanaman Modal Daerah *(East Java Regional Investment Coordinating Board)*
BMG	Badan Meteorologi dan Geofisika *(Meteorological and Geophysical Agency)*
BPPI	Balai Penelitian dan Pengembangan Industri, Surabaya *(Agency of Industrial Research and Development, Surabaya)*

BPPT	Badan Pengkajian dan Penerapan Teknologi *(Agency for the Assessment and Application of Technology)*
BPS	Biro Pusat Statistik *(Central Bureau of Statistic)*
BRLKT	Balai Rehabilitasi Lahan dan Konservasi Tanah *(Land Rehabilitation and Soil Consevation Agency, Ministry of Forestry)*
BTKL	Balai Teknik Kesehatan Lingkungan *(Agency of Environment Health Techniques, Ministry of Health)*
DBPP	Direktorat Bina Program Pengairan *(Directorate of Planning and Programming, DGWRD)*
Dep.HUT	Departmen Kehutanan *(Ministry of Forestry)*
Dep.KES/MOH	Departemen Kesehatan *(Ministry of Health)*
Dep.KEU	Departemen Keuangan *(Ministry of Finance)*
Dep.PE/MME	Departemen Pertambangan dan Energi *(Ministry of Mining and Energy)*
Dep.PRINDAG/MIT	Departemen Perindustrian dan Perdagangan *(Ministry of Industry and Trade)*
Dep.PU	Departemen Pekerjaan Umum *(Ministry of Public Works)*
Dep.TAN	Departmen Pertanian *(Ministry of Agruculture)*
DGWRD	Direktorat Jenderal Pengairan *(Directorate General of Water Resources Development, Ministry of Public Works)*
DIPENDA	Dinas Pendapatan Daerah Propinsi Daerah Tingkat I *(Provincial Revenue Service)*
DIPERTA	Dinas Pertanian Daerah Propinsi Daerah Tingkat I *(Provincial Agricultural Service)*
DJBM	Direktorat Jenderal Bina Marga *(Directorate General of Highways, Ministry of Public Works)*
DJCK	Direktorat Jenderal Cipta Karya *(Directorate General of Human Settlements,Ministry of Publiuc Works)*
DPERIKAN	Dinas Perikanan Daerah Propinsi Daerah Tingkat I *(Provincial Fishery Service)*
DPRIND	Dinas Perindustrian Daerah Propinsi Daerah Tingkat I *(Provincial Industry Service)*
DPU	Dinas Pekerjaan Umum *(Public Works Service)*
DPUK	Dinas Pekerjaan Umum Kabupaten *(Municipal Public Works Service)*
DPU Pengairan	Dinas Pekerjaan Umum Pengairan Daerah Propinsi Daerah Tingkat I *(Provincial Water Resources Service)*
GOI	*(Government of Indonesia)* Pemerintah Indonesia
GOJ	*(Government of Japan)* Pemerintah Jepang

HIPPA	Himpunan Petani Pemakai Air *(Water Users Association)*
IBRD	*(International Bank for Reconstruction and Development)*
IPAIR	Iuran Pelayanan Irigasi *(Irrigation Service Fee)*
JICA	*(Japan International Cooperation Agency)*
Kem. Neg. LH	Kementrian Negara Lingkungan Hidup *(State Ministry of Environment)*
KPH	Kesatuan Pemangku Hutan *(Unit of Forestry Management)*
KPPPLH	Komisi Pengendalian dan Penanggulangan Pencemaran Lingkungan Hidup *(Commision for Environmental Pollution Control and Abatement)*
LIPI	Lembaga Ilmu Pengetahuan Indonesia *(Indonesian Institute of Science)*
MIT/Dep.PRIND	*(Ministry of Industry and Trade)* Departemen Perindustrian dan Perdagangan
MME/Dep.PE	*(Ministry of Mining and Energy)* Departemen Pertambangan dan Perdagangan
MOC	*(Ministry of Construction, Japan)*
MOF	(Ministry of Finance)
MOH/Dep.KES	*(Ministry of Health)* Departemen Kesehatan
OECF	*(Overseas Economics Cooperation Fund, Japan)*
PBS	Proyek Induk Pengembangan Wilayah Sungai Bengawan Solo *(Bengawan Solo River Basin Project)*
PDAB	Perusahaan Daerah Air Bersih *(Regional Clean Water Supply Company)*
PDAM	Perusahaan Daerah Air Minum *(Regional Drinking Water Supply Company)*
PGK	Proyek Gunung Kelud *(Volcanic Disaster Prevention Project of Mt. Kelud, DOI)*
PGKS	Proyek Pengendalian Banjir Lahar G. Kelud Semeru *(Volcanic Disaster Prevention Project of Mt. Kelud Semeru)*
PJT	Perum Jasa Tirta *(Jasa Tirta Public Corporation)*
PKB	Proyek Pengembangan Wilayah Sungai Kali Brantas *(Brantas River Basin Development Project)*
PLN	Perusahaan Umum Listrik Negara *(State Electric Power Company)*
PLN PJB II	P.T. PLN Pembangkitan Tenaga Listrik Jawa - Bali II *(PLN Electric Power Generator Corporation Java Bali II)*
POJ	Perum Otoritas Jatiluhur *(Jatiluhur Authority Public Corporation)*
PPPLD	Pengendalian dan Penanggulangan, Pencemaran Limbah Domestik *(Work Team for Controlling and Overcoming Domistic Waste Pollution)*

PPPLI	Pengendalian dan Penanggulangan, Pencemaran Limbah Industri *(Work Team for Controlling and Overcoming Industrial Waste Pollution)*
UNDP	*(United Nations Development Program)*
USAID	*(United States of Agency for International Development)*
WARDEC	*(Water Resources Development Corporation)*

4 OTHERS

APBD	Anggaran Pendapatan dan Belanja Daerah *(Provincial Government Resources and Expenditure Budget)*
APBN	Anggaran Pendapatan dan Belanja Negara *(Central Government Resources and Expenditure Budget)*
BOD	*(Biochemical Oxygen Demand)*
Bupati	*(Head of Regency)*
Camat	*(Head of sub District)*
COD	*(Chemical Oxygen Demand)*
CPI	*(Costumer Price Index)*
DIP	Daftar Isian Proyek *(Development Budget Allocation)*
DO	*(Dissolved Oxygen)*
EOM	*(Effective Operation & Maintenance (ISSD under IBRD)*
FFWS	*Flood Forecasting and Warning System*
GDP	*(Gross Domestic Product)*
GERBANG KERTOSUSILA	Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo,Lamongan
GRDP	*(Gross Regional Domestic Product)*
HWL	*(High Water Level)*
IPEDA	Iuran Pendapatan Daerah *(Village Land Tax)*
ISF	*(Irrigation Service Fee)*
ISSP	*(Irrigation Subsector Project) (IBRD Project)*
Kabupaten	*(Regency)*
Kanwil	Kantor Wilayah *(Provincial Office of a Ministry)*
Kecamatan	*(District)*
Kotamadya	*(Municipality)*
LWL	*(Low Water Level)*
O&M	*(Operation & Maintenance)*
Polowijo	*(Second crop or collective term for all annual crops other than paddy and sugarcane)*
SS	(Suspended Solid)

ANNEX – 11

INSTITUTIONAL STUDY

ANNEX - 11 INSTITUTIONAL STUDY

TABLE OF CONTENTS

LIST OF TABLES

I Introduction

1 Objective and Approach

The objective of this supporting report is to present the results of institutional studies based on the three studies in Indonesia and the two studies made in Japan. The studies are aimed at analyzing legal and institutional aspects of water resources management in the Brantas River Basin and providing recommendations.

The content of this Report deals with legislation and institutions related with water resources management including;

- Major points of basic legislation related with water resources development and management in Indonesia,
- Legal foundations of Perum Jasa Tirta and related organizations;
- Water right and water allocation;
- Water demand management including non structural water saving measures
- Water resources institutions including examples of private sector participation in several countries.

The approach used in the study is to identify and discuss major issues concerning water resources management in the basin. The study therefore did not intend to examine in detail the whole of legal issues and the activities of the related agencies and offices.

This report first reviews major points of the above issues and it provides brief evaluation. Then it presents recommendations for action.

II Present Condition of Water Resources Management Institutions

1 Legal Issues on Water Resources Development and Management

1.1 Basic Water Regulations

The Constitution of the Republic of Indonesia (1945) sets the basic principle on the use of water resources. The most specific clauses related with water include the following:

1. Water, water resources and the natural riches contained therein are gift of the Almighty God;

2. Soil, water resources and the natural riches contained therein shall be controlled by the State and utilized for the optimum welfare of the people; and

3. Utilization of water resources shall be in the interest and welfare of people.

Water Resources Development and Management Policies in the First Long – Term Development Period (PJP-I)

Indonesia completed its First Long - Term Development Period (PJP-I, 1969-1994). Water resources development and management policy during the period emphasized the increase in rice production through irrigation and provision of access to water for people to meet basic human needs. Indonesia achieved food sufficiency in rice in 1984. Water resources development and management policy during this period was based on Law No. 11 of 1974 on Water Resources Development. A number of Government Regulations including No.22 of 1982 on Water Management, No. 23 on Irrigation and No. 35 of 1991 on River, together with various Ministerial and Provincial Governor's Decrees were prepared. Major laws and government regulations of this period are reviewed.[1]

The following legal provisions including Law, Government Regulation and Ministerial Decree describes the basic legal framework related with water resources institutions. Major aspects of legislation with particular attention to water resources institutions are pointed out below. A list of legislation related with water resources development and management is shown in Table A11-2.

(1) Law No. 11 of 1974 on Water Resources Development

Law No. 11 of 1974 on Water Resources Development gives the responsibility for control, development, and management of water resources to the State. It reiterates the Constitutional provision that the water resources are to be utilized for the welfare and prosperity of the people. Drinking water, agricultural water use and energy are the lead categories in the three groups of priority for water planning and allocation. The law stipulates that direct beneficiaries including corporation and association participate in bearing the cost for the operation and maintenance activities with central and local governments.

[1] Classification of legislation and regulations in Indonesia is given as Table A11-1.

(2) Government Regulation No. 22 of 1982 on Water Management

Government Regulation No. 22 of 1982 on Water Management provides several key principles to lead water resources management. Water management activities are based on river basin. River basins include smaller drainage areas when necessary. Comprehensive water resources management plan is to be formulated for each basin. All water use requires license from the provincial government. It is necessary to obtain the approval from the Ministry of Mining and Energy along with provincial license for abstraction of ground water.

(3) Government Regulation No. 23 of 1982 on Irrigation

Government Regulation No. 23 of 1982 on Irrigation stipulates that management and regulation of irrigation water and irrigation networks together with their accessory structures within province are delegated to the relevant Provincial Government to promote their benefits for prosperity and welfare of the community.

(4) Government Regulation No. 35 of 1991 on River

Government Regulation No. 35 of 1991 provides stipulations on management of river problems. It stipulates that river shall be under the authority of the government. It includes the stipulations on the following issues: river area line, river function, river planning, exploitation and maintenance of river and river structures. This Government Regulation confirms that river basin development pattern shall be based on the river basin unit. Authority and responsibility of the said river development can be authorized to regional authority and / or to state corporations, which are established to execute river development and operation in conformity with valid regulations. Construction of river structure with the aim for public welfare and safety shall be made by Government or state-owned corporation. Similarly operation of river and / or river construction shall be performed by the government or state -owned corporation.

There are only two state corporations, i.e. Perum Otoritas Jatilufur and Perum Jasa Tirta, which are established for executing basin management activities in Indonesia. Both corporations are established as "Perum". These two corporations are regarded as State Corporation as long as their capital belongs to the State[2].

Water Resources Development and Management Policies in the Second Long – Term Development Period

Water resources development and management policies must follow the broader Indonesian policy framework for the Second Twenty – Five Year Plan (PJP-II, 1995 – 2019). The Plan's primary objective is to achieve a well-distributed water supply that provides sustainability of development and its people.

---

[2] Government Regulation as Law's Substitute No. 19 of 1960 on State Corporation

(5) Ministry of Home Affairs Decree No. 179 of 1996 on Guidelines of Organization and Work Procedures for Water Resources Management Bureau

The basic idea of the Decree is that the role of central government will be limited to provision of guidance, while the role of provincial water resources service will be to provide supervision and limited management. Much of operation and maintenance function and its management will be transferred to Daerah Tingkat II (Local Administration Level II, hereinafter referred to as "DATI-II").

Though irrigation management role has already been delegated to DATI-II, DPU Pengairan (Provincial Water Resources Service) has primal responsibility on water resources development and management at provincial level. In the case of East Java Province, under the supervision of Provincial Water Resources Service, there is Cabang Dinas Pekerjaan Umum in 39 DATI-II offices (Kotamadya and Kabupaten). In addition, there are 10 Koordinator Wilayah Pengairan in the Province, coordinating Inter-Kabupaten irrigation matters.

10 Koordinator Wilayah Pengairan are to be abolished. 9 Balais (River Basin Water Resources Service) will be established instead in the East Java Province. Balai will assume the responsibility formerly borne by Koordinator Wilayah Pengairan. The idea of setting up Balai is to manage water resources by river basin unit rather than by administrative boundary of DATI-II. The Decree sets that the Balai can assume the following tasks;

- Inter- DATI-II irrigation;
- Supply of raw water for industry, harbor, clean water, hydroelectric power, ferry, pond and tourism;
- Rivers;
- Lake, reservoir, springs and ponds;
- Flood and drought control;
- Swamps;
- Water pollution control;
- Beach conservation;
- River mouth and Delta

It should be noted that though the Decree was issued, Balai itself is yet to be established. According to the Decree, 3 Balais are to be established in the Brantas river basin - in Surabaya (Puntung Peketiegan), in Malang (Bango Gedangan river basin) and in Kediri (Puncu Selodono).

The establishment of Balai would be effective in development and management of most river basins in Indonesia, which are now in "development" stage.

In case of Citarum and Brantas basins, there are the basin management entities in charge. Thus duties of Balai seem to overlap with the tasks of PJT. For instance, maintenance of water resources infrastructure is included as Balai's duties. This is an example of obvious duplication of duty between PJT and the Balai.

Jatilufur and Brantas river basins are considered as the two most developed basins in Indonesia. The basin management organizations were established for these two basins. In other words, the two river basins appear to be in "mature" or "management" stage of water resources development and management. In the case of Brantas river basin, it has a population of 13 millions and its economy accounts for 9.4% of Gross Domestic Product. In the mature stage, marginal costs of providing water is high because of increasing interdependency of users, - conflicts over scarcities and one user's interference with another, e.g. if upstream user pollutes a river, it increases cost for down stream user -.

Balais does not seem necessary for the Brantas and Citarum River basins, considering the above situations.

1.2 Water Use License

The right on water is water appropriation right in Indonesia. Water appropriation right is the right to obtain and use for certain necessity. All water use except for hydropower and agricultural purposes requires license from the provincial government (Government Regulation No. 22 of 1982)[3].

In 1990, the Minister of Public Works issued the two important regulations on river basin management. One is on "Management of water and water resources in the river basin (No. 48/1990), and on "Enactment process and requirement process for water licensing (No.49 of 1990)." No. 48 set forth 90 river basins in Indonesia. 15 of them, which are inter-provincial rivers, are kept under the management of Ministry of Public Works. 73 river basins are under the jurisdiction of the provincial governments; two river basins are to be managed by the special river management agencies.

The Regulation No. 49 stipulates licensing authority. According to this Regulation, the Minister of Public Works gives license for the water use in the river basins, which are under his jurisdiction. Governor can provides license in the basins under his jurisdiction.

Permission to use water is provided by the Governor in the East Java province. In case of surface water, Dinas Pengairan (hereinafter "DPU Pengairan ") acts as a secretariat in handling license. Groundwater licensing is also given by the Governor in coordination with provincial office of Ministry of Mines and Energy (hereinafter "MME"). Provincial Mining Service (hereinafter "DISTAMB") acts for ground water use. Ledger of water use rights holders indicating name, amount of water used exist. The license has to be renewed every three years. It is however automatically renewed in most cases. *De facto* "customary water right" prevails. There is no penalty for overuse of water. In case PDAM and industry abstract water more then the licensed amount, they just have to pay more. Similarly in case of less abstraction of water, they pay less. Thus there is no big room for water right adjustment. In the Brantas river basin, PJT provides water according to the plan set at the provincial water

[3] Article 20 of Government Regulation No. 22 of 1982 stipulates " water utilization for agricultural purposes is carried out in accordance with local custom..." Article 23 (2) sets "water use license for hydropower purposes... is to be given by the Minister (of Public Works)."

management committee. Cabang Dinas monitors actual amount of water abstraction. Current water use licensing does not function to effectively control demand for water.

1.3 Water Allocation

Priority order of the water use is stipulated in the explanation note on Law No. 11 of 1974 (Water Resources Management) as shown below. It should be noted that the classification does not clearly stipulate the priorities among Category A, B and C.

(a) Social use

- a. Drinking water;
- b. Domestic use;
- c. National Defense and Security;
- d. Religious purpose;
- e. Municipal uses like fire brigade, flushing, watering plantations;

(b) Economic use

- a. Agriculture;
- b. Animal husbandry;
- c. Plantation;
- d. Fishery;

(c) Economic use

- a. Energy;
- b. Industry;
- c. Mining;
- d. Water traffic;
- e. Recreation

In the East Java Province, besides the stipulation of priority of water allocation by the fundamental water law of Indonesia, priority of water utilization license is set as follows[4]:

- Drinking water;
- Agriculture;
- Plantation;
- Fishery;
- Industry;
- Hydro power;
- Flushing;
- Bathing pool;

[4] East Java Governor's Decree No.316 of 1988 on Guideline of implementation for provincial regulation No. 15 of 1987

As seen above, there exist general water allocation priorities: domestic use, agriculture, industry, and hydro generation in declining order. The allocation among specific users is not clearly defined. No priority is defined in long-term and emergency water shortages. In addition, no reference was made to river maintenance flow that is considered important for preserving water quality in the Brantas river basin. Currently river maintenance water is managed at PJT's discretion. In view of river water pollution control, Government Regulation No. 20 of 1990 on Water Pollution Control provides that liquid waste disposal into water (including river) will be charged as retribution tax. The procedures and amount of tax are to be determined by Provincial Regulation.

The Water Management Committee at the provincial level is organized to assist the Governor in coordinating water management in the province. The committee is chaired by Vice Governor of the East Java. Chief of Provincial Water Resource Service assumes the role of Secretary. The Committee holds plenary meetings at least twice a year. The meetings are usually held at the beginning of dry and rainy seasons. PJT participates in the Committee and presents water supply plan for the coming six months. When preparing the allocation plan, water demand from beneficiaries and hydrological data (supply) are taken into account.

PJT prepares three patterns of water supply plan or reservoir operation plan (POLA) for the coming season (6 months). The three patterns include: 1) water supply plan for rainy weather; 2) water supply plan for normal weather; and 3) water supply plan for dry weather. In the Water Management Committee meeting, one plan is chosen. It is often the case that PJT and DPU Pengairan have a preparatory meeting before the Committee meeting. The Committee holds ad-hoc meeting when they face water shortage problem. When significant deviation from the allocation plan occurs, PJT prepares a revised plan and presents it to the core team of the Committee. In most cases, PJT is required to reduce the water level of Sutami Dam to provide more water.

1.4 Water Quality and Pollution Control

Law No. 4 of 1982 provides general principles of environmental management in Indonesia. In addition to the Environmental Law of 1982, the new Environmental Law was enacted in 1997.The revised Environmental Law stresses the two issues; 1) involvement of non-governmental organization or citizens in general, and 2) strict enforcement of environmental regulation.

In addition to the above mentioned basic environmental law, the following central level and provincial level legislation have been prepared:

- Government Regulation No. 20 of 1990 on Pollution control;
- Ministry of Public Works Regulation No. 45 of 1990 on Water quality control of pollution sources;
- East Java Governor's Decree No. 413 of 1987 on Water classification and standardization in East Java;
- East Java Governor's Decree No.35 of 1993 on Committee for controlling and preventing environmental pollution

- East Java Governor's Decree No. 136 of 1994 on Effluent standard for industries

1.5 River, River Areas and River Structures

Government Regulation No. 35 of 1991 provides stipulations on management of river, river areas and river structures.

Ministry of Public Works Regulation No. 63 /PRT/ 1993 on "River demarcation and river exploitation area" provides the definition of river borderline, river border area, river benefit area and river authority area. The River Environment Expert does the detailed analysis on river area in the other of the Report.

Construction of river structure with the aim for public welfare and safety shall be made by Government or state-owned corporation. Public welfare and safety means that the objective which will not provide any direct economical value profit. River structure for purposes other than this – which is aimed at providing direct economic benefit - can be made by a legal body, social or private body after obtaining a permit from the Government (Government Regulation no. 35 of 1991). Government and state-owned corporation are in charge of operation and maintenance of river and river structures as well.

There is no clear stipulation regarding demolition of old river structures.

Land use in river boundary areas of such rivers as Kali Surabaya, Kali Wonokromo, Kali Kedurus and Kali Porong is stipulated by the Ministry of Public Works Regulation No. 70 of 1996. By this Regulation, the Governor of East Java Province is given the authority to manage land in river boundary area based on the technical proposal from Perum Jasa Tirta. Similar regulation has been drafted for other rivers in the Brantas River basin.

1.6 Excavation of Materials from River

The Government Regulation No. 35 of 1991 on River stipulates that continuous exploitation of such materials as sand and stone shall be carried out in a manner to preserve river and river structures function.

Ministry of Mining and energy has the competence and responsibility for the administration of groundwater resources and/or hot springs as mineral resources as stipulated in the Government Regulation No. 22 of 1982. River sand is classified as Class C, non-vital and non-strategic material. By the Government Regulation No. 37 of 1986, the management of Class C materials is transferred to the provincial government.

Minister of Public Works issued the Decree No. 458 of 1986 on "Safeguarding on rivers related with excavation of Class C quarry material". It stipulated that entire or part of mining operation should be stopped if there is any change in river flow, which is assumed to pose a danger.

1.7 Irrigation

Government Regulation No. 23 of 1982 on Irrigation provides general stipulation on irrigation. It sets that the management and regulation of irrigation water and irrigation networks with their structures within provincial jurisdiction area shall be delegated to the relevant local government unless otherwise determined by Government Regulation or Law. The Minister of Public Works does planning for irrigation water supply to meet the regional needs on the basis of proposal by the Governor concerned. Institution and association and individual who need irrigation water shall submit their application together with its plan to the Governor (Article 5). DPU Pengairan manages and regulates irrigation water and its network up to the tertiary head gate. HIPPA (Water Users' Association) or village level administration is responsible for O&M of tertiary level irrigation canal.

The use of water by agricultural water users association is stipulated in Presidential Instruction No. 2 of 1984 on Implementation guidance of P3A (Farmer Water Users Association).

Presidential Instruction No. 1 of 1969 on Water resources management sets that the Governor may establish "Irrigation Committee" at regional level. The committee is composed of the Bupati (Head of a district), Head of Ministry of Public Works in the region, Head of Ministry of Agriculture in the region, Chief of Police of the Province / Region and Head of the Local Agrarian Office. Provincial government is responsible for establishing the association for farmer water user's association.

1.8 Resettlement and Land Acquisitions

Government Regulation No. 35 of 1991 on River says, "Land utilization required for construction of reservoir shall be settled according to the valid regulation". Social impact that may arise from the construction of reservoir shall be thoroughly dealt by involving various parties with the coordination of Minister of Public Works.

Presidential Decree No. 55 of 1993 on "Land acquisition for construction purpose of public utilities" provides stipulations on land acquisition.

1.9 Flood Control

Government Regulation No. 35 of 1991 on "River" provides stipulations in regard to prevention from flood danger. According to Article 18 of this Government Regulation, the Government decided method for flood danger prevention, management of flood ground including decision on retention area, and guidance on the precautions for flood prevention either before during or after the flood. Governor and head of region shall coordinate the flood danger prevention effort by involving government agency and the people concerned.

As regards usage of retarding basin, the Article 21 stipulates that it has the function for flood control. It can be used for other use for people though the Minister decides the condition and method.

There has been no serious flood in the main Brantas River. Ministry of Public Works published the flood control manual in 1987. The President of the Republic issued the Decree on Earth (Flood) Disaster. It established National Coordination Board to fight a Disaster including flood fighting (BAKONAS). In addition to the national level disaster fighting board, there exists a provincial level board (SATKORLAK).

1.10 Soil Erosion and Conservation

Current land use in the mountainous area in the Brantas River basin is mainly of productive use and a little attention is given for watershed conservation.

Ministry of Forestry designated critical land area of the Brantas River basin in 1988. PGKS is involved in operation and maintenance work for Mt. Kelud area.

1.11 Water Service Fee Determination

Government Regulation No. 6 of 1981 empowered the Minister of Public Works and the Minister of Finance to establish water service fee. This Regulation enabled Perum Otoritas Jatilufur and Perum Jasa Tirta to recover costs for operation and maintenance of river structures (Presidential Decree No. 58 of 1990 specifically designates PJT as a corporation to receive operation and maintenance contribution.). Article 3 of the Regulation provides that any institution, association and individual who get benefit from water as the results of water resources infrastructure construction shall contribute for O&M costs. This provision is not applied for farmers because they pay IPEDA (Regional Development Contribution). The amount of O&M contribution is decided taking the following elements into consideration:

- Operation and maintenance cost
- Amortization of interest
- Depreciation
- Alternate for development

However, it is not clear whether actual water service fee is determined considering the above four elements.

1.12 Summary of Jurisdiction for Water Resources Development and Management in the Brantas River

The State has overall responsibility for water resources development and management. The government is empowered to manage, develop and utilize water resources. Such powers of the government may be delegated to central or regional level government agencies and to specific corporate bodies. River including lake and reservoir is under the jurisdiction of the Minister of Public Works. Ministry of Mining and Energy is responsible for groundwater. Some aspects of water resources management including water use licensing are delegated to provincial governor and to State-owned corporations.

Activities	Jurisdictions	Practices in the Brantas River Basin
Overall responsibility for water resources and river	State has responsibility for WRDM. The Government authorizes its power to central and government agencies (Law No.11/74) Authority on river including lake and reservoir lies upon Minister of Public Works (GRNo.35/91)	
River Planning including Master planing	MPW (Law 11/74 & GR35/91). It can be delegated to Provincial Government or State-owned corporation (GRNo.35/91 & GRNo.22/82). 73 river basins by Governor, 15 by MPW and 2 by State-owned Corporation (MPWReg. No.48/90).	Though PJT is responsible for master planning for the Brantas River basin, it has never prepared.
Development (construction)	MPW or State-owned corporation (GRNo.35/91) or it can be Governor in case it has not been delegated to State-owned Corporation	MPWReg.56/91 provides that development as one of PJT's major tasks. PKB is currently doing construction work.
Operation & Maintenance	MPW or State-owned corporation (GRNo.35/91)	PJT does O&M of major river structures.
Water Use License	Governor except hydropower which is issued by MPW (GRNo.22/82). MPWReg.No49/90 stipulates that MPW shall issue license in the basins of MPW jurisdiction, and Governor in his jurisdiction.	PJT provides technical recommendation with Governor on licensing (EJPReg.No.11/95). MPWReg.No49/90 does not stipulate licensing authority in Citarum and Brantas River basins.
Water Allocation (priority)	Governor (MPWReg.67/93 on Water Management Committee).	PJT presents reservoir operation plan (POLA) to Water Mgmt. Committee
Water Quality	MPW approves water quality standard. Governor issues the license for waste disposal (MPWReg.45/90).	PJT and several other agencies monitor water quality.
Sand Mining	Governor decides location of sand mining. (GRNo.37/86) Sand mining is prohibited if it affects river flow.(MPW Decree No.458/86).	Many illegal sand mining activities are observed.
Irrigation (water & channel)	Management and regulation of irrigation networks together with their accessory structures are delegated to Governor (GRNo.23/82).	Operation and maintenance of main and secondary irrigation channels are done by DPU pengairan.
Resettlement	Coordination shall be made by MPW (GRNo.35/91).	No particular practice to report

(to be continued)

Flood Control	MPW sets standards, methods for flood prevention. Governor coordinates the prevention effort by involving government agencies. Emergency action shall be taken by Governor (GRNo.35/91).	Flood control manual is prepared by MPW. PGKS and PJT do Sabo works.
Watershed Management	Ministry of Forestry (Law No.5/67).	BRLKT has primal responsibility for watershed conservation.
Water service fee decision in PJT working area	MPW designates the tariff for PDAM, PLN and industry (GRNo.6/81). Governor approves the tariff for PDAM and industry.	Water service fees are first negotiated among PJT, PDAM and PLN. Then the Governor approves the fee for PDAM then MPW issues the Decree. PLN tariff shall be approved by MPW.
Pollution charge	Can be formulated by each province.	PJT and BAPEDALDA are planning to introduce pollution charge.

MPW Minister of Public Works
GR Government Regulation
MPW Reg. Minister of Public Works Regulation
MPW Decree Minister of Public Works Decree
EJP Reg. East Java Provincial Regulation

1.13 Major Issues in Water Resources Management Regulations

Several problems in regard to current regulations are pointed out below.

1.13.1 Compliance with Water Regulations

Current water regulations are mostly well designed. Enforcement of regulation needs more effort. Compliance with the existing is the problem. Lack of compliance may exist in many areas. Some examples are described.

(1) Sand Mining

Sand mining activities without approval is prohibited. Many illegal sand mining activities are however observed in the Brantas River, Porong River and Surabaya River. On the other hand, Perum Jasa Tirta is doing dredging work at the down stream. More efforts should be made to prevent the sand mining.

(2) Water Use License

The license of water use could be cancelled in case water use is no longer in conformity with what that stipulated in the license (GRNo.22/82). Many cases of unconformity in water use are seen.

(3) Penal Provisions

Penalty for violations of legal provisions is stipulated in Law No.11 of 1974. Similar penal provision is found in Government Regulation No. 22 of 1982. Such provisions refer to prohibition of water use without license and negligence in participation for soil conservation, and protection of water resources and waterworks. Penalty is stipulated as negligence and infringement of the legal provisions shall be detention of up to 3 (three) months and/or to a fine up to 50,000 rupiahs. Amount of fine shall be examined. It is important to make more policing efforts.

Other example of non-compliance includes throwing solid and liquid waste in a form of sewage into river. Though the Government Regulation No.35 of 91 prohibits it, this is seen in many areas along the Brantas River.

1.13.2 Contradiction among Regulations and Conformity with Regulations

There seems to be some contradictions among regulations. Such contradictions should be corrected. The most critical contradiction in terms of water resources management in the Brantas River basin is the planned establishment of Balai.

(1) Balai in the Brantas River Basin

The Ministry of Public Works Regulation (No.56/1991) says that PJT carries out planning, developing, rehabilitation, operation and maintenance activities in Brantas River and 39 rivers and its tributaries. It means that PJT has overall responsibility over the Brantas river basin. Similarly, Ministry of Public Works Regulation No. 48 of 1990 on the "Management of Water and or Water Resources within River Basin" lists names of 90 river basins in Indonesia. It provides that PJT has general responsibility over the Brantas River basin. There seems to be a contradiction regarding the roles of river basin management in the case of Brantas river basin, i.e. discrepancy between the roles of PJT set by the Government Regulation and Balai set by the Ministry of Home Affairs.

(2) Water Service Fee Determination

Current water service fee in the Brantas River basin is determined by negotiations between PLN, PDAM and PJT. It is not clear whether what elements are considered in fee determination.

Service to pay concept as set in Government Regulation No. 6 of 1981 is yet to be fully realized.

1.13.3 Lack of Coverage

Demolition of Old River Structures

Operation and maintenance of river structures are made by the government or State-owned Corporation. No clear stipulation is however found regarding demolition of old river structures.

1.13.4 Minister of Public Works and Provincial Governor

As seen above, there are various level regulations including Law, Government Regulation, Presidential Decree, Presidential Instruction, Ministerial Regulation and Decree, Provincial Regulation and Decree in Indonesia. By its nature, provincial level regulations provide the most specific provisions among the various levels legislation. There are some areas however both the Ministers of Public Works and the Governor set regulation. For example, similar provision is made by the Minister and the Governor in terms of land use in river bank area, i.e., Kali Surabaya by the Minister (No.70 of 1996) and Kali Mas by the Governor (No. 93 of 1997).

2 Regulations Related with Perum Jasa Tirta

It is proposed that PJT, PKB and PGKS be integrated by the end of 2001. The new organization will start its operation on 1 January 2002. Several aspects related with the scope of work of the new organization must be clearly defined before commencing its operation. Jurisdictions of three organizations are summarized below.

2.1 PJT Tasks and Responsibility

Perum Jasa Tirta Public Corporation was established in 1990 based on the Government Regulation No. 5 of the Year 1990 on Jasa Tirta Public Corporation. A few follow-up regulations were enacted The most specific provisions are found in Minister of Public Works' Regulation No. 56 / PRT / 1991 on the general policy for managing Jasa Tirta Public Corporation. The following is the summary of the Government Regulation and Ministry of Public Works Regulation. Task of PJT set in "Government Regulation No. 5 of 1990" and "Minister of Public Works Regulation No. 56 / PRT/ 1991" is summarized in Table A11-3 "PJT task and activities".

(1) Major Tasks

Chapter IV "Jasa Tirta Public Corporation Task", Article 6 (Minister of Public Works Regulation No. 56 /PRT/ 1991, hereinafter referred to as "The Regulation No.56/91") stipulates the major tasks of Perum Jasa Tirta as follows:

a. Operation and maintenance of water resources infrastructure;

b. Trading on water and water resources;

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

d. Rehabilitation of water resources infrastructure

Current PJT's human and financial resources do not seem sufficient to be responsible for (c) River basin management and (d) Rehabilitation. It should be noted that PKB is required to design, develop and rehabilitate water resources infrastructures, however, O&M activities are not included in its scope of work. In addition, PGKS is required to rehabilitate the damaged water resources infrastructures. However its activities are limited to the rivers near the Mount Kelud (and Mount Semeru). If PJT has adequate resources of its own, a part of the activities done by PGK and PKB can be transferred to PJT. According to PJT, the Ministry of Public Works policy at the establishment of PJT was to separate development activities from the PJT for the time being. The reason for this separation at the initial state was to observe the development of PJT.

(2) Master Plan

(The Regulation No.56/91") Article 10 clause (1) says, "The Corporation carries out the planning activity as mentioned in Article 9 by setting up the integrated and comprehensive

river basin master plan in accordance with the regional development plan to achieve optimum benefit, considering conservation and development of the environment as well".

PJT itself has never prepared the integrated and comprehensive river basin master plan though the Master Plan prepared in 1985 is still valid and PJT started its operation in 1991.

(3) 40 rivers and Tributaries

(The Regulation No.56/91") Chapter VI Public Corporation Activities (Article 9) says "The Corporation carries out the activities on planning, developing, rehabilitation, operation and maintenance, trading, conservation, supervision and controlling in relation with the implementation of the Corporations tasks as mentioned in Article 6, in Kali Brantas.... *and their tributaries* including the water resources infrastructure related in the river basin.

As regards this Article, a small difference exists between G. R. No. 5 of 1990 on PJT and Ministerial Regulation No. 56 of 1991. Article 8 of G.R. No. 5 of 1990 lists the names of 40 rivers, it does not refer to their *tributaries*. As regards this contradiction, PJT should manage 40 rivers and its tributaries if the principle of "one river, one plan and one management" is taken.

(4) PJT Funding

(The Regulation No.56/91") Chapter VII Finance and Tariff Determination provides the possible sources of funding.

Article (1) says, "the budget for carrying out the main tasks as mentioned in Article 6 is obtained from;

- Corporation internal fund;
- State-joint capital through State Income and Expenditure Budget;
- Inland and or foreign loan;
- State Income and Expenditure Budget;
- Other legal funding sources

PJT has not received any government fund though a part of salary of civil servants working in PJT is covered by state governmental fund.

According to the Regulation as stipulated above, PJT has the right to borrow money from foreign financial institutions like Asian Development Bank and Overseas Economic Cooperation Fund. PJT has never received foreign loan to date. There are many areas of work as described above that PJT is required to assume. It is important that PJT should become able to receive foreign loan. It appears necessary for PJT to negotiate with the Ministry of Finance for making loan agreements available.

(5) Reporting

PJT reports to Director, Directorate of Water Resources Utilization and Conservation, Directorate General of Water Resources Development, Ministry of Public Works on technical

issues. As regards financial issues, it has to report to Ministry of Finance.

Several Presidential Decrees were issued as a follow-up to the Regulation No.56/91 and one Ministry of Public Works Decree is drafted as follows:

- Presidential Decree No. 195 / M of the Year 1990 on the assignment of the Board of Directors of Jasa Tirta Public Corporation;
- Presidential Decree No. 58 of the Year 1990 on the designation of Jasa Tirta Public Corporation as an agency which can collect and receive the contribution for operation and maintenance of water resources infrastructures;
- Presidential Decree No. 77/M of the Year 1991 on the assignment of the Board of Supervision of Jasa Tirta Public Corporation;
- Draft of Ministry of Public Works Decree on the designation of authorities and responsibilities of Perum Jasa Tirta

2.2 Contradiction and Unconformity with Regulations on PJT Task and Responsibility

Contradiction and unconformity found in current PJT operation is summarized in the following table.

Issues	Provisions	Practices
Major task	Development and rehabilitation are included as major tasks. (MPWReg.56/91)	Little activity is made in the areas of development and rehabilitation
Master plan	The river basin master plan preparation is included as PJT tasks. (MPWReg.56/91)	Master plan for the Brantas River basin has not been prepared yet since PJT establishment though the Master plan prepared in 1985 is still valid.
40 rivers and tributaries	Government Regulation No.5 of 1990 lists the names of 40 rivers without referring to tributaries, while the Regulation No. 56 of 1991 sets those 40 rivers and their *tributaries* are PJT working area.	
PJT funding	APBN is included as PJT's budget source (MPWReg.56/91)	PJT never received government budget (APBN).
IPEDA(PBB)	Article 4 of "Government Regulation No. 6 of 1981 on Contribution for operation and maintenance cost for water resources infrastructure" sets that " Corporation (in this case, refers to Perum Otoritas Jatilufur and PJT) has the right to receive a part of IPEDA ...from local government concerned". IPEDA now has been changed to PBB.	While POJ receives a part of PBB, PJT has not received any to date.

2.3 Current Expansion Proposal of PJT Tasks and Responsibility

In order to clarify and support the above mentioned issues, Ministry of Public Works Decree on the designation of authorities and responsibilities of Perum Jasa Tirta was drafted and is now under discussion. Major proposals included in the Draft Decree are given below. Authorities of the Governor of East Java and the role of the Ministry of Public Works are also described below with a view to present its roles in water resources development and management in the Brantas River basin. A table for "Authorities of Ministry of Public Works and the transferred ones in managing water resources in the working area of PJT (prepared by PJT) " is shown as Table A11-4.

(1) Water Resources Development and Management

(a) Water resources utilization

The Governor has the authority for the following issues;

Licensing

Water allocation: approves the Reservoir Operation Plan as the chairman of Water Management Committee

PJT proposes the following actions:

Provision of technical recommendation on water resources utilization;

Preparation and signing agreements on water resources utilization;

Provision of input in water allocation in the process of Reservoir Operation Program arrangement;

(b) Maintenance and Rehabilitation

The Minister of Public Works together with the Minister of Finance approves the PJT working program and budget for implementation of Maintenance and Rehabilitation.

PJT proposes that it proposes program budgeting and carries out the work itself without the approval from the Ministry of Public Works and the Ministry of Finance.

(c) Water resources control

The Governor has the following authorities:

Flood control: approves the Flood Control Manual as the chairman of Water Management Committee;

Pollution control: issues the license or rejects the request for waste disposal, also can cancel the license for waste disposal. The head of regency can take administrative sanctions on behalf of the Governor;

Sand mining control: designates the mining location, issues and rejects for mining license. The Governor as well as the head of regency cancels the license.

PJT proposes the following actions:

Provision of input for Water Management Committee and Governor for flood control;

Provision of input for the Minister of Public Works on water use and water quality standards for pollution control, provision of technical recommendation on the licensing of liquid waste disposal on rivers, and conduct routine monitoring of rivers;

Provision of input to the Governor in mining control of C group material in rivers, provision of technical recommendation in licensing C group material mining, and supervision of mining execution and issue of temporary termination.

(d) Water resources conservation

The Governor has no authority over management of critical land area.

PJT proposes the following activities:

Propose activities on land and water conservation as well as water resources construction for critical land management and sediment control, monitor the execution of land and water conservation activities and construction of water resources infrastructure

(e) Arrangement of land use

The Governor designates the land use in river bank areas, issues and rejects the request for land use in river bank areas, river use areas and river authority areas and cancels the license for land use.

PJT proposes the following activities:

Provision of input to the Governor in the arrangement of land use and designation on land use, provision of technical recommendation in licensing of land use and supervision of execution of land utilization, and issue order for temporary termination of the activity.

(f) Water resources development

The Governor has no authority over water resources development. DGWRD approves the proposal for Master plan preparation. The Ministry approves and legalizes the Master plan.

DGWRD approves the preparation of Feasibility Study, Detailed Design and implementation program for construction of water resources infrastructures. DGWRD also monitors the progress of the construction.

PJT proposes the following activities:

Propose the Master plan preparation to the DGWRD, then preparation of the master plan

Propose preparation of Feasibility Study and Detailed Design.

As seen above, in terms of water resources management, the roles of the Ministry of Public Works are limited to policy formulation and provision of policies, guidance in particularly for water supply side management.

The governor is given authority over licensing and other demand-side management issues.

(2) Water Trading (Corporate Management of PJT)

Tariff arrangement for water service fee:

> The Minister of Public Works designates the tariff for O&M contribution. The Governor approves the proposal on the tariff for PDAM and industries.
>
> *PJT proposes that it propose the tariff for PLN, PDAM and Industries to the Minister of Public Works and to the Governor.*
>
> a. Tariff arrangement for discharge fee: *PJT proposes the Minister of Public Works and/or the Governor about tariff arrangement for effluent charge.*
>
> b. Land utilization service: *PJT designates the amount of the contribution for land utilization, as well as to collect and to receive the contribution.*

Activities of PJT will expand to a great degree if this Draft Decree is enacted. This Draft Decree attempts to provide PJT with authorities and responsibilities in many areas of works. It seems necessary to carefully analyze organizational setting of PJT including human and financial resources in order to cope with its expanded authorities and responsibilities foreseen in this Draft Decree.

It should be noted that some points mentioned above in the Draft Decree could be done within the current scope of legislation. For example, PJT is authorized to prepare the Master plan.

2.4 Brantas River Basin Development Project Office (Proyek Pengendalian Wilayah Sungai Kali Brantas – PKB) Tasks and Responsibility

Some of the laws and regulations regarding Brantas River Basin Development Project Office are given below:

Contract No. 16-MISPRI-33 (59) of 10 September 1958 between the Indonesian and Japanese governments.

This contract was made for investigation along the Brantas River with the war reparation fund.

Ministry of Public Works and Power Decree 16/12/11 of 1961 on Karankates Dam

The construction of Karankates dam was made under the supervision of PLN. After the

completion of the project, supervision was handed over to Ministry of Public Works and Power

3. Ministry of Public Works and Power Decree No.63/KPTS/1967 on Proyek Induk Serbaguna Kali Brantas;

Its name was changed to Proyek Induk Serbaguna Kali Brantas and abbreviated to "Proyek Brantas". The following tasks were added:

investigation in cost analysis and construction techniques for big projects, especially dam projects in Indonesia;

manpower training and transfer of technology;

assimilation of big projects operation including accounting and financial administration

4. Ministry of Public Works and Power Decree No. 219/KPTS/1968 on the tasks of Brantas project;

Tasks of Brantas Project ware set as follows;

carry out projects to develop the Brantas river basin including survey, investigation, planning, design and construction;

carry out investigation on cost analysis, structure design and construction techniques for big projects, especially dam projects;

carry out training to develop specialists for other projects;

In carrying out its tasks, General Manager of Brantas Project has to collaborate with other related agencies in the basin development activities;

5. Ministry of Public Works and Power Decree No. 78/KPTS/ 1970 on additional tasks of Brantas Project;

Brantas project was given three additional tasks as: New Lengkong Dam, K. Porong Improvement Project, and Wlingi Dam.

6. Directorate General of Water Resources, Ministry of Public Works Decree No. 5/25/1974 on design of 2 dams in south Lombok;

Brantas project was instructed to design 2 dams in south Lombok. In this case, the position of Brantas Project was an assistant unit of Nusa Tenggara Barat Unit of Ministry of Public Works in Lombok;

7. Ministry of Mining and Energy, and Ministry of Public Works Decree No.108A/KPTS/M/Pertamben/1983 on water resources development for electric power

generation in East Java Province;

Brantas project was instructed to carry out water resources development for electric power generation in East Java Province besides the electric power generation within the Brantas river basin.

In addition to the above decrees, a few DGWRD decrees were issued for defining the organization of PKB.

The General Manager of Brantas project reports to Director, Directorate of Construction Guidance, Central Region, Directorate General of Water Resources Development, Ministry of Public Works. The Directorate of Programming and Planning decides budget for the Project with consultation from the Directorate of Water Resources Utilization and Conservation.

2.5 Volcanic Disaster Prevention Project of Mt. Kelud and Mt. Semeru (Proyek Pengendalian Lahar G. Kelud dan G. Semeru – PGKS) Tasks and Responsibility

PGKS was established in 1969 based on Ministry of Public Works and Power Regulation No. 181 of 1969. Its tasks are to decrease the damage of production infrastructure caused by the explosion of volcanoes, emergency repair of water resources infrastructures. Chief of KANWIL PU stipulates the recent organization in July 1994. The General Manager of Brantas project reports to Director, Directorate of Construction Guidance, Central Region, Directorate General of Water Resources Development, Ministry of Public Works. The Directorate of Programming and Planning decides budget for the Project with consultation from the Directorate of Water Resources Utilization and Conservation.

3 Water Resources Institutions in Selected Countries

Water resources institutions in the following countries are briefly described below for reference.

- Japan;
- Netherlands;
- United Kingdom
- France;
- U.S.A.
- Australia

(1) Japan

Rivers considered particularly important for national safety and economy are classified as Grade A river. The Minister of Construction acts as a river administrator for Grade rivers. Grade B rivers, which are considered to be important to the public interest, are managed by the prefecture governor. River administrators have responsibility and the power for installation of facilities required for river management.

Seven river systems have been designated as important river systems for water resources development in Japan. The Basic Plan for Water Resources Development is established for each river system. It presents water demand forecast, sets targets of water supply and construction of necessary facilities.

The seven river systems cover areas of major economic and social activities. While it only accounts for only 15% of the national land, it covers approximately 50% of the total population and 48% of industrial shipments.

Water Resources Development Public Corporation (WARDEC)

Water resources development projects require a long period of time for their completion. The projects must be based on long-term planning and implementation. This called for an organization which implement water resources development projects comprehensively and raising and distributing large funds, and for providing experts and engineers.

The government established Water Resources Development Public Corporation (WARDEC)[5], a non profit, public corporation with the objectives of improving water utilization and flood control in 1962. WARDEC implements projects on the river systems for the development and utilization of water resources that are urgently needed for industrial development and increasing urban population.

It constructs large-scale dams, estuary barrages, water level controlling facilities for lakes and marshes, and water channels for various purposes.

[5] "1996 Outline of the Corporation" Japan, Water Resources Development Public Corporation

(a) Activities of WARDEC

Construction and reconstruction of facilities under the Basic plans;

- Maintenance of facilities after completion;
- Study, research and design related to the development of utilization of water resources as well construction and maintenance of power generation commissioned to the Corporation;
- Water utilization projects: projects to supply raw water for domestic, industrial and agricultural purposes;
- Flood control projects: projects for flood control and maintenance of normal river functions.

(b) Financial Resources

Projects of Water Resources Development Public Corporation are financed by the following sources:

a. Government grants (Ko-fu kin): flood control and storm surge protection works, and maintenance and improvement of river ways;

b. Subsidies (Hojokin): subsidy for agricultural, industrial and domestic water supply works

c. Beneficiary contribution: costs received from beneficiaries during construction and installment expenses for industrial and agricultural water works

d. Loan capital (including issue of Water Resources Development Bonds):

e. Other revenue: Income from study and research, on construction of related facilities including hydropower facilities and roads.

(c) Human resources

There are some 2000 employees working in 46 offices throughout Japan.

(2) Netherlands

Water resources management is borne by the following four level institutions:

(a) Central Government

Ministry of Transportation and Public Works bears primal responsibility for water resources management. It is responsible for international rivers, rivers of national lakes and large lakes. Regulatory responsibilities reside for the most part at the central government. Government sets water quality standards together with waste permit issuance. It supervises the works of provincial level government. Ministry of Housing, Land Planning and Environment and Ministry of Agriculture and Fisheries collaborate with Ministry of Transportation and Public Works in water resources management.

(b) Provincial Government

There are 12 provinces. The role of provincial government is similar to that of central government. The provincial government does water resources development and management within the province. However, water level management and water quality management are delegated to Water Board in many cases. Enforcement of water quality standards is being delegated to the water boards. Provincial governments solely do ground water management.

(c) Municipality

The role of 700 municipalities in water resources is limited to construction and maintenance of sewerage and domestic water supply. In a big municipality like Amsterdam, the municipality is responsible for water quantity and quality management.

(d) Water Board

Water Board has a long tradition in Netherlands. It is a functional and independent organization but non-administrative organizations like municipality or province. The members are chosen from representatives from landowners and various groups. Major roles are to water level management in reclaimed lands and maintenance of pumping facilities. Provincial governments sometimes delegate a part of water resources management activities including flood and drainage works to large scale Water Boards.

The government prepared the third National Policy Document on water management for 1990 to 1994. It set out that 1) provincial governments should promote formation of district water boards along hydrologic / hydraulic boundaries, and 2) provincial governments consolidate provincial water quantity and quality control and waterways management under district water boards. This may have led to provincial governments' initiative in water resources management.

(3) United Kingdom (England and Wales)

Due to the information available, the following description only refers to England and Wales.

Ministry of Agriculture, Fisheries and Food and Department of Environment has overall responsibility for water resources development and management. Ministry of Agriculture, Fisheries and Food monitors fisheries, drainage, flood control works, and land and sea disposal of wastes. Municipalities may provide flood protection works within their boundaries. After the enactment of Water Act in 1989, domestic water supply activity has been privatized. Water Authority is responsible for domestic water supply and sewage. 10 private Water and Sewerage Companies together with 29 water companies provide all water supply and sewerage functions without governmental involvement. 1991 Water Resources Act provides that Catchment Management Plan must be prepared by the National River Authority. Currently Catchment Management Plan is being prepared at 29 river systems in England and Wales.

National River Authority

National River Authority under the supervision of Department of Environment is responsible for flood control, water resources management, water quality control and environmental protection, recreation and river navigation.

National River Authority has some 7,700 staff as of December 1993. It has 10 offices. Their fund consists of the following two sources:

Government subsidy from Department of Environment and Ministry of Agriculture, Fisheries and Food (approximately 56%);

Business income including subsidy from local government; Business income includes contribution from those who obtained fishery rights and river water use right.

Local authorities manage smaller rivers other than those 29 catchment areas.

(4) France

After the enactment of Water Law on 1964, water resources management in France is made on the 6 major river systems. There are several central level institutions involved in water resources including Ministry of Environment. It co-ordinates activities among the related ministries. It is also responsible for water and fishery restriction and flood control.

1982 Decentralization Law transferred significant executive powers to 22 Regional Councils. There are 6 Basin Financial Agencies (Agence Financiere de Bassin) which deal with water fee setting for water intake and discharge, provision of water quality improvement and co-ordination between upstream and down stream water users and supervision of municipalities on environmental standard protection. Basin Financial Agencies provides financial assistance with river facilities construction projects and environmental conservation projects. Besides Basin Financial Agencies, Basin Committee (Comite de Bassin) is organized. The roles of Comite de Bassin are:

- Formulation of The Master Development and Water Management Schemes (SDAGE);
- Provision of advice on River Management Plan formulation for smaller rivers (SAGE);
- Approval for Basin Financial Agency's operation plan

The Committee member consists of citizen, beneficiaries and local civil servants. It has a characteristic of "Water Congress" in region.

It should be noted that Water Law of 1992 emphasizes the importance of ecosystem and involvement of beneficiaries. The preparation of SDAGE requires involvement of local government, water users and industry. SDAGE has to cover overall water and water environment including surface water, ground water, lake and brackish water.

Private sector participation in water supply has started since the end of 1980's. The decision

to allow private sector participation is made at the level of municipality. There are two major companies, which attempts to expand their water supply and wastewater treatment business internationally.

(5) U. S. A.

Since U.S.A. is administered by a federal governmental system, each state has a great autonomy. Except for defense and diplomacy, many issues are delegated to each state. The roles of federal government in water resources are limited to provision of National Flood Insurance, Land use regulation, Disaster prevention and relief. As for water quality management, Environmental Protection Agency is responsible at the federal level. U.S. Army Corps of Engineering is also involved in flood relief activities when state or county can not cope with the problem.

The federal government once established Tennessee Valley Authority (TVA) in 1930s. It was established to mobilize resources not available in existing institutions. The federally authorized TVA was highly successful in improving the region's economy within inter state jurisdiction. TVA was responsible for land and water development and operation in multi-state basin. Inter-state conflicts with the federally established institutions prevented the creation of similar authorities. An exception is Delaware River Commission[6], directed by equal representatives from five basin states and the federal government, has substantial coordination, review and operating powers over the river. Its staff manages operations for water supply and water quality in the highly industrialized basin.

Water Resources Division of United States Geological Survey (USGS) has the principle responsibility within the Federal Government to provide hydraulic information. With those needed to achieve the best use and management of nation's water resources. It systematically collects and analyzes data to evaluate the quantity, quality and use of water resources. It also conducts basic and problem-oriented hydrologic and related research. It coordinates water resources information of each state.

State government is therefore required to formulate policy on water resources management at State level. State government does implementation of various measures. County and Municipality as well plan, implement and manage water resources development projects within their jurisdictions.

(6) Australia

The Australian federation has a three-tier system of government, the Federal government, six State Government and two Territory Government, and approximately 900 local government bodies at the city, town, municipal and shire level. The division of powers between the Federal and the governments follows the American model of federation.

Surface waters are owned by the state. Each state carries responsibility for broad resource

---

[6] "Water Resources Institutions – Some Principles and Practices" World Bank Technical Paper, Number 191

planning, allocation, and regulatory functions. The execution of such functions is sometimes delegated to lower level organizations; the civil or special purpose governmental units.

River basin is designated as the basis for detailed resources planning and management. In terms of water allocation priority: domestic use is given the first priority followed by industry and agriculture. Special consideration is however given to arid areas.

Regulatory function and operational or service functions are separated. For instance, the State of Victoria places all regulatory responsibilities (water rights, water quality and dam safety) in the (State) Department of Natural Resources and Environment that has no service facilities.

In the Murray-Darling River Basin, which spreads over the States of Victoria and the New South Wales, a special inter-state commission called the Murray-Darling Commissions exists.

The Murray-Darling Commissions was empowered and staffed to implement 1915 interstate agreement on sharing the basin waters. States continue to carry out a broader scope of activities within their boundaries under the oversight of the Commission, which is now composed of key state ministers. Individual states retain final approval authority through the requirement for unanimous agreement on proposed measures.

Comprehensive Interstate agreement on water agreements are in place on water quantity allocations, real-time operations. The agreements include considerations for deviations during emergency drought conditions.

The Australian Geological Survey Organization, national geological research and survey agency under the Department of Primary Industry and Energy provides research and technical services to support the sustainable management of natural resources, including water at the commonwealth level.

(7) Summary

Major characteristics for the above countries' water resources institutions can be summarized as follows:

(a) Governmental units, either central or provincial level, carry responsibility for overall or broad planning, allocation and regulatory functions. Execution of these functions can be decentralized or delegated to lower level organizations. Central government, however, manages major rivers,

(b) Participation of beneficiaries or water users in basin management plan is realized in France and in some countries under examination,

(c) Special purpose governmental service entities for managing water resources are established in some countries,

(d) Almost all countries have adopted the river basin as the management unit,

(e) Domestic water supply is the first component to be privately operated,

(f) Separation of regulatory function from operating function is common.

	Indonesia		Japan	Netherlands	U.K.	France	U.S.A.	Australia
Demarcation of river	90 river basin management demarcation		Grade A and B river	N/A.	29 river systems	6 major river systems	N/A.	N/A.
Working area	Brantas Basin		7 major river systems		29 river system	6 river basins	single state	single state
Type and Functions of W. M. Entity	State Corporation/ O&M, provision of raw water		State Corporation/ construction and O&M	Water Board (civil organization) / O&M of limited facilities	Government Agency/ planning, construction, and O&M	Inter-regional agency/ planning & Coordination	State commission / planning & coordination	State Commission/ planning & coordination
Name of Organization	Perum Jasa Tirta		Water Resources Development Public Corporation	Water Boards	National River Authority	Basin Financial Agency	State Commission	State Commission
	(A)	(B)						
Data collection	○	○	○	○	○	○	○	○
Planning	×	○	×	×	○	○	○	○
Design	×	○	○	×	○	×	×	×
Construction	×	○	○	×	○	×	×	×
O&M	○	○	○	○	○	×	○	○
Regulatory	×	×	×	×	○	×	×	×
Privatization	under study		N/A.	N/A.	Domestic water supply	Domestic water supply	Domestic water supply	N/A.

- N/A. indicates either no data available or not applicable.
- ○ - implemented, × - not in the scope of work
- **(A) – Present**
- **(B) – Proposed**

4 Private Sector Participation in Water Supply

4.1 Privatization in Provision of Infrastructure

The worldwide trend of economic liberalization has led to institutional experimentation in provision of infrastructure. The early experiences of privatization were made in Chile and U.K. The privatization of British Telecom in 1984 is a well-known project. Many privatization projects followed in 1980s throughout the world. These projects have shown that there are fewer activities requiring public intervention than once was believed.

Latin American countries first followed the privatization trend of Chile and other industrialized countries in late 1980s. In the 1990s, privatization trends spread over the countries of Eastern Europe. They transformed their economies after the fall of communism. North Africa, Sub-Saharan Africa and Middle East have an only a minimal share of privatization[7]. Many Asian countries now have privatization projects.

There is a wide range of institutional options in private sector participation in provision of infrastructure. The most unregulated option is " transfer of ownership of assets. The other options include " Concession/BOT", "Leasing", and "Management or Service Contract".

Type of privatized form of institutional arrangement is summarized below.[8]

Forms / Functions	Service Contract	Management Contract	Leasing	Concession including BOT
Ownership of assets	Public	Public	Public	Private and Public
Investment Planning & Regulation	Public	Public	Public	Public with Private Contractor
Capital Financing	Public	Public	Public	Private
Current Financing	Public	Public	Private	Private
Execution of Investments	Private Contractor			Private Contractor
O & M	Private Contractor	Private Contractor	Private Contractor	Private Contractor
Managerial Authority	Public	Private	Private	Private
Commercial Risk	Public	Mainly Public	Private	Private
Basis of Compensation	services rendered	services rendered	Based on results, net of contractor payment for use of existing assets.	
Duration	~ 5 years	3~5 years	5-10 years	10-30 years

[7] "Privatization – Principles and Practice" International Finance Corporation 1995
[8] "Institutional Options for the Provision of Infrastructure" Kessides, C. 1993 The World Bank

In many countries, there are two goals in privatization. One is to resolve macroeconomic or fiscal crisis, and the other is to reduce the economic inefficiencies associated with public management of infrastructure. In this regard, more specific goals of privatization can be set as 1) expansion of service coverage and raise its quality, 2) increased economic efficiency, 3) reduction of fiscal burdens and 4) introduction of advanced technologies from private sector.

Characteristics of infrastructure vary. Construction of dam requires a lot of capital. Cost recovery is complicated for capital investment. The characteristics of infrastructure or public goods can be expressed using the terms Subtractability and Excludability. Subtractability refers to the impact that consumption by incremental users has on consumption opportunities by others. Low subtractability refers to the situation that consumption by one user does not prevent others from using. High subtractability means that consumption by one user impedes the use of others (i.e. privately consumed). Excludability refers to the feasibility of controlling access to goods. High excludability refers to the situation when it is easy to prevent users from consuming it. The following table summarizes the nature of subtractability and excludability by sample public goods and services.

<table>
<tr><th rowspan="2">Subtractability</th><th colspan="2">Excludability</th></tr>
<tr><th>Low</th><th>High</th></tr>
<tr><td rowspan="2">Low</td><td>(pure Public Goods)</td><td rowspan="2">Street sewer, wastewater treatment plant</td></tr>
<tr><td>Traffic signaling, Air traffic control, Primary roads, Clean air Fire brigade, National defense</td></tr>
<tr><td rowspan="2">High</td><td rowspan="2">(congested) Urban roads, aquifer</td><td>(Closer to Private Goods)</td></tr>
<tr><td>Port equipment, power generation, piped water supply</td></tr>
</table>

According to the above explanation, water supply has a nature of high excludability and a high subtractability. Water supply can prevent users from consume water when it is not piped to the users. The consumption of piped water by one user has an impact on total water available to the other users. It is therefore relatively easy to charge cost of water supply to water users compared to capital cost of reservoir construction.

4.2 Practices of Private Sector Participation

The transformation of Perum Jasa Tirta's corporate status to Persero is proposed in this study. Corporate management becomes more important when it operates as Persero. Perum Jasa Tirta already plans to diversify its business lines. Water supply to Madura Island is one of the plans. There are various institutional arrangements in water supply. Examples of private sector participation are described.

There are more than 75 privatized piped water supply projects in the world. Though French water supply companies are famous for their international activities, a large-scale privatization of water supply started in U.K. In 1985, British government disclosed its plan to privatize water supply in line with such other utilities as British Telcom, British Airways and British

Gas. The goals of then Water Authority privatization project included 1) financing from market become available independent of government subsidy and 2) efficient operation due to possible competition. Government departments retained its authorities over water supply companies in terms of quality of water supplied and water use just like other governmental regulatory functions over electricity, gas and other utilities. Water resources management such as flood control, water resource development plan and other activities are kept in the hands of National River Authority.

As described above, French companies are active in international water supply and wastewater projects. Two French companies, Compagnie Generale des Eaux and Lyonnaise des Eaux, have 23 contracts internationally.

As described above as general privatization trend in the world, there are many privatized water supply projects in Latin America. The Asian privatization projects include Malaysia, Thailand, Philippines, India, Pakistan and China. The Asian projects are mostly implemented as BOT/Concession. The World Bank publication "Private Sector Participation in the Water Supply and Wastewater Sector (1996)" provides six examples from Argentina, Mexico, Colombia, Chile, Guinea (West Africa) and Poland.

Asian privatization projects in water supply have only a few years' experiments[9]. It is too early draw any conclusions. Thus four Latin American projects are presented below[10] to study performance of the projects.

(a) Buenos Aires, Argentina

Private sector participation in water and wastewater sector is a part of a privatization program to help stabilize the economy after the crisis of the 1980s. Water and wastewater service public company, Obras Sanitarias de la Nacion (OSN) suffered from weakness from insufficient operation, weak commercial and financial management, poor maintenance and poor billing procedures. In 1993, the Federal government awarded a thirty-year concession contract to a consortium led by French company Lyonnaise des Eaux, together with Spanish, English companies. International Financial Corporation, a member of the IBRD group, became a partner holding an equity share of 5%. The concessionaire is responsible for providing water supply and sewerage services for the federal capital and fourteen districts of the Buenos Aires. A new regulatory agency, Ente Tripartito de Obras y Servicios Sanitarios was created as an autonomous entity to control and maintain service quality, protect customers, and approve and supervise the execution of expansion plans and the investment according to contract specifications.

As summarized below, Aguas Argentinas has so far made an improvement in its performance. In addition, the quality of potable water has been upgraded. New payment system was introduced allowing customers to pay 900 payment counters including the company's own

[9] In case of Manila (Metropolitan Waterworks and Sewerage System), the competitive bidding for water supply concession was held in January 1997. The new operation started in August 1997.

[10] "Private Sector Participation in the Water Supply and Wastewater Sector" Rivera, D (1996) The -World Bank

service centers, commercial banks and other financial institutions.

Performance Indicators – Buenos Aires

Indicators	Before Concession	12/9	% change
Production capacity (millions m^3/day)	3.4	4.3	27
Population served (millions)			
Water	6.0	6.5	8.8
Sewerage	4.9	5.3	6.4
Length of network (km)			
Water	11,000	12,100	9.0
Sewerage	7,100	7,300	2.8
Water pipes rehabilitated (km)	N/A	500	N/A
Sewerage pipes drained (km)	N/A	3,500	N/A
Number of meters in service	30,000	170,000	460

(b) Cancun, Mexico

Growing population of Cancun has led to serious deficiencies in the provision of public services. The city's population has grown seventeen folds from 20,000 to 340,000 in 1995. There is an imbalance in water supply and sewerage coverage between the city's residential and tourist areas. The Water and Sanitation Commission (CAPA), a State organization, awarded a fourteen year BOT contract to a private construction company (DHC) in 1991. This contract could not meet the increased demand for the investments. In 1993, the state government and CAPA invited other four proposals for the expansion, operation, and maintenance of the entire water and wastewater system of Cancun and surrounding island. DHC was awarded a thirty-year concession contract. DHC and four other companies created an operating firm, AGUAKAN. AGUAKAN inherited all staff and tariff structure from CAPA that supervises AGUAKAN performance and approves its tariff.

The concession contract set as its goal to reduce this imbalance by increasing water coverage for the whole city to 95% by the end of 1996 and sewerage coverage to 95% by the end of 1998. The Mexican macroeconomic crisis of 1994 and 1995 impeded the required investments. The municipality of Cancun decided to become more involved in AGUAKAN. It then created a technical board to oversee AGUAKAN's performance and practice in tariff decisions.

(c) Cartagena, Colombia

Public municipal water and sewerage utility of Cartagena, Empresas Publicas Distitales (EPD) was operating at chronic inefficiency, excessive political interference and poor service quality. It did not make any investment for eleven years prior to turning operations over to private sector. In October 1993, the mayor of Cartagena decided to liquidate EPD to create a

new mixed-capital company to operate the water and sewerage system. A new mixed-capital ACUACAR – 50% owned by the District of Cartagena, 45% by Aguas de Barcelona (Spain) and 5% by other private sectors -- was established. ACUACAR and the city of Cartagena signed a twenty-five year operation and management contract. The District of Cartagena continues to own the assets and is responsible for financing all future expansion of network. ACUACAR itself therefore is not responsible for investment.

During the first three months of operation, ACUACAR computerized all administrative workplaces and opened seven new customer service centers. Complaints from customers decreased. Quality of water has improved through better use of chlorinating. Maintenance and operation of water and sewerage networks became better as well.

(d) Santiago, Chile

Most water and wastewater services are provided through public corporations established as autonomous commercial enterprises. The state is the major shareholder. Santiago's water and sewerage agency, Empresa Metropolitana de Obras Sanitarias (EMOS) was created in 1977. EMOS was awarded concessions of production and distribution of drinking water, and sewage collection. Its coverage includes population of five millions – approximately 40% of the Chilean population-. Since 1979 EMOS has chosen to outsource the private sector. In Chile, the government has the tariff policy to ensure affordable service to the low-income and rural populations. The government adopted a system of direct subsidies for low-income consumers. EMOS is performing well as shown below.

Performance Indicators -- Santiago

Indicators	1990	1991	1992	1993	1994
No. connections(thousands)					
Water	837	867	905	944	985
Sewerage	777	807	868	915	956
Coverage (% of all households)					
Water	99	100	100	100	100
Sewerage	91	93	95	97	97
Water production (millions of m^3/year)	462	453	466	469	475
Unaccounted-for water (%)	39	39	38	35	31

The following table presents types of private sector participation of the above four cities. Improved performance is seen in Buenos Aires and Santiago as described. Gains from private sector participation does not seem to depend on the model of participation such as foreign companies participation or BOT or management contract. Gains from privatization seem to be more dependent on such other factors as stable macro economy and effective financing mechanism.

Principle Features of Private Sector Participation in Four Cities

Name of Cities	Year of privatization	Participation of Foreign Capital	Length & Type of Contract	Agency for Regulation
Buenos Aires – Argentina	93	IBRD, France U.K. Spain	30yrs BOT	autonomous regulatory agency
Cancun – Mexico	94	N/A	30yrs BOT	regional agency
Cartagena – Colombia	95	IBRD, Spain	25yrs Mgmt contract	central&municipal gov'ts
Santiago – Chile	80	N/A	Service contract	national agency

PJT is a water resources development and management organization. The above four cases are the examples of outsourcing and concession of water supply by municipal water supply organizations. New PJT shall make appropriate institutional arrangement when they actually start providing drinking water. The government support is necessary. The Government shall issue Government Regulation to show its commitment and support for private sector participation in water supply. Without the governmental support, it will be difficult to attract private sector investment.

5 Water Demand Management

Supply-driven approach has been dominant in water resources development and management. Supply-driven approach is structure-oriented investment approach in water resources management to capture, store and deliver water. In contrast, water demand-side approach involves the use of economic, legal, institutional and other policy interventions to influence the demand for water. It also includes coordination on how people use water. Meeting growing demand by developing new supplies has now become difficult in the well-developed river basin.

In market-oriented economies, governments or any regulatory organizations can interfere with market through the two types of measures: one is to emphasize incentives for certain behavior of people and the other is to establish rules. In this section, the actions to affect water users' behavior are mostly presented.

5.1 Economic Incentives for Efficient and Equitable Use of Water as Non Structural Water Saving Measures

In this study, several principles are proposed as the basic principles of water resources management, which include "full cost recovery", "beneficiaries to pay", "service to receive" and "polluters pay principle". Those principles are proposed in view of application of sound economic principles of water in the Brantas river basin. Such principles are effective as economic incentives for efficient and equitable use of water.

Failure in the past to recognize the real cost of service provision led to wasteful and environmentally damaging uses of water. Managing water as economic goods is an important way of achieving efficient and equitable use. If efficient water use is not achieved, consequent water shortage might become constraining factor for socio-economic development of the Brantas river basin that accounts for 7% of Gross Domestic Product and 9% of population. It is thus necessary to establish a structure of incentives and regulations that will help guide and coordinate how people use water while encouraging innovations in water-saving technologies including irrigation efficiency improvement.

5.1.1 Irrigation Water Use

Participation of farmers in operation and maintenance activities is expected in bearing its cost. In 1987, Government issued the Policy Statement on Irrigation and Maintenance in order to secure the fund for operation and maintenance. Farmers have to pay Land and Building Tax (PBB) for their paddy field. Revenue from PBB is utilized for regional and local development especially in DATI-II (level of Kabupaten). Its usage is however not specified (e.g. PBB is not necessarily used for operation and maintenance of irrigation canal or access road.). In addition to PBB, Irrigation Service Fee (hereinafter referred to as "IPAIR") is collected from farmers. Water User Farmers' Association (hereinafter referred to as "HIPPA") collaborates in collection of IPAIR. The collected Irrigation Service Fee is mostly utilized for operation and maintenance of primary and secondary irrigation system where IPAIR is collected. HIPPA is given approximately 10% of the IPAIR collected for motivating them for collection. In the

Brantas river basin, IPAIR is collected in all Kabupatens except Trenggalek. It is however not yet collected in all irrigated areas of the above Kabupatens.

The amount of IPAIR is calculated based on the following formula:

IPAIR = (Total Maintenance Cost + Collection Cost of IPAIR) / Total Irrigation Area

As seen in the above formula, the amount of IPAIR collected varies. Each Kabupaten and each irrigation system calculates its rate. The IPAIR in the Brantas river basin was set at from 16,000 rupiahs to 22,500 rupiahs per ha per year in 1995/1996. Payment of IPAIR does not seem to affect farmers' income because the amount of IPAIR paid is small. Paddy yield rate (ton/ha) in the Brantas river basin is 5.71 tons in 1995[11]. The government paddy purchase price is 400 rupiahs / kg. Income per ha is therefore 2,284,000 rupiahs / year. The IPAIR amounts to merely 1% of annual income per ha[12]. In terms of production cost, IPAIR amounts to approximately 5%. According to "Community and Beneficiaries Participation Survey" conducted within the scheme of the JICA study, annual household income of farmers vary from some 1 million rupia to 3 million rupiahs. This household income includes non-agricultural income as well though agricultural income contributes to about 3/4 of the total household income.

Despite the above formula for IPAIR fee setting, it was set below the estimated actual cost of operation and maintenance costs for primary and secondary irrigation canals.

Though farmers have obligation to pay PBB that is a contribution for regional development, and IPAIR that is used for operation and maintenance of irrigation canals, they do not have to pay for water they use for their productive activities. In other words, they bear costs only for irrigation canals and do not pay for reservoir operation and maintenance. While other water users pay for reservoir costs. As described below, in the Brantas river basin, two PDAMs and industry pay contribution (IURAN) to Perum Jasa Tirta while they bear retribution charge (retribusi) to DATI II as well. PLN pays contribution to PJT too. PDAM, PLN and industry also have to bear for corporate tax for their business. Agriculture is not only the largest water user; it is the most subsidized water users. Industrial and city water users can afford to pay more for water. They can expect to gain a higher economic rate of return from a unit of water than agriculture in many cases. Though agricultural water users are expected to produce more, on the other hand they may have to give up water for higher-value water users in the near future. In the Brantas river basin, at the Water Management Committee, agricultural water is seen as the water supply system's safety valve.

In the irrigation areas of the Brantas river basin, several problems related with farmers water use are pointed out. Such problems include that irrigation water does not reach downstream in many tertiary canals due to intentional and/or mistaken overtaking of water by upstream farmers, large seepage loss in the canal (Lodoagung). Many farmers have side jobs in Brantas delta irrigation area. They employ agriculture labors from such areas as Nganjuk and

[11] Yield rate for wetland paddy (not husked) (1995) JICA Study Team

[12] 5,710 kg * 400 rupia = 2,284,000 rupiahs, 22,500 rupiahs /2,284,000 rupiahs = share of IPAIR to income/ha

Mojokerto. Planting and irrigation are carried out when they have sufficient labor regardless of the planned planting and irrigation schedule. Overtaking of water is observed in many irrigation areas in the basin. The overtaking of water can not be fully controlled by Juru Air[13]. Education for farmers in regard to the efficient and equitable water use is essential as well as encouraging their compliance with the rule. Charging water service fee for water they use is the one of the best education.

5.1.2 Brackish Fishery Water Use

Fish farmers use return-flow from irrigation water for fishpond. Thus fish farmers receive fresh water free of charge. East Java Fishery Service (Dinas Perikanan) prepares water demand estimate for fish farming. It is difficult for them to prepare accurate water demand estimate at present due to the difficulty in monitoring amount of water consumed by fish farmers. Fish farmers have to pay for licensing fee. The fee is decided upon the hectare area of the fishpond.

5.1.3 Domestic and Industrial Water Use

PJT has water supply contracts with two Municipal Water Supply Companies (PDAM Surabaya and PDAM Sidoarjo). PDAM pays water service fees. Current water service fee rate for PDAM is 30 rupiahs /m^3 while industry pays 51 rupiahs / m^3. 51 rupiahs applies to the use up to 10,000m^3 and the progressive tariff applies as follows:

- 51 rupiahs / m^3 to 10,000m^3 ;
- 52 rupiahs / m^3 for 10,001 to 100,000m^3 ;
- 53 rupiahs / m^3 for 100,001 to 500,000 m^3;
- 54 rupiahs / m^3 for 500,001 to 1,000,000 m^3;
- 55 rupiahs / m^3 over 1,000,000m^3

Some industrial enterprises abstract water directly from the Brantas River while others receive water supply from respective PDAM. Some 80% of industrial water taken from Brantas River are used for production of sugar and paper. Most of industrial water is returned back into the water system as effluents. The problem is that much of this water is returned polluted with wastes.

In addition to water service fee given to Perum Jasa Tirta, PDAM is required to pay 10 rupiahs/m^3 to DATI II as retribution tax for their water consumption. Industry has to pay 20 rupiahs each year if their water consumption is below 10,000 m^3 and the progressive tariff applies as follows:

- 20 rupiahs/m^3 to 10,000m^3;
- 25 rupiahs/m^3 from 10,001m^3 to 100,000m^3;
- 30 rupiahs/m^3 from100,001m^3 to 500,000m^3;
- 35 rupiahs/m^3 from 500,001m^3 to 1,000,000m^3
- 40 rupiahs/m^3 over 1,000,001m^3

[13] Field inspector responsible for water distribution to several tertiary units

As seen above, the rate increase is very small both for water service fee (contribution) and retribution. This progressive rate does not seem to encourage water conservation.

A paper factory for example, located in the basin takes some 4 millions m^3 annually. According to the water service charge and retribution tax as described above, it has to pay approximately 220 million rupiahs for water service charge and 160 million rupiahs for retribution charge.

Domestic water is supplied at lower price while Industry pays more expensive price. Industry uses groundwater as well. In Kediri, about half of industrial water supplied are from ground water. This pricing method can be considered as subsidy for domestic water supply from industrial water users. Piped water however does not reach the poor because only limited households have access to piped water. PDAM service coverage in the Brantas river basin is merely 12 % as of 1996.

5.1.4 Hydropower Generation

PLN pays 11.76 rupiahs/kWh as their contribution for water provided by Perum Jasa Tirta. PLN is not required to pay retribution tax. Annual increase of 5 % is agreed until 2000 provided intensive-dredging work of Sengguruh reservoir is done. There is no standard formula to decide the amount of contribution from PLN. The study on water charge formula will be intensively made in the other part of the Report.

Summary of Payment for Surface Water by Water Users

Name of user	Farmers	PDAM & Industry		PLN	
Name of payment	IPAIR (ISF)	Water Service Fee	Paid to PJT	Water Service Fee	paid to PJT
	-	Retribution	Paid to Local Government	-	
Purpose of payment	A part of O&M cost for irrigation canal	Water Service Fee is for O&M cost of reservoir.		O&M cost for reservoir	
		Retribution is a tax levied by the local government.			

Explanation of Each Payment

IPAIR (Irrigation service fee (ISF): Levied to farmers based on size of land. It is used for operation and maintenance of primary and secondary irrigation canal. Collected and used by local government though some parts of collected IPAIR become HIPPA income.

N.B. At the central level, Ministry of Home Affairs supervises IPAIR and is in

charge of provision of irrigation O&M budget.

Water Service Fee (Contribution – IURAN): Fees levied to non-agriculture water users. It is used for O&M of reservoirs. PJT receives the fee through DISPENDA. Water Service Fee for PDAM and the Minister of Public Works decides PLN. East Java Governor comments to the fee levied to PDAM.

Retribution: Fees levied by local government to assist in recovering water resources management and other activities done by local government. The usage of retribution is not specified.

PBB(Land and building tax - Pajak Bumi dan Bengunan -):, a kind of property tax. Levied to land and building based on its size. Collected and used by Kabupaten for various purpose.

5.1.5 Groundwater Retribution

As regards groundwater use, users pay retribution to local government. Its retribution rate is higher than for the use of surface water. Its rate is broadly divided into two categories of users, profit use and non-profit use. Detailed retribution rate is given below.

RETRIBUTION FEE FOR GROUNDWATER ABSTRACTION

EAST JAVA GOVERNOR'S REGULATION No. 7 of 1994
RETRIBUTION FEE FOR GROUNDWATER ABSTRACTION

CLASSIFICATION OF GROUNDWATER ABSTRACTION	Fee (in rupiahs)					
	0 to 1000 m^3	1001 to 2500 m^3	2501 to 5000 m^3	5001 to 10.000 m^3	10.001 to 15.000 m^3	more than 15.001 m^3
A. Profit Companies						
Drinking Industry	100	110	125	145	170	200
Industry	80	90	100	115	135	160
Mining and Energy	70	80	90	105	125	150
Water Company	30	30	30	30	30	30
Hotels and Swimming Pools	80	90	100	115	135	160
Real Estate	40	50	60	70	85	100
Fishery and Husbandry	30	35	40	50	60	70
Other endeavors	60	70	80	100	120	140
B. Non-Profit Organizations						
Irrigation of Agribusiness Sugarcane and Plantation	20	25	30	35	40	50
Dormitory / Lodgings / Government Offices	20	25	30	35	40	50
Households (with the use of water over100 m^3)	50	55	65	75	90	105
Private Hospitals	30	35	40	50	60	70
Social Foundations	20	25	30	35	40	50
House of Worship	0	0	0	0	0	0
Government Hospitals	0	0	0	0	0	0