

# Integrated Water Resources Development and Management and Its Developing Capacity in Brantas River Basin

By:

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Certificate No. ID03/0127

# Description of Brantas River Basin

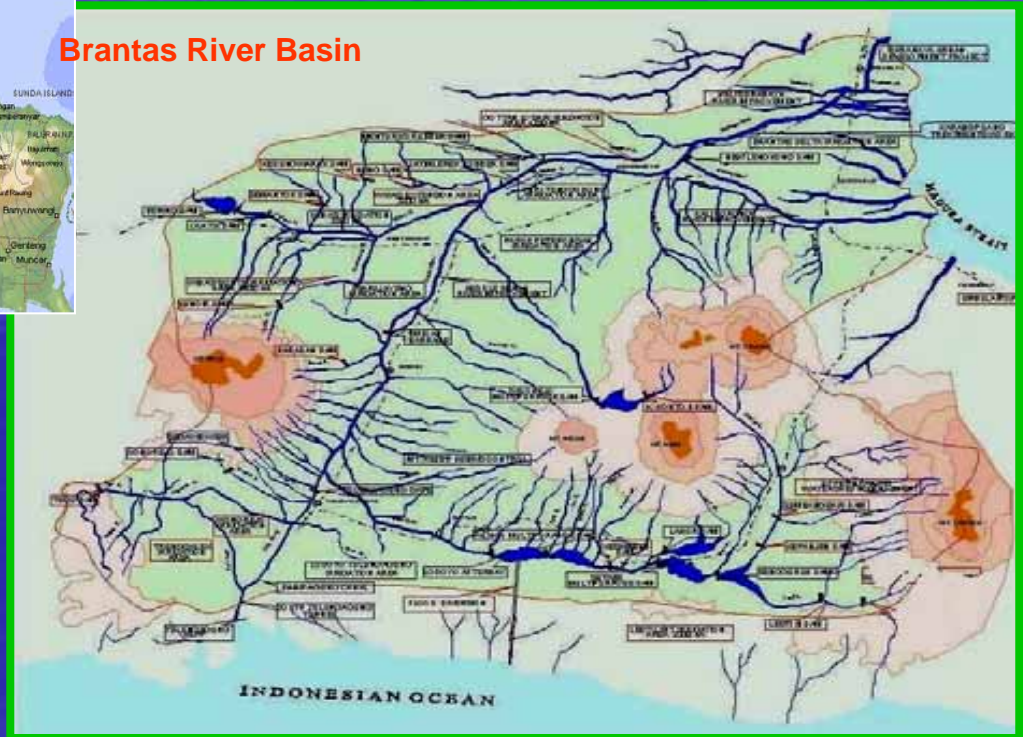


East Java



- Basin Area : 11,800 km<sup>2</sup> (25% of E. Java)
- Population (2003) : 15.5 million (43% of E. Java)
- Average Rainfall : 2,000 mm/year
- Water Potentials : 12 billion m<sup>3</sup>/year
- River Length : 320 km

Brantas River Basin



- Active volcanoes: Mt. Kelud & Mt. Semeru
- Land Use (2004) :
 

- paddy field	39.0%
- dry land	12.0%
- plantation	22.0%
- forest	11.0%
- settlements	12.0%
- others	4.0%

# Initial Condition in the Brantas River Basin (1960's)



Flood



Drought



Lack of Electric Energy



Water Stress

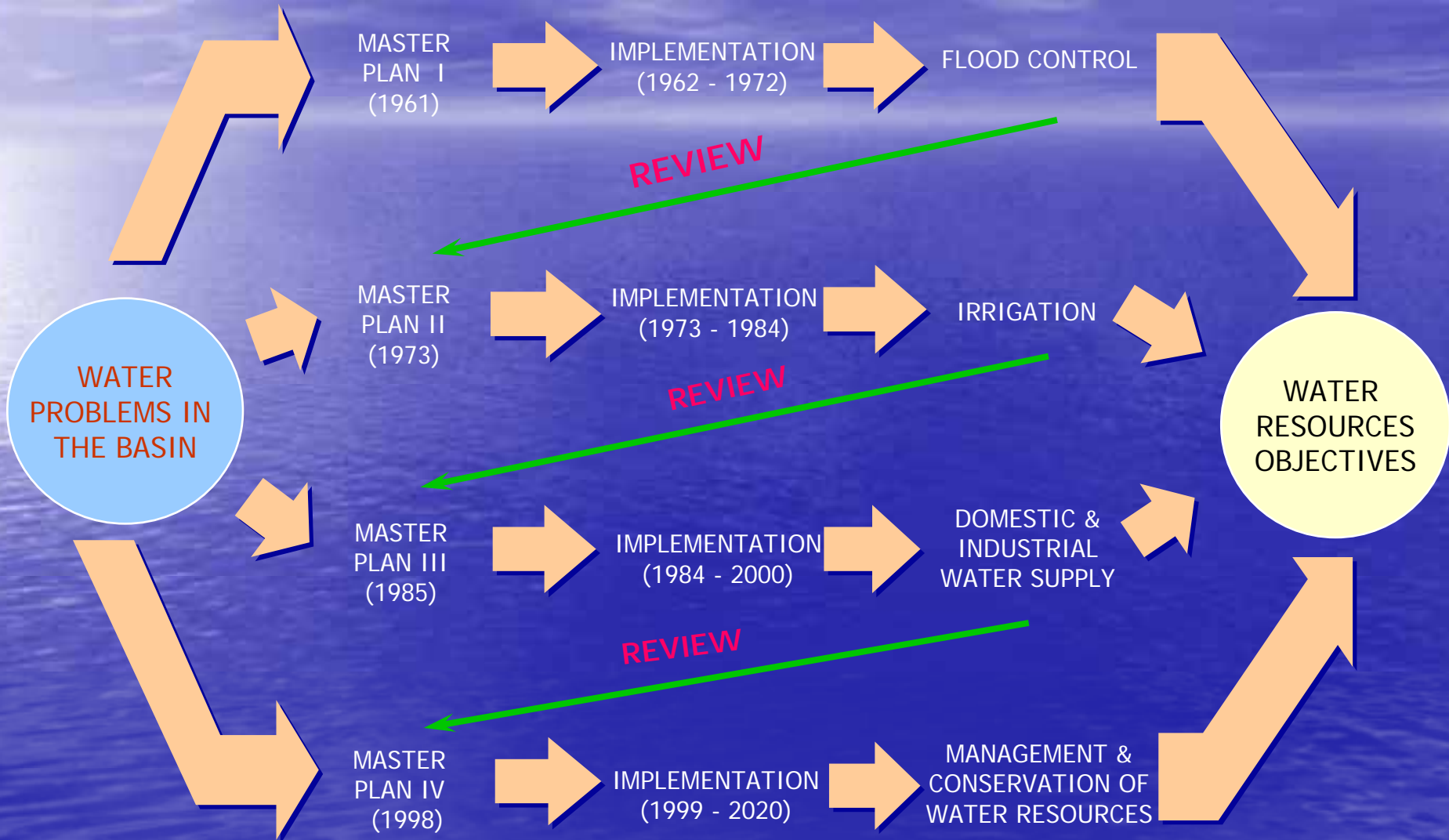
# Background of Integrated Development Concept

- Some area in the Brantas basin had been severely hurt by flooding in rainy season and drought in dry season
- Construction of several water resources infrastructures has lead to the necessity to develop an overall plan for the Brantas basin
- Water resources development in the Brantas basin is decided to be conducted at a basin-wide level with integration of various aspects

# Background of Integrated Development Concept

- Comprehensive water resources development is carried out based on “One River, One Plan, and One Integrated Management” principle.
- This comprehensive plan commences in 1961 and is based on a series of master plans that involves stage-wise planning in accordance to the national development requirements

# The Brantas River Basin's Master Plans



# Development of Brantas Basin

Master Plan I  
(1961 - 1973)

Master Plan II  
(1974 - 1985)

Master Plan III  
(1986 - 2000)

Total investment (1960-2001) : 7.3 trillions Rp.  
(US \$ 0.097 billions, ¥ 78,8 billions, 258.9 billions Rp.)



Bening Dam (84)



Waru-Turi B. (92)



Selorejo Dam (72)



Wonorejo Dam (00)



T.Agung Tunnel (91)



Lodoyo Dam (83)



Wlingi Dam (78)



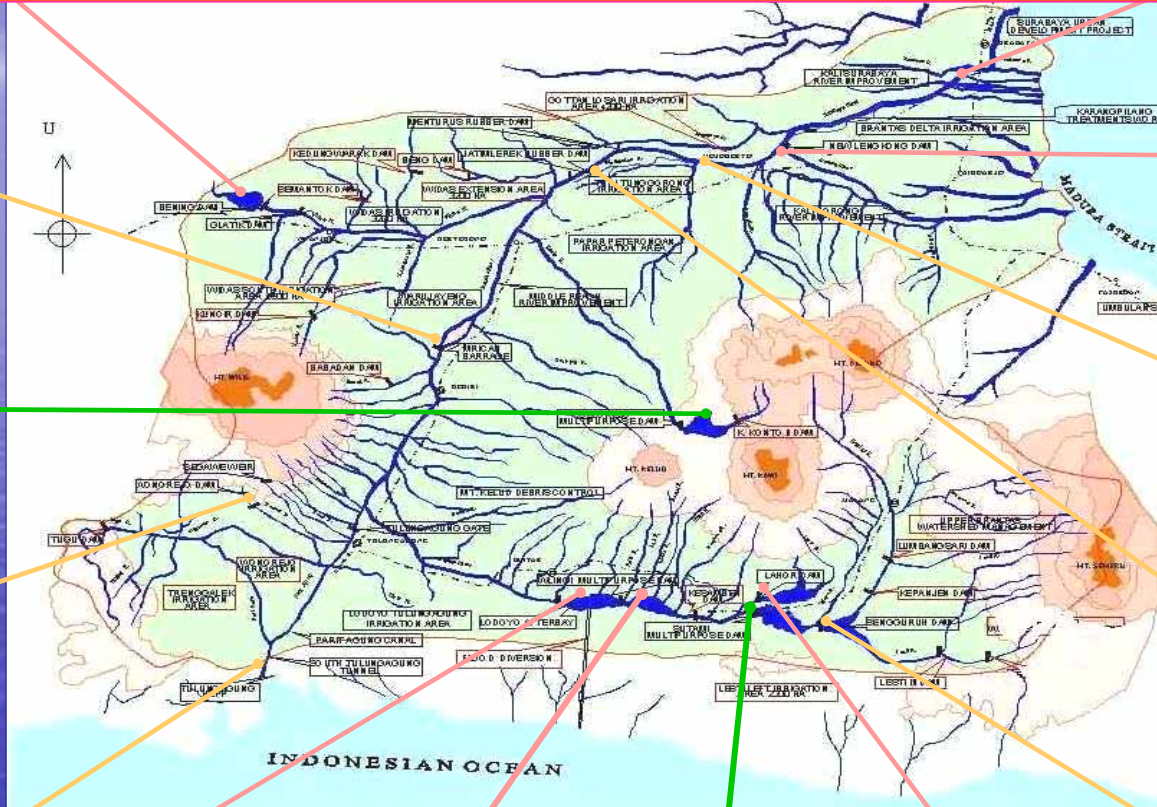
Sutami Dam (72)



Lahor Dam (77)



Senggruh Dam (88)



Gunungsari B. (81)



New Lengkong B (74)



Menturus R.D (93)



Jatimlerek R.D (93)

# Utilization of Water from Brantas in 2004



Electricity = 1.00 billion kWh/year



Irrigation Area = 304,000 ha  
(121,000 ha from reservoirs)



Raw Water for Domestic Supply  
= 245 Mm<sup>3</sup>/year



Raw Water for Industries Supply  
= 135 Mm<sup>3</sup>/year



Maintenance Flow = 204 Mm<sup>3</sup>/year  
and Flood Control 50 years  
Return Period = 60,000 ha



Fisheries = 41 Mm<sup>3</sup>/year or  
about 15,730 ha  
(in delta area)



# Development Benefits

<b>Beneficiaries</b>	<b>Unit</b>	<b>1960</b>	<b>1990</b>	<b>2004</b>
- Flood Control	Inundated areas	Flooding every year (60.000 ha)	None	None (main stream)
- Irrigation	Cropping Intensity	0.8 x / year	1, 8 / year	2.2 x / year (244%)
- Hydropower	Million kWh/year	170 <sup>a)</sup>	910	1.000 (588%)
- Raw Water for Domestic	Million m <sup>3</sup> /year	73 <sup>b)</sup>	125	245 (305%)
- Raw Water for Industries	Million m <sup>3</sup> /year	50 <sup>c)</sup>	115	135 (270%)

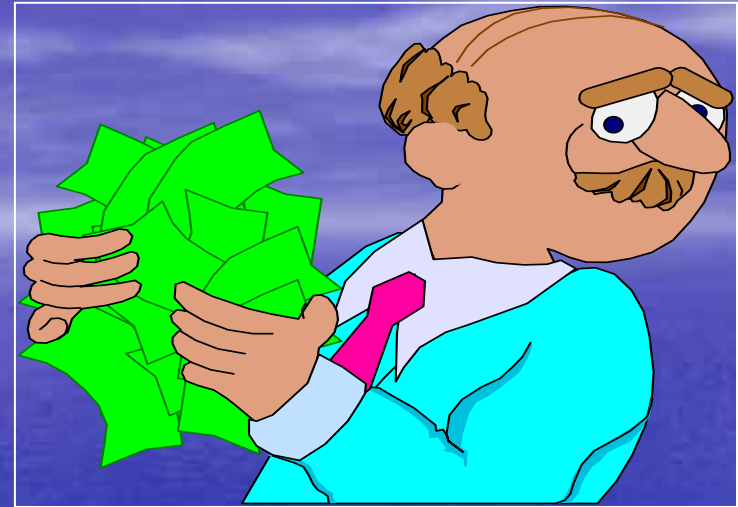
Note:

- a) Mendalan and Siman HEPP,
- b) Ngagel I dan II Domestic Water Treatment Plants,
- c) Sugar factories

# Post Construction Problems (1990)



1. No Permanent **Institution** for O&M

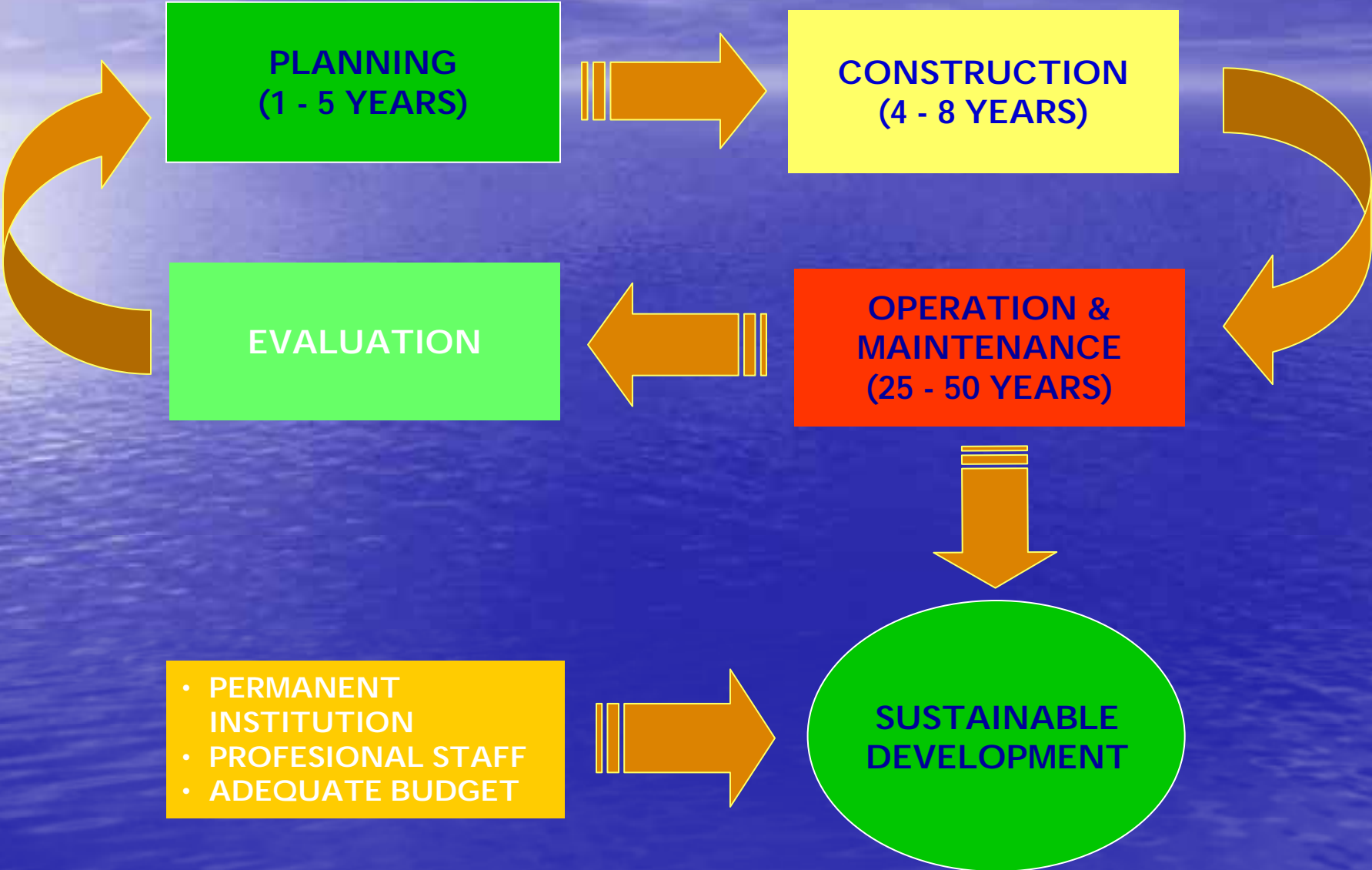


2. Limited **Budget** available for O&M



3. **Degradation** of W/R. Infrastructures

# Development Cycle



# Jasa Tirta I Public Corporation (1/4)

## Basic Law

Jasa Tirta I Public Corporation was established by Government of Republic of Indonesia to manage Brantas River and its 39 tributaries, according to Government Regulation No. 5 of 1990. This regulation was replaced by Government Regulation No. 93 of 1999. Then based on the Presidential Decree No. 129 of 2000, working area is added by Bengawan Solo river basin (in 25 rivers of Bengawan Solo River Basin).

The Corporation has no role in irrigation management in the basin, except to provide bulk water supply to the irrigation systems.

# Jasa Tirta I Public Corporation (2/4)

## Vision and Mission

### Vision

Government Owned Company that capable to manage water resources in professional, innovative and sustainable manner supported by all stakeholders.

### Mission

- ✓ To conduct services for public utilization on water resources in sufficient and high quality manner for fulfilling public needs
- ✓ To manage water resources effectively and efficiently including O&M activities of water resources infrastructures, conservation, making efficient use of water and controlling destructive force of water according to the task given by the Government based of stakeholders' participation
- ✓ To conduct Corporation management in order to reach healthy condition (best performance)

# Jasa Tirta I Public Corporation (3/4)

## Main Tasks

- ✓ Performing operation and maintenance activities of water resources infrastructures.
- ✓ Dealings in water and water resources.
- ✓ Conducting river basin management including water resources conservation, development and utilization.
- ✓ Conducting rehabilitation of water resources infrastructures according to capability of the corporate body.

# Jasa Tirta I Public Corporation (4/4)

## Financial Sources

### – Beneficiaries Pay Principle

Beneficiaries pay for water services, rendered in form of water service fee (except farmers and water for daily life)

### – Polluters Pay Principle

Polluters are obliged to pay pollution fee and tax (not yet implemented but legal background is being drafted)

### – Government Obligation Principle

Government finances for social services, and for the welfare and safety of the people, such as for irrigation, flood control, water quality control and water resources conservation (under preparation)

# Relevant Technical Issues (1/8)

## Watershed Degradation



⇒ Cause Erosion and Reservoir Sedimentation



⇒ Short terms economic life of dams

⇒ Degradation of base flows during dry spells



# Relevant Technical Issues (2/8)

## Limited water availability



Irrigation



Water Supply (PDAM)

- Increasing in water demand and limited in supply capacity  
⇒ Impeding an out-of-balance condition that cause conflict of interest between users

# Relevant Technical Issues (3/8)

## Water Quality Degradation



Waste discharge



Polluted river



Reservoir Eutrophication

- pollution from domestic, industrial and agricultural sources has polluted the river and the reservoir

⇒ creates a span with the designated standards

# Relevant Technical Issues (4/8)

## Flood Hazard



- inadequate tributaries capacity
- degradation of recharge area
- sedimentation in most dams in the basin
- global climate change

⇒ Flooding occurs back

# Relevant Financial Issues (5/8)

- Less financial support from the beneficiaries for the sustainable water resources management
- Less funding of water resources management for the welfare and safety of the people and conservation
- Reaching only 40 % of O&M Cost Recovery it causes deferred maintenance, and finally degradation of water resources infrastructures occurs



degradation of water resources infrastructures

# Relevant Social Issues (6/8)

## Social Issues:

- Less awareness from the community for implementation of water resources sustainability
- The awareness for the conservation (both in watershed and in the river) is not gained yet.

# Relevant Organizational Issues (7/8)

## Human Resources Problems:

- more than a half of staffs are aged older than 40 years old
- close to 80% of staff has educated level of high school or lower.
- low quality of skills caused by inexperience for executing tasks, lack of basic knowledge, and attitude of staffs

## Numerous fragmented uncoordinated organizations:

- many agencies carry out various management activities related to the water resources management.
- Jurisdiction of agencies was not clearly delineated, and duplication and obscurity of duties and responsibility among the organizations

# Relevant Institutional Issues (8/8)

**Much useful data and information, but no proper data base:**

- there are much useful data and information under many agencies concerned with the water resources management in the Brantas River Basin. it seems that the information of one agency is not used effectively by other agencies
- it is not clear what kind of and where the information exists among the agencies concerned
- information is not put in order for easy use
- some differences of data arrangement among the related agencies

# Problem Solving (1/8)

## To cope with watershed degradation

- ✓ Reservoir dredging
- ✓ Promoting public initiatives on re-greening and re-forestation
- ✓ Reducing sheet erosion by terracing & constructing sediment control structures
- ✓ Reviewing Catchment Management Plan

### ▪ Terracing and Re-greening



### ▪ Reservoir Dredging





# Problem Solving (2/8)

## To cope with water shortage

- ✓ introducing appropriate water service fee for hydropower generation, domestic and industrial water supply
- ✓ promoting efficient use of water on all sectors
- ✓ implementing transparent and fair water allocation to decrease potential conflict between sectors and users
- ✓ improving existing telemetry system to support real time water allocation
- ✓ proposed to construct new water storage (Beng Dam: 9.5 m<sup>3</sup>/sec and Kedungwarak 3.5 m<sup>3</sup>/sec in 2010 and 2015 in order to meet the water demand in 2020)

# Problem Solving (3/8)

## To cope with water quality degradation issue

- ✓ reviewing Water Quality and Pollution Control Master Plan
  - ✓ initiating public awareness in environment issues
  - ✓ improving monitoring facilities (real-time system and laboratories facilities)
  - ✓ implementing waste water discharge license
  - ✓ controlling major industrial pollution sources strictly
  - ✓ constructing small scale centralized domestic waste water treatment plant in selected urban area
- **Water Quality Monitoring and Restoration**



# Problem Solving (4/8)

## To cope with Flood Hazard:

- ✓ upgrading Flood Forecasting and Warning System (FFWS)
- ✓ improving river flow capacity by dredging, riverbank aligning, etc
- ✓ promoting coordination among related agencies in flood hazard mitigation
- ✓ reviewing design flood



FFWS master station



Rainfall gauging station



Water level gauging station

# Problem Solving (5/8)

## To cope with riverbed degradation issue

- ✓ effective control of sand mining is continuously implemented by promoting public awareness and law enforcement
- ✓ Integrated Sediment Management (incl. sediment balance)

# Problem Solving (6/8)

## To cope with Financial Issue:

- ✓ Promoting cost recovery principle by implementing beneficiaries pay principle for commercial users (electricity, domestic and industrial water supply) and government obligation principle for social services, and for public welfare and safety of the people (irrigation, flood control and pollution control)
- ✓ Preparing government regulation and ministerial decree relating to proper financing system on water resources management
- ✓ Law enforcement: dissemination of all laws and regulation related to the water resources and environment law, etc.

# Problem Solving (7/8)

## To cope with Social Issue:

- ✓ Do public campaign activities in cooperation with provincial/local governments, non-government organizations and academic institutions to rise community awareness, education, and participation in water utilization & water resources conservation.



**RAISING PUBLIC AWARENESS**



**FIELD STUDY**



**RE-GREENING WITH LSM**

# Problem Solving (8/8)

## To cope with Organizational & Institutional Issue:

### ✓ Intensive training:

- Increase technical & managerial skills
- On the job training

### ✓ Increase the coordination between sector concerned:

- Make clear of task and responsibilities of each institution
- Consistency in planning
- Implement comprehensive and systematic coordinator

### ✓ Data Management:

- Proposed on unified management of water resources management data and information
- Establishment of data/information exchange

# Conclusions (1/2)

- **Water is a value as an economic good, many past failure in water resources management are attributable to the fact that water has been and is still viewed as a free good, or at least that the full value of water has not been recognized.**
- **In order to sustain water resources management and to address effective water governance in the Brantas River basins, Government of Indonesia has established River Basin Organizations (RBOs) namely Jasa Tirta I Public Corporation (PJT I) as neutral and professional institutions who apply in balance between healthy corporation principles and accountable public service norms on water resources supported by stakeholders participation.**



## Conclusions (2/2)

- Some issues faced by PJT I identified in technical, financial, social, organizational, and institutional and legal aspect.
- To cope these issues, PJT I done some action for each relevant issues.
- Community empowerment is one of the society development strategy, so that they could be early, develop themselves to solve social economic problems in order to increase their own welfare.

A scenic landscape featuring a calm lake in the foreground, a white house with a brown roof on the opposite shore, and rolling green mountains in the background under a clear blue sky. In the immediate foreground, vibrant red poinsettia leaves and stems are visible, partially obscuring the view of the lake.

Thank you very much