

- Supervisors who fully support and continuously disseminate rain water reservoir technology to other areas.
- Central and local governments that fully support the implementation and development of rainwater reservoir plant.
- Sharing adequate fund from both donor and local government.
- Good community participation in the construction, operation and maintenance of the rainwater reservoir.
- Other facilities and infrastructure that support implementation program of *embung* construction.

### **Regulatory change**

In order to guarantee the rainwater reservoir can be built and operated sustainably, it is necessary to hold legal protection. In this case is Law No. 7/ 2004 regarding water resources. Government needs to enforce this law appropriately to achieve the goal of *embung* development and operation. Also, Government Regulations No. 42/ 2008 regarding water resources management, No. 43/2008 regarding ground water, No. 37 regarding Dam, and No. 38/2011 regarding river can be used for guidances or references in developing *embung*.

### **Coordinating or implementing agency**

Implementation of rainwater reservoir (*embung*) pilot plant requires coordination as well as implementing agency. In this case the implementing agency is the Ministry of Agriculture and Ministry of Public Works, while the supporting institutions are the Agency for the Meteorology, Climatology and Geophysics (BMKG) and others. In addition it is also necessary to do coordination with the Agency for the Assessment and Application of Technology (BPPT), and related local government.

## **b. Wastewater Recycling technology**

### **Description**

The concrete action plan designed for recycling domestic wastewater is to create a pilot domestic wastewater plant in an urban area. The area chosen is the Yogyakarta City, based on the consideration that it already has an integrated domestic wastewater treatment plant in a densely populated urban area.

### **Objectives**

- To serve the local community as a model for domestic wastewater recycling technology with membrane system.
- To gain local people's trust and interest in using the recycled water.

### **Time line**

#### **First year:**

- Survey on public perception regarding the recycling of wastewater with a sample of 10 major cities in Java Island.
- Planning of wastewater recycling process from wastewater treatment plant (WWTP), Sewon.

### Second year:

- Construction of the recycling wastewater at the wastewater treatment plant (WWTP), Sewon, Yogyakarta.
- Monitoring and evaluation of the wastewater recycling process of WWTP, Sewon, Yogyakarta.

### Third year:

- Dissemination of wastewater recycling process in Yogyakarta Province.
- Dissemination of wastewater recycling in 10 big cities of Java, through mass media as well as seminars and/ or elucidations.

### Geographic scope

Yogyakarta is one of the provinces in Java Island. One of the most important needs for the people of Yogyakarta is immediate access to clean water. Until this present day, people who have already had access to clean water from the provincial tap water company (PDAM) are only 67% of the total population. (Proceedings of Dialogue of Policy Planning and Management of Water Supply for Small Communities in Yogyakarta, CIDA-AIT, May 20, 2006). The most reliable sources of water are shallow wells and deep wells of Sleman regency but the public water service reduces to 40% in dry seasons. One important issue for Yogyakarta in the next five years is the availability of clean water. In 2010 the need for clean water in Yogyakarta reached 1,544 liters per second and, by 2020, it is predicted to increase to 2,899 liters per second. Considering this dire situation, reasonable solution needs to be made. One of possible strategies offered in this TAP proposal is to supply clean water derived from recycled domestic wastewater.

### Resources needed

- Professional institution or a private company that built and manages pilot plant of water recycle.
- Qualified expert who can transfer the technology and system of water recycle pilot plant to the operator or community.
- Professional workers who have been trained and have the discipline and commitment to supervise field water recycle operation and maintenance.
- Supervisor who fully supports and continuously disseminates water recycle product and technology.
- Central and local governments that fully support the development and operation of water recycle pilot plant.
- Sharing adequate fund from both donor and local government.
- Good community participation in the construction, operation and maintenance of the water recycling pilot plant.
- Raw materials such as membrane filter and good quality of carbon filter media.
- Other facilities and infrastructure that support construction of water recycling program.

### Regulatory change

In order to guarantee the water recycling pilot plant can be built and operated sustainably, it is necessary to hold legal protection and in this case is through Law No. 7/ 2004 regarding water resources. Government needs to enforce this law appropriately in order achieve the goal. In

addition it has been issued Government Regulatory No. 42/ 2008 regarding water resources management, Ministry of Public Works Regulatory No. 6/2011 regarding water resources usage guidance, and President Instruction No 2/2008 regarding energy and water efficiency that need to be followed in implementing wastewater recycling program.

#### **Coordinating or implementing agency**

Implementation of water recycling pilot plant requires coordinating and implementing agency. The implementing agency is the Ministry of Public Works while the supporting institutions are , Ministry of Environmental, the Agency for the Assessment and Application of Technology (BPPT), and Local Government.

### **c. Water resources projection model**

#### **Description**

Flood and drought disasters that occurred in Indonesia was allegedly caused by global warming, unsuitable land use with the physical condition, and spatial planning which does not take into account the condition of natural resources and existing water system. Evaluation of the water system balance can describe the circumstances and needs of potential future water resources and can be used as data in conducting adaptive steps to anticipate the vulnerability of water resources due to the climate change.

The main objective of the water resource projection model is to develop the potential of Indonesia's water resources that consist of database of water resources, the use of geographic information systems, the quantity and quality of various types of water resources in one watershed of Indonesia. Also, inventory of the software will be carried out for modeling water resources in Indonesia as well as modeling and simulation of water balance.

The goal is to know the water resources potential projection of selected watershed as a base for the drafting of adaptation measures on long-term and short-term in facing water resource vulnerability due to global climate change.

#### **Time line**

Time line of the water resources projection model is predicted as follows.

##### **First year:**

- Determine a watershed location of the project activity. It will be selected one watershed whose condition is critical and needs immediate treatment, for example Citarum watershed.
- Collect secondary data from all institutions related to water resource management of that selected watershed area.
- Survey and collect primary data regarding the condition of the selected watershed area such as data of rainfall for a certain period, hydrogeology, water quantity and quality, and social economy of the society.

##### **Second year:**

- Do inventory of the software that can be used for modeling of water resource projections in Indonesian conditions.