2) Initial operation of the rainwater reservoir
   - Water filling
   - Leakage test
   - Training for the rainwater reservoir operators

Third year

1) Monitoring and mentoring during the initial operation of the rainwater reservoir.
2) Official opening ceremony and handling of the rainwater harvesting facility to the regional government.

Budget

In the construction phase of ponds need for socialization, land replacement, the construction itself, the initial operation until the handover to the people who will manage the ponds. The proposed pilot ponds here have 100.000 m3 volum per day. If the average depth is 8 m, then the area required for the manufacture of ponds is around 15.000 m2.

Total cost of the starting phase of socialization required for managing ponds is estimated at USD 8 billion. The cost of construction of the ponds pilot is obtained by grant assistance of foreign aid.

b. Project ideas for waste water recycling technology

Objective: to increase the availability of clean water through a recycling process of the domestic wastewater by applying of ultrafiltration and reverse osmosis membranes processes

Introduction

Reuse of domestic wastewater has been occurring for a long time. However, planned wastewater reuse has being gained importance for only the last couple decades, as the demands for water has dramatically increased due to technological advancement, population growth, and urbanization, which impact on the natural water cycle. Reuse of wastewater, which consumes limited fresh water, will actually imitate the natural water cycle via engineered processes. This treatment has been done confidently for the safe reuse of reclaimed water for beneficial uses. The main reuse is commonly for agricultural and non-potable reuses. There are also many projects that have proved to be successful for indirect or direct potable reuse. Thus, the potential wastewater has to serve as a viable alternative source of water, in future.

Historically, water management has focused on building dams, reservoirs, and diversion canals etc., to make available water wherever needed, and in whatever amount desired. Soaring demands due to rapidly expanding population, industrial expansion, and the need to expand irrigated agriculture, were met by ever larger dams and diversion projects. Dams, river diversions, and irrigation schemes affected both water quality and quantity. Demands on water resources for household, commercial, industrial, and agricultural purposes are increasing greatly. In Indonesia, the populations are growing while water availability is getting scarcity. More than half of the populations have low to very low water availability, and quality of water has also been the key issue for this low water availability. In addition, the rapid spread of water pollution, the links between quantity and quality of water supplies have become more

apparent. In many parts of Indonesia particularly in urban areas, there is already a widespread scarcity, gradual destruction and increased pollution of freshwater resources.

Widespread shortage of water is caused due to contamination of ground and surface water by industrial effluents, and agricultural chemicals. They are severe near large urban centers lika Jakarta, Surabaya, Medan, Bandung, etc. Untreated sewage poses acute water pollution problems that causes low water availability. Development of city is heavily dependent upon availability of water with suitable quality and in adequate quantities. It is used for a varirous purposes ranging from domestic to industrial supplies. It is estimated that every year, the wastewater discharges from domestic, industrial and agricultural practices pollute environment more and more, thereby, what can be called a "man-made water shortages." Thus, water scarcity is endemic in most parts of Indonesia.

One concept of urban waste water treatment for clean water uses can be carried out using a combination between primary and secondary treatment of biological processes proceeded with further processing such as physic-chemical coagulation-flocculation process including sedimentation, filtration, adsorption with activated carbon, ion exchange process, as well as the process of demineralized and chlorinated reverse osmosis. With the combination of these processes the wastewater can be treated to become a agricultural and non-potable water reuses or even drinking or potable water.

Goals of the Project

The main goal of the project is to provide a pilot plant of water recycling technology for recycling domestic wastewater to become clean water uses. The main processing part is ultrafiltration and reverse osmosis membranes. The TTD of this membrane technology is estimated to be done through aid from donor countries. Transferred technologies include knowhow of microbial reactor (MBR) design system as well as the operation of the system.

The target of this project will be:

- Construction of a waste water recycling plant with a capacity of 50 liter per second in a designated location.
- Sustainable operation of the waterwater recycling pilot plant in Indonesia.
- Improvement of wastewater recycling plant and its produced clean water.
- Awareness and acceptance of this technology by communities.

Methods

Methodology for the implementation of wastewater recycling demoplant includes:

Public perception survey. It is intended to know what communities who will utilize this produced clean water respond to this technology. The survey will be conducted through the distribution of questionnaires to determine the extent of public understanding and willingness to recycled domestic wastewater. It is planned to conduct the survey in 10 major cities of Indonesia.

Planning process for wastewater recycling. Wastewater recycling plant is planned to be built in communal domestic WWTP Yogyakarta. This area was chosen because it has already owned a wastewater treatment system that is good enough in quality of the processed water. In addition, in the next few years Yogyakarta will potentially be impacted with clean water crisis.

The main equipment of the system that might need supporting from the donors is bioreactor and Reverse osmosis membranes.

Pilot development of wastewater recycling technology. The system construction and installation will be carried out by local contractors with the help of experts from abroad who have already experienced in this technology.

Running test. The trial test operation (commisioning test) is carried out when the system is installed completely. The modification or allignment of the system might be done if it is required depending on the results during trial test.

Monitoring and Evaluation. During the installation, trial test and operation, it will be carried out monitoring of the system performance as well as the quality of the processed water. Processed water will be sampled regularly and analyzed it at the laboratory for its quality parameters. The knowledge transfer from expets to Indonesian experts or operators will occur during whole activities.

Socialization. Socialization of the system and its processed water must be carried to communities that this product of water is safe to be utilized. Socialization in other major cities in Indonesia might be necessary in order to spread out this technology to other areas. To have communities accepting the technology it is better to get processed water checked and certified. The role of local government is pivotal in this regard. It is expeted that the government will improve the existing regulations in order to better support the movement of wastewater recycling program in Indonesia.

Expected Results

The expected results of the domestic wastewater recycling technology development is the utilization of domestic wastewater to become clean water and can operate in a sustainable way and socially acceptable. The water products are constantly monitored to make sure the quality is met with the clean water standard.

With the implementation of wastewater recycling pilot plant and socialization to the public, it is expected that the increased public's perception on using recycled water to address the water crisis in the future will be widely spread out to other areas of Indonesia.

Phase of Activity

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 fro wastewater treatment plant (WWTP).

Second Year

- Construction of the recycling wastewater at the WWTP.
- Monitoring and evaluation of the wastewater recycling process of WWTP.

Third Year

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

Budget

Installation of a wastewater recycling plant with about 50 liters per second product capacity will cost USD 6 Million, covering from the survey until the complete installation of the system. The cost of the system construction and installation is expected coming from international support in the form of grant with government fund of APBN.

The operating and maintenance costs of wastwater recycling system that includes cost for power, labor, equipment replacement and chemicals is estimated to be USD 0.5 - 0.8 per m3 of product water.

c. Project Ideas for water resource model

Objective: to develop the potential of Indonesia's water resources along with its model, and the simulation of water balance.

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.

Water resources modeling is an important tool to plan the use of resources for public water supply ensuring that the water environment is protected from over-abstraction.The modeling will be conducted by simulation model at Citarum Watershed. Watershed (DAS) Citarum is the largest and longest river basin in West Java, geographically from 106 ° 51'36 "- 107 ° ° 51 'E and 7 ° 19' - 6 ° 24 'latitude. Watershed wide Citarum: 718,268.53 Ha, Long DAS Citarum: 269 Km (Main River), 14346.24 km (including tributaries), derived from the Fountain of Mount Wayang through 8th District (Bandung, Bandung, City Cimahi, Sumedang, Cianjur, Purwakarta, Bogor and Kerawang) as Citarum River estuary.

There are 12 sub-watersheds and three the Great Basin (Saguling, Cirata and Jatiluhur). These basins are as a source of 300 000 ha of agricultural irrigation water and also as a source of drinking water to Bandung, Cimahi, Cianjur, Purwakarta, Jakarta, Karachi, Jakarta. Land Critical Frequency = 125,692.20 ha with flood events every year there and Sedimentation mean = 25.52 tons / ha / yr.

***Goals of the Project*:**

- To get better understanding of 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