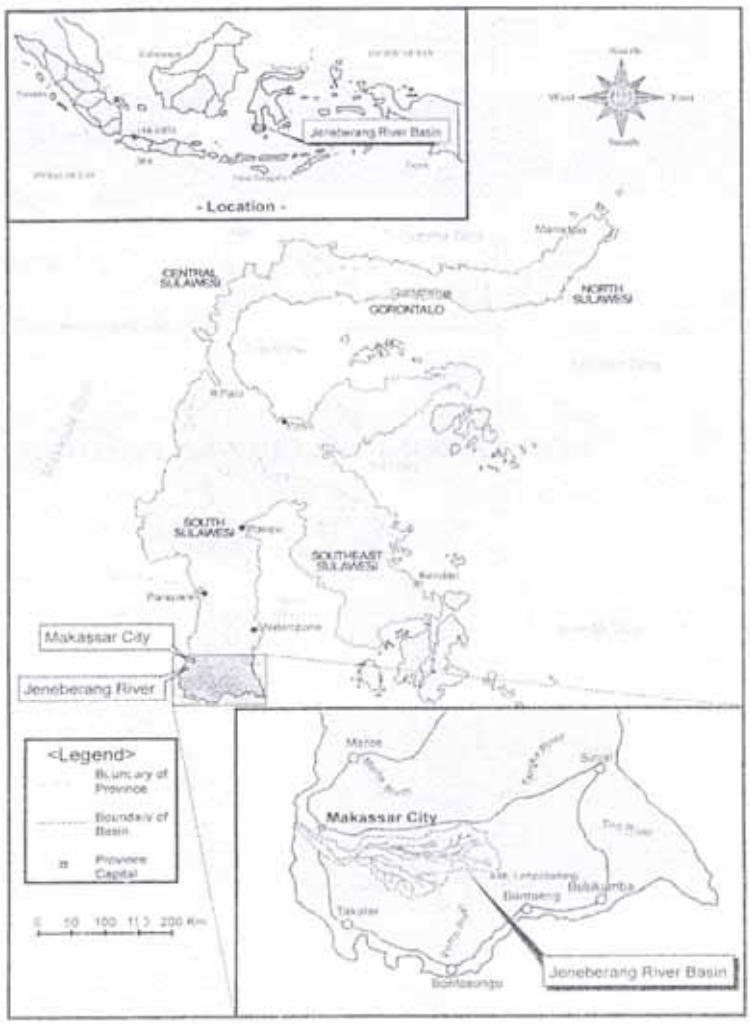
JENEBERANG RIVER BASIN DEVELOPMENT PROJECT



MINISTRY OF SETTLEMENT AND REGIONAL INFRASTRUCTURE

DIRECTORATE GENERAL FOR WATER RESOURCES

JENEBERANG RIVER BASIN DEVELOPMENT PROJECT

TABLE OF CONTENT

JENEBERANG RIVER BASIN DEVELOPMENT PROJECT (YEAR 1986-2003) (AN OVERVIEW)

I. INTRODUCTION

A. Background

Jeneberang River Basin Development Project is the current organization continuing the tasks of the previous ***Operation and Maintenance of Jeneberang River Project (established in 1986)*** combined with ***Bili-Bili Multipurpose Dam Development Project (established in 1991).*** In order to guarantee the efforts for comprehensive protection, development and water utilization of Jeneberang River and to provide large scale benefit for the communities, these projects have been merged based on the Decree of Director General of Water Resources Development No: 27/KPTS/A/1992.

The organization of Jeneberang River Basin Development Project has been re-organized several times based on the Decree of Director General of Water Resources Development No: 24/KPTS/A/1994 and the Decrees of Director General of Water Resource No: 40/KPTS/D/2001, and the latest by Decree of Directorate General of Water Resource No: 110/KPTS/D/2002 coordinating three projects as follow:

1. ***Jeneberang Water Resources Development and Management Project***
2. ***Jeneberang Raw Water Supply Project***
3. ***South Sulawesi Flood Control and Coastal Protection Project***

Basically, the Jeneberang River Basin Development Project, coordinating the above three projects in operating and maintaining infrastructures in the river besides developing the river basin, in terms of water resources management, water supply, and flood control.

B. Objective and Main Task

Based on the decree of Directorate General of Water Resource No: 110/KPTS/D/2003, in order to develop the Jeneberang River Basin, the Organization has the following objectives.

- □ To improve water resources in providing water supply to fulfill the population demand for agriculture, tourism, electric power and other water demand, besides flood mitigation and shore protection.
- □ To improve the efficiency and productivity of water resource utilization.
- □ To encourage investment in water resources development and its distribution system.
- □ To enhance community participation in operation and maintenance of water resources infrastructures.

In order to achieve the objectives, the Jeneberang River Basin Development Project has the following main tasks.

- □ To coordinate the arrangement of and or review the master plan of the river basin development within the responsibility area.
- □ To prepare studes in the field of administrative, financial, legal and technical for the river basin management within the responsibility area.
- □ To conduct coordination and program synchronization with the related institution in central level and regional.
- □ To conduct monitoring and evaluation of the project activities within the responsibility area, and reporting to the Head of Provincial Water Resources Development and Directorate General of Water Resources (through the relevant Director of Region).

C. Organization

Organizational group of Executive Body of Jeneberang River Basin Development Project according to decree of Directorate of General Water Resources Development no: 27/KPTS/A/1992 specified with the group III-B and by Decree of Directorate of General of Water Resources Development no: 24/KPTS/A1994 improved to become the group II-C, and the last performed of re-structuring by Decree of Directorate of General of Water Resources no: 110/KPTS/D/2003 with the organization structure as follows :

1. **Element of Manager is :**
   General Project Manager of Jeneberang Rover Basin

2. **Element of Assistant Manager are :**
   2.1. Chief of Staff for Planning, assisted by :
   - Technical Planning Assistant
   - General Planning Assistant
   - Survey and Investigation Assistant.

   2.2. Chief of Staff for Constructions Guidance, assisted by :
   - Construction Guidance Assistant
   - Construction Program Assistant
   - Operational and Maintenance Assistant

   2.3. Chief of Staff for Administration, assisted by :
   - Organization and Human Resources Assistant
   - Financial Assistant
   - General Assistant

3. Element of Executor are :

3.1. Project Manager of Jeneberang Water Resources Development and Management Project, assisted by :

- Technical Assistant
- Program and Construction Guidance Assistant
- Financial Administration Assistant
- General Administration Assistant
- Treasurer
- Sub Project Manager of Planning and Guidance
- Sub Project Manager of Development
- Sub Project Manager of Management and Operation Maintenance
- Treasurer of Sub Project
- Administration of Sub Project
- Field Supervisor

3.2. Project Manager of Raw Water Supply of Jeneberang, assisted by :

- Technical Assistant
- Program and Construction Guidance Assistant
- Financial Administration Assistant
- General Administration Assistant
- Treasurer
- Sub Project Manager I
- Sub Project Manager II

3.3. Project Manager of Flood Control and Coastal Protection of South Sulawesi, assisted by :

- Technical Assistant
- Program and Construction Guidance Assistant
- Financial Administration Assistant
- General Administration Assistant

- Treasurer
- Sub Project Manager of Planning and Guidance
- Sub Project Manager of Flood Control
- Treasurer of Sub Project
- Administration of Sub Project
- Field Supervisor

II. WORK PROGRAM

A. The Development

Water resources development shall refer to the unity of whole ecosystem starting from upstream periphery of the basin. Water is a dynamic resource flowing geographically from higher place into lower place. There are many rivers crossing boundaries of Kabupaten / Kotamadya (Regencies or Cities), Provinces, even countries. The crossing may results conflict of interests among the local governments. Critical land at the upstream part of the basin will affect flooding at downstream part. The excessive water utilization at the upstream part may disturb provision of water downstream. Therefore policy and strategy applied for water resources management shall base on an integrated approach for the whole basin: "**One River One Plan One Management"**

Jeneberang river is about 75 km long and in the 760 km^2 of cathment area. The River Basin starts at Mt. Bawakaraeng flowing down along Kabupaten Gowa, a little part of Kabupaten Takalar, and ends in the estuary at Makassat City .

The Makassar city located at the downstream part of Jeneberang River were frequently inundated every year during rainy season. The most incredible flood happened in 1976 where 2/3 of the city was inundated.

Flood Control Works
Works have been finished in FY 1992/1993 to mitigate 10 year return period flood of Makassar City:

- Normalization and improvement of river and dike 11 km
- Slope protection 4.7 km
- Installation Crib 16 unit
- Installation jetty 1 unit
- Long storage 4 km length and 3.800.000 m^3 capacity

Bili-Bili Multipurpose Dam
The Bili-Bili Dam construction was finished entirely in 1999. The height of the Dam is 73.000 m; length 18.00 m, extent of catchment area is 384,4 km^2, inundation area is 18,5 km^2 ; elevation of the top point is + 91.80 m; elevation of river bed is + 33.00 m; volume of total capacity is 375 million m^3; effective volume is 346 million m^3. The main function of this Dam is flood control with Q of 50 years return period at the area 5200 Ha, irrigation water : 24600 Ha , for raw water supply: 3300 lt/ sec; electric power: 20.4 MW and for some other intangible benefit, such as tourism, fisheries, livestock, and sports.

Jeneberang Rubber Dam
This Dam was constructed in the years 1996 – 1997. Technical data : length, 330 m; left river bank 100 m, right river bank, 14 m ; spillway length 216 m, comprises 5 spans; spillway height; 2 m, top of dam elevation + 1.80 m; apron elevation + 2.20 m, flood water level elevation + 3.70 m, flood discharge Q 50 = 2.300 m^3/sec. The main function of this dam is to prevent the river bed degradation of S. Jeneberang and sea water intrusion, for protection of raw water supply and provision of city flushing.

Jeneberang Long Strorage Dam
Built started in the year 1992 and finished in 1993. Length of the storage is 4 km, 200 m width; capacity including the upstream part is about 3.8 million m^3; bottom elevation + 1.00 m ; elevation of mean sea level, + 1,80 m. The main function of the storage is for Maccini Water Treatment Plant 700 1/sec and for city flushing 1.50 m^3/sec.

R**egulation Pond and Pampang Major Drainage Channel**
Regulation Pond Pampang and Makassar Major Drainage Channels were constructed in the years 1997-2001. Capacity of the pond is 1.000.000 m^3, length of spillway is 150 m and 4.30 m high, a generator of 600 KVAA for pumping is installed; pumping capacity 3 x 2 m^3/sec. Pond surface area is about 38.9 ha with the variation of depth between 2.80 m to 3.50 m.

The Pampang Major Drainage Channel is 16.1 km long, having 8 bridges, 3 culvert boxes , 2 water supply pipe bridges. The main function of this pond and its drainage channels is flood control of the eastern part of Makassar city.

Major Drainage of Makassar City
The Channel system consists of Panampu, Sinrijala and Jongaya Channels. The system was constructed in the years 1989 – 1993. The main function is flood control at the middle part of the Makassar City.

Raw Water Transmission Main (RWTM)
Raw Water Transmission Main (RWTM) is a main transmission pipe for raw water from Bili-Bili Dam to WTP – Somba Opu. This has been constructed in the years 1996. The raw water discharge capacity through pipe is 3.300 1/sec. At the first stage, water discharge transmitted to water treatment plant (WTP) Somba Opu is 1.10 1/sec the current maximum capacity of the WTP. The later stage, 2.20 1/sec, is still beyond the plan. The pipe is of pressured concrete pipe with diameter 1.50 and 1.65 m.

Sediment Control Structure
Sabo Dams and Sand Pockets were constructed in 1998 to 2001. Three Sabo Dams and 5 sand pockets were located at the up stream of Bili-Bili Dam. Its main function is for controlling sediment flow to the Bili-Bili reservoir. However, they stabilize soil and water at the cathment by reducing erosion rate.

Jeneberang River Flood Control Infrastructure

Flood control mitigation infrastructure of Jeneberang River comprises dykes, gabions, and cribs along 11 km stretch of the river. They were constructed since 1988 and completed in the year 1993. The main function of this system is for flood mitigation of down stream part of Jeneberang River.

Environment Improvement (Green Belt & Arboretum) :

For the purpose of water resources conservation, environmental conservation and also to maintain the sustainability of the Bili-Bili Dam, a reforestation and arboretum is conducted by planting of various kind of industrial plant and fruits in the area about 750 Ha in the periphery of the Bili-Bili Reservoir.

III. ESTABILISHMENT OF PUBLIC CORPORATION

Jeneberang River Basin Development Project is an organization responsible among others for operation and maintenance of all water resources infrastructures in the Jeneberang River Basin. In order to provide professional services to the water users, the organization requires adequate fund for the operation and maintenance as well as service cost, which is at the moment is provided by the Central Government. The fund, which can be stated as Government subsidy is never adequate. In order to overcome this problem, there has been a plan for establishing a Public Corporation.

The Public Corporation will be authorized to collect money from the water users. The potential source will be from the water supply sector and from the hydropower generation. While from the flood control sector it is still too complicated to formulize the tariffs and the collection system. From the irrigation sector, collection of money is prohibited by the law, since farmers are responsible to maintain the infrastructures themselves.

Besides the effort for pursuing legal recognition from the Government, in this case from Central Government and the President of Indonesia, the establishment of the Public Corporation is also through strengthening of management for the institution. There have been several studies carried out in 2003 and being carried out in 2004, which are as follows:

- Study empowerment Plan for Regional Water Resources Development and management System by JICA, 2004
- Study of Water Resources Management by Corporatization and process the establishment of Jasa Tirta Institute in Jeneberang River Basin in corporation with LPM-UNHAS, 2003.

So far the Public Corporation has not yet been established.

IV. BAWAKARAENG MASS MOVEMENT AT THE UPSTREAM END OF JENEBERANG RIVER BASIN

Occurrence

A large – scale Mt. Bawakaraeng caldera-wall collapse had occurred on March 26, 2004 killing 32 people, 635 cows and buried many houses, elementary school, and 1500 HA agricultural land. The volume of collapsed mass was estimated at about 235 million m^3. Mt. Bawakaraeng which has an elevation of 2833 m above MSL is the headwaters of the Jeneberang River where the Bili-Bili Multipurpose Dam is located. The amount of potential sediment volume would jeopardize not only to the agricultural lands and residents living along the Jeneberang River but moreover to the life time of the Bili-Bili Reservoir. We may compare the potential sediment flow from the collapsed mass to the original gross storage capacity of the dam which was 375 million m^3, and the corresponding dead storage capacity of 29 million m^3.

Justification

In order to mitigate the sediment related disaster (hereinafter called debris flows) flowing rapidly into the Bili-Bili Reservoir, The Jeneberang River Basin Development Project (RBDP) office has constructed five sand pockets and one Sabo dam (Sabo Dam No.4) along the Jeneberang river since 1997. However, these facilities are considerably not adequate to cope with such tremendous potential debris flows. At present Sabo dam No 4 has fully been buried by the sediment. The deposition of sediment has reached sand pocket No. 3 of which the distance from the Bili-Bili Dam is about 20 km.

Through the Project, sediment-related disaster mitigation should be implemented in integrated and comprehensive manner with the development of the region and always in harmony and balance with the natural environment for a better prosperity. Physical and non-physical countermeasures will be conducted within the Jeneberang River basin including sand mining management. Sand mining management is a part of sediment control plan, while the regional development process is necessary to control the sand mining by among others providing an alternative income source. Thus, the project components interact to each other and require integrated implementation to support and maintain sustainable regional development.

The implementation of the Project may strengthen roles of the local government in accordance with regional autonomy by capacity building, institutional reinforcement and acquisition of budgetary source for operation and maintenance cost through sand mining management and the development of the region.

The large-scale collapse of Mt. Bawakaraeng wall is a new phenomenon in Indonesia. Therefore, the success of the Project will also be utilized to enrich the knowledge on Sabo technology.

Mitigation Plan

Countermeasures of potential debris flow resulted from Mt. Bawakaraeng collapse.

- Countermeasures against sedimentation of Bili-Bili Reservoir.

- Sustainable sand mining management.
- Regional development through Sabo works.
- Strengthening the role of Sabo Technical Center (STC) as a technical backbone of Sabo technology by establishing a branch of STC for East Indonesia region in Makassar.

Activities

- Preparation of Comprehensive ***Master Plan Study*** for integrated sediment control works in Jeneberang River Basin, including sediment balance study in the Jeneberang River Basin and regional development of the Jeneberang River Basin through Sabo works.
- Selection and implementation of ***countermeasures*** and Sabo works among the master plan.
- Establishment of ***warning evacuation system*** and improvement of ***public awareness*** on sediment related disaster.
- Preparation of sustainable ***sand mining management system*** at sabo and sand pocket dams.
- Improvement of existing systems for periodical ***monitoring and survey***; and
- Establishment of ***Makassar Sabo Technical Centre*** (MSTC) for observing the caldera wall collapsed area and accumulating the past and future data.

Scope of Works

1. Master Plan Study

The objective of the Master Plan Study is to prepare the future plan for sediment control of the Jeneberang River basin. The study shall include the following items:

- Analysis of the event and mechanism of caldera wall collapse on March 26, 2004,
- Review of the Sabo and sediment control plan to which the river basin is related,
- Additional topographic survey and geotechnical investigation,
- Sediment balance analysis of the Jeneberang River basin including formulation of sand mining plan,
- Preparation of hazard map,
- Preparation of long term sediment control plan and preliminary design of the structures,
- Proposal for minimizing measures of the sedimentation into Bili-bili Reservoir,
- Proposal for regional development plan of Jeneberang River basin through Sabo works based on the integrated sediment related disaster management (ISDM) concept,
- Preparation of non-structural countermeasures against the sediment discharge, and
- Empowerment of present monitoring and warning system.

2. Countermeasures

The proposed works for structural countermeasures of potential debris flow resulted from Mt. Bawakaraeng collapse and sediment control for the whole Jeneberang River Basin, are as follows:

- Sabo dams (incl. Sand pockets) : 10 locations

- Training dikes : 4 kms
- Hillside works especially on the debris : 3 km^2

3. Warning evacuation system and **public awareness**

While the non-structural countermeasures focus on forecasting and warning evacuation system and public awareness improvement on sediment related disaster consist of the following activities:

- Capacity building for evacuation system:
  This will involve capacity improvement of SATLAK PB (district operation unit for sediment disaster mitigation) and local government agencies (provinces, districts, sub-districts, and villages).
- Improvement of public awareness for sediment related disaster:
  This will include public consultation meetings (local government agencies, SATLAK PB, residents), evacuation drill, manuals/map/poster for evacuation, and publicity of Sabo facilities.
- Evacuation facilities:
  This will comprise among others 4 refuges, 20 km evacuation roads (rehabilitation and improvement of rural roads), 50 signboards denoting evacuation routes.
- Warning facilities :
  4 sirens and radio communication system (fixed type: 10 pc, portable type: 20 pc)
- Improvement of monitoring system :
  Consist of various gauging stations (rainfall, water level, wire sensor). This station is ultrasonic gauging stations.

4. Sustainable sand mining management

Participation of all stakeholders is essential to maintain the sand mining institution beneficially and practically. In order that sand mining can be managed properly, the following environmental approach will be implemented :

- Public consultation meeting for all stakeholders to determine the components of the sand mining institution, such as institutional frameworks, tasks, laws and regulations, and so on.
- Establishment of sand mining institution so as to facilitate the sediment control sustainable as natural resources, and to contribute the increasing of the regional economy income.
- Formulation of benefit allocation system through the sand mining institution to manage the operation and maintenance cost for the institution and Sabo facilities associated with sediment disaster mitigation and regional development.
- Capacity building to manage and sustain the institution.
- Provision of the sand mining institution facilities: one office building, one workshop for heavy equipments, two stockyards with miner workshop, 10 km access roads to quarry and heavy equipments (excavator, crusher, etc.).

5. Monitoring and survey

- Improvement of monitoring and observation system of movement of debris and rainfall at the site, and

- Periodical river cross section survey and capturing aerial photograph as well as reservoir sedimentation survey.

6. Makassar Sabo Technical Centre

Risk of loss of life and assets caused by sediment related disaster such as debris flows and other sediment flows are increasing in various places, particularly in sediment related disaster prone areas of east region of Indonesia. STC of Yogyakarta, Indonesia, has been a technical backbone of Sabo Technology since 1970. It is considered urgent to foster the role of STC by establishing a branch of STC for East Indonesia region in Makassar. The STC branch will cover Sulawesi, Maluku, NTT, and Papua provinces. This Centre is expected to be able to prepare integrated regional sediment related disaster management based on socio-economic and characteristic of the region, and to formulate implementation schemes with community participation.