

**THE STUDY ON
CAPACITY DEVELOPMENT FOR
JENERANG RIVER BASIN
MANAGEMENT
IN
THE REPUBLIC OF INDONESIA**

FINAL REPORT

**VOLUME I
EXECUTIVE SUMMARY**

March 2005

Japan International Cooperation Agency

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CAPACITY DEVELOPMENT FOR
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PREFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct the Study on Capacity Development for Jeneberang River Basin Management in the Republic of Indonesia and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA selected a study team consisting of Nippon Koei, Co., LTD. and CTI Engineering International Co., Ltd. The team was headed by Mr. Michito Kato and was dispatched to Indonesia three times between January 2004 and January 2005. In addition, JICA set up an advisory committee headed by Dr. Takeyoshi Sadahiro, Japan Water Agency (JWA), for the period between January 2004 and and March 2005.

The team held discussions with the officials concerned of the Government of the Republic of Indonesia and conducted field surveys and studies in the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the capacity development of the river basin management activities in the Jeneberang River basin and also to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for the close cooperation they extended to the Study.

March 2005

Mr. Etsuo Kitahara
Vice-President
Japan International Cooperation Agency

March 2005

Mr. Etsuo Kitahara
Vice-President
Japan International Cooperation Agency (JICA)
Tokyo, Japan

Letter of Transmittal

It is with great pleasure that we submit herewith the Final Report of the “Study on Capacity Development for Jeneberang River Basin Management in the Republic of Indonesia”.

The main objectives of the Study were threefold: (i) assistance in establishment of a new Public Corporation (PJT Jeneberang) to be responsible for river basin management, (ii) preparation of a river basin management plan incorporating plans for O&M of infrastructures, and (iii) preparation of a capacity development plan. Phase I of the Study examined the present conditions of the basin and its management. Subsequently, in Phase II, a plan was formulated in line with the above-stated objectives. The Final Report presents the outcomes from these Phase I and Phase II studies.

We hope that this Final Report will assist capacity development for river basin management in the Jeneberang River basin. We believe that the success of the proposed capacity development programs would assure further improvements in river basin management activities in the long term and thus would contribute to the improved social welfare and living environments of people in the basin.

We wish to express our sincere gratitude to the personnel concerned of your Agency for the guidance and support given throughout the Study period. Our deep gratitude is also expressed to the Directorate General of Water Resources of the Ministry of Public Works (acted as Counterpart Agency) and other concerned authorities of the Government of the Republic of Indonesia, JICA Indonesia Office, and the Embassy of Japan in Indonesia for their close cooperation and assistance extended during the course of the Study.

Very truly yours,



Michito Kato
Team Leader

The Study on Capacity
Development for Jeneberang
River Basin Management in the
Republic of Indonesia

Composition of Final Report

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Volume II **Main Report**

Volume III-1 **Supporting Report 1**

Volume III-2 **Supporting Report 2**

Volume IV-1 **Data Book 1-Guidelines and Manuals**

Volume IV-2 **Data Book 2-Data**

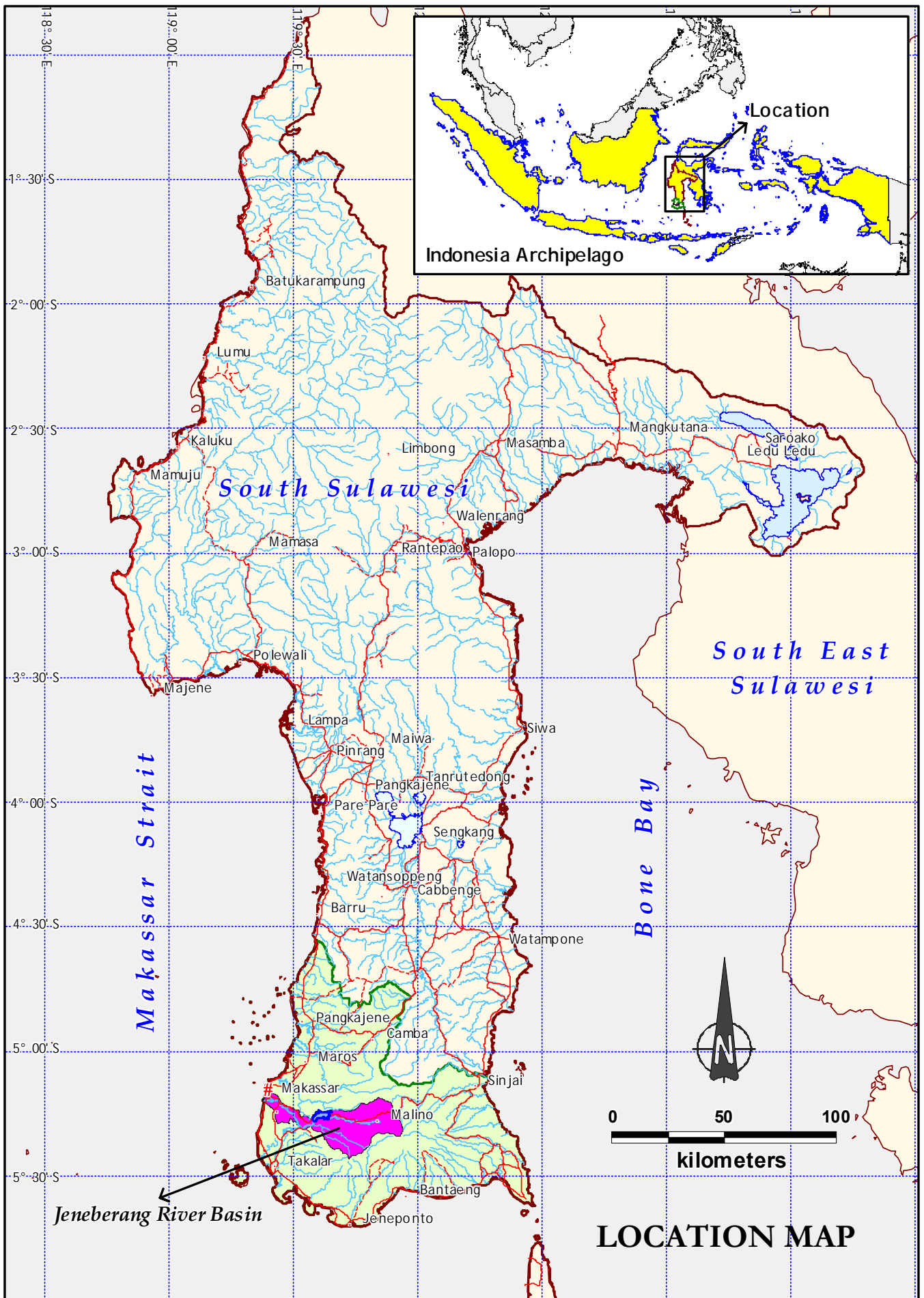
Cost Estimate : October 2004 Price

Exchange Rate: IDR 1,000 = JPY 11.92 = USD 0.1094

JPY 100 = IDR 8,387 = USD 0.9174

USD 1 = JPT 109.0 = IDR 9,142

(Bank Indonesia, October 2004 average TT selling rate)



LOCATION MAP

MAIN POINTS OF EXECUTIVE SUMMARY

The main objectives of this Study are threefold: (i) assistance in establishment of a new Public Corporation (PJT Jeneberang), (ii) preparation of a river basin management plan including arrangements for O&M of infrastructures, and (iii) preparation of a capacity development plan. A summary of the plans proposed for these three items is given below.

Plan of Establishment and Operation of PJT Jeneberang

1. PJT Jeneberang will be established as an extension of the working area of Perum Jasa Tirta I (PJT I). This seems to be a most practical solution in view of (i) simplest legislative procedure needed for the establishment (only a Presidential Decree needed), (ii) merits of using the PJT I experiences accumulated through more than 10-years operation in Brantas basin, and (iii) least cost requirement due mainly to simple organizational structure (no board of directors and minimum administration sections) and cost-free technical/administrative support from PJT I. In the long-term, PJT Jeneberang will have a possibility of future reform to an independent public corporation, either state-owned (BUMN) or province-owned (BUMD). Various features regarding the establishment and operations of PJT Jeneberang are summarized in Table S-1.
2. Various legislative decrees will be required to initiate the operation of PJT Jeneberang; namely, one Presidential Decree (for establishment of PJT Jeneberang as stated above), six central-level regulations/decrees, at least 12 regional-level regulations/decrees, and various agreements among stakeholders in the basin.
3. Owing mainly to time requirements for legislation/agreements and also the budgetary process, it is foreseen that a year for establishment and about 2 years before operation can commence will be required. The Study assumes that PJT Jeneberang will commence its organizational setup in 2006 and its operation in the field in 2007.
4. PJT Jeneberang will act as the 'operator and/or service provider' for water resources management in the Jeneberang basin. The South Sulawesi Province Governor will be appointed as the 'administrator' of river and basin management (authority to be delegated by the Minister of Public Works), under which the respective agencies of the provincial government will act as the 'regulator' for administration and law enforcement.
5. PJT Jeneberang will be entitled to collect and receive revenue from the services. The revenue will consist of raw water supply fees from PDAM, PLN and other water users (industry, plantation, fishpond), government funding support for non-revenue generating public services under the concept of PSO (public service obligation), and income from other non-water businesses mobilized by PJT Jeneberang (such as sand mining, fishery, tourism).
6. PJT Jeneberang can have a profit-making operation from the 1st year of operation on the basis that government support for PSO would be provided. Without government PSO support, PJT Jeneberang operations will run at a loss for about 11 years toward 2017.

River Basin Management Plan

7. River basin management services provided by the PJT Jeneberang consist of the following seven categories: (i) water quantity management, (ii) drought management, (iii) flood management, (iv) river administration area management, (v) water quality management and pollution control, (vi) watershed management and (vii) O&M of water resources and river infrastructures. Proposed activities are listed in Table S-2.
8. River basin management service is broadly classified into in-stream management service and off-stream management service (see Chapter 12 of Main Text). PJT Jeneberang will be directly responsible for the in-stream management such as water resources allocation/distribution/conservation, flood discharge control, and river and infrastructure management. PJT Jeneberang will also participate in the off-stream management such as in-situ flood area management, flood and drought disaster relief, watershed conservation and other environmental conservation activities on the basis of collaboration with the respective leading agencies.

Capacity Development Plan

9. PJT Jeneberang is a new organization established without past organizational experience in the field of river basin management. Although due support is expected from the parent body (PJT I), the new organization will require a specific program for its capacity development.
10. The number of personnel in PJT Jeneberang will be 45 persons in the start-up year (2007), increasing to 76 persons in the fifth year (2011). It is planned that most personnel will be recruited from the O&M group of the present Jeneberang River Basin Development Project (JRBDP). Intensive training should be given, especially to the 45 personnel during the initial 3-year period (2006-2008) after establishment.
11. The Study recommends a plan of deploying the capacity development programs, in total 27 programs, as listed in Table S-3. Total cost of program implementation is roughly estimated at Rp. 1.9 billion. PJT Jeneberang shall acquire this funding either through grants from the Government or PJT I head office or an interest-free loan from the Government.
12. Training of personnel will be the main program in capacity development. The training is given mostly in the form of focus-group lectures and on-the-job training, both in the office and field. The trainers will be sourced from the Ministry of Public Works, PJT I, provincial agencies and foreign experts as appropriate depending on the subjects.
13. The implementation of the program is monitored and evaluated on a continuous basis. A task force team will be organized in the PJT Jeneberang to lead the implementation, monitor progress and evaluate achievement. It is also proposed to formulate a monitoring committee, which will include members from external agencies, e.g. the member agencies of the present Regional Steering Committee for the current Study.

Table S-1 Corporation Establishment and Operation Plan – Summary Table

Item	Description	Anticipated Schedule
Establishment of PJT Jeneberang:		
1	Organizational form of setup	By March 2005
2	Legislation	By March 2005 By March 2006 By Dec. 2006
3	Budgetary arrangement	By Sept. 2005 By Dec.2005 By Dec. 2006
4	Schedule of establishment and operation	Beginning 2006 Beginning 2007
Operational Framework:		
5	Assets to be transferred	2007-2009 By Dec. 2005
6	Classification of river basin	
7	Rivers to be managed by PJT J	
8	River administrator	
9	Regulator at technical level	
10	Operator / service provider for O&M of infrastructure	
11	Major rehabilitation work	
12	Coordinator	
Financial Operation:		
13	Revenue source	
14	Financial operation	

Note: MPW: Ministry of Public Works, JRBDP: Jeneberang River Basin Development Project, PJT I: Perum Jasa Tirta I, PJT J: PJT Jeneberang, Keppres: Presidential Decree, RB: River basin

Table S-2 Proposed River Basin Management Plan – Summary Table (1/2)

	Service	Proposed River Basin Management Plan (Main Items only)
1.	Water Quantity Management	<ul style="list-style-type: none"> (1) Complete registration of existing water use (489.3 million m³/year in total) as officially admitted water permit holders (2) Ensure reliable water supply to water users against the following drought levels: (i) drought of 5-year return period for irrigation use, (ii) drought of 10-year return period for all water requirements other than irrigation use (3) Update continuously the inventory of water use permits (also water use rights in the future) (4) Monitor river flow discharge at eight critical points and the water abstraction volume at six principal river intake points (5) Continue to update the H-Q rating curves at the proposed river flow monitoring points. (6) Establish and operate definitive procedures of daily water distribution with referring to the procedures proposed in the Study.
2.	Drought Management	<ul style="list-style-type: none"> (1) Priority of water supply should be given to the water requirement of municipal water and river maintenance flow in the drought year. (2) Elaborate on a continuous basis the reservoir operation curve incorporating the experience accumulated in various type of drought years (3) Operate the reservoir, if drought occurs, in accordance with stepwise procedures proposed in the Study.
3.	Flood Management	<ul style="list-style-type: none"> (1) Enhance flood evacuation and fighting system in cooperation with SATLAK PB which involves Mayor of Makassar City, the commander of regional military administrative unit, the head of provincial police and the relevant local communities. (2) Develop and disseminate flood risk map, which shows the location of the flood evacuation centers and the evacuation routes (3) Enhance the system for the post-flood technical/financial support from the central government through coordination by the Governor of South Sulawesi, who is the member of BOKORNAS PB
4.	River Area Management	<ul style="list-style-type: none"> (1) Update the inventory of land ownership, classification of land use and other relevant information in the river area (2) Any land use in the high water channel of the river area should be subject to approval of the PJT Jeneberang (3) Monitor and control the excessive land exploitation in the private land located within the boundary of the river area (4) Any logging activities, construction activities and land exploitation around circumference of Bili-Bili dam reservoir specified as the administration area should be subject to approval of the PJT Jeneberang (5) Any renewal of mining license in the lower reaches of Bili-Bili dam should be frozen. (6) Promote the mining activities at the potential mining sites proposed in the upper reaches of Bili-Bili dam (7) Monitor the tendency of degradation of riverbed through river channel survey at every end of rainy season. (8) Monitor the sediment runoff from Mt. Bawakaraeng to facilitate the implementation of the urgent countermeasures by JRBDP.
5.	Water Quality Management and pollution Control	<ul style="list-style-type: none"> (1) Water quality monitoring shall include the following tasks: <ul style="list-style-type: none"> ➤ Conduct river water quality monitoring at 8 proposed locations ➤ Release river maintenance discharge as required for maintaining the river water quality ➤ Report the results of monitoring and recommend corrective measures to Bapedalda through Dinas PSDA ➤ Assist Bapedalda in formulating and conducting an integrated water quality monitoring activity in the basin

Table S-2 Proposed River Basin Management Plan – Summary Table (2/2)

	Service	Proposed River Basin Management Plan (Main Items only)
		<p>(2) Wastewater Pollution Management shall include the following services:</p> <ul style="list-style-type: none"> ➤ Monitor periodically effluent quality at pollutant sources in addition to factories' 3- monthly reporting currently in practice ➤ Identify pollutant sources as a part of river patrol ➤ Report the results of data analysis and recommend corrective measures to Bapedalda through Dinas PSDA ➤ Submit technical recommendation regarding the issuance of effluent discharge permits on demand of Bapedalda ➤ Assist Bapedalda in formulating and conducting an integrated water pollution control activity in the basin
6.	Watershed Management	<p>PJT Jeneberang will contribute to this sector by providing the following services</p> <ol style="list-style-type: none"> (1) Reforestation and Forest Management: (a) Donation of seeds and seedlings to Dinas Forestry and communities, and (b) Provision of technical recommendation regarding priority area of reforestation / forest management (2) Improvement of Land Use Practices: (a) Donation of fund for land use practice improvement work, and (b) Provision of technical recommendation regarding priority area of land use practice improvement (3) Structural Measures for Sediment Yield Reduction: (a) Donation of fund for sediment yield control work, and (b) Planning, design and construction supervision service of structural works in assisting Dinas of local government (4) River Environment Conservation: (a) Periodical inspection of condition of river course to identify any adverse issues as part of river patrol, (b) Implementation of corrective measures as required as part of river channel maintenance work (5) Fishery Resources Conservation: (a) Monitoring of fish culture activities in the Bili-Bili reservoir so that over-development of fish-cage aquaculture should not occur, and (b) Reporting to local government (Dinas Fishery) regarding condition and recommendation of corrective measures
7.	O&M of River Infrastructures	<ol style="list-style-type: none"> (1) Undertake O&M for all of the river infrastructures currently managed by JRBDP other than urban drainage facilities. (2) The inventory and location map of the river infrastructures should continue to be updated in accordance with the latest information. (3) Among the above objective river infrastructures, PJT Jeneberang will firstly undertake O&M of those for water resources/distribution as represented by Bili-Bili Dam, 3 irrigation intakes, rubber dam and long storage facilities (4) Expand the O&M works to those for the flood control facilities (e.g. levees), Sabo and sand pocket dams and other riparian structures after 2009 onward, (5) JRBDP should rehabilitate the damages of the eleven drainage sluice gates along the lower Jeneberang River, the telemetry system and a flow meter at the Raw Water Transmission Main before handover of the O&M works to the PJT Jeneberang (6) Undertake the preventative maintenance works, while JRBDP should be responsible for the corrective and emergency maintenance which are oriented to replacement of the river infrastructures due to over-extended operation and/or destructive damages by the extensive scales of natural disasters. (7) O&M manuals should continue to be updated in accordance with the latest information.

Note: SATLAK PB: Regional Implementation Unit for Disaster Management, BOKORNAS PB: National Coordination Board of Disaster Management

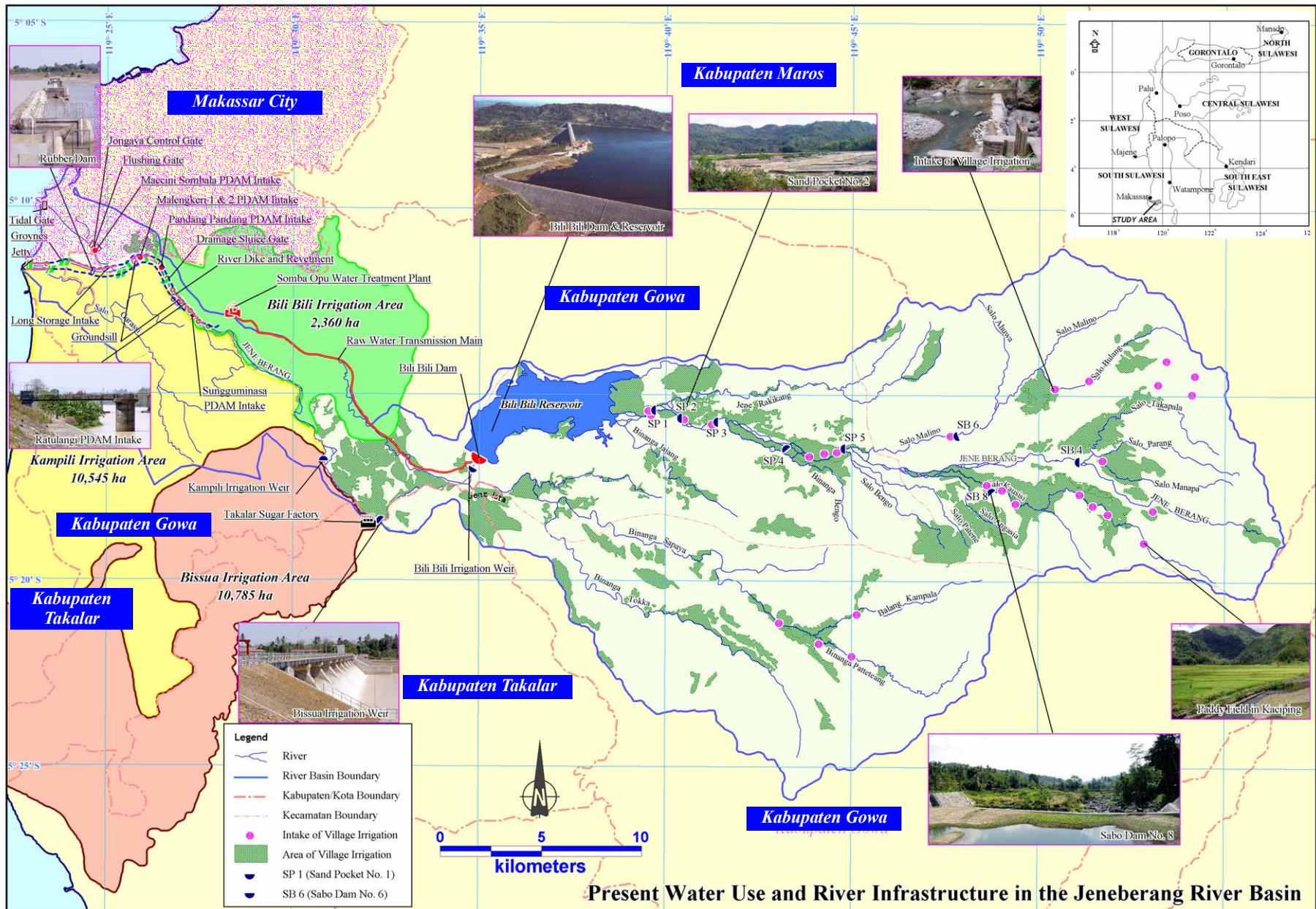
Table S-3 Proposed Capacity Development Program – Summary Table (1/2)

No.	Subject	Objective of Capacity Development	Target Group	Schedule		
				'06	'07	'08
(1) Facility Management						
(1)-1-1	Development of inventory of land use status in river area	<ul style="list-style-type: none"> ➤ To identify the outward bound of river area to be managed by PJT Jeneberang ➤ To identify the updated land use states in the river area 	TB WS I WS II			●
(1)-1-2	Development of inventory of facilities relevant to river management	<ul style="list-style-type: none"> ➤ To identify the updated states of facilities relevant to river management 	TB WS I WS II	●	●	
(1)-1-3	Hydrological data collection and analysis	<ul style="list-style-type: none"> ➤ To improve knowledge of PJT Jeneberang on hydrological data collection and analysis ➤ To improve accuracy of hydrological gauging data as the base for operation of the facilities 	WS I		●	
(1)-2-1	O&M of Bili-Bili Dam and Raw Water Transmission Main (RWTM)	<ul style="list-style-type: none"> ➤ To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works and to improve the conditions of facilities. 	WS I	●	●	
(1)-2-2	Maintenance system for electrical equipment in Bili-Bili Dam	<ul style="list-style-type: none"> ➤ To achieve the conduct of proper maintenance work for electrical equipment in Bili-Bili dam on a continuous basis. 	WS I		●	●
(1)-2-3	O&M for hydromechanical facility (Bili-Bili Dam site)	<ul style="list-style-type: none"> ➤ To establish a long-term maintenance plan and to conduct proper O&M for hydromechanical facility at Bili-Bili dam site. 	WS I		●	●
(1)-2-4	O&M for hydromechanical facility (drainage gates at Jeneberang river)	<ul style="list-style-type: none"> ➤ To establish a long-term maintenance plan and to conduct proper O&M for hydromechanical facility for drainage gate. 	WS II		●	●
(1)-2-5	O&M of the existing 11 drainage gates along lower Jeneberang River	<ul style="list-style-type: none"> ➤ To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works ➤ To improve the knowledge of the local residents as the gatekeepers regarding the relevant operation and maintenance works 	WS II TB	●	●	
(1)-2-6	O&M of Rubber Dam and Long Storage	<ul style="list-style-type: none"> ➤ To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works. ➤ To improve the knowledge of the local resident as the gatekeepers regarding the relevant operation and maintenance works. 	WS II	●	●	
(1)-2-7	O&M of irrigation weirs	<ul style="list-style-type: none"> ➤ To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works 	WS II	●	●	
(2) River Basin Management						
(2)-1-1	Flood plain management	<ul style="list-style-type: none"> ➤ To establish the effective flood plain management system. ➤ To improve the knowledge of PJT Jeneberang on flood plain management. 	TB AB WS II	2009 onward		
(2)-1-2	Flood warning, fighting and evacuation	<ul style="list-style-type: none"> ➤ To establish the flood warning, fighting and evacuation system ➤ To improve the knowledge of PJT Jeneberang on flood warning, fighting and evacuation system 	TB AB WS I WSII	2009 onward		
(2)-2	Water quantity management	<ul style="list-style-type: none"> ➤ To establish the water quantity management system for accomplishing reliable water supply. ➤ To improve knowledge of PJT Jeneberang on water quantity management system. 	TB AB WS I WSII	●	●	
(2)-3	Drought management	<ul style="list-style-type: none"> ➤ To establish the drought management system ➤ To improve the knowledge of PJT Jeneberang on drought management system 	TB AB WS I WSII	2009 onward		

Table S-3 Proposed Capacity Development Program – Summary Table (2/2)

No.	Subject	Objective of Capacity Development	Target Group	Schedule		
				'06	'07	'08
(2)-4	Implementation of watershed management services	<ul style="list-style-type: none"> ➤ To accomplish the conduct of services relevant to watershed conservation and management. ➤ To acquaint with the basic know-how of providing the services. 	TB WS II	2009 onward		
(2)-5-1	Water quality monitoring (WQM)	<ul style="list-style-type: none"> ➤ To accomplish the conduct of WQM work on a continuous basis. 	TB		●	●
(2)-5-2	Water pollution monitoring (WPM)	<ul style="list-style-type: none"> ➤ To accomplish the conduct of WPM work on a continuous basis 	TB		●	●
(3) Institutional Management / Human Resources Management						
(3)-1	Laws and regulations in the water sector	<ul style="list-style-type: none"> ➤ To familiarize PJT Jeneberang management with the relevant (i) national laws, regulations and decrees, (ii) regional regulations, decrees, (iii) PJTI Directors' Decrees. 	M All BD	●		
(3)-2	Organizational structuring & staffing, and HRA	<ul style="list-style-type: none"> ➤ To educate selected senior personnel and those responsible in organizational structuring, job analysis, staff planning and budgeting, and personnel administration so that the staff can execute jobs properly. 	All BD	●	●	
(3)-3	Human resources development (HRD)	<ul style="list-style-type: none"> ➤ To educate the HR Section and PJT Jeneberang managers in the basic skills, procedure and documentation of HRD. 	M All BD	●	●	
(3)-4	Strengthening of public relations capability	<ul style="list-style-type: none"> ➤ To strengthen operation capability by establishing public relations system and skills development aiming at customer satisfaction and stakeholder participation. 	All BD		●	
(4) Administration Management						
(4)-1	Business planning skill training	<ul style="list-style-type: none"> ➤ To familiarize with the basic skills, procedure, know-how and documentation of business planning, and to be able to elaborate planning document and business proposal. 	M All BD	●	●	
(4)-2	Quality management system training	<ul style="list-style-type: none"> ➤ To learn about Quality Management System (QMS) – quality policy and goals, work procedure and instruction, and document control – and acquire capability of preparing the certificate acquisition process through actual operation. 	M All BD	●	●	
(4)-3	Corporate management capacity development	<ul style="list-style-type: none"> ➤ To establish management base of PJT Jeneberang with business mind. 	M All BD	●	●	
(5) Financial Management						
(5)-1	Financial administration capacity development	<ul style="list-style-type: none"> ➤ To strengthen capacity of financial administration system and its operation by establishing the system and skill development. 	M All BD	●	●	
(5)-2	Corporate accounting by ASGL (Accounting System General Ledger)	<ul style="list-style-type: none"> ➤ To develop skills for corporate accounting specialized in water resources management using ASGL. 	AB	●	●	
(5)-3	Revenue collection	<ul style="list-style-type: none"> ➤ To establish and strengthen revenue collection procedure of the services provided by PJT Jeneberang. 	AB WS II		●	

Note: M: Management, All BD: All Bureau and Divisions, TB: Technical Bureau, AB: Administration & Finance Bureau, WS I: Work Service Division I. WS II: Work Service Division II



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FINAL REPORT

Volume I Executive Summary

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Appendix

Appendix I	Scope of Work
Appendix II	Minutes of Meeting

ABBREVIATIONS (1/2)

ABBREVIATION	ENGLISH	BAHASA INDONESIA
APBD	Regional Government Revenue and Expenditure Budget (Province/Regency Budget)	Anggaran Pendapatan dan Belanja Daerah
APBN	Central Government Revenue and Expenditure Budget (National Budget)	Anggaran Pendapatan dan Belanja Negara
ASGL	Accounting System General Ledger	Sistem Akuntansi Buku Besar
Balai PSDA	Provincial River Basin Management Unit	Unit Pelaksana Teknis Dinas Balai Pengelolaan
Bapedalda	Provincial Environmental Impact Agency	Badan Pengendalian Dampak Lingkungan Daerah
Bappeda	National Development Planning Agency	Badan Perencanaan Pembangunan Daerah
BUMD	Regional Government-owned Corporation	Badan Usaha Milik Daerah
CDP	Capacity Development Plan	Rencana Pengembangan Kapasitas
COD	Chemical Oxygen Demand	Kandungan Oksigen dari Bahan Kimia
CSSP	Competence Standard for Structural Position	Standar Kompetensi Posisi Struktural
DAK	Special Allocations Fund	Dana Alokasi Khusus
DAU	General Allocations Fund	Dana Alokasi Umum
DGWR	Directorate General of Water Resources	Direktorat Jenderal Sumber Daya Air
DPR	House of Representatives	Dewan Perwakilan Rakyat
DPRD	Regional House of Representatives	Dewan Perwakilan Rakyat Daerah
Dinas PSDA	Provincial Water Resources Services (PWRS)	Dinas Pengelolaan Sumber Daya Air
F/S	Feasibility Study	Studi Kelayakan
GDP	Gross Domestic Product	Produk Domestik Bruto
GIS	Geographic Information System	Sistem Informasi Geografik
GOI	Government of Indonesia	Pemerintahan Republik Indonesia
GR	Government Regulation (GR)	Peraturan Pemerintah (PP)
GRDP	Gross Regional Domestic Product	Produk Domestik Bruto Daerah
HR	Human Resources	Sumber Daya Manusia
HRA	Human Resources Administration	Administrasi Sumber Daya Manusia
HRD	Human Resources Development	Pengembangan Sumber Daya Manusia
HRM	Human Resource Management	Pengelolaan Sumber Daya Manusia
Inhutani	Government-owned Forestry and Agricultural Industry Company	PT. Industri Kehutanan dan Pertanian
P3A	Main Water Users Association (WUA)	Perkumpulan Petani Pemakai Air (P3A)
ISF	Irrigation Service Fee	Iuran Pelayanan Air Irigasi (IPAIR)
ISO	International Standard Organization	Pengoperasian Standar Internasional
JBIC	Japan Bank for International Cooperation	Bank Jepang untuk Kerjasama Internasional
JICA	Japan International Cooperation Agency	Badan Kerjasama Internasional Jepang
JRBDDP	Jeneberang River Basin Development Project	Proyek Induk Pengembangan Wilayah Sungai Jeneberang
Keppres	Presidential Decree	Keputusan Presiden
Kimpraswil	Ministry of Settlement and Regional Infrastructure (former MPW)	Departemen Pemukiman dan Prasarana Wilayah
MoHA	Ministry of Home Affairs	Departemen Dalam Negeri
MEI	Monitoring, Evaluation and Implementations	Laporan Monitoring, Evaluasi dan Implementasi
MENR	Ministry of Energy and Natural Resources	Departemen Energi dan Sumber Daya Alam
MoA	Ministry of Agriculture	Departemen Pertanian
MoF	Ministry of Finance	Departemen Keuangan
MPW	Ministry of Public Works	Departemen Pekerjaan Umum
MSOE	Ministry of Stated-Owned Enterprises	Departemen BUMN
MSRI	Ministry of Settlement and Regional Infrastructure	Departemen Permukiman dan Prasarana Wilayah (Kimpraswil)
NGO	Non-Government Organization	Lembaga Swadaya Masyarakat (LSM)
O&M	Operation & Maintenance	Operasi & Pemeliharaan (O&P)
PCM	Project Cycle Management	Manajemen Siklus Proyek
PDAM	Regional Drinking Water Supply Company	Perusahaan Daerah Air Minum
PDM	Project Design Matrix	Matriks Disain Proyek
Perum	Public Corporation	Perusahaan Umum
PIPWSJ	Jeneberang River Basin Development Project (JRBDDP)	Proyek Induk Pengembangan Wilayah Sungai Jeneberang
PIRASS	South Sulawesi Major Swamp and Irrigation Project	Proyek Irigasi dan Rawa Andalan Sulawesi Selatan

ABBREVIATIONS (2/2)

ABBREVIATION	ENGLISH	BAHASA INDONESIA
PJT	Jasa Tirta Public Corporation	Perum Jasa Tirta
PLN	State Electricity Company	Perusahaan Listrik Negara
PLTA	Hydro Electric Power Plant	Pembangkit Listrik Tenaga Air
PNS	Government Employees	Pegawai Negeri Sipil
PTPA	Provincial Water Resources Coordination Committee(PWRC)	Panitia Tata Pengaturan Air
PPTPA	River Basin Water Resources Coordination Committee (RBWRC)	Panitia Pelaksana Tata Pengaturan Air
PRA	Participatory Rural Appraisal	Identifikasi Desa secara Partisipatif
Prokasih	Clean River Campaign Program	Program Kali Bersih
PSO	Public Service Obligation	Kewajiban Pelayanan Umum (KPU)
RBM	River Basin Management	Pengelolaan Wilayah Sungai
ROE	Return on Equity	Laba atas Modal Sendiri
ROI	Return on Investment	Laba atas Investasi
Satlak-PB	Implementation Unit for Disaster Management (District Level)	Satuan Pelaksana-Penanggulangan Bencana
Satkorlak	Implementation Coordination Unit (Province Level)	Satuan Coordinator Pelaksana
SDA	Water Resources	Sumber Daya Air
SMSOE	State Minister of State-Owned Enterprises	Menteri Negara BUMN
SOE	State-Owned Enterprises	Badan Usaha Milik Negara (BUMN)
SWS	River Basin Unit	Satuan Wilayah Sungai
TNA	Training Needs Analysis	Pelatihan Analisa Kebutuhan
ToR	Term of Reference	Kerangka Acuan
UPTD/Balai PSDA	Local Technical Implementation Unit/Balai PSDA	Unit Pelaksana Teknis Daerah/Balai PSDA
WQM	Water Quality Monitoring	Pemantauan Kualitas Air
WRM	Water Resource Management	Pengelolaan Sumber Daya Air (PSDA)
WTP	Water Treatment Plant	Instalasi Pengelolaan Air (IPA)
WUA	Water User Association	Perkumpulan Petani Pemakai Air (P3A)
WUAF	Water User Association Federation	Gabungan Perkumpulan Petani Pemakai Air (GP3A)

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Background Information

1.1.1 Necessity of River Basin Management

The Government has launched a reform of the water resources sector in recent years, in which the importance of proper river basin management, including operation and maintenance (O&M) of the facilities, is recognized as a priority policy. The Government pursues the attainment of integrated river basin management for all river basins in the country based on a policy of ‘one river basin, one management’.

The necessity of a proper river basin management can be expressed in terms of the following four points:

- (i) Water resources are a valuable social/economic good essential for the welfare of the public but are of limited availability, especially in the dry seasons. It should be utilized most efficiently and effectively through proper water resources management under the rules of integrated river basin management.
- (ii) The completed water resources facilities and river facilities are the nation’s valuable assets. Their service lives must be prolonged as much as possible by providing proper operational care, maintenance and rehabilitation.
- (iii) Proper river basin management is requisite for enhancing people’s daily lives and regional economic activities.
- (iv) Proper river basin management is also requisite for maintaining and upgrading the basin’s natural environments including water quality conservation, ecological protection and watershed conservation.

1.1.2 River Basin Management by a Public Corporation

River basin management must be consistent with Government policies on good governance, decentralization, community participation and long-term sustainability as emphasized in the draft National Water Resources Policy (NWRP) in April 1999. NWRP states that there is a need to establish a river basin management organization capable of managing the basin with strategies in line with the policies stated above.

An approach to attaining strategic river basin management is to entrust the work to a public corporation fully supported and empowered by central and regional governments and communities in the basin (refer to NWRP). There are already two successful examples of existing public corporations; Jasa Tirta I in the Brantas and Bengawan Solo River basins and Jasa Tirta II in the Citarum River basin. They have been in operation for more than a decade after

corporatization and are showing a fair degree of success in river basin management.

Unlike the government agency, a public corporation is entitled to recover the O&M costs from water users and generate other income sources, thus contributing to reducing the budgetary burden on central and regional governments.

With these advantages in mind, the Government contemplates establishing a new public corporation responsible for river basin management of the Jeneberang River. In the Jeneberang basin, bulk water supply to Bili-Bili irrigation schemes (Bili-Bili, Bissua and Kampili; 23,660 ha) has commenced in November 2004 and moreover municipal water supply demand is increasing year by year. These situations indicate that water demand-supply balance becomes increasingly tight and a proper water resources management will be more important in the coming period. This necessitates an early establishment of the new public corporation that would be responsible for such management work.

1.1.3 Technical Cooperation Program by JICA

The Government of the Republic of Indonesia (GOI) requested the Government of Japan (GOJ) to conduct a study on the establishment and capacity development of a new public corporation to be formulated in the Jeneberang river basin.

In response to the request of the GOI, the GOJ decided to conduct the ‘Study on Capacity Development for Jeneberang River Basin Management in the Republic of Indonesia’ (hereinafter referred to as “the Study”) in accordance with the relevant laws and regulations in force in Japan.

Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched a Preparatory Study Team to Indonesia in August 2003 to discuss the scope of works and other study requirements. The ‘Scope of Work’ agreed between the Directorate General of Water Resources (DGWR) of the then Ministry of Resettlement and Regional Infrastructure (now renamed as Ministry of Public Works) and JICA Preparatory Study Team on August 27, 2003 is contained in Appendix I, and the relevant Minutes of Meeting in Appendix II, both attached to this report.

In accordance with the agreed Scope of Work, JICA dispatched the study team to Indonesia at the end of January 2004 to commence study activities. Since then, the study team has conducted investigations and undertaken studies in Indonesia up to the end of November 2004. After explanation and discussion of draft final report in January 2005, the study team has finalized the outputs from Phase I & II studies toward March 2005.

1.2 Objective of the Study

The objectives of the Study described in the Scope of Work are as follows:

- (1) To assist in the establishment of a Jeneberang Public Corporation

- (2) To assist the Jeneberang Public Corporation in capacity development in the following aspects: (i) Administration, (ii) Financial arrangement, (iii) River basin management, and (iv) Human resources development
- (3) To formulate operation and maintenance plans for river facilities

The further detail of the Scope of Work of the Study is described in Appendix I.

1.3 Study Area

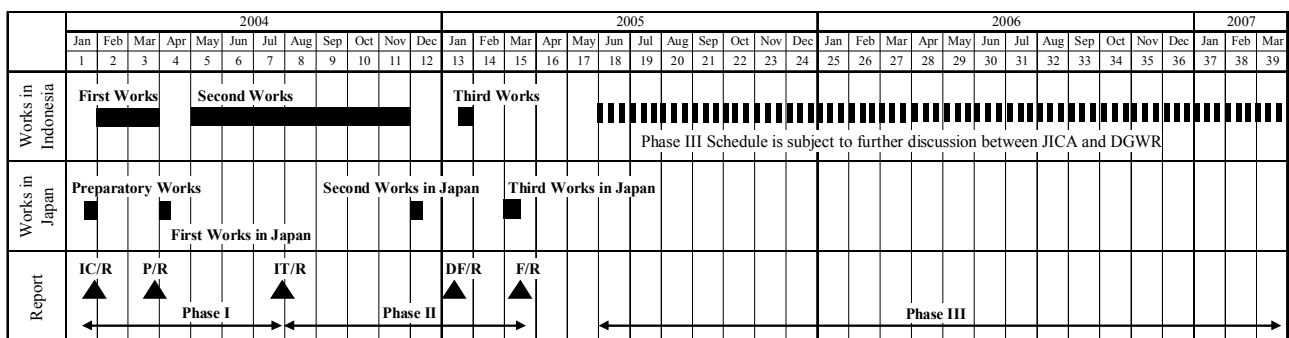
The study area covers the whole Jeneberang River basin (approximately 762 km² in area) and, in addition, the potential service areas where any revenues and other income sources are expected for the new Jeneberang Public Corporation (e.g. municipal water supply area, irrigation area, flood mitigation area, etc).

The Jeneberang River basin is located administratively in two Kabupaten (District) and one Kota (City); namely, Kabupaten Gowa, Kabupaten Takalar and Kota Makassar. It spreads over seven Kecamatan (Sub-district) in Kabupaten Gowa, one Kecamatan in Kabupaten Takalar and three Kecamatan in Kota Makassar (see Chapter 2 and 3 of Main Report). The service area includes the almost entire area of Makassar urban area and Bili Bili-Bissua-Kampili irrigation scheme areas in Kabupaten Gowa and Takalar.

The location of the Study area is shown on a Location Map and a River Basin Map attached at the beginning of this report.

1.4 Overall Schedule of the Study

Total duration of the Study has been originally scheduled as 39 months, starting in January 2004 and ending in February 2007. The Study is now at the end stage of Phase II.



Overall Schedule of the Study

Owing to delays in the establishment of Jeneberang Public Corporation, it is now foreseen that Phase III schedule will have to be reprogrammed. Revised program of Phase III will be subject to further discussion between JICA and DGWR in consideration of actual progress of the establishment of Corporation.

1.5 Final Report

This Final Report (F/R in the above figure) is hereby submitted as a final product of the Phase I and Phase II studies conducted since the beginning of the study.

The Report presents among others (i) proposed formation of a new public corporation, (ii) proposed capacity development plan for the Corporation and (iii) proposed operation and maintenance plan of river infrastructure, in compliance with the objectives of the Study.

The Final Report consists of the following six (6) volumes:

Volume I	Executive Summary (this volume)
Volume II	Main Report
Volume III-1	Supporting Report 1
Volume III-2	Supporting Report 2
Volume IV-1	Data Book 1 - Guidelines and Manuals
Volume IV-2	Data Book 2 - Data

Before preparation of this Final Report, a draft final report was explained and discussed at the Steering Committee meeting and Regional Committee meeting in the middle of January 2005. The Final Report was finalized incorporating the comments from the committees and relevant agencies.

2. Socio-Economy of the Study Area

2.1 Population and GRDP

The population of the Study area was around 1.9 million as at 2002 and has increased at a rather high rate (1.4 % per annum). Kota (City) Makassar accounts for almost 60 % (1.1 million) of the total population of the Study area. Average annual GRDP growth rate of South Sulawesi province and the Study area has been 4.3 % and 6.0 %, respectively, between 1998 and 2002 in real terms. There has been a growth in per-capita GRDP of 3.1 % and 4.4 %, respectively, over the same period. These indices show a growing trend of economy in the province as well as Study area.

Population and GRDP in South Sulawesi and Study Area

Description		1998	2000	2001	2002	Average Growth Rate
Population:	South Sulawesi	7,624,525	7,801,678	-	7,960,991	1.09 %
	Makassar	1,066,757	1,100,019	-	1,127,785	1.40 %
	Study Area Total	1,786,276	1,842,611	-	1,888,779	1.41 %
GRDP: (Rp .million)	South Sulawesi	9,366,229	10,101,948	10,603,661	11,092,996	4.3 %
	Makassar	2,212,970	2,589,535	2,704,974	n.a	6.9 %
	Study Area Total	2,914,515	3,327,499	3,475,227	n.a	6.0 %
Per-capita GRDP: (Rp.)	South Sulawesi	1,228,434	1,294,843	1,343,632	1,389,587	3.1 %
	Makassar	2,074,484	2,354,082	2,392,969	n.a	4.9 %
	Study Area Total	1,631,615	1,805,861	1,857,301	n.a	4.4 %

The agricultural sector is the mainstay of the economy in South Sulawesi, accounting for 37.5 % of the total GRDP (in 2002). This did, however, decline from 45.8 % (in 1998) due to the shift to a service-oriented economy. The Study area will in the future shift further to a service-oriented economy and gradual industrialization. Further detail is given in Chapter 2 of Main Report.

2.2 Diffusion Ratio of Piped-water and Electricity Supply

Compared to electricity supply (62.5 % in 2002), piped-water supply (23.5 % in 2002) has not been widely distributed among the households of the entire Study area.

Kota Makassar has the highest distribution ratio for both water (36.7 %) and power (70.5 %) among the Study area, reflecting its higher household income. Piped water supply has been particularly low in the Kabupaten (districts) of Gowa and Takalar. This may indicate a high potential for water demand growth in the future.

2.3 Social Aspects in Urban, Semi-urban and Rural Sub-districts

Kecamatans (Sub-districts) belonging to the Jeneberang river basin can be categorized into the three groups (urban, semi-urban and rural), depending on the degree of urbanization. A large agglomeration of industry is not seen in the river basin area, except for some minor factory concentration seen in semi-urban sub-districts of Tamalate, Somba Opu and Pallangga, located in the lower basin.

Reflecting high population density and some factory concentration, urban and semi-urban sub-districts have more assets requiring protection from the threat of flooding; those areas also generate much higher rates of effluent and waste discharge, and have a greater negative impact on the river environment.

Rural sub-districts, mostly located in the upper basin area, might need more assistance on better environment practices regarding agriculture and forestry to ensure adequate watershed management along the upper stream. The lower income base in rural sub-districts continuously generates pressures on forestry and land soils. Less care in terms of the practices essential for sustainable water resources is also undertaken.

3. Physical Features of Jeneberang River Basin

3.1 Topography of River Basin

Jeneberang River originates from Mt. Bawakaraeng (EL. 2,830 m), running westward and finally discharging into Makassar Strait, as shown in Figure S3.1. The overall area of the river basin and channel length of the mainstream are about 762 km² and 85.5 km, respectively.

Bili-Bili Multipurpose Dam, the outstanding water resources development facility in the basin is

located on the main stream of Jeneberang River just upstream from the confluence with a principal tributary, Jenelata River. The lower reaches of Bili-Bili Dam comprise the extremely flat alluvium plain, while the upper reaches from the confluence are a mountainous/hilly area forming the foothills of Mt. Bawakaraeng and its mountain ranges.

Due to these contrasting geographies, the upper and lower reaches of Bili-Bili Dam catchment show quite different patterns of land use. A large part of the lower reaches have been exploited as paddy field, while more than 80 % in the upper reaches remains behind as non-cropping area (refer to Figure S3.2).

3.2 Administrative Boundaries of River Basin

Jeneberang River basin (catchment area: 762 km²) is administratively divided into Kabupaten (District) Gowa, Kabupaten Takalar and Makassar City in South Sulawesi Province, as shown in Figure S3.3.

Of these, Kabupaten Gowa occupies 95.9 % (730 km²) of the river basin including the entire catchment of Bili-Bili Dam. The share of the river basin associated with Kabupaten Takalar and Makassar City is extremely small; 1.2 % (9.5 km²) and 2.9 % (22.5 km²), respectively.

An irrigation area of about 7,400 ha in Kabupaten Takalar receives its irrigation water supply from the Jeneberang River. Makassar City also relies for the majority of its municipal water supply on the Jeneberang River. Thus, both Kabupaten Takalar and Makassar City are the major water users of Jeneberang River, although topographically they do not represent a substantial share of the basin. Kabupaten Gowa is also the beneficiary of Jeneberang water resources, taking water for the PDAM water supply system and also for an irrigation area of about 16,200 ha.

3.3 Particular Issues on River Morphology

(1) Sand mining and riverbed degradation

Sand mining is now intensively practiced along the downstream reach of Jeneberang River. The annual mining volume in the recent five year period (1995 to 2001) was 1,749 thousand m³/year, of which 75 % (or 1,316 thousand m³/year) is mined downstream of Bili-Bili Dam. This downstream extraction volume is more than two times the annual sediment runoff volume of the basin.

The excess of sand mining over the natural sediment runoff volume was further aggravated by trapping of sediment runoff by Bili-Bili Dam reservoir, after its completion in 1999. As a result, serious river channel erosion as well as damage to river infrastructure has occurred along the downstream reach of Jeneberang River. The riverbed elevation dropped by 5.2 m at Sungguminasa Bridge and 8.1m at Kampili Weir during a period of 22 years from 1979 to 2001.

(2) Sediment yield due to Mt. Bawakaraeng collapse

The Jeneberang River has another particular issue regarding sediment runoff as a result of the major collapse of a quay on the caldera of Mt. Bawakaraeng. The collapse occurred on 26 March 2004 and it is now producing a tremendous volume of sediment runoff. The “JICA Sabo Urgent Investigation Team” estimated the volume of these collapses at round 235 million m³ in total, of which about 27 million m³ is expected to accumulate in Bili-Bili Dam reservoir in the next five years. This sediment accumulation corresponds to about 90 % of the dead storage capacity of Bili-Bili Dam reservoir.

3.4 Climate

The Jeneberang River basin is subject to a tropical monsoon climate, which exhibits as high and rather constant air temperature throughout the year, but with a distinct variation in rainfall creating rainy and dry seasons. The rainy season from December to May produces about 80 to 90 % of the annual rainfall. The Jeneberang River basin also has a large spatial variation of rainfall due to the local topographic effects. The upper mountainous reaches receive average annual rainfalls of more than 4,000 mm, while the lower reaches receive less than 2,500 mm.

3.5 Present Use of Jeneberang River

The Jeneberang River is currently used as the source for municipal water use, irrigation use, factory/commercial water use, and aquacultural use. The mining of river sand and gravel has also been undertaken as described above. Moreover, a rather large part of the land within the designated river area is used as settlement area by illegal dwellers and/or as agricultural farmland.

3.6 Present Use of Groundwater

The shallow wells of less than 10m in depth are extensively exploited by individual households, especially in low land areas in Jeneberang river basin. Of the total annual consumption for household use, about 70 % is sourced from shallow wells, and the remainder is supplied from the PDAM piped water supply system. Deep wells of about 50 to 250 m in depth are also exploited, especially for upland irrigation.

4. Irrigation Development in the Basin

4.1 Bili-Bili Irrigation Project

The areas of Bili-Bili irrigation project lie in the downstream basin of the Jeneberang River, and administratively belong to the two Kabupatens of Takalar and Gowa, and partially to Makassar city. The Bili-Bili irrigation project is composed of three irrigation schemes; Bili-Bili, Bissua and Kampili. The location of irrigation schemes is shown in Figure S4.1.

Based on intended irrigation development, the cropping intensity is likely to increase from 160 % (paddy 125 % and palawija 35 %) to 240 % (paddy 200 % and palawija 40 %), together with a

strengthening in agricultural supporting services. The proposed cropping schedule is shown in Figure S4.2. The anticipated yields of paddies were estimated to be 5.5 tons/ha of wet season paddy and 6.0 tons/ha of dry season paddy. The net benefit excluding family labor cost was assessed to be about Rp. 13.2 million/ha.

4.2 O&M of Irrigation Facilities

With the decentralization policy, the Provincial and Kabupaten governments through the Balai PSDA in charge of the Jeneberang and surrounding basins and Dinas PSDAs will be responsible for operation and maintenance (O&M) of main irrigation facilities. These local governments are due to undertake the project O&M from 2006 when the project will be transferred from PIRASS (Proyek Irigasi dan Rawa Andalan Sulawesi Selatan), the authority responsible for post-management over a two-year period.

The water users' associations (WUAs/P3As), which total 307 members within the irrigation system area, will be responsible for the O&M of 426 tertiary blocks. The 307 WUAs form 28 WUA federations (GP3As). A field reconnaissance by the study team at an advanced WUA federation revealed that WUA's activities are still in a developing stage under the assistance of NGOs.

4.3 O&M Cost and Irrigation Service Fee (ISF)

The O&M cost of irrigation facilities has been updated by the Bili-Bili irrigation project office. The total annual O&M cost has been preliminarily estimated to be about Rp. 7.2 billion, excluding salaries for state employees (PNS) at the Kabupaten level. If this amount is to be collected in the form of an Irrigation Service Fee (ISF), the ISF rate adopted for the Bili-Bili irrigation project and to be appropriated would be Rp. 304,000/ha/year (equivalent to US\$ 38/ha/year). This would cover O&M of weir/intake and primary and secondary systems.

The new Public Corporation will manage weir/intake facilities. The O&M cost for weirs/intakes corresponds to about ten percent (10 %) of the total O&M costs. On the premise that ISF will be collected in the future, it is therefore recommended that ten percent (10 %) of the ISF actually collected shall be given to the Corporation.

4.4 Financial Sharing of Irrigation Sector to River Basin Management

The irrigation sector is the largest water user, accounting for about 78 % of total water demand (total of irrigation and municipal water without hydropower) from the Jeneberang River. This is equivalent to about 35 % (382 MCM) of the average annual runoff (1,100 MCM) at the Bili-Bili Dam site. The irrigation sector should therefore bear an equitable portion of water resources O&M costs.

Present Government Regulation No.77/2001 permits the collection of ISF from irrigation beneficiaries (farmers) to cover irrigation O&M costs. Recently however, a revised concept of

O&M of irrigation was introduced in the New Water Resources Law No.7/2004 that was enacted in March 2004.

The New Water Law sets forth the principles of irrigation O&M and water management fee as follows:

- The operation and maintenance of primary and secondary irrigation systems shall be under the authority and responsibility of the Government and the regional governments according to their authorities **【Article 64 (6)】**
- Due to the limited ability of farmers to pay for water, its use by people for agricultural activities does not require payment of water resource management services (it does not, however, eliminate the obligation to pay the costs for development, operation and maintenance of tertiary irrigation) **【Elucidation Para.I.12】**

The above clearly prescribes the government obligation for the O&M of irrigation facilities, except for the tertiary system.

Considering the above concepts, this Study proposes the following principles be established:

- (a) Irrigation O&M cost shall be paid principally by farmers (as beneficiaries) based on beneficiary-to-pay principle
- (b) Due to farmers' limited ability to pay, the government shoulders the obligation of paying O&M costs. This government obligation should also be applied to the O&M service cost incurred by the public corporation.
- (c) Compensation to the corporation will be in the form of either a subsidy or service fee under the concept of PSO (public service obligation), which is now under discussion within the government.

The O&M service fee to be paid by the government to the corporation shall include the O&M cost of the irrigation weir and intake stated in Section 4.3 above, as well as the allocated portion of the O&M cost of Bili-Bili dam/reservoir, which is discussed further in Chapter 12.

5. Water Supply Development in the Basin

5.1 Present Water Use in Water Supply Sector

At present, the following utilities are extracting water from the Jeneberang River for the purpose of municipal and industrial water supply:

- 1) PDAM Makassar
- 2) PDAM Gowa
- 3) Industries represented by a sugar factory in Kabupaten Takalar

Of the above utilities, the largest user of water from the Jeneberang River is the PDAM Makassar, which supplies water for most parts of Makassar City. Of the total clean water production capacity

of 2,340 liter/sec in the existing water treatment plants owned by PDAM Makassar, around 53 % (1,250 liter/sec) is sourced from the Jeneberang River. The remainder is extracted from the Maros River (see table in Subsection 5.2.1 below).

Water supply for the service area of PDAM Gowa, with a supply capacity of 290 liter/sec, is wholly dependent on the water resources of the Jeneberang River.

Water abstraction by industries (other than supply from the PDAM network) is not significant at present. A major water abstractor is a sugar factory in Kabupaten Takalar¹, which is permitted to pump up to 500 liter/sec for use in processing in the factory as well as to irrigate sugarcane fields.²

In addition to the above municipal uses of water from the Jeneberang River, the JRBDP releases water from the Long Storage to the Jongaya canal in the dry season. This is used to dilute polluted canal water and flush pollutants when bad odors spread along the canal.

The present use of water from the Jeneberang River is schematically shown in Figure S5.1.

5.2 Existing Water Supply System and Issues

5.2.1 PDAM Makassar

At present, the PDAM Makassar has five water treatment plants (WTP) to supply water to its own service area in Makassar City. The service area covered by each of the above five WTPs is shown in Figure S5.2 while the actual output of each in 2003 is as follows:³

Actual Water Production Output at Each WTP in 2003

No.	Name of Existing WTP	Source of Water	Capacity of WTP (liter/sec)	Actual Output in Year 2003 (liter/sec)	
				In December	Yearly
1	Ratulangi	Jeneberang R.	50	65.9	62.4
2	Panaikang	Maros R.	1,000	1,078.3	983.2
3	Antang	Maros R.	90	36.8	31.3
4	Maccini Sombala	Jeneberang R.	200	91.8	87.5
5	Somba Opu	Jeneberang R.	1,000	1,191.5	1,191.5
	Total		2,340	--	--

Note: WTP: Water Treatment Plant

PDAM Makassar system is facing the following two issues:

- Water supply-demand balance is already critical, as indicated by the fact that Panaikang WTP and Somba Opu WTP are operated in excess of their nominal capacities to meet the increasing water demand (see table above).
- The water source of Panaikang WTP depletes in the dry season. This necessitates additional abstraction of water from the Jeneberang River at the Malengkeri intake (500 liter/sec) during the dry season.

¹ PT. Perkebunan Nusantara IV (Persero)

² Other three factories are also taking water from Jeneberang, but the quantity is small

³ Informasi PDAM Kota Makassar, Bulan September, Tahun 2003

Other issues are a high unaccounted-for-water ratio (currently around 51 %) and a high turbidity of raw water (refer to Chapter 8 hereinafter).

5.2.2 PDAM Gowa

There are five WTPs operated by PDAM Gowa for water supply to its service area with a total capacity of 290 liter/sec, as shown in the following table:

List of Existing Water Treatment Plants Operated by PDAM Gowa

No.	Name of Existing Water Treatment Plant (WTP)	Water Source	Capacity of Water Production (liter/sec)
1	Bajeng WTP	Jeneberang River	20
2	Borong Loe WTP	Raw water trans. main (RWTM)*1	20
3	Malino WTP	Spring*2	10
4.	Unit Tompo Balang	Jeneberang River	40
5.	Unit Pandang-Pandang	Jeneberang River	200
Total			290

Note: *1 Original source of water for RWTM is Jeneberang River at Bili-Bili Dam

*2 Water source of Malino WTP is spring water in upper reach of the Jeneberang River.

Of the total water treatment capacity of 290 liter/sec, water production usually remains low at about 190 liter/sec because of frequent problems at pumping facilities (except Bajeng WTP, constructed under financial assistance of JICA). For this reason, about 50 % of households in the service area are not supplied with sufficient piped water.

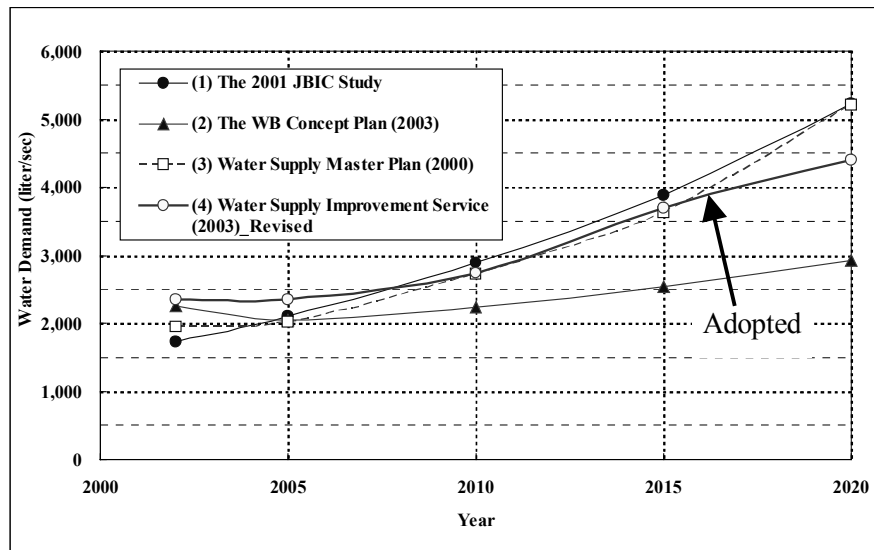
Other issues are (i) budget shortages for regular maintenance works, (ii) low revenue-collecting ratio (60 %), and (iii) deteriorating raw water quality and high turbidity at intakes in the lower Jeneberang River.

5.3 Water Demand Projection

Water demand for the Makassar City was projected in four studies conducted recently (2000-2003). The results are compared in the figure below. This Study considered the latest projection by PDAM ((4) in the figure) would represent a most likely projection. Water demand was projected to increase up to 4,400 liter/sec (or 139 MCM⁴ per year) in 2020 from the present 2,340 liter/sec (74 MCM).

The projected water demand of 4,400 liter/sec for year 2020 consists of 2,890 liter/sec (65 %) for domestic use, 80 liter/sec (2 %) for social water use, 120 liter/sec (3 %) for industrial use and 1,320 liter/sec (30 %) for unaccounted-for-water.

⁴ MCM: million cubic meters



Water Demand Projection for Service Area of PDAM Makassar

Water demand of PDAM Gowa is projected to grow from the present 190 liter/sec (present actual supply capacity) to 810 liter/sec in 2020.⁵

Since there is no alternative water source, all future demand growth will be met from the Jeneberang River.

6. Hydrology and Water Balance Study

6.1 Rainfall Analysis

The mean basin rainfall was estimated using the Thiessen Method based on 5-day rainfall data gauged at a total of nine stations. These data covered a 30-year period from 1972 to 2001. As a result, it was clarified that Jeneberang river basin has received an average annual basin rainfall of 3,830 mm/year, although this has varied greatly from 2,450 mm/year to 5,300 mm/year over the period.

The probable one-day rainfalls were further estimated using the Gumbel Method based on annual maximum one-day rainfalls at two gauging stations at Malino and Bili-Bili. The estimated probable rainfalls of varying return period are: $R_{50\text{-year}}=303$ mm, $R_{10\text{-year}}=234$ mm and $R_{2\text{-year}}=154$ mm at Malino, and $R_{50\text{-year}}=317$ mm, $R_{10\text{-year}}=228$ mm and $R_{2\text{-year}}=157$ mm at Bili-Bili, respectively.

⁵ Main Report on Consulting Services for Comprehensive Water Management Study for Maros-Jenepono River Basin, November 2001, CTI Engineering

6.2 Runoff Analysis

Estimates of long-term basin runoff are essential for the simulation of a water supply-demand balance. Basin runoff was simulated using a Tank Model Method based on the above 5-day basin rainfall and covered the 30-year period from 1972 to 2001. From the simulation, it is estimated that the annual discharge from the upper reaches of Bili-Bili Dam (catchment 384.4 km²) is on average about 1,100 million m³, which is equivalent to about three times the effective storage capacity of Bili-Bili Dam reservoir (346 million m³). Adding the annual runoff of 570 million m³ from Jenelata River Basin (226.3 km²), the total annual runoff of Jeneberang river basin is estimated to be about 1,670 million m³.

6.3 Simulation of Water Supply-Demand Balance

The water supply-demand simulation was undertaken to clarify the present and future balance between available water resources of Jeneberang River and the water demand dependent on the Jeneberang River as the water source.

From the results, the three years of 1972, 1982 and 1997 within the simulated 30 years were identified as drought years, during which Bili-Bili Dam reservoir could not satisfy the present water demand. Thus, it is concluded the supply from Jeneberang River could meet the present water demand up to a probable drought with a 10-year return period (based on three simulated drought years divided by 30 years of the simulation period).

Further water balance simulations were made assuming future incremental municipal water demand was added to the present demand. As the result, it was estimated that the frequency of drought years would increase from 1/10 years at present to 1/5 years in 2018 and 1/3.8 years in 2019-2020.

7. River and Infrastructure Management Plan

7.1 Present River Management in Jeneberang River Basin

7.1.1 Existing River Infrastructures

A variety of river infrastructures exist in Jeneberang river basin as shown in Table S7.1 and Figures S7.1 and S7.2. The major structures used as water sources and for distribution are Bili-Bili Multipurpose Dam, Rubber Dam, Long Storage and three irrigation weirs, namely Bili-Bili, Bissua and Kampili weirs. There are also a variety of riparian structures and urban drainage facilities for flood mitigation along the lower Jeneberang River and seven sand pocket dams/sabo dams⁶ in the upper reaches of Bili-Bili Dam. The latter function to minimize sediment inflow into Bili-Bili Dam reservoir.

⁶ Excluding Sabo Dam No.4 which was abandoned due to damage by flood and debris flow

7.1.2 Water Quantity Management

Bili-Bili Dam was originally designed to satisfy a total water demand of about 541 million m³/year during a 5-year drought. However, some water demand programmed at the time of the dam design has not yet taken place. As a result of an updated review, the present water demand is limited to about 490 million m³/year. Bili-Bili Dam reservoir could therefore fully satisfy its present water demand up to a 10-year drought, as simulated in Section 6.3 above. Thus, Jeneberang River still has sufficient water capacity and has never experienced a serious drought since operation of Bili-Bili Dam commenced in 2000.

In light of this background, a less strict and consistent water quantity management has evolved as seen in the following conditions:

- (1) The updated water demand is substantially authorized only by JRBDP as the present operator of Bili-Bili Dam reservoir and not through the formal permission of the Provincial Governor/Dinas PSDA.
- (2) Daily water distribution for the updated water demand is implemented in a rather vague manner due to (i) defects in devices monitoring river flow and water intake volume and (ii) inaccurate H-Q rating curves at the existing water level gauging stations. The latter have not been updated since their original development in 1999.
- (3) No definite coordinating body exists for daily water distribution. JRBDP is informed of downstream water requirements at irregular intervals by the water users themselves.
- (4) No definitive drought management system for Jeneberang River has been established.

7.1.3 Flood Management

The low-lying flood plain areas extend over the densely populated areas of Makassar and Sungguminasa City along the river reaches downstream of Sungguminasa Bridge. River flow capacity is increased by existing river dikes, and floods are controlled by the Bili-Bili Dam reservoir. The floodplains are therefore currently protected against a design flood with a 50-year return period. Due to the flood control effect, no serious flood damage has occurred since completion of Bili-Bili Dam in 1999.

However, no countermeasures exist against major floods exceeding those with a 50-year return period. In order to minimize disastrous flood damage, including the death of people during such major floods, it is necessary to formulate an emergency flood warning, fighting and evacuation system.

7.1.4 Management of River Area

The relevant government and provincial regulations prescribe that a water body (such as river, lake and dam reservoir) and its adjacent river corridor with outer boundaries (defined in the following Table) represent the minimum extent of the river area.

Borderline of River Corridor

Type of Water Body	Borderline of River Corridor
River with dike in urban area	3 m from edge of dike
River with dike in non-urban area	5 m from edge of the dike
Major river ($A > 500 \text{ km}^2$) without dike in non-urban area	100 m from the river bank
Minor river ($A < 500 \text{ km}^2$) without dike in non-urban area	50 m from the river bank
Bili-Bili Dam reservoir	Both: <ul style="list-style-type: none"> - Land around the reservoir, which has a ground level between NWL and SWL of Bili-Bili Dam*, and - Land around the reservoir to a width of 50 m from the shoreline of the reservoir at NWL**.

* : The land acquired by JRBDP as the dam management agency

** : The land as specified in the Minister of MPW Decree No.63/1993

Presently, JRBDP and Dinas PSDA are the principal administrative agencies for the above water body as well as river corridor. However, regular inspections in the area are rarely implemented. This has resulted in illegal activities such as sand mining without permit licenses and construction of houses in the river corridor often being seen along the Jeneberang River.

7.1.5 Operation and Maintenance of River Infrastructures

JRBDP has undertaken a substantial part of O&M works of river infrastructures in the Jeneberang River. The annual budget of JRBDP in 2004 was Rp. 88 billion, of which 89 % was allocated to water resources development projects. Thus, the present works by JRBDP is oriented to development rather than O&M.

O&M works in the Jeneberang River basin increased significantly in 2003 due to commencement of O&M of Bili-Bili Dam. The budget allotted to O&M works was Rp. 1,329 million (about 4.7 % of total annual budget) in 2003 and Rp. 954 million (about 1.1 %) in 2004. Of the total O&M cost, that for Bili-Bili Dam accounted for about 65 % of the total O&M cost in 2003 and 84 % in 2004. In contrast to Bili-Bili Dam, however, the sand pocket dam /sabo dams and riparian structures such as river revetments, groynes and groundfills are likely to have received little notable O&M work.

7.2 Proposed Water Quantity Management Plan

7.2.1 Water Allocation Plan

As described above, shortages in water supply would occur during a 5-year drought year after 2018 due to increased municipal water demand from the Jeneberang River. Hence, in order to protect the reliability of water supply for present water uses and to establish more effective and fair rules over water allocation, the licensing of water use permits should be strictly implemented to comply with the present regulations.⁷ It is further proposed that permits of water use should be granted to the present water demand of 490.0 million m³/year, which prevails over the general

⁷ MPW is now studying the introduction of a water use rights (WUR) system in place of or as a supplement to the present water use permit system.

community recognition.

Of the total water use, irrigation water requirements account for the largest share at about 78.0 %, followed by 12.3 % for municipal water use, 6.4 % for river maintenance flow, and 3.2 % for the `sugar factory in Kabupaten Takalar. The existing river infrastructures should maintain the following drought levels for these water uses: (a) 5-year drought for irrigation use and (b) 10-year drought for other water use.

7.2.2 Monitoring Plan on River Flow Discharge and Water Use

The Public Corporation, as the river management authority, has an obligation to satisfy the water requirements of the above water users against the designated drought reliability levels. In order to ensure this obligation, the Public Corporation is required to precisely monitor seasonal variations in both river flow and water use requirements. Such monitoring works have become more crucial since completion of the Bili-Bili irrigation project in November 2004.

From these viewpoints, monitoring of the following river flow and water intake discharges is proposed: (1) inflow/outflow of dam reservoir, (2) unregulated flow discharge from the Jenelata River, (3) river flow below the major water intake points, and (4) water abstraction volumes at all intake points where water use permits are granted. Among these monitoring items, those for items (1) to (3) should be monitored by the Public Corporation, with item (4) monitored by water users under supervision of the Public Corporation.

7.2.3 Proposed Procedures for Water Distribution

In order to achieve sustainable water distribution throughout the year, the Public Corporation should prepare a draft of the semi-annual water allocation plan at the end of the rainy and dry seasons. The draft of the plan should stipulate the updated water users and seasonal variations in water abstraction volumes for the next six months. The draft of plan is to be submitted to, evaluated and finalized by the Water Resources Coordination Committee (PTPA). PTPA would distribute the finalized semi-annual water allocation plan at least four (4) days before commencement of the daily operation for water allocation to the relevant agencies, such as the Public Corporation, Dinas/Balai PSDA and all other water users entitled to have a water use permit.

Based on the semi-annual water allocation plan, the Public Corporation should further formulate a daily operation plan for water distribution. This would stipulate the time schedule of operation, necessary personnel in charge, and their duties at the end of the dry season. The Public Corporation is further required to collect the half-monthly water requirement from all water users.

7.2.4 Drought Management Plan

Should the Bili-Bili Dam release its stored water unconditionally to meet the downstream water requirement, the available water in the reservoir could possibly drop to zero during drought years.

This would cause a sudden and drastic reduction in water supply, even drinking water. In order to avoid such unfavorable conditions, a drought management plan together with detailed methodologies on reservoir operation was proposed (refer to Vol. II Main Report- Chapter 7). The principles and/or contents of the proposed drought management are outlined below:

- (1) The priority of water supply during drought years should be given to municipal water supply and river maintenance flow.
- (2) The present Reservoir Operation Curve (RC), which was established in 1993 and is based on the lowest daily reservoir water level, should be revised in accordance with the updated water uses. Revisions to the RC were made in this Study as presented below:

Month	Present and Proposed Reservoir Operation Rule Curve	
	RC at the beginning of Month (EL. m)	
	Existing	Newly Proposed
May	99.0	84.0
Jun.	95.0	88.5
Jul.	88.0	84.0
Aug.	81.0	79.5
Sep.	74.0	75.0
Oct.	66.0	70.5
Nov.	65.0	66.0
Dec.	67.0	66.0

Note: The daily RCs are defined as the values interpolated from the above RCs at the beginning of each month.

- (3) Reservoir operations in the drought years should be made based on the stepwise procedure proposed in Table S7.2.

7.3 Proposed Flood Management Plan

7.3.1 Plan for Flood Warning, Evacuation and Fighting System

In order to cope with an extreme flood, which exceeds the design level of the existing flood control facilities (i.e., 50-year return period flood in Jeneberang River basin), the following flood warning, evacuation and fighting system is proposed.

(1) Setup of Flood Warning Levels

The warning levels are classified into (1) Step 1 for Standby, (2) Step 2 for Warning and (3) Step 3 for Evacuation/Flood Fighting. These would be determined based on the discharge/water level gauged at the four principal telemetry stations shown in Table S7.3 and Figure S7.3. There are also several telemetry water level and rainfall gauging stations transmitting data to the Dam Control Office at the dam site and Monitoring Office in Makassar. These should be used as supporting gauging stations and their data taken into consideration as a reference for forecasting of future flood conditions.

(2) Required Work Activities at Each Flood Warning Level

The Public Corporation would place its flood-warning center at the existing Monitoring Office for Bili-Bili Dam in Makassar City, where the Operation Director of Public Corporation should be

stationed during a flood to make all critical determinations and issue flood warning, evacuation and fighting messages. The secondary center would be placed at the Dam Control Office at Bili-Bili Dam site and undertake the necessary flood control operation of gate facilities at Bili-Bili Dam based on the flood conditions (flood discharge, rainfall intensity and dam inflow discharge). The Public Corporation, with a mandate to instigate the proposed flood warning center, should undertake those activities listed in Table S7.4.

7.3.2 Development and Dissemination of Flood Risk Map

The flood risk map should be revised and disseminated to ensure that residents are aware of the extent of the potential flood inundation area and available evacuation routes during a flood. The flood risk map could also provide guidance for appropriate urban planning and land development.

The potential flood inundation area was estimated as the basis for the flood risk map in this Study, as shown in Figure S7.4. The estimated area covers some 58.5 km², extending over a substantial part of Makassar and Sungguminasa City on the left bank of the Jeneberang River. The location of evacuation centers as well as evacuation routes were, however, not specified in this Study due to limited information. The evacuation centers/routes should be designated in the future by the relevant local government agencies based on the base flood risk map. The flood risk map should be disseminated to the public through a bulletin, an information board and other available information tools.

7.4 Proposed Management Plan of River Area

7.4.1 Land Use Control in River Area

In order to sustain appropriate conditions in the river area, the Public Corporation should undertake the following activities:

(1) Development of Inventory of River Area

To facilitate management of the river area, the Public Corporation should develop an inventory of the river stretches and river corridors in its river management area. The inventory should contain information on land ownership, classifications of land use type and sand mining activity, if any, together with evaluation on whether or not the activities could cause danger to the levees.

(2) Land Use Control in River Utilization Area

The river utilization area⁸ (Daerah Manfaat Sungai) is defined as part of the river area and covers the water body and its adjacent river corridor where land acquisition has been executed by the river administrator. The allowable land use in this river control area should be limited to those associated with public interest such as river-parks and public grounds. Moreover, structures in the river corridor should be limited to those not impeding flood flow and/or riparian structures such as

⁸ The above English terms are based on literal translation of Indonesian terms

water level gauging stations and drainage sluices, which must be constructed within the river corridor.

(3) Land Use Control in River Control Area

The river control area⁸ (Daerah Penguasaan Sungai) is defined as part of the river area but is limited to the river corridor, where land acquisition has not been executed by the river administrator. The land in the river corridor is privately-owned and therefore, the Public Corporation could not impose its authority of land control over the river corridor. Nevertheless, the Public Corporation should monitor the progress of land exploitation in the river corridor, and control any excessive exploitation, whenever it is judged to have significant impacts on river morphology, river flow conditions, and/or river environment.

(4) Land Use Control in Circumference of Bili-Bili Dam Reservoir

Any removal of grass and logging activities in the area around the dam reservoir under the management of the Public Corporation should be subject to approval of the Public Corporation. Construction of structures except those for public interest, such as roads and riparian structures, should also be prohibited in the area.

7.4.2 Control of Sand-mining

The following measures should be taken in order to prevent the current progressive and serious degradation of the downstream riverbed of Jeneberang River below Bili-Bili Dam, which has resulted due to excessive sand mining activities:

- (1) Stop any renewal of mining licenses for the downstream channel below Bili-Bili Dam;
- (2) Promote the potential sand mining sites located upstream of the reservoir area and the sand pocket dams Nos.1 to 4 (refer to Figure S7.5).
- (3) Carry out the river channel survey at the end of every rainy season and clarify the tendencies of riverbed degradation at each major river structure based on the results of the river channel survey;
- (4) Estimate sediment deposition in the riverbeds at each major river structure after ceasing renewal of mining licenses;
- (5) Estimate the allowable sand mining volume and available mining sites on the downstream reach of Jeneberang River based on clarification of the above result; and
- (6) Carry out a river patrol to control illegal sand mining activities.

7.4.3 Control of Sediment Runoff from Collapse of Mt. Bawakaraeng

As described above, the recent collapse of Mt. Bawakaraeng is now producing a substantial volume of sediment runoff. In order to reduce the sediment accumulation in the dam reservoir and to prevent the impounded water in the natural ponds at the caldera of Mt. Bawakaraeng from flowing out, JRBDP will implement urgent countermeasures outlined below. The Public Corporation should collaborate on project implementation with JRBDP.

- (1) Increase sand trap capacity of sand pocket dams and sabo dams by: (a) excavation of sediment deposits at the existing sand pocket dams/sabo dams, (b) raising of height of the existing sand pocket dams and sabo dams, (c) construction of new sabo dams⁹, and (d) rehabilitation of the existing damaged sand pocket dams and sabo dams;
- (2) Construct a waterway (such as drainage channel and siphon) to drain the water impounded in the ponds;
- (3) Establish a monitoring system including assigning a watchman and establishing telemetry hydrometric gauging stations at critical points;
- (4) Establish mudflow warning system including (a) organizing of the community network¹⁰, (b) setup of warning sirens and (c) using radio broadcast system for early warning; and
- (5) Disseminate the hazard map.

7.5 Proposed Operation and Maintenance (O&M) Plan of River Infrastructures

7.5.1 Objective River Infrastructures for O&M by Public Corporation

Of the river infrastructures currently managed by JRBDP, those apart from urban drainage facilities are essential in maintaining consistent water quantity and flood mitigation to a wide range of beneficiaries. The urban drainage facilities only contribute to the benefit of Makassar City, and their function is less related to consistent river management. As a result, the Public Corporation should undertake O&M for all river infrastructures other than urban drainage facilities. O&M for the urban drainage facilities should be handed over by JRBDP directly to Makassar City.

7.5.2 Expansion Program of O&M by Public Corporation

Due to limited potential human resources and budgetary constraints, it is assumed to be difficult for the Public Corporation to initially undertake O&M of all river infrastructures. The following expansion program of O&M is therefore proposed after considering the potential revenue source for the Public Corporation:

Proposed Expansion Program of O&M by Public Corporation

Stage	Objective River Infrastructures of O&M by Public Corporation
Initial stage in 2007 and 2008	<ul style="list-style-type: none"> – Bili-Bili Dam and its associated Raw Water Transmission Main (RWTM); – Rubber Dam and Long Storage; and – Three irrigation weirs of Bili-Bili, Bissua, and Kampili.
Succeeding stage from 2009 onward	<ul style="list-style-type: none"> – Four sand pocket dams and three sabo dams (other than Sabo Dam No.4, which was seriously damaged and abandoned) in upper reaches of Bili-Bili Dam reservoir, and – Riparian structures such as embankments, revetments, groynes, and groundsills, and sluices along the downstream reaches of Jeneberang River from the river mouth up to Sungguminasa Bridge.

⁹ Eleven sabo dams are proposed. One is about 1.2 km downstream from Daraha Bridge and the other ten dams are about 1.5 km upstream from the Bridge.

¹⁰ The community named “Komunitas Sabo Jeneberang” has already been established for early dissemination and evacuation against the mud-flow.

7.5.3 Development of Inventory and Location Map of Water Resource Facilities

In order to ensure effective inspection and maintenance, an inventory of all major river infrastructures in Jeneberang river basin should be developed and updated. It would contain the following information:

- (1) A unique identity number (ID) and name of each infrastructure;
- (2) Location of infrastructure and name of river on which infrastructure is located; and
- (3) Structural size, type and quantities of river infrastructures.

Preliminary location maps of the river infrastructures from the river mouth to Sungguminasa were developed in this Study as shown in Figure S7.6.

7.5.4 Maintenance Plan

The works are broadly classified into the following three categories:

- (1) Preventative Maintenance: This aims at maintaining the original design function of the river infrastructure based on the following three activities:
 - (a) Routine Maintenance, which includes all repetitive activities to be performed throughout the year such as lubrication of mechanical facilities and removal of weeds, garbage, and sediment deposits,
 - (b) Periodic Maintenance, which includes all activities such as overhaul of mechanical facilities and re-painting of substantial parts of metal components, to be performed at intermittent intervals in accordance with a predefined program; and
 - (c) Small Repair Work, which includes works of a small-scale necessary for restoration of a facility such as repairs of small cracks, holes or detachment on structures and replacement of damaged facilities.
- (2) Corrective Maintenance: This aims at more substantial repair/replacement works (than the Preventative Maintenance) to restore a facility that has considerably reduced its original design function due to over-extended operation and/or destructive damage.
- (3) Emergency Maintenance: This is executed to prevent imminent failure of infrastructures during extreme disasters such as floods, landslides and earthquakes.

Among these, Preventative Maintenance would be performed based on a definite and consistent maintenance plan. On the other hand, both Corrective and Emergency Maintenance are ad-hoc and it is therefore difficult to formulate in advance a consistent annual plan.

Both Corrective Maintenance and Emergency Maintenance require huge implementation costs within a rather short period and budgetary arrangements for them are deemed to be well beyond the capacity of the Public Corporation. Moreover, Corrective and Emergency Maintenance is oriented to replacement of the assets (river infrastructure) resulting from over-operation and/or destructive damage during extreme natural disasters. Such replacement of the assets is deemed to be the responsibility of JRBDP, as the possessor of the assets, but not the Public Corporation as the operator of the assets.

From these viewpoints, both Corrective and Emergency Maintenance should be excluded from the scope of the Public Corporation. The Public Corporation should formulate a maintenance plan for Preventative Maintenance. In due consideration of the present status of river infrastructures, standard maintenance works described in Volume IV-1 "Part-I Guidelines and Manuals for River Infrastructure Operation and Maintenance" were defined.

7.5.5 Operation Plan

The operation procedures for all objective river infrastructures are described in the existing O&M manuals as currently applied by JRBDP. The list of available O&M manuals is shown in Table S7.5.

All O&M manuals, other than those for irrigation intake facilities, were prepared from 1994 to 2001, but no updating on the contents of the manuals has been implemented. As a result, some operating instructions in the manuals are not compatible to the present water demand, present land use, and other existing, relevant conditions. Moreover, the manuals contain no definitive technical instructions to combat emergency cases such as the occurrence of extreme droughts or floods exceeding design levels.

Taking this into account, the necessary revisions and updating of contents of the existing manuals was undertaken in this Study. This was based on the O&M plan of the relevant river infrastructures mentioned below and its results are compiled in Volume IV-1 "Part-I Guidelines and Manuals for River Infrastructure Operation and Maintenance".

7.5.6 Required Rehabilitation Works for Existing River Infrastructures

Some river infrastructures exist that are seriously damaged and have not received the necessary rehabilitation and/or replacement. JRBDP would be required, as the present possessor of the facilities, to repair and/or replace these before hand-over of O&M works of the structures to the Public Corporation. The major required rehabilitation works together with their rehabilitation costs are summarized below:

Required Rehabilitation Works for Existing River Infrastructures

Objective Facilities	Required Cost of Rehabilitation (Rp. Million)
Telemetry gauging system for monitoring and operation of Bili-Bili Dam, including a partial revision of software system	703.8
Flow meter placed at inlet of RWTM	7.5
Eleven drainage gates along the downstream reach of Jeneberang River	1,250.0
Total	1,961.3

Note: Excluding repairs of Rubber Dam, Groundsill No.2 and Sand Pocket No.4: the former two are under repair and the latter one is scheduled to be repaired by JRBDP

7.6 Required Cost for O&M of River Infrastructure and River Management

The O&M cost of river infrastructures and relevant river basin management by the Public Corporation was estimated at Rp. 4,054 million per year. This corresponds to about three times the actual budget disbursed by JRBDP. The breakdown of the estimated cost is listed below:

Summary of Cost for O&M of River Infrastructures and Cost for River Management *

(Unit: Rp. million)

Item	Facility/management Field	2007-2008**	From 2009 onward
O&M of River Infrastructures	Bili-Bili Dam/RWTM	933	996
	Irrigation Intake Weir	566	593
	Rubber Dam/Long Storage	353	437
	Riparian Structure	0	428
	Sand Pocket Dam and Sabo Dam	0	468
	Sub-total	1,852	2,917
River Management	Water Quantity management	188	259
	Flood Management	229	278
	Drought Management	227	267
	River Conservation Management	209	334
	Sub-total	854	1,137
Total		2,706	4,054

* The above cost represents direct cost of O&M works, not including indirect expenditures such as indirect personnel cost and general expenses

** In accordance with the proposed expansion program of O&M as described above, Public Corporation would not undertake O&M for the sand pocket dam/sabo dam and riparian structures during the first operation period from 2007 to 2008.

8. Water Quality and Watershed Conservation**8.1 Water Quality Management**

8.1.1 Water Quality of Jeneberang River

Of the rivers in South Sulawesi Province, the Jeneberang River is of relatively better water quality. Although the available data are limited, the water quality of Jeneberang River, represented by BOD and COD values, can be compared with that of other rivers as below:

Comparison of BOD and COD in Rivers in South Sulawesi

(Unit: mg/l)

River	Jeneberang River ¹⁾	Average of other 7 rivers ²⁾	Urban Drainage Canal in Makassar City ³⁾
BOD	2 – 6	6 -20	20 -50
COD	8 -14	14 -50	35 -70

Note: The above figures show a range of observed data. See Figure F4.1 of Supporting Report F.
BOD: Biochemical oxygen demand, COD: Chemical oxygen demand

Source: 1) Environment Impact Assessment of Bili-Bili Multipurpose Project (1997-2001), 2) Hydrology and monitoring section of Dinas PSDA (2003), and 3) Observation under JICA Study (2004)

Figure S8.1 shows the seasonal variation of representative water quality parameters of the Jeneberang River (data before the Bawakaraeng land collapse). This shows that, although the extent is not severe, the observed BOD values (3 to 6 mg/l) do not meet the requirement for the standard of Class-I water¹¹, which is classified as water acceptable as a raw water source for drinking water supply (BOD value Class-I water to be less than 2 mg/l). The observed COD (9 to 11 mg/l) is also at marginal levels in terms of meeting the Class I water standard (COD value to be less than 10 mg/l). Deterioration of river water quality seems to be progressing.

¹¹ Raw Water Quality Standard of Government Regulation No.82/2001

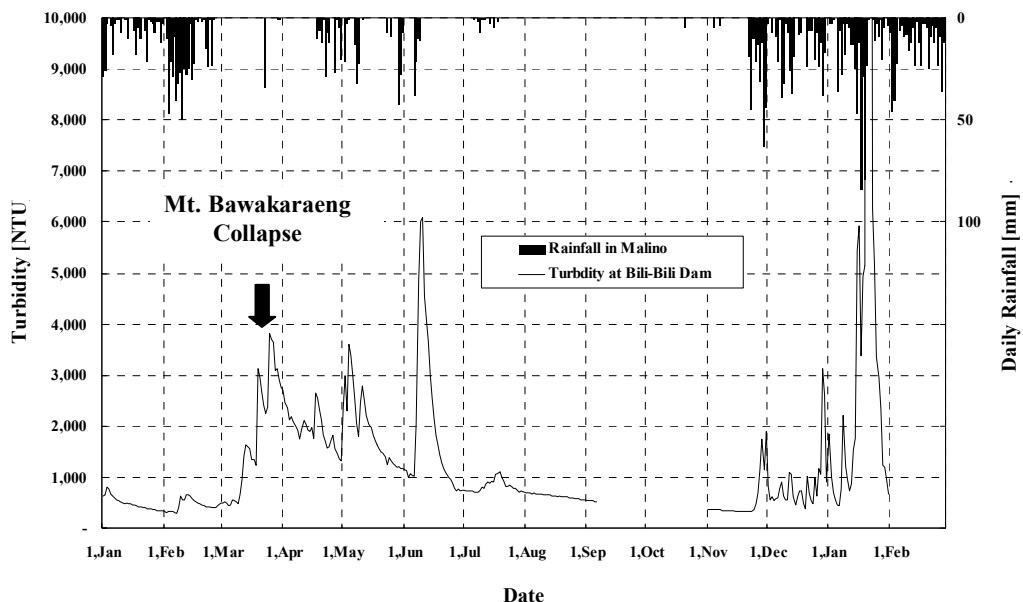
The river water has relatively high suspended solids (60-150 mg/l) and turbidity (40-70 NTU) during the rainy season. This is supposedly due mainly to deterioration of the upper watershed and partly due to sand mining activities along the river course.

The data also show that river water has a total nitrogen (T-N) content of 0.11 – 0.22 mg/l, although this is not serious. Such levels indicate the increasing use of fertilizers in upstream agriculture.

The potential sources of water pollution or contamination can be summarized as: (i) domestic pollution sources located everywhere along the river stretches, (ii) industries located mainly in the lower area, (iii) agricultural activities in the upstream area, (iv) deterioration of upper watershed, (iv) sand mining activities, and (v) recent Mt Bawakaraeng land collapse. Figure S8.2 shows the location of potential pollution sources.

A large-scale land collapse occurred in March 2004 at Mt. Bawakaraeng in the uppermost basin that has seriously aggravated the turbidity of river water. After the land collapse, the turbidity rose drastically to a level of 1,000 - 6,000 NTU in the rainy period (April-June 2004), remained at 400 - 500 NTU in the subsequent dry period (July-November 2004), and again rose to higher levels in this rainy season (from December 2004). This has resulted in some difficulties in the water treatment process in the PDAM water treatment plants.

Relating mainly to the above turbidity issue, the Study conducted some selected items of water quality observation during a period from September 2004 to March 2005. Figure S8.3 shows the results of observation.



Period: Jan. 2004 – Aug. 2004

Source: Proyek Induk (Rainfall), PDAM Makassar (Turbidity)

Record of Turbidity after the Land Collapse

8.1.2 Present Water Quality Monitoring Activities

(1) Water Quality Monitoring

There are several agencies conducting water quality monitoring on the rivers in the Province, including Jeneberang River. They are Bapedalda, Dinas PSDA, JRBDP, PDAM Makassar (at their WTPs) and PLN (at Bili-Bili hydropower site).

Reviewing the present water quality monitoring activities, the Study noted that due improvement would be required in the following aspects:

- a) Water quality monitoring is being conducted by several agencies as stated above. They are however mostly on an ad-hoc and intermittent basis and not with a predetermined integrated monitoring program coordinated among the agencies concerned. The observed data are not properly reported to Bapedalda.
- b) There is no coordinated data management system at present. The data are kept in different ways of filing (hard copy or computerized file) by each agency.
- c) Bapedalda has commenced monitoring of effluent discharges (presently at 16 identified factories), but has not fully launched the implementation of controls on inadequate effluent disposals (such as instruction of corrective measures, fines and sanctions), although some effort is being made.

As the leading agency for water quality conservation and management, Bapedalda shall take the initiative in improving the above aspects in coordination with the concerned agencies. Overall framework of demarcation of roles and responsibilities among the concerned agencies is proposed as shown in Figure 8.7 of Main Report.

(2) Water Quality Testing Laboratory

At present, there are four laboratories operating in Makassar. They are laboratories operated by (i) Provincial Industry Service, (ii) Provincial Health Service, (iii) Bapedalda, and (iv) University of Hasanuddin.

All laboratories have the capability to conduct standard water quality testing. The Study assumes that the new Public Corporation can use these laboratories to outsource on a contract basis and, hence, will not need to establish its own laboratory for a certain period. Nevertheless, there will be an option to have an own laboratory in the future depending on the increase of work volume.

8.1.3 Proposed Role of Corporation

As one of the elements for proper water resources management and as required in the relevant regulations, the new Public Corporation shall participate in water quality monitoring and pollution control activities in a cooperative manner with the concerned agencies, including among others Bapedalda. Similar to the cases PJT I and PJT II are conducting, the role and responsibility of the Public Corporation will be as follows:

Activities to be Undertaken by the Corporation

Item	Proposed Activity
1. Water Quality Management	<ol style="list-style-type: none"> 1) Conduct river water quality monitoring through sampling and testing at 8 proposed locations (see Subsection 8.1.4 below for detail), including collaboration with PROKASIH program 2) Release river maintenance discharge as required for maintaining river water quality 3) Report the results of monitoring and recommend corrective measures to Bapedalda through Dinas PSDA 4) Assist Bapedalda in formulating and conducting an integrated water quality monitoring activity in the basin
2. Wastewater Pollution Control	<ol style="list-style-type: none"> 1) Periodically monitor effluent quality at pollutant sources in addition to factories' 3- monthly reporting currently in practice 2) Identify pollutant sources as part of river patrol survey 3) Analyze collected data and propose necessary corrective measures as required 4) Report the results of data analysis and recommend corrective measures to Bapedalda through Dinas PSDA 5) Submit technical recommendation regarding the issue of effluent discharge permits on demand of Bapedalda 6) Assist Bapedalda in formulating and conducting an integrated water pollution control activity in the basin 7) Collect effluent discharge fee as service cost for the above activities, through regional tax office (collection of the fee together with effluent discharge tax)
3. Data Management	<ol style="list-style-type: none"> 1) Keep in custody all collected data in a database system established in the Corporation 2) Exchange data among all other agencies to share information 3) Coordinate with Bapedalda in establishing a provincial data management system 4) Disseminate relevant information to public through Corporation's annual report, public information leaflet or web-site

The estimated cost of the above services is about Rp. 366 million annually on a direct cost basis.

8.1.4 River Water Quality Monitoring Plan

Main objectives of river water quality monitoring are the identification of any potential problems before they arise. The monitoring will focus mainly on the following six aspects:

- (a) Adequacy of water quality for use as a source of drinking water supply
- (b) Hazardous industrial effluent inflow into the river in the lower reach
- (c) Effect of using fertilizers in upstream agriculture
- (d) Eutrophication of Bili-Bili reservoir water, particularly potential pollution due to fish-cage aquaculture
- (e) Excessive sediment runoff from Mt. Bawakaraeng area
- (f) Excessive aggravation of water quality in canals of Makassar City

Eight (8) locations are selected for monitoring of the river water quality, as shown in Figure S8.4. Of the 8 locations, observation of No.8 (at Makassar city canal) shall eventually be taken over by the Cipta Karya of Makassar City in the future.

8.1.5 Financial Source

Water quality monitoring is a service essential for public health and environmental conservation, but no revenue income is expected for the Corporation. Thus, the expenditure incurred by the Corporation shall be borne by the government under a concept of public service obligation (PSO).

Existing regulations (Government Regulation No.6/1981) stipulates that polluters shall pay a fee to the river management body as compensation for having caused contamination of water. However, there has been no definite regulation applicable to the Jeneberang River. A new decree¹² shall be legislated, either by MPW or regional government, to authorize the Corporation to collect the effluent discharge fee in the Jeneberang river basin.

8.2 Watershed Conservation

8.2.1 Need for Forest Conservation

The Study noted that the most prominent issue regarding upper watershed conservation is the decreasing trend in forest area. According to the CEPI-PPLH UNHAS study in 2001, it was identified from satellite image data that a considerable change in land use cover has taken place during the recent 10-year period. The result is summarized below:

Changes in Land Use in the Jeneberang River Basin

No	Type of Cover Crops	Landsat 1987		Landsat/Spot 1996	
		Area (ha)	%	Area (ha)	%
1	Forest	25,845	34.46	17,250	23.00
2	Dry-land	22,118	29.49	28,845	38.46
3	Wetland paddy	19,973	26.63	18,383	24.51
4	Settlement Area	3,314	3.93	5,909	7.69
5	Bushes	3,750	6.15	4,613	6.15
Total		75,000	100.00	75,000	100.00

Source: Center for Environmental Survey of Hasanuddin University (CEPI-PPLH UNHAS), 2001

Because of population growth and development activities, land coverage in the upstream area of Jeneberang basin has changed annually. In particular, horticultural farming practices and tourism activities in the upstream area have generated changes in land coverage pattern from forest area into lands for horticulture cultivation, tourism infrastructures and supporting facilities.

The reduction of forest area in the upper watershed is not only causing impacts on the forest ecosystem but also generating further effects on the hydrological regime such as increases in the maximum-minimum discharge ratio, prolonged drought duration, increase in sediment yield, and so on.

¹² A decree similar to Kimpraswil Decree No.342/KPTS/M/2002 issued for PJT I to authorize PJT I to collect and receive fees including effluent discharge fee

¹³ A decree similar to Kimpraswil Decree No.342/KPTS/M/2002 issued for PJT I to authorize PJT I to collect and receive fees including effluent discharge fee

8.2.2 Watershed Conservation

(1) Main Focuses from Aspect of River Basin Management

From the aspect of river basin management for the new Public Corporation, the main interests will be placed on the following:

- (a) Reduction of sediment yield from the upper basin
- (b) Conservation of water resources by increasing water holding capacity in the upper basin
- (c) Conservation of natural environments in the river course
- (d) Conservation of fishery resources, particularly in the Bili-Bili reservoir

Of the above, item (a) - reduction of sediment yield, will need the utmost attention and active participation of the Corporation, from viewpoints of minimizing the inflow of sediments into the Bili-Bili reservoir.

(2) Measures for Reduction of Sediment Yield

There are various types of measures, both structural and non-structural, to reduce sediment yield. Among others, the following may be the main activities:

(a) Reforestation

A report of Dinas Forestry and Land Conservation of Kabupaten Gowa (2000) estimated that existing forests requiring an early reforestation program total about 2,050 ha (about 10% of existing forest). The reforestation program will be implemented with the lead role assigned to Dinas Forestry Services, to which the Public Corporation will provide necessary collaboration.

(b) Forest Management

The UNHAS study in 2001 proposed the following economic incentive measures for forest utilization and conservation:

Exploitation of existing pine forests by planting coffee, and ensuring proper cultivation and silviculture technique so that the planting does not disturb the existing pine trees.

Conversion of public forest to horticulture plantation can still be achieved by retaining spaces for Acacia trees or Eucalypts, without felling the in-situ existing trees.

Intensification of greenbelt functions occurs along the river and around the reservoir by planting multipurpose trees, particularly in the steep slopes in upstream areas that will contribute to improving the community's income. Land behind greenbelts may be used for plant cultivation with due care in preventing surface erosion in the manner proposed in (c) below.

These measures seem practical and can meet community requirements in a sense that the land remains usable for income generation of the communities. The Corporation can collaborate in these activities by providing technical services and funding.

(c) Land Use Practices

Farming most common in the upstream area is food crop farming in the form of rainfed paddy, horticulture plants (vegetables) and plantation. Sediment yield can be reduced by exercising improved land use practices in those areas, such as bench terracing, constructing embankments following the contours, planting along the contours, and a combination of embankments and terracing. The Corporation can collaborate in these activities by providing technical services and funding.

(d) Structural Measures

Typical structural measures possible in the basin to reduce sediment yield include check dams, sand pockets, gully protection, channel consolidation work, and various types of hillside erosion control work (e.g. planting work, lateral drains, fence work, slope greening work, etc.).

Several types of work appropriate to each location will be implemented by Dinas of Kabupaten. The Public Corporation will provide technical services (design and construction supervision) and also provide funding assistance for those structural works.

8.2.3 Watershed Management by Public Corporation

It is understood that the leading role in watershed conservation will be taken by Dinas Forestry, in the field of forest conservation, and by Dinas Plantation / Dinas Agriculture, in the field of land use practices in cultivation areas. Hence, the main role of the Public Corporation will be participation (on a collaboration basis) in those watershed conservation activities.

It is proposed that the Public Corporation will provide the following services in the watershed conservation sector:

Proposed Watershed Management Activities by Corporation

	Description	Purpose
1.	Reforestation and Forest Management (a) Donation of seeds and/or seedlings to Dinas Forestry and communities (b) Provision of technical recommendation regarding priority area of reforestation / forest management, particularly from aspect of sediment yield reduction	SYR & WRC
2.	Improvement of Land Use Practices (a) Donation of funds for land use practice improvement work undertaken by Dinas of local government and communities (b) Provision of technical recommendations regarding priority area of land use practice improvement, particularly from aspect of sediment yield reduction	SYR
3	Structural Measures for Sediment Yield Reduction (a) Donation of funds for sediment yield control work undertaken by Dinas of local government and communities (b) Planning, design and construction supervision service of structural works in assisting Dinas of local government	SYR

Description		Purpose
4.	River Environment Conservation (a) Periodic inspection of condition of river course to identify any adverse issues such as physical damage to river channel, environmental deterioration, etc., as part of river patrol survey (b) Implementation of corrective measures required as part of river channel maintenance work	REC
5.	Fishery Resources Conservation (a) Monitoring of fish culture activities in the Bili-Bili reservoir so that over-development of fish-cage aquaculture should not occur (b) Reporting to local government (Dinas Fishery) regarding condition and recommendations for corrective measures	FRC

Note: SYR: Sediment yield reduction, WRC: Water resources conservation, REC: River environment conservation, FRC: Fishery resources conservation

(3) Service Schedule and Cost Estimate

Provision of these services will be a burden to the PJT Jeneberang during the initial phase of operation since no direct revenue is expected from the above services. It is proposed that the PJT Jeneberang would commence these services only after it has consolidated firm revenue income; say, commencing the services from the 3rd year after operations start. The estimated cost of the above services is about Rp. 285 million annually on a direct cost basis.

9. Legal and Institutional Framework

9.1 Existing Legislation

Four areas of legislation govern water resources management (WRM) in Indonesia: (i) control of water resources, (ii) regional administration, (iii) WRM funding and taxation, and (iv) the public corporation.

The new Water Law No. 7/2004 has introduced major change to WRM legislation, e.g. new (or enhanced) paradigms such as regional autonomy, decentralization and state revenue sharing, a National Water Resources Council, stakeholder participation in policy-making, private sector involvement in water resources development and management, and empowerment of farmers. Nine¹⁴ of the 35 WRM Government Regulations (GR) needed under the law are in various stages of completion.

On one hand, Ministry of Public Works (MPW) contemplates establishing a new Public Corporation for the Jeneberang river basin based on present laws and regulations. The revision of the GRs is therefore not necessarily a prerequisite for the establishment of the Corporation.

In September 2004, DPR¹⁵ approved the revision of Regional Autonomy Law No. 22/1999, now Law No. 32 of 2004, to include changes that will return certain authorities from Kabupaten (District) / Kota (City) to national and provincial governments. In particular, regional leaders will

¹⁴ GRs on irrigation, rivers, WRM, financial management of WR, WQM, ground water, WRM corporatization, PJT I & PJT II.

¹⁵ House of Representatives.

not be able to issue regulations that contradict Central Government (CG) policy. Following this, GR No. 25/2000 and other dependent legislation will also need revision. Again in September 2004, DPR passed Law No. 33/2004, to replace Law No. 25/1999. Changes include some small increases in funds transferred from CG to provinces and district governments.

9.2 Legislation Needed for the Establishment and Operation of the New Corporation

As described in succeeding Subsection 12.2.1, the new public corporation in the Jeneberang River basin (called 'PJT Jeneberang' or 'PJT J' hereinafter) will be established as the extension of the working area of existing PJT I. Accordingly, this Study has assessed the legal framework for establishment of a corporation on this basis.

It is estimated that seven items of national legislation will be needed to establish PJT Jeneberang: a Presidential Decree (PD), a GR and five ministerial decrees. At regional level, four provincial regulations, 8 governor decrees, at least two head of Dinas decrees, several joint decrees and cooperation agreements with Kabupaten / Kota are the main legal products to be drafted, stakeholder consulted, approved, socialized and enacted. They are listed in Table S9.1.

The scheduling of these activities suggests that PJT Jeneberang cannot be established before January 2006, and is unlikely to begin formal operations before January 2007. This is because of the time needed to (i) enact provincial regulations/decrees, (ii) budget for the cost of processing the legal products required, and (iii) preparation of PJT Jeneberang's staff, premises, O&M and financial resources for full short-term O&M operation. A projected legislation schedule is shown in Figure S9.1.

A key deadline is issuance of the PD on PJT Jeneberang and enactment of the GR on PJT III before the end of March 2005. The legislation for establishment of PJT III should precede that for PJT Jeneberang, since the Bengawan Solo basin, currently under management of PJT I, would be transferred to PJT III before PJT Jeneberang comes under PJT I.

9.3 Institutions Involved in River Basin Management

There are three groups of organizations in the water sector:

- (i) Central Government Agencies,
- (ii) Regional Government Agencies,
- (iii) Foreign-funded Projects, such as the Jeneberang River Basin Development Project (JRBDP).

The Ministries of Public Works (main ministry responsible for WR management), Home Affairs, Agriculture, Forestry, and Finance, and the State Ministry of State-Owned Enterprises, are those most concerned with regulating various aspects of the water sector. Tim Koordinasi (to become NWRC under Law No. 7/2004) should provide top-level coordination of policies and strategies in the water sector.

Regional government agencies responsible for WRM in South Sulawesi Province and the Jeneberang River basin include:

- (i) Provincial Water Resources Management Service (Dinas PSDA)¹⁶ and its technical implementation unit (TIU): the Balai PSDA for Jeneberang SWS,
- (ii) Provincial Water Resources Coordination Committee (PTPA)¹⁷,
- (iii) At the Jeneberang River basin level, the River Basin Water Resources Management Committee (PPTPA)¹⁸,
- (iv) At Kabupaten level, the Kabupaten Water Resources Services,
- (v) At farmer level, P3As and GP3As.¹⁹

The Jeneberang River Basin Development Project (JRBDP)²⁰ is one of two major foreign-funded WR development projects in the Jeneberang river basin, and is responsible for constructing and currently operating the Bili-Bili dam and reservoir, among other things. The second development project, PIRASS²¹, rehabilitates dams and irrigation systems and develops irrigation systems, swamps and irrigation for fishponds throughout South Sulawesi, including Bili-Bili, Bissua and Kampili irrigation systems.

9.4 Requirements for PJT Jeneberang

Five first, second and third order rivers and their associated infrastructure (17 major infrastructures consisting of dams, weirs, gates, raw water transmission main, and 10 hydrological gauging stations) in the Jeneberang River basin (JRB) have been selected for PJT Jeneberang to manage. The rivers and infrastructures selected for management by the PJT Jeneberang are listed in Table S9.2. The stretch of rivers to be managed and the location of the infrastructures are shown in Figures S9.2 and S9.3, respectively.

To be consistent with PJT I, PJT Jeneberang's main areas of responsibility should be water quantity management, water quality management, flood and drought management, river area management, watershed management, and O&M of water resources infrastructure (refer to Chapters 7, 8 and 12 for further detail of PJT Jeneberang's responsibilities).

To achieve sustainable O&M, finance must be secured. Thus, beneficiaries, polluters and Government must increasingly bear the full cost of managing the river basin through: water use fees; pollution fees; and Government payment for essential non-commercial water services under the concept of Public Service Obligation Principle (PSO).

No beneficiary is at present paying for the raw water consumed. No polluter is paying for licenses

¹⁶ Dinas Pengelolaan Sumber Daya Air – Dinas PSDA

¹⁷ Panitia Tata Pengaturan Air – PTPA

¹⁸ Panitia Pelaksana Tata Pengaturan Air – PPTPA

¹⁹ Perkumpulan Petani Pernakai Air (Water Users Association) – P3A; Gebungan Perkumpulan Petani Pernakai Air (Water Users Association Federation) – GP3A

²⁰ Proyek Induk Pengembangan Wilayah Sungai Jeneberang – PIPWS Jeneberang

²¹ PIRASS = Proyek Irigasi dan Rawa Andalan Sulawesi Selatan.

or for discharging pollutants into water bodies. The PSO is currently being discussed for the water sub-sector.

9.5 Organization Structure and Interagency Arrangements

PJT Jeneberang will be an Operations Directorate within PJT I's organization. The Operations Director will manage two Water Service Divisions²², a Technical Bureau and Administration and Finance Bureau, with technical assistance from the PJT I parent units. An estimated staffing of 76 persons is intended for a future steady state (in the 5th year, say) to allow all assets controlled by PJT Jeneberang to be operated and maintained sustainably and efficiently. In due course, a division should be set up to develop revenue from non-water business. The proposed organization chart is shown in Figures S9.4.

Start-up staff levels will be much reduced (at 45 persons²³), partly for financial reasons (costs should be minimal until adequate revenue is assured) and partly because any newly established organization must begin with a reduced functionality. The number of staff will increase to 76 during the initial 5-year operation period.

The South Sulawesi (SS) Dinas PSDA will regulate PJT Jeneberang's WRM activities on behalf of the SS Governor, while Balai PSDA will undertake its mandate in those rivers not selected for PJT Jeneberang. Other provincial Dinas, such as Mining, will perform the same role within their sectors.

Coordination of WRM and stakeholder participation will be accomplished by the fully functioning provincial PTPA and Jeneberang PPTPA.

10. Administrative and Financial Management

10.1 Administrative Management

10.1.1 Preparation and Implementation of Work Plans

One of principal requirements from an administrative management aspect is the proper preparation and implementation of a work plan and budgetary plan. The proposed Corporation (PJT Jeneberang) will be required to fulfill the following requirements:

- (1) Formulation of the long-term plan (RJP)

MSOE Decree KEP-102/MBU/2002 and MSOE master plan 2002 (which covers 2002-2006) requires the corporation to prepare a strategic long-term plan (RJP), which covers formulation of the aim and target to be achieved during the coming 5 years. The formulation process should

²² WS Division I will cover Bili-Bili Dam / reservoir & upstream Jeneberang and Jenelata; WS Division II will cover middle Jeneberang with three weirs and lower Jeneberang.

²³ For 2007.

involve all key staff of entire working units so that the formulation is truly done with total corporation effort. Essential is the direct involvement of top management in defining the work targets, strategies, policies and implementing programs.

(2) Formulation of Annual Plan (RKAP)

According to GR No.13/1998, the Board of Directors must prepare annual work plans and budgets of the corporation. MSOE specifies the details of formulation of the annual work plan in its Decree KEP-101/MBU/2002. The annual work plan and budget plan should cover programs of O&M work, production, budget, financial estimation, donations to small local enterprises and communities, audit schedule, and other matters as instructed by MSOE and MOF. The initial annual work plan (RKAP) must be forwarded to obtain the approval of MSOE via MPW within 60 days before the beginning of the fiscal year.

(3) Implementation of Work Plan

Law No.19/2003 on State-Owned Enterprise (SOE) stipulates that one of the purposes in establishing a SOE is to pursue profits based on principles of business management. According to the MSOE Decree KEP-100/MBU/2002, the corporation's performance is evaluated by three criteria: finance, operation and administration. In financial evaluation, the SOE is requested to earn a profit equivalent to 10 % of return on equity ("A" rank - Healthy) or desirably 15 % ("AA" rank - Very Healthy). This constitutes one of the guidelines for the operation of PJT Jeneberang.

10.1.2 Corporate Monitoring and Review by the Management

Corporate monitoring and review by the management is an important activity to ensure sound corporate management and to efficiently achieve the planning targets of river basin management, including customers' satisfaction. The management review should be regarded as one of the main responsibilities of top management and be documented for accountability to the supervising authorities as well as stakeholders.

10.1.3 Internal Auditing

The internal audit chiefly addresses financial and operational aspects. It is to find any discrepancy between prescribed rules and actual works. During the audit inspection, the head of respective sections concerned should fully collaborate with PJT I's head office inspector to become acquainted with the outcomes from the inspection. The inspection should be used as a good opportunity of gaining know-how and experience accumulated in PJT I.

10.1.4 Public Relations and Customer Management

(1) Proposed Activities of Public Relations

The objective of the public relations activity is to establish and maintain a harmonic relationship with the customers and stakeholders, and to strengthen the corporate management base by making use of incoming information on their needs. Public relations will not only lead to regional

understanding on the corporation's role and activity, but also strengthen the corporate management base.

For example, PJT I have a public relations advisor working under a Management Secretariat who carries out a series of public relations programs, such as periodic surveys of customer satisfaction, awareness raising of environmental conservation and livelihood improvement. One of the programs is financial and technical support to small and medium-sized enterprises (SMEs) and cooperatives (referred to as PUKK) in the basin. This is conducted as a mandatory program appointed to all SOEs in Indonesia. Financial contribution consists of loan provision with low interest rate and grant provision to individual SMEs and cooperatives wishing to apply for such assistance. A similar public relations activity is scheduled in the PJT Jeneberang from the beginning year. PUKK will commence as early as possible after establishment of fund; say from the 3rd year.

(2) Customer Management

Customers of the corporation will be beneficiaries of water resources management; they include PDAM, PLN, industry, plantations, farmers, fisheries and the public. The corporation's management will be strengthened through a strong relationship with the customers. Therefore, the top management of the PJT Jeneberang should know the customers' present situation and their demands of the corporation.

In order to maintain good collaboration with the customers, customer satisfaction will be monitored once a year through a questionnaire to customers asking on customer satisfaction of water quantity, water quality and services provided by the PJT Jeneberang. The results of evaluation shall be reported to each business division and bureau.

(3) Stakeholder Participation

One of the tasks assigned to a public relations coordinator of PJT Jeneberang will be to educate and promote the responsibilities of the stakeholders. This will be attainable through (i) disseminating the information of the Corporation's activities to stakeholders and (ii) calling for stakeholders' involvement in the river basin management activities.

It is proposed to identify and monitor stakeholders' opinion through the following measures:

- a) Distributing questionnaires and carrying out surveys, for example using PRA (participatory rural appraisal) method
- b) Focus group discussions
- c) Providing a complaints box and setting "complaints day" to listen to and process the aspirations of the stakeholders.

(4) Feed-back of benefits to Communities in Upstream and Middle-stream Areas

It was identified in the workshops conducted during the Study that communities in the upstream and middle-stream areas still have arguments and questions about the benefits they have gained

from the Bili-Bili reservoir development and benefits they will gain from the subsequent river basin management. Some tend to believe they are victims of development activities rather than the beneficiaries.

Local people and stakeholders in the upstream area are more interested in seedling nursery and tree planting activities and also believe that tourism would be an alternative source of income for them. In the middle-stream area, people feel that water is abundant in the area downstream from the Bili-Bili reservoir, while their area suffers from a scarcity of water supply and low socio-economic conditions.

The management of PJT Jeneberang should consider donating a part of the corporation's profits to enhance the economic activities in the upstream and middle-stream areas.

10.1.5 Authority to be delegated

PJT Jeneberang shall be afforded a reasonable level of authority and power in its operation by PJT I head office. In monetary terms, the amount of authorization assigned to the Operations Director of PJT Jeneberang will be up to Rp. 50 million and the maximum amount of advance payment will be Rp. 15 million. These will be a sufficient authority for PJT Jeneberang to realize self-governance, efficient and timely decision-making and involvement of stakeholders' interest. Nevertheless, it is suggested that the anticipated major expenditures and contracts be reported to ensure they receive prior approval of the head office at the quarterly management meetings during the first 2 years of operation.

10.1.6 ISO 9001 Management System

Preparation for and effective operation of the above management system, structured by the corporate planning, monitoring and review, internal audit, and customer and stakeholder relationship management, will be a vital requirement for the PJT Jeneberang as well as top management. In this regard, adoption of International Standard Organization (ISO) 9001: 2000 - Quality Management System (QMS) is considered as one of the effective approaches to shape and strengthen the corporate management system. It is suggested that PJT Jeneberang would acquire the ISO 9001 qualification within a 5-year period.

10.2 Financial Management

10.2.1 Framework of Financial Management

Financial sustainability of the corporation requires capital adequacy, profit-making and soundness of financial ratios.

(1) Funding Plan of Paid-in Capital

Basic sources of capital to establish a corporation, to start operations and to sustain growth are equity (owner's capital), debt (borrowed capital), retained earnings and contributed capital (grant).

For PJT Jeneberang, capital investment will be made as follows:

- (a) Assets of JRBDP will be transferred to the PJT Jeneberang as owned assets, the value of which is calculated at Rp.3.438 billion. The assets consist of office building with land, office furniture, machinery and tools for O&M work. This is a capital investment in kind.
- (b) Fresh money is required for initial operation, which will be about Rp.6.0 billion²⁴ to cover initial mobilization cost and start-up working capital. The Government shall afford a grant or an interest-free loan to PJT I so that PJT I could provide initial working capital for PJT Jeneberang.

(2) Funding Plan of Working Capital

Working capital should be sourced from revenue of fees for raw water supply and other river basin management services. Additional revenue generated from non-water services²⁵ (or business) may help realize more adequate water resource management in the basin. The Study assumes that the government will subsidize part of the working capital under the principle of 'public service obligation' for the corporation's services for irrigation water supply, water quality monitoring, etc. for which collection of fees is not possible. Further detail is given in Section 12.4.

(3) Cash flow

Liquidity is the life-blood of the corporation and lack of cash will force the corporation out of business. The corporation shall ensure a constant income of revenues to generate cash flow for running the operation.

10.2.2 Accounting Policy

Law No.13/1998 prescribes the public corporation to comply with financial accounting standards set forth in the Law. PJT I set forth its accounting policy in the Director's Decree KP 001/KPTS/2000, which conforms to MSRI Minister Decree No. 49/KPTS/M/2000 and also financial accounting standards issued by Indonesian Accountant Association in 1999. Accounting is practiced based on the accrual basis. PJT Jeneberang should follow the accounting policy set forth by the PJT I.

10.2.3 Budget Control

Budget control shall be exercised by checking the current financial status and projecting the future financial condition in comparison with the predetermined budgetary plan. PJT I is conducting budget planning and control through cash flow review on a weekly basis and budget allocation review on a monthly basis for the succeeding quarterly period. A similar exercise shall also be done in PJT Jeneberang.

²⁴ Total of Rp. 4.8 billion for initial organizational set-up and Rp.1.2 billion for initial working capital at start-up stage

²⁵ Non-water services means the services other than raw water supply, including corporation's business activities such as tourism development, land lease, fishery business, sand mining business, etc.

10.2.4 Accounting System

Since PJT Jeneberang will become a work unit under PJT I, it shall use the same accounting system as used by PJT I currently. A computerized system, called ASGL (Accounting System General Ledger), was developed by PJT I in 1990. It was revised for improvement in 1999. The system is running parallel with manual bookkeeping so that reconciliation may be made at key points such as daily journal, accounts receivable/payable and cash flow. The ASGL for PJT Jeneberang was prepared under this Study with the assistance of PJT I.

11. Human Resources Development Plan

11.1 Existing HRD Programs

Kimpraswil (now MPW²⁶) runs a number of training courses in various aspects of WRM. (In 2003, 49 courses were conducted for 1,347 employees.) There is the core human resources Development (HRD) program for Civil Servants, thought by some to have little direct relevance to WRM, perhaps because of a lack of emphasis on capacity building at provincial level²⁷.

Within the PJT I, the process for assessing staff and arranging staff training appears to be systematic and may be effective. However, in setting up PJT Bengawan Solo, PJT I management was not always able to select the staff preferred. Partly for this reason, capacity development there proved arduous and demanding, e.g. in terms of PJT I management time. This should not be repeated in Jeneberang: only staff of appropriate age, caliber, motivation, qualifications and experience should be appointed, at every level.

11.2 HRD Framework Proposed for PJT Jeneberang

A statement of HRD policy for PJT Jeneberang will be needed, including statements on:

- (i) Corporate commitment to continuous development of staff;
- (ii) Self-development is a responsibility of every member of staff;
- (iii) Corporate commitment to staff appraisal, to recognize and reward improved performance, and to use enhanced skills operationally.

Top management in PJT I and in PJT Jeneberang must be committed to HRD policy and should request and be given feedback on its implementation.

HRD should be central to PJT Jeneberang's development especially in the early years. Training is directly linked to organizational development, promotion and career structure, succession planning, job evaluation and salary structure.

²⁶In this report, MPW is used for all present or future references, and MSRI (or Kimpraswil) for references earlier than October 2004.

²⁷Information extracted from a comprehensive assessment of this Program performed in 2001.

Training needs of all employees should be regularly assessed (against job and career requirements), from their appointment onwards, using standard TNA (training needs assessment) procedure. Training needs can be *reactive* (e.g. to correct substandard performance) or *proactive* (to prepare employees for new or changed work). Once training needs have been determined, one or more training programs should be identified each with a series of objectives. Objectives should be realistic, measurable and specific, and be communicated to trainees.

Off-the-job or classroom training in-house should be undertaken ensuring the use of techniques to motivate trainees, reinforce learning, and give feedback to trainees on their performance.

On-the-job training (OJT) can be handled in several ways. The “on-the-job presentation” is more suitable when only a few employees are involved and tasks are relatively simple; employees can practice immediately in the trainer’s presence and this promotes feedback and discussion.

Programmed instruction replaces a “live” trainer with a written set of instructions, programs and information modules. The trainee then works through the written material.

Training and development should be cost-effective: investment costs should be balanced by the benefits of improved performance. Trainers must devise objective measures of the results of training, e.g. increased productivity, better output quality, changes in behavior.

Trainers may be full-time professionals or capable line managers or other staff co-opted for the course or program. Supervisors and managers, even if not undertaking training themselves, must be involved in such tasks as: staff TNA, assisting with course selection and design, employee motivation and encouragement, evaluating results of training, and counseling. This implies that supervisors and managers should themselves be trained in these skills.

11.3 Manuals and Guidelines for HRM

Existing manuals and guidelines used by PJT I will be applied to HRM of PJT Jeneberang. In PJT I, most organizational and human resource management (HRM) systems and procedures are documented in decrees, instructions, procedure statements and guidelines. Job descriptions and employee specifications (JDESs) have recently been prepared for all structural positions in PJT I. Similarly, JDESs for all posts in the PJT Jeneberang start-up organization should be prepared by PJT I based on the proforma and draft JDESs provided in this Study (see Supporting Report I).

The documented procedures (ISO and non-ISO) available in PJT I are sufficiently detailed to act as training aids, as long as they are implemented with competent trainers in the early stages of PJT Jeneberang’s start-up.

Ten major organizational and HRM procedures²⁸ will be progressively transferred to PJT Jeneberang during the last 6 months of 2006 and in the first year after the start of operations at the beginning of 2007. An intensive HRD program is scheduled during this start-up period.

²⁸ Refer to Section 11.5.1 of Main Report for items of procedures

12. Establishment and Operation Plan of PJT Jeneberang

12.1 Roles and Responsibilities of PJT Jeneberang

12.1.1 Roles and Responsibilities

Based on the scope of services of PJT Jeneberang as described in preceding Chapters 7 to 11, the duties and functions of PJT Jeneberang are proposed as summarized in Table S12.1. In principle, PJT Jeneberang will act in the basin as ‘operator or service provider’.

The PJT Jeneberang will expand its activities in three phases: (i) start-up phase (2 years), (ii) development phase (3 years) and (iii) expansion phase (10-15 years). The period of (i) and (ii), 5 years in total, is regarded as the ‘mid-term plan period’.

12.1.2 River Basin Management Services

As detailed in Chapters 7 and 8, the PJT Jeneberang will provide various services related to river basin management and infrastructure O&M. The principal items are summarized in Table S12.2.

12.2 Proposed Plan for Establishment and Operation of PJT Jeneberang

12.2.1 Organizational Form of PJT Jeneberang

Ministry of Public Works (MPW, former Kimparswil) has studied three options regarding the organizational form of corporations, including four new corporations to be established each in Juratunseluna, Serayu-Bogowonto, Way Sekampung-Way Seputih, and Jeneberang river basins. The three options studied are:

- Option I: Corporations will be established under two main corporations (PJT I for eastern regions and PJT II for western regions), where Jeneberang will be under the umbrella of PJT I
- Option II: Corporations will be established under three main corporations (PJT I, PJT II and new PJT III in central Java), where Jeneberang will be under the umbrella of PJT I
- Option III: Establishment of a National Corporation, where existing PJT I and PJT II are restructured and Jeneberang is one of seven branch offices under the National Corporation

MPW finally adopted Option II in November 2004, where the PJT Jeneberang is established as the extension of the working area of PJT I at the start-up stage, while allowing a possibility of future reform to an independent public corporation, either state-owned (BUMN) or province-owned (BUMD). This MPW proposal was under process of approval of SMSOE, MOF and SEKNEG as at November 2004.

12.2.2 Schedule Towards the Establishment of PJT Jeneberang

The Study Team learned that a sufficient lead-time should be assumed towards the establishment and operation commencement; say 1 to 2 years. The time is required for (see also Section 9.4):

- (i) Legislation of various regulations and decrees at central government level to enable the establishment of the PJT Jeneberang, and
- (ii) Subsequent legislation at Province-Kabupaten level to enable the actual operation of the PJT Jeneberang in the field.

If the legislation of (i) is accomplished, the organizational setup of the PJT Jeneberang would be possible, being initiated with the office setup, appointment of an Operation Director, and assignment of key staff.

However, the actual operation of O&M services in the field would become possible for the PJT Jeneberang only after it is legally and socially authorized to deploy its activities in the field, including collection of revenue. This should be supported by the legislation of the relevant regional regulations/decrees and various mutual agreements among stakeholders; namely completion of (ii) above.

Furthermore, funding for the establishment, mobilization and initial operation of PJT Jeneberang will need many procedural steps, which also require a year-round time period.

The Study Team exchanged views on the anticipated schedule with DGWR, JRBDP and Dinas PSDA. It was informed that there are many uncertain factors affecting the schedule and hence a definite schedule is difficult to predict at present.

Incorporating various opinions, the Study team tentatively established an anticipated schedule towards the establishment and commencement of operations of the Corporation, as shown in Figure S12.1. The schedule assumes the following milestone achievements:

- | | |
|---|-------------------------|
| - Establishment of Corporation: | Towards the end of 2005 |
| - Completion of all required legislation: | Towards the end of 2006 |
| - Commencement of Operation: | Early 2007 |

It is noted that this schedule is still preliminary and subject to further change depending on the actual progress of legislation and budgetary arrangements.

12.2.3 Schedule Towards the Commencement of Operation

Mobilization of PJT Jeneberang will commence in 2006 after it is legally established. The activities involve the organizational setup, which includes the following:

- (a) Office setup at one of the existing JRBDP offices, presumed to be the present dam monitoring office at Jalan Monumen Emmy Saelan in Makassar
- (b) Assignment of key staff who would be engaged in initial mobilization work in 2006 (about 15-20 persons)
- (c) Assistance in regional legislation and socialization, including agreement of water fee rates
- (d) Preparation of detailed annual work plan and budget plan for the first operation year

- (e) Finalization of corporate management system so that it could function once the operation starts in 2007. The system proposed in this Study could be a basis of this finalization work
- (f) Procurement of initial O&M operation resources: partial items needed for initial mobilization work in 2006 are to be procured at the beginning of 2006 and the remaining items needed for operations commencing in 2007 procured by year end

Among the above activities, (a), (c), (d), (e) and (f) can be conducted under PJT Jeneberang's own efforts supported by PJT I head office. It is important that PJT Jeneberang shall also take a positive role to proceed with activity (c) in coordinating with MPW, JRBDP and Dinas PSDA. Any delay in (c) would defer the commencement of operations.

Funding for these activities, roughly estimated as Rp.4.8 billion, would be procured from a grant fund or from an interest-free loan made available by the Government.

Figure S12.1 shows the time schedule of these activities.

12.2.4 Operational Program

In 2007, PJT Jeneberang will commence operations. The major activities at the initial operation stage are described hereunder. A conceptual time-table is shown in Figure S12.1.

(a) Recruitment of staff

Most of the present O&M personnel of JRBDP will be transferred to PJT Jeneberang without a change in their present tasks. However, PJT Jeneberang will take the initiative in selecting qualified personnel. The number of staff will be kept at a reduced number of 45-48 for the initial two years (2007-2008) so as to minimize the cost burden.

The number of staff will be gradually increased to 76 during the next three years (2009-2011) by additionally recruiting from JRBDP, Dinas PSDA and other sources.

(b) Establishment of management system

This activity is to install and implement the management system through actual operation of the organization. Various capacity development programs will be deployed for strengthening both the internal management and external relation capacity.

(c) Transfer of O&M of Infrastructures

The management of most major infrastructures related to water distribution (Bili-Bili Dam, 3 irrigation intake weirs, Rubber Dam, Long Storage facilities and hydrological stations) will be transferred from JRBDP to PJT Jeneberang at the commencement of operation. The management of other infrastructures (such as sand pocket and Sabo dams, levees, drainage gates, and other riparian structures) will be transferred one by one towards 2009.

(d) River basin management services

In the first two years (2007-2008), priority of PJT Jeneberang's operation will be given to water quantity management and O&M of major infrastructure for which management is transferred. Since knowledge on most of these works is already inherent within present JRBDP staff to be transferred to PJT Jeneberang, the services in this category can be mobilized in a short period.

PJT Jeneberang will expand the activities to gradually cover other service areas, such as water quality management, flood and drought management, river administrative area management and watershed conservation, towards 2009. For these service items, the initial two years (2007-2008) will be a preparatory period to conduct pre-studies, establishment of work systems through coordination with other agencies, training of personnel, and procurement of resource materials/equipment. Nevertheless, PJT Jeneberang will provide the essential services needed by stakeholders, such as flood control operation at the reservoir, dissemination of flood and drought information, even during the initial preparatory work period.

12.3 Financing Source for Operation of PJT Jeneberang

12.3.1 Revenue from Service Fees

Of the proposed services (refer to Section 12.1), the items producing revenue are envisaged to be fees from raw water supply for various uses, water use for hydropower generation, and several items of non-water service fees (e.g. service fee from effluent discharge monitoring, C-class mining and land use in river area). The fees are contributed by respective beneficiaries based on beneficiary-to-pay and/or polluters-to-pay principles.

The conceivable fee items are listed in Table S12.3, classified into water supply revenue and non-water revenue items.

It is foreseen that fee collection from PDAM and PLN can be agreed before the commencement of PJT operation (i.e. during the process of legislation of basic water tariffs in 2006). Also, agreement can be reached with industries, since the number of industries is small (only one sugar factory is presently listed for fee collection). Fee collection from other sources (see Table S12.3) can also be mobilized within two years of commencement at the longest.

12.3.2 Funding Support by the Government

(1) O&M Cost for Irrigation Intake Weirs

PJT Jeneberang will provide O&M services for three irrigation intake weirs.

As noted in Section 4.4 previously, New Water Law No.7/2004 clearly prescribes the government obligation for O&M of irrigation facilities (except for tertiary systems) and also no charge of water resources management service costs for agricultural activities of people (except for

O&M cost for tertiary systems).

Accordingly, this Study understands that, due to the farmers' limited ability to pay, the government takes over the obligation of bearing the O&M cost. The compensation of cost to PJT Jeneberang will be in the form of either a subsidy or service fee under the concept of public service obligation (PSO).

(2) Public Service Obligation

Apart from the O&M of irrigation intake weirs, PJT Jeneberang will provide a wide range of technical services required for supporting public welfare and livelihood without revenue (e.g. water quality monitoring, flood and drought management, watershed conservation, etc.).

It is expected that the Government will introduce the concept of PSO, based on which the PJT Jeneberang will be entitled to receive funding support from the Government to cover the cost of such non-revenue generating public services.

From the viewpoint of the owner of public corporations (i.e. Government as a 100% equity holder), it is important to determine how to encourage corporations to carry out such public services positively. The introduction of the PSO concept is a strong instrument for such encouragement.

(3) Government Grant or Loan for Working Fund

As described in Section 12.4, the PJT Jeneberang will need to secure a working fund for initial organizational setup and also for operation over the initial several years. The Government shall provide a grant or interest-free loan to the PJT Jeneberang for use as a working fund. The PJT Jeneberang shall repay the loan within a prescribed period.

(4) Government Funding for Major Rehabilitation and Development Works

For a foreseeable period, PJT Jeneberang will not have the financial capacity to bear costs of major rehabilitation works, replacement of major equipment, and development of new infrastructures. Such costs, if such works are to be implemented by the PJT Jeneberang, shall be financed by the Government.

12.4 Corporate Financial Plan

12.4.1 Estimate of Operation Cost by Revenue Category

The Study determined the operation cost of PJT Jeneberang by revenue category in the following manner:

- (a) Direct cost of O&M work was first estimated for respective categories of infrastructure and service items. The total direct O&M cost is Rp. 4.71 billion as estimated in Sections 7.6, 8.1.3 and 8.2.3.

- (b) Adding indirect operation costs (such as indirect personnel cost, general expenses) and required margin²⁹, the total annual operation cost was assessed as Rp. 8.99 billion (cost at the full service stage, see Figure 12.5 of Main Report).
- (c) Operation cost was then allocated to respective revenue categories in proportion to the ratio of direct O&M cost as estimated in (a) above. O&M cost of infrastructures for specific use for a particular revenue category was allocated to that category (e.g. O&M cost of irrigation weirs was to be allocated to the irrigation revenue category). O&M cost of Bili-Bili dam/reservoir, a major joint facility for multi-purpose use, was allocated to four beneficiary sectors by applying the following ratios:

Allocation of Bili-Bili Dam O&M Cost to Beneficiary Sectors

Allocation of O&M costs of joint-facility (Bili-Bili Dam) based on cost allocation study *	Flood control	Irrigation	Water supply	Hydro Power
	31.1 %	25.6 %	29.6 %	13.7 %

Note: * Based on the concept of 'separable cost-remaining benefit' method, but a simplified method is applied in the study

Relatively large allocation ratios were assessed for flood control and water supply sectors because of their large benefits accrued from the Bili-Bili Dam.

- (e) As a result, the operation cost (or service cost) of respective revenue/service categories was derived as shown in the table below.

Operation Cost Allocated to Respective Revenue/Service Categories

(Unit: Rp. million at 2004 constant price)

Service item	Allocation Ratio (%)	Allocated Service Cost	Remarks
1) Water Supply Service * ¹	39.2 %	Rp. 3,523	
a) Raw water supply for municipal water	32.3 %	Rp. 2,902	Rp. 38.6/m ³
b) Water provision to hydropower	6.9 %	Rp. 621	Rp. 8.0/kWh
2) Public Service Obligation (PSO) * ²	56.0 %	Rp. 5,034	
a) Flood control	24.7 %	Rp. 2,224	
b) Irrigation water supply	27.1 %	Rp. 2,431	Rp. 127,149/ha
c) Flushing water supply	2.2 %	Rp. 198	
d) River water quality monitoring	0.8 %	Rp. 72	
e) Watershed management	1.2 %	Rp. 109	
3) Quasi-public Services * ³	4.8 %	Rp. 431	
a) River area management	2.6 %	Rp. 233	
b) C-class mining management	1.4 %	Rp. 127	
c) Waste water monitoring	0.8 %	Rp. 71	
Total	100.0	Rp. 8,988	

Note: *1: Services with fee revenue, *2: public services without revenue, *3: public services for which revenue collection may be permitted if the relevant legislation is issued

12.4.2 Basic Water Fee Rates Calculated from Operation Cost

Water fee rate was calculated by dividing the annual operation cost estimated above by the annual

²⁹ Margin is calculated so that the corporation is able to assure 15% Return on Equity (as indicated by MSOE).

water use quantities or beneficial area. The rates for raw water supply, hydropower generation and irrigation weir/intake O&M service were as shown in the Remark column of the above table. The rate calculated is referred to as ‘basic water fee rate’.

Water fee rates for industry, plantation and fishpond water supply were separately derived in the following manner:

- a) Industrial water: derived by applying a multiplier based on ratio between current average PDAM consumer tariff (as base case) and tariff being applied to large unit customers (industries)
- b) Plantation and fishpond water: derived by applying multipliers based on production value of irrigated paddy (as base case) and those of plantation (sugarcane) and fishpond

Basic water fee rates estimated are summarized in the table below:

Basic Water Fee Rates Calculated from O&M Cost Allocation Analysis

Service	Multiplier (ref. a) and b) above)	Tariff at 2004 price
Municipal Water:		
- Raw water supply to PDAM	(Base rate for water supply)	Rp. 39/m ³
- Industrial water (city)	Multiplier factor: 3.70	Rp. 143/m ³
- Industrial water (others)	Multiplier factor: 1.70	Rp. 66/m ³
Irrigation Water:		
- Paddy irrigation water	(Base rate for irrigation water)	Rp. 102,751/ha-year
- Plantation water	Multiplier factor: 0.53	Rp. 54,040/ha-year
- Fishpond water	Multiplier factor: 3.87	Rp. 398,083/ha-year
Hydropower Water Use		Rp. 8.0/kWh

12.4.3 Water Fee Rate Alternatives

The study examined the following three alternative scenarios for water fee rate setting:

Case-1: Beneficiary-to-pay Principle

This alternative assumes that the cost of river basin management services shall be borne by beneficiaries as far as they are defined. The following are taken into account:

- (a) Beneficiaries of water supply and power supply living in the lower basin area are also the beneficiaries of flood control services provided by the PJT Jeneberang. They may be requested to bear the cost of flood control services.
- (b) Beneficiaries of irrigation water supply are farmers in irrigation areas, who shall bear the cost of intake weir O&M services provided by the Corporation. This obligation is taken over by the government according the New Water Law. The cost shall be borne by the government under the concept of PSO.

Case-2: Corporation to be financially self-reliant within five years

This alternative assumes that the Corporation is able to charge water fees, which would enable the Corporation to profit in the 5th year after commencement of operations.

Case-3: Affordability-to-pay Principle

This alternative assumes that rates shall be set in consideration of affordability-to-pay of the beneficiaries. Since the level of affordability-to-pay is difficult to determine, the rates currently applied in the PJT I service area were adopted as a guideline.

Water fee rates estimated are summarized in the table below.

Water Fee Rate Assumed in Alternative Cases

(Price at 2004)

Customer	Unit	Case-1	Case-2	Case-3
PLN	Rp./kWh	17	14	25
PDAM	Rp./m ³	59	47	40
Industry	Rp./m ³	66	66	80

Note: Rates shown in bold seem to exceed or are very close to the limit of affordability-to-pay of average households. See Section 12.4.5 below for detail.

The relatively low rate assessed for PLN is due to a particular feature that Bili-Bili multi-purpose dam was primarily designed for flood control and irrigation, while hydro-generation is placed as a subordinate operation. Accordingly, a relatively low share of O&M cost was assessed for hydropower.

12.4.4 Profit-Loss Calculation

Financial projections were made by preparing profit and loss statements up to 2020 for three alternative cases. The results are shown in Tables S12.4 to S12.6 and are summarized below.

Profit-Loss before Tax for the Three Alternative Cases

Alternative Case	Mid-term Plan Period					2015	2020
	2007	2008	2009	2010	2011		
Case-1	616	1,231	488	487	825	3,133	4,749
Case-2	-215	383	-205	-216	59	2,126	3,446
Case-3	211	797	196	172	403	2,293	3,392

12.4.5 Evaluation of Alternative Water Rate Scenarios

A review was made regarding the appropriateness of water fee rates and the results of profit-loss calculations. The following were noted:

- (a) A household's affordability to pay the raw water fee must be taken into consideration in proposing the raw water fee rate.

In Makassar, average monthly household expenditure is estimated as Rp.1,210 thousand at 2004 price levels. If the affordability-to-pay for piped water supply by average households is 3.0 % of monthly expenditure, the tolerable amount of household payments for piped water is calculated as Rp.36,300/month. This corresponds to a water tariff of Rp.1,370/m³ and the average household consumption of 26.5 m³/month.

Since the present average water tariff is already as high as Rp.1,279/m³, the households appear to have no sufficient extra capacity to accept the increased water tariff. This implies the extra raw water fee charge to water supply recipients should be suppressed to a minimum

extent. The maximum charge rate of raw water fee that is affordable to recipients would be Rp.46/m³, which is derived from the difference between Rp.1,370/m³ and Rp.1,279/m³ stated above and further in consideration of an unaccounted-for water ratio of about 0.5 (i.e., $(1,370-1,279) \times 0.5 = 46$).

- (b) Case-1 is an ideal fee scenario in which the beneficiaries bear most of the river basin management service costs, including service costs for flood control and irrigation. However, the raw water supply fee is Rp.59/m³ (see a table in Subsection 12.5.3 above), which exceeds the consumer's affordability to pay of Rp. 46/m³.
- (c) Case-2 is the minimum level of financial operation required for the PJT Jeneberang from the viewpoint of attaining self-financing capability. In this case, however, the rate of raw water supply fee is also close to the consumer's affordability to pay.

Overall, this Study recommends that the raw water fee rates proposed in Alternative Case-3 are the most practical fee rate scenario. The proposed rates would be most easily explained to the customers (PDAM and PLN), since they are the rates already accepted in the PJT I service area in East Java.

In Case-3, a higher rate is proposed for hydropower as compared with Case-1 and Case-2. The proposed rate is deemed to be within PLN's capability to pay. Additional expenditure incurred for PLN by the payment of the raw water fee amounts to Rp. 1.9 billion annually, which accounts for only 0.1% of the total expenditure of the PLN regional office (Rp.1,720 billion in 2002) and 0.3% of Makassar sub-office (Rp. 639 billion). This will not result in any visible impact on the energy selling prices to consumers.

12.4.6 Issues Involved in Alternative Case-3

Case-3 assures a financially sound operation in terms of profit-loss projection (see Subsection 12.4.4 above). However, this is based on a premise that the government would provide funding under the principle of PSO, including the O&M cost of the irrigation intake weir. Should the government not fulfill this obligation, the financial performance of the PJT Jeneberang will worsen significantly as shown in Table S12.7 and summarized in the table below.

Profit-Loss before Tax for the Cases 'With and Without PSO Support' from the Government

Case	Mid-term Plan Period					2015	2020
	2007	2008	2009	2010	2011		
Case-3 with PSO	211	797	196	172	403	2,293	3,392
Case-3 without PSO	- 1,700	- 1,333	- 2,371	- 2,517	- 2,407	- 517	581

Note: PSO referred to herein covers Items 2) and Part of 3) of table shown in Subsection 12.4.1

The above table shows that PSO support from the government is most essential for the Corporation's financial operation. Under the case of 'Without PSO', loss-making operation will continue for 11 years towards 2017.

12.5 Five-Year (Mid-term) Financial Operation Plan

(1) Profit-Loss Projection at Current Prices

Five-year financial projection was made for Case-3 above based on current prices, assuming a price inflation rate of 7.36 % per annum.

Sensitivity testing was also carried out assuming the following variations:

- Sensitivity 1: Water revenue collectable is limited to 75 % in the first year, but will increase in stages to 100 % in the fifth year
- Sensitivity 2: Water revenue collectable is limited to 50 % in the first year, but will increase in stages to 100 % in the fifth year, and
- Sensitivity 3: No payment of PSO for irrigation O&M and other public services.

The results of profit-loss calculations are shown in the Table below.

Profit-Loss Projection for 5-Year Period based on Current Price (Case-3)

(Unit:Rp.million)

Year	2007	2008	2009	2010	2011	Total
Base case	299	1,141	416	558	1,007	3,421
Sensitivity 1	-1,074	18	-401	113	1,007	-337
Sensitivity 2	-2,447	-1,105	-1,217	-332	1,007	-4,095
Sensitivity 3 *	-2,065	-1,688	-3,245	-3,559	-3,613	-14,170

Note: * This case corresponds to 'Case-3 Without PSO' in the Table in Subsection 12.4.6

The Table above indicates that any level of reduction of revenues is very sensitive for the operation of the PJT Jeneberang.

(2) Fund Requirement

The Corporation will require working capital of Rp.4.8 billion in 2006 for the initial organizational setup of the PJT Jeneberang. Furthermore, a working fund is needed to commence operations in 2007 to pay wages and other expenses. This amounts to at least Rp.1.2 billion, which represents the shortage of running funds for the initial 2-month period in 2007.

These running funds shall basically be financed by PJT I head office. However, the cash position of PJT I has weakened recently. During the late 1990s, the average cash balance was about Rp.20 billion, whereas during the 2000s it has decreased to Rp.10 billion. Hence, the Government shall consider providing assistance in this funding operation, either by grant or interest-free loan. This study assumed that the running fund would be procured by an interest-free loan from the Government with repayment period of seven years, including a grace period of two years.

(3) Evaluation of Major Financial Ratios

Financial ratios were calculated and evaluated according to the Decree of MSOE No.100/MBU/2002. The results are shown in Table S12.8.

Under the condition that initial working capital is provided by loan (or inter-office account from

PJT I if capable) and the government provides PSO support for irrigation and other public services, the financial condition of the PJT Jeneberang is assessed as “healthy” for the first three years and will become “very healthy” in the 4th and 5th years.

13. Capacity Development Program

13.1 General

The Capacity Development Program is designed to be implemented after establishment of the PJT Jeneberang to strengthen its operational and management capacity. A participatory approach was applied for the formulation of the Capacity Development Program for which PCM (Project Cycle Management) workshops and stakeholder workshops were conducted to examine and understand the stakeholder needs for river basin management and needs for strengthening of the capability of PJT Jeneberang.

13.2 PCM Workshop and Stakeholder Workshop

13.2.1 Project Cycle Management (PCM) Workshop

A series of PCM workshops were conducted to identify the issues and measures, and a Project Design Matrix (PDM) for river basin management was formulated. The target group of the workshop was the organizations directly responsible for river basin management including JRBDP, Dinas PSDA, Balai PSDA Jeneberang.

Project Design Matrix (PDM)

Narrative Summary	
Overall Goal	Sustainable Jeneberang River basin management is achieved
Project Purpose	Capacity of PJT Jeneberang and Balai PSDA Jeneberang is strengthened, and watershed management, water quality/quantity management, flood/drought management, and river area management is properly executed.

Outputs	
1	Facility O&M and management capacity will improve by management staff making proper decision on facility O&M resulted from improved manual, improved database management and improved O&M equipment
2	Organization operation and management capacity will improve by proper execution of jobs resulted from efficient organizational structure, proper understanding and implementation of laws and regulation related to internal and external affairs
3	Financial management capacity will improve by securing income sources and fee collection, and efficient financial management resulted from improved fee collection system, installation of corporate accounting system and staff skill development, and promotion of non-water businesses
4	Human resources will be developed by improving management staff skills and improving personnel system resulted from staff training, more senior staff, improving skill of young staff, and improving staff assignment / promotion / recruitment

The PDM prepared for the Capacity Development Program is shown in Table S13.1.

13.2.2 Stakeholder Workshops

A series of stakeholder workshops were conducted to exchange ideas on the roles of stakeholders, method of stakeholder participation, and expectation of PJT Jeneberang. The outcomes from the stakeholders' workshop are summarized in Table 13.2.

13.3 Capacity Development Program

Capacity development is composed of four components namely: 1) facility management/river basin management, 2) institutional and organizational management, 3) financial management, and 4) human resources development.

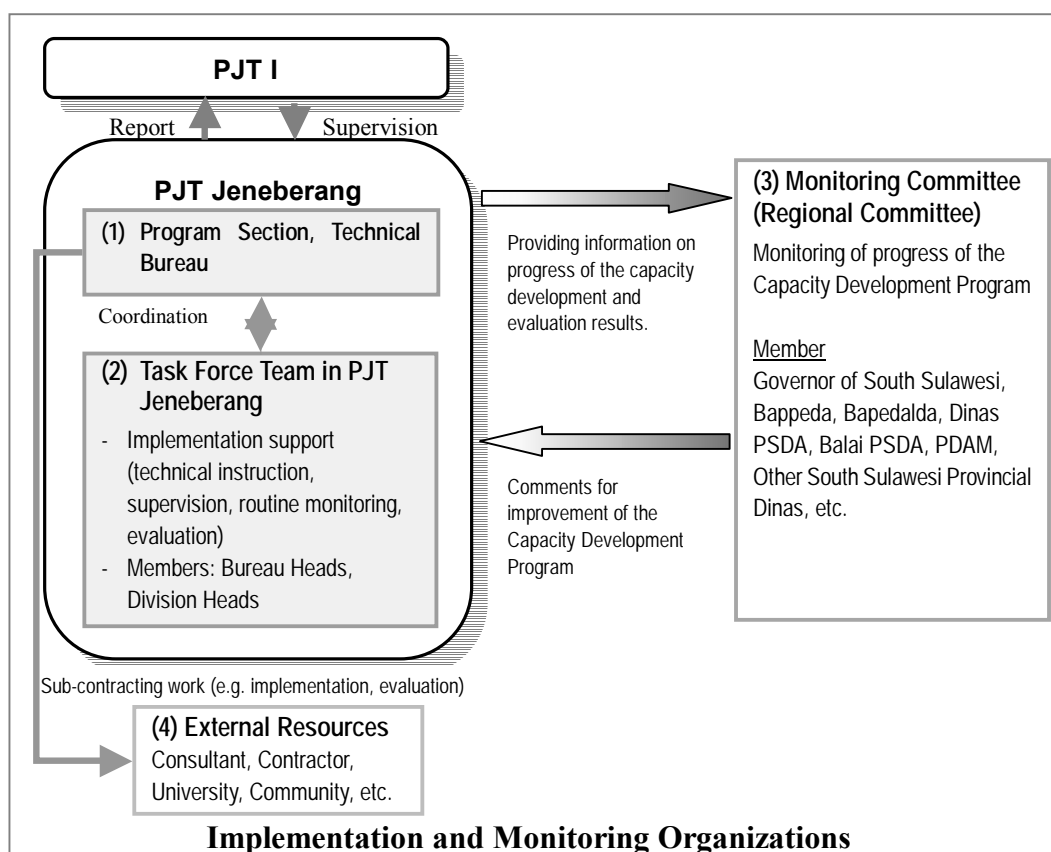
The facility management and river basin management are a primary objective of the capacity development, which is supported by the institution/organizational management, financial management, and human resources development as shown in Figure S13.1. Human resources development aims to strengthen components 1) to 3).

In total, 27 programs were proposed as shown in Table S13.3. The detail of the proposed programs is presented in the profile sheets contained in Supporting Report N.

13.4 Implementation Organization for Capacity Development Program

Several groups within the PJT Jeneberang are involved in the implementation and monitoring of the Capacity Development Program.

- **Program Section** in Technical Bureau of PJT Jeneberang takes sole responsibility for implementation; supported by **Task Force Team** composed of Bureau Heads and Division Heads and also supervised by PJT I head office.
- **Monitoring Committee**, composed of stakeholders, is responsible for monitoring the implementation and providing advice if necessary.
- **External Sources** can be utilized for some work for implementation.



13.5 Monitoring and Evaluation of Capacity Development Program

Implementation of the Capacity Development Program shall be monitored and evaluated by PJT Jeneberang during and after its implementation. Monitoring and evaluation is important not only to understand the input and output, but also for improvement of the program by integrating the monitoring and evaluation results.

(1) Monitoring

Monitoring shall be conducted internally, and all sections of PJT Jeneberang should be involved. The Table below shows monitoring activities and responsible sections in PJT Jeneberang.

Monitoring and Responsible Section

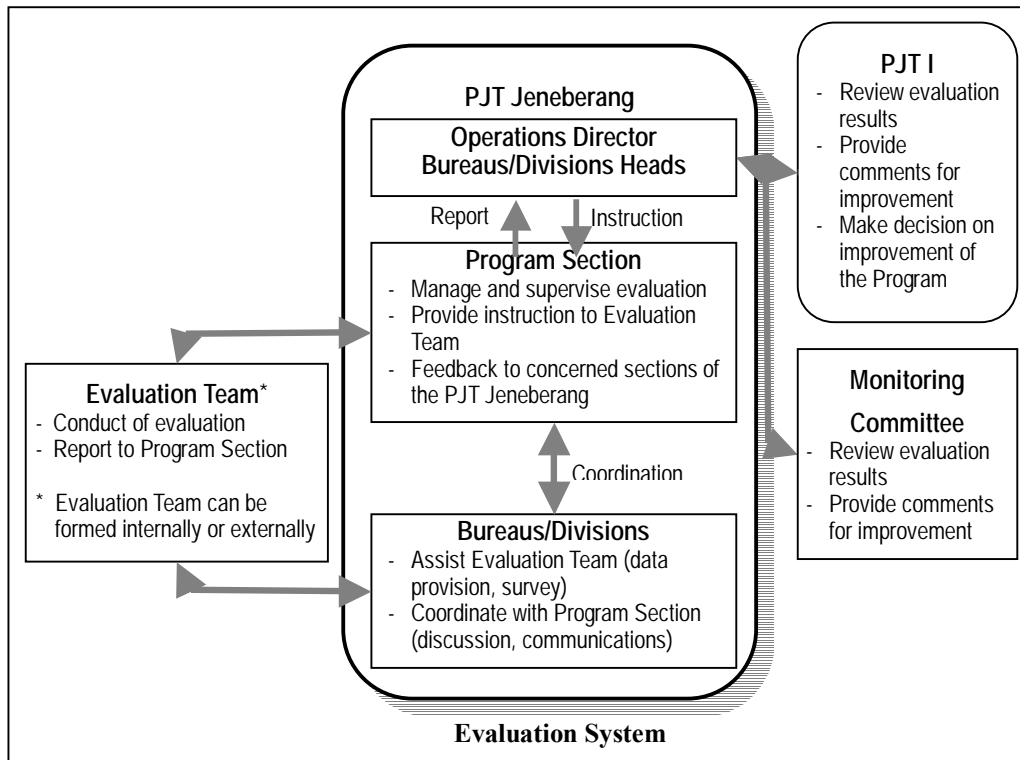
Sections in PJT Jeneberang	Responsibilities
Bureau Heads (Technical Bureau and Administration & Finance Bureau) of PJT Jeneberang	<ul style="list-style-type: none"> • Decision-making and feedback • Modification of the program (if necessary) • Report to PJT I head office
Program Section, Technical Bureau of PJT Jeneberang	<ul style="list-style-type: none"> • Aggregation of monitoring information • Reporting to Bureau Heads/Division Heads • Modification of the program (if necessary)
Each Section responsible for implementation of Capacity Development Program	<ul style="list-style-type: none"> • Record keeping of the Capacity Development Program • Information collection (e.g. monitoring indicators)

(2) Evaluation

Unlike monitoring, which is conducted internally, evaluation will involve several organizations. Sections of PJT Jeneberang and other organizations involved in the evaluation and their responsibilities are summarized in the Table below.

Evaluation and Responsible Section	
Section/Organizations Involved	Responsibilities
(1) PJT Jeneberang <ul style="list-style-type: none"> • Operations Director • Bureau Heads (Technical Bureau and Administration & Finance Bureau) 	<ul style="list-style-type: none"> • Decision-making and feedback • Modification of the program (if necessary) • Report to Monitoring Committee and PJT I
(2) PJT Jeneberang <ul style="list-style-type: none"> • Program Section, Technical Bureau 	<ul style="list-style-type: none"> • Function as secretariat of Evaluation Team • Management and supervision of Evaluation Team • Information provision (monitoring results) • Reporting to Director/Bureau Heads/Division Heads • Modification of Capacity Development Program based on evaluation results and recommendation by Monitoring Committee (if necessary) • Feedback to concerned sections of the PJT Jeneberang
(3) PJT Jeneberang <ul style="list-style-type: none"> • Each Section responsible for implementation of Capacity Development Program 	<ul style="list-style-type: none"> • Information provision (indicators for monitoring)
(4) PJT I	<ul style="list-style-type: none"> • Decision-making and feedback on the Capacity Development Program • Review evaluation results • Provide recommendation for improvement of Capacity Development Program
(5) Evaluation Team (internal or external)	<ul style="list-style-type: none"> • Conduct evaluation
(6) Monitoring Committee	<ul style="list-style-type: none"> • Review evaluation results • Provide recommendation for improvement of Capacity Development Program

The concept of the evaluation system is shown below.



13.6 Implementation Schedule

The Capacity Development Program is planned to be implemented intensively for three years after establishment of PJT Jeneberang, starting in 2006 and being completed mostly in 2008. The implementation schedule of the Capacity Development Program is shown in Figure S13.2.

14. Further Programs

14.1 Actions Towards the Establishment and Operation of PJT Jeneberang

Approaching the establishment and commencing the operation of the newly established PJT Jeneberang, there are a number of actions to be taken by the relevant organizations. Details of such actions are described in Chapters 7 to 12. Major points are summarized in Table S14.1.

In order not to delay the commencement of operations of PJT Jeneberang, the agencies responsible for respective actions shall accomplish the necessary activities within the prescribed period.

14.2 Phase III Program

14.2.1 Phase III Program According to Original Scope of Work

The Study was originally programmed to commence activities of Phase III (monitoring and evaluation of capacity development activities) soon after the commencement of operation of the

new Corporation, scheduled in early part of 2005. However, it is now foreseen that PJT Jeneberang would commence operations in 2007. In this case, Phase III is scheduled to start in 2007, a 2-year delay from the original schedule.

The implementation and monitoring of the capacity development programs will be undertaken through the initiative of the new PJT Jeneberang, supported by PJT I head office. The progress will be monitored and evaluated in accordance with target and evaluation indicators as proposed in the respective program profile sheets (refer to Supporting Report N).

The original schedule contemplated that the Study Team will be assigned on four occasions during the Phase III period to assist capacity development and monitoring activities of the PJT Jeneberang. In each assignment, the Study Team will (i) review the monitoring reports prepared by PJT Jeneberang, (ii) conduct the Study Team's own monitoring and evaluation, and (iii) exchange discussions with PJT Jeneberang to summarize the improvement measures in the following stage. Class-room lectures will be held on specific subjects needing improvements, as required by the PJT Jeneberang or as proposed by the Study Team.

14.2.2 Revision of Phase III Program

As stated above, Phase III will commence in 2007 if the original schedule is maintained. On one hand, the Study Team identified the necessity of an early commencement of the Phase III program (preferably from 2005), particularly in terms of strengthening the current river management and facility O&M activities. In this context, it is recommended to formulate a revised Phase III program through discussions between DGWR and JICA.

Table S7.1 Principal River Structures in Jeneberang River Basin (1/2)

Project/Purpose	Components of Structures	Quantity/Structural Size		Time of Completion	River	Agencies Responsible
		Description	Quantity/Size			
Bili-Bili Dam for Water Supply and Flood Control	Main Dam	Type	Rock fill	Aug. 1999	Jeneberang	PPSA*
		Height	76 m			
		Crest Length	750 m			
		Crest Width	10 m			
		Dam Volume	3,559,000 m ³			
	Left Wing Dam	Height	42 m	Aug. 1999	Jeneberang	PPSA*
		Crest Length	646 m			
		Crest Width	10 m			
		Dam Volume	1,515,000 m ³			
	Right Wing Dam	Height	52 m			
		Crest Length	412 m			
		Crest Width	10 m			
		Dam Volume	1,153,000 m ³			
Reservoir	Catchment Area	384.4 km ²	Aug. 1999	Jeneberang	PPSA*	
	Effective Water Depth	36.6 m				
	Reservoir Area	18.5 km ²				
	Total Storage	375,000,000 m ³				
	Effective Storage Vol.	346,000,000 m ³				
	Flood Control Vol.	41,000,000 m ³				
	Water Utilization Vol.	305,000,000 m ³				
	Municipal Water Vol.	35,000,000 m ³				
	Irrigation Water Vol.	270,000,000 m ³				
Sediment Deposit	29,000,000 m ³					
Telemetry System	Control Station	Number	1 Sta.	May 1999	Jeneberang	PPSA*
	Monitoring Station	Number	1 Sta.			
	Rainfall Gauging Sta.	Number	7 Sta.			
	Water Level Gauging Sta.	Number	7 Sta.			
	Warning Station	Number	2 Sta.			
Bridges	Number	2 units	Nov. 1994	Jeneberang	PPSA*	
River Improvement for Flood Control	River Dike	Length	20,970 m	Dec. 1993	Jeneberang (River Mouth to Sungguminasa)	PPSA*
	Revetment	Length	8,786 m			
	Groyne	Number	40 units			
	Groundsill at K5.96	Width	265.0 m			
	Groundsill at K9.00	Width	204.5 m			
	Sluice	Number	12 units			
	Intake	Number	2 units			
	Drainage ditch	Length	5,700 m			
	Jetty	Length	300 m			
Jongaya-Panampu-Sinrijala Drainage System for Flood Control	Drainage Channel	Length	13,870 m	Dec. 1993	Jongaya-Panampu-Sinrijala	PPSA*
	Control Gate	Number	4 units			
	Sluice (Box Culvert)	Number	34 units			
	Sluice (Pipe Culvert)	Number	291 units			
	Bridges	Number	23 units			
	Fence	Length	14,995 m			
	Inspection Road	Length	13,870 m			
	Jetty	Length	50 m			
Pampang Drainage System for Flood Control	Pump (Submersible)	Capacity	6 m ³ /s	Dec. 2001	Pampang	PPSA*
	Regulation Pond	Storage Capacity	1,100,000 m ³			
		Area	39 ha			
	Sluice	Number	2 units			
	Bridges	Number	4 units			
Long Storage for Water Supply and Channel Cleaning	Reservoir	Length	4 km	Nov. 2001	Jeneberang (Old Estuary Channel)	PAB**
		Width	200 to 300 m			
		Effective Storage Vol.	1,600,000 m ³			
	Intake Sluice	Number	1 unit			
	Outlet Sluice	Number	1 unit			
Tidal Barrage	Number	1 unit				

* PPSA = Jeneberang Water Resources Development & Management, Jeneberang River Basin Development Project

** PAB = Raw Water Development, Jeneberang River Basin Development Project

Table S7.1 Principal River Structures in Jeneberang River Basin (2/2)

Project/Purpose	Components of Structures	Quantity/Structural Size		Time of Completion	River	Agencies Responsible
		Description	Quantity/Size			
Rubber Dam for Water Supply	Dam	Width	210 m	Dec. 1996	Jeneberang	PAB**
		Height	2 m			
		Main body Length	10 m			
		Upstream Apron Length	5 m			
		Downstream Apron Length	12 m			
		Revetment Length	336 m			
		Control house Number	1 unit			
Raw Water Transmission System for Water Supply	Pipeline	Design Discharge	3.3 m ³ /s	Mar. 1999	-	PAB**
		Pipe of 1600mm dia Length	6,630 m			
		Pipe of 1,500mm dia Length	10,380 m			
		Valve Number	30 units			
		Fire Hydrant Number	15 units			
		Flow-meter Chamber Number	2 units			
		Blow-off Chamber Number	5 units			
		Air Valve Chamber Number	15 units			
		Fire Hydrant Chamber Number	3 units			
		Sand Pocket and Sabo Dam	Sand Pocket Dam No.1			
Length of Dam Crest	620 m					
Dam Height	7.5 m					
Sediment Capacity	164,000 m ³					
Mining Capacity	113,000 m ³					
Sand Pocket Dam No.3	Dam Volume		16,100 m ³	Oct. 1997	Jeneberang	PPSA*
	Length of Dam Crest		336 m			
	Dam height		7 m			
	Sediment Capacity		129,000 m ³			
	Mining Capacity		93,000 m ³			
Sand Pocket Dam No.2	Dam Volume		28,000 m ³	Sep. 2000	Jeneberang	PPSA*
	Length of Dam Crest		465 m			
	Dam height		7 m			
	Sediment Capacity		202,000 m ³			
	Mining Capacity		153,000 m ³			
Sand Pocket Dam No.4	Dam Volume		35,800 m ³	Nov. 2000	Jeneberang	PPSA*
	Length of Dam Crest		644 m			
	Dam height		7 m			
	Sediment Capacity		444,000 m ³			
	Mining Capacity		359,000 m ³			
Sand Pocket Dam No.5	Dam Volume		26,800 m ³	Nov. 2000	Jeneberang	PPSA*
	Length of Dam Crest		441 m			
	Dam height		7 m			
	Sediment Capacity		142,000 m ³			
	Mining Capacity		106,000 m ³			
Sabo Dam No.4	Dam Volume		8,400 m ³	Jan. 2001	Jeneberang	PPSA*
	Length of Dam Crest		150 m			
	Dam height		8 m			
	Sediment Capacity		129,000 m ³			
	Mining Capacity		92,000 m ³			
Sabo Dam No.6	Dam Volume		8,400 m ³	Jan. 2001	Marino	PPSA*
	Length of Dam Crest		230 m			
	Dam height	10 m				
	Sediment Capacity	74,400 m ³				
	Mining Capacity	62,000 m ³				
Sabo Dam No.8	Dam Volume	28,000 m ³	Jan. 2001	Salo Bengo	PPSA*	
	Length of Dam Crest	104 m				
	Dam height	10 m				
	Sediment Capacity	122,400 m ³				
	Mining Capacity	73,150 m ³				

* PPSA = Jeneberang Water Resources Development & Management, Jeneberang River Basin Development Project

** PAB = Raw Water Development, Jeneberang River Basin Development Project

Table S7.2 Proposed Procedures to Reduce Water Supply in Drought Years

Steps	Approx. Leading Time to Next Step	Flood Discharge/Water Level to Commence the Steps	Necessary Activities
Step 1: Standby	10 days	<ul style="list-style-type: none"> • {RWL < RC + 2.0m} and • The dairy descending rate of RWL > 0.25 m/day 	<ul style="list-style-type: none"> • Setup a dam operation team against drought • Estimate the expected dam inflow discharge based the long term weather forecast • Inform the relevant water councils/committees and water users about possibility reduction of irrigation water supply
Step 2: Coordination	5 days	<ul style="list-style-type: none"> • {RWL < RC + 1.0m} and • The dairy descending rate of RWL > 0.25 m 	<ul style="list-style-type: none"> • Estimate and the necessary reduction of irrigation water supply • Proposed the above estimated value to the water council and water users
Step 3: Reduction of Water Supply for Irrigation	2 days	<ul style="list-style-type: none"> • {RWL < RC + 0.5m} and • The dairy descending rate of RWL > 0.25 m 	<ul style="list-style-type: none"> • Execute the above estimated necessary reduction of irrigation water supply
Step 4: Stop of Irrigation Water Supply	-	<ul style="list-style-type: none"> • When RWL = RC 	<ul style="list-style-type: none"> • Reduce 100% of irrigation water supply
Step 5: Stop of Whole Water Supply	-	<ul style="list-style-type: none"> • When RWL = LWL 	<ul style="list-style-type: none"> • Reduce a certain volume of municipal water supply from dam reservoir

Table S7.3 Proposed Principal Hydrological Gauging Stations and Levels for Flood Warning and Evacuation

Name of Gauging Station	Hydrological Data to be Gauged	Critical Discharge to Initiate Each of Steps for Flood Warning and Evacuation		
		Step 1	Step 2	Step 3
Bili-Bili Dam	Bili-Bili Dam Inflow Discharge	642.3 m ³ /s	1,000.0 m ³ /s	1,200.0 m ³ /s
Patarikan bridge	Discharge of Jenelata River	400.0 m ³ /s	900.0 m ³ /s	1,100.0 m ³ /s
Kampili Weir	Discharge of Jeneberang River	1,150.0 m ³ /s	1,800.0 m ³ /s	2,300.0 m ³ /s
Maccini Sombala	Water Level of below Crown Level	1.5m (EL. 4.7m)	1.0m (EL. 5.2m)	0.6m (EL. 5.6m)

Note:

Step 1 corresponds to the probable flood to about 2-year return period

Step 2 corresponds to the probable flood to about 20-year return period

Step 3 corresponds to the probable flood to about 50-year return period

Table S7.4 Required Activities in Each Level of Flood Warning, Evacuation and Fighting

Step	Required Work
Step 1	<ul style="list-style-type: none"> - To forecast the flood conditions based on the river flow discharges and water levels monitored by the above telemetry gauging stations and the meteorological information provided from Meteorology and Geophysics Agency (BMD), - To standby a team for patrol along the potential flood area along the river course and for dissemination of the flood evacuation to the residents.
Step 2	<ul style="list-style-type: none"> - To start river patrol along the potential flooding area and dissemination for the necessity of flood evacuation to the residents, - To standby a term to carry out the emergency protection works against flood, and - To issue flood warning to the external relevant organizations as required.
Step 3	<ul style="list-style-type: none"> - To issue request of flood evacuation to the external relevant organization, - To dispatch a team for facilitate the flood evacuation and flood fighting, and - To request the Implementation Unit for Disaster Management (SATLAK PB)* to mobilize their personnel, heavy equipment and materials to execute the necessary prevention works against flood overflow under technical instruction from the Public Corporation and the necessary rescue works in case of occurrence of flood overflow.
After Flood	<ul style="list-style-type: none"> - To announce the end of flood operation, when the flood is judged to have subsided based on the comprehensive evaluation on the hydrological information from the telemetry gauging stations and the metrological information furnished from the Meteorology and Geophysics Agency. - To request the Governor of South Sulawesi Province to take the necessary coordination for the technical/financial support from the central government as the member of National Coordination Board of Disaster management (BOKORNAS PB).

Note:*

The SATLAK PB is composed of (a) Mayor of Makassar City as the head of SATLAK PB, (b) the territorial military commander (PALGDAM) and/or the commander of regional military administrative unit (DANREM) as the deputy head of SATLAK PB; (c) the head of provincial police (KAPOLDA) and/or the head of regional police (/KAPOLWIL) as the another deputy head of SATLAK PB; (d) the heads of relevant provincial and regional government agencies such as Water Resources Management Services of Public Works and Housing, Planning and Urban Development Service of Public Works; and (e) the relevant regional communities.

Table S7.5 Existing Operation and Maintenance Manuals of River Structures

Name of Project	Principal Structures in the Project	Principal Contents of O&M Manuals	Prepared in
Bili-Bili Dam	Bili-Bili Dam	<ul style="list-style-type: none"> - Dam operation rule - Water control plant - Dam control and monitoring system - Telecommunication system - Micro hydropower plant - Dam instrumentation - Power supply system - Instruction manual of end suction volute pumps 	Dec. 1999
Sand Pocket and Sabo Dam	Sand Pocket and Sabo Dam	<ul style="list-style-type: none"> - List of structures and structural features - Institutional setup for O&M - Budgetary arrangement for O&M - Guideline for monitoring on progress of sedimentation - Operation guideline for mining of sand trapped in the Structures - Maintenance manual of structures 	Nov. 2001
Pampang River Improvement Project	<ul style="list-style-type: none"> - Pampang Drainage Pump - Regulation Pond - Pampang Drainage Channel 	<ul style="list-style-type: none"> - List of structures and structural features - Institutional setup for O&M - Budgetary arrangement for O&M - Guideline for the necessary inspection works - Guideline for gate and pump operation, - Maintenance manual of structures and facilities 	Dec. 2001
Lower Jeneberang River Urgent Flood Control Works	<ul style="list-style-type: none"> - Lower Jeneberang Drainage Channel 	<ul style="list-style-type: none"> - List of structures and structural features - Institutional setup for O&M - Budgetary arrangement for O&M - Guideline for the necessary inspection works - Guideline for operation of drainage sluices - Maintenance manual of river channel, structures and facilities 	Mar. 1994
Construction of Long Storage	Long Storage	<ul style="list-style-type: none"> - List of structures and structural features - Organization for O&M - Budgetary arrangement for O&M - Guideline for the necessary inspection works - Guideline for operation of reservoir operation and gate operation - Maintenance manual of river channel, structures and facilities 	Jan. 2002
Bili-Bili Irrigation Project (Draft)	<ul style="list-style-type: none"> - Bili-Bili Weir - Bissua Weir - Kampili Weir 	<ul style="list-style-type: none"> - List of structures and structural features - Organization for O&M - Guideline for the necessary inspection works - Guideline for operation of Weirs - Maintenance manual of structures and facilities - Guideline for data collection and evaluation on maintenance works 	Aug. 2003
Rubber Dam Construction	Rubber Dam	<ul style="list-style-type: none"> - List of structures and structural features - Organization for O&M - Budgetary arrangement for O&M - Guideline for the necessary inspection works - Guideline for operation of rubber dam - Maintenance manual of structures and facilities 	Mar. 1997
Raw Water Transmission Main	Pipe Line	<ul style="list-style-type: none"> - List of Structures - Operation of gates - Maintenance Guideline of gates 	Mar. 1999

**Table S9.1 Legal Products Required to Establish
and Operate PJT Jeneberang as PJT I Extension¹**

No.	Legal Product	Chronological Order ²
	<u>NATIONAL</u>	
1	Presidential Decree on the extension of PJT I's working area to include the Jeneberang River basin <i>[new]</i>	1
2	Government Regulation on Investment of State Capital into the Capital of PJT I <i>[new – needed to meet initial O&M costs in PJT Jeneberang]</i>	2
3	MPW Decree Delegating Authority to South Sulawesi Governor to issue permits for water use from beneficiaries in PJT Jeneberang's working area <i>[new]</i>	2
4	MPW Decree on the Authority of PJT I as a corporation authorized to collect and receive fees to finance O&M of regional infrastructure <i>[existing]</i>	2
5	Revision to Decree of State Minister for SOE on Appointment of PJT I Supervisory Board <i>[existing – to add one SS member to the Supervisory Board]</i>	2
6	MPW Decree on Basic Tariff for fee for financing O&M of water resources infrastructure and use of raw water for industry and PDAM within PJT I's work area <i>[existing]</i>	2
7	MPW Decree on Basic Tariff for fee for financing O&M of water resources infrastructure and use of raw water for PLN within PJT I's work area <i>[existing]</i>	2
	<u>REGIONAL</u>	
8	<i>Provincial Regulations of South Sulawesi on:</i>	
8.1	Surface Water Extraction and Utilization <i>[existing]</i>	2
8.2	Land Use in River Administrative Area <i>[existing]</i>	3
8.3	River Protection concerning C-Class [sand] Mining in the River Administrative Area <i>[existing]</i>	3
8.4	Water Quality Management and Water Pollution Control <i>[existing]</i>	3
9	<i>Decrees of South Sulawesi Governor on:</i>	
9.1	Guidelines for Implementing Provincial Regulations (for areas in #9 above) <i>[new]</i>	4
9.2	Permit Procedure for Extraction and Utilization of Surface Water in PJT Jeneberang Working Area <i>[new]</i>	4
9.3	Permit Procedure for Land Use in River Administrative Area in JRB <i>[new]</i>	4
9.4	Procedure for River Protection concerning C-Class [sand] Mining in the River Administrative Area <i>[existing]</i>	4
9.5	Service Fee Payment and Collection for Water Resources Management in PJT Jeneberang Working Area <i>[new]</i>	4
9.6	Working Group for endorsing permit for extracting / utilizing surface water within the working area of PJT Jeneberang <i>[new]</i>	4
9.7	Revised membership of South Sulawesi PTPA to include PJT Jeneberang <i>[existing]</i>	4
9.8	Revised membership of SWS Jeneberang PTPA to include PJT Jeneberang <i>[existing]</i>	4
10	Decree of Head of South Sulawesi Dinas PSDA on Technical Guidelines for Implementation of each Governor's Decree <i>[new]</i>	4
11	Decree of Head of South Sulawesi BAPEDALDA on Technical Guidance for Implementation of each Governor's Decree <i>[new]</i>	4
12	Joint Decree and Cooperation Agreement between PJT I and Relevant Bupati/Walikota in South Sulawesi Province [primarily Gowa] with the involvement of MPW <i>[new]</i>	5

¹ Excluding PJT I Board of Directors' Decrees.

² Estimated by PJT I from its experience of establishing Bengawan Solo River basin as extension to PJT I working area. Partially modified by South Sulawesi Legal and Institutional Bureau, and later by officials from DGWR, Jakarta..

Table S9.2 Rivers Selected for Management by Public Corporation

1 st Order River	2 nd Order River	3 rd Order River	Length (km)	Catchment Area at Confluence (km ²)	%	Infrastructure & Measuring Stations
Jeneberang			85.50	762.01 (at river mouth)	100.0	Rubber Dam Kampili Weir (10,545 ha) Bissua Weir (10,758 ha) Bili-Bili Weir (2,360 ha) Bili-Bili Multipurpose Dam Raw Water Transmission Main Hydrological Gauging Station (6) Sabo Dams/Sand Pocket Dams (6)
	Long Storage		4.50	15.76	2.1	Flushing Gate Intake Gate Tidal Gate
	Garassi		16.47	45.32 10.75	5.6	
		Burunguntea	6.04	27.10	1.4	
		Salo Bontorea	5.06		3.6	
	Salo Tetebatu		6.57	6.33	0.8	
	Jenelata/Sapaya (Largest Tributary)		38.45	232.69	30.5	Hydrological Gauging Station (3)
		Bela Punrangan	9.21	11.28	1.5	
		Binanga Tokka	24.26	77.53	10.2	
		Munggunturu	6.47	13.27	1.7	
		Balang Kampala	10.44	32.64	4.3	
		B. Pateteang	5.26	29.95	3.9	
		Tallanggantarang	6.55	13.50	1.8	
	Binanga Jajang		9.73	22.43	2.9	
	Jene Rakikang		19.16	41.24	5.4	
		Bulu Tanetelang	5.26	8.14	1.1	
		Parigi/Asana	3.26	17.23	2.3	
	Binanga Bengo		6.62	14.23	1.9	
	Salo Bengo		8.48	22.55	3.0	
		Salo Patene	8.66	8.88	1.2	
	Salo Malino		18.67	85.89	11.3	Sabo Dam No.6
		Salo Ahuwa	6.53	16.69	2.2	Hydrological Gauging Station (1)
		Salo Bulang	9.96	17.95	2.4	
	Salo Angasia		5.63	5.36	0.7	
	Kausisi		18.91	37.50	4.9	Sabo Dam No.8
		Salo Kanipa	4.10	8.39	1.1	
TOTAL =1	14 (3 selected)	14 (1 selected)	190.29	---	---	17 – Major Infrastructures 10 – Hydrological Stations

TOTAL RIVER BASIN CATCHMENT AREA = 762.01 km²

Source: Interim Report Table 10.1

Notes: 1. Criteria for selecting rivers and river infrastructure to be managed by PJT I Jeneberang:

- 1st, 2nd, and 3rd order rivers with a sub-catchment area more than or close to 10 % of the total river basin area, or other significant features
 - Large dams and weirs irrigating > 500 ha of potential area
 - Other significant infrastructure and measuring stations (Kausisi)
 - Long Storage is considered to be part of the Jeneberang River
2. Drainage infrastructure and waterways for Makassar City currently managed by Proyek Induk are excluded. They should be transferred to Makassar City Dinas Cipta Karya as already instructed.
3. Bold letters and shaded figures are for selected rivers.

Table S12.1 Basic Concept of Corporation's Duties and Functions (1/3)

Management Item	Phasing of Expanding Corporation Management Activities		
	Start-up Phase (2007-2008, 2 Years)	Development Phase (2009-2011, 3 Years)	Expansion Phase (2012 onward, 15 years)
1 Target of Achievement in Respective Phases	(Strengthening of Internal Capacity) <ul style="list-style-type: none"> ● Develop institutional and technical capabilities to attain effective and sustainable RB management ● Establish regional legislation and agreements additionally required to effectively implement the RB management activities 	(Strengthening of External Relation) <ul style="list-style-type: none"> ● Develop adequate ways of public relation with all stakeholders including creation of consensus for water charges ● Develop revenue incomes 	(Strengthening of Self-financing Capacity) <ul style="list-style-type: none"> ● Consolidate income resources, including PSO fees and non-water businesses, so that Corporation becomes financially sustainable
2 Priority of Management Policy in Respective Phases	<ul style="list-style-type: none"> ● Develop institutional and technical capability sufficient for providing professional services acceptable to beneficiaries and other stakeholders ● Develop consensus of major stakeholders to contribute RB management costs based on beneficiary-to-pay principle ● Consolidate the concept of PSO (Public Service Obligation) with enactment of relevant laws 	<ul style="list-style-type: none"> ● Establish RB management system on a principle of participation of communities at all levels in order to call for their positive commitment ● Consolidate consensus of all stakeholders regarding payment of water management fees for all service items 	<ul style="list-style-type: none"> ● Develop non-water businesses in order to expand income sources other than raw water supply ● Create environment of participation of private sector in RB management activities in order gradually to relieve the Government burden of RB management
3 Organizational Form of Corporation	<ul style="list-style-type: none"> ● As extension of working area of PJT I, subject to final decision by MPW (ex Kimpraswil) with agreement of regional governments 	- ditto left -	<ul style="list-style-type: none"> ● Ditto left for a foreseeable future, subject to reform in future as an independent corporation, either state-owned or province-owned, after achievement of self-financing ability
4 Rivers to be Managed	<ul style="list-style-type: none"> ● Jeneberang main stream (1st Order River) + 3 selected 2nd order rivers and 1 selected 3rd order river (out of 1-main stream, 14 - 2nd order rivers and 14 - 3rd order rivers) (see Table S9.2 for detail) ● In this start-up stage, priority would be given to Jeneberang Main Stream where major infrastructures exist 	<ul style="list-style-type: none"> ● Expand working area gradually to cover all selected 2nd order and 3rd order rivers by the end of this Development Phase 	<ul style="list-style-type: none"> ● Manage all rivers listed left, with gradual increase of managed rivers to cover eventually all rivers (29 rivers in total) in the basin as the Corporation's financial capacity increases
5 Assets to be Managed			
(1) Managed assets	<ul style="list-style-type: none"> ● All infrastructures built on managed rivers, including 17 major facilities (see Table S9.2) 	- ditto left -	- ditto left -
(2) Owned Assets	<ul style="list-style-type: none"> ● Lands, buildings, and other fixed assets transferred from state assets (those presently managed by Proyek Induk PWS Jeneberang) ● Vehicles and heavy equipment transferred from Proyek Induk PWS Jeneberang 	<ul style="list-style-type: none"> ● Purchase of additional vehicles and heavy equipment needed for proper river basin management (to be planned depending on actual requirements) 	- ditto left -, including equipment and facilities needed for non-water business development
6 River Basin Management Organizations			
(1) Classification of river basin	<ul style="list-style-type: none"> ● Regarded as 'strategic river basin' under jurisdiction of State (after enactment of Keppres on Strategic RB), or trans-Kabupaten river basin under jurisdiction of Province (before enactment of Strategic RB) 	- ditto left -	- ditto left -
(2) River administrator	<ul style="list-style-type: none"> ● Provincial Governor delegated by Minister of Public Works. River Administrator will be the final decision maker including issuance of water use permits and other licenses ● A representative of Provincial Government will be assigned as a member of Supervisory Board of Corporation main body 	- ditto left -	- ditto left -

Table S12.1 Basic Concept of Corporation's Duties and Functions (2/3)

Management Item	Phasing of Expanding Corporation Management Activities		
	Start-up Phase (2007-2008, 2 Years)	Development Phase (2009-2011, 3 Years)	Expansion Phase (2012 onward, 15 years)
(3) Regulator at technical level (Agency responsible for law enforcement)	<ul style="list-style-type: none"> Dinas PSDA for river and water management Bapedalda for water quality and river environmental issues, also act as PROKASIH coordinator Dinas Forestry Services for watershed conservation Dinas Mining Services for river sand mining and groundwater use 	- ditto left -	- ditto left - (Note: It is proposed for inter-ministerial discussion that regulation of groundwater and sand mining would be under the jurisdiction of MPW in the future)
(4) Operator / service provider for O&M of infrastructure	<ul style="list-style-type: none"> Corporation will manage rivers listed in 4. above and related infrastructure (Note: Management of river itself is basically limited to in-stream management, while however Corporation will provide technical assistance and collaboration for off-stream management in the relevant basins) Dinas PSDA Kabupaten for infrastructure on other 2nd & 3rd order rivers within the Kabupaten, assisted by Balai PSDA and Corporation Cipta Karya of Kota Makassar for city canals and Pampang drainage pump station/retention basin, assisted by Corporation Balai PSDA for trans-Kabupaten irrigation canals, and Dinas PSDA Kabupaten for in-Kabupaten canals, including water allocation management As water users, PLN will operate Bili Bili power plant, PDAM and other water users operate water supply intakes owned by them 	- ditto left -	<ul style="list-style-type: none"> Ditto left for a foreseeable future
(5) Infrastructure development, renewal and major rehabilitation work	<ul style="list-style-type: none"> Proyek Induk PWS Jeneberang (JRBDP) or Dinas PSDA Province/Kabupaten depending on type of project 	- ditto left -	- ditto left -
(6) Coordinator	<ul style="list-style-type: none"> PPTPA supported by PTPA, which will assess and coordinate issues arising in connection with water use and conservation, acting as advisor to river administrator 	<ul style="list-style-type: none"> Provincial and river basin level Water Resources Council to be established under new Water Resources Law (reform of PTPA and PPTPA) 	- ditto left -
7 River Basin Management by Corporation (see Table S12.2 for detail of operation)			
(1) Water quantity management	<ul style="list-style-type: none"> Hydrological observation Assessment and recommendation of water use permits Water allocation and distribution 	- ditto left -	- ditto left -
(2) Water quality management	<ul style="list-style-type: none"> Periodical flushing of Makassar city canals to dilute polluted stagnant water in the canals 	<ul style="list-style-type: none"> Commence water quality monitoring at 8 key stations on rivers, with reporting of the results to Bapedalda/Dinas PSDA Monitoring of effluent discharges at identified pollutant sources, with reporting of the results to Bapedalda Assessment / recommendation of effluent discharge permits 	<ul style="list-style-type: none"> Expansion of water quality and effluent monitoring stations Recommend to Bapedalda the method of water quality improvement and pollution control, based on data accumulated by this stage

Table S12.1 Basic Concept of Corporation's Duties and Functions (3/3)

Management Item	Phasing of Expanding Corporation Management Activities		
	Start-up Phase (2007-2008, 2 Years)	Development Phase (2009-2011, 3 Years)	Expansion Phase (2012 onward, 15 years)
(3) Flood management	<ul style="list-style-type: none"> Propose flood management system, such as flood forecasting, warning, dissemination, evacuation, and relief measures, in collaboration with Dinas PSDA / Balai PSDA and SATKOPLAK-PAB 	<ul style="list-style-type: none"> Implement the proposed flood management measures in collaboration with the concerned agencies Repair of damage on river facilities due to floods 	- ditto left -
(4) Drought management	<ul style="list-style-type: none"> Establish rules of water allocation and distribution during drought, drought dissemination system and drought countermeasures 	<ul style="list-style-type: none"> Elaborate drought prediction method, including development of a simulation model Participate in drought relief activities in collaboration with concerned agencies 	- ditto left -
(5) River area management	<ul style="list-style-type: none"> Prepare inventory of infrastructure of water resources infrastructures and land use in the river area 	<ul style="list-style-type: none"> Monitor land use in river area and green-belts around reservoir Monitor C-Category mining (sand mining) activities, with recommendation of control measures 	- ditto left - <ul style="list-style-type: none"> Propose measures for conservation of aquatic biota in river areas
(6) Watershed management	<ul style="list-style-type: none"> Study watershed condition and formulate a conservation program particularly from viewpoint of sediment yield reduction 	<ul style="list-style-type: none"> Monitor basin condition particularly in regard of sediment yield Provide technical and financial contribution to concerned agencies and communities 	- ditto left -
(7) O&M of infrastructures	<ul style="list-style-type: none"> Operation of facilities in a manner of ensuring reliable water supply Maintenance of facilities, consisting of preventive, corrective and contingency maintenance works 	- ditto left -	- ditto left -
(8) Contribution to regional economic development	(No financial capacity has been build in this phase)	- ditto left -	<ul style="list-style-type: none"> Establish a revolving funding system for providing financial assistance to small-scale home industries and communities' watershed conservation activities
(9) Formulation of plans	<ul style="list-style-type: none"> Formulation of long-term plan (master plan), covering both RB development and management, assisted by Proyek Induk PIPWS Jeneberang (JRBDP) 	<ul style="list-style-type: none"> Updating of plans as required 	- ditto left -

Note: RB: River basin, PJT: Perum Jasa Tirta (Water Service Public Corporation) , PROKASIH: Clean river campaign program, WQM: Water quality monitoring, PTPA: Provincial Water Resources Management Committee, PPTPA: River Basin Water Resources Management Committee

Table S12.2 Summary of Proposed River Management Plan (1/3)

Sector	Present Conditions	Present Issues	Plans Proposed in the Study	Major Products in the Study
Water Quantity Management	<p><u>Water Supply and Demand Balance</u></p> <ul style="list-style-type: none"> ➤ The existing water resources facilities of Jeneberang River still reserves the sufficient water supply capacity, which could promise full supply for the present water demand against 10-year drought. ➤ The existing water resources facilities would hardly promise the full water supply for the future water demand after 2018 onward against even 5-year drought due to increment of municipal water demand. 	<p><u>Water Allocation</u></p> <ul style="list-style-type: none"> ➤ Water requirement to the source of Jeneberang River has never been updated since it had been programmed during the detailed design of Bili-Bili Dam in 1996. ➤ Any official permission by the Provincial Governor has never been issued to almost all of the present water use of Jeneberang River, in spite of stipulation of the Provincial Regulation. ➤ Some of water users in Jeneberang River, the village irrigation in particular, have not been registered yet. <p><u>Water Distribution</u></p> <ul style="list-style-type: none"> ➤ There does not exist any definite institutional setup to coordinate and decide the daily water distribution. ➤ The current monitoring system for the river flow regime and the water abstraction volume is insufficient due to defects of hydrological gauging facilities and non-updating of H-Q rating curves. 	<p><u>Proposals on Water Allocation</u></p> <ul style="list-style-type: none"> ➤ The water use permit (WUP) should be officially granted to the present water requirements of 489.31 million m³/year, which has been customarily accepted by JRBDP and Dinas PSDA ➤ The existing water resources facilities should promise the full water supply to the above WUP holders against the following drought levels: <ul style="list-style-type: none"> – Drought of 5-year return period for irrigation use – Drought of 10-year return period for all water requirements other than irrigation use ➤ The Public Corporation should continue to update the inventory of WUP including name of water users, their intake points and their granted water abstraction volume. <p><u>Proposals on Water Distribution</u></p> <ul style="list-style-type: none"> ➤ The Public Corporation should monitor river flow discharge at eight critical points and the water abstraction volume at six principal river intake points. ➤ The Public Corporation should continue to update the H-Q rating curves at the proposed river flow monitoring points. ➤ The Public Corporation should establish the definitive procedures of daily water distribution with referring to the proposed procedures in the Study. 	<p><u>Water Allocation</u></p> <ul style="list-style-type: none"> ➤ Inventory of updated water users and their water requirement as of 2004. ➤ Water supply-demand balance from 2004 until 2020. <p><u>Water Distribution</u></p> <ul style="list-style-type: none"> ➤ Definitive procedures of daily water distribution. ➤ Revised Bili-Bili Dam reservoir operation rules for daily water distribution.
Drought Management (as part of water quantity management)	<p><u>Past Droughts</u></p> <ul style="list-style-type: none"> ➤ There were three major drought years (1972, 1982 and 1997) in the past 30 years. Such droughts may recurrent in the future ➤ There was no incidence of drought after Bili-Bili reservoir was put in service in 1999. 	<p><u>Drought Management</u></p> <ul style="list-style-type: none"> ➤ There is no definite drought management system and procedures. 	<p><u>Proposals on Drought Management</u></p> <ul style="list-style-type: none"> ➤ The priority of water supply should be given to the water requirement of municipal water and river maintenance flow in the drought year. ➤ The Public Corporation as the operator of Bili-Bili dam should continue to update the reservoir operation curve in accordance with the latest water requirement. ➤ The Public Corporation should set up the stepwise procedures of reservoir operation in drought year with referring to the proposed procedures in the Study. 	<p><u>Drought Management</u></p> <ul style="list-style-type: none"> ➤ Revised Rule Curves of Bili-Bili dam reservoir operation for drought management ➤ Stepwise procedures for drought management ➤ Simulated necessary reduction rates of irrigation water supply in drought years
Flood Management	<p><u>Present Flood Control Capacity</u></p> <ul style="list-style-type: none"> ➤ The present flood control facilities could cope with the probable flood of 50-year return period. ➤ Jeneberang River has never caused flood overflow after completion of Bili-Bili Dam. 	<p><u>Countermeasure against Over-design Flood</u></p> <ul style="list-style-type: none"> ➤ There does not exist any definite countermeasure against the extra-ordinary scale of flood of more than 50-year return period. 	<p><u>Flood Warning, Evacuation and Fighting System</u></p> <ul style="list-style-type: none"> ➤ The Public Corporation should enhance the flood evacuation and fighting system in cooperation with “Implementation Unit for Disaster Management (SATLAK PB)” which involves Mayor of Makassar City, the commander of regional military administrative unit (DANREM), the head of provincial police (KAPOLA) and the relevant local communities. ➤ The Public Corporation should develop and disseminate the flood risk map, which shows the location of the flood evacuation centers and the evacuation routes. ➤ The Public Corporation should enhance the system for the post-flood technical/financial support from the central government through coordination by the Governor of South Sulawesi, who is the member of “National Coordination Board of Disaster Management (BOKORNAS PB)”. 	<p><u>Flood Warning, Evacuation and Fighting System</u></p> <ul style="list-style-type: none"> ➤ Locations of the proposed hydrological gauging stations for flood warning and evacuation. ➤ Critical flood discharges and water levels to initiate each steps of flood warning and evacuation ➤ Required work activities at each of flood warning levels ➤ Institutional setup plan for flood evacuation and fighting ➤ Extent of potential flood inundation area

Table S12.2 Summary of Proposed River Management Plan (2/3)

<p>River Area Management</p>	<p><u>Administrative Boundary</u></p> <ul style="list-style-type: none"> ➤ The cross-sectional outward boundary of the river area is clearly specified by the relevant regulations. ➤ However, there does not exist clear longitudinal administrative boundaries for JRBDP and other potential administrative entities such as Balai PSDA and the local government. ➤ Illegal activities such as sand mining, construction of houses, and land exploitation are often seen in the river corridor of Jeneberang River. <p><u>Sand Mining in the Lower Reaches of Bili-Bili Dam</u></p> <ul style="list-style-type: none"> ➤ The present sand mining volume along lower Jeneberang River below Bili-Bili Dam is more than two times of natural sediment yield. <p><u>Sediment Runoff in the Upper Reaches of Bili-Bili Dam</u></p> <ul style="list-style-type: none"> ➤ The gigantic-scale of collapse of quay occurred on the caldera of Mt. Bawakaraeng on 26 March 2004 producing a tremendous volume of sediment runoff. 	<p><u>Control of Illegal Activities in River Area</u></p> <ul style="list-style-type: none"> ➤ The regular inspection/control on the illegal activities in the river area are now hardly implemented. <p><u>Degradation of Riverbed in the Lower Reaches of Bili-Bili Dam</u></p> <ul style="list-style-type: none"> ➤ The serious degradation of riverbed level is now in progress in the lower reaches of Bili-Bili Dam due to the excessive sand mining. ➤ Some of the existing river infrastructures are seriously damaged due to the degradation of riverbed. <p><u>Accumulation of Sediment in Bili-Bili Dam reservoir</u></p> <ul style="list-style-type: none"> ➤ About 90% of the dead storage capacity of Bili-Bili dam would be filled up, within the next five years, by the sediment runoff from the collapse of quay on the caldera of Mt. Bawakaraeng, unless a certain countermeasure is undertaken. 	<p><u>Administrative Area of Public Corporation</u></p> <ul style="list-style-type: none"> ➤ The river management area of the Public Corporation should be limited to the mainstream and its major tributaries with a channel length of 190km in total, which corresponds to about 65% of the whole river system. ➤ The Public Corporation should update the inventory of land ownership, classification of land use and other relevant information in its river management area. ➤ Any land use in the high water channel of the river area should be subject to approval of the Public Corporation. ➤ The Public Corporation should monitor and control the excessive land exploitation in the private land located within the boundary of the river area. ➤ Any logging activities, construction activities and land exploitation around circumference of Bili-Bili dam reservoir specified as the administration area should be subject to approval of the Public Corporation. <p><u>Control of Sand mining Activities in the Lower Reaches of Bili-Bili Dam</u></p> <ul style="list-style-type: none"> ➤ Any renewal of mining license in the lower reaches of Bili-Bili dam should be frozen. ➤ The Public Corporation should promote the mining activities at the potential mining sites proposed in the upper reaches of Bili-Bili dam. ➤ The Public Corporation should monitor the tendency of degradation of riverbed through river channel survey at the every end of rainy season. <p><u>Prevention against Sediment Runoff from Collapse of Quav on Caldera of Mt. Bawakaraeng</u></p> <p>The Public Corporation should monitor the sediment runoff from Mt. Bawakaraeng to facilitate the implementation of the urgent countermeasures by JRBDP.</p>	<p><u>Activities in River Area</u></p> <ul style="list-style-type: none"> ➤ Inventory of land use in the river area. ➤ Inventory and location map of the present sand mining sites. <p><u>Proposed Sand Mining Sites in the Upper Reaches of Bili-Bili Dam</u></p> <ul style="list-style-type: none"> ➤ Balance between the sand mining volume and sediment runoff volume. ➤ Proposed sand mining sites in the upper reaches of Bili-Bili dam.
<p>Water Quality Management</p>	<p><u>Water Quality Condition</u></p> <ul style="list-style-type: none"> ➤ Present river quality appears not to meet Class I water which is designated to be usable as raw water for drinking water supply, BOD exceeds the standard value ➤ High turbidity of river water due to excessive sediment runoff from Land collapse area at Bawakaraeng <p><u>Pollution Sorces</u></p> <ul style="list-style-type: none"> ➤ Potential source of water pollution/contamination are as follows: <ul style="list-style-type: none"> - Domestic and industrial pollutant sources along the river - Upstream agricultures - Deterioration of upper watershed due to decrease of forests - Sand mining activities 	<p><u>Water Quality Monitoring</u></p> <ul style="list-style-type: none"> ➤ Water quality monitoring has been conducted by several agencies. But they are of ad-hoc and intermittent basis, not along with an integrated program coordinated by concerned agencies. <p><u>Pollution Control</u></p> <ul style="list-style-type: none"> ➤ So far, no proactive enforcement of laws against inadequate or illegal wastewater disposal <p><u>Data Management</u></p> <ul style="list-style-type: none"> ➤ Data so far accumulated are kept in different way of filings by each agency 	<p><u>Water Quality Monitoring</u></p> <p>Public Corporation shall undertake the following tasks:</p> <ul style="list-style-type: none"> ➤ Conduct river water quality monitoring at 8 proposed locations ➤ Release river maintenance discharge as required for maintaining the river water quality ➤ Report the results of monitoring and recommend corrective measures to Bapedalda through Dinas PSDA ➤ Assist Bapedalda in formulating and conducting an integrated water quality monitoring activity in the basin <p><u>Wastewater Pollution Management</u></p> <p>Public Corporation shall undertake the following tasks:</p> <ul style="list-style-type: none"> ➤ Monitor periodically effluent quality at pollutant sources in addition to factories' own 3-monthly reporting currently in practice ➤ Identify pollutant sources as a part of river patrol survey ➤ Analyze the collected data and propose the necessary corrective measures as required ➤ Report the results of data analysis and recommend corrective measures to Bapedalda through Dinas PSDA ➤ Submit technical recommendation regarding the issuance of effluent discharge permits on demand of Bapedalda ➤ Assist Bapedalda in formulating and conducting an integrated water pollution control activity in the basin ➤ Collect effluent discharge fee as service cost of the above activities <p><u>Data Management</u></p> <p>Public Corporation shall undertake the following tasks:</p> <ul style="list-style-type: none"> ➤ Keep in custody all collected data in a data base system established in the Corporation ➤ Exchange data among all other agencies to share the information ➤ Coordinate to Bapedalda in establishing a provincial data management system 	<p><u>Water Quality Monitoring</u></p> <ul style="list-style-type: none"> ➤ Propose location of water quality monitoring by the Public Corporation ➤ Proposed parameters of water quality monitoring <p><u>Water Pollution Control</u></p> <ul style="list-style-type: none"> ➤ Concept of water pollution control operation <p><u>Operation Cost</u></p> <ul style="list-style-type: none"> ➤ Estimate of Corporation's operation cost for services related to water quality monitoring and pollution control

Table S12.2 Summary of Proposed River Management Plan (3/3)

			<ul style="list-style-type: none"> ➤ Disseminate the relevant information to public through Corporation's annual report, public information leaflet or web-site 	
Watershed Management	<p>Present Activity</p> <ul style="list-style-type: none"> ➤ Forestry Service is implementing 5-year master plan consisting of land rehabilitation in public forest, reforestation, forest management, supply of seedling, check dams and recharge wells ➤ Communities in upper area are very willing to conservation and rehabilitation of forestry resources if supported by the government 	<p>Decrease of Forest Area</p> <ul style="list-style-type: none"> ➤ During these 10 years, forest area has much decreased due to conversion to horticulture cultivation and settlement. Forest area needing early reforestation is estimated as some 2,000 ha equivalent to 10 % of total forest area. <p>Increasing Trend of Sediment Yield</p> <ul style="list-style-type: none"> ➤ Aside from the Bawakaraeng issue, sediment yield from other parts of basin appears increasing. Measures for reduction of the yield is increasingly important. 	<p>Measures for Reduction of Sediment Yield as a Most Imminent Program</p> <ul style="list-style-type: none"> ➤ Reforestation ➤ Forest exploitation and management based on economic incentive method ➤ Improved land use practices ➤ Structural measures by least cost method <p>Services to be Provided by the Public Corporation</p> <ul style="list-style-type: none"> ➤ Reforestation and Forest Management: (a) Donation of seeds and seedlings to Dinas Forestry and communities, and (b) Provision of technical recommendation regarding priority area of reforestation / forest management ➤ Improvement of Land Use Practices: (a) Donation of fund for land use practice improvement work, and (b) Provision of technical recommendation regarding priority area of land use practice improvement ➤ Structural Measures for Sediment Yield Reduction: (a) Donation of fund for sediment yield control work, and (b) Planning, design and construction supervision service of structural works in assisting Dinas of local government ➤ River Environment Conservation: (a) Periodical inspection of condition of river course to identify any adverse issues as part of river patrol survey, (b) Implementation of corrective measures as required as part of river channel maintenance work ➤ Fishery Resources Conservation: (a) Monitoring of fish culture activities in the Bili Bili reservoir so that over-development of fish-cage aquaculture should not occur, and (b) Reporting to local government (Dinas Fishery) regarding condition and recommendation of corrective measures 	<p>Concept of Role and Responsibilities of Corporation</p> <ul style="list-style-type: none"> ➤ The service provided under this sector is basically of a collaboration concept. Only the basic concept is proposed in the Study <p>Operation Cost</p> <ul style="list-style-type: none"> ➤ Estimate of Corporation's operation cost for services related to water quality monitoring and pollution control
O&M of River Infrastructures	<p>Existing River Infrastructures</p> <ul style="list-style-type: none"> ➤ There exist a variety of infrastructures for water resources/water distribution, flood control/mitigation, and sediment runoff control in Jeneberang river basin. <p>Budget Allocated to O&M</p> <ul style="list-style-type: none"> ➤ The annual O&M budget has a substantial increment after 2003 due to commencement of full-scale operation of Bili-Bili Dam. ➤ O&M cost for Bili-Bili Dam takes a substantial part (about 60%) of the total O&M cost for all river infrastructures. <p>O&M Manuals</p> <ul style="list-style-type: none"> ➤ The operation procedures for all major river infrastructures are described in the existing manuals. ➤ The existing manuals other than that for the on-going Bili-Bili Irrigation Project had been prepared in 1994 to 2004, and since then, any updating of manuals have never been made. 	<p>Present Implementation Body of O&M</p> <ul style="list-style-type: none"> ➤ JRBDP currently undertakes O&M of the existing river infrastructures, but its principal scopes are oriented to project development but not O&M. <p>Budget Allocation to O&M</p> <ul style="list-style-type: none"> ➤ The annual budget for O&M of the river infrastructures for Jeneberang river basin in 2003 is Rp. 1,329 million, which corresponds to only 35% of the necessary cost (= Rp. 3,797 million) for the full-scale of O&M. <p>Damage of Existing River Infrastructures</p> <ul style="list-style-type: none"> ➤ Some of the existing river infrastructures are seriously damaged and left behind without any rehabilitation and/or replacement in spite of their important functions contributive to river management. <p>O&M Manuals</p> <ul style="list-style-type: none"> ➤ Some of contents described in the existing O&M Manuals are no longer compatible to the latest water demand, land use and other relevant conditions. 	<p>Objective River Infrastructures Managed by Public Corporation</p> <ul style="list-style-type: none"> ➤ The Public Corporation should undertake O&M for all of the river infrastructures currently managed by JRBDP other than urban drainage facilities. ➤ The inventory and location map of the river infrastructures should continue to be updated in accordance with the latest information. <p>Expansion Program of O&M by Public Corporation</p> <ul style="list-style-type: none"> ➤ Among the above objective river infrastructures, the Public Corporation should firstly undertake O&M of those for water resources/distribution as represented by Bili-Bili Dam. ➤ The Public Corporation should expand its O&M works to those for the flood control facilities and the watershed management facilities after 2009 onward. <p>Rehabilitation of the Damages of the Existing River Infrastructures</p> <ul style="list-style-type: none"> ➤ JRBDP should rehabilitate the damages of the eleven drainage sluice gates along the lower Jeneberang River, the telemetry system and the flow meter at the Raw Water Transmission main before handover of O&M works to the Public Corporation. <p>O&M Manuals</p> <ul style="list-style-type: none"> ➤ The Public Corporation should undertake the preventive maintenance works, while JRBDP should be responsible to the corrective and emergency maintenance which are oriented to replacement of the river infrastructures due to over-period of durability service and/or destructive damages by the extensive scales of natural disasters. The O&M manuals should continue to be updated in accordance with the latest information. 	<p>Inventory of River Infrastructures</p> <ul style="list-style-type: none"> ➤ The inventory of the existing river infrastructures as of 2004 covering name of infrastructures, location, structural type, structural dimensions, investment cost and completion year. ➤ The location map of all river infrastructures located along the downstream of Jeneberang River from the river mouth to Sungguminasa Bridge. <p>Estimation of Necessary O&M Cost</p> <ul style="list-style-type: none"> ➤ The necessary full-scale O&M cost of the river infrastructures. ➤ The necessary rehabilitation cost born by JRBDP for the existing damaged river infrastructures. <p>O&M Manuals</p> <ul style="list-style-type: none"> ➤ The standard work items, time interval of works and annual work volume for the preventive maintenance. ➤ Revisions on the operation rules described in the existing manuals in accordance with the latest water demand, land use and other relevant conditions. ➤ New technical instructions against emergency cases such as extra-ordinary drought and flood over design capacity.

Table S12.3 List of Revenue Sources

Description	Type of Revenue	Payer
Water Supply Revenue:		
- Drinking water supply	Raw water supply fee	PDAM
- Hydropower generation	Water use fee	PLN
- Fishpond water supply	Raw water supply fee	Fishpond owners
- Plantation water supply	Raw water supply fee	Plantation land owners
Non-water Revenue:		
- Water pollution monitoring	Effluent discharge fee	Effluent sources
- Land use in river control area	Land use permit fee	Licensees
- C-Class mining	C-Class mining monitoring fee	Licensees
- Fishery	Fishery monitoring fee	Licensees
Government Obligation:		
- Irrigation O&M	Irrigation weir & intake O&M fee	Government(s) (in replacement of ISF)
- City canal water flushing	Flushing O&M fee	Makassar city (under principle of PSO)
- Public services not chargeable to specific beneficiaries	Government subsidy under concept of PSO	Government(s)
Non-Water Business:		
● Tourism	Income from tourism services	Tourists / visitors
● Land lease	Lease fee from lands owned by Corporation	Leaseholders
● Sand mining	Selling to market	Market
● Fish culture	Income from fish culture business	Consumers
● Other potential businesses in long term	Consultancy, construction, training services, equipment lease, etc.	Clients

Note: *1 Services for non-specific beneficiaries, such as water quality monitoring, flood and drought management, watershed management, etc

*2 PSO: Public Service Obligation

Table S12.4 PJT Jeneberang
Profit and Loss Projection 2007 - 2020 (at 2004 price without inflation factor)
Case 1: Beneficiary-to-Pay Principle

No.	ITEM	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I.	REVENUES	Rp. million	4,991	5,293	5,502	5,741	6,167	6,552	6,957	7,346	7,729	8,150	8,571	8,963	9,411	9,810
1	Revenues of Water Services	Rp. million	4,986	5,090	5,195	5,300	5,664	6,028	6,392	6,756	7,120	7,484	7,848	8,212	8,576	8,940
a.	Production															
	Electricity	GWh	77	77	77	77	77	77	77	77	77	77	77	77	77	77
	Raw water for Drinking Water	thousand m ³	64,716	66,586	68,456	70,325	76,822	83,318	89,815	96,311	102,807	109,304	115,800	122,297	128,793	135,289
	Raw water for Industries	thousand m ³	159	164	170	176	182	188	194	201	208	215	223	230	238	246
	Raw water for Plantation	ha.	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	Raw water for Irrigation	ha.	14,906	17,035	21,294	22,477	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660
b.	Tariffs															
	Electricity	Rp/kWh	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2	17.2
	Raw water for drinking water	Rp/m ³	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9	58.9
	Raw water for Industries	Rp/m ³	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8
	Raw water for Plantation	Rp/ha	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040
	Raw water for Irrigation	Rp/ha	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751
c.	Revenues of Water Service															
	Electricity	Rp.million	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327
	Raw water for drinking water	Rp.million	3,621	3,726	3,830	3,935	4,299	4,662	5,026	5,389	5,753	6,116	6,480	6,843	7,207	7,570
	Raw water for Industries	Rp.million	10	10	11	11	11	12	12	13	13	13	14	14	15	15
	Raw water for Plantation	Rp.million	27	27	27	27	27	27	27	27	27	27	27	27	27	27
2	Income from Non Water Service	Rp.million	6	202	307	441	503	524	565	590	609	666	723	751	835	870
	Tourism	Rp.million	6	6	6	6	7	7	7	15	17	20	22	24	25	25
	Land Lease	Rp.million	0	0	11	12	13	13	14	15	15	16	17	18	19	20
	Sand Mining	Rp.million	0	196	206	319	373	368	374	379	385	390	396	402	408	415
	Reservoir Fishery	Rp.million	0	0	7	8	10	12	15	17	21	25	30	36	43	52
	Waste water monitoring service fee	Rp.million	0	0	77	96	101	124	157	164	171	215	258	271	340	359
II.	COSTS	Rp.million	6,286	6,191	7,581	7,943	8,153	7,296	7,426	7,526	7,405	7,493	7,584	7,676	7,772	7,871
	O&M	Rp.million	2,189	2,346	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431
	Personnel	Rp.million	1,226	1,396	1,565	1,735	1,905	1,962	2,021	2,082	2,144	2,208	2,275	2,343	2,413	2,485
	Travelling	Rp.million	325	362	400	437	475	489	504	519	534	550	567	584	601	619
	General Affairs	Rp.million	228	264	300	336	372	372	372	372	372	372	372	372	372	372
	Marketing	Rp.million	50	53	55	57	62	66	70	73	77	82	86	90	94	98
	Depreciation	Rp.million	1,216	1,216	1,216	1,210	1,210	127	127	149	149	149	149	149	149	149
	Public Relations	Rp.million	50	50	50	50	50	50	50	50	50	50	50	50	50	51
	Human Resources Development	Rp.million	56	59	76	92	111	111	111	111	111	111	111	111	111	111
	Watershed conservation	Rp.million	0	57	143	285	285	285	285	285	285	285	285	285	285	285
	Board of Commissioner	Rp.million	85	88	90	93	96	99	102	105	108	111	114	118	121	125
	Research and Development	Rp.million	54	72	89	125	144	144	144	144	144	144	144	144	144	144
	Capacity Development	Rp.million	807	228	166	91	13	161	209	205	0	0	0	0	0	0
III.	Profit & Loss of Operation	Rp.million	-1,295	-899	-2,079	-2,202	-1,986	-744	-468	-180	323	657	988	1,287	1,639	1,939
IV.	Other Revenues	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Interest etc.	Rp.million														
V.	Other Costs	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Fee etc.	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VI.	Profit and Loss from others source	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VII.	Government Allocation for Public Services	Rp.million	2,048	2,270	2,883	3,014	3,146	3,156	3,166	3,177	3,188	3,199	3,211	3,223	3,235	3,248
	PGPS (public servant salary)*	Rp.million	137	141	316	326	336	346	356	367	378	389	401	413	425	438
	Government Payment for Irrigation O&M	Rp.million	1,532	1,750	2,188	2,310	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431
	Total other PSOs	Rp.million	379	379	379	379	379	379	379	379	379	379	379	379	379	379
VIII.	Profit & Loss before Taxes	Rp.million	616	1,231	488	487	825	2,066	2,342	2,630	3,133	3,467	3,798	4,097	4,449	4,749
IX.	Taxes	Rp.million	167	352	129	129	230	602	685	772	923	1,023	1,122	1,212	1,317	1,407
X.	Profit & Loss after Taxes	Rp.million	449	879	359	358	595	1,464	1,657	1,859	2,211	2,444	2,676	2,885	3,132	3,342
XI.	Accumulated Profit/Loss		449	1,328	1,687	2,045	2,640	4,104	5,760	7,619	9,830	12,275	14,950	17,836	20,967	24,309

*Profit excludes PGPS because tariff includes PNS Salary

Table S12.5 PJT Jeneberang
Profit and Loss Projection 2007 - 2020 (at 2004 price without inflation factor)
Case 2: Tariff setting with a target of attaining PJT's Self-financing ability within 5 years

No.	ITEM	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I.	REVENUES	Rp. million	4,013	4,294	4,483	4,701	5,055	5,368	5,702	6,018	6,330	6,678	7,028	7,347	7,724	8,051
1	Revenues of Water Services	Rp. million	4,007	4,092	4,176	4,260	4,552	4,844	5,136	5,428	5,720	6,013	6,305	6,597	6,889	7,181
a.	Production															
	Electricity	GWh	77	77	77	77	77	77	77	77	77	77	77	77	77	77
	Raw water for Drinking Water	thousand m ³	64,716	66,586	68,456	70,325	76,822	83,318	89,815	96,311	102,807	109,304	115,800	122,297	128,793	135,289
	Raw water for Industries	thousand m ³	159	164	170	176	182	188	194	201	208	215	223	230	238	246
	Raw water for Plantation	ha.	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	Raw water for Irrigation	ha.	14,906	17,035	21,294	22,477	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660
b.	Tariffs															
	Electricity	Rp/kWh	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
	Raw water for drinking water	Rp/m ³	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3
	Raw water for Industries	Rp/m ³	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8
	Raw water for Plantation	Rp/ha	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040
	Raw water for Irrigation	Rp/ha	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751
c.	Revenues of Water Service															
	Electricity	Rp.million	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065	1,065
	Raw water for drinking water	Rp.million	2,905	2,989	3,073	3,157	3,449	3,740	4,032	4,324	4,615	4,907	5,199	5,490	5,782	6,074
	Raw water for Industries	Rp.million	10	10	11	11	11	12	12	13	13	13	14	14	15	15
	Raw water for Plantation	Rp.million	27	27	27	27	27	27	27	27	27	27	27	27	27	27
2	Income from Non Water Service	Rp.million	6	202	307	441	503	524	566	590	609	666	723	751	835	870
	Tourism	Rp.million	6	6	6	6	7	7	7	15	17	20	22	24	25	25
	Land Lease	Rp.million	0	0	11	12	13	13	14	15	15	16	17	18	19	20
	Sand Mining	Rp.million	0	196	206	319	373	368	374	379	385	390	396	402	408	415
	Reservoir Fishery	Rp.million	0	0	7	8	10	12	15	17	21	25	30	36	43	52
	Waste water monitoring service fee	Rp.million	0	0	77	96	101	124	157	164	171	215	258	271	340	359
II.	COSTS	Rp.million	6,276	6,181	7,571	7,932	8,142	7,285	7,413	7,512	7,391	7,478	7,568	7,660	7,755	7,853
	O&M	Rp.million	2,189	2,346	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431
	Personnel	Rp.million	1,226	1,396	1,565	1,735	1,905	1,962	2,021	2,082	2,144	2,208	2,275	2,343	2,413	2,485
	Travelling	Rp.million	325	362	400	437	475	489	504	519	534	550	567	584	601	619
	General Affairs	Rp.million	228	264	300	336	372	372	372	372	372	372	372	372	372	372
	Marketing	Rp.million	40	43	45	47	51	54	57	60	63	67	70	73	77	81
	Depreciation	Rp.million	1,216	1,216	1,216	1,210	1,210	127	127	149	149	149	149	149	149	149
	Public Relations	Rp.million	50	50	50	50	50	50	50	50	50	50	50	50	50	51
	Human Resources Development	Rp.million	56	59	76	92	111	111	111	111	111	111	111	111	111	111
	Watershed conservation	Rp.million	0	57	143	285	285	285	285	285	285	285	285	285	285	285
	Board of Commissioner	Rp.million	85	88	90	93	96	99	102	105	108	111	114	118	121	125
	Research and Development	Rp.million	54	72	89	125	144	144	144	144	144	144	144	144	144	144
	Capacity Development	Rp.million	807	228	166	91	13	161	209	205	0	0	0	0	0	0
III.	Profit & Loss of Operation	Rp.million	-2,263	-1,887	-3,088	-3,231	-3,086	-1,917	-1,711	-1,494	-1,062	-800	-540	-313	-31	198
IV.	Other Revenues	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Interest etc.	Rp.million														
V.	Other Costs	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Fee etc.	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VI.	Profit and Loss from others source	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VII.	Government Allocation for Public Services	Rp.million	2,048	2,271	2,883	3,014	3,146	3,156	3,166	3,177	3,188	3,199	3,211	3,223	3,235	3,248
	PGPS (public servant salary)	Rp.million	137	141	316	326	336	346	356	367	378	389	401	413	425	438
	Government Payment for Irrigation O&M	Rp.million	1,532	1,750	2,188	2,310	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431
	Total other PSOs	Rp.million	379	379	379	379	379	379	379	379	379	379	379	379	379	379
VIII.	Profit & Loss before Taxes	Rp.million	-215	383	-205	-216	59	1,239	1,455	1,683	2,126	2,399	2,670	2,910	3,204	3,446
IX.	Taxes	Rp.million	0	98	0	0	6	354	419	487	620	702	784	856	944	1,016
X.	Profit & Loss after Taxes	Rp.million	-215	286	-205	-216	53	885	1,036	1,196	1,506	1,697	1,887	2,055	2,260	2,430
XI.	Accumulated Profit/Loss		-215	70	-134	-351	-298	587	1,623	2,819	4,324	6,021	7,908	9,963	12,223	14,652

Table S12.6 PJT Jeneberang
Profit and Loss Projection 2007 - 2020 (at 2004 price without inflation factor)
Case3: Tariff setting in consideration of Beneficiary's Affordability to Pay

No.	ITEM	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I.	REVENUES	Rp. million	4,443	4,711	4,888	5,093	5,403	5,671	5,960	6,232	6,498	6,802	7,107	7,382	7,713	7,996
1	Revenues of Water Services	Rp. million	4,438	4,509	4,581	4,652	4,899	5,147	5,394	5,642	5,889	6,136	6,384	6,631	6,879	7,126
a.	Production															
	Electricity	GWh	77	77	77	77	77	77	77	77	77	77	77	77	77	77
	Raw water for Drinking Water	thousand m ³	64,716	66,586	68,456	70,325	76,822	83,318	89,815	96,311	102,807	109,304	115,800	122,297	128,793	135,289
	Raw water for Industries	thousand m ³	159	164	170	176	182	188	194	201	208	215	223	230	238	246
	Raw water for Plantation	ha.	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	Raw water for Irrigation	ha.	14,906	17,035	21,294	22,477	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660
b.	Tariffs															
	Electricity	Rp/kWh	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
	Raw water for drinking water	Rp/m ³	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Raw water for Industries	Rp/m ³	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	Raw water for Plantation	Rp/ha	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040
	Raw water for Irrigation	Rp/ha	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751
c.	Revenues of Water Service															
	Electricity	Rp.million	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939
	Raw water for drinking water	Rp.million	2,459	2,530	2,601	2,672	2,919	3,166	3,413	3,660	3,907	4,154	4,400	4,647	4,894	5,141
	Raw water for Industries	Rp.million	12	12	13	13	14	14	15	15	16	16	17	18	18	19
	Raw water for Plantation	Rp.million	27	27	27	27	27	27	27	27	27	27	27	27	27	27
2	Income from Non Water Service	Rp.million	6	202	307	441	503	524	566	590	609	666	723	751	835	870
	Tourism	Rp.million	6	6	6	6	7	7	7	15	17	20	22	24	25	25
	Land Lease	Rp.million	0	0	11	12	13	13	14	15	15	16	17	18	19	20
	Sand Mining	Rp.million	0	196	206	319	373	368	374	379	385	390	396	402	408	415
	Reservoir Fishery	Rp.million	0	0	7	8	10	12	15	17	21	25	30	36	43	52
	Waste water monitoring service fee	Rp.million	0	0	77	96	101	124	157	164	171	215	258	271	340	359
II.	COSTS	Rp.million	6,280	6,185	7,575	7,936	8,145	7,288	7,416	7,514	7,393	7,480	7,569	7,660	7,755	7,853
	O&M	Rp.million	2,189	2,346	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431
	Personnel	Rp.million	1,226	1,396	1,565	1,735	1,905	1,962	2,021	2,082	2,144	2,208	2,275	2,343	2,413	2,485
	Travelling	Rp.million	325	362	400	437	475	489	504	519	534	550	567	584	601	619
	General Affairs	Rp.million	228	264	300	336	372	372	372	372	372	372	372	372	372	372
	Marketing	Rp.million	44	47	49	51	54	57	60	62	65	68	71	74	77	80
	Depreciation	Rp.million	1,216	1,216	1,216	1,210	1,210	127	127	149	149	149	149	149	149	149
	Public Relations	Rp.million	50	50	50	50	50	50	50	50	50	50	50	50	50	51
	Human Resources Development	Rp.million	56	59	76	92	111	111	111	111	111	111	111	111	111	111
	Watershed conservation	Rp.million	0	57	143	285	285	285	285	285	285	285	285	285	285	285
	Board of Commissioner	Rp.million	85	88	90	93	96	99	102	105	108	111	114	118	121	125
	Research and Development	Rp.million	54	72	89	125	144	144	144	144	144	144	144	144	144	144
	Capacity Development	Rp.million	807	228	166	91	13	161	209	205	0	0	0	0	0	0
III.	Profit & Loss of Operation	Rp.million	-1,837	-1,474	-2,687	-2,843	-2,743	-1,617	-1,456	-1,283	-895	-678	-462	-279	-42	144
IV.	Other Revenues	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Interest etc.	Rp.million														
V.	Other Costs	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Fee etc.	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VI.	Profit and Loss from others source	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VII.	Government Allocation for Public Services	Rp.million	2,048	2,271	2,883	3,014	3,146	3,156	3,166	3,177	3,188	3,199	3,211	3,223	3,235	3,248
	PGPS (public servant salary)	Rp.million	137	141	316	326	336	346	356	367	378	389	401	413	425	438
	Government Payment for Irrigation O&M	Rp.million	1,532	1,750	2,188	2,310	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431	2,431
	Total other PSOs	Rp.million	379	379	379	379	379	379	379	379	379	379	379	379	379	379
VIII.	Profit & Loss before Taxes	Rp.million	211	797	196	172	403	1,538	1,710	1,894	2,293	2,521	2,749	2,944	3,193	3,392
IX.	Taxes	Rp.million	46	222	41	34	103	444	496	551	670	739	807	866	941	1,000
X.	Profit & Loss after Taxes	Rp.million	165	575	155	138	300	1,094	1,215	1,343	1,622	1,783	1,942	2,078	2,253	2,392
XI.	Accumulated Profit/Loss		165	740	895	1,032	1,332	2,426	3,641	4,985	6,607	8,390	10,331	12,410	14,662	17,054

**Table S12.7 PJT Jeneberang Profit and Loss Projection 2007-2020 (at 2004 price without inflation factor)
Case 3: Without PSO: Tariff setting in consideration of Beneficiary's Affordability to Pay**

No.	ITEM	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I.	REVENUES	Rp. million	4,443	4,711	4,888	5,093	5,403	5,671	5,960	6,232	6,498	6,802	7,107	7,382	7,713	7,996
1	Revenues of Water Services	Rp. million	4,438	4,509	4,581	4,652	4,899	5,147	5,394	5,642	5,889	6,136	6,384	6,631	6,879	7,126
a.	Production															
	Electricity	GWh	77	77	77	77	77	77	77	77	77	77	77	77	77	77
	Raw water for Drinking Water	thousand m ³	64,716	66,586	68,456	70,325	76,822	83,318	89,815	96,311	102,807	109,304	115,800	122,297	128,793	135,289
	Raw water for Industries	thousand m ³	159	164	170	176	182	188	194	201	208	215	223	230	238	246
	Raw water for Plantation	ha.	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	Raw water for Irrigation	ha.	14,906	17,035	21,294	22,477	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660	23,660
b.	Tariffs															
	Electricity	Rp/kWh	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
	Raw water for drinking water	Rp/m ³	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Raw water for Industries	Rp/m ³	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	Raw water for Plantation	Rp/ha	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040	54,040
	Raw water for Irrigation	Rp/ha	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751	102,751
c.	Revenues of Water Service															
	Electricity	Rp.million	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,939
	Raw water for drinking water	Rp.million	2,459	2,530	2,601	2,672	2,919	3,166	3,413	3,660	3,907	4,154	4,400	4,647	4,894	5,141
	Raw water for Industries	Rp.million	12	12	13	13	14	14	15	15	16	16	17	18	18	19
	Raw water for Plantation	Rp.million	27	27	27	27	27	27	27	27	27	27	27	27	27	27
2	Income from Non Water Service	Rp.million	6	202	307	441	503	524	566	590	609	666	723	751	835	870
	Tourism	Rp.million	6	6	6	6	7	7	7	15	17	20	22	24	25	25
	Land Lease	Rp.million	0	0	11	12	13	13	14	15	15	16	17	18	19	20
	Sand Mining	Rp.million	0	196	206	319	373	368	374	379	385	390	396	402	408	415
	Reservior Fishery	Rp.million	0	0	7	8	10	12	15	17	21	25	30	36	43	52
	Waste water monitoring service fee	Rp.million	0	0	77	96	101	124	157	164	171	215	258	271	340	359
II.	COSTS	Rp.million	6,280	6,185	7,575	7,936	8,145	7,288	7,416	7,514	7,393	7,480	7,569	7,660	7,755	7,853
	O&M	Rp.million	2,189	2,346	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431	3,431
	Personnel	Rp.million	1,226	1,396	1,565	1,735	1,905	1,962	2,021	2,082	2,144	2,208	2,275	2,343	2,413	2,485
	Travelling	Rp.million	325	362	400	437	475	489	504	519	534	550	567	584	601	619
	General Affairs	Rp.million	228	264	300	336	372	372	372	372	372	372	372	372	372	372
	Marketing	Rp.million	44	47	49	51	54	57	60	62	65	68	71	74	77	80
	Depreciation	Rp.million	1,216	1,216	1,216	1,210	1,210	127	127	149	149	149	149	149	149	149
	Public Relations	Rp.million	50	50	50	50	50	50	50	50	50	50	50	50	50	51
	Human Resources Development	Rp.million	56	59	76	92	111	111	111	111	111	111	111	111	111	111
	Watershed conservation	Rp.million	0	57	143	285	285	285	285	285	285	285	285	285	285	285
	Board of Commissioner	Rp.million	85	88	90	93	96	99	102	105	108	111	114	118	121	125
	Research and Development	Rp.million	54	72	89	125	144	144	144	144	144	144	144	144	144	144
	Capacity Development	Rp.million	807	228	166	91	13	161	209	205	0	0	0	0	0	0
III.	Profit & Loss of Operation	Rp.million	-1,837	-1,474	-2,687	-2,843	-2,743	-1,617	-1,456	-1,283	-895	-678	-462	-279	-42	144
IV.	Other Revenues	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Interest etc.	Rp.million														
V.	Other Costs	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bank Fee etc.	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VI.	Profit and Loss from others source	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VII.	Government Allocation for Public Services	Rp.million	137	141	316	326	336	346	356	367	378	389	401	413	425	438
	PGPS (public servant salary)	Rp.million	137	141	316	326	336	346	356	367	378	389	401	413	425	438
	Government Payment for Irrigation O&M	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total other PSOs	Rp.million	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIII.	Profit & Loss before Taxes	Rp.million	-1,700	-1,333	-2,371	-2,517	-2,407	-1,272	-1,100	-916	-517	-289	-61	134	383	581
IX.	Taxes	Rp.million	0	0	0	0	0	0	0	0	0	0	0	23	98	157
X.	Profit & Loss after Taxes	Rp.million	-1,700	-1,333	-2,371	-2,517	-2,407	-1,272	-1,100	-916	-517	-289	-61	111	286	425
XI.	Accumulated Profit/Loss		-1,700	-3,033	-5,404	-7,921	-10,328	-11,599	-12,699	-13,615	-14,132	-14,421	-14,482	-14,371	-14,085	-13,661

**Table S12.8 PJT Jeneberang
Financial Ratio Analysis 2007 - 2011**

No.	Item	Formulation	2007		2008		2009		2010		2011	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
1	Return On Equity (ROE)	$\frac{\text{Profit After Tax}}{\text{Equity}} \times 100\%$	6.6 %	7.5	23.4 %	15	8.4 %	9	10.8 %	12	18.7 %	15
2	Return On Investment (ROI)	$\frac{\text{EBIT} + \text{Depreciation}}{\text{Capital Employed}} \times 100\%$	17.4 %	9	24.0 %	10	19.6 %	10	23.4 %	10	31.3 %	10
3	Cash Ratio	$\frac{\text{Cash} + \text{Bank} + \text{Time Deposit}}{\text{Current Liabilities}} \times 100\%$	229.1 %	3	178.0 %	3	157.8 %	3	170.9 %	3	191.3 %	3
4	Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}} \times 100\%$	516.6 %	4	253.7 %	4	229.8 %	4	247.2 %	4	275.0 %	4
5	Collection Periods (CP)	$\frac{\text{Account Receivable}}{\text{Revenue}} \times 365 \text{ days}$	12.5 days	4	12.1 days	4	11.9 days	4	11.6 days	4	11.6 days	4
6	Inventory Turn Over	$\frac{\text{Inventory}}{\text{Revenue}} \times 365 \text{ days}$	0.4 days	4	0.4 days	4	0.6 days	4	0.6 days	4	0.5 days	4
7	Total Asset Turn Over (TATO)	$\frac{\text{Total Revenue}}{\text{Capital Employed}} \times 100\%$	79.1 %	2.5	84.8 %	2.5	114.1 %	3.5	143.0 %	4	176.2 %	4
8	Ratio Total Equity and Total Assets (TE/TA)	$\frac{\text{Total Equity}}{\text{Total Assets}} \times 100\%$	36.1 %	6	39.7 %	6	41.7 %	5.5	48.5 %	5.5	58.4 %	5
Total Score				40.0		48.5		43.0		46.5		49.0

Table S13.1 PDM of Capacity Development for Jeneberang River Basin Management

Project : Capacity Development for Jeneberang River Basin Management

Implementation Period : 2006 ~2008

Target group : PJT Jeneberang

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Sustainable Jeneberang river basin management is achieved.	<ul style="list-style-type: none"> The cost needed for basin management can be covered by the revenue. Make notable negative environmental impact in the basin zero (none). 	<ul style="list-style-type: none"> Accounting record prepared by the government. Quality control record of the government. 	<ul style="list-style-type: none"> GOI policy on Basin Management Company and Balai PSDA related to basin management does not change. The Jeneberang Public Corporation keeps existing. Regional autonomy regulation does not change.
Project Purpose Capacity of PJT Jeneberang and Balai PSDA Jeneberang is strengthened, and watershed management, water quality/quantity management, flood/drought management, and river area management is properly executed.	<ul style="list-style-type: none"> Provide 95% of raw water annually demanded that satisfied the quality required by users (provide safe, good quality, low cost raw water stably). The complaints from general public and clients is properly treated. 	<ul style="list-style-type: none"> Water balance (demand and supply) record of raw water. Claim record Media, news paper. 	<ul style="list-style-type: none"> Drastic social and economic changes such as drop in value of Rupiah followed by economic crisis which make beneficiaries unable to pay fees do not occur. Stakeholders understand and participate in the river basin management activities.
Outputs <ol style="list-style-type: none"> Facility O&M and management capacity will improve by the staff conducting proper O&M of facilities based on improved manuals, improved database management and improved O&M equipment Organization operation and management capacity will improve by proper execution of jobs resulted from efficient organizational structure, proper understanding and implementation of laws and regulation related to internal and external affairs Financial management capacity will improve by securing income sources and fee collection, and efficient financial management resulted from improved fee collection system, installation of corporate accounting system and staff skill development, and promotion of non-water businesses Human resources will be developed by improving management staff skills and improving personnel system resulted from staff training, more senior staff, improving skill of young staff, and improving staff assignment/promotion/recruitment 	<p>① Indicator for capacity development in O&M of river facilities: Water use management with accurate monitoring of conditions (hydrological observation/database available, water allocation operation, water use permit, effective use of reservoir, drought management), River facility O&M based on database and manual (dams/reservoir management, intake management, river facility management, sabo and sand pocket management), River management based on manual (river course management, water quality management, flood control, land use/river use management, sand/gravel mining management), Watershed conservation based on manual (sediment control, land use control, forest conservation control, ecological conservation)</p> <p>② Indicator for capacity development in institutional/organizational management: Organizational management strengthening (structuring efficient organization, clarification of job description, authority, and line of command), Management control (activity of management board, decision making, trouble and claims), Availability and understanding of institutional framework (laws and regulations for river basin management, internal rules for organization management), Public relations (community organizations, accountability, community education/enlightenment, community service)</p> <p>③ Indicator for capacity development in financial management: Availability of accounting system (installation of corporate accounting system, guidelines/manuals related to finance statement, auditing), Tariff collection improvement (approval of water rate, water fee collection system, revenue from tariff), Cash flow management (revenue/expenditure control based on accounting system), Asset management (balance sheet, asset management), Non-water businesses (formulation and operation of non-water projects)</p> <p>④ Indicators for capacity development for human resources: Proper execution of education and training (formulation of education and training programs, execution of education and training, verification of output of education and training), Personnel management system (system is established and implemented, recruitment, promotion, staff assignment, incentive)</p>	<p>① Means of verification for O&M of river facilities: Hydrological database, water distribution operation record, water use permit application record, reservoir operation rule/operation record, minutes of meeting of water resources coordination committee, maintenance and repair record, water quality observation record, flood control work record, river management record, sand/gravel mining record, inspection/dam management record/facility management record, other work record, relevant manuals and guidelines</p> <p>② Means of verification for institutional/organizational management: Number of laws and regulations enacted, number of rules established, minutes of meeting of internal meeting, training record, interviews, minute of meeting of board meeting</p> <p>③ Means of verification for improvement of financial management: Number of laws and regulations enacted, number of rules established, regulations at provincial level, contract with clients including agreement of water use fee collection, fee collection record, internal document, financial document, accounting record, auditing record, asset ledger, minutes of meeting of internal meeting, pilot project activity record, relevant manuals and guidelines</p> <p>④ Means of verification for human resources: Staff database (Number of staff by age, education, specialty, qualification, personnel management record), document related to personnel management system, number of education and training, staff training record, salary record, internal rules for personnel management</p>	<ul style="list-style-type: none"> Beneficiary pay principle for basin management and pollutant discharger pay principle do not change. Drastic social and economic changes such as drop in value of Rupiah followed by economic crisis which make beneficiaries unable to pay fees do not occur. Water demand does not decrease drastically. Stakeholders agree and follow the role and function of the Public Corporation and the stakeholders. Drastic natural conditions (rainfall, temperature, geography) change.
Activities <ol style="list-style-type: none"> 1-1 Formulate facility operation and maintenance management plan 1-2 Formulate and distribute facility operation and maintenance guideline and manuals (database, operation, maintenance) 1-3 Establish data monitoring system (evaluation, reporting, feedback) 1-4 Formulate calibration plan of monitoring equipment 1-5 Formulate and conduct capacity development plan (training) related to facility operation and maintenance (data monitoring/analysis, operation, maintenance, calibration) 1-6 Monitor and evaluate the progress of capacity development and feedback to the plan and implementation 2-1 Formulate organization operation management plan (annual plan, activity report) 2-2 Analyze and formulate job description, organizational structure, line of command, staff requirement 2-3 Formulate organization operation management regulations and rules 2-4 Review and understand existing laws and regulations related to river basin management including Water Law, autonomy 2-5 Formulate and conduct capacity development plan (training) related to organization operation management plan for management and institutional aspects 2-6 Monitor and evaluate the progress of capacity development and feedback to the plan and implementation 3-1 Formulate security of revenue source for O&M management plan 3-2 Establish and install corporate accounting system (cost calculation, computer program, financial rules) 3-3 Prepare a contract with clients, tariff setting system and guideline 3-4 Promote of non-water businesses 3-5 Formulate and conduct capacity development plan related to financial management including job description, staff requirement, manuals, and training 3-6 Monitor and evaluate the progress of capacity development and feedback to the plan and implementation 4-1 Evaluate manpower and personnel system, execution and system of education and training 4-2 Introduce personnel management system including career development, personnel evaluation, recruitment, promotion, and personnel database 4-3 Formulate and conduct manpower and human resources development plan including management and technical skill development 4-4 Monitor and evaluate the progress of manpower and human resources development and feedback to the plan and implementation 	Inputs <p>Japan/Foreign</p> <p>Manpower</p> <ol style="list-style-type: none"> JICA Study Team (monitoring and evaluation for Phase III) Experts <p>Materials</p> <ol style="list-style-type: none"> Computers and other office equipment Computer soft (GIS) Financial management system (Administration management system) Manuals and guidelines <p>Indonesia</p> <p>Manpower</p> <p>Counterpart (Region)</p> <ol style="list-style-type: none"> Public Corporation staff JRBDP staff who are likely to be transferred to the new corporation Balai PSDA Jeneberang Staff (limited to those responsible for Jeneberang River Basin Management) PJT 1 staff <p>Counterpart (Central)</p> <ul style="list-style-type: none"> Staff of General Directorate of Water Resources Development, Ministry of Public Works <p>Capacity Development Monitoring Committee</p> <ul style="list-style-type: none"> Composed of South Sulawesi government and Kabupaten government <p>Materials</p> <ul style="list-style-type: none"> Office space, computer, hydrological observation equipment and other equipment necessary for basin management work <p>Local costs</p> <ul style="list-style-type: none"> Project management and operation costs 		<ul style="list-style-type: none"> Staff who received training keeps working at PJT Jeneberang or Balai PSDA Jeneberang. Staff who received training keeps working at the same department or the section. Stakeholders agree and follow the role and function of PJT Jeneberang and the stakeholders. <p>Pre-conditions</p> <ul style="list-style-type: none"> The concept of basin based water resources management (one basin one management) does not change. Government regulations (PP) necessary for establishment of the Public Corporation is drafted. Budget from regional government and central government is allocated for initial operation of the Jeneberang Public Corporation. Initial staff assignment is fixed.

Table 13.2 Outcomes from Stakeholders Workshop

Target Group	Workshop Result Summary
Future clients of PJT Jeneberang	Participants identified many activities for river basin management including water quality & quantity, facility O&M, legal issue, environmental conservation, capacity building, and coordination among agencies. Participants' expectation to PJT Jeneberang is high, and the participants are aware of stakeholder involvement for river basin management is important.
All stakeholders in Jeneberang River basin	The workshop was the first official stakeholder meeting in which the information on river basin management and the concept of PJT Jeneberang was provided to stakeholders. After the stakeholders understand river basin management and the concept of PJT Jeneberang, they generally agree the establishment of the Corporation and show willingness of participating in river basin management activities.
Malino area	<p>(1) Stakeholder participation in river basin management</p> <ul style="list-style-type: none"> • Forest conservation (tree planting, protection, education) are the major interest of the participants. • Revival of local custom for reforestation efforts (this region had a custom of planting trees for special occasion such as wedding). • Participants are well aware of importance of forest conservation for water resources conservation and show willingness to contribute for forest conservation through education, planting trees, land conservation. • Other areas of participation are identified as tourism, health, infrastructure, fishery, women empowerment. <p>(2) Slogan for river basin management</p> <ul style="list-style-type: none"> • "One piece of land, one tree" • "Your green is my crystal water" • "Plant the fruits seed you eat to shade Jeneberang" • "The redness of <i>Spatudea</i>* flowers reflects clear water of Jeneberang" <p>* <i>Spatudea</i>: a kind of plant grown in Malino area.</p>
Bili-Bili area	<p>(1) Stakeholder participation in river basin management</p> <ul style="list-style-type: none"> • Forest management including planting trees, law enforcement. • Bili-Bili dam reservoir management including excavation, solid waste management, planting vegetation. • Benefits of the reservoir existence to the surrounding communities and utilization of the reservoir for the benefit of the community. • Promotion of economic activities including fishery, tourism and mining • Community empowerment. <p>(2) Slogan for river basin management</p> <ul style="list-style-type: none"> • "Conserve Bili-Bili Reservoir" • "Forest is my hope. River is my life"
Down Stream area	<p>(1) Stakeholder participation in river basin management</p> <ul style="list-style-type: none"> • Operation and maintenance of irrigation channels is the main concern of the participants, which directly affects the production of crops and wellbeing of farmers. • O&M includes cleaning, water allocation, proper use of channels and facilities. • Strengthening of O&M by mutual cooperation, empowerment of WUA, legal enforcement are discussed. • Importance of paying ISF for all water uses including paddy and fishpond and pay for WUA fund to be used for rehabilitation of canals are discussed. • Participant also show willingness for canal rehabilitation by themselves. <p>(2) Slogan for river basin management</p> <ul style="list-style-type: none"> • "Irrigation channels are mutual ownership" • "Stop illegal off-take and tree planting on dykes" • "Let's work together to clear irrigation channels"

Table S13.3 List of proposed Capacity Development Programs (1/2)

(1) Capacity Development Program for Facility Management

No.	Program Name	Objective
(1)-1-1	Development of inventory of land use states in river administration area	<ul style="list-style-type: none"> To identify the outward bound of administration area of PJT Jeneberang To identify the updated land use states in the administration area
(1)-1-2	Development of inventory of facilities relevant to river management	To identify the updated states of facilities relevant to river management
(1)-1-3	Hydrological data collection and analysis	<ul style="list-style-type: none"> To improve knowledge of PJT Jeneberang on hydrological data collection and analysis To improve accuracy of hydrological gauging data as the base for operation of the facilities
(1)-2-1	O&M of Bili-Bili Dam and Raw Water Transmission Main (RWTM)	To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works and to improve the conditions of facilities.
(1)-2-2	Maintenance System for Electrical Equipment in Bili-Bili Dam	To achieve the conduct of proper maintenance work for electrical equipment in Bili-Bili dam on a continuous basis.
(1)-2-3	O&M for Hydromechanical Facility (Bili-Bili Dam site)	To establish a long term maintenance plan and to conduct proper O&M for hydromechanical facility at Bili-Bili dam site.
(1)-2-4	O&M for Hydromechanical Facility (Drainage gate at Jeneberang river)	To establish a long term maintenance plan and to conduct proper O&M for hydromechanical facility for drainage gate.
(1)-2-5	O&M of the existing eleven drainage gates along lower Jeneberang River	<ul style="list-style-type: none"> To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works To improve the knowledge of the local resident as the gatekeepers the relevant operation and maintenance works
(1)-2-6	O&M of Rubber Dam and Long Storage	<ul style="list-style-type: none"> To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works. To improve the knowledge of the local resident as the gatekeepers the relevant operation and maintenance works.
(1)-2-7	O&M of irrigation weirs	To improve the knowledge of PJT Jeneberang on the relevant operation and maintenance works

(2) Capacity Development Program for River Basin Management

No.	Program Name	Objective
(2)-1-1	Flood Plain management	<ul style="list-style-type: none"> To establish the effective flood plain management system. To improve the knowledge of PJT Jeneberang on flood plain management.
(2)-1-2	Flood warning, fighting and evacuation	<ul style="list-style-type: none"> To establish the flood warning, fighting and evacuation system To improve the knowledge of PJT Jeneberang on flood warning, fighting and evacuation system
(2)-2	Water quantity management	<ul style="list-style-type: none"> To establish the water quantity management system for stabilizing water supply. To improve knowledge of PJT Jeneberang on water quantity management system.
(2)-3	Drought Management	<ul style="list-style-type: none"> To establish the drought management system To improve the knowledge of PJT Jeneberang on drought management system
(2)-4	Implementation of Watershed Management Services	To accomplish the conduct of services relevant to watershed conservation and management. To acquaint with the basic know-how of providing the services.
(2)-5-1	Water Quality Monitoring (WQM)	To accomplish the conduct of WQM work on a continuous basis.
(2)-5-2	Water Pollution Monitoring (WPM)	To accomplish the conduct of WPM work on a continuous basis

Table S13.3 List of proposed Capacity Development Programs (2/2)**(3) Capacity Development for Institution/Organization Management/Human Resources Management**

No.	Program Name	Objective
(3)-1	Laws and Regulations in the Water Sector	To familiarize PJT Jeneberang management with the relevant (i) national laws, regulations and decrees, (ii) regional regulations, decrees, (iii) PJT I Directors' Decrees.
(3)-2	Organizational Structuring & Staffing, and HRA	To educate selected senior personnel and those responsible in organizational structuring, job analysis, staff planning and budgeting, and personnel administration so that the staff can execute jobs properly.
(3)-3	Human Resources Development (HRD)	To educate the HR Section and PJT Jeneberang managers in the basic skills, procedure and documentation of HRD.
(3)-4	Strengthening of Public Relations Capability	To strengthen operation capability by establishing public relations system and skills development aiming at customer satisfaction and stakeholder participation.

(4) Capacity Development for Administrative Management

No.	Program Name	Objective
(4)-1	Business Planning Skill Training	To be familiarize with the basic skills, procedure, know-how and documentation of business planning, and to be able to elaborate planning document and business proposal.
(4)-2	Quality Management System Training	To learn about Quality Management System (QMS) – quality policy and goals, work procedure and instruction, and document control – and acquire capability of preparing the certificate acquisition process after the operation.
(4)-3	Corporate Management Capacity Development	To establish management base of PJT Jeneberang with business mind.

(5) Capacity Development for Financial Management

No.	Program Name	Objective
(5)-1	Financial Administration Capacity Development Program	To strengthen capacity of financial administration system and its operation by establishing the system and skill development.
(5)-2	Corporate Accounting by ASGL (Accounting System General Ledger)	To develop skills for corporate accounting specialized in water resources management using ASGL.
(5)-3	Revenue collection	To establish and strengthen revenue collection procedure of the services provided by PJT Jeneberang.

Table S14.1 Actions Required toward Establishment and Operation Commencement of PJT Jeneberang (1/2)

Item	Proposed Action	Responsible Agency	Schedule of Achievement
A. Legislation:			
A1 PJT J and PJT III Initial Legislation	<ul style="list-style-type: none"> ■ Approve Option II (PJT I + II + III option) through inter-departmental discussion, with final consent from SEKNEG 	DGWR *1	March 2005
	<ul style="list-style-type: none"> ■ Acquire consensus of Option II from SS regional governments (Province and Kabupaten) 	- do. above -	March 2005
	<ul style="list-style-type: none"> ■ Legislate new PP on establishment of PJT III (Remove Solo basin from PJT I jurisdiction and incorporate in PJT III) 	- do. above -	March 2005
	<ul style="list-style-type: none"> ■ Legislate new Keppres for inclusion of Jeneberang basin as additional working area of PJT I 	- do. above -	March 2005
A2 Central Government Regulation other than A1 above	<ul style="list-style-type: none"> ■ Legislate new PP for investment of capital of PJT J, and subsequently proceed with the transfer of assets to PJT I 	MOF supported by DGWR	June 2005
	<ul style="list-style-type: none"> ■ Issue MPW Decrees to enable the operation of PJT J in its working area (i) Decree for authorizing PJT I to collect water management fees (ii) Decree for authorizing SS Governor to issue various permits 	DGWR*1	March 2006
	<ul style="list-style-type: none"> ■ Issue SMSOE Decree for amending PJT J Supervisory Board 	SMSOE assisted by DGWR	March 2006
	<ul style="list-style-type: none"> ■ Issue MPW Decrees on basic tariff for PDAM, PLN and industries 	DGWR*1	March 2006
A3 Regional Regulations and Agreements	<ul style="list-style-type: none"> ■ Legislate four SS Provincial Regulations concerning (i) surface water permits, (ii) land use in river control area, (iii) C-class mining, and (iv) water quality and pollution management 	SS Dinas PSDA, assisted by PJT I after its establishment	September 2006
	<ul style="list-style-type: none"> ■ Issue SS Governor Decrees concerning the implementation of Provincial Regulations above, fee collection, organizational change (e.g. PTPA) and other related matters 	- do. above -	December 2006
	<ul style="list-style-type: none"> ■ Issue Decree of Head of SS Dinas PSDA on technical guidelines for implementation of the relevant Governor's Decrees 	SS Dinas PSDA	December 2006
	<ul style="list-style-type: none"> ■ Issue Decree of Head of Bapedalda on technical guidelines for implementation of the relevant Governor's Decrees 	Bapedalda	December 2006
	<ul style="list-style-type: none"> ■ Conclude joint decrees and cooperation agreements between PJT J and relevant Bupati/Walikota (primarily Gowa); among others, regarding (i) demarcation of detailed roles, (ii) borders of jurisdiction area, (iii) collection of fees for land use, C-class mining, fishery, effluent discharge, etc. 	PJT J and Kabupaten/Kota governments	December 2006
B. Budgeting:			
B1 Budget for regional legislation	<ul style="list-style-type: none"> ■ Acquire budget for expenditures for legislation work, public consultation and socialization 	Dinas PSDA	September 2005

Table S14.1 Actions Required toward Establishment and Operation Commencement of PJT Jeneberang (2/2)

Item	Proposed Action	Responsible Agency	Schedule of Achievement
B2 Budget for organizational set-up	■ Provision of loan to PJT I to cover costs for initial organizational set-up	MOF supported by DGWR and SMSOE	December 2006
B3 Budget for initial operation cost	■ Provision of loan to PJT I to cover costs for initial running cost for 1 st year operation	- do. above -	December 2006
C. Organizational Set-up of PJT J			
C1 Office set-up	■ Set up PJT J head office at present PIPWS office at Jl. Monumen Emmy Saelan in Makassar, including reform of building	PJT J assisted by PIPWS Jeneberang	March 2006
C2 Appointment of key staff	■ Assign key staff on respective posts to conduct start-up organizational work - Nomination of personnel to be completed in previous year by PJT J and DGWR - Cost of personnel (PNS) to be borne by the relevant agencies which dispatched the personnel	PJT J assisted by DGWR and Dinas PSDA	December 2006
C3 Assistance in regional legislation and agreements	■ Assist Dinas PSDA and other agencies in conducting the following: - Preparation of regional regulations and decrees - Conduct of public consultation and socialization as needed - Conclusion of various agreements among stakeholders	PJT J	December 2006
C4 Annual work plan and budget plan	■ Prepare corporate operation plans under guidance of PJT I head office. The work includes annual work plan and budgetary plan.	PJT J supported by PJT I head office	September 2006
C5 Finalization of corporate and RBM management system	■ Establish corporate administrative, financial and river basin management systems based on PJT I regulations and recommendation from this Study	- do. above -	December 2006
C6 Initial Training of Personnel	■ Conduct initial introductory training for PJTJ management and O&M personnel, the latter is assumed to be transferred from PIPWS Jeneberang.	PJT I	December 2006
C7 Procurement of initial O&M resources	■ Procure equipment and supplies required for initial O&M operation, such as vehicles, office equipment, survey tools, etc	PJT J	December 2006
D. Rehabilitation of Infrastructures			
D1 Rubber dam and ground sill	■ Scheduled to be rehabilitated by the end of 2005 dry season	PIPWS Jeneberang	November 2005
D2 Sand pocket dam No.4	■ Scheduled to be rehabilitated by the end of 2005 dry season	- do. above -	November 2005
D3 Drainage gates in levee section	■ Repair inoperable gates at 11 places between rubber dam and Sunguminasa	- do. above -	November 2005
D4 Telemeter water level gauging station at Bayang	■ Reinstall gauging equipment which was stolen in 2002, together with correction of software for data transmittal system	- do. above -	December 2005
D5 Flow meter at inlet of raw water transmission main	■ Replace inlet flow meter which is currently in malfunction	- do. above -	December 2005

Note: Refer to Chapter 7, 9, 10 and 12 for further detail

SF-1

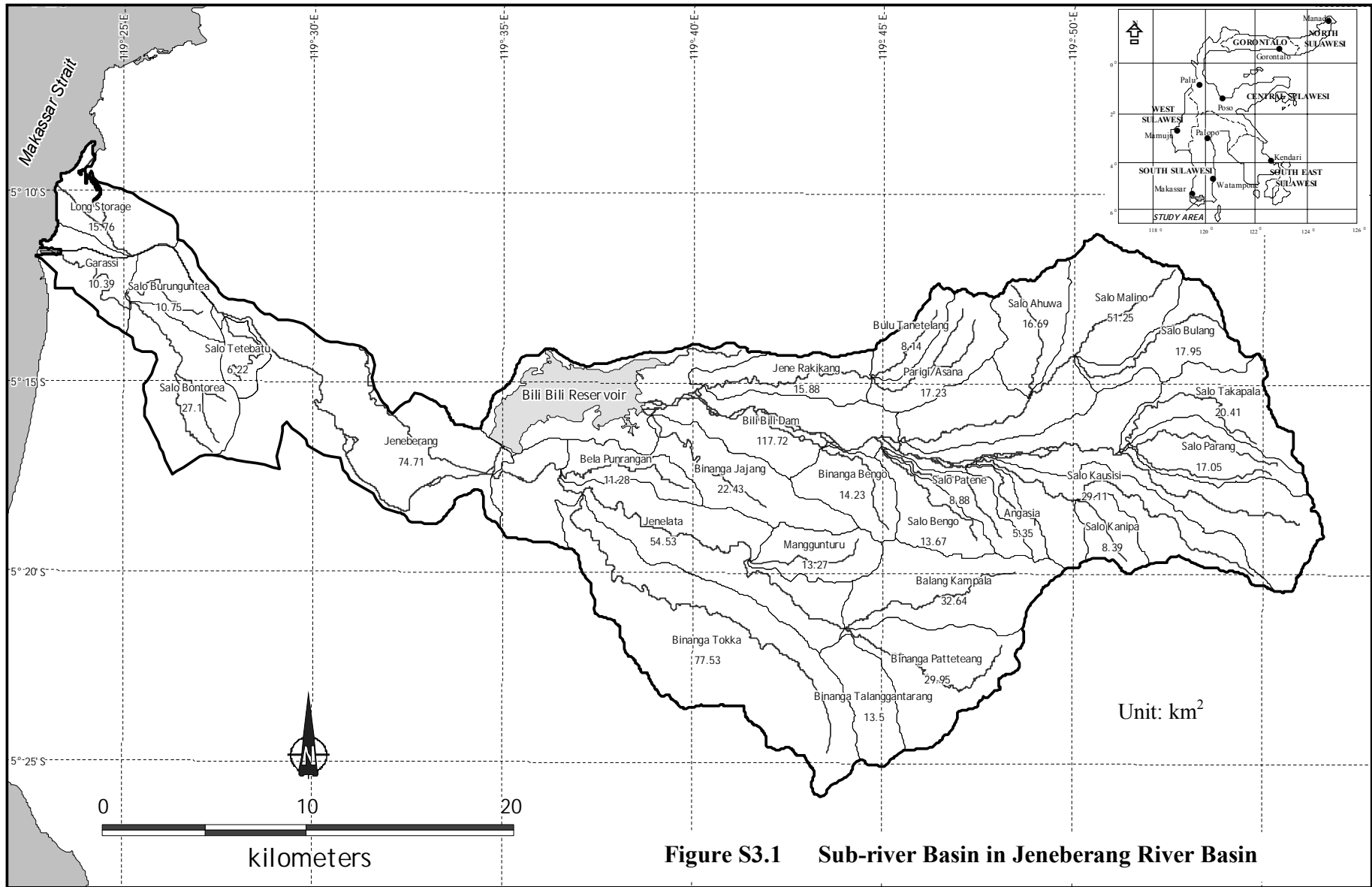


Figure S3.1 Sub-river Basin in Jeneberang River Basin

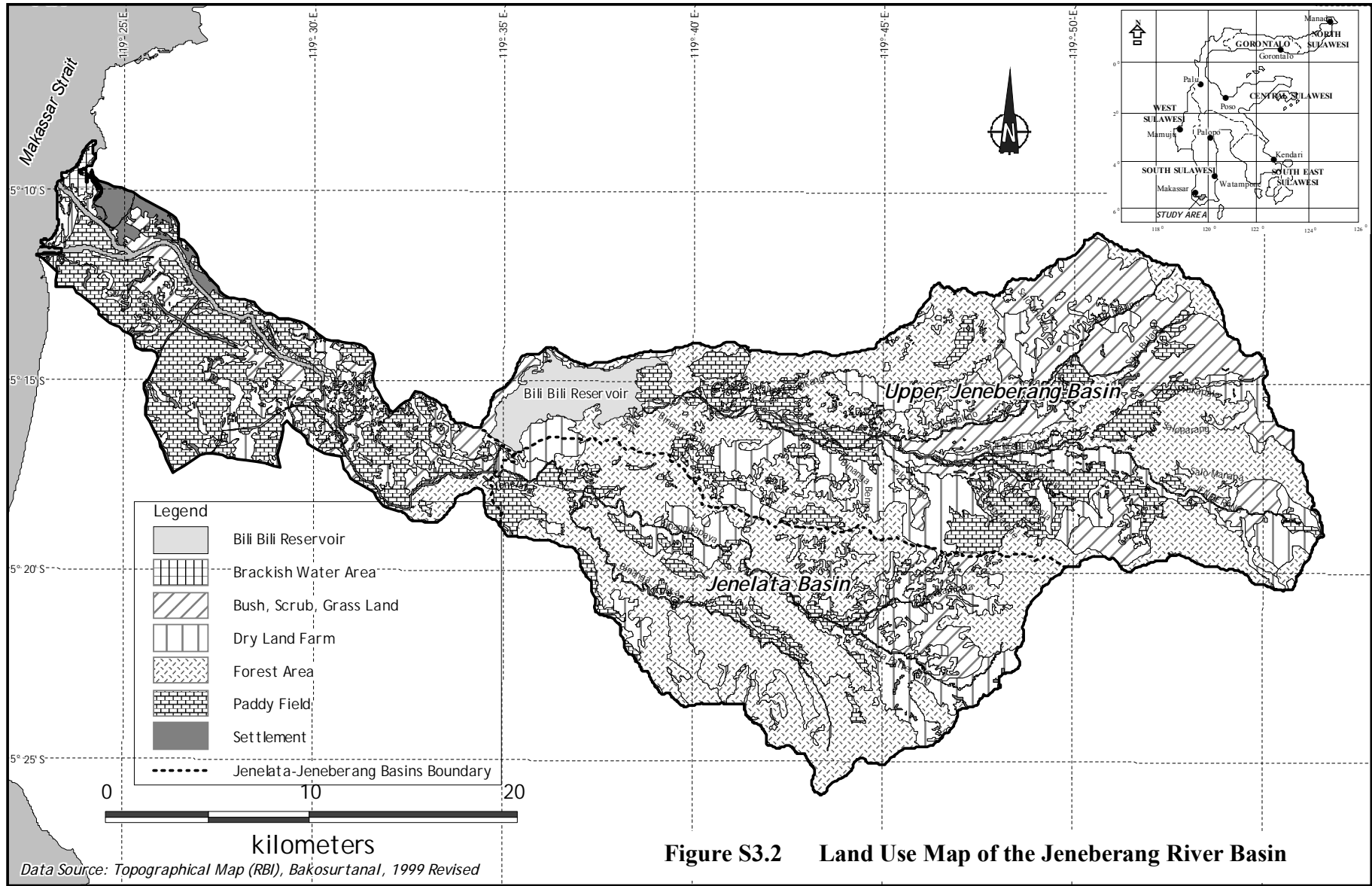


Figure S3.2 Land Use Map of the Jeneberang River Basin

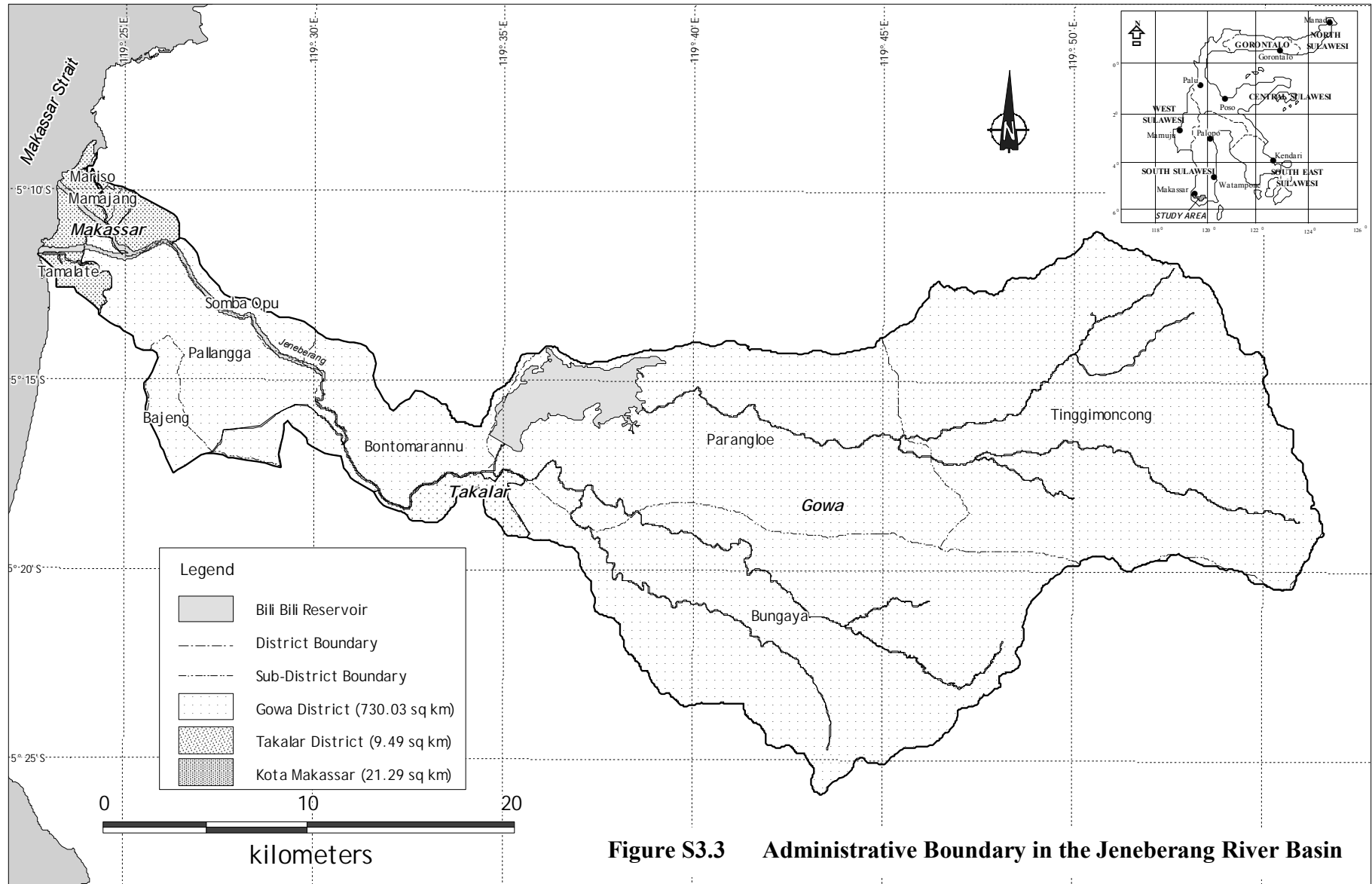
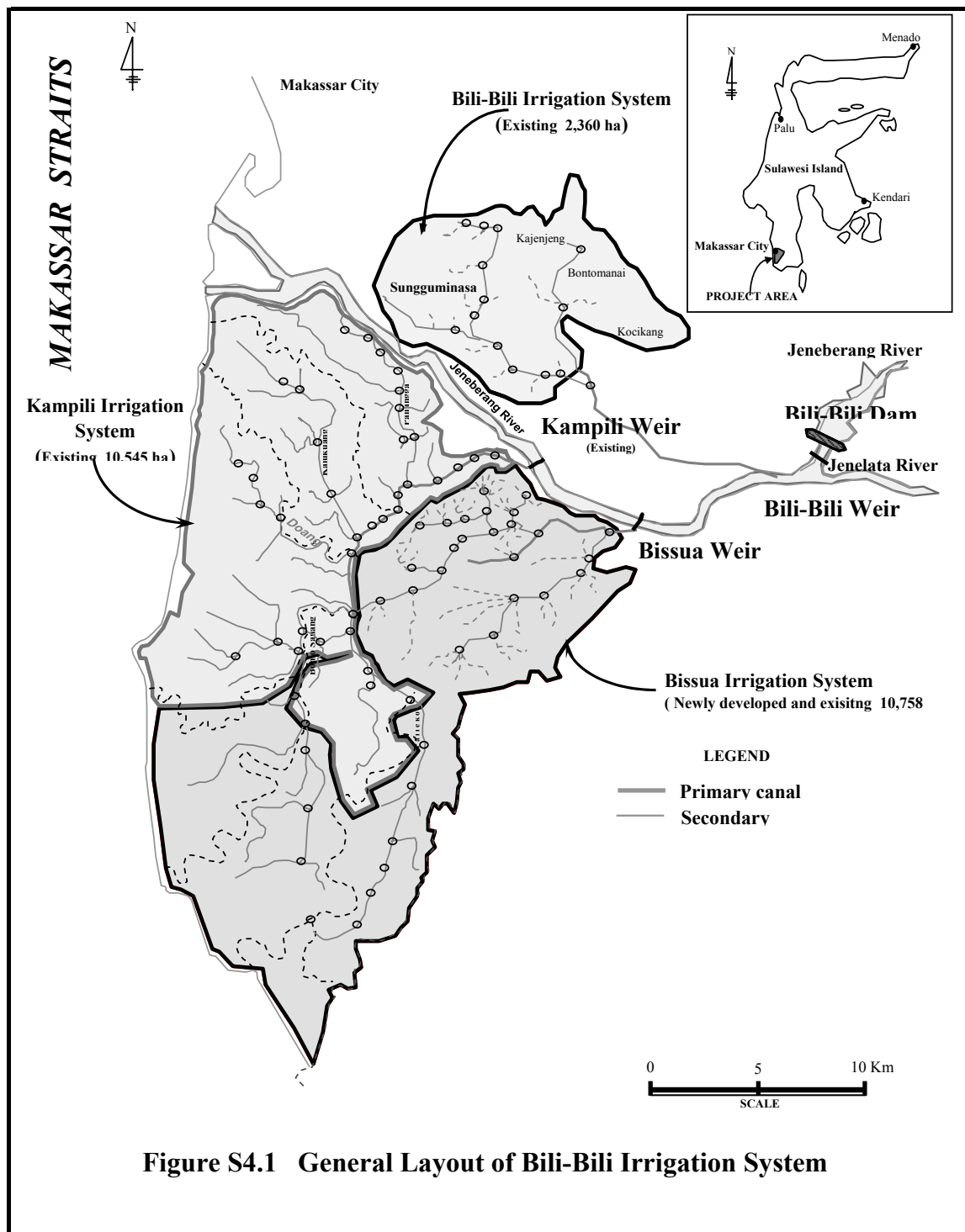


Figure S3.3 Administrative Boundary in the Jeneberang River Basin



Source : Bili - Bili Irrigation Project Office

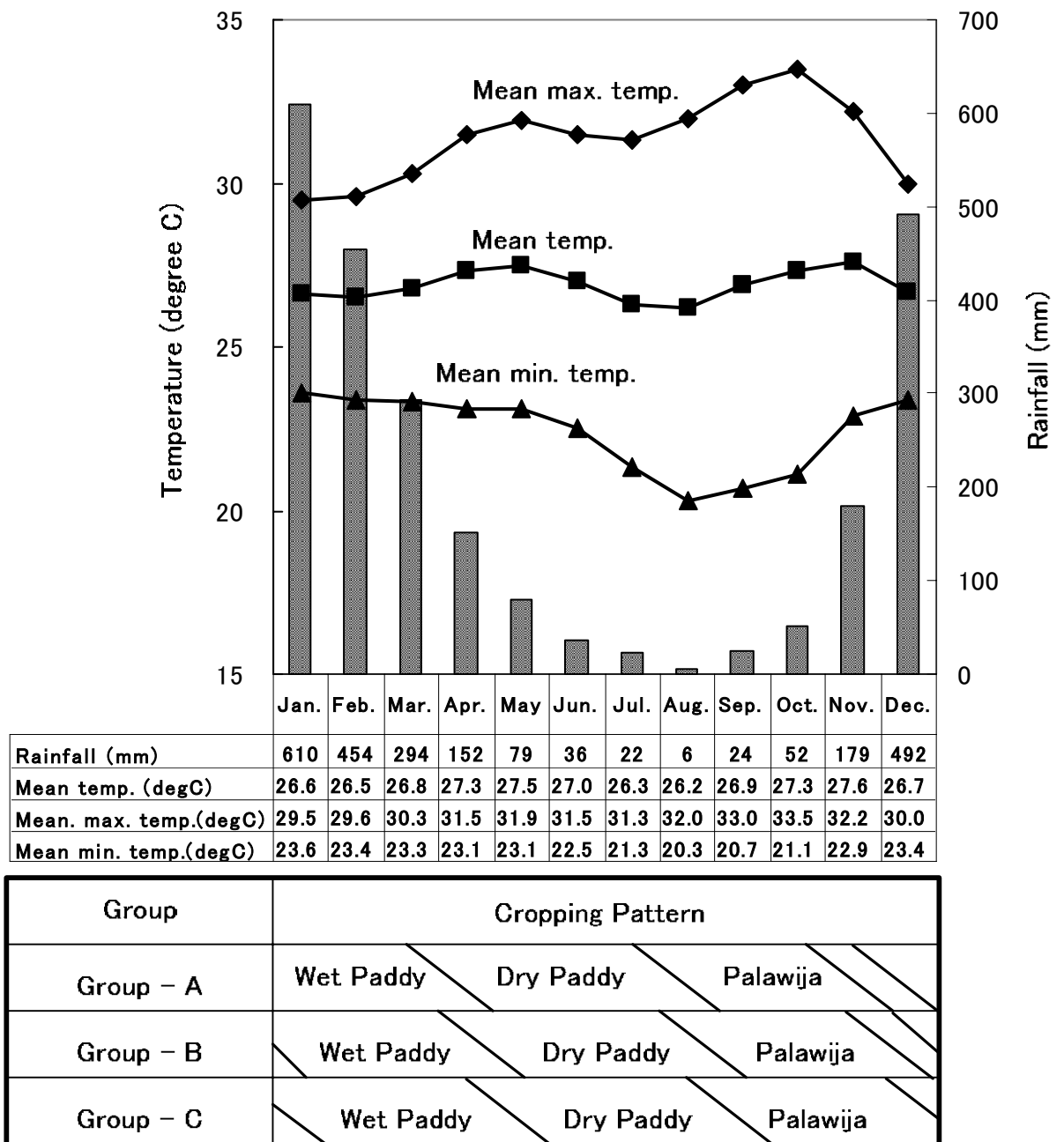


Figure S4.2 Proposed Cropping Pattern

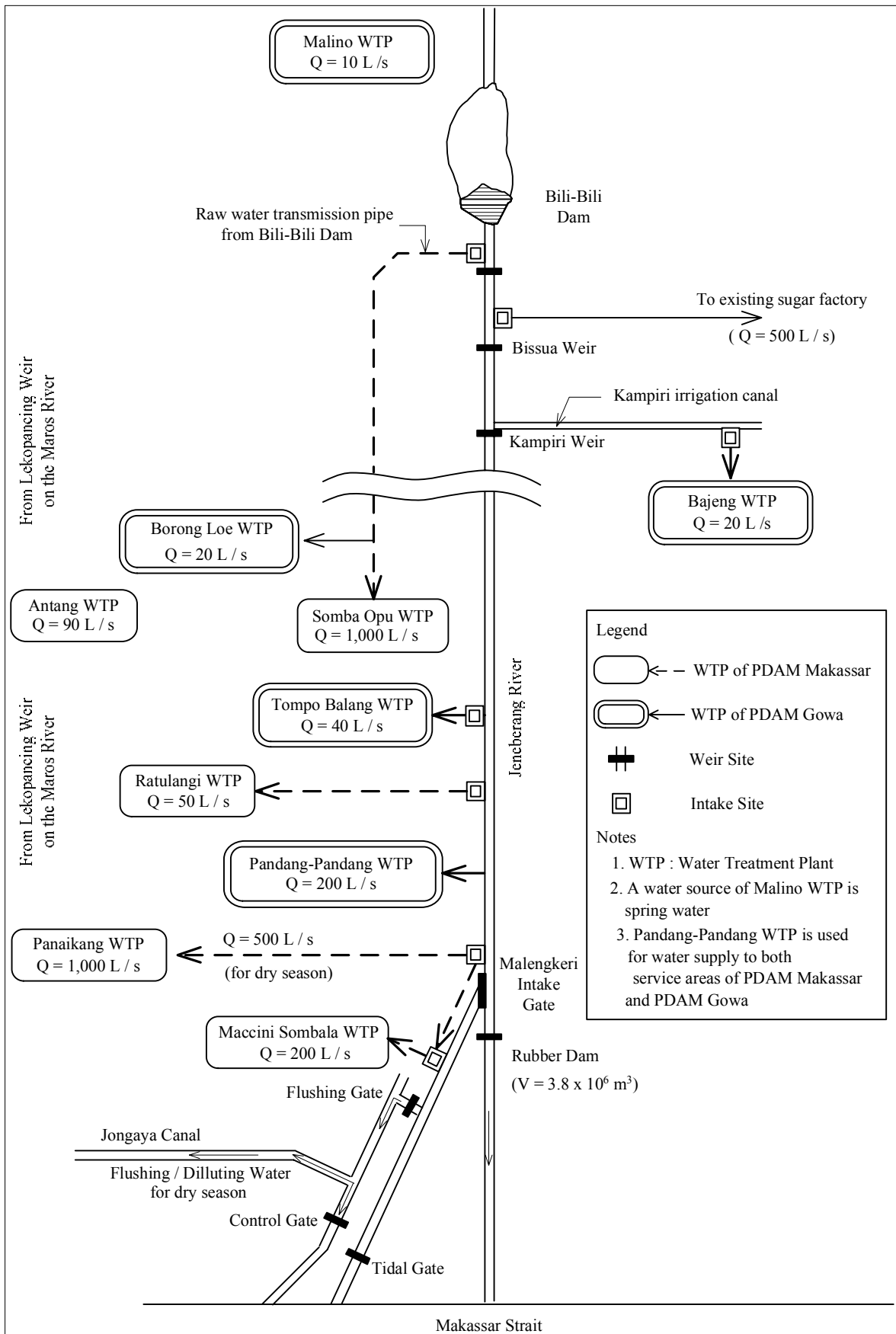


Figure S5.1 Schematic Map on Water Use of the Jeneberang River for Municipal Water Supply

