1. Program Title: Program 5-2
Water Quality Monitoring System Establishment

2. Location

Location of Water Quality Monitoring for the basin's water management shall be the following 45 locations and 10 additional locations in tidal swamp areas:

Regency	No.	Location Name	River Name	Regency	No.	Location Name	River Name
Muara Enim	1.1	Tebat Agung	Niru		4.5	Kayu Agung	Komering
	1.2	Muara Niru	Lematang		4.6	Desa Pedamaran	Babatan
	1.3	Teluk Lubuk	Lematang		4.7	Desa Gunung Batu	Komering
	1.4	Banu Ayu	Lematang		4.8	Muara Burnel	Burnel
	1.5	Indramayu	Enim	OKU	5.1	Rantau Nipis	Selabung
	1.6	Jembatan Enim II	Enim		5.2	Desa Selabung	Ogan
	1.7	Tanjung Priok	Lematang		5.3	Desa Mendala	Ogan
Lahat	2.1	Kembatan Kebur	Lematang		5.4	Desa Pusar	Ogan
	2.2	Tanjung Mulak	Lematang		5.5	Martapura	Komering
	2.3	Bunga Mas	Kikim		5.6	Muara Dua	Komering
MUBA	3.1	Sukamerindu	Lematang		5.7	Kota Batu	Warkuk
	3.2	Sungai Dua	Komering		5.8	Danau Ranau	Danau Ranau
	3.3	Desa Upang	Musi		5.9	Tj. Lengkayap	Lengkayap
	3.4	Pulau Burung	Musi	Palembang	6.1	Jembatan Ampera	Musi
	3.5	Hulub Ogan	Ogan		6.2	Hulu Komering	Komering
	3.6	Talang Kelapa	Musi		6.3	Desa Rambutan	Keramasan
	3.7	Kota Sekayu	Musi		6.4	Pulau Kerto	Musi
	3.8	Durian Gadis	Padang	MURA	7.1	Terawas	Hulu Lakitan
	3.9	Desa Teluk	Batangharileko		7.2	Lawang Kidul	Rawas
OKI	4.1	Desa Indralaya	Kelekar		7.3	Muara Rupi	Rupit
	4.2	Desa Pemulutan	Ogan		7.4	Muara Beliti	Beliti
	4.3	Tanjung Raja	Ogan		7.5	Lubuk Linggau	Kelingi
	4.4	Desa SP Padang	Komering				

3. Objectives

- To accumulate water quality data required for basin water management.

4. Executing Agency

- Musi Balai PSDA of Dinas PU Pengairan in close coordination with Provincial PAPEDALDA, Municipal BAPEDALDAs, and PDAMs

5. Program Description

(1) Program 5-2-1: Coordination between Relevant Agencies

Dinas PU Pengairan (Musi Balai PSDA), Provincial BAPEDALDA, Municipal BAPEDALDAs, and PDAMs shall coordinate and formulate clear demarcation of the water quality monitoring work. It is preferable that Musi Balai PSDA will be the leading agency. In any case, data and information should be stored and maintained in the Water Resource Data and Information Unit to be established under Musi Balai PSDA, and sharing of the data and information between relevant agencies and dissemination to the general public are deemed important.

5. Program Description (continuous)

(2) Program 5-2-2: Preparation of Monitoring Plan

Musi Balai PSDA shall finalize water quality monitoring plan based on the proposal above. Monitoring item and interval shall be as follows:
Location: 45 as shown above and 10 in tidal swamp area
Sampling and laboratory test interval: as shown below

Parameters	Measurement interval
A. Field Measurement Items Water Temperature, EC, Salinity, Flow Rate, Transparency, Color and Smell	Every month
B. General Items TDS, TSS, NH_3, NO_3, pH, BOD, COD, DO, Cl_2, PO_4 SO_4, Feacal coliform, Total coliform	Every month
C. Heavy Metals and Other Toxic Substances Hg, As, Ba, Fe, Cd, Cl^-, B, Co, Cr^{6+}, Mn, Se, Zn, CN, H_2S, , Cu, Pb, Aldrin and Didrin, 2,4-D, DDT, BHC, Detergent, Phenol, Heptachlor, Lindane, Methylchlor, Oil and Grease, Toxaphan	Once in 6-month

(3) Program 5-2-3: Establishment of Water Quality Laboratory in Musi Balai PSDA

Musi Balai PSDA shall establish Water Quality Laboratory. Necessary equipments are those for the above parameters including Gas Chromatography for toxic testing. Equipments consist of common analytical equipment and general laboratory equipment (for detail, see Annex E5.3.1).

(4) Program 5-2-4: Monitoring

Water quality monitoring work shall be conducted following the proposed monitoring program. Data storage and processing work shall be conducted under the **Program 5-4** as discussed below. Necessary water quality monitoring equipment is in Annex E5.3.1, and necessary man-power for three monitoring team and one test group is: Manager 1, Secretary 1, Monitoring group chief 3, Sampling staff 9, laboratory staff 10.

6. Implementation Schedule

Implementation schedule is as follows:

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
5-2	**Water quality monitoring system establishment**																												
5-2-1	Coordination between relevant agencies																												
5-2-2	Preparation of monitoring plan																												
5-2-3	Establishment of water quality laboratory in Musi Balai PSDA																												
5-2-4	Monitoring																												

7. Program Cost

Program 5-2-1 and Program 5-2-2: n.a.
Program 5-2-3: Common analytical equipment Rp. 1,966 million
General laboratory equipment Rp. 2,481 million
Program 5-2-4:
Water quality monitoring equipment Rp. 1,637 million
Monitoring and laboratory testing man-power Rp. 291 million/year

8. Others

1. Program Title: Program 5-4
Hydrological Database Establishment

2. Location

N.A.

3. Objectives

Hydrological data is a basis for the basin's water management. All the related hydrological data should be stored in proper database for use. The objective of the program is to accumulate hydrological data for use.

4. Executing Agency

Musi Balai PSDA

5. Program Description

Establishment of Numerical Database

Musi Balai PSDA is presently establishing the numerical database using Microsoft ACCESS. This system shall storage rainfall and water level data. Necessary data processing should be included in the system. Water quality database should also be established. Use of Microsoft ACCESS is recommended to unite the numerical database.

Establishment of GIS Database

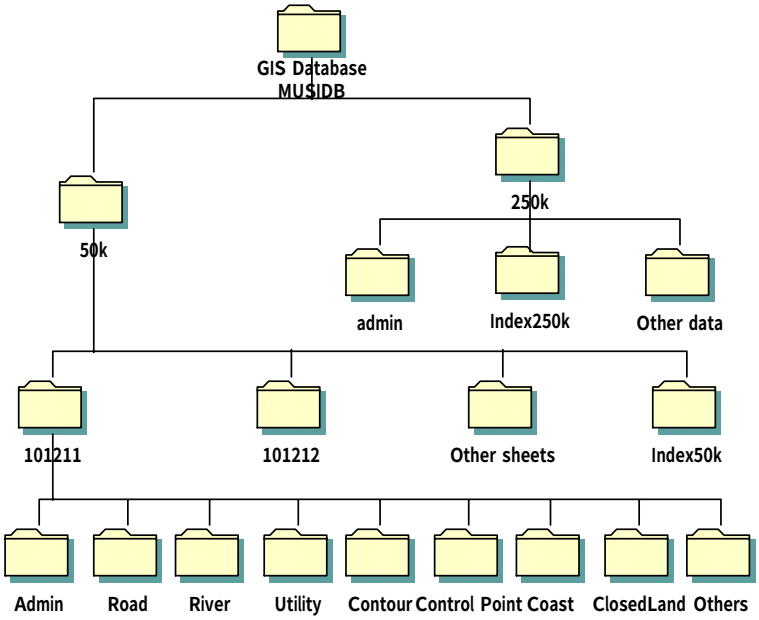
The JICA study team has already established a GIS database for Musi River Basin. The database has been used in the study for land use analysis, environment analysis and forest disappearance analysis. It was proofed that the water management work can be more efficient by using the GIS Database. To use the GIS technology efficiently in daily management work, the following shall be needed.

The GIS environment has three factors, GIS Engineer, GIS Database and GIS Application. The GIS database and GIS application must be stored in computer hardware. To maintain the computers, system administrators must be included in the environment. In Musi Balai PSDA, the following GIS environment (GIS group) is proposed by this study.

Engineers	Persons	Software	Unit	Hardware	Unit
GIS Engineer	2	ArcView 8.2	2	Computer	3+
Database Manager	1	ArcInfo8.2	1	Plotter	1
Computer System Administrator	1	Office Soft	3	Printer	1
				Scanner	1

5. Program Description (continuous)

Structure of the GIS Database established thorough the Study is as follows.



6. Implementation Schedule

Implementation schedule is as follows:

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
5-4	**Hydrological database establishment**																												

7. Program Cost

System development (initial investment):		Rp. 50 million
Maintenance man power (annual cost):		Rp. 57 million/year
Hardware and software	(initial cost):	Rp. 353 million
	(annual lisencing):	Rp. 68 million/year (from 2nd year)
Total:	(initial cost):	Rp. 403 million
	(annual O&M):	Rp. 125 million/year

8. Others

1. Program Title: Program 6-2-3
Official Web Site of Water Resources Management

2. Location
N.A.

3. Objectives
- To promote transparency with public relations
- To exchange data and information with related agencies
- To disseminate government information to the people

4. Executing Agency
- Dinas PU Pengairan

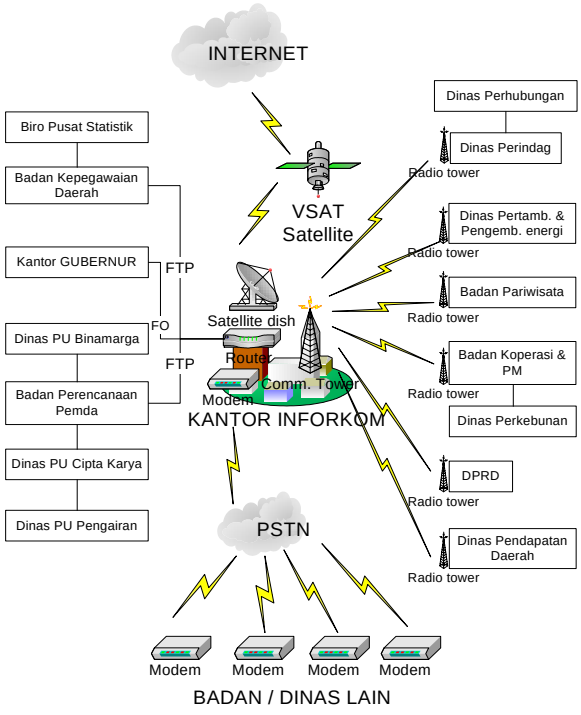
5. Program Description

Official web site contains information on water resources management. Data and information are provided by Water Resources Data and Information Unit of Balai PSDA and other related offices with the consultation of PTPA. Dinas PU Pengairan decides the data and information to be released in the official web site with the consultation of PTPA. Such data and information include:

- Data and information stored by Water Resources Data and Information Unit
- Explanation on water resources management
- Summary of accountability report by the Governor
- Summary of annual report on water resources management

Establishment of the official web site is not so difficult from the viewpoint of hard ware system because Regional Management Information System (MIS) has already been established in Kantor Inforkom (Telecommunication Office) and lined to Internet, and the web sites of other provincial offices such as Governor, BAPPEDA, Agriculture, Irrigation and Forestry have been set up with it. Thus, establishing the official web site of water resources management is just setting up web server computers in Dinas Pengairan and connecting them to MIS with cables.

Network configuration of MIS and Official Web Site of Water Resources Management in Dinas PU Pengairan are as follows:



6. Implementation Schedule

Implementation schedule is as follows:

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
6-2	**Promotion of transparency with public relations**																												
6-2-3	Official web site of water resources management	Preparation		Test Drive		Full Operation																							

7. Program Cost

1. First year (Rp. '000)

Item	Number	Month/Time	Unit Price	Amount
1. Salary for Personnel				
System administrator	1	12	1,500	18,000
Web page design/maintenance engineer	2	12	1,000	24,000
Network maintenance engineer	2	12	1,000	24,000
2. Equipment				
Server computer	2	1	35,000	70,000
Network equipment	1	1	5,000	5,000
3. Web server program	2	1	20,000	40,000
4. System installation/customizing				
System engineer	2	2	2,000	8,000
5. Training				
System administrator	1	2	1,000	2,000
Web page design/maintenance engineer	2	2	1,000	4,000
Network maintenance engineer	2	2	1,000	4,000
6. Maintenance and repair	1	1	6,000	6,000
TOTAL				205,000

2. Years after (Rp. '000)

Item	Number	Month/Time	Unit Price	Amount
1. Salary for Personnel				
System administrator	1	12	1,500	18,000
Web page design/maintenance engineer	2	12	1,000	24,000
Network maintenance engineer	2	12	1,000	24,000
2. Maintenance and repair	1	1	6,000	6,000
TOTAL				72,000

8. Others

1. Program Title: Program 6-5-1
Establishment of Water Resources Data and Information Unit in Balai PSDA

2. Location

N.A.

3. Objectives

- To collect, process, store and distribute data and information on water resources management at river basin
- To establish disclosure system on water resources management at river basin

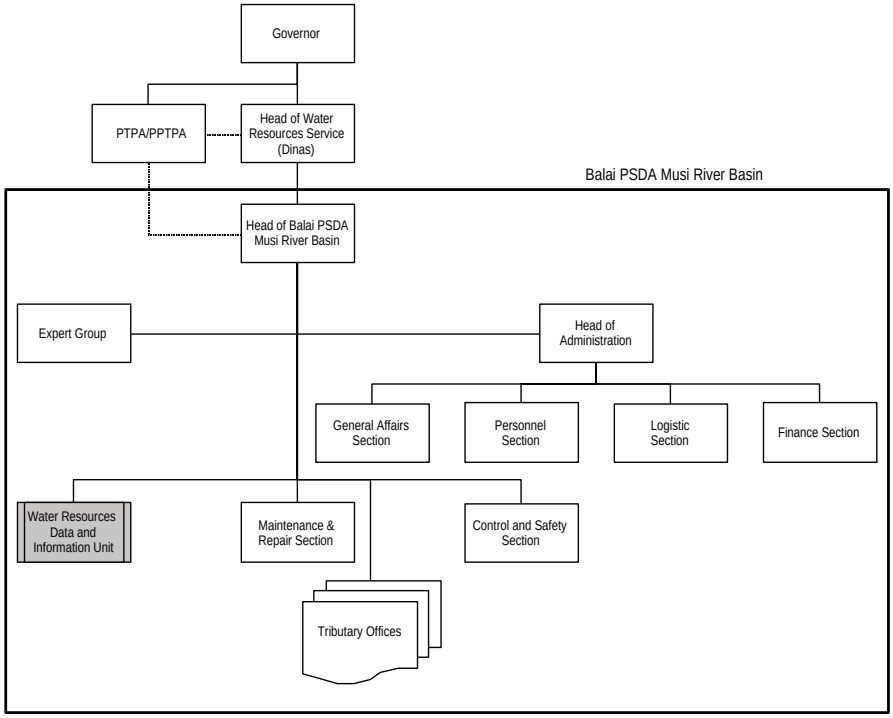
4. Executing Agency

- Dinas PU Pengariran/Balai PSDA Mursi River Basin

5. Program Description

According to the new Government Regulation, the Provincial Government establish Water Resources Data and Information Unit for a data centre of the River Basin. It is strongly recommended that the Unit be set up by enhancing the Operation & Data Management Section of Balai PSDA Musi River Basin. The Unit's functions include:

- Supplier of data and information for Water Resources Data and Information Unit at District/Town, provincial, and national levels and simultaneously as selector and keeper of data, and
- Presenter and distributor of information.



5. Program Description (continuous)

6. Implementation Schedule

Implementation schedule is as follows:

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
6-5	**Organizational enhancement**																												
6-5-1	Establishment of Water Resources Data and Information Unit in Balai PSDA	▲	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
6-5-3	Activation of PTPA/PPTPA	▲	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

7. Program Cost

N.A. (No additional cost will be accrued for the establishment since the routine expenditure is re-allocated.)

8. Others

1. Program Title: Program 6-5-3
Activation of PTPA/PPTPA

2. Location

N.A.

3. Objectives

- To collect opinions from various stakeholders of water resources management
- To coordinate water resource management within the Province/river basin

4. Executing Agency

- Provincial Government (Governor)

5. Program Description

Water resources councils, or coordinating agency are to be established at the Provincial level and river basin level. Water resources councils are under preparation in the Provincial Government with the former named PTPA and the latter PPTPA. The new Government Regulation gives the following roles to PTPA/PPTPA:

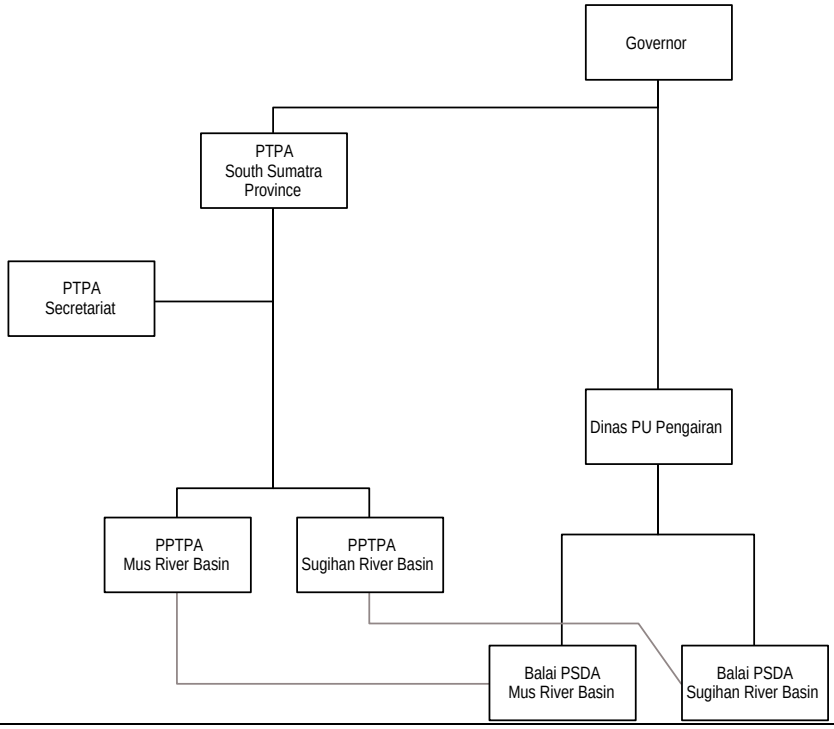
- Recommend draft of policy guidance on water resources management to the Governor (Article 15)
- Discuss draft of master plan of river basin water resources management (Article 24)
- Carry out coordination in the implementation of master plan (Article 27)
- Give consultation for the cooperation in the implementation of master plan (Article 29)
- Give input for deciding fee tariff (PTPA only) (Article 37)
- Receiving information on grant, loan and bond issuing (Article 40)
- Propose policy on water resources information system to provincial agencies (PTPA only) (Article 47)
- Make recommendation for the decision of border land (Article 57)
- Make recommendation for the decision of water allocation (PTPA only) (Article 72)
- Make recommendation for the decision of water resources supply priority (PTPA only) (Article 73)
- Make recommendation for the decision of water resources supply plan (PTPA only) (Article 74)
- Give input for water resources supply adjustment (PTPA only) (Article 75)
- Decide whether to give agreement or not with permission which can disturb balance of water resources supply (PTPA only) (Article 82)
- Consider allocation of fee from water exploitation (PTPA only) (Article 109)
- Give consideration on evaluation of performance (PTPA only) (Article 110)

(continues to next page)

5. Program Description (continuous)

According to the Governor's Letter (No. 226/KPTS/PU-AIR/2003), PTPA/PPTPA should report regularly (every three month) or incidentally upon request to the Governor and the Minister of KIMPRASWIL through the Director General of Water Resource. These reports also should be disclosed with using the Official Web Site (See Program 6-2-3).

The structure of water resources management organizations at river basin is illustrated in the following figure.



6. Implementation Schedule

Implementation schedule is as follows:

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
6-5	**Organizational enhancement**																												
6-5-1	Establishment of Water Resources Data and Information Unit in Balai PSDA																												
6-5-3	Activation of PTPA/PPTPA																												

7. Program Cost

N.A. (No significant amount of additional cost will be accrued for the establishment.)

8. Others

1. Program Title: Program 6-6: Human Resources Development
6-6-1: Training of Operating Techniques for Government Employees of Balai PSDA Musi River Basin
6-6-2: Training of Management and Planning for Related Government Employees
6-6-3: Training on Operation & Maintenance of Irrigation System
6-6-4: Joint training with NGOs to Informal Leaders and Selected People

2. Location N.A.

3. Objectives

6-6-1: Training of Operating Techniques for Government Employees of Balai PSDA Musi River Basin

- To improve operating skills concerning jobs of Balai PSDA
- To improve understanding of the water resources management plan
- To increase moral and incentives of employees toward their jobs

6-6-2: Training of Management and Planning for Related Government Employees

- To improve skills of business management and planning
- To improve skills of personnel management and planning
- To improve understanding and skills of public relations

6-6-3: Training on Operation & Maintenance of Irrigation System

- To improve management skills of the management committee members of WUAs

6-6-4: Joint training with NGOs to Informal Leaders and Selected People

- To improve communication skills of the people
- To disseminate ideas of water resources management of the Province

4. Executing Agency:

- Dinas PU Pengairan (in cooperation with related Agencies or NGOs)

5. Program Description

6-6-1: Training of Operating Techniques for Government Employees of Balai PSDA Musi River Basin

Middle or higher-level specialists or engineers will conduct on-site training courses for the employees concerning water resources management in order to improve not only their techniques but also their incentives toward their jobs. Each training course lasts at least for one month for a field of technique and repeats once for halves of employees can take part in the course by turns. The training courses include:

- Business accounting,
- GIS data management and operation,
- Data sampling and chemical analysis,
- Hydrological data analysis
- Operation and maintenance of water resources facilities, and
- Training skills for irrigation management and irrigation operation.

6-6-2: Training of Management and Planning for Related Government Employees

Middle or higher-level specialists will conduct on-site training courses for overhead personnel concerning water resources management in order to improve their skills of management and planning as well as public relations. Each training course lasts at least for one month for a field of skill and repeats once for halves of overhead personnel can take part in the course by turns. The training courses include:

- Effective planning and implementation of water resources management,
- Personnel management,
- Project management,
- Public relations and public consultation, and
- Administration of web server system.

6-6-3: Training on Operation & Maintenance of Irrigation System

Extension workers circulate all Water Users Associations (WUAs) in the river basin to have a 5-day training course for members of the management committee. The training course include:

- Business administration,
- Business accounting,
- Cropping pattern, and
- Gate operation.

6-6-4: Joint training with NGOs to Informal Leaders and Selected People

A group consisting of two government officials and two NGO members circulate 11 Districts/Municipalities in the river basin to have a 3-day training course for informal leaders and selected people. The training course include:

- Presentation and discussion skill,
- Basics on water resources management, and
- Planning and implementation procedures of water resources management.

6. Implementation Schedule

Priority Program		1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
No.	Title	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
6-6	**Human resource development**																												
6-6-1	Training for Operating Techniques for Government Employees of Balai PSDA																												
6-6-2	Training for management and planning for related government employees																												
6-6-3	Training for operation & maintenance of irrigation system																												
6-6-4	Joint training with NGOs to informal leaders and selected people																												

7. Program Cost

6-6-1: Training of Operating Techniques for Government Employees of Balai PSDA Musi River Basin

1) Preparation of training course
   6 persons x 0.5 month x 3,000,000 Rp./ person・month = Rp.9,000,000-
2) On-site training
   6 persons x 1 months x 2 times x 3,000,000 Rp./ person・month = Rp.36,000,000-

Total: Rp.45,000,000-

6-6-2: Training of Management and Planning for Related Government Employees

1) Preparation of training course
   5 persons x 1 month x 3,000,000 Rp./ person・month = Rp.15,000,000-
2) On-site training
   5 persons x 1 months x 2 times x 3,000,000 Rp./ person・month = Rp.30,000,000-

Total: Rp.45,000,000-

6-6-3: Training on Operation & Maintenance of Irrigation System

1) Preparation of training course
   1 person x 1 month x 1,500,000 Rp./ person・month = Rp.1,500,000-
2) On-site training
   8 persons x 30 months x 15 days/month x 200,000 Rp./ person・day =Rp.720,000,000-
   (including consumptions, transport and accommodations)

Total: Rp.721,500,000-

6-6-4: Joint training with NGOs to Informal Leaders and Selected People

1) Preparation of training course
   2 persons x 1 month x 1,500,000 Rp./ person・month = Rp.3,000,000-
2) On-site training
   4 persons x 3 days x 11 times x 200,000 Rp./ person・day = Rp.26,400,000-
   (for trainers: including consumptions, transport and accommodations)
   30 persons x 3 days x 11 times x 100,000 Rp./ person・day = Rp.99,000,000-
   (for trainees: including consumptions and compensation)

Total: Rp.128,400,000-

8. Others