Republic of Indonesia

Japanese ODA Loan Mid-term Review Report

Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project

Evaluator：Hiroshi AOKI

Sanshuu Engineering Consultant

Field Studies：May 2009 – July 2009

1． Project Profile

Location of Project Site

Upper Solo River Protection・Revetment

1.1 Objectives

The objectives of the project are to restore the functions of existing facilities of completed Japanese ODA loan projects (hereinafter called as "the Project") in the water resource sector and to improve and strengthen operation and maintenance (O/M) organizations through rehabilitation of urgent and necessary facilities and assistance for enhancing abilities of O/M organizations, thereby contributing to assuring sustainability of the completed projects. The project location is shown in the Figure 1 and 2.

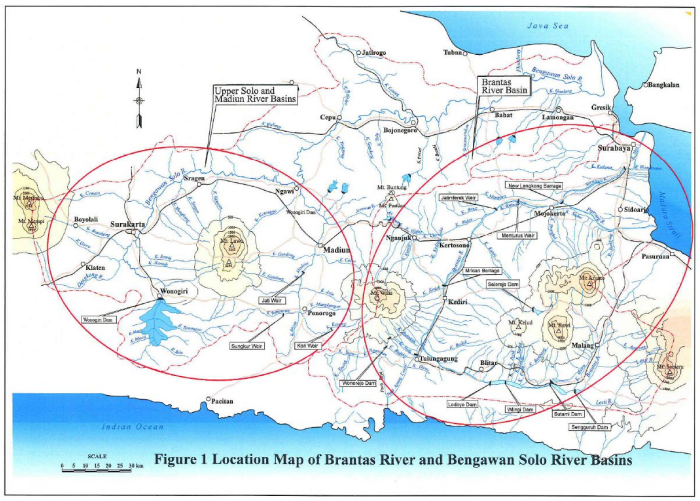

Figure. 1　Location of Solo River & Brantas River Basin

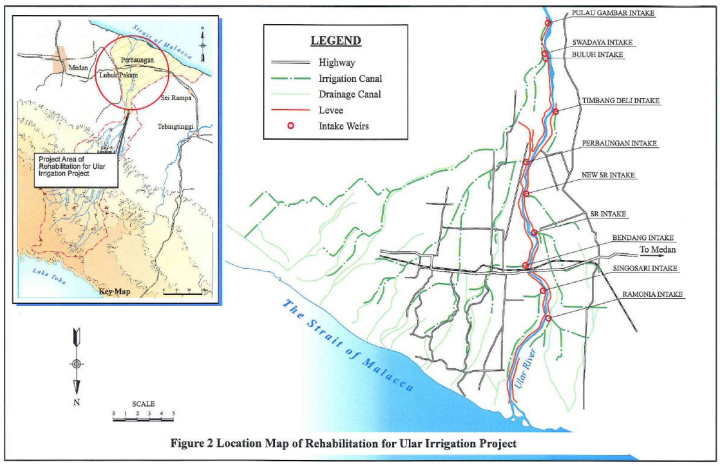

Figure. 2　Location of Ular Irrigation

1.2　Outline of Loan Agreement

Loan Amount	14,696million yen
Loan Signing／Closing Date	October 2002／February 2011
Terms and Conditions -Interest rate -Repayment period (grace period) -Procurement	Construction works: 1.8 %, 30years (10 years), General untied Consulting Service: 0.75%, 40 years(10 years), bilateral tied
Borrower	Government of Indonesia
Executing Agency	Ministry of Public Works, Directorate General of Water Resources（DGWR）
Construction Work Contractor	PT. BRANTAS ABIPRAYA（Indonesia）・PT. HUTAMA KARYA　(Indonesia)・PT.NINDYA KARYA (Indonesia)・PT.PEMBAN GUNAN PERUMAHAN（Indonesia）,PT.ADHI KARYA (Indonesia)・PT. WASKITA KARYA（Indonesia）・PT. WIJAYA KARYA（Indonesia）・PT.ISTAKA KARYA（Indonesia）
Consulting Services	Nippon Koei, Co. Ltd.　(Japan)・YACHIYO ENG. CO.（Japan）・NIKKEN CONSULTANTS, INC.（Japan）・PT. TATA GUNA PATRIA（Indonesia）・PT.TRI

	TUNGGAL KONSULTAN（Indonesia）
Feasibility Study	SAPS “Assistance Effectiveness Promotion Study on Rehabilitation Projects of Karangkates Dam Construction Project and others”

1.3 Background

The project faced cost increase and extension of construction period due to flood damage of the Solo River basin during construction. Thus, it is essential to analyze these impacts, which may exert on efficiency and effectiveness of the project and recommend the actions to be taken. Taking this project as a target for mid-term review, the project was reviewed in terms of evaluation criteria based on the results of field surveys and conclusions were derived.

2. Mid-term Review Results

2.1 Relevance

2.1.1 Consistency with national/government policies

The Five Year National Development Plan (Propenas;2000 – 2004), which was valid at the time of appraisal, stipulated the following five items as important agendas: 1) security assurance, political renovation, and democracy, 2) legal renovation and improvement of public sector management, 3) economic recovery and sustainable economic growth, 4) improvement of social services, and 5) de-centralization and poverty reduction. In the economic recovery program, it was planned to maintain the function, by rehabilitation and improvement, of existing infrastructure in “Program to Maintain Service Level of Public Facilities and Infrastructure”. “Development and Management Program for Water Resources” targeted increase of food production and promotion of agri-business by expansion of water resources and improvement of water system management. The program also emphasized that the water system organizations of local farmers in cooperation with provinces, prefectures and city governments, and managed water systems, thus creating fair water supply systems and appropriate water management organizations and agencies.

Under this policy, the Government of Indonesia had been making efforts to renovate the water resource sector. More specifically, they focused on the following areas: 1) improvement of legal structures related to the National Policy on water resource development and management, 2) improvement of laws and ordinances of organizational and financial system on comprehensive river basin, 3) establishment of effective regulations and implementation systems for water quality improvement and river basin water quality management, and 4) improvement of legal systems

pertaining to irrigation system management policy.

As for the operation and maintenance (O/M) of the irrigation sector, the Indonesian Government amended the irrigation management and irrigation service fee (ISF) policy in 1998. Water Users Associations (WUA) were entitled to collect and manage irrigation fees, which would be used for O/M of irrigation facilities. It was also planned to expand scope of WUA's O/M by organizing WUA federations (WUAF) and introducing joint O/M with regional governments and WUA for trunk irrigation facilities.

Furthermore, RPJM 2004-2009, which is the valid National Plan at mid-term review (March 2009), has three important objectives: 1) Forming a society based on fairness and justice, 2) Realization of a safe and peaceful country, and 3) Realization of a both economically and socially affluent society. Especially, in terms of the third objective, they emphasized promotion of investment and export, job creation, poverty reduction and economic growth. One of the ways to achieve economic growth was revitalization of agriculture, forestry and fishery industries, and development of infrastructure, roads, and irrigation system in rural areas are considered vital. In the light of this situation, the objective of the project is still consistent with the national policies and plans. The Strategic Plan of water resource management is stipulated by the Minister of Public Works Decree No. 51/PRT 2005 dated March 7, 2005. In relation to flood control, the decree mentions the following activities; 1) to protect the residential and production center (agriculture and industry) areas from 10 years return period flood (the target area is about 10,000 ha and the budget requirement is about Rp. 876,000 billion); and 2) to improve and maintain 1,500 km of river course (the budget requirement is Rp. 56.0 billion).

The activities in water system management area to support a safe and peaceful society are classified as the following: 1) Rehabilitation of irrigation area, 2) Increase of water supply, 3) Construction of wells to use ground water in remote areas, 4) Program to support formulation of WUA, and 5) Program for strengthening of WUA. In addition to it, the programs for improving welfare of people include the following activities and have their planned budget: 1) Irrigation system improvement, lake irrigation system improvement; and 2) Construction of irrigation ponds and rehabilitation and maintenance of man-made and natural lakes and ponds. Thus, the objectives of the project are consistent with current Indonesian national policy and plans.

2.1.2 Consistency with development needs

The development needs of the water resource sector at the time of appraisal were the followings:

【River Management】

The legal and organizational structures have been discussed to establish State and Provincial level

institution for river basin management including water allocation, fees for water supply, and water quality monitoring. Public corporations for the sustainable management of water resources have been introduced for major and important river basin. The Brantas River Management Corporation for the Brantas River basin (Perm Jasa Tirta: PJT1) was established and has operated comprehensive and independent O/M of the river basin since 1990. The Indonesian Government was considering the introduction of river basin management by public corporation for major six rivers. It was pointed out as an issue that the legal structures to establish river basin management organizations consistent with decentralization policy implemented since 2001 as well as to reinforce stable management bases of such public corporations are keys to success.

【Irrigation】

At the time of appraisal, rice deficit caused by increased rice consumption due to population and income growth and reduction of farm lands in Java was exposed as a structural crisis. Food security, especially self-sufficiency of rice, was one of the pillars of national policy, and thus development of irrigation facilities to solve this problem was high-priority. The law on management of the irrigation sector was prepared based on decentralization and the above irrigation management policy. The challenges were clarification of the role of central and regional governments and strengthening capacity of WUA and the water users' association federation (WUAF) after transferring irrigation management to WUA and WUAF.

On the other hand, the needs for water resource sector at the time of mid-term review (July 2009) are identified as follows:

【River Management】

As for assistance needs for O/M capacity development, though the transfer of authority for water resources management and operation including clarification of the role and responsibility of the central, province, prefecture and city government was promoted based on the decentralization policy, necessary budget allocation and transfer of maintenance technology were not sufficient. In fact, Brantas River Management Public Corporation (PJT1) and Solo branch, which are responsible bodies for the O/M of the project, activities are limited to daily and periodical maintenance due to lack of budget. Large scale repair and improvement depend on other financial sources such as loans. The training of staff for O/M has not been sufficiently practiced, again due to the lack of a sufficient budget.

【Irrigation】

President Yudhoyono (reelected in July 2009) announced the plan to reduce the rice import by 2008 and to increase the self-sufficiency rate by expanding domestic production, and declared to

increase the current rice production of 55 million tons per year to 61 million tons per year by 2008. Development of irrigation facility is necessary to achieve this commitment, however, the irrigation rate in farmlands greatly varies by region while about 6.77 million ha farmlands are irrigated in Indonesia. Moreover, in the 25% (about 1.67 million ha) of farmlands, the irrigation facilities are not properly functioning, and in Java and Sumatra about 30% of irrigation facilities have deteriorated due to insufficient O/M activities. As for O/M capacity, farmers (WUA) who are responsible for tertiary irrigation facilities have growing needs for assistance of O/M capacity development while transfer of irrigation management authority and assets to prefecture and regional government and WUA based on decentralization policy since 1999.

In conclusion, the Project is consistent with the national development plan and development needs both at the time of appraisal and mid-term review and thus, the relevance of the project is high.

2.2 Efficiency

2.2.1 Output

The output of the project is composed of two elements: 1) Civil works and 2) Consulting services.

(a) Civil Works

The civil works of the project are 1) Solo River basin located in the Central and East Java Province, 2) Brantas River basin in East Java Province, and 3) Irrigation project in North Sumatra. The contents of civil works are shown in the Table-1.

Table-1Civil Works and Progress (as of July 2009)

River basin	Work Items (Appraisal)	Work Items (Mid-term Review)	Progress (July 2009)
1) Central/East Java: Solo River Basin	① Solo river basin improvement *Upper Solo river protection/repair *Madiun river protection rehabilitation *Rubber gate repair	① Solo river basin improvement * Upper Solo river protection/repair *Madiun river protection rehabilitation/ Rubber gate repair	 Ongoing Ongoing
2) East Java: Brantas River Basin	② Karangkates multipurpose dam (reservoir sedimentation problem) *Procurement of a dredging machine *Construction of Sabo dam *Improvement of revetment at spillway plunge	② Karangkates multipurpose dam (reservoir sedimentation problem) * Procurement of a dredging machine (cancelled, note 1) * Construction of Sabo dam * Improvement of revetment at spillway plunge	 Completed Completed
	③ Wlingi multipurpose dam (reservoir sedimentation problem) * Procurement of a dredging machine * Construction of Sabo dam *Construction of bypass channel	③ Wlingi multipurpose dam (reservoir sedimentation problem) * Procurement of a dredging machine * Construction of Sabo dam * Construction of bypass channel	 Completed Completed Ongoing
	④ Brantas Middle Reaches river improvement	④ Brantas Middle Reaches river improvement	

	* River protection/repair *Repair of intake weir for irrigation	* River protection/repair * Repair of intake weir for irrigation	Ongoing Completed
	⑤ Porong improvement * River protection/repair	⑤ Porong improvement * River protection/repair	Ongoing
	⑥ Mt. Kelud Sabo dam repair *Construction/rehabilitation of sabo dam	⑥ Mt. Kelud Sabo dam repair * Construction/rehabilitation of sabo dam	Completed
3) North Sumatra : Ular Irrigation	⑦ Ular irrigation rehabilitation *Intake weir for Ular irrigation *Link canals construction	⑦ Ular irrigation rehabilitation * Intake weir for Ular irrigation * Link canals construction	Ongoing On going

Note: 1 The procurement was cancelled because the dredging equipment purchased for Ulingi dam reservoir sedimentation was utilized for the Karangkates multi-purpose dam reservoir sedimentation problem.

Major changes from the time of appraisal were the cancellation of dredging equipment and addition of the bypass channel for sediment removal of the sediment control dam as written in Note 1 to the above table.

Groundsill down stream of a bridge in the Brantas River

(b) Consulting Services

Progress of consulting services as of July 2009 is shown in the table-2.

Table-2 Consulting Services and Progress (as of July 2009)

Item		Progress
1) Overall Project Management		Ongoing
2) Monitoring of operation and maintenance of each subprojects and assistance in preparing monitoring meetings held by executing agency		Ongoing
3) Detail design, assistance in P/Q evaluation and bidding activities for civil works of each subprojects and construction supervision	Detail design, Assistance for PQ, bidding activities	Completed
	Construction supervision (Brantas, Solo, Kelud)	Ongoing
	Construction supervision (Ular irrigation)	On going
	Construction supervision (Rubber dam)	Completed

4) Assistance in strengthening of the operation and maintenance system for Perum Jasa Titra-1 covering the Brantas River and the Bengawan Solo River basins	Completed
5) Preparation of comprehensive basin-wide sediment management plans for the Brantas River and the Bengawan Solo River basins	Completed
6) Monitoring and evaluation of activities for establishment and strengthening of WUA along the Ular irrigation	Not started
7) Environmental management	Ongoing

Two items out of seven components of consulting services, 4) and 5), were completed. Two sub-items, detail design, assistance for PQ and bidding activities and construction supervision of the rubber dam, of 3) were completed. 1) and 2) as well as the rest of 3) construction supervision of the Brantas and Solo River basins, Mt. Kelud and Ular irrigation will be completed by the amended term, September 2010. 6) monitoring and evaluation of activities for establishment and strengthening of WUA has been temporarily suspended based on the following reason after discussions with the executing agency and not started yet.

At the time when the consulting service of the project started in October 2003, the transfer of management of tertiary irrigation facilities to WUA was being implemented under the PKPI (Pembaharuan Kebijakan Pengalolaan Irigasi) program financed by the World Bank based on the decentralization policy. The purpose of the PKPI program was to transfer irrigation management authority and assets previously under central government control to regional governments and WUA. According to the Water Resources Law (PP77/2001), the irrigation responsibility of trunk systems (Intake weir, primary and secondary irrigation system) belonged to prefectures and tertiary systems to WUA. The PKPI program attempted gradual and total transfer from central to prefectures and regional offices including budget allocation and technology guidance.

The Water Resource Law, (U.U.No.7/2004) was passed by the congress in February 2004, because efficient management of irrigation facilities based on the Water Resource Law, PP77/2001 slowed down and became difficult due to budget constraints. However, the transfer still did not proceed.

In 2006 a Government Regulation on Irrigation (PP20/2006) as an implementation regulation, which is stipulated in article 41 of the law No.7/2004, became effective. According to this regulation, the central and regional governments take responsibility for O/M of primary systems (Intake weir, primary and secondary channel) and WUA takes responsibility for tertiary irrigation system. The central government also takes responsibility for irrigation areas of more than 3,000 ha and cross-border of prefectures. Since Ular irrigation, which has an area of 18,500ha, belongs to this category, the central government is in charge of management of the intake weir and primary and secondary water channels.

The consulting services for monitoring and evaluation of PKPI activities for strengthening of

WUA in Ular irrigation area, 6) in Table-2) was decided to be suspended on January 26, 2006 because the responsibility of WUA was not clear at the time of January 2006, when the new law for irrigation had not been determined. The TOR was to be reviewed after the new law was determined. Even after the new law became determined, the basic concept of transfer of irrigation management to WUA was abolished. Thus, implementation of the PKPI program was suspended and the consulting services for monitoring and evaluation of activities for establishment and strengthening of WUA along the Ular irrigation was also suspended. Since then the related consulting services have been stopped.

On the other hand, the Water Irrigation Sector Management Project (WISMP) for strengthening of WUA financed by the World Bank began in 2006. The Ular irrigation area was included in a part of the WISMP target area. The consulting services for monitoring and evaluation of establishment and strengthening of WUA along the Ular irrigation were not to strengthen WUA but to monitor and evaluate the program. Thus, it would be appropriate to propose WUA strengthening activities by collecting information of activities of the Bank financed project.

7) in Table-2) of the consulting services, environmental management consisting of seven items were almost completed except for assistance in guidance on environmental consideration and monitoring impacts on water quality during project implementation. All items will be completed by the completion of works and supervision of construction in September 2010.

2.2.2 Project Period

Although there are some delays, river protection (revetment and groundsill) of Solo, Brantas, and Porong River Basin will be completed by the loan closing date. Bypass channel construction of Kelud sabo will be completed by the loan closing date while warranty period will be several months later due to delay of procurement. The construction of Ular irrigation work will finish before the loan closing date including the maintenance period, though a construction delay is recognized. The project schedule at the time of appraisal, start of consulting services and proposed revision of schedule are shown in the Table-3.

Table-3 Planned and Revised Schedule by Item

Item	Schedule at Appraisal	Schedule at start of consulting services	proposed Revision of Schedule
Selection of Consultant	October 2002 ~ December 2002	March 2003 ~ October 2003	May 2003 ~ December 2003
Consulting services	January 2003 ~ December 2007	October 2003 ~ May 2008	October 2003 ~ September 2010
Civil Works (Brantas river middle reach protection/repair)	－note)	December 2003 ~ May 2004	January 2004 ~ May 2004

Civil Works (Brantas river middle reach protection/repair, Mt. Kelud sediment control dam repair/bypass channel, others)	December 2003 ~ October 2005	December 2003 ~ October 2005	August 2005 ~ November 2006
Civil Works (Mt. Kelud bypass channel construction)			January 2008 ~ November 2008
Civil Works (Brantas river middle reach protection/repair)	note)	June 2004 ~ December 2005	June 2004 ~ October 2006
Civil works (Brantas river middle reach protection/repair, Kelud emergency sediment control dam bypass channel, others)	May 2005 ~ September 2007	May 2005 ~ September 2007	June 2006 ~ August 2010
Procurement of Equipment	January 2005 ~ December 2005	January 2005 ~ December 2005	June 2005 ~ June 2007

Note): Additional work of replacement of rubber gate of the Jatimelek weir (Package 3A) was necessary and added after appraisal.

The main delay was attributed to consultant selection. The delay during the construction stage is as follows.

1) Central/East Java Province: Solo River basin

・Flood damage (Solo River)

2) East Java Province: Brantas River basin

・Delay of P/Q procedure (sediment control bypass channel)

・Design change (Increased quantity-Brantas River)

・Additional works (Replacement of rubber gate)

3) North Sumatra Province: Ular irrigation

・Additional design (Change of intake weir and weir type)

・Design change and delay in construction due to unexpected soil conditions and worsened weather conditions

It seems crucial to monitor and promote the smooth progress of works in Ular irrigation because there may be unforeseen factors such as adverse weather conditions.

Link Canals under Construction in Ular

2.3 Effectiveness

2.3.1 Quantitative impact

(1) Operation and effect indicators

Target values of operation and effect indicators and EIRR at appraisal were reviewed at the time of mid-term review and new operation and effect indicators reflecting current conditions are proposed. The target year is proposed as two years after completion based on the current ex-post evaluation scheme, although the initial target year agreed at appraisal was five years after completion of the project. It was also confirmed that there was no need to modify the target value by this target year change.

1) Solo River Basin Rehabilitation Project

【Operation and Effect Indicator】

Examination has been conducted if review of indicators and their target values is necessary or not in consideration of flood damage conditions in 2007 of Upper Solo, Madiun, and Lower Solo River Basins. The flood in 2007 was roughly a fifty year return period and far serious from the flood of ten year return period, which was assumed at appraisal to establish the operation and effect indicators of the rehabilitation project. Table-4 shows flood damages and operation and effect indicators.

Table-4 Operation and Effectiveness Indicators and Flood Damage of 2007 of Solo River Basin

	Upper Solo River			Madiun River			Lower Solo River
Indicator (unit)	Baseline at appraisal (2001)	Flooding in 2007	Target at appraisal (2 years after project	Baseline at appraisal (2001)	Flooding in 2007	Target at appraisal (2 years after project	Flooding in 2007

			completion)			completion)	
Damaged river protection (m)	965		0				
Flood area (ha)	12,500	6,920	9,500	6,700	4,248	4,550	47,190
Flooded houses (no)	2,500	16,307	1,900	1,340	1,101	909	121,527

Note 1: The damage data of Solo River flood in 2007 was provided by the Solo River Basin Management Office which collected data from surrounding towns and villages. Flood areas were estimated based on information in the region.

Note 2: Operation and effect indicators for Solo River Basin are for the Upper Solo River Basin according to the Solo River Basin Development Office.

Note 3: The blank in the table are due to difficulty in data collection.

The numbers of flooded houses of the Upper Solo River flood in 2007 were far extensive in comparison with area because the flood water, for a short time period, reached not only low land and paddy fields (with few houses) but also high land which was densely populated residential area. This damage is not expected with a flood of 10 year return period. Since operation and effect indicators of the Project assume a flood of only 10 year return period, it is appropriate to keep the same operation and effect indicators established at appraisal as for the target values of the project as shown in the Table -4.

【EIRR】

The EIRR at appraisal was 10.7%. The new EIRR at mid-term review (2009) calculated based on the review of the assumption at appraisal is 11.2% for the Solo and Madiun River.

2) Brantas River Basin Rehabilitation Project

【Operation and Effect Indicators】

The target value for the Brantas River at the time of mid-term review is still valid since there is no flood damage after the start of the Project.

Table-5 Operation and Effect Indicators of Brantas River Basin

Indicator (unit)	Baseline at appraisal (2001)	Target at appraisal (2013) (2 years after project completion)
Damaged river protection (m)（m）	1,550	0
Dredging volume of Wlingi Dam (m^3/year)	200,000	500,000
Flood area (ha)	198	0
Flooded houses (no)	12,040	0

【EIRR】

The EIRR at appraisal was 21.4%. The new EIRR at mid-term review (2009) calculated based on the review of the assumption at appraisal for sediment control dam, dredging and bypass channel is 21.4 %, and that for Brantas River protection, rubber weir, and Poron River rehabilitation is 14.1 % due to increased cost of additional work of replacement of the rubber gate of the Jatimelek weir (Package 3A) .

3) North Sumatra Province Ular Irrigation

【Operation and Effect Indicators】

The target value will be altered because a higher unit crop rate will be attained for the target irrigation area based on performance in recent years (from 5.2ton/ha to 5.5ton/ha).

Table-6 Operation and Effect Indicators of North Sumatra Ular Irrigation

Indicator (unit)	2001	Target at appraisal	Revised Target at Mid-term review (2013)
Rice harvest (ton/year)			
(rainy season)	75,400	96,200	101,750
(dry season)	50,456	98,050	101,750
Income per household of farmers (Rp. 1,000/year)	6,066	9,166	9,749
Participation rate in WUA (%)	90	100	100

【EIRR】

The EIRR at appraisal was 22.2 %. The new EIRR at mid-term review (2009) calculated based on the review of the assumption at appraisal is 19.9 % for the intake weir and irrigation channel. The reason for lower EIRR value is the increased construction cost.

2.3.2 Qualitative impact

The qualitative impacts vary depending on the kind of project components, because the Project is composed of different kinds of works including dredging of a multipurpose dam, river protection and rehabilitation of irrigation facilities. Stable and safe life conditions will be possible by reducing flood damage to the downstream area through better river management. The quality of life will be raised as a result of stable and increased electric power supply (peak electric supply of 54,000kw and increased generation of 136 MWH) with restored water reservoirs. Overall, farmers' lives will be improved by increased rice harvests brought by the rehabilitation of irrigation facilities. These qualitative impacts should be confirmed by beneficiary surveys during the ex-post evaluation stage.

2.3.3 Impact

Regarding water resources management, the safe and stable life of people will be secured through

sustainable flood damage mitigation, effective use of water resources, and better O/M of rivers. It is foreseen that the project contributes to higher productivity, strengthening of social and production infrastructures of farmers and thus poverty reduction through efficient use of water resources by WUA/farmers.

2.4 Others (Items influencing project effect and maintenance)

2.4.1 Cooperation with NGO/Local Universities

The environmental study (fish, flora and ecology) entrusted to the Brawi Jay University. Except for that, there is no further cooperation with local institutions which influence project effect and maintenance.

2.4.2 Grant Assistance/Technical Cooperation

River bed change analysis was conducted for the formulation of sediment management plans for the Brantas River and the Upper Solo River basins, respectively. Among those, the expected amount of sediment supply data were given by the "JICA Study on Countermeasures for Sedimentation in Wonogili Multipurpose Dam Reservoir". There is no further cooperation with grant projects which influence project effects and maintenance.

2.4.3 Coordination with Other Donors

There was no cooperation with other donors with regard to river management and irrigation development. However, the World Bank financed project, Water Resources and Irrigation Sector Management Project (WISMP), started from 2006. It is possible to promote monitoring and evaluation of the WISMP activities as explained in 2.2.1 (b). Cooperation with World Bank will be necessary because the Ular irrigation area is one of the target irrigation areas of WISMP.

Meeting with WUA

2.4.4 Environmental and social impact

For environmental and social protection, the construction of civil works was based on the Environmental Impact Analysis (EIA), Environmental Management Plan (RKL), and Environmental Monitoring Plan (RPL) regarding environmental and social impact. The environmental and social study for the Brantas River basin, which was within the scope of the consulting services of the project, was written in the Report on Environmental Study（January 2005). Environmental factors including soil and water quality, farm land and irrigation area influences, and land acquisition were studied. The Executing Agency reviewed the contents of the EIA before starting the project for Ular irrigation. The results were written in the various reports[1]. Items including water pollution, waste disposal, soil contamination, ground water, and ecology were studied. The impacts on animals and natural conditions were minimized. Also, the possibility of adverse effects on the water and air quality is low. Adverse effects on the environment by the construction work were not identified.

There were four relocations of houses for Kelud sediment control dam construction. Land acquisition was for the purpose of an access road and water covered area of the dam. There was no relocation of houses in the Ular irrigation area. Even though land acquisition was delayed, it is not foreseen that this will influence the progress of the project.

2.4.5 System, technical capacity, and financial status for operation and maintenance

（1）Operation and maintenance

The O/M of the rehabilitated facilities by the Project have been implemented based on each river basin. The Solo River Basin Development Office has been developing water resources and managing the Solo River since 1969. However, the preparation of establishing the Brantas River Management Corporation (PJT1) Solo branch started based on the Presidential Order of September 14, 2000, and O/M of the Solo River was transferred gradually to PJT1. The present bodies responsible for O/M for each river basin are shown below. O/M organization of irrigation facilities is based on the amended Water Resources Law in 2004. The primary and secondary irrigation facilities are operated and maintained by the central and regional governments, and the tertiary facilities by WUA or WUAF.

1) Solo and Madiun River Basin O/M

Item/facilities	Responsible Body
River structures	Brantas River Management Corporation (PJT1) Solo branch Solo River Basin Management Office (Balai Besar Wilaya Sungai

[1] 1) Environmental Management Efforts and Environmental Monitoring Efforts, Irrigation Rehabilitation Region II, Deli Serdang District, May 2004、2) Environmental Management Program and Environmental Monitoring Program, Irrigation Rehabilitation and Dike Construction of Ular River, April 2006, 3) Design Report of Modification Design Work for Rehabilitation for Ular River Flood Control and Improvement of Irrigation Project (Volume-XI) Environmental Investigation

	Bengawan Solo)
Irrigation facilities	Provincial River Basin Management Office (Balai PSDA)
Small rivers	Provincial River Basin Management Office and regional government

2） Brantas River Basin O/M

Item/facilities	Responsible Body
River structures, flood warning system, dam	PJT1、Brantas River Basin Management Office (Balai Besar Wilaya Sungai Brantas)
Kelud/Semeru volcano area	Kelud/Semeru sediment control Office

3) North Sumatra Ular Irrigation

Irrigation Area		Responsible Body
Intake Weir and Trunk Water Channel		
	more than 3,000ha	Balai Wilaya Sungai Sumatera II (central)
	1,000ha - 3,000ha	North Sumatra Province Water Resource Bureau, River Management Office（Balai PSDA）(province)
	less than 1,000ha	Prefecture
Tertiary Channel		WUA

（2） Technical capacity in operation and maintenance

The central and regional governments take responsibility for O/M of the river protection facilities. The number of engineers who have sufficient technology and commitment are few due to budget constraints for various works. However, there will be no serious problems of O/M of rehabilitated river facilities, which do not require advanced technology in daily O/M. The inventory data for asset management should be prepared and maintained for future O/M activities.

Strengthening of O/M organization for irrigation facilities including intake weir and link canals, which are being constructed in the ongoing works, is to be done based on the new regulation. Water Resource Law No. 7/2004 and Government Regulation on Irrigation No. 20/2006. Involvement of the central and provincial governments is crucial both financially

and technically for large scale repair of small irrigation facilities and tertiary facilities, which was transferred to WUA.

（3）Financial status on operation and maintenance

O/M of river basins is twofold. There are two corporations for water resource management of the Brantas and Solo River Basin: The Brantas River Management Corporation (PJT1) Solo branch and related River Basin Management Office. The scale of budget for each corporation differs: the expense of PJT1 Solo Branch is less due to limited income of the Solo River because water supply to farmers, which comprises a large proportion, is free of charge; whereas the PJT1 in Brantas River has ten times as much budget as the Solo Branch because of more water supply to be sold. The budget of the other O/M organizations, which are the Brantas River Basin Managment Office and Solo River Basin Management Office, have opposite trends against those of PJT1. The budget amount of the Solo River is three times as much as that of the Brantas River in 2007. Based on this fact, it is reasonable to say that PJT1 mainatains the river according to the income amount and especially the maiantenance of the Solo River might not be satisfactory. In general, the budget amount for O/M and improvement is unstable and depends on the budget allocated to a specific project. A large proportion of an ordinary budget is used for a salary of staff, office operation costs, and inspection and minor maintenance.

The primary and secondary irrigation water channels are managed by the central and local governments because of the large irrigation area of 18,500 ha in Ular. The provincial budget for North Sumatra Ular Irrigation from 2006 to 2009 is shown in the Table-7. The amount of Rp. 200,000/ha is necessary but securing the budget is difficult according to the Irrigation Department of the Province.

Table-7 Budget for North Sumatra Ular Irrigation

2006	2007	2008	2009
Rp. 88,887/ha	Rp. 128,827/ha	Rp. 120,000/ha	Rp. 88.887/ha

Source: Balai Wilaya Sungai Sumatra, Dinas PU Sumatra

The O/M budget of tertiary irrigation systems is covered by Rp. 250,000/ha/year equivalent to Rp. 125,000/ha/harvest/year (twice the harvest collected from WUA farmers in Ular). Major daily maintenance activities are removing of waste materials in the channel and cleaning of pipe culverts.

3. Conclusions, Lessons Learned, and Recommendations

3.1 Conclusions

This project coincides with the National Development Policy/Plan and development needs and is a

higher priority project at the mid-term review stage. Therefore, it is necessary to support project implementation continuously.

3.2 Recommendations

3.2.1 Recommendations to the Executing Agency

The Monitoring and evaluation of activities for establishment and strengthening of WUA along the Ular irrigation in the PKPI program, which is a part of the consulting services of the rehabilitation project, has been suspended since 2006 as stated in 2.2.1. On the other hand, the strengthening of WUA program financed by the World Bank under the Water Irrigation Sector Management Project (WISMP) including Ular irrigation area, started in 2006. Although it seems difficult to finish every item of monitoring/evaluation as previously planned within one year before the Project completion, some recommendations for strengthening of WUA can be provided from consultations from local government officials, WUA management officials and farmers with reference to the results and contents of activities of WISMP. It is desired that the consultant examines the possible contents of activities within a limited time and promote implementation as soon as possible.

As pointed out in 2.2.2, the main delay was attributed to delay in consultant selection before the physical construction of the project. There was a delay in P/Q process of additional work of bypass channel construction. It is necessary for the executing agency to minimize delays by prompt decision making and selection process.

The O/M of river basins was not satisfactory due to budget constraints. Water resource operation and maintenance efforts should be continued by PJT1. Water Resource management is to be conducted with a collaboration of the Balai Besar, Provincial Government and PJT 1. On the other hand, enough budgets should be allocated to maintain the effects brought by the rehabilitation project.

3.2.2 Recommendations to JICA

(1) It is necessary to give proper guidance during meetings between the executing agency and the consultant in order to promote implementation of the monitoring and evaluation activities for establishment and strengthening of WUA along the Ular irrigation.

(2) The target values of the operation and effect indicators of the Ular irrigation have been reviewed and the new values were proposed at mid-term review as explained in 2.3.1. It is necessary for the executing agency and JICA to confirm, examine and reach consensus of indicators to be adopted at the ex-post evaluation stage.