Indonesia

Rehabilitation of Irrigation and Flood Alleviation Works

Report Date：October, 2002
Field Survey：August, 2001

1. Project Profile and Japan's ODA Loan

Location Map of the Sub-projects

Komering-I Irrigation Project, Package I
(The biggest sub-project among all)

1.1 Background

The Government of Indonesia realized rehabilitation works in the irrigation sector during the 4th five year development plan (1984/85 to 1988/89), comprising of the development of new irrigation systems (340,000 ha), rehabilitation of existing irrigation systems (560,000 ha), and river improvement and flood control (360,000 ha). As a result, rice production increased, on average, 3.4% per year; enlargement of the cultivated area accounted for 2.0% of this figure, and increase in productivity for 1.4%.

The 5th five-year development plan*) (1989/90 to 1993/94) prioritized 1) the improvement of farmers' income and living standards through the stabilization of self-sufficiency in food crops, 2) an increase in the volume of industrial exports, by diversifying cropping patterns, and 3) the implementation of flood control projects for the purpose of improving people's sense of security and their standard of living.

The Government of Indonesia, consequently, requested that the Japanese Government assist in the rehabilitation and renewal of irrigation facilities in 1989/90 and in implementing flood controls, as a part of the aforementioned development plan, for the purpose for achieving: 1) an increase in food production, 2) improvement of farmers' income, and 3) mitigation of flood damage.

1.2 Objectives

To rehabilitate and upgrade the existing irrigation and river systems, in order to increase food production and farmers' income and to protect human life and property from flooding. The project consists of the following five sub-projects;

*) The major sub-programs under the development plan are the irrigation improvement program (2,330,000 ha) and the irrigation development program (500,000 ha), which aim to achieve an overall economic growth rate of 5.0% p.a. (3.0% p.a. in the agricultural sector).

(A) Ular River Flood Control and Improvement of Irrigation Project
(B) Komering-I Irrigation Project, Package-I
(C) East Jakarta Flood Control Project Stage I
(D) Brantas River Rehabilitation Project
(E) Urgent Flood Control Project of Upper Citarum (E/S : Engineering Services)

1.3 Project Scope

1) The scope of the rehabilitation/upgrading works for the irrigation and river systems are as follows:

(A) Ular River Flood Control and Improvement of Irrigation Project

Flood Control Facilities / Irrigation and Drainage Works (Canal dredging, lining, etc.)

(B) Komering-I Irrigation Project, Package-I

Perjaya Headworks (bank protection) / Upper Komering Main Canal/Rehabilitation and Improvement of Irrigation and Drainage Facilities in Belitang Area / Belitang Water Supply Canal / O&M Equipment

(C) East Jakarta Flood Control Project Stage I

Channel excavation / Embankment / Bank protection / Sluiceway / Drop structure / Bridges and roads / Drains / Water level gauging station

(In 4 rivers in East Jakarta; i.e. Sunter River, Cipinang River, Buaran River and Cakung River)

(D) Brantas River Rehabilitation Project

Dredging, Riverbed Protection in Wlingi Dam Reservoir/Riverbed Protection in Lodoyo Dam / Wonokromo Sluice Rehabilitation / Gubeng Dam Rehabilitation

(E) Urgent Flood Control Project of Upper Citarum (Engineering Services)

Pre-construction services/Transfer of technology

2) Consulting services for detailed design/supervision of civil works mentioned above.

1.4 Borrower / Executing Agency

The Government of Republic of Indonesia/Directorate General of Water Resources Development (DGWRD), the Ministry of Public Works (present Ministry of Settlement and Regional Infrastructure)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	21,518 **) million yen 21,492 million yen
Exchange of Notes Loan Agreement	December, 1989 December, 1989
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	 2.5% p.a. 30 years (10 years) General Untied (Partially Untied for Consulting Services)
Final Disbursement Date	December, 1996

NOTE

1) The sub-projects of "Rehabilitation of Irrigation and Flood Alleviation Works" are each evaluated in terms of the 5 evaluation criteria separately in this report, since each sub-project was implemented independently.

2) "Lessons Learned" and "Recommendations", in Chapter 3 and Chapter 4, respectively, refer to all the sub-projects. "Results and Evaluation" in Chapter 2 covers sub-projects (A), (B), (C) and (D).

3) "Urgent Flood Control Project of Upper Citarum", Sub-project (E), is excluded from the sub-projects evaluated in this report, because it was an Engineering Service and did not produce physical outputs or generate effects directly.

**) To be allocated among the five sub-projects as follows: i) Ular River Flood Control and Improvement of Irrigation Project: 468 million Yen, ii) Komering-I Irrigation Project Package I : 11,223 million Yen, iii) East Jakarta Flood Control Project, Stage I : 7,309 million Yen, iv) Urgent Flood Control Project of Upper Citarum (Engineering Services) : 265 million Yen, v) Brantas River Rehabilitation Project : 2,253 million Yen.

2. Results and Evaluation

Sub Project (A)

Ular River Flood Control and Improvement of Irrigation Project

Figure A-1 : Project Site Map

All irrigation facilities and flood control structures (levees) illustrated in the map were constructed under the original project.

A.1 Relevance

Irrigation facilities and flood control structures were completed under the previous project, *The Overall Ular River Improvement and Irrigation Project*[1)] (hereinafter referred to as the original project) to protect the area of 2,500 ha from 30 year-return-period magnitude floods. However, a large flood in December 1987, of a magnitude equal to a 30-year-return-period flood, occurred during the completion stage of the original project, and the newly constructed facilities suffered serious damage, including river bank erosion, riverbed degradation (by scouring) and sand sedimentation.

Given these flood-prone conditions, it was recommended that the damaged facilities be rehabilitated, in order to restore the facilities to their optimal functioning level. Without doing so, the expected benefit planned under the original project could not be realized.

Thus, this sub-project, "Ular River Flood Control and Improvement of Irrigation Project,"

[1)] The previous project was also funded by a Japanese ODA loan, in the amount of 7,498 million Yen, on a basis of actual disbursement. Under the project, irrigation facilities such as intake structures, main, secondary and tertiary canals and drainage systems were constructed, and flood control facilities / works such as dredging, excavation, embankment (levee), etc. were completed.

was necessary and relevant, and is still relevant, in terms of assuring people's security / safety in the area and contributing to protecting their standard of living.

A.2 Efficiency

A.2.1 Project Scope

There were some additional dredging works to meet the actual site requirements, and bridge construction incorporated during the implementation stage in response to a special request from the local government. The bridge was needed because volume of agriculture-related material / produce to be distributed between both sides of the river was increasing, as irrigation area was expanded in the area.

A.2.2 Implementation Schedule

The sub-project was implemented by the Ministry of Public Works (present Ministry of Settlement and Regional Infrastructure) and was completed in October 1995, four months after the originally scheduled date of April 1995.

A.2.3 Project Cost

The actual total project cost was 1,070 million Yen, exceeding the 537 million Yen originally estimated. This cost overrun of 533 million Yen, which resulted from the additional works, was covered by rearranging the loan allocation among the sub-projects.

A.3 Effectiveness

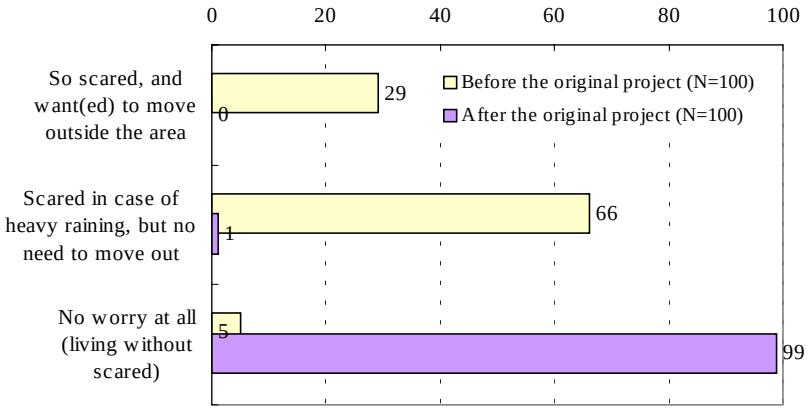
The purpose of the Sub-project is to restore the function of the existing facilities constructed under the original project, in order to realize the originally expected benefit.

A.3.1 Flood Control

No credible quantitative data / records were available on flood mitigation. However, according to information gathered in interviews at Provincial Water Resources Services of North Sumatra Province and during site inspections for this evaluation, no considerable flood or inundation damage has occurred in the Ular River basin since the original project was completed in 1990.

An interview survey of beneficiaries was carried out in the project area for this evaluation, in order to assess people's perception of the project. The survey includes a question about respondents' experience of flood damage. Figure A-2 shows their responses to the question, "How has regional safety / security been improved by the projects? ".

Figure A-2 : An assessment of regional safety and security



The majority of respondents no longer feel threatened by floods, whereas prior to the original project completion, fear of potential flooding made them consider relocating. Though this kind of comparison is based on the subjective impressions of the respondents, it is helpful in understanding the project's effects, and shows that the project, to some extent, has contributed to safer, more secure conditions.

A.3.2 Effects on Rice Production

The sub-project also includes irrigation facility improvement components, i.e., canal dredging, lining, etc., which were to restore original project function. Annual cropping area and cropping intensity of paddy for year of 2000 are estimated to be 24,000 ha (14,500 ha in the wet season and 9,500 ha in the dry season) and 130%, respectively, while the planned annual cropping area and cropping intensity, originally set at the time of appraisal were 37,000 ha p.a. (18,500 ha both in dry and wet seasons) and 200% (100% in both dry and wet seasons) (see Table A-1).

Table A-1 : Performance Indicators of Rice Production

Indicator		Original Plan in 1989 under the original project		Year of 2000	Achievement Ratio (%)
		w/o Project	w/ Project		
Irrigated Area					
- Annual	(ha)	9,000	37,000	24,000	65
Cropping Area					
- Paddy / Wet Season	(ha)	18,500	18,500	14,500	78
- Paddy / Dry Season	(ha)	4,500	18,500	9,500	51
- Palawija	(ha)	900	--	7,100	--
- Annual	(ha)	23,900	37,000	31,100	84
Cropping Intensity					
- Paddy / Wet Season	(%)	100	100	78	78
- Paddy / Dry Season	(%)	24	100	51	51
- Annual (Paddy)	(%)	124	200	130	65
Annual Average Yield of Paddy	(ton / ha)	3.6	4.5	5.2 5.0 / wet season 5.4 / dry season	116
Paddy Production	(ton / year)	82,200	166,500	125,860	76

Note : Planned values are taken from the "Project Completion Report" (1989) of the previous original project, since there was no target level set at the time of this sub-project appraisal.

Since actual performance data were not available at the site during the field study, the present data shown in the above matrix are taken from the "Final Report for the Study under JBIC Special Assistance for Project Sustainability (SAPS) for 24 Infrastructure Rehabilitation Projects" (July 2001). The figures were confirmed by local government officials.

During the field survey, the evaluation mission found that none of the nine free-intakes[2)] for irrigation constructed in the original project were functioning as originally planned because the intake vestibules were above the water line. At present this severely affects the project effectiveness. (Details are discussed in *A5.2 Current Status of Facility*)

A.3.3 Recalculation of EIRR

Since the Sub-Project's objective is to recover the function of the original project, EIRR was recalculated by combining the original project and the Sub-Project, applying the estimated annual cost and the anticipated original benefit of flood control and irrigation. The result was 12.7% (9.7% for flood control and 13.5% for irrigation)[4)]. The recalculated EIRR is much smaller than the 20.2% estimated at the time of appraisal. The result reflects the actual project situation; the Flood Control Capacity has been retained sufficiently while the Irrigation function is less than expected because of the conditions of the irrigation facility (intake), described above.

A.4 Impacts

A.4.1 Impact on Society

<Improvement of inter-area transportation>

A new bridge, namely Pulau Gambar Bridge, and approach roads totaling 360 m in length were constructed in 1995 under the Sub-project around the upper reaches of the Ular River. According to people who lived in the area before completion of the bridge, it used to take a long time to cross the river by boat, and ferry services ran only until 10 p.m. At present (post-completion), people and trucks transporting agricultural produce can cross the river anytime, thereby avoiding the inevitable loss of time. The Sub-Project can be said to have contributed to improving the inter-area transportation, especially in the upper reaches of the Ular River.

Figure A-3 : View of Pulau Gambar Bridge

[2)] Free-intake is a type of intake facility that is connected directly to the river and takes water freely from the water stream without headworks or weirs between the intake and the river.

[4)] The EIRR of the original Project was recalculated at 15.2 % (10.0% for Flood Control and 16.5% for Irrigation), which was made in the Post-Evaluation Report on The Overall Ular River Improvement and Irrigation Project.

A.4.2 Impact on Environment

Since the Sub-project comprised rehabilitation of existing facilities, no negative impacts on the environment occurred during implementation. And so far, no considerable impact on the environment has been reported by government officials or the community.

A.5 Sustainability

A.5.1 Operation and Maintenance Organization

<Flood Control Facilities>

Dinas PU Pengairan Deli Serdang District Office (branch office of Water Resources Services under Provincial Government) is responsible for operation and maintenance (O&M) services including the flood control portion at the time of field survey for this evaluation conducted in August 2001. This office implements O&M works for river structures such as levees, revetments and the river channel. Dinas PU Pengairan North Sumatra Province was allocated an annual budget of Rp. 9,600 million for O&M works from the central government in 2001. The allocated budget is sufficient for ordinary O&M works. However, budgetary allocation may be subject to change in future under on-going decentralization policy in Indonesia.

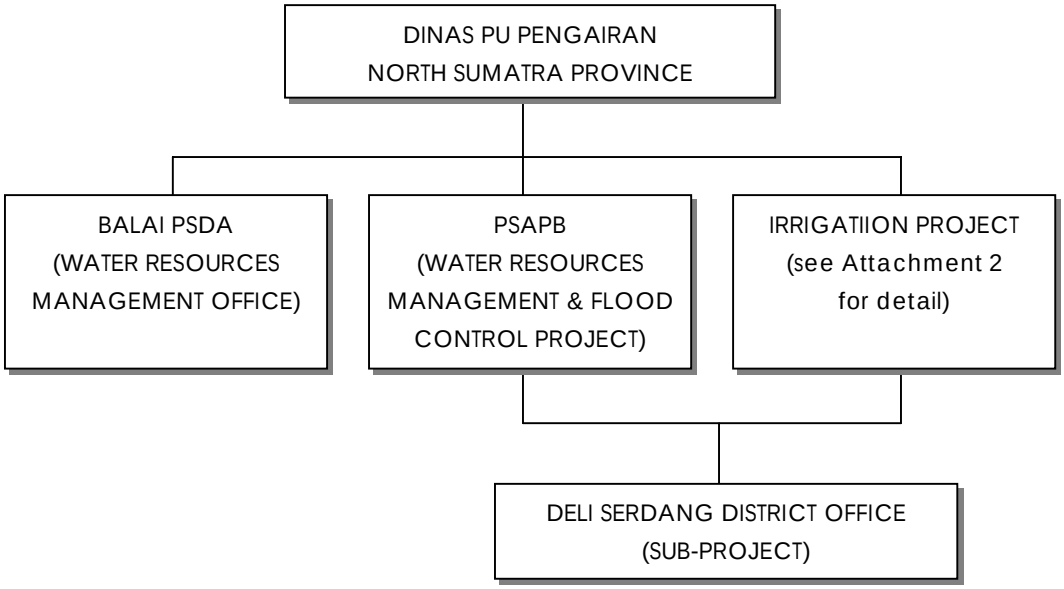
<Irrigation Facilities>

Dinas PU Pengairan Deli Serdang District Office (branch office of Water Resources Services under Provincial Government) is also responsible for O&M services of irrigation facilities, such as the intake, main and secondary canals. The allocated budget for the irrigation facilities in 2001 was Rp. 13,000/ha, although Rp. 80,000 is required for sufficient O&M.

WUAs (Water Users Associations) was planned to be responsible for O&M of on-farm irrigation facilities (tertiary canals), and for collecting an ISF (Irrigation Service Fee) from members (farmers). However, farmers' actual participation in O&M activities is less than originally planned; i.e., a WUA working ratio is 60 % (65 WUAs have already been established, but only some of them are operating), and an ISF collection ratio of 22%). This situation has contributed to inappropriate maintenance of the on-farm irrigation facilities. The project office once conducted a beneficiary survey, seeking an answer to the question of how to motivate farmers to become active and to collect the ISF appropriately. The results indicated that farmers' WTP (Willingness to Pay) ISF was around 100,000 Rp./ha/year, twice the set-up price of 50,000 Rp/ha/year, if sufficient irrigation water service were provided.

Figure A-4 : Organization of Dinas PU Pengairan, North Sumatra Province

As in August 2001



A.5.2 Current Status of Facility

During the field survey carried out in July 2001, the mission for this evaluation visited the project site to inspect the current status of project facilities.

The flood control facilities, such as the embankment and revetments improved under the Sub-project, are generally in good condition.

Inspection of the irrigation facilities revealed that the river degradation has prevented all of the intakes upgrated under the Sub-project from working as originally planned. The river degradation has been caused by intensive river-sand mining taken place in numerous locations since the late 1990's. In addition, the channels and sand settling basins were filled with deposits. It will be difficult to remove such deposits by means of ordinary O&M with the present staff, equipment, machinery and financial support levels (see Figure A-5).

Figure A-5 : View of Bendang Intake

Senior technical officer is pointing to the original water level

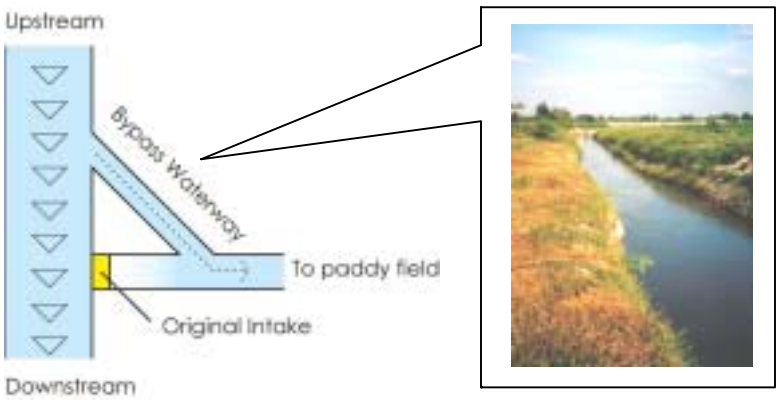
Possibly, this situation is the result not only of riverbed degradation, aggravated by sand mining in numerous locations, but also of the original characteristics of the Ular River, i.e., the steep gradient of the riverbed (more than 1/1,000), a rapid flow and a

heavy sedimentation load from upstream. Under such circumstances, providing a solid structure that is not only resistant to riverbed degradation but also well-equipped with effective deposit-arresting devices is of primary importance to ensuring a stable intake of irrigation water.

A.5.3 Toward Sustainability

According to government officials, there has been conflict between farmers and the local government related to water use. During the previous drought periods, farmers appealed to the irrigation project management authority, seeking the appropriate distribution of water rights, but their appeal failed. After 1999, farmers constructed a bypass irrigation waterway[5)], as an alternative facility for intake, to solve the water shortage (see Figure A-6). According to farmers in the Sumber Rejo Lama block interviewed during the site inspection, it took one night to fill their paddy fields with irrigation water before the original intake became dysfunctional, but now it takes at least two nights to complete filling. Although the conflict over water distribution is not active at present, the essential problem has not yet been resolved.

Figure A-6 : Schematic Diagram of Bypass Waterway



There is an urgent need to improve/rehabilitate the irrigation water distribution system. The original free intake system is inappropriate, but rehabilitation of the existing intakes is not enough to solve the current situation. Innovative measures are required to address this issue.

The project office of the local government has already prepared a basic plan for facility renovation, which consists of constructing a new weir upstream from the Ular River and installing connecting canals (link canals) on both sides of the river basin. Rehabilitation of Ular Irrigation System is included in Japan's ODA-assisted project, Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project, Exchange of Note of which was signed in March 2002.

In addition, farmers' participation in the O&M of on-farm irrigation facilities and in collecting ISF should be strengthened to promote the project's sustainability.

5) According to the officials, the construction of the bypass irrigation waterway was probably paid by the river-sand mining company.

Comparison of Original and Actual Scope

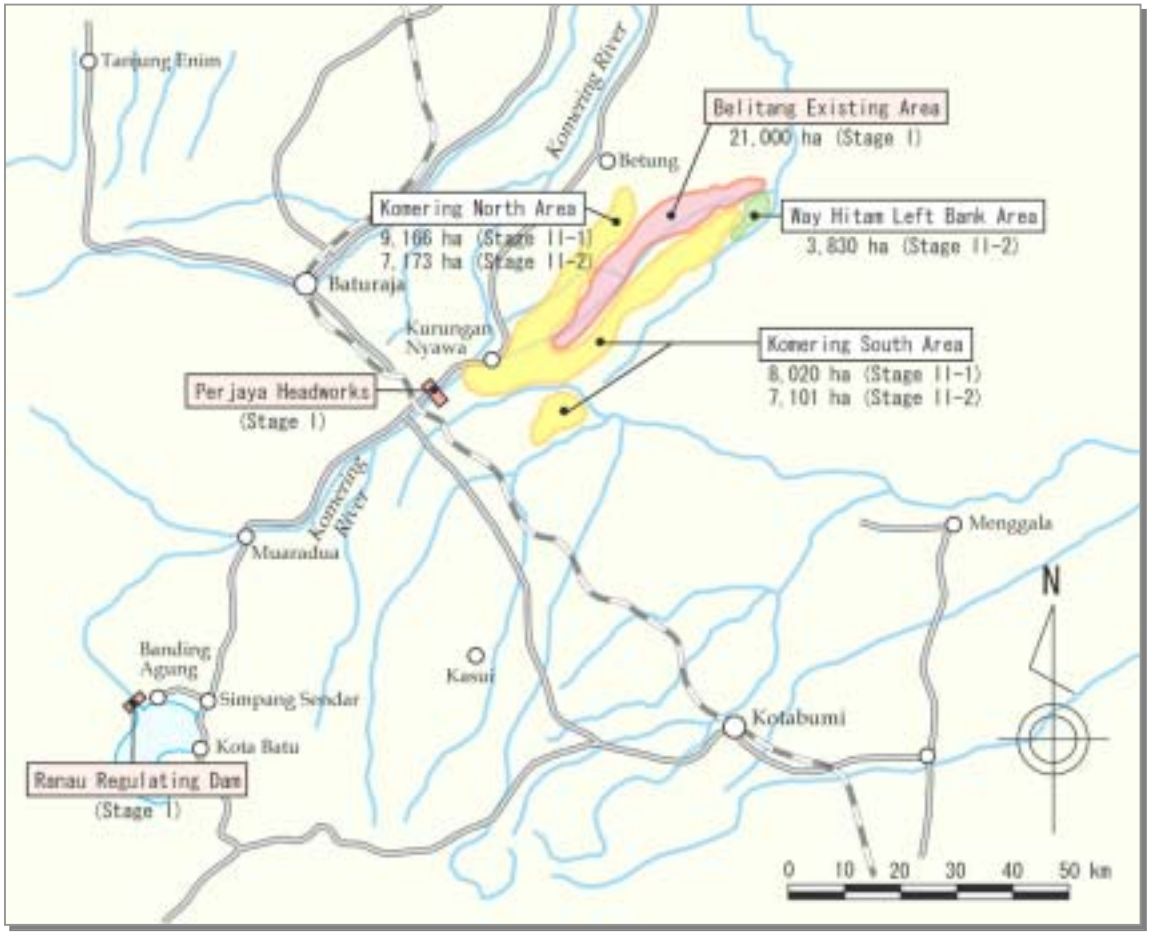
Item	Plan	Actual
(1) Project Scope		
1. Irrigation and Drainage ID-5		
a. Removal of sediment and improvement	10 nos	as planned
b. Desilting of sediment in existing canal		
-Main canal	2,616.53 m	1,721.53 m
-Secondary canal	22,058.00 m	28,669.69 m
-Tertiary canal	4,308.00 m	4,813.00 m
Drainage	---	800.00 m
c. Raising of high existing canal embankment		
-Main canal	2,054.02 m	1,559.82 m
-Secondary canal	28,198.00 m	27,148.00 m
-Tertiary canal	4,308.00 m	4,013.00
d. Construction of new canal lining		
-Main canal	---	342.00 m
-Secondary canal	4,642.37 m	8,491.26 m
-Tertiary canal	1,612.50 m	1,458.00 m
-Heightening of existing stone masonry lining	342.00 m	as planned
e. Construction, Improvement and Repairing of related structures		
-New Turn Out	2 nos	8 nos
-Remodel Turn Out	6 nos	5 nos
-Repairing of Turn Out	2 nos	2 nos
-Heightening of Turn Out	1 nos	as planned
-Rehabilitation of Spillway	8 nos	9 nos
-New Culvert	2 nos	3 nos
-Improvement of Culvert	2 nos	as planned
-Improvement of Drop	2 nos	3 nos
-Improvement of Aqueduct	1 nos	as planned
-Heightening of Siphon	4 nos	as planned
-Repairing of Romijn gate	12 nos	as planned
-Repairing of Slide gate	7 nos	as planned
f. New, box and mattress gabion		
-Box gabion	4 nos	4 nos
-Mattress gabion		2 nos
g. Gate keeper house	2 nos	as planned
h. Procurement of Irrigation O&M		
-Motor car	1 unit	as planned
-Motor cycle	10 unit	as planned
-Bicycle	21 unit	as planned
-Filing Cabinet	4 unit	as planned
-Drafting Machine	2 unit	as planned
-Type Writer	3 unit	as planned
i. Installation of new screen	---	8 nos
2. Flood Control Facilities FC-6		
a. Dredging Works	---	441,810.00 m3
b. River training works	---	1,010.00 m
c. Repairing of flood control	---	n.a.

facilities		
d. Construction of Pulau Gambar bridge	---	32 m×6 span=192 m
e. Construction of approach road	---	364.00 m
3. Consulting Services		
a. Foreign Consultant	30.5 M/M	36.5 M/M
b. Local Consultant	83.0 M/M	93.3 M/M
c. Total	113.5 M/M	129.8 M/M
(2) Implementation Schedule		
1. Loan Agreement	Dec. 1989	as planned
2. Tender & Evaluation	Jun. 1990 – Dec. 1993	Apr. 1991 – Aug. 1993
3. Contract Negotiation		
-Package No. ID-5 & FC-5	Sep. 1990 - Jan. 1994	Jul. 1991- n.a.
-Package No. FC-6		
-Package No. ID-6		
4. Construction		
-Flood control work	Oct. 1990 – Mar. 1992	Jul. 1990 – Oct. 1992
Package No. FC-5	Feb. 1995 – Apr. 1995	Nov. 1993 – Oct. 1995
Package No. FC-6		
-Irrigation & Drainage Facilities		
Package No. ID-5	Oct. 1990 – Mar. 1992	Jul. 1990 – Oct. 1992
Package No. ID-6	Feb. 1994 – Jan. 1996	n.a.
6. O&M Study & Training	Aug. 1991 – Aug. 1993	n.a.
(3) Project Cost		
Foreign currency	333 million yen	779 million yen
Local currency	204 million yen (2,788 million Rp)	291 million yen (5,829.0 million Rp)
Total	537 million yen	1,070 million yen
ODA loan portion	468 million yen	890 million yen
Exchange Rate	1Rp. = 0.073 yen (Apr. 1989)	1Rp. = 0.05 yen (Average during implementation)

Komering-I Irrigation Project Package I

Figure B-1 : Project Map

※Stage I is illustrated with pink color



B.1 Relevance

The **Komering-I irrigation** Sub-project was designed to increase food production and to improve farmer income by constructing new works and rehabilitating and upgrading existing irrigation systems, whose water supply capacity was considered decreasing. The sub-project objective was, therefore, in line with government policy at the time, and remains consistent with Central Government policy for the agriculture sector -- 1) enhancing farmers living standards by increasing agricultural produce and 2) improving self-sufficiency in the production of food crops. The Regional Development Plan of District Ogan Komering Ulu (OKU) also placed emphasis on agricultural development in the southern area of the district.

B.2 Efficiency

B.2.1 Project Scope

The “Ranau Regulating Facility” was added to the original scope of work. The facility was needed to secure the necessary amount of water in the Lake Ranau Regulating Dam, which was the source of irrigation water.

B.2.2 Implementation Schedule

The Sub-project was implemented as the "Komering Irrigation Project" under the Ministry of Settlement and Regional Infrastructure (former Ministry of Public Works) and was completed in 1996, 1.5 years behind the original schedule. Construction of the "Perjaya Head Works" was delayed as design modifications were made to reflect actual field conditions. There was also a delay in the land acquisition process, which affected the follow-on construction process. Together with delay in budget allocation process by the Indonesian Government, the Sub-project was at one point 2.5 years behind schedule, but the Project Office made an effort to compensate and shortened the delay to 1.5 years by project completion.

B.2.3 Project Cost

The total Sub-project cost and the total amount of ODA loan disbursement were within the originally planned amount; there was no major cost over-run.

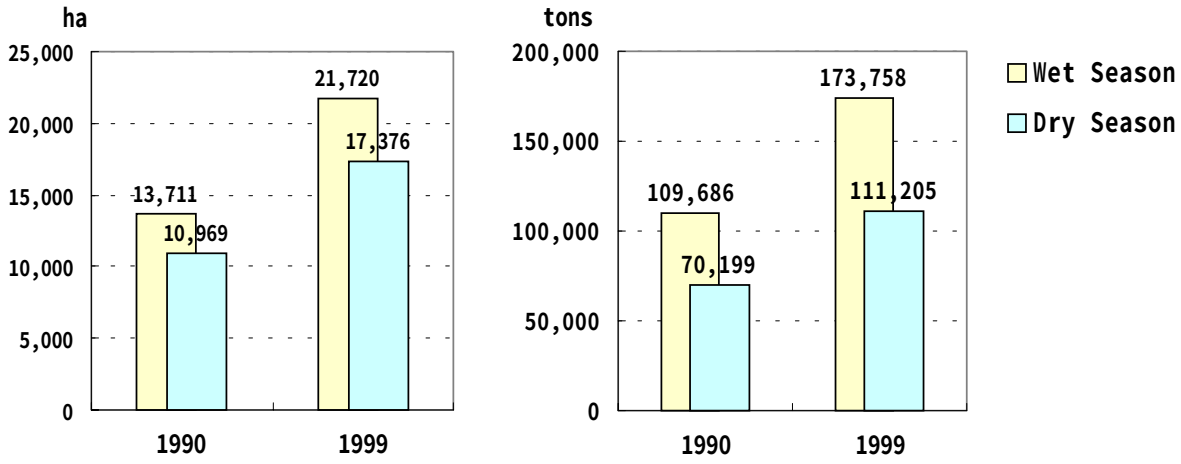
B.3 Effectiveness

B.3.1 Quantitative Effect ---Increase in Agricultural Produce---

<Paddy>

Figure B-2 shows figures for actual paddy area and production volume by season in the years directly before and after the Sub-project (in 1990 and 1999, respectively), highlighting a marked improvement in paddy production[2].

Figure B-2 : Area (left) and Production (right) of Paddy



source : Komering Irrigation Project Office

Paddy Area increased from 24,680 ha in 1990 to 39,096 ha in 1999, nearly reaching the goal of 40,000 ha (20,000 ha both in rainy season and dry season) set in the original plan. Paddy production increased from 179,885 tons in 1990 to 284,963 tons in 1999, exceeding the target of the original plan, 210,000 tons (100,000 tons in rainy season and 110,000 tons in dry season). Increases in both area and production were around 1.6 times pre-project figures[3].

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[2] Other reliable data between 1991 to 1998 were not available at the time of this evaluation.

[3] At the time of appraisal, there were certain targets stated in the appraisal documents: a) 55,290 ha in wet season and 54,080 ha in dry season for paddy area, b) 276,450 tons in wet season and 297,420 tons in dry

<Other Crops in Dry Season>

Table B-1 shows actual data reflecting the production of other crops before and after the Sub-project. At the time of appraisal, Soybeans and Peanuts were targeted for an increase in both area and production. However, after 1999, Maize and Cassava became more widely cultivated. This change in crops may be reflecting the market price changes.

Table B-1 : Cultivated Area and Production Volume on Other Crops

	Cultivated Area (ha)			Production (ton)		
	Before (1990)	After (1999)	After / Before	Before (1990)	After (1999)	After / Before
Soybeans	1,708	1,708	1.0	2,220	2,459	1.1
Maize	1,600	4,100	2.6	2,033	15,990	7.9
Peanut	900	1,214	1.3	1,101	1,663	1.5
Cassava	3,968	2,078	0.5	18,760	42,973	2.3
Sweet Potato	139	0	0.0	1,001	0	0.0
Green Peas	63	118	1.9	76	120	1.6
Rubber	0	5,555	n.a.	0	2,212	n.a.
Pepper	4	23	5.8	0	14	45.3
Total	8,122	14,796	1.8	25,191	65,431	2.6

source : Komering Irrigation Project Office

<Cropping Intensity>

According to the Project Office, there were three cropping patterns in the area: a) Paddy-Paddy-Other Crops (Palawija), b) Paddy-Paddy-Paddy and c) Paddy-Paddy-Fish (Ikan Tawar). Before the project, cropping had not been as intensive as in 1999.

B.3.2 Recalculation of EIRR

Since the overall project is still ongoing, the full expected benefit has not been achieved, even though the Sub-Project has been completed[4]. Therefore, the actual EIRR should be calculated after completion of the follow-on project stages and compared to the original EIRR (10.6%).

B.4 Impacts

B.4.1 Economic Impact ---Farmers' Income---

Table B-2 below summarizes the average figures indicating the economic conditions of farmers in the project area; data were collected during an Interview Survey of beneficiaries, conducted in August 2001 as a part of the Evaluation[5]. Data for both in 1992 and 2000 are stated in year 2000 values for easy comparison of the two different periods[6]. "Income from Agriculture" increased 70% while expenses more than doubled,

season for paddy production, etc. Those target levels, however, is set for the overall project scope, not only the subject project (Stage I), but also other following projects (Stage II-1, II-2). Stage II-1 was also supported by a Japan's ODA loan. Thus, the actual records on area and production obtained this time cannot be compared yet to the original targets stated in the appraisal documents.

4) See footnote 3).

5) The interview survey was conducted with the cooperation of the Project Office, Komering Irrigation Project. 100 respondents (the population in Belitang County covering the project area is 68 thousand as of 1996) were selected by means of Random Samplings.

6) Using CPI in International Financial Statistics Book 2000. The CPI for the year 2000 was not available at the

and “Net Income from Agriculture” increased 33%.

This comparison of Farmers’ Income in the two periods shows that income increases could not keep pace with the increases in expenses / costs, probably because of the rise in agricultural input prices.

Table B-2 : Summary of Farmers’ Income (comparison in 2000 real basis)[7)]

[Unit: 1,000 Rp.]

		①. Before Project Completion 1992	②. Recent (After Completion) 2000	②/①
Land Use	･Irrigated Paddy	0.72 ha	0.76 ha	106%
	･Rainfed Paddy	1.33 ha	1.25 ha	106%
	･Fields for Other Crops	0.00 ha	0.00 ha	-
	Total	2.05 ha	2.01 ha	98%
Number of Family Members		5.9 people	4.1 people	69%
Income from Agriculture		4,457	7,572	170%
Expense for Agriculture		1,421	3,549	250%
Net Income from Agriculture		3,036	4,023	133%
Other Income		2,178	1,081	50%
Total Income		5,214	5,104	98%
Cost for Living		2,225	2,937	132%
Possible Savings		2,989	2,167	72%
Possible Savings per one family member		507	529	104%

source : Interview Survey to the Beneficiaries (a component of PEDAC 2001)

note: The cashflows do not include such benefit as rice produce increment for the purpose of self-consumption.

B.4.2 Economic Impacts on Regional Economy

According to the beneficiaries, the Sub-project supports improvement of regional economic activities. More than 95%, or 93 of the 96 total respondents, replied that the Sub-project contributes to an “increase of farmer’s income”, and around 50%, or 44 of the 96 respondents, said the Sub-project contributed to “Increased Job Opportunities”.

B.4.3 Environmental Impacts

No negative impact has been observed nor reported so far, according to the Project Office.

B.4.4 Social Impacts ---Land Acquisition---

Construction of Perjaya Head Works and the Lake Ranau Regulating Dam required acquisition of land. Land acquisition process delayed about 2.5 years because of delay in mobilizing fund for compensation by Indonesian Government. However, any major dispute regarding land acquisition between Government and the farmers were settled eventually.

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time of evaluation, thus, the data for 1999 were applied instead, with the assumption that there was no big discrepancy between 1999 and 2000.

7) Data on incomes and expenses in 1992 were converted into 2000 prices, applying CPI (Consumer Price Index) quoting from International Financial Statistic Books 2000 (IMF).

B.5 Sustainability

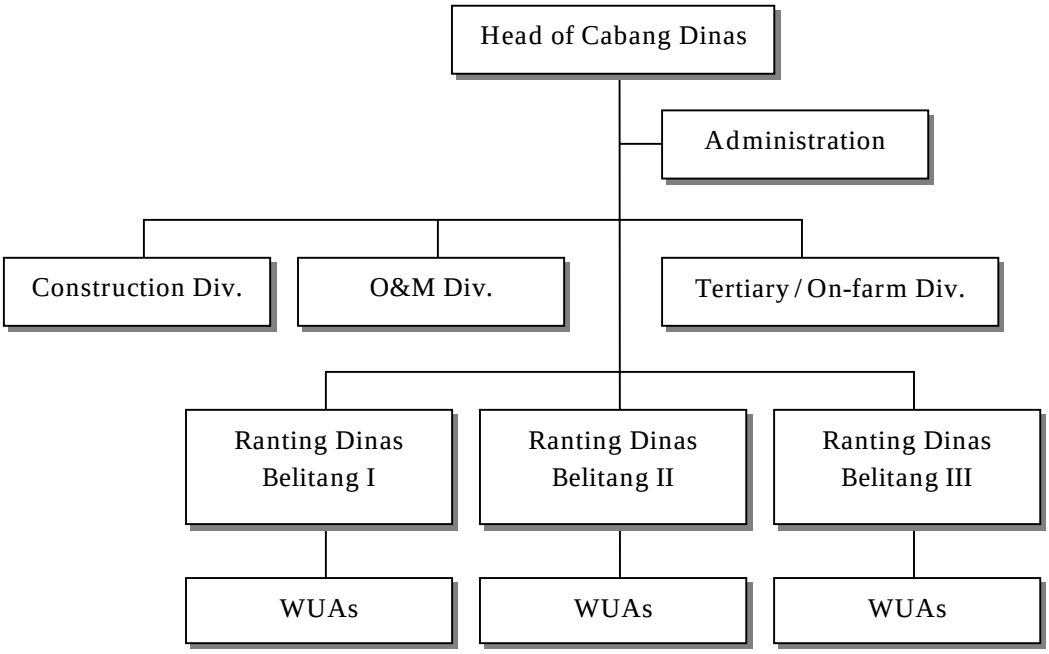
B.5.1 Operation and Maintenance Organization

When this evaluation was conducted in August 2001[8], the Sub-project's key facilities, the Head Works, Regulating Dam and Primary Canal, are operated and maintained by the Project Office "Komering Irrigation Project," which is under the umbrella of the Directorate of Water Resources in West Region, the Ministry of Settlement and Regional Infrastructure. Other major facilities, namely the Secondary Canal and Drainage, are managed by "Cabang Dinas" (branch office of Water Resources Service under Provincial Government).

On-farm irrigation facilities such as tertiary canals are managed by farmers through WUAs (Water Users Associations), which are organized under Cabang Dinas and directly supervised by Sub-Branch Offices "Ranting Dinas I, II and III." There are a total of 84 WUAs in the area.

Figure B-3 : Organization Chart of Cabang Dinas OKU-I

August 2001



B.5.2 Current Status of the Project Facilities

The Mission for this evaluation visited the project site in July 2001 to inspect the status of the project facilities constructed under the Sub-project, Stage I, and to inspect facilities being constructed in the on-going project, Stage II Phase 1. Major observations were noted, as follows:

<Perjaya Head Works>

- The facility itself is still in good condition, but some of the electronic devices in the

[8] Government of Indonesia is now conducting the Irrigation Management Policy Reform, and irrigation sector is under the institutional reform.

control center malfunction, i.e., the monitoring display (since 2001) and remote sensing gauges (since 1998). This impairs O&M appropriate activities.

Figure B-4 : A view of Perjaya Head Works

<Main & Secondary Canal>

- Both major canals are well maintained and have no serious sedimentation problems.

Figure B-5 : A view of Main Canal

<Tertiary Canal>

- On-farm irrigation facilities (tertiary canal) are well managed by farmers.

Figure B-6 : A view of Tertiary Block

<Ranau Regulating Dam>

- No problems could be found in the operating gates.

Figure B-7 : A view of Ranau Regulating Dam

Since, under the cooperation of the Project Office and the farmers, the facilities were maintained in good condition after completion in 1996, rice can now be harvested at least twice a year.

B.5.3 Technical Capacity

There are no appropriate data showing the status of the technical capacity of the staff. According to the Project Manager, however, through daily work at the construction of Stage II Phase 1 (the follow-on project), project staff members are improving their technical capacity in O&M activities under the instruction and guidance of the Project Consultant.

B.5.4 Financial Status

There are no appropriate data on the financial status of the project. According to Cabang Dinas, however, the budget for O&M is currently sufficient, although actual disbursement is always delayed by 3 to 4 months. The budget is used for dredging sedimentation, grass cutting and gate maintenance (lubricating oil).

B.5.5 Toward Sustainability

Since there are follow-on projects to enhance the Komering Irrigation scheme, this is not the right time to evaluate this sub-project's effects; it would be more appropriate to conduct the evaluation after the full series of Komering Irrigation concerned sub-projects is completed. However, it is expected that the Komering Irrigation scheme will have positive effects in terms of boosting agricultural production, because the field survey conducted for this evaluation revealed that the facilities are currently well-managed.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope		
1. Perjaya Headworks		
a. Diversion Weir	l=215.5 m	as Planned
b. Intake and drop	l=90.5m, Q=81m3/s	as Planned
c. Driving canal	l=810m, H=2.7m, W=33m	UP : L=115m, H=2.9m, W=6.5m LW : L=560m, H=4.0m, W=24m
e. Control house	4 nos.	1 nos.
f. Electric supply system	5 sets	4 sets
2. Upper Komering Main Canal		
a. Main canal	l=13.3 m	l=13.3 m
b. Related structure	32 nos.	29 nos.
c. Belitang supply canal	l=0.2 km	l=0.2 km
3. Rehabilitation and Improvement of Irrigation and Drainage Facilities in Belitang Area		
a. Secondary canal		
-Reshaping and modification of canal	l=66.1 km	l=67.4 km
-Expansion of top width	l=41.8 km	l=67.4 km
-Repair-improvement and reconstruction of structures	128 nos.	128 nos.
-New construction of structure	167 nos.	38 nos
-Concrete lining of canal	l=11.3 km	l=27.5 km
-Expansion of width of inspection road	l=38.9 km	l=25.4 km
b. Other secondary canal		
-Reshaping and improvement of canal	l=57.9 km	l=52.5 km
-Repair, Improvement or new construction of structures	459 nos.	300 nos.
-Concrete lining of canal	l=20.3 km	l=22.5 km
-Improvement of inspection roads	l=26.7 km	l=26.8 km
c. Tertiary development	A=7,560 ha	A=6,667 ha
d. Drainage canal system		
-Canals	l=43.2 km	l=34.1 km
-Structure	76 nos.	42 nos.
4. O&M Equipment		
a. Vehicle and equipment	---	25 nos.
b. Warning system for headworks	---	1 lot
c. Wireless communication equipment	---	(included in 2 above)
5. Ranau Regulating Facility	Additional works to Original scope	
a. Dam		l=144 m, h=7 m
b. Driving channel		l=3.1 km, w=20m

6. Consulting Services	Professional (A) : 250M / M Professional (B) : 250M / M Total : 500 M / M	Professional (A) : 238M / M Professional (B) : 555M / M Total : 793 M / M
(2) Implementation Schedule		
1. Land Acquisition	Jan. 1990 – Dec. 1991	Jun. 1990 – Mar. 1994
2. Selection of Consultant	Oct. 1989 – Jun. 1990	Oct. 1988 – Jun. 1989
3. Consulting Services	Jul. 1990 – May 1995	Oct. 1989 – Oct 1996
4. Head Works: Lot 1(Civil Works)	Apr. 1991 – Dec. 1994	Oct. 1991 – Feb. 1996
5. Head Works: Lot 2 (Gate)	Oct. 1991 – Sep. 1994	Nov. 1992 – Feb. 1996
6. Main Canal: Lot 3	Jan. 1992 – Jun. 1994	Oct. 1991 – Dec. 1994
7. Main Canal: Lot 4	Jan. 1992 – Jun. 1994	Oct. 1991 – Feb. 1995
8. Belitang : Lot 5-11 (Other Secondary Canal,Tertiary)	Jan. 1991 – Mar. 1995	Apr. 1993 – Sep. 1995
13. Belitang : Lot 12-14 (O&M)	Apr. 1992 – Mar. 1993	Aug. 1993 – Sep. 1995
		Lot 15-18: (O&M equipment) Dec. 1995 – Aug. 1996 Lot 18-21: (Base Camp) Jun. 1990- Mar. 1993 Lot 22: Renau Dam Feb. 1995 – Sep. 1996 Lot 23-24: Belitang : I&II, Rehabili Jul. 1996 – Oct. 1996
	(Completion in May 1995)	(Completion in Oct 1996)
(3) Project Cost		
Foreign currency	7,164 million yen	4,267 million yen
Local currency	6,073 million yen (83,190 million Rp)	9,057 million yen (181,148 million Rp)
Total	13,237 million yen	13,324 million yen
ODA loan portion	11,223 million yen	10,426 million yen
Exchange Rate	1Rp. = 0.073 yen (Apr. 1989)	1Rp. = 0.05 yen (July 1996)

Sub Project (C)

East Jakarta Flood Control Project, Stage I

C.1 Relevance

The Sub-project objective is to rehabilitate and upgrade the river systems in order to protect local residents and their property from floods. That objective was relevant at the time of project appraisal because the target area of East Jakarta, where an industrial zone was situated behind ports, had gone through rapid urbanization. However, the eastern part of Jakarta remained less developed, in terms of flood control capability, than the western area of Jakarta.

Strengthening such capability is still a vital component of the current development policy and plan of Jakarta City[1)], in which high priority is given to river area improvement in the eastern part of the city, including the target area.

C.2 Efficiency

C.2.1 Project Scope

The original project scope consisted of 4 packages for river improvement works, which were designed to anticipate 25-year-return-period flooding of the 4 existing rivers, namely Sunter, Cipinang, Buaran and Cakung. The scope was actually rearranged into 6 packages. 2 packages of drainage system works, namely Sunter East I and Sunter East III, were added, while river improvement work on the Cipinang river, a part of the original Package 3, was postponed and finally deleted from the project scope, since it faced difficulties in land acquisition for compensation stemming from budgetary constraints following a sudden rise in land prices. This postponed section is expected to be implemented in a future follow up project by Indonesian Government to be connected with the proposed Eastern Banjir Canal.

Table C-1: Comparison of the Original and Actual Project Scope

Item	Original Plan	Actual
Package 1 : Sunter River	3,380 m	as planned
Package 2 : Sunter River	3,984 m	as planned
Package 3		
- Sunter River	4,233 m	as planned
- Sunter River	3,825 m	as planned
- Cipinang River	3,824 m	deleted
Package 4		
- Buaran River	5,633 m	as planned
- Cakung Floodway	3,930 m	as planned
Package 5 (additional)	n.a.	Sunter East I drainage system works (pump capacity of 4.0 m3/sec)
Package 6 (additional)	n.a.	Sunter East I drainage system works (pump capacity of 4.0 m3/sec)

source: DGWRD

[1)] A regulation of Local Government of Jakarta City, No. 6 in 1999

Figure C-1 below is a schematic diagram of the project in which the actual scope of works are identified as Packages 1, 2, 3.1, 3.2, 4, 5 and 6.

Figure C-1: Schematic Diagram of "East Jakarta Flood Control"

non-scale map

C.2.2 Implementation Schedule

The Sub-project was implemented by the project office, CCWR (Ciliwung Cisadane River Basin Management), under the Ministry of Settlement and Regional Infrastructure (former Ministry of Public Works). The Sub-project was completed in December 1996, approximately two years after the originally scheduled completion date. This delay was caused mainly by the revisions in scope, as discussed above.

C.2.3 Project Cost

The cost for the additional works, Packages 5 and 6, was covered by the balance of the ODA loan of the Sub-project, which was originally allocated for postponement of the river improvement works on the Cipinang River.

C.3 Effectiveness

C.3.1 Quantitative Effect --- Alleviation of Flood Damage ---

Table C-2 shows the actual record of flooding in the project area, as provided by CCWR. Frequent floods and flood damage were recorded before completion of the project in 1993. However, no flooding was officially recorded between project completion and 2000. Although, unfortunately, annual rainfall data could not be obtained, it is possible to say that the project improved the river basins in terms of flood control and drainage capacity.

Table C-2: Flood Record in the Project Area

	Maximum Flood Discharge (m3/sec)	Flooded Area (ha)	Flooded Damage (10^6 Rp.)	Inundation Days (days)	Inundation Height (m)	Number of Injuries and Fatalities (persons)	Number of Flooded Houses (houses)
1973 (Jan)	-	10,100	-	-	0.3-1.0	-	-
1976 (Jan - Feb)	-	15,100	-	-	1.3-2.0	-	-
1977 (Jan)	-	6,800	-	-	1.0-1.2	-	-
1977 (Feb)	-	5,300	-	-	0.4-0.8	-	-
1979 (Jan)	-	6,400	-	-	0.4-1.2	-	-
1981 (Jan)	-	1,800	-	-	0.4-0.8	-	-
1981 (Dec)	-	2,200	-	-	0.4-0.8	-	-
Year of Appraisal 1989	55	4,950	-	2	-	948,000	2,170
1993	120	460	-	2	-	68,000	-
Year of Completion 1996	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-

Source : Ciliwung Cisadane River Basin Management

C.3.2 Assessment by the Beneficiaries --- Results of Interview Survey ---

A questionnaire-based Interview Survey to beneficiaries was carried out for this evaluation in order to examine the project's effect/impact. One hundred (100) interviewees were selected randomly, with the cooperation of the project office. The major points covered in the interviews are as shown below:

1) Experience of flooding before and after the Sub-project and assessment of benefits of the Sub- project in safety and security, sanitation and socio-economic.
2) Impact/indirect effects of the Sub-project
3) Further requirements and recommendations

Major results related to the direct effects, i.e., flood alleviation effects, are described below.

Figure C-2 summarizes beneficiaries' answers to a questions about "the extent of flood damage before and after project completion". These data indicate that beneficiaries assess

the project's contribution to reducing flood damage positively.

Figure C-2: Comparison of the extent of flood damage before and after the Sub-project completion

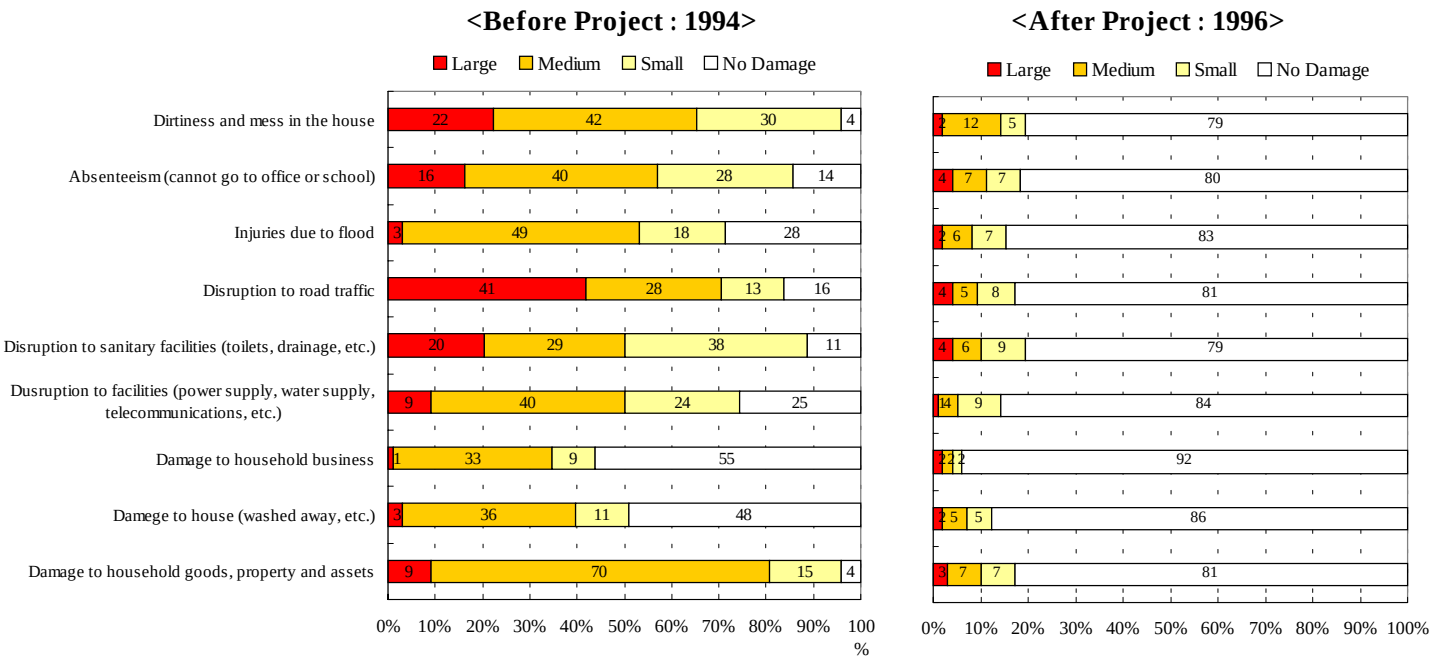
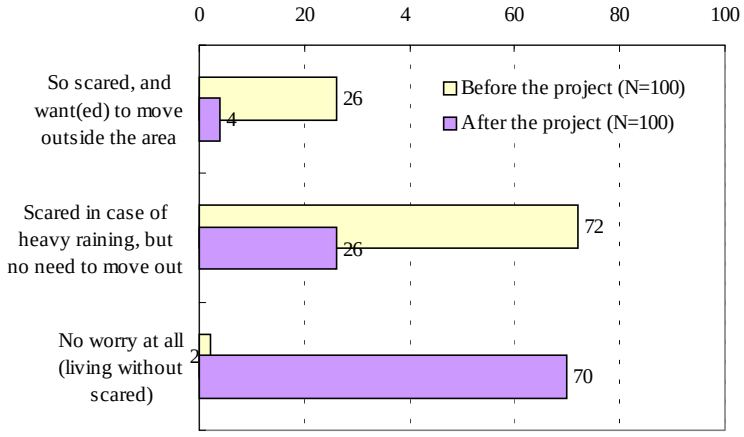


Figure C-3 illustrates the beneficiaries' assessment of "regional safety/security". Most of respondents no longer live in fear of floods after the Sub-project.

Figure C-3: An assessment on regional safety and security



Even though the responses above are subjective, they are helpful in understanding to what extent the Sub-project has contributed to improving the respondents' living conditions in terms of safety and security.

C.3.3 Recalculation of EIRR (Economic Internal Rate of Return)

EIRR of the Sub-Project was recalculated by DGWRD in 1999, when the Project Completion Report was made, following the assumptions used at the time of project appraisal. It was reevaluated at 16.5%, lower than the 21.3% of the original estimate. Since there are still some low-lying areas where people are subjected to inundation

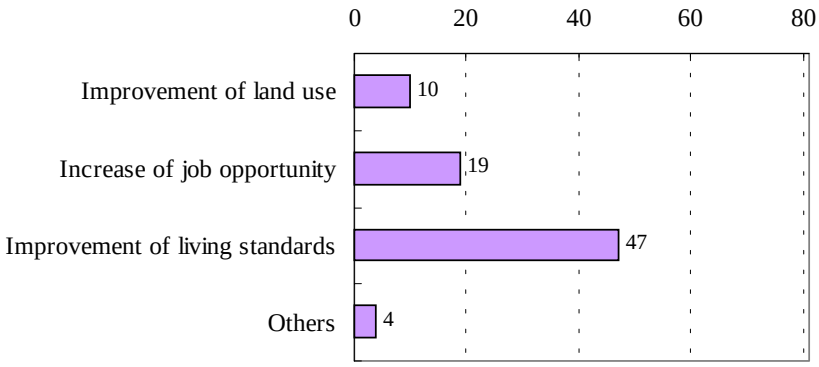
because of drainage function problems (see C.5.2), the original anticipated benefit has not been fully realized. Nevertheless, in terms of flood control, it can be concluded that conditions in the area have improved greatly.

C.4 Impacts

C.4.1 Impacts on Economy

It is difficult to achieve a quantitative analysis of a Sub-project's effects on the regional economy, even if enough macroeconomic data are available. To gain insight into the contribution made by this Sub-project, the results of the Interview Survey are a valuable source of information. Responding to the question, "Do you think this project supports economic activity?", the majority of respondents (72 %) said that the Sub-project has made a sufficient contribution to the regional economy. Following that, a multiple-choice type question was asked to clarify the nature of contribution; responses are shown in Figure C-4. Forty-seven of seventy-two (the effective number of total respondents), or 65% of respondents selected "Improvement of living standards", and nineteen or 26% selected "Increase of job opportunities". These responses are based on the beneficiaries' subjective impressions. Nonetheless, they suggest that the project has had a clear, positive impact on the regional economy.

Figure C-4: Specification of economic activity (N=72, MA)



C.4.2 Environmental Impacts

No negative impact directly generated by the Sub-project was recorded, although a waste water problem caused by surrounding industries was observed during the field survey (see C.5.2 for details).

C.4.3 Social Impact --- Land Acquisition ---

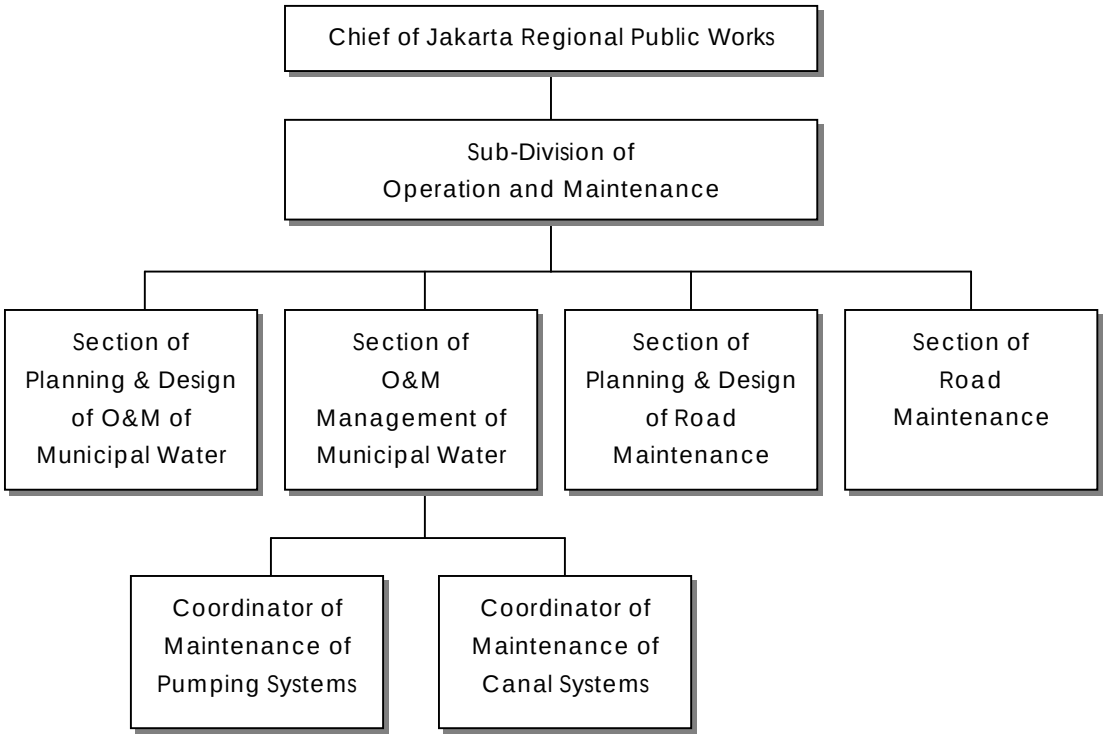
As mentioned before, potential difficulties with land acquisition caused a part of the original Package 3 to be postponed, and eventually cancelled. This problem was not evident in the other river improvement packages. In fact, in two additional packages for constructing pump stations, namely Sunter East I and III, land acquisition was completed smoothly and quickly since these packages were located in sparsely populated areas and in a public area previously owned by the government.

C.5 Sustainability

C.5.1 Operation and Maintenance Organization

Most of the facilities were turned over by the Project Office, CCWR (Ciliwung Cisadane River Basin Management Office), to Jakarta Regional Public Works, under the Local Government of Jakarta (Dinas PU Jakarta; see Figure C-5), after completion of the project. However, one of the drainage pump stations was still under the responsibility of the project at the time of the field survey in 2001, because of a delay in the transfer process.

Figure C-5: Organization of Jakarta Regional Public Works



source : Ciliwung Cisadane River Basin Management Office

C.5.2 Current Condition of the Project Facilities

The Mission for this evaluation visited the project site in July 2001 to inspect the current condition of the project facilities. The facilities themselves were still in good condition, but sedimentation (see Figure C-6) and garbage deposits were often observed. These should have been cleaned up properly by the O&M body in order to maintain the designed capacity of flood water discharge.

In addition, water quality in the Cipinang River is getting worse (darker and offensive-looking). This effect, unrelated to the Sub-project, is actually a by-product of the operation of several textile factories upstream. They discharge waste water containing dyes into the river without sufficiently treating the waste with neutralizing agents. The factories are not in compliance with the Local Government's (Jakarta City) guidelines for discharging waste water. Although this situation is not caused by the Sub-project itself, appropriate remedial measures, i.e., the strengthening of Local Government Regulations, must be taken in order to improve the sanitary conditions of

the beneficiary areas.

The Mission also found mechanical problems, stemming from a non-operational drainage gate, and worn-out chains for a trash rack in the pump station. These minor problems should also be rectified promptly by the O&M body. However, due to a budget shortage, current O&M activities are limited to annual routine maintenance.

Figure C-6 : A view of sedimentation in Sunter River
(at the point of the Pulo Gagung Gate)

Figure C-7: A view of the junction of the Cipinang and Sunter rivers

The Cipinang River flows from the right of the photograph, and the Sunter River from the left. It is easy to distinguish the dirty black water of the Cipinang River (right side).

C.5.3 Technical Capacity

No specific information on the size of the total staff in charge of the O&M for the project was available, though it is known that 6 to 7 people are assigned for each of the drainage pump stations. According to the O&M leader of Sunter East I, under the Local Government, staff numbers are adequate but their technical capacity is insufficient, as staff members do not receive periodic technical training and have few opportunities to improve their skills and knowledge.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope		
1. Package 1: Sunter River	3,380 m	as planned
2. Package 2: Sunter River	3,984 m	as planned
3. Package 3		
-Sunter River	4,233 m	as planned
-Sunter River	3,825 m	as planned
-Cipinang River	3,834 m	deleted
4. Package 4		
-Buaran River	5,633 m	as planned
-Cakung Floodway	3,930 m	as planned
5. Package 5 (additional)	---	Sunter East I Drainage System Works (Pump capacity : 4 m3/s)
6. Package 6 (additional)	---	Sunter East III Drainage System Works (Pump capacity : 15.5 m3/s)
(2) Implementation Schedule		
1. Loan Agreement	Dec. 1989	as planned
2. Selection of Consultant	Jul. 1989 – Jun. 1990	<Original Contract> Jan. 1990 – Jan. 1991 <Addendum> Jul. 1993 – Jun. 1994
3. Land Acquisition	Nov. 1989 – Mar. 1991	Apr. 1990 – Jun. 1996 Feb. 1992 – Feb. 1993
4. Selection of Contractor		
a. P/Q		
-Announcement	Nov. 1989	Dec. 1989
-Approval by OECF	May 1990	as planned
b. Tender		
-Invitation	Jul. 1990 - Apr. 1991	Jun. 1990 - May 1993
-Award	Jul. 1990 - Sep. 1991	Feb. 1991 - Mar. 1994
5. Construction Works	Mar. 1991 - Jul. 1994	Feb. 1991 - Dec. 1996
6. Consulting Services	Aug. 1990 - Jan. 1995 (Completion in Mar. 1995)	Aug. 1990 - Dec. 1996 (Completion in Dec. 1996)
(3) Project Cost		
Foreign currency	5,127 million yen	3,622 million yen
Local currency	3,902 million yen (53,456 million Rp)	3,942 million yen (65,707 million Rp)

Total	9,029 million yen	7,564 million yen
ODA loan portion	7,309 million yen	7,210 million yen
Exchange Rate	1Rp. =0.073 yen (Apr. 1989)	1Rp. = 0.06 yen (Weighted average)

Sub Project (D)

Brantas River Rehabilitation Project

D.1 Relevance

At the time of the project appraisal, several facilities on the Brantas River, the condition of which had deteriorated, as shown below, were recommended for rehabilitation.

Table D-1 : Facility conditions at the time of appraisal

Site	Conditions at the time of appraisal
Wlingi Dam (originally constructed in 1979)	- Decrease of reservoir capacity due to sedimentation inflow from Mt. Kelud, a volcano around which Brantas River flows - Riverbed degradation downstream of the dam
Lodoyo Dam (originally constructed in 1983)	- Riverbed degradation downstream of the dam
Wonokromo Sluice (originally constructed in 1990)	- Deterioration of some parts of the original facility
Gubeng Rubber Dam (originally constructed in 1990)	- Deterioration of some parts of the original facility

source : DGWD

note : See Figure D-1 below

Figure D-1: Project Site Map

Wlingi Dam and Lodoyo Dam were constructed in the early 1980's, as part of a hydropower plant utilizing the water of the Brantas River. Around 200 GWh of power can

be generated and provided to the Brantas River Basin area, including Surabaya, the Capital of East Java Province. Wonokromo Sluice and Gubeng Rubber Dam were constructed in 1990, after the aforementioned dam structures, for the purposes of flood control, protection against sea water intrusion and for water supply for Surabaya City. Given these factors, each sub-project was necessary, and their rehabilitation was relevant.

Furthermore, the Sub-project objective, to rehabilitate and/or upgrade the river systems in order to protect local residents and their property from floods, is still relevant to the current regional development policy and plan that require regional safety as an essential precondition; the policy and plan are set as follows:

1) Sustaining high economic growth and population control, and
2) Promoting equitable growth and reducing gaps between regions, social groups, sectors, and urban and rural areas as well as eradicating poverty.

Although the Brantas River Basin lies within East Java Province, the Sub-project is not only for regional benefit, but for the economic benefit of the nation as a whole, especially in terms of farm products. The Brantas River basin produces a large share of the nation's rice, so preventing flood damage, as a pillar of further stable economic growth in the Brantas River Basin area, is likely to become even more important.

D.2 Efficiency

D.2.1 Project Scope

The sub-project consists of four rehabilitation component, namely: 1) Wlingi Dam and Reservoir, 2) Lodoyo Dam, 3) Wonokromo Sluice, and 4) Gubeng Rubber Dam, of which 1) and 2) are located on the upper reaches of the Brantas River, and 3) and 4) are at the point where it empties into the Madura Strait, as shown in Figure D-1. Each sub-project's scope was realized mostly as planned, with a few modifications related to site conditions, as summarized in Table D-2.

Table D-2: Summary of the modifications in the Project Scope

Wlingi Dam and Reservoir
1. There were additional dredging works to increase the effective storage in front of the hydro power intake and to protect the hydropower operation from sediment disturbances.
Lodoyo Dam
2. Repair of the existing revetment was incorporated
Wonokromo Sluice
3. Navigation gates were added to avoid sedimentation and accumulation of other deposits on the gate leaf.

source: DGWRD

D.2.2 Implementation Schedule

All components were implemented by the Brantas River Basin Development Office, under the Ministry of Settlement and Regional Infrastructure (former Ministry of Public Works).

The sub-projects for Wlingi Dam and Lodoyo Dam were completed in October 1996 after

a delay of 3.7years, due to the additional construction works, while the rehabilitation works for Gubeng and Wonokromo Dams were completed in March 1993, as originally scheduled.

D.2.3 Project Cost

Though the planned project cost was 2,615 million Yen at the time of project appraisal, the actual total was 2,767 million Yen, the 6% cost over-run stemming from the modification of the project scope.

D.3 Effectiveness

The expected effect of each component was to maintain the original flood control function, to anticipate flood magnitude of a 50 year-return-period. No flooding occurred after the rehabilitation of Wonokromo Sluice and Gubeng Rubber Dam were completed in 1993, according to a report by the Brantas River Basin Development Office.

As for the dam facilities, dredging sedimentation was a major component for regaining reservoir capacity. In Wlingi Dam, some 5 million m3 of sedimentation was dredged up under the Sub-project, thus restoring the initial effective storage volume.

D.4 Impacts

D.4.1 Impact on Environment

According to the Brantas River Basin Development Office, no negative environmental impact has been recorded.

D.4.2 Impact on Society

The Sub-project did not necessitate any relocation or resettlement of local residents in the course of the implementation.

D.5 Sustainability

D.5.1 Operation and Maintenance Organization

Former Ministry of Public Work handed over project facilities to PJT (Perusahaan Umum (PERUM) Jasa Tirta: Public Corporation of Water Service), which was established in 1990 in accordance with Governmental Regulation No. 5 of 1990 as a public corporation of the central government. The roles of PJT are stipulated as follows:

i) Operate and maintain the water resources infrastructure,

ii) Manage the river basin, for example, the conservation, development and utilization of water and water resources,

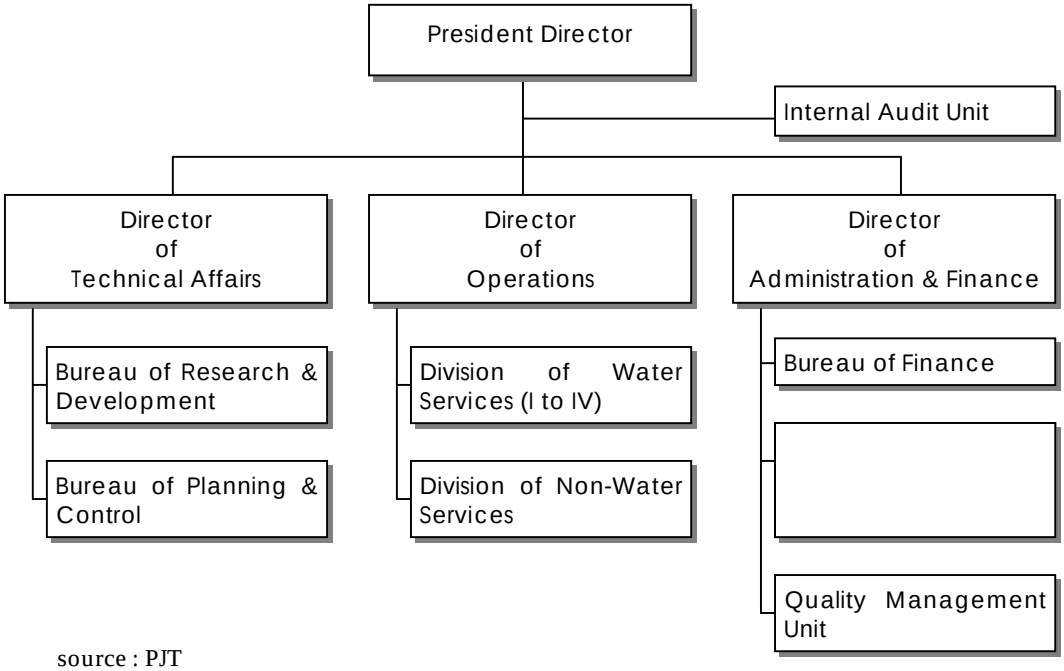
iii) Rehabilitate the water resources infrastructure, and

iv) Provide raw water for such purposes as drinking water supply, electricity

enterprise, agricultural enterprise, fisheries enterprise, industry, port, flushing and other enterprises that utilize water and water-derived energy, and waste water treatment.

PJT, the organizational structure of which is illustrated in Figure D-2, is headed by three major directors, namely the Director of Technical Affairs, the Director of Operations, and the Director of Administration & Finance. The Bureau of Planning & Control under the Director of Technical Affairs is the actual O&M unit for the Sub-projects.

Figure D-2 : Organization of PJT



source : PJT

D.5.2 Technical Capacity --- Human Resources ---

PJT has a staff of 460[2)], of which 45 persons were in charge of the O&M activities for the Sub-project. An O&M staff of 95 persons is required at present, according to the Director of Technical Affairs. The technical level of the staff (self-assessed) is sufficient in terms of daily operation and maintenance of project facilities.

D.5.3 Current Status of the Project Facility

The Mission for this evaluation visited sites of each component during the field survey in August 2001. Current conditions are summarized as follows:

1) Wonokromo Sluice

- The sluice gate was rehabilitated to keep the water level at a certain level for the use of PDAM (Regional Water Service Corporation) water intake.
- Five years have passed since the Sub-project completion, but the facility is still in good condition.
- Now the surrounding water space (Mas River) is utilized as a boat recreation area.

[2)] As of June, 2000

Figure D-3 : A view of Wonokromo Sluice

The facility circled is the rehabilitated sluice

2) Gubeng Rubber Dam

- The sluice gates as well as the rubber dams were rehabilitated to keep the water level at a certain level for the use of the PDAM water intake.
- Five years have passed since the Sub-project completion but the facility is still in good condition.

Figure D-4 : A view of Gubeng Rubber Dam

Circled facilities are the rehabilitated ones (Left side : Sluice Gate, Right side : Rubber Dam)

3) Wlingi Dam

- The riverbed protection (Groundsill) and the embankment were rehabilitated, and the guide wall was extended to maintain the original physical condition in front of the hydro power intake. The facilities are still in good condition.

Figure D-5 : A view of Wlingi Dam (Down Stream)

Red circled facility is rehabilitated. Left side is the Hydro Power Plant.

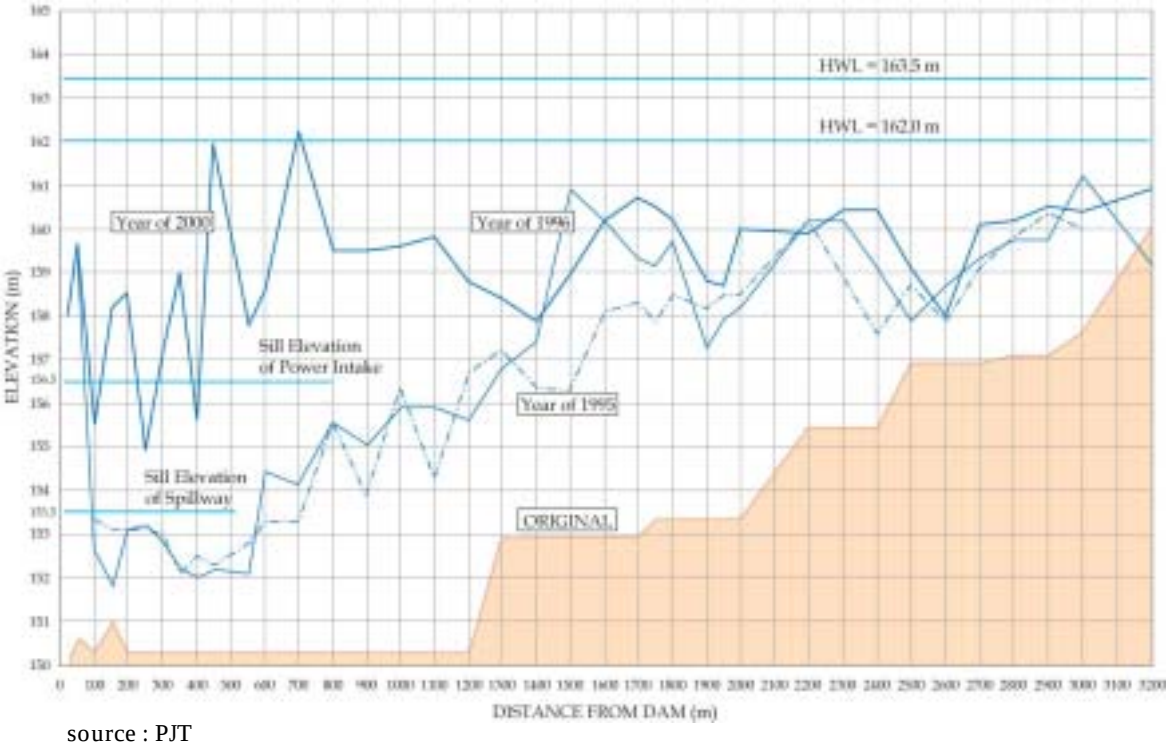
- Some 5 million m^3 of sedimentation were dredged up under the project. Since then PJT has conducted periodic dredging of 200,000 m^3/year until the present, at a cost of Rp. 3 million.

According to research on sedimentation by PJT, done via an echo sounding study, the

current accumulated amount of sedimentation is estimated at 2.5 million m^3, against the initial effective storage volume of 5.2 million m^3. This situation was caused by the inflow of sedimentation from four tributaries of the Brantas River: the Putih River, Ganggaran River, Jari River and Lekso River, all of which originate from Mt. Kelud. This sedimentation flow pace was more rapid than originally estimated (see Figure D-7).

Figure D-6 : A view of Wlingi Dam (Reservoir)

Figure D-7 : Data on Sedimentation in the Reservoir



source : PJT

note : Sedimentation volume has accumulated continuously since 1995 and is building up more rapidly in the near area than in the far area, because a large quantity of sedimentation (volcanic debris) flows from Mt. Kelud, through the tributaries of Brantas River which have confluence in the close area.

4) Lodoyo Dam

- The riverbed protection (Groundsill) and the revetment were rehabilitated, and are still in good condition.

Figure D-8 : A view of Lodoyo Dam (Downstream)

Riverbed and protection wall were rehabilitated

D.5.4 Financial Status

The financial status of PJT is shown in Table D-3.

Table D-3: Income /Expenditure Statement of PJT (million Rp.)

Item	1996	1997	1998	1999	2000
I. REVENUES	**21,050**	**21,734**	**28,679**	**28,791**	**31,020**
1. REVENUE OF WATER SERVICE	17,715	19,055	26,123	26,991	28,621
a. Electricity	9,898	6,519	12,637	13,151	13,941
b. Raw Water for Drinking Water	3,683	5,330	6,958	7,254	7,283
c. Raw Water for Industries	4,134	7,206	6,528	6,586	7,398
2. REVENUE OF NON WATER SERVICES	3,176	2,355	2,304	1,351	2,102
a. Tourism	479	551	582	652	1,047
b. Equipment Rental	1,332	791	311	236	205
c. Construction	1,049	651	1,096	180	187
d. Consultant	316	361	315	283	662
3. OTHER ACTIVITIES	159	327	252	449	297
II. COST	**18,062**	**18,516**	**24,647**	**27,481**	**26,675**
1. Operation & Maintenance	9,080	8,858	14,130	16,613	14,629
2. Supporting O&M	5,933	6,393	6,983	8,052	8,847
3. Non Water Activities	1,405	1,291	1,500	827	932
4. Depreciation	1,644	1,974	2,035	1,989	2,267
III. BALANCE (I - II)	**2,987**	**3,220**	**4,031**	**1,310**	**4,346**
IV. OTHER REVENUES	**1,784**	**2,098**	**3,857**	**5,192**	**2,525**
V. OTHER COSTS	**176**	**666**	**1,692**	**165**	**249**
VI. BALANCE (IV- V)	**1,607**	**1,432**	**2,165**	**5,028**	**2,276**
VII. BALANCE (III + VI)	**4,595**	**4,652**	**6,196**	**6,338**	**6,622**
VIII. TAXES	**1,115**	**1,365**	**1,292**	**1,010**	**1,813**
IX. FINAL BALANCE (VII - VIII)	**3,479**	**3,287**	**4,904**	**5,328**	**4,809**

source : PJT, administration & finance bureau

The table indicates that PJT's financial status is generally good, and sustainable.

D.5.5 Toward Sustainability

The current condition of the facilities rehabilitated under this project can be assessed as good, except for the dam reservoir. Though the O&M body periodically conducts dredging works with their own resources, the pace of sedimentation is faster than originally anticipated. When a large amount of volcanic debris is created, it will flow into the reservoir site from several tributaries.

Considering the urgent necessity to improve the current situation, it is decided that Japan's ODA loan would support the dredging works in Wlingi reservoir and to strengthen the technical and institutional capacity of O&M activities by PJT.

COMPARISON OF ORIGINAL AND ACTUAL SCOPE

Item	Plan	Actual
(1) Project Scope		
1. Wlingi Dam and Reservoir		
a) Dredging in the reservoir	4,000,000 m3	4,963, 000 m3
b) Riverbed protection	300,000 m3	1,043 m3
c) Construction of sand storage dam		
-K. Lekso	1,700 m3	110,000 m3
-K. Jari	1,800 m3	51,000 m3
-K. Ganggangan	900 m3	n.a.
-Excavation works for Ganggangan	12,000 m3	312,000 m3
-K. Putih	1,900 m3	53,000 m3
d) Groundsill and stilling basin	52.5 m wide	as planned
-Main structure	l=6.5 m	as planned
-Stilling basin	l=15.0 m	as planned
-Riverbed protection	l=20.0 m	as planned
e) Extension of Guide Wall	l=92 m	as planned
f) Repair of embankment	Left Bank Protection:65 m	as planned
	Right bank Protection:105m	as planned
2. Lodoyo Dam		
a) Construction of riverbed protection	25,000 m2	1,444 m3
b) Construction of sub weir	120 m wide	as planned
-Main structure	l=6.0 m	as planned
-Stilling basin	l=15.0 m	as planned
-Riverbed protection	l=10.0 m	as planned
c) Protection of existing groundsill	12 m steel sheet pile	3,600 m piling
d) Repair of existing revetment	---	2,650 m3
3. Surabaya River Improvement		
<Wonokromo Sluice>		
a) Repair of sluice	1 nos	as planned
b) Sealing of Navigation Lock	L.S.	L.S.
c) Improvement of riverbed and slope protection	1,200 m2	191,755 m3
d) Manufacturing and installation of sluice gate (3.4 m high and 5.0 m wide)	50,000 m3	2 sets (3.40 m×4.50 m)
e) Control house	3 m×3 m	76 m2 (2-stories)
-First floor	4.5 m×3 m	
-Second floor	6 m×5.5 m	
f) Stoplog house		
-Navigation gates		2 sets (1.45 m×5.90 m)
<Gubeng Dam>		
a) Removal and repair of dam	1 nos	1 nos
b) Inflatable of rubber-made dam (2.8 m high and 10 m wide)	2 sets	2.85 m×12 m（sets）
c) Sealing of navigation lock	L.S.	L.S.
d) Slope protection	2,120 m2	323,295 m3

e) Construction of dam gate	4.5 m×3 m	3 m×6.1 m（2 sets）
f) Control house	9 m×5 m	110 m2
5. Consulting Services	Professional (A) : 86 M/M Professional (B) : 102 M/M Total : 188 M/M	126.3 M/M 289.5 M/M 415.8 M/M
(2) Implementation Schedule		
1. Pre-construction stage		
-Selection of consultant	Dec. 1989 – Mar. 1990	Apr. 1991 – Sep. 1991
-Detailed design	Apr. 1990 – Sep. 1990	Oct. 1991 – Oct. 1992
-Pre-qualification	Oct. 1990 – Jan. 1991	Oct. 1992 – Jan. 1993
-Tendering	Feb. 1991 – Jul. 1991	Feb. 1993 – Sep. 1993
2. Construction stage		
-Dredging of Wlingi Reservoir	Aug. 1991 – Mar. 1995	Extended up to Jul. 1996
-Protection of D/S Wlingi Dam	Apr. 1992 – Mar. 1993	Extended up to Oct. 1996
-Lodoyo D/S protection Works	Apr. 1992 – Mar. 1993	Extended up to Oct. 1996
-Rehabilitation works for Gubeng and Wonokromo dams	Apr. 1991 – Mar. 1993 (Completion in May 1995)	as planned (Completion in Oct. 1996)
(3) Project Cost		
Foreign currency	1,544 million yen	1,411 million yen
Local currency	1,071 million yen (14,677 million Rp)	1,356 million yen
Total	2,615 million yen	2,767 million yen
ODA loan portion	2,253 million yen	2,428 million yen
Exchange Rate	1Rp. =0.073 yen (Apr. 1989)	

Independent Evaluator's Opinion on

Rehabilitation of Irrigation and Flood Alleviation Works

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The project objectives, which were translated into individual objectives of the sub projects, are still highly relevant with the priority of the national development policy of the Republic.

Project efficiency varied remarkably. Common finding that could be raised was the flexibility of sub projects in accommodating scope modification to meet the locality. However, it is reminded by the independent evaluator that major modification should have never been experienced in any project. This is based on the fact that major modification strongly indicated the carelessness of project design and appraisal in identifying necessary data used for overall project design and planning.

Project effectiveness and project impacts were proven to be satisfactory. Project achievement in terms of the project output could be generally said as significant without necessarily being accompanied by negative impacts. Various facts showed that remarkable socioeconomic improvement proved the effectiveness of the project.

Functional sustainability of the overall sub project was proven to be very dependent upon the post project management, especially in connection with the post project O&M. Both the technical and then institutional sustainability of those could be generally said as optimistic, though necessary empowerment and capacity building measures need to be well formulated. Financial sustainability seems to be more serious constraint in supporting the post project operation.

Knowing the facts that it is absolutely necessary to accommodate the participation of overall stakeholders in water resource management, as has been outlined by water resource management reform of the country, therefore, the independent evaluator suggested that stakeholders' participation could be better invited. The role of people as the most important stakeholder in this case needs to be empowered and to be put in frontline. Through their active participation, in any form, functional sustainability of overall sub project would be properly and significantly protected for the benefit of the people and the nation.

JBIC View

Regarding "Project scope modification"

It should be reminded that the Project was not modified due to the "carelessness of the project design", but the scope was added to the original scope and modified in order to resolute unpredictable changes of local conditions in line with the project objective.