Indonesia

Brantas River Middle Reaches Improvement Project (II)

Report Date: March 2001
Field Survey: September 2000

1. Project Profile and Japan's ODA Loan

Location Map of Project Area

Rubber Dam of Brantas River Middle Reaches

(1) Background

The Brantas River in eastern Java has a total length of 320km and a river basin area of 12,000km^2, making it the second largest river in Java. Its inadequate downstream flow caused frequent flooding which resulted in damage in the river basin. The Brantas River basin is a densely populated area, including the cities of Surabaya and Malang. It is also one of the leading grain producing regions in Java. The development of the region has been going on for many years under the Comprehensive Development Plan for the Brantas River Basinmostly with the assistant from Japan. Many projects before this had been implemented with ODA loans (Table 1). The initial aim of the middle reaches improvement project was to guard against flooding with a 50-year probability of occurrence (50-year floods), but as an urgent measure the first phase of the project was implemented to guard against 10-year floods. However, there was demand for continuation to a second phase which would improve the river to guard against 50-year floods, prompted by the following points.

- Advanced land development of the region was planned.
- Floods occurring after the start of work on Phase I caused severe damage.
- The lower reaches of the river had already been improved to cope with 50-year floods.
- Continued use of the construction equipment purchased for the implementation of Phase I.

Table 1 Major Projects for the General Development of the Brantas River Basin (up to this project)

	Project Name	Objectives	Year of completion	Aid body	ODA loan amount (¥1 million)
1	Neyama Tunnel Project	Spillway, flood control	1961	Japan (reparation)	-
2	Karangkates Dam Project	Flood control, irrigation, generation of electricity	1972	Japan (reparation/ODA loan)	7,713
3	Kali-Konto Dam Project	Flood control, irrigation, generation of electricity	1971	Japan (reparation/ODA loan)	1,604
4	Brantas Delta Refurbishment Project	Refurbishment of irrigation	1973	Japan (ODA loan)	468
5	Porong River Rehabilitation Project	Flood control	1977	Japan (ODA loan)	1,459
6	Karangkates Project (II) (Lahor Dam)	Flood control, generation of electricity	1977	Japan (ODA loan)	3,268
7	Wlingi Dam Project	Flood control, irrigation, generation of electricity	1978	Japan (ODA loan)	6,150
8	Surabaya River Rehabilitation Project	Flood control	1981	Japan (ODA loan)	4,080
9	Wlingi Project (II) (Lodoyo Dam)	Flood control, generation of electricity	1980	Japan (ODA loan)	7,008
10	Widas Irrigation Project	Irrigation	1982	Japan (ODA loan)	1,833
11	Lodoyo-Turungagung Irrigation Project	Irrigation	1984	Asian Development Bank	(20.5 M$)
12	Brantas River Middle Reaches Improvement Project	Flood control	1985	Japan (ODA loan)	6,222
13	Turungagung Drainage Project	Flood control, irrigation	1985	Asian Development Bank	(39.0 M$)
14	Sungguruh Dam Generation of Electricity Project	Generation of electricity	1989	Asian Development Bank	(18.2 M$)
15	**Brantas River Middle Reaches Improvement Project (II)**	**Flood control**	**1993**	**Japan (ODA loan)**	**6,000**
				Accumulated amounts of ODA loans	45,805

(2) Objectives

This project was to improve the river enabling to endure 50-year probable floods following the Phase I project which improved the river to handle 10-year floods, in order to protect the middle reaches of the Brantas River basin (an area of 192km^2) from flood damage.

(3) Project Scope

1) River improvement works

The project comprised works including dredging, excavation, embankment and revetment along 92km of the river, from the New Lengkong Dam (47km from the river mouth) to a point 7km upstream of Kediri (139km from the river mouth).

2) Procurement of construction machinery and parts

The construction machinery and parts necessary for the above river improvement works were procured.

3) Installation of flood warning system

The facilities below were built and the flood warning system was procured for installation in the facilities.

[1] Central monitoring station (one).
[2] Rainfall and water level monitoring station (14).
[3] Radio station (nine).
[4] Monitor station (one).
[5] Relay station (three).

4) Consulting services

Consulting services amounted to 490M/M for assistance in procurement procedures, supervision construction, and a survey of flood countermeasures in the upper reaches of the river.

(4) Borrower/Executing Agency

Republic of Indonesia / Directorate General of Water Resources Development, Ministry of Housing and Infrastructure Development (Former Directorate General of Water Resources Development, Ministry of Public Works)

* The executing agency is Brantas General Development Office under the jurisdiction of the same ministry.

(5) Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	¥6,000 million / ¥5,945 million
Exchange of Notes/Loan Agreement	July 1984 / February 1985
Terms and Conditions	Interest rate: 3.5%, Repayment period: 30 years (10 years for grace period), General Untied (Partially untied for consulting services)
Final Disbursement Date	January 1994

2. Results and Evaluation

(1) Relevance

Since the 1960s, Japan has provided a large value of aid for the development of the Brantas River, in the form of ODA loans and grant aid (including some reparation payments). This aid has clearly advanced the basic infrastructure development of the Brantas River basin, (which contains the Surabaya metropolitan area, Indonesia's second largest urban area, and a population of 13.5 million people, in 2000), and contributed to the economic development which is the aim of the general regional development plan. This project is considered as flood protection measures which is a part of this ongoing plan. Considering the fact that flooding in excess of the planned flood volume still occurred after work began on Phase I of the project, this plan appears to have been relevant. The implementation of the project involved design changes due to topography and geology, and some changes in the scope of the project, but it was largely completed as planned.

(2) Efficiency

The project was completed three years behind the planned schedule, due to above changes in the project

and delays in central government (Ministry of Public Works) internal procedures. Project cost expenditure in foreign currency was largely as planned, costing ¥5,942 million against a planned ¥6,000 million. In local currency there was a 25% cost overrun, costing 51,106 million Rupiah, against a planned 40,885 million. The overrun, which was covered by Indonesian central government funding, was mainly due to rising prices during the delay in implementation schedule, and increased physical quantities necessitated by the design changes.

(3) Effectiveness

1) Quantitative effects

This survey requested the recording and submission of various indicator values concerning the operation and effects of the project. For this project in particular, recorded figures for "flooded area" and "value of damage" were not kept by either the executing agency or the maintenance agency, making it impossible to gain a quantitative grasp of the effects of the project.

It was confirmed that the flood warning system installed under this project was in use and regularly measuring rainfall and water level data.

2) Recalculation of economic interval rate of return

The Economic Internal Rate of Return (EIRR) for this project was recalculated at 17.55%, approximately matching the 16.0% anticipated at the time of the appraisal. The recalculation used data for the actual project cost, as recorded in data obtained from the Indonesian side, and the actual maintenance cost figures recorded by the Water Management Corporation. The recorded value of benefit (flood damage reduction effect) for the calculation is a theoretical value in which the initially anticipated value was converted to standard year prices, and the increase in assets due to population increase was taken into account. The flood occurrence pattern was assumed to be the same as it was at the time of the appraisal.

(4) Impact

1) Impact on environment

The implementation of this project had no notable adverse environmental impact. The water quality in the middle and upper reaches of the Brantas River is no problem as it satisfies water quality standards.

2) Impact on society

Figures 1 and 2 show movements in gross regional product and regional population between the 1970s, when the projects for the development of the Brantas River basin began, and 1993, when this project was completed. (The graphs are prepared based on "Development of the Brantas River Basin; JICA).

The growth or the Brantas River basin is remarkably rapid in all aspects, and it is reasonable to assume that these projects made some form of contribution to that development process.

Figure 1 Movements in Gross Regional Product (Rp x 100 million)

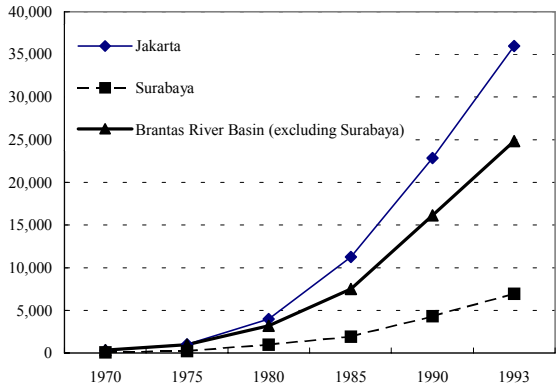
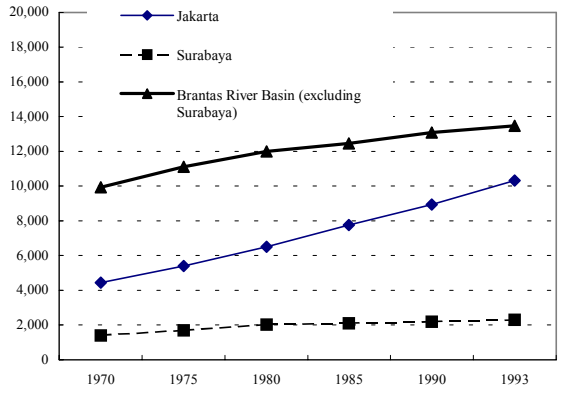


Figure 2 Movements in Regional Population (thousands)



(5) Sustainability

1) Operations and maintenance

The river-related facilities for the improvement of the Brantas River were managed by the Water Management Corporation (PJT: Perum Jasa Tirta), which was established in 1991 with the aim of operating and managing facilities related to the Brantas River (government regulation PP No.5, 1990). The Water Management Corporation's responsibility for the maintenance of river-related facilities is as follows:

[1] Management of a database on the Brantas River.

[2] Management of the allocation of water resources (industry, water supply (Waterworks Bureau), irrigation).

[3] Water quality management (with mandatory reporting to the Environmental Impact Management Office (BAPPEDAL)).

[4] Maintenance of facilities.

[5] Flood control (including the operation of the flood warning system).

The facilities built under this project were transferred to the Water Management Corporation on completion. However, it is difficult for the corporation to cover the expenses entailed by the maintenance of river-related facilities from its revenue sources, which are charges for the provision of industrial, irrigation and water supplies. It relies on central government budget allocations for 30~40% of its expenditures. The expenditures for the corporation, as shown in Figure 3, are growing year after year, reaching 1.6 billion Rupiah in 1999. The budget coverage rate from central government (actual allocated amount / requested amount x 100%) reached 50~60% in 1997, as shown in Figure 4, but in 1998 and 1999 it fell below 40% due to the impact of the currency crisis which occurred in 1997.

Figure 3 Expenditures by the Water Management Corporation (Million Rp.)

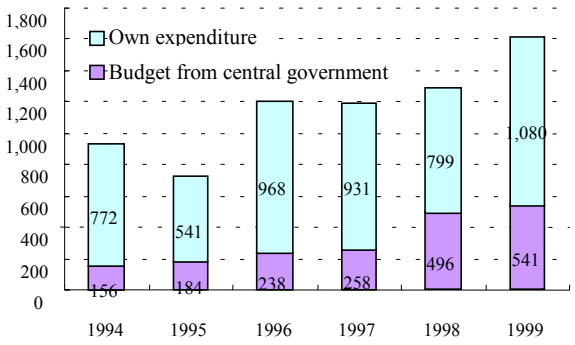
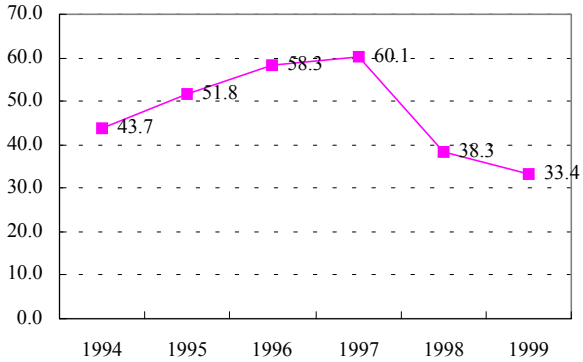


Figure 4 Central Government Budget Allocation Coverage Rate (%)



* Figure 3 and Figure 4 are based on data from the Water Management Corporation.

The outlook for national financial rehabilitation remains unclear, and it remains difficult to rely on budget allocations from the central government. Therefore, to secure ample funding for operation and maintenance, the Corporation has to rely on its own self-help efforts to increase its revenues and improve its profitability.

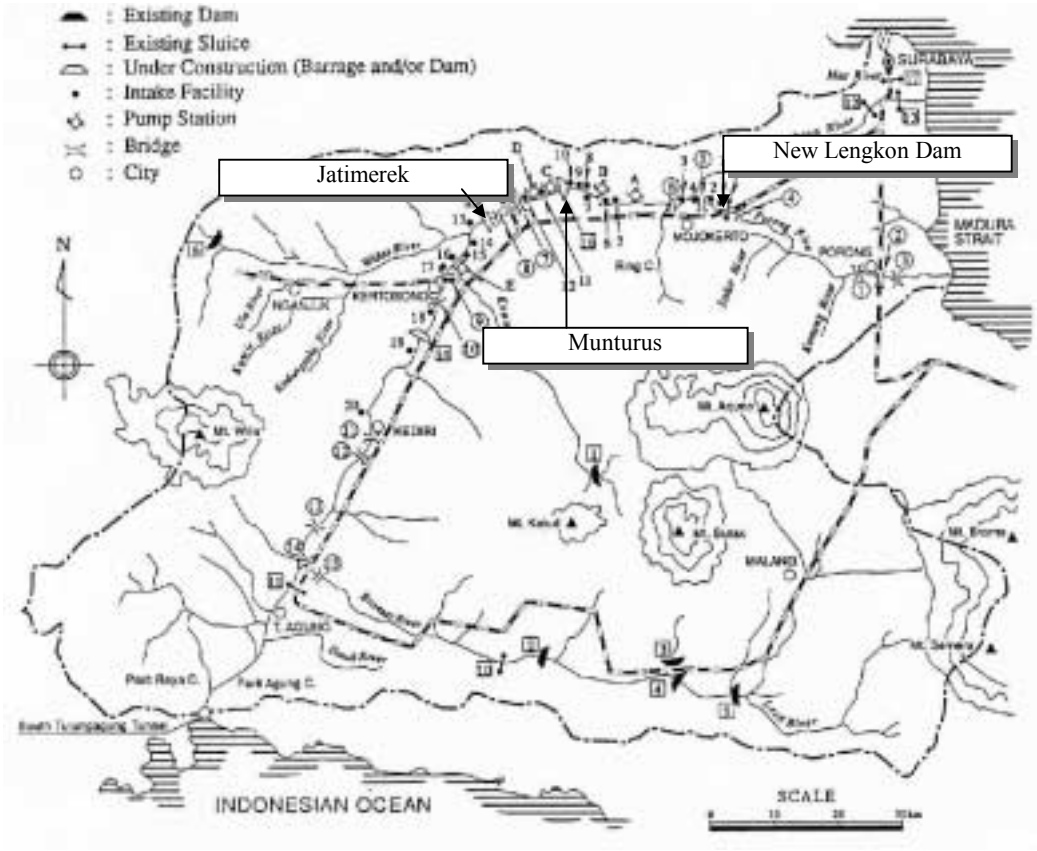
When large-scale maintenance work, such as dredging silt from the river bed, is required, it is difficult for the Corporation to find the necessary budget. Therefore, in such cases, it requests an allocation of the necessary funds from the Brantas General Office, which is the project executing agency. The Brantas General Office prepares request documents including technical background data and presents them to the central government. By cooperating in this way, the Water Management Corporation and the Brantas General Office are striving to maintain the river basin.

At the time of the evaluation, the Water Management Corporation had a staff of approximately 440, of whom approximately 20% were its own staff and 80% were seconded (on loan) from the Brantas General Office. When the Brantas General Office completes the project, it transfers it to the Water Management Corporation, and at the same time, it seconds the personnel and equipment necessary for maintenance of the facilities. The equipment and materials procured for the project (shovel cars, trucks and spare parts etc.) are also transferred to the Corporation.

2) Operation and maintenance status

<State of river bank protection and other facilities>

Figure 5 Locations Visited on Site (September 6, 2000)



The state of the main facilities inspected during the field survey in September 2000 are as described below (see Figure 5 for visited locations). The condition of other facilities was largely good.

[1] New Lengkong Dam

This dam is located in the upper reaches of the Porong River, which were rehabilitated by this project in 1991. The facilities are in good condition.

[2] Munturus rubber sluice

Some parts at the end of the river bank protection were eroded and repair was deemed necessary.

[3] Jatimerek rubber sluice

The river bank protection was broken on the right and left banks. According to the executing agency, that section of the river had been the scene of concentrated gravel mining at one time, artificially lowering the river bed and causing soil erosion from the embankments, which in turn made the structures unstable. The structures are thought to have collapsed in the heavy rains of December 1999. Temporary works were erected in a subsequent project as an emergency measure, but a permanent repair is required.

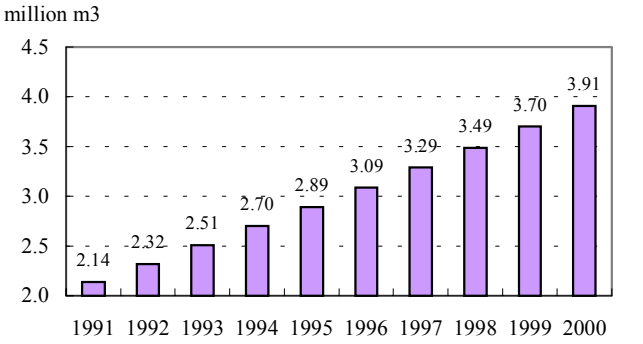
<The condition of other equipment>

Most of the equipment and machinery procured under the project was already been transferred to the Water Management Corporation. According to the Brantas General Office, it is generally in good condition. The flood warning system is functioning, and in emergencies it makes contact with the local government, which issues warnings to the public.

3) Sustainability

Uncontrolled gravel mining is now common in the middle reaches of the Brantas River, and it is one factor that causes severe damage to river facilities such as bank protection and embankments. A survey by the Water Management Corporation found that the estimated volume of gravel excavated from the Brantas River is increasing every year, reaching the enormous volume of 3.91 million m^3/year in 1999[1].

Figure 6 Estimated Volumes of Gravel Excavated From the Brantas River (millions of m^3/year)



* Data provided by the Water Management Corporation

Economic activity in the form of gathering and selling gravel suitable for use as construction material is artificially lowering the level of the river bed, eroding soil from the river bank reinforcements, reducing the strength of their support for structures and causing collapses when the water level is high. The collapses in turn reduce flood control performance. This causal relationship is causing considerable concern. In response to this grave situation, the local government of East Java Province issued a decree in October 1989 banning the excavation of river gravel, but it still goes on.

None of the facilities have been confirmed to be in a state of collapse and immediately preventing the realization of project effects, but if the situation is not corrected they could lose both their effects and their sustainability. The Indonesian government has petitioned the Japanese government for a new project for the rehabilitation of completed ODA loan projects, which would include repairs for some of the damaged facilities from this project. A survey (Special Assistance for Project Sustainability: SAPS) is to be conducted to examine the technical appropriateness of the repair plans and the sustainability of the facilities after such repairs. If the effects of this project are to be realized sustainably, the repairs must be accompanied by the elimination of the medium and long term obstacles facing them. There must be social system measures such as stronger restriction and full implementation to back the prohibition of river gravel excavation.

[1] Taking the specific gravity of gravel as 2.4t/m^3, and a base weight of 4t for trucks, this volume is equivalent to approximately 2.35 million truck loads. Converted to a daily number, it means that approximately 6,400 trucks per day were removing sand from the Brantas River basin.

Comparison of Original and Actual Scope

Item	Plan	Actual
① Project Scope		
Outline of scope		
(1) Location of project area	・ Middle reaches of Brantas River in East Java Province.	・ No changes
(2) Project scope	・ River improvements, installation of flood warning systems, consulting services.	・ Same as left
(3) Fund plan	・ Foreign currency procurement for the entire project scope listed above, other than local currency procurement for a portion of the river improvement.	・ Same as left
(4) Planned flood probability	・ 50-year probable floods.	・ Same as left
1. River improvement works		
(1) Improvement section	・ A 92km section from New {Renkon} Dam to a point 7km upstream of Kediri.	・ Same as left
(2) Improvement method	・ Dredging and embankments.	・ Same as left
(3) Planned discharge	・ Between 900m^3/s and 1,500m^3/s, varying between river sections.	・ Same as left
(4) Planned riverbed grade	・ Between 1/1,500 and 1/2,290, varying between river sections.	・ Same as left
(5) Planned river stage	・ New Rengkong Dam (47k): 19.500m Confluence with the Widas River (89k): 37.590m Confluence with the Konto River (96k): 41.818m 139k point: 67.953m	・ No changes No changes 41.821m 67.955m
(6) River width of dredging	・ Between 70m and 100m, varying between river sections.	・ Same as left
(7) Quantity of works		
①Dredging work	・ 8,700,000m^3	・ 11,976,500m^3
②Excavation work	・ 1,005,000m^3	・ 793,800m^3
③Embankment work	・ 731,000m^3	・ 999,010m^3
④Revetment work	・ Length set for each construction method	・ Some changes and additions
⑤Repair work	・ Irrigation headworks, syphon, movement of surrounding roads, re-installation etc.	・ No changes
2. Flood warning system (FFWS)		
(1) Meteorological observation system	・ Central station and several of each type of necessary facility (meteorological station etc.).	・ Some changes
(2) Communications system	・ Central station, several UHF stations.	・ Same as left
3. Consulting Service		
(1) Content of operations	・ Construction works supervision, procurement assistance, technical guidance etc.	・ No changes
(2) Obligation of reporting, results	・ Monthly reports, additional surveys, O&M manual, completion report etc.	・ Same as left
(3) Personnel/month required	・ Foreign:320M/M, Local:170M/M Total: 490M/M	・ Foreign:320 M/M, Local:326 M/M Total: 646 M/M
4. Procurement of facility equipment	・ Vehicles, materials and equipment for construction works	-Same as left

Item	Plan	Actual
② Implementation Schedule		
1. Exchange of Notes	・ Nov. 1984	・ Feb. 1985
2. Selection of consultant	・ Nov. 1984 ~ Nov. 1985	・ Feb. 1985 ~ May 1986
3. Consulting service	・ Nov. 1985 ~ Nov. 1990	・ Sep. 1986 ~ Nov. 1993
4. Procurement of construction machinery	・ Nov. 1984 ~ May 1986	・ Aug. 1986 ~ Jan. 1991
5. Procurement of flood warning system	・ Nov. 1984 ~ Mar. 1986	・ Mar. 1988 ~ Mar. 1990
6. Installation of flood warning system	・ Mar. 1986 ~ Sep. 1986	・ May 1989 ~ Nov. 1990
7. Civil works	・ Apr. 1986 ~ Sep. 1990	・ Aug. 1986 ~ Nov. 1993
8. Repair works	・ Apr. 1987 ~ Sep. 1988	・ Same as above
◎Completion of project	・ Sep. 1990	・ Nov. 1993
③Project Cost		
Foreign currency	¥4,200 million	¥4,172 million
Local currency	40,885 million Rp.	51,106 million Rp.
Total	¥13,890 million	¥8,040 million
ODA loan portion	¥6,000 million	¥5,945 million
Exchange rate	4.219Rp.＝¥1 (Jan. 1984)	13.213Rp.＝¥1 (Dec. 1993)