Indonesia

Overall Ular River Improvement and Irrigation Project

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

1. Project Profile and Japan's ODA Loan

Location Map of the Project

Intake from Ular River

1.1 Background

The Ular River (length 115 km, drainage area 1,081 km^2) did not have sufficient flood control facilities, and flooding often caused enormous damage to agricultural produce and to buildings in the river basin area. In order to mitigate flood damage, an urgent flood control project was carried out from 1972 to 1976. The project covered an area 13 - 23 km from the river mouth and was implemented with assistance of Japan's ODA loan. However, the project did not achieve sufficient results, as the facilities only protected the region from flood flows of 600 m^3 per second, the equivalent of an 8-year return period flood. There was also a need for irrigation and drainage facilities to increase rice crop yields, so that further improvement and development of irrigation and drainage in the area extending 34 km from the river mouth to Serbajadi Bridge was planned.

1.2 Objectives

To mitigate flood damage in a 25,000 ha area by means of river improvement and to increase the production of rice by improving irrigation and drainage on 18,500 ha of crop field.

1.3 Project Scope

1) River Improvement

The flood control component of the Project involves execution of river channel improvement works (design discharge: 800 m^3/sec, magnitude: 30-year return period), for the purpose of preventing flood damage over a 25,000 ha. area.

2) Irrigation & Drainage Improvement

The irrigation and drainage improvement component includes the establishment of intensive year-round irrigation farming over 18,500 ha of paddy fields in the downstream alluvial plain utilizing water flow from the Ular River.

Figure 1 : Project Site Map

1.4 Borrower / Executing Agency

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

1.5 Outline of Loan Agreement

Loan Amount	8,140 million yen
Loan Disbursed Amount	7,498 million yen
Exchange of Notes	December, 1980
Loan Agreement	May, 1981
Terms and Conditions	
Interest Rate	2.5 % p.a.
Repayment Period (Grace Period)	30 years (10 years)
Procurement	Partially Untied
Final Disbursement Date	November, 1990

2. Result and Evaluation

2.1 Relevance

The project has a dual purpose: to mitigate flood damage by means of river improvement works on the Ular River, based on a 30 year return period flood control plan; and to increase paddy production by installing irrigation facilities, such as main, secondary and tertiary canals, and by improving drainage.

Flood control was an urgent issue[1)] at the time of appraisal, and the project's objectives were in line with the "Ular River Development Master Plan," which aimed to strengthen flood control capability and improve irrigation facilities in the river basin. To date, this objective is still relevant, in terms of assuring people's security/safety in the project areas and contributing to protect their standard of living. The other purpose, improving irrigation, was also relevant under the aforementioned master plan, and is also still indispensable for the regional economy, as rice production is a major economic activity in the area. There were additional construction works incorporated during the implementation stage in order to meet actual site condition requirements. This modification in the actual scope of work was in line with the project's original objective, and is assessed as relevant.

2.2 Efficiency

Because of the additional works, both in flood control and in irrigation improvement, the implementation period was extended by four years. Thus the project was completed after the originally scheduled date. According to the Project Completion Report (PCR), despite the additional works and delays in government budget allocation, the contractors made efforts to meet the originally scheduled completion date. The total project cost, including the revisions to the project scope, was 12,393 million Yen[2)], well within the original estimate of 15,292 million Yen. The total amount of the ODA loan disbursed was 7,498 million yen, less than the 8,140 million yen originally planned. According to the PCR, the additional project cost caused by unforeseeable works was sufficiently covered by the price escalation adjustment at the time of appraisal.

2.3 Effectiveness

1) Flood Control

There were no credible quantitative data/records on flood mitigation made available during the survey. However, in interviews at the site inspection, officials from the Provincial Water Resources Services of North Sumatra Province, the current O&M agency, said that there has been no considerable flooding nor inundation damage at the project site since the project completion. An interview survey of beneficiaries[3)] was carried out in the project area in order

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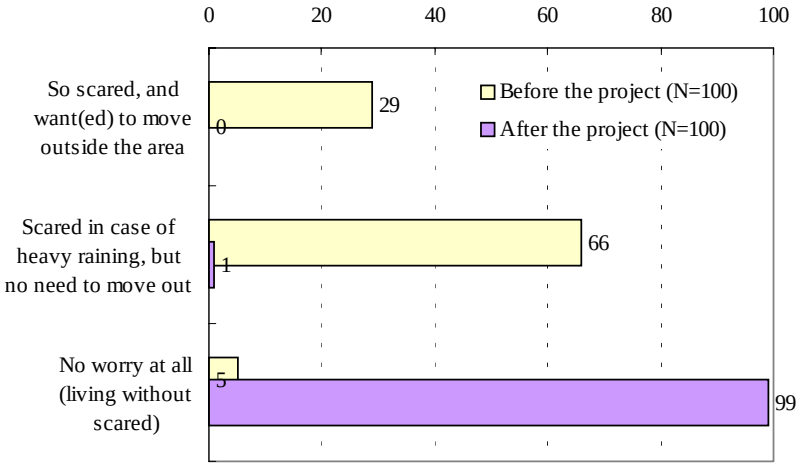
1) There were four serious floods before 1985, of which the one in September 1957 (865 cum/sec) was the largest. Annual flood damage was estimated at 830 million Rupiahs (1977-constant-price), an accumulated amount of 6,169 million Rp. through 1985.

2) Estimate based on data in the Project Completion Report (Nov. 1990).

3) A questionnaire-based Interview Survey to the Beneficiaries was carried out in order to examine the project's effects/impact. A hundred (100) interviewees were selected randomly in the project area, with the cooperation of Irrigation Office of Public Works, North Sumatera Province. The major interview items covered: 1) utilization of facility and accessibility, 2) impact of the project, 3) overall assessment of the project, and 4) further requirements and recommendations.

to assess the people's perception of the project. In it, respondents were asked to assess regional safety/security. Responses, illustrated in Figure 2, indicate that most local residents now live without fear of flooding, although prior to the project completion the threat of flooding made many consider relocating.

Figure 2: An Assessment of Regional Safety and Security



2) Improving Rice Produce

The present annual cropping area and cropping intensity of paddy is estimated to be 24,000 ha (14,500 ha in wet season and 9,500 ha in dry season) and 130%, respectively, while the planned annual cropping area and cropping intensity, originally set at the time of the appraisal, are, respectively 37,000 ha (18,500 ha in both dry and wet seasons) and 200% (100% in both dry and wet seasons) (see Table 1 below).

Table 1 : Performance Indicators of Rice Production

Indicator	Planned		Actual	Achievement Ratio (%)
	w/o Project	w/ Project		
Land Use				
- Irrigated Paddy Field (ha)	4,500	18,500	18,500	100
- Rainfed Paddy Field (ha)	14,000	n.a.	5,500	n.a.
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 (Unhulled Rice)	(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 value is quoted from the "Project Completion Report" in 1989.

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" in July 2001. These figures were confirmed by local government officials.

A monitoring survey on the project conducted in the mid-1990's shows that annual cropping area of paddy and cropping intensity during 1989-1993 were 37,000 ha (18,500 ha in both seasons) and 200% (100% in both seasons), respectively reaching the original target levels. As seen from Table1, however, production performance at present has been declining.

During the field survey, it was found that none of the nine free-intakes[4)] for irrigation constructed in the project functioned as originally planned because the intake vestibules were above the surface of the river. According to the chief technical officer of the project, riverbed degradation, the result of intensive river-sand mining[5)] has caused the gradual exposure, since 1995, of the vestibule slabs, which have consequently dried up. The local government of North Sumatra Province prohibited sand-mining activity in the downstream basin in 1998. In addition, Bupati (Head of District Government) has prohibited such an activity in 2000, but so far this regulation has not been kept. Strong enforcement of the regulation is needed.

3) Recalculation of EIRR

EIRR of the current project was re-calculated with the same assumptions used at the time of project appraisal: the annual cost estimate was based on the consultant's project completion report and the anticipated benefit of Flood Control and Irrigation. The re-evaluated EIRR for the project overall was 15.2% (10.0% for Flood Control and 16.5% for Irrigation), while the projection at appraisal was 15.7% (10.2% for Flood Control and 18.1% for Irrigation). The re-calculated EIRR is a little smaller than the original: Flood Control is almost same as the original, while Irrigation is smaller 1.6% less than the original. This result seems to reflect the actual situation of the project, i.e., that Flood Control capability has been sufficiently retained but that the Irrigation function is less than the original expectation.

2.4 Impacts

1) Socio-Economic Impact

At the time of project appraisal, it was expected that the project would contribute to

4) Free-intake is a type of the intake facility, which is directly connected to the river to take water freely from the water stream without such facilities for water reservation as headwork or weir, between intake and river.

5) The sand quality is not suitable for construction material but for glass product. Sand-mining activities were anticipated at the time of project planning at an average annual amount of 600,000 cum./year, while more than 1,000,000 cum./year of actual mining is estimated to occur.

stabilization of people's livelihoods, the improvement of living standards and to regional development. It is difficult to analyze socio-economic impacts, however, the interview survey of beneficiaries is helpful in this regard. Respondents were asked, "Do you think this project supports regional economic activity?", to which 98% said the project has contributed sufficiently to the regional economy. Subsequently, respondents were asked to specify the type of contribution; the results are shown in Figure 3. People think that, to some extent, the project contributes to improved living standards, greater job opportunity and better land use.

Figure 3: An Assessment of Regional Economy (N=98)

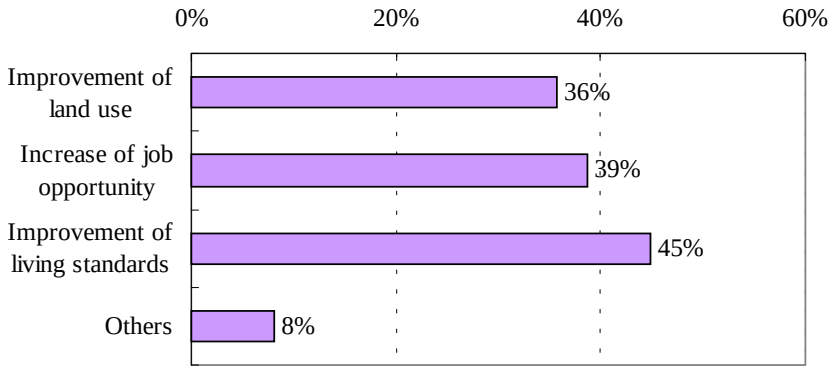
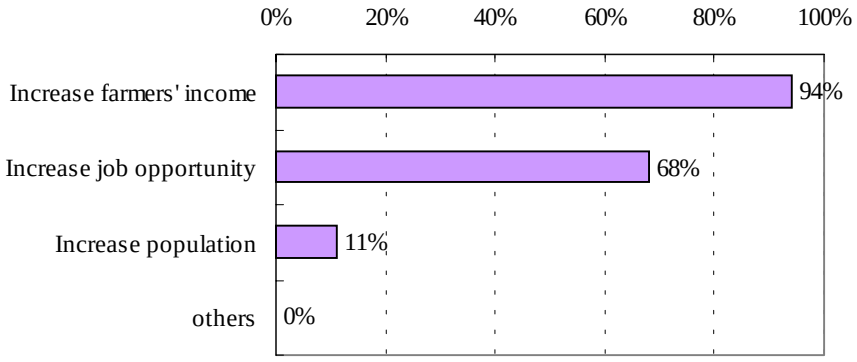


Figure 4 shows that the irrigation component of the project also has contributed to increasing farmers' income and creating job opportunities.

Figure 4: An Assessment of Regional Economy (Irrigation) (N=100)



Though the responses are subjective, they imply the project does, contribute to better economic conditions in the region.

2) Impacts on Society

1,121 ha of land, consisting of agricultural and residential land, was acquired for the project. Since there was no relocation or resettlement, no serious problems have been reported by the project office.

3) Impacts on Environment

Water quality in Ular river is not monitored by the project office. Although it is not clear the direct impact to water quality of the Ular River, the turbidity of the river water is relatively

high, but it is still usable for drinking, being classified as Group B, based on an interview with the PDAM staff[6]. So far, no other considerable impact on the environment has been reported by government officials.

2.5 Sustainability

1) O&M Organization

Dinas PU Pengairan (Irrigation Office of Public Works) Deli Serdang District branch office (Caban Dinas) under Dinas PU Pengairan (Water resources Services of Provincial Government) has been responsible for the O&M services including flood control until the end of 2001, while BALAI PSDA (Provincial Water Resources Management Office) will be established and take over the role from 2002. The branch office implements O&M works for the river structures, such as levees, revetments and river channels. The budget allocated in 2001 was Rp. 9,600 million for O&M works, and the amount is sufficient for ordinary O&M works. This office is also responsible for O&M services on the irrigation facilities, including intake, main and secondary canals. The budget allocated in 2001 was Rp. 13,000/ha, although Rp. 80,000 was needed for sufficient O&M.

The present branch office has a staff of about 100. The skills and technical level of the workers are considered sufficient for daily O&M activities, according to the senior project staff; however, there is no special training program at the moment.

WUAs (Water Users Association) will be responsible for the O&M of on-farm irrigation facilities (tertiary canals), and for collecting an ISF (Irrigation Service Fee) from members (farmers). However, actual participation in O&M activities is less than originally planned (60 % of the WUA working ratio[7]). In addition, ISFs (Irrigation Service Fee) have not been collected since 1997 because of water scarcity. This situation causes insufficient maintenance of the on-farm irrigation facilities. The project office once conducted a beneficiary survey to find out how to motivate farmers to become active and to collect 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.

2) Current Status of Facility

During the field survey carried out in July 2001, the mission visited the project site to inspect the current status of facilities for flood control and irrigation.

The flood control facilities, such as the embankment and revetments constructed/improved in the project, are generally in good condition. The one exception is the hydrological & flood warning station. Senior technical staff has commented that the station facility doesn't operate

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6) PDAM is the regional drinking-water corporation (semi-governmental), which has a classification for raw water quality (cleanliness), i.e., Group A, B, C and D. Group A is "Water that can be used directly for drinking without any prior treatment". Group B is "Water that can be used for drinking after appropriate treatment". Group C is "Water that can be used for fisheries and animal husbandry purposes". And Group D is "Water that can be used for agriculture purposes, urban operations, industry and hydroelectric power plants"

7) 65 WUAs have been established formally, but only some of them are operating

because of inappropriate maintenance caused by budgetary constraints in the project office. Under the circumstances, rainfall or water discharge measurements cannot be monitored properly.

Inspection of the irrigation facilities revealed that the phenomenon of river degradation has prevented all of the intakes constructed under the project from working as originally planned. The degradation has been caused by intensive river-sand mining since the late 1990's, as stated above. 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 5).

Figure 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 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. To cope with this situation, the project office and the North Sumatra Province office are currently preparing the rehabilitation plan, which is one of sub projects under Japan's ODA loan, named "Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project. [8)]" The scope of rehabilitation consists of rubber dam weir, two link canals with effective settling basins. Meanwhile, it is reported that there are no serious problems with the other project facilities, including the main and secondary canals, the main and secondary drainage canals, and related structures.

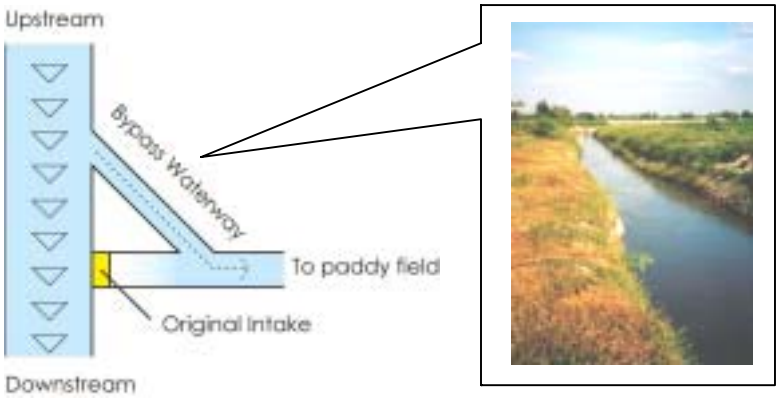
3) Sustainability / Self-sufficiency

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, as an alternative facility for intake, to solve the water shortage (see Figure 6). According to

8) Loan Agreement (L / A) for Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project was concluded on October 10, 2002.

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 in irrigation blocks is not active at present, the social issues caused by water shortage have not yet been resolved.

Figure 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. 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. In 2001, Japan's ODA loan for implementation of the rehabilitation works and O&M improvement was approved. Considering the urgent necessity and sustainability of the project, the ODA loan will support the implementation of rehabilitation work and to strengthen the capacity of O&M activities.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope		
1) Flood Control Facilities and Works		
a. Dredging	34 km, 706,000 m3	34.8 km
b. Excavation	30 km, 935,000 m3	60.3 km
c. Embankment	67.7 km (new : 22 km, 733,000m3) (improve : 45.6 km, 464,000m3)	64.1 km
d. Drain	64.2 km	62.7 km
e. Revetment	2.0 km	2.23 km
f. Sluice	1	1
g. Hydrological & Flood Warning Station	L.S	L.S
2) Irrigation and Drainage Facilities		
1. Irrigation Works		
a. Intake Structure	9	9
b. Main Canals	40 km	45km
c. Secondary Canals	145 km	148 km
d. Canal Structures	415 nos	762 nos
2. Drainage Works		
a. Main Canals	90 km	67 km
b. Secondary Canals	84 km	73 km
c. Canal Structures	85 nos	315 nos
3. On Farm Works		
a. Tertiary Canals & Farm ditches	700 km	814 km
b. Tertiary Drains and Farm Drain		751 km
c. Quarter Irrigation Canals		979 km
d. Related Structure		25,830 nos
4. Consulting Services		
a. Construction Supervision	Total : 410 M/M (Foreign : 310 M/M) (Local : 100 M/M)	Total : 525 M/M (Foreign : 401.5 M/M) (Local : 123.5 M/M)
b. Detail Design for On Farm Works		
c. Operation & Maintenance Works		
(2) Implementation Schedule		
1) Land Acquisition and Compensation	Apr. 1981 – Mar. 1983	Feb. 1982 – Dec. 1985
2) Civil Works	Jun. 1981 – Jan. 1986(*) (*) *is scheduled completion date*	May 1982 – Sep. 1990
1. Tendering (ICB)	Jun. 1981 – Mar. 1982 Oct. 1982 – Jul 1983	May 1982 – Sep. 1983 (FC-1, FC-3 & ID-1, ID-2)
2. Flood Control	Apr. 1982 – Oct. 1985	May 1984 – Jul. 1985 (ID-3, ID-4 & FC-2, FC-4) Jun. 1983 – Jan. 1988 (FC-1 & FC-3)
3. Irrigation & Drainage	Apr. 1982 – Oct. 1985	Jul. 1985 – Aug. 1988 (FC-2 & FC-4) Jun. 1983 – Sep. 1986

4. On-Farm Work Detailed Design Construction	Jul. 1982 – Jan. 1986	(ID-1 & ID-2) Jul. 1985 – Aug 1989 (ID-3 & ID-4) Jul. 1982 – Mar. 1986 (Block I – Block IV / DD) Feb. 1983 – Sep. 1990 (Construction)
3) Procurement of Equipment		
1. Tendering	Jun. 1981 – Sep. 1981	
2. Shipping	Feb. 1982 – Apr. 1982	
		Feb. 1983 – Aug. 1984
		Aug. 1984 – Jan. 1986
(3) Project Cost		
Foreign Currency	5,698 million yen	5,388 million yen
Local Currency	26, 071 million Rp.	44,321 million Rp.
Total	15,292 million yen	12,393 million yen
ODA Loan Portion	8,140 million yen	7,498 million yen
Exchange Rate	625 Rp. = 230 yen (as of 1981)	note: Estimated based on the data in PCR (Nov. 1990)

Independent Evaluator's Opinion
on Overall Ular River Improvement and Irrigation Project

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1. In general, the objectives of the project are still relevant to the needs of the target groups and the development policy of Indonesian government. However, since there is lack of information about the area of the project (i.e., the location, the people, and economic activity of its population), it is quite difficult to examine the relevant of the project specifically.

2. The project is basically failed in the accomplishment of Indonesia's middle and long-term development plans. On the flood control side, as stated in the report, there is no credible quantitative data/records on flood mitigation made available to examine the effectiveness of the project. While on the rice production side, the achievement ratio of the project is only 65% of its' planned target and is almost the same (104%) with its' prior condition without the project.

3. The impact of the project is difficult to examine. However, while the report stated that the project has been so successful in the improvement of regional safety and security, at the same time there is interesting information about the phenomenon of river degradation and water scarcity. As stated in the report, it was found that none of the nine free-intakes functioned as originally planned because the intake vestibules were above the surface of the river.

4. Serious attention needs to be put on the effectiveness and the sustainability of the project. Considering the lack of budget available for O&M activities of the project, the participation of society—especially the farmers, in managing the project needs to be improved.