

Bila Irrigation Project (I)(II)

Report Date: March 2001

Field Survey: September 2000

1. Project Profile and Japan's ODA Loan



Location Map of Project Area (South Sulawesi)



Trunk Canal in the Targeted Irrigation Area

(1) Background

The Indonesian government has pursued four Five-Year Plans, starting in 1969, with the aim of achieving self sufficiency in rice. It has devoted considerable efforts to building irrigation facilities to that end. In 1984, Indonesia achieved self sufficiency in rice. However, it was anticipated that future demand for rice would continue to rise steadily every year with population growth, even if the per capita consumption volume remained at 137kg/year (the level of consumption at the time of the appraisal). Therefore, continued efforts to increase production were required to meet that growth in demand.

The Fifth Five-Year Plan, which began in 1989, set the following goals:

- [1] Enhanced self sufficiency in staple foods.
- [2] Improved quality.
- [3] Increased income for farmers.
- [4] Provision of job opportunities.

Irrigation plans were implemented in line with those goals, with a target of 500,000ha to be covered by new irrigation projects.

The central South Sulawesi Province is Indonesia's leading grain-producing region. The surplus rice ships to the neighboring regions of East Kalimantan, Maluku, Irian Jaya and others, which do not produce enough rice. The Bila Irrigation Project Area is located approximately 210km northeast of Ujung Pandang (now Makassar), which is the state capital. It had abundant water resources, but the diffusion rate of irrigation facilities was low (approximately 9% before the implementation of this project), leaving considerable scope for development. Agricultural productivity in the area was low in dry season, and the lack of job opportunities caused an increasing amount of seasonal migration. Expansion of irrigation facilities was deemed necessary to promote local development by increasing employment opportunities.

This situation led the Indonesian government to draw up a plan, with the cooperation of the Japanese government, for the development of central part of South Sulawesi Province, which has abundant water resources. The "Basic Plan for Comprehensive Water Resources Development in Central South Sulawesi

Province” contained nine projects, including this project, which was assigned a high priority, ranking behind the Sanrego and Lankeme irrigation projects.

(2) Objectives

The project was to construct headworks, a dam, water supply and drainage canals and other facilities in the paddy field belt (9,524ha) in the Bila River basin of central South Sulawesi Province, in order to enable year-round irrigation and thereby increase rice production and farmers’ incomes.

(3) Project Scope

The project as a whole comprised two phases. Phase 1 mainly consisted of the construction of the headworks, dam and trunk canals, while Phase 2 emphasized the construction of branch canals, terminal distribution facilities and the drainage network. The scope of the project was as shown in Table 1.

Table 1 Project Scope (at the planning stage of each phase)

Item	Phase 1	Phase 2
a) Bila headworks	One location Gate height : 3.5m, overall width : 66.5m	-
b) Kalola dam	One location Embankment height: 35.3m, Embankment top length : 255.3m, Effect water containment: 57.8 million m ³	-
c) Trunk irrigation canals	2 canals, 23.2km	1 canal, 6.7km
d) Branch irrigation canals	4 canals, 8.3km	18 canals, 84.2km
e) Trunk drainage canals	2 canals, 18.4km	5 canals, 28.0km
f) Branch drainage canals	4 canals, 3.9km	10 canals, 23.8km
g) Improvement of terminal facilities	-	Improvement of 9,524ha
h) Farm roads	1 canal, 2.3km	1 canals, 4.9km
i) Procurement of maintenance equipment	-	All required
j) Consulting services	(For the plan as a whole) Assistance in bidding procedures, construction supervision etc., 532M/M	

(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)

(5) Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	(1) ¥6,460 million / ¥6,073 million (2) ¥3,788 million / ¥2,898 million
Exchange of Notes/Loan Agreement	(1) December 1990 / December 1990 (2) September 1992 / October 1992
Terms and Conditions	(1) Interest rate: 2.5%, Repayment period: 30 years (10 years for grace period), General Untied (Partially untied for consulting services)
	(2) Interest rate: 2.6%, Repayment period: 30 years (10 years for grace period), General Untied
Final Disbursement Date	(1) December 1997, (2) November 1998

*(1) shows Phase I and (2) is Phase II in the table.

2. Results and Evaluation

(1) Relevance

This was a high-priority project in line with the basic aims of increased grain production and higher farming incomes, as stated by the government in the Fifth Five-Year Plan. Those aims remain relevant at the time of evaluation. The improvement of rivers and lakes in the project area, which was added to the project during its implementation, was related to project objectives such as the conservation of water sources, and therefore the project plan was relevant.

(2) Efficiency

This project was implemented by the Bila Irrigation Project Office, which was under the umbrella of Directorate General of Water Resources Development, Ministry of Housing and Infrastructure Development (Former Directorate General of Water Resources Development, Ministry of Public Works), an organization with abundant experience of the implementation of similar irrigation projects.

The project cost for Phases 1 and 2, including additional works, remained within the planned value.

Construction began on schedule, but the addition of river improvement works, with a view to water source conservation and other factors, delayed the completion of construction by over two years from the planned date. Nevertheless, the project was carried out efficiently.

(3) Effectiveness

1) Record of irrigation

Table 2 presents the planned irrigation areas for this project, and the movements in actual cultivated areas (for rice as the main crop) for dry and rainy seasons. The facilities began to be used commonly in 1996. In 1997 the cultivated area did not increase because it was affected by an unusually long dry season, combined with the currency crisis, but the figures have been improving steadily since then. In 2000 the cultivation rate of rainy season rose to 115% of the planned value, and the dry season rate to 103% of the planned value.

Table 2 Cultivation Records

		Plan	1996 Start of common use	1997 Phase 1 completed	1998 Phase 2 completed	1999	2000
. Area of rice cultivation (rainy season)	ha	9,747	9,951 (102%)	7,858 (81%)	10,305 (106%)	10,574 (108%)	11,187 (115%)
. Area of rice cultivation (dry season)	ha	7,657	4,289 (56%)	6,335 (83%)	7,510 (98%)	7,586 (99%)	7,858 (103%)
. Annual area of cultivation (+)	ha	17,404	14,240 (82%)	14,193 (82%)	17,815 (102%)	18,160 (104%)	19,045 (109%)

(Note) Figures in parentheses are percentages compared to the planned values.

(Source) South Sulawesi Province, Directorate of Water Resources Development, Local Office (4 local offices consisting of Bila, Kalola, Kalosi, Anabaua)

2) Improvement in production volume and productivity

Productivity at the time of the appraisal was 3.1 tons/ha in the rainy season and 2.8 tons/ha in the dry season. After the completion of the project the figures rose to 5.5~6.0 tons/ha and 5.0 tons/ha, respectively, raising the annual rice production volume to 106,000 tons, triple the approximately 34,000 tons harvested annually at the time of the appraisal. At the time of the evaluation, rice production had reached the planned value of approximately 90,000 tons (table 3).

Table 3 Records of Production Volumes, Unit Yields and Other Indicators

		Plan	1992 (At the time of the appraisal)	1996 (Start of common use)	2000 (Evaluation point)
Rice production volume (tons)	Rainy season	47,620	25,553 (-)	54,731 (115%)	67,122 (141%)
	Dry season	42,114	7,967 (-)	21,443 (51%)	39,290 (93%)
	Total	89,734	33,520 (-)	76,174 (85%)	106,412 (116%)
Unit rice yields (rainy season) (tons/ha)		5.0	3.1 (-)	5.5 (110%)	6.0 (120%)
Unit rice yields (dry season) (tons/ha)		5.5	2.8 (-)	5.0 (91%)	5.0 (91%)
Total net income from rice (millions of Rupiah/ year)		n.a.	n. a.	15,459	91,416

(Note) Figures in parentheses are percentages compared to the planned values.

3) Recalculation of Economic Internal Rate of Return

The Economic Internal Rate of Return (EIRR) for this project was calculated at 12.4%, substantially above the 7.2% anticipated at the time of the appraisal. The EIRR calculation used the actual project expenditures provided by the executing agency. The calculation of benefits included farming income in the “results of the implementation of the project”, based on data such as harvest volumes and crop prices obtained from the provincial Directorate of Water Resources Development, with the difference between that income and the estimated income in the “case where the project was not implemented” taken as the benefit. The result reflects the increase in cultivated area and the steady increase in unit yields due to this project.

4) Evaluation by local residents

This study included a questionnaire survey of 100 farming households in the project area, which was conducted with the cooperation of the Directorate of Water Resources Development, South Sulawesi Province¹. (“N” in the graphs refers to the number of questionnaires collected.) The farmers surveyed did not necessarily answer on the basis of a sound understanding of project effects, but the survey was conducted as a way of incorporating the voices of the farmers. The average land area per farmer was about 1~1.5ha, with the main cropping pattern being two crops of rice. Approximately nine out of ten farmers had been farming their land for ten years or more. The questionnaire asked questions concerning the following areas:

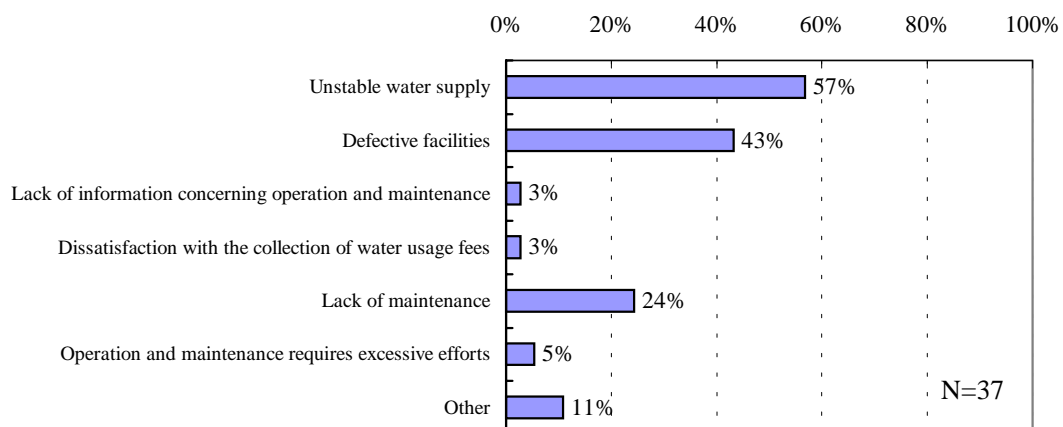
- [1] Evaluation and current state of the irrigation facilities as a whole.
- [2] The state of payment of water use charges.
- [3] Changes in productivity.
- [4] Participation in operation and maintenance activities.
- [5] Degree of satisfaction with the irrigation project as a whole, and further opinions and wishes.

Responses to [1], [3] and [5], which deal with project effects, will be discussed here. [2] and [4] will be discussed in Section 5 “Sustainability”.

<Evaluation and current state of the irrigation facilities as a whole>

When questioned on their satisfaction with the current system of water management by local government, over 60% of respondents said they were “satisfied” and less than 40% said they were “dissatisfied”. The main reasons cited by those who were dissatisfied were “unstable water supply”, “defective facilities” and “lack of maintenance” (Figure 1).

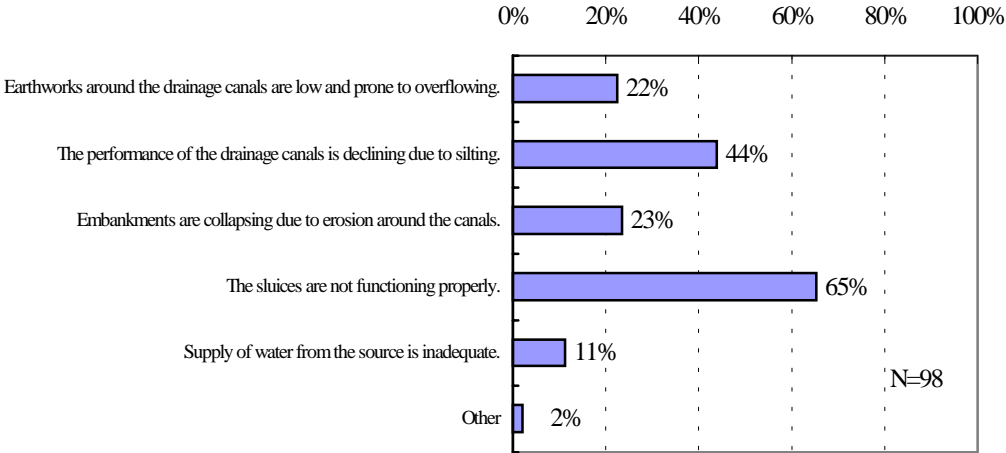
Figure 1 Reasons for Dissatisfaction with the Current Water Management System



¹ The 100 households are a random sample from the four water resources branch offices. The questionnaires were conducted in the form of face to face question and answer sessions.

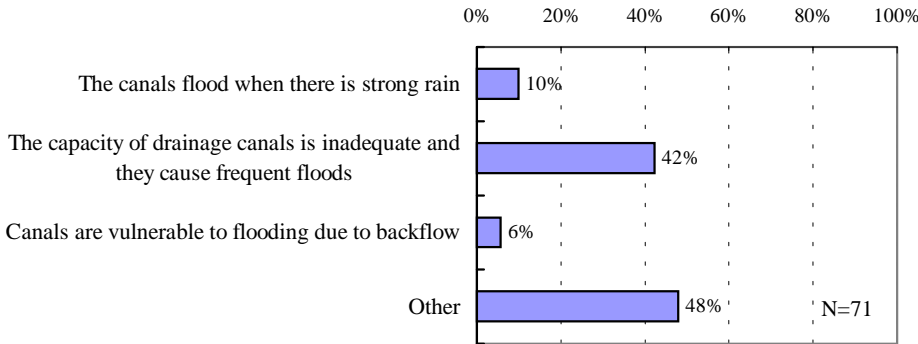
On the current overall state of the irrigation facilities, the overall evaluation was favorable, but many dissatisfactions such as “The sluices are not functioning properly” and “The performance of the drainage canals is declining due to silting”. Other opinions and wishes expressed included the “Earthworks around the drainage canals are low and prone to overflowing”, “The capacity of drainage canals is inadequate and they cause frequent floods”, “The access roads need improvement”, “Damaged portions of the facilities require repairs” and “The volume of water supplied from the source is inadequate” (Figure 2).

Figure 2 Current State of the Irrigation Facilities (multiple responses permitted)



Over 70% of respondents said they had suffered damage due to poor drainage, and they describe a situation in which “silting due to mud and debris impairs drainage performance (included in “other” response content)” and “the capacity of drainage canals is inadequate and they cause frequent floods” (Figure 3).

Figure 3 State of Drainage Problems



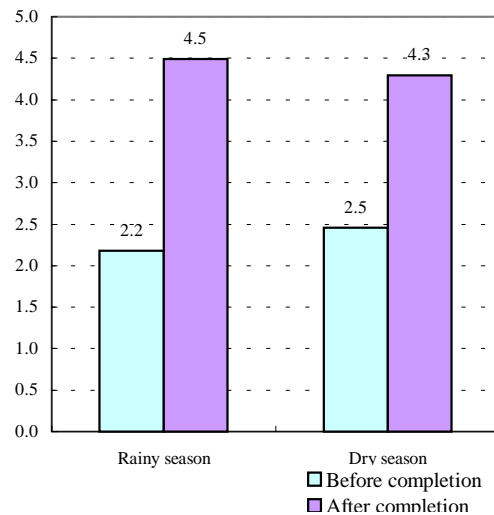
* The main complaint included under “other” was “silting due to mud and debris impairs drainage performance”.

On the question of water supply, over 70% of respondents perceived some complaints. This dissatisfaction appears to be related to the fact that nearly 100% of respondents complained of the high incidence of improper water usage, including opening of sluice gates without permission, blocking of canals with trees or stones to control water flow (to improve supply to the culprit’s own farm), and similar practices.

<Changes in productivity>

Figure 4 shows the results obtained when interviewees were asked about changes in rice productivity between before and after the completion of the project. Figures are averages of all valid responses received. Production increased by 105% in rainy season and by 72% in the dry season (Figure 4), from which it can be inferred that the construction of a drainage network under this project has had an effect.

Figure 4 Rice Productivity Before and After Completion of the Project
(average of responses: tons/ha)



<Degree of satisfaction with the irrigation project as a whole, and further opinions and wishes>

When interviewees were asked to rate their satisfaction with the irrigation project as a whole on a four grade scale, an overwhelming majority of 97% were in the satisfied group (comprising 33% who were “very satisfied” and 64% who were “satisfied”).

(4) Impact

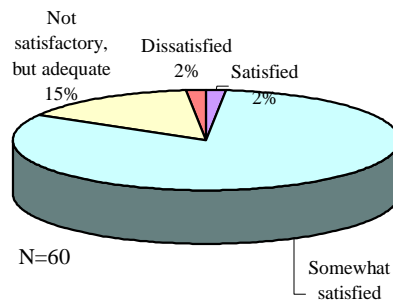
1) Impact on environment

The Bila Irrigation Project Office, which is the local executing agency, has not reported any notable problems due to pollution of lake water with agricultural chemicals, which was noted as a point of concern at the time of the appraisal. Also, the questionnaire survey described above received no negative responses when it asked interviewees whether the project had produced any negative environmental impact.

2) Impact of resident relocation and land acquisition

Ten farming households were relocated in the course of the project, but, according to the Vila Irrigation Project Office, the government provided them with suitable alternative land and handled the process smoothly. According to the questionnaire survey, 63 of the 99 households (66%) had some of their land acquired for the project, even though they were not relocated. Of those, over 80% said they were “satisfied” or “somewhat satisfied” with the value of compensation paid (Figure 5). It can be inferred that the land acquisition was carried out without major problems.

Figure 5 Degree of Satisfaction with Compensation Aid for Land Acquisition (select one)



3) Improvement of living standards

On completion of this project, in 1996, the first year the facilities were commonly used, the value of benefits from this project² was 13,679 million Rupiah. By 2000 the figure had risen to 19,110 million Rupiah (both at 1996 prices), which suggests that agricultural income was increased and stabilized by the project. According to the South Sulawesi Province, Directorate of Water Resources Development, which is the maintenance agency, the increase in incomes has brought improvements in living environments (new houses and extensions) and environmental health improvements, as well as improvements in living standards through the purchase of goods such as televisions and automobiles. This observation was confirmed by the findings of the questionnaire survey. When asked whether this project had yielded a positive impact on the local economy, 99% of interviewees responded affirmatively. This response appears to have been prompted by the increase in farming incomes and employment opportunities.

This project also built washing steps at 98 locations in the water canals to reduce the burden of household chores on women. All the washing steps are in regular use as everyday washing facilities.

(5) Sustainability

1) Operations and maintenance status

<Reservoir facilities>

The maintenance of the reservoir facilities, namely the headworks and dam, is carried out by the Bila Irrigation Project Office, which was the executing agency, using the national budget. The Office handles all operation and maintenance tasks related to the reservoir facilities, ranging from daily work such as cleaning and the opening and closing of dam gates to major repair works. After the facilities were completed, it was planned that they would be transferred to the authority of the provincial government, but the transfer has not taken place to date due to the provincial government's poor financial position.

<Trunk and branch water supply canals>

After the completion of the trunk and branch water supply canals, responsibility for their maintenance was transferred from the Bila Irrigation Project Office, which was the executing agency, to the South Sulawesi Provincial Government, Directorate of Water Resources Development. The transfer process took approximately two years, during which time the provincial government established four branch offices as maintenance organizations for four zones. The provincial government also trained the staff and made other

² The return from this project is calculated as agricultural produce earnings minus production costs for the project as a whole.

preparations. The branch offices are responsible for the operational (water control) tasks of opening and closing sluices on trunk canals and adjusting water flow volumes in branch canals, as well as the day to day maintenance tasks of oiling and painting sluices, grass cutting, removal of sediment and debris, and small-scale repairs.

Budget requests for the costs for this operation and maintenance work are made by each zone presenting project proposals (DUP: Daftar Usulan Proyek) to the South Sulawesi Provincial Government. Records for 1999 show that the actual allocation made against budget requests for approximately 760 million Rupiah was approximately 130 million Rupiah, a budget coverage rate of around 17% of the requested amount³. The authorities concerned say that the full amount requested is not paid in normal years, making it difficult to carry out adequate operation and maintenance work due to the resulting budgetary constraints.

<Terminal waterways>

The maintenance of terminal waterways is to be carried out by Water Users' Associations (WUA) of farmers. The Provincial Water Resources Development Branch Office state that the associations are relatively enthusiastic in carrying out maintenance tasks such as cleaning and weeding of the waterways. There was a plan for the establishment of 206 associations to cover each of the areas, but the actual number established by September 2000 was 141, less than 70% of the planned number.

<Payment of water use charges>

Water use charges are to be collected under the system presented below, with a total collected value of 134 million Rupiah per year. Actual collection amounts to only 74 million Rupiah, a collection rate of 55%. The target of 100% collection has not been reached, but the rate is climbing every year, and the collection system is expected to take firmer hold in future.

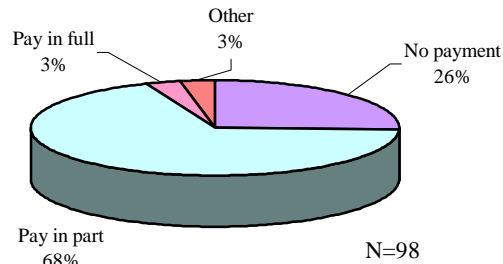
<The system for collection and use of water use charges in the project area>

- | | |
|-----|---|
| [1] | Farmers pay 25,000 Rupiah per ha at harvest time. |
| [2] | Of the 25,000 Rupiah collected in [1], 15,000 is allocated to branch canals, terminal waterways and the operation of the associations (5,000 Rupiah for each), with the remaining 10,000 Rupiah reserved by the associations. |

The findings of the questionnaire survey carried out for this study show that only 5% of farmers pay their charges in full, and one household in four responded that it made "no payment" (Figure 6). Despite the fact that over 80% of farmers responded that the level of charges was appropriate, the actual state of payment is poor (the number of responses to questions on reasons for non-payment was low, making it difficult to grasp tendencies).

³ The value requested comprised 391 million Rupiah for personnel costs, 72 million for costs of materials and fuel, 232 million for maintenance of equipment, 50 million for other repairs and 16 million for general management costs. The allocation comprised 94 million Rupiah for personnel costs and 39 million for all other costs.

Figure 6 State of Payment of Water Use Charges (select one)

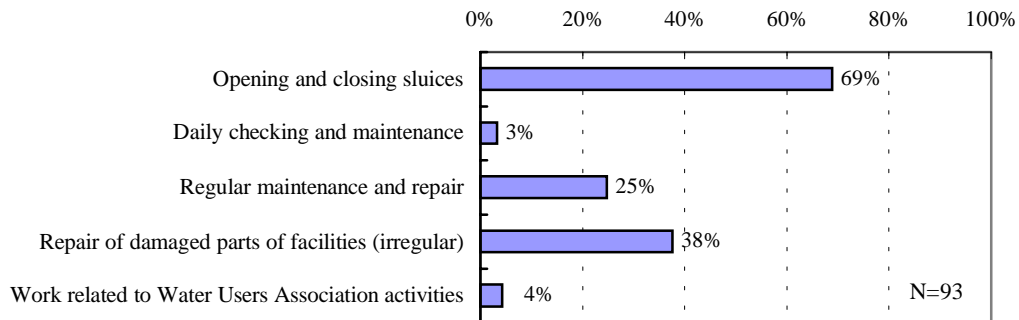


Note Other includes responses such as “no obligation to pay”, “providing labor (cleaning etc.) in lieu of payment” and “charges were not collected”. In each case, they mean practically the same as “no payment”.

<Participation in operation and maintenance work>

The questionnaire survey found that nearly all respondents (97%) said they participated in operation and maintenance activities. Most of them cooperate as members of the water users associations. The specific content of their work is as shown in Figure seven. Concerning operation and management work, less than 5% of respondents said “the burden is too much to handle”, and approximately 90% indicated their intention to carry on those activities.

Figure 7 Content of Operation and Maintenance Work (multiple responses permitted)



2) The state of the facilities

When the main facilities were visited in September 2000 during a field survey, no problems had yet emerged in the functioning of the irrigation facilities, but the lack of maintenance had caused the following problems.

- Erosion of reservoir embankments.
- The hydroelectric generator for opening and closing the dam gates broke down immediately after it started operation (the staff now open and close the gates manually).
- Cracks and breaks had appeared in the concrete surfaces of some of the trunk and branch canals.

The executing agency also states that the terminal waterways are broken in places, which reduces their performance. A survey is needed to find damaged areas of the canals, including the drainage network, and the causes must be identified and countermeasures devised.

3) Sustainability

The completion of this project reinforced the base of agricultural production, enhanced productivity and stimulated the regional economy. However, the current state of the facilities gives cause for concern over the sustainability of the project. Budget shortages (see section (5) 1) caused by the Indonesian government's fiscal problems mean that even day-to-day maintenance is not carried out adequately. Also, only around 70% of the planned numbers of Water Users' Associations have been established, giving cause for concern that the maintenance of the facilities concerned may not be adequate over the whole project area.

This situation necessitates a thorough investigation of the state of the facilities, followed by adoption of appropriate remedial measures. In addition, adequate maintenance budgets must be secured from central and local governments, and the water use charge collection system must be strengthened to stabilize the maintenance system.

Comparison of Original and Actual Scope

Item	Plan	Actual
Project Scope Phase 1 and 2 are both indicated.	(1) Irrigation development works ...Headwork, {Karora} dam, irrigation canal, drainage canal, control building (2) Improvement of terminal facilities: 9,524ha (3) Procurement of maintenance equipment (4) Consulting services for (1)~(3) above	(1) The initial plan, and improvements to the Bila River and Tanpe Lake. (2) 9,747ha (3) Same as planned (4) Consulting services for (1)~(3) above
Implementation Schedule (a) Civil works (b) Procurement of equipment (c) Consulting service	-Apr. 1991 ~ Jul. 1995 -Jul. 1995 ~ Sep. 1995 -Jun. 1992 ~ Jun. 1996	-Apr. 1991 ~ Dec. 1997 -Oct. 1995 ~ Mar. 1997 -Oct. 1991 ~ Mar. 1998
Project Cost <Total of Phase 1 and Phase 2> Foreign currency Local currency Total ODA loan portion Exchange rate	¥6,473 million ¥5,785 million ¥12,258 million ¥10,248 million 1Rp. = ¥0.081 (Mar. 1990-Phase 1) 1Rp. = ¥0.064 (Apr. 1992-Phase 2)	N.A. N.A. ¥9,988 million ¥8,971 million N.A.