

Republic of the Philippines

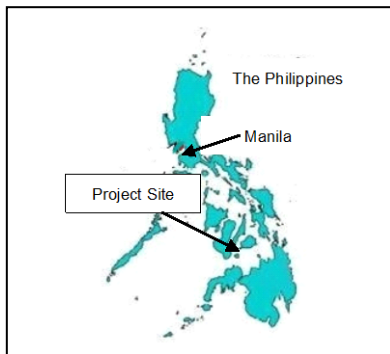
Ex-Post Evaluation of Japanese ODA Loan Project
“Bohol Irrigation Project (Phase II)”

External Evaluator: Kenichi Inazawa, Octavia Japan Co., Ltd.

0. Summary

With an aim to increase rice production through improved agricultural infrastructure, this project developed an irrigation dam, main, lateral and drainage canals while carrying out land leveling work and constructing main farm ditches in Bayongan located in the northeastern part of Bohol Island. Both at the times of project appraisal and ex-post evaluation, the project is consistent with the development policy of the Philippines as can be seen in the agricultural infrastructure policy. Similarly, the project is consistent with the needs of the Philippines, such as to develop irrigation facilities, at the times of appraisal and ex-post evaluation. Owing to the development of main and lateral canals by the project, targets were generally met for service area and per-hectare yield of rice. Rice production has been increasing after project completion, and the irrigation service fee collection rate is higher after project completion than it was at the time of project appraisal. Furthermore, target for gross farm income per hectare, which was set at the time of project appraisal, was exceeded after project completion, and the results of the beneficiary survey were largely positive. The project period was significantly longer than planned, and the project cost was slightly more than the plan. No major problems are observed in the institutional, technical, and financial aspects of operation and maintenance. In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Location



Constructed Main Canal

1.1 Background

Bohol Island, located in Central Visayas, was one of the least economically developed areas in the Philippines¹ before project appraisal. Agriculture was an important industry for the island. Approximately 60% of the island was agricultural land (equivalent to 103,761ha), and almost 50% of its workforce was engaged in agriculture². Having soil suitable for farming, the island had high potential for agricultural production, the main of which was rice cultivation. On the other hand, irrigation systems were underdeveloped, and agricultural productivity was generally low. Consequently, many farmers were in poverty. Thus there was an urgent need to develop agricultural infrastructure, especially irrigation facilities, in order to increase food production and improve livelihoods of farmers.

In Bohol Island an irrigation scheme began in 1970s with the aim of strengthening agricultural infrastructure. Three dams (Malinao, Bayongan, and Capayas Dams) were planned to be constructed so as to irrigate 10,000ha of farmland. Out of the three, Malinao Dam, located upstream, was constructed with Japanese ODA loan (“Bohol Irrigation Project”) and completed in 1996 before this project. Capayas Dam, located downstream, was constructed with Japan’s Grant Aid and completed in 1991. This project constructed Bayongan Dam, which is located in between the other two.

1.2 Project Outline

The objective of this project is to increase rice production through agriculture development by constructing a dam, main, lateral and drainage canals and by carrying out land leveling work and developing main farm ditches, thereby contributing to the improvement of farmers’ livelihoods and poverty alleviation in the east northern part of Bohol Island.

Loan Approved Amount / Disbursed Amount	6,078 million yen / 6,014 million yen
Exchange of Notes Date / Loan Agreement Signing Date	December 1999 / December 1999
Terms and Conditions	<Construction> Interest Rate: 1.8% Repayment Period: 30 years (Grace Period: 10 years)

¹ The average annual household income of Central Visayas, a part of which is Bohol Island, was 85,215 pesos in 1997. It is lower than the national average of 123,168 pesos and Metro Manila’s average of 270,993 pesos. (source: National Statistics Office of the Republic of the Philippines)

² This information was taken from JICA’s project appraisal document.

	<p>Conditions for Procurement: general untied</p> <p><Consultant> Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: bilateral untied</p>
Borrower / Executing Agency	The Government of the Philippines / National Irrigation Administration (NIA)
Final Disbursement Date	March 2009
Main Contractor (Over 1 billion yen)	Kurimoto, Ltd. (Japan) and Hanjin Heavy Industries & Construction Co., Ltd. (South Korea) (Joint Venture), Hanjin Heavy Industries & Construction Co., Ltd. (South Korea)
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan) , PKII Engineers (the Philippines) , Integrated Philconsult, Inc. (the Philippines) , and Sustainable Development Solutions, Inc. (the Philippines) (Joint Venture)
Feasibility Studies, etc.	“Feasibility Study on Bohol Irrigation Development Project (Phase II) in the Republic of the Philippines,” JICA, November 1985
Related Projects	<p>【Technical Cooperation Projects】</p> <ul style="list-style-type: none"> ■ “Bohol Integrated Agriculture Promotion Project” (November 1996 – November 2003) <p>【ODA Loan】</p> <ul style="list-style-type: none"> ■ “Bohol Irrigation Development Project” (L/A signed in 1983) ■ “Dispatching of Experts to Confirm the Status of Bohol Irrigation Project” (April - October 2010) ■ “Dispatching of Loan Assistance Experts to Follow up on Bohol Irrigation Project” (to facilitate and monitor the action plan implementation) (February 2012 – March 2013) <p>【Grant Aid】</p> <ul style="list-style-type: none"> ■ “Capayas Irrigation Project” (completed in 1991)

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Octavia Japan Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September 2012 – July 2013

Duration of the Field Study: 25 November – 7 December 2012, 7-13 April 2013

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan

At the time of project appraisal, the Government of the Philippines (Estrada Administration) was implementing the “Medium-Term Philippine Development Plan (1999-2004).” The plan identified national priorities, such as increase in agricultural production, food security, and improved incomes in the regions. With a view to achieving these goals, the Government identified key geographical areas for food production, promoting development and improvement of irrigation facilities. In addition, the Medium-Term Agricultural Development Plan (1993-1998) developed by the Ministry of Agriculture called for an improvement in cereal production, particularly in rice cultivation. Furthermore, the Ministry of Agriculture was implementing the “Golden Harvest Program,” promoting the development and dissemination of farming technologies suited to each region. The program recognized Bohol Island as one of the key geographical areas for increasing rice production.

At the time of ex-post evaluation, infrastructure development, including irrigation facilities in the regions, remains a priority for the Government of the Philippines. This is visible in the new Medium-Term Philippine Development Plan (2011-2016), which lists improvement of agriculture infrastructure and increase in farmers’ incomes as development priorities. The plan stresses the importance of improving irrigation facilities. In addition, the Ministry of Agriculture has developed the Food Staple Self-Sufficiency Roadmap (2011-2016). It places an emphasis on upgrading and development of irrigation facilities for increased rice acreage, yield per hectare, and output. Furthermore, the National Irrigation Administration (NIA), the executing agency of this project, has a six-year irrigation roadmap, which was developed in 2012. It aims to construct irrigation facilities to irrigate 166,671ha while rehabilitating the existing irrigation facilities covering 284,399ha of land. In view of the above, the project remains consistent with the development policy of the Philippines.

3.1.2 Relevance to the Development Needs

Before project appraisal Bohol Island was one of the least economically developed regions of the country. Agriculture was an important industry for the island. Approximately 60% of the island was agricultural land, and almost half of its workforce was engaged in farming. Having

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ② Fair, ① Low

soil suitable for agriculture, the island had high potential for agricultural production, particularly for rice cultivation. It was believed that by improving irrigation facilities the island would be able to increase agriculture production and thereby alleviate poverty. In Bohol Island an irrigation scheme began in 1970s with an aim of strengthening agricultural infrastructure. Construction of three dams was planned to irrigate 10,000ha of farmland in total. Out of the three, Malinao Dam, located upstream, was constructed with Japanese ODA loans and completed in 1996 before this project. Capayas Dam, located downstream, was constructed with Japan's Grant Aid and completed in 1991. Then this project constructed Bayongan Dam in between the other two as there was a strong need to improve agricultural infrastructure and farmers' incomes in Bayongan area⁵.

At the time of ex-post evaluation, NIA is carrying out concrete-lining of tertiary canals with an aim to achieve efficient distribution of irrigation water to tail-end farms in the project area⁶. Additionally, Malinao Dam mentioned above is currently being redeveloped⁷. With the population growing in all parts of the Philippines, NIA recognizes the importance of stable production and supply of rice as well as sustained self-sufficiency ratio⁸. It is believed that the concrete-lining work and redevelopment of Malinao Dam would contribute to stable production and supply of rice as well as to sustaining self-sufficiency ratio. Therefore, irrigation development remains relevant in the Philippines at the time of ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

Based on the Official Development Assistance (ODA) Charter of Japan endorsed by the Cabinet in 1999 and the Medium-Term Policy on ODA issued in the same year, JICA developed the Medium-Term Strategy for Overseas Economic Cooperation Operations. This strategy lays out overall policy directions and priority areas for Japanese ODA loans. In the strategy the following fields were identified as priorities: (1) making economies more resilient and overcoming constraints in order to achieve sustainable growth (e.g., appropriate macroeconomic management, reinforcing industrial structures, and developing economic infrastructures); (2) poverty alleviation and correction of regional disparities; (3) environmental protection and disaster prevention; and (4) human resource development and system building.

⁵ Bayongan Dam covers 14 communities in three municipalities (San Miguel, Ubay, and Trinidad).

⁶ It will be further discussed in the "Project Output" section under "Efficiency."

⁷ The plan is to elevate the body of Malinao Dam by 2m thereby securing sufficient storage capacity and ensuring reliable supply of irrigation water.

⁸ In Bohol Province, the self-sufficiency ratio for rice has reached 100% since 2008 (The source of this information is Bohol Department of Agriculture. The calculation is based on a rice consumption of 85kg/year/person. In Japan the calculation is normally made based on 60kg/year/person. (Source: Planning Division, General Food Policy Bureau, Ministry of Agriculture, Forestry and Fisheries, 2006)

The strategy also describes country-specific priorities. For the Philippines the priority is to “reduce poverty and correct regional disparities through agriculture and rural development.”

This project provides infrastructure building assistance in the Philippines, which aims to achieve stable food supply, to reduce poverty, and to correct regional disparities. Evidently, the project is in line with the priorities set by JICA (i.e., “(2) alleviating poverty and rectifying regional disparities”) and thus consistent with Japan’s ODA policy.

In light of the above, this project has been highly relevant with the country’s development plan, development needs, as well as Japan’s ODA policy; therefore its relevance is high.

3.2 Effectiveness⁹ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

1) Data concerning Rice Production Increase through Agriculture Development in the Project Area

Data concerning rice production increase through agriculture development is shown in Table 1 (at appraisal) and Table 2 (at ex-post evaluation).

Table 1: Data concerning Rice Production Increase in the Project Area through Agriculture Development (Actual and Target at Project Appraisal)

Indicator	Actual at Project Appraisal (1999)	Target after Project Completion (Completion Planned in 2005)
1) Designed area / Irrigable area ¹⁰ (ha)	N/A	5,300 (Bayongan: 4,140ha, Capayas: 1,160ha)
2) Per-hectare yield of rice (ton/ha)	2.9	4.8
3) Irrigation service fee collection rate (%)	36	N/A

Source: JICA’s document

⁹ Sub-rating for Effectiveness is to be put with consideration of Impact

¹⁰ In Table 1 and Table 2, “designed area” refers to an area designed to be irrigated within the project area. “Irrigable Area” refers to an area within the service area where irrigation becomes possible with the preparation of land and construction of tertiary canals. “Irrigated Land” refers to an actually cropped area out of the irrigable area. “Benefited Area” refers to an area from which rice is harvested.

Table 2: Data concerning Rice Production Increase in the Project Area through Agriculture Development (Actual after Project Completion)

Indicator	Area / Season	2010 (2 years after Completion)	2011 (3 years after Completion)	2012 (4 years after Completion)	
1) Designed area (ha)	Bayongan	4,140			
	Capayas	1,160			
2) Irrigable area (ha)	Bayongan	2,957	2,957	3,300	
	Capayas	750	750	750	
3) Irrigated area (ha)	Bayongan	Wet Season ¹¹	1,986	2,586	2,608
		Dry Season	2,325	2,644	2,809
		(ratooning)	-	(276)	(824)
	Capayas	Wet Season	600	624	600
		Dry Season	577	617	672
		(ratooning)	-	(92)	(184)
4) Benefited area (ha)	Bayongan	Wet Season	1,589	2,439	2,604
		Dry Season	1,860	2,620	2,806
		(ratooning)	-	(276)	(815)
	Capayas	Wet Season	406	472	536
		Dry Season	550	500	668
		(ratooning)	-	(92)	(184)
5) Yield of rice per hectare (ton/ha)	Bayongan	Wet Season	4.1	3.6	4.38
		Dry Season	4.1	3.4	4.9
		(ratooning)	-	N/A	N/A
	Capayas	Wet Season	4.8	4.5	4.38
		Dry Season	3.4	4.2	4.97
		(ratooning)	-	N/A	N/A
6) Annual yield of rice (ton)	Bayongan	Wet Season	6,494	8,741	11,407
		Dry Season	7,603	8,937	13,931
		(ratooning)	-	N/A	N/A
	Capayas	Wet Season	1,962	2,109	2,347
		Dry Season	1,977	2,085	3,317
		(ratooning)	-	N/A	N/A
7) Irrigation service fee collection rate (%)	Bayongan	72.47	52.62	62.63	
	Capayas	52.76	42.04	44.25	

Source: Document provided by NIA

Data shown in Table 1 and Table 2 are analyzed below:

Designed Area/Irrigable Area

As shown in Table 1, it was expected at the time of project appraisal that irrigable area would be equal to designed area after project completion. However, as seen in Table 2, irrigable area in Bayongan and Capayas was 4,050ha in 2012, which is 76.4% of the target (target was 5,300ha, out of which 4,160ha was in Bayongan and 1,140ha in Capayas). The target was not achieved

¹¹ In the project area the wet season is from May to October, and the dry season is from November to April. Dual cropping is the common practice.

because of the delay in farm preparation,¹² the main of which is land leveling¹³. In Bayongan area, however, irrigable area is gradually expanding, reaching 2,957ha in 2011 and 3,300ha in 2012. According to NIA, they are “trying to achieve proper water distribution by making progress on the concrete-lining work for tail-end farms as well as on the installation of perch tubes.¹⁴ In fact, irrigable area is expanding with more landowners showing support and understanding.”

Cropped Area / Benefited Area

It is difficult to analyze cropped area and benefited area because no targets were set for these indicators at project appraisal (see Table 1). What can be said is, however, both cropped and benefited areas are increasing along with the progress made on land leveling. On a side note, ratooning¹⁵ was introduced in the project area in 2011. Since then some amount of rice is harvested using this method, which is shown in Table 2.

Per-Hectare Yield and Annual Yield of Rice

The average per-hectare yield of rice has been around 4.2 tons/ha in Bayongan and Capayas areas since 2010, which is close to the target (87% of the target). This achievement can be attributed to the project for it made the distribution of irrigation water smooth through development of irrigation facilities. Another contributing factor is the introduction of hybrid seeds in 2011. They are more resistant to pests and natural disasters¹⁶. With respect to annual rice yield, it has been increasing along with benefited area and per-hectare yield¹⁷.

Irrigation Service Fee Collection Rate

Although targets were not set at the time of project appraisal, irrigation service fee collection rate is higher after project completion (2010-2012) than it was at the time of project appraisal

¹² The reason for the delay will be discussed later in the “Efficiency” section under “Output.”

¹³ It is conducted to correct difference in height that exists in some parts of rice paddies. It has a number of purposes: to distribute irrigation water efficiently; to promote planted rice to grow equally; and to make herbicides more effective.

¹⁴ It is a round-shape cylindrical PVC tube with a diameter of 15cm and a height of 30cm. It functions as a water regulator, keeping water level at 5cm or below. It is used in combination with concrete-lining to realize efficient distribution of irrigation water for the tail-end farms.

¹⁵ It is to harvest a crop which leaves the roots and the lower parts of the plant uncut to give the ratoon or the stubble crop. If fertilizer is applied properly, it can be harvested within 40-50 days. In Japan it is called *Hitsuji* or *Hikobae*, which is rarely practiced in temperate regions.

¹⁶ Data for 2012 shows that 20% of the seed rice was crossbred and 80% was inbred in the wet season, whereas 35% was crossbred and 65% was inbred in the dry season. This indicates that hybrid seed rice is increasingly used these days. NIA aims to make it all hybrid by 2017 as it is estimated that yield will become 5-7 tons/ha when crossbred seed rice is used for the entire cropped area.

¹⁷ Data on the per-hectare yield and annual yield for ratooning was not available.

(see Table 2). This is because NIA has been making efforts to improve fee collection rates. For example, they started the recruitment of Institutional Development Officers in 2011 with the aim of reinforcing irrigator's associations (totally 21 associations) and promoting irrigation service fee payment among farmers¹⁸.



Figure 1: Rice Fields in Bayongan



Figure 2: Developed Lateral Canal

2) Trends in Irrigated Rice Output and Impacts on Local Socio-Economy in Bohol Province

Table 3 shows the trends in province-wide output of rice since project commencement. Generally, it has been increasing. The output was 134,055 tons for the province in 2012, while the output for Bayongan area in the same year was 25,000 tons (wet and dry seasons combined, see Table 2). Thus it can be said that the project accounts for approximately 19% of the provincial rice production in terms of rice output.

Interviews were conducted with the management of the Bohol Agricultural Bureau and staff of Agricultural Promotion Center (APC), which is under the Ministry of Agriculture. Regarding project impacts they commented on the following points: (1) The project anchors the rice self-sufficiency rate of the province which has been 100% since 2008; (2) The project has brought economic benefits¹⁹ because surplus rice is transported to other parts of the country²⁰ for sale; and (3) The project contributes to the improvement in farmers' incomes²¹. Therefore,

¹⁸ According to NIA, they recruit young professionals who completed master's courses in agriculture or related fields. The responsibilities of IDOs are: to provide farmers with support and advice on cropping; to help make irrigator's associations stronger; and to make farmers aware of water charge payment. Although there was only one IDO in the project area in 2011, the number has increased to four in 2012.

¹⁹ Although no concrete data exists on the surplus rice, it can be estimated as follows. The total amount of rice consumed in Bohol Province is estimated at 107,000 tons per year. This was calculated based on the average rice consumption of 85kg/year/person (Footnote 8) and the population of 1,260,000 (2010 National Census). From Table 3, 134,055 tons of irrigated rice was produced in 2012. Subtracting the estimated consumption from the production gives us 27,000 tons. With the assumption that all 27,000 tons are marketed in other parts of the country, sales are estimated to be 459million pesos (about 1.02billion JPY) using the current rice price in the province, which is of 17 peso/kg.

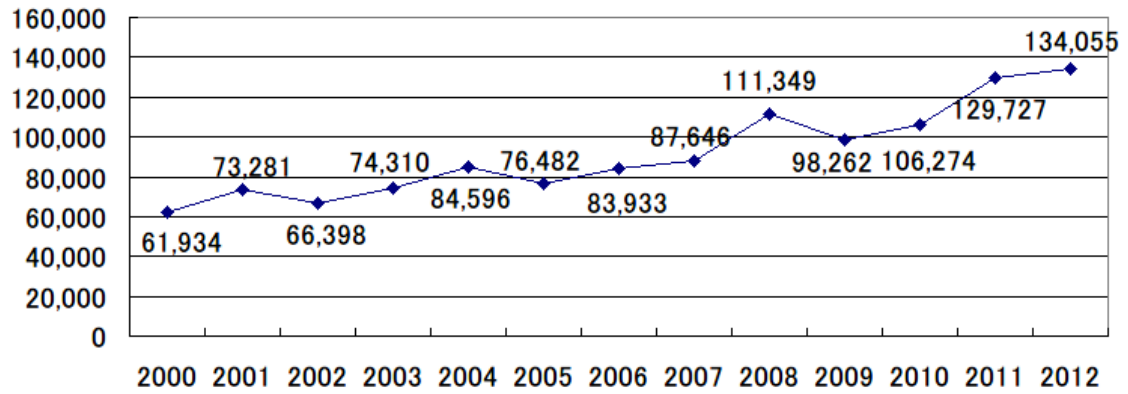
²⁰ The surplus rice is first transported to Cebu, the capital of the province, in Central Visayas. From Cebu it is shipped to different parts of the country.

²¹ It will be further discussed in the "Impact" section ("3.3.1.1 Impact on Farmer's Income and Poverty Alleviation,

the project is believed to have a considerable influence on the local society and economy.

Table 3: Trends in Irrigated Rice Output in Bohol Province

(Unit: ton)



Source: Philippines Bureau of Agricultural Statistics (BAS)

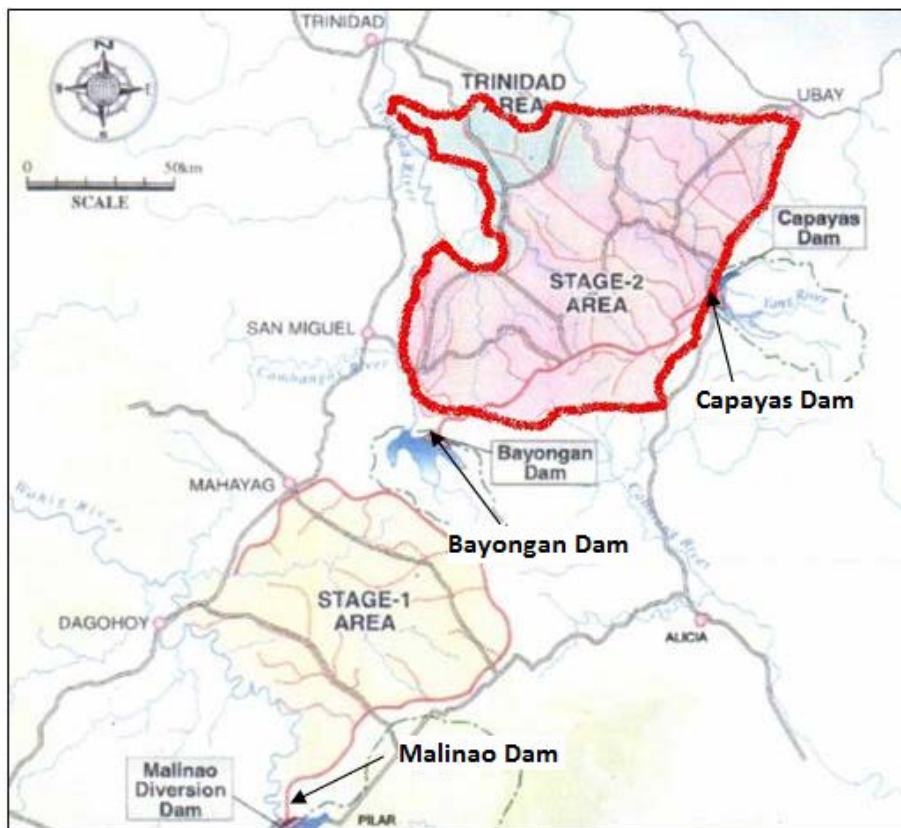


Figure 3: Project Location
(Bayongan area is circled in red)

2) Improvement in Farmers' Incomes").

3.2.2 Qualitative Effects

Job Creation in the Project Area

Farmers in Bayongan area were employed by the construction companies during project implementation. Additionally, it was learned through the evaluation study that most farmers belong to irrigator's associations and receive monetary compensation from NIA for cleaning water canals (e.g., de-silting, de-weeding, and cleaning of concrete panels on protective walls). Farmers were asked in interviews to describe changes they observed during project implementation and after project completion in employment, agriculture, and livelihoods. They commented as follows²²:

【Farmers' Comments on Employment】

- I worked for a construction company during project implementation. I did not have any complaints about the pay. (Note: Salaries were paid every 15 days at that time.)
- As I was previously, I am taking part in the irrigator's association's activities. Many farmers are engaged in maintenance activities, which is mainly to maintain and clean water canals. We receive monetary compensation from irrigator's associations for this, but it is not a salary. I do not have any complaints about the rate of compensation²³.

【Comments on Changes in Agriculture/Livelihoods】

- Many farmers switched from dry-field farming to rice cultivation before, during, and after project implementation. The main reasons are as follows: (1) Irrigation water became available; (2) Rice yield per hectare improved; and (3) hybrid seeds were introduced.
- Regarding lifestyle changes, our income increased thanks to the boost in rice production. With extra income, we were able to send our son to university in Cebu.

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Impact on Farmer's Incomes (Poverty Alleviation²⁴)

1) Results from the Beneficiary Survey (Farmers Interviews)

²² As a part of the evaluation survey, key informant interviews were conducted with 7 farmers who were employed during the project implementation while engaging in water canal cleaning on a part-time basis. Information was not available concerning the number of farmers employed during project implementation and after project completion.

²³ When member farmers carry out operation and maintenance of water canals at the request of irrigator's associations, 400 pesos per km is paid based on the standard set by NIA.

²⁴ According to the project appraisal document, the project aimed to increase farmers' incomes, and it was viewed as one way of alleviating poverty.

As a part of this evaluation study, farmers residing in Bayongan area (the area downstream of Malinao Dam²⁵ amounting to 11.2km²) were interviewed using a questionnaire²⁶. The results are shown in Figure 4-11 below.

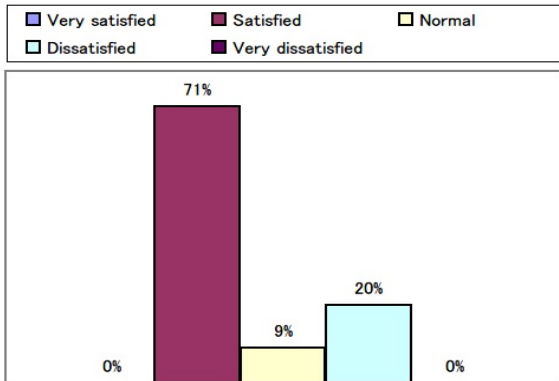


Figure 4: Are you satisfied with the project?

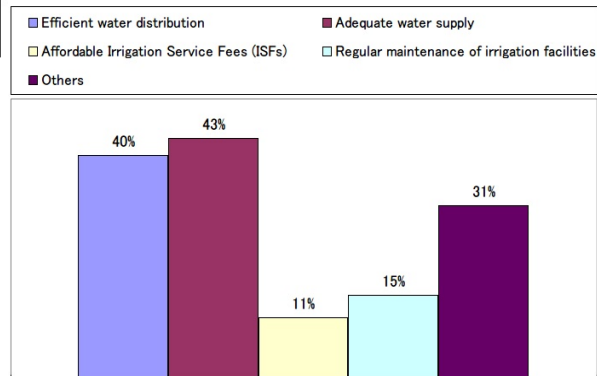


Figure 5: Reason(s) for responding “satisfied” to the question in Figure 4 (Multiple answers allowed)

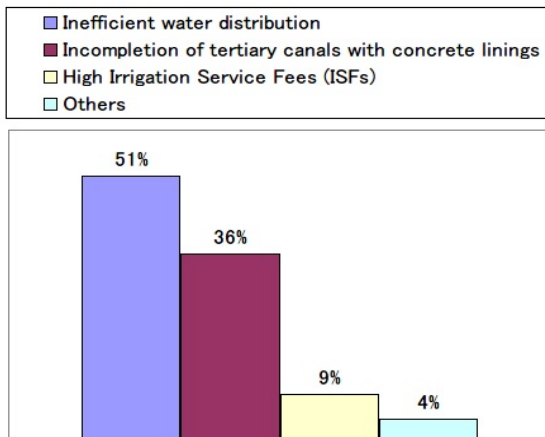


Figure 6: Reason for responding “dissatisfied” to the question in Figure 4

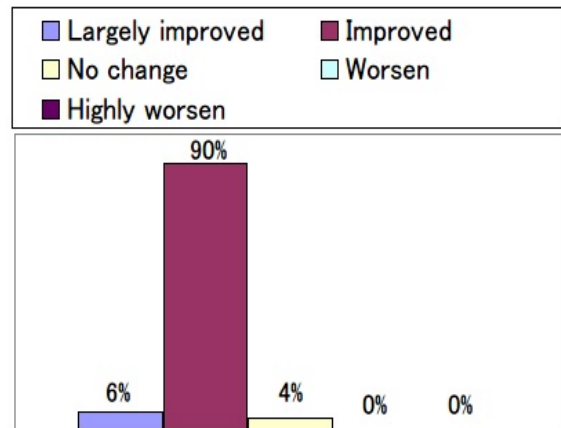


Figure 7: Did rice output improved after project completion?

²⁵ The area of the Malinao Dam watershed is 138.8km². The main rivers in the watershed are the Wahig river (length: 16km) on the west one western side and the Pamaclasan river (length: 12km) on the eastern side. These rivers meet 1.5km upstream of Malinao Dam.

²⁶ 100 farmers were interviewed using a random sampling method: 53 samples were drawn from farmers residing in the area near the main and the lateral canals, while 47 were drawn from farmers residing in the area near the tertiary canals. There are a total of 3,400 farming households (2012) in the project area.

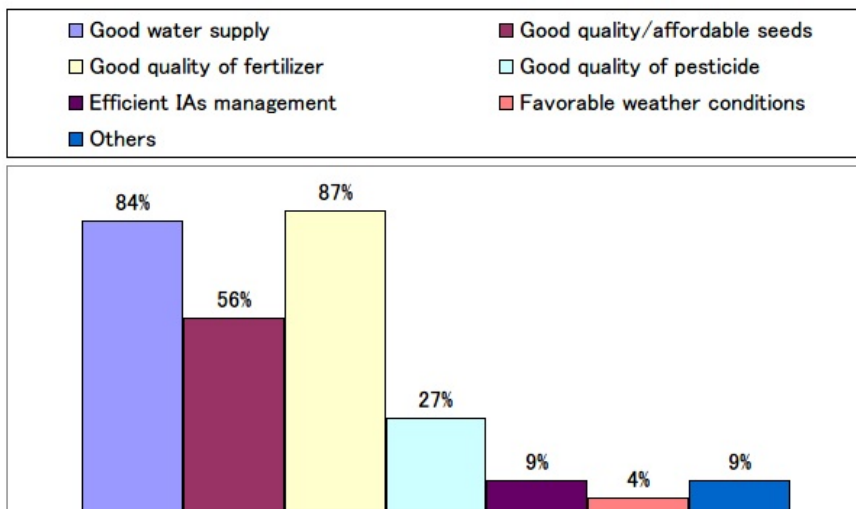


Figure 8: Reason(s) for responding “greatly improved” or “improved” to the question in Figure 7 (Multiple answers allowed)

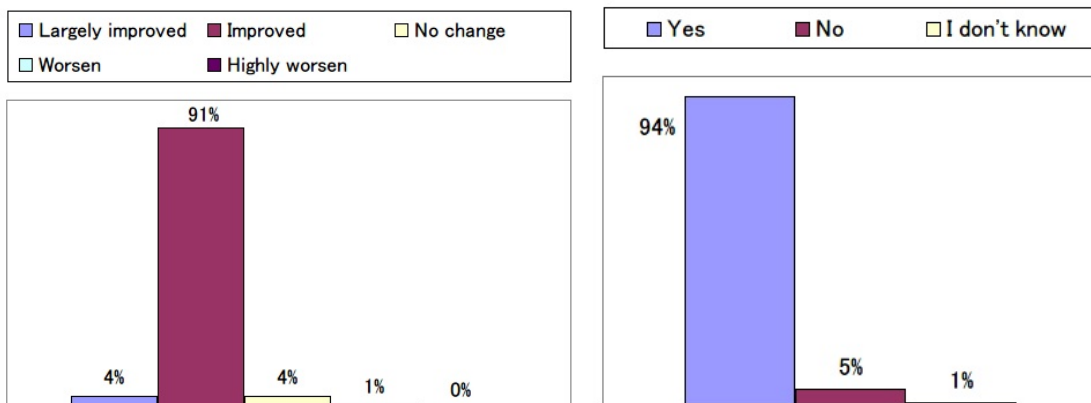


Figure 9: Did your income increase after project commencement?

Figure 10: Did the living standard improve along with the increase in income?

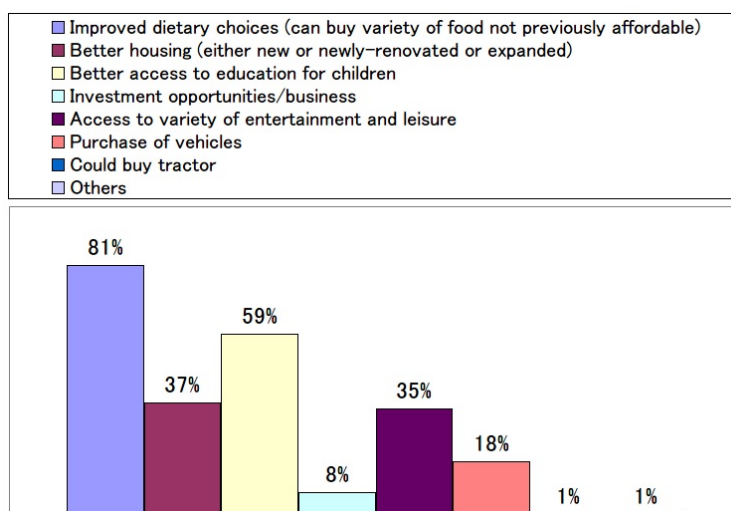


Figure 11: Reason(s) for responding “yes” to the question in Figure 10 (Multiple answers allowed)

It can be seen from Figure 4 that the level of satisfaction is generally high. As Figure 5 suggests, many respondents said they were satisfied with the project because of efficient water distribution and adequate water supply, which were made possible through the construction of irrigation canals. Thus the high level of satisfaction can be attributed to the project. According to Figure 6, some people are not satisfied with the project (about 20% of the interviewees responded “dissatisfied” as seen in Figure 4) because of the little progress²⁷ made on the concrete-lining of tertiary (field) canals²⁸. On the other hand, many farmers said that rice output increased after project completion (see Figure 7). The increase in rice output was attributed not only to the project (i.e., good water supply) but also to the introduction of hybrid seeds and higher qualities of fertilizer (see Figure 8)²⁹. Figure 9 suggests that the project is contributing to improving farmers’ incomes. Additionally, more than 90% of respondents think that their living standards have improved along with incomes (see Figure 10). The reasons are provided in Figure 11, indicating that people are purchasing more food and other basic necessities. Therefore, it can be concluded that the project is contributing to the improvement in incomes and living standards of farmers.

2) Improvement in Farmers’ Incomes

Table 4 shows how the gross farm income per farmer³⁰ changed in Bayongan from the time of project appraisal to after project completion. Gross farm income is essentially determined by farm gate price³¹ (i.e., gross farm income is output multiplied by gate price). From 2000 to 2012 gate price of rice grew by an average of 5.97% per year in Bohol Province³². Applying this 5.97% to the target set at the time of project appraisal (8,553 peso/ha), the adjusted target can be estimated to be 17,800 peso/ha. Because gross farm income after project completion is 25,427 peso/ha (2012), the actual gross farm income is higher than the adjusted target. It is thus suggested that the project is contributing to improving incomes of farmers in the project area.

²⁷ It will be discussed later in the “Efficiency” section under “Output.”

²⁸ During the beneficiary survey quite a few farmers expressed their demands for the concrete-lining of tertiary water canals.

²⁹ The Bohol Bureau of Agriculture is promoting the improvement in qualities of seeds and fertilizer while supplying them. Supports provided by the bureau of agriculture seem to have contributed to the increase in output.

³⁰ The ex-post evaluation data refers to incomes of farmers who are using irrigation services.

³¹ Farm gate price can be obtained by subtracting costs, such as that of marketing and purchasing of seeds, from market price. It is also calculated based on price index, such as agriculture price statistics and wholesale market price statistics.

³² The source of this information is Philippines Bureau of Agricultural Statistics.

Table 4: Gross Farm Income per Farmer in Bayongan Area

At the Time of Project Appraisal ³³		After Project Completion
Actual	Target	2012
3,347 peso/ha	8,553 peso/ha ³⁴	25,427 peso/ha

Source: JICA document and NIA document

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

1) Total Suspended Particles (TSP), Dust, and Noise during project implementation

Before project implementation, there were concerns that vehicles driving on access roads inside the project area might cause problems of TSP, dust, and/or noise. According to the interview with NIA, 3 staff members conducted environmental monitoring during project implementation. The monitoring findings were presented at monthly meetings, based on which no major problems were observed. According to NIA, no environmental concerns exist currently, either. Furthermore, no major negative impacts were observed through the field visits of the evaluation study.

2) Water Pollution, Impacts on Water Creatures Caused by Excessive Use of Pesticide and Fertilizer, Impact on Soil Due to Expansion of Irrigated Area

Excessive use of pesticide and fertilizer has not caused problems of water pollution. It has not affected water creatures negatively, either. Negative impacts on the natural environment were not observed during the field visits. Additionally, the Agriculture Bureau of Bohol Province is promoting proper uses of fertilizer (e.g., how to mix organic and chemical fertilize) among farmers through workshops and field training. No negative impacts on soil, which could be caused by the expansion of irrigated area, were observed through the field visits and interviews with NIA.

3.3.2.2 Land Acquisition and Resettlement

It was required to resettle 264 households (134 houses³⁵) and 9 *barangay* (village) facilities

³³ Information on farmers' non-agricultural incomes was not available through the interviews with NIA and beneficiaries.

³⁴ The JICA's Appraisal Document (1999) states: "It is expected that the average annual income per farmer would grow from 4,016 pesos to 10,264 pesos after project completion," in which the income was calculated per 1.2ha. The values shown in Table 4, such as 3,347 pesos/ha (at project appraisal) and 8,553 pesos/ha (target), are incomes per 1.0ha.

(church, school, and other public buildings) which existed on the land amounting to 522ha near Bayongan Dam reservoir. The compensation in the amount of 74 million pesos (or 150 million yen) was paid to the heads of households, and the *barangay* (village) facilities³⁵ were relocated by NIA. In June 2010 one survey was conducted to check the levels of satisfaction. Out of 264 households whose houses were to be submerged after the construction of Bayongan Dam, 34 households were interviewed. The survey results are shown in Table 5. A few respondents said they were not satisfied because they had not received the compensation. NIA later on clarified that the problem lied with the ways in which the compensation money, which was duly paid to the “heads of households,” was distributed among family members. According to NIA, no inquiries or claims have been received about the payment of compensation thus far (as at December 2012).

Table 5: Survey Results on Satisfaction Levels among Resettled Residents

Question	Answer
1) Are you satisfied with the actual compensation?	<ul style="list-style-type: none"> • Satisfied: 23 persons • Not satisfied: 5 persons • No answer: 6 persons
2) Reasons for dissatisfaction	<ul style="list-style-type: none"> • Didn't receive compensation: 2 persons • Decided the new address voluntarily: 2 persons

Source: JICA document

In this project, landowners are expected to bear the cost of farm preparation, including land leveling work. To make financing of the costs easier, the following system was put in place. First, landowners borrow money from local financial institutions for farm preparation work. NIA then takes over the debt in full amount, for which landowners would repay NIA in a maximum of 10 years with no interest. As discussed earlier in the “Efficiency” section, the project’s land leveling work is behind schedule. Even though efforts are being made to make progress on it as well as on the concrete-lining of canals while accommodating local residents’ requests, some people are discontent with the water distribution and the concrete-lining status as seen in Figure 4. According to NIA, landowners are exempted from bearing the cost of land leveling if a joint inspection by NIA and landowners finds that it is geographically difficult for irrigation water to reach the farm because the area is higher than the water surface elevation of the farm ditches. Additionally, farmers do not have to pay irrigation service fees if the yield does not reach a prescribed level. Similarly, landowners would be exempted from repaying NIA for

³⁵ More than one household reside in one building in the Philippines.

³⁶ NIA provided the compensation money to the residents (head of households) and made 3ha of land available for the relocation of the village facilities. The resettlement was implemented as per the Resettlement Action Plan.

the debt if they had bad harvests due to water shortage. Although measures such as these are in place to minimize the risk of overburdening farmers, continuous efforts are required to explore an appropriate course of actions by listening to farmers.

(Conclusion on Effectiveness and Impact)

At the time of project appraisal three indicators were identified to measure the project's effectiveness: (1) irrigable area; (2) yield per hectare; and (3) gross farm income per hectare. For the first indicator 76.4% of the target was achieved. For the second indicator target was almost achieved (87% of target). For the third indicator, which is gross farm income per hectare, the target set at the time of project appraisal was exceeded. Furthermore, rice production has been increasing since project completion, and irrigation service fee collection rate is higher after project completion than it was at the time of project appraisal although targets were not set for these two indicators. In view of the above, this project has largely achieved its objectives; therefore its effectiveness is high.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The planned and actual outputs of the project are summarized in Table 6.

Table 6: Planned and Actual Project Outputs

Plan (At Project Appraisal)	Actual (At Ex-Post Evaluation)
<p>[Construction]</p> <ol style="list-style-type: none"> 1) Construction of Bayongan Dam: Zone earthfill type, active storage capacity 25.1MCM, dam height 35.5m, catchment area 11.2k m² 2) Main canals: 12.7km (Bayongan area) 3) Lateral canals: 49.7km (Bayongan System) 4) Lateral canals: 18.0km (Cayapas System) 5) Drainage canal: 65.3km 6) Construction of main farm ditches and land leveling work: 2,800ha <p>[Procurement of Machine & Equipment]</p> <ol style="list-style-type: none"> 1) Procurement of equipment for the Integrated Water Management System: dam depth measurement equipment, rain gauge, PC equipment, cable laying 2) Procurement of construction machines: heavy machines (e.g., bulldozers) and vehicles (e.g., trucks) 	<p>[Construction]</p> <ol style="list-style-type: none"> 1) Construction of Bayongan Dam: as planned 2) Main canals: 17.76km (Bayongan area) 3) Lateral canals: 42.40km (Bayongan System) 4) Lateral canals: 15.82km (Cayapas System) 5) Drainage canal: 66.91km 6) Construction of main farm ditches and land leveling work: 1,479ha <p>[Procurement of Machine & Equipment]</p> <ol style="list-style-type: none"> 1) Procurement of equipment for the Integrated Water Management System: as planned 2) Procurement of construction machines: as planned

<p>[Consulting Services] 323MM (International: 157MM, Local: 166MM) Main TOR: review of tendering document, support for tender evaluation, construction supervision, training of NIA staff in the Integrated Water Management System, support for reinforcement of irrigator’s associations, and support for environmental monitoring.</p>	<p>[Consulting Services] 410.87MM (International: 108.60MM, Local: 302.27MM) As planned.</p>
--	--

There are some deviations from the plan as seen in Table 6. The reasons are explained below.

1) Construction

Small deviations are found in the extension of main, lateral, and drainage canals because a design review was carried out at the stage of detailed design. With regard to the construction of main farm ditches and land leveling work, only 50% of what was planned has been achieved. One reason is that landowners disagreed with the terms of the farm preparation work during project implementation³⁷. However, as it was mentioned in the “Effectiveness” section above, NIA is currently using its own fund to make progress on concrete-lining of tertiary canals³⁸ (see Figure 12 below) and perch tube installation (see Figure 13 below) for tail-end farms. By making such efforts to realize smooth water distribution management, NIA is increasingly gaining understanding of landowners, and as a result, prepared farmland (leveled land with main farm ditches) is increasing in area.

3) Consulting Services

The man-month increased as the project period was extended. The reason for project period extension will be explained below in the “Project Period” section under “Project Inputs”.

³⁷ According to NIA, landowners hesitated to convert their lands into paddy fields partly because at that time they could not see sufficient volume of irrigation water distributed to tail-end farms.

³⁸ For concrete-lining of tertiary canals, NIA’s Head Office allocated 50 million pesos (or 100 million yen) to Bayongan area in 2012. Although concrete-lining work is also on-going in Malinao area, a priority is given to Bayongan area when it comes to budget allocation because more requests have been received in Bayongan area from local farmers and NGOs since before project completion. Through the field study the progress on concrete-lining of tertiary canals was confirmed as follows: 11% of planned in Bayongan area; 63% in Malinao area, and 29% in Capayas area. (Unfortunately, detailed data, such as the plan, extension, and actuals, was not available.) The progress on concrete-lining of tertiary canals depends on the level of budget allocated by NIA’s Head Office. Considering that the budget was allocated to Bayongan area in 2012 for the first time, concrete-lining construction is expected to make further progress in the future.



Figure 12: Concrete-Lining of Tertiary Canal



Figure 13: Perch Tubes (used to adjust paddy field water)

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual cost of the project was 7,653 million yen (out of which 6,014 million yen in ODA loan) as compared to the plan of 7,153 million yen (out of which 6,078 million in ODA loan). The project cost is thus slightly higher than planned (107% of the plan). One reason for this is that material costs increased during project implementation, pushing up the cost of constructing Bayongan Dam, main, and lateral canals³⁹. Another reason is that there was a need to review the design system plan for the Integrated Water Management System after project commencement, which increased the cost of procurement. Furthermore, the compensation for land acquisition and resettlement cost more than initially estimated. It is because market prices of commodities, which determine the amount of compensation, increased during project implementation⁴⁰. Finally, the cost of administration and consulting services increased as the project was extended.

3.4.2.2 Project Period

The planned project period was 5 years and 7 months (67 months), from December 1999 to June 2005. In reality the project required 8 years and 10 months (106 months), from December 1999 to September 2008, which is significantly longer than planned (158% of the plan). The reasons are as follows: (1) Contractor selection required more time than planned; (2) Review of the project scope (e.g., the number of main and lateral canals to be extended) at the stage of detailed design too time; (3) Long processing time was required for allocating the local portion

³⁹ In addition, the lowest bid submitted for the construction work was higher than the initial estimation, and as a result, the construction cost increased.

⁴⁰ According to NIA, the amount of compensation is determined by the Provincial Appraisal Committee (PAC) organized by NIA and the Provincial Bureau of Agriculture. They take account of market price and fair price.

of the project budget⁴¹ because the Central Government faced peso shortage due to currency fluctuations (peso depreciated against yen), (4) Long spell of rain and La Niña⁴² caused delay in construction schedule; (5) While NIA opted for competitive tender, bids had to be re-invited a few times for the procurement of the Integrated Water Management installation because not many firms had the required technical know-how. Finally, the consulting service was extended due to the delay in construction schedule.

The project cost slightly exceeded the plan, while the project period significantly exceeded the plan; therefore efficiency of the project is low.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Economic Internal Rate of Return

The Economic Internal Rate of Return (EIRR) of the project is 17.38% when recalculated by considering increase in farmers' net incomes and tourism revenue⁴³ as benefits, project cost (e.g., construction cost) and maintenance cost as costs, and a project life of 50 years. The recalculated EIRR is slightly lower than the initial estimate of 19.08% because the construction cost was higher than initially planned.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

NIA remains the executing agency of the project, which has not changed since project appraisal. Three irrigation areas in Bohol, namely Malinao, Bayongan, and Capayas, are administered by NIA's regional office ("NIA-7"). For operation and maintenance (O&M) concerning the project, it is Bayongan Office under NIA-7 that is responsible. Although it was originally a part of NIA-7, Bayongan Office was separated from NIA-7 in 2010 following the completion of this project. Currently, it is operating under the supervision of NIA-7.

Bayongan Office has 20 employees at the time of ex-post evaluation (as at December 2012). Under the leadership of General Manager, two departments, namely Operation and Engineering Department and Administration Department, are in charge of O&M of the project facilities,

⁴¹ The delay was most serious from 2003 to 2005, and it also affected the budget approval and allocation of other ODA loan projects in the Philippines.

⁴² It is a phenomenon during which the sea surface temperature across the equatorial Eastern Central Pacific Ocean becomes lower than normal. During La Nina temperature goes down while rainfall tends to increase.

⁴³ "Tourism revenue" was considered as a benefit because the project area has some tourist attractions, such as Chocolate Hills, and the area near Bayongan Dam reservoir is one of the viewpoints. (Note: The local government has spent its own budget to build ramadas and benches for visitors.)

irrigation service fee collection, procurement of machines and equipment as well as accounting. Out of the 20 employees, 11 are dedicated to the O&M of project outputs (e.g., Bayongan Dam, main and lateral canals, and drainage canals).

Twenty-one irrigator's associations exist in Bayongan irrigation area. Under these associations there are 225 Turnout Service Areas (TSAs). TSA is a unit under irrigator's associations that manages irrigation water for tertiary canals. Tasks of irrigator's associations include: to assist Bayongan Office in collecting irrigation service fees (e.g., follow up on farmers who have not paid); to monitor the irrigation water distributed to canals; and to maintain canals as commissioned by Bayongan Office (e.g., de-silting, de-weeding, and cleaning of concrete panels on protective walls). On the other hand, TSAs are responsible for monitoring the status of water distribution in the tertiary canals. They also assist the collection of irrigation service fees (covering areas with tertiary canals) as is the case with irrigator's associations.

The staffing level of Bayongan Office seems sufficient⁴⁴ as far as O&M is concerned. It was also observed that Bayongan Office is on good terms with irrigator's associations by communicating as appropriate⁴⁵. Additionally, stakeholder meetings among NIA, local NGOs, and farmers are organized on a regular basis. In view of the above, no major problems are observed in the institutional aspects of O&M carried out by Bayongan Office.

【Irrigator's Associations and IMT】

With a view to improving national irrigation systems, NIA launched IMT in 2008 to transfer irrigation maintenance functions to irrigator's associations in stages. Irrigator's associations would sign four-phased IMT contracts with NIA (Model No.1-4) according to their maintenance abilities⁴⁶. NIA would then transfer functions, such as maintenance of irrigation facilities and collection of irrigation service fees, to associations based on IMT contracts.

There are 21 irrigator's associations in the Bayongan Irrigation System as mentioned earlier. All of them are in Model No.1 currently. At the stage of Model No.1, system-wide maintenance is managed by NIA and Bayongan Office, while maintenance of canals is done by irrigator's associations (e.g., de-weeding, trash removal, temporary repairs for canal overflow, etc.).

⁴⁴ A good system seems to be in place at Bayongan Office concerning O&M of the project facilities. Staff tries to address maintenance problems in a timely manner by going to the site as soon as it is reported.

⁴⁵ The System Management Committee, organized by the management and employees of Bayongan Office as well as irrigator's association staff members, is meeting regularly. The committee meets twice a year before the planting times (the wet season and the dry season) to discuss and share information about crop acreage and irrigation water distribution plan. According to Bayongan Office, the committee will continue to meet regularly in the future.

⁴⁶ The higher the model number is, the greater the responsibilities of irrigator's associations would be, and the higher the required levels of maintenance abilities would be.

Associations also assist collection of irrigation service fees (e.g., delivering water bills, organizing campaigns to promote ISF payment, etc.)⁴⁷.

3.5.2 Technical Aspects of Operation and Maintenance

NIA is conducting training and workshops for O&M staff of Bayongan Office and irrigator's association members after project completion. In 2012 JICA's ODA loan expert taught a training course on maintenance skills, which was attended by a total of 62 O&M staff and irrigator's association members. When interviewed, training participants commented that "the training content was relevant and useful for the actual maintenance work." In addition, in 2009 which is immediately after project completion, NIA offered a training course covering topics, such as water distribution, water-saving technique for irrigation canals, and water management system. It was attended by many O&M staff and irrigator's association members. On-the-job training (OJT) is also provided as needed. When interviewed during the field study, staff of Bayongan Office and irrigator's association members made positive comments about training, such as this: "As we carry out O&M work, we keep in mind that improvement in O&M is the key to keeping canals in good conditions and attaining fair and appropriate distribution of irrigation water. We are eager to utilize what we learned in the training and workshops." Furthermore, O&M staff of Bayongan Office are well experienced in their work, and irrigator's association members are equipped with necessary maintenance skills. Maintenance work, which will be described later in "3.5.4 The Current Status of Operation and Maintenance," is carried out without problems. In view of the above, no major problems are observed in the technical aspects of O&M carried out by Bayongan Office staff and irrigator's association members.

3.5.3 Financial Aspects of Operation and Maintenance

Table 7 provides O&M related budgets and expenditures of Bayongan Office for the past three years. O&M budget is allocated by NIA-7 and used for salaries or maintenance work. Collected irrigation service fees are used to fund the O&M budget.

In 2012 O&M budget of Bayongan Office increased from the previous year⁴⁸. Looking at the

⁴⁷ It was not until December 2011 that all associations in the project area signed onto IMT Model No.1. Thus it is too early to review the effects of IMT or to speculate how the situation would evolve. However, the evaluation study did confirm that Bayongan Office was providing advice to irrigator's associations regarding water distribution and other activities at a committee meeting. On the other hand, collection of irrigation service fees is a responsibility of Bayongan Office, and irrigator's associations provide support to Bayongan Office in this regard.

⁴⁸ NIA-7's explanation about Table 7: "In 2010 we were in the process of separating Bayongan Office from NIA-7. Although O&M budget was allocated to Bayongan Office that year, expenditures were covered by the budget of NIA-7 (which is shown in parentheses). Therefore, 2010 utilization of Bayongan Office alone is not known, although it does not mean that budget was not expended. Budgets and expenditures of Bayongan Office separately are known

levels of budgets and expenditures, NIA-7 has been allocating sufficient budget for the Bayongan irrigation area. In addition, Bayongan Office commented in an interview that their “office receives sufficient level of budget.” Thus the level of O&M budget of Bayongan Office is deemed sufficient.

Table 7: O&M Budget and Utilization of Bayongan Office

(Unit: peso)

		2010	2011	2012
Budget	Salaries	315,000 (2,800,000)	355,000	790,645
	Maintenance	150,000 (3,500,000)	200,000	2,186,370
	Total	465,000 (6,300,000)	555,000	2,977,015
Utiliza- tion	Salaries	N/A (796,233)	313,943	556,260
	Maintenance	N/A (291,804)	153,633	227,112
	Total	N/A (1,088,037)	467,576	783,372

Source: NIA-7

Note 1: Numbers shown in parentheses are budget/utilization of NIA-7.

Note 2: Utilization for 2012 represents the amount up to the end of October.

Figure 14 shows a result from the beneficiary survey (sample size: 100, see 3.3.1.1 for interviewee selection) regarding the level of irrigation service fees borne by farmers⁴⁹. Although some farmers think the fee is “very high” or “high,” more than 70% of the farmers responded that the fee is “fair.”

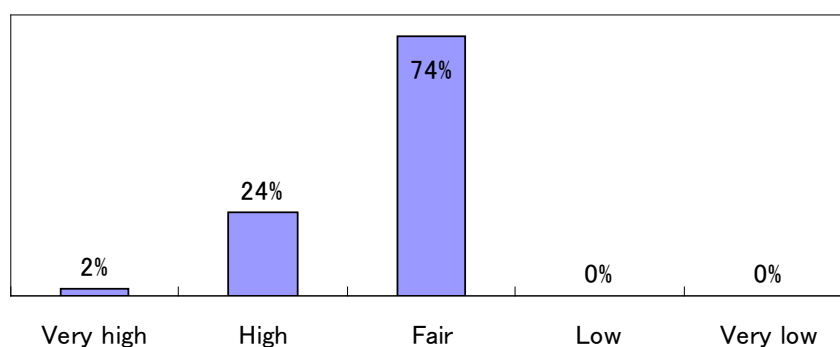


Figure 14: What do you think of the level of irrigation service fee? (Dry season 2012)

from 2011 onwards as the office began its full operation.”

⁴⁹ In the Bohol irrigation area farmers pay irrigation service fees to NIA’s Management Office at the rate of 150kg of unhulled rice or equivalent in cash (2,550 pesos based on 17 pesos/kg) per hectare of paddy fields (the wet season and the dry season are counted separately). (All farmers in this area have cadastres based on which irrigation service fees are determined.) Farmers are exempted from paying irrigation service fees if their harvest is less than 2t of unhulled rice per hectare due to droughts, climate change, pests, epiphytotic, and shortage of irrigation water.

3.5.4 Current Status of Operation and Maintenance

No problems were observed during field visits in the water volume adjustment for Bayongan Dam, management/operation/data measurement of the Integrated Water Management System, and routine O&M, including the opening-and-shutting of floodgates for main, lateral, and drainage canals. Each facility was being managed and utilized properly. As mentioned above, the project facilities are operated and managed by Bayongan Office, and staff is on duty around the clock to manage the Bayongan Dam as well as the Integrated Water Management System. Their tasks include: opening-and-shutting of floodgates to adjust discharged water; monitoring dam water levels; and measuring rainfall. For the main and lateral canals, staff is managing the distribution of irrigation water as well as opening-and-shutting of sluice-gates for diversions. Similarly for the drainage canals, opening-and-shutting of drainage gates is being managed properly. As described in “3.5.1. The Institutional Aspect of Operation and Management,” Bayongan Office delegates certain maintenance activities to irrigator’s associations (e.g., de-silting, de-weeding, cleaning concrete panels of protective walls). No major problems are observed in the maintenance work carried out by irrigator’s associations according to the interviews with association members. Additionally, it was also confirmed during field visits that heavy machines and vehicles procured by the project are properly utilized and stored.

With regard to spare parts, Bayongan Office sends procurement requests to NIA-7 as needed. Although it takes longer to procure certain items, it has been on schedule for most items according to the management of Bayongan Office. O&M staff normally work 8 hours per day from Monday to Friday, but they also come into work on weekends in case of an emergency. A maintenance manual is available in the office, which is utilized by staff members as needed for the day-to-day maintenance work.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

With an aim to increase rice production through improved agricultural infrastructure, this project developed an irrigation dam, main, lateral and drainage canals while carrying out land leveling work and constructing main farm ditches in Bayongan located in the northeastern part of Bohol Island. Both at the times of project appraisal and ex-post evaluation, the project is

consistent with the development policy of the Philippines as can be seen in the agricultural infrastructure policy. Similarly, the project is consistent with the needs of the Philippines, such as to develop irrigation facilities, at the times of appraisal and ex-post evaluation. Owing to the development of main and lateral canals by the project, targets were generally met for service area and per-hectare yield of rice. Rice production has been increasing after project completion, and the irrigation service fee collection rate is higher after project completion than it was at the time of project appraisal. Furthermore, target for gross farm income per hectare, which was set at the time of project appraisal, was exceeded after project completion, and the results of the beneficiary survey were largely positive. The project period was significantly longer than planned, and the project cost was slightly more than the plan. No major problems are observed in the institutional, technical, and financial aspects of operation and maintenance. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- It is recommended that NIA continue its effort to achieve results for farmers in Bayongan area while duly reflecting farmers' interests. To that end, it is recommended that NIA allocate sufficient budget and carry out the concrete-lining of tertiary canals in due consideration of farmers' opinions. NIA's Head Office allocated budget for the concrete-lining work in Bayongan area for the first time in 2012. Although some progress has been made since then, many irrigator's associations and farmers are requesting that progress should be made on the concrete-lining work so as to realize efficient distribution of irrigation water. It is thus important that NIA continue the work of concrete-lining.
- It is recommended that the Provincial Agricultural Bureau, in collaboration with NIA, continue to provide training and workshops for rice farmers and irrigator's associations to disseminate rice cultivation technologies, including the introduction of new seeds, and to promote agriculture as a profitable business. Farmers were introduced to irrigation rather recently, and it takes more than the work of concrete-lining to improve cultivation practices of irrigator's associations and farmers. It is essential to develop capacities of farmers in rice cultivation technologies and techniques through training. It is also recommended that NIA continue its effort to recruit more Institutional Development Officers (IDOs), who seem to be well-received by irrigator's associations and farmers for their support and services.

(Recommendations to JICA)

- It is recommended that NIA lead the monitoring of cropped and benefited area, output as well as irrigation service fee collection while keeping in mind that irrigation was introduced in the project area rather recently. Collecting data for these performance indicators would allow NIA to identify an appropriate course of actions and assistance. NIA should put effort into such monitoring and JICA should continue extending relevant assistance as needed (e.g., training for irrigator's associations and farmers) with a view of enhancing project effects.
- In addition, it would be beneficial if JICA periodically requested continued allocation of budget for the concrete-lining work.

4.3 Lessons Learned

- At the time of ex-post evaluation, various efforts are being made toward project objectives, including concrete-lining of tertiary canals, training, and workshops. As these efforts were started in full scale only after project completion, some farmers are still voicing dissatisfaction with the supply of irrigation water in tail-end farms. In the future, essential supports including capacity building should be explored and planned thoroughly at the stage of project formulation so that project objectives could be attained at an earlier stage.
- JICA's ODA loan expert gave training and workshops to staff of Bayongan Office and irrigator's associations after project completion. It was learned through interviews that the work of this expert was useful not only for Bayongan Office but also for irrigator's associations as it led to improved maintenance work by association members. Judging from the fact that assistance of this kind was effective, it would be beneficial for JICA to consider extending technical assistance which would enhance project effects from early stages, such as before and during project implementation, for similar projects in the future.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	<p>[Construction]</p> <p>1) Construction of Bayongan Dam: Zone earthfill type, active storage capacity 25.1MCM, dam height 35.5m, catchment area 11.2k m²</p> <p>2) Main canals: 12.7km (Bayongan area)</p> <p>3) Lateral canals: 49.7km (Bayongan System)</p> <p>4) Lateral canals: 18.0km (Cayapas System)</p> <p>5) Drainage canal: 65.3km</p> <p>6) Construction of main farm ditches and land leveling work: 2,800ha</p> <p>[Procurement]</p> <p>1) Procurement of equipment for the Integrated Water Management System: dam depth measurement equipment, rain gauge, PC equipment, cable laying</p> <p>2) Procurement of construction machines: heavy machines (e.g., bulldozers) and vehicles (e.g., trucks)</p> <p>[Consulting Services]</p> <p>323MM (International: 157MM, Local: 166MM)</p> <p>Main TOR: review of tendering document, support for tender evaluation, construction supervision, training of NIA staff in the Integrated Water Management System, support for reinforcement of irrigator's associations, and support for environmental monitoring.</p>	<p>[Construction]</p> <p>1) Construction of Bayongan Dam: as planned</p> <p>2) Main canals: 17.76km (Bayongan area)</p> <p>3) Lateral canals: 42.40km (Bayongan System)</p> <p>4) Lateral canals: 15.82km (Cayapas System)</p> <p>5) Drainage canal: 66.91km</p> <p>6) Construction of main farm ditches and land leveling work: 1,479ha</p> <p>[Procurement]</p> <p>1) Procurement of equipment for the Integrated Water Management System: as planned</p> <p>2) Procurement of construction machines: as planned</p> <p>]</p> <p>[Consulting Services]</p> <p>410.87MM (International: 108.60MM, Local: 302.27MM)</p> <p>As planned, consultants provided the following services: review of tendering document, support for tender evaluation, construction supervision, training of NIA staff in the Integrated Water Management System, support for reinforcement of irrigator's associations, and support for environmental monitoring</p>
2. Project Period	December 1999 – June 2005 (67 months)	December 1999 – September 2008 (106 months)
3. Project Cost		
Amount paid in Foreign currency	4,474 million yen	1,636 million yen
Amount paid in Local currency	2,679 million yen	6,017 million yen
Total	7,153 million yen	7,653 million yen

Japanese ODA loan portion	6,078 million yen	6,014 million yen
Exchange rate	121 JPY / US 3 JPY / peso (As at Sep 1999)	2.21 JPY/ peso (average over project period)