People's Republic of Bangladesh

FY2017 Ex-Post Evaluation of Japanese ODA Loan Project

"Small Scale Water Resources Development Project"

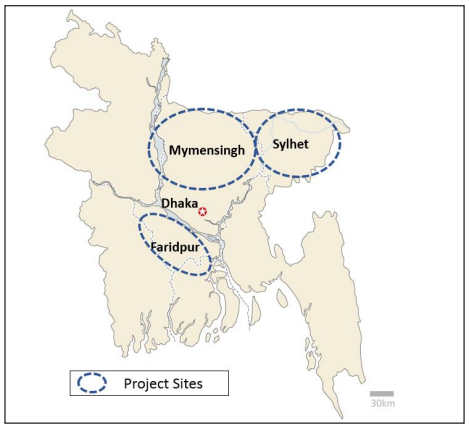
External Evaluator: Hisae Takahashi, Ernst & Young ShinNihon LLC

0. Summary

This project was implemented in the north-eastern and central parts of Bangladesh, aiming to increase agriculture and fishery production and efficiency by utilizing water resources effectively through the development of small infrastructure for water-resource management. Implementing this project was consistent with Bangladesh's development strategy that emphasizes the role of agriculture and fishery sector in helping reduce poverty, a sector plan showing the need to use irrigation and fishery water resources efficiently, development needs following frequent damage inflicted by floods, which hinder agricultural and fishery activities and the need to mitigate damage from water logging as well as Japan's ODA Policy. Therefore, its relevance is high. Though the project cost was within the plan, the project period exceeded the plan due to the increase in the number of sub-projects (hereinafter referred to as "SPs") and commencing the project was delayed due to delays in concluding the contract with a consultant, so the efficiency is fair. Improvement of irrigation facilities and various kinds of training enabled agricultural and fishery activities that were restricted by floods and droughts, and boosted crop and fish production in the SP area as well as employment opportunities for workers and agricultural and fishery income. While implementing project, working opportunities were offered to women through minor construction work. It was also confirmed that women who participated in training of income-generation activities and so on have started small businesses such as poultry farming and tailoring, helping generate income after completion of the project. Through these changes, the poverty rate of the area declined, thus the effectiveness and impact of this project are high. No major problems have been observed in the institutional, technical, financial aspects of the maintenance system and the small infrastructure facilities developed by this project are operating almost without problems. Therefore, the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Locations

Constructed sluice gate
(Binna Kandi SP：Sylhet)

1.1 Background

In Bangladesh, where 77% of all people and 85% of the poor live in rural areas and poverty reduction is a development policy priority, efforts in rural areas with particularly high poverty rates were considered critical issues[1]. The country is prone to frequent floods in the rainy season due to the impact of outflow water equivalent to four time and more the domestic rainfall of neighboring countries; seriously damaging agricultural activities and people's lives in rural areas. The river erosion caused by these floods ravaged land and houses, especially of poor people and caused agricultural land to drain. Conversely, there is hardly any rainfall in the dry season and drought caused a decline of up to 30% in agricultural production and a shortage of drinking water. Accordingly, measures to prevent enormous damage in agricultural areas while securing and effectively utilizing water resources proved a major challenge when promoting regional development nationwide.

Under such circumstances, in response to the flood and water shortages during the dry season, it was decided to support efforts to develop small-scale infrastructure for flood control, drainage improvement, surface water storage, irrigation, etc., which will promote effective use of water resources through this project, to improve agriculture and fishery production in the three deprived areas (Sylhet, Mymensingh, Faridpur) where the per-capita GDP level was below the national average.

1.2 Project Outline

The objective of this project is to increase agriculture and fishery production through effective use of water resources by providing infrastructure for the small scale water resources development and management in north eastern and central zone of Bangladesh, thereby contributing to economic and social development and the poverty reduction in the target area.

[1] The poverty rate in rural areas was 43.8%, far exceeding that of 28.4% in urban areas (as of 2005)
(Source: document provided by JICA)

Loan Approved Amount/ Disbursed Amount	5,313 million yen / 5,311 million yen	
Exchange of Notes Date/ Loan Agreement Signing Date	December 2007 / December 2007	
Terms and Conditions	Interest Rate Repayment Period (Grace Period Conditions for Procurement	0.01% 40 years 10 years) General untied
Borrower / Executing Agency	The Government of the People's Republic of Bangladesh/ Local Government Engineering Department (LGED)	
Project Completion	June 2016	
Main Contractor(s) (Over 1 billion yen)	-	
Main Consultant(s) (Over 100 million yen)	Resource Planning and Management Consultants(PVT)ltd. (Bangladesh)/Northwest Hydraulic Consultants (Canada) / Nippon Koei Co., Ltd. (Japan)(JV)	
Related Studies (Feasibility Studies, etc.)	-	
Related Projects	【Technical Cooperation Projects】 ・"The Master Plan Study on Small Scale Water Resources Development for Poverty Alleviation through Effective Use of Surface Water in Greater Mymensingh of Bangladesh" (2004-2005) 【ODA Loan Projects】 ・"Small Scale Water Resources Development Project (Phase 2)"(June, 2017) 【Asian Development Bank (ADB)・Dutch government】 ・"Small Scale Water Resources Development Project Phase I" (1996),"Small Scale Water Resources Development Project Phase II" (2001)	

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young ShinNihon LLC

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: November, 2017 – January, 2019

Third-country meeting: February 18 – 21 and May 6 – 9, 2018

Field survey: March 17 – April 30, 2018 (A local consultant carried out the field study.)

2.3 Constraints during the Evaluation Study

Based on instructions from the JICA Evaluation Department, the evaluator did not enter Bangladesh for security reasons and a local consultant carried out the entire process of the field study under the direction of the evaluator. The evaluator and the local consultant had a preliminary meeting in the third country (Thailand) before the field study to share information on the evaluation policy of the project and the method of the field study. In the meeting, in order for the local consultant to accurately understand and be able to collect information necessary for the five evaluation and analysis items, materials prepared by the evaluator such as a questionnaire to the executing agency and an information collection checklist to be used in the site survey were used, so as to ensure the completeness of the collection of information and the quality of information collection used in analysis.

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Consistency with the Development Plan of Bangladesh

At the time of appraisal, *Unlocking: National Strategy for Accelerated Poverty Reduction (2005)* was taken as the basic document of the government's development strategy, equivalent to *the Poverty Reduction Strategy Paper* (hereinafter referred to as "PRSP") in Bangladesh. This strategy aimed to accelerate poverty reduction by effectively linking agricultural and irrigation policies, which were summarized as follows: (1) establish effective ways of utilizing water resources nationwide, (2) improve access to safe water and 3) realize a stable water supply[4]. In the development plan for the water sector at that time, *National Water Policy (1999)*, the six items including (1) promotion of small-scale irrigation, (2) promotion of private sector participation in groundwater irrigation, (3) use of both surface and underground bodies of water, (4) promotion of crop diversification toward the efficient use of water resources, (5) regulation of chemical substance use and (6) strengthening monitoring institutions for water quality, quantity and specifications, were cited concerning agricultural irrigation. In (1), the goal targeted was to consolidate the system for collecting maintenance fees of small-scale irrigation facilities, mainly by the executing agency, the Local Government Engineering Department (hereinafter referred to as "LGED") in the Ministry of Local Government, Rural Development and Co-operatives[5]. In addition, the *National Water Management Plan (2004)* focused on improving small-scale infrastructure for using water resources for agricultural land and disseminating agricultural and fishery technology to use such infrastructural elements as a means of boosting the agricultural and fishery sectors, and

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ③: High, ②: Fair, ①: Low
[4] Source: document provided by JICA
[5] Source: document provided by JICA

on promoting cooperative network with related authorities. Furthermore, *the Guidelines for Participatory Water Management (2000)* were also prepared to promote the participation of local people in improving the utilization of water resources[6].

At the time of ex-post evaluation, the country's development plan, *Seventh Five-Year Plan 2016-2020 (2015)*, which consolidated the role of PRSP, shows the role to be played by the agricultural sector and cited the utilization of efficient and balanced land and water resources as one of the goals of the agricultural field, since about half the labor force was intensified in the agricultural sector, in which most of the poor were engaged. In addition, improving the infrastructure for water-resource management is also specified as an issue, given the propensity for flooding and circumstances where 11% of rural laborers are engaged in fisheries, more than half of whom are domestic fishery[7]. Regarding the sector plans, *National Water Policy*, *National Water Management Plan*, the G*uidelines for Participatory Water Management* etc. at the time of appraisal remained effective as of the time of ex-post evaluation.

As mentioned above, in the development plan and the plan of the water-resource management sector of Bangladesh, the effective use of water resources in agriculture and fishery and improving infrastructure for water-resource management have been emphasized both at the time of appraisal and ex-post evaluation. This project was conducted to assist the plan and its consistency with the development policy was confirmed.

3.1.2 Consistency with the Development Needs of Bangladesh

Bangladesh is a low plain where over 90% of the land area is 9m or less above sea level and frequent flooding during the rainy season has damaged people's lives to a huge extent. Drainage conditions remain poor even after flooding, with prolonged clogging in agricultural land affected by such flooding, which affected agricultural production. Conversely, during the dry season, droughts cause agricultural production to decline by up to 30% or so. Accordingly, while coexisting with natural conditions and helping reduce poverty by spearheading rural development, the need emerged to reduce flood damage and shorten the flooding period by using water resources effectively through improvement of small-scale reservoir and irrigation facilities. At the time of ex-post evaluation, rice, the country's main agricultural product, is produced in over 80% of the total cultivated area during the rainy season and 58% of the same during the dry season. Rice production in the rainy season is about 18% lower on average than during the dry season, with yields of 15.8 and 18.9 million tons during the rainy and dry seasons respectively in 2016. The main reasons are still the damage caused by the flood, the

[6] Source: document provided by JICA
[7] Source: *Seventh Five-Year Plan 2016-2020 (2015)*
http://www.plancomm.gov.bd/wp-content/uploads/2015/10/7th_FYP_18_02_2016.pdf
(accessed as of July 26, 2018)

delay in cultivation following such damage and the lack of drainage facilities. The effects of drought in the dry season and the supply of insufficient irrigation water are also cited.

In this project, the three deprived regions (Sylhet, Mymensingh and Faridpur areas), each with per-capita GDP below the national average at the time of appraisal, were selected for the project areas (see Table 1). Although the poverty ranking[8] of the target area in Bangladesh subsequently improved after the appraisal, as shown in the poverty map of Figure 1, a sizeable number of households in the target area were still confirmed as in absolute poverty[9].

Table 1 Poverty ranking of target areas

Area	District	Poverty ranking	
		2000	2010
Sylhet	Habiganji	29	20
	Maulvibazar	40	21
	Sunamganj	53	21
	Sylhet	31	20
Faridpur	Faridpur	48	20
	Gopalganj	51	27
	Madaripur	64	34
	Rajbari	45	26
	Shariatpur	59	34
Mymensingh	Jamalpur	50	34
	Kishoreganj	43	16
	Mymensingh	33	32
	Netrakona	30	20
	Sherpur	55	30
	Tangail	56	18

Source: document provided by JICA and executing agency
Note: Ranking in 64 districts nationwide

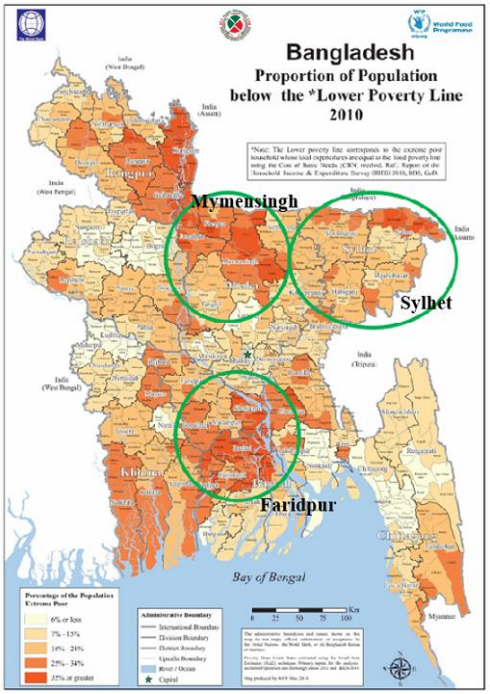


Figure 1 Poverty map

Source: WB, Bangladesh Bureau of Statistics and WFP, Lower poverty line, Poverty of Bangladesh 2010

3.1.3 Consistency with Japan's ODA Policy

Country Assistance Program for Bangladesh (May 2006) and *Medium-Term Strategy for Overseas Economic Cooperation Operations* (FY2005-2007) specified the need to strengthen support for rural areas as a more direct poverty-reduction measure. Rural development was regarded as a priority area also in FY2006 Country Assistance Strategy for Bangladesh[10]. This project developed small-scale infrastructure for flood control, drainage improvement, surface water storage and irrigation and helped improving agricultural and fishery production through water-resource management, led to the contribution of the poverty reduction in the three areas with poverty levels below the national average. Accordingly, it is consistent with areas of

[8] The latest available data is 2010.
[9] The map shows the proportion of households in absolute poverty in each district in color. The darker the color, the higher the proportion of poor households.
[10] Source: document provided by JICA

priority support given by Japan to Bangladesh.

In light of the above, this project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The major output of this project comprises the construction of small infrastructure for water-resource management, procurement of construction materials, Survey Investigation and Design (hereinafter referred to as "SID"), arrangement of facilitators, capacity-building training and consulting services. The plan and actual output are shown in Tables 2 to 5.

Table 2 Planned and actual major output (Civil works, procurement of construction materials)

Plan	Actual
【Civil works】 1) Flood management (FM) 65 SP 2) Drainage improvement (DR) 80 SP 3) Surface water storage 50 SP 4) Irrigation facility (IRR) 5 SP Total 200 SP ＊Since SP would be selected based on the executing agency's criteria (more than 70% of residents are willing to become members of the water management cooperative association (WMCA)), the actual number may differ from the number above.	1) CAD 8 SP 2) Water conservation (WC) ・CAD 1 SP 3) FM & DR and WC 45 SP 4) WC 31 SP 5) DR・WC 44 SP 6) FM ・WC 8 SP 7) FM 4 SP 8) FM &DR 40 SP 9) FM&DR・ IRR 2 SP 10)DR and IRR 47 SP 11)DR 12 SP Total 242 SP
【Procurement of construction material】 Construction material, vehicles for site management /trainings and monitoring and office equipment	Nine 4WD vehicles, six pickups, 185 motor bicycles
【Construction of WMCA offices】 No information	225 offices for WMCA were constructed.

Source: documents provided by JICA and questionnaire

Note 1：CAD is an abbreviation for Command Area Development, which mainly refers to facilities such as header tank (pressure adjustment), pumping and distribution pipe to farm. In addition, small-scale infrastructure, where WC is mainly a control gate for water flow, FM for repairing banks and water flow control facilities, DR for drainage canals, IRR for irrigation canals and so on, was developed.

Changes of output and reasons

【Civil works: Increase in the number of SPs】

It was pointed out at the time of appraisal that the number of SPs after the selection may

differ from the plan due to the nature of the project developing small infrastructure facilities over a wide area. In fact, the SP number was actually 121% of the planned total. It was explained that the increase was mainly attributed to the project steering committee putting forward a proposal to increase the number of SPs due to the unused loan caused by fluctuations in the foreign exchange rate. Although the descriptions of the facility content differ from that at the time of planning, it can be explained that the contents of classifications 1) to 4) at the time of appraisal were conducted by combining each of the items and all the planned contents were covered as follows: 1) flood management = water conservation・CAD, 2) drainage improvement = drainage, 3) surface water storage = water conservation・CAD, 4) Irrigation facility = irrigation.

【Construction of WMCA offices】

The preceding project, supported by ADB and the Dutch government, included plans to construct the WMCA offices and made them the base for WMCA activities. Though it was not included in the plan at the time of appraisal, to ensure consistency with the proceeding project and to have its needs recognized, construction of WMCA offices was decided on for this project in the same way when formulating the revised project plan. Since land was available in 225 of the 242 actual SPs, the number of SPs where the office was built was 225. Regarding the remaining 17 offices, the land was secured after completion of this project and it was decided that they would be constructed using an ODA loan "Small-Scale Water-Resources Development Project (Phase 2)" as the successor to this project.

Table 3 Planned and actual major output (SID and community facilitators)

	Plan	Actual
【SID】		
1) Participatory Rural Appraisal	Approx. 260 SP	335 SP
2) Feasibility Survey; F/S	Approx. 240 SP	331 SP
3) Detail Design	Approx. 220 SP	258 SP
4) Baseline Survey	Approx. 10 SP	20 SP
【Facilitator】 Allocation of facilitators (each district) for technical assistance and dissemination activities including training sessions and so on, Allocation of community assistants for institutional establishment support for WMCA		242 community assistants Five general facilitators

Source: documents provided by JICA and questionnaire

Changes of output and reasons

【SID】

Various surveys related to the design survey were also carried out according to the needs of the sites at the implementation stage, which meant a difference from the plan emerged, however, it

can be said that each of the surveys constituted a necessary process to select the appropriate SP.

【Facilitator】

The community assistants, named as facilitators during the appraisal, did not finalize the number to be placed at the time of appraisal. However, since the same number as the actual SP number was scheduled for placement, it can be said that the number of community assistants was placed as planned. The community assistants instructed each SP on to smoothly establish WMCA and the daily operation, while as for general facilitators, five were selected for all target areas of this project; supported for SPs whose community activities did not proceed steadily.

Table 4 Planned and actual major output
(Total number of trainees for capacity-building training)

	Plan	Actual	Plan/actual
1) Orientation & Management	20,045	24,915	124%
2) Plan, design and construction	33,767	14,567	43%
3) Establishment and management of WMCA	157,061	126,572	81%
4) Operation & management	28,773	1,993	7%
5) Agriculture	23,720	28,823	121%
6) Fishery	21,481	4,128	20%
7) Environment	11,230	10,145	90%
8) Gender and development	8,455	14,384	170%
9) Overseas trainings	112	44	40%
Total	**304,644**	**225,571**	**74%**

Source: documents provided by JICA and questionnaire

Changes of output and reasons

【Trainings to strengthen capacity】

Training was also expected to change to a certain extent from the beginning, given the need to make a plan by considering site circumstances as appropriate following the SP selection. Consequently, the total number of training participants was lower than the plan (74% of the plan). The number of participants in “Operation & Management” and “Fisheries” training (technical guidance) largely decreased, while that for “Gender and development” largely increased.

It was not possible to conduct “Operation & Management” training by the end of project period in 50 SPs where the facility constructions were completed in the later stage of the project period. Furthermore, there were WMCA with only one training session, despite multiple such sessions planned originally in the abovementioned SPs. Accordingly, the number of training sessions was significantly lower than planned. The contract with consultants, having already extended for two and a half years, finally terminated half year before the

project completion without further extension. It is because thanks to training conducted by then, LGED could conduct training on behalf of the consultants. LGED provided follow-up training for the above 50 SPs which could not receive the trainings by the end of June 2016. It was confirmed that all WMCA, which were visited by site surveys, had received "Operation & Management" training. Number of trainees of Fishery training was significantly lower than planned because it was limited only to SPs expected to have potential for fishing activities, out of the overall SPs. In addition, the reason for the increased number of participants in "Gender and development" training included holding multiple training sessions within a short period responding the needs and convenience of participants.

More importantly, training sessions were conducted for WMCA members; not only to strengthen capacity but also to promote understanding, cooperation and motivation to participate, underline their roles and responsibilities and promote continued participation in future. With this in mind, it is considered that the training sessions were planned and implemented properly, since all areas of this project were covered (except for some "Operation & Management" and "Fishery"). It was also confirmed that assistance had been obtained from the relevant ministries and agencies such as the Ministry of Agriculture and Ministry of Fisheries, when planning, implementing and monitoring training sessions[11] to improve technical capacity.

Table 5 Planned and actual major output (Consulting services)

Plan	Actual
1) Plan, design, pre-examination, quality management and monitoring 2) Support for participation of community 3) Support for tendering and planning 4) Capacity strengthen of executing agency, WMCA and related institutions 5) Supervising supports to related institutions and collaboration	While service was conducted as planned, the contract period was extended due to the increase of SP. (Original contract: 51months, additional re-contract : 30 months)

Source: documents provided by JICA and questionnaire

【Consulting services】

The consulting services was implemented as planned and the period of re-contracting with the increase in SP was considered appropriate, since it was realistically extended according to real circumstances at the time.

3.2.2 Project Inputs

3.2.2.1 Project Cost

While the total project cost was planned to be 7,538 million yen (of which yen loan

[11] It indicates training sessions for 5) Agriculture and 6) Fishery in Table 4.

portion was 5,313 million yen), the actual cost was 7,428 million yen (of which yen loan portion was 5,311 million yen) and within the plan (99% of the plan). Cost covered by Bangladesh side exceeded the plan in local currency as the number of SP increased, however, the amount converted into yen was reduced to within the plan due to the fluctuation of the exchange rate[12] (95% of the plan).

3.2.2.2 Project Period

Though the planned project period of this project was 77 months in total from October 2007 to February 2014[13], the actual period was 103 months in total from December 2007 to June 2016, exceeding the plan (134% of the plan). This was mainly due to delays in starting the project due to delays in procuring consultants and extension of the period with the increase in SPs. In this project, while the loan became effective in March 2008, given the delay in selecting consultants, the commencement was postponed to April 2009. Delays in selecting and concluding contracts with consultants were exacerbated by the situation, while the internal procedures also took longer than expected due to the temporarily increased workload in ministries given the election of December 2008 and the subsequent launch of the new administration[14]. In addition, the detailed design, tendering period and consulting services period were also extended due to an increase of around 20% in the number of SPs at the time of appraisal. The extension of surveys and consulting services accompanying the increase in SP was indispensable for implementing the project and can thus be considered reasonable.

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

（1） Financial Internal Rate of Return(FIRR)

Since it was not calculated at appraisal, no recalculation was carried out.

（2） Economic Internal Rate of Return (EIRR)

The economic internal rate of return (EIRR) at the time of appraisal was estimated at 36% as the average rate of various SPs[15]. EIRR at the time of project completion was calculated 12%[16]. This is because the EIRR at the time of appraisal included both agricultural and fishery production increases in benefits, whereas benefits at the time of project completion

[12] At the time of appraisal; 1 taka＝1.66 yen, At the time of project completion, 1 taka＝1.38 yen and as an average during project implementation: 1 taka＝1.34yen

[13] The project period is defined from the Loan Agreement signing month (starting point) to the civil engineering completion month (completion).

[14] Source: questionnaire

[15] 36% is the average EIRR for four types of SPs. The EIRR of each SP is as follows: flood control = 24.8%, drainage improvement = 48.6%, surface water storage = 17.4%, irrigation = 45%. Cost of integration at the time of calculation was cost = project cost (excluding tax) + operation and maintenance expenses, benefit = increase in agriculture · fishery production, project life = 30 years.

[16] Source: document provided by JICA. EIRR at the time of project completion was data recalculated by the executing agency not by this ex-post evaluation survey.

included only agricultural production but none from fishery production[17]. Furthermore, it is because there was limited benefit from agricultural production in most areas of the SPs. Since most SPs that completed at the last year of project period experienced only one or two times of harvesting in most SPs by the project completion, even though some of these SPs can perform three times of harvesting year-round. Given that data on agricultural and fishery production by areas after project completion needed for quantitative analysis could not be obtained from the executing agency, EIRR could not be recalculated at the time of ex-post evaluation.

In light of the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair

3.3 Effectiveness and Impacts[18] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

At the time of appraisal, the provisional indicators, namely "benefited area", "number of benefitting households", "number of WMCAs", "collection rate of irrigation water charge", "production of rice" and "production of fish" and their targets were set based on the SP selected samples as shown in Table 6, whereupon it was decided that both baseline data and target would again be revised after the SPs were selected after the project commencement.

Table 6 Baseline and target for indicators which were set at the time of appraisal

Indicator	Baseline (2005)	Target (Two years after completion)
Benefited area (ha)	—	167,000
Number of benefitting household(no.)	—	259,000
Number of WMCA (no.)	—	200
Collection rate of irrigation water charge (%)	—	100
Production of rice (ton/year)	778,396	1,000,000
Production of fish (ton/year)	10,000	27,000

Source: document provided by JICA

242 SPs were selected in 2010 after the project commencement and the target was again set as shown in Table 7. SP construction proceeded in phases and the effect indicators of each SP were monitored during the project. Meanwhile, though LGED continues to monitor efforts to maintain and manage the infrastructure related to rural development, data after the project completion was not collected since information on production was outside LGED

[17] According to LGED, for fisheries, there were many cases where it was made for consumption by themselves and the catch was smaller than the agricultural harvest, so it was not included in the benefit.

[18] Sub-rating for Effectiveness is to be put with consideration of Impacts.

jurisdiction. Accordingly, the actual data shown in Table 7 was that obtained from the SP completed during the project period until project completion[19].

Table 7 Target and actual operation and effect indicators set after the project commencement

Indicator	Target[Note1]	Actual			
		2012/13	2013/14	2014/15	2015/16
	2 Years After Completion	A part of SP completed			Completion year
		27 SP	83 SP	143 SP	242 SP
Benefited area (ha.)	130,000	14,438	44,920	73,676	127,863
Number of benefitting household (no.)	150,000	15,486	38,058	71,923	115,125
Number of WMCA (no.)	235-250	27	83	143	242
Production of serial (ton/year)	184,000	10,714	34,536	67,918	n.a.
Production of no serial (ton/year)	145,000	4,567	14,432	31,637	n.a.
Production of fish (ton/year)	10,000	28	95[Note2]	156[Note3]	717[Note4]

Source: documents provided by executing agency

Note 1: Target set as of 2010

Note 2: Production of fish for 48 SPs, Note 3: Production of fish for 92 SPs, Note 4: Production of fish for 217 SPs

(1) Benefited area, number of benefitting household, number of WMCA formed

Although there is no baseline for these indicators[20], the actual benefited area at the time of project completion reached 98% of the target and thus almost achieved the target. It can be said that the number of benefitting households also largely attained the target, despite being slightly lower than 80% of the figure. Since the benefited area achieved 98% of the target, it can be assumed that benefited area per benefitting household increased and that the target number of benefitting households was largely attained. The number of WMCA formed was also equivalent to the number of SPs, so it can be said that the number of WMCA largely reached their target. It is possible to say that even in areas where sufficient water could not be obtained, due to the development of reservoirs and irrigation facilities, scope to utilize water resources more widely and more effectively and efficiently emerged.

(2) Increase of crop production

As mentioned above, the latest data obtained at the ex-post evaluation was that for 2014/2015. At the time, 143 out of 242 SPs were completed, namely 59% of the total SPs. Therefore, although it is impossible to measure the achievement situation accurately, considering the number of SPs completed in 2014/2015 and confirmed if the target value is 60%, the achievement rate for crop production in 2014/15 is about 62%.

According to the executing agency, triple cropping is common in Bangladesh. Conversely, there were also many SPs which did not cover the planned three cultivation periods, since the

[19] According to LGED, it is assumed that the impact assessment will be conducted five years after completing all SPs, as with the preceding project.

[20] The baseline of the number of benefitting households and WMCA formed can be said as zero.

monitored data gathers data from the following month after the completion of the facility. For example, while 83 SPs was completed in 2013/2014, many SPs obtained data from the second cultivation period because the completed timing of each SP was different resulting only 27 SPs, completed in 2011/2012, could monitor the actual data of three cultivation periods. Moreover, according to the executing agency, when confirming the agricultural production as the project effect, it is desirable to check the production at least two years after completing the facility constructions since one year after completion of the facility includes cases not covering multiple cultivation periods as described above and approximately one year would be needed to correct and adjust defects occurring in the facility. Therefore, for targeting the production of 27 SPs, the incremental production of 27 SPs and incremental yield per hectare are shown in Table 8 and the estimated effects of 242 SPs based on information of 27 SPs are shown in Table 9 to determine the effect more accurately. Consequently, it was considered that the estimated production of 242 SPs achieved 80% or more of the target though the same cultivation conditions may not apply to all 242 SPs.

Table 8 Comparison on incremental crop production of 27 SPs immediately after project completion and two years after project completion

	Cropped area (ha)	Incremental production (t)	Incremental yield per ha (t)
Immediately after SP completion (2012/2013)	14,438	15,280	1.058
2 years after SP completion (2014/2015)	14,438	30,340	2.101

Source: document provided by executing agency

Table 9 Comparison of incremental crop production of 242 SP immediately after project completion and 2 years after project completion (estimate)

	Cropped area (ha)	Incremental yield per ha (t)	Incremental production (t)	Target (t)	Achievement rate (%)
Immediately after SP completion (2012/2013)	127,863	1.058	135,320	―	―
2 years after SP completion (2014/2015)		2.101	268,691	329,000[Note]	82

Source: document provided by executing agency

Note: Data include the total crop production of cereal and non-cereal. Therefore, the target was also set as the sum of the cereal production (184,000 t) and non-cereal production (145,000 t).

(3) Increase in fish catch

The catch shown in Table 7 was less than 10% of the target. Conversely, when measuring the effectiveness of fishing activities, it is necessary to consider the fact that fishery activities did not commence immediately after completion of the facilities at each SP. After completion of the facilities, fishery activities have started followed by the establishment of a carp farm, implementation of an aquaculture demonstration utilizing the pond and various training related to fishery, etc. through cooperation of the Ministry of Fisheries and Livestock. It is

expected that the facilities developed under this project will facilitate management of wetlands and floodplains and so on in the target area, to prepare an environment suitable for fish ecology over several years, whereupon fish production will gradually increase by utilizing members' experiences gained through training. Therefore, although catches may not increase rapidly after the SP completion year, it is expected that productivity will gradually increase over the next few years. Accordingly, it had not reached the target as of completion of the project, despite commencing the new fishery activities. Conversely, according to the results of the questionnaire conducted on completion of the project, 95% of the 142 SPs who responded answered that the catch volume had increased. As the majority of the areas did not originally carry out fishing activities except for the purpose of domestic consumption in the target area, it can be said that the result of the questionnaire shows scope to boost the catch volume by starting new fishery activities after the project was implemented (see Table 10).

Table 10 Result of questionnaire about fish catch amount

Increase	No change	Decrease
95%	1%	4%

Source: documents provided by executing agency
Note: Questionnaire survey was conducted for 142 SPs at the project completion.

3.3.1.2 Qualitative Effects (Other Effects)

To collect information to supplement the qualitative effects and those described above, Focus Group Interviews (hereinafter referred to as "FGIs") were conducted for WMCA members during the site visit by the local consultant[21], the results of which are shown below.

(1) Strengthening the local community's organizations and raising awareness through WMCA activities

According to the executing agency, members of committees and WMCAs participated in the facility construction, monitoring and quality management activities while implementing this project, helping foster a sense of ownership among beneficiaries toward the completion of works. A system was also established to perform maintenance and sustainable management under the WMCA initiative.

[21] During this evaluation, site visits were conducted by local consultant at 16 SP sites and FGIs were also conducted at all sites. Sites visited included 4 SPs in Mymensingh area, 6 SPs in the Faridpur area and 6 SPs in the Sylhet area. FGI was implemented for 12 WMCA members at each SP. As one third of WMCA committee members were to be composed of women, around 30% of all interviewees were women.

Also, in FGI, it was explained that the members, mainly WMCA committee members, participated in the capacity-building training implemented in this project and utilized the knowledge gained thereby for agricultural and fishery activities. Since WMCA did not exist before the project, most members responding were unable to provide feedback on changes in terms of strengthening WMCA and raising awareness. However, it is confirmed that respondents have been involved in organized WMCA as members and cooperated in providing a workload and a member fee (water charge) for maintenance works. Accordingly, it can be said that awareness of the importance of maintaining and managing facilities was raised by participating in this project. Moreover, it was decided that one third of the WMCA committee members would be women. In Bangladesh, where very few women participate in social activities, having women elected to a committee initiated changes in terms of awareness of women's participation in WMCA and encouraged women to participate in regional and social activities.

WMCA members maintaining river bank
(Kalagang Roar Haor SP Sylhet)

(2) Increase in crop and fish production
(supplementary information on quantitative effects)

In the answers to the questionnaire from the executing agency and the result of FGI, flood damage decreased during the monsoon period and more irrigation water could be used during the dry season, thanks to improvements in facilities such as irrigation, drainage, water storage and adjustment gates. Consequently, harvesting and fishery areas thrived, the cultivatable period extended and scope emerged to obtain water for irrigation and aquaculture ponds promptly, timely and as required. Accordingly, increases in the production of rice, jute and vegetables etc. and fishery catches were confirmed in areas where fishing activities were carried out (see Table 11).

Pre-harvest Boro rice
(Binnakandi Chara SP in Sylhet)

Fish culture in artificial pond
(Sutiar Khal SP in Mymensingh)

Table 11 Change of crop and fish production (Answers in FGI)

Area	SP	Crop production	Fish production
Mymensingh	Dogachi	Boro rice [Note1] production increased approximately 2-3 times. 60kg/1khara[Note 2] à 120-160kg/1khara.	Culture fishery started at 20 ponds as a new activity after the project.
	Foliar Khal	Production increased approximately 4 times for Boro rice and 3 times for Aman rice [Note 1], Cultivation of vegetable and Robi [Note 1] were also started after the project completion.	Due to increased water volume, the fishery catch increased about 3-4 times in canals and fish culture ponds.
	Morahashi	Both Boro and Aman rice production increased by 2 to 3 times.	The fishery catch increased 2-3 times compared with the figure before implementing the project.
	Sutiar Khal	Cultivation became possible on 100% of the land and crop production increased 1.6 times.	The fishery catch increased 2-3 times compared with the figure before implementing the project.
Faridpur	Baneswardi	Significantly increased. Approximately 200kg/acre for jute and 400kg/acre increased. Harvesting of Robi and onions and so on also become possible.	N.A.
	Satgavia	Increased. Rice production pattern increased from double- to triple-cropping.	Fishery catch by members who participated in fishery training sessions increased 3 to 4 times.
	Rotandia-Balughat	Production of Aman, Robi and Onion doubled and using higher quality water also boosted the quality of jute.	Almost tripled.
	Bangdubi Beel	Production of Boro rice and jute approximately doubled. Production of onions started.	Largely increased.
	Auliar Char	Production of Aus and Aman rice as well as jute increased 2-3 times. Production of Boro rice, which was not possible before the project, emerged at 1200kg/acre.	Due to the use of canals and starting to use fish culture ponds, the fishery catch roughly tripled.
	Palordi-Alinagar	Production of all crops increased, 1.7 times for Jute and approximately doubling for Boro and Aman rice.	Due to the use of canals and starting to use fish culture ponds, the fishery catch roughly tripled.
Sylhet	Binnakandi	Production of Boro rice increased 2-3 times and significantly for vegetables, which could not be produced due to the shortage of water.	N.A.
	Bawa-Chamurakandi Bora Haor	Rice production increased about 4-5 times.	N.A.
	Kalagang Roar Haor	Production of Boro rice increased about 2-4 times.	N.A.
	Bongaon Chhara	Production of Boro rice roughly tripled.	Increased.
	Moti Khal	Production of Boro rice roughly doubled. 600-640kg à 800-1200kg /cultivation area	Fish production doubled.
	Bara Chhara	Production of Boro rice has increased from 40-60kg/bigha to 80-100kg /bigha (1Bigha=1500- 6771m^2)	Approximately tripled.

Source: prepared based on the record of FGI

Note 1: Boro rice is a type of rice cultivated from October to April (dry season), Aman rice is cultivated from May to August and September (monsoon season), Aus rice is from January to April and May (pre-monsoon season). Robi refers to crops other than rice. It includes wheat, vegetables, spices, etc. and cultivation requires considerable water.

Note 2: 1 Khara＝7decimal=0.07 acre

3.3.2 Impacts

3.3.2.1 Intended Impacts

(1) Contribution to poverty reduction (increase in farmer's income)

As mentioned in effectiveness, beneficiaries answered that the production of crops and fish had increased and women's participation in economic activities such as poultry, tailoring, making baskets and so on had been promoted through participation in training to develop small-scale infrastructure facilities and activities related to agriculture, fisheries, income-generation, etc. Consequently, it can be said that incomes have increased, which has helped reduce poverty in each region. As seen in the answer in FGI for Table 12, it was confirmed that the poverty rate was reduced across the board after completion of this project.

Table 12 Situation of poverty reduction based on information confirmed at FGI

Area	SP	
Mymensingh	Dogachi	Due to the stimulation of agricultural and fishery activities in the area, no families categorized as poor were confirmed at the time of ex-post evaluation.
	Foliar Khal	Thank to implementing this project, the poverty rate of this area has been considered lowered by about 60%.
	Morahashi	The poverty rate declined with the activation of agricultural and fishery activities and is currently considered to be about 10%.
	Sutiar Khal	Although about 20% of residents can still be considered in poverty, it can be said that the poverty rate in the SP area has declined drastically due to the revitalization of agriculture and women's economic activities.
Faridpur	Baneswardi	Since income-generation activities were implemented after this project, incomes have increased, which has helped reduce poverty, despite the lack of figures.
	Satgavia	Along with the increase in individual agricultural activities and incomes, it helps reduce the poverty rate in the area.
	Rotandia-Balughat	It was answered that the poverty rate among WMCA members was almost zero.
	Bangdubi Beel	On completion of this project, the poverty rate of this area had decreased by 10 - 15%.
	Auliar Char	The poverty rate dropped by 40%, 10% of which was considered thanks to this project.
	Palordi-Alinagar	The poverty rate of the target area decreased by 30 - 40%. About 10% is thought attributable to the impact of developing irrigation facilities.
Sylhet	Binnakandi	The poor in the SP area has decreased. Despite the lack of official data, 80% of population were considered poor, which decreased to about 20% after the project.
	Bawa-Chamurakandi Bora Haor	Despite the lack of data, through SP income-generation activities, incomes have increased, which has also helped reduce poverty.
	Kalagang Roar Haor	It can be said that the proportion of poor has been reduced by about 10 - 15%.
	Bongaon Chhara	About 70% of poverty has been reduced. As things stand, the proportion of poor has fallen to about 10%.
	Moti Khal	At the time of ex-post evaluation, the poor households were only limited.
	Bara Chhara	Poor families have declined by about 20% and the current situation is about 10% of the total.

Source: prepared based on the record of FGI

Note: Respondents do not set criteria for defining poverty and explained the poverty situation as judged by the living conditions of local people.

(2) Increased employment opportunities

According to the executing agency, it was analyzed that implementing this project has stimulated agricultural and fishery production, generating employment opportunities of 3.1 million man/day[22]. Local consultant on site visits for field investigations confirmed that employment opportunities had been generated and boosted in all 16 areas visited as a result of FGI. Given the limited opportunities for labor before this project, one or two people from each household had been working in neighboring cities. However, since most of the areas had expanded agricultural and fishery activities after the project, migrant work was no longer needed. In reverse, certain areas short of labor during the harvesting season were also confirmed. At the same time, it was also mentioned that employment opportunities for women had increased. As well as employing workers, employment of women involved in poultry farming, vegetable cultivation, tailoring and basket-making etc. was also confirmed by using the knowledge and experience of income-generation activities learned through capacity-building training, which played a key role in boosting household income. Cases of expanding the agricultural activities and income-generation activities of women after this project are shown in the following box.

BOX 1: Women's income generation activities: departure from poverty

Mrs. A, a member of Baneswardi SP in Faridpur, received poultry farming training in this project. On completion of the project, she took out a loan of 5,000 Taka (about 6,500 yen) from WMCA and started poultry farming by utilizing her training knowledge and experience. Although it used to be difficult for families to eat enough meals each day, the income she now earns varies from about 20,000 to 30,000 Taka (approximately 26,000 – 39,000 yen) per month. Moreover, her children can now attend school and eat three meals a day. She is also involved in vegetable cultivation in her small yard alongside poultry farming and harvesting became possible. She is delighted with the WMCA activities, since they allowed her to escape poverty by utilizing the fruit gained from capacity building training.

BOX 2: Expansion of agricultural activity

Mr. B, a WMCA member of Binnakandi SP in Sylhet, used to cultivate rice in this area before the project. On completion of this project, annual rice production tripled. With the support of WMCA, he purchased a rice crushing machine and can also earn 500 to 700 taka per day from a crushing mill. With the increased income, currently he has started new activities to cultivate a demonstration plot in a portion of farmland for high-grade seed for rice cultivation.

[22] Source: questionnaire. This is an estimated figure by the executing agency based on the survey for 142 SPs. Man/day is one of the units to express workload and shows how many people need to work for how many days to complete works. It is indicated as the "number of persons × number of days".

BOX 3: Purchasing land through income generation activity

Mrs. C, a WMCA member of Kalagang Roar Haor SP in Sylhet, engages in duck farming for a living. Before the project, since she did not own land, she needed to work as a labourer on landowners' land to earn income. She became a WMCA member after WMCA was formed, and participated in training on duck farming. Receiving support from WMCA, she started duck farming activity. She currently earns 150,000 taka (about 200,000 yen) per year. With these earnings, she could purchase 60 decimal (0.6 acres) of land, which makes it possible to cultivate rice.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

Based on the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations*, it was considered that the undesirable effects on the environment of the project is not likely to be serious and the project was categorized as B. The environmental impact assessment report was not required under the domestic laws of the country[23]. According to the executing agency, the construction monitoring committee of the Contractor / WMCA monitored the impact of air, soil, water quality and noise in the 242 SP areas, details of which were periodically reported to LGED and no issues was confirmed. The WMCA members also explained that no negative impact was imposed on the environment, even in the interviews conducted during the site surveys. Therefore, it is judged that no negative impact was imposed on the natural environment by this project.

(2) Resettlement and Land Acquisition

At the time of appraisal, land acquisition of 300 hectares was assumed. However, the fact that the majority of the necessary land was state-owned land, the land of the WMCA office was provided free of charge from the WMCA, thus land acquisition actually limited only 0.46 hectares, which was significantly lower than the plan. According to the executing agency, all land acquisition was carried out without problems according to domestic procedures. It was also confirmed with the executing agency that there was no resettlement.

As mentioned above, it is confirmed that the crop production and catch volume had increased in SP area since agricultural and fishery activities previously restricted during rainy and dry seasons became possible thanks to improved small infrastructure facilities for water management such as irrigation and drainage as well as various training. In addition, income has increased and employment opportunities for workers in agricultural and fishery activities have proliferated. While implementing the project, women were given opportunities to engage in labor through minor construction work, while females participating in training such

[23] Source: document provided by JICA and questionnaire

as income-generation activities became involved in activities to boost income after completion of the project. It was also confirmed in FGI that such efforts could help expand employment opportunities and reduce the rate of poverty in the area.

In light of the above, this project has largely achieved its objectives. Therefore, the effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

Daily maintenance of the infrastructure facilities constructed in this project is handled by the WMCA formed by each SP. Each WMCA has established a WMCA committee comprising about 12 persons[24] on average and the maintenance subcommittee is selected under the committee. The subcommittee is responsible for understanding the cultivation area and water usage of members, formulating a maintenance plan based on said usage, collecting water charges or member fees from members and also conducting the necessary activities for management and maintenance of the same.

While WMCAs perform daily Operation and Maintenance (hereinafter referred to as "O&M"), handling breakage due to natural disasters, replacement due to aging and large-scale repairs are supported by LGED, including financial aspects. Integrated Water-Resource Management (hereinafter referred to as "IWRM"), an LGED unit, has continuously monitored facilities, the collection rate of member fees, etc. and provided technical advice as necessary. They oversee training to the O&M subcommittee as well as support the emergency response.

At the time of ex-post evaluation, a total of 11,184 staff members are assigned to LGED nationwide and among the 204 head office staff members, 17 staff of the maintenance team controlled the O&M of small-scale infrastructure facilities. In actual fact, the headquarters of LGED help supervise/manage and provide technical support to regional offices such as district and Upazila (sub-units of districts) offices, while the regional offices provide WMCA administrative and technical support. Specifically, the scope includes O&M guidance to the O&M subcommittee, assistance to assess the necessary maintenance activities, advice to prepare the O&M annual plan, support for urgently needed maintenance and so on. According to LGED, in each regional office, about four to five engineers and seven to nine technical staff members are assigned and the lack of any staff shortages, including in the target area of this project, was confirmed.

[24] It was decided by a contract between the WMCA and LGED that one third of the committee members would be women and the term of office is three years.

3.4.2 Technical Aspect of Operation and Maintenance

In this project, a total of 1,245 O&M training sessions were conducted for WMCA members. Further, a detailed follow-up on SP's O&M emerged through follow-up training after handing over of the facilities maintained by the SP[25]. At the time of the ex-post evaluation, LGED answered to questionnaires that almost all WMCA carried out the O&M activities without problems and even on the site where the local consultant visited for the field survey, the WMCA members basically understood the required activities based on the O&M manual and tried to implement them. In particular, it was confirmed through a questionnaire and interview survey to LGED and WMCA, for using water, maintenance fees had been collected and accumulated in the account opened in the bank and a mechanism to make it as a fund for maintenance and management had also been implemented according to the manual.

According to WMCA, however, changes of the committee members every three years and new members joining the WMCA underlines the need for ongoing training sessions. Although the WMCA also has the opportunity to participate in a range of training conducted by the IWRM unit and the LGED region (Upazila) office, the IWRM unit lacks funds to continue providing organizational management and O&M training to the WMCA, so ongoing WMCA training needs still apply. Since the development of infrastructure facilities for this project was completed in 2016, no maintenance work requiring high technical skill occurred at the time of ex-post evaluation and even if it occurs, LGEDs are supposed to support WMCA as needed so the lack of any issues from a technical perspective can be confirmed.

3.4.3 Financial Aspect of Operation and Maintenance

Expenses related to the O&M of small scale infrastructure facilities constructed in this project are borne by each WMCA and LGED. In this project, to secure future sustainability, only the WMCA having opened a bank account and capable of preparing the funds in the WMCA, although the amount varies in each union, were selected as target SPs at the time of SP selection. Therefore, all WMCAs have a certain level of O&M budget. In the WMCA, fees are collected from all members for labor and irrigation water, etc. even after facility development and deposited in the WMCA bank account. According to the executing agency, the total amount collected from 242 WMCAs as member fees amounted to 59,394,655 taka (data as of 2015/2016) and the annual average collected amount was 716 taka / year per member. The average collection rate of the member fee was also generally high, as shown below. It was also confirmed that there were some WMCA which had started fish farming, then hired workers locally and part of the income obtained from them was used for O&M expenses.

[25] Source: documents provided by JICA

Table 13 Collection rate of a member fee of 242 WMCAs

	2012/13	2013/14	2014/15	2015/16 Note
Average rate of collection fee	100%	99.5%	99%	94%

Source: document provided by executing agency
Note: Data of 2015/2016 is the one as of May 2016.

The following table shows the development budget of LGED and the amount of subsidy from LGED to WMCA in the recent year. The LGED development budget comprises about 12 to 14% of the development budget of the Bangladesh government and according to LGED, more than half is budgeted for rural development projects. Furthermore, LGED has secured a budget to support the WMCA, the amount of which is confirmed as having increased substantially over the past three years.

Table 14 Development budget of LGED

(Unit: million Taka)

	2014/2015	2015/2016	2016/2017
Development budget of LGED	108,145	117,763	141,286
Ratio of Bangladesh's total development budget	13.6%	12.3%	12.4%

Source: document provided by LGED

Table 15 The amount of subsidy from LGED to WMCA

(Unit: thousand Taka)

	2015/2016	2016/2017	2017/2018
The amount of subsidy from LGED to WMCA	9,865	18,702	38,930 Note

Source: document provided by LGED
Note: Amount of 2017/2018 is provisional budget.

Since this project was completed in 2016 and given the very limited time to ex-post evaluation, no significant maintenance costs are assumed incurred, but according to the results of FGI conducted at site surveys, appropriate maintenance fees were collected, including a form of providing a labor force at the time of ex-post evaluation. In addition, all SPs had bank accounts for maintenance and management and a system usable for maintenance and management expenses, including interests, is in place. Based on the above analysis, it can be said that there is no problem in terms of O&M financial aspects.

3.4.4 Status of Operation and Maintenance

Although it is difficult to determine the situation of all SPs of 242, according to the executing agency, no serious damage precluding the use of facilities was reported. In addition, it was confirmed that the facilities were mostly well utilized even when visiting the site. Although some SPs were confirmed where the facilities could not be 100% utilized due to partial erosion caused by rain or water shortages during the dry season, this is a situation

where periodically and partial troubles occur, so no cases of non-operational facilities were confirmed. Though damage to embankments caused by rain, partial damage to river banks and clogging mud etc. were reported by members during FGI, cleaning and simple repair work of damaged parts utilizing O&M funds were carried out by the O&M subcommittee with the support of WMCA members.

At sites where the site survey was conducted, records were kept in line with the O&M manual and stored. It was also confirmed through records that controlling the opening and closing of the water gate, cleaning of the gate and mud and repairs to the embankment were all carried out. Consequently, as mentioned above, though it is assumed that a portion of the SP facilities are not operational periodically and partially, it can be said that they have been largely utilized without issues.

In light of the above, no major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented in the north-eastern and central parts of Bangladesh, aiming to increase agriculture and fishery production and efficiency by utilizing water resources effectively through the development of small infrastructure for water-resource management. Implementing this project was consistent with Bangladesh's development strategy that emphasizes the role of agriculture and fishery sector in helping reduce poverty, a sector plan showing the need to use irrigation and fishery water resources efficiently, development needs following frequent damage inflicted by floods, which hinder agricultural and fishery activities and the need to mitigate damage from water logging as well as Japan's ODA Policy. Therefore, its relevance is high. Though the project cost was within the plan, the project period exceeded the plan due to the increase in the number of SPs and commencing the project was delayed due to delays in concluding the contract with a consultant, so the efficiency is fair. Improvement of irrigation facilities and various kinds of training enabled agricultural and fishery activities that were restricted by floods and droughts, and boosted crop and fish production in the SP area as well as employment opportunities for workers and agricultural and fishery income. While implementing project, working opportunities were offered to women through minor construction work. It was also confirmed that women who participated in training of income-generation activities and so on have started small businesses such as poultry farming and tailoring, helping generate income after completion of the project. Through these changes, the poverty rate of the area declined, thus the effectiveness and impact of this project are high.

No major problems have been observed in the institutional, technical, financial aspects of the maintenance system and the small infrastructure facilities developed by this project are operating almost without problems. Therefore, the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency and WMCA

(1) Sharing of O&M knowledge within WMCAs considering sustainability

WMCAs have requested that LGED regularly conduct training sessions on an ongoing basis due to regular changes in the WMCA committee members and new members joining. Accordingly, LGED needs to examine continuing guidance on new technical aspects in future. Conversely, training sessions on capacity-building were implemented in this project for all WMCAs during and after implementation. With this in mind, when committee members change, there is a need to conduct take over and explain sufficiently from former to new members and when new members join, mainly the committee members need to set up briefing sessions. As such, there is also a need to strive to share basic O&M knowledge and experience learned to date within the WMCA. LGED can also instruct and encourage WMCA to share knowledge within the WMCA.

4.2.2 Recommendations to JICA

(1) Setting a mechanism for providing implications to the successor phase and understanding the area-wide effectiveness

Since many SPs completed construction in 2016, only limited periods have elapsed since the project completion. Accordingly, the effect and impact of this project will further clarify in future. Meanwhile, LGED have been monitoring O&M performance of all SP's facilities through the IWRM unit, but it is difficult to measure data showing the effectiveness / impact of this project such as crop and fishery production because LGED is the agency responsible for maintaining infrastructure facilities. In implementing Phase 2 of this project which has already started, the executing agency and JICA Bangladesh office should examine the mechanism of measurement of the project effect / impact on completion of the project, a few years after project completion and further after for a certain period so as to avoid the situation occurred in this project. The mechanism may include cooperation with the Ministries of Agriculture and Fisheries during project implementation.

4.3 Lessons Learned

(1) Systematic implementation of O&M training for maintenance organizations in supporting small-scale irrigation facilities

This project involved developing small-scale irrigation facilities and the details and numbers of SP were confirmed through a survey after the project started. With site needs and survey results in mind, the number of SPs increased and the period allowed to construct facilities was also extended. Consequently, some SPs completed in the later stage of the project period and those SPs could not receive trainings by the end of the project period. In most projects developing small irrigation facilities, community organizations are normally responsible for improving facilities, underlining the crucial need to improve the O&M capabilities of community organizations simultaneously ensure sustainability. Accordingly, in determining details of the target SP of similar types of project, the executing agency and JICA should examine project period considering not only infrastructure development needs but also capacity development support for an organization responsible for O&M (soft component), and formulate a realistic plan to ensure project sustainability.

(2) SP selection considering sustainability

In this project, opening a WMCA's bank account with funds for maintenance and management was set as a selecting condition of SP so that the WMCA could assure sustainability. Consequently, it can be said that SPs with WMCAs who have motivations to participate in this project and to become involved in O&M were selected. This is one of the reasons for securing high effectiveness and sustainability of this project. Where the entity responsible for maintenance is a facility user, it is desirable to examine factors to scale the motivation of the user / responsible entity of maintenance (in this project, opening an account by the WMCA for O&M), and add it to the selecting criteria at the time of project planning.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
Civil works	Small scale infrastructure for water-resource management in farmland (Benefited area of 1,000ha or less) ・Flood management (FM) 65 SP ・Drainage improvement (DR) 80 SP ・Surface water storage 50 SP ・Irrigation facility (IRR) 5 SP Total approximately 200 SP	・CAD 8SP ・Water conservation (WC) ・CAD 1SP ・FM & DR and WC 45SP ・WC 31SP ・DR・WC 44 SP ・FM ・WC 8 SP ・FM 4 SP ・FM&DR 40 SP ・FM&DR・ IRR 2 SP ・DR and IRR 47 SP ・DR 12 SP Total 242 SP
Procurement of construction material	Construction material, vehicles for site management /trainings and monitoring and office equipment	・Construction material was procured as planned. Vehicles for site management, trainings and monitoring.
Construction of WMCA offices	No information	225 offices for WMCA were constructed.
Survey Investigation and Design	・Participatory Rural Appraisal approx.260SP ・Feasibility Survey approx.240SP ・Detail Design approx.220SP ・Baseline Survey approx. 10SP	・Participatory Rural Appraisal 335 SP ・Feasibility Survey 331 SP ・Detail Design 258 SP ・Baseline Survey 20SP
Facilitator	Allocation of facilitators in each district for technical assistance and dissemination activities including training sessions and so on, Allocation of community assistants for institutional establishment support for WMCA	242 community assistants Five general facilitators
Trainings to strengthen capacity	(Number of Participants) ・Orientation & Management 20,045 ・Plan, design and construction 33,767 ・Establishment and management of WMCA 157,061 ・Operation & management 28,773 ・Agriculture 23,720 ・Fishery 21,481 ・Environment 11,230 ・Gender and development 8,455 ・Overseas trainings 112 Total 304,644	(Number of Participants) ・Orientation & Management 24,915 ・Plan, design and construction 14,567 ・Establishment and management of WMCA 126,572 ・Operation & management 1,993 ・Agriculture 28,823 ・Fishery 4,128 ・Environment 10,145 ・Gender and development 14,384 ・Overseas trainings 44 Total 225,571
Consulting Service	・Plan, design, pre-examination, quality management and monitoring ・Support for participation of community ・Tendering and plan ・Capacity strengthen of executing agency, WMCA and related institutions ・Supervising supports to related institutions and collaboration	While service was conducted as planned, the contract period was extended due to the increase of SP. (Original contract: 51months, additional re-contract : 30 months)
2. Project Period	October 2007 – February 2014 (77 months)	December 2007 – June 2016 (103 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	522 million yen 7,016million yen (4,227 million Bangladesh Taka) 7,538 million yen 5,313 million yen 1 Bangladesh Taka= 1.66 yen (As of September 2006)	373 million yen 7,055 million yen (5,265 million Bangladesh Taka) 7,428 million yen 5,311 million yen 1 Bangladesh Taka =1.34 yen (Average between December 2007 and June 2016
4. Final Disbursement	March 2016	