Republic of the Philippines

Ex-Post Evaluation of Japanese ODA Loan Project
"Agno River Flood Control Project (Phase II) (Phase II-B)"

External Evaluator: Masumi Shimamura
Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

This project aims to reduce flood damage in the project area by constructing flood control facilities and conducting the Information Education and Communication program (IEC program) for the Local Government Units (LGUs) and residents. Mitigation of flood damage has been achieved by the project－construction of floodway and diversion structures, river improvement, and construction of bridges－and the results of local interview and beneficiary survey have shown local residents' satisfaction to the benefit of the project. The project has also contributed to the improvement and enhancement of the people's living environment, and the economic and social development. In light of this, the project is deemed as to have yielded positive effectiveness and impacts in various ways. In addition, the IEC program conducted in the project has drawn much attention as a good practice which had promoted awareness of the LGUs and local residents for disaster prevention and enhancement of disaster prevention measures. The project objective to contribute to the reduction of flood damage, enhancement of people's living environment and sanitation situation, and development of local economy and society is consistent with Philippines' development plan and development needs, both at the time of appraisal and the ex-post evaluation, as well as Japan's ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the project cost was lower than planned, the project period was longer than planned. As regards operation and maintenance, some uncertainty has been observed in terms of financial prospects of the LGUs, therefore sustainability of the project effect is fair.

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

1. Project Description

Project Location

Agno River after improvement

1.1 Background

The Philippines is exposed to severe geographical and climatic conditions. Approximately twenty typhoons out of around thirty, occurring on the Pacific Ocean every year, approach the country and around ten of them land. Frequent earthquakes and volcanic eruptions also occur in the country as well. In addition to this, the people in the country frequently suffers from fierce flood and mudslides during rainy seasons because of the country's social and economic conditions that urban areas have developed in flat and low-lying, flood-prone areas. Such disasters have become serious impediments to socioeconomic development in the Philippines, and steady countermeasures are needed to control flood and mudslides.

The Agno River flows through the broad Pangasinan Plain in central Luzon, and then empties into the Gulf of Lingayen. The Agno is the fifth largest river in terms of basin area in the Philippines, draining 5,952 km^2 (approximately the same area as the drainage basin of the Abukuma River in Japan). In this plain, where about 1.33 million people live and their main occupation is farming, flood caused by typhoons and localized torrential downpours has been an annual occurrence. This situation has been worsened by accumulations of mud on the riverbed caused by an eruption on Mt. Pinatubo in the south, thus making the area even more susceptible to flooding. Japan International Cooperation Agency (JICA) had, prior to implementing this project, assisted the urgent emergency repair project for dredging and bank protection on the lower reaches of the Agno River, however, project in the middle section in the basin has been essential to implement drastic flood control measures.

These backgrounds at that time have shown urgent necessity for flood damage mitigation in the project area by implementing this project in order to improve living

environment and sanitation situation[1] of residents and to achieve socioeconomic development of the Agno River drainage basin.

1.2 Project Outline

The objective of this project is to reduce flood damages in the Agno River drainage basin by constructing diversion and floodway structures, and repairing and constructing dikes and bridges in the middle section of the Agno River, which flows through both Provinces of Pangasinan and Tarlac, thereby improving the area's living environment and sanitation situation, and contributing to its socioeconomic development.

	Phase II	Phase II-B
Loan Approved Amount / Disbursed Amount	6,734 million yen / 6,315 million yen	2,789 million yen / 2,776million yen
Exchange of Notes Date / Loan Agreement Signing Date	September, 1998 / September, 1998	March, 2001 / May2001
Terms and Conditions	Interest Rate: 1.7%, Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: General Untied Consultant Interest Rate: 0.75% Repayment Period: 40years (Grace Period: 10years) Conditions for Procurement: Partially Untied (II) / Bilateral Tied (II-B)	
Borrower / Executing Agency	The Government of the Republic of the Philippines / Department of Public Works and Highways (DPWH)	
Final Disbursement Date	March, 2010	September, 2009
Main Contractor (Over 1 billion yen)	C.M.Pancho Construction Inc. (Philippines) / Toa Corporation (Japan) / Daewoo Engineering & Construction Co.,Ltd. (Korea)	China State Construction Engineering Corporation (China) ・ Ciriaco Corporation (Philippines) (JV)
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan) ・Basic Technology and Management Corporation (Philippines) ・PKII Engineers (Philippines) (JV)	

[1] Mitigation of health damage due to overflow of sewage water, drifting and scattering of decomposed matters etc.

Feasibility Studies, etc.	JICA Feasibility Study (1991)
Related Projects	ODA Loan (JICA) - Agno and Allied Rivers Urgent Rehabilitation Project (Loan Agreement signing on 1995) Technical Cooperation (JICA) - JICA Experts dispatched to DPWH (Section related with river management) - Strengthening the Flood Management Function of DPWH (Technical Cooperation Project) (July, 2005–June, 2010) - Strengthening of Flood Forecasting and Warning System for Dam Operation (Technical Cooperation Project) (October, 2009–November, 2012) Grant Aid (JICA) - Project for Improvement of Flood Forecasting and Warning System in the Pampanga and Agno River Basins (2007–2008)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September, 2012–August, 2013

Duration of the Field Study: November 18–December 15, 2012, March 31–April 13, 2013

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of the Philippines

At the time of appraisal, the government of the Philippines identified, in its Medium-Term Philippine Development Plans (1993–1998, 1999–2004) the importance of mitigation of flood damages, disaster prevention measures, and comprehensive watershed management through development of flood control facilities. The objective of the project

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③: High, ② Fair, ① Low

aiming to reduce flood damage in the Agno River drainage basin was consistent with the Philippines' medium-term development plans. The project had been also recognized as one of the priorities in the Medium-Term Philippine Development Plan (1999–2004) of the Department of Public Works and Highways (DPWH).

At the time of ex-post evaluation, the Philippine Development Plan (2011–2016) stipulates the importance of conservation of watersheds, and development of efficient and appropriate infrastructure in order to reduce flood damages. The Philippine Development Plan specifies following strategies to be pursued.

- Prioritize the construction of flood management structures in highly vulnerable areas
- Apply Climate Change Adaptation strategies in the planning and design of flood management structures
- Develop mechanism to expedite immediate financing for the repair and rehabilitation of flood management structures
- Increase LGU and community participation in disaster prevention measures and maintenance of flood management structures
- Implement disaster risk reduction and management from both structural and non-structural infrastructures (flood forecasting, flood warning system, evacuation plan, etc.)

In addition, the policy of the National Water Resources Board, an institution under the Department of Environment and Natural Resources (DENR), states the importance of water resource management, taking into account countermeasures of water related disasters. The project is consistent with the Philippines' development policy, and continuous support for flood prevention measures is highly important.

The project would be categorized as flood control sector or disaster risk reduction and management sector[4] at the time of ex-post evaluation, instead of environmental and natural resource sector being categorized at the time of appraisal, given the strategies stipulated in the Philippine Development Plan (2011–2016).

3.1.2 Relevance with the Development Needs of the Philippines

Pangasinan Plain where the Agno River flows, is primarily an agricultural land[5], and

[4] One of the important pillars the National Water Resources Board puts up is "mitigation of water related disasters and hazards". The Philippine government recognizes the importance of coordination among relevant departments/agencies and the LGUs in undertaking comprehensive water resource management including disaster prevention measures. The National Water Resources Board under the DENR puts up policies consistent with this.

[5] Agricultural land area in Pangasinan Province and the percentage of agricultural land in Pangasinan Province are as follows: 1991: 193,439 ha (36.0%), 2002: 160,697 ha (29.9%)

has been suffering, from frequent flood damages caused by typhoons and torrential rains at the time of appraisal.[6] Furthermore, this situation has been worsened by accumulations of mud on the riverbed caused by an eruption on Mt. Pinatubo in the south (1991). Therefore, urgent measures were needed to control flood and mudslides.

At the time of ex-post evaluation, the Development Plan of Pangasinan Province (2010–2015) indicated the importance of constructing flood management structures. Pangasinan Province was attacked by super typhoon Pepeng in October 2009 and suffered from immense damages,[7] which brought much-needed attention to continue reducing flood damages. In addition, the Agno River Basin Watershed Management Plan, prepared by the DENR after the typhoon Pepeng, emphasized the importance of comprehensive disaster risk reduction measures and pointed out the significance of practical disaster prevention activities and coordination among the LGUs, local communities and related institutions in reforestation in upstream areas and water resource management measures.

3.1.3 Relevance with Japan's ODA Policy

The objective of the project was consistent with the government of Japan's assistance policies and the assistance policy by JICA at the time of appraisal. The Ministry of Foreign Affairs of Japan's Country Assistance Strategy for the Philippines (August, 2000) stipulated in its "Disaster Prevention" section that "Japan has been putting effort in supporting for flood prevention measures and recovery from volcano damages, and will continue to support for flood control, erosion control and earthquake countermeasures as well as institutional and capacity development of relevant government agencies from medium- and long-term perspective. This is because frequent occurrences of large-scale natural disasters inhibit development and are likely to have enormous effects to the poor people." Moreover, Overseas Economic Cooperation Strategy by JICA (2000) emphasized its support for disaster prevention sector, focusing mainly on flood prevention. In fact, most of the support provided in that sector in the Philippines comes from the Japanese government.

Source: National Statistics Office

[6] (1) Number of major typhoons/monsoon rainfalls, (2) Affected number of people, (3) Damage to agricultural production for major typhoons and monsoon rainfalls which hit the project area before and after the time of appraisal are as follows:

- 1995: (1) 4, (2) 128,906 people, (3) 2.3 million pesos
- 1996: (1) 3, (2) 60 people, (3) 11.2 million pesos
- 1997: (1) 1, (2) N.A., (3) 17.1 million pesos
- 1998: (1) 3, (2) 238,608 people, (3) N.A.
- 1999: (1) 3, (2) 811,426 people, (3) 189.8 million pesos

Source: Region I Disaster Risk Reduction and Management Council

[7] 63 dead, more than 1.22 million people affected, 2,274 houses damaged, more than 6,760 million pesos as total amount of damages

Since the onset of the project, there has been no change in the assistance policies of the government of Japan or JICA, which might affect the direction of the project. Thus, the consistency of the project with the Japanese assistance policies is still maintained.

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 Effectiveness[8] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)[9]

The project aimed at reducing flood damages by improving flood control ability of the Agno River to respond to 10-year return period flood. Table 1 summarizes recent damages by major typhoons in the project area based on available data.

Table 1: Damages by Recent Major Typhoons in the Project Area

Year and month of major typhoons	Name of typhoons	Number of persons affected	Number of dead or missing persons	Number of damaged houses	Damage to agricultural production (mil. pesos)	Damage to infra-structure facilities (mil. pesos)	Maximum high water level at Bayambang Bridge (m)	Total rainfalls for four days at the times typhoon (mm) Station: Dagupan
August 2004	Marce/Nina	578,861	21	N.A.	314.4	51.1	25.20	N.A.
July 2006	Henry	40,026	5	N.A.	13.3	N.A.	22.45	N.A.
May 2008	Cosme	974,451	48	139,409	3,732.0	931.1	22.45	N.A.
May 2009	Emong	236,268	47	41,894	1,127.4	1,019.4	20.69	N.A.
October 2009	Pepeng	1,224,740	63	2,274	4,180.2	2,581.0	26.40	566.8
October 2010	Juan	538,098	11	10,531	1,776.7	65.1	20.37	N.A.
Project completion: February 2011								
June 2011	Falcon	94,848	1	28	95.8	61.7	20.75	N.A.
August 2011	Mina	69,606	2	22	137.9	44.2	22.00	388.7
September 2011	Pedring	99,245	2	380	560.8	22.9	N.A.	N.A.
August 2012	Monsoon Rains	324,849	5	N.A.	481.6	236.4	22.37	N.A.

Source : Utilized data from both Region I Disaster Risk Reduction and Management Council, and Pangasinan Provincial Disaster Risk Reduction and Management Council

[8] Sub-rating for Effectiveness is to be put with consideration of Impact

[9] At the time of appraisal, Operation and Effect Indicators including maximum flood, maximum high water level, damaged amount etc. had been established, however, adequate measurement has not taken place, therefore, analysis was made based on available data at the time of ex-post evaluation.

Maximum high water level data from DPWH Bureau of Research and Standards
Rainfall data from Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Note1) Damages are combined damages from flooding and rainstorm, and cannot be separated.
Note2) Damaged amount are damages from each typhoon.
Note3) The observation point for maximum high water level was identified as Wawa Station (where water from the adjacent Tarlac River flows into the Agno River) at the time of appraisal, however, available appropriate data at the time of ex-post evaluation was at Bayambang Bridge
Note4) The magnitude of each flood is not clear

Differences among each typhoon's scale, including size, strength, duration of stay, and route of passage, and ambiguity of magnitude of flood for each typhoon caused difficulty in making simple comparisons between typhoons, however, comprehensive analysis was endeavored taking into consideration the interview results from local residence as described below

When comparing two major typhoons before and after the project－Pepeng (October 2009) and Mina (August 2011)－the total amount of rainfalls for four days when Mina approached the project area was 388.7 mm, which fell little below that of Pepeng, which amounted to 566.8mm. The number of persons affected by Mina was less than one-seventeenth of that of Pepeng and the amount of damage caused by Mina (damage to agricultural production and infrastructure facilities) was well below that of Pepeng. When comparing the maximum high water levels of these typhoons, while water level during Pepeng typhoon was 26.4m, that of Mina was 22.0m. From these data, it can be supposed that the project has contributed to lowering the water height of the Agno River during times of flooding.[10]

After the completion of the project, typhoons including Falcon, Mina, and Pedring, and monsoon rainfalls attacked the project area, however, interviews with local residents during the field survey showed that no flood damage has occurred after the project completion. According to the beneficiary survey (to be described later), over 95% of respondents answered "no damage" or "small damage" after the project completion. Judging all the facts in a comprehensive manner, the project is deemed as to have realized its effects sufficiently.

Furthermore, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) established the Agno River Flood Forecasting and Warning Center in the project area with the grant aid from Japan (Project for Improvement of Flood Forecasting and Warning System in the Pampanga and Agno). This

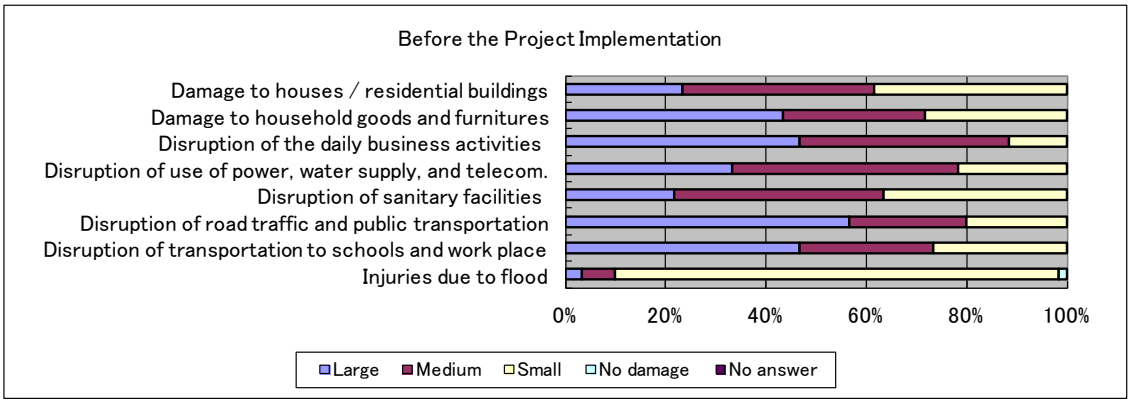
[10] According to the DPWH, discharge capacity of the Agno River is 4,000m^3/sec., and it is designed that during times of flooding, water would flow into the widened floodway at 3,000 m^3/sec and to the guide channel which flows into the original Agno River at 1,000m^3/sec as a result of the development of closure dike which realigned the River. (See footnote 12 for explanation of closure dike.)

Center aims to reinforce its flood forecasting and warning capacity through Japan's technical cooperation (dispatch of JICA experts etc.), which has given further positive effects on this project. The PAGASA installed water height, rainfall measurement stations in seven places where flood risk is high in the Agno River drainage basin, and sends data to relevant institutions and the PAGASA headquarters in Manila on water level records collected automatically 24 hours a day. In the case of occurrence of typhoons or monsoon rainfalls, the PAGASA analyzes measuring results twice a day, every early morning and evening, based on the early warning system and sends out evacuation alert and related information to local residents through media via the Provincial Disaster Risk Reduction and Management Council (PDRRMC) in Pangasinan Province. Evacuation directives are also put out by the governor of Pangasinan Province. The flood forecasting and warning system has been functioning effectively and has contributed to urgent transmission of flood forecasting and warning to residents for evacuation measures.

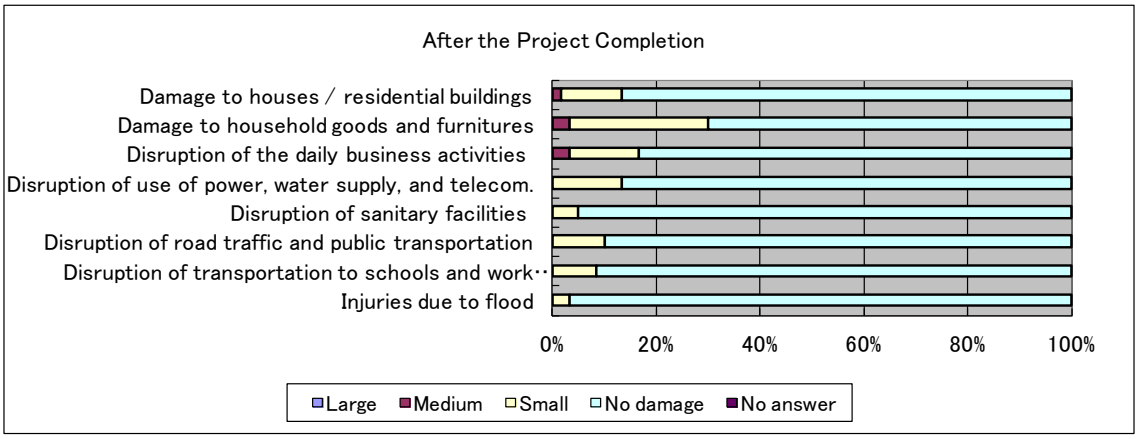
3.2.2 Qualitative Effects

3.2.2.1 Mitigation of Flood Damage

The results of the beneficiary survey[11] to residents and farmers in the project area on typhoon and monsoon rainfall damages before and after the completion of the project are summarized in Figure 1. The results show that the project has greatly contributed to mitigate flood damages on all items enumerated in the figure, including damage to houses and damage to household goods and furniture.



[11] Beneficiary survey was conducted in three municipalities in the project area, Bayambang, Bautista and Alcala, consisting of 116 barangays. Ten barangays were randomly selected from each municipalities followed by a random selection of six households from each barangay, totaling to 60 households. (Data collection method: hearing investigation)



Source: Results from the beneficiary survey

Figure 1: Comparison of Flood Damage Before and After the Project (N=60)

According to the executing agency, three municipalities, Bayambang, Bautista and Alcala, have benefited most from mitigation of flood damages thanks to this project. The municipality of Bayambang is the center of economic activities in the project area with big market and large population (115,521 people as of 2010). The municipalities of Bautista and Alcala are major agricultural production areas. The Poponto Swamp is reported to effectively function as evacuation area from flood for local residents. In fact, the Poponto Swamp is utilized as a natural flood control basin in the project, therefore, water comes into the basin during times of flooding. As such, the area has been targeted for development, including installation of the Evacuation Mound Centers (EMCs) and elevation of local roads for residents living on agriculture and inland water fishing in the swamp.

According to the interview with the beneficiaries (residents) during filed survey, the area around the closure dike[12] (the municipality of Alcala) has not suffered from flood damage by typhoons and monsoon rainfalls (rainy season: from June to November) any longer after the project completion. There were also such responses indicating that there has been no flood occurrence after the project completion, which has made possible for residents to live in peace, even though they had suffered from flood damages twice or three times a year before the project. Some residents pointed out that the EMCs constructed in the Poponto Swamp have contributed to mitigate flood damages and have been utilized effectively by the local people during times of flooding. Because the Poponto Swamp is always inundated during typhoons and rainy seasons, these EMCs are

[12] Closure dike is a type of dike that blocks the water flow of the main river and to channel the water into a planned diversion. (The project aims to channel 25% of the 10-year return period flood to the main river (1,000m^3/sec) and the rest of 75% to a diversion (3,000m^3/sec) in order to mitigate flood.)

regarded as important facilities for local residents for flood countermeasures.[13]

Closure Dike (taken from side)

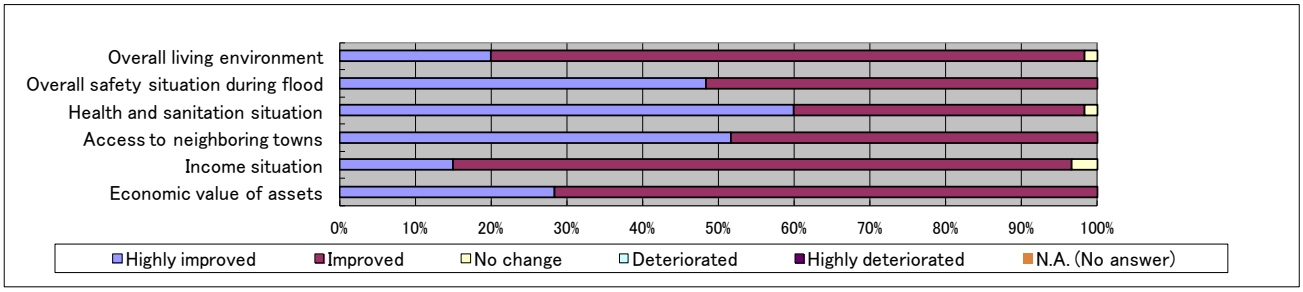
Poponto Swamp

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Improvement of Living Environment in the Project Area

Regarding changes of living environment after the project completion, results of the beneficiary survey to local residents and farmers in the project area is summarized in Figure 2. According to the beneficiary survey results, more than 95% of respondents answered that all the items including overall living environment, overall safety situation during flood, health and sanitation situation were "highly improved" or "improved", thus, it can be confirmed that their living conditions after the project completion have improved. Furthermore, as for effects on economic value of assets, all the respondents answered the situation has "highly improved" or "improved."



Source: Results from the beneficiary survey

Figure 2: Respondents' Living Environment After Project Completion (N=60)

[13] For example, local residents nearby the EMC in Manambong Sur pointed out during the field survey that local residents (124 families) evacuated for five days in the EMC at the time of flood in August 2012. It was also pointed out that the EMC was able to avoid inundation when super typhoon Pepeng hit the area in October 2009, and therefore, the EMC has been effectively utilized.

The results of interview survey from the beneficiaries (local residents) during the field survey are shown below. Every respondent showed satisfaction with positive impacts from the project on improvement of living environment (especially increased crop yields and income by the creation of new agricultural lands, and improved stability and predictability of farm work).

- Construction of closure dike has changed alignment of the Agno River, turning a land between the old Agno River and the closure dike into productive agricultural lands. Three barangays[14] (villages) in the municipality of Alcala have largely reaped the benefits of the change and the unused land prior to the project is now in use as agricultural lands.
- After the project completion, crop yields and income have increased[15] since arable areas expanded. Additionally, the project has contributed to secure stability and predictability of farm work and has stabilized living conditions of local residents.
- Local residents' relief of anxiety from flood damages has induced construction of new houses in the area and thus resulted in population increase.

The EMCs in the Poponto Swamp have contributed to provide education and other opportunities such as business, agricultural, and community activities in ordinary times in addition to being effectively utilized as evacuation facilities during times of flooding as mentioned before. For example, the EMC which was visited during the field survey is utilized as nursery school, kindergarten, and elementary school (243 students in total) in ordinary times.[16] Another EMC is used for T-shirt printing business (20 staffs in total).[17] Other EMCs are used as storage of agricultural products (corns, palays, onions, etc.), sports gym, community center, and so on.

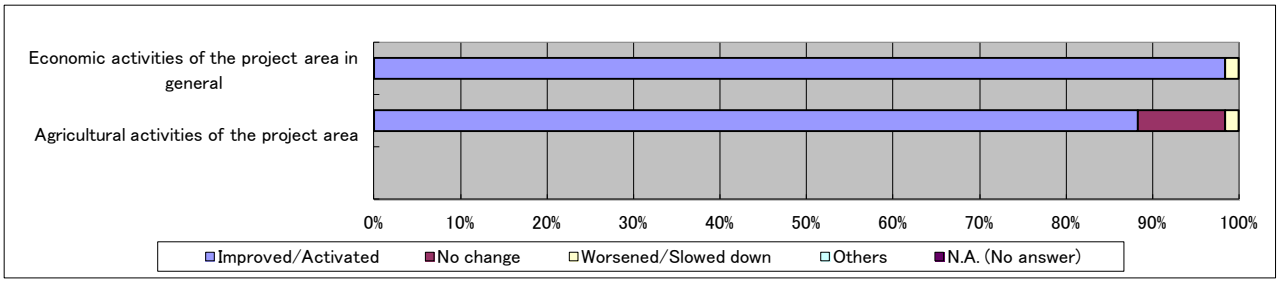
New agricultural land

Manambong Sur EMC

14 Three barangays are Gualsic, Laoac, Anulid.
15 The households interviewed during the field survey pointed out that their income increased by 40 thousand pesos.
16 Manambong Sur EMC
17 Wawa EMC

3.3.1.2 Promotion of Economic and Social Development in the Project Area

Figure 3 summarizes the beneficiary survey results to residents and farmers in the project area regarding the effects on regional economy after the completion of the project. Over 98% of residents responded “economic activities in the project area in general have been improved” and over 88% responded “agricultural activities of the project area has been activated”. Therefore, it can be considered that the project has given positive impact on local economy.



Source: Results from the beneficiary survey

Figure 3: Effects on Economy of the Project Area (N=60)

The results of interview survey to the beneficiaries (local residents) during the field survey include their comments saying “economy and business activity in the village have been activated with increase in the number of shops after the project completion”. As for the influence on agricultural activity, their responses are shown below. They suggest that the project has contributed to the increase in the level of convenience to transfer and to transport agricultural products, which led to activate their agricultural activities.

- Hector Mendoza Bridge constructed by the project has connected the municipalities of Alcala and Bautista even at the time of flood occurrences. Furthermore, with permanent connection between the municipalities of Bayambang, a center of economy in the project area, where markets are located, and Alcala, the agricultural production area, farmers in Alcala have been able to save time, cost and labor for transporting products. Hector Mendoza Bridge has been functioning as farm-to-market road as well.
- The closure dike and the earth dike constructed along the Bayambang floodway by the project have also contributed to improve traffic convenience as well as transport for agricultural products as farm-to-market road.[18]

[18] The family interviewed during the field survey mentioned that it took one hour by bike to get to the nearest highway before the closure dike was constructed but after the project, it takes only 10 minutes.

Hector Mendoza Bridge

Closure Dike (taken from the top)

As regards agricultural production data, Tables 2 and 3 show the yield trend of palay (rice) and corm in the whole Pangasinan Province, respectively. Only the data up to a year after the project completion (February 2011 to 2012) was available at the time of ex-post evaluation, which makes it difficult to judge evident correlation between the data shift and the project. However, yields of palay and corn are, in general, showing an upward trend. It is necessary to get hold of future data in order to see the contribution of the project.

Table 2: Palay Production in Pangasinan Province

	2006	2007	2008	2009	2010	2011	2012
Palay production in the whole Pangasinan Province (metric tons)	976,198	1,011,115	1,027,289	802,108	940,700	958,270	1,057,580
Palay production growth in the whole Pangasinan Province (%)	16.79	3.58	1.60	(21.92)	17.28	1.87	10.36

Source：Bureau of Agricultural Statistics

Table 3: Corn Production in Pangasinan Province

	2006	2007	2008	2009	2010	2011	2012
Corn production in the whole Pangasinan Province (metric tons)	199,227	199,120	211,229	207,528	230,521	249,070	285,180
Corn production growth in the whole Pangasinan Province (%)	5.44	(0.05)	6.08	(1.75)	11.08	8.05	14.50

Source：Bureau of Agricultural Statistics

The shift in farm population in the project area and the whole Pangasinan Province is shown in Table 4. Comparing the farm population in the municipalities of Bayambang, Bautista, and Alcala, which have gained the most benefit from the project, with that of the whole Pangasinan Province, the growth rate of the three municipalities has shown higher

figure (7.11%) than that of the whole Pangasinan Province (5.49%). Because only the data available were for 2009 and 2011, it cannot be concluded that the figures show statistically significant result. The project, however, has contributed to increase farm population and to activate agriculture in the project area.

Table 4: Comparison of Farm Population Shift in the Project Area and those in Pangasinan Province

	2009	2011	Growth from 2009 to 2011
Farm population in project area: the municipalities of Bayambang, Bautista, and Alcala	10,331	11,066	7.11%
Farm population in the whole Pangasinan Province	160,093	168,881	5.49%

Source：Pangasinan Province Statistical Office

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

The Environmental Impact Assessment (EIA) was conducted for the project and Environmental Compliance Certificate (ECC) was issued by the DENR in January 1997. The EIA was also carried out for Hector Mendoza Bridge and the DENR issued the ECC in 1996.[19]

According to the executing agency, no particular issue has been observed since the executing agency has made guidance to the contractors to give necessary environmental consideration during project implementation, and the contractors have taken necessary measures[20] based on the EIA.

As regards environmental monitoring during project implementation, a monitoring team (consisting of DPWH, DENR, LGUs of concerned province and municipalities, consultants etc.) conducted monitoring activities every quarter. All project sites including locations where the EMCs were constructed were subject to monitoring, and the results were compiled in quarterly reports. (Major check items were water quality, air quality, noise, landscape, erosion, and river ecology.)

No particular issue has been observed on the natural environment as a result of the environmental monitoring. Although there were some temporary effects, such as issue of muddy waters due to dredging work of the river, and scattering of dust and noise along access roads due to transportation of construction materials by truck, each of them was

[19] According to the executing agency, it was not necessary to conduct new EIA after change of scope. The ECC which has been approved is comprehensive and covers the successive phase for the project in upper river which is currently under preparation by the DPWH.

[20] Concrete mitigation measures were as follows: installation of sand bags to prevent outflow of mud (a measure to mitigate effect on water quality and ecological environment), watering the access road (a measure to mitigate effect on air quality), limiting time for construction work (a measure to mitigate noise), and properly siphoning of dredged materials onto pre-selected areas (a measure to mitigate effect on topography and geology) etc.

minor and remedied in short-term. Moreover, no particular issue on natural environment during construction and after the project completion has been pointed out in the interviews with local residents during the field survey. Furthermore, no particular objection was identified as a result of beneficiary survey (see footnote 11) － 28 respondents out of 60 beneficiaries said that there was temporary effect on natural environment during construction, such as muddy waters, scattering of dust and noise, however, 54 respondents (nearly 90% of the total respondents) answered “natural environment has improved” or “there has been no effect on natural environment after the project completion”.

3.3.2.2 Land Acquisition and Resettlement

The executing agency has carried out procedures for land acquisition and compensation payments following the DPWH’s guideline (Infrastructure ROW Procedural Manual, April 2003) which is based on the Philippines’ regulation. According to the interviews with local residents during the field survey, consultations were conducted including dissemination of information and public hearing regarding the contents of the project prior to its launch. Consultations with landowners regarding compensation payments for land acquisition were carried out on continuous basis. No particular issue have been observed for land acquisition procedures since the process has taken place appropriately including public hearing and consultations based on the Philippines’ regulation.

However, unexpected issues came about in the course of land acquisition. The executing agency had to cope with the situation by design change (changing the alignment of flood control structures etc.). Concretely, some landowners planted trees (mahoganies) in the project site after the project plan was made public－these landowners intended to obtain more compensation. In face of such situation, the executing agency changed the design of structures in order to avoid land owned by landowners who did not agree with the amount of compensation proposed, and to minimize effects of resettlement on local residents.

As a result, the final number of landowners to whom the executing agency paid compensation for land acquisition was 528. Of which, 151 households all moved to neighboring sites which they owned. They were newly identified landowners for relocation due to change of alignment of flood control structures as mentioned above. Because each of them preferred to move to nearby sites which they owned, there was no need for the executing agency to develop alternative sites. (The executing agency coped with the situation by paying compensation for lands and buildings.) Livelihood programs were no longer necessary because their main livelihoods were farming and there was no change in the way of their living. No particular issue was pointed out by residents

regarding land acquisition in the interviews during the field survey.

The executing agency made efforts to gain understanding from residents for implementing the project. In fact, the executing agency has carried out consultations with local residents including those living in the Poponto Swamp through social development survey and the IEC program which were undertaken in the consulting service of the project. Since the Poponto Swamp, in particular, was planned to be used as a natural flood control basin and therefore, water was expected to flow in during times of flooding, the executing agency constructed 23 EMCs which have been elevated by 2.8 to 3.5 meters in order to cope with 10-year return period flood. Furthermore, the IEC program was provided to residents during project implementation in order to enhance awareness for disaster control and to reinforce disaster prevention measures. (See Column 1 for details of the IEC program.)

Column 1: The IEC Program

・ Objective

To gain the understanding of residents about the expected increased flooding in the Poponto Swamp after the project, and to provide support so as to enhance their awareness and strengthen flood prevention measures (flood risk management).

・ Concrete Activities taken place under the program

The IEC program consisted of following two major components: (1) the information campaign on the implementation of the project, and (2) the training for electro-mechanical facilities of the EMCs. As regards (1), on barangay level, target barangays were divided into 6 groups and 6 workshops in total were conducted from 3rd to 17th August 2009, and on municipality level, workshops were conducted in each town hall from 1st to 4th September 2009. As regards (2), targeted barangays were divided in to 6 groups, and basic and advanced training courses were conducted for 6 times respectively from 4th to 20th August 2009. Concrete activities were as follows:

- Survey on existing conditions of the EMC facilities, situation during times of flooding, and disaster prevention activities
  - State of inspection and operation and maintenance of the EMC facilities (generators, electric lights, pumps for ground water etc.)
  - State of utilization of the EMCs during times of flooding as well as ordinary times
  - State of damage during times of flooding (damaged area, water level, duration, etc.)
  - State of disaster prevention activities for flood prevention
- Project information sessions (conducted in 4 municipalities and 23 barangays where

the EMCs were constructed)

- Dissemination of project information
- Enhancement of awareness for disaster prevention activities and management of the EMC facilities
- Sharing information on good practices regarding disaster prevention activities and management of the EMC facilities

➢ Basic and practical training for the EMC facilities

- Utilization, management, and operation and maintenance methodology of the EMCs during times of flooding as well as ordinary times
- Operation and maintenance methodology on the EMC facilities (generators, electric lights, pumps for ground water etc.)

➢ Preparation of manuals and public relations activities of the project

- Preparation of manuals for operation and maintenance of the EMC facilities (electric-mechanical equipments, and sanitary facilities)
- Setting up notice boards for effective utilization of the EMCs
- Education and publicity on project information and project benefits
- Development and dissemination of tools on project information interpretation

・ Progress

Residents in the Poponto Swamp well understood the expected increased flooding after the project completion through the project information campaign. Their understanding and awareness on good practice for flood prevention measures has deepened and their actual prevention measures have been reinforced. It was confirmed through interviews with local residents during the field survey that awareness on flood disaster prevention has been strengthened in that residents have been stockpiling foods and medicines, strengthening attention towards flood forecasting and warning system, and promptly evacuating to the EMCs. Through training on operation and maintenance of electro-mechanical facilities of the EMCs, participants acquired necessary knowledge and skills to cope with maintenance troubles of electrical system and to operate engine and generator set.

・ Reasons why the IEC program is performing well

It can be considered that the IEC program performed well because local residents and the LGUs have gained more benefits than had disadvantage of expected increased flooding in the Poponto Swamp by the project, and the IEC program facilitated communication between the executing agency and local residents, which led local residents' deeper understanding of the project, and thereby support for implementing the project has grown.

＜Benefits＞

- Flood duration has been considerably shortened thanks to the drainage facilities installed in the Poponto Swamp by the project. In 2002, before the project commenced, flood duration in the municipality of Moncada, Tarlac Province, where part of the Poponto Swamp is located, used to be between 1 to 5 months but was reduced to between 2 to 30 days in 2009, after the drainage facilities were installed by the project. (See Table 5)

Table 5: Comparison of Flood Duration in the Municipality of Moncada, Tarlac Province

Nine Barangays in the Municipality of Moncada, Tarlac Province	Flood Duration in 2002 (Number of Days)	Flood Duration in 2009 (Number of Days)
Banaoang East	31	3
Banaoang West	90	7
Baquero Norte	60	30
Baquero Sur	90	30
Calapan	90	14
Camangaan West	150	7
Ablang-Sapang	7	2
Sta.Lucia East	120	30
Sta. Lucia West	60	30

Source：Technical Report on IEC Program (September, 2009)

- 23 EMCs constructed in the Poponto Swamp by the project have been used effectively as evacuation facilities during times of flooding and have also been utilized for other purposes during ordinary times such as school facilities, day care centers, barangay offices, crop storage, community events, business activities and so on. Hence, local residents enjoy benefits of the EMCs during times of flooding as well as ordinary times.
- Through trainings on operation and maintenance of electro-mechanical facilities of the EMCs carried out in the IEC program, local community has become empowered in managing the EMCs. The LGUs have also strengthened ownership to cope with flood control measures.

＜Disadvantage (not clearly recognized by local residents)＞

- Although it was expected that flood would increase in the Poponto Swamp after the

project completion due to the design of the project, local residents do not clearly recognize increase in flood occurrences. They have been suffering from flood every year during rainy season and typhoon season, and flooding has become part of their life. Moreover, thanks to the reduction of flood duration, local residents do not have a sense of additional increase in flood occurrences in particular. As such, it can be considered that disadvantage to local residents in the Poponto Swamp is minimal.

3.3.2.3 Other Impacts

＜Effects of direct hit of a super typhoon in project area during project implementation＞

During the project implementation, a super typhoon, Pepeng, directly hit the project area in October 2009, destroying an approach road to Grade Control Structure, which was constructed during the project. Agricultural lands were damaged by flood. Flood was contained within the areas of floodway thanks to urgent repair by the executing agency. The executing agency has put priority on repairing the approach road utilizing the 2013 operation and maintenance budget.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

Comparison of planned and actual project outputs is summarized in Table 6.

Table 6: Comparison of Planned and Actual Project Outputs (Phase II and Phase II-B)

Planned	Actual	Comparison
Civil Works (Phase II and Phase II-B)		
1) Bayambang Stretch Improvement 2) Guide Channel to Bayambang Stretch 3) Social Development for the Poponto Swamp (including construction of EMCs) 4) Resettlement Site Development for 149 households 5) Hector Mendoza Bridge	1) Bayambang Stretch Improvement 2) Guide Channel to Bayambang Stretch 3) Social Development for the Poponto Swamp (including construction of EMCs) 4) Hector Mendoza Bridge	1) Bayambang Stretch※ - Design change (re-alignment of stretch) took place - One of sluiceways not constructed and alternative drainage constructed 2) Guide Channel to Bayambang Stretch ※ - Design change (re-alignment of closure dike, design change of T-Head Spur Dike) took place ※Reasons for scope changes for 1) and2) above : Alignment was changed to avoid ROW issues - to avoid lands owned by landowners who did not agree with the amount of compensation proposed 3) Social Development for the Poponto

		Swamp - 1 EMC (San Vicente) not constructed, which end up in 23 EMCs, instead of 24 EMCs, in total 4) Resettlement Site Development - Not developed (there was no need because 151 households all chose to move to neighboring sites which they owned) 5) Hector Mendoza Bridge - As planned In addition to above, scope was added in order to repair damage due to direct attack of the super typhoon, Pepeng, in October 2009.
Consulting Service (Phase II and Phase II-B)		
1) Review of Detailed Design, Assistance in Tendering, Construction Supervision of the Project 2) Study, Design and Supervision of Social Development Measures for the Poponto Swamp and Resettlement Site Development 3) Preparation of Agno River Watershed Management Development Plan 4) Study on Sediment Balance for Tarlac River 5) Construction Supervision for Hector Mendoza Bridge Project (including environmental management) 6) Tarlac River "Overall" Improvement Works Stud	1) Review of Detailed Design, Assistance in Tendering, Construction Supervision of the Project 2) Study, Design and Supervision of Social Development Measures for the Poponto Swamp 3) Preparation of Agno River Watershed Management Development Plan 4) Study on Sediment Balance for Tarlac River 5) Construction Supervision for Hector Mendoza Bridge Project (including environmental management) 6) Tarlac River "Overall" Improvement Works Study 7) IEC Program	1) As planned 2) Scope deleted - Supervision of Social Development Measures for the Poponto Swamp was deleted due to unavailable GOP fund. 3) As planned 4) As planned 5) As planned 6) As planned 7) IEC Program - Additional scope

Source：Information from JICA at time of appraisal, results from questionnaire surveys, and interview survey results during field survey

There were scope changes and additional scope for the civil works. According to the executing agency, 1) re-alignment of the Bayambang stretch and construction of alternative drainage, and 2) re-alignment of the closure dike, design change of the T-head spur dike took place to avoid Right of Way (ROW) acquisition issues. In other words, such measures were taken in order to avoid lands owned by landowners who did not agree with the amount of compensation proposed, as well as to minimize impact of land acquisition. 3) 1 EMC was not constructed since the local barangay did not wish to set it up. 4) Resettlement site development was not implemented because all 151 households chose to move to neighboring sites where they owned, therefore, site development was no longer necessary.

In addition to the above scope change and additional scope, the following scope was added in order to repair damages caused by a direct attack of the super typhoon Pepeng in October 2009.

- Urgent repair of damaged dikes
- Regrading and widening of existing dikes
- Expanding existing floodways
- Removing sediments etc.

The scope change and additional scope which took place in order to restore typhoon damages are both considered as appropriate.

Agno River after improvement

T-head spur dike

There were changes and additions in consulting services. According to the executing agency, supervision of social development measures for the Poponto Swamp (see Table 6, 2)) was not conducted due to unavailable local fund. As an alternative, the IEC program targeting four municipalities and twenty three barangays (see Table 6, 7)) was newly added to the scope. As explained above, information campaign on the implementation of the project and practical training for electro-mechanical facilities of the EMCs were

provided to the concerned LGUs and local residents in the IEC program. As such, deletion of supervision of social development measures for the Poponto Swamp seems to have no substantial effect on the project.

Inputs for consulting service have increased substantially for Phase II, and decreased for Phase II-B, which are summarized in Tables 7 and 8.

The increase of inputs in consulting service for Phase II was due to the additional supervision work associated with additional scope and changes of civil works, and the increased supervision period (due to interruption of bid evaluation of civil works and delay in land acquisition) as a result of the extended project period. As regards Phase II-B, the main scope was the basic survey, assistance in design and tendering, and construction supervision for Hector Mendoza Bridge. As a result of efficient project implementation including civil works, all the work was completed with less amount of inputs compared with that of the original plan.

Table 7: Comparison of Planned and Actual Consulting Service for Phase II (M/M)

Phase II	Plan	Actual	Comparison
Foreign	254	293	Increased by 39
Local	348	491	Increased by 143
Total	602	784	Increased by 182

Source：Information from JICA at time of appraisal, results from questionnaire surveys, and interview survey results during field survey

Table 8: Comparison of Planned and Actual Consulting Service for Phase II-B (M/M)

Phase II-B	Plan	Actual	Comparison
Foreign	65	65	As planned
Local	285	105	Decreased by 180
Total	350	170	Decreased by 180

Source：Information from JICA at time of appraisal, results from questionnaire surveys, and interview survey results during field survey

3.4.2 Project Inputs

3.4.2.1 Project Cost

Both projects (Phase II and Phase II-B) were regarded as one whole project to carry out analysis on project cost. The total project cost, covering both Phase II and Phase II-B, was initially estimated at 16,654 million yen, of which Japanese ODA loan would cover 9,523 million yen, consisting of 6,734 million yen for Phase II and 2,789 million yen for Phase II-B. In actuality, total project cost was 13,041 million yen, of which Japanese ODA loan provided a total of 9,091 million yen－6,315 million yen for Phase II and

2,776 million yen for Phase II-B－resulting in a lower amount than the initial estimate (78% of the planned amount).

Despite the delay in project implementation schedule and the increase in the outputs, the yen equivalent total amount of project cost decreased mainly because of depreciation of local currency (Philippine peso) during the project implementation period.

3.4.2.2 Project Period

Both projects (Phase II and Phase II-B) were regarded as one whole project to carry out analysis on project period as well. The overall project period, covering both Phase II and Phase II-B, was planned as 144 months as opposed to 185 months including the extended loan period in reality, representing an expansion to 129% of the initial plan. Due to the delay in the schedule, the project involved extension of the loan disbursement period for Phase II in January, 2007–the loan disbursement deadline was extended to March 2010.

Table 9 shows comparisons of planned and actual project period for Phase II and Phase II-B, respectively, and the entire project

Table 9: Comparison of Planned and Actual Project Period

	Planned (at the time of Appraisal)	Actual (at the time of Ex-post Evaluation)	Comparison
Phase II	Sept. 1998*–Apr. 2005 (80 months)	Sept. 1998*–Feb. 2011** (150 months)	Delayed by 70 months
Phase II-B	Mar. 2001*–Jul. 2006 (64 months)	May 2001*–Mar. 2004** (35 months)	Shortened by 29 months
Total	144 months	185months	Delayed by 41 months

* Loan Agreement conclusion date
** With an agreement with the executing agency, project completion is considered at the time when the civil works were completed.

The delay in the implementation schedule was caused mainly by the design change in order to mitigate impact of land acquisition and relocation, as well as delay in construction period associated with change and additional project scope. As mentioned above, the executing agency changed the design in order to avoid lands where landowners planted mahoganies in the project site, and to minimize effects of resettlement. Incomplete documentation by the landowners also caused delays in the land acquisition process. In addition, interruption in bid evaluation for civil works for selection of contractors also delayed the project implementation process.

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

Table 10 summarizes the result of recalculation of the economic internal rate of return (EIRR).

Table 10: Assumption and Results of EIRR Recalculation

	At the time of Appraisal	At the time of Ex-post Evaluation
EIRR	18.7% (Figure at the time of Phase II appraisal) 16.1% (Figure at the time of Phase II-B appraisal: for the entire project including Phase II)	15.8% (For the entire project - Phase II and Phase II-B)
Benefit	Expected amount of total flood damages mitigated (Amount of damage caused by 10-year return period flood or less)	Expected amount of total flood damages mitigated (Amount of damage caused by 10-year return period flood or less) *
Cost	Cost required to implement the project and increased O&M cost due to the project	Cost required to implement the project and increased O&M cost due to the project
Project Life	50 years after project completion	

* Utilized the same assumption with that at the time of appraisal for percentage of rise.

The recalculated figure for the entire project－Phase II and Phase II-B－became 15.8%, a little lower than the one at time of the appraisal (16.1%), which falls within the scope of the original assumption.

Although the project cost was within the plan, the project period was exceeded, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

As regards sustainability of the project, recent changes in overall disaster prevention sector in the Philippines (enactment and enforcement of the new Act and the administrative instruction) are taken up in Column 2. This section analyzes project sustainability, taking into account such changes.

3.5.1 Institutional Aspects of Operation and Maintenance

The Project Management Office-Agno Flood Control System (PMO-AFCS) is responsible for operation and maintenance of flood control facilities and bridge constructed by the project. The PMO-AFCS is the local subordinate office under the Project Management Office-Flood Control (PMO-Flood Control [21]), a project

[21] The PMO-Flood Control, located in Manila, was established in January 11, 2013 with the DPWH Special Order No.17. (The previous Project Management Office-Major Flood Control and

management office of the DPWH. Under the PMO-AFCS, technical section in charge of operation and maintenance is deployed, along with management, financial and accounting sections. At the time of ex-post evaluation, 18 staffs out of total of 42 staffs in the PMO-AFCS were engineers responsible for operation and maintenance of the project.

Those staffs responsible for operation and maintenance of the project are also in charge of operation and maintenance of flood control facilities which were constructed by the Agno and Allied Rivers Urgent Rehabilitation Project, a Japanese ODA loan project, and moreover, they have also participated in implementation of the project. In this respect, it can be regarded that mechanism has been secured to maintain coherency and consistency between project implementation, and its operation and maintenance. Therefore, there is no particular problem observed in the institutional aspects of operation and maintenance of flood control facilities and bridges constructed by the project.

The LGUs are in charge of operation and maintenance of 23 EMCs in the Poponto Swamp. The Memorandum of Agreement (MOA) has been signed among the DPWH, heads of each city and barangay where the EMCs are constructed, and the EMCs have been officially handed over to each barangay from the DPWH－for 12 EMCs located in Tarlac Province in June 2005, and for 11 EMCs located in Pangasinan Province in March 2012. No particular issue has been identified on institutional aspects of the operation and maintenance of the EMCs－the LGUs have been undertaking operation and maintenance of the EMCs proactively and their supervision and budget allocation have been conducted by the Mayor's Office, based on the MOA.

3.5.2 Technical Aspects of Operation and Maintenance

The PMO-AFCS's 9 out of 18 engineers, who are in charge of operation and maintenance of the project, are veterans with experiences of more than 30 years on average. Other technical staffs also have rich experiences with average of around 10 years. They have participated in the project implementation and are knowledgeable about issues for considerations on operation and maintenance of the project, therefore, no particular issue is identified for technical capacity of the operation and maintenance staffs in the PMO-AFCS. Furthermore, as part of the consulting service of the project, 4 operation and maintenance staffs in the PMO-AFCS have participated in study tour to Japan and acquired necessary skills on maintenance of flood control facilities.

As regards operation and maintenance of the EMCs, 52 staffs from related LGUs (4 municipalities and 23 barangays) participated in the IEC program and had trainings on

---

Drainage Projects, Cluster I and Cluster II merged to formulate the PMO-Flood Control.) The PMO-AFCS is under the administrative supervision of the DPWH Regional Office I. The PMO-Major Flood Control and Drainage Projects, Cluster II, requested the assistance of the PMO-AFCS in the implementation of the Agno River Flood Control Project, Phase II.

maintenance and troubleshooting of electro-mechanical facilities, and maintenance of engine and generator set. The training was conducted smoothly, and therefore, no particular problem was observed in technical aspect of operation and maintenance of the EMCs.

3.5.3 Financial Aspects of Operation and Maintenance

The annual operation and maintenance costs associated with the project are first estimated by the PMO-AFCS, then estimation will be reviewed by the PMO-Flood Control in Manila. Once approved, the budget is drawn out from the DPWH headquarters' ordinary budget and allocated to the PMO-AFCS.

As Table 11 shows, requested operation and maintenance budget for the project has been fully secured each year after the project completion (since 2011), and therefore, no particular issue has seen at the time of ex-post evaluation.

Table11: O&M Budget Allocation for the Project (Note 1)

Year	Requested Amount (mil. pesos)	Allocation (mil. pesos)
2011	16.10+238.06 (Note 2)=254.16	254.16
2012	16.10	16.10
2013	32+355 (Note 3)=387.00	387.00

Source：Results from questionnaire surveys, and interview survey results during field survey

Note 1) The figures include operation and maintenance budget for Agno and Allied Rivers Urgent Rehabilitation Project

Note 2) In addition to ordinary operation and maintenance budget (16.1 million pesos), budget for repair (238.06 million pesos) was requested in order to repair damaged dike and bank protection etc. by monsoon rainfalls and typhoons (excluding Pepeng in October 2009)

Note 3) In addition to ordinary operation and maintenance budget (32 million pesos), budget to repair damaged dike and bank protection etc. by typhoon Pepeng, and removal of sediments (355 million pesos) was requested

The operation and maintenance cost indicated in Table 11 (including operation and maintenance costs for the Agno and Allied Rivers Urgent Rehabilitation Project, Japan's ODA loan project) includes not only ordinary operation and maintenance costs (daily maintenance of equipments and facilities, flood control activities, and other related costs) but also costs to repair damaged dikes and bank protection etc. caused by monsoon rainfalls and typhoons for the years 2011 and 2013. These budgets for repairs have been fully secured, which indicates that DPWH has prioritized budget allocation to this project. In addition, budget for urgent repairs from possible flood damages caused by heavy typhoons is to be allocated from the DPWH's Calamity Fund, which the funding source is separately categorized from the annual allocation of operation and maintenance budget.

On the other hand, the operation and maintenance cost for the EMCs are to be coped

with by each relevant LGU, however, required budget has not necessarily been secured. At the EMC sites during the field survey, some LGUs pointed out that there is no prospect for securing necessary budget to repair water supply system and generator set. Although situation varies depending on each LGU's financial status, some LGUs seem to be suffering from lack of funding. As one of financial sources for the LGUs, Local Disaster and Risk Reduction and Management Fund (LDRRMF) was newly established (see Column 2), which is expected to facilitate the LGUs to ensure securing necessary operation and maintenance budget for the EMCs. However, it is too early to make judgment on the actual enforcement of the Fund at the time of ex-post evaluation since it will depend on the operation and budget plan of the EMCs to be reflected in the Local Disaster and Risk Reduction and Management Plan (LDRRMP) (see Column 2)－the LDRRMP is expected for finalization in October 1, 2013. While the EMC construction cost accounted for small percentage of the whole project cost, it is important to secure necessary operation and maintenance costs for what the LGUs have committed in a sustainable manner, considering that the overall LGU's participation in sustainability of flood control projects is expected to increase, with steady enforcement of the Disaster Risk Reduction Management Act.

3.5.4 Current Status of Operation and Maintenance

The super typhoon Pepeng hit the project area in October 2009 and destroyed the approach road of the Grade Control Structure (GCS[22]) and dikes constructed by the project. The LGU (the municipality of Bautista) had undertaken urgent repair to the damaged approach road of the GCS but the road remained as a gravel road, and was not fully repaired at the time of ex-post evaluation. The PMO-AFCS intends to prioritize 2013 budget allocation to fully repair the GCS approach road (with concrete) and dikes. In fact, the GCS has been utilized by local residents for crossing. As urgent measures for residents, hanging bridge was constructed right next to the GCS after the Pepeng typhoon hit the project area.

The PMO-AFCS conducts periodic inspection and maintenance work such as removal of vegetation, soil and stone as well as cleaning of channels and diversions. Additionally, non-regular inspection and maintenance works are carried out every time typhoons or monsoon rainfalls approach the project area and the PMO-AFCS prioritizes inspection in important places such as dikes and guide channels. Furthermore, the PMO-AFCS monitors the status of sediments and obstacles. In emergency situation, urgent repair of damaged facilities is conducted using the Calamity Fund as mentioned above.

[22] Grade control structures are used to stabilize waterways, thereby reducing channel bed erosion and scouring.

The LGUs are responsible for the operation and maintenance of the EMCs, based on the MOA which stipulates the transfer of the property from the DPWH to respective LGUs. However, in 2 EMCs where site visit was conducted, water supply system and generator set were not functioning. As mentioned above, prospect for securing necessary budget for repair is uncertain and thus the current situation may continue.

Some uncertainties have been observed in terms of financial aspects of operation and maintenance, therefore sustainability of the project effect is fair.

Grade Control Structure

Hanging bridge

Column 2: Disaster Risk Reduction and Management (DRRM) Act of 2010 (RA 10121)
(Changes in Overall Disaster Prevention Sector in the Philippines and Effects on the Project)

In the Philippines, the DRRM Act has come into force in May 2010, and its administrative instruction has come into force in September 2010. The DRRM Act is a proactive regulation that substantially revised the previous Disaster Control Act (PD1566) which focused on measures during and after the occurrence of disasters. The new Act emphasizes the importance of forecasting and undertaking prior measures for possible future disaster risks (enhancing preparedness for risk and disaster prevention). The Act continues to point out the importance of taking prompt measures when disasters occur and undertaking adequate correspondence for restoration after the disaster. By the Act, establishment of Disaster Risk Reduction and Management Councils (DRRMCs) is obligated from the national level to the barangay level, and a hierarchy system is formed as shown in Figure 4.[23]

[23] The rate of organization for each DRRMC at each level is high since DRRMCs were reorganized based on the existing "Disaster Coordination Council"－prior to the DRRM Act, "Pangasinan Disaster Coordination Council" was in place which was enhanced into "Pangasinan DRRMC" after the enactment of the Act.

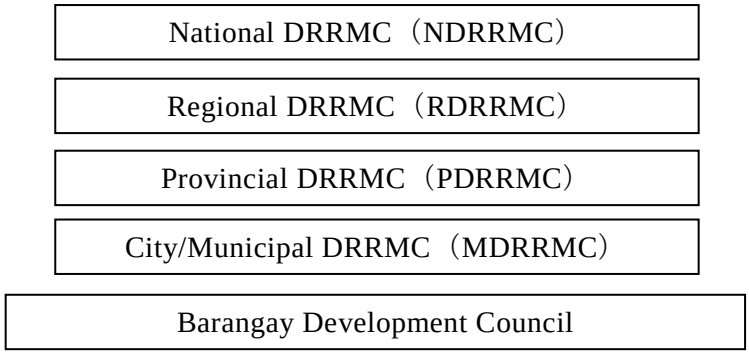


Figure 4: DRRM Structures[24] under the DRRM Act

With the enactment of the Act, budget allocation structures for the LGUs was revised, and the Local Disaster and Risk Reduction and Management Fund (LDRRMF) was established, which enables budget allocation focusing on preventive measures in advance. In addition, the Joint Memorandum Circular regarding the allocation and practical use of the LDRRMF has been signed in March 2010.[25] In concrete terms, based on the Local Disaster and Risk Reduction and Management Plan (LDRRMP) which the LGUs establish, more than 5% of Internal Revenue Allotment would be secured as the LDRRMF, and the LGUs would be able to apply up to 70% of the LDRRMF to allocate funds for prior measures. The rest of the 30% of the LDRRMF will be used for costs to cope with urgent measures when disasters occur.[26]

The PDRRMC in Pangasinan Province has organized a technical working group for disaster prevention management, consisting of a governor, provincial government and concerned organizations, the DPWH, the DENR, the Army, the Navy, the Police, the Coast Guard, the Fire Department and NGOs etc. as members. Its main activities focus on proactive measures including preparation of disaster prevention plans, disaster prediction and analysis, dissemination of disaster prevention activities and knowledge (providing trainings and seminars), sending out disaster related information, evacuation and rescue activities, securing and storing medicine and food and so on. Furthermore, as part of environmental advocacy program, the technical working group is committed to comprehensive watershed conservation activities such as participating in cleaning up the river, flood control facilities and drainage facilities, reforestation, and environmental education. In addition, the PDRRMC in Pangasinan Province undertakes disaster prevention measures and watershed conservation activities in collaboration with the Disaster Risk Reduction and Management Council (DRRMC) of each

[24] National/Regional/Provincial/Municipal Disaster Risk Reduction and Management Council (NDRRMC/RDRRMC/PDRRMC/MDRRMC)

[25] Joint Memorandum Circular was signed by three organizations: National DRRMC, Department of Budget and Management and Department of Interior and Local Government.

[26] The previous Disaster Control Act (PD1566) focused on budget measures after the occurrence of disasters.

city/municipality and Development Council of each barangay.

On the other hand, according to the PDRRMC in Pangasinan Province, necessary budget for the activities has not been adequately secured even though the budget system has changed. The PDRRMC has especially emphasized the importance of securing budget for restoration of dikes, flood control and conservation activities in the upper reaches of the Agno River.

With the enforcement of the DRRM Act, awareness of local residents and concerned parties for proactive disaster preventive measures have steadily enhanced, and disaster prevention activities have also been activated even in barangay level. However, although the budget system has been revised under the new Act, enough budget has not been secured to carry out necessary activities, and each DRRMC seems to be conducting activities within its limited budget.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to reduce flood damage in the project area by constructing flood control facilities and conducting the IEC program for the LGUs and residents. Mitigation of flood damage has been achieved by the project－construction of floodway and diversion structures, river improvement, and construction of bridges－and the results of local interview and beneficiary survey have shown local residents' satisfaction to the benefit of the project. The project has also contributed to the improvement and enhancement of the people's living environment, and the economic and social development. In light of this, the project is deemed as to have yielded positive effectiveness and impacts in various ways. In addition, the IEC program conducted in the project has drawn much attention as a good practice which had promoted awareness of the LGUs and local residents for disaster prevention and enhancement of disaster prevention measures. The project objective to contribute to the reduction of flood damage, enhancement of people's living environment and sanitation situation, and development of local economy and society is consistent with Philippines' development plan and development needs, both at the time of appraisal and the ex-post evaluation, as well as Japan's ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the project cost was lower than planned, the project period was longer than planned. As regards operation and maintenance, some uncertainty has been observed in terms of financial prospects of the LGUs, therefore sustainability of the project effect is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Importance of Providing Advice and Guidance to the LGUs

The LGUs are responsible for operation and maintenance of the EMCs constructed by the project, based on the MOA which stipulates the property transfer from the DPWH to the LGUs. However, all the LGUs have not been able to secure necessary budget for the operation and maintenance of the EMCs in that there would be cases in the future where the EMCs may not function properly when damaged by heavy typhoons. Basically, each LGU should be responsible for the operation and maintenance of the EMCs and it should secure necessary budget using the newly established LDRRMF. It is also important that the executing agency fully understands the system for the LDRRMF, and to keep providing guidance to the LGUs in order to facilitate their utilization of the Fund to secure necessary budget. Notwithstanding that, in case some LGUs cannot secure necessary budget, which may bring about the possibility that the basic function and effectiveness of the EMCs would be ruined, the executing agency should consider financial arrangements for such LGUs. (For instance, allocating a part of the DPWH's annual operation and maintenance budget to the LGU). Considering that the overall participation of the LGUs in sustainability of flood control projects is expected to increase, with the enforcement of the DRRM Act, it is crucially important to secure sustainable operation and maintenance structures for which the LGUs are responsible.

4.3 Lessons Learned

Importance of Introducing the IEC Program in Flood Control and Water Resource Management Projects

When the executing agency prepares projects on flood control and water resource management in the future, it would be important to incorporate the IEC program (conducting disaster prevention activities such as disaster drills and first aid, installing disaster prevention equipments, providing seminars, training and environmental education at schools, tree planting, cleaning up flood control and drainage facilities etc.) to enhance awareness and reinforce preparedness for flood prevention measures in the project area. Furthermore, initiatives to strengthen flood forecast capacity through Japan's grant aid and technical cooperation have contributed to raise awareness of the LGU and local residents on disaster prevention. These various initiatives are considered to have generated synergy and have led to implement this project, duly incorporating the IEC program. It is important that the executing agency incorporates such soft components in the project scope during project preparation, prior to proceeding with project approval process, from the point of view of securing necessary budget and resources (experts etc.), facilitating smooth project implementation, and enhancing project effectiveness.

[END]

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	1) Bayambang Stretch Improvement 2) Guide Channel to Bayambang Stretch 3) Social Development for the Poponto Swamp (including construction of the EMCs) 4) Resettlement Site Development for 149 households 5) Hector Mendoza Bridge Consulting Service: 1) Review of Detailed Design, Assistance in Tendering, Construction Supervision of the Project 2) Study, Design and Supervision of Social Development Measures for the Poponto Swamp and Resettlement Site Development 3) Preparation of Agno River Watershed Management Development Plan 4) Study on Sediment Balance for Tarlac River 5) Construction Supervision for Hector Mendoza Bridge Project (including environmental management) 6) Tarlac River "Overall" Improvement Works Study	1) Design change (re-alignment) took place 2) Design change (re-alignment) took place 3) One EMC not constructed 4) Not developed 5) As planned Consulting Service: 1) As planned 2) Supervision of Social Development Measures for the Poponto Swamp was deleted 3) As planned 4) As planned 5) As planned 6) As planned 7) Additional scope: IEC program
2.Project Period	Phase II: Sept. 1998–Apr. 2005 (80 months) Phase II-B: Mar. 2001–Jul.2006 (64 months) Total 144 months	Phase II: Sept. 1998–Feb. 2011 (150 months) Phase II-B: May 2001–Mar.2004 (35 months) Total 185 months
3.Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 8,451 million yen 8,203 million yen (2,434 million pesos) 16,654 million yen 9,523 million yen Phase II: 1 peso＝3.5 yen (As of Sept. 1997) Phase II-B: 1 peso＝2.8 yen (As of Jan. 2000)	 9,091 million yen 3,950 million yen (1,739 million pesos) 13,041 million yen 9,091 million yen 1 peso＝2.3 yen (Average between Jan. 1998 to Nov. 2009)

[END]