Republic of the Philippines

Ex-Post Evaluation of Japanese ODA Loan Project
"Laoag River Basin Flood Control and Sabo Project"

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0. Summary

This project aims to reduce flood damage in the project area by constructing flood control facilities. Mitigation of flood damages has been achieved by the project－construction of sabo dams, spur dikes, and construction and restoration of earth dikes－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. 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 both project cost and project period exceeded the plan. As regards operation and maintenance, some concerns have been observed in the state of operation and maintenance, 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

Sabo dam

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 Laoag River flows through the Province of Ilocos Norte in northern Luzon. It is one of the Philippines' major rivers, draining 1,332 km^2 (approximately the same area as the drainage basin of the Oi River in Japan, which is 1,240 km^2). In the Laoag River drainage basin, floods and sand deposits caused by typhoons were an annual occurrence. Damage was often especially severe in farming areas that were essential to the economy of Ilocos Norte, and about 1,000 hectares of farmland have been lost over the past twenty years. A number of stopgap measures have been implemented to deal with this situation, such as the construction and repair of dikes, but the problem remained unsolved and comprehensive efforts were urgently needed to control flooding.

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 Laoag River drainage basin.

1.2 Project Outline

The objective of this project is to reduce flood damages in the Laoag River drainage basin by constructing Sabo dams, repairing and constructing dikes and spur dikes in the Laoag River, which flows through the Province of Ilocos Norte in Northern Luzon, thereby improving the region's living environment and sanitation situation, and contributing to its socioeconomic development.

Loan Approved Amount / Disbursed Amount	6,309 million yen / 6,295 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2001 / May, 2001

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

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: Bilateral Tied
Borrower / Executing Agency	The Government of the Republic of the Philippines / Department of Public Works and Highways (DPWH)
Final Disbursement Date	September, 2009
Main Contractor (Over 1 billion yen)	Hanjin Heavy Industries & Construction Co., Ltd. (Korea) / Toyo Construction (Japan)
Main Consultant (Over 100 million yen)	Pacific Consultants International (Japan)・Yachiyo Engineering Co. (Japan)・Basic Technology and Management Corporation (Philippines) (JV)
Feasibility Studies, etc.	JICA Master Plan and Feasibility Study (1997)
Related Projects	Technical Cooperation (JICA) - JICA Experts dispatched to DPWH (Section related with river management) - The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of DPWH (January, 2000–June, 2005) - Strengthening the Flood Management Function of DPWH (Technical Cooperation Project) (July, 2005–June, 2010)

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 Plan (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 aiming to reduce flood damage in the Laoag River drainage basin was consistent with the Philippines' medium-term development plan. 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

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

[3] ③: High, ② Fair, ① Low

[4] One of the important pillars the National Water Resources Board puts up is "mitigation of water

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

The Laoag River drainage basin has been suffering from frequent flood damages[5] caused by typhoons and landslides at the time of appraisal. They have inflicted significant damage to agriculture, which takes up major portion of local economy in the Province of Ilocos Norte. Therefore, urgent measures were needed to control floods and mudslides.

At the time of ex-post evaluation, the Disaster Risk Management－Enhanced Regional Physical Framework Plan : 2004－2030 of the Region I[6] (including Province of Ilocos Norte) pointed out the importance of flood control measures as one of the countermeasures for disaster risk management, and the necessity to implement the project was mentioned as part of the measures. After the signing of the ODA loan project in 2001, the Laoag River basin continued to suffer from enormous floods and mudslides caused by four super typhoons: Igme (June 2004), Labuyo (September 2005), Helen (July 2008), and Igme (July 2008). From 2005 to 2011, serious damage and human loss occurred: 35 people were killed, more than 1.01 million people were affected, 39,165 houses were damaged and the amount of damage totaled more than 2.28 billion pesos. The necessity of reducing flood disaster continues to be emphasized in Province of Ilocos Norte where the project locates.

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

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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] (1) Number of major typhoons/monsoon rainfalls, (2) Affected number of people (of which number of dead persons), (3) Damage to agricultural production and (4) Damage to infrastructure facilities for major typhoons and monsoon rainfalls which hit the project area around the time of appraisal are as follows:

- 1999: (1) 2, (2) 2,945 people (3 people), (3) 2.0 million pesos, (4) N.A.
- 2000: (1) 2, (2) 5,708 people (2 people), (3) 1.1 million pesos, (4) 10.0 million pesos
- 2001: (1) 1, (2) 88,928 people (3 people), (3) 122.8 million pesos, (4) 21.0 million pesos
- 2002: (1) 3, (2) 2,394 people (N.A.), (3) 1.7 million pesos, (4) 5.4 million pesos
- 2003: (1) 4, (2) 18,878 people (1 person), (3) 1.9 million pesos, (4) 13.2 million pesos

Source: Region I Disaster Risk Reduction and Management Council

[6] Region I consists of 4 provinces: Ilocos Norte, Ilocos Sur, La Union and Pangasinan.

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.

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[7] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)[8]

The project aimed at reducing flood damages by improving flood control ability of the Laoag River to respond to 25-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 infrastructure facilities (mil. pesos)	Maximum high water level at Gilbert Bridge (m)	Total rainfalls for four days at the times typhoon (mm) Station: Laoag
June 2004	Igme	137,357	21	N.A.	33.3	73.8	8.60	N.A.
September 2005	Labuyo	115,427	4	25,155	31.2	20.7	6.06	N.A.
July 2008	Helen	46,882	1	6,128	9.8	4.7	5.20	N.A.
July 2008	Igme	26,715	3	4,919	2.3	27.1	5.00	N.A.
August 2008	Karen	102,914	3	25,628	213.2	12.0	8.50	426.4

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

[8] 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.

Project completion: May 2009								
July 2009	Isang	44,649	1	N.A.	0.8	33.3	5.00	N.A.
October 2009	Pepeng	170,674	3	N.A.	929.2	87.3	N.A.	N.A.
October 2010	Juan	8,534	N.A.	N.A.	38.7	9.4	2.60	N.A.
August 2011	Mina	92,024	3	25,828	55.2	45.6	1.87	655.8
June 2012	Dindo	21,234	0	4,615	10.0	32.7	3.05	N.A.

Source : Utilized data from both Region I Disaster Risk Reduction and Management Council, and Ilocos Norte Provincial Disaster Risk Reduction and Management Council
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 is Gilbert Bridge, and water level is monitored every typhoon and monsoon rainfalls
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－Karen (August 2008) and Mina (August 2011)－the total amount of rainfalls for four days when Mina approached the project area exceeded that of Karen. The number of persons affected by Mina was less than that of Karen by about 10 thousand, and the amount of damage caused by Mina (damage to agricultural production and infrastructure facilities) was less than that of Karen by around 124 million pesos.

The super typhoon Pepeng that directly hit the project area in October 2009 is said to have caused 50-year return period flood, according to media information, however, interviews with local residents during the field survey showed that no flood damage has occurred even when Pepeng hit the area. According to the beneficiary survey (to be described later), all the 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.

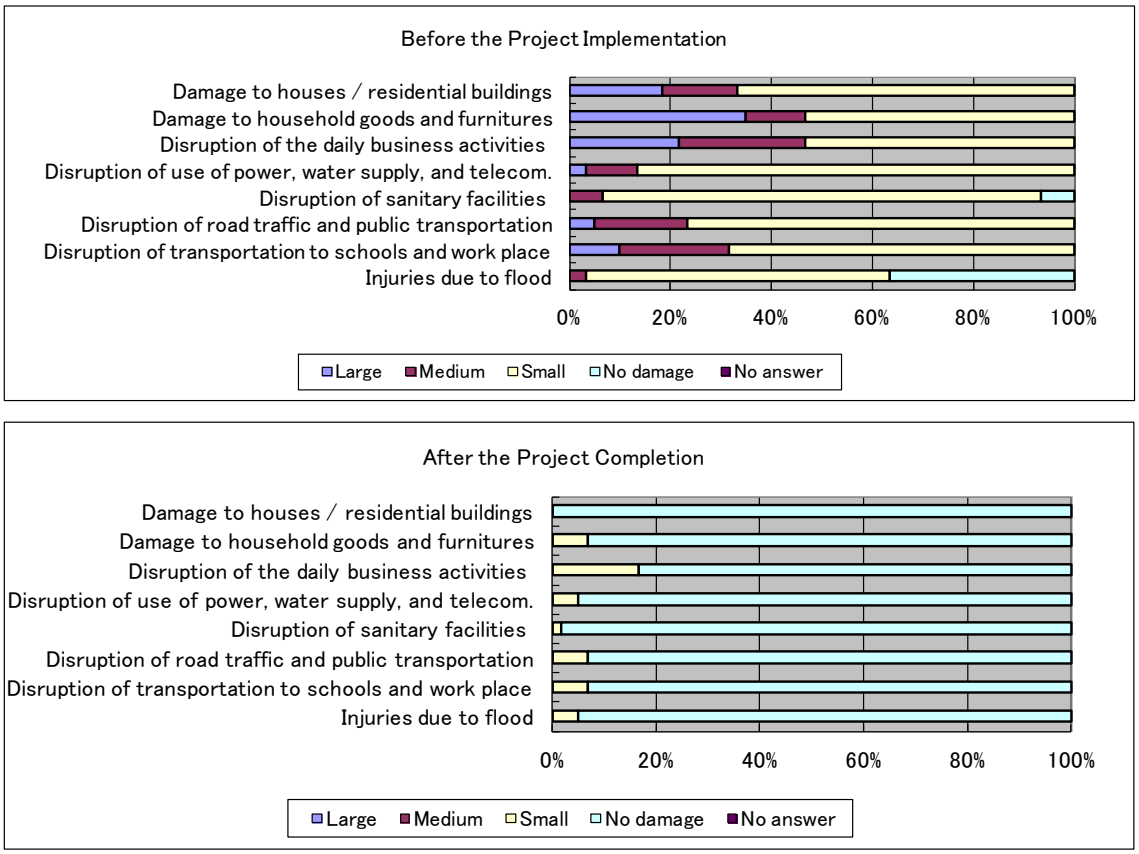
3.2.2 Qualitative Effects

3.2.2.1 Mitigation of Flood Damage

The results of the beneficiary survey[9] to residents and farmers in the project area on

[9] Beneficiary survey was conducted in one city (Laoag City) and ten municipalities in the project

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.



Source: Results from the beneficiary survey

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

According to the executing agency, the project area covers one city and ten municipalities,[10] and of which Laoag City and the municipality of San Nicolas have benefited most from mitigation of flood damages thanks to this project.

According to the interview with the beneficiaries (residents in Laoag City and the municipality of San Nicolas) during filed survey, residents have not suffered from flood damage by typhoons and monsoon rainfalls any longer after the project completion. There

area (municipalities of San Nicolas, Piddig, Sarrat, Banna, Dingras, Marcos, Nueva Era, Solsona, Carasi, and Vintar), consisting of 284 barangays. Ten barangays were randomly selected, followed by a random selection of six households from each barangay, totaling to 60 households. (Data collection method: hearing investigation)

[10] Laoag City and the municipalities of San Nicolas, Piddig, Sarrat, Banna, Dingras, Marcos, Nueva Era, Solsona, Carasi, and Vintar.

were also such responses indicating that there has been no inundation of access roads to the Laoag Airport and to the Gilbert Bridge during times of typhoons and monsoon rainfalls. Residents pointed out that they have been living in peace without flood after the project, while they had suffered from flood damages twice or three times a year before the project. In addition, residents indicated that students in primary and secondary schools near Bagbag Bridge, which has been expanded by the project, can continue attending classes during times of typhoons after the project. In fact, the schools had to close classes everytime typhoon occurred prior to the project, but now, it has been utilized as place for evacuation.

Bagbag Bridge

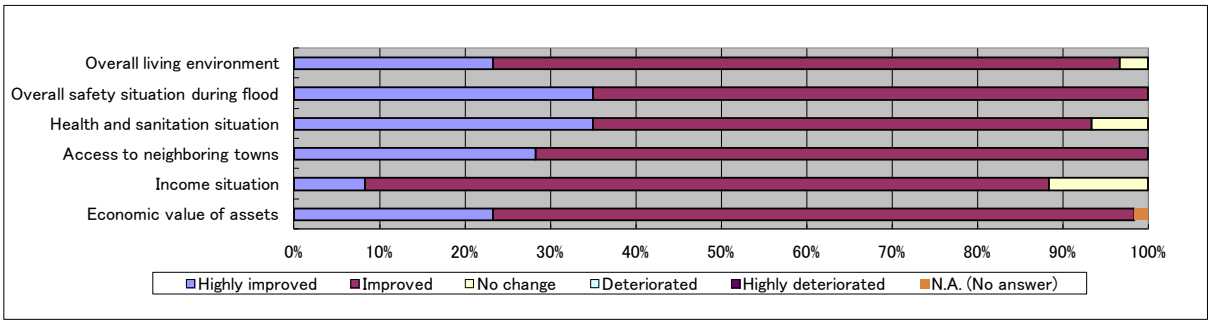
Earth dike in San Nicolas

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 90% of respondents answered that almost 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. (As regards effects on “income situation”, 88% of 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)

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 through creation of new agricultural lands and population growth).

- After the project completion, agricultural productivity has increased since arable areas have expanded. (Prior to the project, agricultural land has been damaged by outflow of sediments due to flooding.)
- After the project completion, new houses were constructed in the area, where it used to be flood-prone, empty land before the project, and resulted in population increase.[11]
- After the project completion, land value has increased due to enhanced productivity of land and improved everyday convenience.

Earth dike and new agricultural land

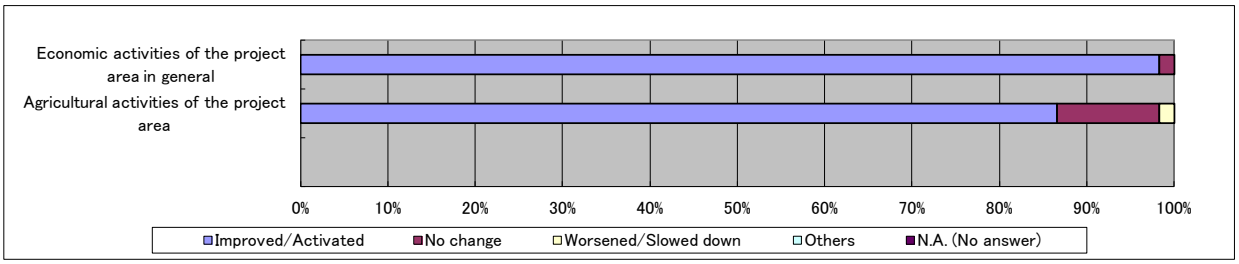
New residential area

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

[11] Nalbo Barangay and Zamboanga Barangay in Laoag City

been improved" and about 87% 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 "a shopping mall was newly opened in the municipality of San Nicolas in 2009 after the project, and local economy has been activated. The shopping mall has never suffered from flood damage." Currently, there seems to be a plan to open another large-scale shopping mall in the area.

The executing agency pointed out "functions for Ilocos Norte Irrigation System,[12] developed by National Irrigation Administration (NIA), have improved due to the construction of sabo dams, which have been blocking sediments to flow down the river and stabilizing water flow. As a result, effective water resource utilization has achieved, leading to enhanced agricultural productivity." In fact, close collaboration among DPWH, NIA and Irrigators Association participated by farmers has taken place during the project preparation and implementation. Further coordination is to be taken place as needs arise.

NIA irrigation intake

Irrigation water from NIA intake

[12] NIA Irrigation System was developed in early 1980s. Although the system was damaged by the super typhoon Igme in July 2008, it was already repaired and function for the water intake system was restored at the time when site survey was conducted.

As regards agricultural production data, Tables 2 and 3 show the yield trend of palay (rice) and corm in the project area (one city and ten municipalities) and the whole Ilocos Norte Province, respectively. While no evident correlation between the data shift and the project can be observed, it is possible to regard that the project has contributed to mitigate typhoon damages to a certain extent in the project area in 2008 and 2009.

Table 2: Palay Production in the Project Area and Ilocos Norte Province

	2006	2007	2008	2009	2010	2011
Palay production in the project area: one city and ten municipalities (metric tons)	182,107	192,840	177,049	164,349	190,140	193,654
Palay production growth in the project area: one city and ten municipalities (%)	-	5.89	(8.19)	(7.17)	15.69	1.85
Palay production in the whole Ilocos Norte Province (metric tons)	282,794	282,832	299,984	256,582	301,934	306,726
Palay production growth in the whole Ilocos Norte Province (%)	11.79	0.01	6.06	(14.47)	17.68	1.59

Source: Palay production in the project area: Project Management Office-Laoag River Basin Flood Control and Sabo Project
Palay production in the whole Ilocos Norte Province: Bureau of Agricultural Statistics

Table 3: Corn Production in the Project Area and Ilocos Norte Province

	2009	2010	2011
Corn production in the project area: one city and ten municipalities (metric tons)	27,621	30,633	29,511
Corn production growth in the project area: one city and ten municipalities (%)	-	10.91	(3.66)
Corn production in the whole Ilocos Norte Province (metric tons)	58,368	53,553	52,157
Corn production growth in the whole Ilocos Norte Province (%)	(0.35)	(8.25)	(2.61)

Source: Corn production in the project area: Project Management Office-Laoag River Basin Flood Control and Sabo Project
Corn production in the whole Ilocos Norte Province: Bureau of Agricultural Statistics

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 October 1997.

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[13] based on the EIA.

[13] Concrete mitigation measures were as follows: constructing a coffer dam in revetment construction (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), properly siphoning of dredged materials onto pre-selected areas (a measure to mitigate effect on topography and geology), and sodding of dike

As regards environmental monitoring during project implementation, a monitoring team (consisting of DPWH, DENR, LGUs of concerned province and city/municipalities, consultants etc.) conducted monitoring activities every quarter. All project sites 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. No particular complaint was raised from the LGUs and local residents.

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. (Inquiries were made regarding effects on fish habitat and wild animals, however, no issue was indicated.) Furthermore, as a result of beneficiary survey (see footnote 9), 6 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, but no complaint was raised. On the other hand, 57 respondents (95% of the total respondents) answered “natural environment has improved” or “there has been no effect on natural environment “after the project completion. Thus, no particular issues have been observed.

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, and agreements seem to have been reached on the amount without any problem. According to the executing agency, some landowners were willing to donate their land for free, as they well understood and supported the project benefit. No particular issue have been observed for land acquisition since the process has taken place appropriately including public hearing and consultations based on the Philippines’ regulation.

With the effort of the executive agency to minimize effect of land acquisition and resettlement,[14] the final land area acquired was 1,628,216 m^2 and the final number of households to whom the executing agency paid compensation for land acquisition was

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embankments with carabo grass (a measure to mitigate erosion) etc.

[14] Design change was carried out for the river wall in Laoag City.

45.[15] Of which, all 5 legal households chose to move to neighboring sites which they owned. As a result, 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.) In addition, compensation for buildings was paid to 40 illegal households. Of which, 20 households received compensation and moved to Mindanao. The remaining 20 households have moved to neighboring sites, thus, livelihood programs were no longer necessary because there was no change in their livelihoods. No particular issue was pointed out by residents regarding land acquisition in the interviews during the field survey.

Endorsement from the National Commission on Indigenous Peoples (NCIP) for sabo dam construction in 5 places[16] has been given without problem, and no particular obstacle for project implementation was observed. In fact, the NCIP concluded that there is no effect on indigenous people living in 3 sabo dam sites－Labugaon, Solosona and Madongan－among 5. As regards remaining 2 sabo dam sites－Cur and Papa－Memorandum of Agreement (MOA) has been concluded between the executing agency and the NCIP, thus, no obstacle was observed for project implementation. Based on the MOA, indigenous people have participated in the construction of sabo dams.[17]

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 4.

Table 4: Comparison of Planned and Actual Project Outputs

Planned	Actual	Comparison
Civil Works		
1) Sabo Dam Works (5 dams) - Sediment Capacity: 4,862,000m^3 2) Laoag-Bongo River Improvement Works - Improvement Length: 13.14 km	1) Sabo Dam Works(5 dams) - Sediment Capacity: 4,709,000m^3 2) Laoag-Bongo River Improvement Works - Improvement Length: 14.0 km	No major change of outputs in terms of constructed items, but design changes/extra works took place for sub-items ➔Direct hit of super typhoons Igme (June 2004) and Labuyo (Sept. 2005) had caused sediment deposition and

[15] At the time of project planning, 3 households were identified for relocation and 10 houses to be affected by elevating the dike in Laoag City. At the time of mid-term review of the project, 65 households were identified for relocation.

[16] Labugaon, Solosona, Madongan, Cura, and Papa

[17] According to the executing agency, around 60% of those engaged in sabo dam construction (about 300 workers) was indigenous people.

- Earth Dike: 11,600 m - Riverwall: 1,540 m - Spur Dike: 5 units - Sluiceway: 5 units 3) Alluvial Fan River Improvement Works - Improvement Length: 39km - Earth Dike: 52,000 m - Spur Dike: 1,328 m - Groundsill: 4 units - Sluiceway: 17units - Existing Bridge Extension: 1	- Earth Dike: 12,500 m - Riverwall: 1,100 m - Spur Dike: 6 units - Sluiceway: 10 units 3) Alluvial Fan River Improvement Works - Improvement Length: 39km - Earth Dike: 70,400 m - Spur Dike: 1,036 m - Groundsill: 4 units - Sluiceway: 15 units - Existing Bridge Extension : 1	topographic change, which necessitated design changes/extra works ➔Design change of Riverwall in Laoag City took place to minimize resettlement. In addition, step over dike was constructed for cattle.
Consulting Service		
1) Basic Survey 2) Detailed Design 3) Assistance to DPWH in Construction Management 4) Assistance to DPWH in Environmental Management (Land Acquisition, Compensation and Resettlement, and Environmental Monitoring on Water Quality, Air Quality, Noise, Waste etc.)	1) Basic Survey 2) Detailed Design 3) Assistance to DPWH in Construction Management 4) Assistance to DPWH in Environmental Management (Land Acquisition, Compensation and Resettlement, and Environmental Monitoring on Water Quality, Air Quality, Noise, Waste etc.)	No major change of outputs in terms of consulting service items, but design change took place due to direct hit by super typhoons Igme (2004) and Labuyo (2005), as well as design change of Riverwall took place in Laoag City.

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, due to the direct hit of 2 super typhoons: Igme (June 2004) and Labuyo (September 2005),[18] massive sediment deposit, changes in the river conditions and topographical features occurred, which necessitated design changes and additional construction works. These changes and additional scope are considered appropriate in the face of unavoidable factors. The executing agency also changed the design of the riverwall in Laoag City in order to minimize effect of resettlement. In addition, in response to requests from the LGUs, step over dike was constructed for cattle. These changes are considered as appropriate.

[18] Typhoon Igme hit the project area in 2004 (prior to civil works; during bidding process) and typhoon Labuto hit the project area in 2005 during construction.

Riverwall in Laoag City

Sluiceway

Inputs for consulting service have increased as summarized in Table 5. According to the executing agency, the reasons for increase were as follows.

- Design changes were conducted due to changes in the river conditions and topographic features caused by the direct hit of two super typhoons Igme (2004) and Labuyo (2005).
- Construction supervision period was increased due to the delay of project implementation.
- Design change of the riverwall in Laoag City took place in order to minimize effect of resettlement.

Table 5: Comparison of Planned and Actual Consulting Service (MM)

	Plan	Actual	Comparison
Foreign	216	247.9	Increased by 31.9
Local	342	407.7	Increased by 65.7
Total	558	655.6	Increased by 97.6

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

The total project cost was initially estimated at 8,412 million yen, of which Japanese ODA loan would cover 6,309 million yen. In actuality, total project cost was 10,591 million yen, of which Japanese ODA loan provided a total of 6,295 million yen, resulting in a higher amount than the initial estimate (126% of the planned amount).

The major factors of the cost overrun were as follows. Either of them were unavoidable factors. As regards project cost overrun, the Philippine government utilized the local fund to complete the project.

- Rise in the price of iron and steel, fuel and cement:[19] escalating prices of these major inputs, utilized substantially for sluiceway, sheet piles, sabo dams, dikes etc. have pushed up the project cost
- Damages cause by super typhoons: In June 2004, right before the start of the civil works and in September 2005, during civil works, two super typhoons (Igeme and Labuyo) hit the projecting area and the Laoag River had encountered serious flood damage. The existing facilities and facilities under construction were destroyed, and changes in landscape and inundation patterns occurred, which necessitated major reassessment and revision of project design. In addition, repairs for access roads (national, regional, municipal, and barangay roads, respectively) were necessary as they were affected by the typhoons.

3.4.2.2 Project Period

The overall project period was planned as 67 months as opposed to 97 months in reality, representing an expansion to 145% of the initial plan.

Table 6 shows a comparison of planned and actual project period.

Table 6: Comparison of Planned and Actual Project Period

Planned (at the time of Appraisal)	Actual (at the time of Ex-post Evaluation)	Comparison
Mar. 2001*–Sept. 2006 (67 months)	May 2001*–May 2009** (97 months)	Delayed by 30 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 significant revision and changes in design due to sediment deposition, changes in river alignment and topographic conditions as a result of damages by super typhoons during the project implementation, and associated delays in civil works as well as delays in procurement procedures (selection of contractors).

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

Table 7 summarizes the result of recalculation of the economic internal rate of return (EIRR).

[19] Each input price soared to following figures assuming its price was 100 in February 2002. Structural steel: 184, reinforcing steel: 151, fuel: 142, cement: 102.

Table 7: Assumption and Results of EIRR Recalculation

	At the time of Appraisal	At the time of Ex-post Evaluation
EIRR	15.5%	13.5%
Benefit	Expected amount of total flood damages mitigated (Amount of damage caused by 25-year return period flood or less)	Flood mitigation benefit, land loss prevention benefit, land use restoration benefit, negative benefit,* and benefit from restoration of irrigation facilities **
Cost	Cost required for river improvement works and construction of flood control facilities, and increased O&M cost due to the project	Cost required for river improvement works and construction of flood control facilities, and increased O&M cost due to the project
Project Life	50 years after project completion	

* The crop production in appropriated farmlands for the implementation of the project.
** Utilized the same assumption with that at the time of appraisal for percentage of rise.

The recalculated figure for the project became 13.5%, lower than the one at time of the appraisal (15.5%). The main reason of this is considered to be the increased project cost compared with that of the initial plan.

Both project cost and project period exceeded the plan, 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 a new Act and Joint Memorandum Circular) are taken up in the Column. This section analyzes project sustainability, taking into account such changes.

3.5.1 Institutional Aspects of Operation and Maintenance

The Project Management Office-Laoag River Basin Flood Control and Sabo Project (PMO-LRBFCSP) is responsible for operation and maintenance of flood control facilities and bridge constructed by the project. The PMO-LRBFCSP is the local subordinate office under the Project Management Office – Flood Control (PMO-Flood Control[20]), a project management office of the DPWH. The PMO-LRBFCSP is undertaking operation and maintenance work under comprehensive monitoring by the DPWH-Ilocos Norte 1st and 2nd District Engineering Offices.

There are 7 technical staffs in charge of operation and maintenance of the project, and

[20] 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 Drainage Projects, Cluster I and Cluster II merged to formulate the PMO-Flood Control.) The PMO-LRBFCSP used to be under the Project Management Office-Major Flood Control and Drainage Projects Cluster II.

some of them have participated in implementation of the project (expansion of existing dikes etc.). 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. In addition, the DPWH-Ilocos Norte District Engineering Offices have been conducting an overall monitoring of operation and maintenance work undertaken by the PMO-LRBFCSP. In this regard, a multilevel system has been secured for the operation and maintenance of the project. 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.

At the time of ex-post evaluation, the Memorandum of Agreement (MOA) between the DPWH and the LGUs regarding operation and maintenance has not been signed yet, and the PMO-LRBFCSP is in charge of the entire operation and maintenance work of flood control facilities and bridges constructed by the project. According to the executing agency, discussion regarding the MOA with the LGUs is expected to resume after May 2013, when new institutional mechanisms are in place.[21]

3.5.2 Technical Aspects of Operation and Maintenance

The PMO-LRBFCSP's 7 engineers, who are in charge of operation and maintenance of the project, have rich experiences with average of around 15 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-LRBFCSP. In addition, technical staffs who monitor the operation and maintenance work of the PMO-LRBFCSP are deployed in the DPWH-Ilocos Norte 1st and 2nd District Engineering Offices, respectively.

As part of the consulting service of the project, 2 technical staffs in PMO-MFCDP-II[22] have participated in study tour to Japan and acquired necessary skills on maintenance of flood control facilities and sabo dams. In addition, one operation and maintenance staff in the PMO-LRBFCSP has participated in JICA training－Water Integration in the

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[21] According to the executing agency, the responsibility for the DPWH and the LGUs were considered as follows:
- LGU－relatively small scale maintenance work such as removal of vegetation and cleaning of channels and drainage, conducting monitoring during times of typhoon, reporting to the DPWH
- DPWH－maintenance and repair of dikes and other flood control facilities, removal of sedimentation etc.

The expected signers of the MOA were the DPWH, the heads of LGUs (one city and ten municipalities) and barangay captain in each barangay. Part of the DPWH operation and maintenance budget were to be allocated to the LGUs for their maintenance costs.

[22] Previous organization before the establishment of the PMO-Flood Control in January 11, 2013. (see footnote 20)

Philippines.

Manuals for the operation and maintenance of facilities constructed by the project have been developed (July 2008), and have been utilized by the PMO-LRBFCSP staffs in their operation and maintenance work.

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-LRBFCSP, then estimation will be reviewed by the DPWH-Ilocos Norte District Engineering Offices, followed by a review 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-LRBFCSP.

Requested operation and maintenance budget for the project has been fully secured each year after the project completion (since 2010), and therefore, no particular issue has seen at the time of ex-post evaluation. (See Table 8)

Table 8: O&M Budget Allocation for the Project (Note 1)

Year	Requested Amount (mil. pesos)	Allocation (mil. pesos)
2010	16.0	16.0
2011	16.0	16.0
2012	16.0+202 (Note 2)=218.0	218.0
2013	21.6+242 (Note 3)=263.6	263.6

Source：Results from questionnaire surveys, and interview survey results during field survey
Note 1）The figures do not include salaries of staffs
Note2）In addition to ordinary operation and maintenance budget (16.0 million pesos), budget for expansion of existing dikes (additional work) (202 million pesos) was requested.
Note3）In addition to ordinary operation and maintenance budget (21.6 million pesos), budget for expansion of existing dikes (additional work) (242 million pesos) was requested.

The operation and maintenance cost in 2010 (16.0 million pesos) was ordinary maintenance cost (daily maintenance of equipments and facilities, flood control activities etc.). As for the breakdown of the operation and maintenance cost in 2011 (16.0 million pesos), 8 million pesos was for ordinary maintenance (daily maintenance of equipments and facilities, flood control activities etc.), and the remaining 8 million pesos was for repair works of damaged dikes and other flood control facilities caused by four typhoons (Helen, Igme, Julian, and Karen) which hit the project area between July to August 2008. The 2012 budget includes ordinary maintenance cost (16.0 million pesos) as well as cost for expansion of existing dikes (additional work) (202 million pesos). Furthermore, the 2013 budget includes cost for expansion of existing dikes (additional work) (242 million pesos) in addition to ordinary maintenance cost (21.6 million pesos). These budgets have

been fully secured, which indicates that the 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.

3.5.4 Current Status of Operation and Maintenance

Four consecutive typhoons (Helen, Igme, Julian, and Karen) directly hit the project area between July to August 2008, and damaged dikes and flood control facilities constructed by the project.[23] In addition, super typhoon Pepeng (occurred in October 2009) aggravated the damages. The PMO-LRBFCSP has already repaired these damages utilizing the local fund (2011 operation and maintenance budget), thus, no particular issue is observed.

Repair work of some part of flood control facilities damaged by the monsoon rainfalls that hit the project area between July to November 2012 (especially the rainfalls in September) and the typhoon Gener in August 2012, still needs to take place, and the PMO-LRBFCSP is planning to prioritize allocation of the 2013 budget for this. The 2013 budget has been fully approved, and no particular problem has seen for repairing the damaged facilities. In addition, the PMO-LRBFCSP is implementing expansion work of existing dikes[24] utilizing both 2012 and 2013 budgets. The sustainability of the project is expected to enhance once the expansion work is completed.

The PMO-LRBFCSP 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-LRBFCSP makes careful inspection of flood control facilities such as dikes and guide channels constructed by the project. Furthermore, the PMO-LRBFCSP monitors the status of sediments and obstacles. In emergency situation, urgent repair of damaged facilities is conducted using the Calamity Fund as mentioned above.

On the other hand, the PMO-LRBFCSP has not conducted dredging of sediments in the sabo dam as well as riverbed of the Laoag River after the completion of the project.[25] Since the Laoag River is located in the area, with a topographical feature easy to

[23] Dikes and other flood control facilities along Papa River, Madongan River and Solsona River.
[24] The municipalities of Dingras and San Nicolas, and Laoag City were the areas for the expansion work.
[25] According to the executing agency, sediments in the middle and lower Laoag River came from the tributaries and open dikes, not from the sabo dam in the upper river. The executing agency pointed out that sediments already existed during the project implementation stage.

accumulate sedimentation and prone to landslide (the Laoag River is winding through mountainous area), it is crucially important to undertake measure to remove sedimentation in order to secure sustainability of the project.

In addition, private companies are doing quarry business and exporting dredged sediments to be utilized for construction materials. However, dredging sediments as a business for private sector may create risks for deterioration of riverbed (riverbed may become rough due to uneven excavation) and destruction of flood control facilities. It is crucial that the PMO-LRBFCSP, in collaboration with the LGUs, conducts a monitoring of excavation activities since the issue may affect project effectiveness and sustainability.

Some concerns have been observed in terms of current status of operation and maintenance, therefore sustainability of the project effect is fair.

Earth dike extension work (using local fund)

Barangay 46 Nalbo was awarded for "Cleanest and Greenest Barangay of Laoag City"

Column: 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.[26]

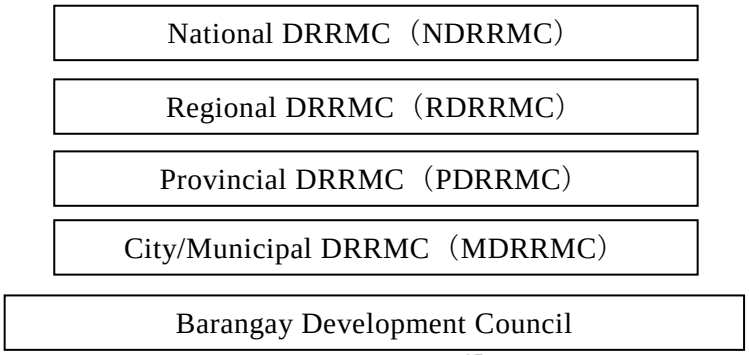

Figure 4: DRRM Structures[27] under the DRRM Act

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.[28] 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.[29]

The Provincial Disaster Risk Reduction and Management Council (PDRRMC) of Ilocos Norte Province, the Disaster Risk Reduction and Management Council (DRRMC) of each city/municipality and each Barangay Development Council have been undertaking disaster prevention measures (providing trainings, conducting dissemination activities and school classes, installing disaster prevention equipments,[30] and cleaning up the Laoag River) for local residents based on the Laoag River watershed management and disaster prevention plan of each LGU. The objective is to enhance awareness and preparedness of local residents. At barangay level, activities such as evacuation drills, solid waste management, cleaning up irrigation channels, and reforestation are implemented although barangays have been facing budget

[26] 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, "Ilocos Norte Disaster Coordination Council" was in place which was enhanced into "Ilocos Norte DRRMC" after the enactment of the Act.

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

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

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

[30] Rubber boats, flashlights, helmets, stockpiling food etc.

shortage. In addition, as a part of the National Greening Program initiated by the DENR, tree planting activities have been conducted in the municipalities of Dingras and Solsona. Furthermore, the PDRRMC of Ilocos Norte Province has been implementing a project in collaboration with the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) to develop meteorological weather stations, and thereby to set up flood warning system.

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 the DRRMCs of Ilocos Norte Province, 1 city and 10 municipalities seem to be conducting activities within their 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. Mitigation of flood damages has been achieved by the project－construction of sabo dams, spur dikes, and construction and restoration of earth dikes－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. 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 both project cost and project period exceeded the plan. As regards operation and maintenance, some concerns have been observed in the state of operation and maintenance, 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

<u>Importance of maintenance (especially removal of sediments)</u>

Since the project completion in May, 2009, the executing agency has not taken measures for removing sediments. According to the executing agency, given the speed

and amount of sedimentation compiling, there is a possibility that sediment storage capacity of sabo dams might fall short of the intended 25 years without regular dredging. In addition, sediments are flowing in to the middle and lower Laoag River from the tributaries and open dikes. In case sediments exceed the sediment storage capacity of sabo dams and flow out to the lower reach or sediments from tributaries and open dikes accumulate, flood control function will decline (i.e., discharge capacity of the Laoag River will decline due to rising riverbed and decreasing river width). This will also diminish agricultural productivity in the project area since sediments may flow into farmlands, which may have negative impact on the effectiveness and sustainability of the NIA irrigation system. Given the fact that the Laoag River is located in the area, with a topographical feature easy to accumulate sedimentation, the executing agency should develop mechanism for appropriate planning, budgeting and implementation for maintenance, including removal of sediments, in order to enhance sustainability of the project. In addition, the executing agency should further collaborate with the DENR and the LGUs to strengthen reforestation initiatives in the upper river basin as part of drastic measures to mitigate sediment discharge.

Furthermore, the executing agency should conduct monitoring and supervision of private sector's quarry business in coordination with the LGUs so as not to affect the sustainability of the project.

Importance of collaboration with the LGUs

The MOA between the DPWH and the LGUs on operation and maintenance of the project has not been signed at the time of ex-post evaluation, therefore, the executing agency is fully responsible for undertaking the operation and maintenance of flood control facilities and bridges constructed by the project. However, it is important that the executing agency develops mechanism for coordination and collaboration with the LGUs in prospect of future role-sharing of the operation and maintenance work with them. In order to secure sustainability of the project, it is crucial to formulate structures that would enable the LGUs to proactively participate in river conservation and disaster prevention activities in collaboration with the executing agency, and to reflect their voices properly to operation and maintenance of the project. In fact, as each LGU plans to prepare the LDRRMP targeting October 1 2013, it would become possible to institutionalize collaborative relationship between the executing agency and the LGUs if such collaborative activities would be stipulated in the LDRRMP.

4.3 Lessons Learned

Importance of participation of the LGUs and local residents 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 participatory type soft components (e.g., 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. As mentioned in the Column, with the enforcement of the DRRM Act, awareness of local residents for proactive disaster preventive measures have steadily enhanced, therefore, the executing agency will be able to facilitate communication with the LGUs and local residents, and provide opportunities to further strengthen their ownership to cope with flood prevention measures by incorporating such soft components in the project scope. In addition, through such initiatives, it would be possible to control flood disasters to some extent even if the magnitude of the flood exceeds the expectation, and would contribute to enhance effectiveness and sustainability of the project as an infrastructure project. Therefore, it is important that the executing agency acknowledges such benefits, and 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. It is also expected that JICA provides advice to the executing agency to incorporate such soft components to similar type of projects in the future as appropriate.

Considerations to be made during project implementation for projects located in natural disaster prone areas

The project was located in disaster prone area from typhoons, and had been hit by super typhoons (Igme: June 2004, Labuyo: September 2005, Helen, Igme and Karen: between July to August 2008) during the project implementation. The executing agency had no choice but to conduct design changes due to changes in the river conditions and topographic features, as well as to restore damaged flood control facilities. These external factors became one of the major causes to exceed the planned period and cost of the project－the executing agency has decided to utilize the local fund to cover the cost overrun to complete the project. As such, it is important for the executing agency to carefully review the project cost and period when adding scope, and to secure mechanism for flexible and agile coordination and approval procedures during project implementation.

[END]

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	1) Sabo Dam Works (5 dams) ・Sediment Capacity: 4,862,000m^3 2) Laoag-Bongo River Improvement Works ・Improvement Length: 13.14 km ・Earth Dike: 11,600 m ・Riverwall: 1,540 m ・Spur Dike: 5 units ・Sluiceway: 5 units 3) Alluvial Fan River Improvement Works ・Improvement Length: 39km ・Earth Dike: 52,000 m ・Spur Dike: 1,328 m ・Groundsill: 4 units ・Sluiceway: 17 units ・Existing Bridge Extension: 1 Consulting Service: 1) Basic Survey 2) Detailed Design 3) Assistance to DPWH in Construction Management 4) Assistance to DPWH in Environmental Management (Land Acquisition, Compensation and Resettlement, and Environmental Monitoring on Water Quality, Air Quality, Noise, Waste etc.)	1) Sabo Dam Works (5 dams) ・Sediment Capacity: 4,709,000m^3 2) Laoag-Bongo River Improvement Works ・Improvement Length: 14.0 km ・Earth Dike: 12,500 m ・Riverwall: 1,100 m ・Spur Dike: 6 units ・Sluiceway: 10 units 3) Alluvial Fan River Improvement Works ・Improvement Length:39km ・Earth Dike:70,400 m ・Spur Dike:1,036 m ・Groundsill: 4 units ・Sluiceway: 15 units ・Existing Bridge Extension:1 Consulting Service: 1) As planned 2) As planned 3) As planned 4) As planned
2.Project Period	Mar. 2001–Sept. 2006 (67 months)	May 2001–May 2009 (97 months)
3.Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 3,996 million yen 4,416 million yen (1,577 million pesos) 8,412 million yen 6,309 million yen 1 peso＝2.8 yen (As of Jan. 2000)	 6,295 million yen 4,296 million yen (1,930 million pesos) 10,591 million yen 6,295 million yen 1 peso＝2.2 yen (Average between Sept. 2001 to Dec. 2008)

[END]