Republic of the Philippines

Ex-Post Evaluation of Japanese ODA Grant Aid Project

"The Project for Flood Disaster Mitigation in Camiguin Island"

External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

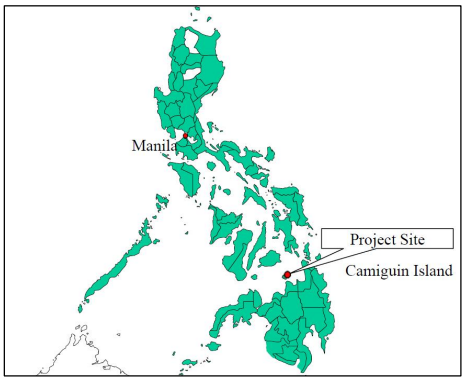
Yumi Ito, Japan Economic Research Institute Inc.

0. Summary

In this project, the Sabo dams were constructed and a bridge was reconstructed in Camiguin Island to prevent the disaster by debris flow along river basins and to improve the traffic condition over the bridge. The relevance of this project is high, as it was consistent with the development plan and needs of the Philippines as well as the ODA policy of Japan. The efficiency is also high, as the contents of the project were implemented mostly as planned and the project cost and period were within the scope of the plan. With regard to the effectiveness of the project, it was confirmed that the effects have been realized in terms of improvement in vehicle speed passing over the bridge, prevention of debris flood disasters, and securing of a safe and smooth traffic flow on the bridge. In addition, as impacts of the project, it was inferred that this project contributed to the establishment of a comprehensive disaster prevention system with a combination of structural and non-structural measures, an increase in traffic volume near the Hubangon Bridge, the improvement in access to markets, a stable transport of goods, and the enhancement of the Camiguin's image as a tourist spot. Therefore, the effectiveness and impact of this project are high. The sustainability of the effects of this project is considered high. There were no problems observed in terms of institutional or technical aspects as well as the current status of operation and maintenance. Although sufficient quantitative information was not obtained to assess financial aspects of the sustainability, there were no particular problems observed in terms of the contents of maintenance activities and implementation status of daily maintenance activities.

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

1. Project Description



Project Location

Sabo Dam (Upper Dam)

1.1 Background

Camiguin Island is a volcanic island located about 70km north of Mindanao Island, with a population of 81 thousand (as of the time of project planning). In November 2001, Typhoon Nanang caused a mudslide resulting in 250 dead or missing persons (among whom 224 were in the Municipality of Mahinog) on the Island. A wide range of areas including infrastructural facilities such as water veins and roads as well as houses and paddy fields were damaged with the amount of damage estimated at about 500 million yen.

After the disaster, Region X Office of the Department of Public Works and Highways (hereinafter referred to as DPWH) and the Provincial Government of Camiguin requested technical assistance from JICA, and JICA conducted "Basic Survey of Disaster Prevention and Rehabilitation Activities in Camiguin" (a basic survey of the overseas office) in 2003 and "Basic Survey of Disaster Prevention for Soft Measures" (a basic survey of the overseas office 2) in 2004. In the basic survey conducted in 2003, a hazard map covering major rivers in Camiguin Island was prepared, and it was recommended to introduce non-structural (soft) measures in addition to structural (hard) measures. Based on this recommendation, the drawing of a line between dangerous areas and other areas, the installation of a rainfall gauge and the instructions on observation, the establishment of an alarm standard, the preparation of a disaster prevention manual, and the execution of emergency drills were conducted in 2004.

However, there was a risk that similar damages might happen because no structural measures for disaster prevention had been introduced to the river basins of the Hubangon and the Pontod rivers where serious damage was caused at the time of the disaster in 2001 and the damaged Hubangon Bridge had not yet been rehabilitated.

Under these circumstances, the Philippine Government requested grant aid from the Japanese Government in 2006, and the project to construct two Sabo dams and reconstruct the Hubangon Bridge was implemented.

1.2 Project Outline

The objective of the project was to mitigate the damage caused by debris flow along river basins by constructing the Sabo dams and to improve the traffic condition by reconstructing Hubangon Bridge in Camiguin Island, thereby contributing to the maintenance/improvement of the residents' living conditions and sustainable economic development.

Grant Limit / Actual Grant Amount	1,013 million yen / 868 million yen
Exchange of Notes Date / Grant Agreement Date	June, 2009 / June, 2009
Implementing Agency	Department of Public Works and Highways

Project Completion Date	July, 2011
Main Contractor	Construction: Toyo Construction Co., Ltd.
Main Consultant	CTI Engineering International Co., Ltd.
Basic Design	April, 2009
Detailed Design	December, 2009
Related Projects	"A Basic Survey of Disaster Prevention and Rehabilitation Activities in Camiguin (a basic survey in the overseas office)" (2003) "The Basic Survey of Disaster Prevention for Soft Measures (a basic survey in the overseas office 2)" (2004)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa, Japan Economic Research Institute Inc.

Yumi Ito, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: October, 2014 – September, 2015

Duration of the Field Study: January 8 – February 6, 2015 and April 5 – 18, 2015

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Plan of Republic of the Philippines

At the time of project planning, the "Medium-term Philippine Development Plan (2001-2010)" aimed at poverty reduction and placed high priority on disaster prevention and transportation that would lead to social stabilization. More concretely, the Plan listed improvement of safety against disaster, rehabilitation/reconstruction of roads and bridges connecting to sightseeing areas, between rural areas and markets, and the completion of a nautical highway system linking the entire country, positioning this project as an important project in the Plan.

At the time of ex-post evaluation, the "Philippine Development Plan (2011-2016) (Midterm Update)" aimed at inclusive growth and poverty reduction. In order to attain these objectives, the Plan listed infrastructure development as one of its key strategies that would

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

[2] ③: High, ②: Fair, ①: Low

contribute to enhancing resilience to increasing climate change risks and natural disasters.

In this way, this project was consistent with the Philippines development plans both at the time of project planning and ex-post evaluation in terms of improving safety against disaster to achieve poverty reduction.

3.1.2 Relevance to the Development Needs of the Republic of the Philippines

The Philippines was considered the most disaster prone country in the world in the final report of the United Nations "International Decade of Natural Disaster Reduction" (1990-1999)[3]. At the time of project planning, there was a risk that similar disasters might happen because no structural measures for disaster prevention had been introduced to the river basins of the Hubangon nor the Pontod rivers where serious damage was caused by Tyhpoon Nanang in 2001 and the river channels were still covered with sediment deposits. In addition, the damaged Hubangon Bridge had not yet been rehabilitated and a traffic restriction had to be implemented to limit the use to only one lane of the bridge.

As Table 1 shows, flood events have continued to happen in Camiguin after project completion. This project introduced structural measures for disaster prevention in the areas seriously damaged by the Typhoon Nanang, but the demand for disaster prevention measures is still high because flood events caused by typhoons, etc. have continued to occur in Camiguin Island after project completion.

Table 1 Flood Events that Caused Damages in Camiguin Island

	Year/month occurred	Number of affected municipalities	Number of affected people	Estimated damage cost (million Pesos)
Typhoon Seniyang	2014/12	5	3,277	1.25
Typhoon Ruby	2014/12	5	3,341	No report
Tropical Storm Agaton	2014/1	2	34,500	15.0
Typhoon Pablo	2012/12	5	1,807	11.26
Typhoon Gener	2012/7	4	4,898	60.5

Source: Provincial Disaster Risk Reduction & Management Council of Camiguin Province

3.1.3 Relevance to Japan's ODA Policy

At the time of project planning, the Country Assistance Program for the Republic of the Philippines, prepared by the Japanese Government (2008), listed "expansion of basic social services" (improving the living conditions of the poor) as one of the priority sectors for addressing one of the priority development issues set in the program known as "empowerment of the poor and improvement of the living conditions of the poor." As one of the guidelines for the above-mentioned priority sector, "protecting life from natural

[3] According to the information provided by JICA

disasters" was included, including support for maintenance and management of flood control and the Sabo infrastructure in high priority sites as well as emergency assistance and support for rehabilitation and reconstruction in the regions which have suffered enormous damages from sudden natural disasters. In addition, JICA prepared "Disaster Prevention Program" as its cooperation policy on disaster prevention in the Philippines and planned to implement a comprehensive program in this sector[4].

Therefore, this project is highly consistent with Japan's assistance policy as it corresponds to Japan's priority cooperation areas set in Country Assistance Program at the time of project planning.

As described above, this project was and is consistent with the Philippines' Development Plan and development needs as well as Japan's ODA policy at the time of project planning. Therefore, the relevance of this project is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The planned components and actual output of this project are as shown in Table 2.

Table 2: Planned Components and Actual Output of This Project

Original	Reconstruction of the Hubangon Bridge and its access road (Bridge length:40.9m, Access road length: Left side 10.75m, Right side 10.15m) Construction of Upper Sabo Dam and its access road (Dam height: 10m, Length: 115m, access road length: 525m) Construction of Lower Sabo Dam and its access road (Dam height: 12m, Length: 70m, access road length: 657m)
Actual output	Reconstruction of the Hubangon Bridge and its access road (Bridge length:40.9m, Access road length: Left side 10.75m, Right side 10.15m) Construction of Upper Sabo Dam and its access road (Dam height: 10m, Length: 115m, access road length: 520m) Construction of Lower Sabo Dam and its access road (Dam height: 12m, Length: 70m, access road length: 660m)

Source: Prepared based on the information provided by JICA

The Hubangon Bridge as well as the Upper and Lower Sabo Dams were implemented mostly as planned and are shown in Table 2 with five changes made to the Detailed Design.

[4] JICA prepared a comprehensive program that would utilize various cooperation schemes in order to extend cooperation with a combination of structural and non-structural measures focusing on disaster prevention capacity building of communities in addition to conventional support for capacity building of the central government mainly focusing on structural measures. As a result, eight cooperation projects were proposed in order to enhance disaster prevention capacity of the Philippines through strengthening support for measures against flood & sediment disasters and volcanic & seismic disasters.

The major changes among them are shown in Table 3[5].

Table 3: Major Changes from the Original Plan (Detailed Design)

Changes in transverse pre-stressing (tightening PC steel wires) of the cross beam in superstructure of the Hubangon Bridge, etc.	This change was made for the purpose of avoiding extension or shortening of the construction period by using materials that were readily available.
Change in the foundation excavation lines of the Sabo Dams	The design was prepared with an assumption of the condition of the foundation. Thus the foundation excavation lines were adjusted according to the actual condition of the dam foundation which became apparent during the progress of excavating the foundation. However, there were no changes in the dam height as a result of this adjustment.
Changes in the line shapes of the Sabo Dams' access roads	The line shapes of the access roads were adjusted to the asperity of the terrain which could not be grasped by the survey conducted at the time of designing. As a result, the lengths of the access roads were changed to 520.3m for the road to the upper dam and 660.4m for the lower dam.

Source: Prepared based on the information provided by JICA

Hubangon Bridge

Sabo Dam (Lower Dam)

According to the DPWH and the Provincial Government of Camiguin, no inconveniences were caused as a result of these changes. Instead, according to the project consultant, these changes were made according to the actual site condition or for the purpose of avoiding an extension or shortening of the construction period by procuring readily available materials. Therefore, these changes are considered as minor and adequate. In addition, no negative influences that might hinder the realization of the project effects were observed during the site survey of ex-post evaluation.

[5] There were two minor changes to cast-in-place piles in the foundation of the abutment of the Hubangon Bridge.

In addition to the above, at the time of project planning, securing land for construction of the project facilities, securing a temporary area necessary for the construction works, developing/improving the connecting roads necessary for the construction works, relocating electric poles and water pipes which could become obstacles for the construction works, and constructing gates were planned and to be implemented by the Philippine side. All of these items were implemented and no particular problems were observed.

Source: Information provided by JICA

Figure 1 Project Sites in Camiguin Island

3.2.2 Project Inputs

3.2.2.1 Project Cost

The cost of this project to be borne by Japan was planned at 1,013 million yen, while the cost to be borne by the Philippine side was planned at 5 million yen. The actual project cost of the Japanese side was 868 million yen. This was due to the result of competition bidding and exchange rate fluctuation. The cost borne by the Philippine side was 3.9 million yen for implementation of the contents of the original plan. Thus, compared to the planned cost of 1,018 million yen, the total project cost was 872 million yen (86 % of the plan) which was lower than the planned amount.

3.2.2.2 Project Period

At the time of project planning, the period of this project was expected to be 25.5

months, from June 2009 (signing date of the Exchange of Notes) until August 2011, including implementation of the detailed design and the carrying out of bidding. This project was implemented in a shorter period than planned (98% of the plan) as the actual project period was 25.1 months, from June 2009 until July 2011.This is because construction progressed smoothly according to the project consultant.

As described above, the outputs of this project were achieved mostly as planned, and the project cost and the project period were within the plan. Therefore, the efficiency of the project is high.

3.3 Effectiveness[6] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

3.3.1.1 Operation Indicator

At the time of project planning, a traffic restriction had to be implemented to limit the use to only one lane of the Hubangon Bridge and the vehicle speed limit on the bridge was 5-10 km/h. The achievement of the target shown in Table 4 was expected by implementing this project.

Table 4: Operation Indicator of This Project

	Baseline	Target	Actual	Actual	Actual
	2008	2014	2012	2013	2014
	Baseline Year	3 Years After Completion	1 Year After Completion	2 Years After Completion	3 Years After Completion
Vehicle speed on the Hubangon Bridge	5～10 km/h	60km/h	50km/h	60km/h	60km/h

Source: Documents provided by JICA, answer to the questionnaire
Note: At the time of basic design, the bridge was designed with the designed speed of 50km/h, but the actual speed limit was set at 60km/h at the project site, therefore the latter was used as a basis for the evaluation. It was confirmed by the project consultant that there would be no problem with the bridge's strength by crossing the bridge at 60km/h.

As the above table shows, it became possible to cross the Hubangon Bridge at a speed of 60km/h by the target year (3 years after completion). Therefore, the target set at the time of the project planning has been achieved.

3.3.1.2 Effect Indicator

At the time of project planning, it was expected that the number of debris flood disasters (in case of intense rainfalls with the interval of more than 100 years) would become zero by implementing this project.

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

The implementing agency reported that such debris flood disasters have not occurred as shown in Table 5. Therefore, the project target set at the time of project planning has been achieved.

Table 5: Effect Indicator of This Project

	Baseline	Target	Actual	Actual	Actual
	2008	2014	2012	2013	2014
	Baseline Year	3 Years After Completion	1 Year After Completion	2 Years After Completion	3 Years After Completion
Number of debris flood disasters (in case of intense rainfalls with the interval of more than 100 years)	Debris flood disasters were happening	none	none	none	none

Source: Basic Design Study Report, Information provided by the Implementing Agency

3.3.2 Qualitative Effects (other effects)

At the time of project planning, securing of a safe and smooth traffic flow on the Hubangon Bridge was expected by implementing this project.

Table 1 shows the situation of flood event occurrences and their damages in Camiguin Island after project implementation. Typhoon Gener in July 2012 caused flooding in four municipalities including Mahinog where the project facilities are located, but there were no deaths or missing persons caused by this typhoon. Furthermore, there was no report of deaths or missing persons caused by other typhoons except one which was a death by electrocution when a flash flood occurred during tropical storm Agaton in January 2014. It could be considered to a certain extent that this project is contributing to the situation that there have been no deaths or missing persons after project implementation, by taking into account that this project mitigated damages caused by debris flow through constructing the Sabo dams in addition to the technical cooperation conducted prior to the implementation of this project on non-structural disaster prevention measures such as evacuation planning or drills.

In addition, the result of the beneficiary survey[7] shows that 98.8% of the respondents answered that they thought the traffic flow on the Hubangon Bridge had become safer and smoother. From this, it could be considered that a safe and smooth traffic flow on the bridge is secured.

[7] A questionnaire survey with a total of 163 users of the Hubangon Bridge and residents living in the vicinity of the bridge or Sabo dams was conducted. The survey concerned securing a safe and smooth traffic flow and improvement of access by reconstruction of the bridge, securing a stable transport of goods, changes in economic conditions by reconstruction/construction of the bridge and Sabo dams, awareness of safety against disasters, occurrence of disasters and their damages after the project completion etc.

3.4 Impacts

3.4.1 Intended Impacts

At the time of project planning, the following impacts were expected from the implementation of this project.

(1) Realization of a comprehensive disaster prevention system, with a combination of structural measures undertaken by this project and non-structural measures performed prior to this project's implementation

(2) Increase in traffic volume near the Hubangon Bridge

(3) Stable access from neighboring farms to the markets and securing of reliable transport of goods

(4) Enhancement of Camiguin's image as a tourist destination with disaster prevention measures by prevention/reduction of damages caused by sediment disasters

With regard to (1), utilizing the experience of JICA support, non-structural measures (preparation and introduction of hazard maps, a warning evacuation standard, a disaster prevention manual, etc.) have continued to be taken in the project sites, the Municipality of Mahinog and Barangay[8] Hubangon. For example, the Municipality of Mahinog revised its warning and evacuation plan by itself in 2013. Therefore, a comprehensive disaster prevention system has been established together with the structural measures undertaken in this project.

More concretely, when a large typhoon approaches, the provincial government sends an early warning to municipalities based on the weather forecast. Actions to be taken by the provincial government, by municipalities, and by barangays have been determined respectively according to the warning level. Ultimately, each barangay will order the residents to evacuate. Furthermore, the damage situation is to be reported from barangays to municipalities and from municipalities to the provincial government.

[8] Barangay is the smallest local government unit in the Philippines. A municipality or city is composed of barangays.

Table 6: Standard Operating Procedures of Each Local Government Unit at the Time of Disaster

Warning Level	PDRRMC	MDRRMC	BDRRMC
1 Standby	1. PDRRMC sends emergency advisory to MDRRMC based on rainfall situation. 2. PDRRMC convenes and activates PDRRMC - Committees. 3. PDRRMC activates PDRRMC / Operations Centers. 4. Networking of all PDRRMC levels will be done.	1. Convene and activate MDRRMC. 2. Activate Operations Center. 3. Ready all warning devices 4. Check network of warning system. 5. Issue advisory to BDRRMC. 6. Put up #1 sign on warning board. 7. Instruct MAO to collect rainfall data, instruct BDRRMC to observe river condition and transmit datato MDRRMC 8. Transmit rainfall data to BDRRMC. 9. Inventory vehicle for evacuation. 10. Check the availability of health workers and volunteers. 11. Dep-Ed disseminate information to teachers and pupils. 12. Decision-making on whether to upgrade warning to #2.	1. Convene BDRRMC upon receipt of adviaory from MDRRMC. 2. Activate disaster operation center. 3. Mobilize community volunteers. 4. Ready all warning devices. 5. Instruct river observer to observe river condition and transmit river condition data to MDRRMC. 6. Inventory vehicles for evacuation. 7. Check the network of warning system. 8. Inventory food stock pile. 9. Locate the bucket near BDRRMC.
2	1. Check the network of warning system. 2. Inventory vehicle for evacuation. 3. Check the medicine stock pile. 4. Check the availability of health workers and volunteers if worst case senario occurs. 5. Invenroty food stock piles.	1. Update warning level from 1 to 2. 2. MAO continues to collect hourly rainfall data. 3. Transmit reainfall and river conditions to BDRRMC. 4. Transmit rainfall data to BDRRMC. 5. Meet to decide whether the situation warrants an order to prepare for evacuation. 6. Evacuation committee secures keys to evacuation centers from school principals and/or security guards. 7. Prepare materials for evacuation. 8. Contact private individuals for	1. Transmit information/data on river conditions to MDRRMC. 2. Prepare materials and stock piles for evacuation. 3. Meet to decide whether the situation warrants an order to prepare for evacuation. 4. Recommend to MDRRMC to prepare the evacuation.
3 Alert / Preparatory	1. Provide suppor to MDRRMC in terms of supplies requirements. 2. Link the RDRRMC on other requirements that PDRRMC cannot provide. 3. Continue monitoring of weather updates and disseminate to lower levels of PDRRMCs. 4. Deployment of PDRRMC operatives to disaster area / incident area.	1. Upgrade warning level from 2 to 3. 2. Order preparation to evacuate all BDRRMCs concerned. 3. Review master list of potential evacuees. 4. Open evacuation centers in preparation for possible evacuation. 5. Dispatch support for evacuation, including medical staff and health volunteers and evacuation committee, to BDRRMC to pre-position augumentation support to BDRRMC. 6. PNP sends police to evacuation centers and areas to evacuate for security purposes. 7. Meet to decide whether to order evacuation.	1. Meet to decide whether the sitation warrants an order to evacuate and recommend to MDRRMC order to evacuate. 2. Announce preparation to evacuate to affected families. 3. Dispatch evacuation team, barabgay health workers to pick-up points. 4. Review master list of evacuees.
4 Evacuation	1. Link with MDRRMC on ready support for evacuation. 2. Deployment all PDRRMC and support operatives for evacuation.	1. Upgrade warning from 3 to 4. 2. Order BDRRMC and operatives to evacuate.	1. Order the community to undertake evacuation.

Source: Prepared based on the information provided by Provincial Disaster Risk Reduction & Management Council of Camiguin Province

Structural disaster prevention measures undertaken in this project are contributing to the realization of an adequate evacuation by the residents in an environment where risk of sediment disaster is mitigated.

With regard to (2), the average daily traffic volume of the two-way lane near the Hubangon Bridge was 1,193 vehicles as of 2008, before project implementation. As shown in Table 7, it has been increasing greatly since the completion of the project.

Table 7: Average Daily Traffic Volume of Two-way Lanes near the Hubangon Bridge

2009	2010	2011 (Completion Year)	2012 (1 Year After Completion)	2013 (2 Years After Completion)
2,037	2,151	3,353	3,743	4,330

Source: Data provided by DPWH Camiguin Office

Regarding (3), the result of the beneficiary survey shows that 95.1% of respondents answered that access to the markets had been improved and 93.9% answered that transport of goods had become more stable. Furthermore, according to an interview with a freight forwarder, it took about 2.5 times more distance and time as well as a higher fuel cost before implementing the project. This was because trucks could not cross the Hubangon Bridge due to weight limits and had to make a detour taking them around to the opposite side of the island. After the project implementation, however, trucks can take the shortest route now that they can cross the Hubangon Bridge. Therefore, based on the result of the beneficiary survey and the interview with the freight forwarder, it could be considered that access to the markets had improved and transport of goods had become more stable compared to the time of project planning.

Besides, the Hubangon Bridge is located on the route of the Central Nautical Highway, one of the highways to be developed as “Nautical Highways to Link the Entire Country” in the “Medium-term Philippine Development Plan (2004-2010).” Decelerating traffic or making a detour due to weight limit was necessary before project implementation; however, they are not necessary anymore owing to the reconstruction of the Hubangon Bridge. Therefore, it could be considered that this project is contributing to the fulfillment of the function of the Central Nautical Highway through realizing smooth and stable transportation of goods at a relay point between the Visayas and Mindanao.

With regard to (4), the number of tourists to Camiguin was 193,012 in 2007, before project implementation. As Table 8 shows, tourists to Camiguin have been increasing yearly. The Sabo dams constructed by this project have been utilized as one of the tourist spots or study tour destinations for university students, local government units, etc. The Provincial Government of Camiguin is making efforts to actively utilize the Sabo dams and the neighboring area as tourist spots, for example, by installing railings at the Sabo dams or paving the unpaved parts of the access roads.

Table 8: Number of Tourists to Camiguin Island

(Unit: persons)

Year	Foreigners	OFW	Domestic	Panaad	Total
2008	9,815	751	242,042	29,563	282,171
2009	9,259	491	260,355	31,177	301,282
2010	7,342	552	283,142	28,132	319,168
2011	8,678	613	326,306	33,215	368,812
2012	9,104	647	350,490	40,412	400,653
2013	10,204	873	388,729	42,412	442,218

Source: Information provided by JICA and by Tourism office of the Camiguin province
Notes: OFW stands for Overseas Filipino Workers, and Panaad is an annual celebration of Roman Catholics to commemorate the Holy Week and it shows the number of visitors to Camiguin Island during the Panaad.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

At the time of project planning, this project was considered as not having a severe negative impact on the environment by the Environmental Management Bureau of the Department of Environment and Natural Resources.

According to the relevant agencies, no negative environmental impacts of this project were observed during and after project implementation and there had been no complaints made by the residents. Therefore, it is considered that there are no particular problems in terms of impacts on the natural environment.

Instead, as a result of implementation of this project, it is considered that there has been a positive impact on the natural environment in mitigating damages in the target area by preventing occurrences of heavy floods.

3.4.2.2 Land Acquisition and Resettlement

At the time of project planning, it was assumed that the negative social impact would be minimized by selecting a site for access road construction with the smallest number of resettlements (one settlement).

There was one case of resident resettlement in the project site (where the access road was constructed) caused by the implementation of this project; however, it was reported that the resident was properly compensated according to domestic law. At the time of ex-post evaluation, it was confirmed that this resident constructed a new house in a different location and was living there. Regarding land acquisition, the affected land owners were also compensated according to domestic law.

As described above, it is considered that land acquisition and resettlement were

conducted without problems because they were both implemented based on the domestic law and no consequent dispute had arisen.

With regard to the effectiveness of the project, it is considered that the intended effects have been realized because the vehicle speed crossing the Hubangon Bridge has achieved the target set at the time of project planning, debris flood disasters (in case of intense rainfalls with the interval of more than 100 years) have not occurred, and the project's qualitative effect, "securing of a safe and smooth traffic flow on the Hubangon Bridge", is considered to have been realized based on the result of the beneficiary survey, etc.

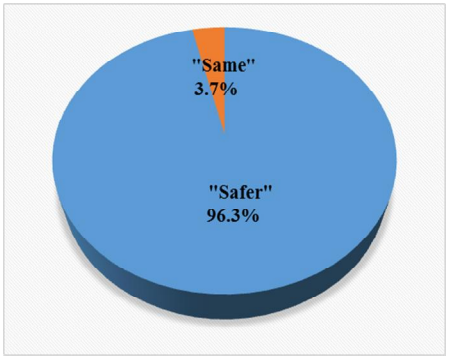
Regarding the impacts, it was confirmed that a comprehensive disaster prevention system has been established with the combination of structural and non-structural measures in the Municipality of Mahinog and Barangay Hubangon. In addition, traffic volume near the Hubangon Bridge has been increasing after project completion, improvement in access to the markets and securing of a stable transport of goods were observed according to the results of the beneficiary survey, and contribution has been made to the fulfillment of the function of the Central Nautical Highway. Furthermore, it was observed that tourists to Camiguin have been increasing yearly and the Sabo dams constructed in this project have been utilized as one of its tourist spots, etc. Therefore, it is considered that the impact of the project has been realized sufficiently.

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

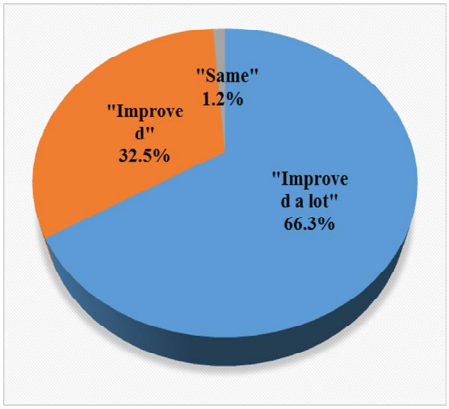
【Reference】Selected results of the Beneficiary Survey

Selected results of the beneficiary survey conducted at ex-post evaluation, except those described in the text, are as follows.

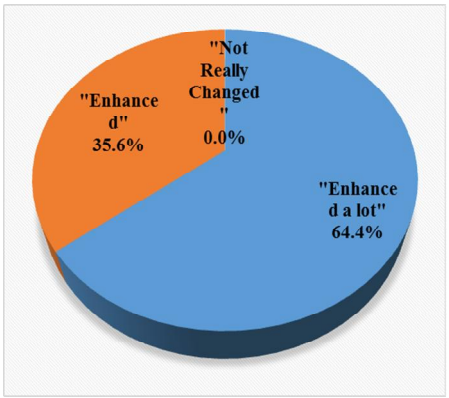
1. Do you feel that your life is much safer with the Sabo Dams constructed up in the mountain?



2. How do you see the changes in economic conditions of Camiguin Island as a result of the project?



3. How do you see the changes in the residents' awareness of safety against disasters after the project?

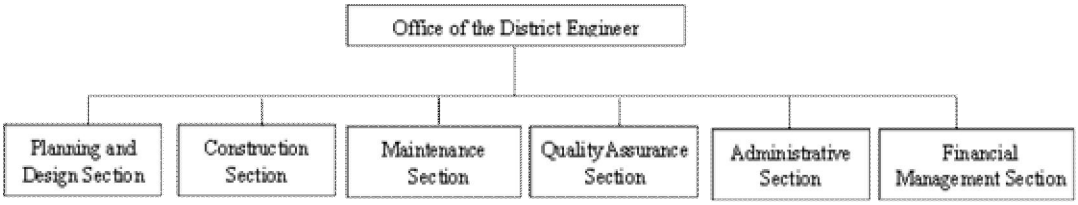


3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

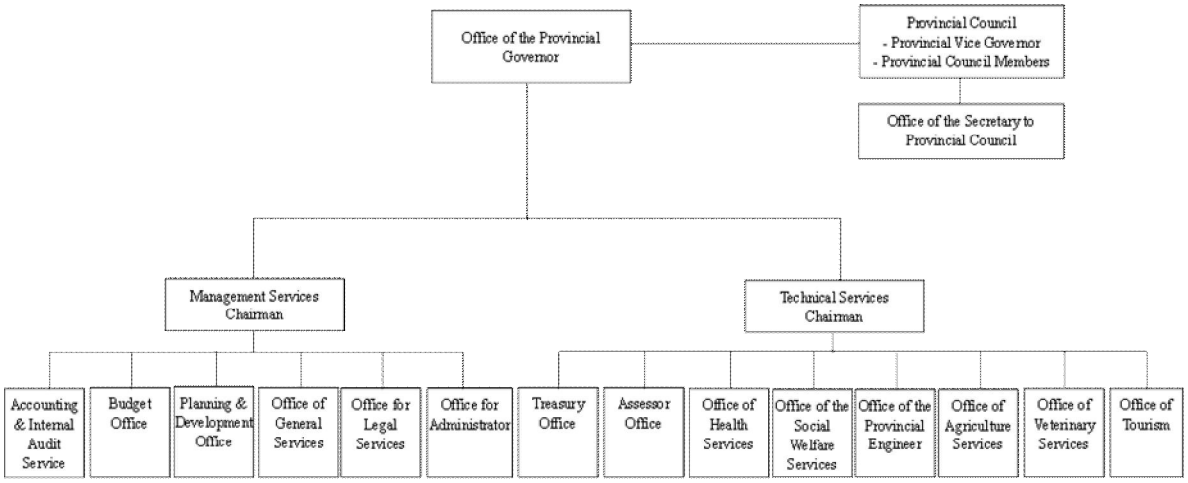
The implementing agency of this project is the DPWH. DPWH Camiguin District Engineering Office is in charge of daily maintenance of the Hubangon Bridge and the access road, while DPWH Regional Office (Region X) is in charge of major repairs. With regard to maintenance of the Sabo dams and access roads, the Provincial Government of Camiguin is in charge of daily maintenance and DPWH Camiguin District Engineering Office is in charge of major repairs. At the time of ex-post evaluation, the Memorandum of Agreement was not signed yet between the DPWH and the provincial government to confirm the respective responsibilities on the maintenance of the project facilities[9].However, it was informed that both sides are in agreement about respective responsibilities in operation and maintenance of the project facilities, and there is a clear structural demarcation between them.

Figure 2 and 3 show the organizational structures of DPWH Camiguin District Engineering Office and the Provincial Government of Camiguin respectively.



Source: Prepared from information provided by DPWH Camiguin District Engineering Office

Figure 2: Organizational Structure of DPWH Camiguin District Engineering Office



Source: Prepared from information provided by the Provincial Government of Camiguin

Figure 3: Organizational Structure of the Provincial Government of Camiguin

[9] As of April 2015, it was being prepared for signing at DPWH.

DPWH Camiguin District Engineering Office, in charge of daily maintenance of the Hubangon Bridge, has 51 staff members (including 19 engineers). The engineering office of the Provincial Government of Camiguin, in charge of daily maintenance of the Sabo dams and access roads, has 45 staff members (including 9 engineers). Table 9 shows the staff numbers in charge of maintenance of the project facilities by function at the respective agencies. It is considered that both agencies are securing a sufficient number of staff.

Table 9: Number of Staff in Charge of Maintenance

	DPWH Camiguin District Engineering Office Maintenance Section	Provincial Government of Camiguin Engineering Office O&M section
Chief Engineer	1	1
Engineer	2	1
Supervisor	2	1
Equipment Operator	3	2
Driver	-	2

Source: Information provided by DPWH Camiguin District Engineering Office and the Provincial Government of Camiguin

3.5.2 Technical Aspects of Operation and Maintenance

Regarding operation and maintenance of the Hubangon Bridge and access road, two engineers from the DPWH Camiguin District Engineering Office were trained by DPWH or its regional office and accredited as Bridge Engineers. In addition, all staff in the maintenance section of DPWH Camiguin District Engineering Office has been working at the section for more than 10 years. Therefore it is considered that they have sufficient experience. Furthermore, regular inspection is conducted on the bridge according to the manual prepared by DPWH and the inspection results are reported to DPWH as well as the DPWH Regional Office. Engineers of the engineering office of the Provincial Government of Camiguin are in charge of operation and maintenance of the Sabo dams and access roads, and there are no problems in technical capacities to maintain the Sabo dams according to an interview with the Flood Control and Sabo Engineering Center (hereinafter referred to as FCSEC)[10].

Besides, training for bridge inspection is conducted every year by DPWH and its regional office, while training for engineers for the Sabo dams is conducted occasionally by FCSEC.

Therefore, there were no particular problems observed with the technical level of the staff

[10] FCSEC is a center under the DPWH and aims to plan, design, construct and maintain flood control and Sabo facilities. Japan has provided technical cooperation to enhance FCSEC's technical skills since its establishment, by dispatching experts, implementing pilot projects, holding seminars, etc.

in charge of operation and maintenance of the project facilities as they have enough experience and skills.

3.5.3 Financial Aspects of Operation and Maintenance

Table 10 shows the total budget, total O&M budget, and O&M budget for bridges (only the budget based on the General Appropriation Act) of DPWH Camiguin District Engineering Office which is in charge of operation and maintenance of the Hubangon Bridge and access road.

Table 10: Total Budget and O&M Budget of DPWH Camiguin District Office

(Unit: thousand pesos)

	2010	2011	2012	2013	2014
Total Budget	281,518	115,641	279,289	193,930	270,687
O&M budget	2,813	7,665	27,315	11,600	10,742
O&M budget for bridges	No data	391	386	386	630

Source: Prepared from information provided by DPWH Camiguin District Engineering Office

It was impossible to specify the O&M budget allocated only for the Hubangon Bridge out of the O&M budget for bridges given by DPWH Camiguin District Engineering Office. However, according to this office, as the Hubangon Bridge is new, O&M cost for this bridge was minimal as of the time of ex-post evaluation. In addition, large-scale maintenance had not yet been considered necessary at the time of ex-post evaluation. In the case there is a need for repair, additional budget is to be allocated by the DPWH following DPWH's approval of a budget request made by Camiguin District Engineering Office based on the findings of a bridge inspection. Therefore, there were no concerns observed with the financial aspect of maintenance of the Hubangon Bridge and access road including the budget allocation process.

Regarding O&M budget of the Provincial Government of Camiguin, the information shown in table 11 was provided by the provincial government at the time of ex-post evaluation. The maintenance cost of the Sabo dams was estimated to be 340,000 pesos/year at the time of project planning. While sufficient financial information was not provided during the ex-post evaluation study, the information in Table 11 which was provided during the study period shows that the amount of O&M budget for the Sabo dams was below the estimated amount. However, there were no particular problems observed with the O&M budget at the time of ex-post evaluation, as the removal of accumulated sediment was conducted[11] and there were no comments made by the provincial government about a

[11] At the time when the first site survey was conducted (January 2015), no problem was observed with the river flow although a typhoon hit the Island in the previous month. According to the provincial government of Camiguin, the

shortage in the O&M budget. Therefore, regarding the financial sustainability of operation and maintenance of Sabo dams, it is considered that the budget for daily operation and maintenance of the Sabo dams has been secured at the time of ex-post evaluation. Besides, there was no plan for large-scale maintenance of the Sabo dams which had been designed not to require large-scale maintenance for decades according to the project consultant.

Table 11: O&M Budget of the Provincial Government of Camiguin

(unit: thousand pesos)

	2010	2011	2012	2013	2014
Total Amount	No data	No data	No data	5,839	6,424
O&M cost	No data	No data	No data	2,223	2,446
O&M cost for Sabo dams	―	No data	No data	223	245

Source: Prepared from information provided by the Provincial Government of Camiguin

3.5.4 Current Status of Operation and Maintenance

During the site survey of this ex-post evaluation study, there were no particular problems observed with the current status of operation and maintenance of the Sabo dams and the Hubangon Bridge. As for daily maintenance activities at the Sabo dams, it was reported that visual inspection is conducted nearly every week and removal of sediment is conducted when the accumulation of sediment reaches a certain level. At the time of the site survey, sediment had not accumulated and no problem was observed with the river flow. Regarding the Hubangon Bridge, inspections on structures, etc. are being conducted based on the above mentioned manual and it was confirmed that a necessity for repair had not been reported until then.

With regard to institutional aspect of operation and maintenance, a sufficient number of staff was secured both at DPWH Camiguin District Engineering Office and the engineering office of the Provincial Government of Camiguin. There were no particular problems observed in terms of technical aspect as the staff in charge of maintenance of the project facilities had skills appropriate for the job. At both agencies, there were no particular problems observed in financial aspects. Furthermore, it was confirmed that the project facilities had been operated and maintained in good condition.

In light of the above, no major problems have been observed in institutional, technical, or financial aspects of the operation nor in the maintenance system or with the current status of operation and maintenance. Therefore, the sustainability of the project effects is high.

rocks removed from the deposits of the Sabo dams are transported to and used as valuable materials on another island. Therefore it was considered that there was a good incentive for the government to conduct removal of the sediment.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

In this project, the Sabo dams were constructed and a bridge was reconstructed in Camiguin Island to prevent the disaster by debris flow along river basins and to improve the traffic condition over the bridge. The relevance of this project is high, as it was consistent with the development plan and needs of the Philippines as well as the ODA policy of Japan. The efficiency is also high, as the contents of the project were implemented mostly as planned and the project cost and period were within the scope of the plan. With regard to the effectiveness of the project, it was confirmed that the effects have been realized in terms of improvement in vehicle speed passing over the bridge, prevention of debris flood disasters, and securing of a safe and smooth traffic flow on the bridge. In addition, as impacts of the project, it was inferred that this project contributed to the establishment of a comprehensive disaster prevention system with a combination of structural and non-structural measures, an increase in traffic volume near the Hubangon Bridge, the improvement in access to markets, a stable transport of goods, and the enhancement of the Camiguin's image as a tourist spot. Therefore, the effectiveness and impact of this project are high. The sustainability of the effects of this project is considered high. There were no problems observed in terms of institutional or technical aspects as well as the current status of operation and maintenance. Although sufficient quantitative information was not obtained to assess financial aspects of the sustainability, there were no particular problems observed in terms of the contents of maintenance activities and implementation status of daily maintenance activities.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Utilization of Camiguin experience in disaster prevention efforts (structural and non-structural measures)

DPWH is considering the application of Sabo dam technology in other areas. In the case DPWH constructs Sabo dams in other areas, it is desirable to promote the sharing of the experience in Camiguin Island, including not only the structural measures of Sabo technology but also the non-structural measures such as preparation of an evacuation plan. This could be conducted through introducing efforts to establish a comprehensive disaster prevention system with a combination of structural and non-structural measures conducted through the support of JICA in the Municipality in Mahinog or Barangay Hubangon in Camiguin Island with the DPWH regional offices or local government units in areas where Sabo dams would be constructed. For this purpose, it would be useful for stakeholders in

Camiguin province to collect and compile the information pertaining to how this project has been contributing to the reduction of damage caused by natural disasters.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Effective combination of supports in introducing structural and non-structural measures for disaster prevention

This project is positioned as a part of the disaster prevention program being conducted in the Philippines with the support of the Japanese Government. Prior to project implementation, technical assistance for introducing non-structural disaster prevention measures was provided at the time of ex-post evaluation, and it was confirmed that the benefit of the assistance had been maintained and utilized, as seen in the independent revision of the warning and evacuation plan. For disaster prevention, the establishment of a comprehensive system (combination of structural and non-structural measures) is considered to be effective. Therefore, when a similar project is to be implemented, it would be important to consider technical assistance for non-structural measures concurrently in order to enhance the effectiveness of the project. In addition, it would be considered useful to organize the experience of establishing a comprehensive disaster prevention system and disseminate it to other areas.

(End)