

Grenada

Ex-Post Evaluation of Japanese Grant Aid Project

“Project for Improvement of the Traditional Fishing Community Infrastructure at
Gouyave”

External Evaluators: Makiko Oleynikov and Kazuo Udagawa, IC Net Limited

0. Summary

This project aims at constructing a new jetty and improving the existing fisheries center and fisheries facilities and thus expanding the center’s functionality in Gouyave, the St. John parish of Grenada, increasing the fish distribution and strengthening the safety of fishing vessels, thereby contributing to the increase in food self-sufficiency and in fishermen’s income and job opportunities. This project is consistent with the country’s development policy at the national level and the Japan’s key areas of assistance in its aid policy. It is also in line with the development policy of the Ministry of Agriculture, Lands, Forestry, Fisheries & the Environment (MALFFE) and the development needs of fisheries sector. Therefore its relevance is high. Although the project period was within the plan, the project cost exceeded the plan. Therefore, efficiency of the project is fair. After the project implementation, there was a reduction in marine perils thanks to the radio communications antenna, and also a reduction of post-harvest loss¹ and ice shortage at the New Fisheries Center, thus increasing the working time and the annual handling volume of fish. This resulted in an increase in the number of fishermen and fishing boats , as well as an increase in employment opportunities. Therefore, effectiveness and impact of the project are high. Though no problems have been observed in the institutional and technical aspects of the operation and management, some minor problems have been observed in terms of the financial aspects of it. The income from receiving fish, bait storage, cold storage facilities and freezer have exceeded the planned income, while the sales of fuel, the supposed main source of the center’s income, had not commenced at the time of the ex-post evaluation, leaving the facility without a stable revenue. Therefore sustainability of the project effects is fair. In light of the above, this project is evaluated to be satisfactory.

¹ A loss after the landing of fish.

1. Project Description



Project Location



New Fisheries Center after Rehabilitation

1.1 Background

Grenada belongs to the Antilles Islands of Caribbean, home to a population of 110,000², with a territorial area of 334 km² (about half of Sado Island) and many volcanoes³. Alongside wheat, spices such as nutmegs, fish is one of its main exports. The import and export value of fish is almost the same. The government of Grenada has paid much attention to its rich marine resources, and from the late 1980s has utilized it effectively and in a sustainable manner to improve people's nutrition, increase food self-sufficiency, promote exports, as well as increase job opportunities and fishermen's income. From 1989 to 2002, the Japanese government carried out four grant aid projects to support Grenada's development of the fishing industry. However, all fisheries facilities were damaged heavily by the hurricane⁴ of 2004.

The village of Gouyave of St. John parish in Grenada Island has been a traditional fishing community for over 300 years, and it is the largest traditional fishing village in the country. Among the 45 landing sites in the country, there are seven managed⁵ by the Fisheries Division of the MALFFE. Gouyave ranks first in these landing sites on the west coast, with 15% of the national fish catches. However, due to the 2004 hurricane, the facility in Gouyave was heavily damaged as those in other areas, and was suffering from the lack of ice-making machines, poor location of the fish market and difficulties in the berthing of small fishing boats.

According to the basic design study conducted by JICA (2008), the fishing industry in Gouyave had shifted from coastal fishery to pelagic fishing, but the existing facilities had

² Grenada Statistics Department (2007).

³ Grenada is comprised of the island of Grenada with its six parishes, and its dependencies of Carriacou and Petite Martinique which are all part of the Grenadines archipelago. Grenada is located in the southernmost part of this archipelago.

⁴ Hurricane Ivan of September, 2004, had the largest force of all of the tropical cyclones in recent years. It had hit Grenada leaving 39 people dead and damaging over 90% of the houses.

⁵ Ice-making machines, sales booths and processing areas are furnished in Grenada's main landing sites.

not been renovated to accommodate this shift. In addition, there were no wireless facilities to support the offshore fishing boats important to ensure their safety. The lack of freezer facility had caused 10% loss of fish catches. It was extremely urgent to improve the fisheries facilities in Gouyave. In response to those conditions, this project was implemented to construct a new jetty and related facilities, as well as renovate the existing fisheries center.

1.2 Project Description

This project aims at constructing a new jetty and improving the existing fisheries center and fisheries facilities and thus expanding the center’s functionality in Gouyave, the St. John parish of Grenada, increasing the fish distribution and strengthening the safety of fishing vessels, thereby contributing to the increase in food self-sufficiency and in fishermen’s income and job opportunities.

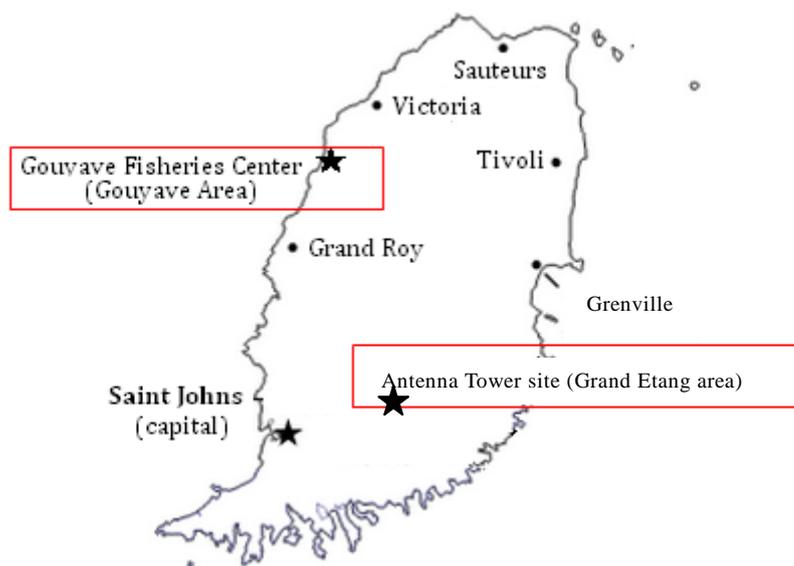


Figure 1: Location of Fisheries Center and Antenna Tower of the Project (Grenada)

Source: Materials provided by JICA

Grant Limit / Actual Grant Amount	1,170 million yen/ 1,168 million yen
Exchange of Notes Date (/Grant Agreement Date)	December, 2009/ December, 2009
Implementing Agency	Fisheries Division of Ministry of Agriculture, Lands, Forestry, Fisheries & the Environment
Project Completion Date	October, 2012
Main Contractor(s)	TOA Corporation
Main Consultant(s)	ECHO Electric Co., Ltd.
Basic Design	August, 2009
Detailed Design	-
Related Projects	<p>【 Technical Assistance: Dispatch of Experts 】</p> <ul style="list-style-type: none"> ● “Fisheries Development” (1990) ● “Fisheries Technical Guidance”(1990) ● “Management and Distribution of Fish” (1995) ● “Aquatic Resources and Fisheries Technology” (2000) ● “Treatment and Distribution of Fisheries Products” (2006) <p>【 Grant Aid 】</p> <ul style="list-style-type: none"> ● “Coastal Fisheries Development Project” (1989) ● “St. George's Artisanal Fisheries Complex Project” (1994) ● “Construction of Melville Street Fish Market” (1999) ● “Project For Improvement of Fish Marketing For Grenville” (2002) <p>【 Projects by Other Institutions 】</p> <ul style="list-style-type: none"> ● “Small-Scale Restoration Work” (United States Agency for International Development and Canadian International Development Agency, 2004) ● “Grant Aid and Equipment Assistance” (United Nations Food and Agriculture Organization, United States Agency for International Development and Canadian International Development Agency, 2004)

2. Summary of the Survey

2.1 External Evaluator

Makiko Oleynikov (IC Net Limited)

Kazuo Udagawa (IC Net Limited)

2.2 Duration of the Evaluation Study

Duration of the Survey: November, 2014—October, 2015

Duration of the Field Survey: February 20—March 3, 2015 and June 1—4, 2015

3. Results of the Evaluation (Overall Rating: B⁶)

3.1 Relevance (Rating: ③⁷)

3.1.1 Relevance to the Development Plan of Grenada

The National Strategic Development Plan of Grenada (2007) sets fish as an important part of the primary industry of the country. The fisheries sector is to be developed in order to increase people's income, food self-sufficiency, foreign trade income as well as employment rate. In addition, the Fishery Development and Management Plan published in 2002 stated "to promote the construction of fisheries facilities that is both comprehensive and appropriate, and to develop human resources."

The country's "Growth and Poverty Reduction Strategy (2014 – 2018)" at the time of the ex-post evaluation, indicates that two thirds of the nation's population is impoverished, and among them, more than half of them engage in agriculture, fishery and infrastructure construction. Thus fisheries sector was very important to generate job opportunities. On the other hand, the "Grenada National Strategic Development Plan Updated (2012 – 2017)" showed that fish had surpassed nutmeg⁸, and has become one of the country's main exports. As such, fishery along with tourism were the most important sectors for economic growth and poverty reduction. In addition, the MALFFE "Corporate Plan (2015 – 2017)" in accordance with Grenada's new economic target stipulates that guarantying fish quality, protecting and managing fishery resources, prohibiting illegal, unreported, and unregulated fishing, strengthening fishermen's association, building fishermen's capacity should be given priority so as to increase job opportunities, earn foreign currency through fish exportation, reduce poverty and ensure food security.

In sum, this project that aims at promoting traditional fishing is highly relevant to country's development policy both at the time of the planning and the ex-post evaluation.

3.1.2 Relevance to the Development Needs of Grenada

According to the plan, there was a great need to improve the fisheries center in Gouyave because of the damage to the jetty by hurricanes and because of aging to the facility. Although measures to prevent marine accidents were undertaken according to the "Fisheries (Fishing Vessels Safety) Regulations (1990)", the fishing boats in the Gouyave area mostly worked beyond the VHF wireless communication range. 16 accidents had occurred in five years caused by loss of contact in these areas. Therefore, there was a great need to construct a wireless facility and furnish equipment.

⁶ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁷ ③: High, ②: Fair, ①: Low

⁸ As of 2004, the export volume of nutmegs of Grenada ranked second in the world. The hurricanes in September, 2004 and 2005 severely damaged these trees (80%), causing its export to decrease by 70% from the year before. From 2004 to 2009, the proportion of fish products exported increased from 18.9% to 44.6%, while that of nutmegs decreased from 61.0% to 29.7%.

After rehabilitation, the Gouyave Fisheries Center ranks third in terms of volume in the landing sites in Grenada. It is expected that fresh tunas caught there will be exported to the United States as well as be distributed to the domestic market as a superior quality animal protein. The export of fish requires sufficient ice and hygienic processing, so these facilities should be fully utilized to ensure profits to the fishermen⁹. The stable supply of ice keeps the fish fresh, thus allowing longer fishing hours at sea. It is particularly important to ensure the safety of vessels which have been equipped with VHF wireless communication devices. This project has been highly relevant to the country's development needs from the time of the planning and to the ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

According to Japan's aid policy¹⁰, Japan shares common interests in the sustainable use of marine biological resources and Grenada's cooperative relationship is very important to Japan. Japan has been providing assistance mainly through technical cooperation, grant aid for fishery, and grant aid for grassroots human security projects. Since 1989, Japan has implemented four grant aid projects and dispatched experts to Grenada's fishery sector. This project serves as an extension to the previous line of assistance. This project has been highly relevant to Japan's ODA policy.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows Japan's plan and its actual implementation of the project. Everything was carried out as planned, except for the expansion of the bait room. With the popularization of beach seine fishing and pelagic fishing there is a higher demand for storage of baits. So the expansion of bait storage is an appropriate modification to the plan. No quality issues of the facility have been observed either through interviews with the Fisheries Division and the site visit. The design of the facility is appropriate for the usages and objectives planned.

⁹ Refers to fishermen and exporters.

¹⁰ Japan's ODA Data by Country (2009).

Table 1: Planned and Actual Outputs

Plan	Actual
1. Jetty: (1) Foundation and structure: steel pipe pile (coated for anti-corrosion); berth: 45m x 9.0m; access: 38m x 4.88m	As planned
2. Outside structure and others: (1) Landfill project (900m ²) (2) Revetment and retaining wall (100m) (3) Park and passageway (4) Demolition of exiting jetty	As planned
3. New Fisheries Center Building: One building (two floors for one part); structure: RC structure (total usable area of 1,110.52m ²) Facilities: (1) Ice-making machine (4 tons/day) (2) Ice storage(10 tons) (3) Freezers (quick-freezer: 17m ³ ; freezing vault 87m ³ ; slow freezing vault: 117m ³) (4) Cold storage 38m ³ (5) Bait storage 43m ³ ; vending machine: 10 sets (sink for washing fish attached), demolition of some parts in fisheries center	1~4 As planned 5. Expansion of bait storage (from 43m ³ to 58m ³ ; 15 m ³ added)
4. Workshop Building: one building; structure: RC Structure (an usable area of 27.04m ²), Demolition of part of existing fisheries center building	As planned
5. Building: four buildings; Structure: RC Structure (an usable area of 34.44m ²)	As planned
6. Waste water treatment Facility: one set; structure: purification tank (volume of sewage: 5.93m ³ ; BOD concentration : 20mg/L)	As planned
7. Specialized Communication Facilities: (1) Antenna tower: one (height: 55.0m) (2) two Repeater sheds (office building, generator, warehouse building) RC structure (one generator)	As planned
8. Equipment: (1) Forklift: one (carrying capacity of 1 ton) (2) Truck with the crane: one (vehicle weight of two tons and elevating capacity of 1 ton)	As planned

Source: Materials provided by JICA and answers provided by the Fisheries Division of Grenada



Freezer in the New Fisheries Center (at the time of the Ex-Post Evaluation)



Antenna Tower at Grand Etang (at the time of the Ex-Post Evaluation)

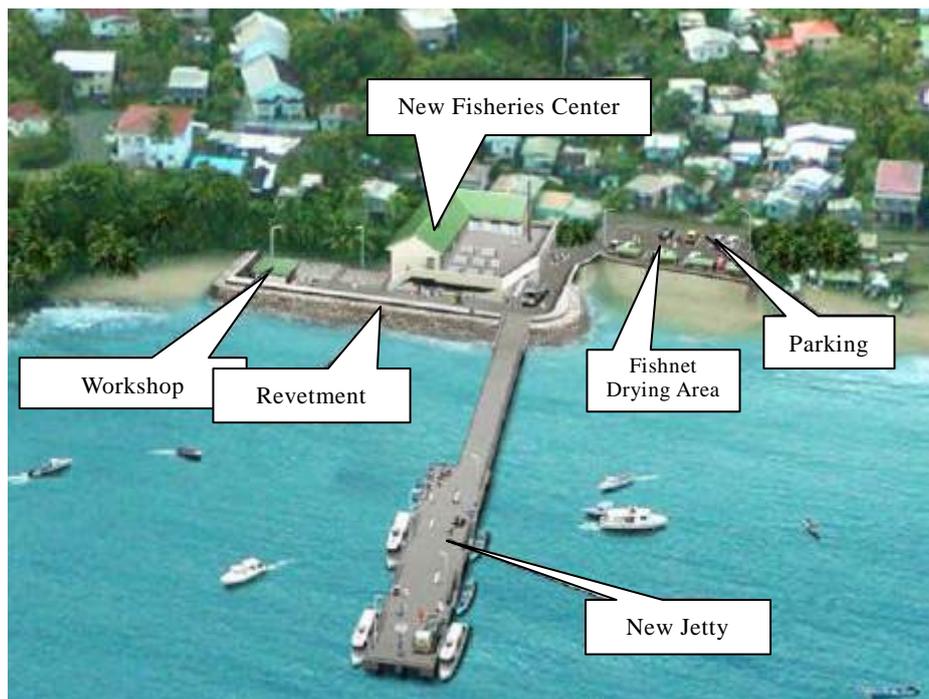


Figure 2: Diagram of the New Fisheries Center

Source: Materials provided by JICA

3.2.2 Project Inputs

3.2.2.1 Project Cost

Table 2 depicts the planned and actual cost of the project. The total planned project cost was 1,181 million yen (with 1,169 million yen undertaken by Japan and 12million yen by

Grenada). The actual cost was 1,188 million yen (with 1,169 million yen undertaken by Japan and 19million yen by Grenada), which slightly exceeded the planned cost (101% of the planned cost). The main reason for this increase was due to the fact that the Grenada government decided to construct a fortified fuel tank as opposed to the one in the basic design study, as the facility was near the shore and had to be protected against hurricanes. This facility was an obligation shouldered by the Grenada government. This modification increased the actual value to three times that of the planned value.

Table 2: Planned and Actual Project Cost

	Planned	Actual
Japan	1,169 million yen	1,169 million yen
Grenada	12 million yen	19 million yen
Total	1,181 million yen	1,188 million yen

Source: Materials provided by JICA and answers to the questionnaire provided by the Fisheries Division

3.2.2.2 Project Period

The project was planned to be completed within 23 months, from January, 2010 to November, 2011 which included the time for detailed design and bidding. The actual duration of this project is from December 22, 2009 to November 21, 2011(23 months in total). The project period was as planned.

Although the project period was as planned, the project cost exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness¹¹ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

Table 3 depicts the planned and actual results of the operation and effect indicators. The operation indicator of the project is “Level of Ice Output” and effect indicators are “Postharvest Loss,” “Annual Handling Capacity,” and “Distance of Radio Wave.”

¹¹ Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 3: Target and Actual Value of Operation and Effect Indicators

Indicator	Baseline 2007 Baseline	Target 2014 3 Years After Completion	Actual		
			2012, 1 Year After Completion	2013 2 Years After Completion	2014 3 Years After Completion
Operation Indicator					
1.ice production capacity (annual average production capacity)	1.1 tons/day	4.0 tons/day	4.0 tons/day	3.4 tons/day	2.0 tons/day
Effect Indicator					
2. postharvest loss	61,977 lbs/year	Decreases	0 lbs/year	0 lbs/year	0 lbs/year
3. annual handling capacity	428,782 lbs/year	Increases	517,155 lbs/year	488,523 lbs/year	488,580 lbs/year
4. distance of radio wave reached at offshore	0 mile	90 miles	100 miles	100 miles	100 miles

Source: Materials provided by JICA and the Fisheries Division

*1lbs (pound) = about 0.45kg, 1 mile = about 1,609.34m

(1) Solutions to the Ice Shortage

Before the implementation of this project, the existing fisheries center needed to buy ice from other landing sites 20km away, because the ice machine was damaged by the hurricanes and the ice-making ability had deteriorated. The operational duration of five middle-sized fishing boats in Gouyave is three to four days, but fishermen had to give up working because of the ice shortage, thus negatively impacting the fish caught in the region. In order to provide sufficient ice even in the peak season, the ice-making machines with a daily production of four tons with the storage of ten tons maximum were constructed. These prevented non-fishing days due to ice shortage. In addition, the New Fisheries Center is only about a 45-minute drive to nearby landing site, and had the capacity to provide ice in surplus for landing sites where the machines are broken.

Two years after of the completion of the New Fisheries Center, one of the two ice machines broke¹² as its lubricating oil burned up in October, 2013, where with its daily output decreased to two tons per day. When the ex-post evaluation was carried out in May, 2015, it was not repaired yet and its daily output remained at the two tons. Since the ice machine breakage, some fishermen in Gouyave during the peak season have had to buy ice from the head office of the fish export company, or from Spice Isle or at Southern Fishermen's Association, both 10km away from the other landing sites. In an interview with the fishermen from the Waltham landing site in the west of Grenada, the fishermen said that even though it takes time, the purchase of ice at the Gouyave Fisheries Center did not affect their fishing. The broken ice machine will be replaced through a grant aid project on provision of equipment from the Japanese people. At the beginning of 2016, its

¹² It has been confirmed that the machine breakdown did not result from human error, but rather from the machine itself.

full ice-making capacity will be restored to four tons per day¹³. Therefore, the target value of the project has been mostly achieved.

(2) Decrease in Postharvest Loss

Before this project, there were no specialized cold storage facilities and freezers for fishes. With the limited ice-making ability, over 10% of fish catches would be wasted. Even more would be wasted in the peak season, so fishermen had to control the number of times they went fishing.

After the implementation of this project, the remaining fish due to good harvest or poor sales could be frozen or put into cold preservation, thus reducing waste and decreasing the postharvest loss down to zero. Therefore, the objective of zero post-harvest loss was fully achieved.

(3) Improvement in Annual Fish Handling Capacity

As for the annual fish handling capacity, prior to the project, the lack of ice-making facilities in Gouyave caused great postharvest loss, leading to stagnated landing and shipment of products during peak season. It also frequently decreased the freshness of fish.

The annual fish catch in Gouyave was 430,000 lbs. before the project (2007), while the number continued to increase between 490,000 to 520,000 lbs. within three years (2012 to 2014) after the project completed. The average annual fish catch was 500,000 lbs., a 16% increase compared with that of 2007. According to the beneficiary survey¹⁴, 20% of the fishermen increased their daily work hours, while another 20% increased their annual work days after the project. Therefore, the establishment of distribution and ice-making reduced the limit of landing, shipment and fishing times as well as postharvest loss. The objective of improving annual handling ability was achieved.

¹³ The Fisheries Division did not receive the budget to repair the compressor from the MALFFE, so it solicited assistance from the Japanese government. In September, 2014, exchange of notes were signed on a project for improvement of fishery equipment and machinery for a total of 4.84 million yen. The equipment and machinery will be provided at the beginning of 2016 after they are procured.

¹⁴ The respondents of the questionnaire are those who use the facilities. Questionnaires were randomly given to captains and crew (1 woman among 75) to half of all the fishing vessels (151 in total) that benefitted from the project. In addition, the questionnaire was also given to non-fishermen, salesmen, staff at the Fisheries Center, vendors and wholesalers (5 women among 9), as well as an exporter (1), a representative in fishermen's association (1 male) and customers (15 women among 21).

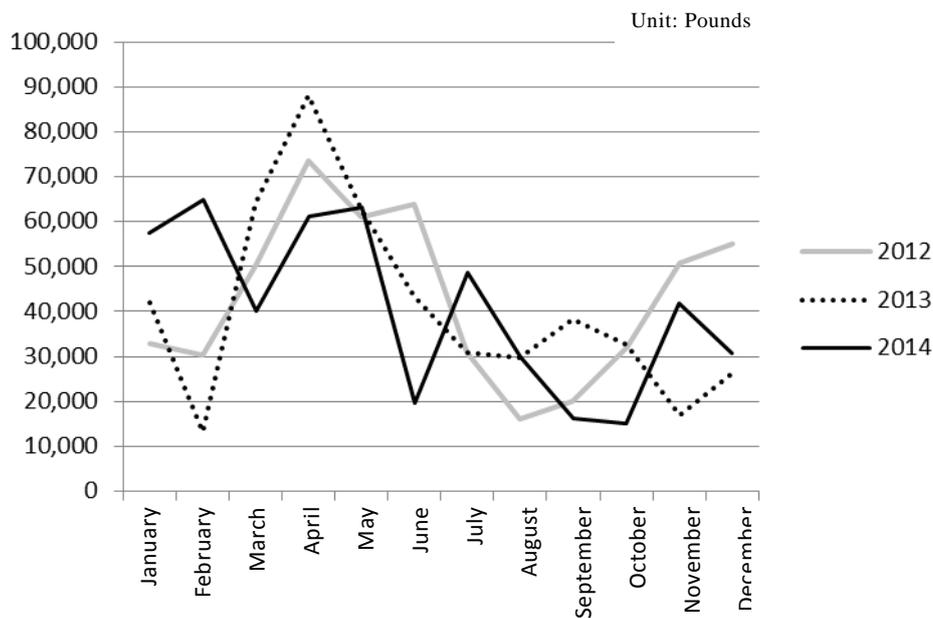


Figure 3: Volume of Fish caught in Gouyave

Source: Created by evaluators from the data provided by the Fisheries Division

The volume of fish landed at Gouyave is shown in Figure 3. As fishing is affected by the sea conditions, the peak season of fishing varies from year to year and the annual fish catch is not always the same. For example, the number of the flying fish captured by beach seine in the west declined sharply in June, while that of red horse mackerel and sliver horse mackerel decreased from September to October in 2014, causing a decrease in bait caught. Moreover, the shortage of baits led to the decrease of fishing activity in Gouyave where many fishermen fish in small boats can use only unfrozen baits. Thus, the landing volume of Gouyave was affected.

(4) Improvement of Fishing Safety on the Sea

Before the project implementation, the radio waves from the northeast of Grenada could not be transmitted to the sea to the west of the island due to its terrain. Ships on the sea could neither be monitored by the Fisheries Center nor could receive emergency signals from the fishermen, which made it challenging to ensure vessel safety. The project plan stated that from 2002 to 2007, out of the 16 sea accidents among the 30 accidents that had occurred were caused from the loss of communication during emergencies.

The new antenna was built in south Grenada, whose wave could transmit up to 100 miles, ten miles more than had been planned. Therefore, the numbers of sea accidents were 12 (2012), two (2013) and one (2014). The number has decreased greatly. The radio allowed the authorities to save all the fishermen on a sinking boat 20 miles away from the

shore. According to the Fisheries Division and fishermen, the extensive application of VHF communication prevents accidents such as driftage from happening. As such, the fishermen and the Division speak highly of the capability of the antenna facility provided by this project. Moreover, this antenna is not limited to Gouyave, but covers all of the west of Grenada, thus improving the fishing safety for the entire island. Besides, it is required that all fishing boats in Grenada be equipped with VHF equipment.

Therefore, the objective of improving fishing safety at sea has been fully achieved.

3.3.2 Qualitative Effects

Apart from the quantitative effects mentioned above, the following planned direct effects of the project have been observed.

- **Berthing efficiency:** Before the project implementation, the obsolete and damaged jetty and facility in Gouyave could not guarantee safe berthing. Fishermen would sustain injuries when the ships were pulled towards the jetty by waves. The jetty was rebuilt in this project to prevent these accidents and to ensure efficient mooring. More than half of the fishermen said that the time of berthing also was reduced.
- **Maintaining fish freshness and sanitary selling conditions:** Before the Project, the sale booths in the old fisheries center were disorderly and unsystematic, with fishes sold in ice boxes. After the project, however, the booths were divided better to ensure ice placement and product display. The ice was sold to the vendors before the project, while after project completion it was free as the Fisheries Division subsidized it. Therefore, they are able to keep fish fresh and booths hygienic.
- **Usage of the fish market:** According the Fisheries Division, 1,600 customers visit the market every year, almost the same as planned value of 1,600 to 1,900. Before the project, many visitors did not want to purchase at the Old Fish Market; there were also many times when the merchandise were stolen. After the new market was built, the market was tucked 20 meters away from the street, so fewer customers would come here by foot. There were also fewer stolen goods. On the other hand, more customers have been visiting the market by car, as was observed at the time ex-post evaluation. It can be said the market continues to be utilized.
- **Increase in fish species handled:** After the implementation of the project, it became more convenient to operate larger boats and process larger fish. In

addition, refrigeration, cold storage and processing equipment increased the species of fish processed, whether they were fresh or frozen. The processing of tunas for export and fishes (such as tuna and sailfish) for domestic market also increased.

- Effective processing of fish: After the implementation of the project, the cutting and weighing of larger fresh fishes in the processing area have become more efficient. In addition, according to the company that is renting the processing room, the processing area expanded by more than three times than before and processing fish for exports such packaging has become efficient.
- Increase in frequency and participation in fishermen's training sessions: In 2012, the Fisheries Division held a training session¹⁵ for fishermen in which 18 people participated. After the construction, six seminars were held in 2013 with a total of 329 participants. From the interview with the implementing agency, after the training, there was an increase in bank loan applications filed by the captains to invest in bait boxes and ships made from lighter material such as fiberglass. Moreover, there has been a push for fishermen to replace using single-sheet-papers, the main method for bookkeeping, with notebooks at landing sites. There has been a positive impact observed in training sessions to the project effect. However, the training sessions were not being held at the time of ex-post evaluation, because after 2014, the government had stopping approving training budgets due to its fiscal deterioration.

The beneficiary survey shows fishermen, residents and users are highly satisfied with the use of this facility. In addition, 3/4 of the fishermen commented that the services such as ice sales, freezers and parking lot in the New Fisheries Center have improved. Almost all fishermen (96%) were fully satisfied with the facilities in New Fisheries Center. Regarding each facility, 53 among 75 fishermen were pleased with ice supply and cold storage facility, while half are satisfied with the jetty. However, some pointed out that the jetty is too high and the stairs from the jetty to fishing boats are too narrow, making it not convenient for the landing of large-sized fishes. In addition, all 20 local residents who were part of the beneficiary survey were satisfied with the ice sales of New Fisheries Center.

There has been no post-harvest loss after the problem of ice shortage in Gouyave was resolved and there was an improvement in the annual handling ability. Moreover, the

¹⁵ As the lecturer, the Center Manager delivered the training entitled "Basics of Accounting for Fishermen."

installation of fisheries communication facilities ensured a communication method for fishing boats offshore, thus reducing sea perils and improving operational safety. This project also has had a positive impact on the preserving the freshness of fish, hygienic sales and efficient berthing. Therefore, efficiency of the project is high.

3.4 Impact

3.4.1 Impact of the Project

This project is intended to increase fishermen's income, food self-sufficiency, and job opportunities. After the evaluation, the impact of this project is as follows.

(1) Increase in Fishermen's Income

According to the data about people's income increase in the fish market provided by the Fisheries Division, the export of a privately owned fisheries company who rents the processing room from the fisheries center has increased from 144,000 pounds in 2012 to 230,000 pounds in 2013 and 2014¹⁶. The interview demonstrates its working efficiency has been improved, thus there is no need to hire more people to increase the export volume. So the income of employees also increased. However, there is no relevant information on the income increase of retailers and processing personnel in the market after the implementation of the project.

The beneficiary survey shows after the project, there was an increase in the fishermen's annual fishing days and their daily fish catches, thus enhancing their income as there have been no decline in the unit prices of fish. The survey also showed that 38 people among 75 (51%) said there were no changes to their income, 28 (37%) said their income increased, and only several of them thought their income decreased. Therefore, this project contributed to an increase in the income for a part of the fishermen.

(2) Increase in Food Self-sufficiency (protein supply for citizens)

From 2011 to 2014, the national per capita consumption of fish increased¹⁷ from 52.1 pounds (23.6kg) in 2011 to 57.9 pounds (26.3kg) in 2014. The project is thought to have contributed to the increase in the per capita consumption of fish, as the increase in fish export volume is lower than that of import, and the improvement of the fish handling ability in Gouyave increased the fish supply in the domestic market. Moreover, the survey for residents on the Fisheries Center reflect that there were no significant changes in quantity of fish consumed, although residents eat fish every day. However, the data mentioned above show that the overall consumption of fish has been increasing, so this

¹⁶ The export volume from 2014 and 2015 obtained from the analysis department of the Fisheries Division.

¹⁷ The national fisheries products, export and import volumes 2012 to 2014, obtained from the Fisheries Division and the Statistics Department of the Ministry of Finance.

project is considered to have had some level of positive impact.

(3) Increase in Job Opportunities

The data from the Fisheries Division (Table 4) show the number of fishing boats in Gouyave had increased from 162 in 2012 to 187 in 2014, and that of fishermen from 406 to 451. The improvement of facilities in this area makes the increase of fishing boats and income possible, so this project contributes to job opportunities to a certain degree.

Table 4: Comparison of Number of Fishing Boats and Fishermen Before and After the Project (Gouyave Area)

Unit: Fishing Boats (vessel) and Fishermen (person)

	Number of Fishing Boats			
	2011 Completion Year	2012 1 Year After Completion	2013 2 Years After Completion	2014 3 Years After Completion
Boats with Inboard Motor	9	10	12	13
Boats with Outboard Motor and cabin	12	14	16	18
Boats with Outboard Motor, without Cabin	120	126	129	142
Trawlers	12	12	14	14
Total	153	162	171	187
	Number of Fishermen			
	2011 Completion Year	2012 1 Year After Completion	2013 2 Years After Completion	2014 3 Years After Completion
Boats with Inboard Motor	36	40	48	52
Boats with Outboard Motor and Cabin	36	42	46	50
Boats with Outboard Motor, without Cabin	240	252	260	273
Trawlers	72	72	76	76
Total	384	406	430	451

Source: Provided by JICA and Fisheries Division.

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impact on Natural Environment

(1) Impact on Natural Environment

In order to carry out the project, the Fisheries Division, in accordance with the Environmental Impact Analysis in the basic design study for cooperation, drafted the Environmental Impact Evaluation Form and submitted it, together with documents such as the structural design drawing and detailed design drawing, to the Construction Planning Division of Ministry of Finance and had obtained the permission for development in March, 2010. Moreover, the questionnaires for the Fisheries Division show that there were no major issues such as dust and noise during the construction.

(2) Waste

Waste water, rubbish from processing fish are produced from the processing facilities and the market. As the waste water is discharged in the “coastal areas” and the all of these operations are classified as “processing of meat for consumption,” the waste water was planned to be treated adhering to the waste water standard set by the Ministry of Health, then be percolated into the ground.

Up to 2011, the waste water tests for fisheries facilities in Grenada were being carried out by the Grenada Produce Chemists Laboratory of the MALFFE. However, since 2012, there has been a lack of budget for personnel and reagents and equipment, hence, there have been no tests conducted on them the since 2012. In May, 2015, the National Water and Sewerage Authority (NAWASA)¹⁸ tested the discharge in response to the ex-post evaluation and found that E. Coli bacteria substantially exceeded the standard value (in Table 5). The NAWASA proposed a simple sterilization and disinfection method to solve this problem. The New Fisheries Center will implement this employ this sterilization process in late 2015. During 2015, the Inter-American Institute for Cooperation on Agriculture, the Organization of Eastern Caribbean States, the European Union and the Japanese Government will provide the drugs and equipment to the Grenada Produce Chemists Laboratory, as it faces a dearth of instruments for water testing. The waste water tests are expected to be conducted regularly after the provision.

Table 5: Waste Water Standards and Actual Values at the Time of the Ex-post Evaluation

Parameters	National Standard (Planned) 2008	Actual 2015
Temperature	Below 40C or 3C increase	No data
pH	6~9	7.9
BOD ₅ (mg/l)	<50	32.6
TSS(mg/l)	<150	8.34
HEM(mg/l)	<15	No data
NH ₃ -N(mg/l)	<10	3.8
E. Coli bacteria (count/100ml)	<400	162,000

Source: Water quality test report provided by the National Water and Sewage Authority of Grenada.

(Notes)

BOD₅: the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present (Biochemical Oxygen Demand)

TSS: Solid suspended in the water after decomposition (Total Suspended Solids)

HEM: The indicator quantity such as oil in the water (Hexane Extraction Mass)

NH₃-N: The substance generated by the decomposition of protein, urea, uric acid and other organic nitrogen (Ammonia-nitrogen)

The waste generated in fish processing was planned to be processed into animal feed. Because it required working with a private company, this effort had been suspended at the

¹⁸ National Water and Sewage Authority of Grenada is subordinate to the Ministry of Communications, Works, Physical Development, Public Utilities & Information and Communications Technology, responsible for the maintenance, management and construction of water pipes and the management of water sources and quality.

time of ex-post evaluation. According to Manager of the New Fisheries Center, however, cooperation from the company was forthcoming, and implementation was expected in the latter half of 2015. The disposal of internal organs of the fresh fish was mainly done while at sea, where these and the waste produced by the New fish Center were dropped in the open sea 1-2 kilometers away from shore in order to cut down expenses. These are food for other animals in the food chain, thus not affecting the coastal environment.

3.4.2.2 Land Acquisition and Resettlement

In 2010, land acquisition of three households (371m²) was carried out. These families were resettled, where they received a total compensation of 15.63 million yen. The land acquisition and resettlement was implemented in accordance to the law of Grenada without any particular problems.

3.4.2.3 Other Positive and Negative Impacts

In order to revitalize the Gouyave area, restaurants in this area would cook fish using various recipes every Friday to host a street fair called “Fish Friday,” where foreign tourists from Europe, America and neighboring countries, as well as residents in Grenada, would visit. Restaurants purchase locally caught fish from the New Fisheries Center and serve them at their stalls. Besides this positive impact, there were no negative impacts reported.

This project has mostly achieved its objectives. Therefore effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

There have been no significant changes from the planning phase regarding institutional aspects of the operation and maintenance of the MALFFE. The personnel allocation of the New Fisheries Center is shown in Table 6, and mostly as planned. Three vacancies were identified in the defect inspection report in August, 2012, and this problem was resolved before 2014 through personnel allocation. Employees work shifts in ice making, freezer maintenance and data processing from 6:00AM to the return of the last boat at midnight. The Center is being operated without delay every day.

Table 6: Planned and Actual Personnel Allocation of the New Fisheries Center

Position	Target (Planned)	Actual (2015)
Manager and the Extension Officer	1	1
Supervisor	1	1
Building Manager	1	1
Accountant	1	1
Cleaners	2	2
Data Clerk	1	1
Cold room attendant	2	2
Security	2	outsourced to a private company
Total	11	10

Source: Interviews with the Fisheries Division.

When the defect inspection was conducted, there was concern that the processing room would not be fully utilized. However, a private company had leased it where it is being utilized as a processing facility for export. The defect inspection further indicated that establishing a monitoring regime for the utilization of facilities, freshness of fish and users' opinions on equipment and the expanding the distribution were necessary. In terms of monitoring, recording of the occupancy time of boats at the jetty and drafting of guidelines for the sensory assessment of fish freshness have begun¹⁹ in an effort to strengthen monitoring.

On the other hand, no particular efforts have been made to the marketing of fish, and the Fisheries Division will pay more attention to this in the future. Regarding vendors, six of them²⁰ were planned to be transferred from the old market to the new one, in addition to two new vendors who were slated to work at the new market. However, at the time of ex-post evaluation only two vendors who once worked in the old market continued selling at the new booths. The number of visitors did not increase as it was tucked into an areas away from the roadside, and the two vendors had not started. Moreover, four of the six vendors from the old market have not begun their business in the new market because of geographic position or personal reasons. This problem is also related to the expansion of market, thus the retail system of the market needs to be strengthened.

The operation and maintenance of the antenna was outsourced to a private company. Daily maintenance records were kept, and repairs were carried out appropriately.

In conclusion, the project has no problem with the institutional aspect of operation and maintenance of the antenna, yet the project faces some problems with the institutional aspects of the Fisheries Center.

¹⁹ To assess the freshness of fish, sensory and chemical assessments are employed. The former method assesses the overall freshness by the appearance and smell of the fish.

²⁰ Vendors pay rent to the Fisheries Division to sell their products at the booths.

3.5.2 Technical Aspects of Operation and Maintenance

The operation and maintenance of all equipment, mainly the ice-making machines and cold storage vaults are the responsibility of a Fisheries Division senior cold storage technician who had received training in Japan. He supervises four technicians and workers in three fisheries centers of Grenada, possessing sufficient technical skills. The daily point inspection of machines is carried out by two workers of the New Fisheries Center to check the oil gauge of ice-making machines, waste water processing and record machine operation logs. The senior technician makes rounds to each center to review the operation logs once a week. The senior technician and the director of Fisheries Division each keep a copy of the maintenance manual. The technician also brings it to his rounds and makes full use of it.

The operation and maintenance of the antenna tower and repeater hut were outsourced to a private company after construction. The inspection records are saved. All other facilities are in good condition without having to repair, except for the repeater hut that had been repaired because it was struck by lightning.

In sum, the project has no problems with the technical aspects of the operation and maintenance of the facilities and equipment, nor of the staff.

3.5.3 Financial Aspects of Operation and Maintenance

The operating funds for the New Fisheries Center is paid by the Government budget allocated to the Fisheries Division. Its income will be deposited into the consolidated fund in accordance with public statute. When the expenses exceeds income, the loss is compensated by the budget of the Fisheries Division.

In addition, the overall budget of Ministry of Agriculture, Lands, Forestry, Fisheries & the Environment has been increasing every year since 2012²¹.

²¹ The annual MALFFE budgets were 23,569,561 ECD (2012), 31,975,102 ECD (2013), 28,800,111 ECD (2014) and 39,172,451 ECD (2015), accounting for 2.30%, 2.90%, 3.10% and 3.40% of national budget respectively.

Table 7: Planned and Actual Revenue and Expenses of New Fisheries Center

Items	Planned (EC dollars/year)	Actual			Planned Ratio
		2012 (EC dollars/year)	2013 (EC dollars/year)	2014 (EC dollars/year)	
Income					
1. Receiving of fish (fish dues)	31,621	18,039	24,894	47,115	149%
2. Ice sales	307,969	51,702	132,285	105,349	34%
3. Fuel sales (commission fee)	606,528	-	-	-	0%
4. Bait storage management	32,700	13,545	35,230	48,810	150%
5. Cold storage management	15,056				
6. Freezer management	13,264				
7. Vendor management	27,000	1,395	825	2,791	10%
8. Fish cleaners management	6,750	35	225	370	5%
9. Fish processing management	24,000	-	7,000	23,000	96%
10. Workshop management	6,000	-	-	-	0%
11. offices management	8,100	-	350	75	1%
Total	1,050,668	84,717	200,810	227,677	22%
Expenses					
1. Staff salary	128,700	106,935	122,375	144,462	112%
2. Electricity	657,861	114,492	252,727	207,439	32%
3. Water	0	0	0	0	-
4. Building repairs	22,653	21,182	14,000	12,750	56%
5. Office expenditure	4,050	4,175	5,270	5,275	130%
6. Ice-making and cold storage repairs	4,308	2,118	1,250	1,250	29%
Total	817,572	260,811	417,791	371,176	45%
Balance					
Annual Profits (Total Income –Total Expenses)	233,096	-164,185	-194,812	-143,499	-62%

Source: Materials furnished by JICA and data provided by the Fisheries Division.

Note: 1EC dollar = 0.37 US \$ (1 US dollar = 2.7EC dollars (fixed rate))

As shown in Table 7, expenses had exceeded the income during three years after the project completion. The fuel sales commission which would have been the largest source of income was supposed to be outsourced to the newly established Fishermen's Association of Gouyave²². However, due to delays in filing the paperwork, the association has yet to commence selling of fuel at the time of ex-post evaluation. During the field visit, the registration for the Fishermen's Association of Gouyave was completed and the outsourcing contract will be signed in September, 2015. According to Fisheries Division, the fuel sales, taking the fluctuation of crude oil price into consideration, will have a projected annual sales of 427,500EC dollars, which could solve the deficit the Center has been facing. In regards to the ice sales which was planned to be the second-largest income, the figure in 2014 only reached 1/3 of the planned value due to the fact that the broken machine's ice-making capacity was reduced to half and the Center donated ice to governments and non-profit organizations. Once the ice-making machine

²² In the original plan, the Fishermen's Association of Gouyave was expected to be found with the government of Grenada's assistance, with aims at enhancing the productivity of fishing and at improving the social and economic status of its fishermen.

restores its full capacity in 2016, its income is predicted to increase. In addition, the plan included income earned from renting a workshop which aimed to provide yearly boat inspections. However, even though it was supposed to be rented out to civil organizations and individuals, no contractors were identified. Thus the workshop had not been utilized nor generated any revenue at the time of ex-post evaluation. During the ex-post evaluation, the Fisheries Division had been in talks with the engineer of a private company, towards signing a rental contract in 2015. The government is promoting energy saving in order to improve its fiscal situation, and by unplugging equipment that is not being used, the Center has been able to reduce the largest source of expenses much less than the planned value.

In sum, although revenue from fish receiving and bait room, cold storage facilities and freezers exceeds its planned values, the fuel sale, the largest source of income, had not commenced, stable income could not be secured and the Center's deficit continues. The revenue deficit was planned to be compensated by the budget of the Fisheries Division, so there are some problems observed in the financial aspects of operation and maintenance.

3.5.4 Current Status of Operation and Maintenance

No other problems have been observed in the operation and maintenance of equipment, except for the broken ice-making machine, the forklift's battery outage and the chain breakage of the truck with crane. The daily cleaning and inspections in New Fisheries Center are also carried out appropriately by cleaners and technicians respectively.

As mentioned in the chapter on Effectiveness, the compressor of the ice-making machine broke and its ice-making capability was halved, but the Japanese government will provide grant aid, and it will be fully repaired in 2016. In addition, the forklift ran out of battery in 2013 and the chain of the truck with crane broke in 2014. They were not in operation as of May, 2015 at the time of ex-post evaluation field visit. However, the battery and chain have been procured by the New Fisheries Center, and the forklift and truck are estimated to be repaired in 2015. Therefore, it is estimated that the project effect will be achieved.

Some minor problems have been observed in terms of the institutional and financial aspects of operation and maintenance in this project. Therefore sustainability of the project effects is fair.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

This project aims at constructing a new jetty and improving the existing fisheries center and fisheries facilities and thus expanding the center's functionality in Gouyave, St. John Parish of Grenada, increasing the fish distribution, strengthening the safety of fishing vessels thereby increasing fishermen's income and job opportunities, and increasing food self-sufficiency. This project is consistent with the country's development policy at the national level to the Japan's key areas of assistance in its aid policy. It is also in line with the development policy of the Ministry of Agriculture, Lands, Forestry, Fisheries & the Environment (MALFFE) and the development needs of fisheries sector. Therefore its relevance is high. Although the project period was within the plan, the project cost exceeded the plan. Therefore, efficiency of the project is fair. After the project implementation, there was a reduction in marine perils thanks to the radio communications antenna, and also a reduction of post-harvest loss and ice shortage at the New Fisheries Center, thus increasing the working time and the annual handling volume of fish. This resulted in an increase in the number of fishermen and fishing boats, as well as an increase in employment opportunities. Therefore, effectiveness and impact of the project are high. Though no problems have been observed in the institutional and technical aspects of the operation and management, some minor problems have been observed in terms of the financial aspects of it. The income from receiving fish, bait storage, cold storage facilities and freezer have exceeded the planned income, while the sales of fuel, the supposed main source of the center's income, had not commenced at the time of the ex-post evaluation, leaving the facility without a stable revenue. Therefore sustainability of the project effects is fair. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

There has not been any no revenue generated through the fuel sales at the time of ex-post evaluation, even three years after the construction of the fuel tank, because it has taken a long time to file the paperwork for founding the Fishermen's Association of Gouyave. The Fisheries Division should first support the establishment of Fishermen's Association of Gouyave, then support the Association's signing of the commission-based sales agreement with the oil company that is distributing the fuel. In addition, the renting of workshop to organizations and individuals requires the permission of the MALFFE, which has taken time. The Fisheries Division should request the Government to expedite this application.

The waste water test, carried out by NAWASA in May, 2015, shows that the E. Coli bacteria in the effluent water of New Fisheries Center substantially exceeded the standard, while it was found that there were no readings for indicators such as oil in the water (HEM). Therefore, the Fisheries Division should establish the system of regular water quality testing as soon as possible, and carry out appropriate waste water disinfection.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

None