Internal Ex-Post Evaluation for Grant Aid Project

conducted by Saint Lucia Office: December 2022

Country Name	the Project for Improvement of Fishery Equipment and Machinery in Grenada
Grenada	

I. Project Outline

Background	The fisheries industry is an important industry in Grenada besides tourism and agriculture. However, the reduction of coastal marine resources due to overfishing in the entire Caribbean region, including Grenada, became an issue. The Caribbean Community (CARICOM) established the Caribbean Regional Fisheries Mechanism (CRFM) in March 2003, and CRFM began activities aimed at managing fisheries resources throughout the region. For sustainable use of fishery resources, it was important to introduce resource-management fisheries to reduce fishing pressure in coastal areas and to distribute fishery products to the maximum without loss. However, another issue in Grenada was the aging of main fishery equipment, such as refrigerating equipment, most of which had been developed under the past Japanese grant aid projects, and this problem would lead to distribution losses due to the deterioration of freshness of landed fish.					
Objectives of the Project	This project aimed to improve fishery product distribution and fishery management in Grenada by upgrading and replacing equipment and machinery at three existing fishery complexes, installing submerged fish aggregating devices (FADs), and installing equipment for information processing and marine environment measurement, thereby contributing to the sustainable use of fishery resources.					
Contents of the Project	1. Project Site: Melville Street, Grenville, Gouyave, and Offshore (Caribbean side and Atlantic side). 2. Japanese side: Provision of grant necessary for the procurement of (a) refrigerating system including ice plant and cold storage (2 locations with the conversion of specified chlorofluorocarbon (CFC) refrigerants to ammonia refrigerants[1]), (b) compressor and supplemental oil tanks for the existing ice plant (1 location), (c) submerged FADs (3 offshore locations), (d) PCs and a server (4 locations including Fisheries Division), and (e) equipment for fisheries environmental monitoring (1 set). 3. Grenada side: Removal and storage of cylinders filled with waste refrigerant, dismantling of existing equipment/materials to the outside, etc.					
Project Period	E/N Date	September 25, 2014	Completion Date (ex-ante)	December 2015	Completion Date (actual)	September 22, 2016 (Completion of installation of equipment)
	G/A Date	September 25, 2014				
Project Cost	E/N Grant Limit / G/A Grant Limit: 484 million yen, Actual Grant Amount: 403 million yen					
Executing Agency	Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment (MALFFE)					
Contracted Agencies	Main Contractor(s): Marubeni Protechs Corporation Main Consultant(s): System Science Consultants Inc.					

II. Result of the Evaluation

<Constraints on Evaluation>

・ Due to the Covid-19, both Grenada and Japanese sides faced the difficulty in usual communication filling out the questionnaire as well as carrying out the site visits. Following travel restrictions, quarantine measures and work from home policy, it took extra months to complete the survey. As a result, JICA St. Lucia Office contracted the CRFM to support the office in implementing a smooth evaluation process. This evaluation report is a result reflecting such constraints and limited site visits.

<Special Perspectives Considered in the Ex-Post Evaluation>

・ This evaluation excluded Indicator 1, "ice/fish ratio," from the ground for judging effectiveness since it might not accurately represent the effect of using the cooling equipment procured by the project as fish catches fluctuate due to external factors.[2] Therefore, we used "ice production volume" as the alternative indicator for ice/fish ratio. In this project, sales of ice is originally expected as part of the qualitative effect, but we collected quantitative data.[3]

1 Relevance

<Consistency with the Development Policy of Grenada at the Time of Ex-Ante Evaluation>

At the time of ex-ante evaluation, the project was consistent with the Fisheries & Aquaculture Policies for Grenada: 2012 with its target year of 2020. Its basic vision is stated as "the sustainable stewardship and conservation of aquatic resources." Among its issues, the modernization of technology, investment in the fish distribution infrastructure, and proper management of resources are stated.

<Consistency with the Development Needs of Grenada at the Time of Ex-Ante Evaluation>

At the time of ex-ante evaluation, there was a need to improve fish distribution and fishery management promotion, as mentioned in "Background" above.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

In the Assistance Policy to Grenada (April 2014), the fisheries sector is stated as one of the important assistance fields (midterm target) and is commented to continue the cooperation for its sustainable development and management of fisheries.

[1] In accordance with the Montreal Protocol on Substances that Deplete the Ozone Layer, which aims to phase-out or to reduce the production and consumption of CFC and hydrochlorofluorocarbon (HCFC) and substitute with hydrofluorocarbon (HFC) such as R404a or natural refrigerants such as ammonia.

[2] The preparatory survey report for the Project for Improvement of Fishery Equipment and Machinery in Antigua and Barbuda (2015). It is found that the ice/fish ratio in Grenada has the same problem as Antigua and Barbuda.

[3] The use of ice production or ice sales as an alternative indicator to ice/fish ratio was confirmed as reasonable by a JICA fishery expert in the ex-post evaluation of the Project for Improvement of Fishery Equipment and Machinery in Saint Lucia (2021).

<Evaluation Result>
In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Effectiveness>

The project's objective, namely, "to improve fish distribution and to promote fishery management," was partially achieved in the target year (2019) as the two quantitative indicators were partially achieved, and the qualitative effects manifested to some extent.

Regarding the improvement of fish distribution, the refrigerating equipment procured under this project was in operation in all target fisheries complexes in the target year, but the operation has become less frequent over time due to troubles with ammonia machines, and the one at Melville Street Fisheries Complex has not operated since September 2018. The Fisheries Division of the MALFFE, the executing agency, considers that ammonia as the refrigerant has the maintenance difficulties; technicians were hesitant and not sufficiently equipped to work or maintain the ammonia machines,[4] and to compound the problem, there were two technicians trained to maintain the units islandwide when the project was implemented (the number of trained refrigeration technicians currently has been reduced to one person). Accordingly, the ice production volume (Alternative to Indicator 1) was 55% of the target value in 2019 and less in 2020. Under this situation, a certain level of fishery product freshness has been achieved because ice is available to some extent, but the systems have not provided the quantity of ice required (therefore, ice is also purchased from private fish processors).

Regarding the promotion of fishery management, two of the three submerged FADs deployed by this project have been in use. The one around Victoria on the northwest side, where the water is very deep, was lost and never found (the FADs did not have a marker head). The registered number of fishers operating at the point of the submerged FADs as their fishing ground (Indicator 2) increased and reached the target for the two FADs (333 fishers, simply assuming two-thirds of 500, the target for the three FADs). According to the Fisheries Division, there is a need for approximately five additional submerged FADs to be deployed to meet the target of 500 since, despite the idea at the time of the ex-ante evaluation of this project, 500 fishers fishing around three FADs is now considered unsustainable as they could lead to overfishing and conflicts. At the time of the ex-post evaluation, fishers throughout Grenada are engaged in FAD fishing on the east coast of Grenada, where the two submerged FADs are located. Indeed, the deployment and promotion of FADs by this grant aid project and a technical cooperation project, the Caribbean Fisheries Co-Management Project (CARIFICO project, 2013-2018), have been effective and successful. FAD fishing has transformed the fishing industry. Fishing has become a lucrative business; fishers spend less time searching for fishing grounds, fuel consumption is reduced, and by extension, fishing has become more sustainable and profitable. The Fisheries Division acknowledged that JICA experts had done an excellent job promoting the use of FADs technology sustainability. FAD regulations have been developed both formally and informally for the management of the resources.

The effects of the equipment for fishery statistics and marine environment monitoring were not fully observed. Although computers have been used, some equipment, e.g., the server and the environment monitoring equipment, have not been used due to logistical and technical issues within the Fisheries Division and limited human resources. The server was never installed because the onshore facilities in the parishes do not have internet. One computer is in Grenville, but the location of the others could not be verified since staff have left the Division or are deceased. The environment equipment was sent to the Produce Chemistry Laboratory of the MALFFE for storage, and its use could not be verified. Additionally, there is no human resource to deal with environmental sampling at the time of the ex-post evaluation. There is no biologist, and there is no lab space within the Fisheries Division.

<Impact>

The expected impact of this project, namely, "contribution to the sustainable fishery development," has manifested to some extent. As mentioned above, the deployment of the submerged FADs, coupled with the institutional development supported by the JICA CARIFICO Project, have enhanced fishers' awareness of fishery resources management and improved their socio-economic status and livelihoods. No adverse impacts were observed.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is fair.

Quantitative Effects

Indicators	Baseline 2015 Baseline Year	Target 2019 3 Years after Completion	Actual 2017 1 Year after Completion	Actual 2018 2 Years after Completion	Actual 2019 3 Years after Completion	Actual 2020 4 Years after Completion	
Indicator 1: Ice/fish ratio	2.1−3.5	2.1−3.5 or higher	N.A.	N.A.	N.A.	N.A.	source: Ex-ante Evaluation Sheet
Alternative to Indicator a: Ice production volume (t/day) (Note)	10	10 or higher	10	9.5	5.5	3.5	source: Fisheries Division
Indicator 2: Registered number of fishers operating at the point of submerged FAD as their fishing ground (persons/year)	0	500	100	200	350	N.A.	source: Ex-ante Evaluation Sheet, Fisheries Division

Note: The target value for the Alternative to Indicator 1 follows the idea in Indicator 1, where the target value is defined as being above the baseline value.

3 Efficiency

While the project cost was within the plan, the project period exceeded the plan (ratio against the plan: 83% and 156%, respectively). The project implementation was delayed due to a delay in the conclusion of the Banking Agreement, a delay in the installation of the refrigerating equipment due to insufficient capacity of some engineers (subsequently resolved with guidance from the manufacturer, etc.), and rechecking

[4] Ammonia refrigerants differ from freon refrigerants in maintenance and management methods. In particular, if ammonia leakage occurs due to mishandling during drain venting, etc., its toxicity (corrosiveness and odor) may lead to accidents, so adequate handling techniques are required. It should be noted that no ammonia leaks or other problems have occurred to date due to the handling of ammonia equipment.

of all welding points due to some refrigerant leaks. The outputs were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Institutional/Organizational Aspect>

There is an organizational structure for operation and maintenance (O&M) of each of the equipment procured by this project. As is planned, Fisheries Division is responsible for O&M of the refrigerating equipment at fisheries complexes and the equipment for fishery statistics. For the submerged FADs, Grenville FAD Fishers Organization (GFFO), a fishers' organization established based on the co-management approach with the Fisheries Division and fishers, is responsible for O&M. The marine environment monitoring equipment is under the responsibility of Produce Chemistry Laboratory of the MALFFE. An issue is the availability of skilled personnel; according to the Fisheries Division, there are a number of vacant posts to be filled or replaced, and the O&M has been affected directly due to a decline in staff replacement and recruitment.

<Technical Aspect>

For the refrigerating equipment, as already mentioned, there is an issue of insufficient knowledge on the use and maintenance of ammonia equipment (introduced by this project) while the situation varies by site. At Grenville Fisheries Complex, the technician has been able to maintain the facilities (although facing regular breakdowns); at Melville Street Fisheries Complex, the technician could not diagnose issues surrounding the ammonia units, and the equipment has not been operated; at Gouyave Fisheries Complex, the refrigeration system still uses R404a since the existing equipment had been still in good condition at the time of the ex-ante evaluation; therefore, there is no problem in the technical aspect of O&M (although the operation is limited due to availability of spare parts). At the time of the ex-post evaluation, there is no training offered on ammonia systems. Also, the Fisheries Division commented that its skills and capacity for marine environment monitoring were not sufficient (the Fisheries Division have not engaged in environmental monitoring activities and use of equipment due to a lack of human resource).

<Financial Aspect>

The budget for all fish markets (fisheries complexes), including the maintenance budget for ice machines and chill rooms, is $ 90,000.00 XCD (the budget for O&M is not available for individual fisheries complexes). While a certain amount of budget seems to be allocated for facilities that are in operation, the Fisheries Division considers that the amount is not sufficient. It also pointed out that there are too many different makers of machines/equipment, which makes it very costly to maintain, especially in terms of the purchase of spare parts.

<Current Status of Operation and Maintenance>

At the time of this survey, some facilities were facing maintenance issues, as already mentioned. In particular, the ammonia equipment has not performed to its optimum production. The equipment in Grenville is in operation although there are regular breakdowns and the water pumps are leaking water constantly. In Gouyave, not all refrigeration units are working. Leakage of refrigerant and corrosion of some parts are reported. Even maintenance is given, sourcing of spare parts is an issue. The equipment in Melville Street has only worked for a few months and has been shut down for several years. In terms of plans for these facilities, it is expected that some small refrigeration units that produce ice at 1t/day be received under grant aid by the Ministry of Foreign Affairs of Japan. However, these are not sustainable for commercial purposes. They are approximately 16 machines – 3 for Melville Street, 3 for Grenville, 1- for Carriacou, and 3/2 for Gouyave.

Regarding the submerged FADs, the remaining two are in good condition. As for the computers, they are used for multiple disciplines. However, the PCs are not linked up to the server currently. Therefore, data cannot be transferred from the fish markets to the head office electronically as intended. Also, internet service was not available at the fish markets.

<Evaluation Result>

In light of the above, some problems have been observed in terms of the institutional/organizational, technical, and financial aspects and the current status of the operation and maintenance system. Therefore, the sustainability of the project effect is fair.

5 Summary of the Evaluation

The project partially achieved the objective of improving fish distribution and promoting fishery management as the ice production and offshore FAD fishing did not reach the target due to problems with some equipment. Nevertheless, the increase in FAD fishers utilizing the FADs is a noteworthy achievement. Regarding sustainability, some problems were found in the institutional/organizational, technical, and financial aspects and the status of some equipment mainly due to insufficient staffing, skills, and budget for O&M. For efficiency, the project period exceeded the plan. Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learned

Recommendations to the Executing Agency:

- Ice production using the ammonia ice machines did not produce the expected outcomes due to a lack of appropriately trained technicians and financial difficulty in sourcing spare parts. However, given the recognition that the replacement of this equipment and the choice of appropriate refrigerants going forward would require substantial human, technical and financial resources, the Government of Grenada is expected to continue its efforts to secure such resources. In the meantime, the Government should provide training opportunities for technicians in the maintenance of ammonia equipment. Technical support from St. Lucia which has ammonia equipment in operation could be an option for such training opportunities.
- Water environment sanitation data demanded by countries importing marine products has not been developed due to the lack of trained personnel. The Fisheries Division is recommended to recruit staff and provision of training in the use of the environmental monitoring equipment in order to provide appropriate sanitation data.
- The Fisheries Division and its branch offices in Melville Street, Grenville, and Gouyave have not become better able to expedite fisheries statistics due to a lack of server installation and unavailability of the internet at market locations. The Fisheries Division is recommended to install the server procured under this project and provide appropriate internet services at market locations in order to expedite fisheries statistics.
- There is a need for approximately five additional submerged FADs to be deployed to meet the target of 500 fishers since the Fisheries Division does not promote overcrowding of the FAD. The Fisheries Division is recommended to seek resource mobilization through donor funding/project to support the construction and deployment of additional FADs to mitigate overcrowding of the current FADs and promote fishers' awareness of fishery resources management.

- The Fisheries Division is encouraged to continue to adopt the co-management approach on the development of FAD fisheries between fishers and the Fisheries Division for the sustainable use of fishery resources through FADs, including those procured under this project.

Lessons Learned for JICA:

- The deployment and promotion of FADs have been the effective and successful among projects executed in Grenada by JICA. The socio-economic status and livelihoods of FAD fishers have been improved, and fishers have become more aware of fisheries resource management through the development of FAD regulations. When introducing FAD fishing, the installation of FADs could go with the introduction of the collaborative co-management approach regarding the development of FAD fisheries with fishers and the Fisheries Division.
- This evaluation found an insufficient use of and maintenance of some equipment (e.g., PCs and the server) to expedite fisheries statistics. In order to improve for higher usability, it is recommended to consider including other related uses of the equipment beyond the existing scope of work. For example, equipment such as PCs and the Server can be used not only for managing fisheries but also for managing the distribution of fishery products. Thus, in future development of a similar project, this may be included in the scope of the project under the distribution of fishery products to enhance responsible traceability and effective fishery management. In addition, at the time of outline design, it is necessary to confirm the prospects for operation and maintenance of the PCs and servers, including the internet connection at the locations where they will be installed.
- Ice production has been reduced due to a lack of appropriately trained technicians and financial difficulty in sourcing spare parts. The ammonia ice machines were considered to be difficult to handle considering the current technical level in Grenada. As special techniques are required to handle ammonia refrigerant that has toxicity, technicians were hesitant and not sufficiently equipped to work or maintain the ammonia machines, and to compound the problem, there was a limited number of two trained technicians to maintain the units island-wide. The number of trained refrigeration technicians currently has been reduced to one person. While the obligations of the recipient country to maintain and use properly and effectively the equipment provided under the project are clearly stated, due to financial constraints, countries cannot always allocate the necessary personnel and operational and maintenance budget to ensure effective collaboration and upkeep. The ease of procuring spare parts and frequency of replacement needs to be taken into account when developing obligations for grant aid, given the varying environmental conditions, costs, and shipping. Also, the human and financial constraints of developing countries need to be taken into account.

Tower and pump of the evaporative condenser, chill room, and ice maker at Melville Street Fisheries Complex

Compressor system, ice maker with drums, and control panels at Grenville Fisheries Complex