Internal Ex-Post Evaluation for Grant Aid Project

conducted by Cambodia Office: March 2016

| Country Name | The Project for Construction of Marine Aquaculture Development Center |
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| Kingdom of Cambodia | |

**I. Project Outline**

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| Background | The fisheries sector in Cambodia has played important roles in the national economy contributing for 10 to 12 % of GDP in 2000 as well as in food security. The fishery sector reform was one of the priority areas in the National Strategic Development Plan 2006-2010 and inland aquaculture development has been promoted through projects supported by donors, including JICA. On the other hand, appropriate marine aquaculture techniques had not been developed yet and the aquaculture famers depended on wild fingerlings or imported ones. Those situations brought about pressure to the natural fisheries resources and outbreaks of infectious fish diseases caused by imported fingerlings. As a result, the development of marine aquaculture had been impeded. Therefore, the government of Cambodia requested the government of Japan to establish Marine Aquaculture Research and Development Center (MARDeC) to develop marine aquaculture techniques and to delivery trainings. | | | | |
| Objectives of the Project | To develop basic marine aquaculture techniques by construction of MARDeC, procurement of equipment for marine aquaculture, and technical assistance for operation and maintenance of the facilities as well as fingerling production at MARDeC, thereby contributing to stable fingerling supply for marine aquaculture and development and extension of appropriate marine aquaculture techniques in Cambodia. | | | | |
| Outputs of the Project | 1. Project Site: Sihanoukville, Preah Sihanouk Province<br>2. Japanese side:<br>(1) Provision of grant necessary for construction of research and administration building, brood stock building, hatchery and breeding building, crustacean building, machine building, electricity substation, security guard house, outdoor live feed culture tank, outdoor rearing pond, seawater intake facility, and effluent treatment facility as well as for procurement of education and training equipment, experiment and research equipment, and rearing equipment, (2) Technical Assistance (soft component of Grant Aid)<br>3. Cambodian side:<br>Land preparation, relocation of two families and their houses, service of electric line and water supply line, construction of gate and fence, procurement of furniture | | | | |
| Ex-Ante Evaluation | 2009 | E/N Date | 30 July, 2009 | Completion Date | March 30, 2012 |
| Project Cost | E/N Grant Limit: 931 million yen, Actual Grant Amount: 711 million yen | | | | |
| Implementing Agency | Fishery Administration (FiA), Ministry of Agriculture, Forestry and Fisheries (MAFF) | | | | |
| Contracted Agencies | Overseas Agro-Fisheries Consultant, Co., Ltd and Fuyo Ocean Development & Engineering Co., Ltd, Kanto Construction Co., Ltd and Sanpo International | | | | |

**II. Result of the Evaluation**

**<Special Perspectives to be Considered in the Ex-post Evaluation>**

[Verification of the quantitative effects of the Project]

- Although the target year set in the ex-ante evaluation is 2016, achievement level of the Indicator 1 (Production of sea bass fingerlings by MARDeC) and the Indicator 3 (Share of seabass fingerlings supplied by MARDeC in the estimated demand) in 2014 and 2015 is verified based on the target value of 100,000 in 2014 and 300,000 in 2015 set at the MARDeC Strategic Plan in December 2011 since the target year set at the time of ex-ante evaluation is 2016.
- In addition to the indicators set in the ex-ante evaluation summary, effectiveness of the project can be verified by additional supplemental information on production of giant river prawn seeds and the number of sea bass broodstock reared in MARDeC since the facilities to conduct those activities were constructed by the project.

1 Relevance

**Consistency with Cambodia's development policy at the time of ex-ante evaluation and ex-post evaluation**

This project has been highly consistent with Cambodia's development policy as "promotion of fisheries and aquaculture" is set in policy documents such as the National Strategic Development Plan 2006-2010, the National Strategic Development Plan 2014-2018, the Strategic Planning Framework for Fisheries 2010-2019.

**Consistency with Cambodia's development needs at the time of ex-ante evaluation and ex-post evaluation**

The project has met Cambodia's development needs for aquaculture as the needs for stable domestic seabass fingerling production to cope with demand for fresh seabass seeds in the country and to reduce pressure to the natural fisheries resources as well as to prevent outbreaks of imported infectious fish diseases. In terms of needs for fingerlings of black tiger prawns, although there was no demand for fingerlings of black tiger prawn due to the worldwide outbreak of disease and difficulties for farmers to control disease, the needs for fingerling production of giant river prawn has increased.

**Consistency with Japan's ODA policy at the time of ex-ante evaluation**

The project was consistent with Japan's ODA policy at the time of ex-ante evaluation as prioritized areas for support include fishery development for the agricultural and rural development in Country Assistance Policy for Cambodia (2002).

**Appropriateness of Project Design/Approach**

The project aimed at development of basic marine aquaculture techniques at MARDeC through support for installation of necessary facilities and equipment as well as technical assistance for fingerling production and the project design of this project was appropriate. The current fingerling production which is lower than the target value is not caused by the project design or approach but the issues of operating the Center. One is the limited technical capacity of fingerling production and the limited maintenance function due to the personnel rotation without technical sharing from the MARDeC staffs acquiring skills through the Soft Component of this project and the training in Japan to the staffs transferred to or newly-recruited. Another issue is insufficient annual operation budget of FiA not to be allocated as planned

which has constrained timely repair for failures of facilities for purification, freshwater and air supply. Those issues limited breeding of broodstocks and fries.

**Evaluation result**

In light of the above, relevance of this project is high.

2 Effectiveness/Impact

**Effectiveness**

The project has partially achieved its objective, "to develop basic marine aquaculture techniques" at the time of ex-post evaluation despite that the target year set in the ex-ante evaluation is 2016. Although the production of sea bass fingerlings by MARDeC (Indicator 1) has exceeded the target value of 100,000 in 2014, the production in 2015 was 220,000 which accounts for 73% of the target value in 2015. This non-achievement attributed to various technical and financial aspects such as limited technique in producing live feeds, high death rate of fingerlings due to lack of sea water supply in hatchery building derived from insufficient maintenance of intake pump facility and limited budget, lack of fresh water due to insufficient fresh water supply by a private operator, broken air pipe, insufficient air, and insufficient number of rearing/nursery tanks at peak time of seed production. In terms of fresh water supply, MARDeC plans to construct wells instead of the supply from the private operator since they are going to cease their service. Due to this limited production operation of MARDeC, the share of sea bass fingerlings supplied by MARDeC in the estimated domestic demand (Indicator 3) in 2015 was 27.50% which accounts for 73% of the target value. Namely, it is because of the limited rearing of sea bass broodstock caused by the malfunctions of the facilities as mentioned above though the demand for seabass fingerlings in the country has been estimated around 800,000 at the time of project planning and the size of demand has been presumably sustained at the time of ex-post evaluationt.

Broodstock of sea bass in the water tank installed by the project

In terms of technical support by MARDeC, the number of trainings on aquaculture techniques and infectious disease at MARDeC (Indicator 2), which has been only 2 so far, is unlikely to reach the target numbers of 10 in 2016 due to lack of budget. However, according to the interviews with 10 fish farmers, the training itself was useful for improving the yield of sea bass adult fish and MARDeC has provided different manners of technical support besides the trainings, such as telephone-based technical consultation and direct visit for feedback on fish disease diagnosis at least every 2 months to fish farmers. Since 2012, MARDeC has also hosted total of 30 students from the Prek Leab National School of Agriculture for on-the-job training in sea bass seed production, and study visit of the students from the Kampong Cham National College of Agriculture and other colleges/universities at least 5 times.

Although the project also constructed the facilities for fingering production of black tiger prawn, there has no production of black tiger prawn seeds. Because they are vulnerable to worldwide disease and it is difficult for farmers to control their disease, there has no demand for black tiger prawn cultivation in the country so far. On the other hand, MARDeC temporarily produced giant river prawn seeds of 100,500 in 2013 thanks to support from an expert dispatched, but has not continued their production due to lack of budget and skilled staff.

**Impact**

As for impact, the number of fish farmers purchasing sea bass fingerlings produced by MARDeC has been increasing from 5 in 2013 to 13 in 2014, and is projected to reach 18 in 2015. The sales of sea bass fingerlings of MARDeC has also increased as all the sea bass fingerlings produced by MARDeC could be sold, which has led to increase in sales amount from USD 5,838 in 2013 to USD 26,688 in 2014. In terms of quality of sea bass fingerlings, the interviews with 10 fish farmers, who have raised sea bass fingerlings produced by MARDeC, revealed that most of them recognized the yield of these fingerlings as generally better than the fingerlings imported from Thailand and could make profits as a result, though there were fewer cases reporting that the yield of the imported ones was better. This is because MARDeC fingerlings are hardly suffered from transportation stress due to shorter transportation distance than imported fingerlings. Furthermore, according to the fish farmers, they have been able to make profits from the sea bass cultivation and this has contributed to improvement of their livelihood. According to MARDeC, the project also may has contributed to reducing pressure to the national fisheries resources and outbreaks of imported infectious fish diseases in Cambodia through supplying the fingerlings produced by MARDeC despite of no quantitative data available. The positive impact of the training was seen as the Kampot Provincial FiA Cantonment Officers who had been trained in MARDeC carried out extension activity on aquaculture technique on feeding and report of fish disease outbreaks to MARDeC. Regarding the land acquisition and resettlement, 2 households resettled in accordance with law and regulations on land acquisition and resettlement in Cambodia. Currently, FiA has been working with the provincial Land management and Construction Department and the Provincial Authorities on the illegal settlement of 10 households in the property of MARDeC though they claimed after the start of the construction by the project. In order to deal with the case, fence has been temporarily put up on the site for demarcation. No negative impacts on natural environment were observed.

**Evaluation result**

In light of the above, effectiveness/impact of the project is fair.

**Quantitative Effects**

| Indicator | Before the project (2008) Baseline | Target Value at the target year (2016) | Actual (2014) | Estimated (2015) | Estimated (2016) (Reference) |
|---|---|---|---|---|---|
| Indicator 1: Production of sea bass fingerlings by MARDeC | 0 | 400,000 (100,000 in 2014) (300,000 in 2015) | 111,933 | 150,000 | 300,000* |
| Indicator 2: Number of trainings on aquaculture techniques and infectious disease at MARDeC | 0 | 10 | 1** | 1 (Actual)** | 2** |

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| Indicator 3: Share of sea bass fingerlings supplied by MARDeC in the estimated domestic demand*** | 0% | 50%<br>(12.5% in 2014)<br>(37.5% in 2015) | 13.99% | 27.50% | 37.50% |

Source：JICA internal documents, questionnaires/interviews to MARDeC, FiA and fish farmers

Note1 : *The data is calculated by the Detail Project Design Study for the new technical cooperation project in December, 2015.

Note 2: ** The number of participants was 7 in 2014, 30 in 2015, and 2 trainings are planned by the new technical cooperation project.

Note 3: *** The share of sea bass fingerlings supplied by MARDeC in the estimated domestic demand is derived from the number of sea bass fingerlings produced by MARDeC divided by the estimated demand of 800,000 based on the results of interview survey for aquaculture farmers in the coastal area conducted by MARDeC.

3 Efficiency

The project cost and period were within the plan (ratio against the plan: 76%, 100, respectively). Therefore, efficiency of this project is high.

4 Sustainability

**Institutional aspect**

MARDeC is the first research and technical development institute for marine aquaculture in Cambodia established under FiA, MAFF. Operation and maintenance (O&M) of equipment and facilities provided by the project have been carried out by MARDeC. The institutional structure at MARDeC has sustained what it was considered desirable at the time of ex-ante evaluation though the name of the center was changed from the Marine Aquaculture Development Center (MADeC) to the Marine Aquaculture Research and Development Center (MARDeC) according to the order of MAFF in 2011. MARDeC was under the direct control of the Director of FiA. The Director who was immediately responsible for securing the operational budget for MARDeC was expected to make a special budgetary arrangement to supplement for the anticipated shortage of operational funds in the initial phase of MARDeC.

There are 28 staffs in total at MARDeC, which is smaller than the needed 41 staff. In particular, the Seed Production Division has only 6 staff, which is insufficient for proper O&M, against the needed 7 staff. Although MARDeC has made its requests to FiA for deploying more staff and for allocating sufficient budget for hiring workers, FiA considers the current manpower as sufficient for operation of the center and has required self-help efforts by MARDeC to improve working conditions including level of payroll and to enhance technical capacity of the staffs through third country training, in particular for young staffs. Also, MARDeC has no engineering staff specializing for inspection and maintenance.

Regarding the cooperation with provinces, it is expected that special arrangement will be made between MARDeC and provincial FiA Cantonment covering joint technical extension service and marine aquaculture technique training provision to farmers. Even before concluding such agreement, several activities, had been already conducted jointly: such as releasing 1,500 sea bass fingerlings as an experimental rearing, and providing necessary advices on fish rearing techniques and fish disease to fish farmers as well as getting feedback from them on the ground in Preah Sihanouk province by MARDeC and Sihanoukville FiA Cantonment.

**Technical Aspect**

Feeding for fingerlings by MARDeC staff

The soft component of the project as well as other technical assistance including dispatch of the short term Japanese experts in the field of marine fish seed production and fish disease prevention, preparation of manuals, provision of workshops, and provision of training in Japan, had been carried out in MARDeC from February to April 2011 for 1.5 months, and contributed to establishing the requisite technical level for MARDeC staff to operate and maintain the provided facilities and equipment. The manual for fingerling production prepared under the soft component has been utilized when staff has any confusion or unclear point, and revised or updated by MARDeC according to the actual practice. Although FiA has not provided any technical supports and trainings for O&M to MARDeC due to its limited skills, donors provided training opportunities for MARDeC staffs. The technical cooperation by JICA including dispatch of the short-term Japanese experts in the field of marine fish seed production and fish disease prevention as well as training in Japan contributed to maintenance and upgrades of the technical skills of MARDeC staffs. Also, the MARDeC staff had opportunities to participate in technical trainings in Vietnam and Thailand sponsored by the Southeast Asian Fishery Development Center (SEAFDEC) and the European Union (EU). Nevertheless, MARDeC currently does not have adequate technical skills and knowledge for conducting the O&M activities without any problem. This is because half of existing staff members (14 out of 28) was newly hired after the project completion. The experienced staff left for another job such as NGO and private sector due to difficult work environment and insufficient salary in MARDeC. MARDeC has also faced technical difficulty in live feed cultivation, which negatively affects sea bass fingerlings production.

**Financial Aspect**

Although the Royal Government of Cambodia had budgeted USD 80,000 as the annual operational cost for MARDeC to be assured a trouble free operation and maintenance of the project facilities, the project effect may not be sufficiently sustained after the ex-post evaluation as MARDeC does not have the requisite financial resources. In 2014, amount of total revenue in MARDeC which was in the one part generated by fingerling sales (USD 26,688) and was in the other part allocated from FiA (USD 12,000) was not enough to cover total expenditure (USD 71,803). The sufficient budget for annual O&M as well as for replacement of sea water intake pump, sea water supply pump and air blower which will be needed in 6-10 years after the installation, have not been and is not expected to be allocated due to the budget implementation capability of the Cambodian government despite its high priority on MARDeC activities. Under this challenging circumstance, MARDeC has strived to allocate the O&M cost by the revenue from sales of sea bass fingerlings as much as possible.

**Current Status of O&M**

There are some facilities and equipment which have not been functioning well. This includes water quality measuring equipment whose

reagent was out of date and spare parts were needed to be changed when MARDeC staff needed to utilize the equipment. Also, the freezer in Crustacean Building is not fully used due to its too much power consumption. Moreover, some air conditioners in the research and administration building do not work. Other provided equipment and facilities were found to be in reasonably good condition at the time of ex-post evaluation.

MARDeC carries out inspection and maintenance as necessary basis by its own best effort when actual problem occurs. However, as MARDeC has no engineering staff specializing for inspection and maintenance, staff that does not have proper skill has needed to deal with inspection and maintenance, and/or MARDeC has occasionally used the outsourcing service for repairing some necessary equipment such as generator. The technical support of inspection and maintenance from FiA does not exist due to lack of its budget. The procurement of spare parts and equipment has not been conducted by MARDeC yet. Also, MARDeC needs to consider how to deal with the limited freshwater issue such as utilization of well water if the current private operator stops water supply service to MARDeC as mentioned above.

**Evaluation result**

There are some problems found in institutional, technical and financial aspects as well as in the current status of the facilities and equipment. Therefore, the sustainability of this project is low. Currently, however, a technical cooperation project supported by JICA, including improvement of technique in production of live feeding, is going to be implemented.

5 Summary of the Evaluation

The project has partially achieved its objectives, "to develop basic marine aquaculture techniques" because the project has partially contributed to the production of sea bass fingerlings by MARDeC although the production itself was below the target.

As for sustainability, the insufficient staff and budget allocation, and the limited technical skill of the MARDeC staff caused trouble in some facilities and equipment installed by the project and the limited fingerling production activities. Hereafter, capacity enhancement will be conducted through the planned technical cooperation project to be supported by JICA.

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

## III. Recommendations & Lessons Learned

**Recommendations to implementing agency:**

**[For FiA]**

- It is necessary to elaborate a plan for MARDeC to prioritize which techniques to be enhanced by the beginning of 2016 in order to improve technical level of MARDeC staff in live food production and O&M of the facilities and equipment installed by the project in order to properly produce and sell fingerlings at MARDeC.
- It is essential to allocate the sufficient budget (at least USD 80,000 per year as planned annual operation cost) in timely manner for O&M of the facilities installed by the project in and after 2016 in order to cover the budget shortage of MARDeC.

**[For MARDeC]**

- MARDeC needs to review the training/outreach activity plan according to the real situation, and formulate the annual training/outreach activity plan of 2016 by the beginning of 2016. Formulation of internal training plan including exchanges among staffs is also recommend in order to maintain the seed production techniques at organizational level.
- It is crucial for MARDeC to consider diversification of revenue sources such as fingerling sales and Development Partners' financial support in order to ensure their financial sustainability through preparation of precise annual budget and activity plans for 2016 by the beginning of 2016.

**Lessons learned for JICA:**

It was found that the production of sea bass fingerlings by MARDeC has not been produced as planned due to the limited technical level in producing live feeds which is fundamental for the production of sea bass fingerlings although some technical supports by the project had been delivered by the soft component as well as the other technical cooperation schemes such as dispatch of Japanese experts and training in Japan. It is planned to implement the technical cooperation project and to improve their technical capacity.

At the time of planning of grant aid project for construction of facilities, especially a case that an O&M agency with insufficient capacity such as MARDeC, it is essential to conduct capacity assessment of the planned O&M agency and to plan and design the soft component of the grant aid project and technical cooperation in an integrated manner as well as to implement it in a timely manner in order to enhance necessary technical capacity of the O&M agency for proper O&M of the facilities and equipment installed by the grant aid project. Also, it is preferable to conduct an integrated ex-post evaluation in the case that the grant aid project and the technical cooperation project are implemented in an integrated manner.