

Country Name	Rural Development Project through the Diffusion of Aquaculture of Tilapia in the Region of Boeny, Mahajanga
Republic of Madagascar	

I. Project Outline

Background	<p>In Madagascar, more than 70% of the total population was engaged in agriculture and living in rural areas. According to statistics of the National Institute of Statistics (2012), the poverty ratio reached 82.2% in rural areas, while the ratio was 54.2% in urban areas in 2010. Therefore, poverty reduction in rural area was urgent issue for the country. In particular, Boeny Region, located in the northwest of the country, was facing severe poverty with the poverty ratio of 71.6% in 2010 though decreasing from 81.9% in 2009. In the region, sluggish coastal fisheries and shrimp aquaculture, which had been used to be ones of important income sources of the residents, and low agriculture productivity harmed poverty reduction in the region. On the other hand, the region had high potential for tilapia aquaculture due to mild climate, sufficient volume of rainfall (1,000-1,500mm per annum) as well as available sites for aquaculture, such as rice fields and floodplains.</p> <p>In response to the situation, the Government of Madagascar requested to the Government of Japan for a technical cooperation project aiming at improving livelihoods of farmers in the region through extension of tilapia aquaculture.</p>				
Objectives of the Project	<p>Through development of seed production techniques suitable for the target areas, practice of tilapia grow-out techniques applicable to the target areas, capacity enhancement of extension staffs, development of a farmer-to-farmer extension approach, and development of a regional tilapia aquaculture development plan, the project aimed at establishing tilapia aquaculture extension system in the target areas, and thereby improving livelihoods of farmers in the target areas.</p> <ol style="list-style-type: none"> Overall Goal: Through the extension of tilapia aquaculture, livelihoods of farmers in the target area are improved. Project Purpose: Tilapia aquaculture extension system is established in the target area. 				
Activities of the Project	<ol style="list-style-type: none"> Project Site: Mahajanga II, Marovoay, and Ambato Boeny Districts in Boeny Region Main Activities: (1) Development of seed production techniques suitable for the target areas, (2) Practice of tilapia grow-out techniques applicable to the target areas, (3) Enhancement of capacity of extension staffs, (4) Development of a farmer-to-farmer extension approach, (5) Development of a regional tilapia aquaculture development plan. Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Japanese Side</p> <ol style="list-style-type: none"> Experts: 12 persons Trainees Received: 7 persons Third Country Training: 5 persons in Indonesia and 6 in Cambodia Equipment: FRP water tank, FRM small boat, motorcycles, solar power system, out-boat engine, small generators, etc. Local expenses: cost for rehabilitation of the Aquaculture Development Center (CDA), local consultants, consumables, etc. </td> <td style="width: 50%;"> <p>Madagascar Side</p> <ol style="list-style-type: none"> Staff Allocated: 23 persons Land and facilities: Project offices in CDA (Ambovoay and Antsahambingo) and Regional Direction of Fishery and Aquaculture (DRRHP) (Mahajanga) </td> </tr> </table> 			<p>Japanese Side</p> <ol style="list-style-type: none"> Experts: 12 persons Trainees Received: 7 persons Third Country Training: 5 persons in Indonesia and 6 in Cambodia Equipment: FRP water tank, FRM small boat, motorcycles, solar power system, out-boat engine, small generators, etc. Local expenses: cost for rehabilitation of the Aquaculture Development Center (CDA), local consultants, consumables, etc. 	<p>Madagascar Side</p> <ol style="list-style-type: none"> Staff Allocated: 23 persons Land and facilities: Project offices in CDA (Ambovoay and Antsahambingo) and Regional Direction of Fishery and Aquaculture (DRRHP) (Mahajanga)
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Project Period	March 2011 – September 2014	Project Cost	(ex-ante) 550 million yen, (actual) 552 million yen		
Implementing Agency	Ministry of Fishery Resources and Fishery (MRHP)				
Cooperation Agency in Japan	Ministry of Agriculture, Forestry and Fisheries				

II. Result of the Evaluation

1 Relevance
<p><Consistency with the Development Policy of Madagascar at the Time of Ex-Ante Evaluation and Project Completion></p> <p>The project was consistent with Madagascar's development policies of "Madagascar Action Plan (2007-2012)" setting eight specific goals including rural development in order to reduce poverty and attain economic development and "The Master Plan for Fisheries and Aquaculture (2004-2007)" perceiving aquaculture as one of the driving forces for rural development and poverty reduction.</p> <p><Consistency with the Development Needs of Madagascar at the Time of Ex-Ante Evaluation and Project Completion ></p> <p>The project was consistent with Madagascar's development needs of poverty reduction and improvement of agricultural productivity through introduction of tilapia aquaculture. The development needs were confirmed at the time of ex-ante evaluation and the time of project completion.</p> <p><Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation></p> <p>The project was consistent with Japan's ODA policy for Madagascar prioritizing agricultural, fishery and rural development as one of the four priority areas confirmed by the economic cooperation policy dialogue between Madagascar and Japan in February 2006¹.</p>

¹ Ministry of Foreign Affairs, Japan, "ODA Databook 2007".

<Appropriateness of Project Design/Approach>

The project approach was appropriate and quite effective in order to improve livelihood of farmers in the target areas through extension of the tilapia aquaculture because of the easy applicability of the technique which can be extended by the farmer-to-farmer training and the profitability of tilapia aquaculture. On the other hand, the unexpected external factors harmed sustainability of the project effects. One is the change of the government in 2014 which resulted changes in the policy priorities and the budget allocation. In addition, the core fish farmers and the ordinary fish farmers have suffered substantial damages by serious thefts of fish from their ponds, in particular, where have been located in the sites with good access to the markets². Since there was no case of such serious thefts reported by the similar type of projects implemented in other countries, the situations have been unpredictable and it was difficult to come up with effective countermeasures against the thefts at the time of project planning and implementation.

<Evaluation Result>

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

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the time of Project Completion>

The Project Purpose was achieved by the time of project completion. Through increases in income of tilapia core fish farmers (the Indicator 1) and adoption of required tilapia aquaculture techniques by farmers (the Indicator 2), it was judged that the tilapia aquaculture extension system had been established in the target area.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

The project effects have partially continued at the time of ex-post evaluation. Although most of the core fish farmers in the target areas have continuously applied the tilapia aquaculture techniques developed by the project and continued to produce and sell tilapia seedlings, their incomes have been in a downward trend across all of the target districts since the time of project completion. It was because of decreases in production of tilapia, seedlings and broodstocks as well as sales volume of tilapia to customers and tilapia seedlings to ordinary farmers. The main reasons of the decreases in the production of tilapia, the seedlings and broodstocks were: 1) natural disasters of droughts and floods, 2) thefts of tilapia and seedlings from farmers' ponds, and 3) no policy backup to extend tilapia aquaculture. The regional tilapia aquaculture plan was developed by the Boeny Region in collaboration with the Regional Directorate of Fisheries and Aquaculture (DRRHP) but not implemented due to lack of budget from the Boeny Region and DRRHP.

On the other hand, in Mahajanga II, the core fish farmers in Antsahanitia area have been motivated to continue their tilapia production even under the severe conditions after the drought and the flood. It is because a resort hotel in the area has needed fresh tilapia for their customers and the hotel and the core fish farmers have had a verbal contract for supply tilapia fish.

In terms of extension of the tilapia aquaculture, according to the 15 core fish farmers interviewed by the survey for this ex-post evaluation, the farmer-to-farmer training by the core fish farmers have been sustained. Although the number of core fish farmers to be engaged in the farmer-to-farmer trainings decreased from 21 in 2014 to 11 in 2017, the number of the training have been sustained at 24 times in total a year for the same period and the number of participants increased from 66 in 2014 to 289 in 2016 but decreased to 138 in 2017. No data on the number of trained farmers practicing tilapia aquaculture was available because of no monitoring system.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal was partially achieved by the time of ex-post evaluation. The average revenue from tilapia sales/m³ of the ordinary fish farmers (Indicator) reached more than or around 50% of the target value in each of the target districts. However, while the income of the ordinary fish farmers increased during the period from 2015 to 2017 in Mahajanga II, it fluctuated in Marovoay and Ambato Boeny for the same period due to the serious thefts of fish.

<Other Impacts at the time of Ex-post Evaluation>

There was no negative impact by the project on environment in the target areas. However, while the profitable tilapia aquaculture introduced by the project has brought about more revenue for the core fish farmers and the ordinary fish farmers, it induced the serious thefts of fish from the ponds of the core fish farmers and the ordinary fish farmers. As mentioned above, the thefts have a disincentive for the farmers to continue or to start the tilapia aquaculture.

<Evaluation Result>

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

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results																									
(Project Purpose) Tilapia aquaculture extension system is established in the target area.	1. Income of tilapia core fish farmers is increased by 30%.	Status of the Achievement: Achieved (Partially continued) (Project Completion) ● The incomes for 11 out of 26 core fish farmers, who had been trained by the project and become able to supply tilapia seeds, increased by 46%. (Ex-post Evaluation) [Sales revenue of tilapia and its seedling by the farmers] (Unit: million MGA)																									
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		Note: The revenues of the farmers in Mahajanga II had reduced from 2014 and 2016 due to a drought in 2015 and a flood in 2016. However, they made a sale contract of tilapia with a resort hotel where they have worked, which																									

² For example, areas along the National Road No.4 (Route Nationale (RN) 4).

		has boosted their aquaculture from 2016 to 2017. Marovoay and Ambato Boeny also had had a reduction in the revenues because the farmer's tilapia in both areas was stolen by thieves, and there was a case that some of the farmers there suspended their aquaculture.																				
	2. More than 320 farmers who are trained tilapia aquaculture techniques from core fish farmers adopt required techniques.	Status of the Achievement: Achieved (Partially continued) (Project Completion) ● The number of the ordinary fish farmers who were trained by the core fish farmers and started the tilapia aquaculture rose to 319. (Ex-post Evaluation) ● The data of the number of fish farmers practicing the tilapia aquaculture techniques is available for only the ones in 2014 - Mahajanga II: 95 - Marovoay: 159 - Ambato Boeny: 65 - Total: 319 ● According to the core fish farmers interviewed for the ex-post evaluation, half of the ordinary fish farmers who participated in the farmer-to-farmer trainings have practiced the tilapia aquaculture even though they mostly came from other Regions.																				
(Overall Goal) Through the extension of tilapia aquaculture, livelihoods of farmers in the target area are improved.	Income of farmers in the target area is increased (fish farmers gain 750 MGA/m ² per 6 months*). *6 months is one course of tilapia aquaculture.	(Ex-post Evaluation) Partially achieved [Income of farmers in the target areas (Unit: MGA/m ² per 6 months)] <table border="1"> <thead> <tr> <th>District</th> <th>2015</th> <th>2016</th> <th>2017 (as of December)</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>Mahajanga II</td> <td>350</td> <td>583</td> <td>583</td> <td>505</td> </tr> <tr> <td>Marovoay</td> <td>466</td> <td>583</td> <td>233</td> <td>427</td> </tr> <tr> <td>Ambato Boeny</td> <td>350</td> <td>408</td> <td>350</td> <td>369</td> </tr> </tbody> </table> <p>Note: In Marovoay and Ambato Boeny, because of the flood in 2016, some of the farmers lost their broodstocks, which led to reductions in the income of the farmers in both areas from 2016 to 2017.</p>	District	2015	2016	2017 (as of December)	Average	Mahajanga II	350	583	583	505	Marovoay	466	583	233	427	Ambato Boeny	350	408	350	369
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Source : Terminal Evaluation Report, Project Completion Report (JP), Questionnaire survey and interview with DRRHP, Boeny Region, and 15 core fish farmers

3 Efficiency

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

4 Sustainability

<Policy Aspect>

There are policies on the fisheries sector, including the "Sectoral Plan for Agriculture, Livestock and Fisheries (2016-2020)" to secure access to the financing necessary for the development of agriculture, livestock and fisheries sectors coming from the state contribution and the international donors contributions and the "Code for fisheries and aquaculture (2015)" to sustain governance and management of fisheries resources in order to protect the marine and freshwater biodiversity of Madagascar to increase the contribution of the fisheries sector and aquaculture to food and nutrition security, and economic and social development of Madagascar for the well-being of current and future generations. Also, the regional tilapia aquaculture development plan for 5 year (2014-2018), which had been drafted by the project, was developed and approved by Boeny Region in collaboration with DRRHP. However, it has not been implemented because of the changes in the policy priorities triggered by the changes of the Minister of MRHP and the Chief of Boeny Region.

Therefore, the extension of the tilapia aquaculture has not been sufficiently backed up by the development policies of Madagascar and the Boeny Region.

<Institutional Aspect>

[Policy planning, implementation and monitoring]

The Direction of Aquaculture (DIRAQUA) of MRHP has been in charge of preparation, implementation and monitoring of a national aquaculture development plan on tilapia in order to politically support the tilapia aquaculture introduced by the project at a national level. 9 staffs (6 technicians and 3 administrative staffs) have been sufficiently assigned to perform the tasks. At the regional level, Boeny Region should have taken responsibilities for preparation, implementation and monitoring of a regional tilapia aquaculture extension plan in order to politically support the tilapia aquaculture introduced by the project. However, no staff has been assigned for the extension of the tilapia aquaculture because of the less priority.

[Extension and monitoring]

DRRHP has played a role in promoting extension of the tilapia aquaculture introduced by the project. 2 technicians out of 11 staffs have been assigned for the role but not accomplished it due to the limited budget allocation. The District Authority of Fishery Resources (CiRRHP) has been also in charge of promoting extension of the tilapia aquaculture introduced by the project. CiRRHP has had 6 technicians (4 for the target areas and 2 for other areas), but the number of the staff has not been sufficient to cover the vast area of Boeny Region. The Agricultural Service Center (CSA) has been taken responsibilities for collecting needs of the fish farmers practicing the tilapia aquaculture introduced by the project and reflecting the needs on the aquaculture techniques. 3 staff members have been sufficiently allocated, but they have not been able to complete their tasks due to lack of budget. Although the NGO staffs that had been contracted by the project played a key role of the extension during the project implementation, in particular at the district level, they have not been engaged in the district level extension activities since the project completion. On the other hand, CDA, as a Public Entity with Commercial and Industrial Characteristics (Etablissement Public à Caractère Industriel et Commercial: EPIC) under DRRHP, has budget and capacity to play a role for extension of aquaculture techniques by their own fund since CDA is allowed to generate revenue by selling seedlings or fish.

However, divisions of responsibilities for aquaculture extension have been unclear among institutions under DRRHP and CDA has not been active in the extension activities so far.

As mentioned above, although some core fish farmers trained by the project have continued to conduct the farmer-to farmer trainings, the extension mechanism based on the core fish farmers have not been fully functioning due to the decrease in the number of the core fish farmers as mentioned above.

<Technical Aspect>

The extension team for the tilapia aquaculture has not been functioning as a technical backstop for the core fish farmers and trainings by the extension team have been limited. The staff members of MRHP, DRRHP and CiRRHP have not sustained the technical knowledge and skills to support the core fish farmers. On the other hand, the core fish farmers have sustained the necessary knowledge and skills for the tilapia and seedlings production and for the farmer-to-farmer trainings and have continued the farmer-to farmer trainings.

The technical package, training curriculum and training/extension materials on tilapia seed production and on tilapia grow-out techniques have been utilized by the core fish farmers. For this ex-post evaluation, the core fish farmers reported that the items are easy to understand and teach other fish farmers. On the other hand, according to the staffs of the government organizations abovementioned, some of them have never seen these items and not been able to make use of them due to weak knowledge on aquaculture techniques.

The technical package, training curriculum and training/extension materials on tilapia grow-out techniques have not been used by the ordinary fish farmers and the related organizations. According to the core fish farmers interviewed by the ex-post evaluation, they have not received the sufficient number of these items so that they could not supply them to the ordinary fish farmers during the farmer-to-farmer trainings. The staff members of the related organizations have not utilized the items, for the reason that they have not had the sufficient knowledge on tilapia aquaculture.

<Financial Aspect> No budget has been allocated for each related organization to promote the tilapia aquaculture developed by the project since the project completion due to the changes in the policy priorities by the changes in the central and regional administration after the project completion. DRRHP had received financial supports in 2016 and 2017 from the International Fund for Agricultural Development (IFAD) at 50 million MGA and tried to back the core fish farmers in Ambato Boeny and Marovoay by funding fish markets there. Yet, for that support, IFAD tried the core fish farmers to pay a part of some necessary materials including chopper for fish food. Because of thefts mentioned above, the core fish farmers are not willing to invest anymore as they were in about to stop aquaculture despite of the IFAD support. So IFAD stopped supporting aquaculture in the region.

Therefore, the financial supports for the farmers were not helpful to support the tilapia aquaculture. Also, there is no prospect to ensure the necessary budget to promote the tilapia aquaculture for future.

<Evaluation Result>

Therefore, the sustainability of the effects through the project is low.

5 Summary of the Evaluation

The project achieved the Project Purpose and partially achieved the Overall Goal to increase the income of the core fish farmers as well as the ordinary fish farmers through establishment the tilapia aquaculture extension system. Although the approach based on the extension of tilapia aquaculture has been effective for improvement of the livelihood of the farmers in the target region, some of the core fish farmers and the ordinary fish farmers have been discouraged to continue the tilapia aquaculture because of the serious thefts. For the sustainability, there have been serious problems in all the aspects. The lack of policy backup for the extension of the tilapia aquaculture in the target region caused no assignment of the staff members for the extension team and the lack of budget for the extension activities. However, the part of the core fish farmers trained by the project has continued the farmer-to farmer trainings for the ordinary fish farmers.

Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

[MRHP, Boeny Region, DRRHP]

- It is recommended to consider countermeasures against the serious thefts of fish from the core fish farmers and the ordinary fish farmers and to collaborate with other ministries/entities for implementation of the effective countermeasures in order to motivate the core fish farmers and the ordinary fish farmers who have stopped the tilapia and the tilapia seedling production restart their production.

[MRHP, DRRHP]

- MRHP and DRRHP have to continue to strengthen the capacity of the CiRRHP even there is no budget for the extension of tilapia aquaculture from the government (internal capacity building). In order to sustain the project effect, DRRHP should reinforce the collaboration with other projects (funded by other development partners) to relaunch activity in tilapia aquaculture.
- CiRRHP has not sustained the sufficient knowledge and skills to disseminate the tilapia aquaculture. Therefore, DRRHP and MRHP should conduct capacity building for them to reinforce their capacity to support fish farmers by using pedagogic materials developed under the project.

[DRRHP]

- It is recommended for DRRHP to clarify the role and responsibilities of CDA. Since CDA they have technical and financial capacity to conduct the aquaculture extension activities, Since CDA is able to conduct the extension activities by using their own fund, CDA can contribute to restart the extension of tilapia aquaculture.

Lessons Learned for JICA:

- While all productions of the core fish farmers along National Road 4 (RN4) have been stolen, that of those who are not close to RN4 have been secured. On the other hand, in general, it is necessary to consider accessibility for the ordinary fish farmers because the core fish farmers play a role as a demonstration farm. Therefore, during the detailed design study and implementation of a project, it is essential to consider appropriate location of demonstration site in order to sustain the activities after project completion by conducting a risk analysis for the demonstration site.
- The project recruited NGO to accelerate the diffusion of the tilapia aquaculture techniques in the target areas so that once the project ended; the NGO did not have their field based extension workers there. To avoid such issue, a project has to strengthen the capacity of



Pond for Tilapia aquaculture



Pond for Tilapia aquaculture