Terminal Evaluation Summary Sheet

1. Outline of the Project	
Country: Kingdom of Cambodia	**Project Title:** Freshwater Aquaculture Improvement and Extension Project II (FAIEX-2) in Cambodia
Thematic Area: Agricultural and Rural development	**Cooperation Scheme:** Technical Cooperation
Division in Charge: Cambodia Office	**Total Cost:** 391 million yen
Project Period (R/D): March, 2011 – February, 2015 (4 Years)	**Counterpart Agencies:** Fisheries Administration (FiA), Ministry of Agriculture, Forestry and Fisheries
	Supporting Organizations in Japan:
	Other Related Cooperation: Freshwater Aquaculture Improvement and Extension Project (FAIEX-1)

1-1. Background of the Project

Cambodia has abundant freshwater fisheries resources produced in Lake Tonle-Sap and Mekong River. Freshwater fishes are one of animal protein sources, which local people can obtain most easily. In fact, fisheries product accounts for about 76% of animal protein which Cambodian people take in. Annual consumption of fisheries products per capita is estimated as 63kg; however, the main fishing grounds are limited at Tonle-Sap Lake and a basin of Mekong River, and the distribution infrastructure is not well prepared. Therefore, the supply of freshwater fish is always short at other rural areas; then, it is a reason for disturbing the improvement of nutrition condition of local farmers. In addition, in order to diversify the variety of food products, improve the nutrition by protein intake, and generate cash income sources, the demand of small-scale fish culture, utilizing paddy fields, canals, and ponds, is very high. However, because rural communities have not experienced fish culture traditionally, the shortages of knowledge of fish culture and fish seed hinder the fish culture practices at farmers' households.

According to those situations above-mentioned, Cambodian Government, with the assistance of Japanese Government, conducted the Freshwater Aquaculture Improvement and Extension Project (FAIEX-1) at 4 southern provinces (Prey-Veng, Takeo, Kampong-Speu, and Kampot) from February 2005 to February 2010. The project could disseminate fish culture to more than 9,000 famers' households, which is more than twice as much as the planned objective number. Hence, Cambodia government appreciated the project outputs; then, it requested FAIEX-2 for the north-western region, where the poverty level is much higher. Japan International Cooperation Agency (JICA) dispatched the detail project planning studies twice at the ends of May 2010 and September 2010 to discuss with relevant governmental officials of the Cambodia side, such as Fisheries Administration, and determined the project framework. The R/D of the project, Freshwater Aquaculture Improvement and Extension Project Phase-2, was concluded on January 10, 2010. The project is implemented in 4 years from the middle of March 2011 in collaboration with Fisheries Administration (FiA), Ministry of Agriculture, Forestry and Fisheries, Cambodian Government, as a counterpart (C/P) agency.

1-2. Project Overview

(1) Overall Goal

Household economy of small-scale fish farmers are improved in the target provinces.

(2) Project Purpose

Small-scale aquaculture production is increased in the target provinces.

(3) Outputs

1. Small-scale seed production and grow-out technology is improved.
2. Capacity of local aquaculture extension services is enhanced.
3. Fish Seed Producers (FSPs) are capacitated.
4. Small-scale aquaculture is expanded in the target provinces.

5. Networks of FSPs are enhanced and broadened.

(4) Inputs (as of July 2014)

3) Japanese side

Experts: 7 experts in 6 fields of expertise (78.1 M/M in total)

Counterpart Training in Japan:
2 C/P personnel

Counterpart Training in Third Country:
44 C/P personnel and FSPs in total (2 times in Indonesia and 1 time in India)

In-country Training: 33 C/P members (incl. 6 inactive), 44 FSPs and 3,425 small-scale fish farmers

Facility Improvement of the Toek Vil Fish Seed Production Station:
Water intake and discharge system, fishponds and dike, an office building and laboratory, a deep well, feed preparation facilities, and electricity line (worth approximately 4,409,018 Japanese yen or 55,774 US dollars in total).

Provision of Equipment:
14 motorbikes, 2 4WD vehicles, office equipment and laboratory and hatchery equipment (worth approximately 17,650,874 Japanese Yen or 220,682 US dollars in total).

Local Cost: Approximately109,897,532 Japanese Yen or 1,235,035 US dollars

4) Cambodian side

Counterpart Personnel: 28 officers in total from FiA Central, and 3 target province offices

Project Offices and Facilities Necessary:
A project office in the building of FiA in Phnom Penh, and Toek Vil Seed Production Station in Siem Reap

Construction and Development of Aquaculture Ponds:
1,000 fish ponds in 2011 by the Cambodian Government, through the collaboration of FiA, Ministry of Industry, Mining and Energy and Pursat Provincial Government

Others: The running costs for electricity, water, internet, etc. for the project office

2. Evaluation Team

Members	Role	Name	Affiliation
	Leader	Hiroshi Takeuchi	Senior Representative, Japan International Cooperation Agency (JICA) Cambodia Office
	Rural Agriculture and Fishery Development	Masahiro Yamao	Professor, Graduate School of Biosphere Science, Hiroshima University
	Freshwater Aquaculture Technique	Satoshi Chikami	Senior Advisor, JICA
	Evaluation Analysis	Yuki OHASHI	Consultant, Tekizaitekisho LLC
	Evaluation Planning	Haruko Toyama	National Staff, JICA Cambodia Office
	Cooperation Planning	Naoko Ide	Project Formulation Advisor, JICA Cambodia Office
Evaluation Period: 26 August 2014 – 10 September 2014			**Type of Evaluation:** Terminal Evaluation

3. Results of Evaluation

3-1. Project Performance

3-1-1. Achievement of Outputs

(1) Output 1: Small-scale seed production and grow-out technology is improved.

As a result of the identification of issues on small-scale seed production and grow-out technology for the farmers in the target provinces and the experiments for technical improvement at the Toek Vil Fish Seed Production Station and at selected FSPs and small-scale fish farmers, various improved technologies were identified and adopted in the technical manuals. Also, the technical improvement was confirmed by the improvement of survival rate and breeding operation at FSPs. It is considered that necessary techniques for target species in both seed production and grow-out were developed sufficiently.

(2) Output 2: Capacity of local aquaculture extension services is enhanced.

The Project intended to enhance the capacity of C/P staff members who provide local aquaculture extension services in the 3 target provinces during the project period, through the training and daily activities of the Project. As a result, the capacity of C/P staff members for local aquaculture extension services in general is considered strengthened. At the same time, the results of recent assessment showed that the capacity in some items, such as the seed production of Silver carp and Mrigal, has not reached to the adequate level.

(3) Output 3: Seed farmers are capacitated.

In order to capacitate the FSPs, For those selected farmers, the Project provided various supports to the selected farmers. The numerical target was achieved in terms of the number of FSPs, although some of them are inactive due to their personal and family reasons. As to the capacities of seed production, while all FSPs, except 3 farmers who started from 2014, are considered to have technical capacities to produce at least 3 species, there is variability among FSPs in the survival rate at nursing stage due to the various conditions required. Regarding the amount of seed production and sales income, the damages caused by flooding and lack of rainfall affected negatively every year during the project period in target provinces.

(4) Output 4: Small-scale aquaculture is expanded in the target provinces.

In order to expand small-scale aquaculture in the target provinces, the Project provided TOT training to FSPs, organized FTF training for selected small-scale fish farmers, and then provided some in-kind assistance, monitoring and technical assistance to the small-scale fish farmers. It also supported selected CFRs by providing materials necessary for the preparation of community ponds and the guidance to prepare management rules. The number of farmers who benefitted from FTF training exceeded 3,000 households by the 4th year of the Project. Also, the CFRs are well recognized by community members and managed mostly in accordance with their regulations in all 4 sites.

(5) Output 5: Networks of seed farmers are enhanced and broadened.

As a first step to establish the networking among the FSPs, the Project facilitated FSPs to establish a provincial network, and to strengthen cooperation among FSPs in each target province. Also, the Project promoted cooperation among the networks of FAIEX-2 and FAIEX-1 to enhance the collaborative relationship among FSPs in the country. The network in each province is functioning independently, under the mutual collaboration of farmers depending on their needs, exchanging information about seed production techniques, seed marketing, availability of broodstocks, among others, not only through the meetings but also more frequent communication by mobile phone and exchange visits.

3-1-2. Achievement of Project Purpose

The targeted value “150 tons” of the indicator of the Project Purpose was estimated setting some conditions, such as the number of small scale farmers, the percentage of farmers continuing fish culture, the supposed pond size, and the productivity (kg/100m2), based on the experiences of FAIEX-1. The

actual situations in each of these conditions were identified, and the current amount of production was estimated. Except a case of which assumes the continuity of grow-out farmers as 60% and the productivity as 30 kg/100m2, the amount of production is considered higher than the numerical target of the indicator of the Project Purpose. Therefore, it is highly likely to achieve the Project Purpose.

3-2. Analysis based on the 5 Evaluation Criteria

(1) Relevance

The relevance of the Project was confirmed as high, in terms of the consistency with needs of Cambodian rural communities and target areas, policy of the Cambodian Government, and Japanese ODA policy. The approach of the Project, which is characterized by FTF training of the FAIEX model, is also considered relevant as means to contribute to the aquaculture extension in Cambodia.

(2) Effectiveness

There is a high prospect of achieving the Project Purpose, since the indicator is likely to be achieved. The continuity of grow-out farmers is the main concern to achieve the indicator of the Project Purpose, and it is mainly attributed to an external factor which is the negative effect of extreme weather occurred every year during the project period. Since the achievement of the Project Purpose largely depends on the weather conditions, it may be necessary to consider additional measures to mitigate the negative effect of extreme weather.

(3) Efficiency

The inputs provided by the Project were utilized directly for the project activities, and the Outputs were mostly produced as a result. Some issues remain in the capacity development of C/P staff and FSPs, which may be necessary to deal with in order to enhance the level of achievement. Also, the sales income did not increase as much as expected due to the damages caused by flooding and negative effects resulted from the lack of rainfall.

(4) Impact

The effects of extreme weather made it difficult to understand the magnitude of FTF extension in next 3-4 years to foresee the achievement of the Overall Goal, while FSPs have been already extending their sales to new farmers by themselves with providing technical instructions for grow-out, although the number of new farmers varies considerably so far depending on each FSP. In addition, some multiplied effects of the Project were identified, including the increase of household fish consumption for farmers, the increase of fish catches in surrounding areas of CFR sites, and so on.

(5) Sustainability

The sustainability in political and institutional aspects is considered to be maintained, since the Project is consistent to the Governmental policies and strategies. As to the sustainability of FSPs, while the production and sales capacity still varies among FSPs, some FSPs have making efforts to improve it, by investing in their facilities and ponds, and having their sales strategies to extend customers. As for FiA, in spite of the budgetary constraints, it will maintain the support to FSPs in a less intensive manner, and similar project will be implemented to extend aquaculture in the country.

3-3. Factors that have promoted or hindered the implementation of project

(1) Promoting factors

- After recognized the different conditions of the target provinces comparing with the sites of FAIEX-1, FiA responded flexibly by providing additional C/P staff necessary for the implementation of the project activities.
- The experiences and human resources of FAIEX-1 were available for the Project to implement activities smoothly and enhance the achievement.
- The network of FSPs has been functioning quite well especially among active FSPs in individual level. The information exchange on the technical issues, availability of broodstocks, customers and

species in demand has been done frequently, which contributed to enhance technical capacities, and increase the amount of production and sales.

(2) Hindering factors

- The Project established criteria for the selection of FSPs and grow-out farmers, such as availability of water, ponds, investment (only FSPs), labor, willingness, and son on, considering the success and sustainability of their activities. However, there was limited number of farmers who meet requirement established by the Project to become FSPs or grow-out farmers comparing to the experiences of FAIEX-1, and therefore the selection was difficult for the Project Team. Also there were delays in the preparative activities for some FSPs due to the lack of fund, time and water.
- In many areas of the target provinces water is scarce for aquaculture. Especially for FSPs, quality and quantity of water were important conditions for seed production, and insufficiency of water limited the amount of fingerlings they can produce. For grow-out farmers, those who have water throughout year can continue their fish farming with their stocks and naturally reproduced fish larvae, and only purchasing additional fingerlings when they can afford. However, those who have no water in the pond during dry season, they harvest all fish before water dry up, and need to purchase fingerlings every year.
- The target provinces of FAIEX-2 are areas where the aquaculture is not as familiar as those of FAIEX-1 and therefore it was difficult to accept the grow-out practices without experiences. It was observed by some FSPs that farers sometimes do not follow the instruction given by FSPs and fail in their production.
- The target area of project activities was extended to remote areas in the target provinces, in order to identify potential FSPs and grow-out farmers. It was difficult for the Project Team, especially for the C/P extension officers, to travel long distance to visit them frequently for on-firm instructions and monitoring, especially during rainy season, when the condition of road did not permit.
- Since the project period was shorter than that of the FAIEX-1, it was difficult for some FSPs to obtain enough experiences and technologies during the Project Period, especially those who got involved in the Project from 2013 and 2014.

3-4. Recommendations

(1) Technical improvement of seed production

There are following technical suggestions for the improvement of seed productions to be taken into account.

- As all hatcheries are operating in small scale and the nursing space is limited for their production, FiA/Project should encourage producers to specialize on the seed production of one or two species only to improve the survival rate and the overall quality of seed;
- To increase the number of breeding and enhance the total fish production per year, FiA/Project should promote and encourage the farmers who want to start a nursing farm to build ponds separately from hatchery and other nursing farms;
- Through the extension services, the hatcheries development should be promoted in the areas where water is sufficient or nearby water sources;
- It is necessary to develop broodstocks with good genetic quality and provide to seed producers, by partially replacing broodstock annually from adequate sources;
- FSPs should create large reservoir pond, at least 4 meters depth to keep water during the dry season, which can be a countermeasure against draught.

(2) Countermeasures against flood damages for FSPs

The Project experienced damages of extreme weather, especially by floods, every year during the project period. One of the serious effects on the seed production is the loss of broodstocks which affect the production in next few years since it takes time to develop the broodfish. In order to mitigate such problems, it is recommended that the Project and FiA continue facilitating FSPs to prevent broodstock escape by establishing such facilities as floating cage, elevated dikes and land-based cement tanks. In so

doing, the intrusion of African origin Walking catfish into natural water bodies also can be avoided.

(3) Strengthening of FSPs especially those who started in 2013 and 2014

FSPs have been strengthened through the various supports of the Project, and achieved the indicators of Output 3 mostly. However, analyzing individually, some FSPs, especially those who started in 2013 and 2014 have not increased and stabilized their seed production yet. It is recommended that the Project Team give priority to those new FSPs during the rest of project period, including the technical instructions on the nursing stage of the seed production. Also, it is expected that FiA will continue to support them even after the completion of the Project, with allocating inputs necessary to secure the support activities.

(4) Measures to enhance the sales of fingerlings

While some farmers think that the demand of fingerlings is increasing, others have difficulties in getting enough number of customers to sell their products. Also there are some farmers who have set up their sales strategies to enhance their sales. Since the marketing of fingerlings is an important factor to sustain and develop seed production, it is recommended to the Project Team to explore measures for FSPs to enhance sales of fingerlings and share with FSPs before the completion of the Project. It may be effective to promote the collaborative relationship among the network of famers, and with communes, donors, NGOs, and private firms to extend their sales opportunities.

(5) Utilization of the Project's experiences and good practices for the extension activities in other provinces

During the project period the Project accumulated experiences of aquaculture extension services and good practices which should be utilized in the future when FiA implements similar projects in the other provinces. Therefore, it is recommended to the Project to make an effort to disseminate such experiences and good practices to FiA Cantonment offices in other provinces and relevant parties in order to provide practical information for future activities.

(6) Maintenance of rice-cum-fish culture and CFR demonstration sites

In addition to earthen pond culture, the Project carried out demonstration of rice-cum-fish culture in strategic sites, and established model CFR in selected communal pond areas. Both activities aimed at increasing opportunities for rural people to access food fish. Although these activities generate substantial benefits to the people directly involved in the activities in the short run, the rice-cum-fish culture demo plots is also expected to generate demonstration effects, and CFR modeling is expected to produce replications in other communities. For this, it is recommended to maintain these rice-cum-fish demo plots and CFR model communities so that more people may be interested in these activities.

(7) Toek Vile Fish Seed Production Station

The Project has contributed not only to upgrading of some key facilities and equipment in the Toek Vile Station but also to skills enhancement for the staff members of the Station. With this, the Station is now functional in terms of technical backstop to respond to farmers' needs and technical problems, and broodstock center to supply quality fish to FSPs and private hatcheries. It is therefore recommended to maintain these important functions as much as possible, with a proper allocation of financial resources even after the project period.

3-5. Lessons Learned

(1) Farmer-to-farmer Extension

Successful implementation of both FAIEX-1 and FAIEX-2 projects in different target areas of Cambodia has demonstrated that farmer-to-farmer extension approach is one of the most effective tools for rural livelihood improvement. Its main mechanisms include economic incentive and social incentive that motivate so-called core-farmers to function as farmer extension agent. They perform as FSPs and at the same time as teachers to teach grow-out farmers fish farming techniques. Grow-out farmers who

initially lack knowledge and skills in aquaculture buy seed and in return get technical advices. As long as this reciprocal relationship between FSPs and grow-out farmers is maintained, both sides can enjoy the benefits out of this win-win business model. It is noteworthy that in order to establish the FTF extension the identification and selection of right core-farmers are crucial. The qualifications and/or characteristics to be met by the potential FSPs include the strong commitment on hard-working, respected by the community, and altruistic, among others.

(2) Networking of core-farmers

According to the experiences gained by FAIEX-1 and FAIEX-2, networking of core-farmers is proven to be an efficient and effective method to sustain the whole extension system. The networking was initially assisted by the project intensively and afterward it is managed and operated by farmers themselves. It implies that the network members recognize the usefulness of the networking to enjoy mutual benefits derived from interactions and communications on seed production technology, seed supply/marketing and broodfish lending/borrowing. It also functions as a platform to connect farmers and government.

(3) Identifying how to share the responsibility in aquaculture extension between FiA at central level and field extension officers in FiA Cantonment

During the project period, knowledge and technology about freshwater aquaculture development have been transferred effectively to field extension officers by staff members of FiA central. FAIEX has been successful in sharing responsibility between FiA central and field extension officers in FiA Cantonment. Through experiences in assisting FSPs and grow-out farmers, field extension officers accumulated extension skills and improved their capacity on aquaculture extension services. By establishing a workable framework of extension service, the capacity of field officers in Cantonment has been strengthened to the satisfactory level.

(4) Generating a strong demand for seeds for the stable business of seed production

In early stage of the development of seed production, FSPs may suffer from lack of demand for seed even if they adopt FTF methods in proper way. In such situation, the seed production business remains unstable. The Project dealt with such situation by organizing FTF training for fish farmers who are potential buyers of fingerlings from FSPs. FiA central and FiA Cantonment offices have cooperated continuously together with commune councils, NGOs, and donor agencies, in order to identify potential buyers, and then FSPs can gradually expend their own marketing network. Then FSPs eventually evolve into mature in economic terms, being able to run business independently.

(5) Grow-out farmers

It was confirmed that small scale fish farming makes significant contribution to the nutrition, food security and sustainable livelihoods in the target areas of the Project. In order to encourage the farmers to continue fish culture successfully, it is essential to give close monitoring to their activity from the preparation of ponds until the harvest. In addition, the integrated farming of fish culture with homestead garden is a very efficient method that could interact each other.

(6) Fish seed producers

FSPs may at first require incentives to try new practices or technologies to help them overcome barriers such as capital cost or perception of risk, which was successfully dealt with by the FAIEX1-2. In order to develop their seed production successfully, regular supervision/monitoring by both FiA central and cantonment was a key important factor.

(7) Effects of extreme weather

In the Project, natural disasters, such as droughts, floods, etc. was considered as an external factor for the achievement of the Project Purpose. As mentioned repeatedly, it actually had considerable effect on the seed production and grow-out every year during the project period, and thus affected negatively the

small-scale aquaculture production. Since such effects of extreme weather or climate change occur more frequent than ever, it may be necessary to consider it as internal factor, and include adequate measures to mitigate the negative influences or avoid risks in the framework of the project design.