

**Freshwater Aquaculture Improvement and
Extension Project in Cambodia
Phase 2**

Final Report

February 2015

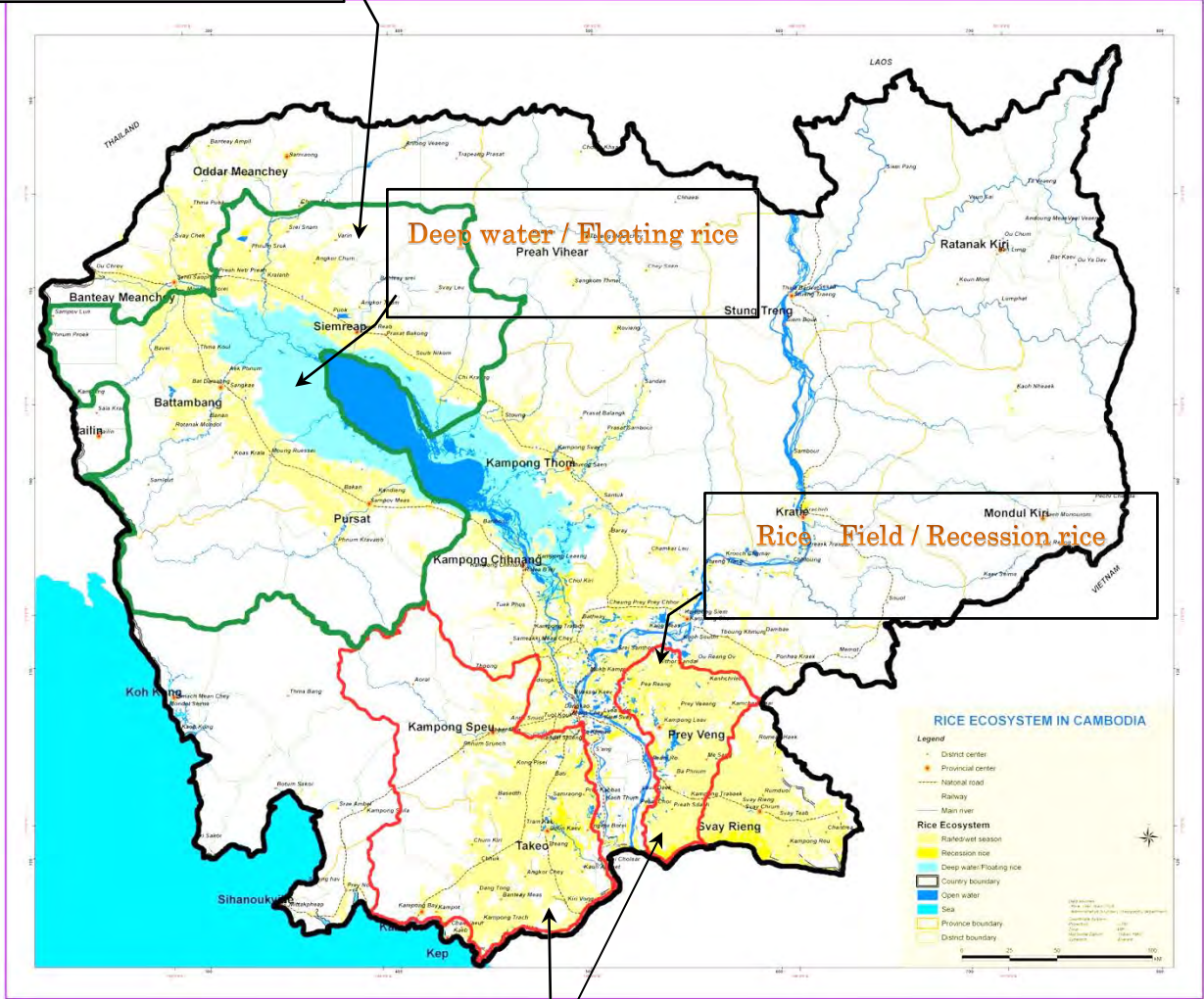
Japan International Cooperation Agency

Contracting Organizations

INTEM Consulting, Inc.

IC Net Limited

Target area in FAIEX-2



Target area in FAIEX-1

Target area of Project
(Cambodia-IRRI Rice project, Mekong Committee)

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Abbreviation

Abbreviation	Full name in English
AIT	Asian Institute of Technology
CFR	Community Fish Refuge
FiA	Fisheries Administration of Cambodia
FAIEX	Freshwater Aquaculture Improvement and Extension Project
FFA	Food for asset
FFW	Food for work
JICA	Japan International Cooperation Agency
PDM	Project Design Matrix
TOT	Training of Trainer
WFP	World Food Programmed

1 Summary of the Project

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 75% of animal protein which Cambodian people take in. Annual consumption of fisheries products per capita is estimated as 52.4 kg; 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, Japanese government conducted the Freshwater Aquaculture Improvement and Extension Project (FAIEX-1, hereinafter "Phase 1") at 4 southern provinces (Prey-Veng, Takeo, Kampong-Spou, 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 (hereinafter "Phase 2") for the north-western region, where the poverty level is much higher.

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 record of discussion (R/D) of the project, Freshwater Aquaculture Improvement and Extension Project Phase-2, was concluded on January 10, 2010. The project will be implemented in 4 years from the middle of March 2011 in collaboration with Fisheries Administration, Ministry of Agriculture, Forestry and Fisheries, Cambodian Government, as a counterpart agency.

1.2 Purpose of the Project

Targeting at 3 provinces, Pursat, Battambang and Siem Reap, the project aims at 1) technical improvement of seed production and fish culture, 2) capacity building of local administrations for fish culture extension, 3) generation of fish seed production farmers, 4) extension of small-scale fish culture activities, and 5) reinforcement and expansion of a famers' network for fish seed production.

2 Framework of Project

2.1 Plan of operation (Work Flowchart)

The operational flows of the project activities in respective outputs in four (4) years are indicated in a following flowchart.

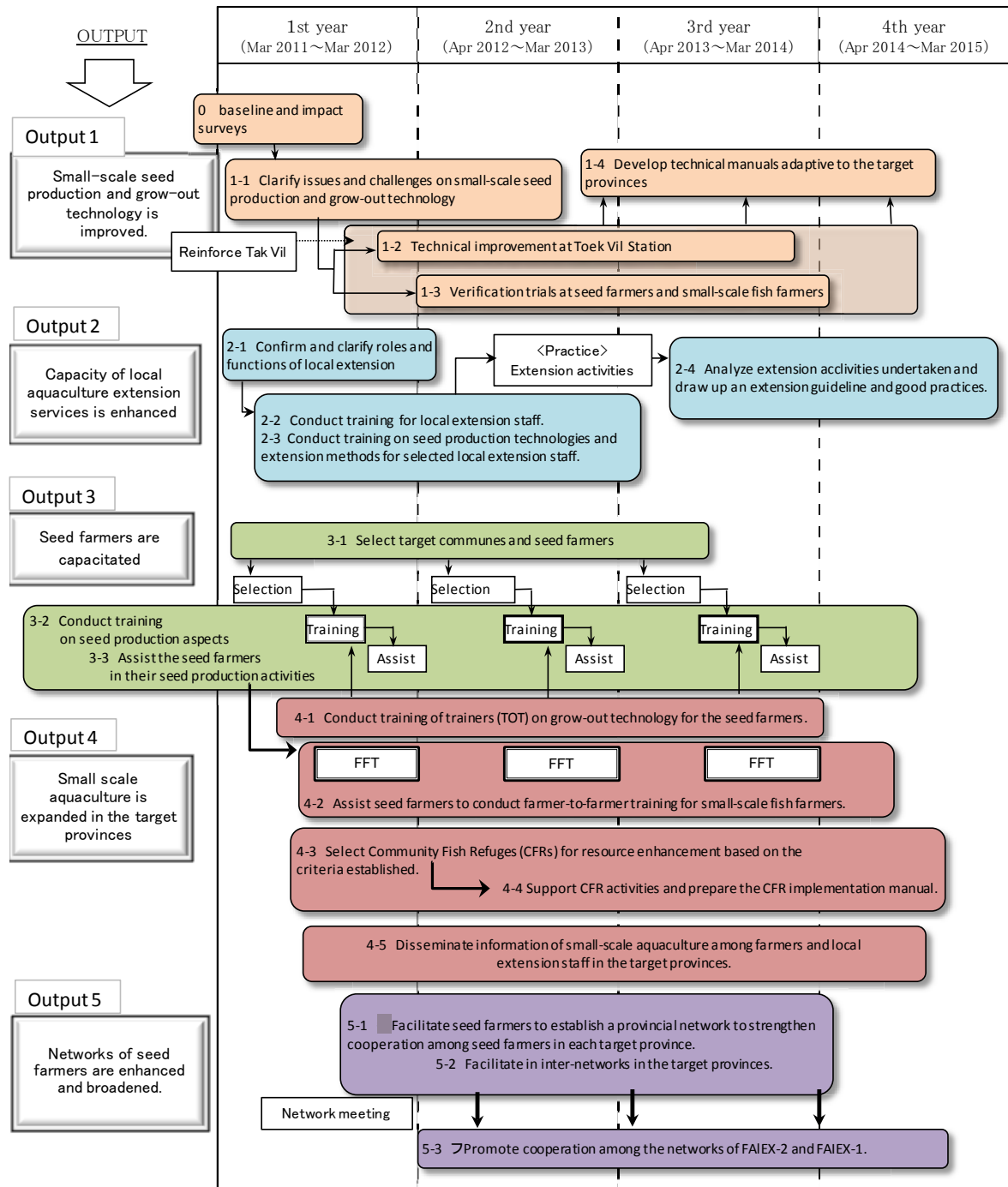


Figure 2-1 Work Flowchart of Project

2.2 Target area

Target area of project is three northwestern provinces (Pursat, Battambang, and Siem Reap).

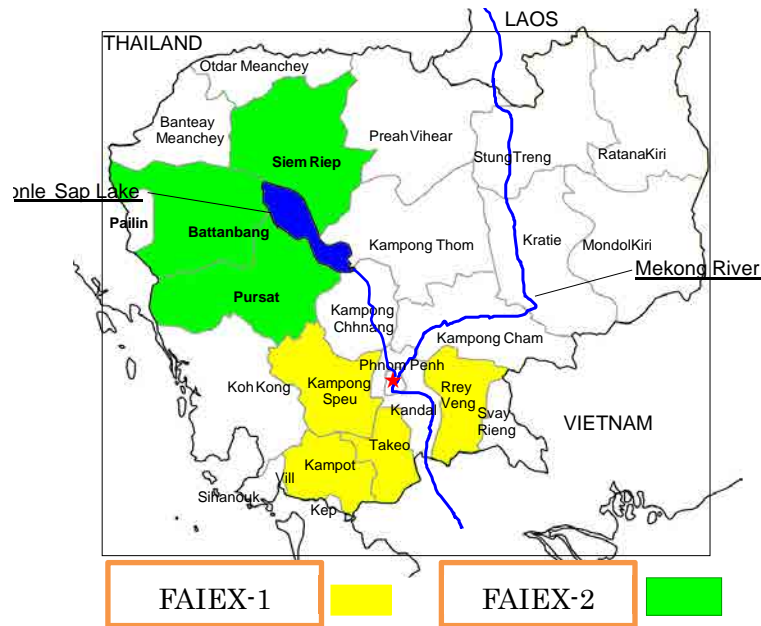


Figure 2-2 Project target province

The following table shows comparison between FAIEX-1 and FAIEX-2 regarding dimension, number of household and household density of project target area. While FAIEX-2 should cover more huge area than FAIEX-1, household density of FAIEX-2 area is almost half of FAIEX-1 area. It means that more work forces will be needed to get results and similar output for extension. Therefore smaller number of aquaculture farmer trained is targeted than the number of outcome (9,000 farmer households) from FAIEX-1.








Table 2-1 Comparison between FAIEX-1 and FAIEX-2 target area

Province	Area (km ²) (a)	Number of HH (b)	Household density (HH/km ²) (b/a)
Kampong Speu	7,017	149,132	21.3
Kampot	4,873	129,745	26.6
Takeo	4,883	226,764	46.4
Prey Veng	3,563	183,905	51.6
FAIEX-1 Target area Total	20,336	689,546	Average 33.9
Pursat	6,679	83,515	12.5
Battambang	11,702	210,327	18.0
Siem Reap	10,299	180,097	17.5
FAIEX-2 Target area Total	28,680	473,939	Average 16.5

2.3 Target species

Following fish species are target for small-scale aquaculture extension in this project, as it is appropriate for extensive pond culture. Catfishes are non-target species although considerable number of farmers is interested in production. These species are more adequate for intensive commercial scale aquaculture. Project only shall provide necessary technical information as well as call seed farmer's attention to strict control of stocking in a pond in order to prevent from escaping to natural waterbody.

Table 2-2 Target fish for extension

	External appearance	Name
Target species		Silver barb <i>Barbonymus gonionotus</i>
		Silver carp <i>Hypophthalmichthys molitrix</i>
		Common carp <i>Cyprinus carpio</i>
		Mrigal <i>Cirrhinus cirrhosus</i>
		Nile tilapia <i>Oreochromis niloticus</i>
Non-target (only for observation)		African catfish <i>Clarias gariepinus</i> (It is used to produce the hybrid with indigenous catfish, <i>Clarias microcephalus</i>)
		Pangasius <i>Pangasius hypophthalmus</i>

2.4 Implementation of the Project and Management Structure

2.4.1 Implementation Structure

Fisheries Administration (FiA) takes responsibility of overall operation of the project. According to the R/D, Director General of Fisheries Administration is assigned as Project Director, Director of Department of Aquaculture Development (DAD) as Project Manager, and Deputy Director of DAD as Deputy Project Manager.

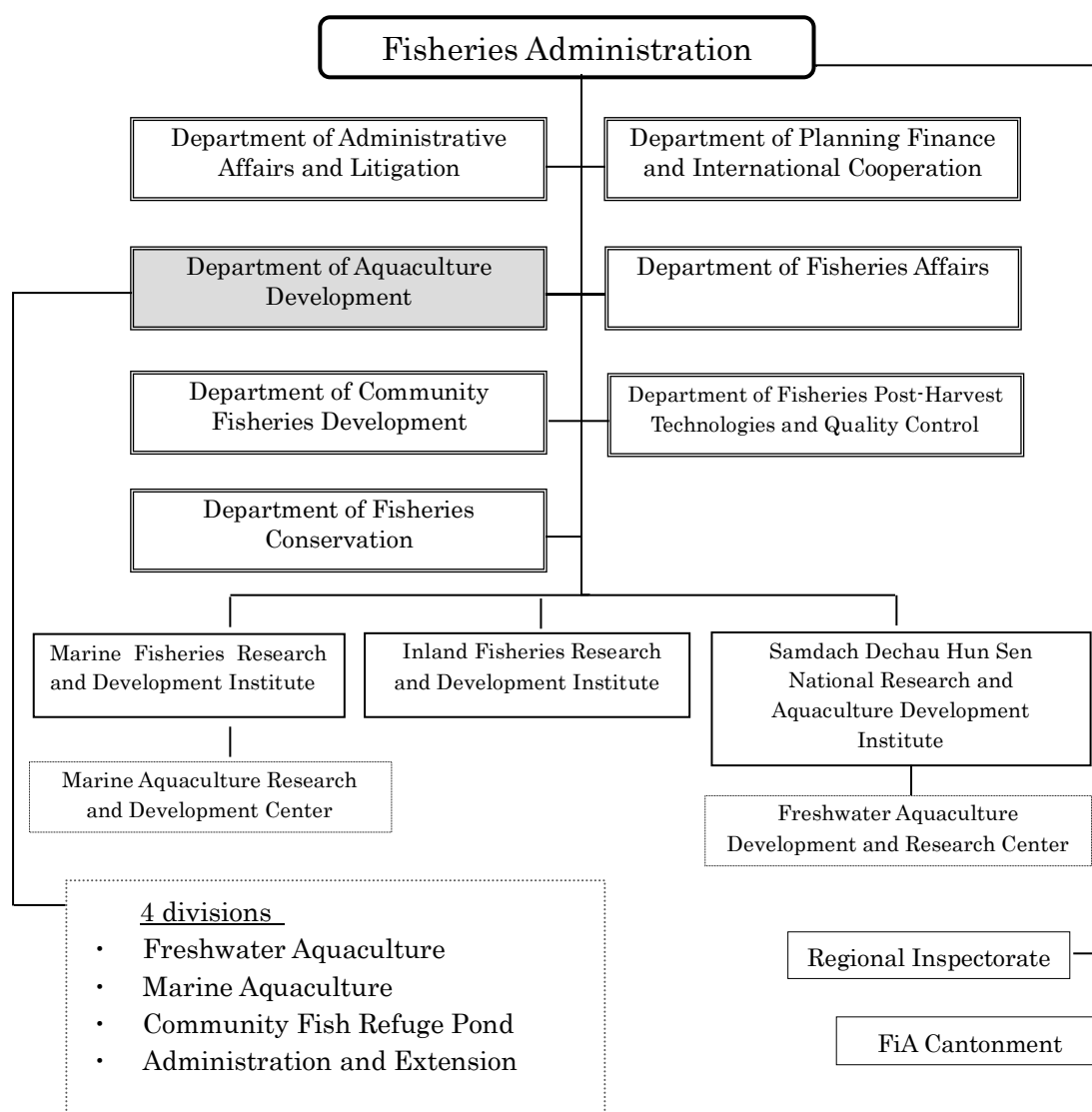


Figure 2-3 FiA organization structure

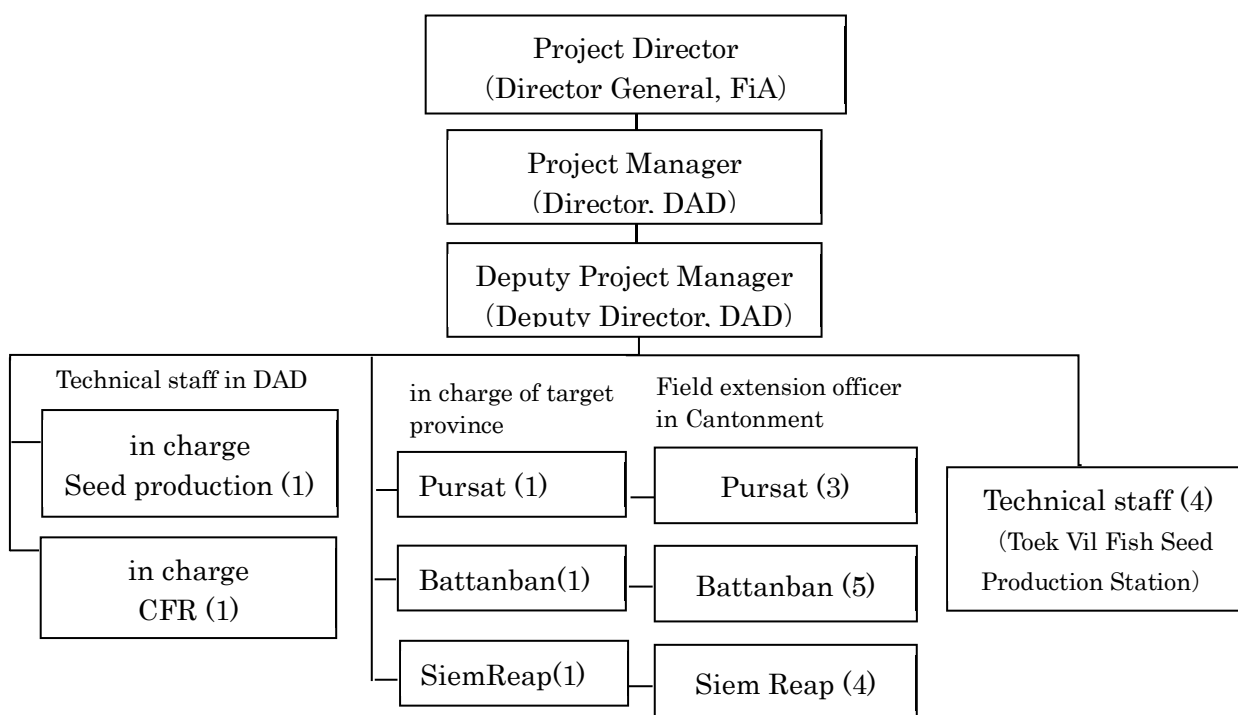
(As of January 2015)

2.4.2 Allocation of Counterpart

(1) Allocation of Counterpart in the 1st year and the 2nd year

At the beginning of the project, according to R/D, Director General of Fisheries Administration is assigned as Project Director, Director of Department of Aquaculture Development (DAD) as Project Manager, and Deputy Director of DAD as Deputy Project Manager. Under the Project Director and Managers, one (1) officers in charge of a province and two (2) technical staffs (in charge of seed production and CFRs) are assigned in each target province. In addition, four (4) extension officers at each provincial fisheries office (cantonment) and two (2) staffs of Teok-Vil Center are also assigned to the project. Total 24 officers are the counterparts of the project.

Afterward, in the first year of the project, one extension officer resigned from a counterpart in Pursat province (October 31, 2011), and one technical staff of Teok Vil Center also resigned in Siem Reap province (December 31, 2011). Therefore, two new counterparts were assigned shortly as their replacement. In the second year, one extension officer resigned from a counterpart in Pursat province due to his health problem (August 1, 2012). Instead of him, one new counterpart was assigned in Battambang province (August 16, 2012).



Total number : 24 c/ps

FiA: Fisheries Administration

DAD: Department of Aquaculture Development

CFR: Community Fish Refuge

Figure 2-4 Implementing Organization chart of the Project (1)

(April 2011 ~ March 2013)

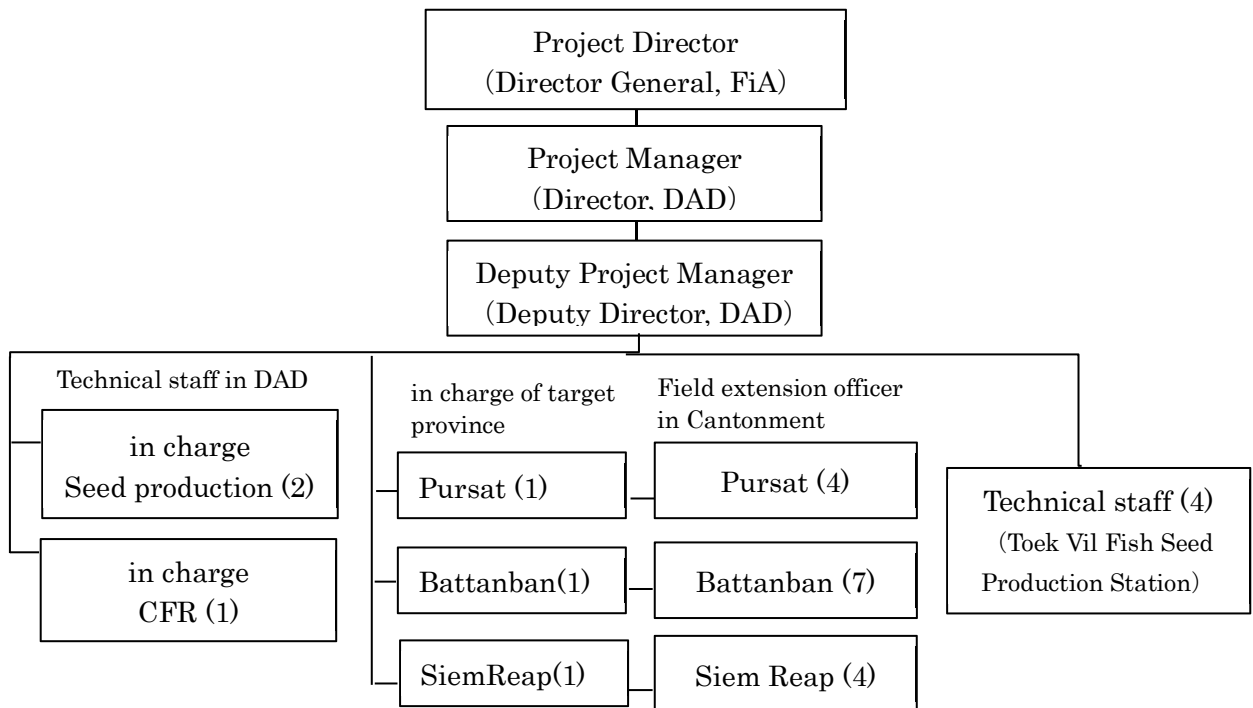
(2) Allocation of Counterpart in the 3rd year

Considering the potential of each target province as well as the increasing number of target communes, the mid-term review team and 2nd JCC committee (January, 2013) suggested that the number of extension officers should be increased to cover overall project activities.

Responding this suggestion, the project decided to increase 1 counterpart in DAD, 1 counterpart in Pursat, 2 counterparts in Battambang. On the other hand, 2 new counterparts were assigned in Toek Vil station at the beginning of the 3rd year as a replacement, because 2 counterparts (technical staffs) died in March and April 2013 respectively.

Currently 28 counterparts are engaged as shown in Figure 1. Extension officers of cantonment offices in target provinces are engaged in project activities in close communication with the counterparts working for Department of Aquaculture Development, Fisheries Administration, and Japanese experts (referring the annex: counterpart list).

In addition, to monitor the overall activities of the project, Project Manager convenes a regular monthly meeting every month in each target province. In the monthly meetings, respective extension officers report the progress of their activities, and the attendance discusses problems and issues about the project activities, to manage to implement the project activities smoothly.



Total number : 28 c/ps

Figure 2-5 Implementing Organization chart of the Project (2)

(April 2013~ February 2015)

Table 2-3 List of counterpart (as of January 2015)

N°	Name	Role	Position	Date
1	H.E. Nao Thuok	Project Director	Director of FiA	April 01, 2011
2	Mr. Hav Viseth	Project Manager	Director of DAD	April 01, 2011
3	Mr. Chin Da	Deputy Manager	Deputy Director of DAD	April 01, 2011
4	Mr. Haing Leap	Aquaculture Office (charge of CFR)	Deputy Director of DAD	April 01, 2011
5	Mr. Ouch Lang	Aquaculture Office (Charge of seed production)	Officer	April 01, 2011
6	Mr. Pol Mimosá	Aquaculture Office (Charge of Pursat)	Officer	April 01, 2011
7	Mr. Chhor Bunly	Aquaculture Office (Charge of seed production)	Officer	April 01, 2011
8	Mr. Sroy Seangly	Aquaculture Office (charge of Siem Reap)	Officer	April 01, 2011
9	Mr. Prak Viseth	Aquaculture Office (Charge of Battambang)	Officer	April 24, 2013
10	Mr. Neang Nget	Pursat Fisheries Office Cantonmen	Officer	April 01, 2011
11	Mr. Seng SongLy		Officer	April 01, 2011
12	Mr. Yim Teang		Chief of FiA.C	November 01, 2011
13	Mr. Lim Sokreth		Officer	April 24, 2013
14	Mr. Kong Sokha	Battambang Fisheries Office Cantonmen	Deputy Director of FiA.C	April 01, 2011
15	Mr. Sam Sour		Chief of FiA-S	April 01, 2011
16	Mr. Meng Sothai		Chief of FiA-D	April 01, 2011
17	Mr. Leng Sovannasa		Vice Chief of FiA-D	April 01, 2011
18	Mr. Neang Sophak		Chief of FiA-S	May 01, 2014
19	Mr. Beng Chham		Deputy of FiA C	April 24, 2013
20	Mr. San Mardy		Chief of FiA-S	April 24, 2013
21	Mr. Prin Savin	Siem Reap Fisheries Office Cantonmen	Director of FiA.C	April 01, 2011
22	Mr. Srey Keovsopheak		Chief of FiA-D	January 01, 2012
23	Mr. Uy Sovanny		Duputy Chief of FiA-S	April 01, 2011
24	Mr. Kim Savoeun		Chief of FiA-S	April 01, 2011
25	Mr. Kear Polak	Toek Vil Seed Production Station	Duputy Chief of FiA-D	January 01, 2012
26	Mr. Hip Mor Ra		Chief of Aquaculture Sector	April 01, 2011
27	Mr. Kleung Chi Heng		Officer	April 24, 2013
28	Mr. Tat Lin		Officer	April 24, 2013

2.4.3 Allocation of Japanese expert

The following Japanese experts were assigned in project.

Table 2-4 Allocation of Japanese expert (MM)

Specialized fields	JFY 2011	JFY 2012	JFY 2013	JFY 2014
Team Leader/ Aquaculture extension/ Feed Development	7.80	7.50	7.40	7.6
Deputy Team Leader/Aquaculture extension II/Training I	4.20	2.00	3.00	1.5
Seed production/Broodstock management	3.83	7.00	6.50	5.9
Aquaculture facilities and equipment	2.50	-	-	-
Community fish refuge pond	2.00	1.50	1.00	-
Coordinator/Training II	5.00	4.50	2.20	-
Total M/M	25.33	22.50	20.10	15.00
	82.93M/M			

2.4.4 Structure of Project Management (JCC)

According to Annex VI of the R/D, the Joint Coordinating Committee (JCC), composed of the following members has been held once a year during project.

Chairperson and Members of
JOINT COORDINATING COMMITTEE

Chairperson

The Director General of FiA, MAFF

Members from Cambodian side

- a. The Director of DAD, FiA, MAFF
- b. The Director of Fisheries Inspectorate, FiA, MAFF
- c. Counterpart personnel of the Project
- d. Representative of Council for Development of Cambodia/ Cambodia Rehabilitation and Development Board
- e. Any relevant stakeholders to be invited by Chairperson, if necessary

Members from Japanese side

- a. Representatives, JICA Cambodia office
- b. Experts of the Project
- c. Any relevant stakeholders to be invited by JICA, if necessary

Note: Official (s) of the Embassy of Japan may attend the committee sessions as observer(s)

In the JCC, the committee members shared the activity achievements and outputs of the year, and discussed plan of operation for the following fiscal year as follows.

Table 2-5 Implementation of JCC

No.	Date	Participation	Agenda
1st	21 February, 2012	47	Sharing the activity achievements and outputs of the year, and discussed plan of operation for the following fiscal year. Discuss PDM indicator.
2nd	13 February, 2013	46	Sharing the activity achievements and outputs of the year, and discussed plan of operation for the following fiscal year. Sharing the report from mid-term review.
3 rd	20 March, 2014	59	Sharing the activity achievements and outputs of the year, and discussed plan of operation for the following fiscal year.
4th	10 September, 2014	55	Sharing the activity achievements and outputs of the year, and discussed plan of operation for remained period. Sharing the report from terminal evaluation.

2.5 Method of aquaculture extension

(1) Farmer to Farmer approach

The project pursues aquaculture extension by making use of Farmer to Farmer (FTF) technique in which seed producers instruct aquaculture techniques to small-scale farmers and provide them with seeds at the same time. The three steps of technical transfer were executed in Phase 1, namely 1) from experts to extension officers, 2) from extension officers to seed producers, and 3) from seed producers to small-scale farmers. Phase 2 builds on and expands this approach.

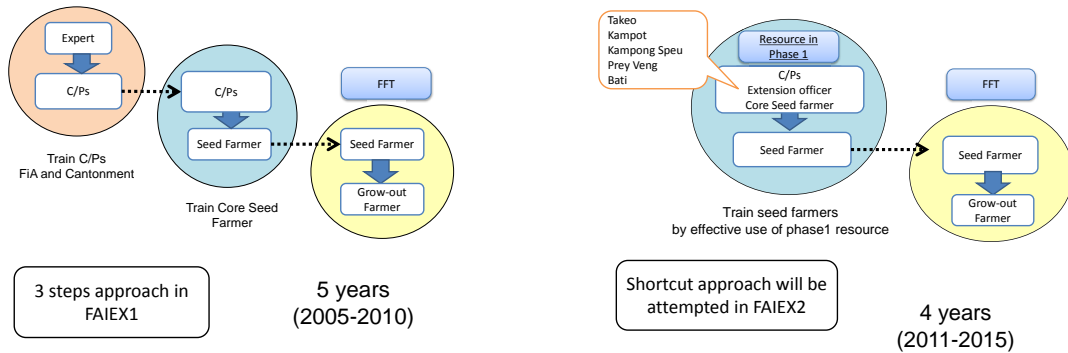


Figure 2-6 Farmer to Farmer approach

(2) Utilization of Resources in Phase 1

The Cambodian counterparts of Fisheries Administration, local extension officers, and fish seed producers, who were trained in Phase 1, have an extensive knowledge and experience in aquaculture and extension methods. Therefore, the project effectively utilizes them as lectures in training programs.

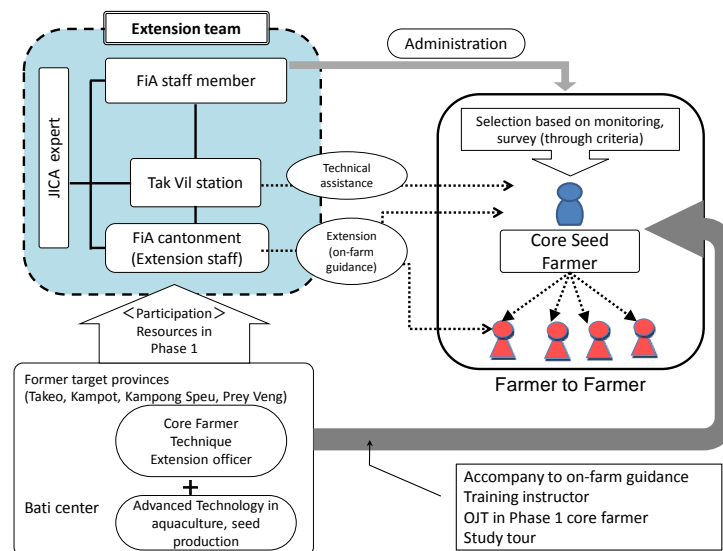


Figure 2-7 Relationship of project resources person and institutes

2.6 PDM

Original PDM has been modified two times so far throughout the discussion with evaluation mission team at JCC by adjusting to actual condition.

Each version of PDM is attached as ANNEX in this report.

Table 2-6 Modification of PDM

Version	Preparation / Modification	Contents and reason
PDM ₀	October 2010 (2 nd preparatory survey)	—
PDM ₁	February 2012 (1 st JCC)	Indicator regarding overall goal, project purpose and outputs were set, as it had not been prepared.
PDM ₂	February 2013 (mid-term review)	Indicator regarding overall goal, project purpose and outputs were modified, as some of indicators were not adequate.

3 Implementation process

Extensive aquaculture system in rural area of Cambodia is depending on rain fall. All work from pond preparation, fish stocking until harvest shall be scheduled following natural cycle. Therefore all project activities were planned considering the period of rain and also dry season as follows.

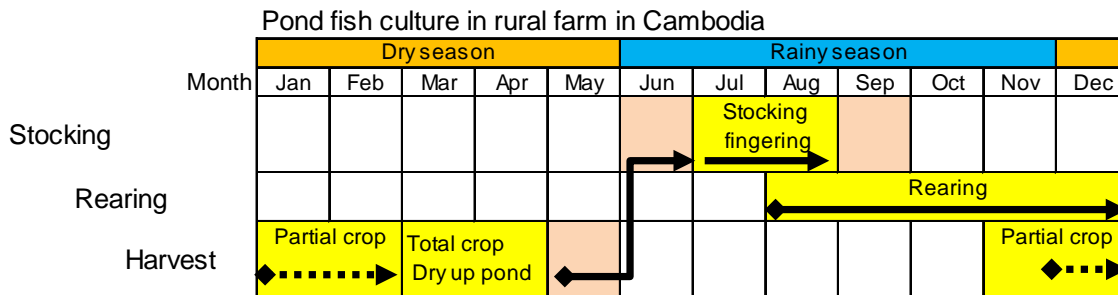


Figure 3-1 General aquaculture schedule in a year

3.1 Achievement of Project Activities in the FY 2011 (March 2011 ~ March 2012)

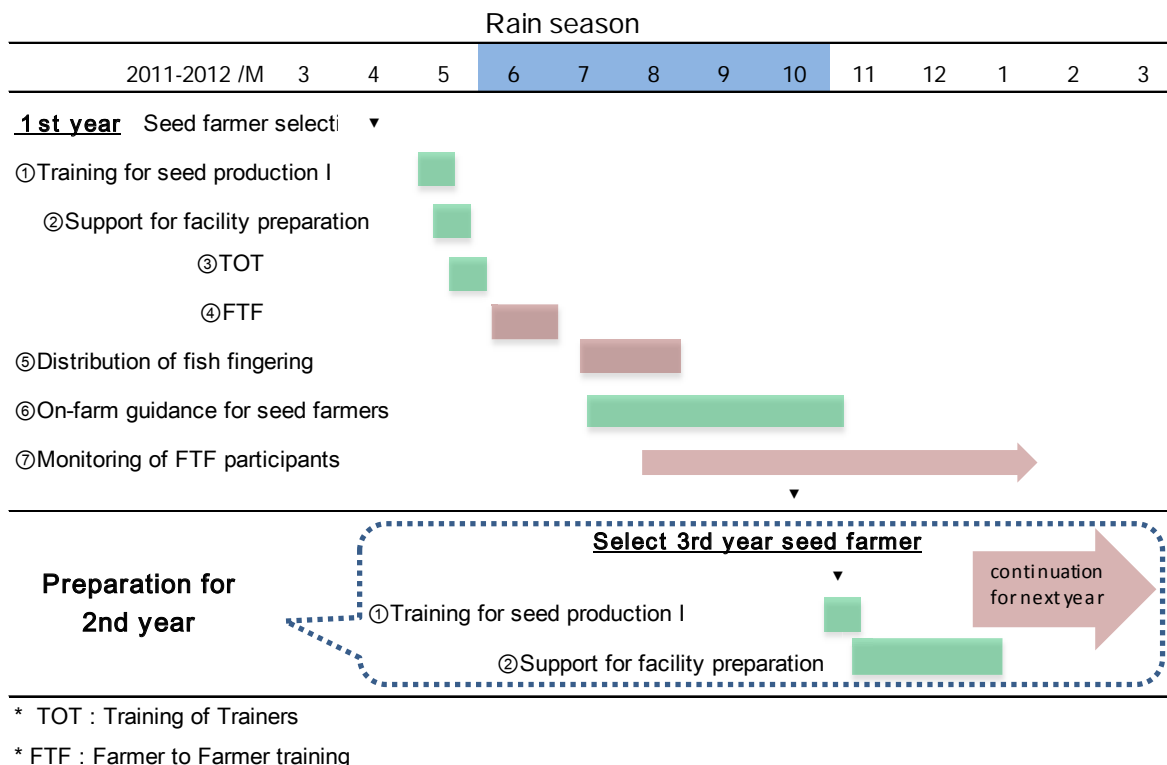


Figure 3-2 Implementation schedule of Main Activities in 2011

According to the Item 4 ‘Work Range and Content’ on the Specification (Attachment II) on the first year’s contract document in FAIEX-2, the accomplishments of project activities and outputs of the project at the first half of the fiscal year 2011 are described below.

The activities of the first year were carried out in accordance with the work plan prepared in April 2012. However, the project team considered that they should take some measures against important subjects, realized at the first half of the year, and front-load a part of second year’s activities. According to the discussion on the revision of project activities and schedule with JICA and counterpart organizations, the project team decided to revise the project activities partly. The project team finally concluded the first revised contract with JICA on October 18, 2011.

In 2011, the target provinces also suffered from a heavy flood covering all over the Cambodia. Some local farmers lost cultured fish before harvest, and some core farmers also lost broodstock by the flood. Therefore, some follow-up activities are necessary for fish farmers damaged by the flood to continue their grow-out culture and seed production in the next season of fish culture. In order to take proper measures to those unexpected damages, the project team concluded the second revised contract with JICA on January 25, 2012, with extending assignment periods of Japanese experts. The implementation plan on those twice revised contracts includes ‘Management of rehabilitation works of Tak Vil Seed Production Research Station’, ‘Selection of second year’s seed producers and their training programs’, ‘Construction of common refuge ponds’, ‘Digging of fish culture ponds’, ‘Support to the flood damages’, ‘Support to procurement of project vehicles’ and so forth. This report describes respective achievements of project activities in order of the ‘Activity Content’ mentioned on the Specification.

Regarding the seed producers in the first year, the project plans to educate the candidate farmers selected from existing seed producers to be core farmers. As a result of the detail project planning study, which was conducted in July 2010, there were 9 seed producers in Siem Reap, 17 in Battambang and Pailin, and 7 in Pursat. Afterward the technical training program for existing fish seed producers was held at the home of Mr. Om Thy, a seed producer at Trangkok district in Takeo province from May 5 to 11. The main target participants for the training program were the first year’s core farmers selected.

For the purpose that local extension officers engaged in extension activities learn necessary basic skills of aquaculture technical extension, the training program for extension officers was held from April 20 to 28. Totally, 22 persons of extension officers and technical staffs (7 in Pursat, 6 in Battambang, 6 in Siem Reap, and 3 in Tak-Vil center) participated in the training program. The training program was held at the home of Mr. Van Po, who is the president of seed producers’ network in Takeo province at present. Additionally, the number of training participants was expanded to reinforce the technical skills of existing seed producers, who had not been selected as core farmers in the first year. Finally, 22 seed producers from three target provinces (7 in Pursat, 7 in Battambang, and 8 in Siem Reap) participated in the training program. Moreover, 3 farmers of Ratanakiri province voluntarily attended the training program, because they had heard the program from local seed producers. Totally, 25 farmers participated in the training program.

The training program focused on seed production skills in 4 target fish species (silver carp, common carp, silver barb and tilapia) except murgal.

As for implementation of Farmer to Farmer Training (FFT) in the first year, after selecting target farmers based on criteria, the first program of farmer to farmer training was held to 505 farmers, who had been selected from 19 target communes in 3 provinces, from June 15 to 28. Each program was conducted in only 2 days. The curriculum was mainly composed of some basic skills of fish culture for beginners. Subsequently in order to promote fish culture practices by the farmers participated in training programs, a maximum of 500 fish seeds and a hapa net were provided to each farmer, if their fish ponds had been prepared. They mainly practiced polyculture with less additional feeding at stagnant ponds.

As a preparation for the second year, by monitoring fish culture activities of local farmers participating in training programs of the first year, some core farmer candidates of the second year were selected, in cases they had high motivation to fish culture and intended to expand their fish culture activities and tackle fish seed production. Consequently 5 farmers in Battambang province, 4 farmers in Siem Reap province and 4 farmers in Pursat province are listed to be core farmer candidates for the second year. Afterward on October 11 to 14, 2011, a preparatory training in seed production techniques for 5 candidates of second years' core farmers was held at a core farmer (Mr. Mao Pek: first year's core farmer) in Battambang province. The main purpose of the training was to train second years' core farmers.

For the part of Fish Refugee Activities, project reviewed the current condition of total 22 ponds in 4 provinces supported by Phase I, and picked up some good practices to reflect for making fish refugee models in the target areas of Phase II. Therefore, as the first year's activities, the project team carried out the reviews of target ponds of Phase I and the selection of candidates of model fish refugee ponds in the target areas of Phase II. Subsequently at each candidate site, a workshop was held to promote an understanding of fish refugee ponds in a community and a cooperation of the program.

As conducted in Phase 1, in the workshops, the communities of target sites considered and shared current situation, problem and solution in their communities and fish refugee ponds, and discussed what kind of supports for them can be given by FAIEX 2. Moreover, according to the results of those workshop series, the project team considered the relevance and efficiency of input supports at target sites and the support processes. Consequently, the project team selected some necessary tools for monitoring activities, such as flash lights, raincoats, boots, transceivers and digging equipment's (shovels, hoes, baskets), and provided them to local communities at target sites on February 27 to 29, 2012.

Project also supported all pond construction works at 135 target farmer who had willinness to practice fish culture but no had fish pond in order to promote aquaculture into less potential area.
ot to

3.2 Achievement of Project Activities in the FY 2012 (May 2012~ March 2013)

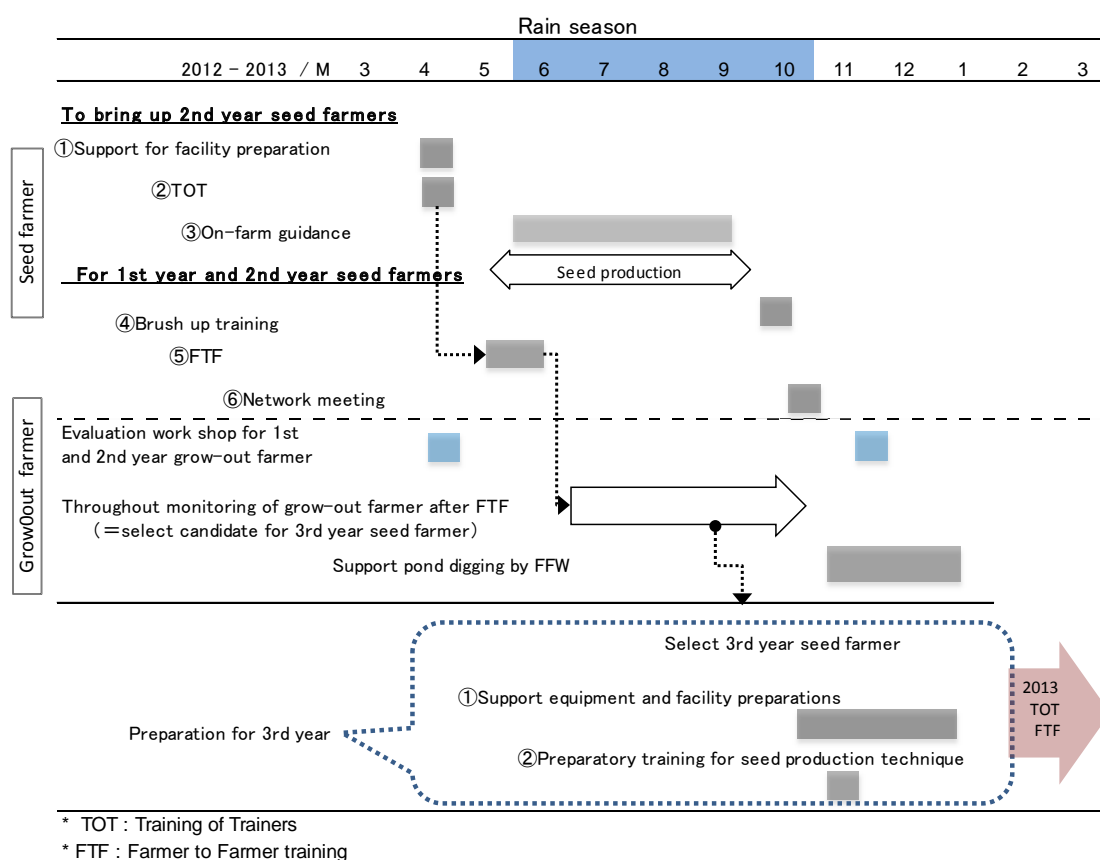


Figure 3-3 Implementation schedule of Main Activities in 2012

The project activities of the fiscal year 2012 are regulated on the Work Plan.

At Teok Vil Seed Production Research Center rehabilitated in the first fiscal year, some improper parts and problems were found. The supplementary rehabilitation works were conducted in the first half of the year.

As for second year's Seed Producers as Core farmers, the project monitored fish culture activities at grow-out fish farmers participating in farmer's trainings of first and second years to find out the farmers who had high motivation of fish culture and intend to extend fish culture activities and begin seed production. Moreover, Japanese experts and counterparts of Fisheries Administration visited the candidates of core farmers, listed up by hearings from commune and village chiefs and interview to individual fish farmers, and evaluated them by the following 5 criteria in the same way in the first and second years. Based on the experiences of the past years, more than 60 points was determined to be a selection standard in principle.

Because major potential farmers had been selected at target 3 provinces in first and second years by the processes of selection surveys mentioned above, it was not easy to find new candidate farmers especially at Pursat and Siem Reap provinces, where the potential of aquaculture is not

higher. Generally, the candidate farmers of third year, targeted by field surveys, had lower evaluation scores than those of first and second years. Some fish farmers, included in the candidates, did not reach a proper standard on the selection criteria. However, considering extending the scale of farmers to farmers trainings after third year, the fish farmers, who may be able to start seed production in 2 years with strengthening of project assistances, were selected as alternative core farmers to be trained. Total 11 fish farmers (5 farmers at Pursat, 5 farmers at Battambang, and 1 farmer at Siem Reap) were selected as candidates of core farmers. Afterword a supplementary training of seed production techniques for 12 core farmer of third year mentioned above was held at Teok Vil center on February 18 to 22 2013. Because all of them were beginners of seed production, the lectures covered all 5 target species in the training. But, the practices only focused on a few fish species, whose seeds are relatively easily produced, such as silver barb, common carp, and tilapia. The project well considered that the training participants could learn basic techniques of seed production certainly. Also in order to educate seed producers properly, the project prepares the three inputs, 'technical training programs', 'material assistances such as facility rehabilitation and broodstock supply', and 'technical assistances by on-farm guidance'.

In order to bring up second Year's Seed Producers, project held a training program of basic seed production techniques for second year's seed producers (16 farmers) at the end of November 2011, and provided necessary materials and equipment for hatchery facilities partially. In order to make seed production smoothly in this season, the project confirmed the preparation condition in March to May, before the beginning of seed production. To avoid any interruption of the project activities in March to April after the completion of the first year's contract, a JICA development specialist, dispatched in the management advisory study from JICA headquarter (period: March 20 to May 4 2012), carried out that confirmation survey. At the time of the confirmation survey (March to April 2012), only 3 core famers could prepare seed production of more than 1 species (2 farmers in Battambang and 2 farmers in Siem Reap) among total 16 second year's core farmers.

Most core farmers got behind in preparing seed production, because they had serious problems, such as "delay on construction works of hatchery facility by lacks of salary and time" and "delay on the supply of broodstock fish. It is concerned that those situations may delay local seed production. In addition to the counterparts of Fisheries Administration, the counterparts of Phase 1, who have enough experiences in hatchery facilities and management (mainly extension officers in Takeo and Kampot provinces), were sent to local seed producers, who had serious problems on the construction of hatchery facilities. As the result, all candidates of second year's core farmers could prepare Cambodia model hatchery facilities. Moreover, the project provided necessary broodstock to all second year's core farmers. Then, they can be engaged in seed production activities in May to June.

3.3 Achievement of Project Activities in the FY 2013 (April 2013~ April 2014)

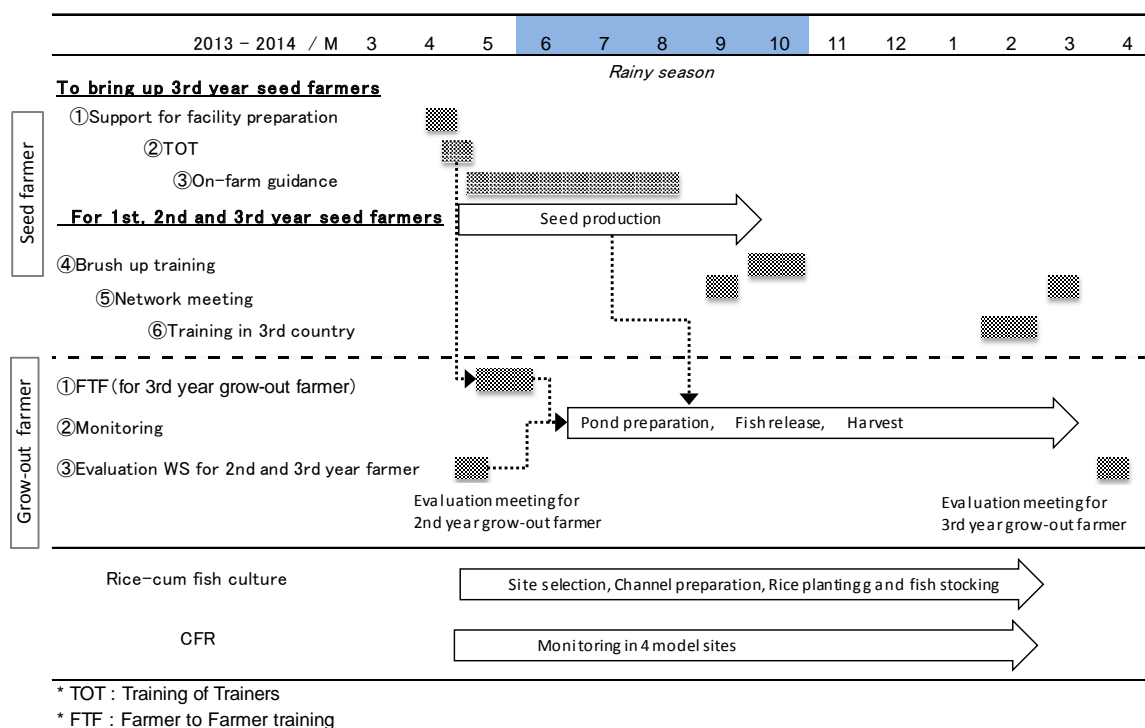


Figure 3-4 Implementation schedule of Main Activities in 2013

Based on the project implementation plan (third fiscal year) submitted to JICA in April 24, the implementation plan of third year's activities were discussed with counterparts of Fisheries Administration.

At first, the project conducted monitoring for fish culture activities at grow-out fish farmers participating in farmers' trainings of first, second and third years to find out the farmers who have high motivation in fish culture and intend to expand their fish culture activities and begin seed production. As of December 2013, five candidate farmers (three farmers from Pursat province, two farmers from Battambang province) were listed up by provincial fisheries office, consequently the project evaluated candidate farmers individually by the following criteria through the interviews to the candidate farmers and the observation to their fish culture activities on 13 January and 14 January 2014. There is no obstacle observed in each farmer in its water source, land and minimum capital to invest the hatchery and nursery pond preparation. After one month observation of farmer's initiative action, it was found that three candidates have extremely high motivation and very quick action following project technical suggestion. Subsequently project decided these three as project core seed producing farmers to bring them up in fourth year, 2014. In order to brush-up fish seed producers, the project planned to hold a brush-up (technical supplementary) training for seed producers, who have serious problems on seed production techniques, among the core farmers selected in the first, second and third years. Because the training is prepared for experienced seed producers, not beginners of seed production, participant farmers have to conduct several trails of seed

production in this season, the training was scheduled later half of the year.

In addition to the existing assistance for hatchery facility preparation such as input assistance, the project will consider the assistance for preparing nursery ponds for rearing fish seeds and new water intake sources like deep wells. As newly selected 3 farmers of 4th year started digging nursery ponds by their own budget, the project provided 300-350 US dollars for each as a partial support of digging expense.

Regarding Farmers to Farmers Training Programs in third year, after selecting target communes and farmers in May 2013, the project team coordinated the schedule of core farmers and provincial extension officers, contacted target farmers, and conducted farmers to farmer's trainings at the communes where training venues had been prepared. A course of the training program was held in only 2 days. A fish culture booklet (A5 size, 59 pages), used as a main material in the trainings, covers a series of fish culture processes such as 'pond preparation', 'seed stocking', 'pond fertilization', 'feeding management' and 'harvest'. Video materials and flipcharts produced by the project were also utilized in the training programs. In the period from May 6 to June 7, 2013, the training programs were held 13 times in Siem Reap province (9 communes), 14 times in Battambang province (16 communes), and 14 times in Pursat province (14 communes in). In 39 communes in 3 provinces, total 1,091 farmers participated (331 farmers in Siem Reap, 383 farmers in Battambang, and 377 farmers in Pursat).

The networking activities for seed producers in target 3 provinces started in the second year. Those network meetings have been held once to three times in each province since then. In each province, seed producers selected a representative of their network group. Especially, in Battambang province, regular network meetings are held voluntarily. As the results, seed producers begin to understand their fellow feeling and the profits of their networking activities. In the third year, in order to strengthen and widen network organizations and reinforce the degree of their sustainability in each province, the project held the network meetings 3 times in each province for strengthening the bases of network organizations.

Many beginner farmers encounter problems, after they started fish culture in the first year. Thus the project made a plan to hold the evaluation meetings for fish farmers who have a half year to 1 year's experiences of fish culture to arrange problems and issues on fish culture, and clarify necessary conditions for their continuing fish culture activities.

The evaluation workshops on fish culture activities of second year's fish farmers at all target communes have been held in the period between 25 April and 3 May 2013.

The second evaluation workshops on fish culture activities of third year's fish farmers at all target communes have been held in the period between 20 January 2014 and 19 February 2014. 377 households in 14 communes in Pursat, 383 households in 14 communes in Battambang, 331 households in 9 communes in Siem Reap, participated workshop.

3.4 Achievement of Project Activities in the FY 2014 (May 2014~ February 2015)

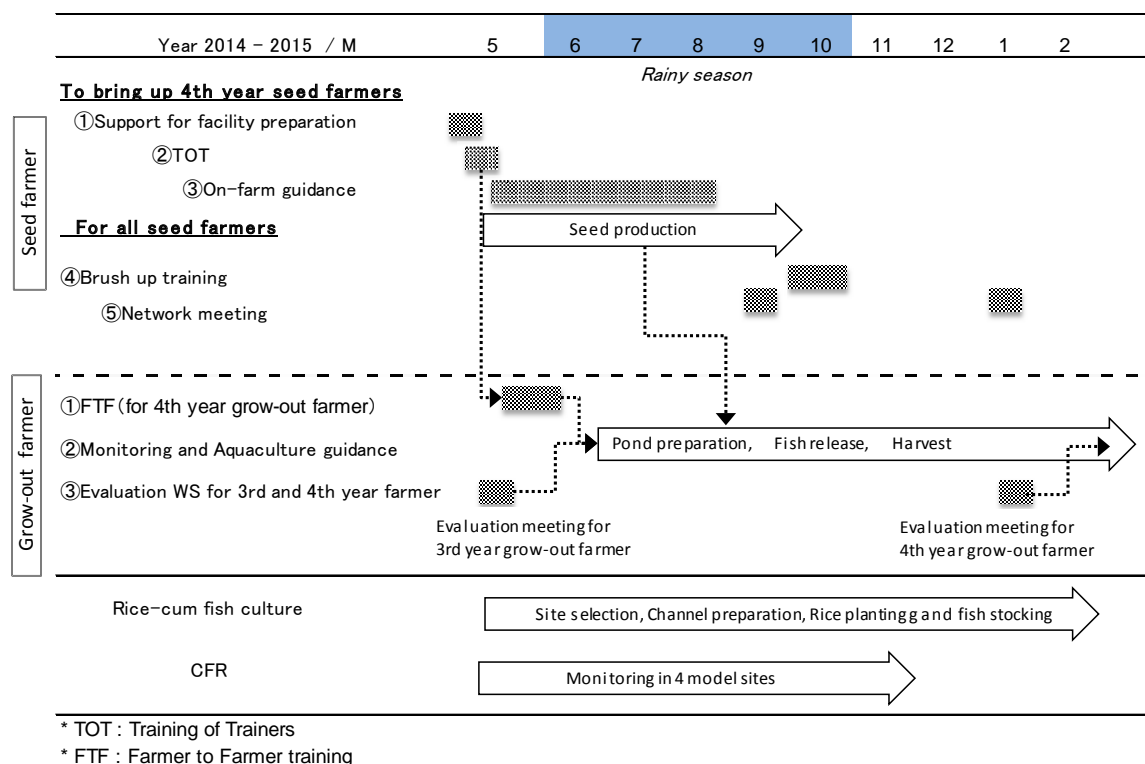


Figure 3-5 Implementation schedule of Main Activities in 2014

Based on the project implementation plan (forth fiscal year) submitted to JICA in May 12, 2014 the implementation plan of year's activities were discussed with counterparts of Fisheries Administration.

As a first activity of fourth year, Farmers to Farmers Training Programs was conducted. After selecting target communes and farmers in March-April 2014, the project team coordinated the schedule of core farmers and provincial extension officers, contacted target farmers, and conducted farmers to farmer's trainings at the communes where training venues had been prepared. A course of the training program was held in only 2 days. Core farmers taught local farmers as lecturers and provincial extension officers gave supplementary explanation as necessary. To improve their understanding of basic skills, the practical sessions showed how to use hapa nets (small-size box nets) and prepare home-made fertilizers and feeds by using actual materials. In the period from May 5 to May 30, 2014, the training programs were held in 34 communes in 3 provinces, total 933 farmers participated.

To bring up seed producers and in order to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas, the project planned to hold brush-up (technical supplementary) training for seed producers, who have serious problems on seed production techniques, among the all core farmers selected from the first to fourth years.

The project held the network meetings 3 times in each province for strengthening the bases of network organizations in November 2014. Afterword overall networking meeting was held for 4 days in same month November 2014.

The evaluation workshops on fish culture activities of fourth year's fish farmers at all target communes have been held in the period in January 2015. All target fish farmers participated in the workshop and answered questionnaire sheets on their fish culture activities. The evaluation sheet had been prepared by the project expert and FiA counterpart. FiA will analyze the data sheets to evaluate general outcomes of fish culture activities even after terminating project period.

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

4.1 Clarify issues and challenges on seed production and grow-out. (Activity 1-1)

Technical problems on small-scale seed production and grow-out technology were extracted throughout mentoring activities.

- Technical issues on small-scale seed production technology

The on-farm guidance to seed producers, conducted by the project, resulted in the following issues of seed production, as indicated in Table 24, and indicated the necessity of on-farm verification programs for technical improvement.

Table 4-1 Issues Arranged by On-farm Guidance to Seed Producers

Issues Observed Actually	Possible Causes
Broodstock do not start spawn eggs after hormone injection.	<ul style="list-style-type: none"> - Broodstock for spawning are not properly selected. - There are some problems on broodstock culture (culture environment without stress, feeding management, and etc.)
Hatching rate of fertilized eggs is low.	<ul style="list-style-type: none"> - The quality of fertilized eggs is not properly checked and verified (it is possible that broodstock culture have some problems). - The quality of water for hatching is not well considered. - Areolation and water change for hatching is not properly practiced. - Water flows in hatching tanks are not properly controlled, in case of sinking eggs like silver carp (too strong or too weak)
Survival rate of fish larva is low	<ul style="list-style-type: none"> - Shortage of initial feeds for fish larva - Pond preparation for intermediate culture is not properly practiced (fertilization of pond water, extermination of aquatic insects and predator fish, and etc.)

The experimental studies for seed production above-mentioned also include highly difficult techniques for seed producers of Phase 2 to practice at their fish farms. Moreover, it is necessary to consider and arrange technical difficulties of seed production by each target fish species. At present, the project carries out experimental studies of applied techniques to solve technical difficulties at Teok Vil Center. After arranging the results of experimental studies as a draft of technical manual, the project will start on-site verification experiments. At the first half of this year, the project conducted some technical experiments on seed production at Teok Vil Center.

On the other hand some technical issued were raised in brush up training targeting to intermediateseed farmers.

Table 4-2 Technical issued observed in brush up training

Work contents	Issue	Evaluation	
		1~2 years*	3~4years**
1 . Broodstock management	Feeding method	○	△
	Stocking density	○	△
	Other environment	○	△
2 . Spawning	Identify maturation 1 (handling)	○	△
	Identify maturation 1 (canule insertion, observation of ovary)	○	△
	Stocking number	○	△
	Weight, Ratio(male/female)	○	○
3 . Hormone	Hormone (preparation, injection)	○	○
	Time	○	○
4 . Hatching	Preparation of Hatching system	○	△
	Hatching control	○	△
5 . Larval rearing	Nursing fry handling Fry collection	○	○
	Nursing pond preparation	○	△
	Feed preparation	○	△
	Larval rearing in nursing pond (until 2 months)	○	△

○ : All issues improved

△ : Some issues improved but still problem

× : Still remain problem

● Technical issues on small-scale pond culture

Some technical problems were sorted out through the evaluation workshop on fish culture activities that has been implemented in the end of April 2013. Moreover grade of feedback to their aquaculture practice from technical guidance varies widely among farmers as shown in Table. The project proceeded technical improvement guidance to grow-out farmers in responding this result.

Table 4-3 Technical issues on small-scale pond culture

Technical subject		Grade of practice
Pond preparation and water management	Pour / Drain water	Percentage of farmers who poured and drained pond water by pumping is 97% in Pursat, 79% in Siem Reap. But only 66% of farmers poured and drained pond water by pumping in Battambang.
	Dusting lime to exterminate predator	Percentage of farmers who carried out disinfection and exterminated predator by dusting lime powder is 97% in Pursat, 83% in Siem Reap. But only 56% of farmers carried out disinfection and exterminated predator by dusting lime powder in Battambang.

	Installation of screen net	80% of farmers installed screen net surrounding the fish pond in Pursat. But percentage of farmers who installed screen net is only 48% in Siem Reap, 45% in Battambang respectively. Grade of practice installing net for protection is low in Siem Reap and in Battambang in comparing with Pursat.
	Fertilization of pond	Most fish farmers used livestock animal manures, especially cow manures, as natural fertilizers for fishponds. Only limited number of them (10 - 20 %) used chemical fertilizers, such as Urea and DAP (Diammonium Phosphate). In terms of manure pits recommended by farmer-to-farmer trainings, 92 % of fish farmers prepared manure pits beside fish ponds in Pursat. However, only 53 % and 25 % of them prepared manure pits in Siem Reap and Battambang Provinces.

4.2 Conduct technical improvement at the Toek Vil Station. (Activity 1-2)

(1) Facility Rehabilitation Works at Toek-Vil Center

At Teok Vil Seed Production Research Center rehabilitated in the first fiscal year, some improper parts and problems were found. The following supplementary rehabilitation works were conducted in the first half of the year.

1) Repair of Cracks and Collapses of Nursery Pond Banks

The land around the nursery ponds, constructed on the first year's rehabilitation work, is very fragile because of gravel-like ground. The strength of banks of nursery ponds was not enough, because the rehabilitation work hardened only surface layers of pond banks by clay soil after leveling the bank sides. In a rainy season since April, the pond banks had a lot of cracks and started to collapse.

As the result of a discussion on proper measures with Fisheries Administration and Siem Reap provincial cantonment office, it is necessary to repair 6 ponds of 9 nursery ponds urgently. The project decided to pile sand bags filled with clay soil (about 800 bags) to repair and reinforce the pond banks. The supplementary work repaired some large collapses of pond banks to remove serious effects to fish production activities at the center. However, because small cracks and collapses are still found at present, the project will take proper measures to repair those cracks and collapses continuously.

2) Measures to the Quality of Underground Water

The underground water dug by the rehabilitation work is acid (pH 5.4 - 5.7) and includes high iron content at 1.0 mg/L. Because the acidity of nursery water lowers the hatching rate of fertilization eggs and the survival rate of fish larva, it may disturb the activities of demonstration

experiments on seed production in the future. Therefore, the project decided to make another system of water intake and combine different intake waters for the purpose.

The canal from the West Barai, flowing in front of the center, has abundant water volume around the year. The canal water is suitable for fish rearing because indicating around pH 7. The supplementary rehabilitation work was conducted to set an engine pump near the entrance of the center and water pipes (diameter 80 mm) from the canal to a new elevated tank on the laboratory / office building (total distance: about 110 m).

3) Setting of Water Pipes to Existing Seed Production Ponds, Broodstock Ponds, and Nursery Ponds

Existing ponds in Teok Vil Center depended on gravity water intake from the canal. Pond water could be discarded by pumps; however, it is hard to control water intake to ponds at any necessary time. It caused difficulties in removing predator fish in ponds and improving the quality of pond bottom soil by spraying lime. Especially, in the process of seed production, it also caused high mortality of fish larva.

To solve those difficulties, another water intake system was newly established to supply water directly from the pump taking water from the canal to earthen ponds in the center. PVC pipes were connected with the pump and put under the grounds to supply intake water to all ponds in the center. Each pond has a valve of water intake pipe to supply pumped-up fresh water and control the water level in the ponds at any time.

4) Aeration to Hatching Tanks and a Wet Laboratory

Commonly, when setting an aeration supply system from air blowers to hatching tanks, aeration hoses are put around wooden or PVC-made frames, which are placed at reachable height at hands. However, the roof of hatchery spaces is too high from the ground (3 m high). Therefore, a new aeration frame fixed by the roof and columns was placed at a medium point (2 m high) to put aeration hoses at proper height. The arrangement enables the aeration to reach all circular water tanks.

5) Work for Public Electricity Supply

In term of the electric work at Teok Vil Center, the following problems have been caused since last year.

Background of the electricity supply problem

- According to the Minutes of Discussion concluded at the project preparatory study in October 2011 (Section 6-3, Annex IV), the Cambodia side takes the responsibility of necessary electric supply for the operation of Teok Vil Center. As understanding this engagement, the Cambodia side has paid the electricity cost (monthly US\$ 55 - 60) since the beginning of the project, March 2011.

- The electricity supply to Teok Vil Center currently comes from Private Line. However, the cost of Private Line is much higher than Public Line. In August 2011, the director of Siem Reap Cantonment Office and the director of Aquaculture Development Department consulted Japanese experts to switch an electricity supply source to a low-cost public line, EDC (Electricité du Cambodia).
- After taking the quotation of a work for switching electricity sources, the project team consulted an officer in charge in JICA office to regard the work as a part of the first year's rehabilitation work in Teok Vil Center. As planning the rehabilitation work in full specification by its maximum budget, US\$ 50,000, the project gave up to it finally. Though considering a possibility to conduct the work for wiring electricity lines by spending 'General Management Cost', the project team decided to reconsider that matter after the completion of rehabilitation work.
- In December 2011, the electricity supply of Private Line was suddenly stopped in the region by its profitability and maintenance problems. At the time, Teok Vil Center made a request to Fisheries Administration for additional budget for electricity supply works. However, because the requested budget had not been allocated, the electricity supply to the center was still stopped in May 2012. Because the electricity supply is dispensable to operate the center facilities, it is possible to affect the project activities seriously. Finally, the Director of Fisheries Administration made a special request to JICA office in June 2012.

Based on the background above-mentioned, the project team discussed with JICA again in June 2012. Finally, both sides concluded that necessary materials and construction costs were prepared from General Management Cost to promote the work for wiring electricity lines.

After the project procured necessary materials, such as wooden poles, wires, and switch boards, at the end of June, the construction work was completed in 4 days. Additionally, the electricity wires were laid on about 20 wooden poles at about 800m distance between an EDC electricity power gage and the center. The electricity from Public Line started to be supplied to the center on July 2. Total construction cost is about US\$ 2,000.

Comparing with the past electricity cost, R 1,470 /kw (before November 2011), the Teok Vil Center can use a lower cost electricity supply, R 820 /kw, in the future. It contributes to the reduction of the operational cost of the center.

6) Extension of New Type Hatching Tanks

After the rehabilitation work, it was found that the hatching tanks of Teok Vil Center are not appropriate for experimental studies of technical verification, because their water volumes and shapes were different from those of local seed producers. Therefore, the project decided to repair the shape and size of the hatching tanks at Teok Vil Center. The repair work was carried out in December 2012, and completed new hatching tanks (3 ton of water volume) which have similar

volumes of the tanks of local seed producers. The new hatching tank has a semi-circular bottom and a race-way structure by gentle water flows and aeration from the bottom. In the next season, the project plans to utilize the new tanks to study a survival condition of fish larva at initial stage, up to 3 days after hatching, for all target species, and consider technical issues which local seed producers face.

(2) Technical improvement at the Toek Vil station

(2) – 1 Technical Improvement at Toek-Vil center in 1st year (FY 2011)

The project carries out) technical improvement experiment in Tak-Vil center and ii) pilot programs at actual farms simultaneously as technical improvement activities. Since the facility rehabilitation of Tak-Vil center will be made in the second half of this fiscal year, a project expert started only broodstock production as a preparation work of technical experiment starting from the next year by utilizing a part of the existing facilities. In addition, the expert also visited local fish farmers and seed producers to arrange technical issues of fish culture.

- Exchange of broodstock

The interview with local staffs identified some problems of broodstock production. Especially, most existing broodstock are still small by shortage of nutrition in long term, even though their ages are high. In addition, the broodstock has not been exchanged in long term. Those problems gave negative effects to fertilization rate, hatching rate and survival rate of fish larva. To solve those problems, 288 fish of new broodstock in four species (sliver barb, silver carp, common carp and murigal) were provided at Bati center or private fish farms and carried to Tak-Vil center. New broodstock are bigger than the existing broodstock in the center. Therefore, seed production experiments are in sight for the next year.

- Rehabilitation and improvement of hatchery facilities

The actual rehabilitation work will be carried out in the second half of this fiscal year. In advance of the rehabilitation works, concrete-made circular hatching tanks, existing in the hatchery, were rehabilitated by handiworks, such as smoothing their bottoms, setting aeration devices, tiling their internal walls and setting drainage strainers at their centers. It is because those tanks are supplementary facilities in the hatchery.

- Underground water for fish seed production

Since a water intake device was improved from a hand pump to a motor pump, underground water always flows for hatching works in the hatchery. The survival rate of hatched fish larva was very low by high acidity (pH 5.6) of the underground water. However, by mixing underground water with lime to neutralize its pH, more fish larva could survive in tanks. The underground water of a current well is acid, because its depth is too shallow. Therefore, in the rehabilitation work at

the second half of this fiscal year, the project team suggests to dig a well up to a sufficient depth to take the neutral underground water (pH 7).

- Hatching experiments of silver barb and local catfish*

Hatching experiments were carried out in silver barb and local catfish. The experiments tried to verify actual hatching rates and survival rates after hatching by changing aeration volumes and water qualities. As a result, the fish larva of both species cannot survive in water without pH controls. However, if its pH is neutralized by lime and the strength of aeration is weak at hatching, fish larva of both species could hatch and survive without serious problems.

*Local Catfish : Catfish is not target fish in the project. However, in the target areas of Phase II, a lot of fish seed producers hope to produce catfish seeds, and strongly request to improve their technical skills of catfish seed production. The Fisheries Administration considers improving technical skills to meet their demands of catfish seeds. In fact, the seed production of other fish species promotes the diversification of fish products of fish farmers, and contributes to strengthening their business management by expansion of local customers. Moreover, it also contributes to establishing a stable supply of multi-species fish seeds for fish grow-out farmers in local areas. According to those actual situations, similarly in Phase I, the project will make only technical supports to seed production of other fish species like catfish on the condition that the technical improvement activities of target fish species won't be disturbed.

- Supplementary experiment of cholera and water flea culture

To improve technical skills of seed production in the next fiscal year, the supplementary experiments of cholera and water flea culture were carried out as important feeds for fish larva at initial stages. The experiments tried to verify the efficiencies of their current culture methods by changing areas, water quality and soil quality.

(2) – 2 Technical Improvement at Toek-Vil center in 2nd year (FY 2012)

The experimental studies for seed production above-mentioned also include highly difficult techniques for seed producers of Phase 2 to practice at their fish farms. Moreover, it is necessary to consider and arrange technical difficulties of seed production by each target fish species. At present, the project carries out experimental studies of applied techniques to solve technical difficulties at Teok Vil Center. After arranging the results of experimental studies as a draft of technical manual, the project will start on-site verification experiments. At the first half of this year, the project conducted some technical experiments on seed production at Teok Vil Center as follows.

Table 4-4 Technical Experiment on Seed Production at Teok Vil station

Target Fish Species	Issue	Items of Verification Experiment
Silver Bar Silver Carp Indian Carp	Spawning	<ul style="list-style-type: none"> ● Effect on spawning by hormone application - Compare effects by several kinds of hormones - Compare effects by expiration date and brand (origin)

(Murgal)		<p>countries)</p> <ul style="list-style-type: none"> - Compare effects by hormone injection methods and volume of injected hormone. - Compare effects on spawning interval time and quantity of spawned eggs (by broodstock size) by practices indicated above. ● Effect on spawning by different designs of spawning tanks (shape and volume) ● Effect on spawning by water quality (areolation, water change rate, water flows)
	Hatching	<ul style="list-style-type: none"> ● Estimation of proper volumes of stocked eggs by shape of hatching tanks and stocking densities of fertilization eggs in tanks ● Causes of mass death at hatching stage by observation (water change rate, water flow, and removal timing and method of dead or unfertilized eggs)
Tilapia	Mono-sex (all male)	<ul style="list-style-type: none"> ● Arrangement of feeds mixed with hormone - Consideration of proper feed types (local feed materials, commercial crumble compounded feeds) - Making trails of proper feeds by existing skills ● Collection method of tilapia seeds ● Culture environment (comparison of effective feeding conditions) ● Feeding methods (feeding frequency, amount of feeds)

(2) – 3 Technical Improvement at Toek-Vil center in 3rd year (FY 2013)

As a prior step on technical verification, in order to study survival rates of fish seeds in accordance with standard methods of the project, fish seeds were cultured at nursery ponds (outdoor ponds) until day 49 - 108 after hatching, and the survival fish seeds were counted. As a result, the survival rates of silver barb and murgal were the lowest, less than 1 %. Afterward, in technical experiences on the process of experiments, it is found that the following points on fish larva rearing are necessary for increasing the initial survival rates.

- a. Release fish larva at the yolk absorption stage (parallel moving and starting of feeding)
- b. Correspond fish larva stock on 4th day after fertilizing ponds by chicken manures (mass growth of rotifers under the environment of Teok Vil center)
- c. Collect aquatic insects, which feed on amount of fish larva, on water surface by lighting at night on 2nd and 3rd day after stoking fish larva, and continue removing them by scoop nets in about 10 days.

These results were reflected to technical manual.

4.3 Conduct verification trials at seed and fish farms. (Activity 1-3)

The project team visited some fish seed producers in Siem Reap, Battambang and Pursat. Almost target seed producers of the project for this year had sufficient experiences of seed production, and certain technical information was well shared in collaboration of vertical lines (cantonment fisheries offices) and horizontal lines (local fish farmers). However, in comparison with seed producers of target provinces of Phase I, the productivities of seed producers of Phase II are lower. Moreover, the technical levels of seed producers largely vary, and the standard seed production methods recommended in Phase I have not been widely diffused. The following issues are identified at some local seed producers.

(1) Survey for fish growth to estimate productivity of pond by fish sampling

Fish sampling surveys were conducted to estimate the productivity of fish pond in Siem Reap. 6 fish farmers were selected out of grow-out farmers participated at farmers to farmer's trainings, who stocked fish seeds in their ponds in August 2011. At selected fish farms, the project team used seine nets to catch fishes in ponds with farmers, counted numbers of cultured fish by species, and measured their body weights. The rate of fish capture in ponds was estimated by pond characteristics, such as size, shape, depth and obstacle objects in the pond as well as farmer's motivation. The sampling results showed good growth rate of cultured fish at private fish ponds. The body weight of captured fish, such as tilapia, silver barb, common carp and Indian carp reached 200 - 300 g per fish.

The production of grow-out culture was estimated to be 36.6 - 43.9 kg / 100 m² on Farm 1, 20.3 - 27.1 kg / 100 m² on Farm 2, and 6.7 - 13.5 kg / 100 m² on Farm 3 respectively. The figures of fish production vary, because of a variety of pond condition and management skills of farmers. Beginner's fish farmers need to improve their pond management skills.

(2) Model Farms for Rice Fish Culture

Rice-cum fish culture is an effective method to increase both rice production and fish production. Productivity per hector is improved by culturing fish in rice field at same time. However in Cambodia most of farmers in rural area do not recognize well its effectiveness yet. Thus FAIEX -2 aims to establish demonstration farm of rice-cum fish to show and promote it to other fish farmers as well as to rice producers.

Throughout this program the data of production regarding rice and fish will be collected respectively to verify improving factor.

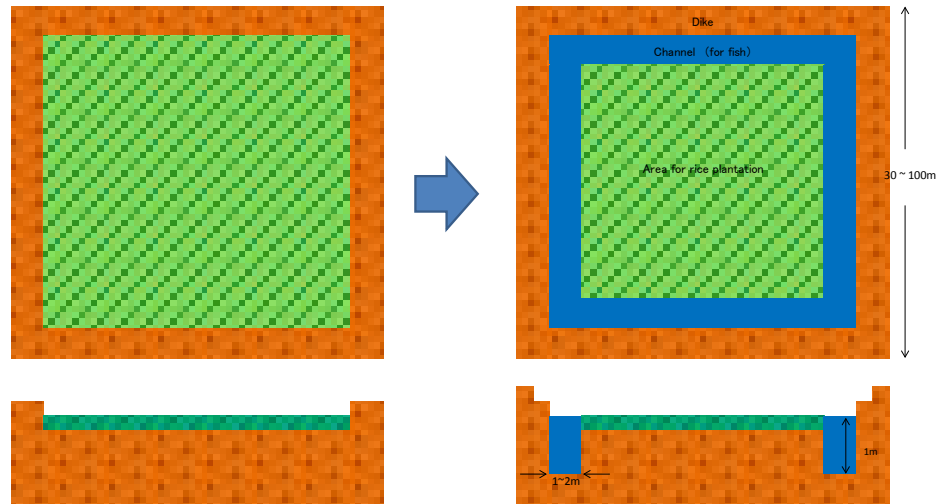


Figure 4-1 Ditch / Canal Designs of Rice Fish Culture

(2) – 1 Establishment of model farms for rice fish culture (2012)

There are few practice cases of rice fish culture at the target areas. The project planned to establish 5 demonstration farms of rice fish culture at each target province to collect production data per areas this year. At the same time, they will promote the method of rice fish culture to local farmers. The project conducted field surveys to core farmers and grow-out famers to select 17 sites (5 in Battambang, 6 in Pursat, and 6 in Siem Reap) as candidates of demonstration farms, and finalized proper canal designs in rice fields, digging methods, and schedule of fish stocking.

Theoretically, rice fish culture promotes to set ditches / canals at parts of rice fields to keep a certain depth in pond water, release fish seeds in rice fields, and raise fish with feeding natural organisms grown in rice fields. According to those basic concepts of rice fish culture, the project promoted to dig ditches or canals in rice fields of local farmers. There are various designs of ditches / canals for rice fish culture. As indicated in Figure 4, fish ditches / canals were dug around the edges of rice fields, because of easy construction work and maintenance.

The necessary area of a rice field is determined to be 0.5 - 1.0 ha. The area of ditches and canals accounts for about 10 % (5 - 15 %) of paddy field area. The depth of ditches and canals is 0.8 - 1.0 m. In practice, according to the shapes of rice fields, water supply condition, and famers' opinions to land use, the designs, depths, and areas of ditches and canals were flexibly arranged.

Achievement in Fiscal Year 2012

At the middle of July 2012, when almost completing the selection of candidate sites, the project proceeded to dig cannels and stock fish seeds in rice fields. In addition, in case of the rice fields where water had been already filled and rice seeds had been planted, it is difficult to dig cannels in that period. Therefore, after December 2012, when rice harvest has been finished, the project will dig cannels to prepare stocking fish seeds of next season.

The implementation result in each target province is as follow.

Battambang Province

In fiscal year 2012, in Battambang province, 3 sites of total 5 sites had completed digging cannel and stocking fish seeds. In these 3 sites, the share of cannel areas in rice fields is 5.1 - 8.9 %. Total number of stocked fish seeds is 3,000 - 7,000. The fish stocking density in rice fields is 0.25 - 1.0 fish per m². After lowering water level in dry season, all 3 sites continued culturing grown-out fish at water cannel (fish pools), and planned to harvest them in the period between March and May. The remaining 2 sites dug water cannel in January to February 2013 and prepared to stock fish seeds for next season.

Table 4-5 Result of 17 Sites of Model Farms for Rice Fish Culture (Fiscal Year 2012)

Province	Name of farm	Commune	Rice paddy area			Digging	Stocking fish			
			Total area (m ²)	Area of water (m ²)	% of water area	Situation	Situation	Number (species)	Stocking density (head/m ²) in total area / in water area	
Battambang	Phal Veasna	Anlung Run	10,425 (100mX95m)+(18.5mX50m)	925 (18.5m X 50m)	8.9%	Completed 6-Aug	Completed 21-Sep	4,000 (SB:2000, TL:1500, CC:500)	0.38 1.00	4.3 13.3
	Choumm Thin	Ou Mal	3,003 ((52m+39m)X66)/2	225 (39m+70.5m+52m+64m) X 1m	7.5%	Completed 6-Aug	Completed	3,000 (SB:1000, TL:1000, CC:500, IC:500)	1.00	13.3
	Lem Pakdewah	Chery	20,000	1,027 ((100mX3)+235m+150m) X 1.5m	5.1%	Completed 17-Aug	Completed	5,000 (SB:1500, TL:1500, CC:1000, IC:1000)	0.25	4.9
	Mao Pek	Bansay Treng	11,550 110mX105m	736.5 ((100m+105m) X 1.5m)+((51.5+52)X4m)	6.4%	Completed 11-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
	Suon Phan	Ou Ta Ki	43,175 275mX157m	490	1.1%	Completed 25-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
Pursat	Chen Kunthy	Trapeang chomg	1,431	159 (29.7m + 16.8m + 26m + 51.4 + 35.3m) X 1m	11.1%	Completed 6-Aug	Completed 4-Nov	1,680 (SB:843, TL:590, IC:253)	1.17	10.6
	Ouch Sen	Trapeang chomg	1,512 28mX54m	161 (14m + 16.5m + 10.5m + 36m + 28m + 35m + 21m)	10.6%	Completed 21-Aug	Completed 27-Oct	1,200 (SB:600, TL:420, IC:180)	0.79	7.5
	Phon Chea	Khmar Tortoeng	3,864 28mX138m	332 (138m + 28m) X 1m X 2sides	8.6%	Completed 28-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
	Pat Kheum	Chomraeun Phal	3,690 41mX90m	187	5.1%	Completed 28-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
	Norm On	Khna Toteung	1,680 28mX60m	168 (28m + 57m + 6m + 32m + 15m + 30m)	10.0%	Completed 21-Aug	Completed 13-Oct.and 18	1,683 (SB:842, TL:589, IC&CC:252)	1.00	10.0
	Suon Seng (Duk Vanny)	Boeng Kantuot	1,806	243 111m+132m	13.5%	Completed 5-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
Siem Reap	Khem Peov (Ms)	Sangvaey	2,700 52mX52m	211 (52.5m + 52 + 51 + 55) X 1m	7.8%	Completed 10-Aug	Completed 9-Sep,2012	3,000 (SB:1000, TL:1000, IC:1000)	1.11	14.3
	Mao Lanh (Limh Ie)	Som Rong	9,000 164mX55m	445 (55m + 164m + 24m + 20.5m + 164m + 18)	4.9%	Completed 13-Aug	Completed 16-Aug,2012	7,000 (SB:2000, TL:2000, CC&IC:2000,CL:1000)	0.78	15.7
	Penh Puth	Tbeng	3,250	293 (55m + 44m + 65m + 36.5m) X1.5m	9.0%	Completed 13-Aug	Completed 22-Nov,2012	4000 (SB:1000, TL:2000, SC:1000)	1.23	13.7
	Puok Chhorn	Spean Tnot	14,250 150mX95m			Completed 11-Feb	Not stocked in 2012, because rainy season has already passed when the channel prepared.			
	Ouk Kimbong	Koovey Riel	1,036 37mX28m	138 (45.6m + 28m + 36m + 28m)	13.3%	Completed 10-Sep	Completed 20-Oct,2012	1,500 (SB:800, TL:500, CC:200)	1.45	10.9
	New Noeum	Svay Sao	5,040 105mX48m	228 (76.7m + 48.5m + 49.8m + 53m)	4.5%	Completed 10-Sep	Completed 27-Sep,2012	1,600 (TL:1000, SC:100, CC:500)	0.32	7.0

Pursat Province

In Pursat province, 3 sites of total 6 sites had completed digging cannel and stocking fish seeds. In these 3 sites, the share of cannel areas in rice fields is 10.0 - 11.1 %. Total number of stocked fish seeds is 1,200 - 1,700. The fish stocking density in rice fields is 0.79 - 1.17 fish per m². Each

site manages mixed species culture by silver barb, tilapia, common carp and murgal. After lowering water level in dry season, all 3 sites continued culturing grown-out fish at water cannel (fish pools), and planned to harvest them in March. The remaining 3 sites dug water cannel in January to February 2013 and prepared to stock fish seeds for next season.

Siem Reap Province

In Siem Reap province, 5 sites of total 6 sites had completed digging cannel and stocking fish seeds. In these 5 sites, the share of cannel areas in rice fields is 7.0 - 15.7 %. Total number of stocked fish seeds is 1,500 - 7,000. The fish stocking density in rice fields is 0.32 - 1.45 fish per m². Each site manages mixed species culture by silver barb, tilapia, common carp and murgal. 1 site of 5 sites (Mr. Neu Noeum) lost many fish seeds by a large flow of muddy water at rice fields from high flow of river water. Another site (Mr. Penh Puth) restocked fish seeds, because many fish seeds escaped from holes of pond banks. At 1 site where could not stock fish seeds in this season, after harvesting rice, water cannel were dug in January to February 2013 and prepared to stock fish seeds for next season.

After lowering water level in dry season, all 3 sites continued culturing grown-out fish at water cannel (fish pools), and planned to harvest them in March. The remaining 3 sites

In all target provinces, most farmers stocking fish seeds at paddy fields told their impressions such as “rice harvest is increased before”, “the use of agriculture chemicals and chemical fertilizers are reduced”, “weeds are not grown out” and etc. It indicates some secondary effects on rice farming by the introduction of rice fish culture.

● Explanation Meeting on Rice Fish Culture

An explanation meeting on rice fish culture was held for 30 core farmers of the project on September 13, 2012. The explanation meeting spent a half day in the brush-up training on seed production, held at Teok Vil center on September 10 -14, 2012. In addition to 30 core farmers participating in the training from 3 target provinces, common seed producers of Battambang and Siem Reap provinces, and local staffs of World Fish Center who visited there to observe field activities of FAIEX 2 project, also joined the meeting. The meeting participants visited 2 model farms of rice fish culture, Ms. Khem Peov at Domry Chhlong village (Sang Vaeuy commune, Chi Kreng district) and Mr. Mao Lanh (Limh Ie) at Svay Chrum village (Som Rong commune, Saut Nikum district). Then, the project counterparts explained the principle of rice fish culture, shapes of water cannel and ponds, selection of fish seeds, timing of fish stock, etc. They also visited a fish farm of Ms. Khem Peov at Domry Chhlong village to observe the scene of fish seed stocking.

(2) – 2 Establishment of model farms for rice fish culture (2013)

The project selected 17 rice fields of common farmers and seed producers (5 sites in Battambang, 6 sites in Pursat, and 6 sites in Siem Reap) as demonstration farms of rice-fish culture in the second year, and promoted digging canals in rice fields and stocking fish seeds. As a result, the works for digging canals and stocking of fish seeds were completed at 11 sites, and stocked fish are continuously cultured at rice fields at present. Most farmers, who stocked fish seed at rice fields, told their positive impression about rice-fish culture, such as “rice harvest much increases than the past”, “the amounts of insecticide and chemical fertilizers for rice farming are drastically decreased”, and “little weed grow at rice field”. It indicates secondary effects on rice farming. The number of farmers’ visitors to the demonstration farms of rice-fish culture is increasing for their observing farming activities, and they are gradually recognized to the public. In order to accelerate and maintain the current extension activities, in the third year, the project is continuing to monitor the activities of demonstration farms of rice-fish culture, which were established in the second year, to collect necessary data and make a guide book and extension video materials of rice-fish culture. In addition, the project considered a proper number of demonstration farms in each target province with counterparts to extend rice-fish culture equally at all target communes.

As a result of the consideration regarding the proper number of rice-cum fish demonstration farm, the project aimed to set 10 to 15 new demonstration farms in target area. Following same criteria as 2012, the project conducted the survey to select new model site.

Demonstration Farm on Rice-cum fish culture ~Criteria to select model farm~

- Owing rice paddy field (suitable dimension is from 0.5ha to 2ha)
- The rice field is filled with water at least for 4 consecutive months a year
- The rice field is located near from residence to watch for 24 hours (for theft prevention)
- The rice field is divided (blocked) from other rice fields or public water area by the dike which is enough strong and enough high.
- Water level in rice field can be controlled by pouring or draining water.
- The farmer is interested in rice-cum fish culture as well as has the willingness to dig the channel or to expand the space for fish in rice field in accordance with instruction from the project.
- The farmer can provide all information regarding to rice and fish production to the project.

Survey to select model site was conducted from June to July 2013, consequently the following 12 sites were selected. Channel digging (= fish refuge space), and rice planting and fish release were completed in newly selected model site except three sites in Pursat.

Table 4-6 Demonstration Farm on Rice-cum fish culture in 2013

Province	Name of farm	Commune	Rice paddy area				Digging Situation	Stocking fish					calculation		
			Total area (m ²)	Paddy area (m ²)	Area of water (m ²)	% of water area		Number	species CC : SB :Ti	Stocking density (head/m ²) in total area / in water area		in paddy area (head /m ²)	in water area (head /m ²)		
2013															
Battambang	KEO Sim (Grow-out farmer in 2011)	On Long Ron	10,960 7800+3160	10,730	230 (60+63+63+44)x1	2.1%	Completed June, 2013	1,150	575	575	0	0.10	5.0	5.0 x 0%	5.0
	OM Khoeun (Core farmer in 2013)	Mok Rea	5,580 90*62	5,276	304 (90+90+62+62)x1	5.4%	Completed June, 2013	2,839	1,420	1,420	0	0.51	9.3	5.0 x 5%	5.0
			3,360 120*28	3,064	296 (120+120+28+28)x1	8.8%	Completed June, 2013	1,480	740	740	0	0.44	5.0	5.0 x 0%	5.0
	YAM Sophon Na (Grow-out farmer in 2011)	Au Mal	1,695 (63*15)+(30*25)	1,532	163 (63+30+25+45) X 1	9.6%	Completed July, 2013	1,581	949	632	0	0.93	9.7	5.0 x 10%	5.0
	CHHIN Khom (Core farmer in 2013)	Prey Svay	4,418 (85.5x54.5)2)+(58x72)2	4,148	270 (85.5+58+72+54.5) X 1	6.1%	Completed July, 2013	2,387	955	1,432	0	0.54	8.8	5.0 x 5%	5.0
Pursat	CHEA ChamNan (Core farmer in 2013)	Leach	3,700 100x37	3,439	261 (100+37+37) X 1.5	7.1%		3,025	1,210	1,815	0	0.82	11.6	5.0 x 10%	5.0
	CHEA Cheng (Core farmer in 2013)	Pitas Rung	3,325 50x66.5	3,051	275 66.5+66.5+50) X 1.5	8.3%		2,898	1,159	1,739	0	0.87	10.6	5.0 x 10%	5.0
	OUM Sam (Core farmer in 2013)	Ou Tapaung	2,268 (27*36)*72)2	2,032	236 (23+36+72+26.5) X 1.5	10.4%	Completed July, 2013	3,213	1,607	1,607	0	1.42	13.6	5.0 x 20%	5.0
	KORM Thiv (Core farmer in 2013)	Roleap	1,170 39x30	963	207 (30+30+39+39) X 1.5	17.7%	Completed July, 2013	1,998	799	1,199	0	1.71	9.7	5.0 x 20%	5.0
	SREI Monynal (Core farmer in 2012)	Thnaut Chom	910 35x26	780	131 (35+26+26) X 1.5	14.3%		1,432	859	573	0	1.57	11.0	5.0 x 20%	5.0
	Siem Reap	Chhorn Chheum	Daun Leng	3,314 (47.5x43)-(13.5x11)	3,040	274 (43+47.5+30.5+13.5+11+37)x1.5	8.3%	Completed Aug. 2013	1,369	690	690	0	0.41	5.0	5.0 x 0%
Pal Sopheak		Sranal	4,029 (49x89)-(9.5x35)	3,755	274 (49+89+15.5+9.5+35+75.5)x1	6.8%	Completed Aug. 2013	1,368	1	1	0	0.34	5.0	5.0 x 0%	5.0
Ngornng Ngoeuy		Sranal	3,351 (59x34)+(52.5x26)+(5x4)	2,757	595 (59x5.5)+(60x4.5)	17.7%	Completed Feb. 2013	2,973	1	1	0	0.89	5.0	5.0 x 0%	5.0

(2) – 3 Experiment of fish release

There is no standard so far regarding stocking density, proper fish size at stocking and fish species in case of rice-cum fish as there are many factors that possibly influence the fish growth and its survival rate. Therefore the project made a plan to conduct experimental trial in former model site (selected in 2012) in order to compare the fish growth and amount of harvest under various different conditions.

A. Site for experimental trial

Site for experimental trial should be fulfills the following criteria. Consequently 6 sites out of 17 sites were selected.

- Proper dimension of rice paddy field (If so large, difficult to collect the data. It should be less than 1ha)
- Easy to know accurate dimension and volume of channel area and rice production area
- The rice field is located near from residence to watch for 24 hours (for theft prevention)
- The rice field is divided (blocked) from other rice fields or public water area by the dike which is enough strong and enough high
- The farmer can take a date by himself to provide it to the project
- Fish will remain in the paddy field (no flooding, no escape, no steal)

B. Fish species

In the demonstration trial of 2012, plural species (Common carp, Silver barb, Tilapia, Indian carp) were stocked in certain ratio of species. According to observation of extension officers and farmers, Tilapia and Indian carp showed inferior growth compared with Common carp and Silver barb. Therefore ration of Common carp and Silver barb will be more than last year.

C. Stocking density

Theoretically, rice fish culture promotes to set ditches / canals at parts of paddy fields to keep a certain depth in pond water, release fish seeds in paddy fields, and raise fish with feeding natural organisms grown in paddy fields. Therefore fish and rice growth will be influenced from many factors and it is difficult to indicate appropriate fish stocking density. In many cases farmers or even officers determine its stocking density from their experience or trust his intuition. Thus the project will calculate several different densities by Figure 4 to be compared. Consequently we try to find out certain method in order to be applicable way showing the proper stocking density for any case.

Table 4-7 Site for experimental trial of rice-cum fish culture (2013)

Province	Name of farm	Commune	Rice paddy area				Stocking fish					calculation		
			Total area (m ²)	Paddy area (m ²)	Area of water (m ²)	% of water area	Number/Size	species CC : SB : Ti	Stocking density (head/m ²) in total area / in water area	in paddy area (head/m ²)	in water area (head/m ²)			
2012														
PS	Chen Kunthy	Trapeang chomg	1,431	1,272	159 (29.7m + 16.8m + 26m + 51.4 + 35.3m) X 1m	11.1%	2,067	1,034	1,034	0	1.44	13.0	5.0 x 20%	5.0
	Phon Chea	Khnar Tortoeng	3,864 28mX138m	3,532	332 (138m + 28m) X 1m X 2sides	8.6%	3,426	1,713	891	411	0.89	10.3	5.0 x 10%	5.0
	Ouch Sen	Trapeang chomg	1,512 28mX54m	1,351	161 (14m + 16.5m + 10.5m + 36m + 28m + 35m + 21m)	10.6%	2,156	862	1,294	0	1.43	13.4	5.0 x 20%	5.0
	Norm On	Khna Toteung	1,680 28mX60m	1,512	168 (28m + 57m + 6m + 32m + 15m + 30m)	10.0%	2,352	1,411	941	0	1.40	14.0	5.0 x 20%	5.0
BT	Choumm Thin	Ou Mal	3,003 (52m+39m)X66/2	2,778	225 (39m+70.5m+52m+64m) X 1m	7.5%	1,125	450	675	0	0.37	5.0	5.0 x 0%	5.0
SR	Khmer Peov (Ms)	Sangvayey	2,700 52mX52m	2,490	211 (52.5m + 52 + 51 + 55) X 1m	7.8%	1,053	632	421	0	0.39	5.0	5.0 x 0%	5.0

D. Harvest

Some farmers still are continuing fish rearing after cropping the rice. Farmers removed the fishes from rice paddy field to another pond or fish refuge and they will continue fish culture probably until Khmer new year. Thus harvest data will be compiled in next fiscal year.

Box 1

- Farmer : Chin Kunthy (Pursat)

He practiced rice fish culture in 2012 and 2013. He stocked small size of fingerling of 3 fish species, Silver barb, Tilapia, Indian carp in 2012. And He stocked a little larger size of fingerling of 2 fish species, Silver barb, Tilapia, Common carp in 2013. He got productivity improved.

Amount of harvest from paddy field

Year	before 2011	2012	2013
Number of stocking (head) * Stocking ratio		1,680 (SB:843, TL:590, IC:253)	2,068 (SB:1034, CC:1034)
Approx. fish size at stocking		1-3cm	5-8cm
Day of stocking fish		2012/11/4	2013/8/1
Period of culturing		4 months	3 months
Estimated fish harvest		50kg	150kg
Rice	Rice planting area	1300 m ²	1300 m ²
	Harvest in 4 months	150 kg	300 kg

*SB : Silver barb, TL: Tilapia, IC: Indian carp, CC: Common carp

Box 2

- Farmer : Mao Lanh (Siem Reap)

He practiced rice fish culture in 2012. He stocked 7000 fingerling of 3 fish species, (Silver barb:2000, Tilapia:2000, Indian carp and Common carp:2000, Walking catfish:1000) in 16 August 2012. And He also planted rice 20 July. He harvested at least 400kg of fish as well as got rice production improved with less chemical using.

Before → Fertilizer 3 times /year → Rice cultivation 4 months →
Harvesting : 2500kg
2012 → Fertilizer only once /year → Rice cultivation 4 months →
Harvesting : 3300kg + 400kg fish

4.4 Develop technical manuals adaptive to the target provinces. (Activity 1-4)

Technical data and information collected throughout the series of verification trials are compiled to develop technical manuals.

(1) Technical manual on seed production and fish culture

- Maturation

Regarding the time of first maturation, only silver barb and common carp both in the male and female mature at approximately 6-7 months after stocking juveniles in the grow-out pond. The sizes of common carp and silver barb are about 80g and 140g in body weight respectively. Male Mrigal matures at 7 months after stocking juvenile. Female however have not matured yet, and then matures at 19 months with the body weight of 250g. The fact is that it is recommended to use broodstock reared at least for 19 months in the pond, because the size is enough to use as broodstock. It is necessary that silver carp however need one year more (at third year) for the maturation.

- Broodstock management (Pond management)

It is necessary that they should be reared in earthen pond with the size of more than 200 m² and the depth of at least 1.0m. Regarding pond arrangement of species, it is necessary to prepare two-individual ponds for male and female Silver barb due to lay eggs in case of mix culture. Concerning other species such as Silver carp, Mrigal and Common carp, it is possible to prepare two ponds for mono-culture of each male and female. Stocking density must be approximately 0.5kg/m². It is better to manage regularly change about 30% of pond water once monthly for the environmental improvement of pond .

- Broodstock management (Feeding management)

Regarding feeding management, formulated diet is fed to brood fish through a year. One is diet contained 30 % protein fed from November to March for maturing stage of gametes, and from April to September for mature stage of gametes. Another is diet containing 20% fed on October-November for resting stage of gametes to recover fish condition after spawning trials. All materials for formulated diet are available locally. It is recommended that feeding rate should be approximately 2.0% of total body weigh in each pond.

- Broodstock preparation for spawning trials

- Selection

At first, it is necessary to separate male and female fish for the spawning trials. During spawning season, berried female fish shows abdomen full of egg. Male fish has running milt from genital pore. Another way, male fish show the appearance on the rough surface of pectoral fin. On the other hand, female fish has smooth surface of pectoral fin.

Regarding female fish, it should be select the fish with soft and swollen abdomen by the hand pressing. Male shows running milt by the light hand pressing near portion of genital pore. Of cause, they are not wound and should be look healthy.

➤ Stocking rate between male and female

Concerning stocking of broodstock in the spawning tank, it is important that a total weight of male and female fish should be same. In case of Silver barb and Common carp, the number of male fish is more than female, because female fish is bigger than male. On the other hand, Mrigal and Silver carp are almost same number and body weight between male and female.

● Hormone

Hormone injection is necessary for spawning induction of carps. In Cambodia, Suprefact/Molilium-M and HCG are well used as famous hormone, the former can purchase from Thailand, while HCG can be purchase from Vietnam. Superfact/Motilium-M is all-round hormone for the spawning induction of carps, while use of HCG is limited, only it is known as the hormone for the spawning induction of catfish and silver carp.

● Spawning Tanks

Carps do not select any shape of tank whether it is circle, rectangular or oval in shape for their spawning activities and lay eggs. Spawning trials are usually conducted in 2-5 m³ tanks with 40-50cm depth water.

● Water source

Water source is from pond, reservoir, grand water and tap water. The pH of water should be more than 7.0, because spawned egg does not hatch if pH is acidic like less than 5.0. It is necessary that small amount of flowing water more or less 20L/min should be set up for stimulation making spawning induction. Circular tank clearly creates the water current along the wall, however rectangular tank directly make the current from inlet side to outlet side. Two-three aeration is set up on the bottom of tank for making float up of layed eggs.

● Accommodation of fertilized eggs

Drifting spawned eggs are collected by large scope net made from fine-mesh close. Adhesive eggs of only common carp are collected from egg collector. The accommodation of floating and adhesive eggs into incubation tank s depends on the specie. An incubation tanks is 300L-tank with 1.2m diameter and should be round shape with moderate water supply from lower position of tank with center outlet, so that eggs are stir with swirling around the wall of tank. In case of Silver barb, Mrigal and Silver carp eggs accommodate 1.3L/100L-water, 1.0L/100L-water, and 0.6L/100L-water respectively.

● Management of fertilized eggs

Supply of continuous water and removing contaminated materials are most important for the management of egg incubation. Decomposition materials consisting of unfertilized egg and egg membrane after hatching are one of the main causes. Countermeasure of larval mortality is to remove decomposition materials frequently using stick with brash, and continue moderate water supply with running water

It is recommended that the exchange rate of water should be more than 10L per minutes and checking of water current and exchange rate of water should be checked every time until releasing fry to the nursery pond. Fertilized eggs distribute bottom layer of incubator, while unfertilized egg

float in upper layer. Therefore air ration system is necessary to assist to float them up and also supply oxygen. Cause of mortality after hatching infer from water pollution.

- Feeding management at fingering nursing

Feeding start to scatter wet type of fine fish meal (50g x 4times: 0800, 1100, 1330, 1700/ day /100 m²) and fine rice bran (50g x 4times: 0800, 1100, 1330, 1700/ day/ 100m²) to the pond for 20 days. It is expected that this scattering ingredients mean additional fertilization for the pond water and same time feed for fish larvae.

From 21 days old larvae, feeding method changes from scattering to tray method and it is recommended that commercial or home-made feed contented more than 20% protein is started to give larvae with the 15% of total body weight. Feed can be used whether home-made wet feed and/or commercial pellet 2 times a day.

- Harvest and transport

Harvesting should be done in the morning that water temperature is not rising yet. Feeding is stopped one day before harvesting. The seed will be cough by the seine net (6 mm mesh) according as the order. Seeds are carefully carried from the pond to the shipping place by plastic container with water, and then seeds are transferred to stocking tanks. Do not carry the seed without water by scope net due to the happening by stress mortality later. Regarding the transporting of seeds, we normally use the plastic bag (60 x100 cm; 10L water with oxygen gas), with stocking density of approximately 500 juveniles (3-5cm TL). The number of stocking fish per bag depends on the size of fish and transporting distance/ hours. Transport should be done early in the morning or late in the afternoon.

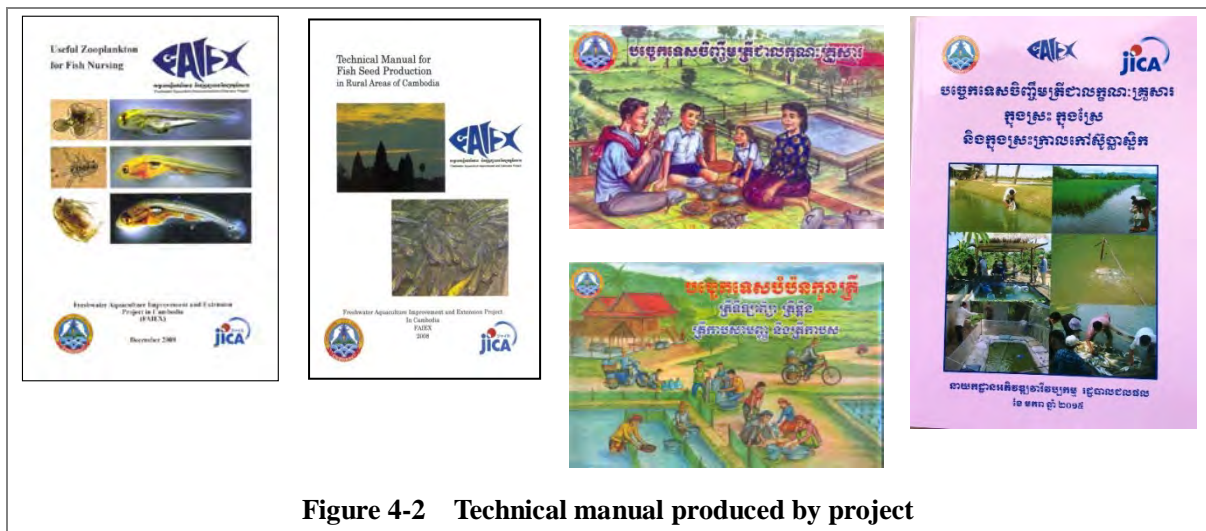


Figure 4-2 Technical manual produced by project

(2) Video material production

The project made video material for training as well as for extension purpose. Video script was prepared in May and June afterward video shooting started in July 2013. The video material covers series of activities of rice-cum fish from the channel preparation by digging soil, planting rice, releasing fish, cropping rice, until harvesting fish. After all video shooting scenes are completed in February 2014, Project team edited by adding text script of explanations and narrations. Finally 20 minutes video was finalized in March 2014, and 500 VCD copies were made.



Figure 4-3 Video material of rice fish

4.5 Indicator (Output 1)

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

Indicator

1-1. The number of the technical improvements through experiments is increased.

1-2. The degree of the technical improvement, such as growth rate and survival rate, is improved.

The number of the technical improvements through experiments was increased throughout project activities as mentioned previous output. Also the degree of the technical improvement, such as growth rate and survival rate, was improved according to observation of farmer's activity.

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

5.1 Confirm and clarify roles and functions of local extension. (Activity 2-1)

Below Figure indicates the basic extension structure of Fisheries Administration in local areas. A cantonment office is basically placed in each province. The offices take in charge of fisheries administration and technical extension in respective responsible provinces. In the target areas of this project, Siem Reap or Pursat cantonment office takes responsibility for only one province as responsible area. However, Battambang cantonment office covers 2 provinces, Battambang and Pailin Provinces.

Some division offices are placed under each cantonment office. The responsible area of each cantonment office is divided in some divisions, of which division office takes in charge. Moreover, some sangkat offices are placed under division offices. On actual area sharing of field activities, the responsible areas of local fisheries offices are not exactly determined.

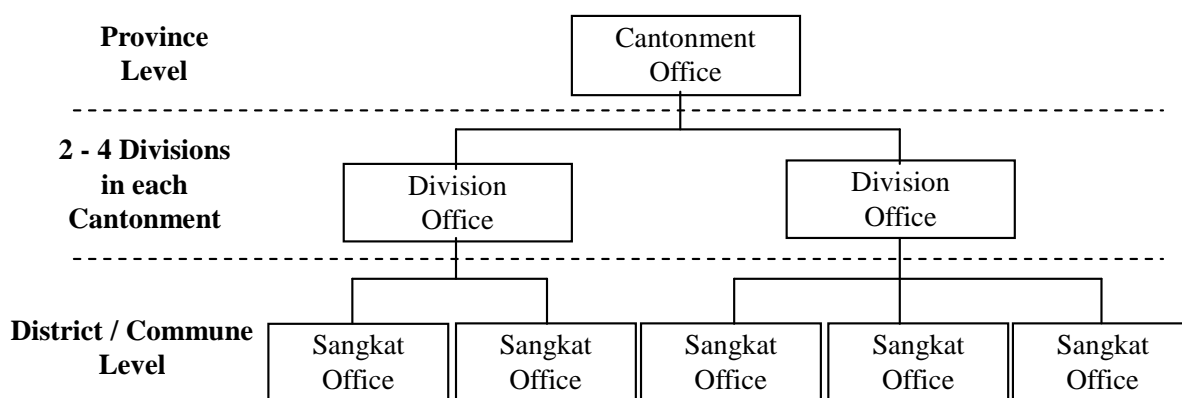


Figure 5-1 Basic Organizational Structure of Fisheries Administration in Local Areas

In order to confirm the current structure of fisheries extension in target provinces and the allocation and roles of field officers in charge of aquaculture extension, the project held mini-workshops with local extension officers at respective cantonment offices in Battambang on January 11, in Pursat on January 13, and in Siem Reap on January 20. The current allocation of field officers of Fisheries Administration in target provinces is shown in Table.

Table 5-1 Current Allocation Situation of Fisheries Offices and Officers

Target Provinces	Total Officers in Fisheries Administration (persons)	Officers in Cantonment Office (persons)	Division Office		Sangkat Office	
			Number of Offices	Number of Officers (persons)	Number of Offices	Number of Officers (persons)
Pursat	33	11	2	9	6	13
Battambang	42	13	3	8	16	21
Siem Reap	53	25	3	9	13	19
Total Provinces	128	49	8	26	35	53

Note: Since Battambang Cantonment Office covers Battambang and Pailin Provinces, the Table 1 shows the figures of offices and officers in Battambang Province only, after excluding those of Pailin Province. The figure of officers in Siem Reap Province includes 4 technical staffs of Tak Vil Station.

The current arrangements of officer allocation in target provinces are indicated in Table 1. In spite of different circumstances in provinces, on the average of 3 target provinces, 40% of local officers are allocated to cantonment office, 20% to division office, and 40% to sangkat offices. Therefore, in 3 target provinces of this project, about 80 officers, who share about 60% of total local officers, working in division and sangkat offices. They are engaged in field extension activities in fisheries sector. Those local officers are considered as ‘local extension officers’, which are indicated on the project plan.

Moreover, the mini-workshops realized that all field officers don’t have knowledge and experiences in freshwater aquaculture. There are only limited officers who have received technical trainings in freshwater aquaculture and carried out aquaculture extensions. The identified figures of aquaculture experienced officers are indicated in below Table. About 30% of local field officers have some experiences of freshwater aquaculture.

Table 5-2 Number of Aquaculture Experienced Officers Identified at Mini-Workshops

Target Provinces	Number of Field Officers	Officers with Aquaculture Skills and Knowledge (persons)			
		Total in the Province	Cantonment Office	Division Office	Sangkat Office
Pursat	25	7	3	0	4
Battambang	31	11	2	5	4
Siem Reap	33	13	1	2	10
Total	89	31	6	7	18

Note: ‘Number of field officers’ is calculated by ‘total number of fisheries officers’ minus ‘number of office workers for administration and accounting at Cantonment officers’. Moreover, the figures of Cantonment officers is the number of counterparts engaged in Cantonment Offices.

Even though those field officers have few or more experiences of freshwater aquaculture, most of them don’t have sufficient skills and knowledge to advise any issues and cases. Especially, in the target provinces, there have been few opportunities in aquaculture extension. Moreover, those field officers also have to work for other fisheries activities.

To improve the technical skills of aquaculture experienced officers, this project should make

effort to prepare / conduct training program series targeting for them. On that condition, we should make interview surveys for their improvement on aquaculture techniques at middle and final terms of the project, and evaluate the actual effects of the project programs to technical improvement on local fisheries offices.

5.2 Conduct training for local extension staff. (Activity 2-2)

For the purpose that local extension officers engaged in extension activities learn necessary basic skills of aquaculture technical extension, the training program for extension officers was held from April 20 to 28. Totally, 22 persons of extension officers and technical staffs (7 in Pursat, 6 in Battambang, 6 in Siem Reap, and 3 in Tak-Vil center) participated in the training program.

The training program was held at the home of Mr. Van Po, who is the president of seed producers' network in Takeo province at present. He has a standard type hatchery, nursery ponds of fish seeds, and grow-out ponds, and keeps the broodstock of target fish species. In addition, he also has hormone drugs and hapa nets as training materials. The trainees could observe all processes of fish seed production at his home. In the areas neighbor to his home, there a few fish grow-out farmer, to whom he supply fish seeds. Therefore, the place of Mr. Van Po has necessary conditions for technical training programs compactly.

According to the curriculum of training program indicated in the figure 5, the counterparts of Fisheries Administration took in charge of respective subjects, such as seed production skills of target fish species, grow-out culture skills, feed preparation skills and so forth. Especially, the extension officers, who had extension experiences in Phase I, were invited as lecturers from Takeo and Kampong Speu provinces. Based on their experiences and achievement in Phase I, they explained applied fish culture skills for small-scale fish farmers and farmer to farmer extension methods for local seed producers.

In addition, on April 28, the last day of the training program, the participants shared and discussed the first year's work plan in a workshop session. For smooth implementation of actual extension activities, it is necessary to consider several initial conditions, such as irrigated water condition, existing fish ponds, number and scale of stagnant ponds, and etc. Those initial conditions are different in target provinces and areas. Confirming those conditions in respective target provinces in the workshop session, the project team discussed the selection method of target communes for extension activities, the number of target communes and the number of farmers for training programs with the training participants. According to the discussion, the schedule of activities in the first half of this year was revised and reconfirmed with the participants. The training program could be efficiently conducted by positively utilizing the resources of Phase I, even though it was held just after the start of the project. As indicated at the table below, the following objectives of the training program for extension officers were set at the time of work plan formulation. The training participants achieved the training objectives in the first year.

Table 5-3 Training for Provincial Extension Officer in Fiscal Year 2011

Training for Extension officers

Location : Mr. Van Po's farm
in Tramkok district, Takeo province

Period : from 21 April to 28 April, 2011

Day	Date	Time	Subject		Contents	Instructor	
0	20-Apr	WED	Registration / Preparation				
1	21-Apr	THU	AM 8:00 - 9:00	Opening address		Chin Da, Niwa	
			9:00 - 11:30	Aquaculture technique I	L	Small scale hatchery design (basic model in FAIEX 1)	Ouch Lang, Niwa
			PM 14:00 - 17:00	Fish feed	P	Kind of feed / feeding technique	Ouch Lang
2	22-Apr	FRI	AM 8:00 - 11:30	Fish feed	L	Supplementary feed and feeding	Ouch Lang
			Breeding technique session				
			PM 14:00 - 17:00	*Breeding technique of <u>Tilapia</u>	L/P	* refer to marginal notes	Hang Savin
3	23-Apr	SAT	AM 8:00 - 11:30	*Breeding technique of <u>Silver Carp</u>	L	* refer to marginal notes	Hang Savin
			PM 14:00 - 17:00	ditto	L/P		Hang Savin
4	24-Apr	SUN	AM 8:00 - 11:30	*Breeding technique of <u>Common Carp</u>	L	* refer to marginal notes	Phon Pech
			PM 14:00 - 17:00	ditto	L/P		Phon Pech
5	25-Apr	MON	AM 8:00 - 11:30	*Breeding technique of <u>Silver Barb</u>	L	* refer to marginal notes	Ouk Hak
			PM 14:00 - 17:00	ditto	L/P		Ouk Hak
6	26-Apr	TUE	Aquaculture technique session				
			AM 8:00 - 11:30	Aquaculture technique I (grow-out)	L	Integrated fish farming	Chhor Bunly
					L	Fish health management	
		L	Record keeping and economic analysis				
	PM 14:00 - 17:00	Aquaculture technique I (nursing)	L	Nursing pond construction and preparation	Pol Mimosa		
7	27-Apr	WED	AM 8:00 - 11:30	Aquaculture technique I (general seed production)	P	Plankton sampling and observation	Chhor Bunly
					P	Handling, packing, transportation and stocking	Pol Mimosa
			PM 14:00 - 17:00	Extension strategy for rural aquaculture development	L		Chin Da
8	28-Apr	THU	AM 8:00 - 10:00	Meeting / Discussion	L	Work Plan of FAIEX 2 In 1st year	Chin Da, Niwa
			11:00	Closing			

L : Lecture, P : Practice

* Notes : "Breeding technique" will include following contents,

- L Basic fish biology of cultured species
- L Mechanism of maturity / artificial induction of maturation
- L Broodstock management General(1)
- L Broodstock selection
- L/P Preparation of hatching tank and its management
- P Broodstock collection from ponds (sc, cc & tilapia)
- L/P Handling / Hormone preparation and injection
- L/P Observation of hatchlings
- L/P Larvae rearing technique

The training programs are held at some candidate places, indicated at the table above. The training places should be flexibly arranged, according to necessary conditions of training candidate places, such as preparation of training materials (broodstock, hormone, and etc.) and existence of proper local lectures.

5.3 Conduct training for selected local extension staff. (Activity 2-3)

In 6 days of September 17 to 22, 2012 the training program for capacity building of extension officers was held at a meeting room in Department of Aquaculture Development in Fisheries Administration Office. Counterparts of Department of Aquaculture Development in Fisheries Administration and extension officers of three target provinces participated in the training program. On the first day, a problem analysis workshop in PCM (Project Cycle Management) method was held with all project counterparts, including 12 extension officers of three target provinces, to discuss the issues of extension activities, to which they actually faced. In addition to project experts, a local consultant, who has work experiences with the Project for Capacity Development for Implementing the Organic Law at Capital and Provincial Level (JICA-PILAC), was invited as a training moderator. After the second day, in order to learn the method for arranging aquaculture related information on maps in project target areas, the training participant took lectures and practices in geological information system (GIS), such as GIS system and theory and instruction of basic GIS software (ArcView). A local expert of other donor projects (AIDA), who has many experiences in the GIS field, was invited as a lecturer.

5.4 Analyze extension activities, and draw up an extension guideline. (Activity 2-4)

At the first step in 1st year, the project revealed current activities and programs on aquaculture extension for extension officers and seed producers by interviews, questionnaire surveys, and mini-workshop with counterparts of Fisheries Administration and fisheries extension officers in target provinces. According to those identified conditions, the project considered strategies, structures, roles, and activities on aquaculture extension in fisheries administrative organizations (Fisheries Administration, cantonment fisheries offices, etc.). Those results were summarized as the first draft of aquaculture extension guideline at the end of the first year. In the second year, according to the experiences and findings on extension activities in the first year of the project, the project plans to revise the first draft of aquaculture extension guideline. As a part of training programs for extension officers, one-day PCM (Project Cycle Management) workshop was held at Fisheries Administration office on September 17 to discuss an overall logical structure of problems and issues in aquaculture extension with extension officers of target province. The output (problem tree) of the workshop will be a part of contents in aquaculture extension guideline.

In the 2nd year and 3rd year, based on the experiences and lessons from the trainings of local extension officers and seed producers and the farmer to farmer training, the project arranged the roles and activities of fisheries administration organizations (Fisheries Administration, provincial fisheries offices, etc.) in aquaculture extension, and the aquaculture extension guideline was finalized in 4th year.

5.5 Indicator (Output 2)

Output 2 Capacity of local aquaculture extension services is enhanced.

Indicator

- 2-1. 80% of the C/P extension staff gains capacities to conduct extension activities on grow-out and seed production technology properly. The percentage of the local extension staff who properly conducts extension activities on grow-out and seed production technology attains to more than 30% on average.
- 2-2. Satisfaction ratings of the FSP seed farmers attain to more than 80% on average regarding the teaching capability of local extension staff.

* Indicators of output 2 were set in JCC at 1st year, as it had not been set when the project started.

The Project Design Matrix (PDM) indicates “Strengthening the capacity of local administration on aquaculture extension” as an expected output of the project. As an indicator for evaluating the achievement of the output, the PDM also indicates “Improvement of extension capacity of local extension officers for fish culture and seed production”. In October and November 2011, the first year of the project, we conducted a questionnaire survey to measure the extension capacity of local extension officers. This time, we also asked local extension officers, who are engage in the project as counterparts, to answer the same questionnaire for self-evaluation of their extension capacities.

「Indicator2-1」

(1) Evaluation Method

In order to verify the proper levels of technical extension of local extension officers, 13 technical items for self-evaluation were prepared as follows. For respective technical items, extension officers answered their achievement by the following competency levels of extension capacity.

Extension Technical Items (13 items)

Seed production for respective target fish species (Silver Barb, Common Carp, Silver Carp, Murgal, and Tilapia), Broodstock culture, Nursery of fish seeds, Home-made feed making, Feeding management, Pond construction and preparation, Fertilization of fish ponds, Fish disease treatment, Record taking for fish culture.

Level of Competence (5 levels)

Level	Achievement of Extension Capacity	Technical Score
A	Enough technical skills and a lot of experiences of technical advice to farmers	5
B	Enough technical skills, but a little experiences of technical advice to farmers.	4
C	Enough technical skills, but no experiences of technical advice to farmers.	3
D	A little technical skills	2
E	No technical Skills	1

According to the competency level, technical scores are determined between 1 and 5. If the technical level is more than Level B (technical score is more than 4), it could be considered that field officers have sufficient extension skills for fish seed production and pond culture.

(2) Result of the Evaluation

First table shows the average technical scores of all extension officers. The average technical score of counterpart's extension officers in 2014 attains 4.05. It is higher than the Level B (technical score: 4) which is a sufficient level for extension activities. Because the average technical score in 2011 was 3.26, it means that extension officers gradually raise technical level in the project period.

Second table shows the average technical scores of respective extension technical items. The technical items, which have not attained the target score 4.0, are seed production of Silver Carp and Murgal, Home-made fish feed making, and Fish diseases treatment. The project should cover up these four technical items in follow-up programs to enhance the effect of technical improvement. In other technical items, the technical scores have attained more than 4.0 on the average. It means that extension officers have mastered these technical items for extension activities.

Table 5-4 Average Technical Score in Respective Extension Technical Items

Extension Technical Item	Average Technical Score	
	2014 (End-line)	2011 (Base-line)
Seed Production: Silver Barb	4.17	3.56
Seed Production: Common Carp	4.11	3.38
Seed Production: Silver Carp	3.28	2.69
Seed Production: Murgal	3.89	2.81
Seed Production: Tilapia	4.56	3.38
Broodstock Culture	4.22	3.31
Nursery of Fish Seeds	4.00	3.25
Home-made Fish Feed Making	3.67	2.56
Fish Feeding Management	4.11	3.63
Pond Construction and Preparation	4.83	4.25
Fertilization of Fish Pond	4.83	4.25
Fish Disease Treatment	2.67	1.94
Record Taking of Fish Culture	4.33	3.56
Total items	4.05	3.27

Table 5-5 Achievement of Extension Technical Level of Local Extension Officers

Year	Average Technical Score		Distribution of Technical Scores			
			1.0 - 1.9	2.0 - 2.9	3.0 - 3.9	4.0 - 4.9
2014 (End-line)	4.05	No. of persons	0	1	4	12
		Share	0%	6%	25%	86%
2011 (Base-line)	3.27	No. of persons	2	4	4	6
		Share	13%	25%	25%	3 %

Note: To compare with the figure of Year 2014 properly, the baseline score of Year 2011 is added with the technical scores of Year 2011 of two extension officers (Mr. San Mardy and Mr. Srey Keovsopheak), who became project counterparts in 2012 to 2013. Therefore, the average technical score of Year 2011 is a little smaller than the figure (3.55) reported on the annual project report of Year 2011.

● 「Indicator 2-2」

The Project Design Matrix (PDM) indicates “Strengthening the capacity of local administration on aquaculture extension” as an expected output of the project. As an indicator for evaluating the output, the PDM also indicates “Level of satisfaction of core farmers to aquaculture extension service”. To verify the achievement of the indicator, the survey team, comprising a Japanese expert in charge of aquaculture extension and a project counterpart of Department of Aquaculture Development in Fisheries Administration (FiA), visited the core farmers (fish seed producers) of three target provinces, and interviewed with them in their satisfaction of aquaculture extension service. In addition, the survey team confirmed the present condition of their fish seed production.

However, local farmers hardly read and answer the questionnaire by themselves. Therefore, a Japanese expert and a FiA’s counterpart explained the questions to them and heard their answers in interview style. Beside the contents of the questionnaires, the survey team flexibly added some relevant questions in accordance with farmer’s answers and fish farm’s condition. It helps to understand the actual condition of core famers in detail.

In this survey, core farmers answered the satisfaction level of whole extension services, provided by extension officers, on three important subjects, Technical Advices, Communication, and Networking Facilitation. As indicated at Table 4, all core farmers answered “Very good” or “Good” on all subjects. It means that all core farmers are satisfied of the extension services in the project.

Table 5-6 Evaluation of Whole Extension Service by Core Farmers (August 2014)

Extension Subject	Technical Advice			Communication			Networking Facilitation		
	Very Good	Good	Need Effort	Very Good	Good	Need Effort	Very Good	Good	Need Effort
Siem Reap	100%	0%	0%	78%	22%	0%	100%	0%	0%
Battambang	100%	0%	0%	100%	0%	0%	100%	0%	0%
Pursat	100%	0%	0%	100%	0%	0%	100%	0%	0%
Total	100%	0%	0%	94%	6%	0%	100%	0%	0%

Note: The questionnaire requests an answer by four levels (Very Good, Good, Common, Bad). Actually, we have the answers of only two levels, Very Good or Good. To simplify the results, other two levels (Common and Bad) are summarized into “Need Effort” on the Table.

In terms of Technical Advices, core farmers also answered their satisfaction levels on six important technical subjects, seed production, pond preparation, home-made feed making, feeding management, water quality control, and fish disease treatment, respectively. In all subjects, except fish disease treatment, all core farmers answered only “Very Satisfied” or “Satisfied”. It means that all core farmers are satisfied of technical advices provided by extension officers in these five technical subjects. In home-made feed making and water quality control, about 10 % of core farmers answered “Satisfied”, not “Very Satisfied”. In both subjects, basically, they are satisfied of technical advices of extension officers. However, in terms of home-made feed making, some core farmers expect that the project might provide pelleting machines. In terms of water quality control, they expect to use water quality devices like pH meter (acid level) and DO (dissolved oxygen) meter. These expectations might reflect their answers.

In terms of fish disease treatment, because all core farmers did not faced any serious fish diseases, they have not need particular technical advices for fish disease treatment. Therefore, many farmers held their answers about fish disease treatment in abeyance, because they hardly decided it properly. However, nobody answered “Not Satisfied”. Moreover, the interview with core farmers confirmed that extension officers gave advices on fish disease treatment, according to their inquiries. Consequently, their satisfaction on fish disease treatment is also highly achieved.

Table 5-7 Satisfaction Level of Technical Advices by Core Farmers in Technical Subjects (August 2014)

Technical Subject	Seed Production			Pond Preparation			Home-made Feed Making		
	Very Satisfied	Satisfied	Need Effort	Very Satisfied	Satisfied	Need Effort	Very Satisfied	Satisfied	Need Effort
Siem Reap	89%	11%	0%	100%	0%	0%	56%	44%	0%
Battambang	100%	0%	0%	100%	0%	0%	100%	0%	0%
Pursat	100%	0%	0%	100%	0%	0%	100%	0%	0%
Total	97%	3%	0%	100%	0%	0%	88%	13%	0%

Technical Subject	Feeding Management			Water Quality Control			Fish Disease Treatment			
	Very Satisfied	Satisfied	Need Effort	Very Satisfied	Satisfied	Need Effort	Very Satisfied	Satisfied	Need Effort	Abeyance
Siem Reap	89%	11%	0%	78%	22%	0%	0%	11%	0%	89%
Battambang	100%	0%	0%	82%	18%	0%	27%	0%	0%	73%
Pursat	100%	0%	0%	100%	0%	0%	75%	0%	0%	25%
Total	97%	3%	0%	88%	13%	0%	38%	3%	0%	59%

6 Fish Seed Producers (FSPs) farmers are capacitated. (Output 3)

6.1 Select target communes and seed farmers. (Activity 3-1)

Considering sustainability of Farmer to Farmer extension system, at the first step core seed farmer has to be selected subsequently target communes should be selected around the core farmer.

(1) Selection of seed farmer

(1) – 1 Selection of seed farmer for the 1st year (2011)

In the first year, the project plans to educate the candidate farmers selected from existing seed producers to be core farmers. As a result of the detail project planning study, which was conducted in July 2010, there were 9 seed producers in Siem Reap, 17 in Battambang and Pailin, and 7 in Pursat. Before the project started, Mr. Chikami, a JICA development specialist, was dispatched from February 27 to April 14, 2011, and conducted a field survey to select core farmer candidates with cantonment fisheries offices. The result of the field survey showed that there were 11 candidate farmers (existing seed producers) in Siem Reap, 17 in Battambang, and 5 in Pursat. From the listed candidate farmers, the large-scale fishing lot owners who got fishing rights by tenders, the producers' groups supported by NGOs in the past, and the fish farms operated by fisheries office staffs as a side-business were excluded. The project team interviewed all remained candidate farmers by individual visits. Moreover, the project team confirmed their facility conditions and current activities of seed production, and evaluated their condition and activities as scores in the following 5 criteria.

Table 6-1 Evaluation of core seed farmer in 2011 (Rating out of 20 points)

Skills / Experience	20	- Having experience of seed production (or fish culture) - Having basic skills of seed production (or fish culture)
Facility / Equipment	20	- Owning necessary facilities and equipment's of seed production - Available to use the facilities and equipment's above-mentioned - Owning necessary lands to construct new facilities, such as intermediate culture ponds
Water Availability	20	- Less difficult to secure the clean water for hatching - Securing the water for intermediate culture of fish seeds in production season.
Economic Status	20	- Not difficult financially - Enable to put small investments to seed production facilities and related equipment's
Willingness / Extension Experience	20	- Supplying fish seeds and high motivation to be core farmers - Having experience of aquaculture extension
Full Score	100	

In addition to the evaluation scores mentioned above, the capacities for implementing farmer to

farmer training programs in this fiscal year and supplying fish seeds after the training programs are also regarded as other important conditions. According to a result of field surveys, some seed producers could not produce fish seeds continuously for various reasons, or might not produce fish seeds stably by a lack of their facility maintenances. Therefore, those inactive seed producers were excluded from candidates of core farmers in this fiscal year. Finally, total 14 seed producers (4 in Siem Reap, 6 in Battambang, and 4 in Pursat) were selected as core farmer candidates.

(1) – 2 Selection of seed farmer for the 2nd year (2012)

Through the monitoring of fish culture activities for farmers participating in farmers to farmers trainings, the project team found promising farmers who have high motivation in fish culture and intend to reinforce their fish culture activities and seed production. The project also conducted field surveys to interview the promising farmers individually. Similarly in a selection survey of the first years' seed producers, the farmers were evaluated in scores of 5 categories on Table 12. Until the beginning of October 2011, total 16 farmers (6 in Siem Reap, 5 in Battambang, and 5 in Pursat) were selected as the second years' core farmers. Those 16 farmers include 4 existing seed producers who were not selected as the first years' core farmers (3 in Siem Reap and 1 in Pursat). Therefore, new seed producers are only 12.

(1) – 3 Selection of seed farmer for the 3rd year (2013)

Until the 2nd year, the project has selected and trained 14 first year's and 16 second year's seed producers. In the 3rd year, the project plans to select 5 third year's seed producers in each province, total 15 farmers.

Moreover, the project conducted fish culture trainings and extension activities for total 54 communes (20 communes in first year and 34 communes in second year). However, according to Table 2, there are not any seed producers at 36 of total 54 communes. To establish a wide supply system of fish seeds in target areas, the project plans to give priorities to 36 communes, where any seed producers do not exist, to select new seed producers (for third year) .

● Selection survey for the 3rd year (2013)

According to the first year's process, the project monitored fish culture activities at grow-out fish farmers participating in farmer's trainings of first and second years to find out the farmers who had high motivation of fish culture and intend to extend fish culture activities and begin seed production. Moreover, Japanese experts and counterparts of Fisheries Administration visited the candidates of core farmers, listed up by hearings from commune and village chiefs and interview to individual fish farmers, and evaluated them by the following 5 criteria in the same way in the first and second years. Based on the experiences of the past years, more than 60 points was determined to be a selection standard in principle.

Because major potential farmers had been selected at target 3 provinces in first and second years by the processes of selection surveys mentioned above, it was not easy to find new candidate farmers especially at Pursat and Siem Reap provinces, where the potential of aquaculture is not

higher. Generally, the candidate farmers of third year, targeted by field surveys, had lower evaluation scores than those of first and second years. Some fish farmers, included in the candidates, did not reach a proper standard on the selection criteria. However, considering extending the scale of farmers to farmers trainings after third year, the fish farmers, who may be able to start seed production in 2 years with strengthening of project assistances, were selected as alternative core farmers to be trained. Total 11 fish farmers (5 farmers at Pursat, 5 farmers at Battambang, and 1 farmer at Siem Reap) were selected as candidates of core farmers.

As the result, the core farmers selected by the project until the present amounted to 42.

(1) – 4 Selection of seed farmer for the 4th year (2014)

The project selected and trained 41 seed producers so far, however four seed producers are possibly not to able to continue seed producing activity due to private issues. It means that there are only 37 active seed farmers in project target area. On the other hand, at least 40 seed farmers should be active at the end of the project because it is mentioned as an indicator in PDM. Moreover there is concern regarding lack of fingerling supplier in some target commune in the province, as the project is expanding area of target communes year by year, especially in Battambang and in Pursat. Consequently project considered to select additional seed farmers to bring them up in 4th year.

● Selection survey for the 4th year (2014)

The project conducted monitoring for fish culture activities at grow-out fish farmers participating in farmers' trainings of first, second and third years to find out the farmers who have high motivation in fish culture and intend to expand their fish culture activities and begin seed production. As of December 2013, five candidate farmers (three farmers from Pursat province, two farmers from Battambang province) were listed up by provincial fisheries office, consequently the project evaluated candidate farmers individually by the following criteria through the interviews to the candidate farmers and the observation to their fish culture activities on 13 January and 14 January 2014. As a result, there is no obstacle observed in each farmer in its water source, land and minimum capital to invest the hatchery and nursery pond preparation. After one month observation of farmer's initiative action, it was found that three candidates have extremely high motivation and very quick action following project technical suggestion. Subsequently project decided these three as project core seed producing farmers to bring them up in fourth year, 2014.

Note: One new seed farmer candidate was selected from Ou Tapaung commune, Pursat province. There is already one existing seed farmer in Ou Tapaung commune. However, as the area of the commune is very wide from west to east, only one seed farmers cannot afford to provide fingerling grow-out farmers in the commune as well as neighbor communes. Thus project decided to bring up two seed farmers only in Ou Tapaung commune exceptionally.

Table 6-2 Core seed farmers selected by FAIEX-2 (from 2011 to 2014)

Province	No.	Name of HH Head	District	Commune	Current situation	Year
Pursat	1	Em Som Ol	Kror Kor	Kbal Torach	inactive	2011
	2	Ly Heng	Kamdieng	Kan Chor	in operation	
	3	Vorn Bona	Kandieng	Kandieng	in operation	
	4	Kean Nhoeng	Kandieng	Koh Chum	in operation	
	5	Suon Seng / Pen Sovan	Kror Kor	Boeng Kantuot	inactive	2012
	6	Phon Chea	Bakon	Khnar Tortoeng	in operation	
	7	Chin Kunthy / Chop Sisavaan (Ms)	Bakon	Tresing Paing chhong	in operation	
	8	Srei Monynal	Krakor	Tnauthom	in operation	
	9	Sou Yeng	Bakon	Romlech	in operation	
	10	Ouk Kuong	Phuna Kravanh	Leach	in operation	2013
	11	Um Sam	Bakon	Ou Tapaon	in operation	
	12	Ya Samnang	Bakon	Snam Preah	in operation	
	13	Chhea Chheng	Phuna Kravanh	Phteah Rung	in operation	
	14	Korm Thiv	Pursat	Roleab	in operation	2014
	15	Phat Sareun	Krakor	Svay Sa	in preparation	
	16	Soeum Chouch	Bakon	Ou Tapaon	in preparation	
		14 active among 16 selected				
Battambang	1	Mao Pek	Thmor Korl	Bansay Treng	in operation	2011
	2	Mith Phan	Bor Vil	Prey Khbos	in operation	
	3	Chhorm Sovan	Battambang City	Autakorn	in operation	
	4	Dy Chana	Ratanamondul	Sdao	in operation	
	5	Sam Thim/ Thim Vibol	Morng Reusey	Prey Touch	in operation	
	6	Van Sinat	Morng Reusey	Kear	inactive	
	7	Suon Pan	Thma Koul	Ou Ta Ki	in operation	2012
	8	Chounm Thin	Bat Dambang	Ou Mal	in operation	
	9	Lim Loum	Moung Ruessei	Robas Mongkol	in operation	
	10	Lem pakedwath	Thma Koul	Chrey	in operation	
	11	Phal Veasna	Thma Koul	Anlung Run	in operation	
	12	Hue Dara	Bavel	Khnach Romeas	in operation	2013
	13	Chheng Sovann	Samlout	Samlout	in operation	
	14	Chen Khom	Moung Ruessei	Prey Sray	in operation	
	15	Roum Chen	Bavel	Lvea	in operation	
	16	Um Khoen	Rukhak Kiri	Muk Rea	in operation	
	17	Chel Thoun	Ou Samrel	Samlout	in preparation	2014
		16 active among 17 selected				
Siem Reap	1	Say Sorn	Puok	Puok	in operation	2011
	2	Yip Prang	Prasat Bakomg	Korndek	in operation	
	3	Mao Lanh	Saut Nikum	Som Rong	in operation	
	4	Puok Chhorn	Chi Kreng	Spean Tnort	in operation	
	5	Neuv Noeun	Va Rin	Svay Sao	in operation	2012
	6	Penh Puth	Bantey Srey	Tbeng	in operation	
	7	Met Nimul	Saut Nikum	Dan Run	in operation	
	8	Heang Hoksom	Angkor Thom	Peak Snaeng	in operation	
	9	Phom Bunnarith	Prasat Bakong	Roluos	inactive	
	10	Ouk Kimhong	Puok	Koovey Riel	in operation	
	11	Lach Chummitn	Angkor Chumm	Doun Peag	in operation	2013
		10 active among 11 selected				

Total 44 (40 active seed farms among 44 selected)

(2) Selection of target communes

(2) – 1 Selection of target communes for the 1st year (2011)

To select target communes for extension programs in the first year in accordance with the implementation principal of the project, the project team conducted field surveys with the counterparts of Fisheries Administration and provincial extension officers at the zones along National Road No.6 in Siem Reap province and No.5 in Pursat and Battambang provinces. Those zones were the rain-fed paddy field areas excluding the flood areas by Lake Tonle Sap in rainy seasons.

The criteria of commune selection, indicated in Box 3, were set by the modification of those of Phase I. According of the criteria, 5 - 8 target communes for extension programs were selected in each province. As a selection result mentioned above, 19 target communes were selected in 3 provinces.

Box 3: Selection criteria of communes targeted at extension programs (FAIEX-2)

- Fish catch at natural water areas is a little.
- Many farmers are economically poor.
- Many farmers have ponds possible to culture fish.
- Many farmers are interested in fish culture.
- The candidates of core fish farmers above-mentioned can prepare necessary animal manures and feed materials by themselves.
- Fish farmers can secure necessary water for fish culture (meteoric water, well water, river water, and etc.) all around a year
- Flooding is not occurred in a rainy season.
- Fish seed supply is short at the area.
- Local leaders are positive to fish culture extension.
- Any conflicts with jealousy and grudge have not ever been occurred at the area.
- The conditions of roads and transportation are good.
- There is no problem in security at the area.

(2) – 2 Selection of seed farmer for the 21st year (2012)

In the first year, observing the criterion “No flood occurs in rainy season” strongly, the project excluded the flooded areas by Lake Tonle Sap in rainy seasons and selected the outside areas from National Road No.6 in Siem Reap province and Road No.5 in Pursat and Battambang provinces (Zone A in Figure 3). However, because the result of the first year’s field survey realized that highland areas extend at the mountain side from the National Roads, the project may not be able to collect sufficient numbers of candidate farmers who can secure necessary amount of water for fish

culture, in case the selection criteria of fish culture conditions are fully applied. Therefore, in order to apply the criterion “No flood occurs in rainy season” properly, some additional criteria should be considered based on flood experiences in rainy season within the past 10 years. It avoids excluding the communes at Lake Tonle Sap side of National Roads as target areas. Despite located at possible flood areas (Zone B in Figure), some communes are regarded as target communes by their past flood experiences, 1) “They have never been flooded in the past 10 years”, or 2) “They have been rarely flooded (less than twice) in the past 10 years”.

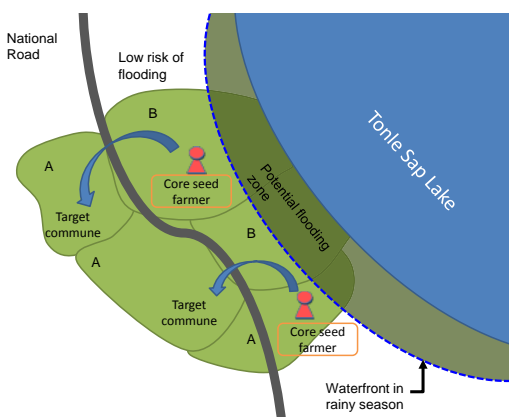


Figure 6-1 Flood Areas for Selection of Target Communes in Year 2012

* Some communes located at Zone B have a little possibility to lose their broodstock fish, according to their less flood experiences in the past 10 years. In case the flood may not affect their seed production activities, those communes also include target areas.

As a selection result mentioned above, 34 target communes were selected in 3 provinces before implementing farmer training in June 2012.

(2) – 3 Selection of seed farmer for the 3rd year (2013)

According to the selection criteria of the first year, the 36 target communes were newly selected. In addition to 36 new target communes, the project involved 3 former target communes (target communes in 2012) to conduct the training again for the effective technical transfer from farmer to other farmer as shown in below Figure. As a selection result mentioned above, 39 target communes were selected in 3 provinces before implementing farmer training in May 2013.

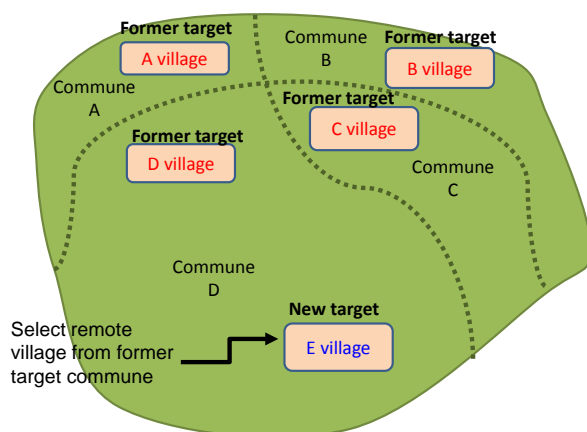


Figure 6-2 Example of reselection of target commune

* Some communes are so large that one farmer cannot transfer its technique to other farmer. Therefore “E village” in “D commune” can be selected again.

(2) – 4 Selection of seed farmer for the 4th year (2014)

Following the selection criteria of the first year, the 34 target communes were selected. As it is mentioned in 3rd year's selection, some former target communes were reselected to conduct the training again for the effective technical transfer from farmer to other farmer. Therefore 34 target communes are consisted of 18 new target and 16 former targets.

Total number of target communes during project is 127 communes but 19 communes among 127 communes have been reselected. Thus 108 communes are actual target number.

Table 6-3 Target communes (from 2011 to 2014)

Province	Year				Total
	2011	2012	2013	2014	
Battambagn	10	14	16 <small>*including 1 former target commune</small>	14 <small>*including 7 former target commune</small>	54 <small>Actual target commune is 46, on account of 8 target communes overlapped.</small>
Siem Reap	5	11	9	8	33
Pursat	5	9	14 <small>*including 2 former target commune</small>	12 <small>*including 9 former target commune</small>	40 <small>Actual target commune is 29, on account of 11 target communes overlapped.</small>
Total	20	34	39 <small>*including 3 former target communes</small>	34 <small>*including 16 former target communes</small>	127 <small>Actual target commune is 108, on account of 19 target communes overlapped.</small>

(3) Seed farmer and Target commune

(3) – 1 Battambang

17 seed producing farmer have been selected and 46 target communes were selected in Battambang during project. Easy access target communes have been selected along the national road in 1st and 2nd year, subsequently project expanded target communes to wider area in province in 3rd and 4th year.

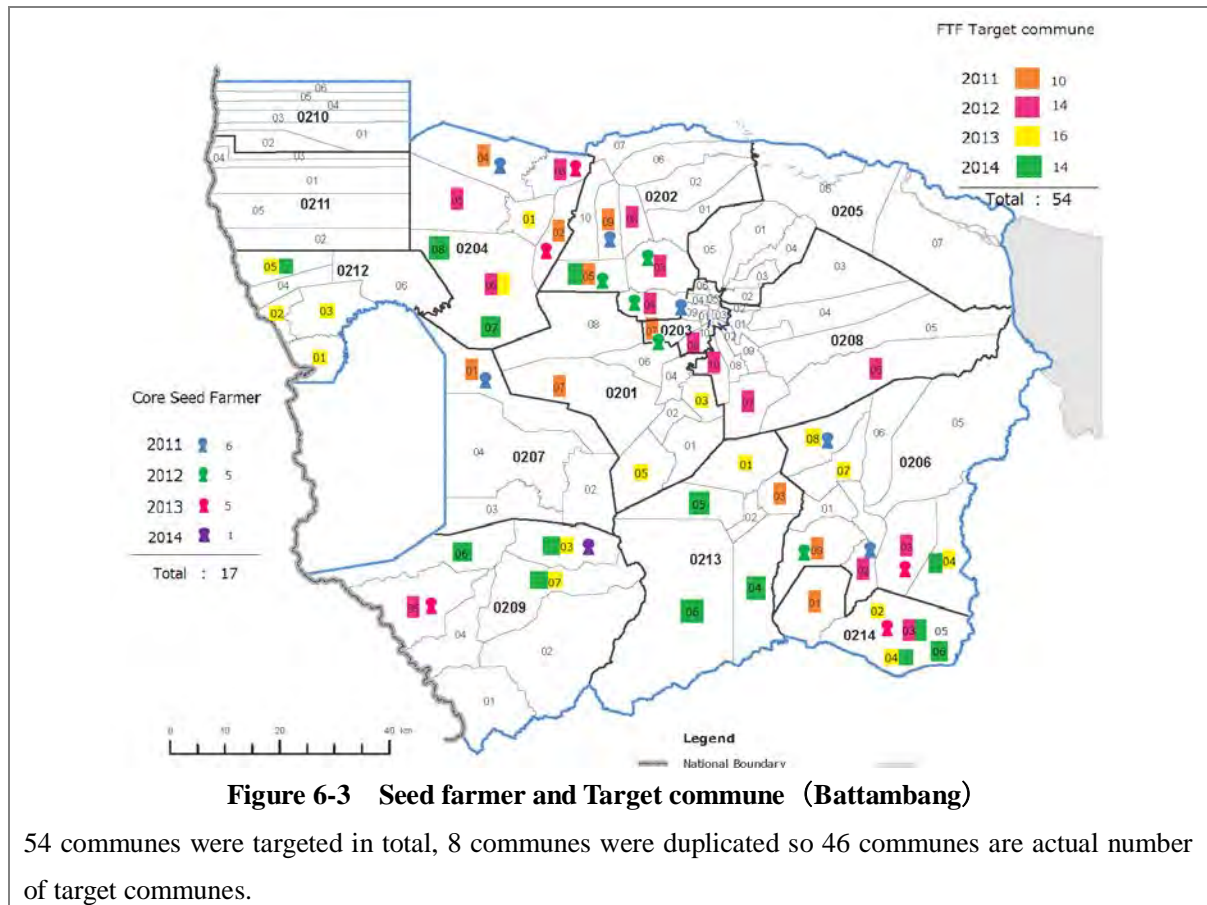


Figure 6-3 Seed farmer and Target commune (Battambang)

54 communes were targeted in total, 8 communes were duplicated so 46 communes are actual number of target communes.

(3) – 2 Pursat

16 seed producing farmer have been selected and 29 target communes were selected in Pursat during project. Easy access target communes have been selected along the national road in 1st and 2nd year, subsequently project expanded target communes to wider area.

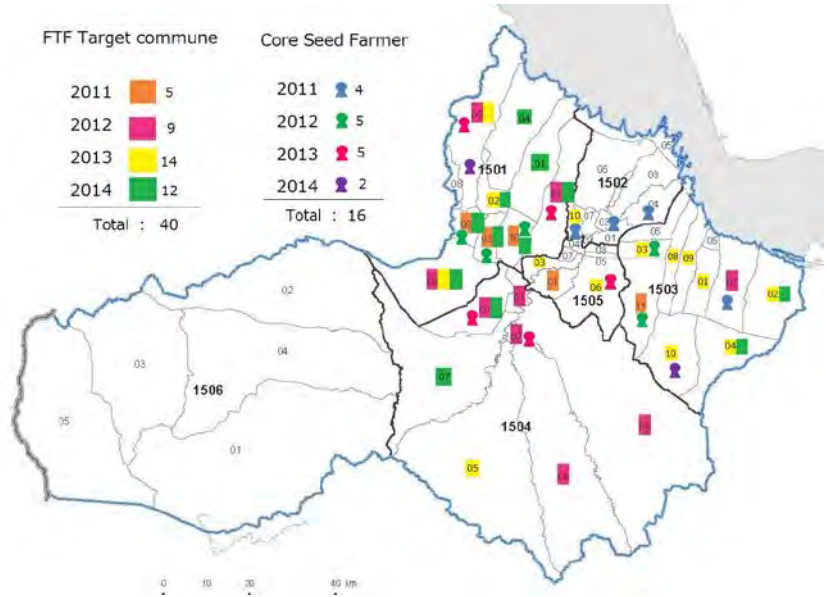


Figure 6-4 Seed farmer and Target commune (Pursat)

40 communes were targeted in total, 11 communes were duplicated so 29 communes are actual number of target communes.

(3) – 3 Siem Reap

11 seed producing farmer have been selected and 33 target communes were selected in Siem Reap during project. Potential areas for aquaculture promotion are limited. It is relatively scattered comparing to Battambang.

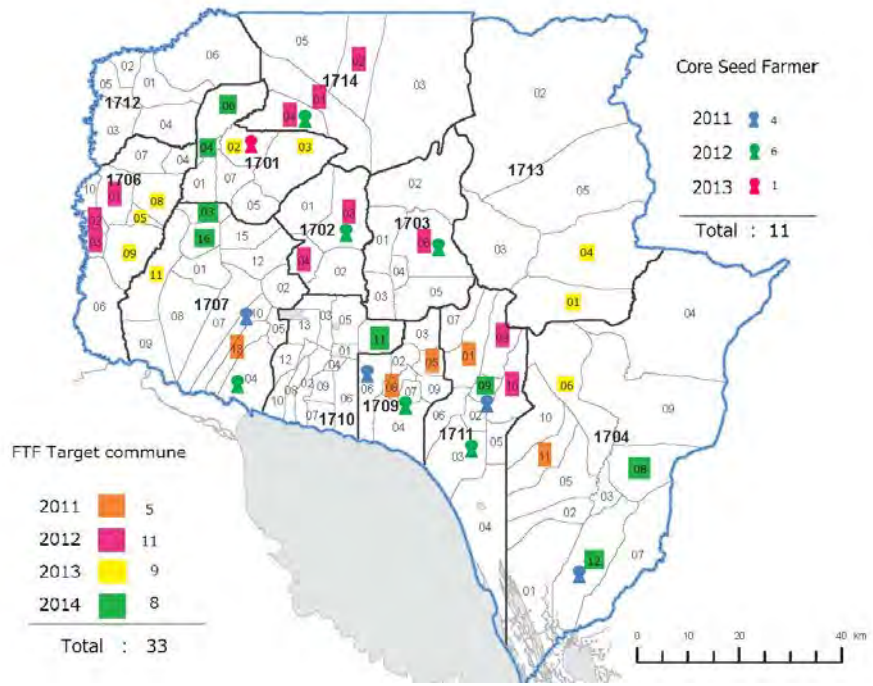


Figure 6-5 Seed farmer and Target commune (Siem Reap)

6.2 Conduct training on seed production for the seed farmers. (Activity 3-2)

Project conducted the following training programmer targeting 173 seed farmers in 8times training.

Table 6-4 Training on Seed Production Technique (2011~2014)

No	Date	Training course	Training venue	Target	Number of participant
1	5 May ~11 May 2011 (7 days)	Training on Seed Production Technique (4 target fish species, silver carp, common carp, silver barb and tilapia) except murgal)	Seed farmer in Takeo province (Mr.Om Thy)	fish seed producer selected for the 1st year	22 seed producers from three target provinces (7 in Pursat, 7 in Battambang, and 8 in Siem Reap) , 3 farmers of Ratanakiri province voluntarily attended
2	11 Oct ~14 Oct 2011 (4 days)	Preparatory Training in Seed Production and Brush-up Training(2 target fish species, common carp, and tilapia)	Seed farmer in Battambang province (Mr.Mao Pek)	Fish seed producer selected for the 1st year and 2nd year)	9 farmers (Second years' core farmers)
3	21 Nov ~26 Nov 2011 (6 days)	Preparatory Training on Seed Production Technique(4 target fish species, silver carp, common carp, silver barb and tilapia) except murgal)	Seed farmer in Takeo province (Mr.Om Thy)	Fish seed producer selected for the 1st year and 2nd year)	16 farmers (Second years' core farmers)
4	10 Sep ~14 Sep 2012 (5 days)	Brush-up Training for Seed Producers selected for 1st and 2nd year	Toel Vil station	Fish seed producer selected for the 1st year and 2nd year)	33 farmers (Second years' core farmers)
5	23 Dec ~25 Dec 2013 (3 days)	Brush-up Training for Seed Producers	Battambang (Spring Park Hotel)	Seed Producers of FAIEX-2	50 farmers (41 Seed Producers of FAIEX-2 and other farmes)
6	11 June ~13 June 2014 (3 days)	Brush-up (Technical Supplementary) Training for the farmers in Pursat	Seed farmer in Pursat (Mr.Seoun Cho)	Seed Producers of FAIEX-2(Pursat)	9 Seed Producers of FAIEX-2 (Pursat)
7	24 June ~25 June 2014 (4 days)	Brush-up (Technical Supplementary) Training for the farmers in Battambang	Seed farmer in Battambang province (Mr.Lempakdewa)	Seed Producers of FAIEX-2(Battambang)	11 Seed Producers of FAIEX-2(Battambang) and 5 students from Battambang university
8	17 Nov ~21 Nov 2014 (4 days)	Brush-up (Technical Supplementary) meeting	Seed farmer in Takeo province (Mr.Van Po)	Seed Producers of FAIEX-2	32 seed producing farmers of FAIEX-2 and 7 seed farmers from FAIEX-2 (from Kampot, Takeo and Prey Veng)

Contents and detail of the implementation are as follows.

(1) Training on Seed Production Technique

1st year (2011)

(1) — 1 Training to fish seed producer selected for the 1st year

The technical training program for existing fish seed producers was held at the home of Mr. Om Thy, a seed producer at Trangkok district in Takeo province from May 5 to 11. The main target participants for the training program were the first year's core farmers selected in Section (5). Additionally, the number of training participants was expanded to reinforce the technical skills of existing seed producers, who had not been selected as core farmers in the first year. Finally, 22 seed producers from three target provinces (7 in Pursat, 7 in Battambang, and 8 in Siem Reap) participated in the training program. Moreover, 3 farmers of Ratanakiri province voluntarily attended the training program, because they had heard the program from local seed producers. Totally, 25 farmers participated in the training program.

Table 6-5 Training to fish seed producer selected for the 1st year

Day	Date	Time	Subject		Contents	Instructor
	4-May WED		Registration / Preparation			
1	5-May THU	AM 8:00 - 9:00	Opening address			Chin Da, Niwa
		9:00 - 11:30	Aquaculture technique I	L	Small scale hatchery design (basic model in FAIEX 1)	Ouch Lang, Niwa
		PM 14:00 - 17:00	Fish feed	P	Kind of feed / feeding technique	Ouch Lang
2	6-May FRI	AM 8:00 - 11:30	Fish feed	L	Supplementary feed and feeding	Ouch Lang
			Seed production technique			
		PM 14:00 - 17:00	*Breeding/Seed production technique of <u>Tilapia</u>	L/P	* refer to marginal notes	Hang Savin
3	7-May SAT	AM 8:00 - 11:30	*Breeding/Seed production technique of <u>Silver Carp</u>	L	* refer to marginal notes	Hang Savin
		PM 14:00 - 17:00	ditto	L/P		Hang Savin
4	8-May SUN	AM 8:00 - 11:30	*Breeding/Seed production technique of <u>Common Carp</u>	L	* refer to marginal notes	Phon Pech
		PM 14:00 - 17:00	ditto	L/P		Phon Pech
5	9-May MON	AM 8:00 - 11:30	*Breeding/Seed production technique of <u>Silver Barb</u>	L	* refer to marginal notes	Ouk Hak
		PM 14:00 - 17:00	ditto	L/P		Ouk Hak
6	10-May TUE		Aquaculture technique session			
		AM 8:00 - 11:30	Aquaculture technique I (grow-out)	L	Integrated fish farming	Chhor Bunly
				L	Fish health management	
				L	Record keeping and economic analysis	
	PM 14:00 - 17:00	Aquaculture technique I (nursing)	L	Nursing pond construction and preparation	Pol Mimosa	
7	11-May WED	AM 8:00 - 11:30	Aquaculture technique I (general seed production)	P	Plankton sampling and observation	Chhor Bunly
				P	Handling, packing, transportation and stocking	Pol Mimosa
		PM 14:00 - 17:00	Extension strategy for rural aquaculture development	L	(Preparatory lecture for FFT) -How to select fish grower -Method of follow-up guidance -Marketing strategy of fingerling	Chin Da, Niwa
		Seed farmer network		Experience of seed farmer network in Takeo	Van Po (President of Seed producers network in Takeo)	
		Closing				
8	12-May THU		Leave			

L : Lecture, P : Practice

The training program focused on seed production skills in 4 target fish species (silver carp, common carp, silver barb and tilapia) except murgal. At first, the characteristics of respective fish species, such as spawning behavior, egg quality and hatching method, were explained at lecture sessions. Afterwards, those seed production techniques were actually practiced. Those practice sessions, including egg collection and hatching, were made for one fish species each day to learn the process of seed production practically. As indicated in Table, the training program was effectively composed of lecture and practice sessions. As lecturers of the training program, 5 counterparts of Fisheries Administration, extension officers of Takeo and Kampong Speu provinces as ex-counterparts of Phase I, and staffs of Bati center were assigned.

To promote making a network of seed producers in target provinces, Mr. Van Pon, a president of fish seed producers' network in Takeo province, was invited on the last day of the training program, and talked about his experience and current activities on a farmers' network. The cases of farmers' networks in other areas are expected to stimulate local seed producers to form their own networks in target provinces of Phase II in near future.

(1) – 2 Training to fish seed producer selected for the 1st year and 2nd year

On October 11 to 14, 2011, a preparatory training in seed production techniques for 5 candidates of second years' core farmers was held at a core farmer (Mr. Mao Pek: first year's core farmer) in Battambang province. The main purpose of the training was to train second years' core farmers. First years' core farmers in the provinces also participated in the training (one core farmer was absent because of his participation in the third country training) to share the suggestion from their seed production operation, difficulties and improving points with second years' core farmers. At the same time, the training gave a chance for first years' core farmers to review their seed production techniques.

Name of HH Head	Main Livelihood / Profession	District	Commune	Status of farmer
Mao Pek	Rice farmer	Thmor Korl	Bansay Treng	CSF-2011
Mith Phan	Fish seed producer	Bor Vil	Prey Khbos	CSF-2011
Dy Chana	School director	Ratanamondul	Sdao	CSF-2011
Sam Thim (Thim Vibol)	Rice farmer	Mong Reusey	Prey Touch	CSF-2011
Van Sinat	Fish seed producer	Mong Reusey	Kear	CSF-2011
Suon Pan	Rice farmer	Thma Koul	Ou Ta Ki	CSF-2012
Chounm Thin	Rice farmer	Bat Dambang	Ou Mal	CSF-2012
Lim Loum	Rice farmer, Rice milling	Moung Ruessei	Robas Mongkol	CSF-2012
Lem pakdewath	Rice farmer	Thma Koul	Chrey	CSF-2012
Phal Veasna		Thma Koul	Anlung Run	CSF-2012

Counterparts of Phase 1 and 2 were lecturers of the training. In collaboration with cantonment fisheries officers, the training program was carried out on the schedule in Table.

Table 6-6 Preparatory Training in Seed Production and Brush-up Training (Battambang)

Date	Time	Subject		Contents	Instructor
10-Oct MON		Registration / Preparation			
11-Oct TUE	AM 8:00 - 9:00	Opening address	L		Ouch Lang / Hang Savin / Ouk Hak
		9:00 - 11:30	Fish Feed		
		Seed production technique			
12-Oct WED	PM 14:00 - 17:00	*Breeding/Seed production technique of <u>Tilapia</u>	L/P	* refer to marginal notes	Ouch Lang / Hang Savin / Ouk Hak
	AM 8:00 - 11:30	*Breeding/Seed production technique of <u>Common Carp</u>	L	* refer to marginal notes	Ouch Lang / Hang Savin / Ouk Hak
13-Oct THU	PM 14:00 - 17:00	ditto	L/P		Ouch Lang / Hang Savin / Ouk Hak
	AM 8:00 - 11:30	*Breeding/Seed production technique of <u>Silver Barb</u>	L	* refer to marginal notes	Ouch Lang / Hang Savin / Ouk Hak
14-Oct FRI	AM 8:00 - 11:30	Practical worl / Networking			Ouch Lang / Hang Savin / Ouk Hak
		Actual practical work on Breeding/Seed production technique	P	Practice of broodstock selection, examine of matured broodfish, hormone injection, etc.	
		Seed farmer network	L	Experience of seed farmer network in Takeo	
		Closing			Mr. Vin Chheum (Vice-President of Seed farmers network in Takeo) Mrs.Set Thy (President of Seed farmers network in Kampot)

L : Lecture, P : Practice

Because of a limited number of participants in the training, all of them could make practices of

hormone preparation and inducement and observe a hatching process after fertilization. Due to those practical sessions, the participants could understand those techniques deeply. Among 9 participants, only one person is female. One 17 years old male participant represented his family. On the last day of the training, all participants received technical manuals of seed production. Then, they are expected as to made seed production activities next year on the basis of technical manuals.

(1) – 3 Basic Technical Training of Seed Production to the 2nd year farmer in Takeo

In 7 days of November 21 to 26, 2011, a basic technical training of seed production was held at a hatchery facility and fish ponds belonging to Mr. Om Thy, fish seed producers in Takeo province. The training targeted at 16 candidates of second years' core farmers.

No.	Name of Participant	Village	Commune	District	Province
1	Mr. Sou Yeng	Raungtakok	Romech	Bakan	Pursat
2	Mr. Phan Chea	Komprakkon	Khna Toteung	Bakan	Pursat
3	Mr. Srey Monynal	Takeoleu	Thnaut Chom	Krakor	Pursat
4	Mr. Suon Soeun	TrapaingKantout	Boeung Kantout	Kror Kor	Pursat
5	Mrs. Chuop Sisavann	Srelvea	Trapaing Chomg	Bakan	Pursat
6	Mr. Lem Loum	Khouychikdei	Robos Mongkol	Maung Reusei	Battambang
7	Mr. Lem Pakdevath	Hai San	Chrey	Thmor Kaul	Battambang
8	Mr. Chhoeum Chin	Kon Sek	Oumal	Battambang	Battambang
9	Mr. Soum Phann	Outaki	Outaki	Thmor Kaul	Battambang
10	Mr. Phal Veasna	Char	Anlung Run	Thmor Kaul	Battambang
11	Ms. Chhut Saly (on behalf of Ms. Chhut Saly)	Ouchinchean	Rolous	Prasat Bakomg	Siem Reap
12	Mr. Nov Noeun	Ou	Svay Sar	Varin	Siem Reap
13	Mr. Pinh Pey (on behalf of Mr. Met Nimol)	Vath	Tbeng	Banteay Srei	Siem Reap
14	Mr. Pinh Puth	Vath	Tbeng	Banteay Srei	Siem Reap
15	Mr. Keo Vanna	Prasat	Sanraung Year	Pouk	Siem Reap
16	Mr. Heang Hoksan	Chubsaum	Paksneng	Angkor Thom	Siem Reap

Table 6-7 Preliminary training on seed production in Takeo

Date		Contents	Lecturers
Nov. 20	Sun	Move: each province to Takeo	
Nov. 21	Mon	Opening ceremony Lecture: Structure and operation of small-scale hatchery Lecture & Practice: Tilapia seed production	Mr. Ouch Lang Department of Aquaculture Development (DAD)
Nov. 22	Tue	Lecture & Practice: Silver carp seed production	Mr. Ouk Hak Fisheries Officer in Takeo Province
Nov. 23	Wed	Lecture & Practice: Common carp seed production	Mr. Phon Pich Fisheries Officer in Kampong Spur Province
Nov. 24	Thu	Lecture & Practice: Silver barb seed production	Mr. Ouch Lang DAD
Nov. 25	Fri	Follow-up workshop of third country training	Participants in Third Country Training
Nov. 26	Sat	Follow-up workshop of third country training	
		Lecture: Networking of fish farmers Visit to local seed producers (Mr. Hang Heng: Pangasius seed production) Closing ceremony	
Nov. 27	Sun	Move: Takeo to each provinces	

2nd year

(1) – 4 Brush-up Training for Seed Producers selected for 1st and 2nd year

The monitoring to first and second years' seed producers for their seed production activities revealed several technical problems on seed production, especially, silver carp and tilapia in target fish species of the project.

In terms of silver carp, core farmers (seed producers) could not produce seeds stably, because broodstock could not spawn eggs after hormone injection, and a majority of larvae could not survive at the development stage between the hatching of fertilized eggs and the first day after hatching. The mass death of silver carp larvae at initial stages are caused by various factors, such as broodstock handling, amount and time of hormone injection, water quality and water change rate in rearing tanks, and shapes of rearing tanks. Even though it is hard to identify exact reasons for those problems on seed production of silver carp at present, a brush-up training program gives an opportunity for core farmers to verify their actual techniques on seed production of silver carp, and improve their current activities of seed production.

In terms of tilapia, core farmers usually collect tilapia seeds, naturally produced and raised in ponds, without any technical difficulties in seed production. However, it is too difficult to control a natural production of proper-size fish seeds at peak times of their high demand as planned. Therefore, there is a weak linkage between seed production and distribution (seed sale). Accordingly, the project considered several measures, such as planned management of broodstock, control of fish seed quantity at intermediate culture stages, grading (male or female) of fish seeds at proper times, and introduction of production techniques of mono-sex fish seeds (all male).

In order to correct improper techniques of seed production in silver carp and tilapia, the project held the brush-up training program for core farmers at Teok Vil Center in Siem Reap province in 5 days, September 10 to 14, 2012. Table 14 indicates the schedule of brush-up training program.

Table 6-8 Brush-up Training for Seed Producers selected for 1st and 2nd year

Date		Time	Tentative Contents
9-Sep	Sun		Move to Siem Reap (Participants from Battambang and Pursat)
10-Sep	Mon	0830-0930	Opening session
		0930-0945	Break
		0945-1100	Lecture: Technique of Silver carp seed production
		1100-1400	Lunch break
		1400-1500	Facility tour
		1500-1600	Practice: Preparation of spawning and incubation tank.
		1600-1730	Harvesting of bloodstock
		1730-1930	Dinner break
		1930-2200	Lecture and practice: Making of hormone (Suprefact and HCG) for spawning induction
2200-2230	Practice: Injection to bloodstock		
11-Sep	Tue	0800-0930	Practice: Egg collection and incubation
		0930-0945	Break
		0945-1045	Practice: Observation of egg development
		1045-1130	Question and answer
		1130-1400	Lunch break
		1400-1500	Practice: Observation of egg development
		1500-1630	Lecture: Technique of mono-sex male Tilapia (YY Tilapia)
		1630-2030	Dinner break
2030-2130	Practice: Observation of egg development and newly hatched larvae		
12-Sep	Wed	0700-0800	Practice: Collection of Tilapia fry in the pond and selection of proper size of fry for mono-sex Tilapia
		0800-0900	Practice: Observation of hatched larvae (Confirmation of larval survival and removing of contamination)
		0900-1000	Practice: Making of feed for mono-sex Tilapia-I
		1000-1100	Practice: Observation of hatched larvae (Confirmation of larval survival and removing of contamination)
		1100-1400	Lunch break
		1400-1500	Practice: Observation of hatched larvae (Confirmation of larval survival and removing of contamination)
		1500-1600	Practice: Making of feed for mono-sex Tilapia-II
1600-1700	Practice: Observation of hatched larvae (Confirmation of larval survival and removing of contamination)		
13-Sep	Thu	0700-0800	Practice: Collection of Tilapia fry in the pond and selection of proper size of fry for mono-sex Tilapia
		0800-0900	Practice: Feeding of hormone diet to fry in experimental tank and hapa net for mono-sex Tilapia
		0900-1000	Practice: Observation of hatched larvae (Confirmation of larval survival and removing of contamination)
		1000-1100	Practice: Feeding of hormone diet to fry in experimental tank and hapa net for mono-sex Tilapia
		1100-1230	Lunch break
1230-1800	Study tour (Visit Core seed producer's farm and Rice-cum fish culture demonstration farm) * Puok Chom's seed farm * Kem Phnom's fish farm (rice-fish culture demonstration farm) * Mao Pek's seed farm (rice-fish culture demonstration farm) * Yip Prong's seed farm		
14-Sep	Fri	0800-1000	Practice: Harvest Silver carp larvae (D-2) to nursery pond
		1000-1100	General review and discussion
		1100-1115	Break
		1115-1215	Closing Session
			Back to Battambang and Pursat (Participants from Battambang and Pursat)

Core famers (seed producers) and extension officers in target provinces participated in the brush-up training program. At the first half of the training program, Japanese experts demonstrated technical procedures of silver carp seed production with counterparts of Fisheries Administration through a practice of hormone injection, an observation of fertilized egg development, a practice of egg hatching and fish larva rearing, etc. Training participants also practiced the demonstrated skills

of seed production for silver carp, and found necessary improvement points in comparison with their current skills of seed production. Visual presentation materials were prepared to explain broodstock management (proper stock density and nutrient and feeds) and theory for stimulating spawning smoothly. The second half of the program explained seed production techniques of mono-sex tilapia. Based on the lectured theory and method, training participants practiced to make compounded feeds mixed with male sex hormones and managed to feed tilapia fries with hormone mixed feeds.

Province	Name of HH Head	District	Commune	Status of farmer
Pursat	Em Som Ol	Kror Kor	Kbal Torach	CSF-2011
	Suon Seng / Pen Sovan	Kror Kor	Boeng Kantuot	CSF-2012
	Ly Heng	Kamdieng	Kan Chor	CSF-2011
	Vorn Bona	Kandieng	Kandieng	CSF-2011
	Kean Nhoeng	Kandieng	Koh Chum	CSF-2011
	Phon Chea	Bakon	Khnar Tortoeng	CSF-2012
	Chin Kunthy / Chop Sisavaan (Ms)	Bakon	Tresing Paing chhong	CSF-2012
	Srei Monynal	Krakor	Tnautchom	CSF-2012
	Sou Yeng	Bakon	Romlech	CSF-2012
Battambang	Mao Pek	Thmor Korl	Bansay Treng	CSF-2011
	Mith Phan	Bor Vil	Prey Khbos	CSF-2011
	Chhorm Sovan	Battambang City	Autakorn	CSF-2011
	Dy Chana	Ratanamondul	Sdao	CSF-2011
	Sam Thim/ Thim Vibol	Morg Reusey	Prey Touch	CSF-2011
	Van Sinat	Morg Reusey	Kear	CSF-2011
	Suon Pan	Thma Koul	Ou Ta Ki	CSF-2012
	Chounm Thin	Bat Dambang	Ou Mal	CSF-2012
	Lim Loum	Moung Ruessei	Robas Mongkol	CSF-2012
	Lem pakdewath	Thma Koul	Chrey	CSF-2012
	Phal Veasna	Thma Koul	Anlung Run	CSF-2012
	Haing Kier	Battambang	Chomkasamrong	Volunteer
	Rithy Sopisal	Thmor Korl	Kok Khmom	Volunteer
	Chhang Sok	Battambang	Prekphashdach	Volunteer
	Siem Reap	Say Sorn	Puok	Puok
Neuv Noeun		Va Rin	Svay Sao	CSF-2012
Yip Prang		Prasat Bakong	Kordek	CSF-2011
Penh Puth		Bantey Srey	Tbeng	CSF-2012
Mao Lanh		Saut Nikum	Som Rong	CSF-2011
Met Nimul		Saut Nikum	Dan Run	CSF-2012
Puok Chhorn		Chi Kreng	Spean Tnort	CSF-2011
Heang Hoksom		Angkor Thom	Peak Snaeng	CSF-2012
Phorn Bunnarith		Prasat Bakong	Roluos	CSF-2012
Ouk Kimhong		Puok	Koovey Riel	CSF-2012

3rd year

(1) – 5 Brush-up (Technical Supplementary) Training

In order to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas, the project planned to hold a brush-up (technical supplementary) training for seed producers, who have serious problems on seed production techniques, among the core farmers selected in the first, second and third years. Because the training is prepared for experienced seed producers, not beginners of seed production, participant farmers have to conduct several trails of seed production in this season, the training was scheduled later half of the year.

The target fish species will be stepped up from tilapia and silver barb, which were dealt at an elementary training on seed production for beginners' farmers, to common carp, Indian carp and silver carp. The training will demonstrate a process of seed production, such as hormone injection (the amount of hormone, the timing of injection), broodstock management (proper stocking density, food nutrition, and feeding control), and hatching management. It will improve weak technical points of individual seed producers, and heighten their capacities of seed production.

The training was held at Battambang province from 23 December to 25 December 2013. Fifteen (15) seed producing farmers (including four new seed farmer candidates for 4th year) in Pursat province, 17 seed producing farmers (including two new seed farmer candidates for 4th year) in Battambang province and 8 seed producing farmers (excluding two existing old seed farmers, Mr.Puok Chorn and Mr.Ouk Kimhong) in Siem Reap province participated the training. An experienced advance farmer from Takeo province, Kampot province and Kampong Speu province respectively also were invited and took part in the training to give suggestion from their experience, additionally six seed farmers supported by local NGO(FLD) joined voluntarily.

All training participants visited core seed farmers of FAIEX-2 (Mr. Mao Pek and Mr.Suon Phan) in the first day of training to learn the technique from their facilities preparations. Participants joined lecture and question-answer session from the second day to discuss the problem of seed production activities.

Since a lot of seed farmers have experience of tilapia and silver barb only, advanced farmers who have experience of common carp, indian carp and silver carp seed production gave advice regarding proper hormone injection method, broodstock selection and hatchery management to inexperienced seed farmer.

4th year

(1) – 6 Brush-up (Technical Supplementary) Training for the farmers in Pursat

In order to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas, the project planned to hold brush-up (technical supplementary) training for seed producers in Pursat from 11 June to 13 June 2014. Training was held at core seed farmer's house in Pursat and 9 seed producing farmers participated the training.

The following trails were demonstrated at the training to verify some technical issues.

Table 6-9 Technical issues on silver barb seed production

Issues to verify	Results
① Comparing hormone	There was no difference between 2 hormones
② Comparing artificial and semi-artificial spawning method	Individual method showed different results
③ Comparing water for hatching (ground water, pond water)	Both water (from ground water and pond water) could be applicable for hatching of silver barb.

(1) – 7 Brush-up (Technical Supplementary) Training for the farmers in Battambang

To improve the production technique as well as to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas, the project planned to hold a brush-up (technical supplementary) training for seed producers in Battambang from 24 June to 27 June 2014. Training was held at core seed farmer's house and 11 seed producing farmers and 5 university students participated the training.

(1) – 8 Brush-up (Technical Supplementary) meeting for the farmers

Responding to recommendation from final evaluation conducted September 2015, project hold a brush-up (technical supplementary) training in order to improve the production technique as well as to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas. Training was held from 17 November to 21 November 2014 at core seed farmer's house in Takeo province and 32 seed producing farmers of FAIEX-2 and 7 seed farmers from FAIEX-2 (from Kampot, Takeo and Prey Veng) participated the training.

Table 6-10 Brush-up (Technical Supplementary) meeting

Date	Program	Facilitators
Day: 1	17-Nov-14	
Morning		
8:30 AM	Register	Project staff
	Speech of district governor	
	Speech of FiAC director Takeo	Mr. Sao Kosal
	Speech of DAD/ JICA	Dr. Hav Viseth/ NIWA
	Purpose of the technical training and co-network meeting	Chin Da/ NIWA
	Brief presentation on Current statuses of Network management of Porsat	Leader of Network Porsat
	Break	
	Brief presentation on Current statuses of Network management of Battambang	Leader of Network Battambang
	Brief presentation on Current statuses of Network management of Siem Reap	Leader of Network Siem Reap
Afternoon		
	Summary of the 3 presentations	Trainers
	Plenary discussion on sustainability of strengthening fish seed farmers' networks	Together with Network in Takeo
	Study tour (observation of prawn hatchery in Van Po fish farm)	
Day: 2	18-Nov-14	
Morning		
8:30 AM	Plenary discussion on breeding techniques	All participants/ Trainers
	1)- Rearing broodfish in earthen ponds	All participants
	2)- Selecting mature broodfish Male and Female for injecting hormone	All participants
	3)- Preparation of hormone	All participants
	4)- Injection of broodfish	All participants
	5)- Preparation of hatchery and breeding broodfish	
Afternoon		
	Summary of breeding techniques	Trainers
	Methods for prevention of broodfish from flooding	All participants/ Trainers
	Practical works on breeding (Divide into 2 groups)	All participants/ Trainers
Day: 3	19-Nov-14	
Morning		
8:30 AM	Checking hatching condition / Observation of hatch out larvae	All participants
	Reminding yesterday's discussion and evaluate the results of hatching	Trainers
	Plenary discussion on Nursing Techniques (nursing fry to fingerling size)	All participants/ Trainers
	1)- Rearing fish seeds in cement tanks, plastic ponds, hapas, earthen ponds	All participants
	2)- How to prevent fish predators from fish nursing ponds	All participants
Afternoon		
	Plenary discussion on Nursing Techniques (Continued)	All participants
	3)- How to improve and maintain water quality	All participants
	4)- How to feed them (Feed formula, feeding method, etc.)	All participants/ Chin Da
	How to dig fish pond properly by hand or by excavator	All participants/ Trainers
Day: 4	20-Nov-14	
Morning		
8:30 AM	Plenary discussion on Techniques for Broodfish rearing	All participants/ Trainers
	1)- Rearing broodfish in earthen ponds	All participants
	2)- Feeding technique (kind of feed, feed preparation, method of feeding, etc.)	All participants
	3)- Water quality	All participants
	Plenary discussion on Techniques in Breeding fish	All participants/ Trainers
	Checking mature broodfish (Male and female)	All participants
	Natural breeding of Tilapia in earthen ponds	All participants
	Commercial breeding of Tilapia in earthen ponds	All participants
Afternoon		
	Plenary discussion on Techniques in Breeding fish (Continued)	All participants
	1)- How to improve female spawning (egg quantity, quality)	All participants
	2)- How to improve fertilized egg ratio, hatching rate, etc.	All participants
	3)- How to evaluate quality of fish egg, broodstock quality	All participants
	Practical work on checking mature broodfish (Male and Female of some species)	All participants
Day: 5	21-Nov-14	
Morning		
8:30 AM	Observation of swim up fry (2days after hatching)	All participants
	Discussion (summary of results for all 4 days lecture, practice, discussion of networking)	Trainers
	Questions and Answers	All participants
11:30 AM	Closing	

(2) Training in 3rd country

The following training was conducted in 3rd country.

Table 6-11 Training in 3rd country (2011~2014)

Date	Country	Training course	Participation		
			Seed farmers	Extension officer FIA Cantonmen	FIA, DAD
2 Oct ~ 21 Oct 2011 (20 days)	Indonesia	Training on Seed Production Technique (4 target fish species, silver carp, common carp, silver barb and tilapia) except murgal)	4	3	4
4 Nov ~ 24 Nov 2012 (21 days)	India	Training on Seed Production Technique (2 target fish species common carp, tilapia)	6	6	4
6 Jan ~ 24 Jan 2014 (19 days)	Indonesia	Training on Seed Production Technique (4 target fish species, silver carp, common carp, silver barb and tilapia) except murgal)	11	2	3

(2) – 1 Training Programs in Third Country Training (Indonesia-1)

The project team discussed a proper training place for provincial extension officers and core farmers to study advance cases and technical skills in the third country with Fisheries Administration. Finally, Indonesia was selected as a country for the training in this fiscal year. Since FAIEX Phase 1, Cambodian Fisheries Administration and Indonesian Directorate General of Aquaculture have made mutual relationship by dispatching short-term experts from Indonesia, holding third country trainings, conducting field survey for improving the quality of catfish (*Pangasius*) broodstock, exporting qualified catfish seeds, and so forth. At present, both agencies also have been sustaining good relationship in sharing technical skills and information. By utilizing the connection between both agencies, the project team prepared and arranged a training program with Directorate General of Aquaculture, Ministry of Marine Affairs and Fisheries in Indonesia. The training program was carried out mainly at Jambi Freshwater Aquaculture Development Center in 21 days from October 2. The training program also included observation tours at private fish farms, rice-fish farms, fish seed markets and fish processing facilities in West Java. The participants of the third country training are indicated at Table 3. Totally, 11 persons participated in the training program, which composed 3 persons from Fisheries Administration, 3 persons from cantonment fisheries offices, and 4 persons from fish seed producers.

Table 6-12 Participants of Third Country Training in 2011

No.	Name	Position
1	Haing Leap *	Deputy Director of Department of Aquaculture
2	Chin Da *	Deputy Director of Department of Aquaculture
3	Chhor Bunly	Officer of Department of Aquaculture
4	Sroy Seangly	Officer of Department of Aquaculture
5	Chhay Morn	Deputy Director of Provincial Fisheries Office
6	Kong Sokha	Deputy Director of Provincial Fisheries Office
7	Prin Savin	Deputy Director of Provincial Fisheries Office
8	Yip Prang	Seed farmer
9	Vorn Bonat	Seed farmer
10	Em Sam Ol	Seed farmer

11	Chham Sovann	Seed farmer
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Because of proper operation of project activities in Cambodia, Mr. Haing Leap participated in the training program only from October 2 to 6. Instead of him, Mr. Chin Da joined it from October 16 to 21. The training program concentrated on a learning of seed production techniques in tilapia and common carp, which are target species of the project. Additionally, seed production of catfish, whose demand is high among fish seed producers, was also included as additional subject (Figure).

Table 6-13 Schedule of Third Country Training in 2011

Date	Location		Activity			Lodging
	Journey	Place	Species	Subject of training or Study tour	Place	
1 2-Oct Sun		Arrive at Jakarta	Jakarta			Jakarta
2 3-Oct Mon	AM PM	Jakarta → Jambi Lion Air (JT 608) 15:30	Jakarta	Courtesy call	9:00 DGA	DGA
3 4-Oct Tue	AM PM		JFADC ditto	Lecture	Country report (Cambodia) Aquaculture in Indonesia (JFADC staff) Orientation (JFADC) Breeding / Seed production	Jambi
4 5-Oct Wed	AM PM		ditto ditto	Practice	Breeding / Seed production Breeding / Seed production	Jambi
5 6-Oct Thu	AM PM		ditto ditto	Practice	Breeding / Seed production Breeding / Seed production	Jambi
6 7-Oct Fri	AM PM		ditto ditto	Practice	Breeding / Seed production Breeding / Seed production	Jambi
7 8-Oct Sat	AM PM		ditto ditto	Study tour	Study tour - Private hatchery - Private farm (pond, cage culture)	Jambi
8 9-Oct Sun			ditto ditto	Study tour	Study tour - Private hatchery - Private farm (pond, cage culture)	Jambi
9 10-Oct Mon	AM PM		ditto ditto	Lecture	Breeding / Seed production Breeding / Seed production	Jambi
10 11-Oct Tue	AM PM		ditto ditto	Practice	Breeding / Seed production Breeding / Seed production	Jambi
11 12-Oct Wed	AM PM		ditto ditto	Practice	Breeding / Seed production Lecture	Jambi
12 13-Oct Thu	AM PM		ditto ditto	Practice	Breeding / Seed production Breeding / Seed production	Jambi
13 14-Oct Fri	AM PM		ditto		Meeting (Evaluation and Discussion) with DGA officials from Jakarta	Jakarta
14 15-Oct Sat	AM PM	Jambi → Jakarta	ditto			Jakarta
15 16-Oct Sun	AM PM	Jakarta → Sukabumi(Bogor)	ditto MCFAD-Sukabumi		move	Cianjur
16 17-Oct Mon	AM PM		ditto ditto	Study tour	- Fish fingerling market in Parung, Bogor - Cirata Reservoir (3 layers fish cage model) (move to MCFAD Sukabumi)	Sukabumi
17 18-Oct Tue	AM PM		ditto ditto	Study tour	MCFAD Sukabumi - Rice fish Cum activities	Sukabumi
18 19-Oct Wed	AM PM	Cianjur → Sukabumi Sukabumi → Jakarta	ditto Jakarta	Study tour	MCFAD Sukabumi Sukabumi → Jakarta	Jakarta
19 20-Oct Thu	AM PM		ditto ditto	Reporting	DGA 14:00 JICA Indonesia office (confirmed)	DGA JICA
20 21-Oct Fri	AM PM	Leave Jakarta - Arrive at Phnom Penh				

- Impression of Third Country Training
 - a. Jambi Freshwater Aquaculture Development Center produces fish seeds of several freshwater species, such as tilapia, common carp and silver barb through a year. The Jambi center also produces fish seeds of 2 species catfish, which have high domestic demand in Cambodia. Therefore, the participant could receive intensive technical trainings in a short time. Moreover, there are a lot of proper observation places around the center, such as backyard hatcheries, tilapia seed producers trained by the center, and catfish farmers producing homemade feeds. Because of those good conditions, the Jambi center is a relevant institute for training programs for fish seed producers.
 - b. Only practical sessions on introduction of seed production was carried out at Jambi Freshwater Aquaculture Development Center. If the practical sessions of larva rearing after hatching (at least in 2 - 3 weeks) was conducted in On-Job Training (OJT) style, it is much better for the participants to understand basic techniques of seed production. Most of them could understand some knocks in selection of initial feeds and management of larva rearing by their actual practices. A part of participants (seed producers) expressed to need a longer training period. The comment will reflect the next training plans.
 - c. Because West Java province has a longest history of freshwater aquaculture in Indonesia, the participants could observe traditional community-based fish culture and various styles of fish culture and related industries at the second half of the training program. Especially, the fish seed market in Sukabumi, one of observation places in the training, has 60 - 70 years' history as a local community market for fish seed sales. At present, there are many retailers selling aquaculture equipment's (nets, grading buckets, baskets, etc.), transportation equipment's for fish seeds or live fish, fish feeds and medicines for aquaculture around the market. It is a completed style of retail market for aquaculture business. Currently, the extensions of fish seed sales and technical skills to neighbor farmers are important issues for local seed producers in Cambodia. Because the participants (seed producers and extension officers) had opportunities to observe the actual case of long-term aquaculture development in local communities, it may be a good reference model to formulate their community-based aquaculture extension plans.
 - d. The Indonesian side took care of the training program well. Especially, Jambi Freshwater Aquaculture Development Center rearranged the training program to add a practical session of *Moina* culture and larva rearing of catfish, in accordance with requests from the participants. Therefore, the satisfaction level of the participants was very high. In the study tour in West Java province, the participants could visit various places efficiently in a short time by a good arrangement of Directorate General of Aquaculture. Visiting places were properly selected with our expectation. The cooperative relationship has been developed in a long time by technical cooperation in fisheries sector conducted by JICA. It should be utilized for training programs for surrounding countries in the future.

- e. The composition of training participants was mixed with officers of Fisheries Administration, local extension officers, and fish seed producers. According to their mixture composition, the training program was composed with technical programs (lectures and practices) and study tours. It was concerned that the mixture member composition made serious confusion in their different interests. On the contrary, it made opportunities to discuss their opinions and ideas each other. Through the training period, basically, an extension officer and a seed production farmer made a pair group in the same province. After lecture and practical sessions, the extension officer voluntarily made supplementary explanation to the farmer in the subjects, which the farmer could not understand. Their strong motivation to learning in the training was very significant.

(2) – 2 Training Programs in Third Country Training (India)

The project conducted the third country training in India on 21 days from November 4 to 24, 2012, on the following schedule. 4 persons of Fisheries Administration officers, 6 persons of extension officers, and 6 persons of core farmers, total 16 persons participated in the training. Because the staffs of Fisheries Administration and counterparts of provincial extension officers could not participate in the whole program due to restriction of their regular works, they were divided in 2 groups, Group A (4 persons) and Group B (6 persons). Each group separately joined the first or second half of the training program.

Table 6-14 List of Participant Candidates of Third Country Training Program

Group	No.	Name	Position	Period of participation in the training
A	1	Dr. Hav Viseth	Director of Department of Aquaculture Development	From 4th to 11th November
	2	Mr. Pol Mimos	Officer of Department of Aquaculture Development	
	3	Mr. Kong Sokha	Deputy Director of Fisheries Administration Cantonment in Battambang province	
	4	Mr. Prin Savin	Director of Fisheries Administration Cantonment in Siem Reap province	
B	5	Mr. Chin Da	Deputy Director of Department of Aquaculture Development	From 10th to 24th November
	6	Mr. Ouch Lang	Officer of Department of Aquaculture Development	
	7	Mr. Leng Sovanara	Officer of Fisheries Administration Cantonment in Battambang province	
	8	Mr. Meng Sothai	Officer of Fisheries Administration Cantonment in Battambang province	
	9	Mr. Neang Nget	Officer of Fisheries Administration Cantonment in Pursat province	
	10	Mr. Uy Sovany	Officer of Fisheries Administration Cantonment in Siem Reap province	
C	11	Mr. Mao Pek	Seed farmer in Battambang province	From 4th to 24th November
	12	Mr. Mith Phan	Seed farmer in Battambang province	
	13	Ms. Chuop Sisavann	Seed farmer in Pursat province (Wife of Mr. Chin Kunthy)	
	14	Mr. Ly Heng	Seed farmer in Pursat province	
	15	Mr. Puok Chhorn	Seed farmer in Siem Reap province	
	16	Ms. Say Rathna	Seed farmer in Siem Reap province (Daughter of Mr. Say Son)	

Table 6-15 Schedule of Third Country Training (2nd year in India)

No.	Date		Program	Lodging
1	4-Nov	Sun	Move from Cambodia to India	Kolkata
2	5-Nov	Mon	Inauguration programme Orientation programme Presentation on overview of West Bengal fishery Visit to 4 No. Bhery Co-operative society	Kolkata
3	6-Nov	Tue	Visit to ornamental fish farms at Paikan and Amtala Visit to Mudially Fisheries Co-operative Society Visit to Central Institute of Fisheries Education, Kokata centre	Kolkata
4	7-Nov	Wed	Visit to Naihati fish seed market, hatcheries & farm	Kolkata
5	8-Nov	Thu	Visit to sewage- fed fishery at East Kolkata Wetland and Bhery (large water body)	Kolkata
6	9-Nov	Fri	Visit to Central Inland Fishery Research Institute (CIFRI)	Kolkata
7	10-Nov	Sat	Visit to Sundarban Mangrove forest area and rice cum fish farmers	Kolkata
8	11-Nov	Sun	Move from Kolkata to Bhubaneswar	Bhubaneswar
9	12-Nov	Mon	Inauguration Freshwater aquaculture – the sunshine sector Visit and interaction with Aquaculture Entrepreneurs at Sarakana, Khurda	Bhubaneswar
10	13-Nov	Tue	DIWALI (Holiday)	Bhubaneswar
11	14-Nov	Wed	Farm visit including hatcheries, aquarium, feed mill, KVK , ATIC etc. Induced breeding of carps and evolution of hatchery models in India Carp seed production – a promising venture in freshwater aquaculture Soil and water management for quality seed production	Bhubaneswar
12	15-Nov	Thu	Visit to CRRI Administrative set up of DAHDF, Min. of Ag. Questions and Answers	Bhubaneswar
13	16-Nov	Fri	Selective breeding in fresh water fishes Practical on preparation of farm made feed Operation of portable FRP hatchery and other gadgets Valedictory	Bhubaneswar
14	17-Nov	Sat	Move from Bhubaneswar to Eluru	Eluru
15	18-Nov	Sun	Indian major carp (IMC) nursery, yearlings, seed rearing practices. Visit to floating pellet feed factory and rice bran factory.	Eluru
16	19-Nov	Mon	Visit to Indian major carp seed production, rearing and marketing centre in Krishna district-the biggest in the South-India Pangus brood stock management pond, pangus hatchery Indian - and Chinese major carp seed rearing practices	Eluru
17	20-Nov	Tue	Vietnamese catfish (pangus), fry, fingerling, stock size rearing on floating pelleted feed, mixed feeding schedule. (Biggest pangus farm in India) IMC seed and grow out culture on floating pellet feed	Eluru
18	21-Nov	Wed	Indian and Chinese major carp seed rearing farm Fisheries Research Station, Undi, Diseases of fish seed Carp hatchery of Sri Radha Krishnam Raju	Eluru
19	22-Nov	Thu	Visit to co-operative Indian major carp seed and grow-out ponds	Eluru
20	23-Nov	Fri	IMC culture on mixed feeding schedules Move from Eluru to Hyderabad	on a plane
21	24-Nov	Sat	Departure from Hyderabad to Bangkok	Cambodia

Result of Training Program

In India, freshwater fish takes 95 % of fish culture production. A sort of carp is mostly cultured in freshwater fish. In the training, the participants visited private hatcheries, fish farms, fish seed markets, aquaculture research centers in 3 provinces where fish culture is very popular (West Bengal, Orissa, Andhra Pradesh). The training aimed that the participants learned local aquaculture methods and advance techniques, and brought back some applicable techniques for Cambodia individually.

According to a project request, Dr. Nandesha, a professor in Collage of Fisheries, Central

Agriculture University, coordinated the training program at Indian side. Because he was engaged in an aquaculture project funded by World Bank and FAIEX Phase 1 as short-term expert, he well-knows actual problems and proper measures to issues on freshwater aquaculture in Cambodia. The abstract of each province was described below.

a. First Week (West Bengal Province)

Kolkata is the largest place of fish seed production in India, and produced about 62 % of fish seeds in the country. There are more than 200 private hatcheries in the city. The participants visited private hatcheries, carp farms, fish seed markets, and got explanation about hormone injection to broodstock, egg collection method, rearing density of fish larva and secrets of water quality maintenance from Indian specialists. In addition, they observed the scenes of experiments and studies on aquaculture at Central Inland Fisheries Research Institute (CIFRI), and learned the recent research outputs on cage culture, fish diseases, fish feed, and rice fish culture by a series of lectures.

b. Second Week (Orissa Province)

In the second week, the participants stayed at Central Institute of Freshwater Aquaculture, Baleshwar and received the training program, which comprised lectures and practices on seed production and selected strain breeding of common carp. Especially, in Cambodia, because farmers hardly manage pond condition for rearing fish larva up to fingerlings, the survival rate of fish larva mostly remains at low level. Therefore, the participants eagerly asked about maintenance of water quality in fish ponds, soil quality, and selection of fertilizer materials. In addition, they visited a model site of rice fish culture system integrated with animal husbandry and vegetable farming at Central Rice Research Institute of Orissa province.

c. Third Week (Andhra Pradesh Province)

The aquaculture production in Andhra Pradesh province is the second largest in India, next to West Bengal province. At Nellore district, eastern areas of the province, carp and catfish culture is very popular at freshwater lakes and rivers. There are about 65 hatcheries and fish farms in the district, and a variety of aquaculture industry, such as local dealers of aquaculture equipment, fish seed factories, and fish distributors, are well developed. In the training, the participants visited fish farms of Indian carp and fish feed factories. In addition, they visited a cooperative association comprising about 30 fish farmers, and collected information on a background of establishment and management of cooperative association.

Impression on the Training

Aquaculture industry in India quite vary. There are various idea and invention on each process of seed production and grow-out farming at farmer's level. Those local skills are not difficult in special, extension officers and core farmers participating in the training told that most learned skills may be applied in Cambodia, such as ideas on fish feeding, effective cannel designs in rice fish

culture, and hormone arrangement in case of difficulty to find commercial products. It is expected that seed producers and extension officers will feedback their lessons learned to local communities.

(2) – 3 Training Programs in Third Country Training (Indonesia-2)

Since the Phase 1, the effective utilization of the third country training has been one of features of the project. In the first and second years of Phase 2, 1) On-Job-Training (OJT) style training program and 2) Observation style training programs (visit to advance cases) were conducted in Indonesia and India respectively. The outputs and learning of those training programs were shared with other farmers through workshops and network meetings. However, because the learnings from the training programs could not be completely conveyed by oral explanation or visual presentation, it was not evitable that the effectiveness of feedback to local people was lowered. Moreover, because some clues of field production techniques could be well understood with actual practices with own hands, the project conducted a third country training once again for seed producers in the third year.

(2)-3-1 Training country

The project team discussed a proper training place mainly for core seed farmers to study advance cases and technical skills in the third country with Fisheries Administration. Finally, Indonesia was selected as a country for the training in this fiscal year. Since FAIEX Phase 1, Cambodian Fisheries Administration and Indonesian Directorate General of Aquaculture have made mutual relationship by dispatching short-term experts from Indonesia, holding third country trainings, conducting field survey for improving the quality of catfish (*Pangasius*) broodstock, exporting qualified catfish seeds, and so forth. At present, both agencies also have been sustaining good relationship in sharing technical skills and information. By utilizing the connection between both agencies, the project team prepared and arranged a training program with Directorate General of Aquaculture, Ministry of Marine Affairs and Fisheries in Indonesia.

The training program was carried out mainly at Jambi Freshwater Aquaculture Development Center. The training program also included observation tours at private fish farms, rice-fish farms, fish seed markets and fish processing facilities in West Java.

(2)-3-2 Period, time and target fish

A main training place for the third year is Jambi Freshwater Aquaculture Development Center in Indonesia, where the project held a training program in the first year. The center is conducting seed production for various fish species, including project target species (tilapia, silver barb, Indian carp, etc.), Java carp, and catfish (*Pangasius*, *Claius*). Most of the center staffs were counterparts, who worked in JICA technical cooperation project in 2000 - 2007. As they can adopt various requests for technical training flexibly, the center has ideal conditions for technical training on hardware and software sides.

Though the center always produces fish seeds of some species all around the year, especially the seed production activities in the center are peaked after December, when rainy season starts. Therefore, the training program is supposed to be conducted between January and March and the training period was

arranged to be about 3 weeks with the center to carry out field practices from egg spawning and hatching to larva rearing. The training targeted mainly for tilapia and common carp seed production technique.

(2)-3-3 Member of participation

The participants of the third country training are indicated in Table. Totally, 16 persons participated in the training program, which composed 3 persons from Fisheries Administration, 2 persons from cantonment fisheries offices, and 11 persons from fish seed producers.

Table 6-16 Participants of Third Country Training in Indonesia

No.	Name	Position
1	Mr. Phon Chea	Seed farmer in Pursat province
2	Mr. Srei Monynal	"
3	Mr. Chin Kunthy	"
4	Mr. Suon Pan	Seed farmer in Battambang province
5	Mr. Lem pakdewath	"
6	Mr. Phal Veasna	"
7	Mr. Um Khoen	"
8	Mr. Mao Pek	"
9	Mr. Mao Lanh	Seed farmer in Siem Reap province
10	Mr. Puok Chhorn	"
11	Mr. Heang Hoksom	"

Farmer

Officer

No.	Name	Position
1	Mr. Haing Leap	Deputy Director of Department of Aquaculture Development
2	Mr. Chhor Bunly	Officer of Department of Aquaculture Development
3	Mr. Sam Sour	Fisheries Officer in Battambang province
4	Mr. Hav Viseth	Director of Department of Aquaculture Development
5	Mr. Seng Songly	Fisheries Officer in Pursat province

Notes: Because of proper operation of project activities in Cambodia, three officers (Mr. Haing Leap, Mr. Chhor Bunly, Mr. Sam Sour) participated in the training program only from January 6 to 18. Instead of him, Mr. Hav Viseth and Mr. Seng Songly joined it from January 20 to 24. The training program concentrated on a learning of seed production techniques in tilapia and common carp, which are target species of the project. Additionally, seed production of catfish, whose demand is high among fish seed producers, was also included as additional subject

(2)-3-4 Training schedule

The training program was carried out mainly at Jambi Freshwater Aquaculture Development Center in the first half from 6 January to 18 January 2014 and at the Sukabumi Main center of Freshwater Aquaculture Development in the second half from 20 January to 24 January 2014 as shown in below. The training program in Jambi targeted mainly tilapia and common carp but also some subject regarding catfish was included responding request from training participants. Training also teaches environmental impact of exotic fish and careful treatment of exotic fish species. The second half of the training program at Sukabumi was consisted of study tour mainly to see the variety of aquaculture of West Java.

Table 6-17 Schedule of Third Country Training (3rd year in Indonesia)

Date	Itinerary	
	Group A (11 farmers)	Place of stay
5-Jan Sun	20:40 Dep. Phnom Penh (TG585) 21:45 Arr. at Bangkok	Bangkok (airport hotel)
6-Jan Mon	08:20 Dep. Bangkok (TG433) 11:55 Arr. Jakarta 15:20 Dep. Jakarta (GA134) 16:50 Arr. at Jambi	Jambi
7-Jan Tue	Training in Jambi center (refer attached training programe)	Jambi
8-Jan Wed	"	Jambi
9-Jan Thu	"	Jambi
10-Jan Fri	"	Jambi
11-Jan Sat	"	Jambi
12-Jan Sun	"	Jambi
13-Jan Mon	"	Jambi
14-Jan Tue	"	Jambi
15-Jan Wed	"	Jambi
16-Jan Thu	"	Jambi
17-Jan Fri	"	Jambi
18-Jan Sat	Discussions and closing ceremony in BBAT Jambi Jambi → Jakarta 13:20 Dep. Jambi (GA133) 14:40 Arr. at Jakarta	Jakarta
19-Jan Sun	Jakarta→Sukabumi by car	Sukabumi
20-Jan Mon	8:00-12:00 Visit Main Center for Freshwater Aquaculture Development (Lunch : Pondok lbuku) 14:00-17:00 Gunung Jaya (common carp culture by running water system)	Sukabumi
21-Jan Tue	6:00-8:00 Fish seed market in Chisaat 8:00-9:00 Visiting Private fish farm in Chibaraja Sukabumi Move from Sukabumi→Chianjur→Chirata (Lunch in Chianjur) Floating cage culture in Chirata lake Move to Bandung Catfish culture in Padalarang (near to Bandung town) Move to Bandung	Bandung
22-Jan Wed	Visiting Tangkuban Perahu Mountain in Bandung Lunch Asia-Africa meseum	Bandung
23-Jan Thu	Bandung→Bogor Visit Catfish Farm in Bogor 13:00-14:00 Lunch and closing in Sawilah Move to Jakarta	Jakarta
24-Jan Fri	Anchor aquarium(sea world) Wrap-up meeting	Jakarta
25-Jan Sat	13:05 Dep. Jakarta (TG434) 16:35 Arr. Bangkok 18:25 Dep. Bankok (TG584) 19:40 Arr. at Phnom Penh	

(2)-3-5 Result of implementation

I. Jambi Freshwater Aquaculture Development Center

In Jambi, 22 hours lecture and 40 hours practice regarding seed production technology on tilapia and common carp and java carp were offered to the training participants. Three days observation tours to visit private farm in South Sumatra and Jambi was also conducted.

II. Sukabumi Main center of Freshwater Aquaculture Development

In West Java after visiting Sukabumi Main center of Freshwater Aquaculture Development, observation tour to traditional fish seed market, backyard hatchery operated private seed farmer group, small-scale fish processing factory, were conducted during four days. Training participant exchanged the views and opinion in each place to understand more not only about fish seed production but also about optimal operation method and post-harvest.

- Impression of Third Country Training
 - a. Jambi Freshwater Aquaculture Development Center produces fish seeds of several freshwater species, such as tilapia, common carp and silver barb through a year. The Jambi center also produces fish seeds of 2 species catfish, which have high domestic demand in Cambodia. Therefore, the participant could receive intensive technical trainings in a short time. Moreover, there are a lot of proper observation places around the center, such as backyard hatcheries, tilapia seed producers trained by the center, and catfish farmers producing homemade feeds. Because of those good conditions, the Jambi center is a relevant institute for training programs for fish seed producers.
 - b. Only practical sessions on introduction of seed production had been carried out by the training implemented in 2011 at Jambi Freshwater Aquaculture Development Center due to shortage of time. If the practical sessions of larva rearing after hatching (at least in 2 - 3 weeks) was conducted in On-Job Training (OJT) style, it is much better for the participants to understand basic techniques of seed production. Taking the past experiences, hormone injection and spawning trial was conducted from the first day of this training. Consequently training participants could learn larval rearing technique at least for initial 10 days after hatching. Most of them could understand some knacks in selection of initial feeds and management of larva rearing by their actual practices.
 - c. Because West Java province has a longest history of freshwater aquaculture in Indonesia, the participants could observe traditional community-based fish culture and various styles of fish culture and related industries at the second half of the training program. Especially, the fish seed market in Sukabumi, one of observation places in the training, has 60 - 70 years' history as a local community market for fish seed sales. At present, there are many retailers selling aquaculture equipment's (nets, grading buckets, baskets, etc.), transportation equipment's for fish seeds or live fish, fish feeds and medicines for aquaculture around the market. It is a completed style of retail market for aquaculture business. Currently, the extensions of fish seed sales and technical skills to neighbor farmers are important issues for local seed producers in Cambodia. Because the participants (seed producers and extension officers) had opportunities to observe the actual case of long-term aquaculture development in local communities, it may be a good reference model to formulate their community-based aquaculture extension plans.
 - d. The Indonesian side took care of the training program well. Especially, Jambi Freshwater Aquaculture Development Center rearranged the training program to add a practical session of *Moina* culture and larva rearing of catfish, in accordance with requests from the participants. Therefore, the satisfaction level of the participants was very high. In the study tour in West Java province, the participants could visit various places efficiently in a short time by a good arrangement of Directorate General of Aquaculture. Visiting places were properly selected with

our expectation. The cooperative relationship has been developed in a long time by technical cooperation in fisheries sector conducted by JICA. It should be utilized for training programs for surrounding countries in the future.

- e. The composition of training participants was mixed with officers of Fisheries Administration, local extension officers, and fish seed producers. According to their mixture composition, the training program was composed with technical programs (lectures and practices) and study tours. It was concerned that the mixture member composition made serious confusion in their different interests. On the contrary, it made opportunities to discuss their opinions and ideas each other. Through the training period, basically, an extension officer and a seed production farmer made a pair group in the same province. After lecture and practical sessions, the extension officer voluntarily made supplementary explanation to the farmer in the subjects, which the farmer could not understand. Their strong motivation to learning in the training was very significant.
- f. Some seed farmer groups (it is called “Kelompok” in Indonesia) that project team visited in this training have experience of offering training to overseas participants. The Kelompoks were very friendly to the training participants and are interested in accepting the training group from overseas although we are not sure what generates their motivation. If such kind of training resource could be utilized by NGOs and donor agencies, farmer-to-farmer training could be possible in international level.

(3) Follow-up Workshop of Third County Training

Following feedback work shop were held after the third country training.

Table 6-18 Feedback workshop after 3rd country training (2011~2014)

Date	Venue	Participation
25 Nov 26 Nov 2011 (2 days)	Seed farmer house in Takeo	60 (seed farmer, extension officer, staff from FiA, etc.)
27 Dec ~28 Dec 2012 (2 days)	Battambang (Spring Park Hotel)	47 (seed farmer, extension officer, staff from FiA, etc.)
20 Feb ~21 Feb 2014 (2 days)	Seed farmer house in Siem Reap	40 (seed farmer, extension officer, staff from FiA, etc.)

(3) — 1 1st Follow-up Workshop of Third County Training (Training in Indonesia-1)

In order to share the outputs of third country training conducted in Indonesia in October 2011, a follow-up workshop was held in 2 days (November 25 and 26, 2011) jointly after the technical training of seed production, mentioned at Section (14)-2. Prior to the workshop, the participants of

the third country training (4 counterparts of Fisheries Administration, 3 provincial extension officers and 4 core farmers) shared the technique and information learned by the training in their respective groups, and arranged important technical points at respective stages of seed production, intermediate culture and grow-out culture and possibilities for introducing the techniques to Cambodia. Based on their prepared presentation materials and technical booklets, they presented the outputs of third country training in respective subjects. Then, attendants in the follow-up workshop put questions and opinions to the presentation. In addition to the participants of an on-going technical training of seed production, 14 first year's core farmers in target provinces and about 20 local fish farmers in Takeo and Kampot provinces voluntarily participated in the follow-up workshop. Total participants in the workshop reached about 60 persons, including training lecturers. In various subjects of the third country training, most attendants were attracted to a broodstock rearing method in dry season and a hatching method in limited water quantity, especially. The output sharing of third country training in the follow-up workshop was expected to promote the capacities of extension officers in target provinces, the technical levels of local seed producers, and the feedback to fish seed production in next season.

(3) – 2 2nd Follow-up Workshop of Third Country Training (Training in India)

In order to share the learning and output of the third country training (India, 21 days from November 4 to 24) and the training in Japan (16 days from December 8 to 23), a follow-up workshop was held in Battambang on December 27 and 28, 2012. Core farmers of the project and extension officers (counterparts) of cantonment offices at target provinces participated in the workshop. Including counterparts of Fisheries Administration, total participants reached 47 persons. From 4 core farmers, wives and daughters also joined the workshop.

On the first day (December 27), counterpart staffs of Fisheries Administration and counterparts of cantonment offices, who participated in those trainings, explained their learning in trainings and the possibility of adaptation to fish culture activities in Cambodia by their presentation materials, which they had prepared in charge of respective fields. In the discussion session after their presentation, many questions and comments were actively raised on various subjects, such as difference in fish culture style between India and Cambodia, method of pond fertilization, quantity of fertilizer materials (base material), and numerical information of rice fish culture, like paddy field area and culture period.

On the second day (December 28), all participants visited 2 fish farming sites of seed producers of the project (Mr. Suo Phan and Mr. Mao Pek) to hear their explanation about seed production activities.

Table 6-19 Follow-up Workshop of Third County Training (2nd training in India)

Date	Time	Presentation by		Title of the talk
27 December	7:00-8:00	Arrival of Participants and Registration		Opening Session
	8:00-8:15	Welcome remarks by Director of Cantonment Battambang		
	8:15-8:30	Welcome remarks by representative of JICA/FAIEXII		
	8:30-8:45	Opening speech by Director of DAD		
	8:45- 9:00	Break		
		Group I.		
	9:00-9:25	Mr. Kong Sokha	Experiences of fish culture (CC, IC, T) and seed production of Common Carp without using hormone in farm area of 100h in India	
	9:25-9:50	Mr. Pol Mimosa	Experiences of Rice Field Fish culture in India	
	9:50-10:15	Mr. Prin Savin	Experiences of Striped Catch fish culture and seed production in India	
	10:15-10:30	Break		
	10:30-11:45	General discussion		
	11:45-1:30	Lunch break		
		Group II		
	1:30-1:55	Mr. Meng Sothay	Experiences of seed rearing in India (Larvae stage to Fingerling size)	
	1:55-2:15	Mr. Leng Sovannara	Experiences of Feed Ingredients and Preparation in India	
	2:15-2:40	Mr. Neang Ngeth	Experiences of feeding fish in India (Feeding Methods)	
	2:40-3:05	Mr. OUCH Lang & Uy Sovanny	Experiences of Brood fish selective and Management for quality seed production in India	
	3:05-3:30	Mr. Chhor Bunly & Sroy Seangly	Lecture on Feed Ingredients and Feed Formulation	
	3:30-3:45	Break		
	3:45-5:30	General discussion		
5:30-7:00	Dinner break			
28 December	8:30 AM	Mr. Kong Sokha	Field visit to experience fish farmers around the training site	

(3) – 3 3rd Follow-up Workshop of Third County Training (Training in Indonesia-2)

After the third country training, a feedback workshop (report session) was held to share the training outcomes and information of improved techniques with counterpart organizations, provincial extension officers, and local seed producers in 2days from 20 February to 21 February 2014 at Siem Reap. The program of workshop is as follows. All project seed farmers (40 active seed farmers among 44 selected seed farmers) participated and exchanged lessons learned each other.

Table 6-20 Follow-up Workshop of Third County Training (Training in Indonesia-2)

Date	Time	Contents		Facilitator
19-Feb WED		Registration / Preparation		
20-Feb THU	AM 8:30 - 9:00	Opening address		Viseth, Chin Da
	9:00 - 11:30	Presentation by training participants (1) Counterparts (Bunley and Soum Sour) (2) Farmer in Battambang	Lecture	
		Lunch		
	PM 14:00 - 16:00	(3) Farmer in Pursat (4) Presentation by individual farmer (brief impression/ only 10 min per person)	Lecture	Viseth, Chin Da
	18:30 - 20:00	Practical work * Demonstrations of broodstock handling, preparation of breeding (hormone injection), etc.	Practice	Bunley, Leap, Chin Da
21-Feb FRI	AM 7:00 - 9:00	Practical work * Demonstrations of breeding (spawned egg handling, hatchery control)	Practice	Bunley, Leap, Chin Da
	9:00 - 11:30	Plenary discussion Closing	Discussion	Bunley, Leap, Chin Da

6.3 Assist the seed farmers mainly at initial stage. (Activity 3-3)

(1) Input Assistance of Seed Production Facilities(1st year and 2nd year, 2011-2012)

Corresponding to a peak season of fish seed demand (May to June: the beginning of rainy season), the third years' core famers should produce fish seeds, conduct fish culture training programs, and supply sufficient amount of fish seeds to other grow-out fish farmers. For the purposes, the core farmers need to prepare minimally necessary facilities for fish seed production. However, they have to pay a large amount of the preparation costs. Referring to the actual cases in Phase1, the project will provide necessary materials for their hatchery construction and rehabilitation, such as blocks, cements, gravels, and iron bars, and broodstock fish. Because the first year's core famers were selected from existing seed producers, the project could ask them to choose necessary materials from the items indicated at Table. However, the second and third years' core farmers are beginners of seed production. Therefore, the construction or rehabilitation costs of hatcheries and nursery ponds will be added into the necessary assistance items.

**Table 6-21 Input Assistance Items
for Seed Producers (1st year and 2nd year)**

No.	Item
1	Construction materials(bricks, sand, cement, etc.)
2	Pump (water pump, air pump)
3	Haching jar
4	Hormone
5	Net (seine net, hapa net etc.)
6	Broodfish
7	Electronic Battery

(1) — 1 Input Provision to Fish Seed Producers Selected for 1st year

(1)-1-1 Input Provision for 1st year seed farmer in FY 2011

In term of the provision of necessary inputs, the Phase I project supported core fish farmers in providing a part of purchase costs of necessary equipment's and materials, such as blocks, cements, gravel and iron bars, to improve their hatchery facilities. It is because individual farmers had to bear certain financial burdens when starting fish seed production. In the Phase II, based on the similar idea of Phase I, the project planned to provide some equipment to reduce the burdens of their initial investments. According to the result of field surveys to existing fish seed producers targeted in the first year, the maintenance condition of hatchery facilities largely varies in farmers, even though they have some facilities and equipment's of seed production. Therefore, the project didn't take a uniformed input support, but gave opportunities for each core farmer to choose necessary items on the above equipment list.

(1)-1-2 Input Provision for 1st year seed farmer in FY 2012

The input assistances to first year's seed producers were already completed last year. Because first year's core farmers were selected from existing experienced seed producers, the input assistances above-mentioned by the project made good effects to increase the amount of fish seeds produced by all of them. However, only 5 farmers could produce more than 100,000 seeds (3 farmers in Battambang, 1 farmer in Pursat, and 1 farmer in Siem Reap) in total 14 first year's seed producers. In term of fish species, about a half of them, only 6 seed producers, could produce less than three species' seeds. Besides reviewing the outcome of fish seed production, the confirmation surveys of seed production preparation for core farmers reveal large gaps in technical level and facility preparation condition among first year's seed producers. For a part of seed producers, the project needs to continue a follow-up guidance is necessary to increase the amount of seed production sustainably. In this fiscal year, the project continues conducting 'technical assistance by on-farm guidance'. Moreover, the project will make opportunities for technical exchanging by supplementary technical training programs and network meeting, and consider making opportunity to learn the techniques from advanced seed producers engaged in Phase 1. Moreover, the project will make opportunities for technical exchanging by supplementary technical training programs and network meeting, and consider making opportunity to learn the techniques from advanced seed producers engaged in Phase 1.

In addition to technical issues, there are still some seed producers, who could not raise their production by lacks of nursery ponds and broodstock. Moreover, some core famers lost fish seeds and broodstock by the flood caused at the second half of year 2011 in all 3 target provinces. To support those core famers, the project supplied broodstock fish to them as additional input.

(1) – 2 Input Provision to Fish Seed Producers Selected for 2nd year

The project held a training program of basic seed production techniques for second year's seed producers (16 farmers) at the end of November 2011, and provided necessary materials and equipment for hatchery facilities partially. In order to make seed production smoothly in this season, the project confirmed the preparation condition in March to May, before the beginning of seed production. To avoid any interruption of the project activities in March to April after the completion of the first year's contract, a JICA development specialist, dispatched in the management advisory study from JICA headquarter (period: March 20 to May 4 2012), carried out that confirmation survey. At the time of the confirmation survey (March to April 2012), only 3 core famers could prepare seed production of more than 1 species (2 farmers in Battambang and 2 farmers in Siem Reap) among total 16 second year's core farmers.

Most core farmers got behind in preparing seed production, because they had serious problems, such as "delay on construction works of hatchery facility by lacks of salary and time" and "delay on the supply of broodstock fish. It is concerned that those situations may delay local seed production. In addition to the counterparts of Fisheries Administration, the counterparts of Phase 1, who have enough experiences in hatchery facilities and management (mainly extension officers in Takeo and Kampot provinces), were sent to local seed producers, who had serious

problems on the construction of hatchery facilities. As the result, all candidates of second year's core farmers could prepare Cambodia model hatchery facilities. Moreover, the project provided necessary broodstock to all second year's core farmers. Then, they can be engaged in seed production activities in May to June.

(2) Input Assistance of Seed Production Facilities(3rd and 4th year, 2013-2014)

As mentioned at Basic Policy for Project Implementation, for newly starting seed production, local farmers need to prepare at least 1 pond for rearing broodstock and more than 2 - 3 ponds for rearing fish seeds other than hatchery facilities. Many seed producers invest their incomes of seed production to expand their facilities. However, due to heavy economic burden for facility preparation, a part of the second year's seed producers and the third year's seed producers may not make their seed production activities smoothly during the project period. In order to reduce their economic burden for hatchery facility preparation, the project made a support program to provide them a part of necessary materials, such as blocks, cements, gravels, and iron bars, expendables, and broodstock (input assistance "A" for seed producers).

Table 6-22 Input for Seed Producers (3rd year and 4th year, 2013-2014)
Input assistance "A"

No.	Assistance Contents	Items of Provision
1	Construction materials for water tanks	Bricks, Brocks, Cements, Gravels, Stones, Iron bars, Glues, PVC pipes, Valves, and etc.
2	Construction materials for spawning tanks	
3	Construction materials for hatching tank (round type)	
4	Construction materials for hatching tank (rectangle type)	
5	Construction materials for hatchery facilities	Vertical water pumps, Air pumps, Hoses, Batteries, Hormones, and etc.
6	Operational materials for hatchery facilities	
7	Seine net	
8	Hapa net cages	
9	Broodstock	

Additional Input Assistance "B" (especially for beginner seed producers)

Support for preparation of hatchery facilities (1) Construction cost for fish seed nursery pond (2) Well digging for securing intake water
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(2) – 1 Input Provision to Fish Seed Producers Selected for 3rd year

Necessary equipment or material selected from item number 1 to 8 listed in the input assistance "A" had been provided in the last fiscal year. In this fiscal year, additional broodfish were provided to 11 third year's seed farmer as shown below Table.

Table 6-23 Broodstock distribution to 3rd year's Seed Producers

Core Seed Producers	Province	Procurement	Amount of fish (kg)					Total
			SB	TI	CC	IC	SC	
Um Sam	Pursat	PS, BB	10	10	10	0	0	30
Yak Summing	Pursat	PS, BB	10	10	10	0	0	30
Cheat Cheng	Pursat	PS, BB	10	10	10	0	0	30
Cheat Cham nan	Pursat	PS, BB	10	10	5	0	5	30
Korma This	Pursat	PS, BB	10	10	5	0	5	30
Chong Sovran	Battambang	BB	10	5	10	5	0	30
Hol Dara	Battambang	BB	10	20	0	0	0	30
Roum Chhen	Battambang	BB	0	10	10	5	5	30
Om Khoeun	Battambang	BB	10	10	10	0	0	30
Chhin Khom	Battambang	BB	10	15	5	0	0	30
Chreng Sovan	Battambang	BB	10	5	10	5	0	30
Lach Chuminith	Siem Reap	SR	10	10	10	0	0	30
Total(11 farmers)			100	120	85	10	15	330

(SB: Silver barb, TL: Tilapia, CC: Common carp, IC: Indian carp, SC: Silver carp, PS:Pursat, BB:Batambang)

(2) – 2 Input Provision to Fish Seed Producers Selected for 4th year

In addition to the existing assistance for hatchery facility preparation such an input assistance “A”, the project will considers the assistance for preparing nursery ponds for rearing fish seeds and new water intake sources like deep wells (input assistance “B” for beginner seed producers). As newly selected 3 farmers of 4th year started digging nursery pond by their own budget, the project provided 300-350 US dollars for each as a partial support of digging expense.

In order to stabilize seed production activities, extension officers visited seed producers regularly to give technical advices and improve their seed production techniques. Extension officers in target provinces mainly carried out the on-farm guidance. The project utilized the human resources trained by Phase 1, such as counterpart of Fisheries Administration, local extension officers, and seed producers, to improve the quantity of technical advices.

6.4 Indicator (Output 3)

Output 3 Fish Seed Producers (FSPs) farmers are capacitated.

Indicator

3-1. The number of FSPs producing fingerlings is increased from 19 farmers to 40 farmers in target areas.

3-2. The number of FSPs who can produce seed of at least three species is doubled in target areas.

3-3. The amount of seed production by FSPs is doubled.

3-4. Sales income of the FSPs is doubled in target areas.

Above 4 indicators regarding output 3 were set at JCC in 1st year of the project subsequently it was revised at the mid-term review in 2nd year considering actual condition in target area.

Table 6-24 Number of seed farmer who has experience of seed production at least 1 time in 2009 and/or 2010

Province	**Number of farmer household surveyed	**Farmer household who produced seed in 2009 or 2010 (at least one time)
Pursat	11	4
Battambang	23	9
Siem Reap	14	6
Total	48	19

*1 Including NGO group, FiA officer's group

6.4.1 Results of seed production in 2014

The results of seed production in 2014, final production season of project is as follows.

- Siem Reap

Nine (9) seed farmers (4HHs selected in 1st year, 4HHs selected in 2nd year, 1HH selected in 3rd year) produced 927,700 fingerling (832,800 fingerling in previous year, 2013 and 464,200 fingerling in previous year, 2012) a total and then had sold 864,400 fingerling to 663 HHs. Number of fingerling purchased by one household is 1300 fingerlings that were decreased slightly than last year. 4 farms produced more than 4 fish species while 5 farmers produced only one fish species.

Table 6-25 Seed production record in 2014 (Siem Reap)

No	Name of Farmer	Year of being project farmer	Fish species produced	Fingerling produced	Fingerling imported	Seed lost by flooding	Fingerling Sold	Remained stock	Number of farmer buying
1	Say Sorn	2011	5 species	186,200	0	15,000	171,100	100	138
2	Mao Lanh	2011	2 species	57,000	0	0	57,000	0	78
3	Puok Chhorn	2011	5 species	183,500	0	0	144,000	39,500	215
4	Yib Prorng	2011	1 specie	334,000	0	0	334,000	0	54
5	Nouv Neuon	2012	1 specie	10,000	0	0	9,000	1,000	22
6	Ouk Kimhong	2012	1 specie	15,000	0	0	15,000	0	12
7	Heng Hocsan	2012	1 specie	100,000	0	0	94,000	6,000	66
8	Penh Puth	2012	3 species	27,000	0	0	25,300	1,700	64
9	Lach Chunitth	2013	1 specie	15,000	0	0	15,000	0	14
Total				927,700	0	15,000	864,400	48,300	663

As shown in below table, although 9 farms keep 5 fish species as broodstock on average, most of them selected only several species consequently they are possibly producing only few species responding market demand.

Table 6-26 Broodstock holding ratio of seed farmer in Siem Reap (n=9)

Fish species	SB	TL	CC	IC	SC	WC	CP	PG	Frog
Number of farmer keeping the brooder	9	9	7	3	5	6	3	1	2
(%)	100%	100%	78%	33%	56%	67%	33%	11%	22%

(SB: Silver barb, TL: Tilapia, CC: Common carp, IC: Indian carp, SC: Silver carp, WC: Walking catfish, CP: Claiming peach, PG: Pangasius catfish)

- Pursat

Fourteen (14) seed farmers (3HHs selected in 1st year, 4HHs selected in 2nd year, 5HHs selected in 3rd year and 2HHs selected in 4th year) produced 1,120,000 fingerling a total and then had sold 478,600 fingerling to 498 HHs. Number of fingerling purchased by one household is 960 fingerlings. 10 farmers produced more than 3 fish species while 4 farmers produced only two fish species.

Table 6-27 Seed production record in 2014 (Pursat)

No	Name of CSP	Year of being project farmer	Fish species produced (specie(s))	Fingerling produced	Fingerling imported	Seed lost by flooding	Fingerling Sold	Remained stock	Number of farmer buying
1	Vorn Bonat	2011	3	55,000	0	0	16,000	39,000	18
2	Ly Heng	2011	4	52,000	2,000	0	23,500	30,500	52
3	Keo Nheong	2011	3	105,000	0	0	50,000	55,000	28
4	Phon Chea	2012	2	40,000	0	0	5,000	35,000	5
5	Chin Kunthy	2012	3	540,000	2,000	0	220,000	322,000	215
6	Sou Yeng	2012	3	104,000	4,000	0	54,000	54,000	70
7	Srey Moninal	2012	3	47,000	2,000	0	18,500	30,500	27
8	Um Sam	2013	2	13,000	0	0	0	13,000	0
9	Chea Cheng	2013	2	50,000	4,000	0	11,600	42,400	41
10	Ya Somnang	2013	3	71,500	5,000	0	70,000	6,500	32
11	Chea Chamnan	2013	3	5,000	10,000	0	0	15,000	0
12	Korm Thim	2013	3	15,000	0	0	5,000	10,000	5
13	Soeun Choch	2014	2	20,000	0	0	5,000	15,000	5
14	Phat Saroeun	2014	3	2,500	2,000	0	0	4,500	0
Total				1,120,000	31,000	0	478,600	672,400	498

As shown in below table, although 14 farmers keep 5.1 fish species as broodstock on average, most of them selected only several species consequently they are possibly producing only few species responding market demand.

Table 6-28 Broodstock holding ratio of seed farmer in Pursat (n=14)

Fish species	SB	TL	CC	IC	SC	WC	CP	PG	Frog
Number of farmer keeping the brooder	14	14	14	10	13	7	0	0	0
(%)	100%	100%	100%	71%	93%	50%	0%	0%	0%

(SB: Silver barb, TL: Tilapia, CC: Common carp, IC: Indian carp, SC: Silver carp, WC: Walking catfish, CP: Claiming peach, PG: Pangasius catfish)

- Battambang

Fifteen (15) seed farmers (5HHs selected in 1st year, 5HHs selected in 2nd year, 4HHs selected in 3rd year and 1HH selected in 4th year) produced 2,441,900 fingerings a total and then had sold 1,441,900 fingerling to 1,044 HHs. Number of fingerling purchased by one household is 960 fingerings. 10 farmers produced more than 3 fish species while 4 farmers produced only two fish species.

Table 6-29 Seed production record in 2014 (Battambang)

No	Name of CSP	Year of being project farmer	Fish species produced	Fingerling produced	Fingerling imported	Seed lost by flooding	Fingerling Sold	Remained stock	Number of farmer buying
1	Mith Phan	2011	5 species	172,000	500	0	150,000	22,500	69
2	Mao Pek	2011	3 species	202,000	3,000	0	143,000	62,000	80
3	Dy Chana	2011	2 species	60,000	0	0	10,000	50,000	5
4	Chhorn Sovan	2011	3 species	430,000	500	0	360,000	70,500	326
5	Thim Vibol / Som Th	2011	3 species	90,000	0	30,000	15,000	45,000	1
6	Chheum Thin	2012	3 species	182,000	0	0	0	182,000	0
7	Phal Veasna	2012	4 species	130,000	12,000	0	42,900	99,100	30
8	Lim Badivath	2012	2 species	70,000	1,000	0	0	71,000	0
9	Soum Phan	2012	4 species	125,600	9,000	0	114,200	20,400	131
10	Lim Luon	2012	1 specie	30,000	100,000	0	0	130,000	0
11	Ruom Chhen	2013	2 species	305,000	0	0	500	304,500	3
12	Chhoeng Sovan	2013	2 species	18,000	0	0	12,500	5,500	48
13	Om Khheun	2013	4 species	600,000	75,000	0	588,000	87,000	336
14	Chhin Khom	2013	2 species	5,300	0	0	0	5,300	0
15	Chhel Thon	2014	4 species	22,000	6,000	0	5,800	22,200	15
Total				2,441,900	207,000	30,000	1,441,900	1,177,000	1,044

Nine (9) farmers out of 15 produced more than 3 fish species while 6 farmers produced one or two fish species. Although 15 farmers keep 4.5 fish species as broodstock on average and all farmers hold more than 3 fish species as broodstock, most of them selected only several species consequently they are possibly producing only few species responding market demand.

Table 6-30 Broodstock holding ratio of seed farmer in Battambang (n=15)

Fish species	SB	TL	CC	IC	SC	WC	CP	PG	Frog
Number of farmer keeping the brooder	15	14	12	11	5	7	1	2	0
(%)	100%	93%	80%	73%	33%	47%	7%	13%	0%

(SB: Silver barb, TL: Tilapia, CC: Common carp, IC: Indian carp, SC: Silver carp, WC: Walking catfish, CP: Claiming peach, PG: Pangasius catfish)

- 「Output indicator 3-1」

44 seed farmers selected and brought up during project, however the following 4 farmers probably stop seed production due to private reasons. Another 40 farmers can continue seed production after 2014.

Table 6-31 Farmers who cannot continue seed production(2014)

Seed farmer	Province	Year for selection
Em Som Ol	Pursat	2011
Suon Seng	Pursat	2012
Van Sinat	Battambang	2011
Phorn Bunnarith	Siem Reap	2012

Table 6-32 Number of seed farmers selected by FAIEX-2(HH)

Province	Farmer's condition	Year				Total
		2011	2012	2013	2014	
Battambang	Selected farmer	6	5	5	1	17
	Farmer in operation	5	5	5	1	16
	Inactive farmer	1	0	0	0	1
Pursat	Selected farmer	4	5	5	2	16
	Farmer in operation	3	4	5	2	14
	Inactive farmer	1	1	0	0	2
Siem Reap	Selected farmer	4	6	1	0	11
	Farmer in operation	4	5	1	0	10
	Inactive farmer	0	1	0	0	1
Total	Selected farmer	14	16	11	3	44
	Farmer in operation	12	14	11	3	40
	Inactive farmer	2	2	0	0	4

● 「Output indicator 3-2」

As shown in table, 10 HHs out of 19HHs (53%) could produce more than 3 species in 2011 at the beginning of project. 23 HHs out of 38 HHs (61%) can produce more than 3 species in 2014 after project implementation. It was more than doubled in target areas.

Table 6-33 Number of farmers by fish species produced (HH)

Number of species produced by individual farmer house hold						
Year	2011			2014		
Province	1 specie	2 species	more than 3 species	1 specie	2 species	more than 3 species
Siem Reap	1	1	4	5	-	4
Battambang	2	2	5	1	5	9
Pursat	1	2	1	-	4	10
Total	4	5	10	6	9	23
Valid response	19 farmers			38 farmers		

6.4.2 Seed production record in target area

(1) Seed production before starting project

Actual condition of seed production in project target area has been surveyed by expert, counterpart and province officer at the beginning of the project by direct interview and site observation. The data collected at the survey were compiled to offer as a baseline data. Government hatchery, NGO hatchery and fishing lot owner hatchery were excluded from baseline data as it is different scale from the project seed farming activities also it is targeting another category of fish culture.

Siem Reap

15 seed farm (seed producers, Government hatchery, NGO hatchery and fishing lot owner) had been listed and registered in Siem Reap in 2011. Only 4 farmers among them had experience of producing fish fingerling, and only 3 farmers had successfully been producing fish fingerling and had been selling before 2010 as shown in below Table. 2 farmers started seed production since 2008 while 1 farmer started since 2009. Each farmer had been producing from 3 fish species to 5 fish species.

Transition of the amount of seed production from the year 2008 to 2010 for 3 years before starting project in Siem Reap had been 120,000 head (2008)→315,000 head (2009)→230,000 head (2010), the amount of seed sales had been 50,000 (2008)→130,000 (2009)→115,000 (2010).

Table 6-34 Production record of seed farmers (Siem Reap : until 2010)

Seed farmer	Seed Production and Sales record (head)							Initial year to start	
	Year	2008		2009		2010		Seed production	Grow -out
	Species	Production	Sales	Production	Sales	Production	Sales		
Say Som	Common carp	5,000		20,000		20,000		2008	2007
	Silver barb	20,000		150,000		40,000			
	Tilapia	5,000		40,000		20,000			
	Total	30,000	nd	210,000	60,000	80,000	60,000		
Mao Lanh	Common carp	0		20,000		30,000		2008	nd
	Indian carp	10,000		0		0			
	Silver barb	20,000		40,000		50,000			
	Silver carp	10,000		0		0			
	Tilapia	10,000		10,000		10,000			
	Total	50,000	50,000	70,000	70,000	90,000	50,000		
Yib Promg	Silver barb			5,000		20,000		2009	2007
	Tilapia	10,000		30,000		30,000			
	Sandgoby	30,000				10,000			
	Total	40,000	0	35,000	0	60,000	5,000		
Total		120,000	50,000	315,000	130,000	230,000	115,000		

Battambang

14 seed farm (seed producers, Government hatchery, NGO hatchery and fishing lot owner) had been listed and registered in Battambang in 2011. Only 5 farmers among them had experience of producing fish fingerling and had successfully been producing fish fingerling to sell before 2010 as shown in below Table. Each farmer had been producing from 2 fish species to 6 fish species.

Transition of the amount of seed production from the year 2008 to 2010 for 3 years before starting project had been 267,000 (2008)→642,000 (2009)→1,080,000(2010) 、 264,000 (2008)→642,000 (2009)→1,060,000 (2010).

Table 6-35 Production record of seed farmers (Battambang : until 2010)

Seed farmer	Seed Production and Sales record (head)							Initial year to start	
	Year	2008		2009		2010		Seed production	Grow -out
	Species	Production	Sales	Production	Sales	Production	Sales		
Mith Phan	Common carp			15,000	15,000			2005	2004
	Indian carp	20,000	20,000	15,000	15,000	20,000	20,000		
	Silver barb	20,000	20,000	30,000	30,000	40,000	40,000		
	Total	40,000	40,000	60,000	60,000	60,000	60,000		
Mao Pek	Silver barb	3,000		25,000	25,000	30,000	30,000	2008	1997
	Common carp			5,000	5,000	10,000	10,000		
	Indian carp			5,000	5,000	5,000	5,000		
	Silver carp					2,000	2,000		
	Walking catfish					3,000	3,000		
Total	3,000	0	35,000	35,000	50,000	50,000			
Chhorn Sovan	Common carp					15,000	10,000	2010	2010
	Silver barb					45,000	30,000		
	Total					60,000	40,000		
Thim Vibol Som Thim	Common carp			7,000	7,000	5,000	5,000	2009	2007
	Indian carp			7,000	7,000	5,000	5,000		
	Silver barb			20,000	20,000	15,000	15,000		
	Tilapia			7,000	7,000	5,000	5,000		
	Total			41,000	41,000	30,000	30,000		
Van Sinat	Indian carp	50,000	50,000	100,000	100,000	100,000	100,000	2007	2006
	Silver barb	50,000	50,000	100,000	100,000	200,000	200,000		
	CC	5,000	5,000	30,000	30,000	30,000	30,000		
	Silver carp	3,000	3,000	3,000	3,000	30,000	30,000		
	In.Carp(Roho)					30,000	30,000		
	Walking catfish	4,000	4,000	20,000	20,000	50,000	50,000		
	Total	112,000	112,000	253,000	253,000	440,000	440,000		
Total	267,000	264,000	642,000	642,000	1,080,000	1,060,000			

Pursat

5 seed farm (seed producers, Government hatchery, NGO hatchery and fishing lot owner) had been listed and registered in Pursat in 2011. Only 4 farmers among them had experience of producing fish fingerling and had successfully been producing fish fingerling to sell before 2010 as shown in below Table. 1 farmers started seed production since 2006 while 2 farmers started since 2009, 1 farmer started since 2010. Each farmer had been producing from 1 fish species to 3 fish species.

Transition of the amount of seed production from the year 2008 to 2010 for 3 years before starting project had been 3,000 (2008)→133,000(2009)→318,000(2010), the amount of seed sales had been 0 (2008)→15,000(2009)→181,000 (2010).

Table 6-36 Production record of seed farmers (Pursat : until 2010)

Seed farmer	Seed Production and Sales record (head)							Initial year to start	
	Year	2008		2009		2010		Seed production	Grow -out
	Species	Production	Sales	Production	Sales	Production	Sales		
Vorn bonat	Silver barb					25,000		2009	2008
	Tilapia					20,000			
	Walking catfish					178,200	178,200		
	Total					223,200	178,200		
Em som ol	Silver Barb					40,000		2010	nd
	Tilapia					52,000			
	Total					92,000	nd		
Suon Seng	Tilapia	3,000		2,800		2,800	2,800	2006	2004
	Total	3,000	0	2,800	0	2,800	2,800		
Koe Nhoeng	Silver Barb			30,000	15,000	0		2009	2007
	Tilapia			100,000	0	0			
	Total			130,000	15,000	0	0		
Total		3,000	0	132,800	15,000	318,000	181,000		

According to this data review, the amount of seed production by small-scale farmers were 1,089,000 fingerings in 2009 and 1,628,000 in 2010 respectively. Mid-term evaluation also reported that amount of seed production by small-scale farmers were 882,000 fingerings in 2009 and 1,472,000 in 2010 respectively as a baseline. This baseline figure indicated at mid-term review was surveyed by interviews to FiA cantonment office and different figure was reported. It probably counted excluding project non-target species therefore it had been estimated lower. However non-target species should be included as it is also indicator of technical improvement by project moreover seed production data at mid-term review as well as terminal evaluation were referred the figure including non-target species.

(2) Transition of seed production after starting project

4,489,600 fingering were produced and 2,785,000 seeds were sold by 38 seed farmers in target area in 2014.(as of November 2014) Silver barb is the most popular species especially in Pursat, which is occupied 65% of total.

Table 6-37 Results of seed production in target area (2014)

No	Provinces	Number of Producers	Fish species produced (heads)								Total
			SB	Ti	CC	IC	SC	Catfish	Anabas	Frog	
1	Pursat	14	722,800	127,700	249,500	10,000	0	10,000	0	0	1,120,000
			65%	11%	22%	1%	0%	1%	0%	0%	
2	Battambang	15	1,168,000	660,300	332,000	130,000	0	151,600	0	0	2,441,900
			48%	27%	14%	5%	0%	6%	0%	0%	
3	Siem Reap	9	321,200	431,000	20,000	4,000	0	113,500	31,000	7,000	927,700
			35%	46%	2%	0%	0%	12%	3%	1%	
	Total	38	2,212,000	1,219,000	601,500	144,000	0	275,100	31,000	7,000	4,489,600
			49%	27%	13%	3%	0%	6%	1%	0%	

This figure shall be used as end line.

Table 6-38 Transition of seed production and sales in target area(2008~2014)

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)				
Siem Reap	3	4 species	120,000	40,000	50,000	nd	nd
Pursat	1	1 species	3,000	3,000	0	nd	nd
Battambang	3	4 species	267,000	89,000	264,000	nd	nd
Total / Average	7		390,000	55,714	314,000		

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)				
Siem Reap	3	3 species	315,000	105,000	130,000	nd	nd
Pursat	2	2 species	132,800	66,400	15,000	nd	nd
Battambang	4	5 species	642,000	160,500	642,000	nd	nd
Total / Average	9		1,089,800	121,089	787,000		

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)				
Siem Reap	3	4 species	230,000	76,667	115,000	nd	nd
Pursat	3	3 species	318,000	106,000	181,000	nd	nd
Battambang	5	6 species	1,080,000	216,000	1,060,000	nd	nd
Total / Average	11		1,628,000	148,000	1,356,000		

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)				
Siem Reap	3	6 species	436,325	145,442	349,730	268	1,305
Pursat	4	5 species	749,000	187,250	619,000	495	1,251
Battambang	6	7 species	907,645	151,274	883,745	652	1,355
Total / Average	13		2,092,970	160,998	1,852,475	1,415	1,309

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)				
Siem Reap	9	5 species	464,200	51,578	373,500	257	1,453
Pursat	9	5 species	305,000	33,889	248,288	479	518
Battambang	11	6 species	1,331,600	121,055	907,500	966	939
Total / Average	29		2,100,800	72,441	1,529,288	1,702	899

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Lost by flooding (head)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)					
2013 Siem Reap	9	6 species	832,800	92,533	19,500	710,900	436	1,631
Pursat	11	5 species	539,500	49,045	30,000	401,700	609	660
Battambang	15	7 species	1,876,200	125,080	718,000	836,700	1,016	824
Total / Average	35		3,248,500	92,814	767,500	1,949,300	2,061	946

Province	Number of seed farms	Fingerling Produced		Average production (head/farmer)	Lost by flooding (head)	Fingerlings sold (head)	Number of farmer buying	Fingerling purchased (head/customer)
		Species	Number (head)					
2014 Siem Reap	9	7 species	927,700	103,078	15,000	864,400	663	1,304
Pursat	14	5 species	1,120,000	80,000	0	478,600	498	961
Battambang	15	5 species	2,441,900	162,793	30,000	1,441,900	1,044	1,381
Total / Average	38		4,489,600	118,147	45,000	2,784,900	2,205	1,263

① Number of seed farmers

In a period of 3 years before starting project (2008 ~2010), total number of seed farmers who had been producing fingerling is 7 farmers in 2008, 9 farmers in 2009 and 11 farmers in 2011 in respective year. While some farmers had been producing not every year, thus producing only some years but not producing in other year, only few farmers had been producing constantly. After starting project, total number of seed farmers who have produced fingerling actually was increased from 13 farmers in 2011, 29 farmers in 2012, 35 farmers in 2013, 38 farmers in 2014.

② Amount of seed produced

Amount of seed production had been increasing slightly even before the project since 2008 because there was potential demand already in this past time. Amount of seed production was 1,628,000 heads a year before starting project in 2010, 1,080,000 head among those were produced in in Battambang.

Amount of seed production increased to 2,090,000 in 2011, the year that project stated, subsequently increasing year by year. Seed production activity was stagnated only in 2012 due to flooding. Total production of target area reached 4,490,000 heads in 2014, 2.8 times more than baseline.

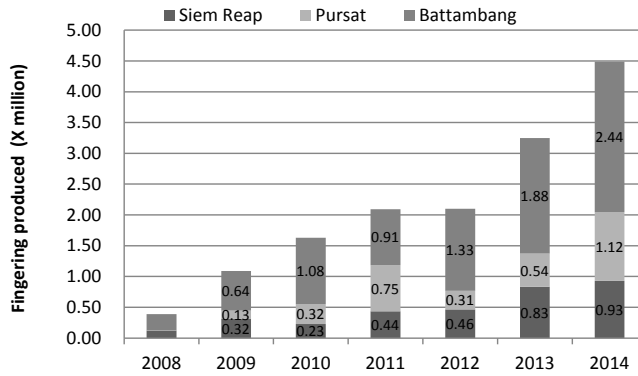


Figure 6-6 Amount of seed production in target area (2008–2014)

③ Amount of seed sales by farmer household (head / HH)

Amount of seed sales by farmer household was 161,000 heads/HH on average in 2011 while seed sales per farmer house hold decreased to 72,000 heads/HH on average in 2012, because only existing seed farmers were selected in first year of project 2011 subsequently new seed farmers also started production in 2012. Average amount of seed sales by farmer household is increasing every year since 2013.

④ Amount of seed sales in target area

Amount of seed sales of target area was 1,356,000 head in 2010, a year before starting project. Sales amount in target area is increasing year by year except in 2012, decreasing from 1,850,000 in 2011 to 1,530,000 in 2012 due to flooding. Total amount of seed sales in target area reached 2,785,000 heads in 2014, 2 times more than baseline.

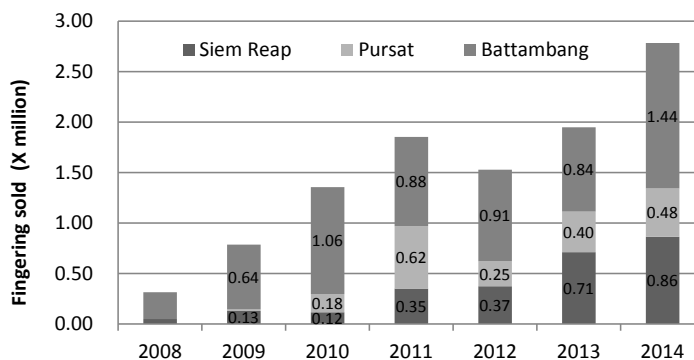


Figure 6-7 Amount of seed sales in target area (2008–2014)

*Sales record of 2014, was surveyed as of November 2014 although some farmers still had been keeping seed stock in pond.

⑤Number of farmers buying fingering from seed farmer

There is a no record regarding neither number of customer nor number of fingering bought by one customer before starting project. Therefore project estimates “number of fingering purchased by one customer” as well as “number of farmers buying fingering from one seed farmer” as shown in below table.

Table 6-39 Number of fingering purchased by one customer (2011~2014)

Province	Fingering purchased by customer (head/customer)				
	2011	2012	2013	2014	Average by province
Siem Reap	1,305	1,453	1,631	1,304	1,423
Pursat	1,251	518	660	961	847
Battambang	1,355	939	824	1,381	1,125
Average in year	1,304	970	1,038	1,215	

“Number of fingering purchased by one customer” during project period (from 2011 to 2014) is 1423 head/buyer in Siem Reap, 848 head/buyer in Pursat and 1125 head/buyer in Battambang on average. By using this average figure, “Number of farmers buying fingering from one seed farmer” from 2008 to 2010 are estimated.

Before starting project, “Number of farmers buying fingering from one seed farmer” (from 2008 to 2010) is 35 buyers/seed farmer (2008), 91 buyers/seed farmer (2009), 81 buyers/seed farmer (2010) in Siem Reap, 0 buyers/seed farmer (2008), 18 buyers/seed farmer (2009), 214 buyers/seed farmer (2010) in Pursat and 235 buyers/seed farmer (2008), 571 buyers/seed farmer (2009), 942 buyers/seed farmer (2010) in Battambang. The number is increasing staley after starting project since 2011 as shown in below figure.

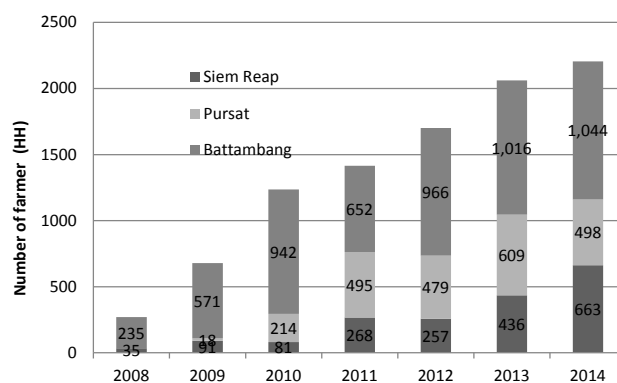


Figure 6-8 Number of seed buyer per one seed farmer (2008 ~2014)

*2008-2010: Number of customer estimated by project

**2011-2014: Data collected directly by interview survey to farmer

- 「Output indicator 3-3」

The total amount of seeds produced by small-scale FSPs identified at baseline was about 1,628,000 (produced by 11 seed farmers) in 2010 according to the farmers registered data of the Project. Subsequently the amount of production reached up to 4,489,000 (produced by 38 seed farmers) in 2014. Therefore, the amount of seed produced was more than doubled from the baseline data.

- 「Output indicator 3-4」

The total amount of seeds sales by small-scale FSPs identified at baseline was about 1,356,000 (sold to 1,237 ordinary farmers by 11 seed farmers) in 2010 according to the farmers registered data of the Project. Subsequently the amount of seed sales reached up to 2,784,900 (sold to 2,205 ordinary farmers by 38 seed farmers) in 2014. Therefore, the amount of seed sales was more than doubled from the baseline data.

Table 6-40 Amount of Seeds production and Seed sales(compared between 2010 and 2014)

Province	Fingerling produced (head)		Rate of increase	Fingerling sold (head)		Rate of increase
	2010	→ 2014		2010	→ 2014	
Siem Reap	230,000	927,700	403%	115,000	864,400	752%
Pursat	318,000	1,120,000	352%	181,000	478,600	264%
Battambang	1,080,000	2,441,900	226%	1,060,000	1,441,900	136%
Total	1,628,000	4,489,600	276%	1,356,000	2,784,900	205%

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

7.1 Conduct training of trainers (TOT) for the seed farmers. (Activity 4-1)

(1) Implementation of Training of Trainers (TOT) for 1st year's seed farmer

Targeting at fish seed producers (core farmer candidates) selected, a training program of trainers (TOT) was held at target three provinces on June 7 and 8 2011. The training program aims at strengthening their capacities of training implementation, because they are expected as to contribute technical extension to local farmers as core farmers. 14 core farmers (4 in Pursat, 6 in Battambang and 4 in Siem Reap) were the training participants in the first year. They would be engaged in farmers to farmers training programs as local lecturers in this fiscal year. The training program included the lecture practices for the participants to learn the necessary skills for teaching at the lectures to common farmers, such as manners of speaking, explanation methods of materials, tables and figures and utilization of textbooks. For that purpose, the training program includes the practice sessions like trial lectures to learn secrets of teaching. On the first day, using actual teaching materials (aquaculture booklets and waterproof plastic flip charts), the counterparts of Fisheries Administration and provincial extension officers explained the contents and the usage methods of respective materials to the core farmers. On the second day, the core farmers conducted trial lectures by using the flip charts respectively.

(2) Implementation of Training of Trainers (TOT) for 2nd year's seed farmer

For 16 second year's seed producers selected in the first year, the project conducted training programs to train necessary teaching methods and guidance techniques for the advices to general farmers. The training programs were held in 2 days at respective target provinces. In the training program, core farmers aimed at learning necessary lecture skills for general farmers (beginners of fish culture), such as speaking method, explanation method with materials and charts, and proper utilization of textbooks. To learn important teaching points effectively, they also made teaching practices with actual materials (fish culture booklets and plastic flipcharts) as a part of training programs.

(3) Implementation of Training of Trainers (TOT) for 3rd year's seed farmer

The project conducted training programs for 11 third years' core famers (seed producers), selected in the second year, to learn necessary teaching methods and guidance skills for technical advices to other grow-out farmers. A course of the training program was held in 2 days on May 2 and 3 in Battambang province. There is only one seed farmer in Siem Reap; therefore that seed farmer in Siem Reap was involved into training in Battambang.

In the training program, the core farmers learned necessary skills for lectures to other famers (speaking methods, explanation of materials, tables and charts, and utilization of textbooks). To learn those teaching skills properly, the training program has teaching practice sessions, in which they use

some training materials (aquaculture booklets and water proof flip-charts).

Table 7-1 Program of Trainer’s Training in 2013

Time		Issue	Content	Lecturer
First Day	AM	- Preparation of Fish Culture - Basic Skill of Fish Culture	- Kind of Training Material - Contents of Training Materials (Flip Charts, Textbooks, etc.)	- Extension Officers - Counterparts of Fisheries Administration
	PM	- Procedure of Lectures	- Procedure of Lecture - Explanation of Materials and Charts - Utilization of Textbooks and Fish Culture Equipment’s - Example of Answers and Questions	- Extension Officers - First Year’s Core Farmers
Second Day	AM	- Lecture Practice	- Lecture Practices by Second Year’s Core Farmers - Advices by Extension Officers and First Year’s Core Farmers	- Extension Officers - First Year’s Core Farmers - Counterparts of Fisheries Administration
	PM	After lunch, flipcharts and textbooks are distributed to second year’s core farmers for self-practice at their homes.		

(4) Implementation of Training of Trainers (TOT) for 4th year’s seed farmer

The project conducted training programs for 3 fourth years’ core famers (seed producers), selected in the year, to learn necessary teaching methods and guidance skills for technical advices to other grow-out farmers. A course of the training program was held in 2 days on May 5 and 6, 2014 in Battambang province. Several old farmers who had been selected and had been trained until 2013 also participated voluntarily to training because some of them does not confident on his teaching skills, although the training focus on fourth years’ core famers. In the training program, the core farmers learned necessary skills for lectures to other famers (speaking methods, explanation of materials, tables and charts, and utilization of textbooks). To learn those teaching skills properly, the training program has teaching practice sessions, in which they use some training materials (aquaculture booklets and water proof flip-charts).

7.2 Assist seed farmers to conduct farmer-to-farmer training. (Activity 4-2)

(1) Implementation of Farmer to Farmer Training (FFT) in 1st year, 2011

(1) – 1 Selection of target farmers

In target communes selected in previous survey, provincial extension officers had interviews with commune leaders and chiefs of candidate villages and identified the condition of reservoirs and water supplies at the communes for extension programs in about 1 month and half from the middle of May. Simultaneously, they also sought for local farmers, who wanted to start fish culture, by their individual visits. Finally, they selected target farmers for training programs, who fulfilled the criteria of the project (Box 4).

Box 4: Selection criteria of farmer trainees for farmer to famers training (FAEIX 2)

- Interested in fish culture,
- Own ponds suitable for fish culture at present, or own lands for pond construction and prepare fish ponds by himself,
- Secure necessary volume of water for fish culture in a whole year,
- Live at a neighbor place to a core farmer (fish seed producer), and can visit him regularly,
- Able to use agricultural input materials (animal manures, by-products of agricultural processing, and etc.)
- Acquire family agreement for fish culture activities

(1) – 2 Implementation of Farmer to Farmer Training Program

As a selection result mentioned above, the first program of famer to famer training was held to 502 farmers, who had been selected from 19 target communes in 3 provinces, from June 15 to 28. Each program was conducted in only 2 days. The curriculum was mainly composed of some basic skills of fish culture for beginners. The first day's lecture gave basic skills, such as fish pond preparation, important points of pond drying and fertilization, proper pond size and stocking density, respective characteristics of fish species and selection of proper fish species. The second day's lecture gave some advance skills additionally, such as fish feed making, feeding methods and water quality management. The training programs were conducted at public meeting places and classrooms of public schools in cooperation with respective target communes.

(1) – 3 Support to training participants

In order to promote fish culture practices by the famers participated in training programs, a maximum of 500 fish seeds and a hapa net were provided to each farmer, if their fish ponds had been prepared. They mainly practiced polyculture with less additional feeding at stagnant ponds. After visiting all target farmers and confirming the following points indicated in Box 3, the

counterpart of Fisheries Administration and extension officers delivered 3 - 4 fish species seeds to target farmers and adjusted their stocking density to be 4 fish / m². The fish species were selected from silver barb, tilapia, murgal, common carp and silver carp. Because many farmers intended to produce more culture fish positively, they often purchased fish seeds at their own expenses, besides 500 fish seeds delivered free of charge.

Box 5: Check list of fish pond preparation (FAEIX 2)

- General condition of fish ponds (area, depth, slop, height and strengthens of dikes)
- Exclusion of predator fishes completely in ponds.
- Improvement of pond bottom soils by spraying limes
- Necessary water volume in ponds (at least 50 cm at seed stocking)
- Preparation of proper additional fertilization (manure pits and etc.)
- Overgrowth of useless aquatic plants and weeds.
- Preparation of protection net fences around fish ponds (in surrounding condition of predator fish invasion)

Table 7-2 Implementation Results of Farmer to Farmer Training Program (2011)

Province	Date	District	Commune	Participation (HH)
Siem Reap	22 - 23 June	Chi Kraeng	Sang Veauy	30
	22 - 23 June	Sout Nikom	Chan Sar	30
	16 - 17 June	Prasat Bakong	Kantreang	25
		Prasat Bakong	Roluos	5
	16 - 17 June	Puok	Samraong Yea	30
Sub total (Siem Reap)		4 districts	5 communes	120
Battambang	15 - 16 June	Thma Koul	Bansay Traeng	26
	27 - 28 June	Thma Koul	Anlong Run	28
	27 - 28 June	Bavel	Khnach Romeas	23
	15 - 16 June	Bavel	Prey Khpos	27
	15 - 16 June	Battambang	Ou Mal	25
	23 - 24 June	Rotanak Mondol	Sdau	25
	27 - 28 June	Banan	Snoeng	18
	21 - 22 June	Koh Krala	Hob	24
	27 - 28 June	Rukhak Kiri	Preaek Chik	28
21 - 22 June	Moung Ruessei	Robas Mongkol	26	
Sub total (Battambang)		8 districts	10 communes	250
Pursat	14 - 15 June	Krakor	Tnot Chum	28
	17 - 18 June	Bakan	Romlech	28
	14 - 15 June	Bakan	Khnar Totueng	27
	17 - 18 June	Bakan	Trapeang Chorng	26
	17 - 18 June	Krong Posat	Chamraeun Phal	26
Sub total (Pursat)		3 districts	5 communes	135
Total		15 districts	20 communes	505

It is important that farmers practice fish culture to earn sufficient production, because the result

influences the continuation of their fish culture activities after the second year. Therefore, the extension officers in respective provinces seriously checked the condition above-mentioned. In case farmers didn't satisfy those conditions, the delivery of fish seeds and the stock to ponds were stopped to them. At the time of September 10, 100 % of farmers participating in training programs in Siem Reap province (120 in total 120 farmers), 89 % of farmers in Pursat province (117 in total 132 farmers) and 30 % of farmers in Battambang province (76 in total 250 farmers) were confirmed to have stocked fish seeds for starting their fish culture activities.

Farmers profile and stocking record of fingerling by province is as follows.

(1) – 4 Farmers participating in training programs in Siem Reap province(2011)

In Siem Reap province, 120 farmers participated in training programs from 17 villages in 5 communes. In their gender composition, 99 farmers were male and 21 farmers were female. 28 % of total farmers (33 of 120 farmers) belonged to Category I and III, in which they had experiences in aquaculture. On the other hand, the beginners' farmers without any aquaculture experiences (Category IV) accounted for 73 % (87 of 120 farmers).

* The category in aquaculture experiences is determined on the criteria as follows. Category I indicates that farmers are currently engaged in aquaculture activities. Category II and III indicates that farmers stop their aquaculture activities, and Category IV indicates that farmers are beginners in aquaculture.

Category of farmer by their aquaculture experience (FAEIX-2)

I : He is running fish culture, He is operating fish culture currently.

II : He used to culturing fish before, but stopped.

III : He used to culturing fish before and stopped, but he is restarting recently.

IV : Begginer (He has no experience of aquaculture.)

- Number of fish pond

115 of 120 farmers had only one fish ponds. Only 5 farmers (4 % of total farmers) had more than two fish ponds.

- Size of fish ponds

The average size of total 127 fish ponds belonging to all farmers participating in training programs is 222.16 m² (3m depth). The smallest size is 48 m² and the largest size is 2,025 m². 98 fish ponds had 100 - 200 m² areas, and accounted for 77 % of total.

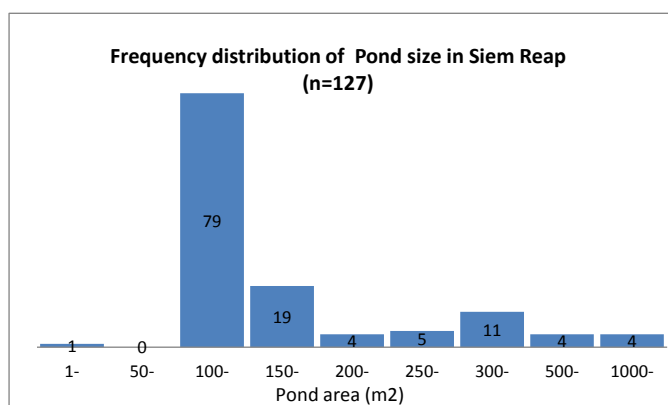


Figure 7-1 Pond size in Siem Reap(2011)

- Stocking of fish seeds

The project distributed total 52,800 fish seeds to 120 farmers participating in training programs. On average, a farmer received 440 fish seeds. In addition of fish seeds from the project, 44 of 120 farmers (37 %) purchased fish seeds by their own costs.

Table 7-3 Number of fingerling stocked by farmer in Siem Reap (2011)

Commune	Village	Total num of farmer who stocked fingerling (HH)	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked (head)
			Total (HH)	Average (head/HH)	Farmer buying fingerling(HH)	Total (head)	Average (head/HH)	
Kantreng	Tatrav	15	6,100	407	0	0	0	6,100
	Kantreng	9	4,400	489	0	0	0	4,400
Rolous	Rolous Chas	4	1,800	450	0	0	0	1,800
	Rolous Lech	2	1,000	500	1	750	750	1,750
Samrong Yea	Prasat	17	7,200	424	4	1,100	275	8,300
	Prey Veng	13	5,800	446	0	0	0	5,800
Chansar	Bekamphloeng	3	1,400	467	0	0	0	1,400
	Cham	1	500	500	1	600	600	1,100
	Chansar Chhoen	4	1,800	450	2	600	300	2,400
	Chansar Tbound	3	1,400	467	2	300	150	1,700
	Kok Chen	13	5,300	408	11	2,200	200	7,500
	Kok Toeng	2	900	450	1	400	400	1,300
	Sanlaung	4	1,800	450	2	1,100	550	2,900
Sangveuy	Chork	3	1,400	467	1	300	0	1,700
	Damrei Chhlang	14	6,800	486	10	11,900	1190	18,700
	Taprom	5	2,000	400	4	1,000	250	3,000
	Thnal Dach	8	3,200	400	5	1,600	320	4,800
Total		120	52,800	440	44	21,850	497	74,650

(1) — 5 Farmers participating in training programs in Battambang province (2011)

In Battambang province, 250 farmers participated in training programs from 16 communes. In their gender composition, 201 farmers were male and 49 farmers were female. 36 % of total farmers belonged to Category I, II and III, in which they have some experiences in fish culture. 64 % of them (161 of 250 farmers) are beginners of fish culture (Category IV). It is relatively lower than other provinces.

● Number of fish ponds

242 of 250 farmers had only one fish ponds. Only 8 farmers (3 % of total farmers) had two fish ponds.

● Size of fish ponds

The average size of total 258 fish ponds belonging to all farmers participating in training programs is 234.7 m² (2.6m depth). The smallest size is 28 m² and the largest size is 1,540 m². 114 fish ponds had only less than 200 m² areas, and accounted for 56 % of total. On the contrary, 64 fish ponds had more than 300 m² (27 % of total)

● Stocking of fish seeds

The project distributed total 105,974 fish seeds to 228 of 250 farmers (91 %) participating in training programs. On average, a farmer received 465 fish seeds. In addition of fish seeds from the project, 15 of 228 farmers (7 %) purchased fish seeds by their own costs. The average number of purchased fish seeds par farmer was 200 - 1,000.

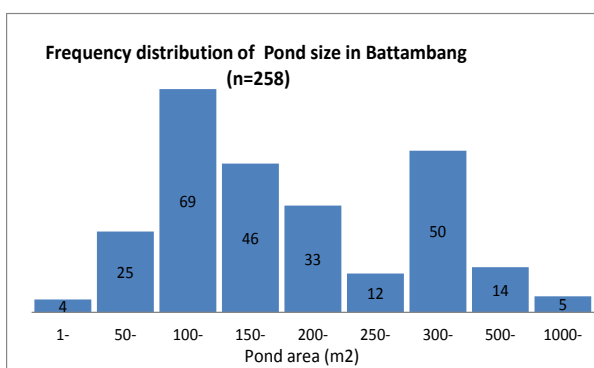


Figure 7-2 Pond size in Battambang(2011)

Table 7-4 Number of fingerling stocked by farmer in Battambang (2011)

Commune	Village	Total num of farmer who stocked fingerling (HH)	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked (head)
			Total (HH)	Average (head/HH)	Farmer buying fingerling(HH)	Total (head)	Average (head/HH)	
Battambang	Chrey	4	2,000	500	0	0	0	2,000
	Ouchar	2	1,000	500	0	0	0	1,000
	Oumal	12	5,880	490	6	1,500	250	7,380
	Phom Sopov	1	500	500	0	0	0	500
Endakheb	2 villages(Boeung Ampil and Serei Vorn)	3	1,500	500	2	2,100	1,050	3,600
Sdav	Boeung Ampil	5	2,400	480	2	1,400	700	3,800
	Doun Meak	2	1,000	500	0	0	0	1,000
	Neang Lem	7	3,400	486	0	0	0	3,400
	Reaksmei Sangha	2	968	484	0	0	0	968
	Sdav	1	480	480	0	0	0	480
Sneung	Boeung Cheng	2	1,000	500	0	0	0	1,000
	Boeung Prey	0	0	0	1	200	200	200
	Khor	2	1,000	500	1	400	400	1,400
	PakSbek	0	0	0	0	0	0	0
	Pras Sre	0	0	0	0	0	0	0
	Sneung Keut	1	500	500	1	200	201	700
Bansay Treng	Spean	4	1,700	425	0	0	0	1,700
	Thmey	5	2,500	500	0	0	0	2,500
	Toul Tasok	16	6,300	394	0	0	0	6,300
Anlung Run	Char	8	3,850	481	0	0	0	3,850
	Khros	9	4,300	478	0	0	0	4,300
	Sopy	8	3,800	475	0	0	0	3,800
Otaky	2 villages(Otaky and Khros)	2	1,000	500	0	0	0	1,000
Tapong	Tapong	1	500	500	0	0	0	500
Khnach Romeas	Kos Ream	18	7,800	433	0	0	0	7,800
	Roung Ampil	5	2,500	500	0	0	0	2,500
Prey Khpos	Kbal Thnol	17	7,872	463	0	0	0	7,872
	Prey Khpos	10	4,508	451	0	0	0	4,508
	Chombok	9	4,216	468	0	0	0	4,216
Hob	Hab	10	3,728	373	0	0	0	3,728
	Samki	6	2,764	461	0	0	0	2,764
	Sombour	2	900	450	0	0	0	900
	Anlung Kaub	9	4,248	472	0	0	0	4,248
Robosmokol	KonkaEk Mouv	1	500	0	0	0	0	500
	KonkaEk Pi	6	3,000	0	1	1,000	1,000	4,000
	Robors Mongkol	10	4,720	472	0	0	0	4,720
Prek Chhik	Che Khampreus	23	11,140	484	1	500	0	11,640
	Khnach Ampor	3	1,500	500	0	0	0	1,500
	Prek Chhik	2	1,000	500	0	0	0	1,000
Total		228	105,974	465	15	7,300	487	113,274

(1) – 6 Farmers participating in training programs in Pursat province (2011)

In Pursat province, 135 farmers participated in training programs from 25 villages in 5 communes. In their gender composition, 127 farmers were male and 8 farmers were female. 11 %

of total farmers (16 of 135 farmers) belonged to Category I, II and III, in which they have some experiences in fish culture. 88 % of them (119 of 135 farmers) are beginners of fish culture (Category IV).

- Number of fish pond

131 of 135 farmers had only one fish ponds. Only 4 farmers (3 % of total farmers) had more than two fish ponds.

- . Size of fish pond

The average size of total 140 fish ponds belonging to all farmers participating in training programs is 120.6 m² (2m depth). The smallest size is 30 m² and the largest size is 400 m². 109 fish ponds had only less than 150 m² areas, and accounted for 78 % of total.

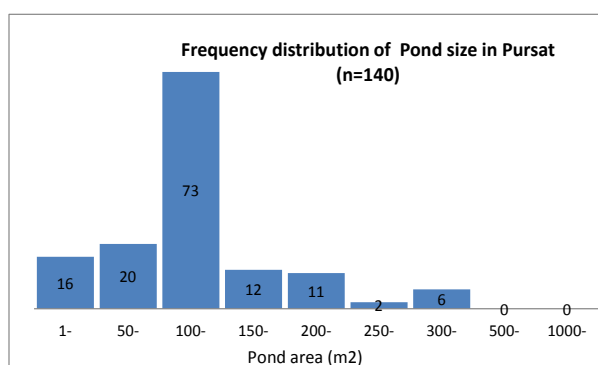


Figure 7-3 Pond size in Pursat(2011)

Table 7-5 Number of fingerling stocked by farmer in Pursat (2011)

Commune	Village	Total num of farmer who stocked fingerling (HH)	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked (head)
			Total (HH)	Average (head/HH)	Farmer buying fingerling(HH)	Total (head)	Average (head/HH)	
Chomraeun Phal	Kdei Khvav	5	1360	272	0	0		1360
	Kompong Stoung	5	1,752	350	1	1,100	1,100	2,852
	Ou Roka	5	2,220	444	1	100	100	2,320
	Ou Taung	3	1,200	400	1	27,000	27,000	28,200
	Svay Meas	8	3,092	387	0	0		3,092
Thnaut Chom	Boeung Veal	2	660	330	1	500	500	1,160
	Chambok Thom	1	340	340	0	0	0	340
	Chheuteal	4	1,284	321	1	200	200	1,484
	Donggeuk Leach	3	1,084	361	2	500	250	1,584
	Kandal	8	2,480	310	1	1,000	1,000	3,480
	Krabeisar	2	1,000	500	0	0	0	1,000
	Takeo Leu	3	1,500	500	2	1,100	550	2,600
Tbeng Chhrom	5	2,080	416	1	100	100	2,180	
Khna Toteung	Kamprakon	9	4,000	444	3	2,500	833	6,500
	Kos Krabei	5	1,680	336	0	0	0	1,680
	Kos Svay	13	5,160	397	2	2,000	1,000	7,160
Trapaing Chomg	Kdei Chhnoul	4	1,860	465	1	1,000	1,000	2,860
	SreLvea	13	4,740	365	3	1,200	0	5,940
	Pras Chambok	9	4,020	447	0	0	0	4,020
Romlech	Brasat	3	1,300	433	0	0	0	1,300
	Dammak Trach	4	1,480	370	0	0	0	1,480
	Kampongkdei	1	400	400	0	0	0	400
	Raung Takok	14	5,652	404	0	0	0	5,652
	Romlech	2	980	490	0	0	0	980
Thmei	4	1,576	394	0	0	0	1,576	
Total		135	52,900	392	20	38,300	1,915	91,200

- Stocking of fish seeds

The project distributed total 52,900 fish seeds to 135 farmers participating in training programs. On average, a farmer received 392 fish seeds. In addition of fish seeds from the project, 20 of 135 farmers (15 %) purchased fish seeds by their own costs. The average number of purchased fish seeds per farmer was 200 - 1,000. Because one farmer purchased 27,000 fish seeds for stocking in paddy fields, the average numbers on the table and figure above were relatively higher.

(2) Implementation of Farmer to Farmer Training (FFT) in 2nd year, 2012

(2) – 1 Selection of Target Farmers

In the field surveys at selected target communes, the project team interviewed commune chiefs and leaders of candidate villages to identify the current conditions of earthen ponds or water supplies. At the same time, the team visited local farmers at target communes to look for target farmers who hope to start fish culture. Finally, target farmers for training programs were selected on the criteria of the project (indicated on Box 3), such as “Farmers can prepare their ponds for fish culture”, “Farmers can secure water sources”, “Farmers can prepare animal manures and feed materials” and etc. Extension officers of provincial fisheries offices selected about 25 farmers in respective communes.

(2) – 2 Implementation of Farmers to Farmers Trainings in 2012

After selecting target communes and farmers in June 2012, the project team coordinated the schedule of core farmers and provincial extension officers, contacted target farmers, and conducted farmers to farmer’s trainings at the communes where training venues had been prepared. A course of the training program was held in only 2 days. A fish culture booklet (A5 size, 59 pages), used as a main material in the trainings, covers a series of fish culture process such as ‘pond preparation’, ‘seed stocking’, ‘pond fertilization’, ‘feeding management’ and ‘harvest’. Video materials and flipcharts produced by the project were also utilized in the training programs.

Core farmers taught local farmers as lecturers and provincial extension officers gave supplementary explanation as necessary. To improve their understanding of basic skills, the practical sessions showed how to use hapa nets (small-size box nets) and prepare home-made fertilizers and feeds by using actual materials. In the period from June 19 to July 18, 2012, the training programs were held 10 times in Siem Reap province (11 communes in 5 divisions), 12 times in Battambang province (14 communes in 7 divisions), and 10 times in Pursat province (9 communes in 3 divisions). In 34 communes in 3 target provinces, total 897 farmers participated in the training program (250 farmers in Siem Reap, 391 farmers in Battambang, and 256 farmers in Pursat).

(2) – 3 Assistance to the Farmers Participating in the Trainings

In order to support the farmers participating in training programs to start fish culture activities quickly, in the first year, the project provided maximum 500 fish seeds and a hapa net to each farmer who had prepared fish ponds. Those assistances encouraged 90 % of trained farmers to start their fish culture activities. In second year, following the same approach, extension officers and experts confirmed the pond preparation whether it meets the project standard or not, subsequently provided fish seeds and hapa nets to the farmers, who had prepared their fish ponds.

Table 7-6 Implementation Results of Farmer to Farmer Training Program (2012)

Province	Date	District	Commune	Participation (HH)
Siem Reap	19-20 June, 2012	Soutr Nikom	Popel	30
		Banteay Srei	Tbeng	31
	22-23 June, 2012	Kralanh	Kampongthkov	33
		Kralanh	Kralanh	
		Kralanh	Chunleasdey	15
	25-26 June, 2012	Angkorthom	Svay Chek	22
		Angkorthom	Peaksneng	14
	05-06 July, 2012	Varin	Svay Sa	41
	08-09 July, 2012	Varin	Lveakrang	21
		Varin	Prasat	15
11-12 July, 2012	Soutr Nikom	Tayek	28	
Sub total (Siem Reap)		5 districts	11 communes	250
Battambang	19-20 June, 2012	Bavel	Ampil Pram Daeum	45
	21-22 June, 2012	Thma Koul	Kouk Khmum	27
		Moung Ruessei	Prey Svay	27
	28-29 June, 2012	Moung Ruessei	Kea	25
		Battambang	Vath Kor	30
		Sangkae	Voat Ta Moem	
	05-06 July, 2012	Bavel	Lvea	29
	09-10 July, 2012	Som lot	Som lot	20
	11-12 July, 2012	Sangkae	Rang Keseiy	25
	12-13 July, 2012	Sangkae	Kompong Preang	20
		Bavel	Kdol Tahien	25
		Thma Koul	Chhey	25
		Thma Koul	Ou ta ki	
17-18 July, 2012	Rukhak Kiri	Muk Rear	93	
Sub total (Battambang)		7 districts	14 communes	391
Pursat	19-20 June, 2012	Phnum Kravanh	Bak Chenhchien	45
	21-22 June, 2012	Bakan	Talo	28
		Phnum Kravanh	Phteah Rung	25
	23-24 June, 2012	Phnum Kravanh	Pro Ngil	24
	09-10 July, 2012	Phnum Kravanh	Santreae	28
	09-10 July, 2012	Bakan	Snam Preach	27
	12-13 July, 2012	Kror Kor	Kbal Tranch	25
	12-13 July, 2012	Phnum Kravanh	Leach	26
15-16 July, 2012	Bakan	Ou Ta Paong	28	
Sub total (Pursat)		3 districts	9 communes	256
Total		15 districts	34 communes	897

Note: 'Muk Rear' commune in Battambang was not included in target areas on the initial plan. However, because of a strong request of commune chief, the project decided to conduct an additional training at the commune. The supply of fish seeds for the commune should be made by self-efforts of local farmers. The project does not provide fish seeds to them.

Most target communes suffered less rainfall in 2012 than the average year. Because most farmers had to take longer time to store water in fish ponds, only a part of them could stock fish seeds in ponds until August. Heavy rains started at most target communes in September, and most farmers became active in stocking fish seeds in ponds. Extension officers of cantonment offices of Fisheries Administration confirmed fish pond condition and supplied / stocked fish seeds. As a results, among all farmers received fish culture trainings in 2012, 98.4 % in Siem Reap (246 in 250 farmers), 98.8 % in Pursat (256 in 253 farmers), and 99.7 % in Battambang (298 in 297 farmers) stocked fish seeds in ponds to start fish culture. The situation of each province is described below.

(2) – 4 Fish stocking in Siem Reap Province (2012)

205 farmers participating in farmers to farmers trainings in 2012, excluding 45 farmers who received pond construction assistance in 2011 (31 farmers at Tbeng, 14 farmers at Svay Sa) from total 250 farmers, and 50 farmers damaged by flood in 2011 (29 farmers in Samrong Yea, 21 farmers at Roluos, Kantreang, and Chan Sar), total 255 farmers were subject to free supply of fish seeds in this fiscal year. The project supplied / stocked total 117,445 fish seeds (4 - 6 cm on average size) to 255 target farmers on August 9 to September 10, 2012. The average number of supplied fish seeds was 461. All fish seeds were provided from 5 core farmers of the project in the province (Say Song, Yip Rrang, Mao Lanh, Puok Chhom, Henag Hokson), a private seed producer (Mr. Reunya) and Teok Vil center.

Table 7-7 Result of Fish Seed Stock in Siem Reap Province (Supplied by the Project)

Commune	Number of Farmer HH		Fingering stocked				Average number of stocking	Date for stocking
	Total participant	Well-prepared pond	SB(35%)	TL(50%)	IC,CC(15%)	Total		
Popel	30	30	4,935	7,050	2,115	14,100	470	9-Aug. 2012
Tbeng	31	Not eligible for free charge distribution fingering *2011 池掘削支援を受けた31戸は対象外						
Kampongthkov	13	13	2,205	3,105	945	6,255	481	10-Aug. 2012
Kralanh	20	20	3,220	4,600	1,380	9,200	460	11-Aug. 2012
Chunleasdey	15	15	2,310	3,300	990	6,600	440	29-Aug. 2012
Svay Chek	22	22	3,535	5,050	1,515	10,100	459	30-Aug. 2012
Peaksneng	14	14	2,135	3,050	915	6,100	436	31-Aug. 2012
Svay Sa	27	27	4,585	6,550	1,965	13,100	485	2-Sep. 2012
	14	Not eligible for free charge distribution fingering *41戸の研修参加者のうち池掘削支援を受けた14戸を除いた						
Lveakrang	21	21	3,360	4,800	1,440	9,600	457	4-Sep. 2012
Prasat	15	15	2,450	3,500	1,050	7,000	467	6-Sep. 2012
Tayek	28	28	4,830	6,900	2,070	13,800	493	8-Sep. 2012
Participants in 2011 *Suffered from flooding in 2011								
Samrong Yea		29	4,375	6,250	1,875	12,500	431	9-Sep. 2012
Roluos,		21	3,185	4,550	1,365	9,100	433	10-Sep. 2012
Kantreang								
Chan Sar								
	250	255	41,125	58,705	17,625	117,455	461	
			35%	50%	15%			

The average shares of fish species in 255 target farmers are 35% in silver barb, 50% in tilapia, 15% in murgal, and 15% in common carp. The average number of stocked fish seed per farmer is 461. Among 45 farmers who received pond construction assistance in 2011 and participated in fish culture trainings in 2012, 4 farmers in 14 farmers of Svay Sa commune, Varin district, could not stock fish seeds, because they could not store enough water in ponds. Among total 250 farmers who participated in fish culture trainings in 2012, 246 farmers could stock fish seeds in their ponds. Therefore, the rate of fish culture practice is 98.4%.

Table 7-8 Number of Fish Farmers for Seed Stock and Rate of Fish Culture Practice
(Siem Reap Province, 2012)

Province	Category of participant		Number of participant in training	Number of farmer who stocked fingerling	
Siem Reap	Participant in FTF 2012	Farmer who have not gotten support for pond digging in 2011	205	205	無償配布
		Farmer who got support of pond digging in 2011	45	41	有償配布
		250	246	98.4%	
	Participant in FTF 2011	Farmers suffered from flooding and lost fingerling in 2011	50	50	無償配布
No suffered serious damage from flooding in 2011		70	ND		

(2) — 5 Fish stocking in Pursat Province (2012)

211 farmers participating in farmers to farmers trainings in 2012, excluding 45 farmers who received pond construction assistance in 2011 from total 256 farmers, and 8 farmers damaged by flood in 2011 (at Samrong and Khnar Toteung), total 219 farmers were subject to free supply of fish seeds in this fiscal year. The project supplied / stocked total 98,424 fish seeds (3 - 4 cm on average size) to 219 target farmers on August 22 to October 13, 2012. The average number of supplied fish seeds was 451. Among 45 farmers who received pond construction assistance in 2011 and participated in fish culture trainings in 2012, 2 farmers gave up fish culture by moving and low water quality; but remaining 43 farmers stocked fish seeds in ponds. All fish seeds were provided from 5 core farmers of the project in the province (Em Sam Ol, Soun Seng/Pen Sovan, Ly Heng, Kean Nhoeng, Chin Kunthy).

Table 7-9 Result of Fish Seed Stock in Pursat Province in 2012

Commune	Number of Farmer HH		Fingering stocked				Average number of stocking	Date for stocking
	Total participant	Well-prepared pond	SB	TL	IC,CC	Total		
Talo	28	12	2,800	1,960	840	5,600	467	22-Aug. 2012
		16	3,896	2,727	1,169	7,792	487	4-Oct. 2012
Ou Ta Paong	28	7	1,490	1,043	447	2,980	426	22-Aug. 2012
		21	4,640	3,248	1,392	9,280	442	9-Oct. 2012
Snam Preach	27	27	6,300	4,410	1,890	12,600	467	6-Oct. 2012
Kbal Tranch	25	12	2,940	2,058	882	5,880	490	24-Aug. 2012
		13	3,156	2,209	947	6,312	486	5-Oct. 2012
Pro Ngil	24	9	1,850	1,295	555	3,700	411	23-Aug. 2012
		15	3,230	2,261	969	6,460	431	7-Oct. 2012
Leach	26	26	5,720	4,004	1,716	11,440	440	8-Oct. 2012
Santreae	28	28	6,132	4,292	1,840	12,264	438	11-Oct. 2012
Phteah Rung	25	24	5,490	3,843	1,647	10,980	458	10-Oct. 2012
Participants in 2011 *Suffered from flooding in 2011								
Romlech		8	1,568	1,098	470	3,136	392	13-Oct. 2012
Khnar Toteung								
11	211	218	49,212	34,448	14,764	98,424	451	
			50%	35%	15%			
Farmers supported pond digging in 2011 *Fingering were stocked by their own budget								
Bak Chenhchien	45	14	3,500	2,450	1,050	7,000	500	23-Aug. 2012
		29	8,600	6,020	2,580	17,200	593	12-Oct. 2012

The average shares of fish species are 50 % in silver barb, 35 % in tilapia, 15 % in murgal, and 15 % in common carp. Among total 256 farmers who participated in fish culture trainings in 2012, 253 farmers could stock fish seeds in their ponds. Therefore, the rate of fish culture practice is 98.8 %.

Table 7-10 Number of Fish Farmers for Seed Stock and Rate of Fish Culture Practice (Pursat Province, 2012)

Province	Category of participant		Number of participant in training	Number of farmer who stocked fingering	
Pursat	Partioated in FTF 2012	Farmer who heve not gotten support for pond digging in 2011	211	210	無償配布
		Farmer who got support of pond digging in 2011	45	43	有償配布
			256	253	98.8%
	Partioated in FTF 2011	Farmers suffered from flooding and lost fingering in 2011	8	8	無償配布
	No suffered serious damage from flooding in 2011	127	ND		

Table 7-11 Result of Fish Seed Stock in Battambang Province (Supplied by the Project) 2012

Commune	Number of participant	Well-prepared pond	SB(35%)	TL(50%)	CC(15%)	Total	Average number of stocking	Date for stocking
Kdol Tahien	25	10	2,250	2,250	500	5,000	500	27-Aug. 2012
		15	3,285	3,285	730	7,300	487	25-Sep. 2012
Kouk Khmum	27	11	2,475	2,475	550	5,500	500	29-Aug. 2012
		16	2,948	2,948	656	6,552	410	24-Sep. 2012
Chhey	25	5	1,125	1,125	250	2,500	500	29-Aug. 2012
Ou ta ki		20	4,500	4,500	1,000	10,000	500	20-Sep. 2012
Vath Kor	30	2	450	450	100	1,000	500	19-Aug. 2012
Voat Ta Moem		28	6,053	6,053	1,346	13,452	480	24-Sep. 2012
Som lot	20	20	3,586	3,585	797	7,968	398	27-Sep. 2012
Kompong Preang	20	4	900	900	200	2,000	500	17-Aug. 2012
		16	3,285	3,285	730	7,300	456	25-Sep. 2012
Rang Keseiy	25	12	2,700	2,700	600	6,000	500	1-Aug. 2012
		13	2,925	2,925	650	6,500	500	20-Sep. 2012
Kea	25	25	5,625	5,625	1,250	12,500	500	27-Sep. 2012
Prey Svay	27	5	1,125	1,125	250	2,500	500	3-Aug. 2012
		22	4,950	4,950	1,100	11,000	500	24-Sep. 2012
Lvea	29	11	2,475	2,475	550	5,500	500	28-Aug. 2012
		18	4,050	4,050	900	9,000	500	28-Sep. 2012
	253	253	54,707	54,706	12,159	121,572	481	

45% 45% 10%

Participants in 2011 *Suffered from flooding in 2011

Commune	Number of participant	Flooded pond	SB(35%)	TL(50%)	CC(15%)	Total	Average number of stocking	Date for stocking
Khnach Romeas	23	6	1,183	1,184	263	2,630	438	27-Sep. 2012
Bansay Traeng	26	5	891	891	198	1,980	396	29-Sep. 2012
Anlong Run	28	2	382	383	85	850	425	24-Sep. 2012
Ou Mal	25	3	675	675	150	1,500	500	19-Sep. 2012
Snoeng	18	2	450	450	100	1,000	500	19-Sep. 2012
Sdau	25	3	675	675	150	1,500	500	19-Sep. 2012
Hob	24	13	2,638	2,639	587	5,864	451	2-Sep. 2012
Robas Mongkol	26	6	1,287	1,287	286	2,860	477	22-Sep. 2012
Preaek Chik	28	8	1,782	1,782	396	3,960	495	25-Sep. 2012
Prey Khpos	27	5	1,044	1,044	232	2,320	464	27-Sep. 2012
	250	53	11,007	11,010	2,447	24,464	462	

45% 45% 10%

Total	306	65,714	65,716	14,606	146,036	477
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Other training participants in 2012

Commune	Number of participant	
Ampil Pram Daeum	45	Among 45 farmers who were supported of pond digging, 44 farmers stocked fingerling in 2012
Muk Rear *	94	Farmer participated volunteers * Not included into target number in 2012

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(2) — 6 Fish stocking in Battambang Province (2012)

256 farmers participating in farmers to farmers trainings in 2012, and 53 farmers damaged by flood in 2011 (at 10 communes), total 306 farmers were subject to free supply of fish seeds in this fiscal year. The project supplied / stocked total 146,037 fish seeds to 306 target farmers on August 1 to September 29, 2012. The average number of supplied fish seeds was 477. All fish seeds were produced at / provided from 8 core farmers of the project in the province (Mith Pan, Chorm Sowan, Dy Channa, Suon Pan, Choum Thim, Lim Loun, Lem Pakdewah, Phal Veasna).

The average shares of fish species are 45 % in silver barb, 45 % in tilapia, 10 % in common carp. Among 45 farmers who received pond construction assistance in 2011 and participated in fish

culture training in 2012, 1 farmer gave up fish culture by the leaking of pond water; but remaining 44 farmers could stock fish seeds for fish culture. In term of additional 94 farmers of Muk Rea commune, where a fish culture training were held by a request of the commune, most of them did not prepare / have fish ponds. Therefore, the farmers of Muk Rea were not subject to supply of fish supply in the project. Among total 298 farmers who participated in fish culture trainings in 2012, 297 farmers started fish culture in their ponds. Therefore, the rate of fish culture practice is 99.7 %.

Table 7-12 Number of Fish Farmers for Seed Stock and Rate of Fish Culture Practice
(Battambang Province, 2012)

Province	Category of participant	Number of participant in training	Number of farmer who stocked fingerling	Provision	
Battambang	Particioated in FTF 2012	Farmer who heve not gotten support for pond digging in 2011	253	253	free of charge
		Farmer who got support of pond digging in 2011	45	44	paid by farmer
		Sub-total	298	297	99.7%
	Farmer participated volunteers	94	ND	paid by farmer	
	Particioated in FTF 2011	Farmers suffered from flooding and lost fingerling in 2011	53	53	free of charge
		No suffered serious damage from flooding in 2011	197	arrox. 40-50% of farmer stocked fingerling (according to FiA-C)	paid by farmer

(3) Implementation of Farmer to Farmer Training (FFT) in 3rd year, 2013

(3) – 1 Selection of Target Farmers

The project conducted field surveys at the selected target communes for aquaculture extension. In the surveys, the project team interviewed commune chiefs and leaders of candidate villages to identify the current conditions of earthen ponds or water supplies. At the same time, the team visited local farmers at target communes to look for target farmers who hope to start fish culture. Finally, target farmers for training programs were selected on the criteria of the project, such as “Farmers can prepare their ponds for fish culture”, “Farmers can secure water sources”, “Farmers can prepare animal manures and feed materials” and etc.

Based on 1,125 farmers (25 new farmers x 45 communes) on the original project plan, if the number of target communes, which are selected at the Section 1) above-mentioned, does not reach 45, the project should find target farmers at or around target communes. At each commune, extension officers of provincial fisheries offices tried to select more than 26 farmers in respective communes to invite them to the training.

(3) – 2 Implementation of Farmers to Farmers Trainings

After selecting target communes and farmers in May 2013, the project team coordinated the schedule of core farmers and provincial extension officers, contacted target farmers, and conducted farmers to farmers trainings at the communes where training venues had been prepared. A course of the training program was held in only 2 days. A fish culture booklet (A5 size, 59 pages), used as a main material in the trainings, covers a series of fish culture process such as ‘pond preparation’, ‘seed stocking’, ‘pond fertilization’, ‘feeding management’ and ‘harvest’. Video materials and flipcharts produced by the project were also utilized in the training programs. Core farmers taught local farmers as lecturers and provincial extension officers gave supplementary explanation as necessary. To improve their understanding of basic skills, the practical sessions showed how to use hapa nets (small-size box nets) and prepare home-made fertilizers and feeds by using actual materials.

In the period from May 6 to June 7, 2013, the training programs were held 13 times in Siem Reap province (9 communes), 14 times in Battambang province (16 communes), and 14 times in Pursat province (14 communes in). In 39 communes in 3 provinces, total 1,091 farmers participated (331 farmers in Siem Reap, 383 farmers in Battambang, and 377 farmers in Pursat) .

Table 7-13 Implementaion Results of Farmer to Farmer Training Program (2013)

Province	Date	District	Commune	Participation (HH)
Siem Reap	08-09/05/2013	Angkor Chum	Doun Peng	29
		Angkor Chum	Doun Peng	20
	16-17/05/2013	Angkor Chum	Doun Peng	25
		Angkor Chum	Korkdoug	36
	20-21/05/2013	Svay Leu	Svay Leu	39
		Svay Leu	Bengmealear	25
	22-23/05/2013	Svay Leu	Bengmealear	21
		Chikreang	Korktloukleu	31
	30-31/05/2013	Kralanh	Roungkor	15
		Kralanh	Roungkor	28
03-04/06/2013	Kralanh	Sranal	20	
06-07/06/2013	Kralanh	Snoul	12	
	06-07/06/2013	Puok	Prey Chrouk	30
Sub total (Siem Reap)		5 districts	9 communes	331
Battambang	6-7/05/2013	Kamrieng	Ta Sen	37
		Kamrieng	Beng Rang / Or Da	20
		Kamrieng	Kamrieng	20
	9-10/05/2013	Som Lot	Or Samrel	29
		Som Lot	Ta Sanh	23
		Bavil	Bavil	30
	16-17/05/2013	Rokhakiri	Prey Tror Lach	20
		Koas Krala	Thipakdei	32
		Mong Reusei	Reusei krang	26
	20-21/05/2013	Banan	Chieng Meanchey	40
		Mong Reusei	Kakaoh / Prytoch	31
		Bavil	*Kdol Tahen	26
	22-23/05/2013	Rokhakiri	Sdok Pravek	25
Banan		Bay Damram	24	
Sub total (Battambang)		7 districts	14 communes	383
Pursat	6-7/05/2013	Kandieng	Koh Chum	14
		Bakan	Boeng Khnar	28
	9-10/05/2013	Kor Kor	Cheu Tom	30
		Kor Kor	Svay Sar	32
	16-17/05/2013	Bakan	*Talor	31
		Bakan	*Au Taporng	31
	20-21/05/2013	Kor Kor	Ansar Chom Bok	29
		Kor Kor	Anlung Tnort	24
	30-31/05/2013	Kor Kor	Snar Ansar	29
		Kor Kor	Au Sandan	22
	03-04/06/2013	Kor Kor	Boeng Kantuot	29
		Krong Posart	Sangkat Roleab	25
	06-07/06/2013	Phnum Kravanh	Rokart	28
Krong Posart		Rolork Sar	25	
Sub total (Pursat)		5 districts	14 communes	377
合計		17郡	39コミュニティ	1,091

Siem Reap: 9 target communes are newly selected in 2013.

Battambang: 16 target communes are consisted of 15 new target communes and 1 existing target commune.

Pursat: 14 target communes are consisted of 12 new target communes and 2 existing target communes (Talor and Au Taporng) .

(3) – 3 Assistance to the Farmers Participating in the Trainings

In order to support the farmers participating in training programs to start fish culture activities quickly, in the first year and the second year, the project provided maximum 500 fish seeds and a hapa net to each farmer who had prepared fish ponds. Those assistances encouraged 90 % of trained farmers to start their fish culture activities. In the third year, the same approach will be taken.

①Screen net

Responding results of evaluation workshop of fish culture activity in the second year, the project provided screen net to protect fish pond instead of hapa net. After the training, extension officers and experts confirmed the pond preparation and provided nets to the farmers and gave guidance how to install in the pond as shown in Box 6.

Box 6: Procedure of Fish Pond Preparation (FAIEX-2, since 2013)

- (i) Manure pit is prepared (to prepare liquid fertilizer)
- (ii) Bank height is enough strong, grassing is done.
- (iii) Install the screen net surrounding the pond (height should be 60cm from the earth at least)
- (iv) Dry up and exterminate the predator
- (v) Spread the lime powder to improve the bottom quality
- (vi) Pour the water (2 or 3 days after)
- (vii) Have the supplementary fertilization

②Fingering

After installing screen net as procedure in Box 3, extension officers and experts checked the pond preparation whether meets the project standard or not and then provided fish seeds to stock in their fish ponds.

(3) – 4 Fish stocking in Siem Reap Province (2013)

Distribution of fingering started from August 3 then completed in the end of August. All 311 trained farmers in 9 communes completed good pond preparation and stocked fingering. Ratio of fish species is 35% silver barb, 50% tilapia and 15% common carp (or indian carp). Some farmers bought additional fingering by themselves to stock in the fish pond.

Figure 7-4 Pond size (Siem Reap, 2013)

Table 7-14 Result of Fish Seed Stock in Siem Reap Province (2013)

Village	Commune	Well-prepared pond (HH)	Fingering stocked (by project)				Average number of fingering for stocking	Additional stocking by farmer		Date of stocking
			SB (35%)	TL (50%)	IC,CC (15%)	Total		Number of farmer	Number of fingering	
Bus Lahong	Doun Peng	29	5,075	7,250	2,175	14,500	500	0		3-Aug. 2013
Kork Yieng	Doun Peng	20	3,500	5,000	1,500	10,000	500	0		3-Aug. 2013
Rokar	Doun Peng	25	4,375	6,250	1,875	12,500	500	0		3-Aug. 2013
Kom Bleim	Korkdoug	36	6,300	9,000	2,700	18,000	500	0		28-Aug. 2013
Khnar	Svay Leu	39	6,825	9,750	2,925	19,500	500	0		28-Aug. 2013
Toek Lich	Bengmealear	25	4,375	6,250	1,875	12,500	500	0		3-Aug. 2013
Sakada	Bengmealear	21	3,675	5,250	1,575	10,500	500	2	1,000	3-Aug. 2013
Kork Thlork	Korktloukleu	31	5,425	7,750	2,325	15,500	500	5	2,100	14-Aug. 2013
Reu Sei	Roungkor	15	2,625	3,750	1,125	7,500	500	1	200	24-Aug. 2013
Rong Ko	Roungkor	28	4,900	7,000	2,100	14,000	500	5	1,950	24-Aug. 2013
Tonlorb	Sranal	20	3,500	5,000	1,500	10,000	500	4	3,500	8-Sep. 2013
Sang Ke	Snoul	12	2,100	3,000	900	6,000	500	0		2-Aug. 2013
Prey Chruk	Prey Chrouk	30	5,250	7,500	2,250	15,000	500	1	500	5-Aug. 2013
	9 Communes	331	57,925	82,750	24,825	165,500		18		

(3) – 5 Fish stocking in Battambang Province (2013)

The fingerings were provided to 383 farmers in 16 communes from July 16 until September. Although among 383 trained farmers only two farmers in Prey Tror Lach commune could not stock fingering due to inadequate preparation of fish pond, all other farmer have stocked fingering until end of September. Ratio of fish species is 50% silver barb, 45% tilapia and 5% common carp (or indian carp). Some farmers bought additional fingering by themselves to stock in the fish pond.

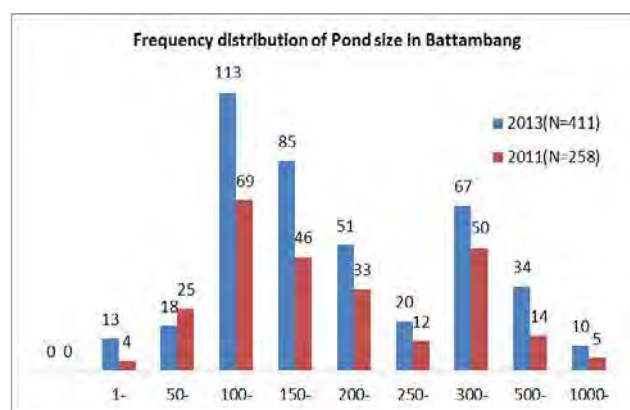


Figure 7-5 Pond size (Battambang, 2013)

Table 7-15 Result of Fish Seed Stock in Battambang Province (2013)

Commune	Well-prepared pond (HH)	Ineligible famer to be supported by project (HH)	Fingering stocked (by project)				Average number of fingering for stocking	Additional stocking by farmer		Date of stocking	
			SB (50%)	TL (45%)	IC,CC (5%)	Total		Number of farmer	Number of fingering		
Ta Sen	36	0	9,000	8,100	900	18,000	500	17	21,600	300-2000/farmer	16-Jul. 2013
Beng Rang Or Da	20	0	5,000	4,500	500	10,000	500	14	3,400	100-500/farmer	22-Jul.2013 ~ 28-Aug.2013
Kamrieng	20	0	5,000	4,500	500	10,000	500	3	950	200-400/farmer	22-Jul.2013 ~ 28-Aug.2013
Or Samrel	29	0	7,250	6,525	725	14,500	500	1	1,500	1500 /farmer	25-Aug.2013 ~ 2-Sep.2013
Ta Sanh	24	0	6,000	5,400	600	12,000	500	8	3,200	300-700/farmer	25-Jul.2013 ~ 26-Aug.2013
Bavil	30	0	7,500	6,750	750	15,000	500	18	13,600	300-3500/farmer	16-Jul.2013 ~ 17-Jul.2013
Prey Tror Lach	18	2	4,500	4,050	450	9,000	500	0			15-Aug. 2013
Thipakdei	32	0	8,000	7,200	800	16,000	500	3	2,000	500-1000/farmer	16-Sep. 2013
Reusei krang	26	0	6,500	5,850	650	13,000	500	10	5,750	200-1000/farmer	13-Aug. 2013
Chieng Meanchey	40	0	8,158	7,342	816	16,315	408	0			16-Sep. 2013
Kakaoh Prytoch	31	0	7,750	6,975	775	15,500	500	9	6,900	300-1500/farmer	11-Aug. 2013
*Kdol Tahen	26	0	6,500	5,850	650	13,000	500	5	3,700	500-1000/farmer	24-Jul.2013 ~ 4-Aug.2013
Sdok Pravek	25	0	6,250	5,625	625	12,500	500	6	2,300	300-450/farmer	15-Aug. 2013
Bay Damram	24	0	6,000	5,400	600	12,000	500	1	500	500 /farmer	23-Sep. 2013
16 Communes	381	2	93,408	84,067	9,341	186,815	490	95	65,400	688	

(3) – 6 Fish stocking in Pursat Province (2013)

Distribution of fingering started from August 7 then completed in the end of August. All 377 trained farmers in 14 communes completed good pond preparation and stocked fingering. 31 famers among 377 trained farmers had gotten financial support for pond digging from the project last year; therefore the project obligated them to buy fingering by self-effort (not free of charge). All 31 farmers bought 600fingering by themselves. Ratio of fish species is 50% silver barb, 35% tilapia and 15% common carp (or indian carp). Some farmers bought additional fingering by themselves to stock in the fish pond.

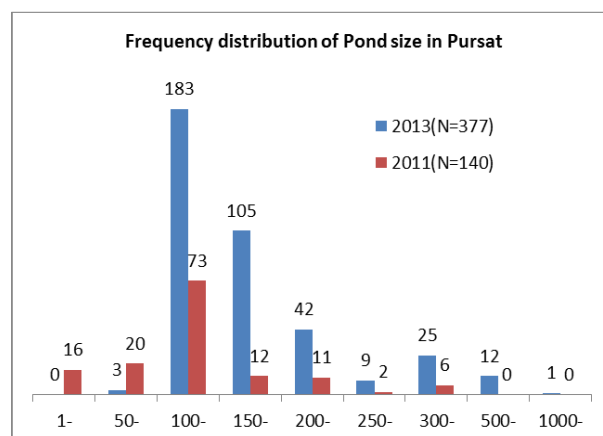


Figure 7-6 Pond size (Pursat, 2013)

Table 7-16 Result of Fish Seed Stock in Pursat Province in 2013

Village	Commune	Eligible farmer to be supported by project (H#)	Ineligible farmer to be supported by project(*1) (H#)	Fingering stocked (by project)				Average number of fingering for stocking	Additional stocking by farmer		Date of stocking
				SB (50%)	TL (35%)	IC, CC (15%)	Total		Number of farmer	Number of fingering	
Dong Rung	Koh Chum	14	0	3,340	2,338	1,002	6,680	477	1	500	12-Sep. 2013
Boeng Khnar	Boeng Khnar	28	0	6,390	4,473	1,917	12,780	456	7	4000	2013/8/26 - 9/12
Kapas	Cheu Tom	30	0	7,340	5,138	2,202	14,680	489	4	2000	2013/8/24 - 9/8
Kom Reng	Svay Sar	32	0	7,400	5,180	2,220	14,800	463	1	600	2013/8/24 - 9/8
Talor	*Talor	31	0	6,832	4,782	2,050	13,664	441	2	1,900	10-Aug. 2013
Au Tapomg	*Au Tapomg	28	3	6,302	4,411	1,893	12,606	450	7	5,000	25-Aug. 2013
Khsach La Ith	Ansar Chom Bok	29	0	7,000	4,900	2,100	14,000	483	19	12000 (200-1000)	2013/8/23 - 9/12
Phsar	Anlung Tnort	23	1	5,270	3,689	1,581	10,540	458	1	500	6-Aug. 2013
Snar Ansar	Snar Ansar	29	0	6,920	4,844	2,076	13,840	477	8	1100 (100-200)	2013/8/14 - 9/12
Au Ach Kok	Au Sandan	22	0	5,080	3,556	1,524	10,160	462	1	500	2013/8/6 - 8/23
Tropaing Kantuot	Boeng Kantuot	27	2	6,170	4,319	1,851	12,340	457	2	600	2013/8/6 - 8/23
Roleab	Sangkat Roleab	1	24	250	175	75	500	500	1	300	2013/7/31 - 8/14
Prey Khlong	Rokart	27	1	5,680	3,976	1,704	11,360	421	3	900 (200-500)	8-Sep. 2013
Dob Bat	Rolork Sar	25	0	5,200	3,640	1,560	10,400	416	3	1500	29-Aug. 2013
	14 communes	346	31	79,174	55,421	23,755	158,350	420	60		13

(*1) The farmers had received financial support for pond digging in 2012.

(4) Implementation of Farmer to Farmer Training (FFT) in 4th year, 2014

(4) – 1 Selection of Target Farmers

The project conducted field surveys at the selected target communes for aquaculture extension. In the surveys, the project team interviewed commune chiefs and leaders of candidate villages to identify the current conditions of earthen ponds or water supplies. At the same time, the team visited local farmers at target communes to look for target farmers who hope to start fish culture. Finally, target farmers for training programs were selected on the criteria of the project, such as “Farmers can prepare their ponds for fish culture”, “Farmers can secure water sources”, “Farmers can prepare animal manures and feed materials” and etc.

Considering target figure 3,000 farmers that are mentioned as a target indicator in PDM, project will select around 880 new farmer households (40 communes X 22 farmer households) in the final year of the project.

Trained farmers from 1 st to 3 rd year(HH)	Trained farmers in 4 th year (HH)	Trained farmers from 1 st to 4 th year (HH)	Farmer who continue aquaculture	Fish farmers trained by FAIEX2(HH)
2493	880	3373 →	90%(*) →	3035

(4) – 2 Implementation of Farmers to Farmers Trainings

The project conducted the training programs of fish culture for selected farmers. A course of the training program was held in 2 days. The curriculum of training program mainly comprises the basic techniques of fish culture for beginners’ farmers. The training program are composed of some lecture sessions to introduce the basic skills of fish culture, such as preparation of fish ponds, drying and fertilization of fish ponds, proper pond size and stock density, characteristics of target fish species, and selection of fish species for aquaculture. Additionally, the training program also includes some advance skills for intermediate level farmers, such as making of compound feed, feeding methods, and water quality management. Local extension officers and human resources of Phase 1 should be utilized to advise the advance skills.

In the period from May 5 to May 30, 2014, the training programs were held in 34 communes in 3 provinces, total 932 farmers participated.

Table 7-17 Implementation Results of Farmer to Farmer Training Program (2014)

Province	Date	District	Commune	Participation (HH)	
Siem Reap	5-6 May, 2014	Saut Nikum	Samraong	21	
		Krong Siem Reap	Am Pil	17	new target commune
	8-9 May, 2014	Angkor Chum	Srae Khvar	25	new target commune
		Angkor Chum	Koul	17	new target commune
	19-20 May, 2014	Pouk	Kdei Run	24	new target commune
		Pouk	Kdei Run	35	
	22-23 May, 2014	Pouk	Yeang	22	new target commune
	26-27 May, 2014	Chi Kreng	Spean Tnort	16	new target commune
		Chi Kreng	Spean Tnort	19	
	29-30 May, 2014	Chi Kreng	Pongro Kraom	15	new target commune
Saut Nikum		Samraong	19	new target commune	
Sub total (Siem Reap)		5 district	8 commune	230	
Battambang	8-9 May, 2014	Rokhakiry	Sdok Pravek	20	target commune in 2013
		Koas Krala	Preah Phos	27	new
		Rokhakiry	Muk Rea	25	target commune in 2012
	19-20 May, 2014	Thmor Kol	Anlong Run	27	target commune in 2011
		Bavel	Klang Meas*	39	new
		Koas Krala	Chhnal Man	27	new
	22-23 May, 2014	Samlout	Ou Somrel	20	target commune in 2013
		Bavel	Beng Bram*	36	new
		Koas Krala	Doun Ba	29	new
	26-27 May, 2014	Kamrieng	Ta Saen	33	target commune in 2013
		Rokhakiry	Basak	20	new
	29-30 May, 2014	Mong Ruessei	Ruessei Krang	25	target commune in 2013
		Samlout	Ta Sanh	20	target commune in 2013
Samlout		Mean Chey	25	new	
Sub total (Battambang)		7 district	14 commune	373	
Pursat	5-6 May, 2014	Phnom Kravanh	Somraong	26	new
		Phnom Kravanh	Phteah Rung	29	target commune in 2012
	8-9 May, 2014	Bakan	Ta Lou	30	target commune in 2012
		Bakan	Rumlech	31	target commune in 2011
	19-20 May, 2014	Bakan	Khnar Toteung	22	target commune in 2011
		Bakan	Boeng Bat Kandal	33	new
	22-23 May, 2014	Bakan	Trapeang Chong	22	target commune in 2011
		Bakan	Snam Preah	34	target commune in 2012
	26-27 May, 2014	Bakan	Boeng Khnar	26	target commune in 2013
		Bakan	Metoeok	30	new
29-30 May, 2014	Kror Kor	Chheu Tom	22	target commune in 2013	
	Kror Kor	Ansa Chambak	24	target commune in 2013	
Sub total (Pursat)		3 district	12 commune	329	
Total		15 district	34 commune	932	

Siem Reap: 8 target communes are newly selected in 2014.

Battambang: 14 target communes are consisted of 7 new target communes and 7 former target commune.

Pursat: 12 target communes are consisted of 3 new target communes and 9 former target communes.

(4) – 3 Assistance to the Farmers Participating in the Trainings

In the 4th year, the same approach was taken in order to support the farmers participating in training programs to start fish culture activities quickly.

①Screen net

Responding results of evaluation workshop of fish culture activity in the second year, the project provided screen net to protect fish pond instead of hapa net. After the training, extension officers and experts confirmed the pond preparation and provided nets to the farmers and gave guidance how to install in the pond.

②Fingering

After installing screen net as procedure following project standard, extension officers and experts checked the pond preparation whether meets the project standard or not and then provided fish seeds to stock in their fish ponds.

(4) – 4 Fish stocking in Siem Reap Province (2014)

Distribution of fingering started from 21 July 2014 in Spean Thnot communethen completed in the end of August 2014. All 230 trained farmers in 8 communes completed good pond preparation and stocked fingering. Ratio of fish species is 35% silver barb, 50% tilapia and 15% common carp (or indian carp). 40 farmers (17%) bought additional fingering by themselves to stock in the fish pond.

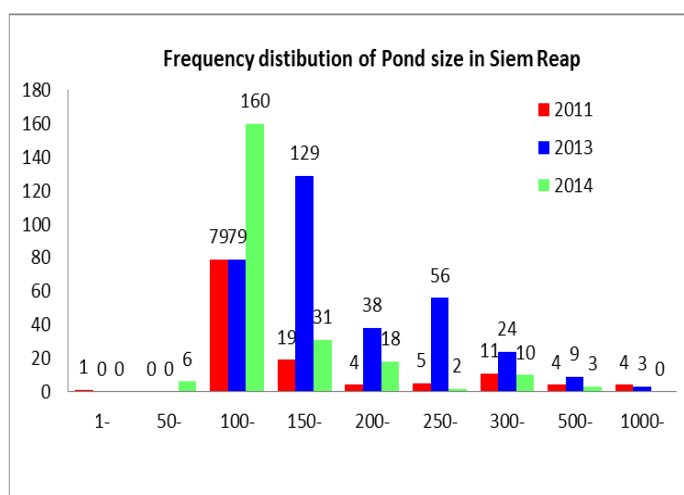


Figure 7-7 Pond size (Siem Reap, 2014)

Table 7-18 Result of Fish Seed Stock in Siem Reap Province (2014)

Commune	District	Eligible farmer to be supported by project	Fingering stocked by project (head)				Average number of fingering for stocking (head/HH)	Additional stocking by farmer		Date of stocking
			SB(35%)	TL(50%)	IC, CC(15%)	Total		Number of farmer (HH)	Number of fingering (head)	
Samraong	Soutr Nikom	21	7,000	10,000	3,000	20,000	500	0	0	7.24
Ampil	Siem Reab	17	2,975	4,250	1,275	8,500	500	0	0	8.19
Srae Khvar	Angkor Chum	25	4,375	6,250	1,875	12,500	500	0	0	8.8
Koul	Angkor Chum	17	2,975	4,250	1,275	8,500	500	0	0	8.12
Kdei Run	Puok	24	10,325	14,750	4,425	29,500	500	2	1,000	8.15
Kdei Run	Puok	35								
Yeang	Puok	22	3,850	5,500	1,650	11,000	500	2	1,500	8.5
Spean Thnot	Chi Kraeng	16	6,125	8,750	2,625	17,500	500	24	43,750	7.21
Spean Thnot	Chi Kraeng	19								
Pongro Kraom	Chi Kraeng	15	2,625	3,750	1,125	7,500	500	12	5,550	7.22
Samraong*	Soutr Nikom	19								
8 communes	5	230	40,250	57,500	17,250	115,000	500	40	51,800	

(4) – 5 Fish stocking in Battambang Province (2014)

The fingerings were provided to 374 farmers in 14 communes from 30 June in Llang Meas commune until end of September. Ratio of fish species is 45% silver barb, 50% tilapia and 10% common carp (or indian carp). Some farmers bought additional fingering by themselves to stock in the fish pond.

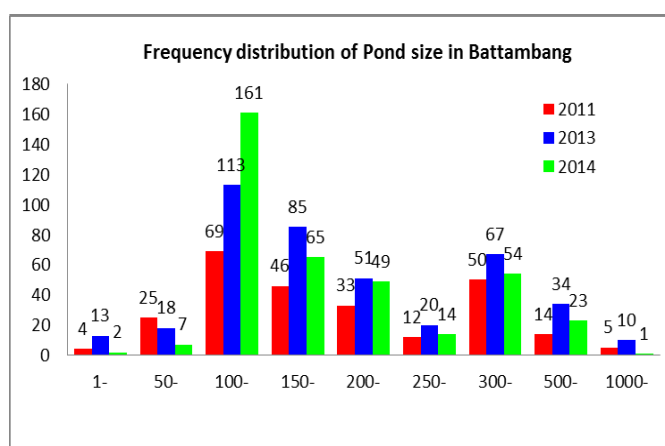


Figure 7-8 Pond size (Battambang, 2014)

Table 7-19 Result of Fish Seed Stock in Battambang Province (2014)

Commune	District	Eligible farmer to be supported by project	Fingering stocked by project (head)				Average number of fingering for stocking (head/HH)	Date of stocking
			SB(45%)	TL(45%)	CC(10%)	Total		
Sdock Praveck	Rukhak Kiri	20	4,500	4,500	1,000	10,000	500	9.16
Preah Phos	Koas Krala	27	6,075	6,075	1,350	13,500	500	8.15, 9.25
Muk Rea	Rukhak Kiri	25	5,625	5,625	1,250	12,500	500	7.10, 7.21
Anlong Run	Thma Koul	27	6,075	6,075	1,350	13,500	500	8.26, 9.3
Klang Meas	Bavel	40	9,000	9,000	2,000	20,000	500	6.30, 8.14
Chhnal Mean	Koas Krala	27	6,075	6,075	1,350	13,500	500	9.14, 25
Ou Samrel	Samlout	20	4,500	4,500	1,000	10,000	500	9.18, 9.26
Beng Bram	Bavel	36	8,100	8,100	1,800	18,000	500	7.25, 8.3
Doun Ba	Koas Krala	29	6,525	6,525	1,450	14,500	500	9.15, 26
Ta Saen	Kamrieng	33	7,425	7,425	1,650	16,500	500	7.18, 7.25
Basak	Rukhak Kiri	20	4,500	4,500	1,000	10,000	500	8.26
Ruessei Krang	Moung Ruessei	25	5,625	5,625	1,250	12,500	500	9.17, 9.26
Ta Sanh, Sung	Samlout	20	4,500	4,500	1,000	10,000	500	7.17, 8.18
Mean Chey	Samlout	25	6,250	5,000	1,250	12,500	500	7.17, 8.1
14 communes	7	374	84,775	83,525	18,700	187,000	500	

(4) – 6 Fish stocking in Pursat Province (2014)

Distribution of fingerling started from 25 August 2014 then completed in the end of September 2014. All 329 trained farmers in 13 communes completed good pond preparation and stocked fingerling. Ratio of fish species is 60% silver barb, 25% tilapia and 15% common carp (or indian carp). Some farmers (71 HH, 21.6%) bought additional fingerling by themselves to stock in the fish pond.

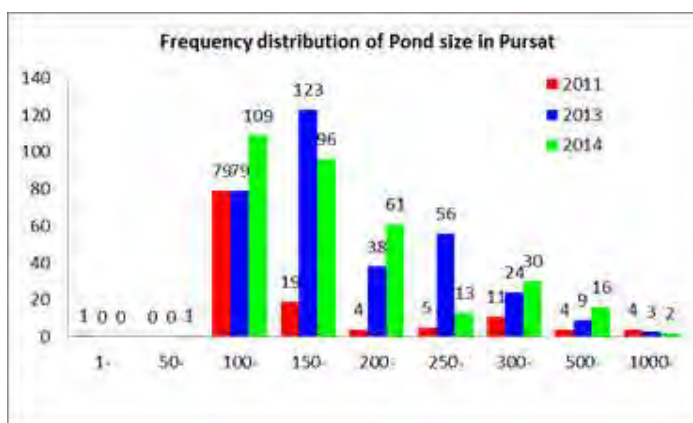


Figure 7-9 Pond size (Pursat, 2014)

Table 7-20 Result of Fish Seed Stock in Pursat Province in 2014

Commune	District	Eligible farmer to be supported by project	Fingerling stocked by project (head)				Average number of fingerling for stocking (head/HH)	Additional stocking by farmer		Date of stocking
			SB(60%)	TL(25%)	CC(15%)	Total		Number of farmer (HH)	Number of fingerling (head)	
Samraong	Phnum Kravanh	26	7,387	3,078	1,847	12,312	474	6	2,700	8.25, 9.15
Phteah Rung	Phnum Kravanh	29	8,335	3,473	2,084	13,892	479	4	1,200	8.29, 9.21
Ta Lou	Bakan	30	9,000	3,750	2,250	15,000	500	16	6,200	8.25, 9.15
Rumlech	Bakan	31	8,914	3,714	2,213	14,856	479	13	5,700	9.2, 9.19
Khnar Totueng	Bakan	22	6,276	2,615	1,569	10,460	476	1	500	9.2, 9.21
Boeng Bat Kandal	Bakan	33	9,768	4,070	2,442	16,280	493	13	3,200	9.26
Trapeang chong	Bakan	22	6,180	2,575	1,545	10,300	468	4	1,300	8.29, 9.19
Snam Preah	Bakan	34	9,708	4,045	2,427	16,180	476	0	0	8.31, 9.26
Boeng Khnar	Bakan	26	7,488	3,120	1,872	12,480	480	6	2,600	8.27, 9.17
Me Tuek	Bakan	30	8,208	3,420	2,052	13,680	456	3	1,000	8.27, 9.17
Chheu Tom	Krakor	22	6,288	2,620	1,572	10,480	476	1	1,000	8.31, 9.28
Ansa Chambak, Kbal Trach	Krakor	24	7,200	3,000	1,800	12,000	500	4	1,800	9.4, 9.28
13 communes	3	329	94,752	39,480	23,673	157,920	480	71	27,200	12

(5) Evaluation meeting for fish farmers

According to the monitoring of fish culture activities in the first and second years, many grow-out farmers stopped their fish culture activities by flood (2011) and shortage of water and draught (2012), even though they started fish culture after the trainings. The project held the evaluation meetings for fish farmers who have about 6 to 8 months' experiences of fish culture to arrange problems and issues on fish culture, and to clarify necessary conditions for their continuing fish culture activities. According to the evaluation meetings, the project took necessary measures to raise the rate of their continuation of fish culture activities. The meeting has been held at each communes around April every year when common farmers start fish culture.

Table 7-21 Evaluation meeting for fish farmers

Target Farmers	Number of Target Communes	Number of Target Fish Farmers	Planned Implementation Period
First year's fish farmer (farmers who started fish culture after participation in the trainings held in June 2011)	19 communes	473 farmers -Siem Reap: 135 -Pursat:120 -Battambang : 218	The end of April 2012
Second year's fish farmer (farmers who started fish culture after participation in the trainings held in June or July 2012)	34 communes	796 farmers -Siem Reap: 246 -Pursat:253 -Battambang : 297	The end of April to May 2013
Third year's fish farmers (farmers who started fish culture after participation in the training held in May to June 2013)	37 communes	1091 farmers -Siem Reap: 331 -Pursat:377 -Battambang : 383	The end of January to February 2014
Fourth year's fish farmers (farmers who started fish culture after participation in the training held in May 2014)	34 communes	932 farmers -Siem Reap: 230 -Pursat:329 -Battambang : 373	The January 2015

7.3 Select Community Fish Refuges (CFRs) for resource enhancement. (Activity 4-3)

The project reviewed the current condition of total 22 ponds in 4 provinces supported by Phase I, and picked up some good practices to reflect for making fish refugee models in the target areas of Phase II. Therefore, as the first year's activities, the project team carried out the reviews of target ponds of Phase I and the selection of candidates of model fish refugee ponds in the target areas of Phase II.

Selection criteria of model small refugee pond sites in the target areas of Phase II.

1. Hydrological aspect

- (1) Sufficient water volume remains in a pond for adult fish to survive in dry seasons (**deeper than 1.5 m of water depth**)
- (2) **Water area in a pond is more than 1 ha in rainy seasons.**
- (3) Lands around refugee ponds are flooded every year. Flood water flows in fish ways from refugee ponds to paddy fields.

2. Geological aspect

- (1) Refugee ponds are located close to paddy fields.
- (2) Refugee ponds and paddy fields close to the ponds are located far from natural water bodies, such as rivers, lakes and swamps.
- (3) **Access to refugee ponds (road condition) is good.**

3. Socio-economic aspect

- (1) There are a lot of poor beneficiaries engaged in rice field fishing.
- (2) **There is no conflict of fish refugee pond activities between members of a management group and community people.**
- (3) **All community people, including the people living at low reaches of refugee ponds, agree on fish refugee pond activities.**

4. Systematic and organizational aspects

- (1) **Refugee pond groups have been organized and made some activities.**
- (2) Refugee ponds belong to the community.
- (3) **Rules of refugee pond management are formulated, and submitted to Fisheries Administration and provincial fisheries offices.**
- (4) **Members of a management group live around refugee ponds.**
- (5) **Sufficient supports and cooperation of community people can be expected.**

5. Pond condition aspect

- (1) **Aquatic plants or weeds grow in ponds for protecting fish and spawning fields.**
- (2) **Refugee ponds are not totally covered with aquatic plants or weeds.**

First of all, the project team surveyed the progress conditions of refugee ponds, which had been

made in one and half years since the completion of Phase I, February 2010, with Fisheries Administration. In the aspects of respective target provinces, fish refugee pond activities in Kampot, Prey Veng, Takeo provinces were continuously made smoothly. On the other hand, in Kampong Speu province, continuous fish releases have already been stopped. In this project, about 2 places of fish refugee pond activities in each province will be selected at target 3 northern provinces. At those target places, the Cambodia side will sustainably carry out fish refugee pond activities as model implementation sites after the completion of this project. To realize the situations, the project team should visit high potential places as future models and confirm their current situations. Before field visits, the project team requested respective provincial fisheries offices to list up some possible candidate places of refugee ponds. In addition, to select proper places of high potentials as models, the selection criteria of Phase I were revised as follows (bold parts show the revised sentences).

The revision of the selection criteria includes more detail areas and depths of ponds, no possibilities of conflicts between management groups and community people, the access to ponds and the pond shapes. Due to select candidate ponds listed by target 3 provinces on those criteria, 1 or 2 sites in each province were selected as model refugee ponds as shown in Table.

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Table 7-22 Selected model CFRs in project target areas

No.	Province	District	Commune	Village	Name of pond	Pond area(ha)	
						Rainy S.	Dry S.
1	Pursat	Krakor	Tnot Chum	Dang Tuek Leaca	Beoung Dang Tuek Leaca *(6km from the route no.5 and 16km from the city center of Pursat)	7km x 150m = 105 ha (7m in depth)	2km x 50m = 10 ha (4m in depth)
2	Pursat	Krakor	Boeung Kantuot	Trapaing Kantourg	Boeung Kantourt *(The pond located only 600m from the national road No.5. The short access road from the national road is narrow and not in good condition.)	100 m x 70 m = 0.7 ha (4 m in depth),	100 m x 65m = 0.65 ha (3.5 m in depth)
3	Battambang	Koas Krala	Preah Phos	Boeung Preah	Boeung Preah Phos *(33km from paved road and 71 km from the city center of Battambang)	85 m x 80 m = 0.68 ha (4m in depth)	80 m x 80 m = 0.64ha (1.5m in depth)
4	Siem Reap	Puok	Prey Chruk	Prey Chrak / Ketyous	Bleukketyous *(alongside of the route no.6 and 40 minutes by car from the city center of Siem Reap)	210 m x 125 m = 2.6 ha (10 m in depth)	205 m x 120 m = 2.46 ha (8 m in depth)

7.4 Support CFR activities and prepare implementation manual.(Activity 4-4)

(1) CFR activities in 2011 (First year)

In target areas of Phase 2, 4 candidate model sites of fish refugee ponds were selected in the Section (18). At each candidate site, a workshop was held to promote an understanding of fish refugee ponds in a community and a cooperation of the program.

Table 7-23 Participatory workshops in the selected 4 Fish Refugee Pond

Name of CFR / Province	Date	Participation
Beoung Dang Tuek Leaca / Pursat	January 25, 2012	40 persons attended the workshop (12 female). 8 committee members of management group attended (group chief is newly selected, and replaced on December 14, 2011). Total committee member is 11 persons.
Boeung Kantourt / Pursat	January 26, 2012	40 persons attended the workshop (20 female). 7 committee members of management group, village chief and commune chief attended the workshop.
Boeung Preah Phos / Battambang	January 27, 2012	A chief of management group and another committee member attended the workshop. 1 member got pregnant. 1 member worked in Thailand. 1 member worked in Battambang. Other 2 members were absent. The management group was inactive by the separation of committee members.
Bleukketyous / Siem Reap	January 31, 2012	40 persons attended the workshop. Village chiefs of 2 villages and a commune chief also attended it. The management group was inactive by the separation of committee members. Only 2 members attended the workshop.

As conducted in Phase 1, in the workshops, the communities of target sites considered and shared current situation, problem and solution in their communities and fish refugee ponds, and discussed what kind of supports for them can be given by FAIEX 2. Moreover, targeting for local communities in target sites, the project carried out observation tours to advanced places of fish refugee ponds in Phase 1. As indicated in the table below, 16 persons participated in the first observation tour on, February 2, 2012, and 5 persons participated in the second observation tour on February 23, 2012. In those tours, the participants observed the actual activities in fish refugee ponds supported by Phase 1 and exchanged ideas and opinions in management methods and know-how of activity continuation actively.

Table 7-24 Observation Tour to observe the actual activities in fish refugee ponds

The First Observation Tour

Date	Observation Sites	Target Participants	
February 2, 2012	1. Trorbek Toung Ponds in Kompong Spe Province	Beoung Dang Tuek Leaca Pond in Pursat Province	1 chief and 2 vice chiefs of management group,

	(Established in 2007) Prey Kduoch Pond in Takeo Province		4 village chiefs of relevant villages
	(established in 2005)	Boeung Kantourt Pond in Pursat Province	1 chief and 2 vice chiefs of management group, 1 village chief of relevant villages
		Bleukketyous Pond in Siem Reap Province	1 chief and 2 vice chiefs of management group, 1 village chief of relevant villages

The Second Observation Tour

Date	Observation Sites	Target Participants	
February 23, 2012	Trorbek Toung Pond in Kompong Speu Province (established in 2007) Prey Kduoch Pond in Takeo Province (established in 2005)	Boeung Preah Phos in Battambang Province	1 chief and 2 vice chiefs of management group, 1 village chief 1 commune chief

Moreover, according to the results of those workshop series, the project team considered the relevance and efficiency of input supports at target sites and the support processes. Consequently, the project team selected some necessary tools for monitoring activities, such as flash lights, raincoats, boots, transceivers and digging equipment's (shovels, hoes, baskets), and provided them to local communities at target sites on February 27 to 29, 2012. In addition, the project team assigned necessary preparation activities to target communities, such as pond preparation (fish canal preparation, pond expansion, water pipe setting) and simple survey, and decided the schedule of fish stoking. Those activities will be carried out in next fiscal year.

(2) CFR activities in 2012 (Second year)

In the year 2011, the project conducted workshops for CFR management groups at 4 model sites and study tours to visit good practice sites. In addition, necessary tools for surveillance activities were provided to each management group. In the second year, to prepare CFR ponds, the project discussed with CFR management groups at 4 sites, and decided the contents of input assistances and a schedule for preparation of CFR ponds in this year. As indicated by Table, the input assistances for preparation of CFR ponds were completed according to the plan.

4 model CFR sites have not made any management regulations. In the first half of this year, the project held participatory workshops at 3 sites, where the preparation works of CFR ponds had been completed, to discuss the meaning and necessity of management regulation. The workshops facilitated to make common knowledge of management regulation between village residents, management groups, village chiefs, commune chiefs, and provincial fisheries officers. Moreover, the experts prepared a draft of CFR management manual for local extension officers, and discussed the contents with counterparts. Though the original draft manual covers necessary basic information, it will be revised by reflecting good practices of Phase 1 sites in the future.

(3) CFR activities in 2013-2014 (Third year and Fourth year)

(3) – 1 Workshop

Based on an implementation manual prepared in the second year, local extension officers is giving necessary advices and guidance about fish refuge ponds. They held workshops with relevant communities to improve the participant motivation as well as to make them understand deeply contents of implementation manual daft in September. Additionally, they collected good practices and revise the implementation manual on management of fish refuge ponds.

Table 7-25 Workshop in Fish Refuge Ponds model site

Target site (Name of CFR)	Date	Participation
Boeung Kantourt Pond Pursat Province	3-September, 2013	50 (member of management group and villagers)
Boeung Dang Tuek Leaka Pond Pursat Province	4-September, 2013	51 (member of management group and villagers)
Boeung Preah Phos Pond Battambang Province	5-September, 2013	50 (member of management group and villagers)
Bleukketyous Pond Siem Reap Province	6-September, 2013	51 (member of management group and villagers)

(3) – 2 Study of management activity and effectiveness in CFR

The management activity in the 4 model CFR has almost been in the final stage as of March 2014.

This study was conducted to examine current situation and effectiveness of the CFR in the each site. The result will provide information used for terminal evaluation of JICA. The method of the study was holding interviews to CFR management group member and individual interview to some of the villagers. The interview to the management group member is to know reality of the CFR management activity and the individual interview to villagers is to take grasp of effectiveness of CFR. Since the individual interview was done by some staff of FiAC, it takes time to compile the result. Therefore, the result will be reflected in the later stage.

(3) – 3 Inputs to CFR

① Digging fish path way

Responding the request from the management group of Bleukketyous pond (Siem Reap), project supported digging work to make fish path way by FFW (Food For Work) scheme. Length of fish path way is 96 meter and divided into three parts to share digging work in three different villages (Prey Chruk village, Ketyous village and Dountok village) as shown in figure. Digging work started from 4 February 2014, 50 to 120 villagers (about 220 villagers in total) and completed after a week. 550kg rice (by calculating with 3.5kg rice per 1 cubic meters soil) were provided to villagers who participated in its work.

② Culvert and dike rehabilitation

Rehabilitation work was implemented in Boeing Preach Phis pond in Battambang as the dike and culvert were swept away by flooding in 2013 there. Project provided the culvert (including construction material, equivalent 626 US dollars) to refuge pond management group for them to do

Table 7-26 Content of Input Assistance to Community Fish Refuge Pond Sites

CFR Pond Site	Contents of Input Assistance (requests from the communities)	Achievement of Input Assistant (since Fiscal Year 2012)
Boeing Dang Turk Leica Pursat Province	<ul style="list-style-type: none"> ● Setting of fish pathways Because it is possible that land mines are still buried at sites, the setting of fish ways was given up. ● Rehabilitation of surveillance huts ● Setting of sticks for protected areas ● Release of broodstock Walking catfish 50 kg, Snakehead 50 kg, Climbing perch 50 kg ● Release of fish seeds Silver barb 10,000 fish ● Setting of a signboard 	<ul style="list-style-type: none"> ● Workshop 40 persons participated (Jan. 15, 2012) 40 persons participated (Aug. 31, 2012) ● Workshop on management rule planning (Nov. 17, 2012) ● Workshop on regulations and implementation guide, 51 persons participated (Sep. 4, 2013) ● Release of broodstock 150kg (Walking catfish 80kg, Snakehead 70kg) (Nov. 17, 2012) ● Install sign board (Mar, 2014) ● <p><u>Input assistance by other donors</u></p> <ul style="list-style-type: none"> ▲ Fence (Prum Vihere Tor with USAID-HARVEST, planned in 2014) ▲ Submerge forest (Prum Vihere Tor with USAID-HARVEST, planned in 2014) <p>Inspection tower US\$6,014 (Prum Vihere Tor with USAID-HARVEST, 2012)</p> <ul style="list-style-type: none"> ▲ Boar with outboard engine US\$1,800 (Prum Vihere Tor with USAID-HARVEST, 2012) <p>(USAID-HARVEST, 2013)</p> <ul style="list-style-type: none"> ▲ Fish release 1ton : US\$7,000, Submerge forest (US\$450), pole for boundary (US\$4,500), pole of protection area (US\$270), artificial fish reef etc.
Boeung Kantourt Pursat Province	<ul style="list-style-type: none"> ● Setting of fish pathways (only pipes) ● Building of a surveillance hut ● Release of broodstock Walking catfish 20kg, Snakehead 30kg, Climbing perch 50kg ● Release of fish seeds Silver barb 10,000 fish ● Setting of a signboard 	<ul style="list-style-type: none"> ● Workshop 40 persons participated (Jan. 26, 2012) ● Workshop on management rule planning (Aug. 31, 2012) ● Workshop on regulations and implementation guide, 50 persons participated (Sep. 3, 2013) ● Setting of clay pipes and fish pathways (Aug. 2012) ● Release of fish seeds (Aug. 31, 2012) ● Release of broodstock ● Total 100kg (Walking catfish 40kg, Snakehead 60kg) (Nov. 16, 2012) ● Install sign board (Mar, 2014) <p><u>Input assistance by other donors</u></p> <ul style="list-style-type: none"> ▲ Fence (Prum Vihere Tor with USAID-HARVEST, planned in 2014) ▲ Submerge forest (Prum Vihere Tor

		withUSAID-HARVEST, planned in 2014)
Boeung Preah Phos Battambang Province	<ul style="list-style-type: none"> ● Setting of fish pathways Repairing and change of two existing pipes ● Expansion of a pond ● Release of broodstock Walking catfish 20 kg, Snakehead 20 kg, Climbing perch 20 kg, Silver barb 40 kg ● Setting of a signboard 	<ul style="list-style-type: none"> ● Setting of clay pipes and fish pathways (planned in 2013) ● Workshop on regulations and implementation guide, 50 persons participated (Sep. 5, 2013) ● Release of broodstock 100kg (Snakehead 60kg, Climbing perch 40kg) (Nov. 20, 2012) ● Install sign board (Mar, 2014)
Bleukketyous Siem Reap Province	<ul style="list-style-type: none"> ● Setting of fish pathways Change of two existing pipes ● Addition of pond dike heights ● Setting of a surveillance hut ● Release of broodstock Walking catfish 30 kg, Snakehead 50 kg, Climbing perch 20 kg, Silver barb 30 kg, Pangasius 20 kg, Snake skin gourami 20 kg, Siamese mud carp (trey riel) 30 kg ● Release of fish seeds Silver barb 3,000 fish ● Setting of a signboard 	<ul style="list-style-type: none"> ● Workshop 40 persons participated (Jan. 31, 2012) ● Workshop on management rule planning 50 persons participated (Sep. 4, 2012) ● Workshop on regulations and implementation guide, 51 persons participated (Sep. 6, 2013) ● Setting of clay pipes and fish pathways (Aug. 2012) ● Release of fish seeds (Sep. 4, 2012) ● Release of broodstock Total 200kg (Walking catfish 30kg, Snakehead 90kg, Climbing perch 60kg, Pangasius 20kg) (Nov. 20, 2012) ● Dike rehabilitation (raise the height the dike by carrying 390m3 of soil) , (21 February 2013) ● Digging fish pathway 96m by FFW (Feb.2014)
		<u>Input assistance by other donors</u> <ul style="list-style-type: none"> ▲ Install sign board by USAID-Harvest (2013) ▲ Pole to show fish protection area by USAID, World Fish Center (2013) ▲ Digging fish pathway by excavator(Tros Try,2013) ▲ Wooden boat (Tros Try,2013) ▲ Workshop in Kampong Thom (Tros Try,2013)

7.5 Disseminate information of small-scale aquaculture. (Activity 4-5)

(1) Public Information of Project Activities in 2011

● ODA Press Tour

On October 12 to 14, 2011, Embassy of Japan and JICA Cambodia Office conducted an ODA press tour for the Cambodian press people mainly. The tour of this fiscal year visited 4 sites of JICA projects in Battambang province. Then, project sites of FAIEX 2 (fish farms of core farmers) were selected as one of visit places. The press visit to project sites was conducted on October 14, the last day of the tour. It is a good opportunity for local presses to observe training scenes for local farmers, which is one of main project activities. The director of Fisheries Administration and

counterparts explained current aquaculture situation in Cambodia and the summary of the project. Afterward, observing the fish culture facilities and the scenes of farmers' trainings, local presses had interviews with project counterparts and seed producers. The articles of the press tour were reported by local newspapers and radio broadcasts. It was a good opportunity to inform the project activities to the public.

- **Making of Fish Culture Calendar**

The Phase 1 project made poster type calendars every year. The Phase 2 project made the first year's calendars with monthly pages. Because each page has a large drawing of monthly activities of fish culture, the calendar can be used as educational material for farmers. 2,000 copies were printed and distributed to project stakeholders.

- **Making of Project Pamphlet**

Project Pamphlets were prepared in Japanese, English and Khmer, and distributed to stakeholders.

(2) Public Information of Project Activities in 2012

- **Interview to core farmers by TVK (National Television of Kampuchea)**

At the middle of July, TVK (National Television of Kampuchea) requested to collect new materials in the project and core farmers' activities. TVK makes the programs focusing on field activities in various industrial sectors. Because Cambodian people are highly interested in agricultural sector, it considers taking aquaculture activities for a TV program theme. Fisheries Administration conducts aquaculture development projects in collaborates with several donor agencies including JICA. Among the several projects, FAIEX project has been achieving good results by the activities on small-scale fish culture and sustainability of fish farmers. Then, the project is chosen as a target of TV program.

Video taking and interview were made at a first year's core farmer (Mr. Mao Pek) in Battambang province on August 17, 2012. A counterpart of Fisheries Administration (project manager) and Japanese experts were also present at the scene. The core farmer was asked the reason why they started fish culture, their fish culture activities including seed production, and rice-fish culture, which they prepared recently. In addition, they were interviewed about the relationship with the project and cantonment fisheries offices and the training programs supported by the project. After the interview with core farmers, Dr. Hav Viseth, project manager, was interviewed about the basic information of the project, assistance structure to fish farmers by the project, sustainable development of fish farmers after the completion of the project, and etc. The program will be broadcasted on September (the broadcast date is not fixed). It is expected to promote the awareness of the project activities.

- **Introduction of project activities on radio program**

For introducing the project activities to the public, counterparts and core farmers appeared at the

radio program (VAYO FM), which JICA Cambodia Office coordinates for public information. Two programs were allocated to this project. Therefore, the first or second program separately targeted at Battambang or Siem Reap province, they explained aquaculture extension activities carried out by the project in each province.

a. Advance Recording

To record the voices on the fields, reporters of radio station and JICA office staffs in charge of public information visited 2 core farmers (Mr. Mao Pek and Mr. Suon Phan) in Battambang province on December 13, and a core farmer (Mr. Yip Prung) in Siem Reap province on December 20. Seeing their activities of seed production and fish culture, the reporters recorded their voices for explaining technical procedure one by one. At the same time, the reporters interviewed counterparts (project manager) and Japanese experts, and recorded their voices for answering questions of reporters.

b. Broadcast

This radio program is broadcasted on live in the morning of every Saturday. In the first program, a core farmer of Battambang (Mr. Mit Panh) and a provincial extension officer (Mr. Kon Sokha) appeared. Entering the interview recorded in advance, they talked about the relation with the project, the change by the project, etc. on the program. At a corner of telephone question in the program, many listeners asked various questions about fish culture, and the extension officer answered some questions about technical information like kinds of fish feed and selection of cultured fish and acquisition of fish seeds. Due to a large response to the radio programs, some listeners of 5 provinces (Kampot, Kampong Speu, Siem Reap, Battambang, Bantery, and Banteay Meanchey) contacted core farmers, after the broadcast. In fact, some listeners came to Battambang to buy fish seeds for starting fish culture activities. Afterward, at the second program (morning of January 5), a core farmer in Siem Reap province (Mr. Say Song) and a provincial extension officers (Mr. Keah Polea) appeared. Similarly in the first program, after a talk with a master of ceremonies, some listeners of total 5 provinces (Battambang, Kampong Speu, Kampot, Prey Veng, and Kampong Thom) asked questions about the size of fish ponds, proper fish species, water management, etc. The radio programs not only gave opportunity to make the project activities know widely, but it has possibility to extend fish culture techniques and promote the marketing of fish seeds and grow-out fish.

● **Making of project T-shirts**

At the same time holding farmers to farmers training programs on June, the project prepared 1,200 T-shirt in the same design of last year and distributed them to training participants.

● **Making of fish culture posters**

As extension materials for beginners of fish culture, the project prepared 3,000 posters, which include all fish culture steps on a paper, and distributed them to target farmers.

● **Making and distribution of fish culture calendar**

The project made the fish culture calendar (Year 2013). Each page of the calendar has illustration of fish culture activities of each month. 2,000 copies of the calendars were distributed to relevant

persons including seed producers and grow-out farmers.

(3) Public Information of Project Activities in 2013

● **INTERNATIONAL SYMPOSIUM**

Responding the request from JICA, project sent 4 counterparts and 1 core seed farmers to the INTERNATIONAL SYMPOSIUM ON SMALL-SCALE FRESHWATER AQUACULTURE EXTENSION, organized by JICA, NACA and Fisheries Department of Thailand, that was held 2 December to 5 December 2013.

● **Study tour from LAO PDR**

29 participants from LIPS (Livelihood Improvement Project for Southern Mountainous and Plateau Areas in LAO PDR) visited FAIEX-2 project from 2 November to 7 November 2013 to exchange the lessons learned of respective projects.

Date	Day	Activity	Stay in
3	Sun	11:45-13:15 Vientiane – Phnom Penh by VN921	Phnom Penh
4	Mon	09:00-09:30 Courtesy call to JICA Cambodia 10:00-10:30 Courtesy call to FiA 10:30-12:00 Phnom Penh – Prey Veng 12:00-13:00 Lunch 14:00-15:00 Visit to 1 core-farmer and 1 ordinary fish farmer 16:00-17:00 Visit to Bati Freshwater Aquaculture Center Visit to private fish farm (cage culture) 17:00-18:30 Prey Veng – Phnom Penh	Phnom Penh
5	Tue	08:00-10:00 Phnom Penh – Kompong Spue 10:00-11:00 Visit to 1 core-farmer in Kimpong Spue 11:00-11:30 Kompong Spue – Tramkok, Takeo 11:30-12:30 Lunch 13:00-15:30 Visit to 2 core-farmers and ordinary fish farmers 15:30-17:30 Takeo – Phnom Penh	Phnom Penh
6	Wed	07:00-10:30 Phnom Penh – Pursat 10:30-11:30 Visit to 1 core-farmer in Pursat 12:00-13:00 Lunch 13:00-14:30 Pursat – Battambang 15:30-16:30 Visit to 1 core-farmer in Battambang	Battambang
7	Thu	08:00-10:30 Visit to 2 core-farmers in Battambang 10:30-12:00 Battambang – Siem Reap 12:00-13:00 Lunch 13:30-14:30 Visit to 1 core-farmer in Siem Reap 15:00-16:00 Visit to Tak Ville Station 16:30-17:30 Visit to 1 core-farmer in Siem Reap	Siem Reap
8	Fri	08:00-11:30 Visit to 2 core-farmers and 1 fish farmer (lady) 12:00-13:00 Lunch 14:00-17:00 Wrap-up meeting and report preparation	Siem Reap
9	Sat	10:05/11:05 Siem Reap – Pakse by QV522 13:00/13:50 Pakse – Vientiane by QV302	

● **Study tour from Madagascar**

6 participants from PATIMA (Rural Development Project through the Diffusion of Aquaculture of Tilapia in the Region of Boeny, Mahajanga) visited FAIEX-2 project for 8 days from 17 August to 24 August 2013 to exchange the lessons learned of respective projects.

Date	Day	Activity	Stay in
17 August	Sat	Arrive at Phnom Penh	Phnom Penh
18t	Sun		Phnom Penh
19	Mon	Courtesy call to FiA Meeting with FAIEX-2 team	Phnom Penh
20	Tue	Visit to core-farmer and ordinary fish farmer in Takeo and Kampot	Phnom Penh
21	Wed	Visit to core-farmer and ordinary fish farmer in Pursat and Battambang	Battambang
22	Thu	Visit to core-farmer and ordinary fish farmer in Battambang (observation of networking meeting)	Battambang
23	Fri	Meeting with FAIEX-2 team in FiA	Phnom Penh
24	Sat	Leave Phnom Penh	

(3) Public Information of Project Activities in 2014

- Asian Wetland Symposium (AWS)

AWS (Asian Wetland Symposium) held international conference in November 2014 in Siem Reap. The project made a presentation regarding project contents and output generated in our activity in the session “Mainstreaming wetland conservation and wise use with poverty eradication” that was programmed on 4th November 2014.

7.6 Indicator (Output 4)

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

Verifiable Indicators

4-1. The number of small-scale fish farmers benefitted from farmer-to-farmer training attains to more than 3,000 households in target areas.

4-2. The 4 target community fish refuges (CFRs) are properly managed in accordance with their regulation. The number of small-scale farmers managing community fish refuges (CFRs) properly is increased up to 30 households in target areas.

● 「Indicator 4-1」

3,425 farmer households participated in farmer to farmer training and they were benefitted from farmer-to-farmer training.

Table 7-27 Target commune and Number of participant of Farmer-to-farmer training

Actual implementation by Province		Year				Total
		2011	2012	2013	2014	
Battambang	Target commune	10	14	16 <small>*including 1 former target commune</small>	14 <small>*including 7 former target commune</small>	54 <small>Actual target commune is 46, on account of 8 target communes overlapped.</small>
	Trained grow-out farmer (HH)	250	391	383	373	1,397
Siem Reap	Target commune	5	11	9	8	33
	Trained grow-out farmer (HH)	120	250	331	230	931
Pursat	Target commune	5	9	14 <small>*including 2 former target commune</small>	12 <small>*including 9 former target commune</small>	40 <small>Actual target commune is 29, on account of 11 target communes overlapped.</small>
	Trained grow-out farmer (HH)	135	256	377	329	1,097
Total	Target commune	20	34	39 <small>*including 3 former target communes</small>	34 <small>*including 16 former target communes</small>	127 <small>Actual target commune is 108, on account of 19 target communes overlapped.</small>
	Trained grow-out farmer (HH)	505	897	1,091	932	3,425

● 「Indicator 4-2」

In the selected 4 CFRs sites, each group of villagers established their regulation based on a model guideline prepared by the Project. According to the monitoring of the activities in each site, the CFRs were recognized by majority of community people, and managed mostly in accordance with the regulation in all sites.

In 2 target sites, there were some incidents of illegal fishing, but community members properly responded to these cases with the assistance of FIA cantonment office and police.

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

8.1 Facilitate seed farmers to establish a provincial network. (Activity 5-1)

(1) Support of Networking of Seed Producer (2012)

In order to organize a network of core farmers, the project held the network meeting in target provinces on the following schedule.

Table 8-1 Date, Place, and Number of Participants of Network Meetings (2012)

Date	Venue	Location				Number of participants (including project counterparts and expert)
		Province	District	Commune	Village	
August 30-31	Suon Phan's house	Battambang	Thma Koul	Ou Ta Ki	Ou Ta Ki	24
October 22-23	Yip Prang's house	Siem Reap	Prasat Bakong	Kandeak	Kork	19
October 23-24	Suon Phan's house	Battambang	Thma Koul	Ou Ta Ki	Ou Ta Ki	24
October 25-26	Chin Kunthy's house	Pursat	Bakan	Trapeang Chornng	Sre Lvea	15

In Battambang province, the project held the first network meeting for core farmers of first and second years at fish farm facility of Mr. Suon Pan, core farmer (seed producers), on August 30 - 31. On the first day, each core farmer presented current condition of seed production (fish species, quantities of produced seeds, etc.), problems and issues of seed production, and discussed actual condition and issues of seed production with fisheries officers. Main issues of seed production activities are 1) difficulty in stably producing fish seeds, especially silver carp seeds, 2) difficulty in arranging fish seed supplies to grow-out farmers among seed producers, and 3) difficulty in carrying / supplying fish seeds to remote areas in reasonable costs. On the second day, core farmers discussed to select management members of a core farmer's network, such as a representative, a vice representative, and a treasure. Afterward, the project held the second meeting in October to discuss the rule of network and activities. In addition to core farmers, fish seed dealers, hatchery managers, and candidates of core farmers of third year also participated in the meeting to discuss various subjects.

In Siem Reap and Pursat provinces, the project held the first network meeting in October. Only core farmers of the project participated in the meeting to discuss the problems on fish culture and success experiences with others, and understand the current subjects of fish culture deeply.

(2) Support of Networking of Seed Producer (2013)

The networking activities for seed producers in target 3 provinces started in the second year. Those network meetings have been held once to three times in each province since then. In each province, seed producers selected a representative of their network group. Especially, in Battambang province,

regular network meetings are held voluntarily. As the results, seed producers begin to understand their fellow feeling and the profits of their networking activities. In the third year, in order to strengthen and widen network organizations and reinforce the degree of their sustainability in each province, the project held the following network meetings for strengthening the bases of network organizations.

Table 8-2 Date, Place, and Number of Participants of Network Meetings (2013)

Target Province	Date	Place
Battambang	22 August (thu) – 23 August (Fri)	Fish Farm of Mr. Soum Phan Outaki Commune, Thmor Kaul District
Siem Reap	29 August (thu) – 30 August (fri)	Fish Farm of Mr. Yip Prang Kandek Commue, Prasat Bakorng District
Pursat	5 September (thu) – 6 September (fri)	Fish Farm of Mr. Chin Kunthy Trapaing Chorng Commune, Bakan District

Those were the first networking meetings, which all core famers of first, second and third years attended together. In these networking meetings, the participants discussed the following main agenda.

- Confirmation of fish seed production at core farmers
- Consideration of issues and problems on fish seed production and possible measurements in the network
- Confirmation of the contents of network of fish seed producers

There are the following issues on seed production this year.

- Management on broodstock rearing
- Water supply for fish culture (especially before start rain season)
- Lack of nursery pond
- Procurement of proper broodstock
- Seed sale to grow-out farmers

Afterward the core farmers exchanged their concrete opinions about the future management of their networking organizations. The meetings also gave good opportunities to share and arrange overall issues of seed production. The core famers could discuss expected objectives and activities of their networking in detail in the meetings. In next networking meetings (at latter half of fiscal year), we expect to discuss actual issues and improved points on networking activities with core farmers, according to their experiences of networking activities.

8.2 Facilitate inter-networks in the target provinces. (Activity 5-2)

(1) Overall networking meeting

Overall networking meeting was held for 4 days from 23 December to 26 December 2013 in the third year of project. In the first 3 days (23,24,25 December), participants discussed mainly technical issues on individual seed production activities as a technical brush-up session. Advanced seed farmers invited from phase-1 province such a Takeo, Kampot, Kampong Speu gave them suggestion for their problems encountered. In the fourth day, participants discussed activities regarding networking. Networking meeting had been held in respective provinces so far, this meeting aimed integration of provincial networking.

In fourth year, final year of the project, overall networking meeting was held for 4 days from 10 November to 13 November 2015. In the first day, participants discussed mainly technical issues on individual seed production activities as a technical brush-up session. Advanced seed farmers invited from phase-1 province such a Takeo, Kampot, Kampong Speu gave them suggestion for their problems encountered. In the remained 3 days, participants discussed activities regarding networking. Networking meeting had been held in respective provinces so far, this meeting aimed integration of provincial networking.

8.3 Promote cooperation among the networks of FAIEX-2 and FAIEX-1.(Activity 5-3)

In order to make the relationship and mutual cooperation between networks of FAIEX-2 and FAIEX-1, overall networking meeting was held on 17 November 2014 in the final year of project.

Participants at first in the morning session discussed technical issues on individual seed production activities as a technical brush-up session. Core network member invited from phase-1 province such a Takeo, Kampot, Kampong Speu and Prey Vemg gave them suggestion for their problems encountered. In the afternoon session, participants discussed activities regarding networking. Networking meeting had been held in respective provinces so far, this meeting aimed integration of provincial networking.

8.4 Indicator (Output 5)

Output 5 Networks of FSPs seed farmers are enhanced and broadened.

Indicator

5-1. The meetings for information exchange on seed production technology, seed marketing, etc. are convened 2 times per year.

5-2. The number of advices and recommendations regarding seed production technology, seed marketing, procurement of farm inputs, etc. is increased in target areas.

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 fAIEEX-2 and FAIEEX-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 broodstock, among others, though not only the meetings but also more frequent communication by mobile phone and exchange visits.

- 「Indicator 5-1」

The Project organized meetings of FSPs'network more than twice every year in each target province since the 2nd year of the project period. In addition to these meetings organized by the Project, there was a training arranged by FSPs themselves in each target province, getting the technical support from the Project.

The network of each province is planning to hold regular meetings by themselves, although it has not been realized yet. Also, in addition to the meetings, some FSPs communicate each other closely by mobile phone upon their necessity.

- 「Indicator 5-2」

Through the meetings mentioned above and other means of communication among the FSPs, they have been exchanging information in seed production technology, seed marketing, procurement of farm inputs, availability of broodstock, and so on. Given that the function of network has been strengthened, the number of advices and recommendations has increased in target areas.

9 Evaluation of project and response to recommendation

9.1 Results of mid-term review and action responding the recommendation

Mid-term review was conducted February 2013. While it was confirmed that project had been implemented in accordance with a plan of operations, several factors including technical issues, natural climate issues that possibly would affect the project implementation to reach the project purpose have arisen. The results of mid-term review were summarized as follows.

Cited from Mid-term review report

The Project was able to steadily implement its planned activities during the first and second year. As a result, the project's Outputs have so far been in accordance with its design, which is also a reflection of the good prospects it has in achieving them by the end of project's time span., However there are several external factors which can affect the progress of the Project, and some issues that need to be dealt with so as to achieve the Project Purpose in the best possible way.

It has been noted that the Project has maintained its relevance to the needs of the target group, the government's policies, as well as the assistance policy of Japan. Also the Project's approach transmitted through the FAIEX 1 is considered to be appropriate in order to contribute to the sustainable aquaculture development of small-scale farmers.

In terms of the project's effectiveness; there are external factors which may limit an increase in the amount of small-scale fish culture production. However if there are no such negative influences the project is expected to be able to fulfill its indicators by the end of project's life span by achieving the five outlined Outputs.

In terms of efficiency, the project's activities have been adeptly implemented using the limited input. And especially the effective use of experience and human resources from FAIEX1 has been noted. At the same time there are some differences in the conditions and characteristics of the target areas of the FAIEX2 compared to the FAIEX1, which necessitate some additional considerations for the activities. Due to these circumstances additional C/P staff members are required among the group of stakeholders in order to implement the planned activities.

It is too early at this stage to foresee the how the project will achieve its Overall Goal when assessing its Impact. However, it has been confirmed that FTF training has already been implemented independently.

Moreover several positive impacts of the Project have been identified in the activities of the seed fanners and extension staff.

Finally, sustainability of the fish seed and grow-out production activities among the fanners in the target areas is expected. This is because the Project has been designed to enhance the fanners 'capacities to become self-reliant through FTF extension activities and farmers 'networking, which allows them to operate with minimum government support. It is expected that C/P members will also have the capacity to follow up on project activities.

Subsequently the following 5 issues were recommended from mid-term review survey team in order to secure the achievement of project purpose as well as to conduct project activities more effectively.

(1) The Target Number of Seed Farmers (recommendation 1)

In accordance with the criteria set for the selection of the seed farmer candidates, the Project has been working on the identification of a batch for the third year. However, enquiries have led to the conclusion that there are an insufficient number of candidates to reach this target due to the unsuitable conditions for fish seed production in the remaining areas. Therefore, it is recommended to lower the target number and only select qualified famers instead of including unqualified famers. Their potential low seed production may otherwise jeopardize the farmer to farmer extension process.

In responding the above “recommendation 1”, project put lower number of seed producing farmer as a target and only selected qualified famers excluding unqualified famers.

(2) Strengthening Extension Services to Fish Farmers (recommendation 2)

It appears necessary to strengthen extension services to the target farmers by increasing the number of C/P personnel at both the DAD and cantonment levels for the following reasons:

a) Contrary to Phase 1, the three targets in Phase 2 are too wide an area for a small number of extension officers to provide adequate extension services.

b) Some of the seed farmers assisted in the first and second years need further development of their technical capacity through intensive technical guidance.

c) All of the seed farmers who will be selected in the third year are beginners and therefore will need considerable care and attention from the extension officers.

d) It has been difficult for local officers to go around the target provinces and identify the fish farmers who participated in the FTF training and follow up on them after the training.

It is therefore suggested to add one more DAD officer as C/P personnel who are responsible for technical matters pertaining to seed production. The number of provincial extension officers should also be increased where appropriate.

A further issue that should be addressed is the capacity development of certain seed farmers whose performance has been below average as a result of certain unfavorable conditions. One of the fundamental issues that have been identified is a lack of nursing ponds and water. It is recommended to consider essential assistance with the construction of nursing ponds and deep wells for those seed farmers whose facilities need immediate improvement so as to fast track their seed production.

In responding the above “recommendation 2”, Project discussed proper number of counterpart to implement project activity smoothly for the third and fourth year. Consequently number of counterpart was increased from the third year. Project increased input assistance to improve facility of seed farmer especially to beginner farmer as well as assistance of broodstock procurement.

(3) Promotion of Small-scale Aquaculture focusing on Rice-fish Culture (recommendation 3)

In the second year demonstrations office-cum-fish culture were undertaken by 17 model fanners. it appears to be an alternative culture system so as to promote fish farming activities in the target provinces. Project should therefore study methods of increasing the number of rice-cum-fish farmers.

In responding the above “recommendation 3”, Project established additional rice-cum fish demonstration farm throughout discussion with counterpart. Project also made dvd material as an extension tool.

(4) Linkage Between Technical Improvement and Extension (recommendation 4)

The technical problems that the target farmers cannot solve by themselves should be addressed by the Toek vil Station through its technical improvement activities. In order to enable this process the Project should establish a system in which both the extension officers and the station officers interact frequently and exchange information. Technical issues that the seed farmers may need to contend with include for example the low survival rate of larvae and the lack of a quality brood stock.

In responding the above “recommendation 4”, Technical problems encountered in the field activity were discussed between the extension officers and the station officers consequently technical improvement activities were conducted in Toek vil Station.

The series of results of verification trial as technical improvement activities were feed backed to technical manual. Also broodstock rearing was started in Toek vil Station for future supply of quality brood stock.

(5) Proper Management of Non-target Fish Species by Seed Farmers (recommendation 5)

Certain fish species such as Clarias and Pangasius have so far not been included in the list of target species. However at the same time they have become popular species among the commercial fish farms. As a result of these circumstances, both the seed and grow-out farmers who have been assisted by the Project are now interested in both of these species. In fact some of the seed farmers

have already started hybrid seed production of clarias and many of the grow-out farmers stock their ponds with clarias and pangasius seed. it is therefore recommended to provide some technical information about these two species. This information could for example be included in the third country training program. Please note that it is important to provide guidance for Clarias seed producers to ensure the proper management of African brood stock to safeguard native biodiversity.

In responding the above “recommendation 5”, Project provided some technical information about these two species with guidance about proper management of African brood stock to safeguard native biodiversity. Project team also gave guidance and suggestion to seed farmers in particular when inappropriate broodstock management was found at field visit.

9.2 Summary of terminal evaluation and Action responding the recommendation

Terminal evaluation was conducted September 2014. While it was confirmed that project had been implemented in accordance with a plan of operations and output indicators were achieved, several factors are affecting to achievement of project purpose especially natural climate issues. The results of terminal evaluation were summarized as follows.

Cited from Final evaluation report

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.

As to the 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.

With regard to the 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 amount of seed production and 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.

As for the 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.

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. In conclusion, the Project Purpose is likely to be achieved by the end of the project period.

Terminal evaluation team showed perspective of termination of project as well as left the following 7 recommendations in order to secure sustainability of the aquaculture extension in the target area as well as in order to utilize project output for expansion of aquaculture extension.

(1) Technical improvement of seed production

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

- As all hatcheries are operating in small scale and the nursing space is limited for their production, FIA/Project should encourage producers to socialize 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 broodstock 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) Counter measures 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 broodstock 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 farmers, 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.

The project took the following actions responding the recommendation from terminal evaluation team although there was only 4 months as a reminded project period.

(1) Brush up training for seed farmers (responding to “recommendation 1” and “recommendation 3”)

Responding to recommendation from terminal evaluation conducted September 2015, project hold a brush-up (technical supplementary) training in order to improve the production technique as well as to minimize technical gaps among seed producers and to establish a sustainable structure of fish seed supply in target areas. Training was held from 17 November to 21 November 2014 at core seed farmer’s house in Takeo province and 32 seed producing farmers of FAIEX-2 and 7 seed farmers from FAIEX-2 (from Kampot, Takeo and Prey Veng) participated the training.

(2) Reinforcement of facility to secure broodstock as countermeasure to flooding (responding to “recommendation 2”)

Many farmers suffered from flooding in recent years in Cambodia. Especially for the seed farmers, reinforcement of facility is essential in order to secure broodstock avoiding from escape to natural water body. Project team discussed countermeasure and the following idea came up with.

Table 9-1 Reinforcement of facility to secure broodstock

No.	Countermeasure	Advantage / Disadvantage	Evaluation*
1	Make an existing dike around the broodstock pond higher by soil.	Maintenance should be done every year. Easy to erosion. It needs a lot of soil, so sometimes it will take high cost.	○
2	Make a protection wall around the broodstock pond.	It need enough strong. If it is constructed once, it will last long time but it takes high cost.	◎
3	Install the floating cage to stock broodfish in rainy season.	It will take high cost and it will not last long time. It may be troublesome to remove broodfish every time.	△
4	Make a cement tank in higher land.	It will take high cost; moreover it is difficult to maintain water in terms of volume and quality.	△

* It was evaluated from the viewpoint of durability, cost, maintenance and handling.

These countermeasures mentioned above have their strong and weak points, therefore there is not recommended only single method. Farmer can take the measure depending on his situation by considering the environment. Considering the action which will be taken by farmer, project decided

to make one demonstration site to show effective counter measure.

Project selected one seed farm (Mr. Say Sorn) in Siem Reap that has been suffering from flooding almost every year, and supported to construct protection wall around his farm as shown in below figure.

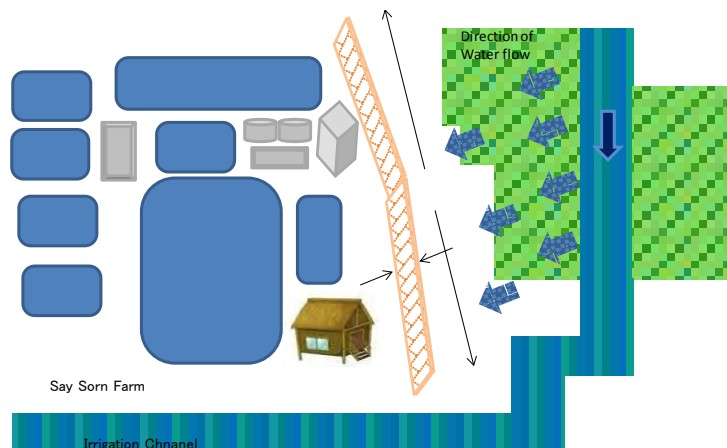


Figure 9-1 Site view to install protection wall in seed farms, Siem Reap

(3) Sharing seed sales and marketing information throughout networking (responding to “recommendation 4”)

Responding to “recommendation 4”, in order to make the relationship and mutual cooperation among provincial network members, network meeting at provincial scale was held from 10 November 2014 in each province. A week later, overall networking meeting was held on 17 November 2014 to make close relationship and mutual cooperation between networks of FAIEX-2 and FAIEX-1. Participants discussed not only technical issues but also how to make their business environment better by strengthening network function.

(4) Regarding to “recommendation 5, 6 and 7”

Regarding to other “recommendation 5, 6 and 7”, it shall be taken necessary countermeasure as action. These shall be entrusted to future action initiatives led by FiA-Cambodia.

10 Achievement of project purpose and prospects to achieve overall goal

10.1 Achievement of project purpose

Project Purpose	Small-scale aquaculture production is increased in the target provinces.
Verifiable	Annual production of small-scale aquaculture promoted by the Project is increased
Indicators :	up to 150 tons in target areas in 2015.

The target value “150 tons” of the indicator was derived from estimation shown below table.

Estimated aquaculture production of small-scale farm by 2015

Number of small-scale farmer	% of farmers continuing fish culture	Supposed pond size	Productivity (kg/100m ²)	Aquaculture production by small-scale farmer
3,375 ×	80% ×	120 m ² ×	35 kg/100m ²	= 113 ton
3,375 ×	80% ×	120 m ² ×	40 kg/100m ²	= 130 ton
		ι	ι	ι
3,375 ×	80% ×	150 m ²	35 kg/100m ²	= 142 ton
3,375 ×	80% ×	150 m ²	40 kg/100m ²	= 162 ton

The actual situations in each of these items used for the estimation have been identified as followings;

The hypothesis verification

(1) Hypothesis 1 : Number of small-scale farmers

The number of small-scale farmers who participated in the FTF training was 3, 425, as described in the Achievement of Output 4.

(2) Hypothesis 2: Percentage of farmers continuing fish culture:

According to the result of questionnaire survey conducted by the Project every year in the "Evaluation workshops of fish farmer "intended for grow-out farmers who started fish culture from previous year, every year more than 90 % of farmers answer that they plan to continue fish farming in the following year. However, the actual number of farmers who continue fish farming was considered lower, due to the flood damages and the lack of rainfall during the project period. According to the C/P officers of each target provinces, they observe that roughly 60-70 % of them are continuing fish culture. On the other hand, according to the results of Impact Survey, 89% (n=118) of fish farmers have more than 1 year experience in grow-out, and it can be assumed that majority of farmers engage in grow-out continuously or intermittingly. Also only 11% plan to stop the aquaculture activity in the future due to the lack of land, financial resource, labor, and water, or

the migration to work outside the village. Therefore, it can be presumed that the 80% of retention rate would be possible to achieve if climate permits.

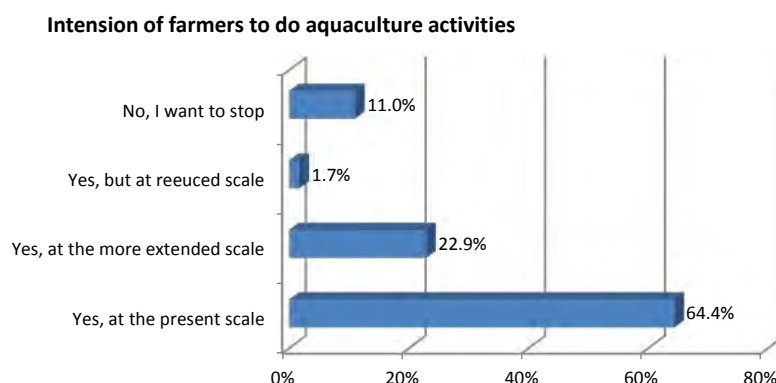


Figure 10-1 Intension of farmers to do aquaculture
(Source: Impact survey report)

(3) Hypothesis 3: Pond size

According to the Project, the mean dimension of earthen ponds of small-scale farmers who participated in the FTF training was 219 m² as shown below. Therefore, the size of pond in the target area for fish production seems larger than the supposed pond size 120m² – 150m².

A. First year (2011)

Siem Reap : average 223 m² (n=127, mode : 100 m²~150 m²)

Pursat : average 121 m² (n=140, : mode 100 m²~150 m²)

Battambang : average 235 m² (n=258, mode : 100 m²~150 m²)

B. Second year (2012)

Siem Reap : average 149 m² (n=246)

Pursat : average 183 m² (n=253)

Battambang : average 403 m² (n=298)

C. Third year (2013)

Siem Reap : average 167 m² (n=338, mode : 150 m²~200 m²)

Pursat : average 173 m² (n=377, mode : 100 m²~150 m²)

Battambang : average 256 m² (n=411, mode : 100 m²~150 m²)

(4) Hypothesis 4: Productivity

According to the evaluation workshop conducted by the Project with fish farmers who started their production in the previous year, the average amount of production was 20.4kg/100m² in Siem Reap, 27.9 kg/100m² in Pursat and 21.4kg/100m² in Battambang.

Also another field survey conducted survey conducted by the Project, 35.4kg/100m² on average (n=28) in the 1st year of the project period and 30. 8kg/100m²(n=17) in the 2nd year. It is assumed


that the productivity of the 2nd year of their production would be higher than these figures. Moreover according to impact survey conducted in 2014, the average amount of production was 87kg/year from 164m² pond (n=122, equivalent : 53kg/year/100m²) if farmers practice polyculture stocking 2 – 3 species of project target fishes. Therefore, the productivity in the target areas of the Project is considered in the similar range as that of FAIEX 1 (30-40kg/100m²).

Table 10-1 Amount of production and pond size (Source: Impact survey report)

Category of farmer	Number of farmer (HH)	Average production (kg/year/farmer)	Average size of fish pond (m ²)	Average productivity (kg/year/100m ² /farmer)
Farmer who answered 1 species	17	112.2	153.4	70
Farmer who answered 2 species	35	103.4	164.8	51.4
Farmer who answered 3 species	64	67.6	159.6	48.1
Farmer who answered 4 species	6	131.8	237.5	61.6
Farmer cultured about 2 to 3species		87.2	164	52.8

As all hypothesis can be verified, it is highly likely to achieve the Project Purpose.

10.2 Prospects to achieve overall goal

Overall Goal	Household economy of small-scale fish farmers are improved in the target provinces.
	
Verifiable Indicators :	
1.The number of small-scale fish farmers with increased profits*1 and savings*2 from fish farming is increased by 5,000 households in target areas by 2018.	
*1 “Profit” is given by subtracting “production cost” from “fish sales income of cultured fish.”	
*2 “Saving” is given by self-consumption of cultured fish, which would otherwise be expenses for purchase of fish in the market, i.e., by subtracting “present cost to purchase fish” from “previous cost to purchase fish.”	

10.2.1 Prospects of number of farmer

According to the results of Impact Survey, more than 63 % (n=122) of fish farmers raise fish mainly for family consumption, and nearly 28% for both consumption and selling in the target provinces. Therefore, it is assumed that fish farmers increase savings, or both profits and savings. As described in the achievement of Output 4, the Project identified 3,425 farmers and provided training to start fish farming. Estimating that around 80% of farmers continue grow-out, it is assumed that there are 2,740 farmers continuing fish farming so far if climatic conditions permit. In order to achieve the indicator of the Overall Goal, it is necessary to extend the small-scale aquaculture to at least 3,510 new farmers by 2018 considering the retention rate.

10.2.2 Grade of improvement of household economy

According to impact survey, 89%(n=121) of fish farmer are getting profit from fish culture activities, among those 84.9%(n=119) of fish farmer answered that their savings were increased. Increasing ratio of 90% of farmers respondents is from 10% – 30%. The survey also indicated

that not all farmers feels improvement but 85%~90% feels that saving and profit were improved.

Table 10-2 Farmers who answered that saving and profit were improved

(Source: Impact survey report)

Q1. Is there profit from fish farming? n=121		Q.2 Is your saving increased by fish farming? n=119	
Yes, there was profit	89.0%	Saving increased	84.9%
Not sure	9.0%	Not sure	12.6%
Negative benefit	2.0%	Negative benefit or no increased	2.5%

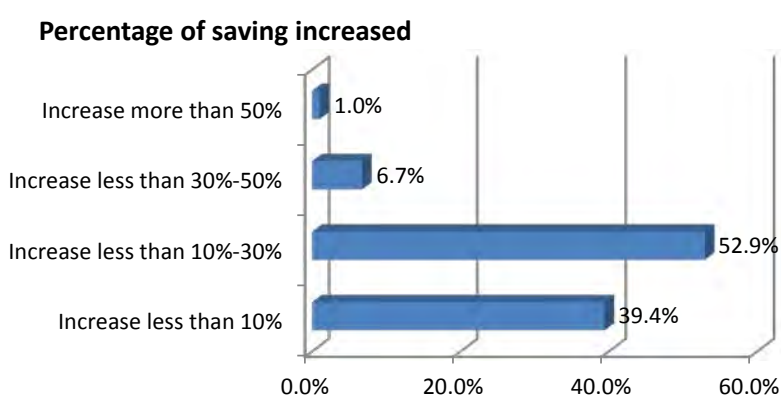


Figure 10-2 Ratio of improvement of savings

(Source: Impact survey report)

10.2.3 Further effort to achieve overall goal

Considering the ration of farmers who can improve house hold economy as it is mentioned above, only 2,329 farmers improved house hold economy in 2014. If this condition is kept, it needs to fish culture extension to 1,000 new farmers every year to reach to 5,000 farmer within 4 years. FiA-Cambodia should make an effort to continue extension action.

Table 10-3 Prospects of number of fish farmers after FIAEX-2

year	2011	2012	2013	2014	2015	2016	2017	2018
Number of farmer trained	505	897	1,091	932	1,000	1,000	1,000	1,000
^(*) Retention rate	80%	80%	80%	80%	80%	80%	80%	80%
Farmer continues fish culture after initial year	404	718	873	746	800	800	800	800
Number of active fish farmer (aggregated)	404	1,122	1,994	2,740	3,540	4,340	5,140	5,940
^(**) Improving saving rate	85%	85%	85%	85%	85%	85%	85%	85%
Farmer with increased profits and savings	343	953	1,695	2,329	3,009	3,689	4,369	5,049

^(*)Percentage of famer who continues culturing fish (80%)

^(**)Percentage of famer who feels the profit/saving increased from fish (85%)

11 Conclusion

11.1 Inventions for project implementation

FAIEX-2 was challenging project to extend target area which has harder condition and less potential comparing toFAIEX-1

Table 11-1 Conditions compared between FAIEX-1 and FAIEX-2

Project		FAIEX-1	FAIEX-2
Period		5 year (2005-2010)	4 years (2011-2014)
Target area		4 provinces in southern area	3 provinces in north-western area
Concept		(basic) Develop the extension approach for trial	(application) Apply the extension approach to harder (less-potential) area to establish fixed extension method
Initial condition			
Geographical features, water environment		Lower Mekong basin (including flatland, many most of farmers have backyard ponds)	Around Tonle Sap lake (including flooding, rice area, some part of high land)
House hold(HH)		689,546	473,939
House hold density(HH/km2)		33.9	16.5
Human resource	Extension officer Cantonmen	Some officers had been trained by AIT and engaged field activity	Poor knowledge and experience of aquaculture
	Seed farmer	21 HHs (had been trained by AIT)	19 HHs (Poor knowledge and experience)
Implementation condition			
Target species		4 target species (Sliver barb, Silver carp, Tilapia, Common carp)+ (Indian carp) + (Pangasius, Freshwater prawn)	5 target species (Sliver barb, Silver carp, Tilapia, Common carp, Indian carp)
Target group		Small-scale farmer	Small-scale farmer
Scale of Target group		48 seed farmer * 9000 farmers (original target was 2400)	40-45 seed farmer 3425 farmer
Aquaculture system		Pond culture ↑ Extensive, No commercial pellet	Pond culture + Rice-cum fish ↑ Extensive, No commercial pellet
Input	Equipment, Machinery	Equipment, Machinery (including 4 vehicles motor bikes) Facility rehabilitation for Bati station : about 200 thousands US\$	Equipment, Machinery (including 2 vehicles motor bikes) Facility rehabilitation for Toek Vil station : about 50 thousands US\$
	Input to farmer	Assistance for hatchery construction Fingering supply, Pond digging etc. Training (Domestic, Overseas)	Assistance for hatchery construction Fingering supply, Pond digging etc. Training (Domestic, Overseas)
	Expert	Japanese expert: 164.9M/M (11 fields) + Third country expert : 10.3M/M	Japanese expert: 82.93M/M (6 fields) + Third country expert : 0
C/P		FIA : 14 5 extension officer X 4 provinces= 20 3 technical staff of Bati station	FIA : 8 4 extension officer X 3 provinces= 12 4 technical staff of Toek Vil station

The following contrives were taken by project team to complete the programmer and also tried to

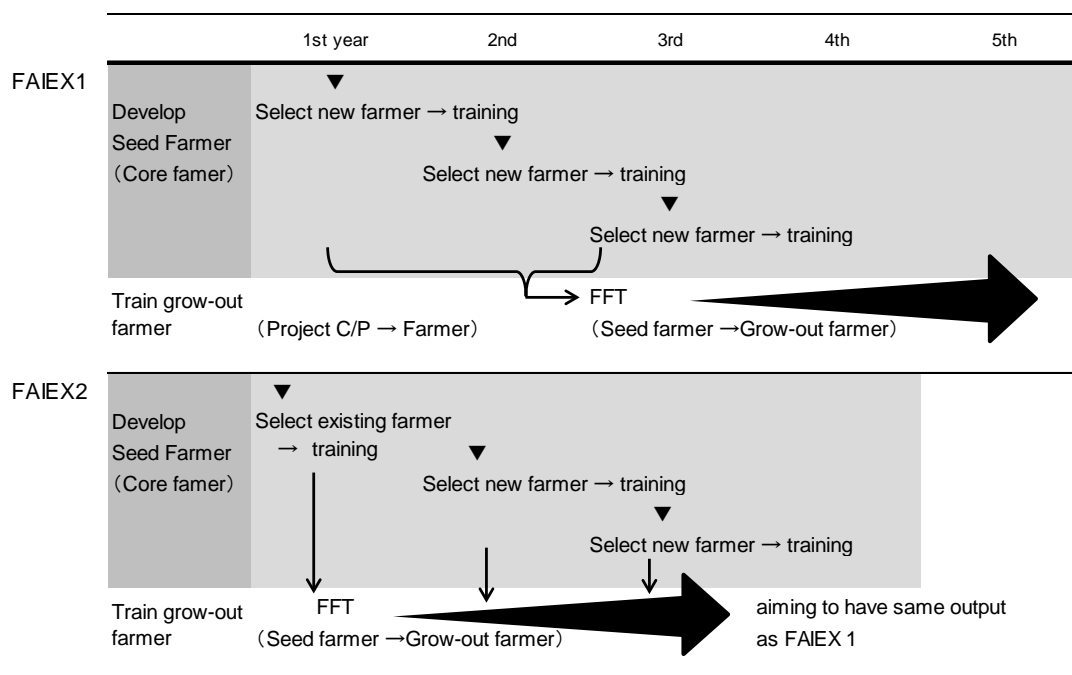
establish the effective extension model.

Table 11-2 Inventions for project implementation

Issue	Contrivance
Poor technique and experience of farmer	<ul style="list-style-type: none"> ● OJT in advanced farmer of FAIEX-1 ● Advanced farmer of FAIEX-1 conduct on-farm guidance ● Brush-up training in advanced farmer of FAIEX-1 as well as Toek Vil station ● Revise training curriculum
Poor technique and experience of extension officer	<ul style="list-style-type: none"> ● Advanced and experienced extension officer of FAIEX-1 conduct on-farm guidance ● TOT is conducted in Advanced farmer of FAIEX-1.
Less potential Lower population	<ul style="list-style-type: none"> ● Selection criteria are modified to adapt to FAIEX-2 target area. ● Core farmer conduct training in remote area, remote village also.
Flooding area around TonleSap	<ul style="list-style-type: none"> ● Selection criteria are modified to adapt to FAIEX-2 target area. ● Make good pond protection, consider timing of stocking.

As a results, FAIEX-2 generated same level of output as FAIEX-1 in shorter project period with less input as shown in below table.

Table 11-3 Comparison of implementation schedule between FAIEX-1 and FAIEX-2



11.2 Lessons

(1) Technical transfer by 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 farmer 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) Proper farmer selection

Project selected qualified seed farmer candidate by using project standard criteria's, also appropriate number was considered in terms of implementing training and conducting farmer to farmer training program effectively. It is considered that FAIEX-2 took effective measures, although retention rate of seed farmer is lower than FAIEX-1 (47 seed farmers out of 48 farmers trained, retention rate :97.9%) in FAIEX-1, 40 seed farmers out of 44 farmers trained, retention rate :90.9% in FAIEX-2),

(3) Incentive of seed farmer to conduct farmer to farmer extension

This project designed to extend aquaculture in the target provinces by developing core seed producers where the project efforts were concentrated so that they became spearheading examples to demonstrate the benefits of aquaculture to the other parts in the region.

The important point of this process is to keep motivation of core seed producers. In first half of the project, fish fingerling was distributed to beginner grow out farmers who got training then they repeated to come to buy fingerling for next season. Thus seed producers could keep high motivation to farmer to farmer training.

(4) Target fish species

Regarding project target species (Sliver barb, Silver carp, Tilapia, Common carp, Indian carp), basic seed production technique had been developed in former project (AIT、AARM). Therefore it was relatively easy to introduce the technology for experienced fish farmers. Moreover these fish species can be cultured extensively by non-feeding (or less-feeding) in fertilized fish pond. Although many farmers nowadays are interested in *Pangasius* catfish and walking catfish, these

were categorized as a non-target species. This classification of species lead effective implementation and introduction of fish culture for beginner grow out farmer. Selection of target species should be defined carefully by considering actual farmer's demand and technical hurdle (difficulty).

(5) Networking seed farmers

According to the experience 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.

(6) Aquaculture 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. However it is not essential to sustain for farmer to farmer extension model rather than importance of core farmer.

11.3 Recommendation

(1) Improvement of environment for aquaculture development

Aquaculture-related business persons such as wholesaler, retailer of feed and fertilization, etc. will be increased numbers corresponding to the extension of aquaculture. Accordingly various and diverse problems would occur, for which objections and unnecessary competition might be appeared. In this context, it is needed to make rules and regulations to settle the problems.

At the seed farmer network meeting in the both target area FIAEX-1 and FAIEX-2, relevant discussions have been started from important subjects such as regulation about seed marketing, verification system of the seed origin by public organization, indicators on quality broodstock and seed, participation method for tender (to be individual bidding or joint bidding as a whole network with sharing of seed production among the members), etc. For those subjects which might be obstacles in practical aquaculture extension, hearing of the farmer's voices is important, following which institutional supports of the government would be indispensable.

In addition it is anticipated that technical problems which is now insignificant might be emerged.

Those will be “increase of environmental loads caused by feeding and intensive aquaculture”, “technical problems at introduction of new species having high marketing value”, “outbreak of fish disease”, etc. Therefore it is important to prepare guidelines in advance regarding application of fertilization, combined feed, feed additives, hormone, etc. Taking the examples in Indonesia, there is an aquaculture standard called SNI (Standard National Indonesia) that has been issued by the General Directorate of Aquaculture. It gives detailed regulations by species about aquaculture method; stocking density at seed production stage; water exchange rate; feeding rate by developmental stage; criteria for disease diagnosis; kind, preparation and application of preventive and disinfection medicines; etc. A similar guideline on aquaculture shall be prepared in near future in Cambodia.

(2) Directions of nationwide extension

The Project has achieved significant results including human resource development. Through the Project, seed producers have been grown-out and procurement of fish seeds becomes easier. In addition, an extension system in which farmer network plays a central role has verified to be functional.

On the other hand, governmental supports tend not to reaching well for the northern provinces that are mountainous and geographically far from the capital and remain as a remote area outside the coverage of farmer’s network. Farmers in those areas are difficult to receive extension services such as technical advice and training. In order to extend the results of the Project for those areas, utilization of core farmers who have been capacitated by the Project and the network formed by them would be important as well as participation of counterparts of FiA.

It would be difficult for the present FiA to implement them by its own efforts only because of limitation of the budget and human resources. Accordingly it would be realistic to ask assistance of other donors and to implement individual subjects following the priority examined.

(3) To increase aquaculture production

Aquaculture production is still low level in Cambodia comparing inland fisheries production. According to the report from FiA Cantonment office, aquaculture production is about 66,000 tons (2012) in total. There is no production data by species. While 16,000 tons was produced in Phnom Penh and 12,000 tons was produced in Kandal province, the aquaculture production of all other provinces are quite low, it is still around 2,000 tons to 4,000 tons. Pond productivity is also high only in Phnom Penh and in Kandal province, it is 4.5 tons/pond/year and 2.2 tons/pond/year respectively. Pangasius catfish, walking catfish and snakehead like species high commercial value are occupied in a large amount of production.

FAIEX extended small-scale fish culture and contributed to increased small-scale fish culture households, but its productivity for example is 50kg/pond-100m²/year. If one farmer has 200m² pond, one farmer can produce 100kg/pond/year. It is relatively low compared to commercial scale aquaculture. While fish demand is increasing in Cambodia, capture from inland fisheries cannot be

expected to increase any more. Therefor it is desirable for some of potential small-scale farmer to scale up the production facility and convert target fishes which are adequate species to intensive culture for example in order to increase national fish supply in long-term view.

End

ANNEX 1

(Final Report)

Project Design Matrix

Annex 1: Project Design Matrix (PDM₀: Tentative Version)

Project Title : Freshwater Aquaculture Improvement and Extension Project II (FAIEX-2) in Cambodia

Project Period : XXX, 2011 – XXX, 201X (Four Years)

Target Areas : Pursat, Battambang, and Siem Reap Provinces

Version No. 0

Target Group : Small-scale fish farmers and seed farmers in the target areas

Date : October 6, 2010

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal Household economy of small-scale fish farmers are improved in the target provinces.</p>	<p>1. The number of small-scale fish farmers with increased profits*¹ and savings*² from fish farming is increased from XX households to XX households in each target province by 2018.</p>	<p>1-1. Sampling survey/ Data from the FiA cantonment offices 1-2. Baseline/ Impact survey report</p>	<p>The policy and direction on the aquaculture programs are not drastically changed by the government of Cambodia.</p>
<p>Project Purpose Small-scale aquaculture production is increased in the target provinces.</p>	<p>1. Aquaculture production in each target province is increased by XX% on annual average.</p>	<p>1. Baseline/ Impact survey report</p>	<p>Prices of cultured fishes are not largely declined.</p>
<p>Outputs</p> <p>1. Small-scale seed production and grow-out technology is improved.</p> <p>2. Capacity of local aquaculture extension services is enhanced.</p> <p>3. Seed farmers are capacitated.</p> <p>4. Small-scale aquaculture is expanded in the target provinces.</p> <p>5. Networks of seed farmers are enhanced and broadened.</p>	<p>1-1. The number of the technical improvements through experiments is increased. 1-2. The degree of the technical improvement, such as growth rate and survival rate, is improved.</p> <p>2-1. The percentage of the local extension staff who properly conducts extension activities on grow-out and seed production technology attains to more than XX% on average. 2-2. Satisfaction ratings of the seed farmers attain to more than XX% on average regarding the teaching capability of local extension staff.</p> <p>3-1. The number of seed farmers enable to produce fingerlings is increased from XX farmers to XX farmers in each target province. 3-2. The number of seed farmers who can produce seed of at least three species is increased by XX % in each target province. 3-3. Seed production in each target province is increased by XX%. 3-4. Sales income of seed farmers is increased by XX% in each target province.</p> <p>4-1. The number of small-scale fish farmers benefitted from farmer-to-farmer training attains to more than XX households in the target provinces. 4-2. The number of small-scale fish farmers working for community fish refuges (CFRs) is increased from XX households to XX households in each target province.</p> <p>5-1. The meetings for information exchange on seed production technology, seed marketing, etc. are convened XX times per year. 5-2. The number of advices and recommendations regarding seed production technology, seed marketing, procurement of farm inputs, etc. is increased in the target provinces.</p>	<p>1-1. Technical manuals 1-2. Results of verification trials</p> <p>2-1. Questionnaire survey to local extension staff 2-2. Questionnaire survey to seed farmers</p> <p>3-1. Baseline/ Impact survey report 3-2. Baseline/ Impact survey report 3-3. Baseline/ Impact survey report 3-4. Baseline/ Impact survey report</p> <p>4-1. Baseline/ Impact survey report 4-2. Baseline/ Impact survey report</p> <p>5-1. Records of the meetings for information exchange 5-2. Monitoring results by the Project and impact survey report</p>	<p>1. Natural disasters, such as droughts, floods, etc., do not give a profound effect to the project activities. 2. Outbreaks of serious fish diseases do not occur. 3. The imports of fingerlings from neighboring countries do not give an enormous influence to the supply balance of fingerlings produced in Cambodia.</p>

*¹ "Profit" is given by subtracting "production cost" from "fish sales income of cultured fish."

*² "Saving" is given by self-consumption of cultured fish, which would otherwise be expenses for purchase of fish in the market, i.e., by subtracting "present cost to purchase fish" from "previous cost to purchase fish."

<p>Activities</p> <p>0 Conduct the baseline and impact surveys.</p> <p>1-1 Clarify issues and challenges on small-scale seed production and grow-out technology in the target provinces.</p> <p>1-2 Conduct technical improvement at the Toek Vil Fish Seed Production Station.</p> <p>1-3 Conduct verification trials at seed farmers and small-scale fish farmers.</p> <p>1-4 Develop technical manuals adaptive to the target provinces by revising the FAIEX-1 manuals.</p> <p>2-1 Confirm and clarify roles and functions of local extension staff at each level of FiA (Cantonment, Division, and Sangkat) and local authorities.</p> <p>2-2 Conduct training on grow-out technology and extension methods for local extension staff.</p> <p>2-3 Conduct training on seed production technology and extension methods for selected local extension staff.</p> <p>2-4 Analyze extension activities undertaken, and draw up an extension guideline and good practices.</p> <p>3-1 Select target communes and seed farmers based on the criteria established.</p> <p>3-2 Conduct training on seed production aspects for the seed farmers.</p> <p>3-3 Assist the seed farmers in their seed production activities mainly at initial stage.</p> <p>4-1 Conduct training of trainers (TOT) on grow-out technology for the seed farmers.</p> <p>4-2 Assist seed farmers to conduct farmer-to-farmer training for small-scale fish farmers.</p> <p>4-3 Select Community Fish Refuges (CFRs) for resource enhancement based on the criteria established.</p> <p>4-4 Support CFR activities and prepare the CFR implementation manual.</p> <p>4-5 Disseminate information of small-scale aquaculture among farmers and local extension staff in the target provinces.</p> <p>5-1 Facilitate seed farmers to establish a provincial network to strengthen cooperation among seed farmers in each target province.</p> <p>5-2 Facilitate inter-networks in the target provinces.</p> <p>5-3 Promote cooperation among the networks of FAIEX-2 and FAIEX-1.</p>	<p>Inputs</p> <p>Japanese side</p> <ol style="list-style-type: none"> 1. Experts <ul style="list-style-type: none"> Chief Advisor / Aquaculture Extension Project Coordinator / Aquaculture Training Seed Production Technology Broodstock Development and Management Grow-out Technology Feed Development Fish Stock Enhancement (CFR) Aquaculture Facility Improvement Others as necessary 2. Training of counterpart personnel in Japan and/or the Third Countries 3. In-country training 4. Facility improvement of the Toek Vil Fish Seed Production Station 5. Provision of machinery and equipment <ul style="list-style-type: none"> Provision of machinery and equipment including transportation means if necessary necessary for the project activities, such as technical improvement at the Toek Vil Fish Seed Production Station, hatchery development for seed farmers, training, extension activities, etc. 6. Local expenses for the project activities <ul style="list-style-type: none"> ▪ Expenses for workshops, seminars, etc. ▪ Teaching materials for training ▪ Others <p>Cambodian side</p> <ol style="list-style-type: none"> 1. Personnel <ul style="list-style-type: none"> Project Director Project Manager Deputy Project Manager Counterparts 2. Provision of the project offices and facilities necessary for the project implementation 3. Expenses for the construction and development of aquaculture ponds 4. Others <ul style="list-style-type: none"> Administrative and operational expenses Running costs for electricity, water, etc. 	<p>The local extension staff, seed farmers, and small-scale fish farmers trained by the Project continue working for their respective positions in the target provinces.</p> <hr/> <p>Pre-condition</p> <p>Understanding and cooperation on the project activities are obtained from famers in the target provinces.</p>
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Annex 1: Project Design Matrix (PDM₁)

Project Title : Freshwater Aquaculture Improvement and Extension Project II (FAIEX-2) in Cambodia

Project Period : March, 2011 – February, 2015 (Four Years)

Target Areas : Pursat, Battambang, and Siem Reap Provinces

Version No. 1

Target Group : Small-scale fish farmers and seed farmers in the target areas

Date : February 21, 2012

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal Household economy of small-scale fish farmers are improved in the target provinces.</p>	<p>1. The number of small-scale fish farmers with increased profits*¹ and savings*² from fish farming is increased by 5,000 households in target areas by 2018.</p>	<p>1-1. Sampling survey/ Data from the FiA cantonment offices 1-2. Baseline/ Impact survey report</p>	<p>The policy and direction on the aquaculture programs are not drastically changed by the government of Cambodia.</p>
<p>Project Purpose Small-scale aquaculture production is increased in the target provinces.</p>	<p>1. Annual production of small-scale aquaculture promoted by the Project is increased up to 150 tons in target areas in 2015.</p>	<p>1. Baseline/ Impact survey report</p>	<p>Prices of cultured fishes are not largely declined.</p>
<p>Outputs</p> <p>1. Small-scale seed production and grow-out technology is improved.</p> <p>2. Capacity of local aquaculture extension services is enhanced.</p> <p>3. Seed farmers are capacitated.</p> <p>4. Small-scale aquaculture is expanded in the target provinces.</p> <p>5. Networks of seed farmers are enhanced and broadened.</p>	<p>1-1. The number of the technical improvements through experiments is increased.</p> <p>1-2. The degree of the technical improvement, such as growth rate and survival rate, is improved.</p> <p>2-1. The percentage of the local extension staff who properly conducts extension activities on grow-out and seed production technology attains to more than 30% on average.</p> <p>2-2. Satisfaction ratings of the seed farmers attain to more than 80% on average regarding the teaching capability of local extension staff.</p> <p>3-1. The number of seed farmers enable to produce fingerlings is increased from 19 farmers to 45 farmers in target areas.</p> <p>3-2. The number of seed farmers who can produce seed of at least three species is increased by 200% in target areas.</p> <p>3-3. Seed production in target areas is increased by 200%.</p> <p>3-4. Sales income of seed farmers is increased by 200% in target areas.</p> <p>4-1. The number of small-scale fish farmers benefitted from farmer-to-farmer training attains to more than 3,000 households in target areas.</p> <p>4-2. The number of small-scale farmers managing community fish refuges (CFRs) properly is increased up to 30 households in target areas.</p> <p>5-1. The meetings for information exchange on seed production technology, seed marketing, etc. are convened 2 times per year.</p> <p>5-2. The number of advices and recommendations regarding seed production technology, seed marketing, procurement of farm inputs, etc. is increased in target areas.</p>	<p>1-1. Technical manuals 1-2. Results of verification trials</p> <p>2-1. Questionnaire survey to local extension staff 2-2. Questionnaire survey to seed farmers</p> <p>3-1. Baseline/ Impact survey report 3-2. Baseline/ Impact survey report 3-3. Baseline/ Impact survey report 3-4. Baseline/ Impact survey report</p> <p>4-1. Baseline/ Impact survey report 4-2. Baseline/ Impact survey report</p> <p>5-1. Records of the meetings for information exchange 5-2. Monitoring results by the Project and impact survey report</p>	<p>1. Natural disasters, such as droughts, floods, etc., do not give a profound effect to the project activities.</p> <p>2. Outbreaks of serious fish diseases do not occur.</p> <p>3. The imports of fingerlings from neighboring countries do not give an enormous influence to the supply balance of fingerlings produced in Cambodia.</p>

*¹ "Profit" is given by subtracting "production cost" from "fish sales income of cultured fish."

*² "Saving" is given by self-consumption of cultured fish, which would otherwise be expenses for purchase of fish in the market, i.e., by subtracting "present cost to purchase fish" from "previous cost to purchase fish."

<p>Activities</p> <p>0 Conduct the baseline and impact surveys.</p> <p>1-1 Clarify issues and challenges on small-scale seed production and grow-out technology in the target provinces.</p> <p>1-2 Conduct technical improvement at the Toek Vil Fish Seed Production Station.</p> <p>1-3 Conduct verification trials at seed farmers and small-scale fish farmers.</p> <p>1-4 Develop technical manuals adaptive to the target provinces by revising the FAIEX-1 manuals.</p> <p>2-1 Confirm and clarify roles and functions of local extension staff at each level of FiA (Cantonment, Division, and Sangkat) and local authorities.</p> <p>2-2 Conduct training on grow-out technology and extension methods for local extension staff.</p> <p>2-3 Conduct training on seed production technology and extension methods for selected local extension staff.</p> <p>2-4 Analyze extension activities undertaken, and draw up an extension guideline and good practices.</p> <p>3-1 Select target communes and seed farmers based on the criteria established.</p> <p>3-2 Conduct training on seed production aspects for the seed farmers.</p> <p>3-3 Assist the seed farmers in their seed production activities mainly at initial stage.</p> <p>4-1 Conduct training of trainers (TOT) on grow-out technology for the seed farmers.</p> <p>4-2 Assist seed farmers to conduct farmer-to-farmer training for small-scale fish farmers.</p> <p>4-3 Select Community Fish Refuges (CFRs) for resource enhancement based on the criteria established.</p> <p>4-4 Support CFR activities and prepare the CFR implementation manual.</p> <p>4-5 Disseminate information of small-scale aquaculture among farmers and local extension staff in the target provinces.</p> <p>5-1 Facilitate seed farmers to establish a provincial network to strengthen cooperation among seed farmers in each target province.</p> <p>5-2 Facilitate inter-networks in the target provinces.</p> <p>5-3 Promote cooperation among the networks of FAIEX-2 and FAIEX-1.</p>	<p>Inputs</p> <p>Japanese side</p> <ol style="list-style-type: none"> 1. Experts <ul style="list-style-type: none"> Chief Advisor / Aquaculture Extension Project Coordinator / Aquaculture Training Seed Production Technology Broodstock Development and Management Grow-out Technology Feed Development Fish Stock Enhancement (CFR) Aquaculture Facility Improvement Others as necessary 2. Training of counterpart personnel in Japan and/or the Third Countries 3. In-country training 4. Facility improvement of the Toek Vil Fish Seed Production Station 5. Provision of machinery and equipment <ul style="list-style-type: none"> Provision of machinery and equipment including transportation means if necessary necessary for the project activities, such as technical improvement at the Toek Vil Fish Seed Production Station, hatchery development for seed farmers, training, extension activities, etc. 6. Local expenses for the project activities <ul style="list-style-type: none"> ▪ Expenses for workshops, seminars, etc. ▪ Teaching materials for training ▪ Others <p>Cambodian side</p> <ol style="list-style-type: none"> 1. Personnel <ul style="list-style-type: none"> Project Director Project Manager Deputy Project Manager Counterparts 2. Provision of the project offices and facilities necessary for the project implementation 3. Expenses for the construction and development of aquaculture ponds 4. Others <ul style="list-style-type: none"> Administrative and operational expenses Running costs for electricity, water, etc. 	<p>The local extension staff, seed farmers, and small-scale fish farmers trained by the Project continue working for their respective positions in the target provinces.</p> <hr/> <p>Pre-condition</p> <p>Understanding and cooperation on the project activities are obtained from famers in the target provinces.</p>
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Project Design Matrix (PDM2) Draft

Project Title : Freshwater Aquaculture Improvement and Extension Project II (FAIEX-2) in Cambodia

Target Areas : Pursat, Battambang, and Siem Reap Provinces

Target Group : Small-scale fish farmers and Fish Seed Producers (FSPs) in the target areas

Project Period : March, 2011 – February, 2015 (Four Years)

Version No. 2

Date : February 13, 2013

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal Household economy of small-scale fish farmers are improved in the target provinces.</p>	<p>1. The number of small-scale fish farmers with increased profits*¹ and savings*² from fish farming is increased by 5,000 households in target areas by 2018.</p>	<p>1-1. Sampling survey/ Data from the FiA cantonment offices 1-2. Baseline/ Impact survey report</p>	<p>The policy and direction on the aquaculture programs are not drastically changed by the government of Cambodia.</p>
<p>Project Purpose Small-scale aquaculture production is increased in the target provinces.</p>	<p>1. Annual production of small-scale aquaculture promoted by the Project is increased up to 150 tons in target areas in 2015.</p>	<p>1. Baseline/ Impact survey report</p>	<p>Prices of cultured fishes are not largely declined.</p>
<p>Outputs</p> <p>1. Small-scale seed production and grow-out technology is improved.</p> <p>2. Capacity of local aquaculture extension services is enhanced.</p> <p>3. Fish Seed Producers (FSPs) are capacitated.</p> <p>4. Small-scale aquaculture is expanded in the target provinces.</p> <p>5. Networks of FSPs are enhanced and broadened.</p>	<p>1-1. The number of the technical improvements through experiments is increased.</p> <p>1-2. The degree of the technical improvement, such as growth rate and survival rate, is improved.</p> <p>2-1. 80% of the C/P extension staff gains capacities to conduct extension activities on grow-out and seed production technology properly.</p> <p>2-2. Satisfaction ratings of the FSPs attain to more than 80% on average regarding the teaching capability of local extension staff.</p> <p>3-1. The number of FSPs producing fingerlings is increased from 19 farmers to 40 farmers in target areas.</p> <p>3-2. The number of FSPs who can produce seed of at least three species is doubled in target areas.</p> <p>3-3. The amount of seed production by FSPs is doubled.</p> <p>3-4. Sales income of the FSPs is doubled in target areas.</p> <p>4-1. The number of small-scale fish farmers benefitted from farmer-to-farmer training attains to more than 3,000 households in target areas.</p> <p>4-2. The 4 target community fish refuges (CFRs) are properly managed in accordance with their regulation.</p> <p>5-1. The meetings for information exchange on seed production technology, seed marketing, etc. are convened 2 times per year.</p> <p>5-2. The number of advices and recommendations regarding seed production technology, seed marketing, procurement of farm inputs, etc. is increased in target areas.</p>	<p>1-1. Technical manuals 1-2. Results of verification trials</p> <p>2-1. Questionnaire survey to local extension staff 2-2. Questionnaire survey to FSPs</p> <p>3-1. Baseline/ Impact survey report 3-2. Monitoring results by the Project</p> <p>3-3. Baseline/ Impact survey report 3-4. Baseline/ Impact survey report</p> <p>4-1. Baseline/ Impact survey report 4-2. Monitoring results by the Project</p> <p>5-1. Records of the meetings for information exchange 5-2. Monitoring results by the Project and impact survey report</p>	<p>1. Natural disasters, such as droughts, floods, etc., do not give a profound effect to the project activities.</p> <p>2. Outbreaks of serious fish diseases do not occur.</p> <p>3. The imports of fingerlings from neighboring countries do not give an enormous influence to the supply balance of fingerlings produced in Cambodia.</p>

*¹ "Profit" is given by subtracting "production cost" from "fish sales income of cultured fish."

*² "Saving" is given by self-consumption of cultured fish, which would otherwise be expenses for purchase of fish in the market, i.e., by subtracting "present cost to purchase fish" from "previous cost to purchase fish."

<p>Activities</p> <p>0 Conduct the baseline and impact surveys.</p> <p>1-1 Clarify issues and challenges on small-scale seed production and grow-out technology in the target provinces.</p> <p>1-2 Conduct technical improvement at the Toek Vil Fish Seed Production Station.</p> <p>1-3 Conduct verification trials at seed farmers and small-scale fish farmers.</p> <p>1-4 Develop technical manuals adaptive to the target provinces by revising the FAIEX-1 manuals.</p> <p>2-1 Confirm and clarify roles and functions of local extension staff at each level of FiA (Cantonment, Division, and Sangkat) and local authorities.</p> <p>2-2 Conduct training on grow-out technology and extension methods for local extension staff.</p> <p>2-3 Conduct training on seed production technology and extension methods for selected local extension staff.</p> <p>2-4 Analyze extension activities undertaken, and draw up an extension guideline and good practices.</p> <p>3-1 Select target communes and FSPs based on the criteria established.</p> <p>3-2 Conduct training on seed production aspects for the FSPs.</p> <p>3-3 Assist the FSPs in their seed production activities mainly at initial stage.</p> <p>4-1 Conduct training of trainers (TOT) on grow-out technology for the FSPs.</p> <p>4-2 Assist FSPs to conduct farmer-to-farmer training for small-scale fish farmers.</p> <p>4-3 Select Community Fish Refuges (CFRs) for resource enhancement based on the criteria established.</p> <p>4-4 Support CFR activities and prepare the CFR implementation manual.</p> <p>4-5 Disseminate information of small-scale aquaculture among farmers and local extension staff in the target provinces.</p> <p>5-1 Facilitate FSPs to establish a provincial network to strengthen cooperation among FSPs in each target province.</p> <p>5-2 Facilitate inter-networks in the target provinces.</p> <p>5-3 Promote cooperation among the networks of FAIEX-2 and FAIEX-1.</p>	<p>Inputs</p> <p>Japanese side</p> <ol style="list-style-type: none"> 1. Experts <ul style="list-style-type: none"> Chief Advisor / Aquaculture Extension Project Coordinator / Aquaculture Training Seed Production Technology Broodstock Development and Management Grow-out Technology Feed Development Fish Stock Enhancement (CFR) Aquaculture Facility Improvement Others as necessary 2. Training of counterpart personnel in Japan and/or the Third Countries 3. In-country training 4. Facility improvement of the Toek Vil Fish Seed Production Station 5. Provision of machinery and equipment <ul style="list-style-type: none"> Provision of machinery and equipment including transportation means if necessary necessary for the project activities, such as technical improvement at the Toek Vil Fish Seed Production Station, hatchery development for FSPs, training, extension activities, etc. 6. Local expenses for the project activities <ul style="list-style-type: none"> ▪ Expenses for workshops, seminars, etc. ▪ Teaching materials for training ▪ Others <p>Cambodian side</p> <ol style="list-style-type: none"> 1. Personnel <ul style="list-style-type: none"> Project Director Project Manager Deputy Project Manager Counterparts 2. Provision of the project offices and facilities necessary for the project implementation 3. Expenses for the construction and development of aquaculture ponds 4. Others <ul style="list-style-type: none"> Administrative and operational expenses Running costs for electricity, water, etc. 	<p>The local extension staff, FSPs, and small-scale fish farmers trained by the Project continue working for their respective positions in the target provinces.</p> <hr/> <p>Pre-condition</p> <p>Understanding and cooperation on the project activities are obtained from famers in the target provinces.</p>
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ANNEX 2

(Final Report)

Results of farmer to farmer training
and fish stocking

Profile of farmers who participated to FTF 2011
in target communes

Farmer to farmer training was conducted from June 15 to June 28 in 19 communes in 3 target provinces. 505 farmers participated at the training as below table.

Farmers to Farmers Training (June, 2011)				FAIEX 2	
District	Commune	Instructor (=core farmer-FAIEX2)	Date	Participant	
Siem Reap	Chi Kraeng	Sang Veauy	Puok Chhom	22 - 23 June	30
	Sout Nikom	Chan Sar	Mao Lanh	22 - 23 June	30
	Prasat Bakong	Kantreang	Yip Prang	16 - 17 June	30
		Roluos			
	Puok	Samraong Yea	Say Son	16 - 17 June	30
			Total	120	
Battambang	Thma Koul	Bansay Traeng	Mao Pek	15 - 16 June	25
		Anlong Run	Mao Pek	27 - 28 June	28
	Bavel	Khnach Romeas		27 - 28 June	23
		Prey Khpos	Mith Phan	15 - 16 June	27
	Battambang	Ou Mal	Chhorm Sovan	15 - 16 June	25
	Rotanak Mondol	Sdau	Dy Chana	23 - 24 June	25
	Banan	Snoeng		27 - 28 June	18
	Koh Krala	Hob	Thim Vibol	21 - 22 June	25
	Rukhak Kiri	Preaek Chik	Van Sinat	27 - 28 June	28
	Moung Ruessei	Robas Mongkol	Van Sinat	21 - 22 June	26
				Total	250
Pursat	Krakor	Tnot Chum	Em Som Ol	14 - 15 June	28
	Bakan	Romlech	Vom Bonat	17 - 18 June	28
		Khnar Totueng	Ly Heng	14 - 15 June	27
		Trapeang Chorng	Keo Nhoeng	17 - 18 June	26
	Krong Posat	Chamraeun Phal	Em Som Ol	17 - 18 June	26
			Total	135	

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

I. Siem Reap

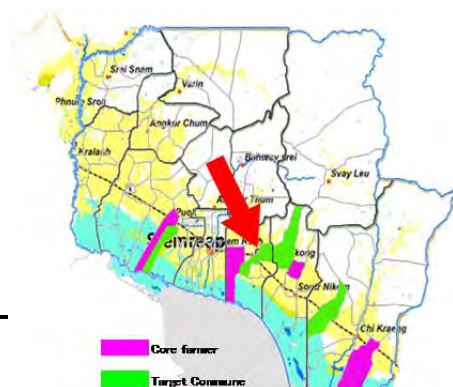
I-1 Profile of farmers in each commune

(SR-1)

Province Siem Reap

Date June 16-17, 2011

Place Kantreng village, Kantreng commune Prasat Bakong district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per famer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Kantreng	Tatrav	15	12	3	0	0	0	15	15	0
Kantreng	Kantreng	9	8	1	0	0	0	9	9	0
Rolous	Rolous Chas	4	4	0	0	0	4	0	2	2
Rolous	Rolous Lech	2	1	1	0	0	2	0	2	0
Total (SR1)		30	25	5	0	0	6	24	28	2

(2) Size of pond

Pond size in Kantreng commune and Rolous commune (33 ponds of 30 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.7	350.5	999.7
Min	2.0	48.0	144.0
Max	3.0	3,025.0	9,075.0

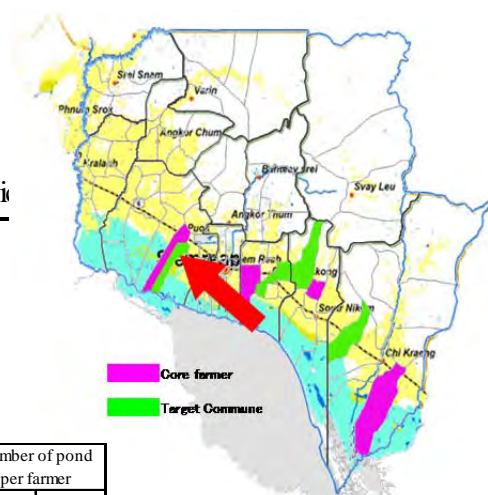
Commune	Village	Total num of farmer	Number of pond per farmer		Pond dimation (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Kantreng	Tatrav	15	15	0	113	100	300
Kantreng	Kantreng	9	9	0	142	100	150
Rolous	Rolous Chas	4	2	2	1156	48	3025
Rolous	Rolous Lech	2	2	0	247.5	195	300
Total (SR1)		30	28	2			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingering supported by project		Fingering bought by famer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Kantreng	Tatrav	15	6100	407	0	0	0	6100
Kantreng	Kantreng	9	4400	489	0	0	0	4400
Rolous	Rolous Chas	4	1800	450	0	0	0	1800
Rolous	Rolous Lech	2	1000	500	1	750	750	1750
Total (SR1)		30	13300	443	1	750	750	14050

(SR-2)

Province Siem Reap
 Date June 16-17, 2011
 Place Prasat village, Samraung Year commune, Pouk distri



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Samrong Yea	Prasat	17	16	1	15	0	0	2	16	1
	Prey Veng	13	10	3	6	0	0	7	13	0
Total (SR2)		30	26	4	21	0	0	9	29	1

(2) Size of pond

SR2 Pond size in Samrong Yea commune (31 ponds of 30 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.5	171.6	411.8
Min	2.0	100.0	200.0
Max	3.0	1,250.0	3,125.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Samrong Yea	Prasat	17	16	1	142	100	450
	Prey Veng	13	13	0	212	100	1,250
Total (SR2)		30	29	1			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingering supported by project		Fingering bought by farmer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Samrong Yea	Prasat	17	7200	424	4	1100	275	8300
	Prey Veng	13	5800	446	0	0	0	5800
Total (SR2)		30	13000	433	4	1100	275	14100

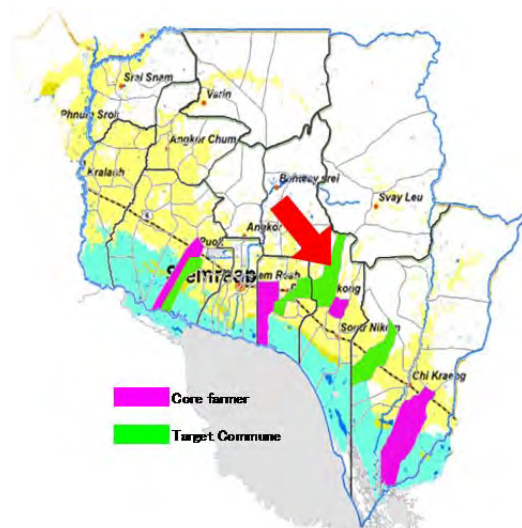
(SR-3)

Province Siem Reap

Date June 22-23, 2011

Place Sanlaung village,

Chansar commune, SothNikom district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Chansar	Bekamphloeng	3	2	1	0	0	0	3	3	0
	Cham	1	0	1	0	0	0	1	1	0
	Chansar Chhoeng	4	4	0	3	0	0	1	4	0
	Chansar Tboung	3	3	0	0	0	0	3	3	0
	Kok Chen	13	5	8	0	0	0	13	13	0
	Kok Toeng	2	2	0	0	0	0	2	2	0
	Sanlaung	4	4	0	0	0	0	4	4	0
Total		30	20	10	3	0	0	27	30	0

(2) Size of pond

Pond size in Chansar commune (30 ponds of 30 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	3.4	151.0	493.2
Min	2.5	100.0	300.0
Max	4.0	475.0	1,425.0

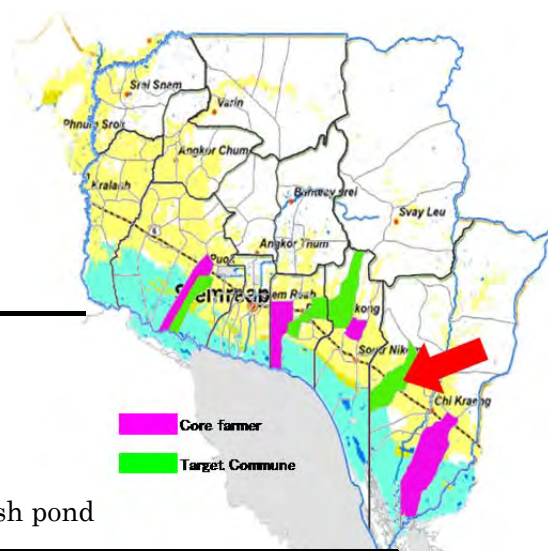
Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Chansar	Bekamphloeng	3	3	0	133	100	150
	Cham	1	1	0	182	182	182
	Chansar Chhoeng	4	4	0	159	100	256
	Chansar Tboung	3	3	0	163	100	240
	Kok Chen	13	13	0	104	100	150
	Kok Toeng	2	2	0	200	100	300
	Sanlaung	4	4	0	268	100	475
Total		30	30	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Chansar	Bekamphloeng	3	1400	467	0	0	0	1400
	Cham	1	500	500	1	600	600	1100
	Chansar Chhoeng	4	1800	450	2	600	300	2400
	Chansar Tboung	3	1400	467	2	300	150	1700
	Kok Chen	13	5300	408	11	2,200	200	7500
	Kok Toeng	2	900	450	1	400	400	1300
	Sanlaung	4	1800	450	2	1100	550	2900
Total		30	13100	437	19	5200	273.6842105	18300

(SR-4)

Province Siem Reap
 Date June 22-23, 2011
 Place Damrei Chhlang village,
 Sangveuy commune, Chikreng district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Sangveuy	Chork	3	3	0	1	0	0	2	3	0
	Damrei Chhlang	14	13	1	2	0	0	12	12	2
	Taprom	5	5	0	0	0	0	5	5	0
	Thnal Dach	8	7	1	0	0	0	8	8	0
Total		30	28	2	3	0	0	27	28	2

(2) Size of pond

Pond size in Sangveuy commune (33 ponds of 30 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	3.4	207.9	735.5
Min	2.0	100.0	200.0
Max	4.0	600.0	2,400.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Sangveuy	Chork	3	3	0	110	100	130
	Damrei Chhlang	14	12	2	308	100	600
	Taprom	5	5	0	100	100	100
	Thnal Dach	8	8	0	100	100	100
Total		30	30	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Sangveuy	Chork	3	1400	467	1	300	0	1700
	Damrei Chhlang	14	6800	486	10	11900	1190	18700
	Taprom	5	2000	400	4	1000	250	3000
	Thnal Dach	8	3200	400	5	1600	320	4800
Total		30	13400	447	20	14800	740	28200

I-2 Participants in Siem Reap

- General aspect

120 farmers from 17 villages in 5 communes participated in the training. The ratio of males and females in these participants is 99 to 21.

28% (33 out of 120) belongs to Category I and III, which means that they have experience of culturing fish.

73% (87 out of 120) belong to Category IV or non-experienced farmer.

I	II	III	IV
27	0	6	87
23%	0%	5%	73%

- Number of pond

115 farmers out of 120 have only one pond.

5 farmers (4%) own 2 ponds or more.

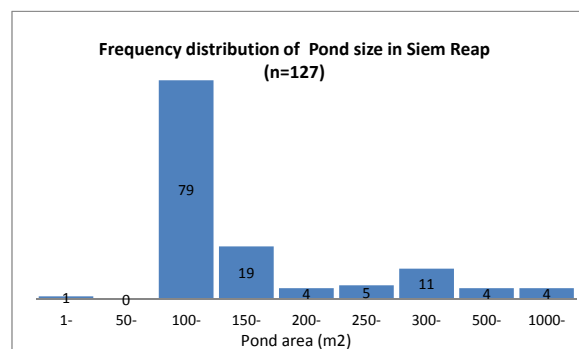
1 pond	2 ponds	3 ponds
115	3	2
96%	3%	2%

- Pond size

The average size of 127 ponds was 222.61 m² (3m depth). Minimum pond size was 48 m² while maximum pond size was 3025 m². The size of 98 ponds (77%) ranges between 100 m² and 200 m².

Pond size in Siem Reap (127 ponds of 120 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	3.0	222.6	667.9
Min	2.0	48.0	144.0
Max	4.0	3,025.0	9,075.0



- Fingering to stock

Project distributed 52,800 fingering to 120 farmers. One farmer received 440 fingering on average. 44 farmers out of 120 (37%) bought additional fingering by themselves.

Total num of farmer who stocked fingering	Number of Fingering supported by project		Number of Fingering bought by farmer			Total number of Fingering stocked
	Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
120	52,800	440	44	21,850	497	74,650

100%



37%



II. Pursat

II-1 Profile of farmers in each commune

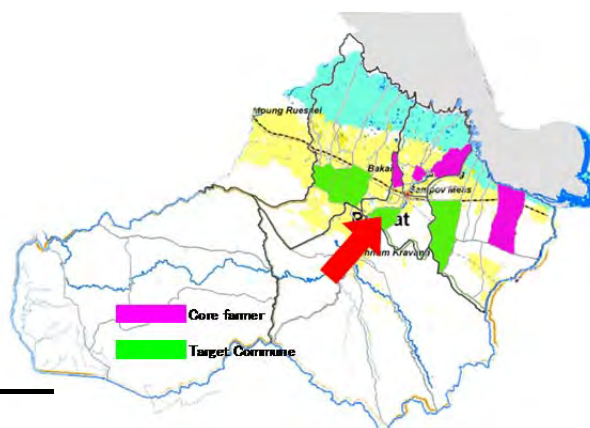
(PS-1)

Province Pursat

Date June 17-18, 2011

Place Ouroka village

Chamroeunphal commune Pursat city



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Chomraeun Phal	Kdei Khvav	5	5	0	2	0	0	3	5	0
	Kompong Stoung	5	5	0	0	0	0	5	5	0
	Ou Roka	5	5	0	0	0	0	5	5	0
	Ou Taung	3	3	0	0	0	0	3	3	0
	Svay Meas	8	8	0	0	0	0	8	8	0
Total		26	26	0	2	0	0	24	26	0

(2) Size of pond

Pond size in Chomraeun Phal commune (26 ponds of 26 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	nd	107.9	nd
Min	nd	36.0	nd
Max	nd	400.0	nd

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Chomraeun Phal	Kdei Khvav	5	5	0	68	42	100
	Kompong Stoung	5	5	0	143	36	400
	Ou Roka	5	5	0	116	100	150
	Ou Taung	3	3	0	100	100	100
	Svay Meas	8	8	0	109	48	225
Total		26	26	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Chomraeun Phal	Kdei Khvav	5	1360	272	0	0	1360	
	Kompong Stoung	5	1752	350	1	1100	2852	
	Ou Roka	5	2220	444	1	100	2320	
	Ou Taung	3	1200	400	1	27000	28200	
	Svay Meas	8	3092	387	0	0	3092	
Total		26	9624	370	3	28200	37824	

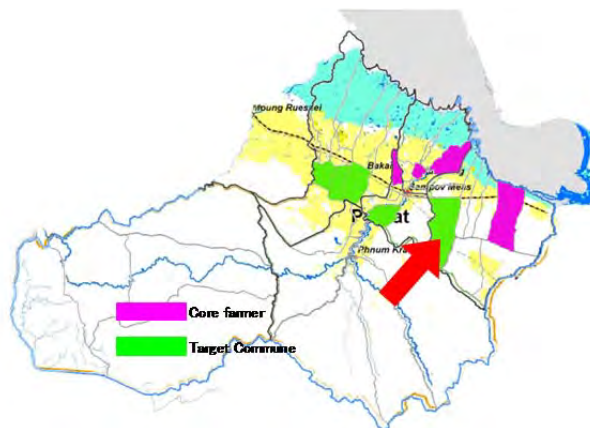
(PS-2)

Province Pursat

Date June 14-15, 2011

Place Tram village

Thnautchom commune Krakor district city



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Thnaut Chom	Boeung Veal	2	2	0	0	1	0	1	2	0
	Chambok Thom	1	1	0	0	0	0	1	1	0
	Chheuteal	4	4	0	0	0	0	4	4	0
	Dongteuk Leach	3	1	2	0	0	0	3	3	0
	Kandal	8	8	0	0	0	0	8	8	0
	Krabeisar	2	2	0	0	1	0	1	2	0
	Takeo Leu	3	2	1	0	0	0	3	3	0
	Tbeng Chhrom	5	4	1	0	0	0	5	5	0
Total		28	24	4	0	2	0	26	28	0

(2) Size of pond

Pond size in Thnaut Chom commune (28 ponds of 28 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.5	135.9	346.3
Min	2.5	35.0	87.5
Max	3.0	300.0	750.0

Commune	Village	Total num of farmer	Number of pond per famer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Thnaut Chom	Boeung Veal	2	2	0	140	40	240
	Chambok Thom	1	1	0	85	85	85
	Chheuteal	4	4	0	113	35	200
	Dongteuk Leach	3	3	0	115	50	200
	Kandal	8	8	0	106	40	300
	Krabeisar	2	2	0	185	144	225
	Takeo Leu	3	3	0	260	180	300
	Tbeng Chhrom	5	5	0	129	49	180
Total		28	28	0			

(3) Number of farmers who stocked fingering and its number

Commune	Village	Total num of farmer who stocked fingering	Fingering supported by project		Fingering bought by famer			Total number of Fingering stocked
			Total	Average (head/famer)	Farmer who bought fingering	Total	Average (head/famer)	
Thnaut Chom	Boeung Veal	2	660	330	1	500	500	1160
	Chambok Thom	1	340	340	0	0	0	340
	Chheuteal	4	1284	321	1	200	200	1484
	Dongteuk Leach	3	1084	361	2	500	250	1584
	Kandal	8	2480	310	1	1000	1000	3480
	Krabeisar	2	1000	500	0	0	0	1000
	Takeo Leu	3	1500	500	2	1100	550	2600
	Tbeng Chhrom	5	2080	416	1	100	100	2180
Total		28	10428	372	8	3400	425	13828

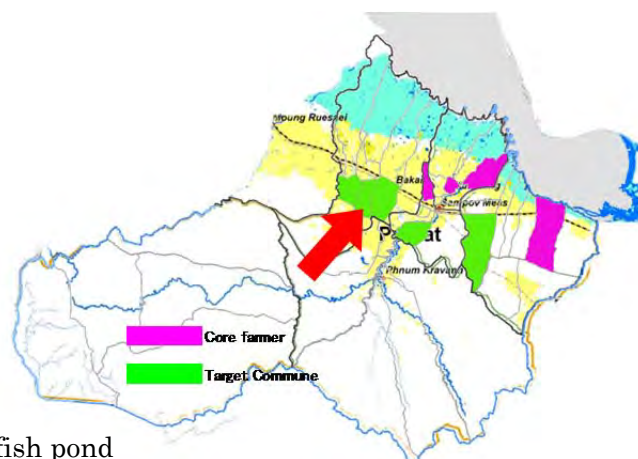
(PS-3)

Province Pursat

Date June 14-15, 2011

Place Kos krabei village

Khna Toteung commune Bakan district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Khna Toteung	Kamprakon	9	9	0	1	1	0	7	7	2
	Kos Krabei	5	5	0	0	0	0	5	4	1
	Kos Svay	13	11	2	0	1	0	12	12	1
Total		27	25	2	1	2	0	24	23	4

(2) Size of pond

Pond size in Khna Toteung commune (32 ponds of 27 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	2.1	121.1	278.3
Min	1.5	30.0	45.0
Max	3.0	300.0	900.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Khna Toteung	Kamprakon	9	7	2	128	50	270
	Kos Krabei	5	4	1	82	60	110
	Kos Svay	13	12	1	133	30	300
Total		27	23	4			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Khna Toteung	Kamprakon	9	4000	444	3	2500	833	6500
	Kos Krabei	5	1680	336	0	0	0	1680
	Kos Svay	13	5160	397	2	2000	1000	7160
Total		27	10840	401	5	4500	900	15340

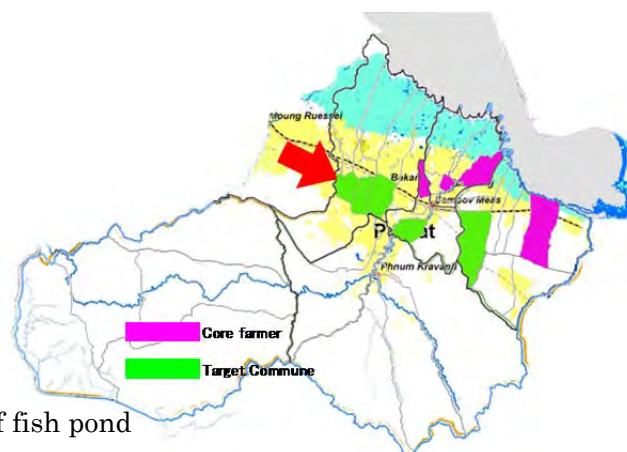
(PS-5)

Province Pursat

Date June 17-18, 2011

Place Damnak Trach village

Romlech commune Bakan district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Romlech	Brasat	3	3	0	3	0	0	0	3	0
	Damnak Trach	4	3	1	1	0	0	3	4	0
	Kampongkdei	1	1	0	0	0	0	1	1	0
	Raung Takok	14	13	1	0	0	0	14	14	0
	Romlech	2	2	0	0	0	0	2	2	0
	Thmei	4	4	0	0	0	0	4	4	0
Total		28	26	2	4	0	0	24	28	0

(2) Size of pond

Pond size in Romlech commune (28 ponds of 28 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	1.6	112.1	185.2
Min	1.5	48.0	72.0
Max	2.0	225.0	450.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Romlech	Brasat	3	3	0	133	100	200
	Damnak Trach	4	4	0	93	70	100
	Kampongkdei	1	1	0	100	100	100
	Raung Takok	14	14	0	106	48	225
	Romlech	2	2	0	173	120	225
	Thmei	4	4	0	111	64	150
Total		28	28	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer who stocked fingerling	Fingerling supported by project		Fingerling bought by farmer			Total number of Fingerling stocked
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)	
Romlech	Brasat	3	1300	433	0	0	0	1300
	Damnak Trach	4	1480	370	0	0	0	1480
	Kampongkdei	1	400	400	0	0	0	400
	Raung Takok	14	5652	404	0	0	0	5652
	Romlech	2	980	490	0	0	0	980
	Thmei	4	1576	394	0	0	0	1576
Total		28	11388	407	0	0	0	11388

II-2 Participants in Pursat

- General aspect

135 farmers from 25 villages in 5 communes participated in the training. The ratio of males and females in these participants is 127 to 3.

11% (16 out of 135) belongs to Category I,II and III, which means that they have experience of culturing fish. 88% (119 out of 135) belong to Category IV or non-experienced farmer.

I	II	III	IV
10	6	0	119
7%	4%	0%	88%

- Number of pond

131 farmers out of 135 have only one pond.

Only 4 farmers (3%) own 2 ponds or more.

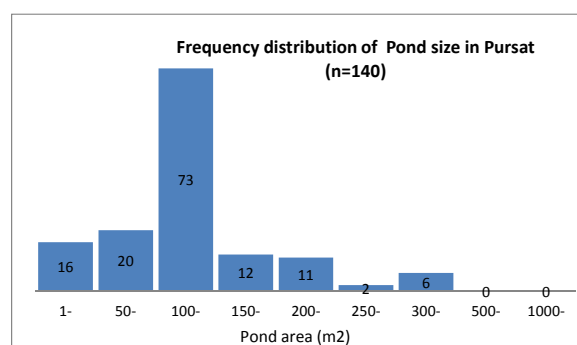
1 pond	2 ponds	3 ponds
131	3	1
97%	2%	1%

- Pond size

The average size of 140 ponds was 120.6 m² (2m depth). Minimum pond size was 30 m² while maximum pond size was 400 m². The size of 109 ponds (78%) was smaller than 150 m².

Pond size in Pursat (140 ponds of 135 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.0	120.6	211.8
Min	1.5	30.0	0.0
Max	3.0	400.0	900.0



- Fingering to stock

Project distributed 52,900 fingering to 135 farmers. One farmer received 329 fingering on average. 20 farmers out of 135 (15%) bought additional fingering by themselves.

Farmer stocked 200 to 1,000 fingering usually but one farmer stocked 27,000 fingering into his paddy field. Therefore average purchase seems to be high.

Total num of farmer who stocked fingering	Number of Fingering supported by project		Number of Fingering bought by farmer			Total number of Fingering stocked
	Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
135	52,900	392	20	38,300	1,915	91,200

100%
▲

15%
▲

III. Battambang

III-(1) Profile of farmers in each commune

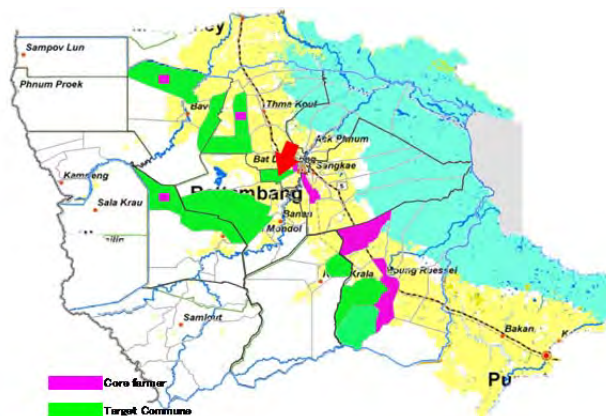
(BT-1)

Province Battambang

Date June 15-16, 2011

Place Andoung Pring village

Oumal commune Battambang district



(1) Sex, Experience of aquaculture, Number of fish pond

District	Commune	Total num of farmer	Male/Female		Category of farmer by their				Number of pond	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Battambang	Chrey	6	6	0	4	0	0	2	4	2
	Ouchar	2	2	0	1	1	0	0	2	0
	Oumal	16	11	5	3	3	0	10	11	5
	Pnom Sopov	1	1	0	0	0	1	0	1	0
Total		25	20	5	8	4	1	12	18	7

(2) Size of pond

Pond size in 4 communes in Battambang district (32 ponds of 25 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.9	220.4	673.2
Min	2.0	96.0	192.0
Max	4.0	540.0	2,160.0

District	Commune	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Battambang	Chrey	6	4	2	185	96	300
	Ouchar	2	2	0	210	150	270
	Oumal	16	11	5	239	100	540
	Pnom Sopov	1	1	0	144	144	144
Total		25	18	7			

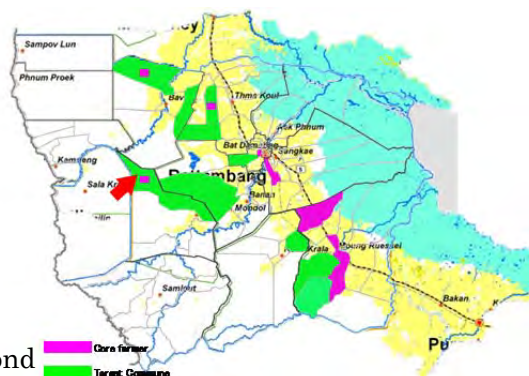
(3) Number of farmers who stocked fingerling and its number

District	Commune	Total num. of farmer	Fingerling supproted from the project		Fingerling bought by farmer			Total number of Fingerling stocked	No stock fingerling
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)		
Battambang	Chrey	4	2000	500	0	0	0	2000	2
	Ouchar	2	1000	500	0	0	0	1000	
	Oumal	12	5880	490	6	1500	250	7380	4
	Pnom Sopov	1	500	500	0	0	0	500	
Total		19	9380	494	6	1500	0	10880	6

(BT-2, BT3)

*Although 18 farmers attended at the training in Rotanak Mondol district ,Sdav commune on June 23-24, and 25 farmers attended at the training in Banon district,Sneung commune on June 27-28, the participants were divided as follows as 28 live in Rotanak Mondol district and 15 live in Banon district.

Province Battambang
 Date June 23-24, 2011 or June 27-28, 2011
 Place Boeung Ampil village
 Sdav commune Rotanak Mondol district



(Rotanak Mondol district)

(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their				Number of pond	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Endakheb	2 villages(Boeung Ampil and Serei Vorn)	3	1	2	0	1	0	2	3	0
Sdav	Boeung Ampil	9	7	2	0	0	0	9	8	1
	Doun Meak	3	1	2	0	0	0	3	3	0
	NeangLem	7	4	3	1	0	0	6	7	0
	Reaksmei Sangha	5	1	4	0	0	0	5	5	0
	Sdav	1	1	0	1	0	0	0	1	0
Total		28	15	13	2	1	0	25	27	1

(2) Size of pond

Pond size in Endakheb commune and Stav commune in Battambang district (29 ponds of 28 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	3.0	230.7	712.4
Min	2.0	80.0	240.0
Max	4.0	600.0	2,240.0

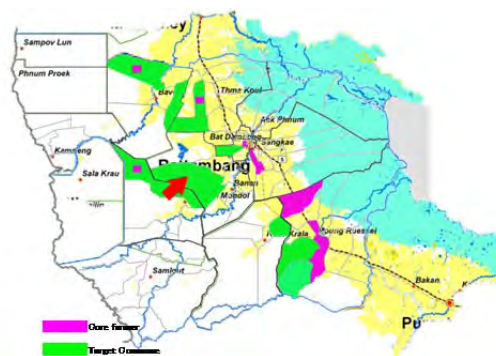
Commune	Village	Total num of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Endakheb	2 villages(Boeung Ampil and Serei Vorn)	3	3	0	278	150	484
Sdav	Boeung Ampil	9	9	0	206	120	375
	Doun Meak	3	3	0	362	225	560
	NeangLem	7	7	0	281	100	600
	Reaksmei Sangha	5	5	0	125	80	150
	Sdav	1	1	0	120	120	120
Total		28	28	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num of farmer	Fingerling supported from the project		Fingerling bought by farmer			Total number of Fingerling stocked	No stock fingerling
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)		
Endakheb	2 villages(Boeung Ampil and Serei Vorn)	3	1500	500	2	2100	2,102	3600	
Sdav	Boeung Ampil	5	2400	480	2	1400	1,402	3800	4
	Doun Meak	2	1000	500	0	0	0	1000	1
	NeangLem	7	3400	486	0	0	0	3400	
	Reaksmei Sangha	2	968	484	0	0	0	968	3
	Sdav	1	480	480	0	0	0	480	
Total		20	9748	487	4	3500	875	13248	8

(BT3)

Province Battambang
 Date June 23-24, 2011 or June 27-28, 2011
 Place Sneung Keut village
 Sneung commune Banon district



(Banon district)

(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their				Number of pond	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Sneung	Boeung Cheng	3	2	1	0	0	0	3	3	0
	Boeung Prey	3	3	0	0	0	0	3	3	0
	Khor	4	4	0	2	1	0	2	4	0
	PakSbek	3	3	0	1	0	0	2	3	0
	Pras Sre	1	1	0	0	0	0	1	1	0
	Sneung Keut	1	1	0	0	0	0	1	1	0
Total		15	14	1	3	1	0	12	15	0

(2) Size of pond

Pond size in Sneung communes in Battambang district (15 ponds of 15 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	2.7	196.3	537.9
Min	2.0	100.0	200.0
Max	3.0	600.0	1,800.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Sneung	Boeung Cheng	3	3	0	171	120	264
	Boeung Prey	3	3	0	283	100	600
	Khor	4	4	0	163	150	200
	PakSbek	3	3	0	160	100	200
	Pras Sre	1	1	0	300	300	300
	Sneung Keut	1	1	0	150	150	150
Total		15	15	0			

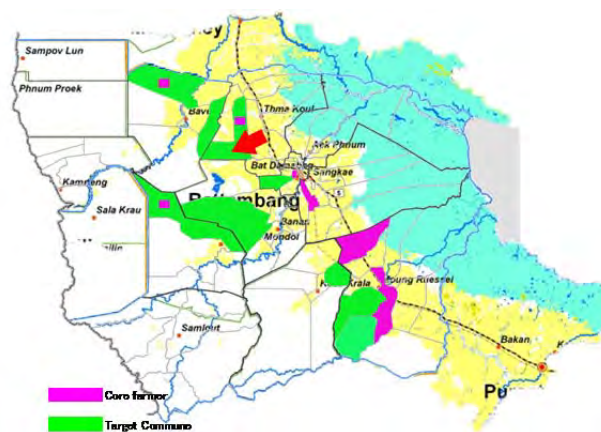
(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num. of farmer	Fingerling supported from the project		Fingerling bought by farmer			Total number of Fingerling stocked	No stock fingerling
			Total	Average (head/farmer)	Farmer who bought fingerling	Total	Average (head/farmer)		
Sneung	Boeung Cheng	2	1000	500	0	0	0	1000	1
	Boeung Prey	0	0	0	1	200	200	200	2
	Khor	2	1000	500	1	400	400	1400	2
	PakSbek	0	0	0	0	0	0	0	3
	Pras Sre	0	0	0	0	0	0	0	1
	Sneung Keut	1	500	500	1	200	201	700	0
Total		5	2500	500	3	800	267	3300	9

(BT5)

Province Battambang
 Date June 27-28, 2011
 Place Krous village

Anlung Run commune Thmor Kaul district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Anlung Run	Char	8	7	1	2	0	0	6	8	0
	Khros	9	7	2	1	0	3	5	9	0
	Sopy	8	4	4	1	0	1	6	8	0
Otaky	2 villages(Otaky and Khros)	2	2	0	0	0	2	0	2	0
Tapong	Tapong	1	0	1	0	0	0	1	1	0
Total		28	20	8	4	0	6	18	28	0

(2) Size of pond

Pond size in Anlung Run and other 2 communes in Battambang district (28 ponds of 28 farmers)

	Depth(m)	Dimension(m2)	Volume(m3)
Average	nd	329.3	nd
Min	nd	72.0	nd
Max	nd	1,200.0	nd

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Anlung Run	Char	8	8	0	266	80	400
	Khros	9	9	0	247	100	600
	Sopy	8	8	0	291	72	600
Otaky	2 villages(Otaky and Khros)	2	2	0	670	340	1,000
Tapong	Tapong	1	1	0	1,200	1,200	1,200
Total		28	28	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num. of farmer	Fingering supported from the project		Fingering bought by farmer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
Anlung Run	Char	8	3850	481	0	0	0	3850
	Khros	9	4300	478	0	0	0	4300
	Sopy	8	3800	475	0	0	0	3800
Otaky	2 villages(Otaky)	2	1000	500	0	0	0	1000
Tapong	Tapong	1	500	500	0		0	500
Total		28	13450	480				13450

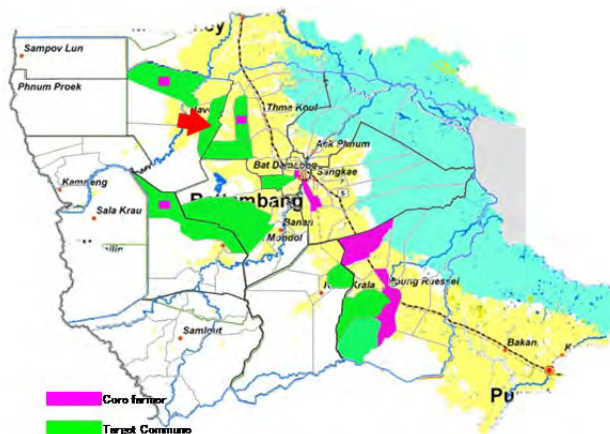
(BT6)

Province Battambang

Date June 27-28, 2011

Place Kos Ream village

Khnach Romeas commune Borvel district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Khnach Romeas	Kos Ream	18	16	2	0	5	7	6	18	0
	Roung Ampil	5	5	0	0	0	4	1	5	0
Total		23	21	2	0	5	11	7	23	0

(2) Size of pond

Pond size in Khnach Romeas communes in Battambang district (23 ponds of 23 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	nd	381.7	nd
Min	nd	60.0	nd
Max	nd	1,540.0	nd

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Khnach Romeas	Kos Ream	18	18	0	348	60	1,540
	Roung Ampil	5	5	0	504	252	1,200
Total		23	23	0			

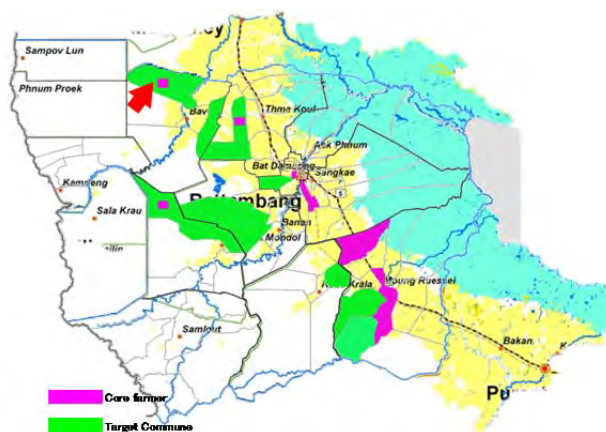
(3) Number of farmers who stocked fingering and its number

Commune	Village	Total num. of farmer	Fingering supprotted from the project		Fingering bought by farmer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
Khnach Romeas	Kos Ream	18	7800	433	0	0	0	7800
	Roung Ampil	5	2500	500	0	0	0	2500
Total		23	10300	448				10300

(BT7)

Province Battambang
 Date June 15-16, 2011
 Place Prey Khpos village

Prey Khpos commune Borvel district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Prey Khpos	Kbal Thnol	17	16	1	6	3	3	5	17	0
	Prey Khpos	10	9	1	0	1	7	2	10	0
Total		27	25	2	6	4	10	7	27	0

(2) Size of pond

Pond size in Prey Khpos communes in Battambang district (27 ponds of 27 farmers)

	Depth(m)	Dimension(m ²)	Volume(m ³)
Average	nd	277.5	nd
Min	nd	28.0	nd
Max	nd	850.0	nd

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimension (m ²)		
			1 pond	2 ponds or more	Average	Min	Max
Prey Khpos	Kbal Thnol	17	17	0	282	28	850
	Prey Khpos	10	10	0	270	72	600
Total		27	27	0			

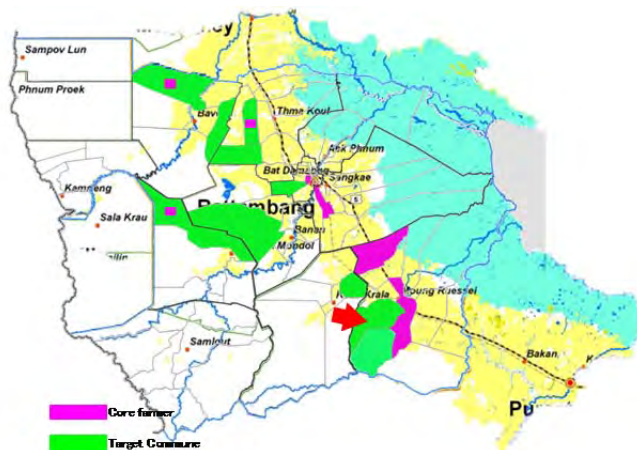
(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num. of farmer	Fingering supported from the project		Fingering bought by farmer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
Prey Khpos	Kbal Thnol	17	7872	463	0		0	7872
	Prey Khpos	10	4508	451	0		0	4508
Total		27	12380	459				12380

(BT9)

Province Battambang
 Date June 21-22, 2011
 Place Konkaek village

Robosmokol commune Moungrisey district



(1) Sex, Experience of aquaculture, Number of fish pond

Commune	Village	Total num of farmer	Male/Female		Category of farmer by their aquaculture experience				Number of pond per farmer	
			M	F	I	II	III	IV	1 pond	2 ponds or more
Robosmokol	Anlung Kaub	9	8	1	4	0	0	5	9	0
	KonkaEk Mouy	1	1	0	1	0	0	0	1	0
	KonkaEk Pi	6	6	0	0	0	0	6	6	0
	Robors Mongkol	10	9	1	2	0	0	8	10	0
Total		26	24	2	7	0	0	19	26	0

(2) Size of pond

Pond size in Robosmokol communes in Battambang district (26 ponds of 26 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.1	166.8	344.1
Min	2.0	100.0	200.0
Max	3.0	300.0	750.0

Commune	Village	Total num. of farmer	Number of pond per farmer		Pond dimention (m2)		
			1 pond	2 ponds or more	Average	Min	Max
Robosmokol	Anlung Kaub	9	9	0	184	100	300
	KonkaEk Mouy	1	1	0	135	135	135
	KonkaEk Pi	6	6	0	204	180	234
	Robors Mongkol	10	10	0	132	100	234
Total		26	26	0			

(3) Number of farmers who stocked fingerling and its number

Commune	Village	Total num. of farmer	Fingering supproted from the project		Fingering bought by farmer			Total number of Fingering stocked
			Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
Robosmokol	Anlung Kaub	9	4,248	472	0	0	0	4,248
	KonkaEk Mouy	1	500	0	0	0	0	500
	KonkaEk Pi	6	3,000	0	1	1,000	1,000	4,000
	Robors Mongkol	10	4,720	472	0	0	0	4,720
Total		26	12,468	480	1	1,000	1,000	13,468

III-2 Participants in Battambang

- General aspect

250 farmers from 16 communes participated in the training. The ratio of males and females in these participants is 201 to 49.

36% (89 out of 250) belongs to Category I, II and III, which means that they have experience of culturing fish. 64% (161 out of 250) belong to Category IV or non-experienced farmer.

I	II	III	IV
30	19	40	161
12%	8%	16%	64%

- Number of pond

242 farmers out of 250 have only one pond.

Only 8 farmers (3%) own 2 ponds.

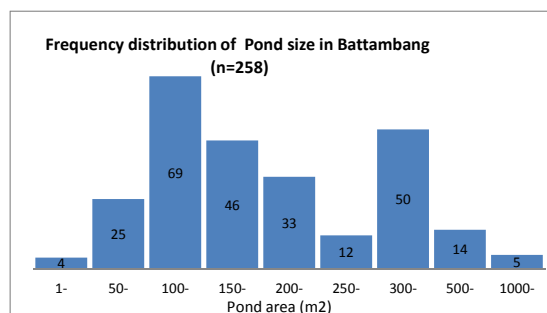
1 pond	2 ponds	3 ponds
242	8	0
97%	3%	0%

- 池サイズ

The average size of 258 ponds was 234.7 m² (2.6m depth) . Minimum pond size was 28 m² and maximum pond size was 1540 m². While the size of 144 ponds (56%) were smaller than 200 m², other 69 ponds (27%) were larger than 300 m².

Pond size in Battambang (258 ponds of 252 farmers)

	Depth(m)	Dimention(m2)	Volume(m3)
Average	2.6	234.7	326.2
Min	1.5	28.0	0.0
Max	5.0	1,540.0	3,000.0



- Fingering to stock

Project distributed 105,974 fingering to 228 farmers. One farmer received 456 fingering on average. 15 farmers out of 228 (7%) bought additional fingering by themselves.

Total num of farmer who stocked fingering	Number of Fingering supproted by project		Number of Fingering bought by farmer			Total number of Fingering stocked
	Total	Average (head/farmer)	Farmer who bought fingering	Total	Average (head/farmer)	
228	105,974	465	15	7,300	487	113,274

91% ▲

7% ▲

以上

Distribution and releasing fish fingerling for FFT participants in 2012

1. Assistance to the Farmers Participating in the Trainings

In order to support the farmers participating in training programs to start fish culture activities quickly, in the first year, the project provided maximum 500 fish seeds and a hapa net to each farmer who had prepared fish ponds. Those assistances encouraged 90 % of trained farmers to start their fish culture activities. In the second year, following the same approach, extension officers and experts confirmed the following points (Box 4), and provided fish seeds and hapa nets to the farmers, who had prepared their fish ponds.

Box 4: Check Items of Fish Pond Preparation (FAIEX-2, 2012)

- Are there any problems of fish pond designs for fish culture? (area, depth, slope, bank height and strength)
- Have predator fish been exterminated completely?
- Have the bottom quality of fish ponds been improved by dusting lime powder?
- Does the necessary water for fish culture remain in fish ponds? (at least 50 cm deep at fish seed stocking)
- Have the supplementary fertilization been prepared properly? (manure pits, and etc.)
- Don't unnecessary aquatic plants grow in fish ponds?
- Have protection nets been set around fish ponds? (if predator fish is expected to invade fish

1.1 Target for assistance

Among famers' participants in farmers to farmers training of this year, the farmers, whom the project supported fish pond construction, (45 farmers in each province) were excluded from the targets of free distribution of fish seeds, because they agreed on the assistance condition that they prepared fish seeds at their own expenses. On the other hand, among first years' fish farmers received farmers to farmers trainings last year, the farmers, who lost cultured fish seeds by floods, (53 farmers in Battambang, 50 farmers in Siem Reap, and 8 farmers in Pursat) were included in the targets of redistribution of fish seeds. The numbers of target farmers for distribution of fish seeds

in this year are 306 farmers in Battambang, 255 farmers in Siem Reap, and 219 farmers in Pursat.

Table 1 Target Farmers for Distribution of Fish Seeds (Year 2012)

Eligible farmer for ngering distribution (free of charge, max. 500 head per farmer)
Progress of stocking fingering

Province	Number of participant		Category of participant	Fingering distribution (Free charge distribution)		Total distribution
				Free of charge	Free of charge	
Battambang	Particioated in FTF 2012	392	Farmer who heve not gotten support for pond digging in 2011	253	→	306
			Farmer who got support of pond digging in 2011	45	⊗	
			Farmer participated volunteers	94	⊗	
	Particioated in FTF 2011	250	Farmers suffered from flooding and lost fingering in 2011	53	→	
			No suffered serious damage from flooding in 2011	197	⊗	
Siem Reap	Particioated in FTF 2012	250	Farmer who heve not gotten support for pond digging in 2011	205	→	255
			Farmer who got support of pond digging in 2011	45	⊗	
	Particioated in FTF 2011	120	Farmers suffered from flooding and lost fingering in 2011	50	→	
			No suffered serious damage from flooding in 2011	70	⊗	
Pursat	Particioated in FTF 2012	256	Farmer who heve not gotten support for pond digging in 2011	211	→	219
			Farmer who got support of pond digging in 2011	45	⊗	
	Particioated in FTF 2011	135	Farmers suffered from flooding and lost fingering in 2011	8	→	
			No suffered serious damage from flooding in 2011	127	⊗	

1.2. Results of Distribution

Due to little rain in 2012, releasing fish in the pond was delaying in the most of communes. After large amount of rain began to fall in most commune in September, releasing fish into the pond became active.

(1) Siem Reap

As shown in the table, 255 households who participated in FTF-2012, got a fish fingering by free charge distribution from the project and released a total of 117,445 tails of fish fingering in the individual fish pond for the period from 09 August 2012 to 10 September 2012. Average number of released fish was 461 head per household. All fish fingering were purchased in project seed farmers (Say Song, Yip Rrang, Mao Lanh, Puok Chhom, Henag Hokson) and in one private hatchery(Mr.Reunya) and in Toek Vil station.

Table 2 Fish releasing in Target Farms in Siem Reap (Year 2012)

Commune	Number of Farmer HH		Fingering stocked				Average number of stocking	Date for stocking
	Total participant	Well-prepared pond	SB(35%)	TL(50%)	IC,CC(15%)	Total		
Popel	30	30	4,935	7,050	2,115	14,100	470	9-Aug. 2012
Tbeng	31	Not eligible for free charge distribution fingering *2011 池掘削支援を受けた31戸は対象外						
Kampongthkov	13	13	2,205	3,105	945	6,255	481	10-Aug. 2012
Kralanh	20	20	3,220	4,600	1,380	9,200	460	11-Aug. 2012
Chunleasdey	15	15	2,310	3,300	990	6,600	440	29-Aug. 2012
Svay Chek	22	22	3,535	5,050	1,515	10,100	459	30-Aug. 2012
Peaksneng	14	14	2,135	3,050	915	6,100	436	31-Aug. 2012
Svay Sa	27	27	4,585	6,550	1,965	13,100	485	2-Sep. 2012
	14	Not eligible for free charge distribution fingering * 41戸の研修参加者のうち池掘削支援を受けた14戸を除いた						
Lveakrang	21	21	3,360	4,800	1,440	9,600	457	4-Sep. 2012
Prasat	15	15	2,450	3,500	1,050	7,000	467	6-Sep. 2012
Tayek	28	28	4,830	6,900	2,070	13,800	493	8-Sep. 2012
Participants in 2011 *Suffered from flooding in 2011								
Samrong Yea		29	4,375	6,250	1,875	12,500	431	9-Sep. 2012
Roluos,		21	3,185	4,550	1,365	9,100	433	10-Sep. 2012
Kantreang								
Chan Sar								
		250	255	41,125	58,705	17,625	117,455	461
			35%	50%	15%			

Composition of fish species was Silver barb 35%、 Tilapia 50%、 Indian carp/Common carp 15%. As a result, 98.4% of FTF participants (246HH out of 250HH) has started fish culture by releasing fingering in 2012.

Table 3 Number of farms who stocked fish fingering in Siem Reap (Year 2012)

Province	Category of participant		Number of participant in training	Number of farmer who stocked fingering	Provision
Siem Reap	Participant in FTF 2012	Farmer who have not gotten support for pond digging in 2011	205	205	free of charge
		Farmer who got support of pond digging in 2011	45	41	paid by farmer
		Sub-total	250	246	98.4%
	Participant in FTF 2011	Farmers suffered from flooding and lost fingering in 2011	50	50	free of charge
		No suffered serious damage from flooding in 2011	70	arrox. 40-50% of farmer stocked fingering (FIA-C)	paid by farmer

(2) Pursat

As shown in the table, 218 households who participated in FTF-2012, got a fish fingering by free charge distribution from the project and released a total of 98,424 tails

of fish fingerling in the individual fish pond for the period from 22 August 2012 to 13 October 2012. Average number of released fish was 451 head per household. All fish fingerling were purchased only in project seed farmers hatchery (Em Sam Ol, SounSeng/Pen Sovan, Ly Heng, Kean Nhoeng, Chin Kunthy) in Pursat province.

Table 4 Fish releasing in Target Farms in Pursat (Year 2012)

Commune	Number of Farmer HH		Fingerling stocked				Average number of stocking	Date for stocking
	Total participant	Well-prepared pond	SB	TL	IC,CC	Total		
Talo	28	12	2,800	1,960	840	5,600	467	22-Aug. 2012
		16	3,896	2,727	1,169	7,792	487	4-Oct. 2012
Ou Ta Paong	28	7	1,490	1,043	447	2,980	426	22-Aug. 2012
		21	4,640	3,248	1,392	9,280	442	9-Oct. 2012
Snam Preach	27	27	6,300	4,410	1,890	12,600	467	6-Oct. 2012
Kbal Tranch	25	12	2,940	2,058	882	5,880	490	24-Aug. 2012
		13	3,156	2,209	947	6,312	486	5-Oct. 2012
Pro Ngil	24	9	1,850	1,295	555	3,700	411	23-Aug. 2012
		15	3,230	2,261	969	6,460	431	7-Oct. 2012
Leach	26	26	5,720	4,004	1,716	11,440	440	8-Oct. 2012
Santreae	28	28	6,132	4,292	1,840	12,264	438	11-Oct. 2012
Phteah Rung	25	24	5,490	3,843	1,647	10,980	458	10-Oct. 2012
Participants in 2011 *Suffered from flooding in 2011								
Romlech	11	211	218	49,212	34,448	14,764	98,424	451
Khmar Toteung								
Farmers supported pond digging in 2011 *Fingerling were stocked by their own budget								
Bak Chenhchien	45	14	3,500	2,450	1,050	7,000	500	23-Aug. 2012
		29	8,600	6,020	2,580	17,200	593	12-Oct. 2012

Composition of fish species was Silver barb 50%、 Tilapia 35%、 Indian carp/Common carp 15%. As a result, 98.8% of FTF participants (253HH out of 256HH) has started fish culture by releasing fingerling in 2012.

Table 5 Number of farms who stocked fish fingerling in Pursat (Year 2012)

Province	Category of participant		Number of participant in training	Number of farmer who stocked fingerling	Provision
Pursat	Participated in FTF 2012	Farmer who have not gotten support for pond digging in 2011	211	210	free of charge
		Farmer who got support of pond digging in 2011	45	43	paid by farmer
		Sub-total	256	253	98.8%
	Participated in FTF 2011	Farmers suffered from flooding and lost fingerling in 2011	8	8	free of charge
No suffered serious damage from flooding in 2011		127	arrox. 40-50% of farmer stocked fingerling (according to FiA-C)		

(3) Battambang

As shown in the table, 306 households got a fish fingerling by free charge distribution from the project and released a total of 146,037 tails of fish fingerling in the individual fish pond for the period from 1 August 2012 to 29 September 2012. Average number of released fish was 477 head per household. All fish fingerling were purchased only in project seed farmers hatchery (Mith Pan, Chorm Sowan, Dy Channa, Suon Pan, Choum Thim, Lim Loun, Lem Pakdewah, Phal Veasna) in Battambang province.

Table 6 Fish releasing in Target Farms in Battambang (Year 2012)

Commune	Number of participant	Well-prepared pond	SB(35%)	TL(50%)	CC(15%)	Total	Average number of stocking	Date for stocking
Kdol Tahien	25	10	2,250	2,250	500	5,000	500	27-Aug. 2012
		15	3,285	3,285	730	7,300	487	25-Sep. 2012
Kouk Khmum	27	11	2,475	2,475	550	5,500	500	29-Aug. 2012
		16	2,948	2,948	656	6,552	410	24-Sep. 2012
Chhey	25	5	1,125	1,125	250	2,500	500	29-Aug. 2012
Ou ta ki		20	4,500	4,500	1,000	10,000	500	20-Sep. 2012
Vath Kor	30	2	450	450	100	1,000	500	19-Aug. 2012
Voat Ta Moem		28	6,053	6,053	1,346	13,452	480	24-Sep. 2012
Som lot	20	20	3,586	3,585	797	7,968	398	27-Sep. 2012
Kompong Preang	20	4	900	900	200	2,000	500	17-Aug. 2012
		16	3,285	3,285	730	7,300	456	25-Sep. 2012
Rang Kesyey	25	12	2,700	2,700	600	6,000	500	1-Aug. 2012
		13	2,925	2,925	650	6,500	500	20-Sep. 2012
Kea	25	25	5,625	5,625	1,250	12,500	500	27-Sep. 2012
Prey Svay	27	5	1,125	1,125	250	2,500	500	3-Aug. 2012
		22	4,950	4,950	1,100	11,000	500	24-Sep. 2012
Lvea	29	11	2,475	2,475	550	5,500	500	28-Aug. 2012
		18	4,050	4,050	900	9,000	500	28-Sep. 2012
		253	253	54,707	54,706	12,159	121,572	481
			45%	45%	10%			

Participants in 2011 *Suffered from flooding in 2011

Commune	Number of participant	Flooded pond	SB(35%)	TL(50%)	CC(15%)	Total	Average number of stocking	Date for stocking
Khmach Romeas	23	6	1,183	1,184	263	2,630	438	27-Sep. 2012
Bansay Traeng	26	5	891	891	198	1,980	396	29-Sep. 2012
Anlong Run	28	2	382	383	85	850	425	24-Sep. 2012
Ou Mal	25	3	675	675	150	1,500	500	19-Sep. 2012
Snoeng	18	2	450	450	100	1,000	500	19-Sep. 2012
Sdau	25	3	675	675	150	1,500	500	19-Sep. 2012
Hob	24	13	2,638	2,639	587	5,864	451	2-Sep. 2012
Robas Mongkol	26	6	1,287	1,287	286	2,860	477	22-Sep. 2012
Preaek Chik	28	8	1,782	1,782	396	3,960	495	25-Sep. 2012
Prey Khpos	27	5	1,044	1,044	232	2,320	464	27-Sep. 2012
		250	53	11,007	11,010	2,447	24,464	462
			45%	45%	10%			
Total		306	65,714	65,716	14,606	146,036	477	

Other training participants in 2012

Commune	Number of participant	
Ampil Pram Daeum	45	Among 45 farmers who were supported of pond digging, 44 farmers stocked fingerling in 2012
Muk Rear *	94	Farmer participated volunteers * Not included into target number in 2012

Composition of fish species was Silver barb 45%、Tilapia 45%、Common carp 10%. As a result, 99.7% of FTF participants (297HH out of 298HH) has started fish culture by releasing fingerling in 2012.

Table 5 Number of farms who stocked fish fingerling in Battambang (Year 2012)

Province	Category of participant		Number of participant in training	Number of farmer who stocked fingerling	Provision
Battambang	Particioated in FTF 2012	Farmer who heve not gotten support for pond digging in 2011	253	253	free of charge
		Farmer who got support of pond digging in 2011	45	44	paid by farmer
		Sub-total	298	297	99.7%
		Farmer participated volunteers	94	ND	paid by farmer
	Particioated in FTF 2011	Farmers suffered from flooding and lost fingerling in 2011	53	53	free of charge
		No suffered serious danege from flooding in 2011	197	arrox. 40-50% of farmer stocked fingerling (according to FiA-C)	paid by farmer

List of Farmers in Battambang

Participants of
Farmer-to-Farmer training in 2013

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by **Kong Sokha**

Place

Chieng Meanchey Commune Kam Reang district

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Prel Savot	ព្រីល សាវុត	Tngour	Chieng Meanchey	Banon	M	IV	1	15x10x3
2	Meas Ream	មេស រមៀ	Tngour	Chieng Meanchey	Banon	M	IV	1	25x10x3
3	Nheb Sokheng	ញឹម សុខហង	Tngour	Chieng Meanchey	Banon	M	IV	1	25x10x2.5
4	Chhoun Chheat	ឆន ឈឿត	Tngour	Chieng Meanchey	Banon	M	IV	1	15x12x3
5	Kem Phoeut	កែម សុយឿន	Kom Pongkol	Chieng Meanchey	Banon	M	IV	1	13x11x3
6	So Saphoeun	សូ សភឿន	Kom Pongkol	Chieng Meanchey	Banon	M	IV	1	25x10x3
7	Phoeun Rotana	ភឿន រតន	Kom Pongkol	Chieng Meanchey	Banon	M	IV	1	25x25x2.5
8	Houn Choeub	ហួន ជឿម	Boskhnour	Chieng Meanchey	Banon	M	IV	1	15x10x2
9	Khoy Chhoy	ខយ ឆាយ	Boskhnour	Chieng Meanchey	Banon	M	IV	2	15x10x2
10	Yen Yean	យ៉ែន យ៉ែន	Boskhnour	Chieng Meanchey	Banon	M	IV	1	10x10x2.5
11	Sem louk	សឹម លុក	Chong Osvay	Chieng Meanchey	Banon	M	IV	1	16x10x2.5
12	Heat Toeub	ហឿត តឿម	Dong	Chieng Meanchey	Banon	M	IV	1	15x10x3
13	Chhat Nok	ឆត ណុក	Dong	Chieng Meanchey	Banon	M	IV	1	15x13x3
14	Houn Heang	ហួន ហឿង	Dong	Chieng Meanchey	Banon	M	IV	1	15x13x3
15	Chhoum Te	ឈួម ទី	Dong	Chieng Meanchey	Banon	M	IV	1	10x8x3
16	Pan pang	ប៉ាន ហង	Dong	Chieng Meanchey	Banon	M	IV	1	15x10x3
17	Nop Sophal	ណុប សុផល	Dong	Chieng Meanchey	Banon	M	IV	1	20x15x3
18	Kon Bourk	គុន បុក	Dong	Chieng Meanchey	Banon	M	IV	1	25x20x3
19	Born Bon	ប៊ុន ប៊ុន	Dong	Chieng Meanchey	Banon	M	IV	1	11x9x3
20	Chhing Chhat	ឈឿង ឆត	Dong	Chieng Meanchey	Banon	M	IV	1	10x8x3
21	Roeun Dinh	រឿន ឌីញ	Dong	Chieng Meanchey	Banon	M	IV	1	12x8x3
22	Thon Thea	ធន ថា	Roung	Chieng Meanchey	Banon	F	IV	1	5x5x2
23	Moeun Sopheap	មឿន សុភេត	Roung	Chieng Meanchey	Banon	M	IV	1	11x18x2
24	Lon Rotha	លន រត្តា	Roung	Chieng Meanchey	Banon	M	IV	1	5x5x2
25	Chhon Tho	ឆន ថូ	Roung	Chieng Meanchey	Banon	F	IV	1	5x5x2
26	Em kea	ឈម កែត	Roung	Chieng Meanchey	Banon	M	IV	1	7x7x2.5
27	Chhom pholy	ជ ផល្លិម	Roung	Chieng Meanchey	Banon	M	IV	1	5x5x2
28	Phon Vana	ផន វណា	Roung	Chieng Meanchey	Banon	M	IV	1	6x6x2.5
29	Bon Pok	ប៊ុន បុក	Roung	Chieng Meanchey	Banon	M	IV	1	6x6x2.5
30	Doy Ritty	ខុយ រិតទី	Roung	Chieng Meanchey	Banon	M	IV	1	5x5x2.5
31	Thou Thoeun	ថូ ធាឿន	Roung	Chieng Meanchey	Banon	F	IV	1	6x6x2.5
32	Chheng Pao	ឆឿង ពៅ	Roung	Chieng Meanchey	Banon	F	IV	1	6x6x2.5
33	Ouch Yen	អ៊ុច យ៉ែន	Roung	Chieng Meanchey	Banon	M	IV	1	13x10x3
34	Lem Chea	លឹម ថា	Roung	Chieng Meanchey	Banon	M	IV	2	10x10x2
35	Seang Sombath	សឿង សម្បត្តិ	Chieng	Chieng Meanchey	Banon	M	IV	1	12x10x2.5
36	Chheng Chhoun	ឆឿង ឈួន	Chieng	Chieng Meanchey	Banon	M	IV	1	15x10x2.5
37	Koy Saroeun	កុយ សរមឿន	Chieng	Chieng Meanchey	Banon	M	IV	1	8x8x2
38	Sanh Sophea	សញ សុភា	Chieng	Chieng Meanchey	Banon	M	IV	1	10x10x3
39	Thong Bontham	ថង ប៊ុនថំ	Chieng	Chieng Meanchey	Banon	M	IV	1	10x10x2.5
40	Roeun Sokren	រឿន សុខរ៉ាន	Chieng	Chieng Meanchey	Banon	M	IV	1	9x9x2
Total									

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Beginner (He has no experience of aquaculture.)

D=1.C=1.V=7. Famer =40

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Sokha, Sour,Phak

Place

Prey Tralach

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Chhoung Vann	ជួន វ៉ា	Chong Por	Prey Tralach	Rokhakiry	M	IV	1	216
2	Ngeth Rourn	ងតៃ រន	Chong Por	Prey Tralach	Rokhakiry	M	IV	1	500
3	Ngeth Roung	ងតៃ រង	Chong Por	Prey Tralach	Rokhakiry	M	IV	1	200
4	Sor kosol	ស កុសល	Prey Tralach	Prey Tralach	Rokhakiry	M	IV	1	460
5	Kao Phoeun	ក្បែរ ភ្នំ	Prey Tralach	Prey Tralach	Rokhakiry	M	IV	1	140
6	Khon Theng	ខុន ថង	Prey Tralach	Prey Tralach	Rokhakiry	M	IV	1	720
7	Ngang Phol	ញាង ផល	Prey Tralach	Prey Tralach	Rokhakiry	M	IV	1	150
8	Hourn Yim	ហន យឹម	Prey Tralach	Prey Tralach	Rokhakiry	F	IV	2	216
9	Chhoub Sot	ជួប សុត	Prey Tralach	Prey Tralach	Rokhakiry	M	IV	1	400
10	Sang Sophea	សំ ង សុផា	Pein (បឹង)	Prey Tralach	Rokhakiry	M	IV	1	150
11	Pich Sophol	ប៊ិច សុផល	Pein (បឹង)	Prey Tralach	Rokhakiry	M	IV	1	375
12	Soeum Heak	ស៊ឹម ហៀក	Prey Klot	Prey Tralach	Rokhakiry	M	IV	1	1400
13	Pa Bien	ហ៊ា ប៊ិន	Preh Ondong	Sdock Praveck	Rokhakiry	M	IV	1	400
14	Mong Bin	មុង ប៊ិន	Preh Ondong	Sdock Praveck	Rokhakiry	M	IV	1	400
15	Vourn Chomrien	វន ចំរើន	Preh Ondong	Sdock Praveck	Rokhakiry	M	IV	1	150
16	Pen Van	ប៉េន វ៉ាន	Preh Ondong	Sdock Praveck	Rokhakiry	M	IV	1	170
17	Tork Savon	តក សុវន	Tol Koky	Sdock Praveck	Rokhakiry	M	IV	1	120
18	Houth Thai	ហ្វួច ថៃ	Tol Koky	Sdock Praveck	Rokhakiry	M	IV	1	145
19	Nann Noeun	ណាន នឿន	Tol Koky	Sdock Praveck	Rokhakiry	M	IV	1	420
20	Choun Naek	ជួន នាក់	Tol Koky	Resey Krang	Mong Resey	M	IV	1	120

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

D=1 .C=3 .V=6.F=20

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Kong Sokha.Phak

Place

Sadock Praveck

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Yem Ol	យ៉ម អុល	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	30x30x3
2	Chhourn Tek	ជួន តឹក	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	12x15x3
3	Soy Sakon	ស៊យ សកុណ	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	12x20x2
4	Ggorn Tek	ឯន តឹក	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x12x3
5	Nouv Ra	នូវ រា	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	12x12x2
6	Naek Thorl	នាក់ ចល	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x15x2
7	Kao Yann	កៅ យ៉ាវ	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	20x12x3
8	Thorn Mao	ចន ម៉ៅ	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x15x2.5
9	Pheng Heang	ផង ហឿង	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	112x13x2
10	Nob Vet	ណប់ វិក	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x10x2
11	Soth Peth	សុត ពើក	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	12x12x2
12	Puy Tha	ព្យាយ ថា	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	12x10x2.5
13	Chon Samen	ជួន សមិន	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x12x1.5
14	Kea Chhoeum	កៅ ជឿម	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x10x3
15	Em Sarath	ឯម សរាត	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	15x12x2.5
16	Them Sokna	ធីម សុខណា	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	15x12x2.5
17	Ky Rooun	គី រឿន	Koh Thom	Sdock Praveck	Rokhakiry	F	IV	1	12x10x2.5
18	Eng Voth	អង វុត	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	13x11x2
19	Khouy Mab	យ្យាយ ម៉ាប់	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x10x2.5
20	Seang oeam	សៀង អឿម	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x10x2.5
21	Ly neang	លី នង	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x12x1.5
22	Soeun Voeun	សៀន វឿន	Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x10x1.5
23	Ben Sun		Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x13x2.5
24	Khouy Phan		Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x12x2.5
25	So Ny		Koh Thom	Sdock Praveck	Rokhakiry	M	IV	1	10x15x2.5

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

D=1 .C=1 .V=1.F=22

Participants of Farmer training in 2013, FAIEX 2

Province
Date
Place

Battambang
2013
Resey Krang .

Selected by Sokha,Phak

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Poy Savorn	ព្យាយ ស វន	Chhey Ron	Reseykrang	Mong Resey	M	II	1	15x15x3
2	Soun Soy	ស្រួន សយ	Chhey Ron	Reseykrang	Mong Resey	F	II	1	10x12x3
3	Sem Thoun	សីម ថន	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	15x25x3
4	Kean Kim	គ ន គីម	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	10x12x2
5	Bronh Khom	ប្រុញ ខុម	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	17x10x2.5
6	Bon Ravoth	ប៊ុន រាវុធ	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	25x15x3
7	Sok ly	សុខ លី	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	12x10x3
8	Thoeun Noeun	ធ្លើន នឿន	Chhey Ron	Reseykrang	Mong Resey	M	IV	2	18x12x3
9	Koy Piseth	កយ ពិសិដ	Chhey Ron	Reseykrang	Mong Resey	M	IV	1	20x15x3
10	Meas Reth	ម ស រេត	Tol Roka	Reseykrang	Mong Resey	M	II	1	13x12x3
11	Reth Hai	រេត ហៃ	Tol Roka	Reseykrang	Mong Resey	M	IV	2	12x10x3
12	Sem Boeun	សីម បឿន	Tol Roka	Reseykrang	Mong Resey	M	IV	1	12x10x2.5
13	Len Koun	ល ន គន	Tol Roka	Reseykrang	Mong Resey	M	IV	2	11x10x1.5
14	Phie Phoeung	ផ្លី ភឿង	Tol Roka	Reseykrang	Mong Resey	M	II	1	20x12x3
15	Loeung Sron	លឿង គន	Tol Roka	Reseykrang	Mong Resey	M	III	2	25x15x3
16	Sourng Thoeun	សឹង ធ្លើន	Tol Roka	Reseykrang	Mong Resey	M	IV	1	15x10x2.5
17	Tem Him	តឹម ហឹម	Tol Roka	Reseykrang	Mong Resey	M	IV	1	20x20x2.5
18	Soeun Sann	សឿន ស ន	Tol Roka	Reseykrang	Mong Resey	M	IV	2	15x12x3
19	Khon Vath	យុន វាត	Tol Roka	Reseykrang	Mong Resey	M	IV	2	15x10x3
20	Chhroun Vy	ជួន វី	Tol Roka	Reseykrang	Mong Resey	M	IV	1	12x10=3
21	Van Vanak	វាន វណា	Tol Roka	Reseykrang	Mong Resey	M	II	2	12x8x2
22	Yoeung Yong	យឿង យុង	Tol Roka	Reseykrang	Mong Resey	M	IV	2	15x12x3
23	Neth Ket	ន ត កឹត	Tol Roka	Reseykrang	Mong Resey	M	IV	2	25x10x3
24	On Eng	អុន អង	Tol Roka	Reseykrang	Mong Resey	M	IV	1	20x15x3
25	Py Sen	ភី ស័ន	Tol Roka	Reseykrang	Mong Resey	M	IV	1	12x10x2
26	Thoch Soeun	ធ្លួច សឿន	Tol Roka	Reseykrang	Mong Resey	M	IV	1	15x9x2.5
Total									

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

D=1 .C=1 .V=2,F=26

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Kong Sokha

Place

Beng Rang Commune Kam Reang district

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Chao la	ចៅឡា	O krouch	Beng Rang	Kom Reang	M	IV	1	20x30x3
2	Noup pornn	ណូប ប៉ន	Svay Thom	Beng Rang	Kom Reang	M	IV	1	10x6x2
3	Seng Sophak	សង សុភក្ត	Svay Thom	Beng Rang	Kom Reang	M	IV	1	30x20x3
4	Kao Money	កៅ ម៉ឺនី	Beng Rang	Beng Rang	Kom Reang	F	I	2	30x20x3
5	Seng Chann	សង ចាន់	Beng Rang	Beng Rang	Kom Reang	M	IV	1	25x15x3
6	Sang Thim	សង ធីម	Beng Rang	Beng Rang	Kom Reang	M	IV	1	20x15x3
7	Ki Thai	កី ថៃ	Beng Rang	Beng Rang	Kom Reang	M	IV	1	12x12x3
8	Eam Aronsovot	អៀម អ័រណសុវតិក	Breh Pot	Beng Rang	Kom Reang	M	IV	1	10x15x3
9	Chan Ron	ចាន់ រ៉ន	Breh Pot	Beng Rang	Kom Reang	M	IV	1	5x8x1.5
10	Hoeun Mab	ហៀន ម៉ាប់	Breh Pot	Beng Rang	Kom Reang	M	IV	1	15x12x2.5
11	Long Sameth	ឡុង សម័ត	Svay	Beng Rang	Kom Reang	M	IV	1	10x10x2.5
12	Reth Sophy	រ៉េត សុភី	Svay	Beng Rang	Kom Reang	F	IV	1	10x10x2.5
13	Kao voeun	កៅ វ៉ឺន	Dong	Beng Rang	Kom Reang	M	IV	1	20x15x3
14	Kim lon	គីម លន	Dong	Beng Rang	Kom Reang	M	IV	2	20 x 10 x 3
15	Kham Meng	ខាម ម៉ង	Dong	Beng Rang	Kom Reang	M	IV	1	20 x 10 x 3.5
16	Vath Vorn	វ៉ាត វ៉ន	Kom Ponglai	Or Da	Kom Reang	M	II	2	10x8x2.5
17	Va Kimeng	វ៉ា គីមង	Kom Ponglai	Or Da	Kom Reang	M	IV	1	10x12x2.5
18	Hour Meng	ហ្វួរ ម៉ង	Kom Ponglai	Or Da	Kom Reang	M	IV	2	10x10x2.5
19	Ngoeung Sem	ញ៉ូង ស័ម	Kom Ponglai	Or Da	Kom Reang	M	IV	2	8x20x2.5
20	Mao Sinarien	ម៉ៅ សីណារីន	Kom Ponglai	Or Da	Kom Reang	M	IV	1	10x10x3

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

D=1. C=2. V =7 . Farmer 20

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Kha,Thai,Sour

Place

Ta Sanh Commune

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Tem Saran	ទឹម សរាន	Prey Romchek	Tasanh	Som Lot	M	IV	1	15x10x3
2	Seav Dyna	សៀងឈា	Prey Romchek	Tasanh	Som Lot	M	IV	1	15x5x3
3	Lorng Bann	ឡង បន	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x20x2
4	Tet Loun	ទឹក លន	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x10x2.5
5	Brak Onn	ប្រាក អុន	Prey Romchek	Tasanh	Som Lot	M	II	2	10x15x2.5
6	Sey Thy	សី ធី	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x5x2
7	Thlok Mong	ត្រក មង	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x15x2.5
8	Khoth Sophol	យុក សុផល	Prey Romchek	Tasanh	Som Lot	M	IV	1	15x15x2.5
9	Kong Sei	កង សី	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x10x2
10	Cheng Thoeun	ចង ធាវ៉ែន	Prey Romchek	Tasanh	Som Lot	M	II	1	10x17x2.5
11	Kin Noeun	កិន នឿន	Prey Romchek	Tasanh	Som Lot	M	IV	1	10x15x3
12	Kem Soksaven	កែម សុខសារិន	Prey Romchek	Tasanh	Som Lot	M	IV	2	10x11x3
13	Korn Nges	កន ង៖	Don Trek	Tasanh	Som Lot	F	IV	1	14x10x3
15	Mesa ley	មេ សឡី	Tasanh Cheng	Tasanh	Som Lot	M	I	2	12x8x2
16	Roeun Mao	រឿង ម៉ៅ	Tasanh Cheng	Tasanh	Som Lot	M	I	1	20x15x2
17	Kong Thy	កង ធី	Tasanh Cheng	Tasanh	Som Lot	M	II	1	12x10x2
18	Som Lorn	សំ ឡាន	Or Sngout	Tasanh	Som Lot	M	IV	1	17x17x3
19	Meth Samoeun	មេត សមឿន	Don Trek	Tasanh	Som Lot	M	IV	1	20x10x3
20	Nai Sophea	ណី សុភ	Don Trek	Tasanh	Som Lot	M	IV	1	15x10x3
21	Prom San	ប្រុំ សន	Don Trek	Tasanh	Som Lot	M	IV	1	18x15x3
22	Soum Bonthoeun	សុម ប៊ុនធាវ៉ែន	Don Trek	Tasanh	Som Lot	M	IV	1	25x12x4
23	Vong Lom	វង ឡុម	Don Trek	Tasanh	Som Lot	M	IV	1	20x10x4
24	Chon Koeun	ជន កឿន	Prey Romchek	Tasanh	Som Lot	M	IV	1	13x10x3

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Beginner (He has no experience of aquaculture.)

1D+1C+4 V = Famer=24

Participants of Farmer training in 2013, FAIEX 2

Province
Date
Place

Battambang
2013
Kamreang Commune

Selected by Kha,Thai, Sour

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Kong Kay	កង កយ	O Chey	Kan Reang	Kan Reang	M	IV	1	10x10x2.5
2	Ouch Sophana	អូច សុផា នណា	O Chey	Kan Reang	Kan Reang	M	IV	1	20x45x3
3	Doun Chhin	ដួន ឈិន	O Chey	Kan Reang	Kan Reang	M	IV	1	15x25x3
4	Chhea Seng	ជ ឃេង	O Chey	Kan Reang	Kan Reang	M	IV	1	20x20x3
5	Soum Kheang	ស៊ុយ ង	O Chey	Kan Reang	Kan Reang	M	IV	1	30x20x3
6	Toeuk Chhey	ត្នោត ជ័យ	O Chey	Kan Reang	Kan Reang	M	IV	1	15x15x3
7	Meas Youm	មេស យ៉ម	O Chey	Kan Reang	Kan Reang	M	IV	1	10x10x2.5
8	Pouy Chheang	ព្រួយ ឈង	O Chey	Kan Reang	Kan Reang	M	IV	1	10x10x2.5
9	Chhoung Khen	ជួង ខេន	O Chey	Kan Reang	Kan Reang	M	IV	1	15x15x3
10	Hiem Hoeun	ហ៊ឹម ហ្វឺន	Lak 62	Kan Reang	Kan Reang	M	IV	1	11x11x3
11	Kem Tang	កែម តង	Lak 62	Kan Reang	Kan Reang	M	IV	1	8x5x2
12	Top Rey	តុប រឿយ	Lak 62	Kan Reang	Kan Reang	M	IV	1	12x10x2.5
13	Sokh Sann	សុខ សន	Lak 62	Kan Reang	Kan Reang	M	IV	1	11x9x3
14	Chhab Chhan	ចាប ចាន	Lak 62	Kan Reang	Kan Reang	M	IV	1	5x9x2
15	Lem Sokhom	ឈឹម សុខខុម	Lak 62	Kan Reang	Kan Reang	M	IV	1	12x9x3
16	Dour Chhom	ខ្ពង់	Srolov Torng	Kan Reang	Kan Reang	M	IV	2	37x37x3
17	Houm Chhay	ហុម ឆាយ	Srolov Torng	Kan Reang	Kan Reang	M	IV	1	12x10x2.5
18	Pech Sok	ពេជ្រ សុខ	Srolov Torng	Kan Reang	Kan Reang	M	IV	1	10x10x2.5
19	Khot Phann	យុត ផាន	Srolov Torng	Kan Reang	Kan Reang	M	IV	2	10x10x3
20	Svay yat	ស្វាយ យ៉ាត	Srolov Torng	Kan Reang	Kan Reang	M	IV	2	10x7x2.5

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

1D+1C+3V = Famer=20

Province

Battambang

Date

2013

Selected by Leng Sovannara

Place

Baydomram Commune Banan district

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimension
1	Yok Sonang	យក សំណាង	Baydomram	Baydomram	Banan	F	IV	1	20.15.3
2	Ngong Chanly	ងង ឆន្ទៈ	Baydomram	Baydomram	Banan	M	IV	1	20.15.3
3	Mok Samoth	មុខ សម្រក	Baydomram	Baydomram	Banan	M	IV	1	30.15.3
4	Oeum Dy	អឺម ឌី	Baydomram	Baydomram	Banan	M	II	1	15.9.3
5	Phon Kha	ផ្លុង ខា	Baydomram	Baydomram	Banan	M	IV	1	15.15.3
6	Eam Yong	ឃ្លែង យ៉ុង	Tolchreang	Baydomram	Banan	M	IV	1	15.14.3
7	Say Thi	សាយ ធី	Tolchreang	Baydomram	Banan	M	IV	1	15.12.3
8	Ra Phean	រ៉ា ផេង	Tolchreang	Baydomram	Banan	M	IV	1	15.12.3
9	Yoeun Ly	យ៉ែន លី	Komponchéng	Baydomram	Banan	M	IV	1	15.10.2,5
10	Mai Thoun	ម៉ៃ ថួន	Komponchéng	Baydomram	Banan	M	IV	1	15.12.3
11	Oer Chhoun	អឺរ ច្បួន	Komponchéng	Baydomram	Banan	M	IV	1	15.8.3
12	Chhoun Chhey	ច្បួន ឆឿ	Komponchéng	Baydomram	Banan	M	IV	1	15.15.3
13	Srei Snom	ស្រី ស្នែង	Tasong	Baydomram	Banan	M	IV	1	13.12.3
14	Ouch Hoeb	អ៊ុច ហឿប	Tasong	Baydomram	Banan	M	IV	1	20.12.2,5
15	Moth Chheang	ម៉ុត ឈឿង	Tasong	Baydomram	Banan	M	IV	1	14.8.3
16	Chhoy Tom	ច្បួន តូម	Tasong	Baydomram	Banan	M	IV	1	30.15.3
17	Seng Ean	សេង ឃ័ន	Tasong	Baydomram	Banan	M	IV	1	30.10.2
18	On Sophon	អ៊ុន សុផុន	Tasong	Baydomram	Banan	M	IV	1	15.9.3
19	Ly Chheat	លី ឆឿត	Tasong	Baydomram	Banan	M	IV	1	25.10.3
20	Rath Pheap	រ៉ាត ភេប	Tasong	Baydomram	Banan	M	IV	1	15.8.3
21	Moy Vany	ម៉ុយ វ៉ាន់	Tasong	Baydomram	Banan	M	IV	1	25.7.2
22	Keit Phola	កេត ផុលា	Stao	Baydomram	Banan	M	IV	1	30.20.2,5
23	Keit Pholy	កេត ផុលី	Stao	Baydomram	Banan	M	IV	1	20.16.2,5
24	Nga Sovoun		Stao	Baydomram	Banan	F	IV	1	10x15x3

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginner (He has no experience of aquaculture.)

1D.1C.5V Farmer = 23

Province
Date
Place

Battambang
2013
Thibadey Commune Kohkrolor district

Selected by Leng Sovannara

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Noum Nath	នំណាត់	Kontourt	Thibadey	Kohkrolor	M	IV	1	12x11x2
2	Rik Mab	រិកម៉ាប់	Kontourt	Thibadey	Kohkrolor	M	IV	1	12x11x2
3	oy Rien	អ៊ុយរឿន	Kontourt	Thibadey	Kohkrolor	M	IV	1	25x8x2,5
4	Oung Enn	អ៊ុងអ៊ុន	Kontourt	Thibadey	Kohkrolor	M	IV	1	20.18.3
5	Khoeun Khout	យ៉ាវ៊ិនយត	Kontourt	Thibadey	Kohkrolor	M	IV	1	15.15.3
6	Neim Chan	ណឹមចាន	Tathok	Thibadey	Kohkrolor	M	III	1	18.15.2
7	Den Noug	ដេនណុង	Tathok	Thibadey	Kohkrolor	M	II	1	20.15.3
8	Phen Men	ភិនមិន	Tathok	Thibadey	Kohkrolor	M	III	1	30.25.3
9	Kao Piron	ក្រៅភ័រិន	Tathok	Thibadey	Kohkrolor	M	IV	1	14.9.3
10	Hen Ny	ហ៊ុននី	Tathok	Thibadey	Kohkrolor	M	IV	1	15.8.2
11	Eng Vandara	អង់វណ្ណារា	Bingsnou	Thibadey	Kohkrolor	M	IV	1	18.10.2
12	Kao Bee	ក្រៅបឺ	Bingsnou	Thibadey	Kohkrolor	M	IV	1	20.15.3
13	Sa Mai	សាម៉ៃ	Bingsnou	Thibadey	Kohkrolor	M	IV	1	50.30.2
14	Tai Noug	តៃនុង	Bingsnou	Thibadey	Kohkrolor	M	IV	1	15.10.2
15	Meth Bonchheang	ម៉េតប៊ុនឈង	Bingsnou	Thibadey	Kohkrolor	M	IV	1	12.10.3
16	sao Rath	សៅរ៉ាត	Bingsnou	Thibadey	Kohkrolor	M	IV	1	20.10.2
17	Kem Chouck	កឹមចុក	Bingsnou	Thibadey	Kohkrolor	M	IV	1	20.15.3
18	Yem Toeub	យឹមតឿប	Bingsnou	Thibadey	Kohkrolor	M	IV	1	20.10.2,5
19	Pheooun Kanja	ភឿនខន់យ៉ា	Konprom	Thibadey	Kohkrolor	M	IV	1	25.15.3
20	Neim Boeun	ណឹមបឿន	Konprom	Thibadey	Kohkrolor	M	IV	1	20.20.3
21	Oum Sol	អឺមសល	Konprom	Thibadey	Kohkrolor	M	IV	1	20.15.3
22	Teb Sarat	តឺបសារ៉ាត	Konprom	Thibadey	Kohkrolor	M	IV	1	15.12.2,5
23	Veng Chiv	វង់ជីវ	Konprom	Thibadey	Kohkrolor	M	IV	1	25.15.3
24	Veng Mao	វង់ម៉ៅ	Konprom	Thibadey	Kohkrolor	M	IV	1	18.15.3
25	Seng Soy	សងសូយ	Tolmatés	Thibadey	Kohkrolor	M	IV	1	20.18.3
26	Yeng Sokh	យ៉េងសុខ	Tolmatés	Thibadey	Kohkrolor	M	IV	1	20.12.3
27	Teng Chhantho	តឺងចង្កូង	Tolmatés	Thibadey	Kohkrolor	M	IV	1	20.10.3
28	Tet Ven	ទឹកវិន	Kokpon	Thibadey	Kohkrolor	M	IV	1	40.30.3
29	Cham Chhoun	ចំជួន	Kokpon	Thibadey	Kohkrolor	M	IV	1	15.15.2,5
30	Chhon Sophoeup	ឈ្មួនសុភព	Chaybalaing	Thibadey	Kohkrolor	M	IV	1	30.20.3
31	Brak Sokhon	ប្រាក់សុក្ខន	Chaybalaing	Thibadey	Kohkrolor	M	IV	1	18.14.2,5
32	Sinara	សីណារ៉ា	Chaybalaing	Thibadey	Kohkrolor	M	IV	1	30.20.3

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

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- IV : Begginer (He has no experience of aquaculture.)

1D+1C+6V Farmer =32

Participants of Farmer training in 2013, FAIEX 2

Province
Date
Place

Battambang
2013
Our Samrel Commune. Sam Lot Decsrice

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Seng Savat	សង សាវត	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	120
2	Nhor Het	ញូរ ហិត	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	800
3	Pen Somoun	ប៉ែន សំបួន	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	180
4	Ek Chea	ឯក ថា	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	150
5	Mao Thary	ម៉ៅ ថារី	OU Rom Chekler	Ou Samrel	Som Lot	F	II	1	200
6	Prak Thol	ប្រាក់ ថុល	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	176
7	Ok vey	អុក វ៉ៃ	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	168
8	Sour Hon	ស៊ូរ ហួន	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	120
9	Proeung chhet	ព្រឿង ចក់	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	120
10	Proeung Brak	ព្រឿង ប្រាក់	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	120
11	Brak Thim	ប្រាក់ ធីម	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	196
12	Sek Vantha	សេក វ៉ាន់ថា	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	144
13	Yon Sothol	យ៉ុន សុផុល	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	144
14	Cheak Theav	ចក់ ថាវ	OU Rom Chekler	Ou Samrel	Som Lot	M	II	1	120
15	Soung Nat	ស៊ុង នាត	OU Rom Chekler	Ou Samrel	Som Lot	M	II	1	144
16	Chhom Sophea	ជ័ង សុភា	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	280
17	Mom Chna	ម៉ុំ ឆន	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	150
18	Proeung Chan	ព្រឿង ចាន	OU Rom Chekler	Ou Samrel	Som Lot	M	iv	1	120
19	Em Chantha	ឯម ចាន់	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	200
20	Ea Pha	អា ថា	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	500
21	Rorun Chandoeun	រៀន ចាន់ឌៀន	Chomlongromangle	Ou Samrel	Som Lot	M	iv	1	300
22	Mein Kong	ម៉ែន កង	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	225
23	Ok Sinao	អុក សិនៅ	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	255
24	On Ny	អុន នី	Ou Somriekrom	Ou Samrel	Som Lot	M	II	1	140
25	Sen Sokhoeun	សិន សុខឿន	Ou Somriekrom	Ou Samrel	Som Lot	F	iv	1	120
26	Chhel Thornn	ឆែល ថន	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	270
27	Seng Sokon	សង គុណប្រំរា	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	168
28	Kheav Phen	ខឿវ ភិន	Ou Somriekrom	Ou Samrel	Som Lot	M	iv	1	375
29	Louk Soheat	លុក សុផតិ	Chomlongromagkrour	Ou Samrel	Som Lot	M	iv	1	120

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D=1 .C=1.V=4. Farmer =29

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Meng Sothai

Place

Tasein Commune Komrieng District

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	Sok Vin	សុខ វិន	Deykroham	Tasein	Komrieng	Male	IV	1	20*18*3.5
2	Ka Vong	កា វង	Deykroham	Tasein	Komrieng	Male	IV	1	15*10*4
3	Seb Song	សេប សុង	Deykroham	Tasein	Komrieng	Male	II	1	40*8*4
4	Mon Ty	ម៉ន ទី	Deykroham	Tasein	Komrieng	Male	IV	1	24*16*3
5	Ngin Kong	ងិន កង	Deykroham	Tasein	Komrieng	Male	IV	1	20*10*4
6	Sen No	សេន នូ	Deykroham	Tasein	Komrieng	Male	II	1	20*8*3
7	Khut Khen	ក្អុត ខេន	Deykroham	Tasein	Komrieng	Male	IV	1	15*10*3
8	Vann Man	វ៉ាន ម៉ាន	Deykroham	Tasein	Komrieng	Male	II	1	18*8*4
9	Puk Thol	បុក ថុល	Deykroham	Tasein	Komrieng	Female	IV	1	10*10*3
10	Teum Horm	ទ្រូម ហម	Deykroham	Tasein	Komrieng	Male	II	1	20*15*4
11	Ma Visal	ម៉ា វិសាល	Deykroham	Tasein	Komrieng	Male	IV	1	20*15*4
12	Kong Keun	កង កឿន	Deykroham	Tasein	Komrieng	Male	IV	1	20*10*4
13	Eang Ma	អៀង ម៉ា	Deykroham	Tasein	Komrieng	Male	II	1	25*15*4
14	Mao En	ម៉ៅ ឿន	Deykroham	Tasein	Komrieng	Male	II	1	20*13*4
15	Nget Phien	ងៃត ផិន	Deykroham	Tasein	Komrieng	Male	II	1	20*10*4
16	Bram Meun	ប្រាំ ម៉ែន	Deykroham	Tasein	Komrieng	Male	II	1	20*15*4
17	Ket Chatsameit	កេត គាតសមេត	Deykroham	Tasein	Komrieng	Male	II	2	17*15*4
18	Mean Pon	ម៉ែន ពន	Deykroham	Tasein	Komrieng	Male	II	1	25*15*3.5
19	Kon Phalla	កុណ ផល្លា	Deykroham	Tasein	Komrieng	Male	IV	1	60*20*3
20	Ke Uy	កេ អ៊ុយ	Deykroham	Tasein	Komrieng	Female	II	1	20*20*4
21	Yan Nat	យ៉ាន ណាត	Deykroham	Tasein	Komrieng	Male	IV	1	15*10*3
22	Cha Nong	ចា ណង	Deykroham	Tasein	Komrieng	Male	IV	1	10*10*3
23	An Sreyneing	អន ស្រីនីង	Deykroham	Tasein	Komrieng	Female	I	1	25*12*3
24	Norng Sothang		Deykroham	Tasein	Komrieng	M	I	1	40x15x3
25	Sen Sokhun		Deykroham	Tasein	Komrieng	Female	II	1	25x10x3
26	Tub SamDeun		Deykroham	Tasein	Komrieng	Female	II	1	20x15x3
27	Ek Som_At	ឯក សុំអត	OurAnlouk	Tasein	Komrieng	Male	IV	1	15*10*3
28	Korng Sam_Eun	កង សុំអឿន	OurAnlouk	Tasein	Komrieng	Male	IV	1	20*12*3
29	Phrom Phal	ផ្រាំ ផល	OurAnlouk	Tasein	Komrieng	Male	IV	1	20*10*3
30	Leuk Neim	ឡឺក នេម	OurAnlouk	Tasein	Komrieng	Female	IV	1	20*12*3
31	Chhorm Sophon	ឈុម សុផុន	OurAnlouk	Tasein	Komrieng	Male	I	1	20*12*3
32	Chea Nat	ចេ ណាត	OurAnlouk	Tasein	Komrieng	Male	IV	1	17*12*3
33	Phrom Veun	ផ្រាំ វឿន	OurAnlouk	Tasein	Komrieng	Male	IV	2	23*20*3
34	Em Sokhorn	អ៊ែម សុខន	OurAnlouk	Tasein	Komrieng	Male	II	1	20*15*5
35	Pe Samnang	ប៉ែ សំណង	OurAnlouk	Tasein	Komrieng	Male	II	1	13*8*3
36	Y Oun	យូ អុន	OurAnlouk	Tasein	Komrieng	Female	I	1	15*12*3
37	Seing Sophal	សេង សុផល	OurAnlouk	Tasein	Komrieng	Male	IV	1	24*18*3

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D=1 . C=1 . V=2, F=33

Province
Date
Place

Battambang
2013
Selected by Leng Sovannara
Kokoh , Preytouch Commun Moungrisey District

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
១	Lon Long	លន ឡុង	Preydomrey	Preytoch	Moungrisey	F	IV	1	20x20x2,5
២	Thoeu bonthai	ថ្លើមប៉ៃនថៃ	Preydomrey	Preytoch	Moungrisey	M	IV	1	40x30x2
៣	Ol Leang	អល ល្បែង	Preydomrey	Preytoch	Moungrisey	M	IV	1	12x11x2
៤	Chhiem vothy	ឆឹម វ៉ូធី	Preydomrey	Preytoch	Moungrisey	M	III	1	30.20.3
៥	Mai Saroum	ម៉ៃ សារ៉ូម	Preydomrey	Preytoch	Moungrisey	M	IV	1	12.12.2
៦	Nem vana	ណែម វណា	Preydomrey	Preytoch	Moungrisey	M	IV	1	45.20.3
៧	Kheang roeut	ក្សេង រ៉ូឡើ	Preannil	Preytoch	Moungrisey	M	IV	1	15.10.2
៨	Mech Mouy	ម៉េច ម៉ូយ	Preannil	Preytoch	Moungrisey	M	IV	1	12.12.2
៩	Mouy Oun	ម៉ូយ អួន	Preannil	Preytoch	Moungrisey	M	IV	1	18.10.2
១០	Soeum Soeuy	ស៊ឹម ស៊ឹយ	Preannil	Preytoch	Moungrisey	M	IV	1	15.10.3
១១	Lo Loeut	ឡូ ល្បើត	Preannil	Preytoch	Moungrisey	M	IV	1	12.10.2
១២	Reth ra	រ៉េត រ៉ា	Preannil	Preytoch	Moungrisey	M	IV	1	15.15.3
១៣	Hiem Phon	ហ៊ឹម ផុន	Preannil	Preytoch	Moungrisey	M	IV	1	13.12.2,5
១៤	Son Kosol	សុន កុសល	Konkhlong	Preytoch	Moungrisey	M	IV	1	20.10.2,5
១៥	Chhoun Chek	ជុន ចឺក	Konkhlong	Preytoch	Moungrisey	M	IV	1	12.12.2
១៦	Ve Sao	វេ សៅ	Konkhlong	Preytoch	Moungrisey	M	III	1	24.22.3
១៧	Sen Chantha	សិន ចាន់ថ	Konkhlong	Preytoch	Moungrisey	M	IV	1	30.10.3
១៨	Mes Sok	ម៉េស សុខ	Konkhlong	Preytoch	Moungrisey	M	IV	1	25.10.3
១៩	Noy Ben	ណយ ប៊ិន	Konkhlong	Preytoch	Moungrisey	M	IV	1	20.20.3
២០	Mao Chamrien	ម៉ៅ ចាមរ៉េន	Konkhlong	Preytoch	Moungrisey	M	IV	1	12.12.2
២១	Prom Moth	ប្រុម ម៉ុត	Konkhlong	Preytoch	Moungrisey	M	IV	1	35.15.3
២២	Sok Keng	សុខ កង	Konkhlong	Preytoch	Moungrisey	M	IV	1	15.13.2
២៣	Houn Rethy	ហ្គុន រ៉េធី	Konkhlong	Preytoch	Moungrisey	M	IV	1	15.12.3
២៤	Chek Toch	ចឺក តូច	Konkhlong	Preytoch	Moungrisey	M	IV	1	20.8.2
២៥	Kiem Reth	កឹម រ៉េត	Konkhlong	Preytoch	Moungrisey	M	IV	1	20.15.3
២៦	Dem Reach	ឌឹម រាជ	Konkhlong	Preytoch	Moungrisey	M	IV	1	12.12.3
២៧	Chhom Mang	ឆឹម ម៉ង	Phaeang	Kokoh	Moungrisey	M	IV	1	30.25.2,5
២៨	Kogn Sokha	កង សុខា	Phaeang	Kokoh	Moungrisey	M	IV	1	12.11.2
២៩	Bon Pheng	ប៉ុន ផេង	Phaeang	Kokoh	Moungrisey	M	IV	1	25.12.3
៣០	Hem bonhem	ហ៊ែម ប៉ុនហ៊ឹម	Phaeang	Kokoh	Moungrisey	M	IV	1	15.15.3
	Hut Heng		Phaeang	Kokoh	Moungrisey	M	II	1	25x17x3

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D=1 , C=2 , V=4 , F=30

Participants of Farmer training in 2013, FAIEX 2

Province

Battambang

Date

2013

Selected by Meng Sothai

Place

Bovel Commune Bovel District

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimension
1	Som Ny	សំនី	PhreyToteung2	Bovel	Bovel	Male	IV	1	20*15*2.5
2	Cheng Ry	ឆេង រ័យ	PhreyToteung2	Bovel	Bovel	Male	IV	1	20* 8 * 2.5
3	Sen Lorn	សែន លន	PhreyToteung2	Bovel	Bovel	Male	II	1	25*15*3
4	Diep Dear	ឌឺប ឌឺរ	PhreyToteung2	Bovel	Bovel	Male	IV	1	30*16*3
5	Ngan Cheya	ញ៉ាន ឆាយ៉ា	PhreyToteung2	Bovel	Bovel	Male	IV	1	15*8*2.5
6	Tha Thai	ថា ថៃ	PhreyToteung2	Bovel	Bovel	Male	IV	1	13*9*2.5
7	Van Vein	វ៉ាន វ៉ែន	PhreyToteung2	Bovel	Bovel	Female	IV	1	10*10*2
8	Tob Nay	តុប ណៃ	PhreyToteung2	Bovel	Bovel	Male	IV	1	30*25*2.5
9	Ton Seung	តុន សឹង	PhreyToteung2	Bovel	Bovel	Female	IV	1	30*15*2.5
10	Tob Neing	តុប នឺង	PhreyToteung2	Bovel	Bovel	Male	IV	1	30*20*2.5
11	Sa Phy	សា ភី	PhreyToteung2	Bovel	Bovel	Male	IV	1	20*10*1.5
12	Seum Phear	ស៊ឹម ភី	PhreyToteung2	Bovel	Bovel	Male	IV	1	17*10*3
13	Kheum Keim	ក្រឹម កឹម	PhreyToteung2	Bovel	Bovel	Male	IV	1	30*5*2
14	Ngugn Thy	ញ៉ូញ ថី	PhreyToteung2	Bovel	Bovel	Male	IV	1	10*10*2.5
15	Cheum Tetsophal	ឃឹម ទឹកតុយផល	PhreyToteung2	Bovel	Bovel	Male	IV	1	15*10*3
16	Wan Veth	វ៉ាន វ៉េត	PhreyToteung2	Bovel	Bovel	Male	IV	1	40*20*3
17	Soy Sam	សយ សម	PhreyToteung2	Bovel	Bovel	Male	IV	1	15*15*3
18	Van Ty	វ៉ាន ទី	PhreyToteung2	Bovel	Bovel	Male	IV	1	20*15*3
19	Soung Sum	សុង សុម	PhreyToteung1	Bovel	Bovel	Female	II	1	40*15*2.5
20	Ros Kong	រ៉ុស កុង	Kob	Bovel	Bovel	Male	IV	1	20*20*3
21	Ro Rang	រ៉ុ រ៉ាង	Kob	Bovel	Bovel	Male	IV	1	20*10*2
22	Bot Svaing	បុត ស្វៃង	Kob	Bovel	Bovel	Male	IV	1	30*20*3
23	Daing Sok	ដាំង សុក	Kob	Bovel	Bovel	Male	II	1	15*10*3
24	Sot Sung	សុត សុង	Kob	Bovel	Bovel	Male	IV	1	30*20*2.5
25	Kong Bunchhat	កុង ប៉ុនឆត	Kob	Bovel	Bovel	Male	IV	1	10*10*2
26	Tet Phear	ទឹកយ៉ា ព	Kob	Bovel	Bovel	Male	IV	1	30*20*2.5
27	Chharn Phon	ឆន កាង	Kob	Bovel	Bovel	Male	IV	1	40*15*2
28	Meas Sopheap	មេស សុភេត	Kob	Bovel	Bovel	Female	IV	1	10*10*2
29	Seu Leuy	ស៊ឹយ ឡឹយ	Kob	Bovel	Bovel	Male	IV	1	20*15*3
30	Bol Laiheng	បុល ឡាយហង	Kob	Bovel	Bovel	Female	IV	1	20*15*2.5

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D=1 , C=1 , V=2 , F=30

Province

Battambang

Date

2013

Selected by Meng Sothai

Place

Khdol-Tahen KhangCheurng Commune Bovel District

No.	Name	Name in Khmer	Location			Male/ Female	Category I-II-III-IV	Pond	
			Village	Commune	District			Num.	Dimention
1	To Dos	ត្បូងឃ្មុំ	Kompongphnov	Bovel	Bovel	Male	IV	1	30*15*3.5
2	Chan Rat	ចាន់រតន	Svay Chrom	Bovel	Bovel	Male	IV	1	20*10*2.5
3	Ngame Sa_Em	ញ៉ាំងសាអ៊ែម	Svay Chrom	Bovel	Bovel	Male	II	1	30*25*1.8
4	Leum Sam_Ngat	ល្វែមសំរងត	Svay Chrom	Bovel	Bovel	Male	II	1	40*25*1.8
5	Sen Sait	សែនសៃត	Svay Chrom	Bovel	Bovel	Female	IV	1	10*10*1.8
6	Mean Savon	ម៉េនសាវ៉ុន	Svay Chrom	Bovel	Bovel	Male	II	1	20*10*1.8
7	So Ly	ស៊ូលី	Kompongphnov	Bovel	Bovel	Male	IV	2	33*15*3.5
8	Chom Chheng	ចមចង	Kompongphnov	Bovel	Bovel	Male	IV	1	15*10*3
9	Kan Keing	កន់កឿង	Kompongphnov	Bovel	Bovel	Male	IV	1	10*10*3
10	Vat Mom	វតម៉ម	Sankei Vier	Bovel	Bovel	Male	II	1	15*12*3
11	Chheun Sheun	ជឿនសឿន	Sankei Vier	Bovel	Bovel	Male	II	3	10*10*3
12	Kong Lon	កងលន	Domnakdongko	Khdoltahen	Bovel	Male	I	1	12*10*2.5
13	Los Lom	លុនល្អ	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	12*15*4
14	Meas Yeng	ម៉េសយ៉េង	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	30*18*3
15	Brang Hieng	ប្រាំងហឿង	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	12*10*3
16	So Som_At	ស៊ូសំអត	Domnakdongko	Khdoltahen	Bovel	Male	II	1	40*30*3.5
17	Chheum Vanny	ជ្រូមវណ្ណា	Domnakdongko	Khdoltahen	Bovel	Male	II	1	30*15*3
18	Pan Tha	ប៉ាន់ថា	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	15*10*3
19	Bok Pheap	បុកភេព	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	40*20*3
20	Kong Bunnarith	កងបុនរិទ្ធិ	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	20*8*3
21	Sok Sophon	សុខសុផុន	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	15*13*3
22	Chea Vith	ជឿត	Domnakdongko	Khdoltahen	Bovel	Male	I	1	12*10*3
23	Rin Reum	រិនរឿម	Domnakdongko	Khdoltahen	Bovel	Male	I	1	18*6*2
24	Hour Reurn	ហ្វួររឿម	Domnakdongko	Khdoltahen	Bovel	Male	IV	1	15*8*3
25	Mork Saorith	ម៉កសារិទ្ធិ	Khdol Leu	Khdoltahen	Bovel	Male	IV	1	27*10*2.5
26	Sa Ry	សារី	Khdol Leu	Khdoltahen	Bovel	Male	IV	1	20*10*3

CATEGORY OF FARMER BY THEIR AQUACULTURE EXPERIENCE

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but heis restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

D=1 , C=2 , V=5 , F=26

List of Farmers in Pursat

Participants of
Farmer-to-Farmer training in 2013

Receipt of farmer Participated training course on Fish Culture Technique

May 06-07, 2013

In Dongrung village Koschom commune Kandeang district Pursat province

* **Strikeout farmer was abcent although farmer had been selected in originally.**

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Tho Ron	M	Damrei Sar	Koschom	Kandeang		10x10x1,5	IV
2	19 Chek Heav	F	Damrei Sar	Koschom	Kandeang		14x18x3	IV
3	20 Ith Channa	F	Damrei Sar	Koschom	Kandeang		15x15x2,5	IV
4	2 Khim Un	M	Spean	Koschom	Kandeang		10x10x2	IV
5	3 Em Vai	M	Spean	Koschom	Kandeang		12x12x2	IV
6	4 Chea Lorn	M	Donglorng	Koschom	Kandeang		10x10x2	IV
7	11 Bouy Mengly	M	Donglorng	Koschom	Kandeang		15x15x2,5	IV
8	7 Van Chorn	M	Donglorng	Koschom	Kandeang		10x20x2,5	IV
9	5 Nib Meth	F	Dongrung	Koschom	Kandeang		10x25x2	IV
10	6 Bil Chheak	M	Dongrung	Koschom	Kandeang		15x15x2	IV
11	8 Than Chida	M	Dongrung	Koschom	Kandeang		10x15x2	IV
12	9 Hem Khean	M	Anlunghab	Koschom	Kandeang		12x13x2,5	IV
13	10 Keo Meth	M	Sdukchom	Koschom	Kandeang		10x12x2,5	IV
14	12 Chuk Neth	M	Sdukchom	Koschom	Kandeang		10x15x2	IV
15	13 Siv Sok	M	Sdukchom	Koschom	Kandeang		10x10x2	IV
16	14 Leng Sothchinda	M	Sdukchom	Koschom	Kandeang		12x20x2,5	IV
17	15 Chea Savun	F	Sdukchom	Koschom	Kandeang		12x15x2	IV
18	16 Bouy Bunny	M	Sdukchom	Koschom	Kandeang		12x15x2	IV
19	17 Seth Kim	M	Sdukchom	Koschom	Kandeang		10x15x2	IV
20	18 Phoun Manit	M	Sdukchom	Koschom	Kandeang		10x10x2	IV

Category of farmer by their aquaculture experience

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Receipt of farmer Participated training course on Fish Culture Technique

May 06-07, 2013

n Boeung Khna village Boeung Khna commune Bakan district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Duk SamOl	F	Prey Damrei	Boeung Khna	Bakan		8x10x2	IV
2	14 Ven Hoeun	M	Prey Damrei	Boeung Khna	Bakan		10x15x2,5	IV
3	23 Duk Rasy	M	Prey Damrei	Boeung Khna	Bakan		10x15x3	IV
4	24 Pich Sophal	M	Prey Damrei	Boeung Khna	Bakan		10x10x2,5	IV
5	25 Ven Kom	M	Prey Damrei	Boeung Khna	Bakan		10x10x2	IV
6	26 Duk Sopha	F	Prey Damrei	Boeung Khna	Bakan		10x10x2,5	IV
7	15 Yoeung Doeum	M	Prey Damrei	Boeung Khna	Bakan		10x10x2	IV
8	2 Em Thy	M	Prey Phdav	Boeung Khna	Bakan		10x20x2,5	IV
9	4 Sem Thy	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
10	5 Khun Khoun	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
11	6 Van Phen	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
12	16 Ros Mean	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
13	17 Khun Ny	M	Prey Phdav	Boeung Khna	Bakan		15x20x2	IV
14	18 Morm Mean	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
15	19 Ouk Chhin	M	Prey Phdav	Boeung Khna	Bakan		10x15x2,5	IV
16	20 Morm Phoeung	F	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
17	21 Prak Khim	M	Prey Phdav	Boeung Khna	Bakan		10x28x2	IV
18	22 Sam Savoeyun	M	Prey Phdav	Boeung Khna	Bakan		10x15x2,5	IV
19	27 Chhouy Chhorm	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
20	28 Nai Soy	M	Prey Phdav	Boeung Khna	Bakan		10x10x2	IV
21	3 Pin Sily	M	Boeung Khna	Boeung Khna	Bakan		12x20x3	IV
22	8 Chin Sokhun	M	Boeung Khna	Boeung Khna	Bakan		25x20x2,5	IV
23	9 You Bunrin	F	Boeung Khna	Boeung Khna	Bakan		8x15x2,5	IV
24	10 Yen Set	M	Boeung Khna	Boeung Khna	Bakan		12x30x2,5	IV
25	11 Khut Seakly	M	Boeung Khna	Boeung Khna	Bakan		10x20x2,5	IV
26	12 Bun Srun	M	Boeung Khna	Boeung Khna	Bakan		15x15x2,5	IV
27	7 Loeuy De	M	Krasang Krou	Boeung Khna	Bakan		10x10x2	IV
28	13 Eum Vuthy	M	Krasang Krou	Boeung Khna	Bakan		10x20x2,5	IV

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D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique
 May 09-10, 2013
 In Kamreng village Svay Sar commune Krakor district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Rom Eut	M	Kamreng	Svay Sar	Krakor		10x13x3	IV
2	8 Hout Nareth	F	Kamreng	Svay Sar	Krakor		10x20x3	IV
3	9 Kuy Ry	F	Kamreng	Svay Sar	Krakor		10x12x3	IV
4	10 Yoy Yoeun	F	Kamreng	Svay Sar	Krakor		8x19x3	IV
5	12 Chan Soth	M	Kamreng	Svay Sar	Krakor		10x10x3	IV
6	15 Vath Soveat	M	Kamreng	Svay Sar	Krakor		10x12x3	IV
7	16 Uch SamOl	M	Kamreng	Svay Sar	Krakor		10x15x2,5	IV
8	17 Hong SreiMoch	F	Kamreng	Svay Sar	Krakor		12x14x3	IV
9	18 Roeun SamNang	M	Kamreng	Svay Sar	Krakor		10x13x3	IV
10	19 Khim Kim	M	Kamreng	Svay Sar	Krakor		10x18x3	IV
11	20 Heng Phy	F	Kamreng	Svay Sar	Krakor		10x12x3	IV
12	26 Men Seanghai	M	Kamreng	Svay Sar	Krakor		15x20x3	IV
13	27 Kong Sreichhun	M	Kamreng	Svay Sar	Krakor		10x30x3	IV
14	28 Thai Sokna	F	Kamreng	Svay Sar	Krakor		10x15x3	IV
15	29 Haing Heang	M	Kamreng	Svay Sar	Krakor		10x10x3	IV
16	30 Choeun Chrib	M	Kamreng	Svay Sar	Krakor		15x15x3	IV
17	31 Moun Eng	F	Kamreng	Svay Sar	Krakor		10x13x2,5	IV
18	2 Ny Ross	M	Toul Andet	Svay Sar	Krakor		10x15x2,5	IV
19	3 Chhoeun Chhun	M	Toul Andet	Svay Sar	Krakor		12x15x3	IV
20	4 Chean Rean	M	Toul Andet	Svay Sar	Krakor		10x10x2	IV
21	5 Song Sav	F	Toul Andet	Svay Sar	Krakor		10x10x2	IV
22	6 Saum Prak	M	Toul Andet	Svay Sar	Krakor		10x10x2	IV
23	7 Neang Khorn	M	Toul Andet	Svay Sar	Krakor		10x10x2	IV
24	11 Pov Thy	M	Toul Andet	Svay Sar	Krakor		10x10x2	IV
25	13 Hom Savry	M	Toul Andet	Svay Sar	Krakor		15x15x3	IV
26	14 Pheum Sophal	M	Toul Andet	Svay Sar	Krakor		10x15x2	IV
27	21 Chhung Sokit	F	Toul Andet	Svay Sar	Krakor		10x10x2	IV
28	22 Heng Soth	F	Toul Andet	Svay Sar	Krakor		10x15x2	IV
29	23 Theung Theang	M	Toul Andet	Svay Sar	Krakor		8x22x2	IV
30	24 Mom Kun	M	Toul Andet	Svay Sar	Krakor		8x15x2	IV
31	25 Pen Choeun	M	Toul Andet	Svay Sar	Krakor		10x15x1,8	IV
	Voun Mao	M	Toul Andet	Svay Sar	Krakor		10x10x2	IV

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Receipt of farmer Participated training course on Fish Culture Technique

May 09-10, 2013

In Kapas village Chheutom commune Krakor district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Un Che	F	Kapas	Chheutom	Krakor		13x20x2,5	IV
2	2 Un Cham	F	Kapas	Chheutom	Krakor		10x15x2,5	IV
3	3 Hok Thim	M	Kapas	Chheutom	Krakor		10x15x2	IV
4	4 Ban Sabath	M	Kapas	Chheutom	Krakor		13x25x2,5	IV
5	5 Lim Srun	M	Kapas	Chheutom	Krakor		10x22x2,5	IV
6	6 Kong Yim	M	Kapas	Chheutom	Krakor		12x16x2	IV
7	7 Ouk Sambun	F	Kapas	Chheutom	Krakor		12x12x2	IV
8	8 Sar Rothna	M	Kapas	Chheutom	Krakor		12x24x2,5	IV
9	9 Sar Hoeung	F	Kapas	Chheutom	Krakor		10x15x2,5	IV
10	10 Khnheu Som	F	Dangkeab Kdam	Chheutom	Krakor		12x15x3	IV
11	11 Sos Sas	F	Dangkeab Kdam	Chheutom	Krakor		12x12x3	IV
12	12 Sles Mom	F	Dangkeab Kdam	Chheutom	Krakor		15x15x3	IV
13	13 Ly Havsy	M	Dangkeab Kdam	Chheutom	Krakor		15x30x3	IV
14	14 Los Roki	F	Dangkeab Kdam	Chheutom	Krakor		13x20x3	IV
15	15 Ly Phoung	F	Dangkeab Kdam	Chheutom	Krakor		10x10x3	IV
16	16 Sos Ya	M	Dangkeab Kdam	Chheutom	Krakor		8x20x3	IV
17	17 Meu Chork	F	Dangkeab Kdam	Chheutom	Krakor		10x10x2,5	IV
18	18 Kuth Ry	F	Dangkeab Kdam	Chheutom	Krakor		10x10x2,5	IV
19	19 Meu Som	F	Dangkeab Kdam	Chheutom	Krakor		10x15x3	IV
20	20 Him Sen	M	Dangkeab Kdam	Chheutom	Krakor		15x15x3	IV
21	21 Man Siyas	F	Dangkeab Kdam	Chheutom	Krakor		10x20x3	IV
22	22 Mit Pas	F	Dangkeab Kdam	Chheutom	Krakor		10x15x2,5	IV
23	23 Pou Tam	M	Dangkeab Kdam	Chheutom	Krakor		10x15x2,5	IV
24	24 Kouk Adam	M	Dangkeab Kdam	Chheutom	Krakor		15x20x2,5	IV
25	25 Hin Samkai	M	Dangkeab Kdam	Chheutom	Krakor		15x15x3	IV
26	26 El Housen	M	Dangkeab Kdam	Chheutom	Krakor		15x25x3	IV
27	30 Sem Mas	F	Dangkeab Kdam	Chheutom	Krakor		10x12x2	IV
28	33 Tit Pov	M	Dangkeab Kdam	Chheutom	Krakor		10x15x2	IV
29	27 Hem Yoeun	M	Kandal	Chheutom	Krakor		15x15x2,5	IV
30	28 San Sarun	M	Toul Tbeng	Chheutom	Krakor		20x30x3	IV
31	29 Horn Sokhom	F	Toul Tbeng	Chheutom	Krakor		20x30x3	IV
32	31 Horn Sokhan	F	Toul Tbeng	Chheutom	Krakor		15x20x2,5	IV
33	32 Deab Orn	F	Toul Tbeng	Chheutom	Krakor		12x20x2,5	IV

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Receipt of farmer Participated training course on Fish Culture Technique
 May 16-17, 2013
 In OuTapaung village OuTapaung commune Bakan district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Chan Mary	F	Phsa Andeth	OuTapaung	Bakan		10x15x2	IV
2	2 Kheng Vanny	F	Phsa Andeth	OuTapaung	Bakan		10x10x2	II
3	3 In Tha	M	Phsa Andeth	OuTapaung	Bakan		10x12x2	IV
4	4 Bun Vith	M	Phsa Andeth	OuTapaung	Bakan		10x12x2,5	IV
5	5 Vith Kimheng	M	Phsa Andeth	OuTapaung	Bakan		10x12x2,5	IV
6	6 Seum Chhean	M	Phsa Andeth	OuTapaung	Bakan		10x12x2	I
7	7 Hen Hong	M	Phsa Andeth	OuTapaung	Bakan		10x10x2	II
8	8 Keuy Hong	M	Phsa Andeth	OuTapaung	Bakan		10x10x2	II
9	9 Ouk Soeun	M	Phsa Andeth	OuTapaung	Bakan		10x10x2	IV
10	10 Som Sal	M	Phsa Andeth	OuTapaung	Bakan		10x10x2	IV
11	31 An Sophorn	F	Phsa Andeth	OuTapaung	Bakan		8x12x2,5	IV
12	11 Phat Chroeun	M	Anlung Kray	OuTapaung	Bakan		10x15x2	IV
13	12 Chea Samai	M	Anlung Kray	OuTapaung	Bakan		10x15x2	IV
14	13 Sam Vuthy	M	Anlung Kray	OuTapaung	Bakan		10x15x2	IV
15	29 Ou Reth	M	Anlung Kray	OuTapaung	Bakan		10x10x2	IV
16	30 Som Mao	M	Anlung Kray	OuTapaung	Bakan		10x10x2	IV
17	14 Re Saren	M	OuTapaung	OuTapaung	Bakan		15x15x3	IV
18	15 Phav Voeun	F	OuTapaung	OuTapaung	Bakan		10x10x2	IV
19	16 Heng Vith	M	OuTapaung	OuTapaung	Bakan		10x15x2	IV
20	17 Bin Eum	M	OuTapaung	OuTapaung	Bakan		10x10x2	IV
21	18 Bin Yean	M	OuTapaung	OuTapaung	Bakan		10x40x2,5	IV
22	19 Ean Kry	F	OuTapaung	OuTapaung	Bakan		15x25x3	IV
23	20 Yath Sopha	F	OuTapaung	OuTapaung	Bakan		15x30x2,5	IV
24	21 Chea Choeum	M	OuTapaung	OuTapaung	Bakan		10x10x1,5	IV
25	22 Horn Prim	M	OuTapaung	OuTapaung	Bakan		10x10x2	IV
26	23 Phin Siden	F	OuTapaung	OuTapaung	Bakan		10x10x2	IV
27	24 Len Solim	M	OuTapaung	OuTapaung	Bakan		10x15x2	IV
28	25 Chorn Nan	F	OuTapaung	OuTapaung	Bakan		15x20x2,5	IV
29	26 Chrik Ol	M	OuTapaung	OuTapaung	Bakan		10x15x2,5	IV
30	27 An Roun	M	OuTapaung	OuTapaung	Bakan		9x20x1,5	IV
31	28 Ren Keang	M	OuTapaung	OuTapaung	Bakan		10x13x2	IV

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Receipt of farmer Participated training course on Fish Culture Technique

May 16-17, 2013

In Tane village Talau commune Bakan district Pursat province

	No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
							No.	Dimention	
1	1	Yam Sarim	M	Toul Toteung	Talau	Bakan		10x12x2,5	IV
2	5	Khoeun Khun	M	Toul Toteung	Talau	Bakan		10x12x1,5	IV
3	6	Mil Nam	M	Toul Toteung	Talau	Bakan		10x10x2	IV
4	9	Choub Tho	M	Toul Toteung	Talau	Bakan		10x10x2	IV
5	10	Chreung Korn	M	Toul Toteung	Talau	Bakan		10x10x2	IV
6	2	Uy Sareth	M	Bouchres	Talau	Bakan		10x10x2,5	IV
7	3	Kheav Somphon	M	Bouchres	Talau	Bakan		10x10x2	IV
8	4	Korn Yorn	M	Bouchres	Talau	Bakan		10x10x2	IV
9	14	Tach Toun	M	Bouchres	Talau	Bakan		10x10x2	IV
10	15	So Channa	M	Bouchres	Talau	Bakan		10x15x2,5	IV
11	16	Ong Mun	M	Bouchres	Talau	Bakan		10x10x2	IV
12	17	Chom Phat	M	Bouchres	Talau	Bakan		10x10x2	IV
13	18	Nget Ngun	M	Bouchres	Talau	Bakan		8x15x1,5	IV
14	13	Tou San	M	Bouchres	Talau	Bakan		10x10x2	IV
15	25	Touch Saron	M	Bouchres	Talau	Bakan		20x20x2,5	IV
16	29	Chom Sarath	M	Bouchres	Talau	Bakan		10x15x2,5	IV
17	7	Sem Sok	M	Toul Thmor	Talau	Bakan		10x15x2	IV
18	8	Kong Thol	M	Toul Thmor	Talau	Bakan		10x13x2	IV
19	11	Thol Thoeun	M	Toul Thmor	Talau	Bakan		10x10x2	IV
20	12	Vith Vy	M	Toul Thmor	Talau	Bakan		10x10x2	IV
21	19	Bun Thoeun	F	Toul Thmor	Talau	Bakan		10x12x2	IV
22	20	Eng Peng	M	Toul Thmor	Talau	Bakan		10x10x2	IV
23	21	Prak Yun	M	Toul Thmor	Talau	Bakan		10x10x2	IV
24	22	Men Dy	M	Toul Thmor	Talau	Bakan		10x12x2	IV
25	23	Kea Norng	F	Toul Thmor	Talau	Bakan		10x13x2	IV
26	24	Mao Chom	M	Toul Thmor	Talau	Bakan		10x13x2	IV
27	26	Cheng Sokdeth	M	Toul Thmor	Talau	Bakan		10x10x2	IV
28	27	Sok Run	M	Toul Thmor	Talau	Bakan		10x10x2	IV
29	28	Rorn Rin	M	Toul Thmor	Talau	Bakan		8x12x1,5	IV
30	30	Neum Lorn	M	Toul Thmor	Talau	Bakan		10x12x2	IV
31	31	Cheum Va	M	Toul Thmor	Talau	Bakan		10x15x2	IV

Category of farmer by their aquaculture experience

I : He is running fish culture, He is operating fish culture currently.

II : He used to culturing fish before, but stopped.

III: He used to culturing fish before and stopped, but heis restarting recently.

IV: Begginer (He has no experience of aquaculture.)

D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique

May 20-21, 2013

្រ Khsach Laith village Ansa Chambok commune Krakor district Pursat provinc

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimension	
1	1 Tuy Roeun	M	Khsach Laith	Ansa Chambok	Krakor		15x40x2,5	IV
2	2 Siv Than	M	Khsach Laith	Ansa Chambok	Krakor		10x10x2,5	IV
3	13 Bith Chanry	F	Khsach Laith	Ansa Chambok	Krakor		30x30x2,5	IV
4	14 Chea Bundy	M	Khsach Laith	Ansa Chambok	Krakor		15x15x2	IV
5	15 Moun Sophal	M	Khsach Laith	Ansa Chambok	Krakor		15x15x2	IV
6	16 Sath Sarith	M	Khsach Laith	Ansa Chambok	Krakor		20x30x2,5	IV
7	19 Kong Kunthea	M	Khsach Laith	Ansa Chambok	Krakor		10x10x3	IV
8	20 Phoun Sophak	M	Khsach Laith	Ansa Chambok	Krakor		10x10x3	IV
9	21 Lun Lorn	M	Khsach Laith	Ansa Chambok	Krakor		10x15x3	IV
10	29 Chin Thy	F	Khsach Laith	Ansa Chambok	Krakor		10x10x2	IV
11	3 Chea Saroeun	M	Thkaul Thom	Ansa Chambok	Krakor		10x15x2,5	IV
12	4 Sorn Ra	M	Thkaul Thom	Ansa Chambok	Krakor		10x15x2,5	IV
13	22 Seum SamAth	M	Thkaul Thom	Ansa Chambok	Krakor		12x20x2,5	IV
14	23 Heng Sokhoeun	M	Thkaul Thom	Ansa Chambok	Krakor		10x10x2,5	IV
15	24 Chea Voeun	M	Thkaul Thom	Ansa Chambok	Krakor		15x20x2,5	IV
16	25 Phoung Tes	M	Thkaul Thom	Ansa Chambok	Krakor		11x25x3	IV
17	5 Eun Sophal	M	Sansar	Ansa Chambok	Krakor		40x45x2	IV
18	6 Leap Khen	M	Sansar	Ansa Chambok	Krakor		25x25x2,5	IV
19	7 Meas Mon	M	Sansar	Ansa Chambok	Krakor		10x20x2	IV
20	9 Khlouk Lay	M	Sansar	Ansa Chambok	Krakor		10x15x2,5	IV
21	27 Chan Nom	M	Sansar	Ansa Chambok	Krakor		15x20x2,5	IV
22	28 Chem Vith	M	Sansar	Ansa Chambok	Krakor		10x25x2,5	IV
23	8 Chhom Savry	M	Arongprouch	Ansa Chambok	Krakor		10x20x2,5	IV
24	26 Phoung Nath	M	Arongprouch	Ansa Chambok	Krakor		14x14x3	IV
25	10 Horn Huy	M	Thkaul Touch	Ansa Chambok	Krakor		10x15x2,5	IV
26	11 Seung Sath	M	Thkaul Touch	Ansa Chambok	Krakor		15x15x2,5	IV
27	12 Chi Khorn	M	Thkaul Touch	Ansa Chambok	Krakor		10x15x2,5	IV
28	17 Say Soung	M	Thkaul Touch	Ansa Chambok	Krakor		10x15x2,5	IV
29	18 Chhay Chork	M	Thkaul Touch	Ansa Chambok	Krakor		30x30,2,5	IV

Category of farmer by their aquaculture experience

I : He is running fish culture, He is operating fish culture currently.

II : He used to culturing fish before, but stopped.

III: He used to culturing fish before and stopped, but he is restarting recently.

IV: Begginer (He has no experience of aquaculture.)

D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique
 May 20-21, 2013
 In Porpit village Anlung Thnaut commune Krakor district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Teuk San	M	Banteay Krang	Anlung Thnaut	Krakor		10x10x2,5	IV
2	2 Ream Hach	M	Banteay Krang	Anlung Thnaut	Krakor		10x10x2,5	IV
3	3 Lim Biseak	M	Banteay Krang	Anlung Thnaut	Krakor		12x14x2	IV
4	4 Moul SaOeun	M	Banteay Krang	Anlung Thnaut	Krakor		10x10x2,5	IV
5	22 Hea Roun	M	Banteay Krang	Anlung Thnaut	Krakor		10x10x2,5	IV
6	23 Vath Sithol	M	Banteay Krang	Anlung Thnaut	Krakor		10x12x2	IV
7	5 Kim Tho	M	Khlang Moeung	Anlung Thnaut	Krakor		10x10x2	IV
8	6 Mao Lorn	F	Khlang Moeung	Anlung Thnaut	Krakor		12x15x2,5	IV
9	7 Va Tol	M	Khlang Moeung	Anlung Thnaut	Krakor		10x10x2	IV
10	8 Khlang Siphah	F	Khlang Moeung	Anlung Thnaut	Krakor		12x15x2,5	IV
11	9 Chan Sorn	M	Khlang Moeung	Anlung Thnaut	Krakor		12x15x2,5	IV
12	10 Chhun Choeun	M	Khlang Moeung	Anlung Thnaut	Krakor		10x20x2,5	IV
13	20 So Sokhom	F	Khlang Moeung	Anlung Thnaut	Krakor		20x35x2,5	IV
14	21 Svay Sokhan	M	Khlang Moeung	Anlung Thnaut	Krakor		10x25x2	IV
15	11 Heng Hou	M	Porpit	Anlung Thnaut	Krakor		10x20x3	IV
16	12 Choub Chamreun	M	Porpit	Anlung Thnaut	Krakor		15x22x3	IV
17	13 Dum Rim	F	Porpit	Anlung Thnaut	Krakor		10x13x2,5	IV
18	14 Bun Man	F	Porpit	Anlung Thnaut	Krakor		15x20x2,5	IV
19	15 Dum Koeun	M	Porpit	Anlung Thnaut	Krakor		15x15x2	IV
20	16 Sou Sarorn	M	Porpit	Anlung Thnaut	Krakor		20x30x3	IV
21	17 Leng Sothea	F	Porpit	Anlung Thnaut	Krakor		10x10x2,5	IV
22	18 Long Sokhom	F	Porpit	Anlung Thnaut	Krakor		13x13x2,5	IV
23	19 Keo Chhen	M	Porpit	Anlung Thnaut	Krakor		10x10x2	IV
24	25 Heng Hour	M	Porpit	Anlung Thnaut	Krakor		10x10x2,5	IV
25	24 Mak Lai	M	Kralanh	Anlung Thnaut	Krakor		10x15x2	IV

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
 - II : He used to culturing fish before, but stopped.
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 - IV: Begginer (He has no experience of aquaculture.)
- D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique
 May 30-31, 2013
 In Sna Ansa village Sna Ansa commune Krakor district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV	
						No.	Dimention		
1	1	Chey Phan	M	Ansas Kdam	Sna Ansa	Krakor		10x15x2	IV
2	2	Phou Chanthoeun	F	Ansas Kdam	Sna Ansa	Krakor		10x15x2,5	IV
3	3	You Chanbora	M	Ansas Kdam	Sna Ansa	Krakor		10x10x2	IV
4	4	Hem Seth	M	Ansas Kdam	Sna Ansa	Krakor		10x13x2	IV
5	5	Choun Sarom	M	Ansas Kdam	Sna Ansa	Krakor		13x20x2,5	IV
6	6	Keo Ran	M	Ansas Kdam	Sna Ansa	Krakor		16x16x2,5	IV
7	7	Ma Seun	F	Ansas Kdam	Sna Ansa	Krakor		10x10x2	IV
8	8	Iv Khun	M	Ansas Kdam	Sna Ansa	Krakor		10x15x2,5	IV
9	9	Om Run	F	Ansas Kdam	Sna Ansa	Krakor		12x15x2,5	IV
10	10	Vorn Toeun	M	Ansas Kdam	Sna Ansa	Krakor		10x12x2,5	IV
11	11	Houv Chan	F	Ansas Kdam	Sna Ansa	Krakor		10x12x2	IV
12	12	Boy Kosal	M	Sna Ansa	Sna Ansa	Krakor		12x25x2,5	IV
13	13	Tuy Yen	M	Sna Ansa	Sna Ansa	Krakor		10x13x2,5	IV
14	14	Pich Sihorn	M	Sna Ansa	Sna Ansa	Krakor		10x12x2	IV
15	15	Ouch Chay	M	Sna Ansa	Sna Ansa	Krakor		10x15x2,5	IV
16	16	Chorn Khou	M	Sna Ansa	Sna Ansa	Krakor		10x15x3	IV
17	17	Khaul Seum	F	Sna Ansa	Sna Ansa	Krakor		17x17x3	IV
18	18	Bin Tork	M	Svay Sar	Sna Ansa	Krakor		15x25x2,5	IV
19	19	Moung Sareth	M	Svay Sar	Sna Ansa	Krakor		10x20x2,5	IV
20	20	Ean Kimheng	F	Svay Sar	Sna Ansa	Krakor		10x20x2,5	IV
21	21	Sem Bunsea	M	Svay Sar	Sna Ansa	Krakor		10x10x2,5	IV
22	22	Pich Reth	F	Svay Sar	Sna Ansa	Krakor		10x12x3	IV
23	23	Ros Chanrith	M	Svay Sar	Sna Ansa	Krakor		10x10x2	IV
24	24	Hin Pern	M	Svay Sar	Sna Ansa	Krakor		10x13x2	IV
25	25	Than Theang	M	Svay Sar	Sna Ansa	Krakor		10x15x2,5	IV
26	26	Phan Sophath	M	Svay Sar	Sna Ansa	Krakor		10x15x3	IV
27	27	Sorn Pot	F	Svay Sar	Sna Ansa	Krakor		10x10x2,5	IV
28	28	Kes Saroeun	M	Svay Sar	Sna Ansa	Krakor		10x15x2	IV
29	29	Mil Chhun	M	Svay Sar	Sna Ansa	Krakor		10x15x2	IV
30	30	You Seum	F	Svay Sar	Sna Ansa	Krakor		10x10x2	IV
31	31	Pich Sary	M	Svay Sar	Sna Ansa	Krakor		10x13x2,5	IV

Category of farmer by their aquaculture experience

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- D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique
 May 30-31, 2013
 In OuAchkok village Ousandan commune Krakor district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV
						No.	Dimention	
1	1 Kuy Sarath	M	Kraing Thom	Ousandan	Krakor		10x10x2,5	II
2	2 Sav Sarom	M	Kraing Thom	Ousandan	Krakor		10x10x3	IV
3	3 Sav Sam	M	Kraing Thom	Ousandan	Krakor		8x15x2,5	IV
4	4 Noun Dith	M	Kraing Thom	Ousandan	Krakor		12x12x3	IV
5	8 Roun El	M	Kraing Thom	Ousandan	Krakor		15x20x2,5	IV
6	9 Thuch Chantha	M	Kraing Thom	Ousandan	Krakor		12x18x2,5	IV
7	10 Leng Sovannara	M	Kraing Thom	Ousandan	Krakor		12x12x2	IV
8	13 Morm Kinl	F	Kraing Thom	Ousandan	Krakor		15x15x2	IV
9	14 Pich Sambo	F	Kraing Thom	Ousandan	Krakor		10x13x2	IV
10	15 Noun Han	F	Kraing Thom	Ousandan	Krakor		10x12x2	II
11	16 Ly Chouk	M	Kraing Thom	Ousandan	Krakor		15x20x2	IV
12	20 Sos Tolos	M	Kraing Thom	Ousandan	Krakor		10x10x2	II
13	21 Tam Ya	M	Kraing Thom	Ousandan	Krakor		10x10x2	II
14	11 Sin Longsorn	M	OuAchkok	Ousandan	Krakor		10x15x2	IV
15	12 Bin Lan	F	OuAchkok	Ousandan	Krakor		10x10x2,5	IV
16	5 Thach Thoeun	M	OuAchkok	Ousandan	Krakor		10x15x2,5	IV
17	6 Sin Buntha	M	OuAchkok	Ousandan	Krakor		10x15x1,5	IV
18	7 Kem Savy	F	OuAchkok	Ousandan	Krakor		10x10x2,5	IV
19	17 Nov Channy	F	OuAchkok	Ousandan	Krakor		10x10x2,5	IV
20	18 Ouk Saroeung	F	OuAchkok	Ousandan	Krakor		10x20x2	IV
21	19 Lim Sareum	M	OuAchkok	Ousandan	Krakor		10x15x2,5	IV
22	22 Kim Sokun	M	OuAchkok	Ousandan	Krakor		10x10x2,5	II
23	23 Sok Phal	M	OuAchkok	Ousandan	Krakor		8x20x2	IV

Category of farmer by their aquaculture experience

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II : He used to culturing fish before, but stopped.

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D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique
June 03-04, 2013

Trapaing Kantout village Boeung Kantout commune Krakor district Pursat provi

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV	
						No.	Dimention		
1	1	Chem Loun	M	Takeo Kraum	Boeung Kantout	Krakor		10x10x2	II
2	2	Mai Phearom	F	Takeo Kraum	Boeung Kantout	Krakor		10x15x2,5	IV
3	19	Som Horn	M	Takeo Kraum	Boeung Kantout	Krakor		10x15x2,5	IV
4	21	Soun Sary	F	Takeo Kraum	Boeung Kantout	Krakor		10x12x2	IV
5	22	Ek Mith	F	Takeo Kraum	Boeung Kantout	Krakor		12x20x2,5	IV
6	23	Luch Chantho	M	Takeo Kraum	Boeung Kantout	Krakor		10x10x2	IV
7	3	Som Seng	M	Thmei	Boeung Kantout	Krakor		12x12x2,5	IV
8	4	Chea Nam	M	Thmei	Boeung Kantout	Krakor		15x18x2,5	IV
9	5	Leung Sorn	M	Thmei	Boeung Kantout	Krakor		12x20x2,5	IV
10	18	Soun Sameth	F	Thmei	Boeung Kantout	Krakor		10x14x2,5	IV
11	20	So Norm	M	Thmei	Boeung Kantout	Krakor		12x14x2,5	IV
12	6	Kim Chhut	M	Chochork	Boeung Kantout	Krakor		10x10x2	II
13	7	Mei Sareth	M	Chochork	Boeung Kantout	Krakor		10x10x2	IV
14	8	Mai Song	M	Chochork	Boeung Kantout	Krakor		10x10x2	IV
15	11	Theam Thorn	M	Chochork	Boeung Kantout	Krakor		10x15x2	IV
16	12	Nuth Seum	M	Chochork	Boeung Kantout	Krakor		10x15x2	IV
17	13	But Beum	M	Chochork	Boeung Kantout	Krakor		10x14x2,5	IV
18	14	Mei Nhuth	M	Chochork	Boeung Kantout	Krakor		10x15x2,5	II
19	24	Chou Sotha	M	Chochork	Boeung Kantout	Krakor		10x10x1,5	II
20	25	Leung Soy	M	Chochork	Boeung Kantout	Krakor		10x10x2	II
21	9	Buth SamOeun	M	Trapaing Khlai	Boeung Kantout	Krakor		20x20x2,5	IV
22	10	Nheum Sokha	M	Trapaing Khlai	Boeung Kantout	Krakor		10x12x2,5	IV
23	15	Seak Siem	M	Trapaing Khlai	Boeung Kantout	Krakor		10x15x2	IV
24	16	Buth Sarun	F	Trapaing Khlai	Boeung Kantout	Krakor		10x10x2	II
25	17	You Yean	M	Trapaing Khlai	Boeung Kantout	Krakor		10x10x2	IV
26	26	Uch Sophorn	M	Trapaing Khlai	Boeung Kantout	Krakor		10x12x2,5	II
27	27	Uch Sophea	M	Trapaing Khlai	Boeung Kantout	Krakor		10x13x2,5	II
28	28	Dy Sockheang	F	Trapaing Khlai	Boeung Kantout	Krakor		10x10x2	IV
29	29	Ly Chantha	F	Trapaing Khlai	Boeung Kantout	Krakor		10x10x1,5	II

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D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique

June 03-04, 2013

In Ronorb village Roleap commune Pursat district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV	
						No.	Dimention		
1	1	Chea Dy	M	Ronorb	Roleap	Pursat		10x15x2	IV
2	2	Kom Sokchhay	M	Ronorb	Roleap	Pursat		10x15x2	IV
3	3	Chea Bora	M	Ronorb	Roleap	Pursat		10x15x2	IV
4	4	Leang Leng	M	Ronorb	Roleap	Pursat		10x15x2	IV
5	5	Sos Sen	M	Ronorb	Roleap	Pursat		10x15x2	IV
6	6	Keo Voeun	M	Ronorb	Roleap	Pursat		10x15x2	IV
7	7	Phat Sarin	M	Ronorb	Roleap	Pursat		10x15x2	IV
8	8	Phat Saron	F	Ronorb	Roleap	Pursat		10x15x2	IV
9	9	Sorn Rotha	M	Ronorb	Roleap	Pursat		10x15x2	IV
10	10	Yi Sarath	M	Ronorb	Roleap	Pursat		10x15x2	IV
11	11	Mai Sarath	M	Ronorb	Roleap	Pursat		10x15x2	IV
12	12	Oeum Pov	M	Ronorb	Roleap	Pursat		10x15x2	IV
13	13	Haing Ron	M	Ronorb	Roleap	Pursat		10x15x2	IV
14	14	Kruth Neath	F	Ronorb	Roleap	Pursat		10x15x2	IV
15	15	Nub Hy	M	Ronorb	Roleap	Pursat		10x15x2	IV
16	16	Hin Vei	M	Ronorb	Roleap	Pursat		10x15x2	IV
17	17	Pok Yun	F	Ronorb	Roleap	Pursat		10x15x2	IV
18	18	Sak Chanthan	M	Ronorb	Roleap	Pursat		10x15x2	IV
19	19	Yim Sareth	M	Ronorb	Roleap	Pursat		10x15x2	IV
20	20	Khan Pov	M	Ronorb	Roleap	Pursat		10x15x2	IV
21	21	San Batimas	F	Ronorb	Roleap	Pursat		10x15x2	IV
22	22	Virak Yuthea	M	Ronorb	Roleap	Pursat		10x15x2	IV
23	23	Ry Pin	M	Ronorb	Roleap	Pursat		10x15x2	IV
24	24	Kom Chhung	M	Ronorb	Roleap	Pursat		10x15x2	IV
25	25	Kom Chheut	M	Ronorb	Roleap	Pursat		12x15x2	IV

Category of farmer by their aquaculture experience

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D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique

June 06-07, 2013

n Prey Smach village Rokat commune Phnom Kravanh district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV	
						No.	Dimention		
1	1	Pin Mony	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
2	2	Kong Kean	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
3	3	Choeun Chean	F	Mol	Rokat	Phnom Kravanh		10x10x2	IV
4	4	Phin Kaly	F	Mol	Rokat	Phnom Kravanh		10x10x2	IV
5	5	Phin Nit	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
6	6	Soeun Thy	F	Mol	Rokat	Phnom Kravanh		10x10x2	IV
7	7	Kong Phin	F	Mol	Rokat	Phnom Kravanh		15x25x3	IV
8	8	Phoun sarin	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
9	9	Soun Sou	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
10	10	Heam Thoun	F	Mol	Rokat	Phnom Kravanh		10x10x2	IV
11	11	Tun Bonh	M	Mol	Rokat	Phnom Kravanh		10x10x2	IV
12	12	Thoun Som	F	Mol	Rokat	Phnom Kravanh		10x10x2	IV
13	13	Oeun Ron	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
14	14	Phauk Pin	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
15	15	In Ny	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
16	16	Se Ron	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
17	17	Choeu Phany	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
18	18	I Chealy	M	Prey Smach	Rokat	Phnom Kravanh		10x10x2	IV
19	19	In Thol	F	Prey Khlung	Rokat	Phnom Kravanh		10x10x2	IV
20	20	Sorn Saroeum	M	Prey Khlung	Rokat	Phnom Kravanh		10x10x2	IV
21	21	Hean Theanat	F	Prey Khlung	Rokat	Phnom Kravanh		20x20x2,5	IV
22	22	In Lorn	M	Prey Khlung	Rokat	Phnom Kravanh		10x20x2	IV
23	23	Vath Kinal	M	Prey Khlung	Rokat	Phnom Kravanh		10x10x2	IV
24	24	Suy Kea	F	Prey Khlung	Rokat	Phnom Kravanh		10x10x2	IV
25	25	Soeun Chanrithy	M	Prey Khlung	Rokat	Phnom Kravanh		8x15x2	IV
26	26	Sin Savuth	M	Prey Khlung	Rokat	Phnom Kravanh		15x15x3	IV
27	27	Lav Sophal	F	Prey Khlung	Rokat	Phnom Kravanh		15x15x3	IV
28	28	Kong Peng	M	Sre Popeay	Santre	Phnom Kravanh		10x15x2	IV

Category of farmer by their aquaculture experience

I : He is running fish culture, He is operating fish culture currently.

II : He used to culturing fish before, but stopped.

III: He used to culturing fish before and stopped, but heis restarting recently.

IV: Begginer (He has no experience of aquaculture.)

D=1 , C=2 , V=5 , F=26

Receipt of farmer Participated training course on Fish Culture Technique

June 06-07, 2013

In Dobbath village Lolork Sar commune Pursat district Pursat province

No.	Name	Sex	Village	Commune	District	Pond		Category I-II-III-IV	
						No.	Dimention		
1	1	Mai Saray	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
2	2	Khut Sarith	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
3	8	Seng Sokheng	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
4	9	Kim Leang	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
5	10	Khut saNang	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
6	12	Ek Sok	F	Dobbath	Lolork Sar	Pursat		10x10x2	IV
7	15	Voeun Kunthea	F	Dobbath	Lolork Sar	Pursat		10x10x2	IV
8	16	Long Pach	M	Dobbath	Lolork Sar	Pursat		12x13x2,5	IV
9	19	Sun Seak	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
10	20	Kaing Heng	M	Dobbath	Lolork Sar	Pursat		10x25x2,5	IV
11	21	Van Loeung	M	Dobbath	Lolork Sar	Pursat		10x10x2	IV
12	3	Krouch Kong	M	Vathloug	Lolork Sar	Pursat		10x10x2	IV
13	4	Sin Phoeun	F	Vathloug	Lolork Sar	Pursat		10x10x2	IV
14	5	Ly Chheng	F	Vathloug	Lolork Sar	Pursat		10x10x2	IV
15	17	Yung Run	M	Vathloug	Lolork Sar	Pursat		25x25x2	IV
16	18	Chhay Kemara	F	Vathloug	Lolork Sar	Pursat		10x20x2	IV
17	6	Khorn Yan	F	Khmar	Lolork Sar	Pursat		10x10x2	IV
18	7	Chhay Savang	M	Khmar	Lolork Sar	Pursat		10x10x2	IV
19	11	Som Phary	F	Khmar	Lolork Sar	Pursat		10x10x2	IV
20	13	Chan Ny	F	Khmar	Lolork Sar	Pursat		10x10x2	IV
21	14	Hach Chrib	F	Khmar	Lolork Sar	Pursat		10x10x2	IV
22	22	Se Leb	F	Khmar	Lolork Sar	Pursat		10x10x2	IV
23	23	Reang Ra	M	Khmar	Lolork Sar	Pursat		10x10x2	IV
24	24	Saing Chan	M	Khmar	Lolork Sar	Pursat		10x10x2	IV
25	25	Leng Pov	M	Khmar	Lolork Sar	Pursat		10x10x2	IV

Category of farmer by their aquaculture experience

I : He is running fish culture, He is operating fish culture cu

II : He used to culturing fish before, but stopped.

III: He used to culturing fish before and stopped, but heis restarting recently.

IV: Begginer (He has no experience of aquaculture.)

D=1 , C=2 , V=5 , F=26

List of Farmers in Siem Reap

Participants of
Farmer-to-Farmer training in 2013

Participants of Farmer training in 2013, FAIEX 2

No.1

Province

Siem Reap

Trainer : Mr.Prin Savin Mr. Uy Sovany

Date

May 08-09, 2013, May 16-17, 2013

Mr.Srey Keosopt Mr. Kim Savoeun

Place

Kouk Yeng, Rokar and Bous Lhong village, Doun Peang commune Prasat Bakong district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Hun Chheung	ហ៊ុន ឈឿង	Kouk yeng	Doun Peang	Angkor Chum	M	IV	3	15x15x3	500
2	Leam Net	លាម នេត	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
3	Sou Oeum	ស៊ូ អឿម	Kouk yeng	Doun Peang	Angkor Chum	M	-	2	15x15x3	500
4	Nich Noeun	និច នឿន	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
5	Reou Vat	រឿន វ៉ាត	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
6	Lat Loem	ឡាត លឿម	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x18x3	500
7	Chhoeun Lor	ឈឿន លរ	Kouk yeng	Doun Peang	Angkor Chum	M	IV		15x15x3	500
8	Seuy Knour	សឿយ ក្នួន	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
9	Pheun Chab	ភឿន ចាប់	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
10	Houn Chheak	អ៊ួន ឈក	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
11	Pok Chik	បុក ឆឹក	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
12	Phan Phoeung	ផាន ភឿង	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
13	Pheoum Phe	ភឿម ភ	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
14	Lach Houn	ហាច ហ៊ួន	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
15	Reoun In	រឿន អិន	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
16	Kol Thung	កល ថុង	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x20x3	500
17	Thlang Thoun	ថាង ថួន	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
18	Pheap Seoung	ភាព សឿង	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
19	Reoun Rum	រឿន រូម	Kouk yeng	Doun Peang	Angkor Chum	M	-		15x15x3	500
20	Linh Tim	លីង ទីម	Kouk yeng	Doun Peang	Angkor Chum	F	-		15x15x3	500
21	Khaov Chhou	ខាវ ច័យ	Bous Lhung	Doun Peang	Angkor Chum	-	-		12x10x3	500
22	Seoun khaov	សឿន ខាវ	Bous Lhung	Doun Peang	Angkor Chum	-	-		10x11x3	500
23	Lat Lam	ឡាត ឡាម	Bous Lhung	Doun Peang	Angkor Chum	-	-		15x10x3	500
24	Tib Tel	ទីប តឺល	Bous Lhung	Doun Peang	Angkor Chum	-	-		15x15x3	500
25	Suy Ing	ស៊ុយ អឹង	Bous Lhung	Doun Peang	Angkor Chum	-	-		10x15x3	500
26	Soun Leap	ស៊ួន លប	Bous Lhung	Doun Peang	Angkor Chum	F	-		10x15x3	500
27	Khann Hay	ខាន ហៃ	Bous Lhung	Doun Peang	Angkor Chum	M	-		10x15x3	500
28	Ring Ream	រឹង រឿន	Bous Lhung	Doun Peang	Angkor Chum	-	-		10x20x3	500
29	Smeoun Smak	សមឿន ស្រាក់	Bous Lhung	Doun Peang	Angkor Chum	-	-		10x15x3	500
30	Team Tha	តឺម ថា	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x3	500
31	Moul Oeun	មឿល អឿន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x20x3	500
32	Soeung Sin	សឿង សិន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		15x15x3	500
33	Yen Roeb	យន រឿប	Bous Lhung	Doun Peang	Angkor Chum	M	IV		15x15x3	500
34	Phinh Kin	ភឿង គិន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x3	500
35	Thun Tea	ថួន តឺ	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x3	500
36	Hun Hung	ហ៊ួន ហុង	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x4	500
37	Khin Khan	ឃឹក ឃន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x10x4	500
38	Man Pear	ម៉ាន ព	Bous Lhung	Doun Peang	Angkor Chum	F	IV		10x15x4	500
39	Lan Lip	ឡាន ឡឺប	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x4	500
40	Phoeu Poen	ភឿ ពឿន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x10x4	500
41	Sroeung Ham	សរឿ ហាម	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x4	500
42	Te Chab	តឺ ចាប់	Bous Lhung	Doun Peang	Angkor Chum	M	IV		15x15x4	500
43	Haov Phat	ហាវ ផាត	Bous Lhung	Doun Peang	Angkor Chum	M	IV		15x15x3	500
44	Eal Ann	ឈល អាន	Bous Lhung	Doun Peang	Angkor Chum	M	IV		20x15x3	500
45	Chhean Chhea	ឈន ឈត	Bous Lhung	Doun Peang	Angkor Chum	M	IV		10x15x3	500
46	Ut Kik	អ៊ុត គឹក	Bous Lhung	Doun Peang	Angkor Chum	M	IV		20x15x4	500

47	Vun Tha	វ៉ុន ថា	Bous Lung	Doun Peang	Angkor Chum	M	IV	20x15x3	500
48	Roeum Phun	រ៉ោម ផុន	Bous Lung	Doun Peang	Angkor Chum	M	IV	20x15x3	500
49	Lan Nich	ឡាន និក	Bous Lung	Doun Peang	Angkor Chum	M	IV	20x15x3	500
50	Phean Lor	ប៉ែន ឡ	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
51	Roeun Chroun	រ៉ោន ជ្រូន	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
52	Pin Pouy	ប៊ិន ប៉ូយ	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
53	Pey Sing	ប៉ែ ស៊ីង	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
54	Heam Hann	អ៊ែម អាន	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
55	Tham Thouy	ថាំ ធៀយ	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
56	Thi Noeum	ធី នឿម	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
57	Sok Yoeun	សុខ យឿន	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
58	Hut Houll	ហុត ហួល	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
59	Chhean Khout	ឈន យឿក	Rokar	Doun Peang	Angkor Chum	F	IV	10x10x3	500
60	Men Vat	ម៉ែន វាត	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
61	Thoun Chrey	ធៀន ជឿ	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
62	Yem Ying	យ៉ែម យីង	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
63	Khaov Ngi	ខ្មោង	Rokar	Doun Peang	Angkor Chum	M	IV	8x10x3	500
64	Khut Keng	យុត កង	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
65	Hip Ping	ហ៊ីប ប៊ីង	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
66	Bun Meut	ប៊ុន មឿក	Rokar	Doun Peang	Angkor Chum	M	IV	10x12x2	500
67	Minh Meoung	មឿ មឿ	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
68	Reoun Leuy	រ៉ោន លឿយ	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x2	500
69	Pheuk Chang	ភឿក ចង	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
70	Chrung Reap	ឈង រាប	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
71	Yun Yeam	យន យ៉ែម	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x2	500
72	Yib See	យ៊ីប សឺ	Rokar	Doun Peang	Angkor Chum	F	IV	8x12x3	500
73	Bik Pun	ប៊ិក ប៊ុន	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
74	Seng Uch	សង អុជ	Rokar	Doun Peang	Angkor Chum	M	IV	10x10x3	500
	សរុប								37000

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
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- IV : Begginer (He has no experience of aquaculture.)

Participants of Farmer training in 2013, FAIEX 2

No.5

Province

Siem Reap

Date

May 03-04, 2013

Trainer : Mr.Prin Savin

Mr. Kim Savooun

Place

Tunleab village, Sranal commune, Kralanh district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Hat Leuon	អតលឿក	Snleng	Sranal	Kralanh	M	IV		10x15x3	500
2	Hoth Ban	ហ៊ុកបន	Llung	Sranal	Kralanh	M	IV		10x12x3	500
3	Ngoung Ngeuy	ងងងឃើយ	Llung	Sranal	Kralanh	M	IV		10x12x3	500
4	Heng Huk	ហងហុក	Tanyu	Sranal	Kralanh	M	I		10x10x4	500
5	Kun Than	កុនថន	Tanyu	Sranal	Kralanh	M	IV		10x10x4	500
6	Heng Hak	ហងហក	Tanyu	Sranal	Kralanh	M	I		10x10x4	500
7	Moul Teng	មូលតង	Tanyu	Sranal	Kralanh	M	IV		10x15x4	500
8	Ouk Lang	អុកឡង	Tunleab	Sranal	Kralanh	M	IV		10x15x3	500
9	Chay Thom	ជយថ	Tunleab	Sranal	Kralanh	M	I		10x12x3	500
10	Cheb Ry	ជឿរី	Tunleab	Sranal	Kralanh	M	IV		10x13x3	500
11	Chan Veng	ចនវង្ស	Tunleab	Sranal	Kralanh	M	IV		8x20x3	500
12	Chok Soun	ចកសួន	Tunleab	Sranal	Kralanh	M	I		10x10x3	500
13	Chroeut Nith	ជ្រូកនិក	Tunleab	Sranal	Kralanh	M	IV		9x16x3	500
14	Krak Chhab	ក្រាកឆប	Sranal	Sranal	Kralanh	M	IV		10x10x3	500
15	Sut Ray	សុតរាយ	Sranal	Sranal	Kralanh	M	IV		10x10x3	500
16	Tim Sambath	ទីមសម្បតិក	Sranal	Sranal	Kralanh	M	IV		25x30x3	500
17	Hak Ran	ហករាន	Sranal	Sranal	Kralanh	M	IV		10x25x3	500
18	Luon Moeut	លួនម៉ឺត	Sranal	Sranal	Kralanh	M	IV		10x15x3	500
19	Moeun Kleb	ម៉ឺនក្លេប	Sranal	Sranal	Kralanh	M	IV		10x10x3	500
20	Luon Lum	លួនឡូ	Sranal	Sranal	Kralanh	M	IV		10x12x3	500
										9500

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

Participants of Farmer training in 2013, FAIEX 2

No.6

Province

Siem Reap

Date

June 03-04, 2013

Trainer : Mr.Srey Keosopheak Mr. Uy Sovany

Place

Sangker village, Snuol commune, Kralanh district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Phit Chav	ផិត ជាវ	Preyrongeng	Snuol	Kralanh	M	IV		20x25x3	500
2	Loy Krat	ឡាយ ក្រាត	Sangker	Snuol	Kralanh	M	IV		10x10x3	500
3	Len Oeuk	លេន ខេក	Sangker	Snuol	Kralanh	-	IV	2	12x15x3	500
4	Ret Sary	រ៉េត សារី	Sangker	Snuol	Kralanh	-	IV	3	10x13x3	500
5	Sunn Veuy	ស៊ុន វឿ	Sangker	Snuol	Kralanh	-	IV		20x30x3	500
6	Cheat Cheuot	ចេត ចេត	Sangker	Snuol	Kralanh	-	IV		12x15x3	500
7	Tim Say	ទឹម សយ	Sangker	Snuol	Kralanh	-	IV		10x10x2	500
8	Hean Phaov	ហ៊ាន ផាវ	Sangker	Snuol	Kralanh	F	IV		10x12x3	500
9	Lin Lab	លិន ឡាប	Tabich	Snuol	Kralanh	M	IV		10x10x3	500
10	Phnom Vy	ភ្នំ វិ	Tabich	Snuol	Kralanh	M	I		10x12x3	500
11	Hauv Hab	ហ្វាវ ហាប	Snuol	Snuol	Kralanh	M	I		១០x៣	500
12	Chinh Houy	ឈីង ហឿយ	Snuol	Snuol	Kralanh	M	IV		8x20x3	500
	សរុប									5500

Category of farmer by their aquaculture experience

I : He is running fish culture, He is operating fish culture currently.

II : He used to culturing fish before, but stopped.

III : He used to culturing fish before and stopped, but he is restarting recently.

IV : Begginer (He has no experience of aquaculture.)

Participants of Farmer training in 2013, FAIEX 2

No.7

Province

Siem Reap

Date

June 06-07, 2013

Trainer : Mr.Uy Sovany

Mr. Srey Keosopheak

Place

Preychrouk village, Preychrouk commune, Puok district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Sin Buntheun	សិន ប៊ុនធឿន	Prabmey	Preychrouk	Puok	M	I	10x10x3	500	
2	Run Reuy	រុន រឿម	Prabmey	Preychrouk	Puok	-	IV	15x20x3	500	
3	Khuy Tib	ឃុយ តិប	Prabmey	Preychrouk	Puok	-	IV	10x10x3	500	
4	Meuy Mam	មឿម មម	Prabmey	Preychrouk	Puok	-	IV	20x20x3	500	
5	Thann Hul	ថាន ហុល	Prabmey	Preychrouk	Puok	-	IV	10x20x3	500	
6	Sek Try	សេក ត្រី	Prabmey	Preychrouk	Puok	-	IV	10x10x3	500	
7	Douk Seang	ដូក សឿង	Prabmey	Preychrouk	Puok	-	IV	10x10x3	500	
8	Thann Buntheun	ថាន ប៊ុនធឿន	Keteyuos	Preychrouk	Puok	-	IV	20x20x3	500	
9	Sa Sen	ស សន	Keteyuos	Preychrouk	Puok	-	IV	10x13x3	500	
10	Moeunh Reun	មឿម រឿម	Preychrouk	Preychrouk	Puok	F	IV	10x12x3	500	
11	Tul Reun	តុល រឿម	Preychrouk	Preychrouk	Puok	M	IV	10x10x3	500	
12	Tinh Thlang	តិញ ថង	Preychrouk	Preychrouk	Puok	F	IV	10x20x3	500	
13	Chun Samut	ជួន ស មុន	Preychrouk	Preychrouk	Puok	M	IV	10x15x3	500	
14	Luot Long	លុត ឡុង	Preychrouk	Preychrouk	Puok	M	IV	7x20x3	500	
15	Yeak Touch	យ៉ាក់ តូច	Preychrouk	Preychrouk	Puok	M	IV	10x10x2	500	
16	Rin Roy	រិន រយ	Preychrouk	Preychrouk	Puok	M	IV	15x15x2	500	
17	Chay Lum	ឆាយ លុំ	Preychrouk	Preychrouk	Puok	M	IV	15x25x3	500	
18	Man Min	មន មិន	Preychrouk	Preychrouk	Puok	M	IV	10x25x3	500	
19	Chea Cheut	ឈ ឆឹក	Preychrouk	Preychrouk	Puok	M	IV	10x10x2	500	
20	Ma San	ម៉ា សន	Preychrouk	Preychrouk	Puok	M	IV	9x12x2	500	
21	Imm Oeum	អឹម អឿម	Dountu	Preychrouk	Puok	M	IV	12x12x2	500	
22	An Nam	អន ណម	Dountu	Preychrouk	Puok	M	IV	12x13x3	500	
23	Lunh Dara	ឡាញ ដារ៉ា	Dountu	Preychrouk	Puok	M	IV	11x12x4	500	
24	Yean Ram	យ៉ាន រម	Dountu	Preychrouk	Puok	M	IV	9x13x3	500	
25	Pha Phy	ផា ផឹ	Dountu	Preychrouk	Puok	M	IV	10x10x2	500	
26	Meuy Lib	មឿម លីប	Dountu	Preychrouk	Puok	M	IV	10x13x2	500	
27	Lun Noy	លុន ណយ	Dountu	Preychrouk	Puok	M	IV	10x15x3	500	
28	Run Ream	រុន រឿម	Dountu	Preychrouk	Puok	M	IV	10x12x3	500	
29	Lat Lab	ឡាត ឡាប	Dountu	Preychrouk	Puok	M	IV	12x14x4	500	
30	Hab Heuy	ហាប ហឿម	Dountu	Preychrouk	Puok	M	IV	10x20x4	500	
	សរុប								15000	

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

Participants of Farmer training in 2013, FAIEX 2

No.8

Province

Siem Reap

Trainer : Mr.Prin Savin

Mr. Kim Savoeun

Date

May 20-21, 2013 and May 22-23

Mr. Uy Sovany

Mr. Srey Keosopheak

Place

Sackakda and Lichtoek village, Beangmelear commune, Puok district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Hoeum Trem	អ៊ុយ ត្រេម	Sackakda	Beangmelear	Svaylor	M	IV		9x18x3	500
2	Von Keam	វ៉ុន កែម	Sackakda	Beangmelear	Svaylor	M	IV		10x20x3	500
3	Vov Vong	វ៉ុន វង	Sackakda	Beangmelear	Svaylor	M	IV		10x20x3	500
4	Khim Yan	ខឹម យ៉ាន	Sackakda	Beangmelear	Svaylor	M	IV		10x20x3	500
5	Ngout Mouy	ង្កុត ម៉ឺយ	Sackakda	Beangmelear	Svaylor	M	IV		10x15x3	500
6	Ing Vong	អ៊ឹង វង	Sackakda	Beangmelear	Svaylor	M	IV		9x13x3	500
7	Soeun Su	ស៊ឺន ស៊ូ	Sackakda	Beangmelear	Svaylor	M	IV		10x10x3	500
8	Nhib Chit	ញឹម ជិត	Sackakda	Beangmelear	Svaylor	M	IV		12x16x3	500
9	Hear Phal	ហ៊ែរ ផល	Sackakda	Beangmelear	Svaylor	M	IV		10x12x3	500
10	Linh Long	លីញ ឡុង	Sackakda	Beangmelear	Svaylor	M	IV		9x10x3	500
11	Sib Sarin	ស៊ីប សារិន	Sackakda	Beangmelear	Svaylor	M	IV		10x11x4	500
12	Chean Von	ឈន វ៉ុន	Sackakda	Beangmelear	Svaylor	M	IV		10x15x4	500
13	Moung Ly	ម៉ុង លី	Sackakda	Beangmelear	Svaylor	M	IV		10x10x3	500
14	Chuon Kan	ជួន កាន	Sackakda	Beangmelear	Svaylor	M	IV		10x10x3	500
15	Pouy Savy	ព្រាយ សាវី	Sackakda	Beangmelear	Svaylor	M	I		9x18x3	500
16	Nab Chia	ណាប់ ជី	Sackakda	Beangmelear	Svaylor	M	IV		10x10x3	500
17	Chia Socheat	ជី សុចេត	Sackakda	Beangmelear	Svaylor	M	IV		11x17x3	500
18	Man Min	វ៉ាន ជួន	Sackakda	Beangmelear	Svaylor	M	IV		10x13x3	500
19	Chea Cheut	ស៊ីន គឹម ជិត	Sackakda	Beangmelear	Svaylor	M	IV		10x15x3	500
20	Phan Mol	ផាន ម៉ុល	Sackakda	Beangmelear	Svaylor	M	IV		10x12x3	500
21	Pol Run	ប៉ុល រុន	Sackakda	Beangmelear	Svaylor	M	IV		10x15x3	500
22	Soeum Phey	ស៊ឺម ផៃ	Trapengreusey	Beangmelear	Svaylor	M	IV		10x12x3	500
23	Sao Kor	សៅក	Trapengreusey	Beangmelear	Svaylor	M	IV		12x15x4	500
24	Khim khi	ខឹម ឃី	Trapengreusey	Beangmelear	Svaylor	M	I		15x15x4	500
25	Loy Sarin	ឡាយ សារិន	Trapengreusey	Beangmelear	Svaylor	M	IV		11x17x3	500
26	Phum Chan	ភ័ក ចាន់	Trapengreusey	Beangmelear	Svaylor	M	IV		10x11x3	500

27	Chun Sam Oeu	ឈ្មួន សំអឿន	Lichtoek	Beangmelear	Svaylor	M	IV	10x11x3	500
28	Lun Leak	លួន លក	Lichtoek	Beangmelear	Svaylor	M	IV	9x13x4	500
28	Beang Phal	បង ផល	Lichtoek	Beangmelear	Svaylor	M	IV	12x12x3	500
30	Phat Phang	ផត ផង	Lichtoek	Beangmelear	Svaylor	M	IV	9x15x3	500
31	Boeun Tay	ប្រឿន តៃ	Lichtoek	Beangmelear	Svaylor	M	IV	9x13x3	500
32	Sunn Seetha	ស៊ុន សីថា	Lichtoek	Beangmelear	Svaylor	M	IV	10x11x3	500
33	Un Hoem	អ៊ុន អឿម	Lichtoek	Beangmelear	Svaylor	M	IV	11x12x3	500
34	Vanna Toeuy	វណ្ណា តឿយ	Beangmelear	Beangmelear	Svaylor	M	IV	8x15x3	500
35	Um Reth	អ៊ុំប រតេ	Beangmelear	Beangmelear	Svaylor	M	IV	12x16x4	500
36	Sum San	ស៊ុម សាន	Beangmelear	Beangmelear	Svaylor	M	IV	15x20x4	500
37	San Seb	សន សិប	Beangmelear	Beangmelear	Svaylor	M	IV	9x13x3	500
38	Heav Song	ហៀង សុង	Beangmelear	Beangmelear	Svaylor	M	IV	12x12x4	500
39	Khley Reak	ខ្សោក	Beangmelear	Beangmelear	Svaylor	M	IV	10x11x3	500
40	Hay Hear	ហៃ ហៃ	Chanhear	Beangmelear	Svaylor	M	IV	11x11x3	500
41	Nhib Bun	ញីប ប៊ុន	Chanhear	Beangmelear	Svaylor	M	IV	15x15x3	500
42	Ean Un	អឿន អ៊ុន	Chanhear	Beangmelear	Svaylor	M	IV	10x15x3	500
43	Boeun Phan	ប្រឿន ផន	Chanhear	Beangmelear	Svaylor	M	IV	10x12x3	500
44	Choeun Chat	ឈឿន ឆត	Chanhear	Beangmelear	Svaylor	M	IV	11x12x3	500
45	Sam Sath	សំសត	Chanhear	Beangmelear	Svaylor	M	IV	11x11x3	500
46	Phun Ran	ផ្ដុន រន	Chanhear	Beangmelear	Puok	M	IV	11x11x3	500
	សរុប								23000

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Beginner (He has no experience of aquaculture.)

Participants of Farmer training in 2013, FAIEX 2

No.9

Province

Siem Reap

Date

June 22-23, 2013

Trainer : Mr.Prin Savin

Mr. Kim Savooun

Place

Koukthlok village, Koukthloklor commune, Chikreng district

No.	Name	Khmer's name	Location			Male/ Female	Category I-II-III-IV	Pond		Number of Fingering by project
			Village	Commune	District			Num.	Dimention	
1	Sem Su	ស៊ីម សូ	Svaypok	Koukthjoklor	Chikreng	M	I		10x10x3	500
2	Phang Pha	ផង ផា	Svaypok	Koukthjoklor	Chikreng	-	I		9x12x3	500
3	Keam Krean	កែម ក្រែន	Talean	Koukthjoklor	Chikreng	-	I		10x12x3	500
4	Ou Luot	អូ លុត	Talean	Koukthjoklor	Chikreng	-	I		10x10x3	500
5	Seng Chut	សង ឈុត	Talean	Koukthjoklor	Chikreng	-	I		10x12x3	500
6	You Khean	យូ ខៀន	Preythom	Koukthjoklor	Chikreng	-	I		15x15x3	500
7	Sunn Ry	ស៊ុន រី	Preythom	Koukthjoklor	Chikreng	-	I		10x12x3	500
8	Keam Khim	កែម ខឹម	Preythom	Koukthjoklor	Chikreng	-	I		10x13x3	500
9	Ouch Chun	អូច ឈុន	Preythom	Koukthjoklor	Chikreng	-	I		9x13x3	500
10	Nut Voeun	នុត វ៉ៃឃ្លែ	Preythom	Koukthjoklor	Chikreng	M	I		10x12x3	500
11	Ros Loeun	រ៉ុស លឿន	Preythom	Koukthjoklor	Chikreng	M	I		9x14x3	500
12	Ri Peang	រី ពង	Preythom	Koukthjoklor	Chikreng	M	I		11x11x3	500
13	Chim Lon	ឈឹម ឡូន	Taphear	Koukthjoklor	Chikreng	F	I		11x17x3	500
14	Ru Meanghang	រូម ដេង	Taphear	Koukthjoklor	Chikreng	M	I		14x20x3	500
15	Chan See	ចាន សី	Taphear	Koukthjoklor	Chikreng	M	I		10x15x3	500
16	Kao King	កែវ កឹង	Taphear	Koukthjoklor	Chikreng	M	I		11x11x3	500
17	Yim Sex	យឹម សិច	Taphear	Koukthjoklor	Chikreng	M	I		11x11x3	500
18	Chhan Chut	ច័ន ឈុត	Thnal	Koukthjoklor	Chikreng	M	I		9x12x3	500
19	Min Hab	មីន ហាប់	Thnal	Koukthjoklor	Chikreng	M	I		10x10x3	500
20	Kheav Thai	ខៀវ ថៃ	Thnal	Koukthjoklor	Chikreng	M	I		10x10x3	500
21	Chuon chun	ជួន ឃុន	Makak	Koukthjoklor	Chikreng	M	IV		15x15x3	500
22	Man Mon	ម៉ាន ម៉ាន	Makak	Koukthjoklor	Chikreng	M	IV		9x20x3	500
23	Suon seam	សួន ស៊ីម	Makak	Koukthjoklor	Chikreng	M	IV		11x11x3	500
24	Hoeung Hun	ហឿង ហួន	Makak	Koukthjoklor	Chikreng	M	IV		12x16x3	500
25	Muy Man	មួយ ម៉ាន	Makak	Koukthjoklor	Chikreng	M	IV		12x12x3	500
26	Ning Theng	នឹង ថេង	Makak	Koukthjoklor	Chikreng	M	IV		12x14x3	500
27	Siu Sunn	ស៊ី ស៊ុន	Koukthlok	Koukthjoklor	Chikreng	M	IV		18x20x3	500
28	Keo Kanha	កែវ កញ្ញា	Koukthlok	Koukthjoklor	Chikreng	F	IV		12x16x3	500
29	Phan Hear	ផាន អែរ	Koukthlok	Koukthjoklor	Chikreng	M	IV		11x11x3	500
30	Sous Mao	ស៊ុន ម៉ៅ	Koukthlok	Koukthjoklor	Chikreng	M	IV		10x13x3	500
31	An Sim	អាន សឹម	Sangker	Koukthjoklor	Chikreng	M	IV		11x11x4	500
	សរុប									15500

Category of farmer by their aquaculture experience

- I : He is running fish culture, He is operating fish culture currently.
- II : He used to culturing fish before, but stopped.
- III : He used to culturing fish before and stopped, but he is restarting recently.
- IV : Begginer (He has no experience of aquaculture.)

ANNEX 3

(Final Report)

Results of evaluation workshop
for aquaculture farmers
(1st year ~ 3rd year)

Abstract of Results of Questionnaire Study in Evaluation Workshops for First Year's Fish Farmers

I. Purpose and Contents of First Year's Evaluation Workshop

For the purposes to evaluate the current situation of fish culture activities of first year's fish farmers and the outcomes of extension programs to them exactly, Department of Aquaculture Development in Fisheries Administration (FiA) and cantonment fisheries offices held the evaluation workshops for aquaculture extension programs in the first year of the project at respective target communes at the latter part of April 2012. Fish farmers in target communes participated in the evaluation workshop and answered the questionnaire sheets for program evaluation. The evaluation sheets were prepared jointly by Mr. Chikami, JICA Fisheries Development Adviser, and FiA counterparts (referring to Annex: Evaluation Questionnaire Sheet).

Afterward, FiA counterparts digitalized all questionnaire answers, and completed the data sheets of all answers in July. After translated into English and corrected major errors, the data sheets were used for evaluation analysis. The numbers of collected questionnaire answers are 135 in Siem Reap Province, 218 in Battambang Province, and 120 in Pursat Province. Total number of questionnaires for all target provinces reached 473.

Table 1: Summary of Evaluation Workshops for First Year's Fish Farmers

Target Province	Date	Division	Commune	No. of Participants	Place (Village)
		Prasat Bakong	Kantreang	24	Ta Trav
Siem Reap	April 23 (Mon)		Roluos	6	
		Puok	Samraong Yea	30	Prasat
	April 25 (Wed)	Soutr Nikom	Chan Sa	30	Sanlorong
	April 26 (Thu)	Chi Kraeng	Sangvaeuy	30	Chork
	April 23 (Mon)	Rukhak Kiri	Preaek Chik	28	Prek Taren
Battambang		Bavel	Prey Khpos	27	Kbal Thnol
	April 24 (Tue)	Bavel	Khnach Romeas	23	Kos Ream
		Koas Krala	Hab	25	Sombour
	April 25 (Wed)	Thma Koul	Anlong Run	28	Ou Ta Ki
		Moung Ruessei	Robas Mongkol	26	Konkaek
		Thma Koul	Bansay Traeng	25	Toul Tasok
	April 26 (Thu)	Rotonak Mondol	Sdau	15	Boeung Ampil
	April 27 (Fri)	Battambang	Snoeng	5	
			Ou Mal	16	Konsek
April 24 (Tue)	Bakan	Trapeang Chorng	26	Trapeang Chorng	
Pursat	April 26 (Thu)	Bakan	Khnar Totueng	27	Koh Kror Bei
		Bakan	Rumlech	28	Rumlech
	April 27 (Fri)	Pursat	Chamraeun Phal	26	Au Rokar
		Krakor	Tnaot Chum	28	Tram

II. Summary of Questionnaire Results

The analysis results of questionnaire answers of first year's fish farmers by target provinces and communes as follows.

1. Basic Information of Fish Farmers (Respondents)

Table 2 indicates the basic information of fish farmers (respondents). About 80 % of fish farmers were men, and 20 % were women. Their average age was around 45 years old. Their sex ratios and average ages were almost same among target provinces. Fish farmers received fish seeds in August 2011 and stocked them in earthen ponds. At the time of evaluation workshops (the end of April 2012), 8 to 9 months had passed since fish stocking. Most of fish farmers are engaged in rice farming and livestock and fish culture as side businesses. Moreover, almost of fish farmers had only one fish pond, and the average area of fish ponds was 150 - 200 m².

Table 2: Basic Information of Fish Farmers (Respondents)

Provinces / Communes	Respondent (persons)	Men's ration	Women's ration	Average age (years old)	Average area of fish pond (m ²)
Siem Reap Province	120	83%	18%	43.5	211
Chan Sa	30	67%	33%	40.3	143
Samraong Yea	30	80%	20%	43.2	131
Kantreang	24	96%	4%	46.3	115
Roluos	6	83%	17%	48.0	1207
Sangvaeuy	30	90%	10%	43.8	236
Battambang Province	218	79%	21%	44.1	268
Ou Mal	16	81%	19%	44.3	209
Sdau	15	60%	40%	46.3	224
Snoeng	5	100%	0%	47.6	169
Prey Khpos	27	85%	15%	43.0	296
Khnach Romeas	23	74%	26%	43.5	382
Anlong Run	28	71%	29%	41.2	428
Bansay Traeng	25	84%	16%	44.4	275
Preaek Chik	28	75%	25%	45.7	236
Hab	25	72%	28%	45.7	173
Robas Mongkol	26	96%	4%	42.8	166
Pursat Province	135	87%	13%	45.3	154
Khnar Toueng	27	89%	11%	42.4	142
Trapeang Chornng	26	92%	8%	46.8	167
Rumlech	28	75%	25%	48.3	133
Tnaot Chum	28	89%	11%	43.3	173
Chamraeun Phal	26	88%	12%	45.7	154

2. Preparation of Fish Pond and Supply of Fish Seeds

After receiving technical trainings by Fisheries Administration (farmers to farmers training), fish farmers prepared own fish ponds and received fish seeds from core farmers (seed producers). About 500 fish seeds were distributed to each farmer in the project. Table 3 indicates the preparation condition of their fish ponds

and the rate of seed distribution by fish species.

The rate of utilization of water pumps for draining and flowing water in fish ponds reached about 90 % in Battambang and Pursat. It means that most of fish farmers use water pumps to drain and flow the water in fish ponds. Comparing with other provinces, the earth quality is much sandy at some areas in Siem Reap province. Therefore, underground water naturally comes out in fish ponds, and some parts of fish farmers may not need to use water pump in Siem Reap.

About 90 % of fish farmers answered to made practices of spraying lime powder to disinfect the bottoms of fish ponds. It shows the effect of farmers to farmers trainings. The protection nets around fish ponds are effective to protect from predators (snake heads or frogs) entering fish ponds and washing fish out of fish ponds by floods. Through trainings and on-farm guidance, Fisheries Administration recommends fish farmers to set those protection nets. However, only a half of them had set the protection nets in the first year. Because requiring certain costs and labors for purchase and setting of protection nets, about a half of fish farmers might hesitate to prepare the protection nets.

Table 3: Preparation Condition of Fish Ponds and Seed Distribution Rate by Fish Species

Provinces / Communes	Fish Pond Preparation			Seed Distribution Rate (by Fish Species)				
	Utilizing Water Pump	Spraying Lime Powder	Setting Protection Net	Silver Barb	Tilapia	Common Carp	Murgal	Silver Carp
Siem Reap	68%	90%	43%	100%	100%	100%	100%	0%
Chan Sa	93%	100%	10%	100%	100%	100%	100%	0%
Samraong Yea	97%	87%	93%	100%	100%	100%	100%	0%
Kantreang	42%	92%	13%	100%	100%	100%	100%	0%
Roluos	67%	50%	33%	100%	100%	100%	100%	0%
Sangvayuey	37%	90%	50%	100%	100%	100%	100%	0%
Battambang	92%	81%	52%	100%	84%	100%	100%	22%
Ou Mal	100%	94%	81%	100%	100%	100%	100%	100%
Sdau	100%	100%	80%	100%	100%	100%	100%	100%
Snoeng	100%	100%	100%	100%	100%	100%	100%	100%
Prey Khpos	96%	100%	26%	100%	0%	100%	100%	0%
Khnach Romeas	70%	87%	61%	100%	65%	96%	96%	0%
Anlong Run	89%	89%	64%	100%	100%	100%	100%	21%
Bansay Traeng	96%	88%	76%	100%	100%	100%	100%	20%
Preaek Chik	93%	61%	14%	100%	100%	100%	100%	0%
Hab	100%	72%	60%	100%	100%	100%	100%	0%
Robas Mongkol	85%	50%	23%	100%	100%	100%	100%	0%
Pursat	96%	98%	64%	100%	100%	40%	60%	0%
Khnar Toueng	100%	100%	89%	100%	100%	0%	100%	0%
Trapeang Chorng	100%	100%	100%	100%	100%	0%	100%	0%
Rumlech	100%	100%	71%	100%	100%	0%	100%	0%
Tnaot Chum	82%	100%	14%	100%	100%	100%	0%	0%
Chamraeun Phal	100%	88%	50%	100%	100%	100%	0%	0%

Fish seeds of silver barb and tilapia were well distributed to most fish farmers at target provinces. Fish seeds of common carp also were widely distributed in target provinces, as a whole. However, a part of fish farmers at some target communes could not receive those fish seeds. In case of silver carp, the distribution

area of fish seeds was very limited. It might indicate that seed producers had some serious problems on seed production and distribution in silver carp. Since silver carp is one of important fish species for celebration events, such as marriage and birth of children, it is usually dealt at high prices with high demand at local markets. However, in fact, only a few farmers can produce silver carp's seeds stably at target areas. It causes a shortage of silver carp's seed supplies.

3. Feeding Management

More than a half of fish famers answered 'daily feeding' to fish. Especially, in Battambang and Pursat provinces, 70 - 80 % of fish farmers answered 'daily feeding'. In Siem Reap province, the answers of 'feeding twice per week' were larger than those of 'daily feeding'. It might be affected by washed away of a large portion of cultured fish by floods at many fish farmers in Siem Reap.

As a major feed material, 70 - 80 % of fish farmers used 'rice bran'. Only a half of fish farmers applied home-made feeds recommended by trainings and on-farm guidance. Especially, in Battambang province, only 20 % of fish farmers answered to apply home-made feeds. It might suggest some important issues for technical training and extension. On the other hand, comparing to other two target provinces, the utilization rate of commercial compounded feeds in fish farmers was higher in Battambang province (about 50 %).

Table 4: Feeding Frequency and Utilization of Feed Materials at Fish Farmers

Province / Communes	Feeding Frequency				Utilization of Major Feeds			
	Once a week	Twice a week	Daily	Sometime	Rice bran	Home-made feed	Commercial compound feed	Others
Siem Reap	3%	49%	43%	5%	89%	53%	33%	3%
Chan Sa	0%	30%	63%	7%	97%	87%	7%	0%
Samraong Yea	0%	63%	33%	3%	73%	37%	90%	0%
Kantreang	13%	54%	29%	4%	92%	8%	21%	0%
Roluos	0%	50%	50%	0%	83%	67%	17%	0%
Sangvaeuy	0%	50%	43%	7%	97%	70%	17%	10%
Battambang	0%	20%	72%	7%	74%	18%	45%	18%
Ou Mal	0%	25%	38%	38%	38%	31%	38%	6%
Sdau	0%	7%	67%	27%	27%	60%	67%	27%
Snoeng	0%	40%	60%	0%	60%	0%	40%	20%
Prey Khpos	0%	15%	81%	4%	89%	11%	30%	30%
Khnach Romeas	0%	17%	83%	0%	83%	4%	78%	13%
Anlong Run	0%	18%	82%	0%	86%	32%	79%	18%
Bansay Traeng	0%	20%	80%	0%	76%	8%	64%	36%
Preaek Chik	0%	46%	50%	0%	75%	29%	21%	7%
Hab	0%	4%	80%	16%	64%	12%	0%	16%
Robas Mongkol	0%	19%	77%	4%	96%	0%	38%	12%
Pursat	0%	16%	81%	3%	84%	53%	17%	5%
Khnar Toueng	0%	0%	100%	0%	96%	85%	11%	0%
Trapeang Chorong	0%	19%	81%	0%	69%	54%	23%	0%
Rumlech	0%	4%	96%	0%	64%	79%	14%	4%
Tnaot Chum	0%	57%	43%	0%	93%	21%	7%	21%
Chamraeun Phal	0%	0%	85%	15%	100%	27%	31%	0%

About 70 % of fish farmers fed aquatic plants collected at paddy fields and fish ponds, such as duckweed and morning glory, to fish as supplementary feeds. Moreover, the farmers feeding with crashed termite nests accounted for about 70 %. However, in Battambang province, the rate of famers feeding termite and aquatic plants was smaller than that in other two provinces. It might be related with a higher rate of utilization of commercial compounded feeds in fish farmers. About 20 - 30 % of fish farmers utilized the meal residues of their families to feed fish.

Only 20 % of fish farmers set insect aggregated lights at fish ponds. Because of the costs for setting and maintenance of insect aggregated lights, its utilization was still limited among fish farmers.

Table 5: Utilization of Supplemental Feeds and Setting of Insect Aggregated Lights

Provinces / Communes	Utilization Rate of Supplemental Feeds					Setting rate of insect aggregated lights
	Termite	Worm	Duckweed	Moring glory	Meal residues	
Siem Reap Province	69%	6%	87%	70%	24%	23%
Chan Sa	87%	17%	100%	93%	47%	20%
Samraong Yea	57%	0%	87%	73%	17%	40%
Kantreang	71%	4%	88%	46%	13%	0%
Roluos	50%	0%	50%	67%	17%	0%
Sangvaeuy	67%	3%	80%	63%	20%	30%
Battambang Province	48%	6%	39%	83%	46%	23%
Ou Mal	50%	0%	44%	56%	69%	6%
Sdau	20%	0%	40%	100%	53%	27%
Snoeng	40%	0%	60%	100%	40%	20%
Prey Khpos	59%	11%	56%	89%	70%	15%
Khnach Romeas	13%	9%	22%	100%	22%	17%
Anlong Run	50%	21%	46%	93%	79%	68%
Bansay Traeng	44%	4%	32%	96%	48%	32%
Preaek Chik	43%	7%	21%	64%	29%	18%
Hab	72%	0%	36%	80%	48%	8%
Robas Mongkol	69%	0%	46%	69%	8%	12%
Pursat Province	81%	7%	88%	66%	24%	21%
Khnar Toueng	89%	0%	93%	100%	19%	15%
Trapeang Chornng	100%	15%	100%	88%	35%	46%
Rumlech	79%	0%	82%	93%	36%	25%
Tnaot Chum	86%	18%	82%	18%	11%	7%
Chamraeun Phal	54%	0%	85%	31%	19%	15%

4. Fertilization for Fish Ponds

Most of fish farmers used livestock animal manures, especially cow manures, as natural fertilizers for fish ponds. Only limited number of them (10 - 20 %) used chemical fertilizers, such as Urea and DAP (Diammonium Phosphate). In terms of manure pits recommended by farmers to farmers trainings, 90 % of fish farmers prepared manure pits beside fish ponds in Pursat province; however, only 30 % of them prepared manure pits in Battambang province. As pointing out at a part of utilization of home-made feeds, in Battambang province, there might be some issues on extension and guidance of basic fish culture skills.

Table 6: Utilization of Fertilizers and Setting of Manure Pits for Fish Ponds

Provinces / Communes	Utilization Rate of Fertilizers					Setting rate of manure pits
	Cow manure	Pig manure	Chicken manure	Urea	DAP	
Siem Reap Province	73%	6%	11%	8%	6%	63%
Chan Sa	100%	13%	33%	23%	17%	100%
Samraong Yea	60%	0%	3%	0%	0%	23%
Kantreang	50%	8%	0%	0%	0%	46%
Roluos	33%	17%	33%	33%	33%	33%
Sangvayy	87%	0%	0%	0%	0%	83%
Battambang Province	83%	15%	27%	26%	12%	29%
Ou Mal	75%	6%	31%	50%	25%	38%
Sdau	93%	33%	60%	47%	40%	47%
Snoeng	80%	20%	20%	80%	80%	40%
Prey Khpos	93%	26%	22%	4%	4%	11%
Khnach Romeas	65%	22%	13%	22%	4%	17%
Anlong Run	93%	7%	43%	14%	11%	36%
Bansay Traeng	56%	16%	24%	20%	4%	12%
Preaek Chik	82%	4%	25%	21%	0%	32%
Hab	92%	16%	32%	32%	16%	52%
Robas Mongkol	96%	12%	8%	31%	8%	27%
Pursat Province	93%	19%	45%	24%	14%	93%
Khnar Toueng	100%	26%	59%	0%	0%	100%
Trapeang Chornng	92%	27%	46%	50%	23%	100%
Rumlech	93%	14%	64%	64%	43%	100%
Tnaot Chum	100%	21%	32%	0%	0%	96%
Chamraeun Phal	81%	8%	23%	4%	4%	65%

5. Average Fish Harvest and Post-Harvest

At the time to make the questionnaire surveys, only 30 % of fish farmers had harvested all cultured fish in ponds. Other 60 % of them had partially harvested cultured fish and remaining 10 % of them had not harvested any cultured fish in ponds. The average amount of harvested fish per fish farmer, who had harvested fish totally, was 30 - 40 kg. The average amount of harvested fish per square meters of fish pond was 20 - 30 kg / 100m².

Table 7: Harvest Condition of First Year's Fish Farmers and Average Amount of Fish Harvest (April 2012)

Provinces / Communes	Totally Fish Harvest			Partially Fish Harvest	
	Rate of farmers harvesting fish totally	Average amount of harvested fish per farmer (kg / farmer)	Average amount of harvested fish per pond area (kg/100m ²)	Rate of farmers harvesting fish partially	Average amount of harvested fish per farmer (kg / farmer)
Siem Reap Province	66%	31.0	20.4		
Chan Sa	87%	27.6	27.6		
Samraong Yea	23%	11.7	9.2		
Kantreang	54%	21.1	17.3		
Roluos	50%	25.7	5.9		
Sangvayy	100%	39.5	19.7		
Battambang Province	29%	42.7	21.4	54%	14.4
Ou Mal	31%	39.0	23.3	44%	8.6

Sdau	27%	45.0	24.9	60%	15.3
Snoeng	20%	30.0	20.0	80%	20.3
Prey Khpos	41%	32.2	14.6	33%	17.1
Khnach Romeas	26%	34.3	16.8	70%	12.5
Anlong Run	46%	76.8	30.9	50%	17.1
Bansay Traeng	16%	36.0	16.1	64%	13.1
Preaek Chik	29%	24.6	16.3	57%	12.1
Hab	28%	38.4	24.0	20%	16.8
Robas Mongkol	19%	31.8	22.0	81%	15.5
Pursat Province	37%	32.0	27.9	57%	14.8
Khnar Toueng	15%	26.3	18.8	85%	11.5
Trapeang Chornng	38%	43.3	37.5	58%	17.1
Rumlech	32%	33.9	32.2	54%	13.9
Tnaot Chum	39%	30.6	21.8	54%	12.3
Chamraeun Phal	62%	26.3	25.9	35%	24.7

Note: In case of Siem Reap province, it is difficult to identify the data of totally harvest and partially harvest clearly. Therefore, all harvest data were integrated in 'totally fish harvest'.

The rate of fish farmers selling harvested fish reached only about 20 %. Especially, in Battambang province, 40 % of fish farmers sold harvested fish and 10 - 20 % of their harvest fish was sold on the average. The sale of harvest fish is much active in Battambang than other two target provinces. In addition, 40 % of fish farmers shared some harvested fish with relatives, friends, and neighbors. However, the amount of harvested fish shared with them was very small and accounted for only less than 10 % in total harvest. Almost fish farmers consumed their harvested fish in families. The amount of self-consumption accounted for 70 - 80 % of total fish harvest.

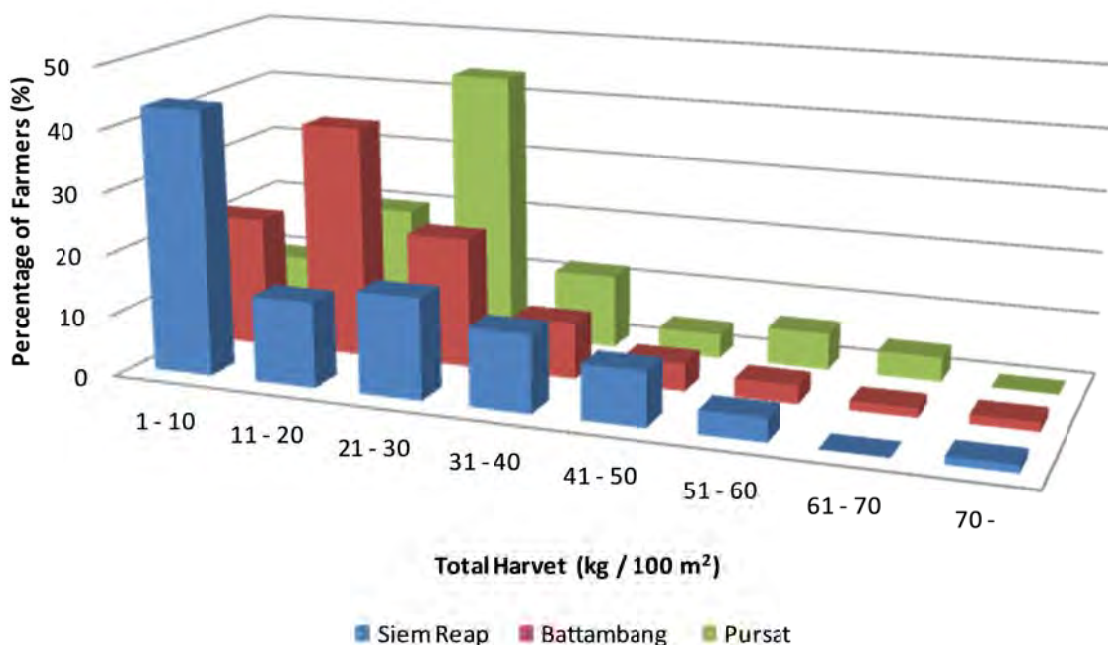


Figure 1: Distribution of Amount of Total Harvest in Fish Farmers

Table 8: Sale, Sharing and Self-Consumption of Cultured Fish after Harvest

Provinces / Communes	Sale of Harvested Fish			Sharing of Harvested Fish			Self-Consumption		
	Rate of farmers selling fish	Average amount of fish sale (kg)	Rate of sold fish in total harvest	Rate of farmers sharing fish	Average amount of shared fish (kg)	Rate of shared fish in total harvest	Rate of farmers consuming fish in family	Average amount of self-consumption (kg)	Rate of self-consumption fish in total harvest
Siem Reap Province	19%	9.7	11%	39%	2.2	7%	99%	19.1	83%
Chan Sa	31%	5.3	12%	58%	2.8	9%	100%	23.7	79%
Samraong Yea	0%	0.0	0%	14%	0.1	1%	100%	11.6	99%
Kantreang	0%	0.0	0%	23%	1.0	3%	92%	20.1	97%
Roluos	0%	0.0	0%	67%	2.7	7%	100%	23.0	93%
Sangvay	23%	20.9	17%	33%	2.5	7%	100%	16.1	75%
Battambang Province	38%	10.5	24%	41%	1.8	9%	96%	12.0	65%
Ou Mal	8%	1.7	2%	67%	3.3	20%	92%	16.3	78%
Sdau	31%	4.5	15%	31%	1.8	14%	92%	19.7	71%
Snoeng	0%	0.0	0%	80%	5.0	21%	100%	17.2	79%
Prey Khpos	50%	11.8	34%	50%	1.8	7%	100%	11.9	58%
Khnach Romeas	27%	7.5	22%	27%	1.0	6%	95%	9.9	72%
Anlong Run	59%	30.1	41%	22%	1.7	6%	100%	14.0	54%
Bansay Traeng	25%	6.7	19%	30%	1.2	8%	100%	9.8	73%
Preaek Chik	4%	5.3	17%	55%	1.8	12%	100%	11.3	72%
Hab	75%	17.1	45%	58%	2.6	9%	92%	9.4	37%
Robas Mongkol	35%	6.3	20%	46%	1.3	6%	100%	11.0	74%
Pursat Province	24%	4.0	12%	48%	2.1	9%	99%	15.9	79%
Khnar Toueng	7%	1.4	5%	52%	1.9	11%	100%	12.4	84%
Trapeang Chornng	12%	1.6	7%	44%	1.9	7%	100%	24.1	86%
Rumlech	29%	13.3	11%	58%	1.8	8%	100%	15.7	77%
Tnaot Chum	15%	2.4	4%	31%	1.9	7%	100%	15.7	89%
Chamraeun Phal	60%	11.2	33%	56%	2.9	11%	96%	11.6	56%

6. Issues on Fish Culture Activities

About 90 % of fish farmers answered that they had some problems on fish culture activities. The most serious problem on fish culture is ‘invasion of predators like snake heads’. 70 - 80 % of them got somehow damage by the invasion of predator fish. The second serious problems are ‘occurrence of floods’ and ‘washed away of culture fish’. 30 - 40 % of fish farmers answered to get some damages to fish culture by floods in rainy seasons. Especially, their answers indicate that the large-scale floods occurred in September and October 2011 seriously affected their fish culture activities all around target areas. ‘low survival rate of cultured fish’ is indicated as the third problem on fish culture activities. It may relate closely to other important problems, ‘invasion of predator fish’ and ‘washed away of cultured fish by floods’.

As specific issues in respective target provinces, in Pursat province, about 80 % of fish farmers pointed out ‘shortage of feeds’. It might mean the difficulties in purchases of commercial compounded feeds. Then, comparing to other two provinces, there may be fewer opportunities to purchase commercial compounded feeds at local markets.

Only a small number of fish famers answered some problems on sales of harvested fish, such as ‘little market for harvested fish’ and ‘low prices of harvested fish’. At current situation, there is no serious problem

on sales of harvested fish.

Table 9: Problems and Issues of Fish Culture Activities (1)

Provinces / Communes	Rate of farmers having some problems	Percentage of Problems on Fish Culture Activities					
		Fish disease	Invasion of predators	Low survival rate	Washed away of cultured fish	Flood	Turbulence of pond water
Siem Reap Province	99%	12%	88%	35%	34%	44%	10%
Chan Sa	97%	28%	100%	0%	10%	10%	28%
Samraong Yea	100%	0%	60%	13%	80%	97%	0%
Kantreang	100%	0%	100%	67%	17%	33%	0%
Roluos	100%	0%	100%	50%	67%	67%	0%
Sangvaeuy	100%	20%	93%	63%	20%	27%	13%
Battambang Province	95%	2%	71%	22%	39%	46%	19%
Ou Mal	100%	0%	100%	6%	31%	63%	25%
Sdau	87%	0%	92%	23%	23%	46%	31%
Snoeng	100%	0%	100%	0%	20%	20%	20%
Prey Khpos	100%	11%	67%	15%	70%	70%	22%
Khnach Romeas	91%	0%	57%	0%	24%	24%	14%
Anlong Run	96%	0%	67%	48%	11%	22%	11%
Bansay Traeng	96%	0%	71%	17%	38%	33%	21%
Preaek Chik	89%	4%	60%	24%	40%	40%	28%
Hab	96%	0%	63%	13%	79%	79%	25%
Robas Mongkol	96%	4%	76%	44%	28%	44%	4%
Pursat Province	96%	13%	82%	41%	15%	14%	52%
Khnar Toueng	100%	22%	78%	78%	11%	22%	44%
Trapeang Chorng	96%	36%	88%	28%	32%	8%	68%
Rumlech	100%	4%	64%	21%	25%	29%	54%
Tnaot Chum	93%	0%	85%	31%	0%	0%	42%
Chamraeun Phal	92%	4%	96%	46%	8%	8%	50%

Table 10: Problems and Issues of Fish Culture Activities (2)

Provinces / Communes	Percentage of Problems on Fish Culture Problems						
	Lack of pond water	Short culture period	Lack of feeds	Lack of fertilizers	Low prices of cultured fish	Little markets for cultured fish	Others
Siem Reap Province	3%	1%	19%	10%	18%	2%	3%
Chan Sa	3%	3%	24%	7%	45%	7%	7%
Samraong Yea	0%	0%	37%	33%	7%	0%	0%
Kantreang	0%	0%	17%	0%	13%	0%	0%
Roluos	17%	0%	17%	0%	17%	0%	0%
Sangvaeuy	3%	0%	0%	0%	7%	0%	3%
Battambang Province	14%	6%	37%	15%	12%	1%	0%
Ou Mal	6%	0%	50%	31%	6%	0%	0%
Sdau	38%	46%	46%	31%	8%	0%	0%
Snoeng	20%	20%	20%	40%	0%	0%	0%
Prey Khpos	22%	15%	41%	33%	11%	0%	0%
Khnach Romeas	5%	0%	76%	10%	10%	10%	0%
Anlong Run	15%	0%	48%	7%	37%	4%	0%
Bansay Traeng	4%	0%	29%	4%	13%	0%	0%
Preaek Chik	24%	4%	24%	16%	0%	0%	0%

Hab	13%	0%	0%	0%	4%	0%	0%
Robas Mongkol	4%	0%	36%	12%	12%	0%	0%
Pursat Province	23%	3%	78%	18%	5%	4%	9%
Khnar Toueng	37%	0%	70%	56%	0%	0%	0%
Trapeang Chornng	16%	16%	76%	8%	0%	0%	0%
Rumlech	32%	0%	96%	7%	25%	18%	4%
Tnaot Chum	12%	0%	77%	0%	0%	0%	42%
Chamraeun Phal	17%	0%	67%	21%	0%	0%	0%

7. Flood Damage

Table 11 indicates the results of actual damages by the flood occurred in September and October 2011. Even though actual flood damages varied in respective target provinces, 30 - 50 % of fish farmers got somehow damages from the floods. The flood damages in Siem Reap province were seriously large. Especially, two communes, Smaraong Yea and Roluos got large flood damages. 70 % of fish farmers getting flood damages answered that their flood damages were seriously large. Then, 40 % of them lost all cultured fish by the floods.

At Preaek Chik and Hab commues in Battambang province, and at Rumech commune in Pursat province, fish famers got serious damages in fish culture. However, comparing to Siem Reap province, the scales of flood damages in both target provinces remained to be limited as a whole.

Table 11: Flood Damage in 2011 (1)

Provinces / Communes	Rate of famers affected by the floods	Degree of Flood Damage			Contents of Flood Damage		
		Serious Damage	Medium Damage	Limited Damage	Washed away of cultured fish	Damage to protection nest	Damage to fish ponds
Siem Reap Province	49%	73%	19%	8%	97%	47%	8%
Chan Sa	20%	0%	50%	50%	83%	17%	17%
Samraong Yea	100%	87%	7%	7%	97%	83%	3%
Kantreang	38%	30%	0%	0%	100%	22%	33%
Roluos	83%	60%	40%	0%	100%	0%	0%
Sangvaeuy	30%	56%	44%	0%	100%	0%	0%
Battambang Province	56%	39%	26%	35%	97%	27%	8%
Ou Mal	69%	18%	55%	27%	91%	55%	27%
Sdau	40%	20%	60%	20%	100%	83%	50%
Snoeng	40%	0%	0%	40%	40%	0%	0%
Prey Khpos	85%	45%	32%	23%	100%	17%	0%
Khnach Romeas	39%	11%	33%	56%	89%	33%	0%
Anlong Run	21%	0%	0%	100%	100%	17%	0%
Bansay Traeng	36%	29%	29%	43%	100%	22%	0%
Preaek Chik	57%	75%	6%	19%	88%	0%	0%
Hab	84%	71%	10%	19%	100%	38%	14%
Robas Mongkol	77%	15%	35%	50%	100%	20%	5%
Pursat Province	27%	19%	19%	56%	94%	61%	8%
Khnar Toueng	30%	13%	38%	50%	100%	100%	0%
Trapeang Chornng	62%	0%	13%	88%	88%	31%	0%
Rumlech	32%	67%	11%	22%	100%	89%	33%
Tnaot Chum	0%	0%	0%	0%	0%	0%	0%
Chamraeun Phal	12%	0%	33%	0%	100%	33%	0%

Table 12: Flood Damage in 2011 (2)

Provinces / Communes	Rate of Cultured Fish Washed Away by Floods					
	100%	80%	60%	40%	20%	10%
Siem Reap Province	41%	32%	7%	12%	7%	2%
Chan Sa	0%	0%	0%	33%	50%	17%
Samraong Yea	53%	33%	0%	10%	3%	0%
Kantreang	56%	44%	0%	0%	0%	0%
Roluos	40%	20%	20%	20%	0%	0%
Sangvaeuy	11%	44%	33%	11%	0%	0%
Battambang Province	20%	12%	6%	27%	26%	9%
Ou Mal	9%	0%	9%	55%	27%	0%
Sdau	17%	17%	0%	50%	17%	0%
Snoeng	0%	0%	0%	0%	20%	20%
Prey Khpos	30%	0%	13%	35%	22%	0%
Khnach Romeas	0%	0%	11%	33%	33%	22%
Anlong Run	0%	0%	0%	0%	50%	50%
Bansay Traeng	11%	11%	0%	44%	22%	11%
Preaek Chik	31%	31%	13%	6%	19%	0%
Hab	48%	24%	0%	10%	14%	5%
Robas Mongkol	0%	15%	0%	30%	40%	15%
Pursat Province	14%	6%	11%	8%	36%	25%
Khnar Toueng	0%	13%	13%	25%	25%	25%
Trapeang Chorng	0%	0%	13%	0%	50%	38%
Rumlech	56%	11%	0%	11%	22%	0%
Tnaot Chum	0%	0%	0%	0%	0%	0%
Chamraeun Phal	0%	0%	33%	0%	33%	33%

8. Future Activities in Fish Culture

More than 90 % of fish farmers answered that they want to stock fish seeds continuously this year. Only less than 10 % of them will stop fish culture activities. In terms of expansion of scale of fish culture, about a half of fish farmers answered to consider expanding their scales of fish culture. However, remaining a half of them does not intend to expand and construct ponds, because their additional costs are necessary.

Table 13: Continuation of Future Fish Culture Activities and Expansion of Fish Culture Scales

Provinces / Communes	Continuation of Future Fish Culture Activities		Expansion of Fish Culture Scales	
	Plan to stock fish seeds	Not intend to stock fish seeds	Want to expand fish culture scale	Not want to expand fish culture scale
Siem Reap Province	93%	7%	17%	74%
Chan Sa	97%	3%	40%	57%
Samraong Yea	97%	3%	10%	87%
Kantreang	100%	0%	4%	96%
Roluos	100%	0%	0%	100%
Sangvaeuy	100%	0%	13%	57%
Battambang Province	95%	5%	51%	49%
Ou Mal	100%	0%	63%	38%
Sdau	93%	7%	93%	7%
Snoeng	100%	0%	100%	0%

	Prey Khpos	100%	0%	33%	67%
	Khnach Romeas	83%	17%	35%	65%
	Anlong Run	93%	7%	59%	41%
	Bansay Traeng	100%	0%	60%	40%
	Preaek Chik	93%	7%	39%	61%
	Hab	96%	4%	48%	52%
	Robas Mongkol	96%	4%	42%	58%
	Pursat Province	90%	10%	36%	50%
	Khnar Toueng	96%	4%	33%	63%
	Trapeang Chornng	85%	15%	50%	31%
	Rumlech	89%	11%	75%	14%
	Tnaot Chum	100%	0%	14%	86%
	Chamraeun Phal	77%	23%	8%	58%

III. Analysis of Extension Effects by Project Activities

Referring to the result of the baseline study conducted by JICA Cambodia Office, the results of the evaluation workshop for first year's fish farmers are compared on four technical aspects, 1) pond preparation, 2) feeding management, 3) pond fertilization and 4) fish production. Moreover, based on the comparison results, the effects of extension activities in the project are also discussed as follows. However, the survey pre-conditions between the baseline survey and the evaluation workshop were not same, and the questionnaire contents of both studies were also same to compare their results. Therefore, comparable figures are limited among both studies. The following discussion should be considered as reference opinions.

Compared some figures between the baseline study and the evaluation workshop, the following outcomes could be indicated in respective technical aspects above-mentioned.

1) Pond Preparation

The practice rates of pump utilization and lime spraying in the evaluation workshop were higher than those of the baseline study. It might indicate that technical guidance on fish pond preparation was carried out smoothly.

2) Feeding Management

Even though the practice rate of daily feeding in Siem Reap province was lower than that of the baseline survey, the practice rates of daily feeding in other target provinces were indicated to be higher. In terms of the practice of home-made feeds, the practice rate in Battambang province was lower than that of the baseline study. On the other hand, the utilization rate of commercial compounded feeds was higher than those of other target provinces, and was close to the result of the baseline study.

3) Pond Fertilization

The utilization rate of livestock animal manures was much higher than that of the baseline study. It might mean that the fertilization practices with livestock animal manures are widely extended by farmers to farmers trainings and on-farm guidance.

4) Fish Production

The average amounts of fish harvests in three target provinces were about a half of that in the baseline study. However, the baseline study covered fish farmers, who had certain experiences of fish culture and fed commercial compounded feeds regularly, as interviewees. As other reference information, the sampling survey of Phase 1 indicated the average fish production in the first year was 0.25 kg / m². Because almost of farmers were beginners of fish culture in the project, the results of fish production in the first year may be reasonable.

Table 13: Comparison of Practice Rates of Fish Culture Skills with Baseline Study

Provinces	Pond Preparation		Feeding Management			Fertilization	Production	
	Utilization of water pump	Spraying of lime powders	Daily Feeding	Practice of home-made feeds	Utilization of compound feeds	Utilization of livestock animal manures	Total fish harvest per farmer	Fish harvest per pond areas
Siem Reap	68 %	90 %	43 %	53 %	33 %	73 %	31.0 kg	20.4 kg/100m ²
Battambang	92 %	81 %	72 %	18 %	45 %	83 %	42.7 kg	21.4 kg/100m ²
Pursat	96 %	96 %	81 %	53 %	17 %	93 %	32.0 kg	27.9 kg/100m ²
Total Average of Baseline Survey	84 %	61 %	72 %	53 %	52 %	37 %	55.0kg	51.4 kg/100m ²

Note: The baseline study covered large and medium-scale fish farmers as target interviewees; therefore, the average amount of fish harvest (production) tends to be higher than actual figures of small-scale farmers. For that reason, in terms of fish production, the median of fish production (55 kg) is adopted as a figure for comparison, not the average (100 kg). The figure of fish harvest per pond areas in the baseline study is calculated by dividing the median (55 kg) by average pond areas (107 m²). As utilization rate of livestock animal manures in the evaluation workshop, the figures of cow manures are indicated above.

As a general result in comparison with the result of baseline study, it can be indicated that the extension activities of Fisheries Administration well promote local fish farmers understand and practice basic technical skills of fish culture. Moreover, ‘improvement of technical advices in feeding management’ and ‘improvement of productivity’ can be regarded as future issues in aquaculture extension.

Questionnaire Survey in the Evaluation Workshop for the Grow-out Farmers

FAIEX2 April 2012

General Information

Name of Commune: _____
Name of Village: _____
Name of Farmer: _____
Main livelihood: Rice farmer Livestock Fish farming Others _____
Sex: Male Female
Age _____ years old
How many fishponds do you have? One Two or more
What is your pond dimension: _____ m²

Fish Farming Practices

- When did you stock the pond with fingerlings? _____ 2011
- How many tails of fingerlings did you stock the pond with: _____ tails
- What fish species did you culture?
 TL SC SB IC CC CL PG Others _____
- Do you feed the fish?
 No feeding Once a week 2-3 times a week Daily Others _____
- What kind of feed do you feed the fish?
 Rice bran uncooked Home-made cooked meal Commercial pellet Others _____
- What supplemental feeds do you feed the fish?
 Commercial pellet Termite Insects/worms Duck weed
 Morning glory Vegetables Kitchen left-over Others _____
- Do you have the insect aggregating light installed on the pond? Yes No
- How do you fertilize the pond?
 Cow manure Pig manure Chicken dung Inorganic fertilizer Others _____
- Do you have manure pit installed for pond fertilization? Yes No
- Do you have protection nets installed around the pond? Yes No

Harvesting

- Have you harvested all the fish in the pond? Yes No
- How many kg have you harvested in the total harvest? _____ kg
- Have you practiced partial harvest before total harvest? Yes No
- How many times of partial harvest have you conducted? _____ times
- How many kg of fish do you estimate you have partially harvested? _____ kg

- How many kg have you sold from partial and total harvests? _____ kg
- How many kg have you given to others (friends/relatives/neighbors)? _____ kg
- How many kg have your family consumed in partial and total harvest? _____ kg

Problems

- Have you encountered any problems on fish culture? ()Yes ()No
- What kind of problems? ()Fish disease ()Predators ()Fish escape
()Flooding or too much water ()Poor water quality
()Lack of water ()Too short culture period
()Lack of feed ()Lack of pond fertilization
()Low fish price ()Limited market
()Others _____
- Have you ever suffered any damages caused by flood in Sep-Nov 2011? ()Yes ()No
- If Yes, what was the damage you encountered on?
()Fish ()Net ()Pond ()Others
- If you lost fish, what was the percentage of the fish loss?
()100% ()80% ()60% ()40% ()20% ()0%
- What was the degree of the damage?
()Very badly ()moderately ()Very limited

Future Plan

- Do you plan to continue fish farming this year? ()Yes ()No
If Yes, why? _____
If No, why? _____
- Do you plan to expand fish farming activities in the future? ()Yes ()No
If Yes, why? _____
If No, why? _____

Request for the FAIEX2 Project, if any

Abstract of Results of Questionnaire Study in Evaluation Workshops for Second Year's Fish Farmers

I. Purpose and Contents of Second Year's Evaluation Workshop

The Department of Aquaculture Development in Fisheries Administration (FiA) and cantonment fisheries offices held the evaluation workshops on fish culture activities of second year's fish farmers at all target communes in the period between 25 April and 3 May 2013. All target fish farmers participated in the workshop and answered questionnaire sheets on their fish culture activities. The evaluation sheet had been prepared by the project expert and FiA counterpart in first year of the project (referring to Annex: Evaluation Questionnaire Sheet).

After the evaluation workshop, FiA counterparts digitalized the questionnaire answers, and prepared the data sheets of target provinces at the beginning of August. Because the second year's data size is twice larger than the first year's, we found a lot of errors and mistakes on data inputs. Therefore, we reconfirmed the contents of data sheets with FiA counterparts. Finally, all data sheets of target provinces were completed for data analysis at the end of August.

We analyzed the data sheets to evaluate general outcomes of fish culture activities. We collected questionnaire answers from 246 farmers in Siem Reap Province (135 in first year), 298 farmers in Battambang Province (218 in first year), and 253 farmers in Pursat Province (120 in first year). Total number of questionnaire answers in all target provinces reached 797 (473 in first year).

Table 1: Summary of Evaluation Workshops for Second Year's Fish Farmers

Target Province	Date (2013)	Target Commune	Division	No. of Participants
Siem Reap	25 April (Thu)	Propel	Soutr Nikom	30
		Tbaeng	Banteay Srei	31
	27 April (Sat)	Kampong Thkov Kralanh	Kralanh	30
		Chanleas Dai	Kralanh	33
	29 April (Mon)	Svay Chek	Angkor Thom	15
		Peak Snaeng	Angkor Thom	14
	1 May (Wed)	Svay Sa	Varin	41
	3 May (Fri)	Lvea Krang	Varin	21
		Prasat	Varin	15
6 May (Mon)	Ta Yeak	Soutr Nikom	28	
Battambang	25 April (Thu)	Lvea	Bavel	29
		Kouk Khmum	Thma Koul	27
		Prey Svay	Moung Ruessei	27
	27 April (Sat)	Voat Kor	Battambang	30
		Reang Kesei	Sangkae	25
		Kampong Prieng	Sangkae	20

	29 April (Mon)	Ampil Pram Daeum	Bavel	45
		Chrey	Thma Koul	25
		Samlout	Samlout	20
		Kear	Moung Ruessei	25
Pursat	25 April (Thu)	Snam Preah	Bakan	27
		Ou Ta Paong	Bakan	28
	27 April (Sat)	Kbal Trach	Krakor	24
		Prongil	Phnum Kravanh	25
	29 April (Mon)	Leach	Phnum Kravanh	26
		Santreae	Phnum Kravanh	28
	1 May (Wed)	Ta Lou	Bakan	28
		Phteah Rung	Phnum Kravanh	24
	3 May (Fri)	Bak Chenhchien	Phnum Kravanh	44

II. Summary of Questionnaire Results

The analysis results of questionnaire answers of second year's fish farmers by target provinces and communes as follows.

1. Basic Information of Fish Farmers (Respondents)

Table 2 indicates the basic information of target fish farmers (respondents) of second year. 80 - 90 % of fish farmers were men, and 10 - 20 % were women. Their average age was around 40 - 50 years old. Their sex ratios and average ages were almost same among target provinces. Fish farmers received fish seeds in August and September 2012 and stocked them in earthen ponds. At the time of evaluation workshops (April and May 2012), 8 - 9 months had passed since fish stocking. Most of fish farmers are engaged in rice farming and livestock as main income sources, and fish culture as side businesses. Moreover, each fish farmer had only one fishpond mostly, and the average area of fishponds was 150 - 250 m².

Table 2: Basic Information of Fish Farmers (Respondents)

Provinces / Communes	Respondent (persons)	Men's ratio	Women's ratio	Average age (years old)	Income Source		Average area of fish pond (m ²)
					Rice farming	Livestock farming	
Siem Reap Province	246	86%	14%	46.4	100%	82%	149
Propel	30	87%	13%	45.2	100%	97%	121
Ta Yaek	28	75%	25%	44.3	100%	79%	150
Svay Check	22	100%	0%	42.7	100%	82%	150
Kralanh	33	91%	9%	47.4	100%	91%	150
Chanleas Dai	15	100%	0%	50.7	100%	73%	140
Svay Sa	37	97%	3%	45.2	100%	59%	173
Prasat	15	80%	20%	46.1	100%	93%	140
Lvea Krang	21	81%	19%	47.0	100%	86%	150
Tbaeng	31	68%	32%	47.8	100%	81%	150
Peak Snaeng	14	79%	21%	51.9	100%	93%	149

Battambang Province	298	87%	13%	43.7	91%	41%	403
Reang Kesei	25	92%	8%	43.3	100%	28%	243
Prey Svay	27	93%	7%	44.7	100%	52%	240
Kear	25	76%	24%	47.2	100%	68%	250
Kampong Prieng	20	85%	15%	43.5	90%	40%	211
Samlout	20	95%	5%	45.9	15%	25%	181
Kouk Khmum	27	89%	11%	43.9	89%	41%	753
Kdol Ta Haen	25	100%	0%	44.3	84%	56%	447
Voat Kor	15	87%	13%	45.6	100%	60%	934
Voat Ta Moem	15	67%	33%	41.1	93%	67%	1091
Lvea	29	76%	24%	41.0	100%	17%	486
Chrey	25	80%	20%	42.2	96%	40%	390
Ampil Pram Daeum	45	91%	9%	43.0	100%	29%	169
Pursat Province	253	77%	23%	42.5	100%	85%	183
Kbal Trach	25	92%	8%	42.4	100%	80%	258
Santreae	28	43%	57%	42.3	100%	68%	149
Bak Chenhchien	43	88%	12%	42.7	100%	95%	190
Ta Lou	28	82%	18%	42.6	100%	100%	230
Leach	26	62%	38%	40.5	100%	100%	165
Ou Ta Paong	28	89%	11%	44.2	100%	100%	142
Phteah Rung	24	83%	17%	44.7	100%	75%	219
Prongil	24	71%	29%	39.4	100%	58%	111
Snam Preah	27	81%	19%	43.8	100%	81%	184

2. Preparation of Fish Pond and Supply of Fish Seeds

After farmer-to-farmer trainings managed by Fisheries Administration, fish farmers prepared their fishponds and received fish seeds from core farmers (seed producers). The project supplied 400 - 500 fish seeds for each farmer. Table 3 indicates the condition of fishpond preparation and the percentages of seed supply by fish species.

The overall utilization rate of irrigation pumps for draining and flowing pond water reached 70 - 90 %. Especially, it reached more than 90 % in Pursat Province. Comparing with other provinces, the utilization rate of irrigation pump for pond preparation still was lower, less than 70 %.

About 70 % of fish farmers answered to spray lime powder to disinfect their fishponds and killed wide fish remaining in ponds. It shows a high effect of farmer-to-farmer trainings. However, in Battambang Province, the practice rate of lime spraying by fish farmers is less than 60 %, and lower than those of other provinces,.

The protection nets around fishponds are effective to protect from predators (snakeheads or frogs) entering fishponds and washing cultured fish out of fishponds by floods. Through trainings and on-farm guidance, Fisheries Administration recommends fish farmers to set those protection nets. However, only a half of them had set the protection nets in Siem Reap and Battambang Provinces. In Pursat province, about 80 % of fish farmers prepared protection nets. It means a high extension effect by the project.

Table 3: Preparation Condition of Fish Ponds and Seed Supply Rate by Fish Species

Provinces / Communes	Fish Pond Preparation			Ave. no. of stocked seeds	Seed Supply Rate (by Fish Species)				
	Utilizing Water Pump	Spraying Lime Powder	Setting Protection Net		Silver Barb	Tilapia	Common Carp	Murgal	Silver Carp
Siem Reap Province	79%	83%	48%	549	100%	100%	100%	100%	0%
Propel	90%	93%	70%	670	100%	100%	100%	100%	0%
Ta Yaek	75%	89%	79%	511	100%	100%	100%	100%	0%
Svay Check	100%	86%	41%	500	100%	100%	100%	100%	0%
Kralanh	88%	88%	85%	865	100%	100%	100%	100%	0%
Chanleas Dai	93%	93%	67%	480	100%	100%	100%	100%	0%
Svay Sa	54%	70%	11%	481	100%	100%	100%	100%	0%
Prasat	100%	100%	67%	507	100%	100%	100%	100%	0%
Lvea Krang	95%	40%	33%	452	100%	100%	100%	100%	0%
Tbaeng	52%	90%	0%	420	100%	100%	100%	100%	0%
Peak Snaeng	71%	64%	71%	436	100%	100%	100%	100%	0%
Battambang Province	66%	56%	45%	690	99%	99%	82%	8%	11%
Reang Kesei	96%	60%	48%	640	100%	100%	100%	0%	0%
Prey Svay	74%	52%	63%	759	100%	100%	100%	0%	0%
Kear	72%	32%	28%	500	100%	100%	100%	0%	0%
Kampong Prieng	100%	95%	95%	459	100%	100%	100%	0%	0%
Samlout	20%	15%	5%	440	100%	100%	100%	0%	0%
Kouk Khmum	81%	70%	44%	841	100%	93%	93%	7%	19%
Kdol Ta Haen	72%	68%	32%	576	100%	96%	50%	46%	21%
Voat Kor	67%	53%	33%	805	93%	100%	53%	0%	60%
Voat Ta Moem	53%	73%	60%	833	100%	100%	87%	0%	40%
Lvea	97%	55%	66%	721	100%	100%	72%	17%	24%
Chrey	56%	68%	76%	840	100%	100%	96%	4%	0%
Ampil Pram Daeum	27%	44%	13%	804	95%	100%	55%	14%	5%
Pursat Province	97%	97%	80%	561	100%	100%	21%	79%	0%
Kbal Trach	72%	84%	72%	528	100%	100%	0%	100%	0%
Santreae	96%	100%	96%	445	100%	100%	0%	100%	0%
Bak Chenhchien	100%	95%	60%	591	100%	100%	0%	100%	0%
Ta Lou	100%	100%	86%	689	100%	100%	0%	100%	0%
Leach	100%	100%	96%	452	100%	100%	100%	0%	0%
Ou Ta Paong	100%	100%	64%	502	100%	100%	100%	0%	0%
Phteah Rung	100%	100%	100%	770	100%	100%	0%	100%	0%
Prongil	100%	96%	71%	442	100%	100%	0%	100%	0%
Snam Preah	100%	100%	85%	614	100%	100%	0%	100%	0%

Silver Barb and Tilapia seeds were widely supplied to fish farmers at all target provinces. Common Carp seeds were also widely supplied in Siem Reap and Battambang Provinces. However, in Pursat Province, the supply rate of Common Carp seeds was only 20 %. In case of Murgal (Indian Carp), fish seeds were widely supplied in Siem Reap and Pursat Provinces. However, in Battambang Province, the supply rate of Murgal seeds is only less than 10 %. In case of Silver Carp, fish seeds were supplied for only limited communes in Battambang Province, because core farmers could not produce a large amount of Silver Carp seeds.

3. Feeding Management

More than a half of fish farmers answered to practice 'Daily feeding' at fishpond. Especially, in Battambang and Pursat Provinces, 70 - 80 % of fish farmers answered to practice 'Daily feeding'. On the country, in Siem Reap Province, the number of fish farmers answering 'Feeding twice per week' was more than 'Daily feeding'.

As major feed materials, 80 - 90 % of fish farmers answered to use 'Rice bran'. Only 40 % of fish farmers answered to apply homemade feeds, recommended by trainings and on-farm guidance. In Pursat Province, 60 % of fish farmers made and used homemade feed regularly. It is higher than other provinces, such as 40 % in Siem Reap Province and 20 % in Battambang Province. It means a difference in outcomes of extension activities on fish culture techniques among target provinces. On the other hand, in Battambang Province, a half of fish farmers answered to use commercial compound feeds regularly. It was higher than other provinces.

Table 4: Feeding Frequency and Utilization of Feed Materials at Fish Farmers

Province / Communes	Feeding Frequency				Utilization of Major Feeds		
	Once a week	Twice a week	Daily	Sometime	Rice bran	Home-made feed	Commercial compound feed
Siem Reap Province	3%	75%	19%	8%	96%	38%	19%
Propel	7%	50%	43%	0%	100%	60%	40%
Ta Yaek	11%	68%	21%	4%	89%	46%	25%
Svay Check	0%	64%	18%	18%	100%	14%	9%
Kralanh	0%	82%	18%	0%	94%	42%	45%
Chanleas Dai	0%	100%	0%	0%	100%	33%	27%
Svay Sa	3%	73%	16%	8%	97%	11%	3%
Prasat	0%	93%	0%	7%	93%	27%	7%
Lvea Krang	0%	86%	24%	10%	100%	10%	5%
Tbaeng	3%	74%	19%	26%	94%	81%	10%
Peak Snaeng	7%	86%	7%	0%	93%	43%	7%
Battambang Province	3%	25%	65%	7%	79%	16%	51%
Reang Ksei	4%	24%	64%	12%	84%	20%	52%
Prey Svay	19%	37%	41%	7%	78%	22%	15%
Kear	0%	32%	60%	8%	76%	16%	40%
Kampong Prieng	0%	20%	70%	10%	75%	15%	65%
Samlout	15%	35%	55%	0%	45%	10%	70%
Kouk Khmum	4%	4%	93%	0%	59%	19%	78%
Kdol Ta Haen	0%	44%	52%	4%	88%	8%	40%
Voat Kor	0%	20%	80%	0%	80%	7%	93%
Voat Ta Moem	0%	40%	60%	0%	93%	7%	93%
Lvea	0%	0%	90%	10%	97%	17%	38%
Chrey	0%	40%	48%	12%	64%	20%	52%
Ampil Pram Daeum	0%	20%	69%	9%	96%	20%	36%
Pursat Province	0%	12%	83%	5%	93%	58%	12%
Kbal Trach	0%	28%	72%	0%	72%	64%	20%
Santreae	0%	4%	96%	0%	89%	21%	0%
Bak Chenhchien	0%	21%	72%	7%	95%	79%	0%
Ta Lou	0%	0%	100%	0%	100%	68%	4%
Leach	0%	8%	92%	0%	100%	35%	4%

Ou Ta Paong	0%	18%	82%	0%	100%	61%	0%
Phteah Rung	0%	0%	100%	0%	100%	75%	63%
Prongil	0%	29%	63%	8%	92%	38%	17%
Snam Preah	0%	0%	74%	26%	89%	70%	19%

70 % of fish farmers fed aquatic plants collected at paddy fields and fishponds, such as duckweed and morning glory, to cultured fish as supplementary feeds. Moreover, the farmers feeding with crashed termite nests accounted for 70 %. However, in Battambang Province, the utilization rates of termite and duckweed for feeding fish was lower than other two provinces. It might be reflected by a higher utilization rate of commercial compounded feeds in fish farmers. 20 - 30 % of fish farmers utilized the meal residues of their families to feed fish.

Only 20 % of fish farmers set insect aggregated lights at fishponds. Due to additional expenses to set and maintain insect aggregated lights, the installation of those devices was still limited among fish farmers.

Table 5: Utilization of Supplemental Feeds and Setting of Insect Aggregated Lights

Provinces / Communes	Utilization Rate of Supplemental Feeds					Setting rate of insect aggregated lights
	Termite	Worm	Duckweed	Moring glory	Meal residues	
Siem Reap Province	70%	11%	75%	86%	41%	13%
Propel	83%	27%	70%	87%	37%	27%
Ta Yaek	68%	39%	79%	86%	50%	21%
Svay Check	73%	0%	68%	82%	32%	0%
Kralanh	48%	0%	94%	88%	39%	36%
Chanleas Dai	73%	7%	87%	93%	33%	13%
Svay Sa	70%	5%	78%	86%	30%	0%
Prasat	47%	0%	87%	87%	13%	0%
Lvea Krang	95%	0%	67%	86%	67%	10%
Tbaeng	61%	13%	68%	81%	58%	3%
Peak Snaeng	86%	0%	43%	86%	43%	0%
Battambang Province	47%	6%	54%	89%	48%	34%
Reang Kesei	28%	4%	72%	92%	28%	36%
Prey Svay	52%	0%	56%	93%	19%	19%
Kear	32%	4%	60%	88%	56%	12%
Kampong Prieng	80%	15%	85%	90%	85%	45%
Samlout	40%	5%	60%	75%	35%	15%
Kouk Khmum	59%	0%	56%	93%	22%	52%
Kdol Ta Haen	76%	4%	60%	88%	40%	24%
Voat Kor	47%	20%	67%	100%	93%	20%
Voat Ta Moem	67%	13%	73%	100%	93%	13%
Lvea	34%	0%	28%	79%	62%	41%
Chrey	48%	12%	64%	84%	52%	40%
Ampil Pram Daeum	31%	4%	22%	91%	42%	53%
Pursat Province	89%	8%	75%	75%	43%	20%
Kbal Trach	88%	32%	52%	44%	44%	8%
Santreae	93%	11%	39%	50%	25%	7%
Bak Chenhchien	93%	5%	60%	79%	74%	7%
Ta Lou	100%	4%	96%	100%	75%	36%
Leach	77%	0%	73%	81%	38%	12%

Ou Ta Paong	89%	4%	93%	86%	32%	43%
Phteah Rung	100%	4%	96%	92%	25%	42%
Prongil	88%	0%	75%	54%	38%	17%
Snam Preah	67%	19%	96%	85%	19%	15%

4. Fertilization for Fish Ponds

Most fish farmers used livestock animal manures, especially cow manures, as natural fertilizers for fishponds. Only limited number of them (10 - 20 %) used chemical fertilizers, such as Urea and DAP (Diammonium Phosphate). In terms of manure pits recommended by farmer-to-farmer trainings, 90 % of fish farmers prepared manure pits beside fish ponds overall. However, only 50 % and 30 % of them prepared manure pits in Siem Reap and Battambang Provinces. As pointing out at a part of utilization of homemade feeds, there might be large difference in outcomes on extension and guidance of basic fish culture skills among target provinces.

Table 6: Utilization of Fertilizers and Setting of Manure Pits for Fish Ponds

Provinces / Communes	Utilization Rate of Fertilizers					Setting rate of manure pits
	Cow manure	Pig manure	Chicken manure	Urea	DAP	
Siem Reap Province	70%	11%	75%	86%	41%	13%
Propel	83%	27%	70%	87%	37%	27%
Ta Yaek	68%	39%	79%	86%	50%	21%
Svay Check	73%	0%	68%	82%	32%	0%
Kralanh	48%	0%	94%	88%	39%	36%
Chanleas Dai	73%	7%	87%	93%	33%	13%
Svay Sa	70%	5%	78%	86%	30%	0%
Prasat	47%	0%	87%	87%	13%	0%
Lvea Krang	95%	0%	67%	86%	67%	10%
Tbaeng	61%	13%	68%	81%	58%	3%
Peak Snaeng	86%	0%	43%	86%	43%	0%
Battambang Province	47%	6%	54%	89%	48%	34%
Reang Kesei	28%	4%	72%	92%	28%	36%
Prey Svay	52%	0%	56%	93%	19%	19%
Kear	32%	4%	60%	88%	56%	12%
Kampong Prieng	80%	15%	85%	90%	85%	45%
Samlout	40%	5%	60%	75%	35%	15%
Kouk Khmum	59%	0%	56%	93%	22%	52%
Kdol Ta Haen	76%	4%	60%	88%	40%	24%
Voat Kor	47%	20%	67%	100%	93%	20%
Voat Ta Moem	67%	13%	73%	100%	93%	13%
Lvea	34%	0%	28%	79%	62%	41%
Chrey	48%	12%	64%	84%	52%	40%
Ampil Pram Daeum	31%	4%	22%	91%	42%	53%
Pursat Province	89%	8%	75%	75%	43%	20%
Kbal Trach	88%	32%	52%	44%	44%	8%
Santreae	93%	11%	39%	50%	25%	7%
Bak Chenhchien	93%	5%	60%	79%	74%	7%
Ta Lou	100%	4%	96%	100%	75%	36%
Leach	77%	0%	73%	81%	38%	12%
Ou Ta Paong	89%	4%	93%	86%	32%	43%

Phteah Rung	100%	4%	96%	92%	25%	42%
Prongil	88%	0%	75%	54%	38%	17%
Snam Preah	67%	19%	96%	85%	19%	15%

5. Average Fish Harvest and Post-Harvest

At the time to make the questionnaire surveys (April 2013), the percentages of fish farmers, who totally harvested cultured fish in ponds, were 70 % in Siem Reap Province, 30 % in Battambang Province, and only 10 % in Pursat Province. Other 60 % of them had partially harvested cultured. The average of fish harvest per fish farmer, who had harvested fish totally, was 20 - 30 kg / 100m². It is not much different from the average amount of total harvest in 1st year. The average fish harvest of fish farmers, who partially harvested cultured fish, was about 10 kg / 100m². It is only a half or a third of the average of total fish harvest.

Table 7: Harvest Condition of Second Year's Fish Farmers and Average Amount of Fish Harvest (April 2013)

Provinces / Communes	Total Fish Harvest		Partial Fish Harvest	
	Rate of farmers harvesting fish totally	Average amount of harvested fish per pond area (kg/100m ²)	Rate of farmers harvesting fish partially	Average amount of harvested fish per pond area (kg/100m ²)
Siem Reap Province	68%	20.1	30%	11.4
Propel	43%	23.5	63%	16.0
Ta Yaek	43%	16.0	57%	9.8
Svay Check	95%	19.7	5%	8.7
Kralanh	94%	21.8	3%	24.7
Chanleas Dai	87%	25.0	13%	15.0
Svay Sa	100%	16.8	0%	
Prasat	100%	24.5	0%	
Lvea Krang	43%	19.3	57%	9.4
Tbaeng	42%	16.2	58%	9.1
Peak Snaeng	50%	22.5	50%	9.7
Battambang Province	28%	27.0	67%	9.7
Reang Kesei	40%	24.0	60%	7.7
Prey Svay	15%	39.1	74%	17.0
Kear	36%	30.1	56%	6.0
Kampong Prieng	30%	30.7	65%	15.9
Samlout	20%	38.5	80%	18.0
Kouk Khmum	7%	12.9	70%	4.9
Kdol Ta Haen	12%	38.0	84%	3.6
Voat Kor	13%	20.0	73%	6.8
Voat Ta Moem	7%	22.2	93%	2.8
Lvea	24%	14.0	72%	4.7
Chrey	60%	18.7	40%	11.5
Ampil Pram Daeum	42%	33.3	56%	16.3
Pursat Province	9%	18.4	88%	8.9
Kbal Trach	32%	21.1	68%	3.8
Santreae	32%	14.9	68%	6.2
Bak Chenhchien	0%		100%	6.4

Ta Lou	0%		100%	15.9
Leach	0%		88%	7.0
Ou Ta Paong	0%		96%	12.7
Phteah Rung	0%		100%	9.0
Prongil	13%	20.7	88%	9.6
Snam Preah	7%	20.2	74%	8.0

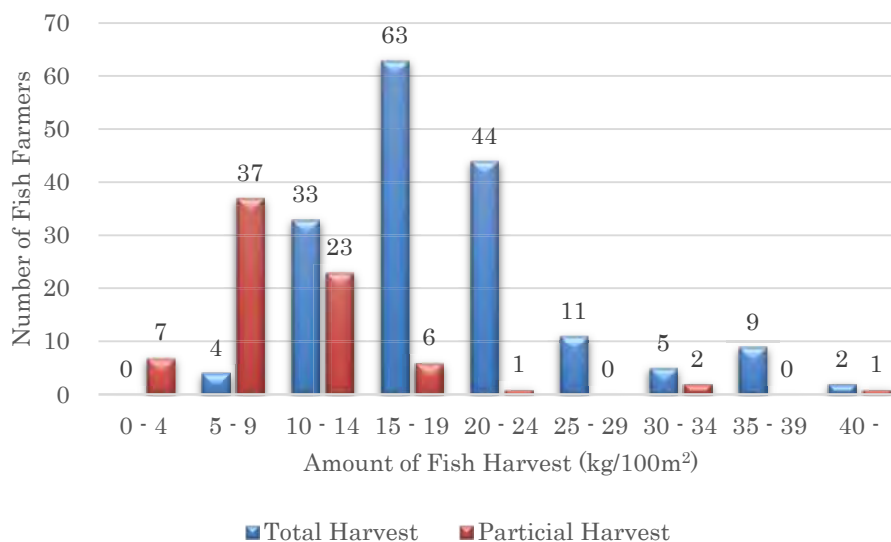


Figure 1: Distribution of Fish Harvest of Second Year's Fish Farmers in Siem Reap Province

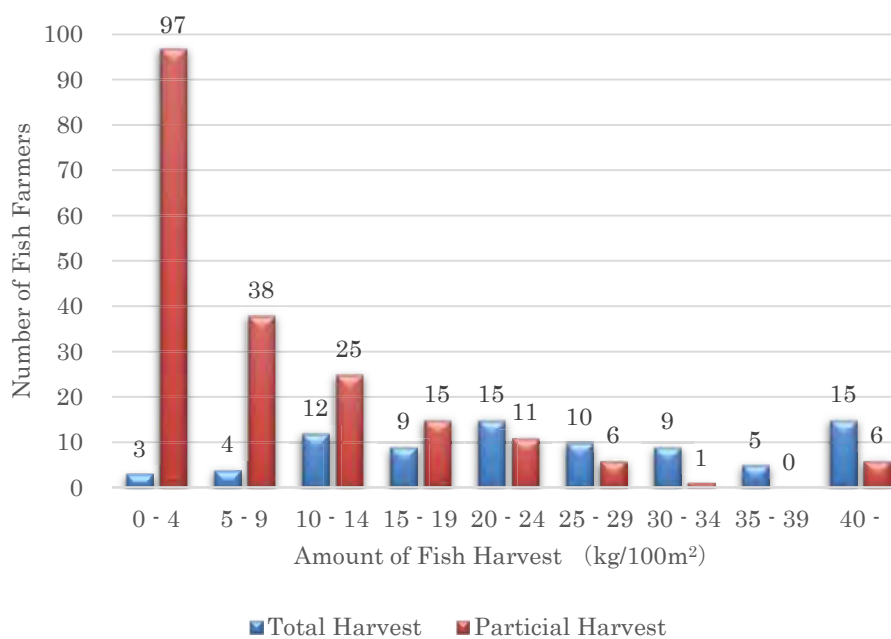


Figure 2: Distribution of Fish Harvest of Second Years' Fish Farmers in Battambang Province

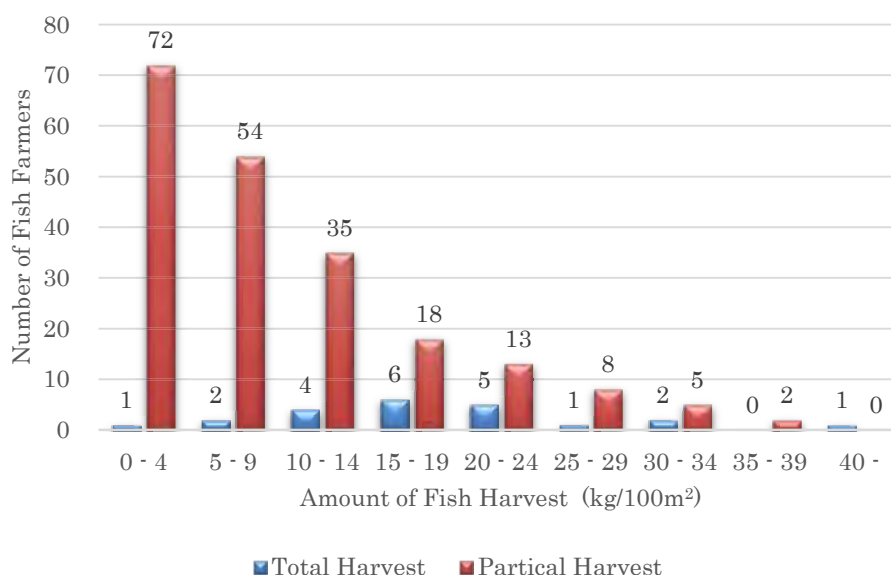


Figure 3: Distribution of Fish Harvest of Second Year's Fish Farmers in Pursat Province

More than 90 % of fish farmers consumed their harvested fish in families (self-consumption). The amount of self-consumption accounted for 70 - 80 % of total fish harvest. On the contrary, the rate of fish farmers selling harvested fish reached only about 20 %. Especially, the rate of fish farmers selling harvested fish in Battambang Province is higher than other provinces, but it reached only 20 %. Then, the portion of fish sale in Battambang Province accounted for only 10 - 20 % in fish harvest. In Siem Reap Province, the rate of fish farmers selling harvested fish reached only less than 10 %. Then, the portion of fish sale in Pursat Province also accounted for less than 10 % in fish harvest on the average. It means that the sale and marketing of harvested fish is one of important issues in aquaculture extension in the future. In addition, about 50 % of fish farmers shared some harvested fish with relatives, friends, and neighbors. However, the amount of harvested fish shared with them was very small, and accounted for only 10 % in fish harvest.

Table 8: Sale, Sharing and Self-Consumption of Cultured Fish after Harvest

Provinces / Communes	Rate of farmers by kind of post-harvest			Rate of post-harvest in fish harvest		
	Sale	Sharing	Self-consumption	Sale	Sharing	Self-consumption
Siem Reap Province	6%	51%	98%	5%	10%	85%
Propel	30%	47%	97%	29%	8%	62%
Ta Yaek	18%	61%	100%	10%	11%	79%
Svay Check	0%	14%	100%	0%	2%	98%
Kralanh	0%	42%	100%	0%	7%	93%
Chanleas Dai	0%	73%	100%	0%	14%	86%
Svay Sa	0%	38%	100%	0%	6%	94%
Prasat	0%	93%	100%	0%	21%	79%
Lvea Krang	0%	76%	100%	0%	13%	87%
Tbaeng	0%	45%	100%	0%	13%	87%
Peak Snaeng	0%	71%	100%	0%	13%	88%
Battambang Province	23%	58%	94%	22%	8%	69%
Reang Kesei	12%	52%	96%	9%	11%	81%

Prey Svay	19%	22%	85%	63%	4%	33%
Kear	16%	48%	92%	12%	8%	79%
Kampong Prieng	30%	55%	95%	18%	16%	66%
Samlout	5%	80%	100%	4%	22%	74%
Kouk Khmum	22%	59%	78%	37%	11%	52%
Kdol Ta Haen	28%	64%	96%	36%	11%	53%
Voat Kor	47%	60%	87%	42%	16%	41%
Voat Ta Moem	53%	67%	100%	36%	9%	55%
Lvea	14%	45%	97%	20%	4%	77%
Chrey	12%	76%	100%	2%	3%	95%
Ampil Pram Daeum	31%	69%	98%	23%	10%	68%
Pursat Province	11%	56%	96%	7%	14%	79%
Kbal Trach	12%	60%	100%	18%	14%	69%
Santreae	0%	71%	100%	0%	15%	85%
Bak Chenhchien	16%	74%	100%	5%	18%	77%
Ta Lou	18%	71%	100%	7%	16%	77%
Leach	8%	12%	88%	12%	2%	86%
Ou Ta Paong	14%	43%	96%	6%	12%	82%
Phteah Rung	8%	96%	100%	5%	17%	78%
Prongil	13%	25%	100%	6%	9%	85%
Snam Preah	11%	37%	81%	7%	10%	83%

6. Issues on Fish Culture Activities

The fish farmers, who answered to have some problems on fish culture activities, accounted for 90 % in Battambang and Pursat Provinces and 60 % in Siem Reap Province. The most serious problem on fish culture was ‘Invasion of predators like snakeheads’. 70 - 80 % of them got somehow damage by the invasion of predator fish. The second serious problems were ‘Shortage of water in fishponds’ and ‘Turbulence of pond water quality’ in second year, instead of ‘Occurrence of floods’ and ‘Washed away of culture fish’ in first year. About 40 % of fish farmers answered to face pond water shortage. ‘Low survival rate of cultured fish’ was the third serious problem on fish culture activities. It may relate closely to first and second problems, ‘Invasion of predator fish’ and ‘Shortage of pond water’.

Only a small number of fish famers answered some problems on sales of harvested fish, such as ‘Little market for harvested fish’ and ‘Low prices of harvested fish’. At current situation, there is no serious problem on sales of harvested fish.

Table 9: Problems and Issues of Fish Culture Activities (1)

Provinces / Communes	Rate of farmers having some problems	Percentage of Problems on Fish Culture Activities					
		Fish disease	Invasion of predators	Low survival rate	Washed away of cultured fish	Flood	Turbulence of pond water
Siem Reap Province	62%	1%	75%	18%	3%	4%	30%
Propel	93%	0%	89%	64%	4%	0%	29%
Ta Yaek	86%	0%	92%	38%	8%	0%	21%
Svay Check	86%	0%	89%	0%	0%	5%	26%
Kralanh	45%	0%	60%	0%	0%	0%	47%
Chanleas Dai	67%	0%	70%	0%	0%	0%	10%
Svay Sa	49%	0%	44%	0%	0%	6%	28%

	Prasat	40%	0%	50%	0%	0%	0%	0%
	Lvea Krang	67%	0%	86%	0%	0%	7%	57%
	Tbaeng	29%	0%	44%	0%	11%	22%	22%
	Peak Snaeng	64%	11%	56%	0%	0%	11%	33%
	Battambang Province	98%	8%	71%	20%	20%	32%	21%
	Reang Kesei	100%	0%	76%	8%	8%	16%	28%
	Prey Svay	100%	7%	70%	15%	0%	0%	37%
	Kear	100%	4%	76%	28%	0%	4%	28%
	Kampong Prieng	90%	0%	89%	11%	17%	22%	17%
	Samlout	100%	5%	100%	20%	20%	15%	10%
	Kouk Khmum	100%	22%	63%	15%	22%	63%	22%
	Kdol Ta Haen	92%	22%	57%	65%	4%	35%	26%
	Voat Kor	100%	7%	87%	60%	20%	27%	27%
	Voat Ta Moem	93%	0%	100%	50%	7%	36%	50%
	Lvea	100%	0%	55%	3%	55%	69%	7%
	Chrey	96%	4%	79%	8%	42%	50%	13%
	Ampil Pram Daeum	98%	11%	52%	5%	27%	34%	9%
	Pursat Province	97%	4%	88%	42%	11%	12%	35%
	Kbal Trach	92%	0%	100%	30%	39%	39%	9%
	Santreae	96%	0%	78%	63%	4%	4%	15%
	Bak Chenhchien	98%	7%	95%	90%	0%	2%	62%
	Ta Lou	93%	0%	73%	12%	12%	8%	27%
	Leach	100%	0%	92%	65%	35%	38%	27%
	Ou Ta Paong	100%	4%	64%	4%	0%	4%	43%
	Phteah Rung	100%	4%	100%	50%	0%	0%	33%
	Prongil	96%	9%	95%	32%	0%	0%	41%
	Snam Preah	100%	7%	100%	4%	19%	19%	44%

Table 10: Problems and Issues of Fish Culture Activities (2)

Provinces / Communes	Percentage of Problems on Fish Culture Problems					
	Lack of pond water	Short culture period	Lack of feeds	Lack of fertilizers	Low prices of cultured fish	Little markets for cultured fish
Siem Reap Province	43%	12%	1%	1%	5%	1%
Propel	14%	0%	0%	0%	14%	0%
Ta Yaek	8%	0%	0%	0%	4%	0%
Svay Check	42%	0%	0%	0%	0%	0%
Kralanh	60%	7%	0%	0%	0%	0%
Chanleas Dai	70%	80%	0%	0%	0%	0%
Svay Sa	94%	44%	0%	0%	0%	0%
Prasat	83%	17%	0%	0%	0%	0%
Lvea Krang	36%	0%	0%	0%	0%	0%
Tbaeng	67%	0%	11%	11%	22%	11%
Peak Snaeng	11%	0%	0%	0%	0%	0%
Battambang Province	38%	7%	21%	12%	5%	2%
Reang Kesei	48%	4%	12%	8%	12%	0%
Prey Svay	48%	4%	4%	11%	4%	4%
Kear	60%	0%	8%	0%	12%	12%
Kampong Prieng	11%	6%	6%	28%	0%	0%
Samlout	45%	20%	45%	55%	0%	0%
Kouk Khmum	30%	15%	15%	11%	7%	0%
Kdol Ta Haen	0%	0%	13%	9%	9%	0%

Voat Kor	20%	13%	7%	7%	0%	0%
Voat Ta Moem	0%	29%	14%	7%	7%	0%
Lvea	17%	3%	24%	14%	0%	3%
Chrey	46%	0%	25%	4%	4%	0%
Ampil Pram Daeum	77%	2%	50%	7%	5%	2%
Pursat Province	39%	20%	14%	4%	0%	0%
Kbal Trach	26%	4%	22%	17%	0%	0%
Santreae	26%	0%	19%	7%	0%	0%
Bak Chenhchien	50%	31%	7%	0%	0%	0%
Ta Lou	42%	58%	15%	4%	0%	0%
Leach	19%	15%	19%	12%	0%	0%
Ou Ta Paong	50%	43%	29%	0%	0%	0%
Phteah Rung	33%	4%	17%	0%	0%	0%
Prongil	36%	14%	5%	5%	0%	0%
Snam Preah	56%	0%	0%	0%	0%	0%

7. Flood Damage

Because national-wide floods occurred in first year (2011) seriously damaged fish farmers, the questionnaire sheet includes some questions to confirm the damage condition by floods. In second year (2012), serious flood rarely occurred and its damage is minimal. Therefore, some fish farmers, who answered not to receive any flood damages, confusingly answered the questions on flood damage. We considered that many farmers mistakenly answer the questions on flood damage. We also confirmed that the questionnaire answers on flood damage is different from the actual condition, confirmed by the follow-up surveys on fish culture activities. Due to those problems on questionnaire answering, we omit the questionnaire result on flood damage in this report.

8. Future Activities in Fish Culture

More than 90 % of fish farmers answered that they intend to buy new fish seeds this year. Only less than 10 % of them answered that they may not continue fish culture. In terms of expansion of scale of fish culture, about 30 % of fish farmers answered to consider expanding existing fishponds or building new fishponds. However, remaining 70 % of them does not intend to expand and construct ponds, because their additional costs are necessary.

Table 11: Continuation of Future Fish Culture Activities and Expansion of Fish Culture Scales

Provinces / Communes	Continuation of Future Fish Culture Activities		Expansion of Fish Culture Scales	
	Plan to stock fish seeds	Not intend to stock fish seeds	Want to expand fish culture scale	Not want to expand fish culture scale
Siem Reap Province	100%	0%	32%	68%
Propel	100%	0%	3%	97%
Ta Yaek	100%	0%	4%	96%
Svay Check	100%	0%	100%	0%
Kralanh	100%	0%	3%	97%
Chanleas Dai	100%	0%	100%	0%
Svay Sa	100%	0%	0%	100%
Prasat	100%	0%	100%	0%

Lvea Krang	100%	0%	100%	0%
Tbaeng	100%	0%	0%	100%
Peak Snaeng	100%	0%	14%	86%
Battambang Province	95%	5%	35%	54%
Reang Kesei	96%	4%	20%	68%
Prey Svay	85%	15%	22%	37%
Kear	84%	16%	16%	68%
Kampong Prieng	95%	5%	25%	75%
Samlout	100%	0%	75%	25%
Kouk Khmum	96%	4%	26%	52%
Kdol Ta Haen	100%	0%	56%	32%
Voat Kor	93%	7%	27%	47%
Voat Ta Moem	100%	0%	33%	40%
Lvea	93%	7%	41%	59%
Chrey	100%	0%	28%	72%
Ampil Pram Daeum	98%	2%	42%	58%
Pursat Province	96%	4%	26%	74%
Kbal Trach	92%	8%	32%	68%
Santreae	100%	0%	4%	96%
Bak Chenhchien	100%	0%	47%	53%
Ta Lou	96%	4%	36%	64%
Leach	100%	0%	8%	92%
Ou Ta Paong	96%	4%	32%	68%
Phteah Rung	96%	4%	29%	71%
Prongil	83%	17%	4%	96%
Snam Preah	93%	7%	33%	67%

III. General Conclusion

The questionnaire answer results in uneven outcomes of technical extension among target provinces, in terms of the setting of protection nets around fishponds, the utilization of homemade feeds, the setting of manure pits for pond fertilization, etc. The difference in extension activities and measurement of respective cantonment fisheries offices may reflect the uneven outcome of technical extension to fish farmers. Therefore, we may need to consider proper arrangement and implication on aquaculture extension activities in the future.

The average amount of total harvest in second year (20 - 30 kg / 100m²) is almost same as the result in first year. It means that the fish culture skills promoted by Fisheries Administration may secure stable fish productivity for local farmers.

‘Invasion of predator fish into fishponds’ is the most serious problem in fish culture in first and second years. The second serious problem in second year is ‘Shortage of water in fishponds’; instead, ‘Flood in fishponds’ is the second problem in first year. Therefore, we should regard a dependence on natural water, especially rainfall, as an important issue in fish culture.

In terms of post-harvest of cultured fish, fish farmers consume most harvested fish at their home (self-consumption). They consume 70 - 80 % of harvested fish at home on the average. Only 20 % of harvested fish is sold at home or local markets for cash income. Even though they consume cultured fish by

themselves, fish culture contributes to reduction of food expense indirectly. However, the income generation by fish culture activities may be taken a long time in the future.

More than 90 % of fish farmers answered to continue fish culture activities with purchasing new fish seeds after the completion of project assistance. It means that the extension program to local farmers by the project is very effective to promote fish culture activities in local communities.

Questionnaire Survey in the Evaluation Workshop for the Grow-out Farmers

FAIEX2 April 2013

General Information

Name of Commune: _____
Name of Village: _____
Name of Farmer: _____
Main livelihood: Rice farmer Livestock Fish farming Others _____
Sex: Male Female
Age _____ years old
How many fishponds do you have? One Two or more
What is your pond dimension: _____ m²

Fish Farming Practices

- When did you stock the pond with fingerlings? _____ 2011
- How many tails of fingerlings did you stock the pond with: _____ tails
- What fish species did you culture?
 TL SC SB IC CC CL PG Others _____
- Do you feed the fish?
 No feeding Once a week 2-3 times a week Daily Others _____
- What kind of feed do you feed the fish?
 Rice bran uncooked Home-made cooked meal Commercial pellet Others _____
- What supplemental feeds do you feed the fish?
 Commercial pellet Termite Insects/worms Duck weed
 Morning glory Vegetables Kitchen left-over Others _____
- Do you have the insect aggregating light installed on the pond? Yes No
- How do you fertilize the pond?
 Cow manure Pig manure Chicken dung Inorganic fertilizer Others _____
- Do you have manure pit installed for pond fertilization? Yes No
- Do you have protection nets installed around the pond? Yes No

Harvesting

- Have you harvested all the fish in the pond? Yes No
- How many kg have you harvested in the total harvest? _____ kg
- Have you practiced partial harvest before total harvest? Yes No
- How many times of partial harvest have you conducted? _____ times
- How many kg of fish do you estimate you have partially harvested? _____ kg

- How many kg have you sold from partial and total harvests? _____ kg
- How many kg have you given to others (friends/relatives/neighbors)? _____ kg
- How many kg have your family consumed in partial and total harvest? _____ kg

Problems

- Have you encountered any problems on fish culture? ()Yes ()No
- What kind of problems? ()Fish disease ()Predators ()Fish escape
 ()Flooding or too much water ()Poor water quality
 ()Lack of water ()Too short culture period
 ()Lack of feed ()Lack of pond fertilization
 ()Low fish price ()Limited market
 ()Others _____

- Have you ever suffered any damages caused by flood in Sep-Nov 2011? ()Yes ()No
- If Yes, what was the damage you encountered on?
 ()Fish ()Net ()Pond ()Others
- If you lost fish, what was the percentage of the fish loss?
 ()100% ()80% ()60% ()40% ()20% ()0%
- What was the degree of the damage?
 ()Very badly ()moderately ()Very limited

Future Plan

- Do you plan to continue fish farming this year? ()Yes ()No
 If Yes, why? _____
 If No, why? _____

- Do you plan to expand fish farming activities in the future? ()Yes ()No
 If Yes, why? _____
 If No, why? _____

Request for the FAIEX2 Project, if any

Abstract of Results of Questionnaire Study in Evaluation Workshop for Third Year's Fish Farmers

I. Purpose and Contents of Third Year's Evaluation Workshop

The Department of Aquaculture Development in Fisheries Administration (FiA) and cantonment fisheries officers held the evaluation workshops on fish culture activities to with third year's fish grow-out farmers at all target communes in the period between 20 January and 19 February 2014. The purpose of the workshop is to confirm the progress of fish grow-out culture of third year's farmers, and evaluate the concrete effects of extension services on them. The evaluation workshops for first and second years were held in April and May, corresponding with a regular harvest season of cultured fish. In the third year, the evaluation workshop was held earlier than those of last two years, because we the data analysis and arrangement has to be completed before the final evaluation, which was planned to be held in August 2014.

All fish grow-out farmers, whom the project supported in the third year of the project, participated in the workshops, and answered questionnaire sheets on their fish culture activities. The evaluation sheet had been prepared by Mr. Chikami, JICA Fisheries Development Adviser, and FiA counterparts in the first year of the project (referring to Annex: Evaluation Questionnaire Sheet).

After the evaluation workshop, FiA counterparts digitalized the questionnaire answers, and prepared the data sheets of target provinces until June. Because the third year's data size is larger than the second year's, we found more errors and mistakes on data inputs. Therefore, we have to spend much time to correct them for data analysis. The data sheets of all target provinces for data analysis were completed at the end of July.

Based on the data sheets, we analyzed the outcomes of fish culture activities in the third year. We collected questionnaire answers from 331 farmers in Siem Reap Province (135 in first year, 246 in second year), 383 farmers in Battambang Province (218 in first year, 298 in second year), and 377 farmers in Pursat Province (120 in first year, 253 in second year). Total number of questionnaire answers in all target provinces reached 1,091 (473 in first year, 797 in second year).

Table 1: Summary of Evaluation Workshop for Third Year's Fish Farmers

Target Province	Date (2014)	Target Commune	Division	No. of Participants
Siem Reap	20 January (Mon)	Doun Peng	Angkor Chum	49
	22 January (Wed)	Doun Peng	Angkor Chum	25
		Kouk Doung	Angkor Chum	36
	24 January (Fri)	Suay Leu	Suay Leu	39
		Boeng Mealea	Suay Leu	25
	27 January (Mon)	Boeng Mealea	Suay Leu	21
		Kouk Thiok Leu	Chi Kraeng	31
	29 January (Wed)	Roung Kou	Kralanh	43
31 January (Fri)	Sranal	Kralanh	20	

		Snoul	Kralanh	12
	19 February (Wed)	Prey Chruk	Puok	30
Battambang	27 January (Mon)	Sdock Praveck	Rukhak Kiri	25
		Kdol Ta Haen	Bavel	26
		Bay Damram	Banan	24
	29 January (Wed)	Kamreing	Kamreing	20
		Boeung Reang	Kamreing	20
		Ta Saen	Kamreing	36
	31 January (Fri)	Bavel	Bavel	30
		Ta Sanh	Samlout	24
		Ou Samrel	Samlout	29
	3 February (Mon)	Ruessei Krang	Moung Ruessei	26
		Chaeng Mean Chey	Banan	40
		Prey Touch	Moung Ruessei	31
		Kakaoh	Moung Ruessei	
	5 February (Wed)	Prey Tralach	Rukhak Kiri	20
		Thipakdei	Koas Krala	32
Pursat	20 January (Mon)	Rokat	Phnum Kravanh	28
		Boeng Khnar	Bakan	28
	22 January (Wed)	Chheu Tom	Krakor	30
		Svay Sa	Krakor	32
	24 January (Fri)	Ansa Chambak	Krakor	29
		Anlong Tnot	Krakor	24
	27 January (Mon)	Sna Ansa	Krakor	29
		Kaoh Chum	Kandieng	14
	29 January (Wed)	Boeng Kantout	Krakor	29
		Ou Sandan	Krakor	22
	31 January (Fri)	Roleab	Pursat	25
		Lolok Sa	Pursat	31
	11 February (Tue)	Ou Ta Paong	Bakan	25
Ta Lou		Bakan	31	

II. Summary of Questionnaire Results

The analysis result of questionnaire answers of third year's fish farmers by target provinces and communes is mentioned below.

1. Basic Information of Fish Farmers (Respondents)

Table 2 indicates the basic information of target fish farmers (respondents) of third year. 80 – 90 % of fish farmers were men, and 10 – 20 % were women. Their average age was 40 – 50 years old. Their sex ratio and average ages were almost same among target provinces. Fish farmers received fish seeds in July and August 2013, and stocked them in earthen ponds. At the time of evaluation workshops (January and February 2014),

only 6 – 7 months had passed since fish stocking. Most of fish farmers are engaged in rice farming and livestock as main income sources, and fish culture as side business. Moreover, each fish farmer had only one fishpond mostly, and the average area of fishponds was 150 – 250 m².

Table 2: Basic Information of Fish Farmers (Respondents)

Province / Commune	Respondent (persons)	Men's ratio	Women's ratio	Average age (years ago)	Income Source		Average area of fishpond (m ²)
					Rice farming	Livestock farming	
Siem Reap Province	331	92%	8%	45.5	100%	62%	166
Doun Peng	74	90%	10%	44.3	100%	88%	170
Kouk Doung	36	92%	8%	44.2	100%	86%	233
Suay Leu	39	83%	17%	43.8	100%	82%	138
Roung Kou	43	93%	7%	47.5	100%	67%	157
Sranal	20	100%	0%	49.8	100%	85%	161
Snoul	12	86%	14%	42.0	100%	75%	199
Prey Chruk	30	91%	9%	48.0	100%	60%	170
Boeng Mealea	46	100%	0%	43.4	100%	0%	145
Kouk Thiok Leu	31	91%	9%	48.5	100%	13%	149
Battambang Province	383	93%	7%	47.7	80%	41%	281
Boeung Reang	15	87%	13%	48.0	13%	7%	268
Ou Da	5	100%	0%	48.4	80%	0%	120
Kamreing	20	100%	0%	46.9	30%	45%	287
Chaeng Mean Chey	40	95%	5%	48.8	98%	48%	159
Bay Damram	24	92%	8%	48.1	92%	46%	241
Prey Touch	26	92%	8%	50.0	100%	23%	302
Kakaoh	5	100%	0%	49.6	100%	80%	366
Thipakdei	32	97%	3%	44.5	100%	38%	347
Ta Sanh	24	100%	0%	46.9	71%	42%	146
Ou Samrel	29	86%	14%	42.0	66%	52%	211
Sdock Praveck	33	97%	3%	45.8	91%	88%	228
Prey Tralach	12	92%	8%	46.9	100%	50%	444
Bavel	41	85%	15%	50.2	93%	17%	445
Ta Saen	36	83%	17%	52.3	33%	11%	374
Kdol Ta Haen	15	100%	0%	51.3	100%	60%	325
Ruessei Krang	26	96%	4%	44.5	96%	54%	201
Pursat Province	377	76%	24%	45.8	98%	94%	174
Lolok Sa	25	60%	40%	47.6	100%	100%	121
Roleab	25	88%	12%	46.8	100%	96%	187
Boeng Kantout	29	76%	24%	48.1	100%	100%	146
Kaoh Chum	14	93%	7%	45.1	100%	100%	157
Ou Sandan	22	68%	32%	44.7	100%	95%	154
Ansa Chambak	29	93%	7%	46.8	93%	90%	331
Sna Ansa	29	69%	31%	44.7	100%	97%	164
Anlong Tnot	24	75%	25%	48.6	92%	92%	176
Svay Sa	32	72%	28%	44.6	88%	94%	137
Chheu Tom	30	50%	50%	41.1	100%	90%	216
Rokat	28	64%	36%	44.6	100%	89%	132
Boeng Khnar	28	89%	11%	46.2	100%	79%	230
Ta Lou	31	94%	6%	47.4	100%	100%	123
Ou Ta Paong	31	74%	26%	45.2	100%	100%	153

2. Preparation of Fish Pond and Supply of Fish Seeds

After farmer-to-farmer trainings managed by Fisheries Administration, fish farmers prepared their fishponds by themselves, and received fish seeds from core farmers (seed producers). The project supplied about 500 fish seeds for each farmer. Table 3 indicates the condition of fishpond preparation and the percentage of seed supply by fish species.

The overall utilization rate of irrigation pumps for draining and flowing pond water reached a high percentage, 80 – 90 % in Battambang and Pursat Provinces. However, in Siem Reap Province, only 50 % of fish famers utilized irrigation pumps for fishpond preparation.

About 80 % of fish farmers answered to spray lime powder to disinfect their fishponds and kill wide fish remaining in ponds. It is one of effects of farmer-to-farmer trainings. However, in Battambang Province, the p the application rate of line spraying by fish farmers is less than 70 %, and lower than those of other provinces.

The protection nets around fishponds are effective to protect from predators (snakeheads or frogs) entering fishponds and washing cultured fish out of fishponds by floods. Through training programs and on-farm guidance, Fisheries Administration recommend fish farmers to set those protection nets. In this year, because the project provided protection nets to fish farmers, the application rate of protection nets attained almost 100% of them in three target provinces.

Table 3: Preparation Condition of Fishponds and Seed Supply Rate by Fish Species

Province / Commune	Fishpond Preparation			Ave. no of stocked seeds	Seed Supply Rate (by Fish Species)				
	Utilizing Water Pump	Spraying Lime Powder	Setting Protection Net		Silver Barb	Tilapia	Common Carp	Murgal	Silver Carp
Siem Reap Province	54%	91%	100%	529	100%	100%	100%	8%	0%
Doun Peng	82%	86%	100%	500	100%	100%	100%	32%	0%
Kouk Doung	81%	83%	100%	500	100%	100%	100%	0%	0%
Suay Leu	59%	92%	100%	500	100%	100%	100%	0%	0%
Roung Kou	21%	98%	100%	559	100%	100%	100%	0%	0%
Sranal	40%	100%	100%	640	100%	100%	100%	0%	0%
Snoul	25%	100%	100%	500	100%	100%	100%	0%	0%
Prey Chruk	33%	97%	100%	517	100%	100%	100%	0%	0%
Boeng Mealea	43%	85%	100%	526	100%	100%	100%	4%	0%
Kouk Thiok Leu	55%	90%	100%	581	100%	100%	100%	0%	0%
Battambang Province	81%	67%	98%	688	100%	100%	100%	36%	8%
Boeung Reang	67%	40%	100%	647	100%	100%	100%	0%	0%
Ou Da	100%	80%	100%	570	100%	100%	100%	0%	0%
Kamreing	80%	25%	100%	485	100%	100%	100%	0%	0%
Chaeng Mean Chey	63%	70%	98%	444	100%	100%	100%	0%	0%
Bay Damram	100%	83%	100%	542	100%	100%	100%	0%	0%
Prey Touch	92%	81%	96%	571	100%	100%	100%	0%	0%
Kakaoh	100%	80%	80%	760	100%	100%	100%	0%	0%
Thipakdei	63%	41%	67%	435	70%	70%	70%	0%	0%
Ta Sanh	50%	42%	100%	640	100%	100%	100%	0%	100%
Ou Samrel	83%	79%	100%	517	100%	100%	97%	3%	3%
Sdock Praveck	94%	100%	94%	500	100%	100%	100%	100%	0%
Prey Tralach	75%	67%	92%	550	100%	100%	100%	100%	0%

Bavel	90%	83%	100%	1017	100%	100%	100%	73%	2%
Ta Saen	69%	3%	100%	1042	100%	100%	100%	100%	8%
Kdol Ta Haen	80%	100%	100%	1880	100%	100%	100%	0%	0%
Ruessei Krang	92%	96%	100%	663	100%	100%	100%	100%	0%
Pursat Province	97%	89%	100%	531	100%	100%	23%	74%	6%
Lolok Sa	100%	100%	100%	456	100%	100%	0%	100%	0%
Roleab	92%	100%	100%	600	100%	100%	36%	12%	52%
Boeng Kantout	100%	100%	100%	474	100%	100%	0%	100%	0%
Kaoh Chum	86%	100%	100%	513	100%	100%	0%	100%	0%
Ou Sandan	95%	82%	100%	462	100%	100%	95%	9%	18%
Ansa Chambak	100%	97%	100%	757	100%	100%	7%	93%	0%
Sna Ansa	97%	72%	100%	498	100%	100%	7%	93%	0%
Anlong Tnot	96%	96%	100%	467	100%	100%	25%	71%	21%
Svay Sa	100%	22%	100%	460	100%	100%	53%	53%	3%
Chheu Tom	93%	93%	100%	556	100%	100%	0%	100%	0%
Rokat	96%	100%	100%	463	100%	100%	100%	0%	0%
Boeng Khnar	100%	96%	100%	630	100%	100%	7%	96%	0%
Ta Lou	100%	100%	100%	473	100%	100%	0%	100%	0%
Ou Ta Paong	100%	100%	100%	591	100%	100%	0%	100%	0%

Silver Barb and Tilapia seeds were widely supplied to fish farmers at all target provinces. Common Carp seeds were also widely supplied in Siem Reap and Battambang Provinces. However, in Pursat Province, the supply ratio of Common Carp seeds was only 20 %.

In terms of Murgal (Indian Carp), 70 % of fish farmers received fish seeds in Pursat Provinces. However, the supply rates of Murgal seeds in Siem Reap and Battambang Provinces were only 10 % and 40 %.

Especially, in terms of Silver Carp, fish seeds were supplied for only limited communes in Battambang and Pursat Provinces, because core farmers could not produce a large amount of Silver Carp seeds.

3. Feeding Management

More than a half of fish farmers answered to practice 'Daily feeding' at fishponds. Especially, in Battambang and Pursat Provinces, 70 – 80 % of fish farmers answered to practice 'Daily feeding'. On the contrary, in Siem Reap Province, fish farmers were divided half-and-half by their answers, 'Daily feeding' or 'Feeding twice per week'.

As major feed materials, 80 – 90 % of fish farmers answered to use 'Rice bran'. Only 40 % of fish farmers answered to apply homemade feeds, recommended by training programs and on-farm guidance of Fisheries Administration. In Pursat Province, 60 % of fish farmers made and used homemade feeds regularly. It is higher than only 30 % in Siem Reap and Battambang Province. It means a difference in outcomes of extension activities on fish feeding skills among target provinces. On the other hand, in Battambang Province, about 40 % of fish farmers answered to use commercial compounded feeds for feeding fish regularly. It is higher than other provinces.

Table 4: Feeding Frequency and Utilization of Feed Materials at Fish Farmers

Province / Commune	Feeding Frequency				Utilization of Major Feeds		
	Once a week	Twice a week	Daily	Sometime	Rice bran	Home-made feed	Commercial compound feeds
Siem Reap Province	1%	51%	47%	2%	96%	30%	19%
Doun Peng	3%	53%	43%	4%	97%	38%	20%
Kouk Doung	0%	81%	19%	0%	100%	36%	39%
Suay Leu	3%	64%	28%	5%	97%	18%	5%
Roung Kou	0%	37%	60%	2%	91%	7%	23%
Sranal	0%	45%	55%	0%	100%	10%	0%
Snoul	0%	50%	50%	0%	100%	42%	8%
Prey Chruk	3%	37%	60%	0%	90%	40%	60%
Boeng Mealea	0%	39%	59%	0%	93%	48%	2%
Kouk Thiok Leu	0%	48%	52%	0%	100%	26%	3%
Battambang Province	1%	19%	78%	2%	79%	31%	43%
Boeung Reang	0%	80%	20%	0%	87%	7%	87%
Ou Da	0%	40%	60%	0%	60%	0%	100%
Kamreing	0%	45%	35%	20%	70%	15%	55%
Chaeng Mean Chey	0%	20%	80%	0%	78%	15%	48%
Bay Damram	0%	4%	92%	4%	88%	4%	21%
Prey Touch	0%	4%	96%	0%	73%	12%	15%
Kakaoh	0%	0%	100%	0%	80%	0%	20%
Thipakdei	0%	11%	59%	0%	57%	11%	13%
Ta Sanh	0%	29%	67%	4%	54%	58%	75%
Ou Samrel	10%	7%	83%	0%	76%	7%	52%
Sdock Praveck	0%	6%	94%	0%	77%	45%	10%
Prey Tralach	0%	42%	58%	0%	75%	25%	42%
Bavel	0%	20%	76%	5%	80%	37%	32%
Ta Saen	0%	3%	97%	0%	97%	69%	78%
Kdol Ta Haen	0%	47%	53%	0%	87%	20%	73%
Ruessei Krang	4%	8%	88%	0%	77%	92%	19%
Pursat Province	0%	12%	86%	2%	75%	57%	32%
Lolok Sa	0%	0%	100%	0%	100%	60%	12%
Roleab	0%	4%	96%	0%	68%	96%	28%
Boeng Kantout	0%	0%	100%	0%	100%	52%	3%
Kaoh Chum	0%	29%	71%	0%	93%	64%	0%
Ou Sandan	0%	18%	73%	9%	27%	50%	73%
Ansa Chambak	0%	24%	76%	0%	62%	59%	31%
Sna Ansa	0%	21%	72%	7%	66%	59%	14%
Anlong Tnot	0%	33%	58%	8%	42%	33%	38%
Svay Sa	0%	19%	81%	0%	56%	59%	6%
Chheu Tom	0%	10%	90%	0%	97%	33%	60%
Rokat	0%	4%	93%	4%	75%	71%	4%
Boeng Khnar	0%	25%	75%	0%	82%	50%	43%
Ta Lou	0%	0%	100%	0%	84%	84%	58%
Ou Ta Paong	0%	0%	100%	0%	97%	35%	61%

70 – 80 % of fish farmers fed aquatic plants collected at paddy fields and fishponds, such as duckweed and morning glory, to cultured fish as supplementary feeds. Moreover, the farmers feeding with crashed termite nests also accounted for 70 %. However, in Battambang Province, the utilization rate of termite and duckweed for feeding fish was lower than other provinces. It might be reflected by a higher utilization rate of

commercial feeds among fish farmers in the province. 40 – 50 % of fish farmers utilized the meal residues of their families to feed cultured fish.

Only 10 % of fish farmers use insect aggregating lumps at fishponds. Due to additional expenses to prepare and maintain insect aggregating lumps, the installation of those devices was limited among fish farmers.

Table 5: Utilization of Supplemental Feeds and Usage of Insect Aggregating Lumps

Province / Commune	Utilization Rate of Supplemental Feeds					Usage rate of insect aggregating lumps
	Termite	Worm	Duckweed	Morning glory	Meal residues	
Siem Reap Province	79%	8%	70%	72%	24%	9%
Doun Peng	76%	16%	77%	78%	32%	11%
Kouk Doung	56%	0%	97%	89%	42%	31%
Suay Leu	79%	3%	31%	64%	10%	0%
Roung Kou	98%	2%	93%	53%	7%	5%
Sranal	90%	0%	100%	85%	0%	0%
Snoul	92%	8%	83%	75%	42%	0%
Prey Chruk	50%	10%	80%	77%	50%	30%
Boeng Mealea	85%	17%	48%	72%	26%	2%
Kouk Thiok Leu	94%	6%	39%	61%	6%	0%
Battambang Province	53%	5%	33%	81%	47%	13%
Boeung Reang	13%	0%	20%	100%	20%	7%
Ou Da	60%	0%	20%	100%	0%	0%
Kamreing	20%	15%	0%	95%	30%	5%
Chaeng Mean Chey	68%	3%	20%	53%	55%	0%
Bay Damram	67%	4%	8%	79%	25%	0%
Prey Touch	69%	0%	35%	73%	27%	0%
Kakaoh	60%	0%	20%	100%	0%	0%
Thipakdei	30%	2%	4%	48%	15%	0%
Ta Sanh	79%	21%	25%	75%	50%	8%
Ou Samrel	66%	0%	38%	79%	72%	10%
Sdock Praveck	77%	6%	71%	84%	87%	26%
Prey Tralach	58%	8%	67%	83%	75%	0%
Bavel	39%	7%	68%	88%	49%	27%
Ta Saen	8%	3%	6%	94%	67%	31%
Kdol Ta Haen	7%	0%	0%	100%	7%	13%
Ruessei Krang	96%	4%	92%	88%	54%	38%
Pursat	73%	5%	69%	72%	66%	13%
Lolok Sa	100%	0%	100%	100%	92%	0%
Roleab	96%	4%	12%	68%	64%	8%
Boeng Kantout	100%	0%	97%	97%	79%	3%
Kaoh Chum	64%	0%	93%	36%	64%	0%
Ou Sandan	59%	5%	86%	77%	95%	14%
Ansa Chambak	55%	14%	55%	48%	41%	14%
Sna Ansa	69%	3%	21%	24%	14%	3%
Anlong Tnot	83%	8%	79%	71%	71%	17%
Svay Sa	84%	6%	91%	72%	88%	6%
Chheu Tom	57%	13%	77%	50%	77%	7%
Rokat	57%	4%	29%	71%	21%	14%
Boeng Khnar	82%	4%	61%	75%	61%	50%

Ta Lou	74%	6%	87%	100%	74%	19%
Ou Ta Paong	48%	0%	94%	97%	81%	19%

4. Fertilization of Fishponds

Most of fish farmers used livestock animal manures, especially cow manures, as natural fertilizers for fishponds. Only 10 % of them used chemical fertilizers, such as Urea and DAP (Di-Ammonium Phosphate). The project recommends fish farmers to prepare manure pits for additional fertilization to fishponds in farmer-to-farmer trainings. About 90 % of fish farmers prepared manure pits for fish culture in Pursat Province. However, only 70 % and 30 % of them prepared manure pits in Siem Reap and Battambang Provinces. There are a large difference of results in extension works for manure pits among target provinces.

Table 6: Utilization of Fertilization and Usage Rate of Manure Pits for Fish Culture

Province / Commune	Utilization Rate of Fertilizers					Usage rate of manure pits
	Cow manure	Pig manure	Chicken manure	Urea	DAP	
Siem Reap Province	89%	11%	23%	10%	5%	74%
Doun Peng	91%	12%	36%	14%	8%	73%
Kouk Doung	78%	22%	42%	31%	25%	58%
Suay Leu	85%	13%	15%	5%	0%	64%
Roung Kou	91%	7%	16%	2%	0%	67%
Sranal	95%	10%	15%	0%	0%	100%
Snoul	100%	0%	17%	0%	0%	67%
Prey Chruk	93%	17%	23%	27%	3%	80%
Boeng Mealea	93%	9%	9%	4%	2%	85%
Kouk Thiek Leu	84%	6%	13%	0%	0%	84%
Battambang Province	92%	17%	31%	6%	1%	35%
Boeung Reang	92%	0%	33%	8%	0%	13%
Ou Da	100%	25%	100%	0%	0%	60%
Kamreing	90%	0%	35%	15%	10%	0%
Chaeng Mean Chey	100%	13%	21%	8%	3%	58%
Bay Damram	100%	14%	14%	14%	0%	21%
Prey Touch	96%	17%	8%	4%	0%	62%
Kakaoh	100%	20%	0%	20%	0%	40%
Thipakdei	65%	0%	2%	2%	0%	20%
Ta Sanh	96%	42%	46%	13%	4%	79%
Ou Samrel	90%	28%	41%	0%	0%	10%
Sdock Praveck	94%	13%	42%	10%	0%	61%
Prey Tralach	91%	0%	36%	0%	0%	42%
Bavel	84%	26%	39%	8%	3%	15%
Ta Saen	50%	31%	50%	0%	0%	11%
Kdol Ta Haen	100%	0%	0%	0%	0%	0%
Ruessei Krang	100%	23%	42%	0%	0%	69%
Pursat Province	94%	22%	42%	9%	6%	94%
Lolok Sa	100%	4%	64%	40%	24%	100%
Roleab	100%	4%	40%	0%	0%	100%
Boeng Kantout	100%	45%	76%	0%	0%	100%
Kaoh Chum	100%	14%	50%	0%	0%	100%
Ou Sandan	91%	9%	5%	0%	0%	86%
Ansa Chambak	97%	41%	41%	3%	3%	97%

Sna Ansa	93%	41%	38%	3%	0%	79%
Anlong Tnot	88%	8%	8%	4%	0%	88%
Svay Sa	66%	16%	19%	3%	3%	75%
Chheu Tom	97%	13%	30%	3%	3%	97%
Rokat	100%	25%	39%	4%	0%	96%
Boeng Khnar	89%	36%	50%	7%	7%	96%
Ta Lou	100%	13%	65%	23%	19%	100%
Ou Ta Paong	100%	23%	55%	26%	19%	100%

5. Average Fish Harvest and Post-Harvest

During the period of the evaluation workshop (January to February 2014), the fish farmers, who totally harvested culture fish in ponds, accounted for only 10 % in Siem Reap Province and less than 10 % in Battambang and Pursat Provinces. About 50 % of fish farmers partially harvested culture fish. However, remained 40 % of them had not started to harvest fish yet.

The average of total fish harvest was 15 – 25 kg / 100 m². It is a little smaller than the average of total fish harvest in first and second years, 20 – 30 kg / 100 m². It may be reflected by smaller sizes of harvested fish at earlier harvest seasons. In addition, the average of partial fish harvest was only 5 kg / 100 m². It is about half of the average of partial harvest in second year (10 kg / 100m²).

Table 7: Harvest Condition of Third Year's Fish Farmers and Average Amount of Fish Harvest
(January to February 2014)

Province / Commune	Total Fish Harvest		Partial Fish Harvest		Not Harvest
	Share of farmers harvesting fish totally	Average amount of fish harvest (kg/100m ²)	Share of farmers harvesting fish partially	Average amount of fish harvest (kg/100m ²)	Share of farmers not harvesting any fish in ponds
Siem Reap Province	15%	15.4	51%	5.1	34%
Doun Peng	30%	18.9	62%	6.9	8%
Kouk Doung	58%	12.5	36%	3.4	6%
Suay Leu	3%	11.1	28%	11.3	69%
Roung Kou	12%	14.6	60%	4.0	28%
Sranal	0%	-	65%	2.6	35%
Snoul	8%	5.0	83%	3.5	8%
Prey Chruk	0%	-	40%	4.7	60%
Boeng Mealea	0%	-	59%	3.6	41%
Kouk Thiok Leu	0%	-	32%	3.8	68%
Battambang Province	2%	24.7	39%	5.4	59%
Boeung Reang	0%	-	67%	2.9	33%
Ou Da	0%	-	60%	3.6	40%
Kamreing	0%	-	25%	2.1	75%
Chaeng Mean Chey	0%	-	25%	1.8	75%
Bay Damram	0%	-	0%	-	100%
Prey Touch	0%	-	23%	3.9	77%
Kakaoh	0%	-	40%	5.6	60%
Thipakdei	0%	-	0%	-	100%
Ta Sanh	25%	29.9	71%	16.5	4%
Ou Samrel	0%	-	55%	4.4	45%
Sdock Praveck	3%	12.5	61%	6.9	35%
Prey Tralach	8%	5.9	33%	1.9	58%

Bavel	0%	-	34%	1.4	66%
Ta Saen	0%	-	97%	5.5	3%
Kdol Ta Haen	0%	-	20%	2.5	80%
Ruessei Krang	0%	-	23%	1.0	77%
Pursat Province	1%	15.2	58%	3.9	40%
Lolok Sa	0%	-	40%	2.7	0%
Roleab	4%	26.7	88%	4.7	4%
Boeng Kantout	0%	-	31%	6.1	0%
Kaoh Chum	7%	9.2	71%	1.8	7%
Ou Sandan	0%	-	86%	4.0	0%
Ansa Chambak	0%	-	46%	5.8	0%
Sna Ansa	3%	16.7	55%	6.2	3%
Anlong Tnot	0%	-	67%	4.6	0%
Svay Sa	0%	-	78%	2.6	0%
Chheu Tom	7%	11.8	27%	2.7	7%
Rokat	0%	-	68%	1.6	0%
Boeng Khnar	0%	-	39%	1.8	0%
Ta Lou	0%	-	77%	4.6	0%
Ou Ta Paong	0%	-	55%	4.5	0%

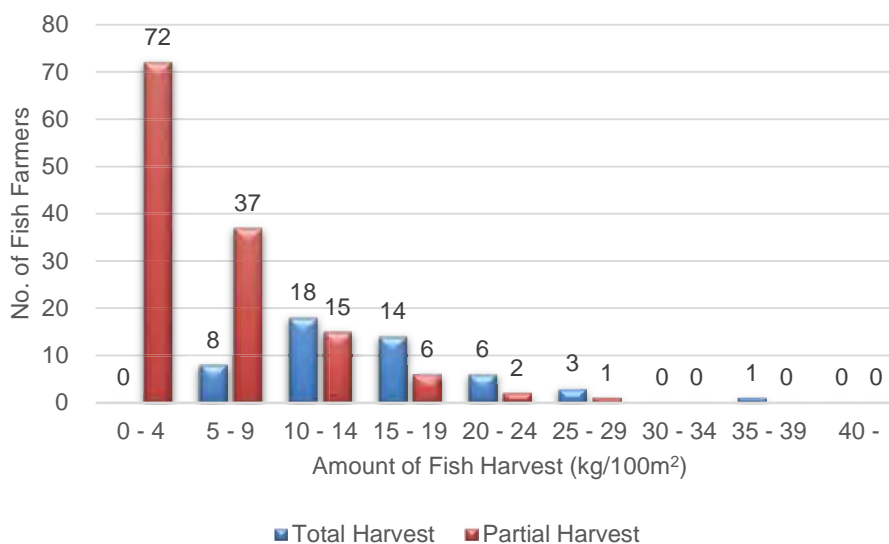


Figure 1: Distribution of Fish Harvest of Third Year's Fish Farmers in Siem Reap Province

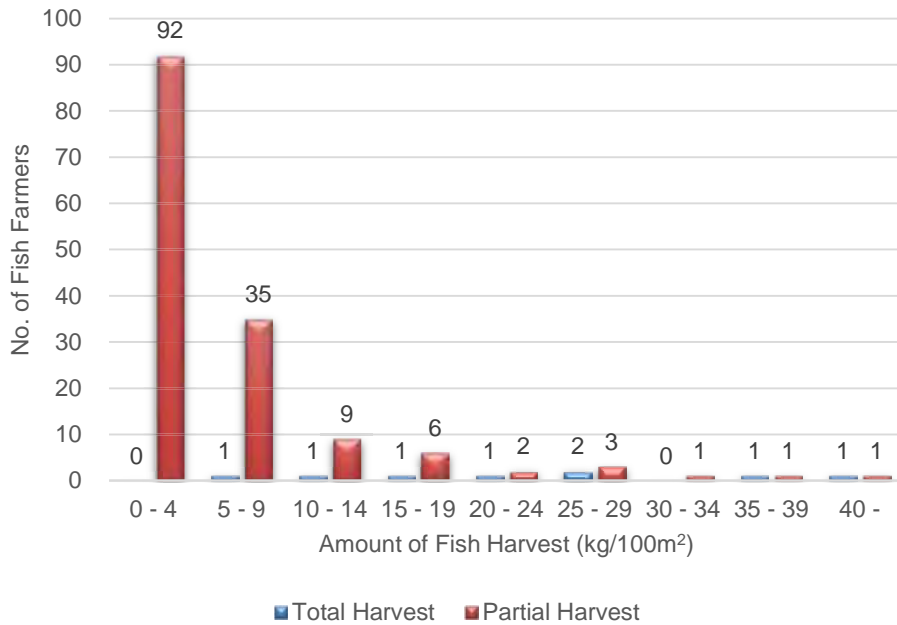


Figure 2: Distribution of Fish Harvest of Third Year’s Fish Farmers in Battambang Province

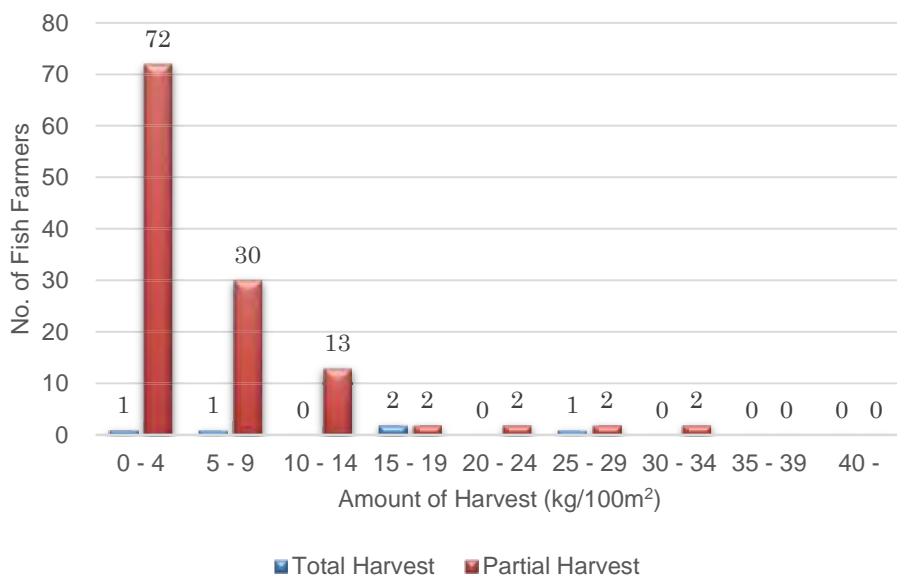


Figure 3: Distribution of Fish Harvest of Third Year’s Fish Farmers in Pursat Province

Most of fish farmers consumed their harvested fish in families (self-consumption). The amount of self-consumption accounted for 80 – 90 % of total fish harvest. On the contrary, the rate of fish farmers selling harvested fish reached only about 20 %. Especially, the rate of fish farmers selling harvested fish in Battambang Province is higher than other provinces; however, it reached only about 10 %. In addition, the portion of sold fish in total harvested fish accounted for less than 10 % on the average. Because the evaluation workshops were held earlier than the common period of fish harvest, almost harvested fish were consumed in families. Then, less amount of harvested fish were sold. About 30 % of fish farmers shared some harvested fish with their relatives, friends, and neighbors. The amount of harvested fish shared with

relatives and others was very small, and accounted for less than 10 % of total fish harvest.

Table 8: Sale, Sharing, and Self-Consumption of Harvested Fish

Province / Commune	Rate of farmers by post-harvest type			Rate of amount of post-harvest in total fish harvest		
	Sale	Sharing	Self-consumption	Sale	Sharing	Self-consumption
Siem Reap Province	0%	17%	100%	0%	4%	96%
Doun Peng	0%	24%	99%	0%	4%	96%
Kouk Doung	0%	32%	100%	0%	4%	96%
Suay Leu	0%	25%	100%	0%	5%	95%
Roung Kou	0%	13%	100%	0%	4%	96%
Sranal	0%	0%	100%	0%	0%	100%
Snoul	0%	0%	100%	0%	0%	100%
Prey Chruk	0%	8%	100%	0%	2%	98%
Boeng Mealea	0%	11%	100%	0%	9%	91%
Kouk Thiok Leu	0%	0%	100%	0%	0%	100%
Battambang Province	8%	42%	99%	7%	13%	81%
Boeung Reang	0%	0%	100%	0%	0%	100%
Ou Da	0%	0%	100%	0%	0%	100%
Kamreing	0%	0%	100%	0%	0%	100%
Chaeng Mean Chey	0%	0%	100%	0%	0%	100%
Bay Damram	-	-	-	-	-	-
Prey Touch	17%	67%	83%	18%	23%	60%
Kakaoh	0%	50%	100%	0%	10%	90%
Thipakdei	-	-	-	-	-	-
Ta Sanh	9%	70%	100%	7%	15%	78%
Ou Samrel	0%	19%	100%	0%	8%	92%
Sdock Praveck	35%	55%	100%	18%	13%	69%
Prey Tralach	0%	20%	100%	0%	5%	95%
Bavel	0%	29%	100%	0%	5%	95%
Ta Saen	6%	71%	100%	6%	13%	81%
Kdol Ta Haen	0%	33%	100%	0%	14%	86%
Ruessei Krang	0%	17%	100%	0%	11%	89%
Pursat Province	6%	26%	99%	17%	10%	73%
Lolok Sa	0%	0%	100%	0%	0%	100%
Roleab	4%	35%	100%	15%	13%	72%
Boeng Kantout	0%	0%	100%	0%	0%	100%
Kaoh Chum	9%	27%	100%	10%	10%	79%
Ou Sandan	5%	47%	100%	5%	14%	81%
Ansa Chambak	23%	31%	100%	59%	6%	35%
Sna Ansa	6%	35%	100%	3%	17%	77%
Anlong Tnot	13%	31%	100%	41%	8%	52%
Svay Sa	0%	44%	96%	0%	17%	83%
Chheu Tom	10%	20%	100%	17%	7%	76%
Rokat	0%	0%	100%	0%	0%	100%
Boeng Khnar	0%	36%	100%	0%	13%	87%
Ta Lou	4%	17%	100%	8%	7%	85%
Ou Ta Paong	11%	17%	100%	19%	9%	73%

6. Issues on Fish Culture Activities

The fish farmers, who answered to have some problems on fish culture activities, accounted for 60 % in Siem Reap Province, 90 % in Battambang Province, and 70 % in Pursat Province. The most serious problems on fish culture activities was ‘Invasion of predators like snakehead’. 40 – 50 % of them got somehow damage by invasion of predator fish. However, the percentage of damaged farmers by the invasion of predators is much less than that of second year’s farmers (70 - 80 %). The provision of protection nets to fish farmers in third year might reduce the damage of predator invasion.

In third year, many fish farmers answered ‘Occurrence of floods’ and ‘Washed-away of cultured fish’ as second serious problems on fish culture activities. It means that large-scale floods, occurred in October 2013, seriously damaged many fish farmers. Therefore, the amount of fish farmers, who raised ‘Shortage of water in fishpond’ and ‘Turbulence of pond water’ as serious problems, was smaller than that of second year. Additionally, in Siem Reap Province, about 70 % of fish farmers answered “Low survival rate of cultured fish” as serious problem on fish culture.

Only a small number of fish farmers answered some problems on sale and marketing of harvested fish, such as ‘Little market for harvested fish’ and ‘Low prices of harvested fish’. At present, there is not serious problems on sale and marketing of harvested fish.

Table 9: Problems and Issues of Fish Culture Activities (1)

Province / Commune	Rate of farmers having some problems	Percentage of Problems on Fish Culture Activities					
		Fish disease	Invasion of predators	Low survival rate	Washed-away of cultured fish	Occurrence of floods	Turbulence of pond water
Siem Reap Province	60%	6%	57%	70%	25%	24%	14%
Doun Peng	77%	0%	88%	37%	23%	4%	14%
Kouk Doung	64%	35%	91%	83%	43%	0%	13%
Suay Leu	67%	4%	31%	92%	0%	4%	8%
Roung Kou	44%	0%	47%	100%	47%	68%	16%
Sranal	40%	0%	0%	100%	25%	75%	13%
Snoul	25%	0%	0%	100%	0%	33%	67%
Prey Chruk	77%	4%	78%	65%	48%	61%	26%
Boeng Mealea	43%	0%	20%	80%	20%	0%	5%
Kouk Thlok Leu	68%	10%	19%	71%	5%	48%	10%
Battambang Province	94%	5%	48%	8%	27%	59%	12%
Boeung Reang	100%	7%	60%	13%	13%	53%	0%
Ou Da	100%	20%	20%	20%	0%	40%	60%
Kamreing	100%	10%	35%	20%	25%	45%	10%
Chaeng Mean Chey	100%	13%	45%	3%	45%	73%	8%
Bay Damram	100%	0%	8%	0%	0%	92%	8%
Prey Touch	88%	0%	8%	0%	0%	85%	0%
Kakaoh	80%	0%	20%	0%	0%	0%	80%
Thipakdei	94%	0%	3%	3%	6%	94%	0%
Ta Sanh	92%	4%	58%	17%	13%	17%	17%
Ou Samrel	97%	3%	86%	7%	7%	7%	28%
Sdock Praveck	87%	7%	63%	19%	22%	41%	15%
Prey Tralach	100%	8%	92%	8%	83%	100%	0%
Bavel	100%	12%	49%	2%	76%	98%	2%

	Ta Saen	83%	0%	67%	0%	25%	25%	28%
	Kdol Ta Haen	100%	0%	53%	27%	13%	87%	7%
	Ruessei Krang	88%	0%	88%	24%	44%	52%	12%
	Pursat Province	73%	4%	44%	11%	9%	19%	21%
	Lolok Sa	56%	0%	0%	7%	7%	14%	71%
	Roleab	68%	0%	6%	6%	0%	0%	6%
	Boeng Kantout	79%	0%	17%	0%	22%	65%	30%
	Kaoh Chum	79%	0%	18%	0%	9%	9%	36%
	Ou Sandan	86%	11%	63%	32%	32%	42%	11%
	Ansa Chambak	86%	0%	76%	0%	12%	4%	8%
	Sna Ansa	86%	0%	71%	13%	4%	13%	17%
	Anlong Tnot	54%	15%	46%	15%	8%	0%	8%
	Svay Sa	84%	0%	78%	44%	11%	11%	19%
	Chheu Tom	77%	0%	39%	0%	4%	22%	9%
	Rokat	57%	0%	6%	13%	0%	13%	38%
	Boeng Khnar	54%	13%	67%	0%	0%	0%	40%
	Ta Lou	71%	9%	18%	14%	0%	5%	23%
	Ou Ta Paong	90%	7%	52%	3%	10%	45%	7%

Table 10: Problems and Issues of Fish Culture Activities (2)

Province / Commune	Percentage of Problems on Fish Culture Problems					
	Lack of pond water	Short culture period	Lack of feeds	Lack of fertilizers	Low prices of harvested fish	Little market for harvested fish
Siem Reap Province	18%	5%	1%	1%	2%	1%
Doun Peng	16%	0%	0%	0%	2%	0%
Kouk Doung	26%	4%	0%	0%	0%	0%
Suay Leu	38%	19%	0%	0%	0%	0%
Roung Kou	26%	16%	0%	0%	0%	0%
Sranal	0%	0%	0%	0%	0%	0%
Snoul	67%	0%	0%	0%	0%	0%
Prey Chruk	4%	0%	4%	4%	9%	4%
Boeng Mealea	10%	0%	5%	0%	0%	5%
Kouk Thioek Leu	0%	0%	0%	0%	0%	0%
Battambang Province	5%	2%	13%	20%	1%	0%
Boeung Reang	7%	0%	80%	60%	0%	0%
Ou Da	60%	0%	40%	20%	0%	0%
Kamreing	5%	0%	30%	50%	0%	0%
Chaeng Mean Chey	5%	0%	5%	5%	0%	0%
Bay Damram	0%	0%	0%	0%	0%	0%
Prey Touch	0%	0%	0%	0%	0%	0%
Kakaoh	0%	0%	0%	0%	20%	0%
Thipakdei	0%	0%	0%	0%	0%	0%
Ta Sanh	13%	4%	0%	46%	0%	4%
Ou Samrel	0%	0%	38%	59%	0%	0%
Sdock Praveck	11%	19%	15%	4%	0%	0%
Prey Tralach	8%	0%	17%	17%	0%	0%
Bavel	2%	0%	7%	5%	2%	0%
Ta Saen	11%	3%	19%	58%	0%	0%
Kdol Ta Haen	7%	0%	0%	13%	0%	0%
Ruessei Krang	0%	0%	4%	0%	0%	0%
Pursat Province	27%	8%	22%	4%	1%	1%

Lolok Sa	14%	0%	29%	0%	0%	0%
Roleab	88%	0%	0%	0%	0%	0%
Boeng Kantout	13%	0%	26%	0%	0%	0%
Kaoh Chum	36%	0%	36%	0%	0%	0%
Ou Sandan	16%	0%	0%	5%	0%	0%
Ansa Chambak	24%	12%	4%	8%	0%	0%
Sna Ansa	29%	0%	13%	17%	0%	0%
Anlong Tnot	23%	0%	0%	0%	0%	0%
Svay Sa	41%	15%	11%	0%	0%	0%
Chheu Tom	4%	0%	57%	0%	0%	0%
Rokat	44%	63%	13%	0%	0%	0%
Boeng Khnar	13%	0%	27%	0%	0%	0%
Ta Lou	27%	14%	41%	5%	0%	0%
Ou Ta Paong	21%	3%	38%	10%	7%	7%

7. Flood Damage

Table 11 and 12 show the result on damage condition by the large-scale floods occurred in October 2013. The fish farmers damaged by floods accounted for 20 % in Siem Reap Province and 70 % in Battambang Province. Especially, the scale of flood damage in Battambang Province was very large. Except Ou Samrel Commune, the fish farmers of all target communes got serious flood damage. About 60 % of damaged farmers lost all cultured fish by the floods.

The scale of flood damage in Siem Reap Province was small than Battambang Province. Only 10 % of damaged famers lost all cultured fish by the floods. In Pursat Province, the scale of flood damage is very small in 2013. Only 6 % of fish farmers got some damages by the floods.

Table 11: Flood Damage in 2013 (1)

Province / Commune	Rate of farmers having flood damage	Percentage by level of flood damage			Percentage of damage items		
		Large damage	Medium damage	Limited damage	Washed-a way of cultured fish	Damage of protection nets	Damage of fish ponds
Siem Reap Province	22%	26%	63%	11%	34%	79%	18%
Doun Peng	23%	18%	53%	29%	0%	24%	6%
Kouk Doung	3%	0%	0%	100%	0%	0%	0%
Suay Leu	0%	-	-	-	-	-	-
Roung Kou	37%	0%	100%	0%	38%	100%	0%
Sranal	35%	0%	100%	0%	0%	100%	0%
Snoul	8%	0%	0%	100%	0%	100%	0%
Prey Chruk	57%	35%	59%	6%	94%	100%	41%
Boeng Mealea	0%	-	-	-	-	-	-
Kouk Thiok Leu	45%	71%	29%	0%	21%	93%	36%
Battambang Province	72%	67%	13%	19%	61%	44%	13%
Boeung Reang	100%	27%	13%	60%	40%	7%	0%
Ou Da	100%	20%	20%	60%	100%	20%	0%
Kamreing	100%	45%	25%	30%	70%	25%	0%
Chaeng Mean Chey	100%	78%	10%	13%	85%	73%	3%
Bay Damram	100%	96%	4%	0%	4%	4%	4%
Prey Touch	88%	70%	9%	22%	0%	4%	0%

Kakaoh	20%	0%	0%	100%	0%	0%	0%
Thipakdei	94%	100%	0%	0%	3%	3%	3%
Ta Sanh	29%	29%	29%	43%	57%	57%	29%
Ou Samrel	7%	100%	0%	0%	100%	100%	50%
Sdock Praveck	39%	58%	25%	17%	75%	50%	25%
Prey Tralach	100%	42%	17%	17%	92%	83%	25%
Bavel	98%	85%	13%	3%	98%	78%	45%
Ta Saen	25%	0%	44%	56%	100%	0%	0%
Kdol Ta Haen	100%	80%	13%	7%	93%	93%	7%
Ruessei Krang	84%	38%	14%	38%	86%	71%	29%
Pursat Province	6%	26%	42%	32%	95%	62%	10%
Lolok Sa	0%	-	-	-	-	-	-
Roleab	0%	-	-	-	-	-	-
Boeng Kantout	3%	100%	0%	0%	100%	100%	0%
Kaoh Chum	7%	100%	0%	0%	100%	100%	0%
Ou Sandan	36%	13%	75%	13%	100%	63%	25%
Ansa Chambak	7%	-	-	-	50%	50%	0%
Sna Ansa	4%	0%	0%	100%	100%	0%	0%
Anlong Tnot	0%	-	-	-	-	-	-
Svay Sa	6%	0%	0%	100%	100%	0%	0%
Chheu Tom	17%	40%	20%	40%	100%	80%	0%
Rokat	0%	-	-	-	-	-	-
Boeng Khnar	0%	-	-	-	-	-	-
Ta Lou	0%	-	-	-	-	-	-
Ou Ta Paong	3%	0%	100%	0%	100%	100%	0%

Table 11: Flood Damage in 2013 (2)

Province / Commune	Percentage of fish famers losing cultured fish by level of washed-away					
	100 %	80 %	60 %	40 %	20 %	10 %
Siem Reap Province	10%	16%	25%	41%	8%	1%
Doun Peng	0%	12%	35%	29%	24%	0%
Kouk Doung	0%	0%	0%	0%	100%	100%
Suay Leu	-	-	-	-	-	-
Roung Kou	0%	0%	25%	75%	0%	0%
Sranal	0%	0%	0%	100%	0%	0%
Snoul	0%	0%	0%	0%	100%	0%
Prey Chruk	0%	41%	41%	18%	0%	0%
Boeng Mealea	-	-	-	-	-	-
Kouk Thioek Leu	50%	21%	7%	21%	0%	0%
Battambang Province	59%	10%	7%	6%	8%	12%
Boeung Reang	27%	0%	13%	0%	20%	40%
Ou Da	0%	0%	20%	20%	0%	60%
Kamreing	40%	0%	10%	10%	20%	20%
Chaeng Mean Chey	78%	0%	0%	5%	10%	8%
Bay Damram	96%	0%	4%	0%	0%	0%
Prey Touch	74%	0%	4%	4%	22%	0%
Kakaoh	0%	0%	0%	0%	0%	100%
Thipakdei	97%	3%	0%	0%	0%	0%
Ta Sanh	0%	29%	0%	14%	14%	0%
Ou Samrel	100%	0%	0%	0%	0%	0%
Sdock Praveck	33%	25%	17%	17%	8%	8%
Prey Tralach	58%	8%	17%	0%	8%	8%

Bavel	48%	38%	5%	5%	3%	3%
Ta Saen	0%	0%	11%	33%	11%	44%
Kdol Ta Haen	87%	7%	13%	0%	0%	7%
Ruessei Krang	19%	24%	10%	10%	5%	33%
Pursat Province	5%	19%	5%	29%	29%	10%
Lolok Sa	-	-	-	-	-	-
Roleab	-	-	-	-	-	-
Boeng Kantout	100%	0%	0%	0%	0%	0%
Kaoh Chum	0%	100%	0%	0%	0%	0%
Ou Sandan	0%	13%	13%	63%	13%	0%
Ansa Chambak	0%	0%	0%	0%	50%	0%
Sna Ansa	0%	0%	0%	0%	100%	0%
Anlong Tnot	-	-	-	-	-	-
Svay Sa	0%	0%	0%	0%	50%	50%
Chheu Tom	0%	40%	0%	20%	20%	20%
Rokat	-	-	-	-	-	-
Boeng Khnar	-	-	-	-	-	-
Ta Lou	-	-	-	-	-	-
Ou Ta Paong	0%	0%	0%	0%	100%	0%

8. Future Activities in Fish Culture

More than 90 % of fish farmers answered that they will stock fish seeds and continue fish culture activities this year. Only less than 10 % of them answered that they may not continue fish culture. In terms of expansion of scale of fish culture, about 30 % of fish farmers answered that they plan to expand existing fishponds or build new fishponds in near future. However, 70 % of them do not have any plans to expand the scale of fish culture, because they cannot afford the costs for fishpond expansion.

Table 13: Continuation of Future Fish Culture and Expansion of Fish Culture Scale

Province / Commune	Continuation of Fish Culture Activities		Expansion of Fish Culture Scale	
	Plan to stock fish seeds	No plan to stock fish seeds	Intend to expand fish culture scale	Not intend to expand fish culture scale
Siem Reap Province	99%	1%	24%	75%
Doun Peng	100%	0%	24%	76%
Kouk Doung	100%	0%	19%	81%
Suay Leu	90%	10%	38%	51%
Roung Kou	100%	0%	53%	47%
Sranal	100%	0%	65%	35%
Snoul	100%	0%	0%	100%
Prey Chruk	100%	0%	0%	100%
Boeng Mealea	100%	0%	0%	100%
Kouk Thiok Leu	100%	0%	6%	94%
Battambang Province	100%	0%	42%	58%
Boeung Reang	93%	7%	27%	67%
Ou Da	100%	0%	25%	75%
Kamreing	100%	0%	21%	79%
Chaeng Mean Chey	80%	20%	18%	82%
Bay Damram	96%	4%	17%	83%
Prey Touch	88%	12%	18%	82%

Kakaoh	100%	0%	0%	100%
Thipakdei	81%	19%	4%	96%
Ta Sanh	100%	0%	75%	25%
Ou Samrel	100%	0%	59%	41%
Sdock Praveck	100%	0%	61%	39%
Prey Tralach	100%	0%	55%	45%
Bavel	100%	0%	46%	54%
Ta Saen	100%	0%	32%	68%
Kdol Ta Haen	100%	0%	33%	67%
Ruessei Krang	100%	0%	42%	58%
Pursat Province	97%	3%	30%	70%
Lokok Sa	100%	0%	12%	88%
Roleab	100%	0%	40%	60%
Boeng Kantout	100%	0%	3%	97%
Kaoh Chum	79%	21%	7%	93%
Ou Sandan	82%	18%	41%	59%
Ansa Chambak	97%	3%	34%	66%
Sna Ansa	100%	0%	21%	79%
Anlong Tnot	96%	4%	21%	79%
Svay Sa	94%	6%	28%	72%
Chheu Tom	100%	0%	30%	70%
Rokat	100%	0%	50%	50%
Boeng Khnar	93%	7%	32%	68%
Ta Lou	100%	0%	29%	71%
Ou Ta Paong	100%	0%	58%	42%

III. General Conclusion

Generally, most of fish farmers well practice the standard techniques of fish grow-out culture, which Fisheries Administration recommended and advised. However, the achievement level of technical extension in some recommended techniques, such as utilization of home-made feeds and preparation of manure pits, varies in target provinces. The fieldwork and measurement of cantonment fisheries offices makes different effects on extension outcome among target provinces.

In addition, the average of total fish harvest of third year's farmers (15 – 25 kg / 100 m²) is not so far from that of first and second year's farmers. It means that the production of fish grow-out culture is stable on the technical extension of the project.

'Invasion of predator fish in fishponds' is the most serious problem in fish culture activities. As second serious problem, many fish farmers raised 'Occurrence of floods' and 'Washed-away of cultured fish'. As 'Shortage of pond water' was an important issue on fish culture in second year, the climate condition like draught or flood largely affects fish culture production.

In terms of the utilization of harvested fish (post-harvest), the share of self-consumption was dominantly large. 70 – 80 % of harvest fish were consumed in farmer's home. Even though fish farmers consume most of harvest fish at home, it contributes to improve their livelihoods indirectly due to the reduction of food expenditure. However, it will take more time to increase their cash incomes by fish culture activities.

More than 90 % of fish farmers answered to continue fish culture activities by the purchase of new fish seeds. Therefore, the technical extension activity to local farmers is very effective.

FAIEX2 January 2014

Questionnaire Survey in the Evaluation Workshop for the Grow-out Farmers

General Information

Name of Commune: _____
Name of Village: _____
Name of Farmer: _____
Main livelihood: Rice farmer Livestock Fish farming Others _____
Sex: Male Female
Age _____ years old
How many fishponds do you have? One Two or more
What is your pond dimension: _____ m²

Fish Farming Practices

- When did you stock the pond with fingerlings? _____ 2013
- How many tails of fingerlings did you stock the pond with: _____ tails
- What fish species did you culture?
 TL SC SB IC CC CL PG Others _____
- Do you feed the fish?
 No feeding Once a week 2-3 times a week Daily Others _____
- What kind of feed do you feed the fish?
 Rice bran uncooked Home-made cooked meal Commercial pellet Others _____
- What supplemental feeds do you feed the fish?
 Commercial pellet Termite Insects/worms Duck weed
 Morning glory Vegetables Kitchen left-over Others _____
- Do you have the insect aggregating light installed on the pond? Yes No
- How do you fertilize the pond?
 Cow manure Pig manure Chicken dung Inorganic fertilizer Others _____
- Do you have manure pit installed for pond fertilization? Yes No
- Do you have protection nets installed around the pond? Yes No

Harvesting

- Have you harvested all the fish in the pond? Yes No
- How many kg have you harvested in the total harvest? _____ kg
- Have you practiced partial harvest before total harvest? Yes No

- How many times of partial harvest have you conducted? _____ times
- How many kg of fish do you estimate you have partially harvested? _____ kg
- How many kg have you sold from partial and total harvests? _____ kg
- How many kg have you given to others (friends/relatives/neighbors)? _____ kg
- How many kg have your family consumed in partial and total harvest? _____ kg

Problems

- Have you encountered any problems on fish culture? ()Yes ()No
- What kind of problems? ()Fish disease ()Predators ()Fish escape
()Flooding or too much water ()Poor water quality
()Lack of water ()Too short culture period
()Lack of feed ()Lack of pond fertilization
()Low fish price ()Limited market
()Others _____
- Have you ever suffered any damages caused by flood in Sep-Nov 2011? ()Yes ()No
- If Yes, what was the damage you encountered on?
()Fish ()Net ()Pond ()Others
- If you lost fish, what was the percentage of the fish loss?
()100% ()80% ()60% ()40% ()20% ()0%
- What was the degree of the damage?
()Very badly ()moderately ()Very limited

Future Plan

- Do you plan to continue fish farming this year? ()Yes ()No
If Yes, why? _____
If No, why? _____
- Do you plan to expand fish farming activities in the future? ()Yes ()No
If Yes, why? _____
If No, why? _____

Request for the FAIEX2 Project, if any
