

1. Outline of the Project		
Country name: Indonesia		Project name: Freshwater Aquaculture Development Project
Fields: Fisheries		Assistance type: Technical cooperation project
Supervising office: Fisheries Cooperation Team, Third Group, Rural Development Department		
Period of cooperation	August 28, 2000, to August 27, 2005	Counterpart organizations: Ministry of Maritime Affairs and Fisheries (MOMAF), Directorate General of Aquaculture (DGA), Jambi Freshwater Aquaculture Development Center (BBAT Jambi)
	R/D: March 29, 2000	Cooperating organizations in Japan: Ministry of Agriculture, Forestry, and Fisheries (Fisheries Agency); Tokyo University of Marine Science and Technology; Prefectural Fisheries Experimental Stations.
<p>1-1 Background and outline of the Project</p> <p>Production from Indonesia's inland water fisheries and aquaculture account for roughly one-fourth of the nation's fisheries production. The industry serves as an important source of protein for the Indonesian population and provides employment and livelihood for some 3 million fishery workers. However, the amount supplied by the industry reaches no more than 60% of the production target set by Indonesia, and the fish species caught are limited as the industry relies almost entirely on traditional fishing. Thus, production level remains low. Consequently, given recent economic crises and food shortages, promotion of freshwater aquaculture is expected to lead to stable food supply and creation of employment opportunities.</p> <p>In 1995, Indonesia's Ministry of Agriculture formulated a general plan for fisheries promotion, entitled the "technical implementing organization plan" (LOKA plan), based on the regulation of the Minister of Agriculture. In accordance with this plan, the Directorate General of Fisheries pushed forward with the establishment of facilities infrastructure for "Jambi Freshwater Aquaculture Development Center (Balai Budidaya Air Tawar Jambi : BBAT Jambi), which would serve as a base for development and extension of freshwater aquaculture in western Indonesia, through self-supporting efforts as well as JBIC financing (Sector Program Loan [SPL]), and submitted a request to Japan for technical cooperation for promotion of freshwater</p>		

aquaculture needed to advance the LOKA plan. Based on this request, JICA conducted a preliminary study in August 1999 as well as a short-term study in November of the same year and formulated a cooperation program. And in March 2000, JICA implemented a preliminary evaluation that led to the commencement of five-year project-type cooperation (currently technical cooperation project) in August 2000.

## 1-2 Description of cooperation

### (1) Overall Goal

Sustainability of freshwater aquaculture of small-scale fish farmers is improved.

### (2) Project Purpose

Extension activities for appropriate applied freshwater aquaculture technologies available to small-scale fish farmers are strengthened.

### (3) Outputs of the project

- 1) High-quality broodstock of existing freshwater culture species is supplied to seed production groups.
- 2) The quality of aquaculture products (seed and grow-out fish) of existing freshwater fish culture species is improved.
- 3) Fish-breeding technologies for new fish culture species are developed.
- 4) Effective extension models adjusted to the local conditions are established.
- 5) The stakeholders in the project area become more interested in freshwater aquaculture.

### (4) Inputs (at time of evaluation)

#### Japanese side

Dispatch of long-term experts:	6 experts
Dispatch of short-term experts:	19 experts
Training of C/Ps in Japan:	20 C/Ps (including 2 for long-term training)
Provision of machinery and equipment:	152 million yen
Assumption of local costs:	85 million yen

#### Indonesian side

Allocation of C/Ps:	30 C/Ps
Provision of land and facilities	

Assumption of local costs (254 million yen)

## 2. Outline of the Evaluation Team

Members	(Field, name, occupational position)		
	1) Leader/ Aquaculture Technology:	Kunihiko Fuskusho	Director, Breeding Department, Port of Nagoya Public Aquarium (chairman of the domestic support committee)
	2) Fish disease measures:	Kishio Hatai	Professor, Division of Fish Diseases, Nippon Veterinary and Animal Science University (currently “Nippon Veterinary and life Science University”) (member of domestic support committee)
	3) Evaluation analysis:	Shohei Natsuda	Consultant, Project Operation Division, International Department, Sanyu Consultants Inc.
	4) Planning evaluation	Ryutaro Kobayashi	Project officer, Fisheries Cooperation Division, Rural Development Department, JICA
Evaluation period	April 12, 2005, to April 30, 2005	Evaluation type: Final evaluation	

## 3. Outline of Evaluation Results

### 3-1 Confirmation of achievements

#### (1) Inputs

The inputs from Japan were judged to be largely appropriate in terms of quantity and quality. As for the inputs from Indonesia, there was a delay in construction of facilities for BBAT Jambi at the beginning of the Project, and this caused a delay in later Project activities. Other inputs from Indonesia were judged to be largely appropriate in terms of quantity and quality.

#### (2) Activities

Of the 46 sub-items of the activities plan, activities for three items have already been

completed and activities for 26 items are expected to be completed by the end of the Project. It is judged that activities for the remaining 17 items will not be completed by the end of the Project. The delay in these activities is caused by slow facilities construction and land issues as well as an unanticipated outbreak of fish disease and a change in the extension system structure that was brought about by decentralization. It is thought that some sort of response to these issues will be required in the future.

### (3) Outputs

For Output 1, high-quality broodstock that was produced through the Project's verification testing—common carp: 2,217 fish; tilapia: 2,400 kg; patin: 200 kg—were distributed and sold to private seed-production groups and seed-production centers of local governments in the model areas and other provinces. Thus, movement toward achievement of this Output is proceeding according to plan, as, among other factors, it is expected that production of high-quality second-generation broodstock will expand at places that received the original broodstock. However, distribution of common carp was interrupted due to the occurrence of the disease caused by Koi Herpes Virus (KHV). And, distribution of nilotica, which is a high-quality species of tilapia, is only just getting started because environmental impact procedures by Indonesia took considerable time.

For Output 2, it is judged that the quality of aquaculture products in the four model areas has improved because high-quality seed and grow-out fish are being steadily produced in these areas. However, in order to ensure continuation of aquaculture production, further extension activities will need to be continued into the future. Of particular relevance here is the model area in West Sumatra Province, where achievement of Output 2 is low due to the short period of activities.

For Output 3, the survival rate of sand goby has reached the point where it stands at or above 50%, and it is expected that over 1,000 fish will have been bred by the end of the Project. Thus, aquaculture and breeding techniques have been developed at the experimental level.

For Output 4, it is thought that two or three more years will be required before technical improvement of fish farmers reaches Level A (fish farmers [groups] acquire and utilize the standard technology) in all model areas. However, extension models for training and technical guidance have been established and the technical levels of fish farmers is

rising steadily in line with progress in extension activities; as of 2004 the rate at which farmers' diaries are kept stands at approximately 60%. In the effort to achieve autonomous activity, extension activities by BBAT Jambi staff members as well as more active participation in extension activities by local governments in each model region will be required.

And for Output 5, interest in freshwater aquaculture has risen through a series of extension activities that include the holding of extension network seminars (three times on the national level) open seminars (three times at the regional level), general meetings during monitoring, and information exchanges with prefectural fisheries department personnel (once or twice monthly) as well as distribution of newsletters (twice yearly), farmers' diaries, and PR calendars. Many concerned persons are attending the seminars and meetings, where they are sharing information. However, more participation by local governments will be necessary in order to advance extension activities in each model area.

#### (4) Project Purpose

It is thought that progress toward achievement of the Project Purpose is on course, as active extension activities are being implemented through the Project, the number of small-scale fish farmers is increasing, and instances of higher production volume and income among farmers that are engaged in aquaculture are apparent. However, delays in project activities and other circumstances mean that the number of cases in which production volume and income are growing is still too small.

#### (5) Overall Goal

Production in six provinces in Sumatra has increased each year; it has been confirmed that production doubled, from 47,192 tons in 2000 to 100,404 tons in 2003. Thus, there are sufficient grounds to expect future increases in freshwater aquaculture production in the areas targeted by the Project.

### 3-2 Outline of evaluation results

#### (1) Relevance

The Project can be seen as having high relevance. The Project Purpose conforms to MOMAF's strategy of improving aquaculture techniques and establishing aquaculture facilities and of further expanding markets for aquaculture products. Moreover, the approach involving simultaneous technical development and extension activities is tied

to discovery of onsite technical problems and development of technologies that address these problems.

Of the six provinces of Sumatra that were targeted for extension, two did not have extension model areas established in them. However, because technical transfer through seminars, training, etc., also included human resources in these two provinces, the benefits of the Project are distributed fairly.

#### (2) Effectiveness

Although extension activities that are based on technologies that were standardized through the Project are still insufficient, the number of fish farmers in the Project regions is growing by between approximately 1.9 and 3 times. Moreover, between 56 and 90% of farmers in the Project model districts are seeing increased production volumes. Training is being held on an average of 25 times a year, and in five model areas (excluding model areas in which all farmers reported no change in income) between 46 and 88% of farmers answered that they had seen a rise in income. For this and other reasons, some degree of Project Purpose achievement as well as a certain level of Project effectiveness can be seen. Moreover, it can be said that efforts by the experts and the C/Ps raised enthusiasm among farmers and were linked to Project outputs. However, extension systems in all parts of Indonesia had to be rebuilt due to the effects of decentralization. While this significant development can be considered to be an external condition, the fact that the Project's extension activities achieved some results even under such severe conditions indicates that the Project Purpose is attainable if local governments sufficiently participate in extension activities.

#### (3) Efficiency

The inputs from Japan were judged to be largely appropriate in terms of quantity and quality. As for the inputs from Indonesia, there was a delay in construction of facilities for BBAT Jambi at the beginning of the Project, and this caused a delay in later Project activities. Thus, Project efficiency cannot be rated highly.

#### (4) Impact

The Project had significant impacts in the fields of technical development and extension activity. First, the Project made possible full-scale research and development on freshwater aquaculture in Sumatra. Secondly, extension activities implemented through the Project can guide fish farmers in ways that match their actual

circumstances, and fish farmers are now able to obtain detailed answers to their questions from BBAT Jambi. Because technologies that were introduced through the Project's extension activities are being transmitted across the boundaries of extension model areas to neighboring farmers, further promotion of aquaculture in Sumatra can be expected in the future.

#### (5) Sustainability

The Project's sustainability cannot be rated highly at the present time. Reasons include remaining insufficiencies in ability among C/Ps to manage and operate activities and equipment as well as in technical responses to sudden outbreaks of fish diseases due to the impact of delays in Project activities. Another reason is incomplete establishment of extension systems that was made necessary due to confusion arising from the movement toward decentralization. Thus, future improvements will be necessary.

### 3-3 Factors contributing to emergence of effects

#### (1) Factors pertaining to planning content

- Because the Project plan was formulated in line with national policy, Project activities contributed to the development of freshwater aquaculture throughout all of Sumatra.
- Dispatch of experts and counterpart training in the fish diseases field facilitated appropriate responses to the unanticipated outbreak of KHV and to individual consultations from fish farmers.

#### (2) Factors pertaining to the implementation process

- The approach involving simultaneous technical development and extension activity appropriately tied technical problems and technical development together at the farm level.
- Methods involving direct approaches from the Project to fish farmers' organizations and establishment of model areas led to extraction of technical needs.

### 3-4 Problem areas and factors leading to problems

#### (1) Factors pertaining to plan content

- The delay in construction of facilities for BBAT Jambi at the beginning of the Project caused delayed progress in later Project activities. It should be noted that a response to the delay was made through priority implementation of a basic survey

for extension activities by the end of construction.

- The emergence of land issues involving BBAT Jambi at the beginning of the Project delayed the progress of later activities, despite a cooperative effort to resolve the issues by the provincial and central governments.

## (2) Factors pertaining to the implementation process

- An outbreak of KHV in western Indonesia forced changes in strategies for producing and distributing common carp, which was a major target species of the Project. However, dispatch of short-term experts, C/P training, and guidance on fish diseases for fish farmers were implemented as countermeasures.
- Decentralization resulted in changes in the extension systems of local governments. This forced modification of the Project's technical transfer target (originally, extension workers of local governments) and resulted in the loss of personnel in charge of transmitting technologies to the regions. The Project responded by aiming extension activities directly at fish farmers/groups. However, aquaculture extension workers are currently assigned by some local governments.

## 3-5 Conclusion

The Joint Evaluation Team found that many activities were implemented and that numerical indicators are being achieved at a certain level. Based on the above, the team finds that Product achievement is not low. Nonetheless, the team finds that certain important elements of the Project Purpose will not be attainable due to occurrence of the following factors:

- 1) Delay in construction of BBAT Jambi facilities
- 2) Occurrence of land issues for BBAT Jambi (problem evicting residents from government-owned land to be used by BBAT Jambi)
- 3) Outbreak of KHV in western Indonesia
- 4) Change in the extension systems of local governments due to decentralization

The team recognized that these external conditions lowered Project efficiency and that activity delays are resulting in a situation in which sustainability is not sufficiently maintained. On the other hand, the Project has high relevance and achieved a certain level of effectiveness, and activities are having strong positive impacts.

## 3-6 Recommendations

### (1) Recommendations pertaining to Project extension

In order to achieve the Project Purpose, the evaluation team determined that it will be



necessary to continue activities by extending the Project Period after termination of the Project. However, the team recommended that C/Ps of BBAT Jambi implement some of these activities on their own so as to promote self-help activities by C/Ps.

The team feels that the length of the Project extension should be two years, and that inputs from Japan should be as follows: one long-term expert should be dispatched in each of the fields of “freshwater aquaculture” and “aquaculture extension,” and one or more short-term experts should be dispatched in the field of “fish diseases.” Counterpart training in Japan should be conducted within the framework for the Project extension period if the necessity of such training is recognized by both Japan and Indonesia. Local activity costs should be borne by both sides. The team does not believe that purchase of additional machinery, equipment, or materials will be required, as sufficient inputs were made in this area during the five-year Project Period.

Indonesian C/Ps during the extension period should include not only BBAT Jambi C/Ps but also local government C/Ps, and efforts should be made to continuously secure facilities, equipment and necessary budgetary funding.

Moreover, the evaluation team recommended that two model areas should be selected for the Project extension period for the implementation of extension activities.

Based on the above, the evaluation team recommended to both the Japanese and Indonesian governments that they start procedures for Project extension.

## (2) Recommendations pertaining to aquaculture technology development

Possibilities for technical transfer in Indonesia: BBAT Jambi should effectively utilize techniques possessed by Java, whose freshwater aquaculture has a long history compared to other areas in Indonesia.

Relationship between BBAT Jambi and other organizations: BBAT Jambi should engage in further joint activities with other organizations of local governments, etc., through arrangements made by DGA.

## (3) Recommendations pertaining to countermeasures against fish diseases

Countermeasures against KHV diseases: It has been observed that some fish infected with KHV may survive. However, because such fish are considered to be KHV carriers,

fish in a pond of a farm on which a KHV disease outbreak has occurred must not be transferred to other farms. Thus, it is important for the Project to keep stocks of KHV-free fish. When distributing KHV-free fish, it is desirable to provide a pamphlet that gives information on preventing KHV disease outbreaks together with fish seeds. Furthermore, if a KHV disease outbreak occurs in a pond, it is desired that the water temperature of the pond be maintained at 28°C or higher. The Project should find appropriate measures for dealing with diseases through testing, field surveys in model areas, and collection of information from both inside and outside Indonesia.

Learning from KHV disease: KHV disease is thought to be a good alarm bell for fish farmers. As aquaculture has developed, a variety of fish diseases have occurred. Thus, implementing countermeasures against these diseases and extending awareness of the importance of these countermeasures will be needed for the sustainable development of aquaculture. In this sense, steady implementation of water quality management and to raise healthy seedling are important.

### 3-7 Lessons learned

#### (1) Extension methods for “on-farm activities”

The extension strategy, which focused on the abovementioned core fish farmers and farmers’ groups, and extension strategy that set model areas contributed significantly to achievement of the Project Purpose. Moreover, continuous monitoring activity as well as discussions and information exchanges led to the building of an interdependent relationship between fish farmers’ groups and the Project. And activities taken on the initiative of fish farmers expanded the techniques that were developed through the Project to other fish farmers.

#### (2) Other effective extension methods

Technical levels in aquaculture vary among fish farmers and regions, and uniform technical development means that some needs may be overlooked. Thus, approaches that simultaneously pursue technical development and extension are useful in feeding back onsite-level extension techniques into development techniques.

It should be noted that incorporating activities pertaining to fish diseases as means for extension into extension activities for freshwater aquaculture proved to be highly effective.

### (3) Land issues

At the beginning of the Project, a delay occurred in construction of BBAT Jambi facilities, which was an input of the Indonesian side. There were also problems evicting residents from government-owned land to be used for BBAT Jambi, the resolution of which required considerable time. These developments resulted in a slowdown in Project progress. Consequently, it will be necessary to confirm the existence of similar problems when conducting preliminary evaluations and to keep them in mind when setting the period for project commencement.