

# WorldFish Center Bangladesh

## Development of Sustainable Aquaculture Project (DSAP)



## Mid-Term Review Report

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**July 15 2004**

## **Acknowledgement**

The mid-term review team would like to take this opportunity to thank WorldFish Center, Dhaka office for their support in many ways to the accomplishment of DSAP Mid-term Review (MTR). Especially, the generous support from DSAP through its Head Quarters and regional office staff is gratefully acknowledged. The team is thankful to USAID mission for giving insights to this review mission. The team highly appreciates the assistance rendered by the partner NGOs for organizing field visits to the project participants and sharing their experiences. BFRI and BAU fisheries faculty deserve thanks for sharing their valuable experiences with the MTR team.

We express our sincere thanks to all the female and male farmers who spared their valuable time in providing information to MTR team. The sincere field level support by the FAs during the MTR field visits was extremely useful and their contribution is very much appreciated.

The services of the two field investigators, Subir and Salam, the data entry person, Adnan and data analyst, Luther Das are gratefully acknowledged.

The team appreciates the useful insights and comments from WorldFish Center, USAID and BFRI in finalizing this mid-term review.

## Acronyms

ADI	=	Alternative Development Initiative (an NGO)
APNGO	=	Associate Partner NGO
BARC	=	Bangladesh Agricultural Research Council
BAU	=	Bangladesh Agriculture University
BFRI	=	Bangladesh Fisheries Research Institute
CRED	=	An NGO
DFG	=	Demonstration Farmer Group
DoF	=	Department of Fisheries
DSAP	=	Development of Sustainable Aquaculture Project
EC	=	European Commission
ED	=	Executive Director
EIA	=	Environmental Impact Assessment
FA	=	Field Assistant (root level staff of NGO aquaculture program)
FGD	=	Focus Group Discussion
IAA	=	Integrated Agriculture and Aquaculture
ICLARM	=	International Center for Living Aquatic Resources Management (currently known as WorldFish Center)
IFADEP	=	International Fund for Agricultural Development
IGA	=	Income Generating Activities
KII	=	Key Informant Interview
MoU	=	Memorandum of Understanding
MT	=	Metric Ton
MTR	=	Mid Term Review
ORD	=	Organization for Rural Development, an NGO
PC	=	Project Coordinator
PNGO	=	Partner Non Governmental Organization
RA	=	Research Assistant (of DSAP)
RDSAP	=	Research for Development of Sustainable Aquaculture Practices
RESTORE	=	A monitoring and evaluation software of DSAP
SO	=	Strategic Objective
USAID	=	United States Agency for International Development
USD	=	United States Dollar (currency)
WFP	=	World Food Program

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## **Executive Summary**

There are huge untapped fisheries resources, which need to be developed for contributing to the economic growth of Bangladesh. There are an estimated 1.3 million ponds in Bangladesh comprising 228,500 ha with perennial water and 76,200 ha with seasonal water. Moreover, 4 million ha of irrigated rice field also represent a potential resource where aquaculture can be practiced profitably.

Development of Sustainable Aquaculture Project (DSAP) aims at promoting pond and rice field based aquaculture in collaboration with national institutes, NGOs and private sector. The Bangladesh Fisheries Research Institute (BFRI) is its key partner in this endeavor. DSAP with a 5.5 million USD funding from USAID, under the Growth of Agribusiness and Small Business SO of USAID, launched a project covering 57 districts of Bangladesh. The duration of the project is from June 2000 to July 2005. The overall goal of this project is to increase the number of small enterprises producing and supporting the production of freshwater aquaculture products, improve the household income and enhance life circumstances of rural resource limited people. DSAP targets dissemination of low-cost improved technology packages to 35,000 demonstration farmers and an additional 175,000 spread over farmers by the end of the project. The project is implemented in 8 regions of the country through 33 partner NGOs of which 16 have provision of farmers' grant and 17 NGOs do not.

The Mid-term Review (MTR) is done to assess the performance of DSAP aquaculture extension approach so far based on review of existing documents, fieldwork, surveys and interaction with various stakeholders. Since the project has at least one more year to go, evaluation of the project at this stage must be limited in scope. Therefore, the conclusions and recommendations made in this MTR should be taken as broadly indicative to guide changes in project implementation.

The major findings of the MTR confirm positive gains with respect to aquaculture expansion in pond and rice field, productivity, profitability and women participation in fish culture. There has been rapid increase in aquaculture practice in pond and rice fields following the low-cost improved technologies suggested by DSAP. The productivity and profitability of fish culture also sharply increased from the pre-project period. The summary matrix of performance indicators presented in Table 12 shows that carp polyculture yield in pond increased from 936 kg/ ha in pre-

project (before 2000) to 2,660 kg/ ha in the post project period (2003). The total production of fish due to the project increased from 3,088 MT in project period to 50,846 MT in the post project period. Consequently, average annual fish consumption during the project intervention period increased from 59.81 kg per farm to 78.98 kg. Over the same period annual value of sales increased from US\$ 3.08 million to US\$ 50.55 million. Aquaculture production following DSAP approach also contributed to an increase in the household income by 15% in case of grant and by 36% in case of non-grant farmers (Table 11).

The participatory extension approach of the project encouraged the participation of women and girls in household based pond aquaculture. Their rate of participation increased from 24% in 2001 to almost 50% in 2003. Anecdotal evidence shows that the increased participation of women and girls did not only contribute to an increase in their household income, but also brought a sense of confidence and higher social status for the participating woman farmers.

The provision of farmers grant facilitates farmers' participation but it appears to have little relevance for sustainability of the farmers' aquaculture practice. There has not been any significant difference in fish yield and gross margin per unit of pond area between grant and non-grant farmers. Farmers expressed their interest to continue with aquaculture practice that they have learnt, irrespective of whether there is grant or not.

The sustainability of the program depends very much on the quality of support services provided by the partner NGOs. The NGOs who participated in aquaculture extension one of at their main programs performed better than those NGOs who were relatively bigger and took up aquaculture activities as an insignificant component of their total program. What is more important for the farmers is the availability of quality service by the NGO field staff so that they gain in productivity and income.

The cost-sharing in agriculture projects is a new practice in Bangladesh, which faces expectedly difficulties in implementation. The grant-NGOs were found to have managed it somehow through service charge collection, but it has been difficult for non-grant NGOs. NGOs that have already diversified into aquaculture related IGAs have greater potential to sustain after the DSAP supports are withdrawn. Generally, NGOs mind set is prepared for implementing project in contracting mode, which ensures that the entire costs will be borne by the project. Nevertheless, NGOs are

also realizing gradually that they have to bear their part of the project costs if they are to sustain their program in the long-run.

A detailed set of actions is recommended below separately for DSAP, PNGOs and the donor. The recommendation part is structured considering two phases of the project. First part consists of recommendations for the current phase and second part presents recommendations for the future phase of the project.

## **A. Recommendation for the Current project**

### **Actions for DSAP**

- i. During the remainder period, DSAP monitoring and evaluation component should continue to ensure more effective interactions with the PNGOs so that a clearer understanding is reached about the PNGO-DSAP-Donor common goal of rural aquaculture development through a partnership approach. The NGO-Coordinator should primarily act on this issue.
- ii. DSAP should strive to ensure quality of training through a more intensive participation and articulation of its field staff in farmers' *in situ* training activities by the partner NGOs field staff. The Research Associate in charge of training should be responsible for this action. The senior core staff of DSAP both from research and training units should be more directly involved in on-farm training.
- iii. Training curriculum and module need to be more simplified with practical examples so that the FAs can deliver more systematic training to the DFGs. The training of FAs should be on both the technical aspects of aquaculture as well as on how to work more effectively with farmers. The Research Associate (Training) should be particularly responsible for this action.
- iv. If resource permits, in addition to continuing with the scheduled follow up training DSAP should also provide additional foundation training to the newly recruited NGO Field Assistants who have otherwise missed it. No doubt, this will need to be adjusted and planned depending on the stage at which the FAs are replaced. Research Associate in charge of training must look into this aspect.

- v. DSAP must encourage formal participation of the local DoF, BFRI and University faculty in training and farmers' rallies to facilitate interactions and mutually share knowledge about proven technologies. DSAP should utilize such collaboration at the local level to get important feedback about improvement of technology packages to fit into the local ecology and farmer's choices. The NGO-Coordinator as well as the Research Associate in-charge of training should be responsible for this action.
- vi. BFRI and DoF have technical expertise and established facilities at the regional level, which could be utilized by DSAP for reinforcing training and research purposes. DSAP Team Leader should consider seriously how these existing facilities of BFRI and DoF can be utilized in future in order to save project operational cost and also to reinforce its training and extension activities.
- vii. DSAP should share extensively with PNGOs and farmers, the MTR observations that the provision of farmers' subsidy or grant has little relevance to sustainability of their aquaculture extension program, since there is no significant difference in fish yield or gross margin between grant and non-grant farmers. DSAP should continue to press that more relevant determinant of sustainability is for the PNGOs to ensure quality service delivery to farmers. This action is supposed to be preformed by the NGO-Coordinator together with the Research Associates (Research and Extension).
- viii. Larger number of demo-farmers is not covered under the grant system nor is there any difference in fish productivity and profitability between grant and non-grant demo farmers. Moreover, since it creates discrimination between grant and non-grant farmers, resulting in unnecessary problem in project implementation. Farmers grant should be ideally discontinued. But as the project has started monitoring grant versus non-grant demo-farmers, it should continue for the remaining year of the project so that a meaningful comparison can be made. But the grant system should be avoided in future project.
- ix. In order to achieve the cost-sharing goal without rapid increase of service charge by the NGO, DSAP should review the yearly rate of cost sharing and set the rules at the beginning of the project through a participatory consultation process in a transparent



manner. In this exercise, the Project should take into consideration the financial position of NGOs, farmers' ability to pay service charge and the lead time available for NGOs to adjust to the cost-sharing practice. The Project Leader should be responsible for this action.

- x. DSAP field staffs (i.e., Research Assistants- extension) need to play more proactive role to advise and stimulate the partner NGOs about how to initiate profitable aquaculture related income generating activities as a means to gaining financial strengths to bear cost-sharing. The experiences of NGOs who have already taken up aquaculture related IGAs should be shared with others through more interactive process i.e. regional coordination meeting. Farmers' group meeting should also be activated through increasing cross-visits by FAs as well as DSAP Research Associates (Extension). However, NGOs must be reminded that they should not compete with the farmers they are trying to help in generating income-earning activities.
  
- xi. DSAP monitoring and research unit should gear up impact assessment, RESTORE implementation, data analyses and synthesize findings so that the lessons learnt from this phase can be fruitfully utilized for designing of the future project. This action should primarily be undertaken by the Research Coordinator with possible guidance from the WorldFish Center headquarters.
  
- xii. The existing coordination between the research and extension units of DSAP should be strengthened and made more effective. Especially, both units should gear up their efforts to ensure that their Research Assistants as well as FAs collect reliable and quality data. The Research and Training units should also jointly plan an assessment of the impact of family approach on the rate of participation of female members in aquaculture training and technology adoption.

## **Actions for the PNGOs**

- i. The partner NGOs should improve and deliver high quality extension service to farmers so that the farmers gradually learn and adopt aquaculture technology that sustain their increasing productivity and income in the long-run.
- ii. The partner NGOs should strengthen its technology dissemination capacity through more careful recruitment of field staff, adequate provision of training, logistic supports and more intensive efforts towards human resource development.
- iii. Along side pond fish culture, fish culture in rice fields and Integrated Agriculture and Aquaculture (IAA) concepts of DSAP should be promoted to substantially increase fish production, together with rice and vegetables in an environmental friendly way using mostly low-cost home made input.
- iv. The partner NGOs should develop facilitation guidelines of the field activities for the FA/PC for better implementation of the project interventions.
- v. The family approach needs to be emphasized for improving participation and household level capacity building in aquaculture activities.
- vi. For sustainability, NGOs need to undertake aquaculture related IGAs such as fish nursery, rice cum fish production, along with collection of service charge, micro-credit for fish culture, etc. against their service delivery. Where unavailability of quality fish seed production exists as a constraint in many areas, there seems to be great prospect for NGOs to promote fish nursery through their DFGs. This would ease the existing challenge to bear the share of the operational cost. It should however be kept in mind that whatever IGAs the NGOs take up, they should not compete with the farmers, rather they should assist the farmers.
- vii. The partner NGOs should reduce drop out rate of their trained staffs by ensuring transparency in contractual arrangements with regard to their salary structure, job security, job description, etc.

- viii. The farmers should be more deeply consulted while the NGOs fix the rate of service charge. This participatory process would ensure ownership of the farmers in this decision making process and help facilitate better collection of service charge.
- ix. In forming demonstration farmer groups, the PNGOs should adhere to the principles and dynamics of group formation and consider farmer's resource base so that the genuine and committed farmers get into the groups. The DFG's learning and decision-making capacity can be enhanced through farmer's need assessment and participatory planning and monitoring exercises.
- x. The PNGOs should upscale their organizational support to not only advise the DFGs on technology dissemination but also link them to other service providers such as funding sources, financial institutions, product market outlets, etc.

## **B. Recommendation for the Future Project**

- i. The USAID – Bangladesh should continue its collaboration with the WorldFish Center on the ground of the positive results of RDSAP and DSAP on fish production, value of fish output and total income to fish farmers. The continuation of USAID funding support to WorldFish Center will accelerate distribution of benefits from rural aquaculture to wider number of farmers. The collaboration will at the same time bolster capacity building of NGO and private sector involvement in improved aquaculture practices.
- ii. The USAID – Bangladesh should build in agri-business focus in the future project. In the project design, there should be enough opportunities for the resource limited farmers and women to take part in the aquaculture development. Rural small holder farmers and women will participate in the project not only as fish cultivator but also many of them will be involved as input suppliers, fish processor and fish marketing agents (as depicted in the dynamic aquaculture model in section 5).
- iii. The key components of the future project should include research, training and extension in aquaculture. The training component should include business development service, record keeping, bank account operation, etc. together with aquaculture technologies. The

WorldFish Center working with BFRI, BAU and other Universities have gained useful experience and thus should play a crucial role in the research and training components in particular. The current and future aquaculture CRSP should also play a role in component.

- iv. Major target resources for future project should be the large number of ponds and ditches, small water bodies and rice field for alternate and concurrent fish culture. Although there might be some overlaps with other projects (i.e., MACH), the systematic efforts towards academic research and extension in the future project will be unique in nature.
- v. To meet up requirement for investment funds by farmers and other actors, the future project should also link rural financing through existing banking channel (i.e. Bangladesh Krishi Bank, and Rajshahi Krishi Unnayan Bank, nationalized commercial Banks) and/or creation of new funds exclusively for aquaculture development . One possible option may be the creation of a separate aquaculture fund with the PKSF. The USDAID/ Bangladesh may consider somehow to provide start-up funds for an aquaculture financing system as above.
- vi. The future project may also experiment with NGOs and private sector to promote contract farming with pond fishery. NGOs and private sector will provide extension, training and credit service package to farmers and buy back products at guaranteed prices. This can also be linked with the growing super market supply chain. Some of the contemporary examples are contract farming of vegetable and dairy by BRAC, contract growing of dairy products by Milk-Vita, contract growing of vegetables and fruits by PRAN company and contract growing of poultry broilers by ABFL Ltd. Even if it is not followed immediately in the future project, an important research component might be added on a pilot basis to seriously study the contract faming in aquaculture and evaluate its impact on small resource limited farmers.

## 1. Introduction

The fisheries resources of Bangladesh are crucially important to the national economy. Some 1.3 million people directly and 15 million people indirectly are involved with the fisheries sector. Fish consumption remains a major source of essential dietary nutrients in most households. Per capita annual fish intake is estimated to be about 12 kg, contributing to about 60 percent of animal protein intake. Fish export occupies the third position in the overall export earnings. The country is rich in extensive fisheries resources. There are over 1.3 million ponds, 0.06 million *dighies*, *beels*, *haors* etc. covering an area of 1.33 million hectares. Around one million people are estimated to fish full time, and 11 million are involved part time and four out of every five rural dwellers are dependent to some extent on aquatic resources.

Rice fields account for some 10 million hectares of which over 4 million hectares are irrigated. Especially, low land rice fields with irrigation facilities represent a potential resource where aquaculture could be practiced. In addition, there are another 2.8 million hectares of floodplain water resources that exist during the monsoon season. The country has a coastal belt of 480 km. with an exclusive economic zone of 320 km from the coast, covering an area of about 43,302 sq. km. It has a rich aquatic biodiversity as well. About 284 freshwater species (including freshwater prawns), 511 marine species (including marine shrimp) and 12 exotic species are available in Bangladesh waters. Therefore, there is tremendous potential of fisheries sector to make a significant contribution to the economy of Bangladesh. It is an area where poor people of rural Bangladesh can be involved and benefited as well.

Production of fish comes from inland open waters (rivers, estuaries, beels, lakes, floodplains), inland closed waters (ponds, baors, paddy fields, fish farms), coastal closed waters (ghers) and marine waters (artisanal fishing and trawl fishing). The current production of fish is about 2.3 million metric ton per year. The growth in fisheries from different sources is not uniform. Production from inland open waters and marine waters is increasing very marginally over the past few years. It is the inland closed water areas, which are mostly contributing to the fish production of the country (42%). An estimate made by DoF-BARC in 2001 shows that during the nineties inland closed water (aquaculture) production grew by about 16% per year. In contrast, the production growth over the same period for the inland open waters and marine waters were only 3.59 and 2.76 percent per year respectively. In fact the culture fisheries are making a significant contribution to the domestic availability of fish as well as export earning of the country. Therefore,

to attain the stated objectives of the fisheries policy of the country, employment creation, nutrition improvement and foreign exchange earning - there is hardly any option but to rapidly expand the culture fisheries.

## **2. Development of Sustainable Aquaculture and Project (DSAP)**

### **2.1 Project Background**

The WorldFish Center (formerly, International Center for Living Aquatic Resources Management or ICLARM) has been an active partner to the efforts of the Government of Bangladesh for expansion of aquaculture in the country since 1989. WorldFish works in close collaboration with national institutes, NGOs and the private sector. The Bangladesh Fisheries Research Institute (BFRI) has been its key partner in carrying out research and development. The United States Agency for International Development (USAID) is the core supporter of WorldFish's aquaculture activities in Bangladesh. USAID funded the Research for Development of Sustainable Aquaculture Practices (RDSAP) from 1995 to 2000 (through Grant No. LAG-4111-G-00-5022-00). The emphasis of this project was to support research and, to some extent, demonstrate improved low-cost aquaculture technology. As a logical continuation of RDSAP, USAID funded the current project "Development of Sustainable Aquaculture Project" (DSAP) under the Cooperative Agreement #3 88-A-00-00-00068-00 with a total approved budget of US\$ 5.5 million. The DSAP officially started functioning from 28<sup>th</sup> June 2000 for a period of 5-years and will end on 31<sup>st</sup> July 2005.

Although DSAP officially started from June 2000, the first aquaculture season to follow the principles laid down in the cooperative agreement between WorldFish and USAID was 2001-2002. In fact, the aquaculture season 2000-2001, which was an overlapping year between the previous RDSAP and current DSAP project followed RDSAP guidelines. The changed leadership of the project in November 2001 led to refinement of the project strategy.

DSAP of WorldFish Bangladesh supported by USAID has been evolving as a dynamic development project directly contributing to the improvement of livelihoods of the poor farmers through participatory approach in aquaculture technology adoption. DSAP has 34 PNGOs (Partner NGO) who are the implementers of the project initiatives. Farmers have been receiving training and technical supports through the partner NGOs of DSAP to increase fish production. The project is developing the skills and knowledge base of fish farming community through capacity building of the NGOs, researcher and academics. The project has a target of implementing at least 7,000

aquaculture demonstration each year through its 33 partner NGOs and 55 associate NGOs in its 8 regions (*see Annex 1 Map*). Thus the total number of demonstrations fish farmers is expected to rise at 35,000 at the end of the project. In addition, another 175,000 fish farmers will have benefits as spread over farmers. DSAP core expert team is located at the WorldFish Bangladesh headquarters in Dhaka from where it organizes training and monitors impact of technology dissemination on aquaculture production in the program areas.

## **2.2 DSAP Goal and Objectives**

The overall goal of the DSAP is to increase the smallholder farm household incomes and life circumstances of resource poor people who take advantage of improved ways to farm the extensive inland water resources of Bangladesh and to bring to market increased aquaculture products. The specific goals are:

- (a) To increase fish production of the small-scale rural farmers and to improve the household incomes and livelihoods of these resource limited people.
  
- (b) To build up the capacity of the partner NGO that will enable the cooperating NGO partners to maintain and, if possible, to extend their aquaculture support programs even in the absence of external support.

The specific objectives of the DSAP are:

- i. To disseminate improved low input technologies to a large number of smallholders through training of local NGOs extension staff;
- ii. To continue research on applied aquaculture technology innovation and refinement; monitor effectiveness of different dissemination methodologies and assess impact of the demonstrations;
- iii. To provide training support to aquaculture-related small businesses (hatchery owners, managers, seed sellers, etc).

## **2.3 DSAP Implementation Strategy**

DSAP has been implementing its extension program in partnership with the selected PNGOs. The PNGOs and DSAP come in an agreement of their role and responsibility in implementing project activities in a memorandum of understanding (MoU). The collaborative research program with

BAU is also being implemented through contractual arrangements. The BFRI has been involved in collaborative research under a GoB approved TAPP. By the time of MTR it was found that a total of 33 PNGOs were directly implementing the project initiatives. Along with these 33 PNGOs, another 55 associate NGOs in 57 districts of Bangladesh are working towards the same goal. DSAP has divided its country wide operation in 8 regions for the convenience of implementation and administrative facilitation. DSAP has established 8 regional field offices at Jessore, Magura, Rajshahi, Bogra, Mymensingh, Gazipur, Comilla and Barisal. Each of the program regions has one Research Assistant (Extension), and 4 regions have one Research Assistant (Monitoring) each.

The PNGOs supported by grant allocation for demo farmers are designated as Grant-NGOs, and those without farmers' grant are called Non-grant NGOs. A farmer under grant NGO received a cash grant of Taka 2,000 each to be able to start up demonstration in the selected pond. Among the PNGOs, 16 PNGOs are working with grant, while 17 PNGOs work without grant provision to the farmers.

### **3. Mid-term Review**

Mid-term (MTR) review is a formal endeavor by the project for a reflection upon the accomplishment to date. Though it was supposed to be done little earlier, having done it in May-June 2004 may still allow some room for the project to incorporate and accommodate necessary adjustments in the remaining period of the project life. The project intended to have an independent evaluation to be done by external expertise. Independent consultants from BAU, SAFE Development Group and Government of Bangladesh were hired to conduct the mid-term evaluation.

#### **3.1 MTR Objectives**

The DSAP has one more year to go. A full scale evaluation of the project performance can only be done after the project period is over. So, the present MTR is bound to be limited in its scope.

The overall purpose of the mid term evaluation is:

- i. To review the performance of the DSAP to-date to assess for the project's impact toward achieving its goals and objectives.



- ii. To assess the future directions including a possible continuation of the collaboration between USAID and WorldFish to assist in the further development of the aquaculture sector in Bangladesh and to help improve the livelihood of resource limited rural households.
- iii. To make necessary suggestions and recommendations for the remainder period of DSAP.

### **3.2 MTR Methodology**

The MTR team visited Sreepur and Kaliakoir area of Gazipur region to get a first hand understanding of the project. The field visit was done to conceive the idea of evaluation design.

The MTR mission applied both qualitative and quantitative techniques for DSAP review surveys (*see Annexure III -XI* ). The qualitative part included FGD (Focus Group Discussion) with the DFGs in the purposively selected regions *viz.* Mymensingh, Jessore and Magura. KII (Key Informant Interview) was done with nursery operator, DoF and other related stakeholders. A number of case studies were also done to reveal the complete picture of the accomplishment of the project.

The quantitative part included structured questionnaire survey. Multi-stage random sampling technique was applied to select a total of 48 demonstration farmers, who started in 2001 and graduated in 2004 after three years of pond demonstration with DSAP supports.

The MTR team facilitated FGD with the DFGs of both the grant and non-grant PNGOs and also held meeting with the project implementation staff (FA, PC, ED) and NGO management team of different NGOs to gather their views and perception on the implementation and sustainability of their own aquaculture program. A list of open ended questions enlisted in the guideline for FGD was followed while facilitating discussion with the groups. A quantitative questionnaire survey was conducted with 24 grant and 24 non-grant DFG farmers from Mymensingh and Magura region. FGD was done with a total of 12 DFGs who were involved in different period of project life i.e. from inception to current aquaculture year. The methodology included the following major steps.

*Briefing session on DSAP:* DSAP Dhaka team arranged a briefing session for the review team on “Development of Sustainable Aquaculture Project” (DSAP) to provide an overview of the project.

*Review of existing documents:* The MTR team reviewed the project documents and available project reports produced since inception of the project.

*Inception report:* The MTR team prepared an inception report prior to actual evaluation work done at the field level. The inception report includes the mode of evaluation operation.

*FGD (Focus Group Discussion):* Focus Group Discussion (FGD) was conducted directly with the project participants (demonstration and spread over farmer) and PNGOs.

*Consultation with stakeholders:* Meetings and interviews were organized with DSAP field staff, PNGO project staff and the stakeholders to know their perception and comments on the specific issues of the project.

*Collection of field data:* Limited qualitative and quantitative information about project interventions was collected from the demo farmers and spread over farmers through structured questionnaires implemented by trained field investigators.

*Collection of PNGO data:* A brief checklist of questionnaire was sent to all PNGOs, out of which 21 PNGOs responded.

*Case studies:* The MTR mission captured a number of interesting cases studies depicting farmers' engagement in fish culture and change pattern in livelihoods.

*Use of existing database:* Existing database of WorldFish including the customized data base titled RESTORE was used for impact assessment.

*De-briefing and reporting:* A pre-debriefing session was made on June 01 with a small group of senior personnel from USAID and DSAP. Presentation to a large audience was held for DSAP, USAID and other stakeholders on June 6, 2004 to get feedback on the MTR report.

### **3.3 Data Management**

The quantitative data was entered in the computer using Microsoft Access database application. The data analysis was done on SPSS. The qualitative data was entered and

analyzed using Microsoft Excel. The information collected from the meetings held with the different stakeholders of DSAP is also used in this report.

## **4. Findings**

### **4.1 Aquaculture Extension Approach**

DSAP has been supporting growth of sustainable small aquaculture initiatives appropriate for the poor farmers through the extension of low input but improvised fish farming technologies using local NGOs as the key vehicle. The main activity is to develop core demonstration farmer groups through the adoption of proven pond, rice-fish aquaculture and nursery development technologies and promote small business among the fellow farmers by motivation and training support.

The ultimate purpose of such extension strategy was to establish an easy accessible two way inter-linked communication system of DSAP central management to farmers' level for quick transformation of technical and management information and get feedback on performance of the field demonstrations. It thus includes an examination on the suitability of these technologies at different aqua-ecological regions of the country for further modification and improvement as required. The strategy intended to facilitate development of support services enterprises (i.e., seed producer, trader, input supplier, processing, transportation, marketing and export) to create employment opportunity and promote sustainable interrelated aquaculture business. To achieve the above goals and objectives, the extension activities of the project included the following major thrusts:

- Training and motivation activities
- Demonstration of the approved technology packages
- Monitoring, evaluation and coordination of the program.

#### **4.1.1 Selection of NGOs**

Farmer groups were formed from the working areas of the selected PNGOs. The PNGOs were selected according to compliance to a set of criteria. The selection criteria included: profile of the NGO, registration status, relevant experience and expertise, involvement with local people, commitment and reliability of the NGO. Their past and present performance in development activities in association with GOB Organization or NGO, local people representatives, local administration and the donors were also considered in the process of NGO selection. The NGOs experience in fisheries and extent of fisheries activities at local, regional and national level (if

any), i.e., type of activities, number and categories of beneficiaries, financial involvement, fund source, impact and response of program were reviewed. The NGOs participation with resource poor beneficiaries, female and gender sensitivity, small enterprise development, environmental and socioeconomic sustainability of the program was taken into account. Their non-alliance to any political, local, personal or institutional elements affecting ethical standard of the rules and regulations was also put down while selecting any NGO for partnership.

A number of relatively big NGOs i.e., CRED and ADI had previous experience in collaborative aquaculture program with ICLARM with support from EC, WFP, IFADEP etc. The relatively more experienced NGOs were selected first as Grant NGO in 2000/01, the first year of the project. The Non-grant NGOs were selected in the 2<sup>nd</sup> year and 3<sup>rd</sup> year and these were comparatively younger. Some of the newer NGOs had undertaken aquaculture program for the first time and did not have adequate experience or orientation towards aquaculture extension activities. Therefore performance varies between NGO's, depending on their size, experience and commitment. Relatively smaller local NGOs, who undertook aquaculture program as their major operation, seemed to have done better than those who treated DSAP aquaculture program only as a minor component of their overall activities.

#### **4.1.2 Group Formation**

Farmers' groups in this project was formed mainly for dissemination of recommended aquaculture technologies. The DFGs (Demonstration Farmer Group) have been formed with 6 – 22 members from the poor and smallholder farm households who have little or no access to information and other necessary resource to improve their income from fish culture. A total of 464 demo farmers groups (DFGs) were formed in 2001, 955 nos in 2002 and 1447 DFGs in 2003. The demo farmers received Tk. 2,000 each from the PNGOs as grant money, which they mainly used for preparation of ponds/ rice fields and buying fish seeds. In many cases, the grant money was misunderstood as loan to farmers and consequently when they paid service charges they meant as if it was repayment of loan they obtained from the NGOs.

**Table 1: Average size of demonstration farmer group**

<b>Parameters of Group Size</b>	<b>Statistics</b>
Mean	12.00
Median	10.00
Mode	10
Minimum	6
Maximum	22

Source: DSAP MTR Survey 2004

The selection of DFG farmers for aquaculture program in the earlier years was mostly done through consultation with the potential resource poor farmers in the village. It was only since 2003 that the participatory approaches were applied in the process of group formation. The MTR survey reveals that about a half of the sample demonstration farmers were small farmers owning only up to 200 decimals of land (*Table 2*).

**Table 2: Land ownership status of the demo-farmers**

Land ownership	Farmers				Overall	
	Grant		Non-grant		#	%
	#	%	#	%	#	%
Less than 50 decimals	7	31.8	1	4.2	8	17.4
50 to 100 decimals	1	4.5	4	16.7	5	10.9
100 to 200 decimals	3	13.6	7	29.2	10	21.7
200 to 300 decimals	3	13.6	7	29.2	10	21.7
More than 300 decimals	8	36.4	5	20.8	13	28.3
Total	22	100	24	100	46	100

Source: DSAP MTR Survey 2004

Only about a quarter of demo-farmers had land area above 300 decimals. So, by and large the demo-farmers were selected from small and lower medium farmers. The landless farmers or the poorest of the poor are not expected to be included in the group because by definition the demo-farmers have to have access to some rice land or pond for fish culture. It may however be noted that grant NGOs selected relatively more demo-farmers from marginal land holding groups owning up to 100 decimals, compared to non-grant NGOs. But there was no significant difference in average land area owned by grant or non-grant farmers (*Table 3*). This however runs counter to the DSAP impact assessment survey results that non-grant farmers have on the average 410 decimals of land as against 286 decimals for grant farmers. DSAP Working Paper 2004/30 reported that average annual income of non-grant farmers (Taka 75,000) was also about 23% higher than that of grant farmers (Taka 61,159).

**Table 3: Average land owned by demo-farmers**

Demo Farmer	Mean (decimal)	n	Std. Deviation
Grant	228.8182	22	209.3959
Non-grant	231.7083	24	150.3479
Total	230.3261	46	178.9338

Source: DSAP MTR Survey 2004

The DFG was formed to have organized training events and follow up sessions with the members. Each of the groups had a Chairman and a Secretary. The Chairman and Secretary in almost all groups under the FGD were found to be clear about their responsibilities. Two of the major factors for sustainability of the DFG members are group fund and record keeping. Only 33% of the NGOs (4 out of 12 NGOs under the FGD) had some form of record such as pond book and resolution book, but these were not always maintained properly. The remainder groups (67%) did not maintain any record, for example, pond book, attendance record, notice book etc. Only 17% of the NGOs (2 out of 12 NGO under the FGD) had generated group fund. For developing group feelings and sense of ownership, building up of group funds and welfare activities should have been emphasized for the sustainability of the groups and solidarity amongst the group members.

The quantitative survey of 48 demo-farmers shows that 19% of the farmers have fish culture as their primary occupation, while 44% of the farmers have the same as the secondary occupation. Therefore, at least 63% of the demo-farmers were involved in fish culture either as their main or secondary occupation.

#### **4.1.3 Participatory Approaches**

There has been an evolution in DSAP extension approach over the project period so far. DSAP evaluated each year important learning from project operation for improving participation of the farmers in aquaculture activities and thus changes took place in the project extension approach from time to time. During the first year in 2001, the project followed an individual approach where only one member from each household, male or female, used to be selected as demo-farmer. They received aquaculture training and participated in farmers' rally for building awareness about improved aquaculture technology packages in the locality. In the following years, participatory and household approaches were introduced where both male and female farmers participated in the training program and other dissemination events. During 2004 the project incorporated further innovation wherein the idea of 'family approach' was applied allowing female farmers, male farmers and their children to participate in training and demonstration practices. The involvement of the entire family in their own pond fish culture has created opportunities for better management and care of their business. The field staffs have recently started applying the participatory tools such as wealth ranking and resource mapping exercise to select the demo farmers. This family approach has empowered both female and male farmers of the family including children to participate in developing a family enterprise. It thus enhanced the opportunity of all the members

of the farm family to upgrade their skills and knowledge in aquaculture production system and also to support each other in nurturing the fish culture.

#### **4.1.4 Duration of Extension Service**

The demonstration farmers have been receiving training and technical support for a period of three years. In the first year the support is intensive for assisting the farmers effectively to practice and learn the technology. In the first year FAs make at least one visit a week. Farmers in the second year receive a semi-intensive support and FA was supposed to visit the DFG fortnightly, but many of the FAs could not stick to this schedule. FA visited once in a month in the third year. FAs deal with 50 new farmers each year so that they have 50 farmers in the first year, 100 farmers in the second year and 150 farmers in the third year. A total of 150 farmers per FA spread over several villages appear to be on the high side, especially when the FAs are hard pressed for collecting service charge.

FAs conduct three group-training sessions. The first one is a foundation training, which included: (a) pond preparation, (b) fish stocking, (c) fish disease management and (d) fish feed preparation and feeding. The foundation training was generally given at pond sites for 2 to 3 hours. The follow up training were sporadic and mostly offered as the FAs visited demonstration ponds. According to the FGD respondents the technical support of the FAs include: (a) pond visit, (b) water quality checking, (c) stocking density, (d) pond preparation and (e) technical assistance in disease preventive measures, etc.

#### **4.1.5 Quality of Services**

Quality of facilitation skills of the FAs varied from one to another. In many cases the trained FAs have developed a good rapport building capacity, skill in providing technical support and qualities for social development activity. In some cases the FAs did not make regular visits to the DFGs for giving technical support. Although all of the 12 FGD farmer groups felt the need for more intensive visits and practical advises by FAs, 8 did not give any specific suggestion as to what the FAs should do. Farmers of the remainder 4 groups mentioned about the need for effective skill development, which was expected from FAs training and field visits. Two of the FGD groups felt the need for more regular visits by the FAs. In summarizing the feedback from the farmers of qualitative and quantitative surveys, it seems that the quality of service delivery by the NGO staff is generally less than expected and that it has to be improved to meet the demands of the rural aquaculture stakeholders.

Besides the service provided to the DFG farmers, the FAs conducted training sessions for fish seed vendors, nursery owners and hatchery owners. The PC and DSAP direct staff co-facilitated these training. The respondents of KII from these stakeholder thought that the quality of training and support services need to be further improved.

The PC of the NGO aquaculture program needs more careful planning skills to ensure FA's regular visit to the DFGs. Large drop out of FA created an immediate crisis affecting necessary assistance and service delivery to the farmers.

#### 4.2 Aquaculture Training Program

Training was viewed as a vital component of the project to develop capacity of the NGO staff. The high turnover rate of the PNGOs staff working in aquaculture field has necessitated the needs for additional training.

One FA looks after 50 demo farmers in the first year of the project, 100 farmers in the second year and 150 farmers in the third year. In the second and third year, the work load for FA increases progressively, although the number of visits decreases. In consideration of the demand of support by the farmers, farmer-leader concept may be introduced to develop local extension agent. The farmer-leader may be selected by the farmers and FA jointly. This will ease the work load of the FA in the second and third year of demonstration.

The PNGO staff i.e. FAs conducted training for demo-farmers. According to the training plan farmers were supposed to receive one foundation training and two follow-up training. Moreover, the demo farmers were supposed to have group meetings in presence of FAs twice a month in the first year, once a month in the second and third year. The MTR quantitative survey indicated that the farmers got on an average 5 to 7 training (one foundation and other follow up training/ meetings) session and a total 40 group meetings were held at DFG level during three year period with the project. Demo farmers of Grant PNGO got comparatively more trainings than the Non-grant demo farmers (*Table 4*).

**Table 4: Number of training received by Grant and Non-grant**

PNGO Farmer	Av. Number of Training	n	Std. Deviation	Minimum	Maximum
Grant	6.58	24	1.25	1	7
Non-grant	4.83	24	1.93	0	12
Total	5.71	48	1.83	0	12

Source: DSAP MTR Survey 2004



Farmers are demanding more effective support from the FAs to increase their fish production. The MTR team observation corroborates the concern of the farmers for more quality training. This indicated a need for improvement in training approaches and quality of the trainers. Many of the NGO staffs lack adequate capacity in exercising participatory practices. It happened due to frequent dropout of the FAs, although some NGOs have made efforts to cover the DFGs support with the help of other staff including project coordinator.

A large number of female and male farmers have been trained since inception (year 2001) of DSAP. What is more striking is that as the project progressed, the number and the proportions of female members trained increased significantly. In 2003 and 2004, about a half of the total member of trained farmers turned out to be women (*Table-5*).

**Table 5: Participation of female and male farmers in aquaculture training**

Year	Total farmers	No of farmers trained		% of participation	
		Female	Male	Female	Male
2001	6,608	1,586	5,022	24	76
2002	6,250	1,187	5,063	19	81
2003	11,250	5,456	5,794	48	52
2004	11,250	5,625	5,625	50	50
G. Total	35,358	13,854	21,504	39	61

Source: DSAP communication during the MTR period

In many cases, the FAs were not found to use any learning session guide as to how to follow the participatory methodology, while imparting training to the farmers. Many FAs did lack the adequate skills of assessing field problems/ learning needs, prioritizing problems, and participatory planning and monitoring system. On the technical aspects, staff understanding of fishpond ecology, rice-fish ecology, disease management etc. issues need more improvement. Similarly, more learning opportunities are to be created for the farmers to practice pond fish, rice-fish, and nursery management. The emphasis should be started from simple level of learning to a higher level so that the technology needs of the advanced farmers are also met. As such a three year learning curriculum may be developed with the participation of the farmers and this can ensure the type of support to be provided during 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> year of the project to each farmers' group. Currently, NGO staff members do not know exactly what and how the specific learning is to be generated for DFG or other stakeholders.

### 4.2.1 Training Curricula and Quality

The training is rendered at two levels - one for the staff capacity development and the other at the beneficiaries' level for demo farmer, nursery operator and fish seed vendor. The broad contents of the training include:

- Low input improved aquaculture practice
- Support services for enterprises development to assist aquaculture business
- Group dynamics
- Participatory rural appraisal (PRA) techniques
- Financial management
- Follow up and refresher training

The DSAP staff has developed the training curriculum by integrating learning from other projects working in Bangladesh. DSAP external resource persons have also facilitated the training events. A drawback of the Project is that the BFRI, DoF or BAU fisheries faculty were not involved in designing training or developing training materials, meaning that the project missed to some extent the opportunities of benefiting from experts with practical knowledge in aquaculture research and extension. The participation of expertise from DoF, BFRI and BAU faculty in the design and implementation of training could have improved the quality of training significantly.

The group meetings of the demo-farmers facilitated by FA should be so organized that farmers learn from each other to discuss practical problems and share solutions to problems amongst themselves. Each demo farmer group should be asked to assess their constraints and opportunities and discuss their practical needs. The FA needs to possess strong social rapport and practical aquaculture knowledge to make the group meeting more effective.

Generally, the DSAP training to NGO staff was intensive in terms of contents, but delivering them in short period of time was not as effective as it could be had the training been given over longer period. The training curriculum could be improved through a participatory need assessment exercise involving expertise from DoF, BFRI and BAU faculty. Training curriculum should also be more flexible to address various ecological diversities and different state of technological development in different regions.

Training by NGO staff to farmers was less intensive and did not follow any systematic curricula. The FAs must guide the training session according to prior training plan. The training on fish cultivation in rice plots seemed to have been very popular but not always delivered in proper context. This approach typically requires raising dikes to resist flooding and digging a small pond in some corner of the rice fields. Field visits by the MTR team reveal that rice-fish culture has a great potential to enhance fish production from rice fields (*see Case Studies 1, 2 and 3*). Anecdotal evidence shows that a large number of hatchery owners, fish nursery operators and fish farmers could successfully utilize their training in their business (*Case studies 1 through 7 illustrate this point*).

#### **CASE - 1**

##### **Aminul - Resource poor or Technology Poor?**

Aminul and his two brothers have 1.9 acres of crop land and a pond of 20 decimals. The crop income, which was declining due to increasing cost of production, was not sufficient for them to maintain a decent life. Two of the younger brothers could not effectively engage themselves in the agricultural activities because of poor income from it. They were looking for more productive opportunities to earn money and improve livelihoods.

Aminul joined ORD (Organization for Rural Development) supported by DSAP aquaculture program in 2001. He is one of the DFG (Demonstration Farmers Group) members in his village Gourdar of Phulpur Upazila in Mymensing District. The training he received from ORD on aquaculture gave him an opportunity to make better use of their resources. Their pond was adjacent to their rice fields. They never thought of harnessing the potential of the natural resources until the elder brother Aminul learned about rice-fish culture from the DSAP.

When he came to know about rice-fish culture he was really happy because he had a rice plot adjacent to a pond, which was ideal for trying this rice-fish aquaculture technology. After learning about the technology, he stocked grass carp, *mrigal*, *shorputi*, common carp and *katta* in the rice field. He was very lucky because he knew exactly what to do before he started such new technology. He applied chemical fertilizers to grow plankton that the fish feed upon. As the fingerlings grew he provided them supplementary feeds.

At the end of the season he harvested the fish and sold them for Taka 30,000. He had spent Taka 9,500 for the rice-fish culture. He had a net income of Taka 20,500 from fish alone while he got only about 30% of the amount from rice.

Aminul and his two brothers decided to expand rice-fish culture plot area. They leased in about an acre of land from their neighbors. They prepared the ditch area and stocked fish. It was a huge amount of work for the three brothers to cut mud and make the piece of land feasible for rice-fish culture. Aminul put cow dung in the plot for better food. Then he stocked fingerlings of different carps. They followed all that Aminul learnt from the ORD. They were actively involved in their farm work after getting substantial amount of income from the initial year of rice-fish culture. They took care of the field by cleaning weeds grown in the ditch area and providing supplementary feed regularly. Again, at the end of the year, they harvested a huge amount of fish. The total sales proceed was Taka 45,000 and the expense was Taka 20,000. The income from rice was only about Taka 12,000 though it was a good yield that year. Aminul did not apply any pesticide in the rice field because there was no pest infestation that year. Aminul was convinced of the idea that fish in the field contributed nutrition to the rice plant and the fish also controlled insects by eating them up. Aminul and his brothers became expert in rice-fish culture. This year (2004) they are planning to lease in one more acre of land for rice-fish culture. They have had verbal agreement done already. They would pay 50 maunds of rice (1860 kg.) yearly as the rent for the land.

Aminul and his brothers are very happy with the income from rice-fish culture. They have built three new houses, one each for three brothers. Two of the elder brothers got married two years ago. They are planning for the marriage of the youngest brother this year. They are self-employed. They are fully occupied with their own farming works. They are very thankful to Mr. Musharof, the FA of ORD, for his hard work in disseminating technology of rice-fish cultivation. Aminul was not a resource poor but technology poor farmer because it is the access to an appropriate technology, which alleviated him from poverty stranglehold.

## CASE - 2

### **Living on Rice-Fish Culture**

Sharif, a retired army man from Baralidha of Sreepur Upazila in Magura, runs a small farm. He narrated his experience as follows: about two years ago I was an idle man after retiring from army. You see my small farm has aquaculture, poultry and other agricultural activities. My wife, two daughters and son are now busy in this small agro-industry.

In 2001, I met Mr. Shafique, Field Assistant of ADI (Alternative Development Initiative) one of the local NGOs. He explained the improved method of pond aquaculture. Seven of my other neighboring farmers and I joined in a group to form DFG (Demo Farmer Group). We were told to undertake pond fish culture and/ or nursery demonstration in rice field to see its effectiveness. Shafique invited us in a fish foundation training. After receiving the training, I made up my mind to make a demonstration of rice-fish culture in my rice field. I raised my paddy field dikes. I transplanted my field with rice plants in late January. A month later I called a fish seed peddler (*patilwala*) and stocked Indian and Chinese carps in the rice field. Shafique visited my rice-fish fields. In the first year of cultivation I earned a net income of Taka 17,500 from my fish sells against my expenses of Taka 6,500. My wife and two daughters supported fish culture by providing various feeds to the fish everyday.

The next year i.e. in 2002, I made a net profit of Taka 21,500 above my total production cost of Taka 5,500 for purchasing fish fingerlings and feeds. Last year (2003), my net income was raised to Taka 23,000, while the total expense was Taka 5,700.

Prior to this rice-fish cultivation I was able to earn a profit of Taka 14,000 only from my 72 decimal of rice field. Fish culture in rice field has given me a substantial increase in income, which is about double the amount I had been earning earlier from the same field. My family was suffering many ways because of not having a good house. I have built a new house for Taka 28,000. All these money came from my rice-fish culture. My daughters are able to attend school regularly with necessary educational materials. We are happy now and looking for more innovative technology for increasing productivity further. I have fulfilled my long waited dream of living a descent life from my own income.

## CASE - 3

### **A carp-golda farmer on the rise**

Abdus Salam of Pajia village in Keshabpur Upazila of Jessore District is a carp-golda demonstration farmer supported by a local NGO Jagoroni Chakra (JC). A married young man of 29 years of age has a family of five members i.e. father, mother, wife, son and a daughter. Salam's family owns about 6 decimal of homestead, 40 decimal of orchard and a pond of 10 decimal. It used to be a very low lying water logged area during rainy season. Salam's father is a migrant farmer from Bhola District, who continued his old profession of collecting golda juvenile (PL) from rivers.

A few years ago, Salam leased in 10 decimal of land for Taka 4,000 to grow vegetables. Later he discontinued vegetable production and started raising golda PL in 10 decimal of land that he leased in. He learnt some basics in golda juvenile culture from his father. In 2001, he joined a JC demonstration farmer group (DFG), got aquaculture training and took up carp-golda culture in 42 decimal of rice field, which he leased in for Taka 6,000 per year. He prepared his pond, released fingerlings and followed fish feeding practice as learnt from his training. He prepared compost and other fish feeds using his domestic left over materials and poultry liters. He earned quite a good return from his demonstration pond. Encouraged by his success, Salam leased in 7 more adjacent rice-fish plots totaling 352 decimals in 2002 for carp-golda culture with rice cultivation. The lease contracts were for 1-3 years and the lease value varied from Taka 1,500 to 6,000 per year depending on location and quality of land. He reported to have a gross fish sale of Taka 400,000 from 7 ponds this year (2003-04).

Salam's fortune kept him going very well. As he gained experience and confidence, he leased in a big enclosure (gher) of 50 bighas (1,650 decimal) for Taka 150,000 per year in 2004 and invested another Taka 500,000 for carp-golda culture in this field. For mobilizing this huge capital and sharing managerial responsibilities, Salam took his friend Islam of the same village as a business partner for fifty-fifty share of profit. He employed one of his distant nephews as a worker, who also learnt from Salam the technique of fish culture in rice field and leased in a rice plot of 42 decimal for carp-golda culture in the vicinity of Salam's 7 ponds. JC field staff keeps supervising Salam's ponds and advises him if he faces any problem. JC also helped him with a low-cost local made fish feed mixture machine for making feed pellets.

### **4.3 Dissemination Technology Packages**

In the early stage of the project the technology package included a list of 19 technologies. Within the first year of the project the farmers as well the DSAP staff realized that the difference among the 19 technologies were only with respect to input practices.

DSAP has promoted the following 3 technology “packages” through the partner NGOs among the poor and smallholders fish farm families to increase their income from fish production in both pond and paddy fields:

- i. Polyculture of indigenous and exotic carps;
- ii. Polyculture of carps and golda (freshwater prawn);
- iii. Nursery practices.

The recommended technology packages are largely suitable for resource poor farmers, who begin fish culture as small scale operations, but later on generally develop into more intensive and larger enterprises. This is what is expected of a project like this. But it was also reported by NGOs that the technologies that are being promoted need to be adequately packaged for more advanced fish farmers and regions such as Jessore and Phulpur in Mymensingh. Especially, two problems appeared very prominently during the MTR field work. Firstly, the lack of quality fingerlings affected fish yield and it was complained by farmers and FAs alike. Secondly, the scaling down of technology support and feedback from NGO field staffs reduced motivation and interest of the farmers in second and third year. This was more common for grant farmers, compared to non-grant farmers.

These technologies have been selected for dissemination also through on farm research by BFRI and other agencies in Bangladesh and other countries of Southeast Asia. It is recognized that small scale carp polyculture in pond and rice fields as promoted by DSAP will continue to be the largest source of fish production and offers the greatest potential for expansion of pond aquaculture in the country. DSAP intervention for integrated aquaculture-agriculture program seems to have further prospect, as illustrated in the case study 7.

### **4.4 Monitoring, Evaluation and Research**

DSAP established its monitoring and evaluation wing managed by competent expertise. The project has monitoring system at three levels: DSAP, NGO and Farmers. DSAP has been receiving technical and financial report on quarterly basis from the PNGOs. Besides this, the RA

(extension) makes regular monthly report and RA (research) from field regularly collects data through structured questionnaire on production, consumption and livelihoods. An efficient software RESTORE is under implementation to effectively monitor the project effectiveness.

A huge rich data has already been generated by the project but a lot of it is yet to be analyzed and absorbed into project interventions. The current monitoring system is centralized and a more effective mechanism for transmitting feedback to the field level is to be devised. Some of the major areas of impact assessment are:

- economic impact assessment extension approach based on sample data
- comparative study of demo versus control farmers
- comparative study demo farmers under grant versus non-grant NGOs
- ex-post assessment of graduated demo farmers through panel data
- long-term year to year impact monitoring using RESTORE software
- supplementary studies on household consumption, livelihoods, fish prices and marketing, etc.

The monitoring at NGO level is mainly performed through regional coordination meeting, where issues like farmers' grant, service charge, cost sharing, etc. get more prominence in discussion than dissemination strategies and experience of PNGOs. The feedback from farmers is also less discussed. The participation from local DoF staff is also not ensured by PNGOs. Many FAs seem to have inadequate understanding about the participatory extension approach that the project wants to promote. Farmers have been provided with 'pond-record book' to maintain the input and output records of their aquaculture activity but its utility has not been fully realized by most of the farmers. Pond books are not properly maintained as expected mainly due to reluctance of farmers to disclose some delicate information e.g. fish output or sale proceeds. DFGs need easy participatory tool to monitor the group performance. The concept of 'participatory planning and monitoring' system is to be explained by NGO staff for developing capacity of the DFGs.

#### **4.5 Collaborative Research Program**

DSAP is involved in research at three different levels:

- Project staff conducted research;
- Collaborative research with Bangladesh Fisheries Research Institute (BFRI);
- Small research studies conducted through Universities.

The collaboration between DSAP and BFRI seems weak, which is not desirable. BFRI gets only US \$ 250,000, which is less than 5% of DSAP total budget. This helps continuation of BFRI's on-going research initiatives, but increased allocation could further strengthen its intellectual capacity and improve participation as the main implementer of the project.

Small research grants to BAU fisheries faculty members appear to be highly useful. DSAP has conducted a large number of scientific studies on technical and social aspects by involving BFRI and universities. Most of the 10 completed, 10 on-going and 10 approved research grants appeared to be problem-solving in nature. Some of the grants produced important results about in-breeding problem, pond ecology, low-cost feed preparation, etc. Besides, the research grants proved very helpful for the development of young professionals and improvement of post-graduate students research quality. The results of the collaborative research have not yet been shared with DSAP, PNGO staff and other project stakeholders in any significant scale.

Functional links between BFRI and BAU fisheries faculty needs to be strengthened for evolving more robust technology packages. The results of DSAP own research and evaluation program should be shared with BAU, BFRI and DoF to enhance value addition to research findings.

## 4.6 Impact of Technology Dissemination

### 4.6.1 Expansion of pond aquaculture

The modern technology package for fish culture has opened up opportunities for farmers to grow fish in many different ways. Among the surveyed grant and non-grant demonstration farmers 100% had adopted modern fish culture methods (*Table 6*).

**Table 6: Fish culture practices before and during project by grant and non-grant farmers**

Farmers	No. of farmers before project			No. of farmers during project		
	Did not culture fish	Cultured fish in traditional way	Cultured fish in modern way	Did not culture fish	Cultured fish in traditional way	Cultured fish in modern way
Grant	2	22	-	-	-	24
Non-grant	-	24	-	-	-	24
Total	2	46	-	-	-	48

Source: DSAP MTR Survey 2004

As a result of the training and technical support from the PNGOs, number of ponds used for fish culture by demo farmers increased by about 37%. This increase in number of pond per demo farmers resulted in an increase of pond area by 65%, compared to the pond area prior to project implementation (*Table 7*).

**Table 7: Average number and size of pond over time**

Item	Year 2000	Year 2003
Number of pond per Demo farmer	1.40	1.92
Average pond area (decimal)	35.04	57.96

Source: DSAP MTR Survey 2004

The good result of the demo farmers had a spread over impact in regards to the number of neighboring farmers, who adopt the technologies observing the demo ponds and acquiring technological know-how from the demo farmers. Approximately 5 neighboring farmers (spread over farmers) per grant demo farmer and about 3 farmers per non-grant demonstration farmer adopted different technologies of low cost pond fish culture (*Table 8*). One should however, be cautious to judge the spread-over impact of the DSAP technology packages because other contemporary aquaculture projects also have had dissemination impacts in the neighborhood of the project area.

**Table 8: Average number of spread over farmers**

PNGO	Mean	Median	Minimum	Maximum	N	Std. D
Grant	4.58	4.00	1	10	24	2.45
Non-grant	3.33	3.00	2	6	24	1.34
Total	3.96	4.00	1	10	48	2.05

Source: DSAP MTR Survey 2004

#### 4.6.2 Gains in Fish Yields

Fish production increased from 3-4 kg/ decimal in 2000 to about 10-14 kg/ decimal by adopting the modern technology in the project area (*Table 9*), while there has been significant increase in fish productivity per unit of pond area, there has not been any significant difference in yield between grant and non-grant farmers.



**Table 9: Fish yield (kg/decimal) by Grant and Non-grant Demo farmers**

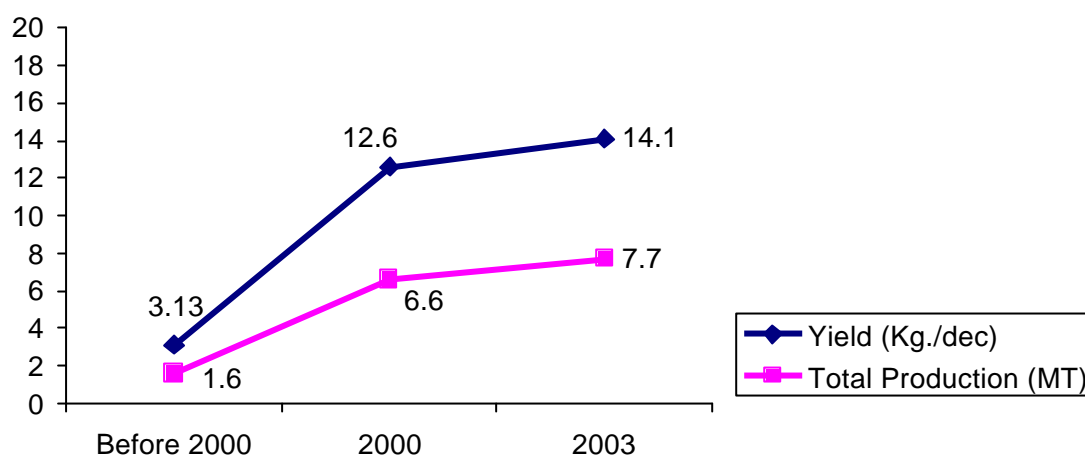
Demo Farmer	MTR		Ex-post Study		Impact study	
	2000	2003	Pre-project (before 2000)	2000	2003	2002
Grant	3.24	10.46	3.13	12.60	14.07	12.38
Non-grant	4.33	11.09	-	-	-	11.28
All NGOs	3.79	10.77	-	12.60	14.07	11.46

Source: DSAP MTR Survey 2004; DSAP Working Paper 2004/30, Siddique 2004.

It is interesting to note that fish yield and production of the same demo-farmer jumped from a very low level before the project period to a four times higher level in 2000 when project intervention was made. But the rates of growth slowed down between 2000 and 2003 (Figure 1). It may mean that the demo-farmers needed more intensive technology supports as well as more financial resources for investment in pond aquaculture.

Diversification of cultured fish production in the rice field opened up a new opportunities for an additional fish production side by side with rice yield production. Farmers learned that insect attack was generally less in the rice field where they stocked fish. They realized that fish feces and its movement contributed to organic matter supply and enhancing microbial activity in the soil. Farmers had been traditionally stocking a large number of fish in their pond from the *patilwala* and the concept of providing supplementary feed requirement was almost absent. There has been marked change in their attitude, knowledge and practice to undertake the modern way of fish cultivation. Many farmers have adopted fish culture in the field as a profitable intervention without much hampering the rice yield. The rice and carp polyculture as well as carp in *golda* culture in ponds and rice plots are gaining popularity amongst the farmers in different regions.

**Figure 1: Trend in Yield and Production**



Source: Siddique (2004)

#### 4.6.3 Profitability Gains

The pond fish culture following DSAP technology packages proved to be highly profitable. The estimated gross margins of Taka 425 per decimal is many times higher than those obtained from alternative uses of land, i.e. for rice, vegetable or fruits (*Table 10*). Again there is no difference in profitability between grant and non-grant farmers.

**Table 10: Gross margins from pond fish production.**

Demo Farmer	Gross margin per decimal		
	Average (Taka)	n	Std. D
Grant	423	22	260.7109
Non-grant	427	23	223.3388
Total	425	45	239.5486

Source: DSAP MTR Survey 2004

The expansion of fish culture increased fish income of demo farmers by over 3-4 times, while the total household income increased by 15 – 36% (*Table 11*).

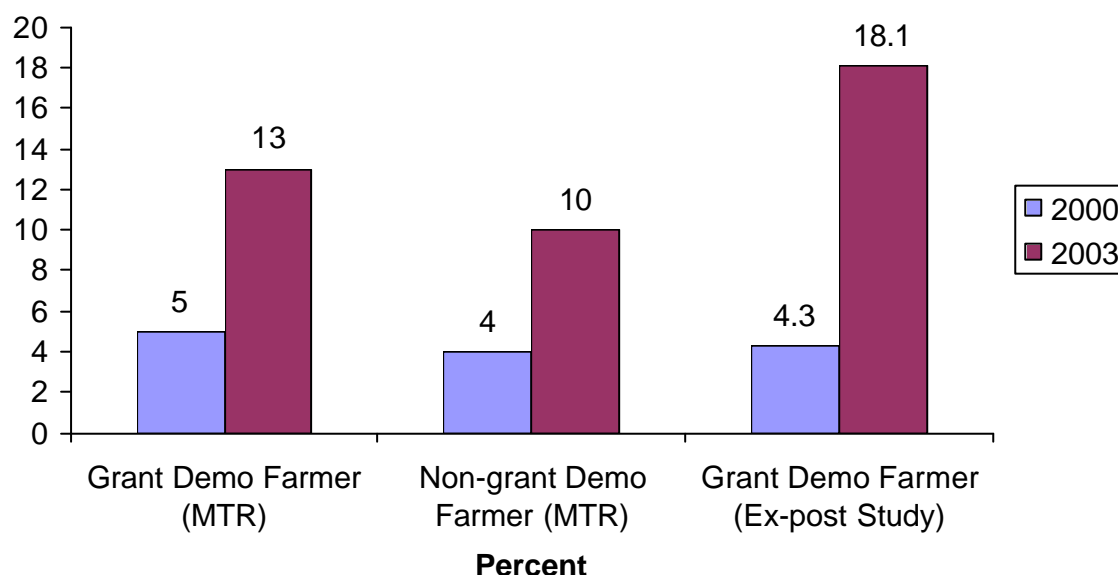
**Table 11: Total household income and fish income of demo-farmers (Taka/ farmer)**

Farmers	Household Income			Fish Income		
	2000	2003	% change	2000	2003	% change
Grant	111,679	128,528	15.01%	5,936	26,991	354.8
Non-grant	152,424	207,188	35.9	6,757	20,500	203.4

Source: DSAP MTR Survey 2004

It is more interesting to note that the proportion of total household income contributed by fish culture increased from about 4-5% before the project situation to about 36% in 2003 (Figure 2). The potentiality of aquaculture development was relatively an unexplored area, compared to crop cultivation practices. When the farmers received an extensive training and demonstration support with proven technology packages, its productivity increased dramatically. DSAP training, demonstration and follow up support created an opportunity for the farmers to learn and utilize the key factors that contributed to increasing fish production. Among the technical aspects, fish pond/ rice field preparation, fish stocking density, adequate feeding practices, and maintaining water quality – all contributed to higher level of return from aquaculture.

**Figure 2: Increase in Fish Culture Income**



Source: DSAP MTR Survey 2004

This means that the expansion of rural aquaculture is making increasing contributions to household income as well as rural economic growth.

#### 4. 6.4 Overall Gains from the Project

The overall impact of the project appears to be highly positive so far. The carp polyculture yield in pond and rice plot, consumption of fish, total fish production, annual sale value of fish and total

income from fish culture in post project period (2003) increased manifolds, compared to pre-project situation (*Table 12*).

**Table 12: Summary of major performance indicators**

Indicators	Pre-project (before 2000)	Post- project (2003)
1. (a) Carp polyculture yield in pond (kg/ ha) <sup>1</sup>	936	2660
(b) Carp polyculture yield in rice plot (kg/ ha)	100 <sup>2</sup>	2025 <sup>3</sup>
2. Fish consumption from carp polyculture in pond (kg/ farm/ year)	59.81 <sup>4</sup>	78.98 <sup>3</sup>
3. Total fish produced (mt) <sup>5</sup>	3,088	50,846
4. Annual value of fish sales (million US\$) <sup>5</sup>	3.08	50.55
5. Total income (million Taka/ year) <sup>6</sup>	9.25	18.17

Source:

1. DSAP – MTR Survey 2004
2. RDSAP Final Report, Fish yield table, Page 8
3. DSAP Working paper 2004/30
4. DSAP Final Report, Table F1
5. DSAP – Estimation 2004
6. Siddique, 2004

#### **4.7 Women’s Participation in Aquaculture**

The PNGOs have successfully organized the woman farmers in both independent and mixed demo farmer groups. They have received foundation training and are currently receiving follow up support from FA. In most cases the woman farmers in demo-groups could quickly pick up the technological understanding on pond and rice-fish culture. Like other counterparts the woman farmers also realized that the density of fish stocking and feeding was the key to get higher level of production. The level of enthusiasm for learning was found quite promising, especially on technical aspects. The woman DFG members seemed happy to be included in organized groups and felt that their status at the household level had increased.

It was learned that the women and children have normally been involved in household linked activities such as preparing simple feeds, mending gear and collecting fish for domestic use, alongside their involvement in routine household work. This aquaculture program has increased their direct involvement in fish production and this allowed them greater role in decision making and overall status in the society.

DSAP aquaculture demonstration is moving more towards gender equality through increasing participation of women as demo farmers. According to DSAP working paper 2004/18, women participation was found to be 24% in 2001, 19% in 2002, 48% in 2003 and in 2004 it stood at 50%. Both female and male demonstration farmers participated in training and all other events of the project. It is worth mentioning that participation of women in aquaculture training is increasing since the household family approaches are being adopted by DSAP. The case study 5 illustrates how a poor woman demo-farmer Usha Rani has established a small scale fish nursery in her pond and increased household income to support livelihoods.

## **4.8 Sustainability of Aquaculture Program**

### **4.8.1 Project Performance**

The Project has one more aquaculture season ahead. According to its own estimates, the Project has achieved its targets so far with respect to expansion of pond demonstration by demo farmers as well as by spread over farmers. The targeted fish production and expected value of fish product sales are also attained. If this trend continues the Project is expected to surpass almost all its targets by the end of the period (*Table 13*).

**Table 13: Achievement against target of the Project**

<b>Demo farmers:</b>	<b>2000/1</b>	<b>2001/02</b>	<b>2002/03</b>	<b>2003/04</b>	<b>Cumulative</b>
Demonstrations ( # of ponds/ plots)	6,248	6,608	7,654	12,925	33,435
Total pond/ plot area (ha)	660	762	1,022	1,680	4,124
Total produced fish/shrimps (mt)	1,216	2,028	2,654	4,200	10,099
Value of annual sales (million US\$)	1.21	2.03	2.65	4.20	10.10
<b>Spread over farmers</b>					
Demonstrations ( # of pond/ plot)	24,992	26,432	30,616	51,700	133,740
Total pond/ plot area (ha)	2,640	3,048	4,088	6,271	16,497
Total produced fish/shrimps (mt)	6,520	7,529	10,098	16,601	40,747
Value annual sales (million US\$)	6.52	7.53	10.10	16.60	40.75
<b>Total farmers:</b>					
Demonstrations ( # of pond/ plot)	31,240	33,040	38,270	64,625	167.175
Total pond/ plot area (ha)	3,300	3,810	5,110	8,401	20,621
Total produced fish/shrimps (mt)	7,736	9,557	12,752	20,801	50,846
Value annual sales (million US\$)	7.73	9.56	12.75	20.80	50.85
<b>Assumptions</b>					
Pond/ plot surface (ha)	0.106	0.115	0.134	0.130	
Pond/ plot surface (decimal)	26	28	33	32	
Production (kg/ ha)	2470	2470	2470	2470	
Sales price (US\$)	1.00	1.00	1.00	1.00	

Source: Revised DSAP Estimation 2004

#### 4.8.2 Sustainability of NGO aquaculture program

Differences in perceptions about sustainability exist at different levels regarding cost sharing vs contractorship in aquaculture extension approach. While the project is designed to implement gradual reduction of its cost share, PNGOs are customarily attuned to contractorship that allows them to get the entire cost from the project. DSAP's predecessor projects IAASP in 2000 and RDASP in 2001 provided the entire costs of NGO operation throughout the project life. This is one reason why it takes time for the PNGOs to get used to and to prepare for the gradual cost-sharing approach.

The sustainability in aquaculture program may be better understood from the perspective of those who have undertaken aquaculture and other related IGAs such as fish nursery, pond fish, rice fish production along with collection of service charges against their service delivery. A total of 22

NGOs out of 33 have started aquaculture related IGAs, according to DSAP monitoring of social issues. Some of them are more advanced than others. The case studies 4, 5 & 6 illustrate how DSAP training through PNGOs helped some demonstration farmers in taking up more profitable enterprises such as quality fingerling production, which brought them good profit.

#### CASE - 4

##### **Revival of a Fish Seed Nursery – the joy of Shajahan**

Md. Shajahan lives in Baligaon village of Fubaria Upazila in Mymensingh District. He used to produce fingerlings in his small pond of 45 decimals. It has not been as profitable as he expected until he joined SARA's (Social Association for Rural Advancement) aquaculture program. He joined DSAP improved low-input-cost fish nursery program with SARA in 2002. Shajahan was excited to narrate his experience as quoted below:

I was not aware of improved technologies for fish nursery. One of the major problems was that I used to give wheat flour to the hatchlings in the nursery pond and that too in quite a large amount. As a result of this, I used to have higher mortality compared to the rate of mortality now. Moreover, I did not know much about proper techniques of cleaning pond and control of predators. Many a times I could not produce any fingerling in the nursery pond and I am now certain that it was because of the predators. For example in 2001, I had a total failure in fish seed production and lost Taka 2,000 spent on purchase of spawn and Taka 1,000 spent on pond preparation.

I received training on low-input-cost fish nursery technology after joining SARA. I learnt some improved ways of fingerling production. The technology that I adopted was to produce fingerlings from stocking hatchlings in the nursery pond. In the first year (2002) I stocked hatchling of different species of fish. The following are the fish I stocked:

<b>Fish species</b>	<b>Spawn weight (Grams)</b>	<b>Spawn cost (Taka)</b>
Rohu	250	300.00
Mrigal	100	100.00
Silver carp	500	600.00
Kalibous	500	550.00
<b>Totals</b>	<b>1,350</b>	<b>1,550.00</b>

I bought these spawns from the Government Hatchery, Mymensingh. I managed to put oxygen in the plastic bag with hatchlings and lightly slap over the water while carrying hatchling carefully in a aluminum vessel. Instead of releasing fish seed in the pond directly, I gradually put some water to acclimatize the fish with pond water. This helped me reduce fish mortality.

I took different measures to clean the pond and to eliminate predatory organisms from the pond. I drained out the water of my pond and eliminated the predatory fish such as *bowal*, *shoul*, snakehead etc. Then I applied lime and decomposed cow dung. I tried different feeding practices. I gave finely mashed yolk of boiled chicken egg to the hatchlings at the early stage. Later, I fed them with decomposed cowdung mixed with urea. The hatchlings grew considerably well due to supply of adequate feed and safe environment in the nursery pond. The survival rate was many folds higher than before. Seeing what I did for the fish nursery pond my wife and children also learned the improved ways of taking care of spawn. They actively take part in caring for the fish pond now.

In 2002, I started selling fingerlings from April and continued selling off and on till July that year. Many of my neighbors and fish farmers from the adjacent villages came to see what I had done in establishing such a wonderful nursery production. I had good fingerlings and therefore, many of the fish farmers from the nearby villages crowded there to buy fingerlings from my nursery. The production and gross income stood at:

<b>Fish Species</b>	<b>Number of Fingerlings Sold</b>	<b>Sales Income (Taka)</b>
Rohu	7,200	5,500.00
Mrigal	4,000	5,800.00
Silver carp	76,000	13,000.00
Kalibous	33,000	7,750.00
		<b>32,050.00</b>

The total expense was Taka 5,180 that year. I had a net income of Taka 26,870.

Shajahan produces good quality fingerlings. He is a reliable fish seed farmer and therefore many of the farmers are eager to buy fingerlings from him. His fingerlings have a great demand in the local area. He grows fry seed of different species in his nursery pond. He hopes to have comparatively large profit this year (2004).

Eventually, he turned out to be a resource person. Fish farmers regarded him as master trainer. All the fish farmers visiting him asked many questions as to how they could also improve their nursery production. Shajahan has a record keeping system developed by him. He keeps detailed record of his expenses and income.

Shajahan has two sons and two daughters. All of his children go to school regularly now. His elder son and daughter are going to complete tenth grade this year. He has built a new house lately. With a great big smile Shajahan concluded saying "I am so happy for the joy of the remarkable achievement in my life and I am so grateful to SARA and DSAP for their support to develop my skill and provide technology for me and other farmers in the locality.

#### **CASE - 5**

##### **Usha Rani's success in fish fingerling production**

Usha Rani had a hard life with her 16 years old daughter and husband Arun Biswas in Ganglania village of Sreepur Upazila in Magura district. They have a small rice field of 35 decimal, 10 decimal homestead area where they grow vegetable and a small pond of 20 decimals. The use of the pond was limited to washing and bathing. Every two or three years Arun stocked fish in the pond without considering any principle of stocking density. Generally, they did not provide any feed for the stocked fish. The small amount of fish produced was mostly consumed by them, while a little amount of fish was sold occasionally. It was quite difficult for them to survive with the income from this small farm.

Usha was looking for some alternative sources of income. Meanwhile, she came to learn from an NGO staff Shabuj, who works as a Field assistant (FA) with ADI (Alternative Development Assistance), that an aquaculture program has been undertaken for the poor families by DSAP of WorldFish. Shabuj organized a meeting in early 2002 to identify poor people interested to form a fish culture-learning group. Usha joined in the group and attended the foundation training on 'modern fish culture'. She also attended the fish nursery production training and became interested to grow fingerling with a view to make more income from her small pond. Usha with her husband decided to use their pond as a fish nursery to grow fingerling as there was high demand of good quality of fingerling in the locality. They cleaned the bushes around the pond and also removed the predatory fish from the pond. Usha with the help of her husband prepared the pond. They put poultry manure and chemical fertilizer *viz.* urea, phosphate and potash with pond soil. They also used 20 kilogram of lime to get a better water quality. The pond became ready for stocking fish seed.

Usha managed to send her husband to Government Hatchery at Kotchandpur to collect Indian and Chinese carp hatchling. They stocked 500 gram hatchling of different carps (*ruhi*, *katla*, *mrigel* and silver carp). After stocking hatchling, Usha started feeding these tiny fish carefully as suggested in the DSAP supported training sessions. Shabuj also was making a regular visit to Usha's nursery pond for necessary assistance and consultation.

Initially Usha gave finely mashed boiled chicken egg yolks and little bit of flour to these tiny fish and a month later she started feeding decomposed cow dung and oilcake. The tiny fishes started growing fast. Usha, her husband and their daughter took care of these small hatchlings. They started enjoying this hatchling nursing. After a four and a half months, the tiny fishes became about three inches long. Usha in consultation with her husband planned to sell fish fingerlings in June. They sold out 90,000 fingerlings for Taka 26,800 whereas the total production cost for fish hatching and feed was Taka 6,200. The net income was Taka 20,600. After the first round sale, they further prepared the pond and stocked 500 grams hatchling of Indian and Chinese carp. This time they did more careful management in feeding the hatchling. After three months, they sold fish fingerlings for Taka 16,250. This time the total expenses for hatchling and feed was Taka 4,300. Usha kept about 200 fingerlings in the pond to grow table fish. They sold 100 table fish for Taka 1,000 and they consumed the remaining fish. Usha at one stage became the Chairperson of the group by dint of her interest and cooperation with the other member of the group. This enhanced her status in the society.

Usha informed that there were some risks in nurturing the tiny fish in the nursery pond. It was no doubt an interesting work for her as it required nursing all the time like one does for a small baby. She learned that it was very important to maintain good water quality. Special care needed to be taken for oxidation and temperature control. Usha was confident that if one knows all these technical aspects and apply them properly, one could make a good profit out of fish nursery business. Usha, her husband Arun and daughter found this small fish nursery to be suitable business for them.



## CASE - 6

### **Shamsul – owner of a successful fish nursery**

Shamsul is a fish nursery demonstration group member from the village Chanda in Jhikorgaccha Upazila of Jessore District. This area used to have drainage congestion, causing severe damage to rice crops. About fifty percent of rice plots in the area now have small ponds and ditches, which are used for rice and fish culture.

Shamsul owns about 10 decimal of homestead plot, a pond of about 12 decimal and another two *bighas* (66 decimal) of crop land. There are 10 members in his nursery group supported by the NGO Bachte Sheka. DSAP training helped him improve his skills a lot. He started nursery business in his own pond in 2001. He expanded his nursery business gradually by leasing in ponds from his neighbours. In 2004, total number of his leased in ponds stood at 10. He buys hatchling of different carp species from the local private hatchery. One big problem he faces is the quality of hatchling he buys from hatchery is not of good quality. He sometimes gets complaints from fish farmers about fingerlings he produce from the hatchlings. He nurtures the fries shifting them from one pond to another and sells fingerlings and table fish. He follows feeding practice as he learned from his training. He prepares his own feeds and also buys additional feeds from the local fish traders.

Initially, Shamsul had difficulty in arranging capital for his business and managed it from various sources. He now earns a good profit from his nursery business. This year he earned a gross profit of about Taka 250,000 from selling fries and table fish. He used a part of his accumulation to pay for expenses to send his brother to Saudi Arabia for a job. His own nursery income plus remittance that he got from his brother enabled him to buy 52 decimal of lands for Taka 300,000. He plans to build a new house in this plot in the hope that closeness of the fish plot near the main road would facilitate his nursery business better.

There are of course variations in performance between NGOs and ecologies. Non grant NGOs seem to have perceived cost-sharing challenge better from the beginning and reported diversification of income sources in aquaculture linked activities. The attitude of NGO top management and capacity of its aquaculture team is the key to make this endeavor workable. Some NGOs meanwhile have made partnership arrangement with the farmers for fish nursery and fish production, which looks prospective. In addition, some NGOs have started group fund savings with the DFGs for introducing their credit program.. It seems to be a viable venture if it could be integrated with group savings-credit and service delivery support. The key issue here would be as to how the NGO will balance the strike between credit program and quality service delivery. On the other hand, the prospect of service delivery by the private aqua-entrepreneur may be promising from the business point of view. The fish hatchery and nursery operators might equip the fish peddlers (*patilwala*) for selling fish seed and providing key information on fish cultivation technology for dissemination.

Service charge is determined differently by different NGOs without enough consultation with farmers. Also, some NGOs raise service charges more progressively than others (*Table 14*).

**Table 14: Rate of service charges imposed by different NGOs**

PNGO	2000-'01	2001-'20	2002-'03	2003-'04	2004-'05
Grant PNGO					
CIRUP	-	10Tk./d	300Tk/F	300Tk/F	-
JC	-	200-460 Tk/F 10-20Tk/d	700Tk/F	700Tk/F	700Tk/F
BAIC	-	10Tk/d	10Tk/d	500Tk/F	500Tk/F
ADI	-	10Tk./d	300Tk/F	300Tk/F	500Tk/F
PRANTEC	-	10Tk/d	450Tk/F	700Tk/F	700/F
TMSS	-	-	10%	15%	15%
CRED	-	10Tk/d	400Tk/F	500Tk/F	600Tk/F
CARP	-	10Tk/d	500Tk/F	700Tk/F	700Tk/F
BS	-	10Tk/d	300Tk/F	700Tk/F	700Tk/F
RRC	-	10Tk/d	500Tk/F	600Tk/F	600Tk/F
Non-grant PNGP					
DJKS	-	-	500Tk/F	500Tk/F	500Tk/F
VDKA	-	-	10Tk/d	10Tk/d	10Tk/d
LIPP	-	-	200Tk/F	Demo F 300Tk/F Adopter 200Tk/F Spread F 150Tk/F	-
CDS	-	-	10Tk/d	5Tk/d	
SATU	-	-	-	-	-
FHD	-	-	-	-	-
OREDAR	-	-	Demo F 10Tk/d Adopter F 5Tk/d	Demo F 10Tk/d Adopter F 5Tk/d	Demo F 20Tk/d Adopter F 15Tk/d
SARA	-	-	300Tk/F	300Tk/F	300Tk/F
PAGE	-	-	200Tk/F	300Tk/F	400Tk/F
BUK	-	-	5Tk/d	Pond F10Tk/d Rice-F 5Tk/d	Nursery 15Tk/d Pond 10Tk/d Rice-F 5Tk/d
COAST	-	-	120Tk/F 6Tk/d	127Tk/F 6 Tk/d	-

Source: DSAP MTR Survey 2004

On the average total collection of service charges by NGOs increased over the years, which allowed the grant NGOs to cover increasingly higher proportion of their annual operational costs more or less according to the agreed cost sharing practice (*Table 15*).

**Table 15: Collection of service charge by NGOs**

Year	Grant PNGO (n = 10)		Non-grant PNGO (n = 11)	
	SC (1000 Tk)	% of AE	SC (1000Tk)	% of AE
2001	9.18	19	-	-
2002	21.47	27	0.29	5
2003	50.66	42	0.67	8

Note: SC = Average Service Charge in Taka 100,000; AE = Average Annual Expenditure

Source: DSAP MTR Survey, 2004

Two points need to be highlighted here. The grant NGOs found it easier to collect service charge as they could link it with Taka 2,000 grant money that they offered to the demo-farmers in the first year. In contrast, non-grant NGOs collection of service charge was too small to pay for their share of operational cost, but some of them somehow managed to cope with the scheduled cost sharing practice through supplementing from IGA income. It was however reported that the relatively small and non-grant NGOs may find it very difficult to sustain the aquaculture program once the DSAP supports are withdrawn.

NGOs urge FAs to collect service charge to meet cost-sharing requirement, but they do not necessarily provide enough moral or logistic support to the FAs for upgrading their service quality. The collection of service charge affects quality of service by FAs, causing reluctance of farmers to pay service charge. The increasing drop out of FAs further complicates the problem and slows down collection of service charges.

#### 4.8.3 Sustainability of Farmers

As the farmers have seen substantial increase in their production and income from fish culture, they continue to expand their pond area through increasing number of ponds (*Table 16*).

**Table 16: Expansion of pond number and area**

Number of Ponds	Before		After	
	Number	Percent	Number	Percent
No pond	1	2.1	-	-
One pond	32	66.7	21	48.3
Two ponds	11	22.9	16	33.3
Three ponds	4	8.3	8	16.7
Four ponds	-	-	2	4.2
Seven ponds	-	-	1	2.1

Source: DSAP MTR Survey, 2004

All the demonstration farmers, grant and non-grant, expressed their willingness to continue with fish culture practices that they have learned. While all the sample demo farmers mentioned high profitability as the main reason for fish culture, about a half of them also mentioned own fish culture as the source of household fish consumption (*Table 17*).

**Table: 17 Reasons for continuation of fish culture**

Reasons	Percent
Fish production is more profitable	58.5
We are able to consume more fish than before	24.4
Fish culture is the major earning source	3.7
Demand for fish in the market is increasing	3.7
Additional income	2.4
We are able to utilize the practices we learn	4.8
It gave us self-employment opportunity	1.2
Rice yield increased	1.2

Note: Multiple responses summery

Source: DSAP MTR Survey 2004

Besides, DSAP has successfully introduced an integrated and aquaculture (IAA) approach to increase fish productivity in rice based farming system. It is a potential area to achieve a rapid increase in production. Farmers can earn a higher level of income by commercializing their feasible rice field for rice, fish and vegetable production. A case study of Shafiq from Phulpur of Mymensingh is presented for illustration (*see case study 7*). There are thousands of Shafiq who can go for such entrepreneurship development in an economically sustainable manner, if proper technological support with adequate financial provision is ensured.

**CASE - 7**

**Shafique's Integrated Agriculture and Aquaculture business**

Shafiqul Islam is the second of four sons of Mir Mohammad Tayebuddin. Shafique live in a joint family of 13 members. He is married and has two sons. They live in a remote village of Fulbaria Upazila of Mymensingh District.

Shafiq came to know about the DSAP aquaculture project through the partner NGO SARA (Social Association for Rural Advancement) in 2003. He attended the aquaculture foundation training organized by SARA and got some understanding of the modern methods of fish culture in rice field. He learnt that rice-fish cultivation is more profitable, compared to cultivating only rice. Shafiq discussed with his father and three of his brothers this idea of fish culture in the rice field. He also told them that he would like to cultivate some fruits and vegetables on the dikes of the rice field.

After getting consent from the family he made a small ditch in a corner of the 22 decimal plot. Mamunur, Field Assistant of SARA, regularly visited his field for necessary counseling and technical assistance. Shafique with the help of his brothers transplanted high yielding rice variety (BRRI dhan – 28). He collected papaya seedling from the upazila nursery and planted on the dikes. He also planted some gourd seeds (snake gourd, ridge gourd, bitter gourd, sweet gourd) for intercropping. When rice plants became about a month old, he stocked fingerlings of *rohu*, *katla*, common carp, silver carp and *shorputhi* in the rice field.

Shafique and his family members started collecting leafy vegetables and gourd for household consumption within the third month of cultivation. They grew plenty of vegetables on the new dikes. The large family of Shafique consumed much of their vegetables grown on the rice field dikes and also sold some for Taka 1,200 in one season. The sale from papaya was Taka 4,300. They harvested 13 maunds<sup>1</sup> (483 kg) of paddy. The value of which was Taka 3,250. Shafique and his father informed that they got two maunds of rice (74 kg) more than in the previous years. They started harvesting fish from June 2003. Shafique and his family members were surprised to see large number of fish produced in their rice field. After five months size of fish in the rice plot was larger than those grown in any of the neighboring ponds. Shafique's father told that they started consuming fish after two month of stocking. The value of the fish that they consumed would be about Taka 3,000 and the cash income from fish sales was Taka 9,200. The total expenses for rice field preparation, fertilizer, transplantation, fish stocking and vegetable cultivation cost was Taka 6,700. Therefore, the gross income he made from the integrated aqua-agriculture was Taka 17,950. Shafique made a net profit of Taka 11,250 in 2003 from the rice-fish and dike cropping.

<sup>1</sup> 1 maund = 37.20 Kg.

#### 4.8.4 Farmers' grant, Cost sharing and Service charge

Most of the grant farmers have stressed on the positive aspects of the grant system (*Table 18*). It also appears that they might have developed some kind of dependency on the grant system. The collection of service charge from the grant farmers is relatively easier as they are receiving a grant amount Tk. 2,000 as a subsidy from the project to support their fish culture either in pond or rice field system. In most cases the grant money has been mixed up with service charges. The farmers generally interpreted that the subsidy was a credit from the NGO and that they needed to pay it back in three years. The non-grant NGOs are facing more difficulty in collecting service charge from the farmers. It was also reported that the service charge was better collected in the groups where the farmers were more or less satisfied with the services being rendered by the FAs.

The provision of farmers' grant, however seems to have little relevance for sustainability as there is no significant difference in productivity or gross margin between grant and non-grant farmers. The wide range of interactions with farmers confirmed that a more important determinant of farmers' sustainability is the improvement of quality service delivery through NGO and aqua business actors. Moreover, grant money creates discrimination between grant and non-grant farmers, the latter being disgruntled with the FAs working under non-grant NGOs.

**Table 18: Comments on Grant Provision by Grant Farmers**

Comments	Frequency	Percent
No comment	2	8.3
Grant was helpful in fish culture	10	41.6
More grant would be better for fish culture	6	25.0
Getting grant money in due time is helpful	3	12.5
Wouldn't start fish culture	2	8.4
Grant may be given when fish is stocked	1	4.2
Total	24	100

Source: DSAP MTR Survey, 2004

Although a large number of farmers have benefited from the grant support of DSAP in terms of instant cash flow, there was no significant difference in fish productivity gains between grant and non-grant system. Those farmers who did not receive any grant support have also been found to have practiced the same improved method of fish culture as the grant farmer. The provision of grant to only one set of farmers (i.e., grant farmers) creates unnecessary complication in aquaculture extension work in the case of non-grant NGOs. For grant NGOs also, the onerous task of ensuring that the grant money is disbursed on time and spent on improved fish culture as

intended take a lot of FA's time, which could otherwise be utilized for delivering better extension services. Considering the pros and cons of the grant system, DSAP may discontinue the system in future.

The principle of cost-sharing is often talked about in designing development project, but is seldom practiced. In Bangladesh, some health sector projects are reported to have introduced partial cost-sharing approach, while the fourth-fisheries project of DFID has reportedly planned to implement cost-sharing approach. However, the outcome of these approached is yet to be known and generalized. The introduction of cost-sharing approach by the DSAP is new and thus challenging, but the initial results indicate that part of the project cost can be shared by the PNGOs from the collection of service charges, provided farmers are convinced of their productivity gains on a sustained basis. The PNGOs, irrespective of grant or non-grant system, also realize the significance of cost-sharing, but they felt that the current rate of 20% cost-reduction is rather high, especially for smaller and new NGOs. Therefore, for long term sustainability, the rate of reduction in cost sharing should be reduced to a level to be worked out on an objective basis.

The collection of service from the non-grant farmers was noticed as a difficult and tedious job for the FAs. All the farmers are not paying service charge timely, while many farmers may have paid only a part of it. FA needs to make repeated persuasions and a lot of time is spent to collect service charge, which seriously limits their extension services to the DFGs. The MTR team learned from the farmers that quite a proportion of them were able and willing to pay service charge, but they wanted quality service, new training and technical support from the FAs on a regular basis (*Table 19*).

**Table 19: Reasons for continuing service charge payment**

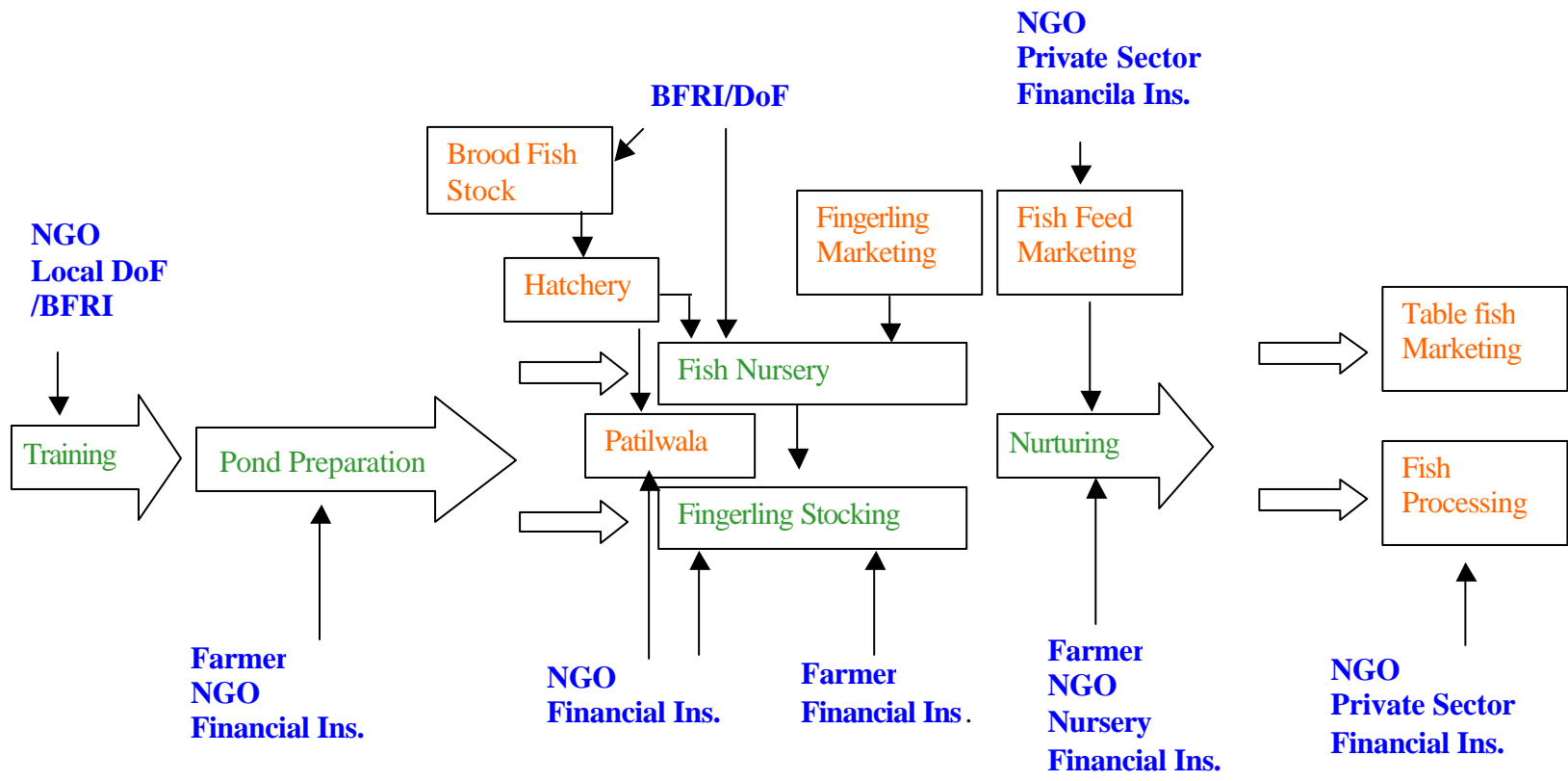
Reasons for continuing	Grant DF (n=14) %	Non-grant DF (n=13) %	Overall (n=27) %
If we get service	14.3	46.2	29.6
If we receive new training	64.3	53.8	59.3
If we received needed support	57.1	38.5	48.1
If we are benefited from working with NGOs	50.0	30.8	40.7

It was learned during the field visits that the amount of service charge should have been negotiated with the farmers in clear terms right at the beginning of the project through service delivery

commitment by the NGOs. This is also true that once the farmers learn the technology and they do not get anything new from the NGOs, they will not have any incentive to pay service charge. Therefore, challenge arises for the project to continuously assess the technology needs of the farmers and accordingly ensure proper training supports to keep farmers' interest up throughout the different stages of the project period. This would facilitate service charge negotiation with the farmers as they will continue to receive new learning for experimentation as well as for increasing their production and income level from fish culture.

## **5. Future Direction: Dynamic Aquaculture Model**

- i. The USAID-Bangladesh and WorldFish Center collaboration should continue on a number of grounds. The rich knowledge base that the current phase of the project generates is expected to provide a solid foundation for carrying forward rural aquaculture development programmes. A continuation of funding supports to World Fish Centre initiatives will also facilitate reaching out to wider beneficiaries in the country side and further strengthen capacity building of NGO and private sector in disseminating improved aquaculture technology packages. Since DSAP's predecessors had also a great part to play in promoting rural aquaculture, they should also be included in the future aquaculture projects that USAID/ Bangladesh decides to support.
  
- ii. The main strategy of future collaboration should have a dynamic agribusiness focus in aquaculture development involving various stakeholders. The dynamic vision should promote rural aquaculture trade and foster a gradual transition from a subsistence to commercial aquaculture (as depicted in the Dynamic Aquaculture Model in Figure 3). The key actors in the future project should be qualified NGOs and private sector entrepreneurs i.e. fish farmers, hatchery and nursery operators, fingerlings vendors, commercial fish feed manufacturers, domestic resource-based feed producers, fishing equipment manufacturers, fish processors (i.e. fish freezing and storing, refri-track transporting, hygienic fish drying, etc.). In the proposed dynamic aquaculture, the small-holders and resource-limited farmers will be involved directly as producers and indirectly through backward – forward linkages of this emerging sub-sector.



**Figure 3: Dynamic Aquaculture**

**Blue:** Facilitating Stakeholders  
**Red:** Private Sector Stakeholders  
**Green:** Project Implementation line



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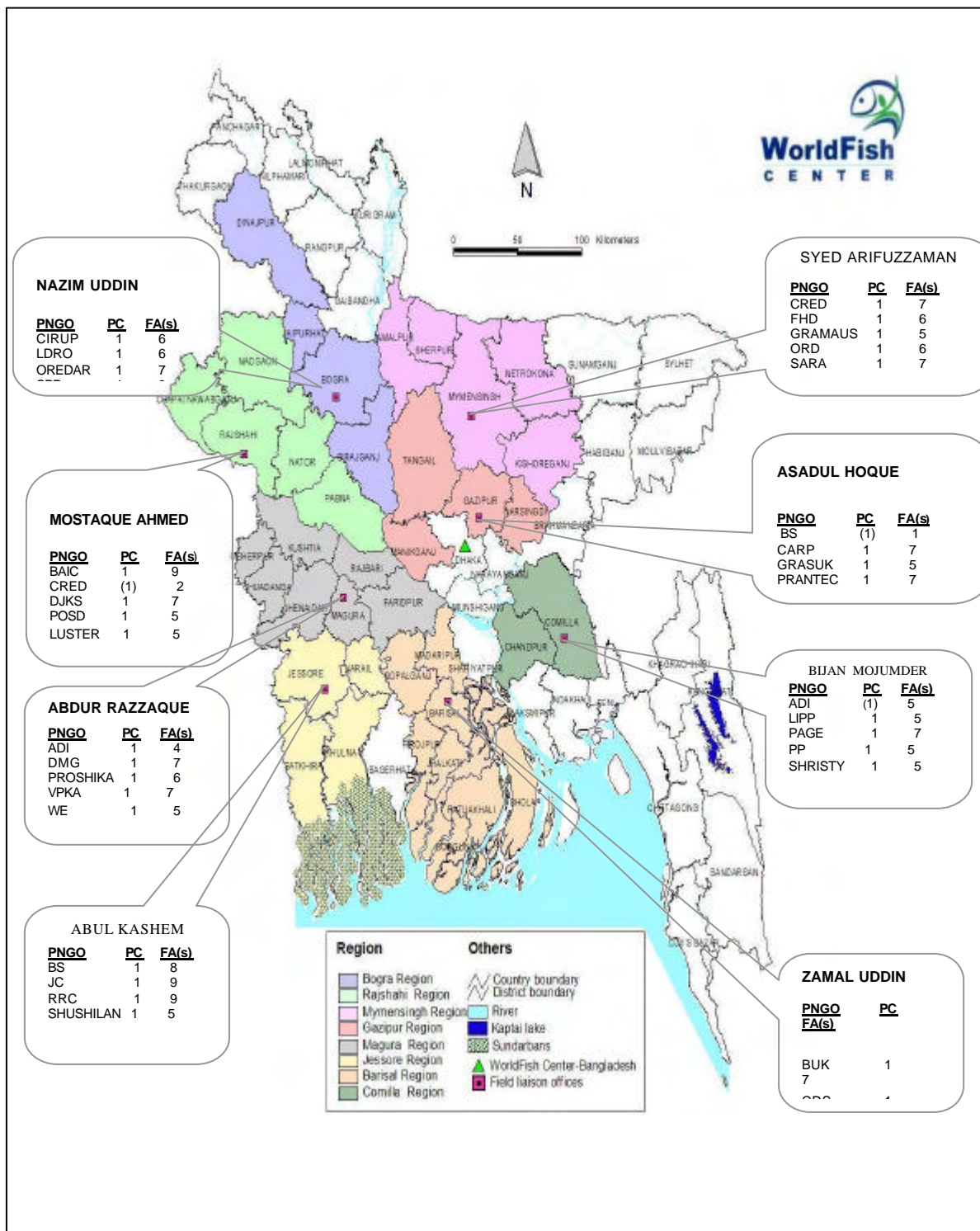
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## Annexure

- I. DSAP Location Map
- II. DSAP – MTR work schedule
- III. Demonstration Farmer Interview Questionnaire
- IV. DSAP PNGO FGD Data Collection Form
- V. DSAP Demo Farmers FGD Data Collection Form
- VI. DoF Staff KII Data Collection Form
- VII. KII Data Collection Form
- VIII. Local fish market salesperson KII Data Collection Form
- IX. Drop Out NGO KII Data Collection Form
- X. Drop Out Farmer KII Data Collection Form
- XI. PNGO Comments Form
- XII. List of persons met
- XIII. List of the DFGs met for FGDs
- XIV. Statement of Work (SOW) for the Mid-Term Review of DSAP

## Development of Sustainable Aquaculture Project Area Map



**WorldFish Center**  
**DSAP – MTR work schedule**

<b>Date</b>	<b>Activity</b>	<b>Remarks</b>
10 May 04 (Day 1)	Arrival of team and meeting with the DSAP staff DSAP presentation by Dr. Johannes Janssen, Team Leader	
11-16 May 04 (Day 2-6)	Meeting with the stakeholders (DSAP staff, USAID team, BFRI), field visits for DSAP activity orientation, develop methodology, suggest work plan and outline of final review	
17-19 May 04 (Day 7-9)	Finalization of field work instruments, sampling, site selection, mobilization, training and placement of field enumerators	<b>Transport requirement:</b> <b>18/5/04:</b> Field work at Comilla. Depart Dhaka at 8:00am and back same day
20 – 23 May 04 (Day 10 -13)	Data collection and field work in Mymensingh region	
24- 27 May 04 (Day 14-17)	Data collection and field work in Magura region	<b>19/5/04 – 23/5/04:</b> field work at Mymensingh. Depart Dhaka at 14:00 hrs  <b>24/5/04 – 27/5/04:</b> Field work at Magura Depart Dhaka at 7:00
28 May-5 June 04(Day 18-26)	I. Consultation with DSAP field staff and selected NGOs. II. Data processing, analysis and draft report writing	
30 May 04	Meeting with Harry and DSAP senior personnel for sharing field observations	
01 June 04	Pre de-briefing with USAID and DSAP senior personnel	
6 June 04 (Day 27)	Presentation of draft report and debriefing at BRAC Inn	
7- 10 June 04 (Day 28-32)	Finalization and submission of report	

**DSAP Mid-term Review**  
**DEMONSTRATION FARMER INTERVIEW QUESTIONNAIRE**  
**(Carp poly-culture)**

**1. Identification**

Sl.	Particulars	Code
1.	Name of the demonstration farmer:	
2.	Name of the Village :	
3.	Name of the Upazila :	
4.	District :	
5.	Name of the NGO :	
6.	Name of the Group:	
7.	Number of members in the Group :	
8.	Year of joining the project:	

2. Main occupation of the demo farmer  Secondary occupation

**3. Land Asset**

Land Type	Decimals				
	Own	Rented-in	Rented-out	Mortgaged-in	Mortgaged-out
1. Homestead area + Orchard					
2. Crop land					
3. Pond + ditch fish culture					
4. Rice-cum-fish					
5. Fish nursery pond					
6. Plant nursery area					
7. Others (specify)					
Total					

\* Rented in/out includes land under fixed renting plus sharecropping.

**4. Information about pond**

Item	Before joining project (2000)	After joining project (2003)
1. No of ponds		
2. Pond area in decimal		
3. Fish species		
4. Fish cultivation practices (T=Traditional/M=Modern)		
5. Fish production (kg./decimal)		

4.1 How many old ponds have you re-excavated or repaired during the project?

4.2 How many new ponds have you excavated during the project period?

**5. What supports have you received from the project?**

Services	Amount	Frequency/Intensity	Comments
1. Grant			
2. Training			
3. Supervision			
4. Advice on pond preparation			
5. Other (specify)			
6.			

**6. Cost and return from demonstration fishpond in 2003**

a. Total area (decimal)

b. Main fish species stocked in the pond

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

**c. Input use and output from demonstration fish pond**

Sl#	Input/Outputs	Quantity (Kg)	Cost/Gross Value(Tk)
	<b>Pond preparation</b>		
1.	Pond excavation/re-excavation		
2.	Pond preparation		
	<b>Inputs</b>		
3	Stocking cost (fingerling)		
4	Water cost		
5.	Cow dung		
6.	Poultry drops		
7.	Compost		
8.	Fertilizer : (a) Urea		
9.	(b) TSP		
10.	(c) MP		
11.	Lime		
12.	Azolla/duckweed		
13.	Rice/wheat bran		
14	Rice flower		
15.	Oil cake		
16.	Fish meal		
17.	Others		
	<b>Labor</b>		
18.	Hired labor (man days)		
19.	Transportation		

	Output		
20.	Fish production (kg.) whole year		

- d. Gross amount of fish consumed from this pond (% of total harvest):
- e. Amount borrowed for fish culture (if any) Tk.
- f. Amount of interest paid Tk.

### 7. Spread-over impact

- a. How many farmers outside your group have started similar modern fish culture practice?

- b. Please give their name:

1.	6.	11.
2.	7.	12.
3.	8.	13.
4.	9.	14.
5.	10.	15.

### 8. Farmer's grant

- a. Did you receive any financial support from the project?  Yes = 1, No = 2

- b. If yes, how much money (Tk.)  when: Year  Month

- c. Do you have any comment about this money?

### 9. Service charge

- a. Did you pay any service charge?  Yes = 1, No = 2

- b. If yes, how much did you pay and which year?

Year	Amount Paid (Tk.)	Basis			Remarks
1 <sup>st</sup> Year			lump sum	Tk. _____ per decimal	
2 <sup>nd</sup> Year			lump sum	Tk. _____ per decimal	
3 <sup>rd</sup> Year			lump sum	Tk. _____ per decimal	

- c. Will you pay service charge even when this project ends?  Yes = 1, No = 2

- d. If yes, please give two important reasons for continuing payment of service charge:



i.

ii.

e. If no, please give two important reasons for not continuing payment of service charge:

i.

ii.

### 10. Household Income

Sl#	Source of Income	Annual Gross Income (Tk.)		Remarks
		Before joining project (Tk.)	After joining project (Tk.)	
1.	Crop and Vegetables			
2.	Fish Culture			
3.	Poultry			
4.	Milk production			
5.	Shop keeping			
6.	Fish Nursery			
7.	Plant Nursery			
8.	Other business			
9.	Service			
10.	Motor vehicle driving			
11.	Rickshaw/van			
12.	Foreign remittance			
13.	Handicraft/Craftsmen			
14.	Other (specify)			

### 11. Marketing Information

a. Where do you sell your fish?  At pond site = 1, at market place = 2.

- b. What is the difference between prices in retail market and prices that you received Taka/kg.
- c. Do you have any fish marketing association:  Yes = 1, No = 2.

## 12. Sustainability of the Aquaculture

a. Do you want to continue your fish culture?  Yes = 1, No = 2.

b. If yes, please mention two of the most important convincing points.

i.

ii.

c. Have you faced any problem in your pond fish farming?  Yes = 1, No = 2.

d. If yes, please mention two of the most important problems.

i.

ii.

## DSAP Mid-term Review

### DSAP PNGO FGD Data Collection Form

Component / Activity Question or issue	Summary of FGD
<b>1. Identification</b>	
a. Name of the NGO (grant or non grant)	
b. Address:	
<b>2. Involvement with DSAP</b>	
a. How did you get the information of the project?	
b. What were the qualification requirements for getting the project from WorldFish?	
c. Was there any aquaculture program before working with WorldFish, If yes, explain?	
d. What was the start up date of the project?	
e. What is the fund allocation” for the project?	
f. Any comments/ suggestions?	
<b>3. Partnership</b>	
a. Does the project have any partnership strategy?	
b. What are the key points of the partnership strategy with WorldFish?	
c. Please mention about the specific achievements for your organization and farmers level out of this partnership?	Organisational level:
	Farmers’ level:
d. What is the cost sharing mechanism with WorldFish? How do you find this system?	

e. Will your NGO continue cost sharing after DSAP withdraws project?					
f. Will your NGO go for 100% cost sharing?					
g. Do you have any comments / suggestions on improvement of the current partnership?					
<b>4. Group formation</b>					
a. How do you proceed with group formation? What criteria do you use to select group members?					
b. Does the project provide any grant to farmers? If not, has it got implication for group formation or service charge collection?					
c. What is the functional mechanism between your NGO and the demo farmers on service charge.					
d. Any comments/ suggestions?					
<b>5. Training and Extension</b>					
a. What are the training and workshop events held with WorldFish? Please explain those?	<table border="1"> <thead> <tr> <th><u>Title of training</u></th> <th><u>Duration</u></th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	<u>Title of training</u>	<u>Duration</u>		
<u>Title of training</u>	<u>Duration</u>				
b. What was the methodology of the training? Please describe?					
c. Which part of the training issues was found most effective? and explain why?					

d. Other than training, what technical assistance did you receive from WorldFish?	
e. What aspects of the training/workshop were not useful? and explain why?	
f. Please explain the extension approach of the project?	
g. Do you find the extension method useful? If yes, why and how?	
h. Any comments/ suggestions on training aspects?	
<b>6. Project operation and management</b>	
a. What is total number of direct farmers in the project?	Male farmers:
	Female farmers:
b. What is total number of secondary/ spread-over farmers (who have undertaken aquaculture activities)?	
c. What is the quantitative figure of your aquaculture project coverage?	
d. How many staffs are directly working in aquaculture projects?	Male staff:
	Female staff:
e. What is their role in the project?	
f. What is the role of the male and female farmers in the project?	
g. What is the process and amount of	

amount of service charge do you collect from the farmers? And what is the negotiation process with the farmers?	
h. What problems did you encounter while collecting service charge?	
i. How did you overcome those problems?	
j. Do the fish producers/ farmers get fair price of the fish? How does the market chain work?	
k. Any comments/ suggestions?	
<b>7. Organisational capacity</b>	
a. What are your organizations strengths to achieve aquaculture project successes?	
b. What were the specific contributions from DSAP for your organisation development?	
c. What are the weaknesses and what you think needs to be addressed them for better running of the aquaculture program?	
d. Comments/ suggestions in relation to capacity building?	

e. How your NGO (particularly aquaculture program) impacted on women's employment?	
f. How your NGO (particularly aquaculture program) impacted on women's life?	
g. What was the process of women selection in the project?	
<b>8. Sustainability</b>	
a. What activities will your NGO continue once DSAP is over?	
b. How will you be able to run the existing aquaculture program?	
c. Are the farmers willing to pay service charge?	
d. Why do you think that farmers will continue to pay service charge for what you do for them?	
e. Do you know about any NGO that dropped out from this program of DSAP/WorldFish?	
f. Why did they drop out?	
c. Is there anything else that you would like us to know?	

## DSAP Mid-term Review

### DSAP Demo Farmers FGD Data Collection Form

Component / Activity Question or issues	Summary of FGD
<b>1. Identification</b>	
a. Name of the Group	
b. Type of group (grant or non grant)	
c. Village	
d. Union	
e. Upazila	
f. District	
g. NGO name	
<b>2. Group information</b>	
a. No of members in the group?	# of Male members: # of Female members:
b. Date of enrolment with the NGO?	
c. Date/ year of Fisheries activities undertaken?	
d. Benefits of working in a group?	
d. What are the specific roles of women in the group?	
e. Problems faced while working in a group?	
<b>3. Group management</b>	
a. Does the group have any management committee?	
b. If yes, what is the composition of group? (# of members)	
c. If no, who leads or manage the group?	
d. Roles of different management committee members (by position)?	



e. Do you have any records of the group meetings and other information?					
f. Direct observation of records? Comments?					
g. How often does the group hold meeting?					
h. Suggestion on group formation and management?					
<b>4. Training and development</b>					
e. Did your group receive any training on aquaculture, if yes please mention title and duration of these training?	<table border="1"> <thead> <tr> <th><u>Training title</u></th> <th><u>Duration</u></th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	<u>Training title</u>	<u>Duration</u>		
<u>Training title</u>	<u>Duration</u>				
b. What was the methodology of the training? Please describe? Or how was the training facilitated?					
c. Was the training/ workshop useful to you?					
d. If yes, which of the contents did you find useful?					
e. Which part of the training was not useful to you and why?					
f. What technical support did you receive? And from whom?					
g. Any comments/ suggestions on training?					
<b>5. Demonstration and dissemination</b>					
e. Did you make any aquaculture demonstration, if yes, what are those? When did you do it?					

b. Please name the technology and describe how was it done?	
c. Did you get any benefit out of applying the technology? If yes, how do you explain its benefits?	
d. Do you currently practice the technology? If yes, why and if not, why not?	
e. How many of your (non-DFG) neighbour farmers practicing the technology now?	
f. Give examples (name of the farmers practicing the technology?	
g. Any comments/ suggestions on technology?	
<b>6. Technical support</b>	
a. Do you generally receive any technical support? If yes, who provides?	
b. Would you please describe the nature of the support you generally receive?	
c. Are you satisfied with the services provided to you and the group? If yes, how and if not why not?	
d. Did any one in the group face any problem in fish culture recently? If yes, what sort of support did you receive from this project?	
e. Any comments/ suggestions on technical support?	
<b>7. Cost and return</b>	

a. Was the aquaculture technology profitable in your case? If yes, explain how and if not, why not?	
b. What is the average level of income per unit area? (if operating profitably). Review the income-expenditure record book and make comments.	
c. What innovations or development have taken place due to this program (please explain)?	
d. Any comments/ suggestions on profitability?	
e. Where do you sell your fish products?	
e. Do you get faire price of you fish products?	
<b>8. Capacity building &amp; Sustainability</b>	
a. Do you wish to continue your aquaculture activity after the withdrawal of the project support? If yes, why? If not, why not?	
b. How much are you paying as service charge now? Would you continue to pay service charge after DSAP? If yes, why? And if, not why not?	
c. Do you have any group fund? If yes, please describe how does it operate?	
d. Will you continue to receive support from the NGOs? If yes, what are those support needs?	
e. Will you continue to pay service charges for the support you receive from the NGO?	
f. If yes, why would you continue to pay service charge?	
g. If no, why would you not continue to pay?	

<p>e. What is your overall a comment or suggestions on the project?</p>	
<p><b>9. Impacts</b></p> <p>a. Is there any change in your life circumstances as a result of participation in fish farming with the NGO?</p> <p>b. Are you able to take better decision regarding fish farming?</p> <p>c. If yes, what are the things that helped you take better decision?</p> <p>d. If no, what are the things that could be done to enhance your decision making?</p> <p>e. Is there any change in your household fish consumption?</p> <p>f. If yes, what is the estimated increase in your consumption?</p> <p>g. If no, why is it so?</p> <p><b>9. Comments on the physical observations and quality of implementation of the project interventions at farmers' level.</b></p> <p>The Consultants will make physical visits to observe and discuss with the farmers regarding the implementation process, quality of work and specific outcomes of the project.</p>	

**DSAP Mid-term Review  
DoF Staff KII Data Collection Form**

Office Address:

<b>Broad Area</b>	<b>Specific questions</b>	<b>Responses to the questions</b>
Support to DSAP	Is there World Fish DSAP project in you working area?	
	Did you provide any support/services to the NGOs working here?	
	If yes, what are the services you have provided the DSAP NGOs?	
	How are the DSAP NGOs benefited from your support?	
	Did you provide any support/services to the DSAP Demonstration Farmers?	
	If yes, what are the services you have provided the DSAP Demonstration Farmers?	
	How are the demonstration farmers benefited from your service?	
Difference between DSAP and other fish farmers	Do you find any difference between DSAP fish farmers and the other fish farmers?	
	If yes, what are the differences?	
Suggestions	Can the DSAP fish farmers be served in a better way?	
	If yes, how or what could be done for them for their better performance?	
	Do you have any comment or suggestions?	

## DSAP Mid-term Review

### KII Data Collection Form

Hatchery owners/Nursery owners/Fish seed distributors/ “other” NGOs (BRAC, CARE, JOBS, ATDP, FTEP, Grameen Bank, LGED, IFAD and BASC)

Name of the Person: \_\_\_\_\_ Farm/company/Office \_\_\_\_\_

Union: \_\_\_\_\_ Upazila: \_\_\_\_\_ District: \_\_\_\_\_

Broad Area	Specific questions	Responses to the questions
Service Providers	Who are the people or organizations you get services from on “Fish Farming”?	
Services	What are the training you received from World Fish DSAP Project or its partnering NGOs.	
	Was the training useful?	
	If yes, how was that useful?	
	How could the trainings be done in a better way?	
Benefits	How are you benefited from the training from World Fish DSAP Projects or its partnering NGOs?	
	Are you able to serve your clients better way compared to earlier times?	
	If yes, how is that?	
	How are the clients benefited from you compared to benefits they got before?	
	Do you have any suggestion to the World Fish or its NGOs so that they could serve you better?	
	Do need any training or other services now so that you can serve the fish farmers further better?	
	If yes, what the trainings you need?	

**DSAP Mid-term Review**  
**Local fish market salesperson KII Data Collection Form**

Name of the market place:

Union:

Upazial:

District:

Broad Area	Specific questions	Responses to the questions
	How is your fish selling business compared to what it was four years ago?	
	How is the fish supply compared to what it was four years ago?	
	Do you know about the NGO that work for fish farmers( <i>say the NGO that works in the area</i> )?	
	How the fish farmers benefited from the NGO?	
	How are those fish farmers doing?	
	Are their fish production rate higher than other farmers?	

**DSAP Mid-term Review**  
Drop Out NGO KII Data Collection Form

Name of the NGO:

Union:

Upazial:

District:

<b>Broad Area</b>	<b>Specific questions</b>	<b>Responses to the questions</b>
Quitting and its reasons	Were you (NGO) involved with WorldFish DSAP project initiatives?	
	Why did not you continue the project initiatives?	
	What are the different reasons or problems for which you did not continue with WorldFish DSAP?	
	Which is the most crucial problem that compelled you to quit?	
NGO status	Know the status of the NGO 1. When did you start the NGO 2. What are the activities you have done before 2000? 3. What was your budget structure before 2000? 4. What was the number of beneficiaries you have been serving before 2000? 5. Was there any Fisheries Graduate in your staff force in 2000?	
	Do you have any aquaculture initiatives this year?	



**DSAP Mid-term Review**  
Drop Out Farmer KII Data Collection Form

Union:

Upazial:

District:

<b>Broad Area</b>	<b>Specific questions</b>	<b>Responses to the questions</b>
Quitting and its reasons	Were you involved with any NGO that had WorldFish DSAP project initiatives in last few years?	
	Why did not you continue the project initiatives?	
	What are the different reasons or problems for which you did not continue with the NGO, particularly in fish farming?	
	Which is the most crucial problem that compelled you to quit?	
NGO status	Know the status of the NGO 1. What is your main occupation? 2. Did you have any kind of pond in 2000? 3. Was there any other resources that you could practice what the NGO was suggesting?	
	Do you have any aquaculture initiatives this year?	

**DSAP Mid-term Review**  
PNGO Comments Form

**1. Identification**

(a) Name of the NGO: \_\_\_\_\_ Grant  Non-grant

(b) Region: \_\_\_\_\_

**2. Cost-sharing**

(a) How do you generate fund for cost sharing?

(b) What is your comment on the cost-sharing practice with respect to:

- (i) Staff salary & benefits
- (ii) Training & farmers rally
- (iii) Overhead

(c) To what extent will your NGO be able to bear the above expenses after DSAP supports are withdrawn?

(d) What is your comment or suggestion about the improvement of your collaboration between NGO and the DSAP?

### 3. Collection of service charge

(a) Please give the rate of service charge of your NGO by year?

Year	Taka per farmer	Taka per decimal
2001-2002		
2002-2003		
2003-2004		
2004-2005		

(b) Please mention the total amount of service charge collected from farmers so far by year:

Year	Total Collection (Taka)
2001-2002	
2002-2003	
2003-2004	

(c) Please mention if you have any suggestion about alternative to service charge collection.

(d) Please mention if you face any problem in collecting service charge from farmers:

(e) What is your overall comment or suggestion about service charge?

Date: \_\_\_\_\_

Signed: \_\_\_\_\_  
Name:

**DSAP Mid-term Review**  
List of the DFGs met for FGDs

<b>Name of NGO</b>	<b>Type</b>	<b>Name of the village/ group</b>	<b>Upazila/ district</b>
ADI	Grant	Dk. Charbhaghat	Modhukhali, Faridpur
ADI	Grant	Boralidha	Sreepur, Mgura
ADI	Grant	Laxmipur	Sreepur, Magura
ADI	Grant	Sobdalpur	Sreepur, Magura
VPKA	Non-grant	Nabogram	Rajbari sadar, Rajbari
VPKA	Non-grant	Nayandia	Rajbari sadar, Rajbari
SARA	Non-grant	Jorbaria	Fulbaria, Mymensingh
SARA	Non-grant	Kalakanda	Fulbaria, Mymensingh
ORD	Grant	Gourdar	Phulpur, Mymensingh
ORD	Grant	Gajendar	Phulpur, Mymensingh
ORD	Grant	Payeri	Phulpur, Mymensingh
ORD	Grant	Bagondi	Phulpur, Mymensingh

## Statement of Work (SOW) for the Mid-Term Review of DSAP

### I. Background

The fisheries sector plays an important role in nutrition, employment and foreign earnings in the economy of Bangladesh. Per capita annual fish intake is to be estimated about 12 kg contributing to about 60 percent of the animal protein intake. Some 1.3 million people directly and 15 million people indirectly are involved with the sector. Fish export occupies the third position in the overall export earnings. The country is rich in extensive fisheries resources. There are over 1.76 million ponds, 0.06 million *dighies*, *beels*, *haors* etc. covering an area of 1.33 million hectares. Rice fields account for some 10 million hectares of which 2 million hectares are irrigated. These also represent a resource where aquaculture could be practiced. In addition, there are another 2.8 million hectares of floodplain water resources that exist during the monsoon season. The country has a coastal belt of 480 km. The country has also an exclusive economic zone of 320 km from the coast covering an area of about 43302 sq. km. It has a rich aquatic biodiversity as well. About 284 freshwater species (including freshwater prawns), 511 marine species (including marine shrimp) and 12 exotic species are available in Bangladesh waters. The potential for fisheries is therefore tremendous.

Production of fish comes from inland open waters (rivers, estuaries, beels, lakes, floodplains), inland closed waters (ponds, baors, paddy fields, fish farms), coastal closed waters (ghers) and marine waters (artisanal fishing and trawl fishing). The current production of fish is 2.3 million mt. These fisheries are however, not progressing uniformly. Production of inland open waters and marine waters is increasing very marginally over the past few years. It is the inland closed water areas which are contributing the most to the fish production of the country (42%). An estimate made by DoF-BARC in 2001 shows that during the nineties inland closed water (aquaculture) production grew by about 16% per year. In contrast, the production growth for the same period for the inland open waters and marine waters were only 3.59 and 2.76 percent per year. In fact the culture fisheries are making a significant contribution to the domestic availability of fish as well as export earning of the country. Therefore, to satisfy the required objectives of the fisheries policy of the country, which are: employment creation, improving nutrition and earning more foreign exchange, there is no other option than to expand the culture fisheries.

The WorldFish Center (formerly, International Center for Living Aquatic Resources Management or ICLARM) has been a partner for this tremendous expansion of aquaculture in Bangladesh since 1989. WorldFish works in collaboration with national institutes, NGOs and the private sector. The Bangladesh Fisheries Research Institute (BFRI) is its key partner in this research and development. The United States Agency for International Development (USAID) is the core supporter of WorldFish's aquaculture activities in Bangladesh. USAID funded the Research for Development of Sustainable Aquaculture Practices (RDSAP) from 1995 to 2000 (through Grant No. LAG-4111-G-00-5022-00). The emphasis of this project was to support research and, to some extent, demonstration of improved low-cost aquaculture systems. As a logical continuation of RDSAP, USAID currently supports the "Development of Sustainable Aquaculture Project" (DSAP) under the Cooperative Agreement #388-A-00-00-00068-00. The DSAP officially started functioning from 28 June 2000 for a period of 5-years to be terminated 31 July 2005 with a total approved budget of US\$5.5 million.

Although DSAP officially started from June 2000, the first aquaculture season following the principles laid down in the cooperative agreement between WorldFish and USAID was 2001 – 2002. In fact, the aquaculture season 2000-2001, which was an overlapping year between the previous (RDSAP) and current (DSAP) project and that followed RDSAP guidelines, has been

reported by the Center in the final report of RDSAP (in press). A change in the project leadership took place in November 2001 that resulted in a refinement of the project strategy.

## **II. Development of Sustainable Aquaculture Project (DSAP)**

### **Goal of DSAP**

The goal of the DSAP is to increase the smallholder farm household incomes and life circumstances of resource limited people who take advantage of improved ways to farm the extensive inland water resources of Bangladesh and to bring to market increased aquaculture products.

### **DSAP Objectives**

- Disseminate improved technologies to a large number of smallholders through local NGOs and training of their extension staff;
- Continue research on applied aquaculture technology innovation and refinement; monitor effectiveness of different dissemination methodologies and assess impact of the demonstrations;
- Provide training support to aquaculture-related small businesses (hatchery owners, managers, seed sellers, etc).

### **Technology dissemination**

The project aims at implementing at least 7,000 aquaculture demonstrations each year through NGO communities. At present DSAP is working with 34 partner NGOs and over 55 associate partner NGOs. DSAP is implementing demonstrations using different modes of dissemination of aquaculture practices. DSAP has opened 8 regional field offices at Jessore, Magura, Rajshahi, Bogra, Mymensingh, Gazipur, Comilla and Barisal to improve the technical support and advice to the cooperating NGOs. Research Assistants (monitoring) and Research Assistants (extension) are fielded in the regional offices. The RAs (extension) deal essentially with the dissemination of technologies by working in close collaboration with the NGOs and other local stakeholders while the RAs (monitoring) conduct the monitoring and evaluation of action oriented research and assessment of impact of the aquaculture demonstrations. Program implementation is bottom up, which ensures active participation and ownership of the project aiming at empowerment of both NGOs and cooperating farmers/households. Partnership, flexibility of the program, transparency and mutual confidence on both the WorldFish-NGO and NGO-farmer/households interface, quality of extension services using participatory approaches, and the integration of aquaculture and agriculture are key elements of the project's strategy. DSAP expects sustainability both at NGO and at farmer level as well as adoption of disseminated technologies by interested neighbors through farmer-to-farmer technology transfer. The following technology "packages" are disseminated in both pond and paddy field based systems:

- Polyculture of indigenous and exotic carps;
- Polyculture of carps and golda (freshwater prawn);
- Nursery practices.

### Provision for Training

DSAP provides extensive training to NGOs, farmers and other concerned persons, agencies/institutions. The following trainings are usually imparted:

- Training of Trainers (ToT) for staff of partner and associate partner NGOs (residential foundation and follow-up training courses as well as on-the-job training);
- Training of demonstration farmers (foundation, follow-up training sessions and on-farm training) by trained NGO extension workers;
- Training for support services enterprise development to assist aquaculture businesses;
- Training of associated staff of linked programs and institutions;

### Monitoring, Evaluation and Research

DSAP is involved in research at three different levels:

- Project staff conducted research;
- Collaborative research with Bangladesh Fisheries Research Institute (BFRI);
- Small research studies conducted through Universities.

### Project Conducted Research

DSAP staff (regular staff, consultants, interns) are involved with research directly in connection with the impacts of different aquaculture technology dissemination approaches as well as research of related interest. At present, project staff are involved with the following research activities:

- Technology profiling and simple economics from pond record book data;
- Long-term participatory monitoring and impact assessment of Integrated Aquaculture-Agriculture (IAA) using the RESTORE (Research Tool for Natural Resource Management, Monitoring and Evaluation: a tool developed by the WorldFish Center) approach;
- Economic, consumption, gender and livelihood surveys;
- Effectiveness of different aquaculture extension approaches;
- Other topics of emerging interest.

### Collaborative Research with BFRI

Under the Development of Sustainable Aquaculture Project the WorldFish Center has a Technical Assistance Project (TAP) entitled “Research for Sustainable Aquaculture Development” with the Ministry of Fisheries and Livestock to conduct collaborative research with BFRI. As per TAP, BFRI and DSAP are involved with research concerning generation of new technologies and refinement of promoted technologies. These need-based technologies generated through action cum research are tested on farm with cooperating farmers and NGOs of the project.

## **Research Grants**

Research grants are awarded to university/college teachers, researchers, NGOs and graduate students for conducting special studies of current interest. The project has funds to support a total maximum of 30 small research grants.

### **III. Purpose and Objectives of the Mid-Term Review**

The overall purpose of the mid term evaluation is to review the performance of the DSAP to date and to provide recommendations for the project's effectiveness toward achieving its goals and objectives. The team is expected to also assess future directions including a possible continuation of the collaboration between USAID and WorldFish to assist in the further development of the aquaculture sector in Bangladesh and to help improve the livelihood of resource limited rural households.

The main objective of the DSAP is to disseminate improved low-input technologies to a large number of smallholders through local NGO. By assisting cooperating NGOs and fish farmers the projects aims at achieving sustainability in terms of the aquaculture extension program and small scale rural fish culture so that both continue operations once the external support is withdrawn. With this in mind the review mission will address whether the project is progressing towards the achievements of its goal and objectives. In particular, the review team should examine whether DSAP has effectively:

- (i) developed innovative approaches to enhance sustained aquaculture support programs of the NGOs including co-sharing of operational costs and service charge for provided extension services;
- (ii) identified and implemented efficient and efficacious skill training programs both residential and on-the-job training for concerned NGO staff;
- (iii) provided efficient and sufficient assistance and support to the NGOs to implement their aquaculture extension programs;
- (iv) identified and stimulated income generating activities ensuring the sustainability of the NGO extension program;
- (v) developed technology transfer approaches that are ensuring sustained fish production using the identified low cost aquaculture technologies;
- (vi) disseminated the identified technologies, developed aquaculture skills, improved decision making, enhanced yield and income, increased women participation and increased technology transfer in the project working area through farmer-to-farmer extension;
- (vii) developed appropriate and effective monitoring and evaluation mechanisms for the concerned agents (NGOs and farmers);
- (viii) identified and implemented approaches supporting research and development programs of concerned research partners;

and is on track to achieving major targets of the program.

### **IV. Statement of Work (SOW)**

In order to meet the objectives of the Mid-Term review, the consultants shall:



- Review the aquaculture dissemination approaches promoted by the project. How relevant are the participatory approaches, the farmer subsidy, the group formation, the duration of extension services, the diversity of the training program, the extension tools developed etc.?
- Assess the progress in the implementation of the aquaculture demonstrations by the NGOs with assistance and support from DSAP. What extension services are provided including training and group and individual visits? What is the quality of these services? Is the methodology used actually participatory? Are the aquaculture activities integrated with the other on-farm agricultural components?
- Review the approach developed by the project to achieve sustainability of the NGO technology transfer program. How relevant is the partnership approach, the flexibility and the transparency? How relevant are the targets for the different technology groups, in particular rice-fish and nursery production systems? How relevant are the co-sharing of operational costs and service charge for provided extension services?
- Review the services provided to the NGO partners in terms of the training program of the concerned NGO staff as well as the technical and financial assistance. How relevant and realistic is the financial participation of the costs of the extension program;
- Review the capacity building of the NGOs particularly in terms of human resource development and aquaculture related income generating activities and assess the degree of success to attain sustainability of the NGO program given the actual time frame of the project;
- Review the monitoring and evaluation program developed by the project including beneficiaries survey, farmer performance surveys, *ex post* impact assessment and the long-term participatory impact assessment using the RESTORE tool i.e. field operations and data analysis software;
- Review the effectiveness of technology dissemination by assessing technology adoption; skills improvement; integration of aquaculture and agriculture activities and the degree of success in terms of increased yield and income, gender, farmer-to-farmer spread and total benefits so far achieved;
- Review the collaborative research program with BFRI, the small research grant program with the Universities and assess the progress so far made in terms of generation of new technology and refinement of disseminated technologies;
- Identify on the basis of the review, steps to ensure the sustainability of (i) the NGO extension program, (ii) the farmer demonstration groups and (iii) the adopted aquaculture technologies;
- Make recommendations on the future direction of DSAP including possible continuation of collaboration between USAID and WorldFish after the completion of the current phase of the project.

## **V. Methods and Procedures**

The mid-term review will be conducted in Dhaka and in the outreach offices for a period of one month from May 10, 2004 to June 10, 2004.

### **Preliminary Activities in Dhaka**

1. Review DSAP documents including project description, annual work plans, technical progress reports, working papers, indicator reports, proceedings, and others as deemed necessary.
2. Receive administrative and technical briefings from DSAP and USAID management team. Refine methodology for Dhaka and field based parts of the review and identify and plan field visits for interviews with key stakeholders.
3. Design a limited impact survey as specified in the SOW, identify methodology, site selection, sample size, human resources needed etc. The team will prepare a brief report that will outline any refinement in the review methodology and outline the final report.
4. Conduct interviews and discussions with appropriate partners of the project, USAID and GoB

#### **Site visits**

1. Visit selected field activities and regional field office so as to assess the achievements of the project activities.
2. Interview DSAP partner NGO staff, key officials and stakeholders of the project.
3. Evaluate progress towards goal, objectives and targets and assess future needs for short and medium term project approach and activities.

#### **Activities in Dhaka**

1. Debriefing with DSAP, USAID and GoB staff to verify, complete field findings
2. Analyze results and a prepare draft report.
3. Conduct presentation of review findings and conduct formal exit debriefing
4. Finalize report based on the team's own professional judgment related to issues of interpretations and analysis of review findings.
5. Complete the entire mid-term review within 30 calendar days of inception

#### **VI. Proposed schedule of the mid-term review**

<b>Day</b>	<b>Activity</b>	<b>Location</b>
1	Arrival of team, meeting with DSAP staff	Dhaka
2-4	Meetings with DSAP, USAID, GoB other stakeholders. In collaboration with DSAP and USAID make final revision to statement of works, objectives, tasks, including limited impact survey and sites/ stakeholders to be visited.	Dhaka
5	Conclude preliminary meetings in Dhaka and submit a preliminary work plan and outline of review	Dhaka
6-15	Field visit discussions with staff and stakeholders, visit beneficiaries groups and data collection	Field
16-23	Analysis and preparation of draft report	Dhaka
24-25	Presentation and debriefing with DSAP, USAID	Dhaka

	and GOB	
26-29	Finalization of report	Dhaka
30	Submission of final report	Dhaka

## VII. Reporting Requirements

### Inception report:

The team will prepare a very brief inception report within first week. This report may include objectives, tasks and a preliminary work plan (to be revised in consultation with DSAP and USAID, as needed) and an outline of the final report. The work plan shall reflect the team's schedule for data collection, analysis, report writing and periodic interim briefings with DSAP and USAID. The outline of the final report shall be approved by DSAP and in consultation with USAID.

### Draft report

A draft report shall be submitted to DSAP for forwarding to USAID not later than the 24<sup>th</sup> day of the consultancy.

### Exit debriefing

Prior to the submission of the final report, the team will officially presents its findings and conduct an exit debriefing for DSAP, USAID and GOB. The debriefing will reflect the content of the draft report and focus on key issues that may be clarified with the team members.

### Final report

The final report will be submitted to DSAP and USAID by the team leader no later than 5 days after the exit debriefing. The report should include an executive summary, a brief background of DSAP, a summary of the methodology used in the evaluation, issues, team findings, conclusions and recommendations, as well as a list of persons interviewed during the data collection period. The report will focus on addressing the topics and questions described in sections III and IV. For each of the topics/questions the evaluation report will present the major findings of the team, relevant implications, and recommendations for future action.

## VIII. Team composition

The Mid-term review team will be composed of 04 (four) members as specified below:

- |       |   |                        |
|-------|---|------------------------|
| (i)   | Rural development specialist (Team Leader)    | independent consultant |
| (ii)  | Socio-economist (Member)                      | independent consultant |
| (iii) | Monitoring and evaluation specialist (Member) | GoB/IMED               |
| (iv)  | Fisheries extension specialist (Member)       | GoB/MOFL               |

Rural Development Specialist (senior-term) should have Ph.D. in a relevant field (preferably rural/agriculture development or rural sociology/sociology/anthropology) with at least 15 years of experience. S/he should have adequate experience in works related to evaluation and assessment of development/extension projects. Candidates involved with rural development

institutions/ academies having experiences on training and extension models and project management will be preferred. The Rural Development Specialist will act as a Team Leader.

The Socio-economist (mid-level) should have at least a Master's Degree in any social science subject preferably Agricultural economics/Economics, Resource economics with at least 10 years of experience in research/independent consultancies. S/he should have adequate experience in works related to evaluation and impact assessments. Reports or published papers on similar evaluations and assessments will be an added advantage.

Monitoring and Evaluation Specialist (mid-level) should have at least a master's degree in any field working in the Monitoring and Evaluation Division of the Planning Commission, Government of the People's Republic of Bangladesh. S/he should have at least 8 years of working experience in the department. Preference will be given to the candidate who had considerable involvement in monitoring and evaluation of development projects of the government and donor funded projects.

Fisheries Extension Specialist (mid-level) should have at least a master's degree in fisheries/aquaculture or agricultural/fisheries extension working in the Ministry of the Fisheries and Livestock of the Government of the People's Republic of Bangladesh. S/he should have at least 8 years of working experience in the department. Preference will be given to the candidate who has a mixture of knowledge in both aquaculture and extension.

#### **IX. Duty Post**

All fieldwork will be performed in Dhaka and at the selected DSAP field sites

#### **X. Logistic support**

All required support will be provided by the project