

**FINAL EVALUATION**  
**of**  
**UNCDF Sponsored**  
**Integrated Aquaculture (Duckweed) Project**

*7 November – 15 December 2000*

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### Project Data Sheet

Country : Bangladesh

Project Number : BGD/91/C06

Project Title : Integrated Agriculture (Duckweed)

Sector : 440 Fisheries / 420 Crops

Sub-sector : Aquaculture / Crop Improvement & Management

Government Executing Agency : Ministries of Fisheries & Livestock

National Implementing Agency : PRISM (Bangladeshi NGO)

UN Cooperating Agency : UN Office for Project Services (UNOPS)

Total Project Cost : US \$ 1,842,662

UNCDF : US \$ 1,803,000

GOB : Tk. 1,527,000

Duration of Project : 5 years

Date Project Approved : September 12, 1993

Date Project Began : September, 1993

Date Project Evaluated : November – December 1995

Type of Evaluation : Mid-Term Review

Date Project Ended : September, 1998

Project Impact Assessment/ : November 7 – December 15, 2000

Type of Evaluation : Final Evaluation

Total project Cost : US\$ 1,842,662

UNCDF : US\$ 1,803,000

GOB : Tk. 1,527,000

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### Executive Summary

The main purpose of this final evaluation is to review the project performance to date, with regard to overall progress and attainment of the immediate objectives and the likelihood of attaining the development objectives of the project. It is also to assess the impact of the project on beneficiaries and the project areas and the efficiency of the implementation process.

The project, Integrated Agriculture (Duckweed) was started in September 1993 for a period of 5 years, with PRISM, a Bangladeshi NGO, as the implementing agency, and the Ministries of Fisheries and Livestock as the Government Executing Agency. The UN Cooperating Agency was the UN office for project services (UNOPS). The total project cost is US \$ 1,842,662 with UNCDF contributing US 1,803,000 and a GOB component of Tk. 1,527,000. There was a mid-term evaluation of the project in November-December 1995, and this final evaluation was from November 7 – December 15, 2000. Data was collected for the evaluation through beneficiary interviews, focus group discussions, and interviews with project officials and staff. In total, 10 percent of beneficiaries and 10 percent of enterprises were sampled, using random sampling methods. Project data and available documents were also reviewed.

The following gives a summary of the main findings and recommendations:

- The project is found to have met its immediate objective of promoting carp poly culture in the two project areas of Mirzapore in Tangail district, and Shibaloy Thana in Manikgonj district. The other immediate objective of promoting duckweed as the sole fish feed was however met with limited success. The main reason for the latter is that duckweed can only be grown for 4 months of the year, the ponds drying up for rest of the months. This means that duckweed can be cultivated during the dry seasons only with irrigation, requiring the availability of water bodies and imposing additional costs. Further problems with duckweed cultivation is found to be the additional costs of building latrines and the fact that duckweed is not viable as the sole fish feed from the point of view of nutrient requirements of the fish.
- The project is also found to be successful in terms of meeting the development objectives of contributing to improving incomes and nutritional levels of landless and marginal farmers, though the change in the project design since the mid-term evaluation means that in the current context, the project has mainly succeeded in reaching the better-off groups amongst the poor and the middle farmers, average size of landholding of the sampled beneficiaries being 2-3 acres.
- The original project design of organising the producer groups (pond operators) into Joint Stock Companies of pond owners and the landless was found by the mid-term evaluation to be a non-viable strategy. This was due to the high overhead costs of registration and tax liabilities of companies. This assessment was found to be justified by this mission on the basis of interviews with beneficiaries and project field staff. In addition, it was found that collective ventures to be successful need to be homogenous in composition, and members to be highly motivated, to avoid conflict and co-option of beneficiaries by better-off and more educated members.
- The current strategy of giving credit and extension advice and training on carp poly culture and duckweed cultivation to family-based enterprises or close-knit and kinship groups is found to be viable. It is however felt that an all-out effort should be made not to exclude the poor/poorest from project activities, supporting them with additional income generating activities, taking lease of ponds, giving access to khas lands and ponds, and providing linkage to public services at the Thana and Union levels. The latter can improve the capabilities of the poor and help them meet the long gestation periods involved in fish farming and other agricultural activities. Lessons can be drawn in this regard from the Community Empowerment Projects (CEPS) of UNDP, in terms of greater access to public services by beneficiaries.
- The socio-economic impact on beneficiaries is found to be by and large positive, with greater consumption of fish by beneficiaries, lowering of the price of fish in the project areas by 3-40%, and sufficient incomes being generated by the enterprises to lead to additional investments in the crop sector, greater expenditure on household effects, housing improvements, and education of children of the beneficiaries.
- The project is also found to be sustainable in terms of the technology learnt and continuation of activities by the groups/enterprises. The low recovery rates associated with the initial high fixed costs incurred in formation of joint stock companies and external factors such as floods, have however meant that at the present time, since the end of the project, there is some scarcity of operational funds.

- The project highlights some important lessons in terms of a rural development and poverty alleviation strategy for Bangladesh. In the present context of a skewed distribution of land and pond ownership, the potential for addressing the needs of the poorest in the farm sector are limited. The focus therefore has to be the non-farm sector for these landless groups, or a multiple set of strategies combining different activities.
- The project also highlights the importance of ensuring that the project design is made after adequate research and careful analysis of all aspects. In this project, it was found that the project performance was affected by faulty design and inadequate analysis on important issues such as site selection (sandy soil and frequent floods in Shibaloy), viability and financial implications of round the year duckweed production, the full financial implications of formation of joint stock companies, and the need for preparing groups with literacy and numeracy skills and adequate motivation, learning from the experience from other NGOs in group formation.
- The main recommendation from the evaluation is continuation of activities in the project areas, and replication to other areas. The replication/continuation should take into account several factors such as greater efforts to include the poor/poorest, better preparedness of groups in terms of basic literacy and numeracy skills and better motivation and social mobilization to promote group cohesion.
- Women's involvement in the project activities should similarly be better designed to enable women to take on greater managerial responsibilities, although women were found to be familiar with the fish culture technology. Women-headed households, who are amongst the poorest in rural areas, can similarly be brought into the programme.
- It is also recommended that the debt liabilities of some companies formed at the initial stage be written off, given that losses were incurred because of the faulty project design, for which group members cannot be held accountable.

## **I. Introduction and Background**

The project was initiated by PRISM, a Bangladeshi NGO. The project activities started in September, 1993 and the project duration was for 5 years. The main rationale for the project was to demonstrate the viability of local duckweed (lumnaceae) cultivation for use as a fish feed substitute, which was known to have a high protein content of 35-40%. This was valid given the high price of fish feed in Bangladesh and the need for alternative low-cost fish feed. The other rationale was the promotion of fish farming to increase the incomes of farmers and improve their nutritional status. It may be mentioned that fish farming was not hitherto widely practised in Bangladesh, but in recent years its viability and profitability was demonstrated in a number of projects, such as the Danida-funded project involving 1,000 small producers in Mymensingh. Given the high population pressure and the need to meet the rising demand for fish, and the decline of the natural fish stock due to environmental degradation of the fish habitat, fish farming is an important option for Bangladesh.

Since 1989, PRISM had been conducting pilot duckweed/fish production in Mirzapore on land donated by Kumudini Welfare Trust (a Bangladeshi social welfare organization funded by UNCDF). PRISM also started cultivation of three native species of duckweed in village ponds using inputs of inorganic fertilizer and water, and at the same time, poly culture of carp & monoculture of tilapia. The yields from fish production were found to be consistently high.

PRISM established a second project site in Manikgonj district (Shibaloy Thana) and set up phase II of the project for which UNCDF funding was requested. The institutional arrangement was such that PRISM was to provide the credit and inputs needed to run the enterprises in return for a percentage share of the profits. The enterprises were originally designed to be run as joint stock companies involving both landless and land-holding farmers. This original design was however modified following the recommendations of the Mid-Term Evaluation Report in November-December 1995 and responding to field conditions. The present structures of the enterprises are informal groups, most of which are family-based enterprises.

### ***I.A. The Development Objectives of the Project***

The project was to contribute to improving incomes and nutritional levels of landless and marginal farmers by providing them access to the technology and credit financing needed to enter into high-return fish farming.

### ***I.B. The Immediate Objectives of the Project***

The immediate objectives were the establishment of small-scale enterprises involved in intensive fish-farming and duckweed production. At the end of the project period, 1000 farmers, organized in small-scale enterprises, were to have doubled their incomes based on a sustained fish and duckweed production of 5 MT/ha and 200 MT/ha, respectively.

### ***I.C. Project Outputs***

The expected project outputs were to be:

- 100 duckweed cum fish production units in operation on a self-sustained basis producing 500 tons of fish and 20,000 tons of duckweed yearly.
- Credit and technical assistance provided to 1,000 pond operators to sustain production with only casual or no assistance.
- Attained yields of 5 MT of fish and 200 MT of duckweed per ha.
- Enrolment of 750 landless and marginal farmers in the programme.
- Enrolment of 375 women in the programme.

### ***I.D. Project Activities and Implementation***

The project activities and implementation arrangements are discussed in this section.

The main project activities were to be:

- Group formation and mobilization.
- Training of producer groups and extension agents in duckweed/fish production.
- Incorporation of informal groups into commercial enterprises.
- Provision of credit and technical and managerial support to enterprises.
- Selection and preparation of fish and duckweed ponds.
- Operation of duckweed/fish enterprises.
- Upgrading of centre facilities and staff.
- Establishment of NGO semi-commercial duckweed/fish farms.

The implementation arrangements of the project were such that the Ministry of Fisheries and Livestock was to bear the overall responsibility for the development activities in the course of the project. However, the Government of Bangladesh (GOB) was to designate OPS as the UN Cooperating Agency for the project, with PRISM as the Implementing Agency for the project under subcontract by OPS.

#### ***I.E. Project Costs and Financing***

The project was jointly financed by UNCDF (US \$ 1,803,000) and GOB (Tk. 1,527,000). The total project cost was US 1,842,662.

#### ***I.F. Project Risks***

Two main risks were anticipated for the project. One was in terms of duckweed cultivation and associated health risks with use of duckweed as fish feed. The other was the credit risk.

The project document mentions that duckweed cultivation will need well water during the dry season. It is also mentioned that no additional risk will be incurred in terms of the lowering of the ground water table, due to the extraction of water, since the ponds are dispersed over a wide area. It is also pointed out in the project document that the duckweed exposed to human excreta will carry some pathogens to the fish ponds and the fish (by eating duckweed). However, this health risk is non-existent if the fish is properly cooked and which is the general practice in Bangladesh.

What was not anticipated is the full financial implications of irrigating the duckweed ponds by the group members, and also the additional costs of installing latrines on duckweed ponds.

The second major risk anticipated was the credit risk. A recovery rate of 95% was targeted for the project. Importantly, the project was designed in such a way that the carp in poly culture component is financially viable even if the duckweed component fails and the pond operators have to fall back on the use of traditional feeds.

The anticipated risks of credit recovery thus does not take into account the risks associated with flooding, which is particularly high in Shibaloy Thana, as well as the additional risks from high fixed costs. The latter are in terms of earthwork and embankments improvement of the ponds, installation of latrines and irrigation of duckweed ponds. As pointed out in the next section, the structure of landholding and pond ownership, the problems and additional costs of registration and tax liabilities involved in operation of Joint Stock Companies (JSCs), management problems of groups, were also not anticipated.

## **II. Project Preparation and Design**

It is felt that there were deficiencies in the project preparation, which affected project performance. Some of these problems were identified in the mid-term evaluation report. However, some important issues were not identified such as the prevailing socio-economic context in Bangladesh, in particular the pattern of land and pond ownership, the problems in terms of duckweed production, the high fixed costs involved in pond excavation, preparation etc.; and the additional costs involved in building latrines for duckweed cultivation. These are discussed below in detail.

One of the main gaps in project preparation relates to the viability of using duckweed as the primary fish feed for poly culture, to be produced by the enterprises and also to be disseminated in the areas concerned. It was learnt during the fieldwork that duckweed could be produced for only four months of the year, from August to November. This means that duckweed cannot be used as fish feed throughout the year. Moreover, duckweed cannot be used as a sole feed from the point of view of a balanced diet and nutrient requirements for fish poly culture. As a result, the use of other feed such as bran and oil cake as supplementary or alternative feed is found to be a continuing necessity for fish farming. The relatively high cost of the feed is an important factor in terms of profitability.

The problems with duckweed production also affected the institutional arrangement of the project, which was conceptualised as Joint Stock Companies consisting (JSCs) of fish and duckweed pond operators. The advantage of this was thought to be utilization of the derelict ponds in the village areas, where duckweed is found to grow naturally. Unfortunately, the viability of growing duckweed round the year without irrigation was not considered. While irrigation is possible in the demonstration farms, this is too costly for individual pond operators.

It is strongly felt that the project preparation should have thoroughly researched these issues on which the project was to be based.

The second lapse in project preparation is found to be in terms of understanding the socio-economic structure of rural Bangladesh, especially the pattern of land holding including pond ownership.

One of the objectives of the project was to maximize participation of the landless and marginal farmers. In fact, Shibaloy Thana was chosen as one of the project sites because of the existence of landless groups, which could be readily brought into the aegis of the project. However, the landless and marginal farmers not only do not own land or own very little cultivable land, they also do not own ponds. The only option therefore is to lease ponds, if available, or to form groups of pond owners and the landless, who could provide only labour. The implications of this in terms of group cohesion, probable conflict and distribution of benefits, costs of leasing, etc. should have been thoroughly explored.

The project design also did not take into account the high fixed costs involved in making the ponds viable for fish farming in terms of earthwork and excavation, preparation of embankments, etc.

This meant that, as pointed out in the mid-term evaluation report, the size of the loan given out as fixed capital to enterprises was in many cases too high, and the repayment schedule unrealistic. The mid-term evaluation report also pointed out the additional costs involved in the registration of JSCs.

In the current context, the project is still found to be a relevant and useful concept, but in terms of changed parameters. Major changes had to be made in the field in the project design, following the recommendations of the mid-term evaluation report, but also in response to field conditions. The main recommendation was to move away from the concept of JSCs, to avoid the additional overhead costs of registration and taxation, and to move towards informal group enterprises akin to NGO group formation. Further changes were made during implementation in that in addition to phasing out of JSCs, most of the enterprises were found to be family enterprises, or owned jointly by kins such as brothers. The project staff, including the Project Directors were of the opinion that this was the only viable structure for groups, given the ownership pattern of ponds and problems relating to management of collective enterprises.

In the present context therefore, the target beneficiaries are not primarily the landless groups or marginal farmers, but marginal to middle farmers. The main relevance of the project is therefore in terms of increasing the output of fish through poly-culture, better utilization of ponds including derelict ponds, and the supplementary investments in crop production from higher earnings of pond operators. The benefits to the poorer sections of the community are in terms of increased availability and lower prices of fish, more business for fish traders and some employment generation, including better utilization of family labour.

It is strongly felt however that efforts to include the landless and poorer groups in fish farming could continue through leasing arrangements, efforts to access "khas" lands, subsidising the excavation costs of ponds with food grains available from government programmes such as Food for Work and Vulnerable Group Development, etc. While it is recognized that the availability of government "Khas" lands are limited, and investment in leased ponds would ultimately accrue to the pond owners, continuation of the programme in the two areas and replication in other areas would have to include the poor. Inclusion of the poor is also difficult since they cannot afford the long gestation periods involved in fish farming. There is therefore need to pursue a diversified set of activities for the poorest such as day labourers and marginal farmers, which combines fish farming with other income-generating activities for the pond operator as well as his family members. Women members of the household in particular can be brought into such programmes. A two-pronged strategy is therefore envisaged for enterprise development, one for the better-off amongst the poor and middle farmers, and a more diversified and innovative programme for the poorest.

The project can be considered as a useful learning experience in understanding the socio-economic context of rural Bangladesh and designing an appropriate development/poverty alleviation strategy in that context. The project history is also an experiment in designing an appropriate institutional structure for producer groups.

### **III. Status and Performance of Implementation, Results and Potential Impact**

#### **i) Status and Performance of Implementation:**

##### *a. Status of Input Delivery*

The main input delivery for the project was in terms of credit and introduction of the new technology for poly culture of carp and duckweed production as fish feed. Additional assistance was given in the form of know-how for excavation and re-excavation of ponds, disinfecting the ponds, drainage, etc.

From September 1993 – June 2000, the total credit disbursed in Mirzapore Thana is Tk. 8,452,529 as fixed capital and 9,481,692 as working capital. The corresponding figures for Shibaloy is Tk. 6,750,750 and Tk. 4,013,730. The interest charges were 15 percent on both fixed and working capital. Some adjustments and shortfall in disbursement of funds were however mentioned by the senior project staff in this Thana, particularly for the credit fund.

It was found that the input delivery was satisfactory in terms of timelessness and efficiency, for all the components including extension advice, credit delivery, and other assistance to pond operators. In addition, pond operators were given additional assistance in flood control during 1995 and 1998.

The staff was also found to have been adequate and of sufficient quality. After the phasing out of the project however, some problems are apparent in terms of payment of the salaries of the staff and cuts in the number of the staff.

*b. Project Management and Systems Performance*

The evaluation mission, during its short time, did not find any lapse in the management of the project, or in project leadership, administration systems and procedures. All the inputs were delivered effectively and on time. Better co-ordination between the Head Office and senior project staff and review of activities could however strengthen the efficacy of the project.

The project field staff however while articulating the effectiveness of the training given, desired further follow-up training and expressed their interest in learning more about fish farming. The beneficiaries/group members also desired more contact and support from the village and Area Co-ordinators, although they were familiar with the technology and were satisfied with the extension advice.

**ii) Results**

This section assesses the project performance in terms of several indicators established by the project and which indicates the attainment of the immediate objectives of the project. These are given below:

- Number of groups formed and mobilized:

The project data shows that in Shibaloy Thana a total of 101 enterprises were formed from September, 1993 – June, 2000 of which 82 were informal groups and 19 were Joint Stock Companies. This comprised 358 male borrowers and 66 female borrowers. The corresponding figures for Mirzapore are 56 enterprises, of which 26 are joint stock companies and 30 are informal groups. The total number of borrowers in this Thana are 370 male and 52 female.

The figures of 846 group members therefore correspond closely to the immediate objectives of the project of organizing 1,000 farmers in small-scale enterprises at the end of the project period.

It should however be mentioned that currently, most of the groups are family enterprises, and the participation of women are in most cases not as independent managers but as family members, who take part in the operation of ponds by helping to feed the fish. They were also found to be familiar with the new technology for fish farming/carp poly culture.

- Training

The type of training provided included training on poly culture of carp, use of fish feed including duckweed and other traditional feed such as oil cake and bran, and training on pond preparation including excavation, disinfecting the ponds and building the embankments, and training in record keeping and accounts.

This training was provided to both the producer groups and the extension agents. The extension agents however expressed the need for follow-up training, while some producer groups were of the opinion that there should be more frequent contact with extension agents and greater supervision of group activities.

In Shibaloy, producer groups were found to have been given additional assistance and training in flood control of the ponds by building dykes, using nets, etc.

- Amount of Credit Provided/Financial Viability of the Credit Programme

For the period September 1993 to June 2000, the total credit disbursed in Mirzapore as fixed capital was Taka 8,452,529 and Taka 9,481,692 as working capital. The recovery rate of fixed capital was 41% in this Thana and 44% on interest accruing to the fixed capital. The recovery rate on working capital is found to be 91% and 94%

on interest accruing to this working capital. The data obviously shows the high fixed investments of the project, and problems in repayment.

For the same period in Shibaloy, the total credit disbursed as fixed capital is Taka 6,750,750 and Taka 4,013,730 as working capital.

The recovery rate on fixed capital is found to be higher in this Thana, at 50.26%. The recovery rate on working capital is however lower at 77.16%. The recovery rates on the interest is also found to be very low (2.65% and 29.12% respectively for fixed and working capital respectively). This data includes the performance of both informal groups and companies. The recovery rates from groups are however found to be much better.

The low recovery rate has meant that at the present time, the project is facing problems in disbursement of working capital. This was particularly mentioned in Shibaloy. It was also mentioned by the senior staff of the project in this Thana that the funds available for project operation were not adequate, although adequate budget provisions were made. In Mirzapore, some rescheduling of loans were also made necessary. Fund problems have also led to some rationalization of staff and difficulties in payment of salaries of the staff, since the completion of the project.

- Management and Operation Capacity of PRISM

The institutional, managerial and technical capacity of PRISM was found to be adequate. As discussed before, in terms of financial solvency however, the project is currently facing some problems leading to rationalizing of staff and problems in payment of the salaries of staff, as well as disbursement of working capital.

- Productivity of the Enterprises

Project data shows that in Mirzapore, 55 hectares were brought under fish production by the enterprises concerned, while 18 hectares were brought under duckweed cultivation, during September 1993 to June 2000. The total fish production was 1,369 MT and total duckweed production was 4,668 MT. The average fish production per hectare/yr is found to be 7 MT.

For Shibaloy over the same period, total area under fish production was 35.23 hectares, while the total area under duckweed cultivation was only 9.43 hectares. The total fish production was 476.32 MT and the total duckweed production by enterprises was 1,523.17 MT. The average fish production per hectare/yr is seen to be 7.34.

The project data therefore shows that the immediate objective of 5 MT of fish yield per hectare per year was attained. The average production of duckweed per hectare/yr is however much below the target in both areas.

The field research collected data from a sample of enterprises in both areas. It is thus possible to compare the productivity, incomes of enterprises, etc. with the project data. This is presented in a later section.

- Management and operation capacity of the enterprises

The mid-term evaluation report focussed on the problems of operation of the joint stock companies. The main problems identified were the high overhead costs in terms of registration and tax liabilities, given the formal nature of the groups. In addition, it was found during the field survey that there were problems associated with both companies and informal groups that were heterogeneous in terms of membership, representing pond owners and the landless. Collectives in general were found difficult to manage, particularly in terms of assignment of responsibilities such as feeding the fish, keeping watch over the ponds etc. and problems in terms of monitoring. This does not preclude the success of some collections, as one company in Mirzapore, consisting of 19 members and operating 7 fish ponds. The main factor accounting for the success of the group was group cohesion, because of similarity in terms of ethnic identity (Thana members all belonged to the Hindu community). For phased-out companies, who had incurred losses some resentment was also expressed by ordinary members towards salaried officials such as the Managing Director of the companies, who were in general more educated, as well as towards project field staff. The main problem was the lack of knowledge of ordinary members in terms of book keeping and accounts. It is felt that this type of model to be effective, would require a much longer period of preparedness and some basic training in terms of literacy and numeracy, including political and social motivation.

In terms of management of enterprises, the simplest model seems to be family enterprises. This explains the current strategy followed by the project (since the mid-term review). Unfortunately however, this to a large extent biases the selection of beneficiaries to the slightly better-off and middle income farmers, given the

structure of land and pond ownership in the country. A more in depth analysis may also bring to the surface intra-household distributional issues, which was not possible to research given the time constraint for the field work.

#### **IV. Project Impact**

One of the main purposes of this evaluation is to assess the immediate impact the project has had on the beneficiaries in the project area, i.e the pond operators and their families, as well as on the local economy. This includes the impact of the credit support, training and extension, and in addition, the developments in the fisheries sector as a result of duckweed promotion.

##### ***IV.1. Data Source and Methodology***

The methodology for impact assessment included data generated in the project areas, Mirzapore Thana in Tangail district, and Shibaloy Thana in Manikgonj district, from three main sources. Thus, a simple structured questionnaire was used to interview individual group/enterprise members who were the direct beneficiaries of the project. The aim was to include ten percent of the project beneficiaries. Thus 100 beneficiaries were to be interviewed out of the 1,000 members, using random sampling methods. In effect, 75 beneficiaries were thus interviewed, 50 in Mirzapore Thana and 35 in Shibaloy. The adjustment in the size of the sample had to be made given the time constraint in terms of field work, and given that most of the existing enterprises were found to be family based enterprises, so that the distribution of benefits within groups was not a key factor, apart from intra-household distributional issues. In such cases, where group members belonged to the same family, one needed to interview only the key person involved with the enterprise. This was especially the case in Shibaloy, where most enterprises were currently family-based enterprises.

In addition, a total of 14 enterprises, comprising 10 percent of the total number of enterprises were selected for detailed data on production, costs and related issues.

Focus Group Discussions were similarly held with different types of groups e.g. the landless groups, phased out groups, Joint Stock Companies, and family enterprises.

Care was also taken to select women beneficiaries in our sample, to understand better the involvement of women in the enterprises.

##### ***IV.2 Discussion of Findings from the Field Research (Socio-economic Impact on Beneficiaries)***

In this section, we discuss the findings from the field research in the two project areas, especially in terms of the socio-economic impact on beneficiaries.

Out of the total of 50 beneficiaries selected in Mirzapore Thana, 37 belonged to Joint Stock Companies, while 13 were members of groups other than JSCs (Table 1). The mean age given in Table 2 is seen to be 50 years. 9 of the sampled beneficiaries were women while the other 41 were men (Table-3). In Table 4a we see that most of the sampled beneficiaries has been with the project for 4 years or more. Table 5 shows that 44 of the beneficiaries were fish pond operators while only 6 operated both duckweed and fish ponds.

In terms of the occupation of respondents, the majority are seen to be farmers, with a few belonging to other occupations such as teachers, small business or in government service (Table 6 a). Table 6b shows the average landholding size of the beneficiary households. This is found to be 196 decimals or little less than 2 acres. The beneficiaries therefore belonged to the marginal to small farmer category in Mirzapore Thana. Most of the respondents joined the project to either improve their incomes or to make use of their under utilized ponds (Table 7). The data also shows that (Table 8a), most of the contribution to the enterprises were either in the form of land or a combination of land and own labour, with pure labour contributions being non-existent in the present context, while the average size of pond as contribution by the beneficiaries to the enterprises is seen to be 58 decimals or around half an acre (Table 8b). Table 9 also gives some indication of the dividend earned from the project by the beneficiaries, while Tables 10 and 11 show that in 38 percent of cases; beneficiaries were able to either wholly or in part build up their assets from income from the project. Most important of these were in terms of building a new house or improvements in existing houses, and also investing in crop production. Further benefits were in terms of increased spending on children's education and personal and household effects. Many enterprises were however still repaying the loan and interest, and had not been able to use the additional income generated from the enterprises for further investments or on expenditure of the family.

Interestingly, 96 percent of the respondents mentioned eating more fish as a result of involvement with the enterprise, and 90 percent noted an improvement in the nutritional status of the household as a result.

Table 15 corroborates the perception of group members on the benefits from the project, mainly in terms of increased income and learning the new technology for fish farming. In Table 16, we see that the main problems perceived by beneficiaries are in terms of risk. It is also interesting that 96 percent of the sampled beneficiaries in Mirzapore expressed that they would continue with the new method of fish farming even without the help of PRISM (Table 17).

The findings from Shibaloy Thana are presented separately, in order to pick up any regional differences in terms of the impact of the project, and in the process of implementation.

In total 35 beneficiaries were sampled from Shibaloy, 25 of which were group members and 9 members of Joint Stock Companies. From Table 20 we see that the beneficiaries in Shibaloy are younger, the mean age being 44 years. It was also found that there was greater women's participation in Shibaloy and accordingly, 30 percent of the sampled beneficiaries were women (Table 21). Most of the sampled beneficiaries in this Thana are also found to be with the project for 4-5 years (Table 22). While most beneficiaries are fish pond operators, some duckweed and combined duckweed and fish farm operators are also represented in the sample (Table 23). Like Mirzapore, most of the beneficiaries are farmers or are found to combine farming with other occupations (Table 24), while the average size of landholding is found to be little over 3 acres. The beneficiaries in this Thana are thus found to be on average from a slightly higher socio-economic group, than what was targeted for the project.

Like Mirzapore, most beneficiaries in Shibaloy also joined the project in expectation of higher income or to improve the utilization of owned ponds.

Table 26 presents the average dividend earned across the sample and this is found to be higher than in Mirzapore. The average pond size of around half an acre in terms of contribution to the groups/companies is however found to be approximately the same in the two areas (Table 27). The findings on the impact of the project on the asset position and household expenditure of beneficiaries are presented in Tables 28-30. There are similarities in the pattern of expenditure in the two locations, in that the additional income from the project was used to build a new house or invested in land purchase and cultivation.

The findings also show that the majority of beneficiaries eat more fish as a result of involvement with the project (Table 31). The main benefits are again in terms of increased income and learning a new technology (Table 32). In Table 34, we see that the beneficiaries felt that they would continue with the new method of fish farming, even without the help of PRISM.

The key findings on socio-economic impact on beneficiaries can thus be summarized below:

- Involvement with the project has generated higher incomes for beneficiaries in the two project areas.
- The additional income has in most cases been used to improve the housing condition of beneficiaries and in purchase of cultivable land or for crop cultivation. The increased income was also used to purchase household effects and on education of children.
- Involvement in pisciculture also led to increased consumption of fish and possibly better nutritional status.
- The indirect impact on the two project areas is also in terms of lower fish prices and greater business for fish traders.
- It is also found from the responses of beneficiaries that the new technology for fish poly culture can be sustained in the future by the pond operators, and in addition, there has been wider dissemination of this technology in the project areas.
- The pond operators are however found to be from marginal or better off income groups, especially in Shibaloy. The constraints on targeting the poorer groups and landless were discussed in the previous section.

#### ***IV.3 Discussion of Findings from the Field Research: Enterprise Performance***

14 enterprises were randomly selected, 7 from each Thana, to understand the performance of enterprises, and compare our findings with the project data. These findings are presented separately for each Thana.

In Mirzapore (Tables 31-37) average size of pond is seen to be 156 decimals or 1.5 acres. The average cost for earthwork is found to be Taka 142,093. The average total operating cost is found to be Taka 49,686, while the average total revenue is found to be Taka 71,782. The enterprises therefore on average earned a total operating surplus of Taka 22,095. This however does not include payment of interest charges on fixed and working capital.

The percentage of credit repayment is found to be 97% on working capital and 33% on fixed capital for the sampled enterprises in this Thana.

For Shibaloy (Table 38-46), the average pond area is found to be similar at around 1.5 acres.

The average cost for earthwork in the sampled enterprises is found to be Taka 159,549, which is slightly higher than in Mirzapore. The average variable cost for the enterprises was somewhat lower in this Thana, at Taka 38,526. The average revenue was Taka 65,668. The sampled enterprises in this Thana thus on average earned an operating surplus of Taka 33,781, without including interest charges.

The analysis thus confirms the profitability of fish farming. The credit repayment of the sampled enterprises is found to be lower in this Thana at 35% for fixed capital and 89% for working capital for the sampled enterprises. It may be mentioned that Shibaloy Thana was affected severely by floods only one year after the project went into operation, in 1995, and again in 1998. It should also be mentioned that the sample included both companies and informal groups. There payment rate for groups is higher

## **V. Project Relevance and Effectiveness**

The objectives set for the project in terms of introduction of poly culture of carp was met. But as mentioned before, the objectives in terms of sole use of duckweed as fish feed was not realistic. Two main issues are to be considered here, (a) the requirements in terms of a balanced diet for the fish, and (b) the problems of round the year cultivation of duckweed, which is possible through irrigation in demonstration farms/pilot projects, but not for beneficiaries. The installation of latrines on duckweed ponds is also not viable, given the current focus in Bangladesh on use of sanitary latrines in the homestead, popularised by Grameen Bank and other NGOs.

Use of duckweed as fish feed was however successfully disseminated and popularised by the project, during the season when it is available.

The project is also successful in terms of enterprise development, though the initial experiment with joint stock companies gave a false start to the project. The project can also be deemed successful in relation to generating investments in ponds, higher incomes for farmers, and additional investments in crop cultivation, home improvements and meeting household expenditures. The increase in fish output and fall in fish prices in the project areas is similarly an important benefit from the project.

The project is in line with the national development objectives of achieving higher production and investments in rural areas in both crop and non-crop agriculture with linkage effects in terms of generating employment and increasing the utilization of family labour. It may be mentioned in this context that the presence of disguised employment in the farm sector has been much discussed in the development literature. Popularisation of fish farming by the project is also in line with the objectives of the fisheries sector, where the reduced availability of fish due to environmental degradation from several sources is an issue of concern.

The chief drawback of the project is its limited potential in including the poorest sections of the rural community.

Any replication of the project in other areas and continued thrust in the project areas, should keep this objective in mind of including the poor and poorest, through a diversified income strategy. The poor cannot afford the long gestation periods involved in fish farming, and additional means of income generation have to be devised for them during this gestation period. One possible option is to involve women members of landless families in poultry, cottage activities, etc.

A critical issue raised by the project is the limited potential of involving the poorest and landless groups in the farm sector, given the fact that Bangladesh has never followed a land redistribution strategy, or any land reform policy. The viability of land reform has also been questioned by some given the low land-man ratio in the country. The most viable option for improving the incomes of the landless thus lies with non-farm enterprises and increasing their accessibility to public services in line with the objectives of the Community Employment Projects of UNDP.

## **VI. Critical Issues**

- Sustainability

The project is both sustainable and replicable given the changes in project design towards family based enterprises, or homogenous groups, within which there is less danger of potential conflict and co-option of benefits, and which are easier to manage. The beneficiaries were found to be well instructed in the new technology and there was wider dissemination of the technology in the project areas including use of duckweed as fish feed when available.

- Monitoring and Evaluation

The monitoring and evaluation system in place was found to be adequate focussing on project performance indicators such as number of groups formed, credit disbursement, recovery, etc. as well as corporate performance indicators. The latter relates to income, production costs and productivity of the enterprises.

## **VII. Findings, Recommendations and Policy Lessons Learnt**

The chief findings of the impact assessment have been discussed in the text. These and the main recommendations are highlighted below:

- The limited success of the project has been in terms of promoting duckweed as the sole feed for fish farming. This objective is however found to be unrealistic given the requirements of a balanced diet for fish, difficulties in round the year cultivation of duckweed, difficulties in installing latrines, costs of irrigating the duckweed ponds during the dry season, etc. The use of duckweed as an alternative feed has however been popularised in the project areas.
- A further limitation of the project has been its limited success in reaching the poorest members of the rural community. The main constraint is found to be the skewed distribution of land and pond ownership. It may be mentioned that very few credit and training programmes in Bangladesh have been able to reach the poorest, though they have been able to reach the slightly better off amongst the poor.
- A further limitation of the project has been its experimentation with the idea of joint stock companies which were found to involve high and avoidable fixed costs of registration, salaries of officials, and tax liabilities.
- The chief success of the project has been in terms of achieving the objectives of popularising carp poly culture both amongst beneficiaries and non-beneficiaries in the project areas. It has also increased the output of fish and lowered fish prices.
- The impact of the project on beneficiaries has been by and large positive, leading to higher incomes, greater consumption of fish and generating additional investments in crop agriculture.
- An additional limitation of the project has been the low recovery rates on fixed capital and the short repayment period, though the recovery rates on working capital are better. In some cases this has led to re-scheduling of the loans. At the present time, the project is facing problems with disbursement of working capital, due to these low recovery rates. Some problems were also mentioned in the field in terms of paying the salaries of the project staff and there has been some rationalization of staff members.
- While the project has made an effort to ensure participation of women as group members and women have learnt the new technology, their involvement in overall management of the enterprises is limited in nature. Women are mainly involved in feeding the fish and have provided labour for earthwork, etc.
- A substantial benefit has been in terms of generating investments in the farm sector by excavating ponds, making derelict ponds usable, and building dykes in the flood-prone area (Shibaloy). A new asset has thus been created for beneficiaries which can sustain higher income in the future for farm families. The problems in terms of reaching the poorest have been discussed previously.
- The chief recommendation which follows is the continued activity in the project areas in terms of coverage, extension advice, and diversification of programmes to reach the poorest, keeping in mind the long gestation periods involved in fish farming. The poor may also be assisted to gain better access to public services such as education, health, family planning, to improve their capabilities. Linkage to other government and non-government programmes such as Food for Work, Vulnerable Group Development, can also be used to subsidise the fixed costs of pond preparation and excavation.
- The project may also be replicated in other areas with due consideration to the external risks involved such as flooding, soil condition, irrigation. Site selection is therefore very important.
- Replication of the project in other areas should also target better the landless and marginal farmers, through leasing arrangements, gaining access to khas lands, promotion of a diversified set of activities to generate round the year income for the poorest members and the landless.
- Replication of the programme may continue with family based enterprises, given the management problem of collectives. The target should however be marginal to middle farmers. A careful assessment should also be made on the accessibility to loans from other institutional sources by farmers.
- Group formation should involve better motivation and imparting of some literacy and numeracy skills, particularly for collective or joint enterprises, so that members are better able to manage accounts and

understand the income and expenditure of the enterprises. Group formation should be seen as a process of social mobilization to promote unity amongst members. The whole process of group formation should be over a longer period to fully prepare the groups, before they undertake production activities.

- The project should better monitor the activities of groups not only from the point of view of ensuring the income of the concerned NGO, but also to ensure that there is no co-option of benefits by better educated or more powerful members. In this case, homogenous groups have better chance of success.
- Women's participation should be a continued focus of the project, but through inclusion of female-headed households and involving women in the management of enterprises.
- It is also recommended that given the faulty project design in terms of formation of joint stock companies, the loan liabilities of these members could be written off.
- The project should be seen as an important learning experience in devising an appropriate development strategy in the farm sector, incorporating a production-based investment strategy involving credit and transfer of technology. The actual field conditions and the viable responses and limitations, is similarly of relevance and usefulness.

**PRISM BENEFICIARY IMPACT ASSESSMENT**

**Thana: Mirzapore**

**Sample size: 50**

Table 1: Types of enterprise

	Frequency	Percent	Valid Percent
Joint Stock Company.	37	74.0	74.0
Group	13	26.0	26.0
Total	50	100.0	100.0

Table 2:

	N	Minimum	Maximum	Mean	Std. Deviation
Age of respondents	50	18.00	90.00	53.1000	15.1162

Table 3: Sex

		Frequency	Percent	Valid Percent
Valid	Male	41	82.0	82.0
	Female	9	18.0	18.0
	Total	50	100.0	100.0

Table 4a: No of years with project

	Years	Frequency	Percent	Valid Percent
Valid	1	1	2.0	2.1
	2	1	2.0	2.1
	3	2	4.0	4.2
	4	9	18.0	18.8
	5	17	34.0	35.4
	6	15	30.0	31.3
	7	3	6.0	6.3
	Total	48	96.0	100.0
Missing	System	2	4.0	
Total		50	100.0	

Table 5: Types of activities

	Frequency	Percent	Valid Percent
A: Fish Pond	44	88.0	88.0
B: Duckweed pond	0	0	0
C: Both	6	12.0	12.0
Total	50	100.0	100.0

Table 6a: Occupation

	Frequency	Percent	Valid Percent
A: Farmer	16	32.0	32.0
B: Labourer	0	0.0	0.0
C: Housewife	8	0.16	0.16
D: Business	6	0.12	0.12
E: Teacher	6	0.12	0.12
F: Government officials	3	0.06	0.06
H: Service holders	3	0.06	0.06
I: Student	1	0.02	0.02
AC	10	20.0	20.0
Total	50	100.0	100.0

Table 6b: Land owned (homestead+cultivable)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Land owned	33	15	800	196.42	155.04

Table 7: The reason for joining the project

	Frequency	Percent	Valid Percent
A: To improve income	30	60.0	60.0
B: Use of under/unutilized ponds	1	2.0	2.0
C: Others	0	0.0	0.0
AB	13	26.0	26.0
AC	6	12.0	12.0
Total	50	100.0	100.0

Table 8a) Personal contribution the group/company

		Frequency	Percent	Valid Percent
Valid	A: Land	34	68.0	68.0
	B: Labour	0	0.0	0.0
	C: Other	2	4.0	4.0
	AB	8	16.0	16.0
	ABC	1	2.0	2.0
	AC	5	10.0	10.0
	Total	50	100.0	100.0

Table 8b) Personal contribution to the group /CO

	N	Minimum	Maximum	Mean	Std. Deviation
Land (decimal)	47	5	210	57.57	42.82

Table 9: Average mean and standard deviation of dividend earned from the project since joining (year-wise) in Taka value:

	N	Mean	Std. Deviation
Year 1	9	466.67	804.67
Year 2	29	1565.52	3612.41
Year 3	40	2837.50	8787.83
Year 4	47	4691.49	10502.38
Year 5	49	316.33	2142.56
Year 6	49	2308.16	6580.71

Note: Year 1 is the year the beneficiary joined the project

Table 10: Change in assets since joining the project

		Frequency	Percent	Valid Percent
Valid		3	6.0	6.0
	A: Building a new house	5	10.0	10.0
	B: Improvement in existing house	4	8.0	8.0
	C: Buying cattle, no.	1	2.0	2.0
	D: Buying poultry	0	0.0	0.0
	E: Others	12	24.0	24.0
	F: Cultivation	6	12.0	12.0
	G: None	16	32.0	32.0
	AB	1	2.0	2.0
	BE	2	4.0	4.0
	Total	50	100.0	100.0

Table 11: Whether these assets were bought with income from the enterprise

	Frequency	Percent	Valid Percent
	8	16.0	16.0
Yes	9	18.0	18.0
No	23	46.0	46.0
Partly	10	20.0	20.0
Total	50	100.0	100.0

Table 12: Are you better off as a result of the project, in terms of

	Frequency	Percent	Valid Percent
	8	16.0	16.0
A: Greater expenditure on education of children	5	10.0	10.0
B: More expenditure on health of family	0	0	0.0
C: Increased spending on clothing	5	10.0	10.0
D: Increased spending on other personal and household items	5	10.0	10.0
None	16	32.0	32.0
AB	1	2.0	2.0
ABC	2	4.0	4.0
ABCD	1	2.0	2.0
AC	3	6.0	6.0
ACD	1	2.0	2.0
BC	1	2.0	2.0
CD	1	2.0	2.0
CE	1	2.0	2.0
Total	50	100.0	100.0

Table 13: Do you/your family eats more fish as a result of involvement with the enterprise?

	Frequency	Percent	Valid Percent
Yes	48	96.0	96.0
No	2	4.0	4.0
Total	50	100.0	100.0

Table 14: If yes, has this improved the nutritional status of your household?

	Frequency	Percent	Valid Percent
	4	8.0	8.0
Yes	45	90.0	90.0
No	1	2.0	2.0
Total	50	100.0	100.0

Table 15: Comment on the benefits from the project

	Frequency	Percent	Valid Percent
	1	2.0	2.0
A: Increased income	7	14.0	14.0
B: Increased employment	0	0	0.0
C: Learning a new technology	12	24.0	24.0
D: Others	0	0	0.0
ABC	3	6.0	6.0
ABCD	1	2.0	2.0
AC	21	42.0	42.0
ACD	1	2.0	2.0
CD	4	8.0	8.0
Total	50	100.0	100.0

Table 16: Comment on the problems with the project, if any

		Frequency	Percent	Valid Percent
Valid		8	16.0	16.0
	A: No improvement in income	1	2.0	2.0
	B: No change in employment	0	0	0
	C: Too risky	17	34.0	34.0
	D: Loan repayment is a problem	0	0	0
	E: Conflict between members	4	8.0	8.0
	F: Other,	18	36.0	36.0
	AC	1	2.0	2.0
	AF	1	2.0	2.0
	Total	50	100.0	100.0

Table 17: Will you continue the new technology without the support of PRISM?

		Frequency	Percent	Valid Percent
Valid	Yes	48	96.0	96.0
	No	2	4.0	4.0
	Total	50	100.0	100.0

Table 18: If no, why?

	Frequency	Percent	Valid Percent
A: Older technology is better	0	0	0
B: New technology is more costly	0	0	0
C: New technology is complex /difficult to apply	0	0	0
Other, explain	2	4.0	4.0
Total	50	100.0	100.0

**PRISM BENEFIT IMPACT ASSESSMENT**  
**TABULATION OF THE RESPONSES**

THANA: SHIBALOY

SAMPLE SIZE: 35

Table 19: Type of enterprise

		Frequency	Percent	Valid Percent
Valid		1	2.9	2.9
	Joint Stock Co.	9	25.7	25.7
	Group	25	71.4	71.4
	Total	35	100.0	100.0

Table 20: Age of respondent

	N	Minimum	Maximum	Mean	Std. Deviation
Age of respondents	35	17.00	76.00	43.5714	15.3648

Table 21: Sex

		Frequency	Percent	Valid Percent
Valid	Male	25	71.4	71.4
	Female	10	28.57	28.57
	Total	35	100.0	100.0

Table 22a: No of years with project

	Year	Frequency	Percent	Valid Percent
Valid	1	2	5.7	5.7
	2	0	0.0	0.0
	3	7	20.0	20.0
	4	14	40.0	40.0
	5	6	17.1	17.1
	6	3	8.6	8.6
	7	2	5.7	5.7
	8	1	2.9	2.9
	Total	35	100.0	100.0

Table 22b: Average number of years with the project

	N	Minimum	Maximum	Mean	Std. Deviation
No of years with project	35	1.00	8.00	4.2571	1.4821
Valid N (listwise)	35				

Table 23: Type of Activity

		Frequency	Percent	Valid Percent
Valid	A	23	65.7	65.7
	AB	5	14.3	14.3
	C	7	20.0	20.0
	Total	35	100.0	100.0

Table 24a: Occupation

		Frequency	Percent	Valid Percent
Valid	A: Farmer	8	22.9	22.9
	B: Labour	0	0	0
	C: Housewife	7	20.0	20.0
	D: Student	2	5.7	5.7
	E: Government service	1	2.85	2.85
	F: Madrasa teacher	1	2.85	2.85
	G: Student	1	2.85	2.85
	H: Tailor	1	2.85	2.85
	I: Teacher	1	2.85	2.85
	J: Quake	1	2.85	2.85
	Both farmer and others	12	34.28	34.28
	Both labour and others	7	20.0	20.0
	Total	35	100.0	100.0

Table 24b: Total land owned by farmers:

	N	Minimum	Maximum	Mean	Std. Deviation
Farmer, total land owned (decimals)	32	0	1000	343.12	256.56

Table 25: The reason for joining the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A: To improve income	16	45.7	45.7	45.7
	B: Use of under /unused pond	0	0	0	0
	C: Other	0	0	0	0
	AB	16	45.7	45.7	91.4
	ABC	1	2.9	2.9	94.3
	AC	2	5.7	5.7	100.0
	Total	35	100.0	100.0	

Table 26: Dividend earned from the project since joining (year-wise) in Taka value

	N	Minimum	Maximum	Mean	Std. Deviation
Year1	7	0	0	.00	.00
Year2	9	0	0	.00	.00
Year3	13	0	75000	6884.62	20776.74
Year4	30	0	85000	15288.83	20549.13
Year5	33	0	60000	3818.18	12692.16
Year6	33	0	80000	14603.03	22471.99
Valid N (listwise)	0				

Note: Year 1 is the year the beneficiary joined the project

Table 27a: Personal contribution to the group /Company

	N	Minimum	Maximum	Mean	Std. Deviation
Land (decimals)	34	4	160	59.41	41.74

Table 27b: Personal contribution to the group/Company

		Frequency	Percent	Valid Percent
Valid	A: Land	31	88.6	88.6
	B: labour	1	2.9	2.9
	C: Others	0	0	0
	AB	1	2.9	2.9
	ABC	1	2.9	2.9
	AC	1	2.9	2.9
	Total	35	100.0	100.0

Table 28: Change in assets since joining the project

		Frequency	Percent	Valid Percent
Valid	A: Building a new house	4	11.4	11.4
	B: Improvement in the existing house	0	0	0.0
	C: Buying cattle no	0	0	0.0
	D: Buying poultry no	0	0	0.0
	E: Others	0	0	0.0
	F: Land/cultivation	8	22.85	22.85
	ABE	1	2.9	2.9
	AC	1	2.9	2.9
	ACE	1	2.9	2.9
	AE	5	14.3	14.3
	Other	6	17.14	17.14
	None	9	25.7	25.7
	Total	35	100.0	100.0

Table 29: Whether these assets were bought with income from the enterprise

		Frequency	Percent	Valid Percent
Valid		1	2.9	2.9
	Yes	20	57.1	57.1
	No	12	34.3	34.3
	Partly	2	5.7	5.7
	Total	35	100.0	100.0

Table 30: Whether the respondents are better off as a result of the project, in terms of

		Frequency	Percent	Valid Percent
Valid		3	8.6	8.6
	A: Greater expenditure on education of children	3	8.6	8.6
	B: More expenditure on health of family/self	2	5.7	5.7
	C: Increased spending on clothing	3	8.6	8.6
	D: Increased spending on other personal and household items such as	1	2.9	2.9
	E: None	11	31.4	31.4
	AB	1	2.9	2.9
	ABC	1	2.9	2.9
	ABCD	4	11.4	11.4
	AC	4	11.4	11.4
	BC	2	5.7	5.7
	Total	35	100.0	100.0

Table 31; Whether the respondent or his/her family eat more fish as a result of involvement with the enterprise

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	2.9	2.9	2.9
	Yes	31	88.6	88.6	91.4
	No	3	8.6	8.6	100.0
	Total	35	100.0	100.0	

Table 32: Comment on the benefits from the project:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A: Increased income	1	2.9	2.9	2.9
	B: Increased employment				
	C: Learning a new technology	6	17.1	17.1	71.4
	D: Other	2	5.7	5.7	100.0
	ABC	2	5.7	5.7	8.6
	AC	13	37.1	37.1	45.7
	ACD	3	8.6	8.6	54.3
	CD	8	22.9	22.9	94.3
	Total	35	100.0	100.0	

Table 33: Comment on the problems with the project, if any:

		Frequency	Percent	Valid Percent
Valid		4	11.4	11.4
	A: No improvement in the income			
	B: No change in employment			
	C: Too risky	1	2.9	2.9
	D: Loan repayment is a problem			
	E: Conflict between members	1	2.9	2.9
	F: Other,	21	60.0	60.0
	AEF	1	2.9	2.9
	CE	1	2.9	2.9
	CF	5	14.3	14.3
	Total	35	100.0	100.0

Table 34: Will you continue the new technology without the support of PRISM?

		Frequency	Percent	Valid Percent
Valid	Yes	34	97.1	97.1
	No	1	2.9	2.9
	Total	35	100.0	100.0

**Enterprise data analysis  
Output Mirzapore**

Table 35: Average area of pond size

	N	Minimum	Maximum	Mean	Std. Deviation
Area of pond(decimal)	7	24	280	155.71	82.97
Valid N (listwise)	7				

Table 36: Cost for earthwork

	N	Minimum	Maximum	Mean	Std. Deviation
Cost for Earthwork/decimal/year(TK)	5	722	396000	142093.40	159705.94
Valid N (listwise)	5				

Table 37: Breakdown of variable cost for enterprise on average:

	N	Minimum	Maximum	Mean
Duckweed cost	7	1799.00	10808.00	4309.57
Supplementary cost	7	2688.00	72240.00	18849.43
Cost fry/fingerling stocked /year	7	1464.00	44100.00	9390.57
Cost for lime	7	216.00	1350.00	868.14
Cost for fertilizer	7	276.00	23520.00	6248.70
Labour cost	7	448.00	27900.00	10020.53
Total operating cost on average				49686.94

Table 38: Total revenue (in taka) for enterprise on average:

	N	Minimum	Maximum	Mean
Total Revenue on average	7	15120.00	224910.00	71781.5857

Surplus created by an enterprise on average

= Total revenue on average -Total operating cost on average

=Tk (71781.59-49686.94)

= Tk 22094.65

Table 39: Input cost for per decimal pond/year

	N	Minimum	Maximum	Average Cost
Supplementary feed/decimal(Kg)	7	12	336	171.71
Cost fry/fingerling stocked/decimal/year(YK)	7	9	62	24.57
Cost for fertilizer/decimal/year?	7	3	9	6.21
Cost for lime/decimal/year(TK)	7	9	99	44.23
Labour cost/decimal/year(TK)	7	2	263	97.40
Total Input Cost per decimal				343.72
Total Input cost per hectre				84898.84

Table 40: Production of fish /decimal/year

	N	Minimum	Maximum	Average Production of fish /decimal/ year (kg)	Average Production of fish /hectare l/ year (kg)
Production of fish/decimal/year(Kg)	7	2	18	10.38	2563.86

Table 41: Average fixed and working cost for the enterprises

	N	Minimum	Maximum	Mean
Fixed cost(Tk)	5	80000	396000	183949.00
Working capital/yr (Tk)	5	11000	35000	20400.00

Table 42 : Percentage of credit repaid by enterprises

	N	Minimum	Maximum	Mean	Std. Deviation
% of repayment for fixed capital	6	0	75	33.17	33.83
% of repayment for fix working capital	7	80	100	97.14	7.56
Valid N (listwise)	6				

**Enterprise data analysis  
Output Shibalaya**

Table 43 : Average area of pond size

	N	Minimum	Maximum	Mean	Std. Deviation
Area of pond(decimal)	7	24	280	155.71	82.97
Valid N (listwise)	7				

Table 44: Average cost for earthwork

	N	Minimum	Maximum	Mean	Std. Deviation
Cost for Erathwork/decimal/year (TK)	5	38000	396000	159549.00	144430.51
Valid N (listwise)	5				

Table 45: Use of supplementary feed

	N	Minimum	Maximum	Mean	Std. Deviation
Supplementary feed/decimal (Kg)	7	3	70	25.29	23.53
Valid N (listwise)	7				

Table 46: Breakdown of variable cost for enterprise on average

	N	Minimum	Maximum	Average Cost
Duckweed cost	7	60.00	12560.00	4162.57
Supplementary cost	7	468.00	35640.00	11069.00
Cost fry/fingerling stocked /year	7	1248.00	11200.00	4974.42
Cost for lime	7	78.00	1884.00	687.42
Cost for fertilizer	7	130.00	14940.00	4792.71
Labour cost	7	.00	65940.00	12840.00
Average Variable Cost				38526.12

Table 47: Total revenue ( in Tk) for an enterprise on average

	N	Minimum	Maximum	Mean	Std. Deviation
Total Revenue on average	7	14196.00	211008.00	72307.1429	65668.9288

Surplus created by an enterprise on average = Total revenue on average –Total Variable cost on average  
= Tk (72307.14-38526.12)  
= Tk 33781.02

Table 48: Input cost per decimal pond/year

	N	Minimum	Maximum	Mean	Std. Deviation
Supplementary feed/decimal(Kg)	7	18	420	151.71	141.17
Cost fry/fingerling stocked/decimal/year(YK)	7	31	140	57.57	38.52
Cost for fertilizer/decimal/year?	7	3	12	6.43	2.70
Cost for lime/decimal/year(TK)	7	5	83	40.21	28.32
Labour cost/decimal/year(TK)	3	0	210	131.00	114.25
Valid N (listwise)	3				

Table 49: Production of fish per decimal pond per year

	N	Minimum	Maximum	Production of fish per decimal per year on average	Production of fish per hectre per year on average
Production of fish/decimal/year(Kg)	7	10	30	19.00	4693

Table 50: Credit received per enterprise

	N	Minimum	Maximum	Mean	Std. Deviation
Fixed cost(Tk)	7	0	320000	85571.43	127470.07
Working capital/yr (Tk)	7	0	64000	15071.43	21917.32
Valid N (listwise)	7				

Table 51 : Percentage of credit repaid by enterprise

	N	Minimum	Maximum	Mean	Std. Deviation
% of repayment for fixed capital	6	20	69	34.67	18.90
% of repayment for working capital	7	20	100	88.57	30.24
Valid N (listwise)	6				

Table 52 : Net income of enterprises

	N	Minimum	Maximum	Mean	Std. Deviation
Net income 94	5	1200	55000	29840.00	23554.79
Net income 95	3	0	62000	20666.67	35795.72
Net income 96	2	2700	35000	18850.00	22839.55
Net income 97	0				
Net income 98	0				
Net income 99	0				
Net income 2000	0				
Valid N (listwise)	0				