Integration of aquaculture in Watershed Management Programmes to benefit the poor people of Tripura, India

A report on the progression and impact of the project, 2010

Supported by: Aquaculture without Frontiers (AwF)
Implemented by: St. Xavier's Bishramganj (SXB), Tripura

Background:

St. Xavier's Vocational Training Centre, a non-profit, non-political, voluntary organization of the development wing of the Salesians of Don Bosco was established in Bishramganj, West Tripura with the organizational objective of social improvement of the poor and marginalized people through strategic intervention. Since establishment, the centre has been playing a key role in capacity building in the state of Tripura with major activities including hands-on training and workshops in the field of agriculture, horticulture, animal husbandry, aquaculture, driving, welding, handicrafts, tailoring, computers, etc. targeted mainly to unemployed and school drop-out youth in a residential facility.

St. Xavier's Bishramganj (SXB) and aquaculture development

With more than 95 % of Tripura's 3.5 million population being fish-eaters, fish plays a major role in the diet of people for their food and nutritional security in general and as a source of livelihood to a large number of rural people, in particular. Realizing the employment potential of aquaculture, a visionary and Director of SXB felt the need of capacity building in this particular sector and to it's advantage AwF has come forward with technical and financial support in developing a project which addresses the local needs and trains the young boys and girls coming from rural villages as trainees who can learn while staying in a farm set-up of the centre. Extensive to semi-intensive composite fish culture is the most common and popular from of aquaculture existing in Tripura along with small number of farmers engaged in integrated fish farming involving paddy, pig, poultry and livestock etc. St. Xavier's Bishramganj in collaboration with the students and faculties from College of Fisheries, Lembucherra under the Central Agricultural University, and Indian Council of Agricultural Research, Lembucherra, has been conducting non-formal training programs for the development of scientific fish culture in the area involving local farmers and to develop technical skills among the young trainees coming from all over Tripura mostly with rural and agricultural background. Most of the farmers in the locality having their own small ponds are enthusiastic and eager to learn, however without scientific know-how and with minimal or no maintenance or inputs to these ponds. Thus, efforts were being made since 2006 to introduce small-scale scientific aquaculture practices to their tanks by providing them technical support.

Impact of the initiatives

During 2006-2009, efforts were made from the centre to enhance fish production in the ponds owned by the farmers as they undergo trainings and transfer better practices they learn here to their tanks for aquaculture. Initially 30 farmers, majority belonging to the tribal community were given technical support to prepare their farming system for better production in a eco-friendly manner, later on the support has been extended to about another 50 farmers, and as of now 75 farmers derive direct benefits from the programs implemented by SXB with the support of AwF. They have been given a limited number of fish seeds, and the technical know-how about pond management and rearing practices with the view that once they get to earn benefits, the farmers should sustain their own.

Fish farmers who derived technical support are in direct contact with the centre and efforts have been made to monitor the status of the farmers periodically. It has been observed that although all the farmers are not making equal benefits from the program, most of them are developing slowly. The economic weakness of the farmers is one major problem that limits them from providing any additional input to their ponds. Natural calamities like flooding and droughts have affected the production of some of the farmers, while some has made significant progress in their fish production and thereby improved their economic condition.

Case Study I: Mr. Sudhir Debbarma

Mr. Sudhir Debbarma (39) of Padmininagar village panchayat of Bishramganj is solely dependant on his farm output for livelihood. However, the production of paddy and vegetables from the limited area of land is not sufficient to sustain his family of 5 members including 3 children. He has one 0.18 Ha pond wherein he grows Indian and Chinese major carps along with some minor carps. This pond, as expressed by Mr. Debbarma, helps him a lot during his financial crisis as he can harvest and sell some fishes as and when necessary. During 2009 he has harvested about 50 kg of fish and sold to market @ 70 INR/kg. In addition, he has harvested fishes regularly for consumption in the family. Although more fish could have been produced from the pond, given that he provided almost no feed because of no money to buy feed, Mr. Debbarma is happy compared to what he has been getting earlier.

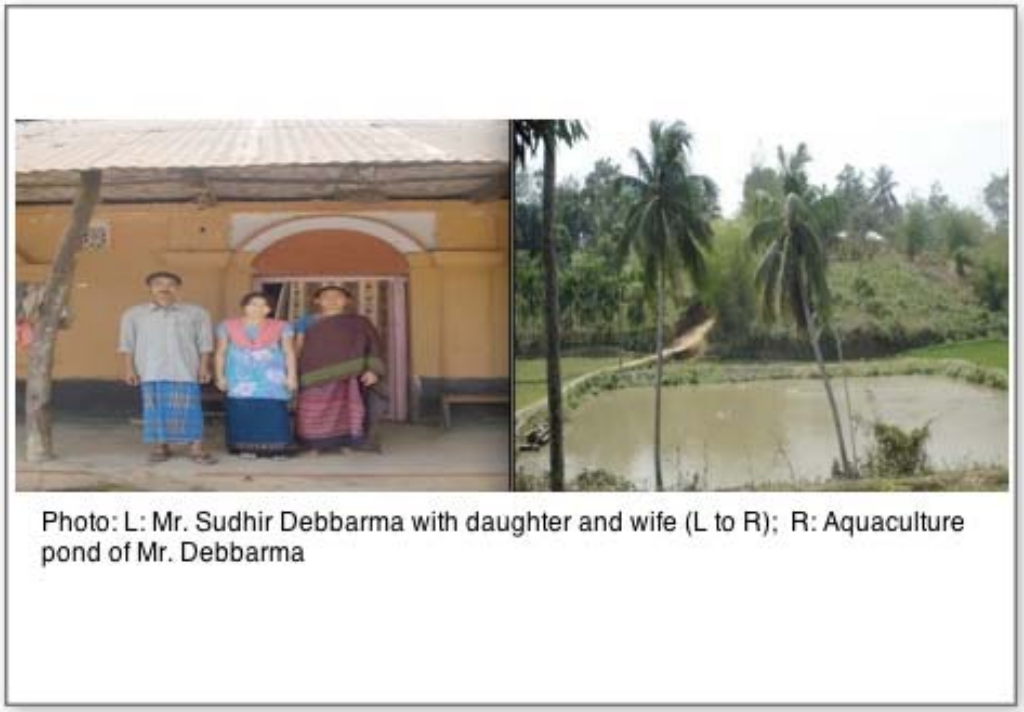

Photo: L: Mr. Sudhir Debbarma with daughter and wife (L to R); R: Aquaculture pond of Mr. Debbarma

Mr. Debbarma is a hard working farmer who has been supported by AwF project through SXB farm in terms of seed and technical support. From AwF initiatives he has derived good knowledge about pond management practices and with his own effort he takes good care of his pond so that it is suitable for best growth of fish. He wishes to increase his production and expects further support from the centre with good quality larger sized seed. He wishes to diversify the farming with the introduction of tilapia as he thinks they can give better returns.

Case Study II: Mr. Manoranjan Debbarma

Mr. Manoranjan Debbarma (42) of the same village panchayat (Padmininagar) also comes from a agricultural background with paddy cultivation. But selling of paddy alone is difficult to run a family of 6, so he has to work as wage labourer in the neighbourhood whenever it is off-season for paddy. His poor economic condition is reflected everywhere in the house. With only about 0.3 Ha of paddy land apart from the mud walled house and a small tank he has no other assets. His living condition has changed over the last 3 years through fish culture in addition to paddy farming since he has got in touch with AwF initiatives implemented through the SXB. With the inputs and technical help from the center he has made significant effort to improve his relatively

unproductive pond situated in a difficult elevation of land vulnerable to many externalities. However, during 2009 he was able to sell more than 80 kg of fish @ 80 INR/kg from his 0.16 Ha pond which is a big amount of money for him, besides getting fish for consumption from pond regularly. Like many other beneficiaries, Manoranjan Debbarma also expects further support from the center and desires to expand his aquaculture activities.

Photo: L: Mr. Manoranjan Debbarma with family; R: Pond of Manoranjan Debbarma

Follow up and capacity building

Significant efforts have been made over the past 3 years to support about 75 fish farmers in 2 phases, identified as poor or marginal farmers deserving technical support to increase the fish production and help them earn livelihood. Efforts made during the first phase of the project targeted 25 farmers, during the second phase 50 farmers were targeted most of whom were belonging to the tribal community of Tripura.

Surveys conducted by the students of College of Fisheries indicate that they are happy with the level of production and other benefits they are getting from the AwF initiatives. The fish

production rate has increased significantly from a mere 500-600 kg/Ha to about 1200-1400 kg/Ha for numerous beneficiaries after their association with the centre. Most importantly, many of the farmers are inspired now and expressed their interest to start doing fish cultivation more scientifically. Some of the farmers as they have admitted, had no idea earlier about the feeding requirement of the fish and manuring, liming and fertilization requirement of the pond. But after they have interacted with the experts in the center, they are more aware and wise about fish farming. A common hindrance as expressed by most farmers that they still cannot afford any big capital investment, however, many farmers have expressed that with their limited capacity they would like to continue fish culture with lower inputs they can afford and good quality seed of larger size with higher survavality from the center could help them substantially.

A good follow up efforts has been made during this year particularly for the beneficiaries selected in the phase II. The farmers were regularly invited to the Bishramganj farm center and interactive training sessions were conducted to impart skill-based knowledge and help them to solve their farming problems. Besides, scientists, teachers, resident trainees, and a group of active students from College of Fisheries periodically made visits to many farms and had interactive sessions with the farmers at farm site.

Moreover, the resident students of the SXB along with local farmers have been given hands on training on specific pond management practices and entrepreneurship development through aquarium fish breeding and rearing. The trainees, both men and woman at the SXB have shown immense interest in ornamental fish breeding.

Photo: L: Father Joseph talking to the students on breeding of ornamental fish at SXB; R: Students from College of Fisheries in interactive training session on aquarium fish rearing with resident trainees and local farmers

Moreover, with the joint efforts made by all the people to support the initiative by constantly following up and keeping the farmers in contact with the centre, it has contributed to the increase in the level of fish production as already mentioned. The emphasis was given on providing technical support to the farmers in all stages so that they can sustain or continue their own. Through group discussions with the farmers, it has been observed that there has been substantial progress in fish farming practices compared to the earlier output from their ponds and the resident students have developed significant skills in different areas of aquaculture.

Efforts towards establishing seed production facility

One of the major problems identified in the aquaculture sector in the locality as well as in all over Tripura is non-availability of good quality fish seed during stocking seasons, particularly in remote areas. The project area is also situated quite remotely and transportation of seed becomes complicated and costly for the rural poor. To address this problem, efforts were made to produce

seed locally, and with the support of AwF a Chinese hatchery has been built at the farm site of SXB in July 2008, which was named after the South Place, Marlow, in respect of the contribution made by the people of that street for the AwF activities during past phases as well as for the establishment of the hatchery during 2008. Initially, to utilize the facilities built at the centre, hands on training has been offered to few students from College of Fisheries who stayed in the centre for 3 weeks during their vacation days of college who learnt practical lessons for carp breeding and shared their scientific knowledge with the vocational trainees of the centre and the local farming community. At the SXB now, there is a well designed Chinese eco-hatchery consisting of 1 breeding pool, 3 hatching pools and an overhead circular tank and a well for water supply in the hatchery. In addition there are 2 jar hatcheries for seed production and 3 rectangular cement tanks for seed nursing have been built with the additional money received from AwF.

Photo: Hatchery complex built with the support of AwF

Since last year significant efforts have been made to produce seed locally and also train the farmers on the seed production and nursery management of the seeds stocked. This is particularly important because the early stages are vulnerable to diseases and mortality and the water quality of all the ponds are not optimum for survival of the seeds in the locality.
This year few training sessions have been organized in the farm hatchery site on breeding, seed production and seed nursing practices of Indian and Chinese major carps, with about 30 resident students and about 15 local farmers. An expert with previous experience on fish breeding, who had been recruited locally recruited for maintenance of farm, has demonstrated how the Chinese hatchery works and how to nurse the infant stages of fish to the vocational trainees and the farmers.

Photos: Vocational Training Centre students undergoing training on hatchery operations

Breeding trials conducted this year at the farm hatchery site involving the students and farmers have generated good enthusiasm among them. The vocational trainees, particularly the women trainees have shown strong interest in learning and carrying out certain operations by their own. With recent supply of electricity, now the farm-hatchery has sufficient energy source to carry out hatchery operations. Given below a table depicting the results obtained from this year's breeding trial with carp species at the farm hatchery.

Species	No. of Bloodstock fish(female)	Total weight (female)	Total no. of eggs(Approx.) (Million)	No. of hatchlings(Approx.) (million)
Labeo rohita (Rohu)	12	14.5	1.37	1.07
C.mrigala (Mrigal)	9	8	0.73	0.53
H. molitrix (Silver carp)	2	5	0.26	0.18

Table: Seed production during 2010

More emphasis was given on producing good quality seed as per the project proposal from selected bloodstocks and nursing them with involvement of selected local farmers who have been given training on nursery management. Special care has been taken to monitor the eggs and hatchlings regularly to minimize mortality.

Photo: Monitoring the development of eggs

Seed nursing efforts

While most of the seed produced have been distributed to the farmers for rearing, some seeds have been sold directly to some interested customers for demonstrating potential for revenue generation. Rest of the seeds remained at the ponds in farm centre of SXB. Table below gives an overview.

Total no. of hatchlings produced(approx.)(million)	No. of spawns given for nursing purpose	No.of fingerlings given to fifty farmers for grow out	Estimated seed remaining at the farm (million)
1.82	5000	50000	0.58

Table: Total seed production and distribution among beneficiaries in 2010

Efforts have been made earlier this year to breed the common carp in captivity in 2 selected farm ponds with localized stocking of floating aquatic weeds as substrates for egg attachment. With this objective the ponds have been prepared for nursery with cleaning up of unwanted aquatic species and netting out the old fishes from the ponds and maintaining a desired water level.

Photo: Pond preparation for nursery rearing

However, sufficient number of mature common carps could not be obtained on time. But since the ponds have been prepared, it was decided to obtain the spawn from external sources and demonstrate the seed nursing potential to the farmers. Thus a limited number of common carp seed have been stocked in the farm ponds. Unfortunately a large number of seed has encountered serious mortality and those remaining are now growing with other major carp seeds.

With the above-mentioned initiatives, the farmers in the locality are more aware about the seed nursing practices, and the hatchery at the farm centre can potentially address the problem of seed non-availability in the locality in the coming years. Decentralized seed nursing demonstrated through this project is helping farmers to earn additional income. Moreover, the vocational young trainees at the SXB mostly coming from rural Tripura can potentially carry the technology and spread the knowledge in their own villages about the benefits of fish farming in general and developing entrepreneurship through fish seed farming in addition to other farming activities.

Ornamental fish seed production

As a follow up of the training programs conducted on aquarium fish breeding and culture last year, this year further training sessions have been conducted and particular efforts have been made to breed and sell some ornamental fishes with combined help of volunteers from College of Fisheries and trainees from the SXB and also involving interested farmers. All the infrastructures available for ornamental fish have been made operational. Now there are 2 functional rectangular cement tanks for gold fish, 2 tanks for *Colisa* sp., and 6 cemented pots for livebearers. Among the livebearers, recently a good number of Guppy, Molly, Sword tail and Platy have been successfully bred and to demonstrate the earning potential about 150 livebearers have been sold to market @ 1.5-2 INR/fish. The gold fish stock in the cemented tanks is fetching a market price of 15-20 INR/fish. Realizing the good market demand for gold fish, 2 rectangular cement tanks are particularly prepared for gold fish breeding in addition to a small earthen pond of about 500 sq.m. at SXB that is also a demonstration pond of the center. 60 brooders of gold fish have been released to the earthen pond recently for breeding purpose and the trainees, particularly the women who have given substantial efforts in this regard are much hopeful about positive outcome. Of all the efforts that have been made towards capacity building, breeding and culture of ornamental fish is particularly important with regard to women trainees at the center. They have not only expressed interest, but learnt quickly and developed the skills to breed fish practically. This has indicated enormous potential for rural woman for income generation.

Photo: L: Gold fish brooders are being conditioned, R: Rearing live bearers in cement pots

Perspective plan

Supported by AwF initiatives and inspired by the enthusiasm from the vocational trainees and local farmers, and successful breeding trials conducted this year, the perspective plan is to strengthen and expand the hatchery facility at the SXB. The short-term goal is to follow up with the capacity building program involving the trainees and farmers. Secondly, to make the seed nursing tanks fully operational year round, construction of which has been completed this year with AwF funding? This will ensure better rearing of early stages of fish.

Photo: New cement tanks built with the AwF support to undertake seed nursing

Large scale breeding operations for the major carp would also to be considered depending on the hatchery capacity and local demand, by partnering with other seed distributors. Since better survival of the seed is expected from the cemented nursery tanks, it is expected to contribute to

increased grown up seed that can be made available to farmers and excess seed sold to the market to generate revenue. Moreover, to increase seed production 2 new hatching pools also have been constructed which is expected to be operational along with 2 jar hatcheries in the upcoming breeding season. Lastly, more scientific facilities for the ornamental fish breeding would be built and expanded at the farm center for the trainees while continuing the technical support to the local farming community on fish farming.

With the experience gained and based on the response from the farming community, strategies are evolved to produce seed. This year farm has received electricity and efforts would be made to get support to drill bore wells to provide water supply to ponds in the dry season. As the rain starts by June-July, for early initiation of breeding, water had a major constraint in the past three years.